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Home Ranch - A Single Family Residential Development in Gilroy, CA

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UNDER MY SUPERVISION BY

Patrick Hagerty, Luke Lazzarini

ENTITLED

HOME RANCH - A SINGLE FAMILY RESIDENTIAL DEVELOPMENT IN GILROY, CA

BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

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Rong He

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HOME RANCH - A SINGLE FAMILY RESIDENTIAL DEVELOPMENT IN GILROY, CA

By

Patrick Hagerty, Luke Lazzarini

SENIOR DESIGN PROJECT REPORT

Submitted to
the Department of Civil, Environmental and Sustainable Engineering

of

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George Duran
Melissa Durkin

for their support throughout the project, and for providing technical knowledge, documentation, and data to aid in our team's design.

Dear Civil Engineering Department,

Thank you for the opportunity to submit the accompanying proposal. The intent of this report is to summarize our findings from this quarter for our Senior Design Project of developing a plot of land in South Gilroy. These findings include our project statement, deliverables, identification of constraints, alternative analysis for best use of the land, preliminary calculations of utilities and trip generation, and non-technical considerations of this project. We hope you find this report insightful.

-Luke Lazzarini and Patrick Hagerty

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Project Overview

The purpose of this project was to provide a housing development plan for an undeveloped plot in the South Gilroy area.

Project Statement

The City of Gilroy needs additional housing to support the growth of their community. This project seeks to determine the best use of the undeveloped McCutchin Creek subplot and design its site layout. This plot of land is constrained by the City development codes, the 2023 City of Gilroy housing element, and the site specific development code.

The deliverables presented to the client are a grading plan, site layout plan, stormwater and sewage plan, potable water, traffic assessment of development, and cost benefit analysis for the City.

Deliverables

The project deliverables were chosen to provide an adequate scope of work in alignment with the project statement and were determined by the project team and its faculty advisor to be the following:

- Site Layout Design (Luke and Patrick)
    a. Alternatives Assessment of best use of land for housing.
    b. Alternatives Assessment of best road layout.
    c. Alternatives Assessment of sizing each plot.
    d. Final plan view design of site
- Grading (Luke)

a. Design main roadways and determine plot elevations in AutoCAD for subdivision
b. Create grading balance sheet

- Utility Design (Patrick)
    a. Determine necessary sewage and stormwater demand
    b. Determine necessary clean water demand
    c. Determine necessary electrical demand
    d. Design sewage and stormwater system for capaCity
    e. Design clean water system
    f. Design electrical system
- Cost/Benefit Analysis (Patrick)
    a. Alternatives Assessment of scheduling development.
    b. Determine revenue of a fully developed site + long term C/B
    c. Design BIM model of standard developed plot
- Flash Traffic Assessment (Luke)
    a. Zoning requirements, existing roadways and potential for mitigation, trip gen/VMT calcs, municipal code requirements/SB 743 (CEQA), parking requirements (if applicable)
- Roadway Segment Details (Luke)
    a. Design roadway segment details for development.

A complete breakdown of the project deliverables can be found in Appendix E.

Analysis of Alternatives

The project team developed a series of constraints and criteria to conduct the analysis of alternatives on the type of development that could be implemented on the Glen Loma Home

Ranch Plot. These constraints and criteria were ranked to provide a grading system for each of the alternatives.

Criteria

The criteria for this project are "nice to haves" that would help the City of Gilroy meet its development goals. These criteria are outlined in the City's general plan. The criteria are ranked in order of importance as used comparing the alternative housing development styles for this project site.

- (1) Foster a sustainable community (multiplier 3.5x)
    - The City of Gilroy repeatedly emphasizes in their Housing Element the importance of further developing the area without compromising their future. They also stress the importance of residents being able to access stores, employment, and recreation within close proximity of homes. Additionally, the City expects to not have to redevelop the land in the long term future. These factors are why fostering a sustainable community is first on this project's list of criteria.
- (2) Support Housing options (multiplier 3.0x)
    - Gilroy's Housing Element emphasizes the importance of creating a diverse mix of housing options and neighborhoods to meet the needs of all residents. It also raises attention to the fact that plots should offer a range of housing options to reduce the feeling of neighborhoods separated by wealth. These factors lead to placing this criteria second.

- (3) Promote fiscal strength (multiplier 2.5x)
    - Gilroy's 2040 vision emphasizes the importance of the City's economy thriving and that the right balance of revenue and costs are achieved to deliver high-quality public services. Developing land efficiently to increase revenue helps achieve this vision. These public services keep the community safe and allow the City to maintain its status as a center for festivals and recreational activities, which are also important to Gilroy's 2040 vision. This criteria is below the support housing options because the City sees the need for adequate housing as a socially more important goal than the expected short term income.
- (4) Offer recreation opportunities and open spaces (multiplier 2.0x)
    - Gilroy's 2040 vision includes that all residents have easy access to high quality City parks. The Gilroy Housing Element does not emphasize this topic as much as the others, so it is fourth on the criteria list.
- (5) Do alternatives meet City zoning requirements and match aesthetics of surrounding developments (multiplier 2.5x)
    - The City of Gilroy has already designated this project's plot of land for neighborhood development in the Glen Loma Ranch plan. It is important that it ties into that plan, but Jorge Duran (City of Gilroy, Engineer) suggested also exploring options outside of it, as that exploring alternative zoning is something that the City does not do a lot of. Thus, this criteria is last on the rankings list.
- (6) Cost of development (money and time) (multiplier 2x)
    - The development will be an area for the City and developer to make a profit. Considering the financial and time costs associated with the development, a

weighting multiplier of two was assigned to ensure a moderate emphasis is placed on the monetary benefit and when that benefit will be actualized.

- (7) Surrounding transportation can support development trips (multiplier 2x)
    - Different land uses will create various levels of trip generations so it is important that the surrounding road infrastructure can support the land development. A multiplier of 2x was applied to this criteria because an emphasis should be placed on developing transportation infrastructure in the surrounding area and designing new infrastructure that mitigates the impacts of additional trips and usage.

<u>Constraints</u>

The plot of land to be developed is part of the Glen Loma Ranch development plan in the City of Gilroy's 2040 General Plan. The General Plan specifies the Glen Loma Ranch to be a 359 acre section of land and a dwelling unit limit of 1693. The project plot is roughly 10 acres and is constrained by the existing surrounding roadways. Additional constraints for this project include the Gilroy Standard Details & Specifications, the Gilroy City Code, and the California Development Standards.

<u>Codes/Regulations</u>

The following City of Gilroy and State of California Codes were used in the development of our project

- Gilroy City Code
    - Ch 18 - Public Parks
    - Ch 19 - Sewers and Sewage Disposal

    - Ch 20 - Streets and Sidewalks
    - Ch 21 - Land Development
    - Ch 22 - Taxation
    - Ch 27 - Water
- Gilroy Standard Details & Specifications
    - General Guidelines
    - General Underground Guidelines
    - Landscape Details
    - Street Details
    - Sewer Details
    - Storm Drain Details
    - Water Details
- Gilroy Housing Element
- California Development Standards
    - Part 2.5 California Residential Code
    - Part 3 California Electrical Code
    - Part 4 California Mechanical Code
    - Part 5 California Plumbing Code
- Caltrans Highway Design Manual
    - Ch 200 Geometric Design

Alternatives

Four alternatives were compared along with a "status quo" alternative. The four alternatives are four types of housing including: apartments, mixed use, town homes, and single-family residences. The status quo alternative is leaving the site undeveloped. A brief description of each alternative is provided below.

a) Apartments: Apartments were chosen as an alternative because they provide an extremely high density (20+ units/net acre) of dwelling units, allowing for more residents to occupy the space. This alternative would also be a development located in a mostly single-family residence occupied space. The apartment design would help the area be less divided across varying wealth levels. Apartments near a middle school also provide accessible housing for families. These reasons are why this alternative received a 4 in the "provide housing options" and "foster a sustainable community" criteria. Apartments received a 3 in the "promote fiscal strength" category because they provide an increase in revenue for the City but not as high as the combined revenue increase that would be seen from a mixed-use (residential + commercial) development. This alternative does not match the City's zoning per the general plan, which is why it received a 1 in this category. The apartments also scored low on cost and travel. Apartments would cost the City more time and money to develop and produce a higher transportation demand to the surrounding area, possibly warranting improvements.

b) Mixed-Use: Mixed-use was chosen as an alternative to provide a high-density housing option (20 units/net acre) that also provided services to the residents of both the new development and the surrounding housing developments. The City also emphasized the importance of walkable neighborhoods, and mixed-use development allows for this. Mixed-use development scored a 5 in fostering a sustainable community because it generates the fewest amount of trips and reduces the need for residents to travel to necessary services. The development is also directly next to Solorsano Middle School which would provide highly accessible housing options to families with middle school aged children.

c) Town Homes: Town homes were chosen to provide a slightly higher density (10 units/net acre) than the single-family residences, possibly providing a higher revenue for the City while still providing many of the benefits of single-family homes such as less foot and vehicle traffic, less sound pollution, etc. They are also attractive to homeowners who want less yard maintenance. Town homes scored a 3 in all criteria and a 4 in balancing open space and development because town homes generally provide amenities and quality connections to outdoor spaces and activities. Town homes are generally a middle ground for all other criteria due the density of this type of development. This type of development scores more highly on cost/time and transportation for its lower density.

d) Single-Family: Single-family housing was chosen as an alternative because it was aligned with the City's predefined zoning designations per the general plan (three to eight units/net acre). This style of development would also visually "fit-in" with the surrounding developments planned to happen in this area. Single family received a 2 in fostering a sustainable community, promoting fiscal strength, and balancing development with open spaces because single family developments are less connected to outside spaces, do less to promote active community building, and use the land less efficiently. It received a 3 in providing housing options, as it does give some diversity to the available housing options per the general plan and the Glen Loma Ranch specific plan. It matches the City's zoning, so it received a 5 in this category. Single family residences also scored higher on cost/time and transportation for their lower cost to develop and lower traffic demand due to lower density.

e) <u>No Development:</u> No development is the baseline for this site. If no housing units were to be developed, the City would not meet its general plan goals. It would, however, preserve the environmental qualities of the land and would not contribute to global warming.

<u>Rating System</u>

The rating system used was a scale from 0 to 5 where each number represents how well each alternative meets a certain criteria. Rating values are defined below:

0 - Does not meet criteria at all

1 - Meets minimum portions of criteria

2 - Meets more than minimum criteria, but has multiple deficiencies

3 - Adequately meets criteria with only a few deficiencies

4 - Fully meets criteria

5 - Exceeds criteria

Results

The results of the Alternatives Analysis can be seen in Table 1 of Appendix D. A mixed-use development best fits the City's criteria, as it supports a wide variety of housing options and can easily foster a walkable community by combining commercial and residential units. The large number of dwelling units and commercial places that a mixed-use structure brings also promotes the City's financial strength. The mixed use development style was one of the best choices to be employed. This can be seen in the entire Glen Loma Ranch specific plan, however, the singular plot in this project's scope will need to be developed in a singular style. This plan fits within the design of the larger development as a whole. The next highest score was the town home development style. This style of single family residences will be the development style of the Home Ranch plot.

Alternative Horizontal Layouts

The Home Ranch site is a site that was suitable for single family or multi-plex construction. Prior to determining that single family residences would be the preferred method of construction on the Home Ranch site, multiple horizontal layouts were considered in both the single family and multi-plex varieties. The drawings in Appendix G show the alternative horizontal layouts that were designed and iterated upon to reach the final design. Criteria for determining the final design included the following: (1) maximize the number of housing units, (2) maintain a safe design for all users of the designed area.

Preliminary Trip Generation of Alternative Housing Styles

Transportation is a critical component of any land development project. As such, the number of daily trips is a useful metric to assess the impact of the new development on the surrounding transportation network.

Linear interpolation between single family and multi-family densities was used to determine average rates for town home style development. Trips were determined by multiplying rates by number of dwelling units on the plot. Syrah Drive is the nearest street and is a collector street that would be the main roadway exiting to Santa Teresa Boulevard. Although the multi-family development style has a smaller trip generation rate, the increased density surpasses the effect of a lower rate, causing more trips to be generated. The increased daily trips due to the choice of a multi-family development would most likely not require upgrades to be made to Syrah Drive. No adjustments in trip generation counts were made to account for public transit in the near vicinity of the project. The Glen Loma Ranch Specific Plan calls for multiple new transit stations to support the neighborhood district.

The development of a multi-family structure must also consider the parking demand that will be generated by the tenants. This is less of a concern for a single family attached development. City of Gilroy municipal code requires 1.5 stalls per one bedroom or two bedroom dwelling units and two (2) stalls for dwelling units having three or more bedrooms, plus one (1) stall for every four (4) units used for guests. One of the stalls per unit must be covered. Two (2) stalls shall be provided per each dwelling unit, one of which shall be a covered carport or garage.

Preliminary Utility Demand & Supply Calculations

Verifying that the City of Gilroy's current utility infrastructure can support the development of the plot was important as it can affect the design of the layout. With regards to sewage capacities, the nearest connection is a 15 inch pipe to the North of the plot under Grenache Way. After running preliminary calculations that can be seen in Appendix B, it was determined that the maximum size pipe the site may require is six (6) inches. A six (6) inch pipe is the smallest size allowed by the City of Gilroy and has a capacity of 130,000 gallons per day. It is expected that it will cost $223 per linear foot of installation according to the Master Plan. The site sewage demand depended on layout design but is expected to be between approximately 6,000 and 22,000 gallons per day.

Storm water calculations were also performed for the plot that can be seen in Appendix B. Demand for stormwater also depended on the final design of the plot, so a preliminary estimate of how the plot will be developed was used. It was assumed that the plot surface area will be 10% streets, 10% parks, 50% single family homes, and 30% multi-unit attached homes. This land distribution provided a demand of 0.624 cubic feet per second. A pipe of 12 inches would be required to handle this demand, as it has a capacity of 0.78 cubic feet per second. According to the Gilroy Master Plan, a 12 inch pipe costs $254 per linear foot. The closest point of connection is also North of the site on Grenache Way.

Ethics Analysis

The City of Gilroy is looking to increase the supply of housing units in the City to meet the demand and provide equitable housing opportunities to a growing population. To accomplish this ethically, this project was graded on certain ethical considerations.

One consideration that must be made is the impact of this development on the cost of living and the supply of housing in the Gilroy area. Depending on the type of housing and ultimately the density of dwelling units, the project must consider the social impacts of creating more or less housing per unit area. The UN Declaration of Human Rights in Article 25 states that

> "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control."

Considering this set of rights, governments and private corporations alike should be attempting to make housing availability equitable. A consideration that must be made is whether the housing being produced meets cost and accessibility levels that enable individuals and families with a wide range of income levels to live in the development. And if this development is not targeted at being as accessible, is the City making efforts to reduce the impacts of high property costs in California.

Another consideration is the sustainability of developing a plot of land. Construction is a large producer of greenhouse gas emissions as according to the 2017 UN Global Status Report, construction produces 11% of all carbon dioxide emissions in the world. This is a major consideration when comparing potential development styles. If a purely environmental approach is taken, factors such as building life span, construction waste, stormwater pollution prevention, building efficiency, etc. must be at the forefront of the design. Given that the project site is located in California, energy regulations affect the level of energy efficiency this project's residential units must meet. As of January 1, 2020, all new residential development must be Zero Net Energy per the California Energy Efficiency Strategic Plan. This regulation potentially makes it more difficult to make these housing units accessible. It could also be argued that more should be done in terms of sustainability and whether the minimum specifications set forth by the State of California are progressive enough to meet a truly long term sustainable community.

The accuracy of the data given for this project also raised some ethical concerns. The main data source for this project was the City of Gilroy. The City worked with the developer to source information, such as the topography of the land as well as existing as-built drawings for the utilities in the surrounding area. Additional data for existing water, sewer, and stormwater flows and capacity was also sourced from the City. It would be in the best interest of the City to maintain accurate records of all data mentioned to ensure the delivered project meets regulations and standards. It would have been difficult to cross check this information with another source, as the main governing authority is the City. Although no action was taken to verify the validity of the data, it was assumed that all data was correct and any discrepancies that did not make sense were clarified with the City Engineer.

It was anticipated that a balance between multiple ethical considerations must be reached in order to provide a product that serves as many clients as possible. Deciding to weigh certain ethical factors with more importance goes back to the Analysis of Alternatives and criteria that were determined to be most applicable to the City's goals and objectives.

It was also important to consider the social, environmental, political, and safety impacts of this development. One social impact of developing this plot of land would be: it will increase the number of residents in Gilroy. Gilroy prides itself for its small town feel, so it is critical that the development of this plot does not negatively impact this community. A second social impact of this project would be that the number of drivers in the area will increase. This was an important consideration because if the local streets cannot handle the increase in drivers, that can lead to traffic congestion and negatively affect the current residents.

An environmental consideration for developing this plot was estimating how much carbon dioxide construction of the project will produce. Since the project would be replacing a grassy field with roads and residential units, it is valuable for the City to know how that will impact carbon dioxide and greenhouse gas emissions. Another environmental consideration of this project was determining if the City can sustainably support the community. Before construction begins, the City should feel confident that they have adequate water, electrical, and sewage capacity to sustain the development.

One political consideration of this development was deciding how much of it will be low income housing. The City of Gilroy mandates that 15% of housing in new developments be for low income housing but encourages developers to increase that percentage. A second political impact of this development would be how the land is restricted for use. The land is currently zoned for only residential units, so any designs that incorporate commercial use will have to receive permission from the City of Gilroy.

With regards to safety, it was critical that the intersections of roads are designed to minimize chances of accidents. The use of roundabouts, stop signs, or signalized intersections in this development were based on trip generation calculations so that the roads in the development would be as safe and efficient as possible. Another safety consideration for this project was verifying that emergency vehicles can quickly and safely reach each structure in this development. If a fire were to occur in a structure on the plot of land, it is important that a firetruck has adequate space to maneuver turns and extinguish the fire quickly.

Grading

Grading the Home Ranch site proved to be quite difficult due to the pre-existing conditions of the site and the relatively flat topography of the site. Once a final horizontal layout had been established, an initial grading plan was attempted by using a constant positive slope of 0.05 in the direction away from existing roadway Syrah Drive to meet the City's street geometry requirements. This approach was quickly determined to be insufficient to meet the cut and fill balance goal. Per City engineer guidance, the Home Ranch site was able to be balanced for cut and fill, requiring almost no import or export. Figure 01 shows the initial grading for the shortest proposed road.

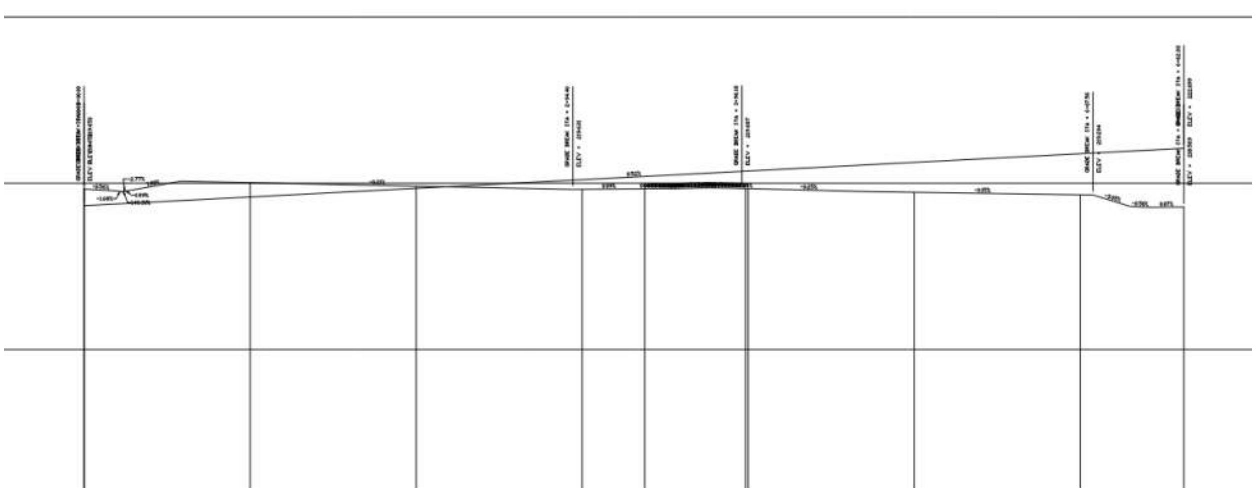


Figure 01. Duran Road with 0.53% constant slope vertical alignment.

The second approach that was used for the grading included inserting a peak, roughly half the horizontal distance along each road. Using this approach was beneficial to the overall design of the site by providing a more appropriate elevation change to accomodate the cross sloping utility design. Utility design for the site is described in more detail in the Utility Design section. For the purposes of grading, utility design requiring minimum velocity (slope) and tie-in to existing utility lines was considered. Figure 02 shows the second method of grading that was used.

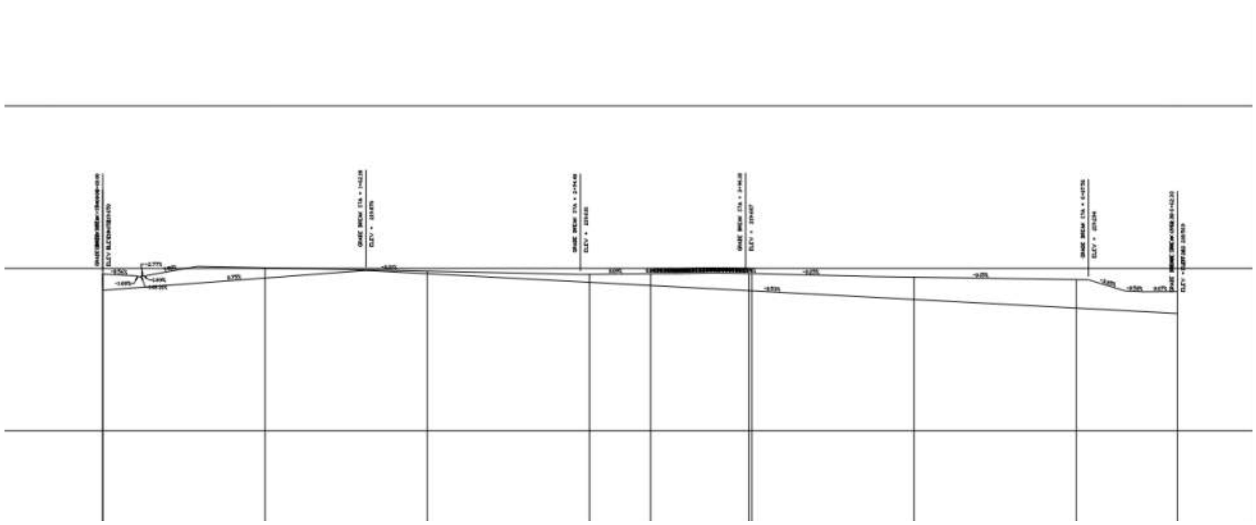


Figure 02. Bronco Road peak design with 0.75% to -0.53% slope vertical alignment.

The third method of grading that was used in the site plan was to create a valley design where a negative slope would begin at the existing Syrah Drive and at about the halfway point, transition to a positive slope of 0.5%. This method was considered as it would provide the design with more cut that would help balance the site. A valley cut was determined to not be feasible due to the maximum flooding depth allowed by the City design requirements. This approach also did not provide a fully balanced cut and fill so it was determined to be not usable. Figure 03 shows the Morley Road valley design with a much larger than acceptable maximum flooding depth.

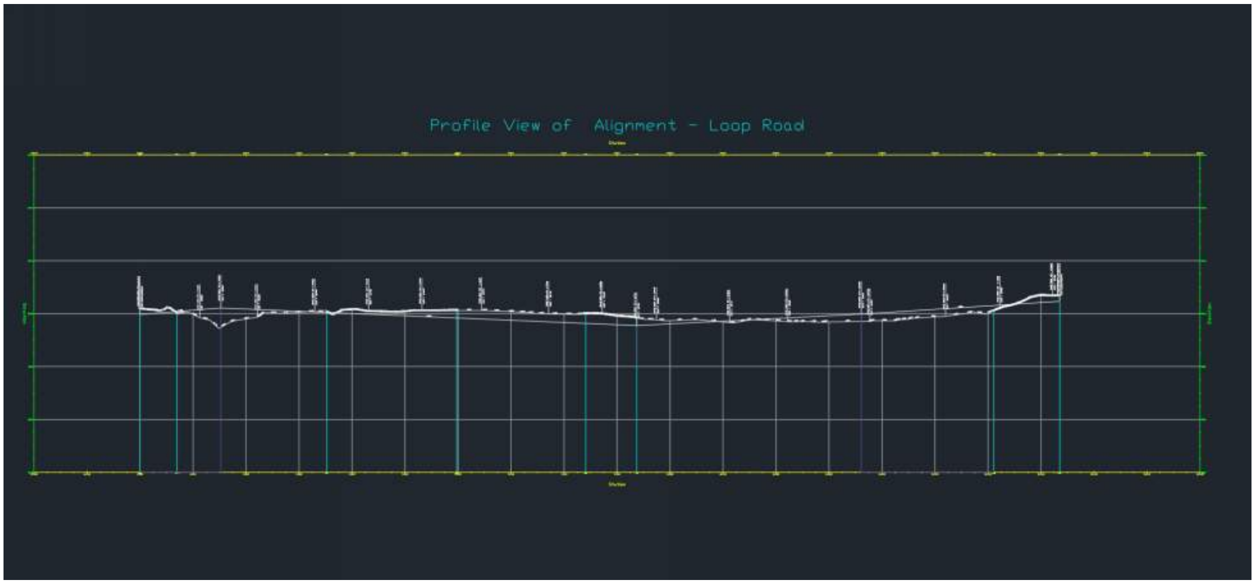


Figure 03. Morley Road valley design with unacceptable max flooding depth.

The fourth and final grading approach used was a sawtooth design. Using this approach increased the number of constraints that had to be met for vertical design per the Caltrans Highway Design Manual. This type of design requires the vertical design to maintain minimum slopes set forth by the City's General Guidelines as well as minimum grade lengths in between the transitions of 50 feet, with no more than a total of 0.5% grade change within 200 feet, per Section 204.4 of the Caltrans Highway Design Manual. Taking into consideration the objectives of the design, as well as the constraints, it led to a design that is represented in Figure 04. To meet grade change requirements, the use of vertical curves had to be employed. Vertical curves at the beginning and end of Loop Road allowed the design to more smoothly transition from the existing road to the development.

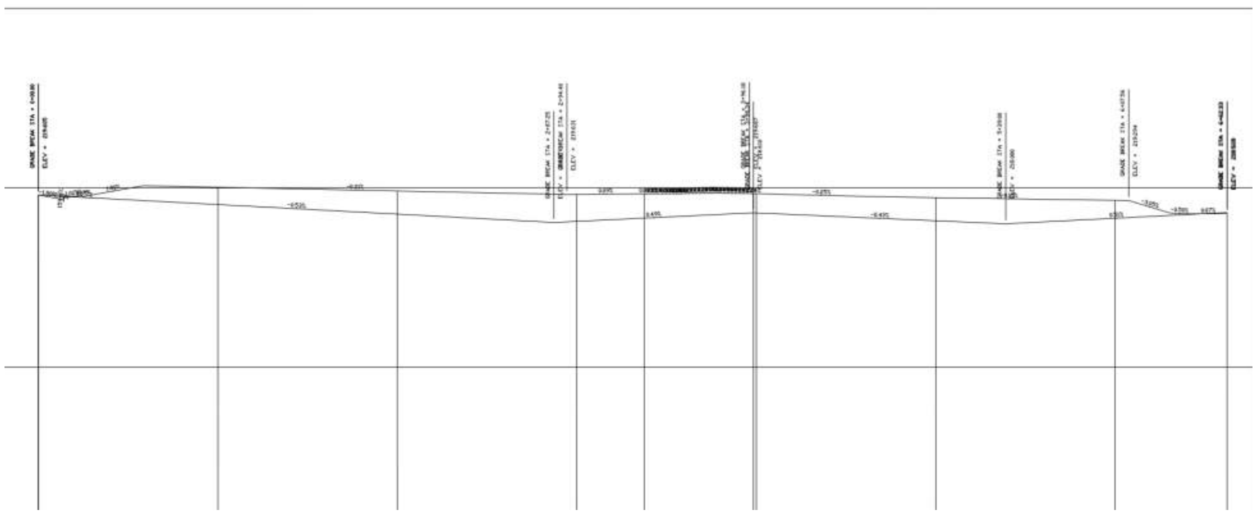


Figure 04. Bronco Road with a sawtooth slope design

A balanced earthwork was achieved using the fourth grading approach. A total cut and fill sheet is shown in Appendix F. The total amount of net cut from the streets was determined to be 7560 cubic yards. The total amount of net fill for the lots was determined to be 4516 cubic yards. Additional information from the City also indicated that more cut would be generated from the trenches dug for the utility lines. The remaining cut was used for lot stockpiles, final grading of lots, and surrounding landscaping areas.

The earthwork was balanced due to the excess of cut from the streets. Table 01 below shows the determined balance of the earthwork. Additional soil was determined to be available from the retention basin on the southside of the project used for stormwater runoff treatment. The full detailed cut and fill reports can be found in Appendix F.

Table 01. Earthwork summary.

Section	Total Cut, yd^3	Total Fill, yd^3
Morley Road	4589	82
Bronco Road	2168	0
Duran Road	885	0
Lots	1564	6080
Bioretention Basin	1235	0
Compaction (2")	0	2070
Lot Stockpiles/Landscaping	0	2209
Total	**10,441**	**10,441**

The amount of cut from the roads, lots, and bioretention provided an adequate amount to counter the fill required while still providing extra cut for final grading and landscaping of the lots and site. Specific locations of cut and fill area can be seen in Figure 05. To ensure a balance within the site, a twenty percent flexibility plan was created. If the site ends up with 20% less cut, the amount fill used for lot stockpiles and landscaping can be reduced from 80 cubic yards per lot minus site landscaping to 41 cubic yards per lot minus landscaping. This is anticipated to still be plenty of soil for the final grading. In the event that the site ended up with 20% more cut, a significant excess of soil would be present on the site. A total of 12,530 cubic yards of cut would be present with a demand of only 10,440 cubic yards. With this excess the flexibility plan suggests that a new landscaping feature be added to the south east corner of the project as well as lifting all pad elevations 0.4 feet. This increase in pad elevation was determined to not have a significant impact on the drainage or feasibility of the lots and would maintain an acceptable front slope for driveways and front yards.

Figure 05. Locations of cut and fill

Utility Design

Design of the horizontal and vertical utility system for this project included providing water, sewer, and stormwater services for all homes in the Home Ranch site. The City of Gilroy General Guidelines and existing utility connection points on Syrah Drive were the main constraints for the utility design. As can be seen in Appendix drawing (ENTER HORZ DRAWING NUMBER), the stormwater and sewer system do not have a redundant horizontal design. The water pipe system requires a redundant horizontal design due to City of Gilroy general code requirements. This is accomplished by having multiple connection points with the existing water infrastructure so that if one section of the pipe breaks, homes will still have access to clean water.

With regard to the vertical aspect of the utility design, the City of Gilroy requires that all pipes have a minimum of 3 feet of coverage from the top of the pipe to the top of curb elevation. The City also requires that the stormwater and sewage systems have a minimum slope based on the diameter of the pipe to maintain adequate capacity. All vertical utility designs follow these requirements and can be seen in Appendix XX

It was determined that an eight (8) inch ductile iron pipe could service all of the homes in this community. The calculations for demand and capacity that conform with the City's General Guidelines can be found on page 6 of Appendix B. Since the pipe is pressurized, it did not require any slope. The water system for Home Ranch plans to connect to the existing 12 inch pipe on the North and South end of Syrah Drive.

It was also calculated that an eight (8) inch polyvinyl chloride pipe would provide adequate sewage capacity for this development. The calculations for demand and capacity that conform with the City's general guidelines can be found on page 5 of Appendix B. The slope of the sewage system was set to 0.5 percent to maintain adequate flow. The sewage system of Home Ranch plans to connect to the existing 18 inch pipe on the North end of Syrah Drive.

Lastly, it was determined that an 18 inch reinforced concrete pipe would service the stormwater for this development. The calculations for demand and capacity that conform with the City's general guidelines can be found on page 8 of Appendix B. The pipe is sloped at 0.25

percent at the recommendation of the City's General Guidelines. The stormwater system will connect to the existing 24 inch pipe on the South end of Syrah Drive.

Stormwater Management

A requirement to develop in California is to maintain the water quality of the water that leaves the site as well as the rate of flow. To meet the requirements set forth in the Stormwater Management Guidance Manual for Low Impact Development & Post-Construction Requirements, a stormwater treatment facility had to be implemented within the project area prior to discharging into the existing stormwater infrastructure. Options for this flow and quality control include: bioretention, flow-through planters, infiltration trench, rainwater harvesting, green roofs, and others. The design of a bioretention basin was the chosen design for the site due to the availability of space and cost effectiveness of this solution.

To calculate the required amount of capacity for the retention basin, the technical guidance in Chapter 6.1 was followed. A four percent rule is advised. Four percent of the impervious area is the amount of surface area required for the retention basin. The total impervious area that was designed at the site includes the roads, sidewalks, driveways, and roofs. The total area of these components is 213,000 square feet, requiring 8,550 square feet of retention. A standard design procedure for creating the bioretention facility was used, providing adequate setbacks from streets and forested areas, underdrain, correct biotreatment depth, etc. Table 02 below shows the calculation of impervious areas used to determine the sizing of the bioretention facility.

Table 02. Impervious area calculations and bioretention design attributes

Impervious Area	**Area (sf)**	
Roof Area	88212.7	
Road Area	104400	
Driveway Area	20300	
Minimum Bioretention Surface Area	8516.508	
Design Bioretention Surface Area	11120	
Drain Rock Depth	12"	C.3 Chapter 6.1 Page 6-4
Biotreatment Depth	24"	C.3 Chapter 6.1 Page 6-5
Biotreatment Volume	1235.555556	

The addition of the bioretention facility also provides the site with an additional amount of cut that can be used for final grading and landscaping. This volume is determined by multiplying the design area by the depths of the layers of the retention area. The volume of cut gained by the creation of the bioretention area is roughly 1100 cubic yards.

Plumbing for the retention basin will be added as part of the stormwater infrastructure being added to the site. Due to site limitations with regards to grade, the use of a pump on the south side of the project at the intersection of the stormwater pipes will be required to lift the stormwater from the elevation of the reinforced concrete pipe to the surface of the bioretention basin. This was necessary to avoid affecting the designed grade of the road. Altering the slope of the proposed piping was also not an option to ensure the minimum slope and cover requirements were met. The addition of a pump is expected to increase maintenance costs of the stormwater system and will have to be added to the private association costs incurred by homeowners.

Horizontal Design

As per the analysis of alternatives, the design of a single family compact layout and a duplex layout were chosen. The first task that needed to be completed was determining the legal boundary of the plot. This would allow for the proper placement of roads and lots with regards for easements and setback requirements. The legal plot boundary for the subdivision was given by the City of Gilroy in the form of lengths and bearings. The AutoCAD file provided by the City was updated to include the legal boundary using the PDF and the survey points in AutoCAD.

The horizontal design was also constrained by environmental requirements such as setbacks from the adjacent Uvas Creek Park. Many of these requirements were constraints set forth by California Environmental Quality Act (CEQA) guidelines and the Environmental Impact Report for the Glen Loma Ranch site.

Vertical Design

To meet the site grading requirements while meeting utility design constraints, vertical curves had to be designed and added to the beginning and end of the Morley Road to bring the road to an acceptable elevation to produce enough cut. The vertical design was used to transition from the existing road, Syrah Drive, to the development site. At the north intersection of Syrah Drive and the Morley Road, the elevation of the intersection is 220.07 feet. The desired elevation at the low point of the vertical curve is 218 feet. This elevation helped to maintain the minimum three (3) feet of coverage from the paved surface to the water main located in the right of way. The maximum grade that was designed at the north end of Morley Road was 1.64%.

Vertical curves were also designed at the south end of Loop Road at the transition corner back to Syrah Drive. These vertical curves had the same purpose of bringing the existing road down to the development site. The set of vertical curves consisted of a 150 foot long concave curve and a 100 foot convex curve. The maximum grade at this transition was 3.12%. The design of these vertical curves can be found in Appendix G.

Estimate

This project also included a rough engineer's estimate of civil activities that can be seen in Appendix H. The purpose of this estimate is to provide developers and the City an idea of how much the civil work for this project will cost. It is also helpful for bonding concerns related to this project. The estimate includes grading, paving, concrete, stormwater, sewage, water, signage, striping, and development fees. The total cost came to $4,121,160.

References

United Nations. *Universal declaration of human rights*. United Nations. Retrieved June 7, 2022, from https://www.un.org/en/about-us/universal-declaration-of-human-rights

International Energy Agency. *GLOBAL STATUS REPORT 2017*. California Public Utilities Commission. Retrieved June 7, 2022, from https://www.worldgbc.org/

California Public Utilities Commission. *Energy Efficiency Strategic Plan*. California Public Utilities Commission. Retrieved June 7, 2022, from http://www.cpuc.ca.gov/

Appendix A - Site Location Overview

Figure A-1. Glen Loma Ranch (green) general site overview with Home Ranch project site (yellow) and labels.

Appendix B - Preliminary Utility Demand & Supply Calculations

Sewage Calculations

$A := 7.7\ acre$ ...Size of developable land

Sewage Demand (Values from City of Gilroy Sewage Master Plan)

$HD_r := 2750\ \frac{gal}{day \cdot acre}$ ...High Density Residnetial (16-20 du per acre)

$MD_r := 1500\ \frac{gal}{day \cdot acre}$ ...Medium Density Residnetial (8-16 du per acre)

$LD_r := 770\ \frac{gal}{day \cdot acre}$ ...Low Density Residnetial (3-8 du per acre)

$ND_r := 1500\ \frac{gal}{day \cdot acre}$ ...Neighborhood District Residnetial (6-12.5 du per acre)

Plan	High Density Residential	Medium Density Residential	Low Density Residential	Neighborhood District
City Original Plan	0%	0%	0%	100%
All High Density Plan	100%	0%	0%	0%
All Medium Density Plan	0%	100%	0%	0%
All Low Density Plan	0%	0%	100%	0%
Mix of Residential Units	30%	15%	55%	0%

Figure 1: Percent of land allocated for each type of density based on plan

Sewage Demand:

$$Plan1 := ND_r \cdot A = \left(1.155 \cdot 10^4\right) \frac{gal}{day}$$

$$Plan2 := HD_r \cdot A = \left(2.118 \cdot 10^4\right) \frac{gal}{day}$$

$$Plan3 := MD_r \cdot A = \left(1.155 \cdot 10^4\right) \frac{gal}{day}$$

$$Plan4 := LD_r \cdot A = \left(5.929 \cdot 10^3\right) \frac{gal}{day}$$

$$Plan5 := \left(HD_r \cdot .3 + MD_r \cdot .15 + LD_r \cdot .55\right) \cdot A = \left(1.135 \cdot 10^4\right) \frac{gal}{day}$$

Sewage Pipe Size:

$Size := 6\ in$ ...6 inches is smallest size allowed in Gilroy Master Plan

$Capacity := 130000\ \frac{gal}{day}$ ...capacity sufficient for any of 5 plans above

$Slope := 0.0049$ ...preffered slope of pipe in Gilroy Master Plan

Cost of Pipe:

$Cost := 223$ ...price of 6" pipe per foot according to Master Plan

Storm Water Calculations

$A := 7.7\ \mathbf{acre}$ ...Size of developable land

Design of Storm Water Systems in Gilroy are based on 24 hr storms with a return period of 10 years (City Storm Water Master Plan)

$D := 24\ \mathbf{hr}$ ...duration of storm

$R := 10\ \mathbf{yr}$ ...return period of storm

$d := 3.93\ \mathbf{in}$ ...depth of rainfall

$I := 0.16\ \frac{\mathbf{in}}{\mathbf{hr}}$ ...depth of rainfall per hour

Time of Concentration

$T_c = t_i + t_{flow} + t_{pipe}$ ...time of concentration equation

$t_i := 10\ min$

$t_{flow} := 3\ min$ ....tflow is determined by length of gutter

$t_{pipe} := 3\ min$ ....tflow is determined by length of pipe

Runoff Coefficients

$SF_r := 0.4$ ...single family residential area

$MF_r := 0.675$ ...multi-family attached residential area

$Street := 0.825$ ...street surface area

$Parks := 0.175$ ...Parks surface area

Preliminary calculation of plot assuming 10% parks, 10% asphaltic streets, 50% single family areas, 30% multiunits attached

$$C := SF_r \cdot .5 + MF_r \cdot .3 + Street \cdot .1 + Parks \cdot .1 = 0.503$$

Expected Runoff (Demand):

$$Q := C \cdot I \cdot A = 0.624 \ \frac{ft^3}{s}$$

Size of Pipe Required:

$$Size := 12 \ in$$

$$Capacity := 0.78 \ \frac{ft^3}{s}$$

...size and capacity taken from Gilroy Storm Water Master Plan

Cost of Pipe:

$$Cost := 254$$

...price of 12" pipe per foot according to Master Plan

Utility demnad calculations post layout design

Sewage Calculations:

Demnad:

$Homes := 53$

$D_S := 175 \frac{gal}{day}$ ...Demand per home per day

$D_{S\_Tot} := D_S \cdot Homes = \left(9.275 \cdot 10^3\right) \frac{gal}{day}$

Sewage Pipe Size:

$Size := 8\ in$ ...8 inches is smallest size allowed in Gilroy Master Plan

$C_S := 220000 \frac{gal}{day}$ ...capacity sufficient

$Slope := 0.0049$ ...preffered slope of pipe in Gilroy Master Plan

Water Calculations:

Demnad:

$Homes := 53$

$A := 7.7\ acre$ ...Size of developable land

$D_W := 3200\ \dfrac{gal}{day \cdot acre}$ ...Demand per acre per day

$D_{W\_Tot} := D_W \cdot A = \left(2.464 \cdot 10^4\right)\ \dfrac{gal}{day}$ ...Total Avg demand per day

$P := 3.5$ ...Peak use factor

$D_{w\_Peak} := D_{W\_Tot} \cdot P = \left(8.624 \cdot 10^4\right)\ \dfrac{gal}{day}$

Water Pipe Size:

$Size := 8\ in$ ...8 inches is smallest size allowed in Gilroy Master Plan

$C_W := 300\ \dfrac{gal}{min} = \left(4.32 \cdot 10^5\right)\ \dfrac{gal}{day}$ ...capacity sufficient

$Slope = NA$ ...no required slope for Water line

Storm Water Calculations

$A := 7.7\ \mathbf{acre}$ ...Size of developable land

Design of Storm Water Systems in Gilroy are based on 24 hr storms with a return period of 10 years (City Storm Water Master Plan)

$D := 24\ \mathbf{hr}$ ...duration of storm

$R := 10\ \mathbf{yr}$ ...return period of storm

$d := 3.93\ \mathbf{in}$ ...depth of rainfall

$I := 0.16\ \dfrac{\mathbf{in}}{\mathbf{hr}}$ ...depth of rainfall per hour

Time of Concentration

$T_c = t_i + t_{flow} + t_{pipe}$ ...time of concentration equation

$t_i := 10\ min$

$t_{flow} := 3\ min$ ....tflow is determined by length of gutter

$t_{pipe} := 3\ min$ ....tflow is determined by length of pipe

Area distribution:

$Street_A := 104393\ \mathbf{ft}^2 = 2.397\ \mathbf{acre}$

$Lots_A := 231473\ \mathbf{ft}^2 = 5.314\ \mathbf{acre}$

$Undev_A := 10.16\ \mathbf{acre} - Lots_A - Street_A = 2.45\ \mathbf{acre}$

Runoff Coefficients

$SF_r := 0.4$ ...single family residential area

$Street := 0.825$ ...street surface area

$Undev := 0.175$ ...Undeveloped surface area

Calculation of Avg Coefficient

$$C := SF_r \cdot \frac{Lots_A}{A} + Street \cdot \frac{Street_A}{A} + Undev \cdot \frac{Undev_A}{A} = 0.588$$

Expected Runoff (Demand):

$$Q := C \cdot I \cdot A = 0.731 \ \frac{ft^3}{s}$$

Size of Pipe Required:

$$Size := 18 \ in$$

$$Capacity := 0.78 \ \frac{ft^3}{s}$$

...size and capacity taken from Gilroy Storm Water Master Plan

Home Ranch Storm Pipe Capacity Calculations

Pt of con.	Gutter Length (ft)	Tc (min)	I (in/hr)	A (acres)	Runoff Q (ft^3/s)	Pipe Segment	Diameter (in)	Perimeter (ft)	Pipe Area (ft^2)	Rh (ft)	Slope	V (ft/s)	Length (ft)	Capacity Q (ft^3/s)
			10 year											
CB 13-1	301.34	16.70	1.35	1.004	0.542							n = 0.015		
						CB13-1 - SDMH #13	18	4.71	1.77	0.375	0.01	5.17	12.8	9.13
CB 13-2	301.34	16.70	1.35	0.124	0.067									
						CB 13-2 - SDMH #13	18	4.71	1.77	0.375	0.01	5.17	14.89	9.13
SDMH #13		16.75	1.33	1.128	0.600									
						SDMH #13 - SDMH #12	18	4.71	1.77	0.375	0.0025	2.58	72.83	4.56
SDMH #12		17.22	1.25	1.128	0.564									
						SDMH #12 - SDMH #11	18	4.71	1.77	0.375	0.0025	2.58	109.54	4.56
CB 11-1	95.38	15.54	1.4	0.376	0.210									
						CB 11-1 - SDMH #11	18	4.71	1.77	0.375	0.01	5.17	25.7	9.13
CB 11-2	96.4	15.54	1.4	0.049	0.028									
						CB 11-2 - SDMH #11	18	4.71	1.77	0.375	0.01	5.17	26.64	9.13
SDMH #11		17.93	1.2	1.553	0.745									
						SDMH #11 - SDMH #10	18	4.71	1.77	0.375	0.0025	2.58	208.88	4.56
CB 10-1	96.7	15.55	1.4	0.462	0.259									
						CB 10-1 - SDMH #10	18	4.71	1.77	0.375	0.01	5.17	12.73	9.13
CB 10-2	98.48	15.56	1.4	0.047	0.026									
						CB 10-2 - SDMH #10	18	4.71	1.77	0.375	0.01	5.17	15.74	9.13
SDMH #10		19.28	1.17	2.062	0.965									
						SDMH #10 - SDMH #9	18	4.71	1.77	0.375	0.0025	2.58	88.05	4.56
SDMH #9		19.84	1.15	2.062	0.949									
						SDMH #9 - SDMH #8	18	4.71	1.77	0.375	0.0025	2.58	51.84	4.56
CB 8-1	150.63	15.85	1.37	0.131	0.072									
						CB 8-1 - SDMH #8	18	4.71	1.77	0.375	0.01	5.17	18.38	9.13
CB 8-2	422.95	17.39	1.24	0.146	0.072									
						CB 8-2 - SDMH #8	18	4.71	1.77	0.375	0.01	5.17	24.08	9.13
SDMH #8		20.18	1.12	2.339	1.048									
						SDMH #8 - SDMH #4	18	4.71	1.77	0.375	0.0025	2.58	159.11	4.56
CB 7-1	258.63	16.46	1.36	0.885	0.482									
						CB 7-1 - SDMH #7	18	4.71	1.77	0.375	0.01	5.17	25.11	9.13
CB 7-2	252.45	16.43	1.36	0.965	0.525									
						CB 7-2 - SDMH #7	18	4.71	1.77	0.375	0.01	5.17	21.08	9.13
SDMH #7		16.54	1.35	1.850	0.999									
						SDMH #7 - SDMH #6	18	4.71	1.77	0.375	0.0025	2.58	62.84	4.56
SDMH #6		16.95	1.26	1.850	0.933									
						SDMH #6 - SDMH #5	18	4.71	1.77	0.375	0.0025	2.58	165.77	4.56
CB 5-1	140.87	15.80	1.37	0.585	0.321									
						CB 5-1 - SDMH #5	18	4.71	1.77	0.375	0.01	5.17	18.87	9.13
CB 5-2	144.96	15.82	1.37	0.619	0.339									
						CB 5-2 - SDMH #5	18	4.71	1.77	0.375	0.01	5.17	13.33	9.13
SDMH #5		18.02	1.19	3.054	1.454									
						SDMH #5 - SDMH #4	18	4.71	1.77	0.375	0.0025	2.58	115.9	4.56
SDMH #4		18.77	1.18	5.394	2.546									
						SDMH #4 - SDMH #2	18	4.71	1.77	0.375	0.0025	2.58	214.86	4.56
CB 3-1	253.36	16.43	1.36	0.827	0.450									
						CB 3-1 - SDMH #3	18	4.71	1.77	0.375	0.01	5.17	19.34	9.13
CB 3-2	286.52	16.62	1.35	1.018	0.550									
						CB 3-2 - SDMH #3	18	4.71	1.77	0.375	0.01	5.17	24.8	9.13
SDMH #3		16.70	1.33	1.845	0.982									
						SDMH #3 - SDMH #2	18	4.71	1.77	0.375	0.0025	2.58	90.31	4.56
CB 2-1	321.42	16.82	1.33	0.533	0.283									
						CB 2-1 - SDMH #2	18	4.71	1.77	0.375	0.01	5.17	60.05	9.13
CB 2-2	101.36	15.57	1.4	0.108	0.061									
						CB 2-2 - SDMH #2	18	4.71	1.77	0.375	0.01	5.17	50.7	9.13
SDMH #2		20.15	1.12	7.771	3.482									
						SDMH #2 - Bio	18	4.71	1.77	0.375	0.01	5.17	33.98	9.13

Appendix C - Preliminary Trip Gen Calculations

Table C-1. Trip generation for alternative housing development styles based on ITE Land Use Rates.

Plot Size: 7.8 acres			
	Single Family (ITE 210)	Town Homes/Single Family Attached	Multi-Family (ITE 220)
Dwelling Units/acre	8	10	20
DU	62	78	156
Avg. Daily Rate[1]	9.57	9.08	6.65
Daily Trips	593	708	1037
AM Peak Rate[1]	0.75	0.71	0.51
AM Peak Trips	47	55	80
PM Peak Rate[1]	1.01	0.95	0.62
PM Peak Trips	63	74	97

[1]Rates from ITE Land Use Codes

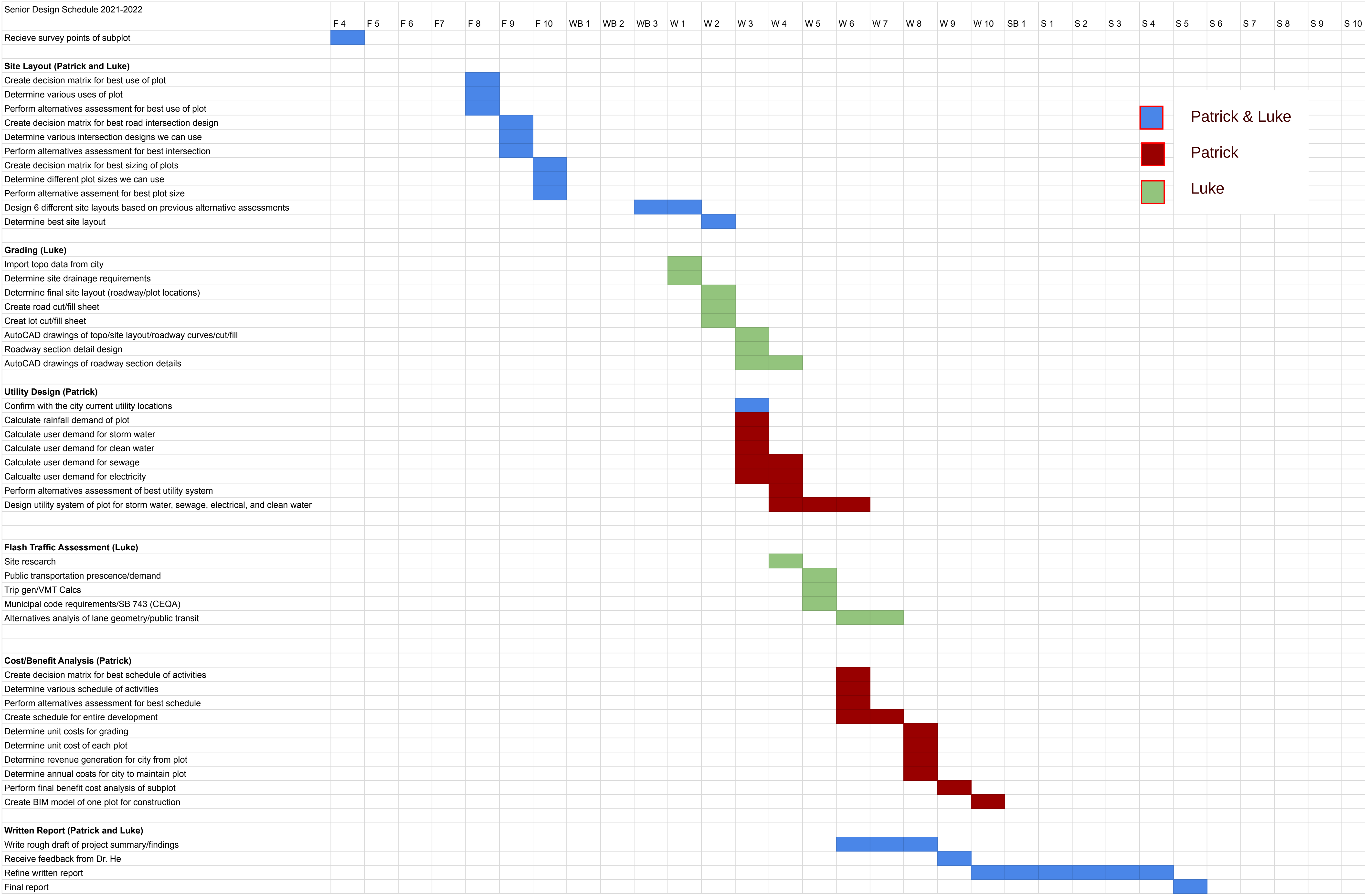
Appendix D - Alternative Assessment of Land Use

Table D-1. Weighted grading of alternatives using selected criteria

	Weighting Factor	Apartments (only)	Mixed-Use (commercial on ground floor, residential above)	Town Homes	Single Family Residences	Mix of Single Family and Multi Family Homes
Foster a sustainable community	3.5	4	5	3	2	3
Support Housing options	3	4	4	3	3	4
Promote fiscal strength	2.5	3	4	3	2	3
Balance of development and open space and offer recreation opportunities	2	4	3	4	2	3
Do alternatives meet City zoning requirements and match aesthetics of surrounding developments	2.5	1	1	3	5	3
Cost of development (monetary, time) (lower score means higher cost and time)	2	2	1	3	4	3
Surrounding transportation can support development trips	2	2	2	4	5	4
Total Score		**52**	**54**	**56.5**	**55.5**	**57.5**

Appendix E - Project Deliverables Timeline

Appendix E - Project Deliverables Timeline



Appendix F - Earthwork Calculations

Cut/Fill Report

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By user: llazzarini

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Table G-1. Earthwork Totals for Streets

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Loop Road Corridor VS	full	1.000	1.000	62086.74	4589.40	82.19	4507.21<Cut>
Medium Road Corridor VS	full	1.000	1.000	25864.34	2168.02	0.00	2168.02<Cut>
Small Road Corridor VS	full	1.000	1.000	16442.69	884.96	0.00	884.96<Cut>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	104393.77	7642.38	82.19	7560.19<Cut>

* Value adjusted by cut or fill factor other than 1.0

Cut/Fill Report

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By user: llazzarini
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Table G-2. Earthwork Totals for Lots

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Lot 1 VS	full	1.000	1.000	4564.14	4.98	143.97	138.99<Fill>
Lot 10 VS	full	1.000	1.000	3735.86	127.06	0.00	127.06<Cut>
Lot 11 VS	full	1.000	1.000	3840.24	85.20	0.00	85.20<Cut>
Lot 12 VS	full	1.000	1.000	3840.18	75.06	0.00	75.06<Cut>
Lot 13 VS	full	1.000	1.000	3840.12	76.81	0.00	76.81<Cut>
Lot 14 VS	full	1.000	1.000	3840.06	32.49	0.60	31.89<Cut>
Lot 15 VS	full	1.000	1.000	4202.97	13.84	49.80	35.96<Fill>
Lot 16 VS	full	1.000	1.000	3790.81	0.01	232.61	232.60<Fill>
Lot 17 VS	full	1.000	1.000	3840.00	0.76	161.83	161.07<Fill>
Lot 18 VS	full	1.000	1.000	3840.00	3.27	90.48	87.21<Fill>
Lot 19 VS	full	1.000	1.000	3840.00	6.36	40.82	34.46<Fill>

Lot 2 VS	full	1.000	1.000	3838.54	5.26	140.90	135.64<Fill>
Lot 20 VS	full	1.000	1.000	3840.00	22.76	0.78	21.99<Cut>
Lot 21 VS	full	1.000	1.000	3840.00	54.19	0.00	54.19<Cut>
Lot 22 VS	full	1.000	1.000	4571.94	65.46	0.00	65.46<Cut>
Lot 23 VS	full	1.000	1.000	5155.75	37.43	0.37	37.06<Cut>
Lot 24 VS	full	1.000	1.000	4377.35	19.05	2.91	16.14<Cut>
Lot 25 VS	full	1.000	1.000	4000.09	22.03	2.51	19.52<Cut>
Lot 26 VS	full	1.000	1.000	3999.98	44.69	0.00	44.69<Cut>
Lot 27 VS	full	1.000	1.000	4000.01	11.99	21.27	9.29<Fill>
Lot 28 VS	full	1.000	1.000	4494.50	11.14	41.78	30.64<Fill>
Lot 29 VS	full	1.000	1.000	4371.41	3.85	116.51	112.66<Fill>
Lot 3 VS	full	1.000	1.000	3839.39	10.80	42.05	31.25<Fill>
Lot 30 VS	full	1.000	1.000	4408.66	7.64	87.30	79.66<Fill>
Lot 31 VS	full	1.000	1.000	4414.79	8.87	77.55	68.67<Fill>
Lot 32 VS	full	1.000	1.000	4616.33	32.61	30.32	2.29<Cut>
Lot 33 VS	full	1.000	1.000	4707.32	13.48	50.25	36.77<Fill>
Lot 34 VS	full	1.000	1.000	3861.11	8.85	48.60	39.75<Fill>

Lot 35 VS	full	1.000	1.000	3840.00	4.32	97.74	93.42<Fill>
Lot 36 VS	full	1.000	1.000	3840.00	1.85	147.96	146.11<Fill>
Lot 37 VS	full	1.000	1.000	3840.00	0.17	201.79	201.61<Fill>
Lot 38 VS	full	1.000	1.000	4564.29	0.00	243.56	243.56<Fill>
Lot 39 VS	full	1.000	1.000	3790.81	0.00	301.73	301.73<Fill>
Lot 4 VS	full	1.000	1.000	3838.59	52.48	0.00	52.48<Cut>
Lot 40 VS	full	1.000	1.000	4000.00	0.00	364.91	364.91<Fill>
Lot 41 VS	full	1.000	1.000	4000.00	0.00	300.52	300.52<Fill>
Lot 42 VS	full	1.000	1.000	4465.24	0.07	248.10	248.04<Fill>
Lot 43 VS	full	1.000	1.000	5171.36	1.29	177.92	176.63<Fill>
Lot 44 VS	full	1.000	1.000	4448.55	5.13	68.51	63.38<Fill>
Lot 45 VS	full	1.000	1.000	3845.15	3.09	96.50	93.40<Fill>
Lot 46 VS	full	1.000	1.000	4776.17	0.29	201.63	201.34<Fill>
Lot 47 VS	full	1.000	1.000	5741.31	0.00	243.60	243.60<Fill>
Lot 48 VS	full	1.000	1.000	4900.21	0.00	371.37	371.37<Fill>
Lot 49 VS	full	1.000	1.000	5335.31	0.00	395.81	395.81<Fill>
Lot 5 VS	full	1.000	1.000	3837.76	110.96	0.00	110.96<Cut>

Lot 50 VS	full	1.000	1.000	4974.47	4.97	240.31	235.34<Fill>
Lot 51 VS	full	1.000	1.000	5856.54	0.49	121.62	121.13<Fill>
Lot 52 VS	full	1.000	1.000	6440.85	1.88	185.20	183.32<Fill>
Lot 53 VS	full	1.000	1.000	7562.37	0.15	688.25	688.10<Fill>
Lot 6 VS	full	1.000	1.000	3836.61	143.64	0.00	143.64<Cut>
Lot 7 VS	full	1.000	1.000	4040.76	128.21	0.00	128.21<Cut>
Lot 8 VS	full	1.000	1.000	4616.83	134.14	0.00	134.14<Cut>
Lot 9 VS	full	1.000	1.000	4398.04	165.00	0.00	165.00<Cut>

Totals

	2d Area (Sq. Ft.)	**Cut** (Cu. Yd.)	**Fill** (Cu. Yd.)	**Net** (Cu. Yd.)
Total	231472.76	1564.11	6080.24	4516.13<Fill>

* Value adjusted by cut or fill factor other than 1.0

Appendix G - Design Drawings

IMPROVEMENT PLANS FOR

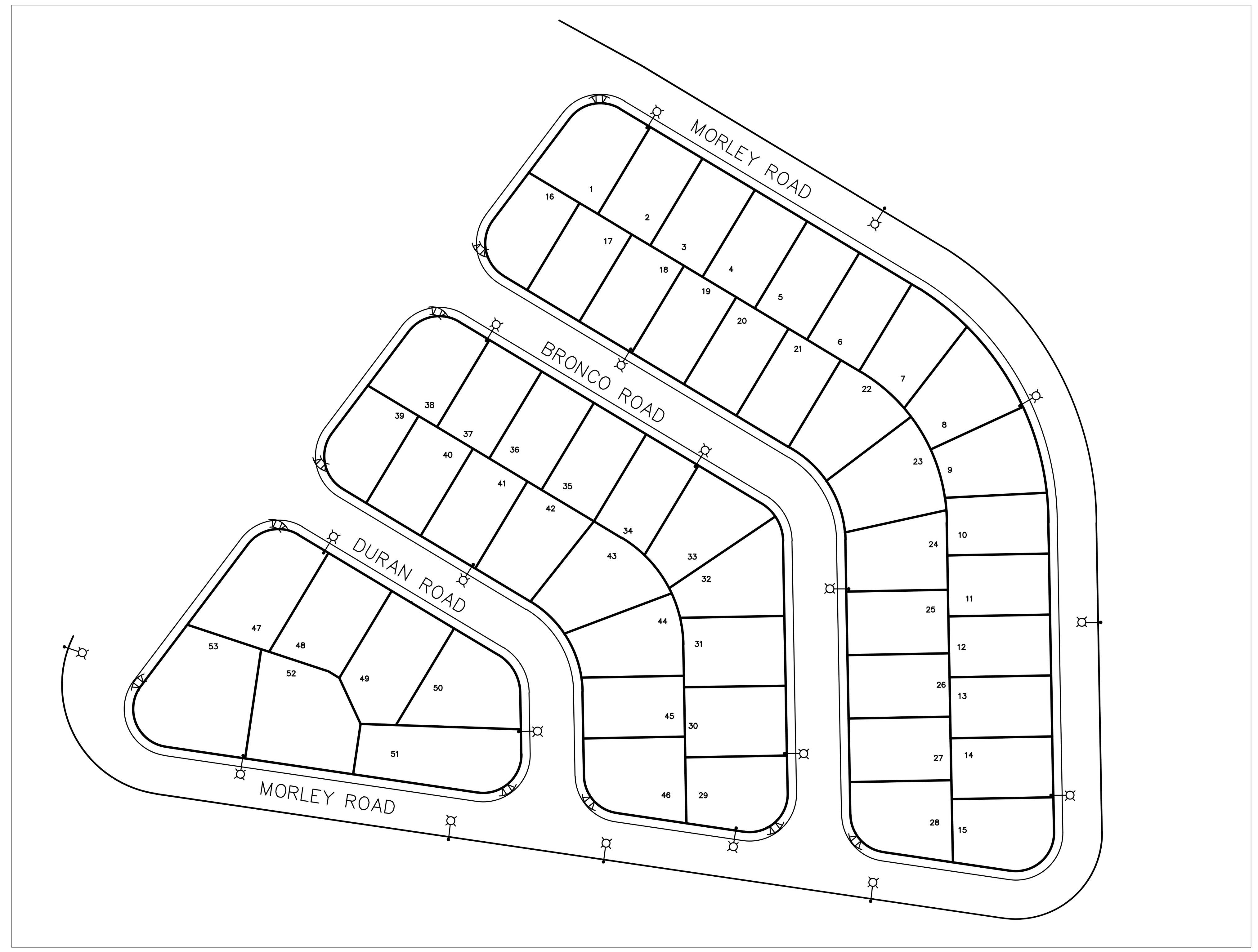
HOME RANCH

TRACT 10302

CITY OF GILROY, CA

VICINITY MAP

NO SCALE



LEGEND

SYMBOL	DESCRIPTION
	PROJECT BOUNDARY
	LOT LINE
	CENTERLINE
	SIDEWALK
	STORM DRAIN
	SANITARY SEWER
	WATER
	FIRE HYDRANT
	WATER VALVE
	ELECTROLIER

SHEET INDEX

Designed 2021/2022
Drawn Luke Lazzarini
Checked Patrick Hagerty
Approved ______ Date ______
Title ______ Job Class ______

CITY OF GILROY
Home Ranch
7351 Rosanna St. Gilroy, CA
City of Gilroy Planning Division
Office of Development

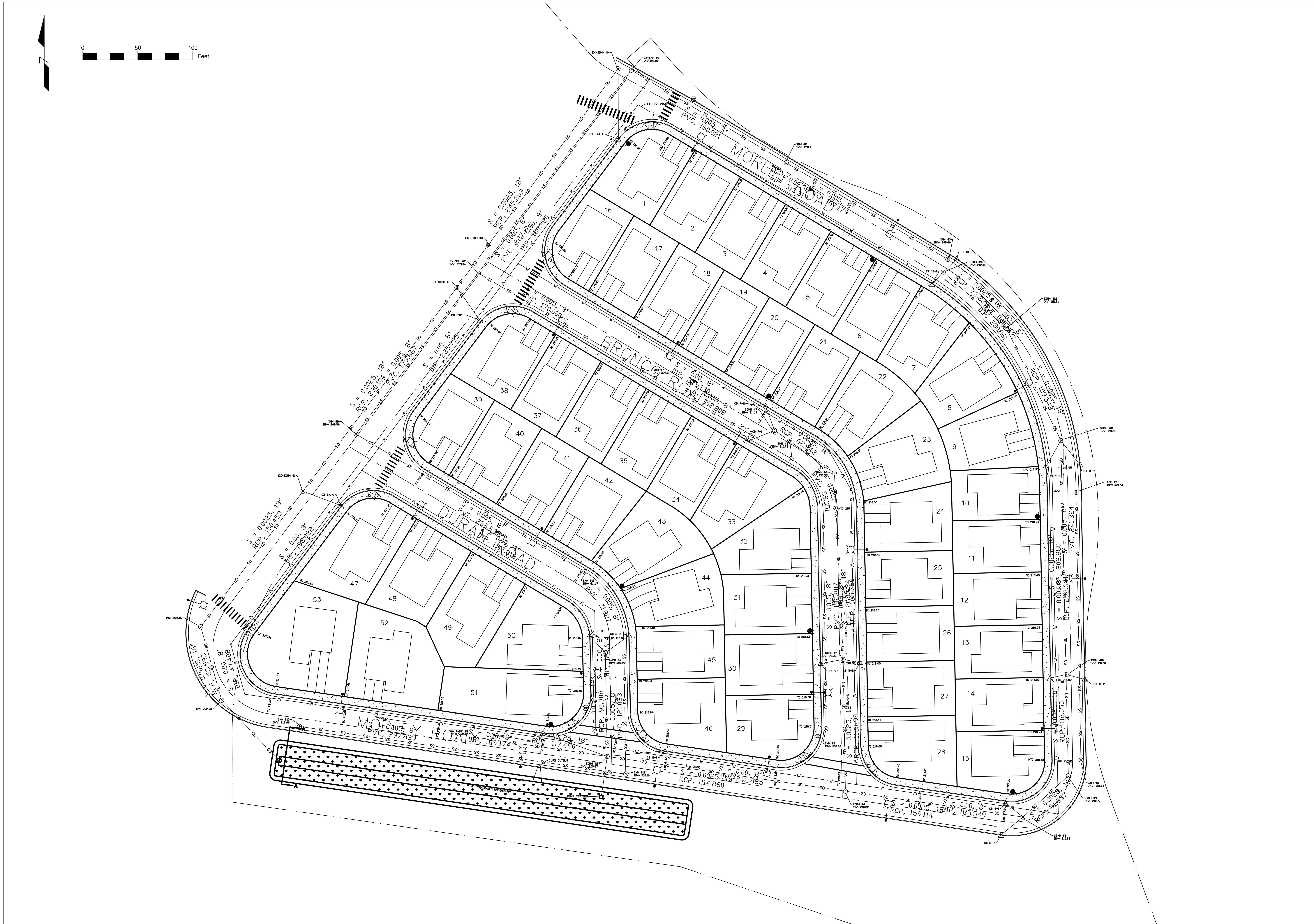
SANTA CLARA UNIVERSITY
PH-LL Engineering Senior Design
Department of Civil, Environmental and Sustainable Engineering

REVISIONS

Date	Description	Approved

File No. TITLE SHEET

Scale NO SCALE



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Approved ______ Date ______

Title ______ Job Class ______

CITY OF GILROY

Home Ranch

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Department of Civil, Environmental and Sustainable Engineering

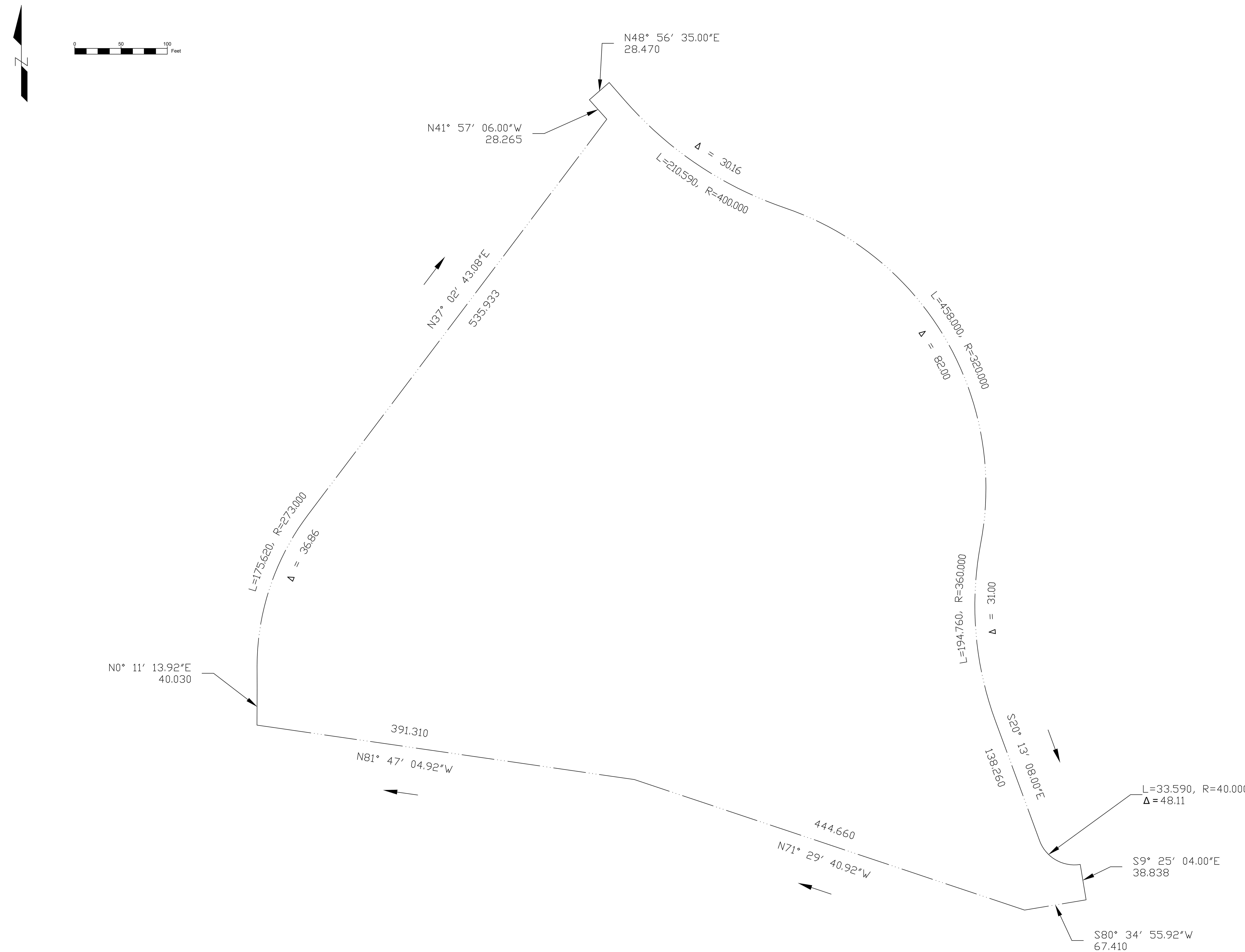
REVISIONS

Date	Description	Approved

File No.
ROAD SECTIONS

Scale
1:40

Sheet 2 of 14



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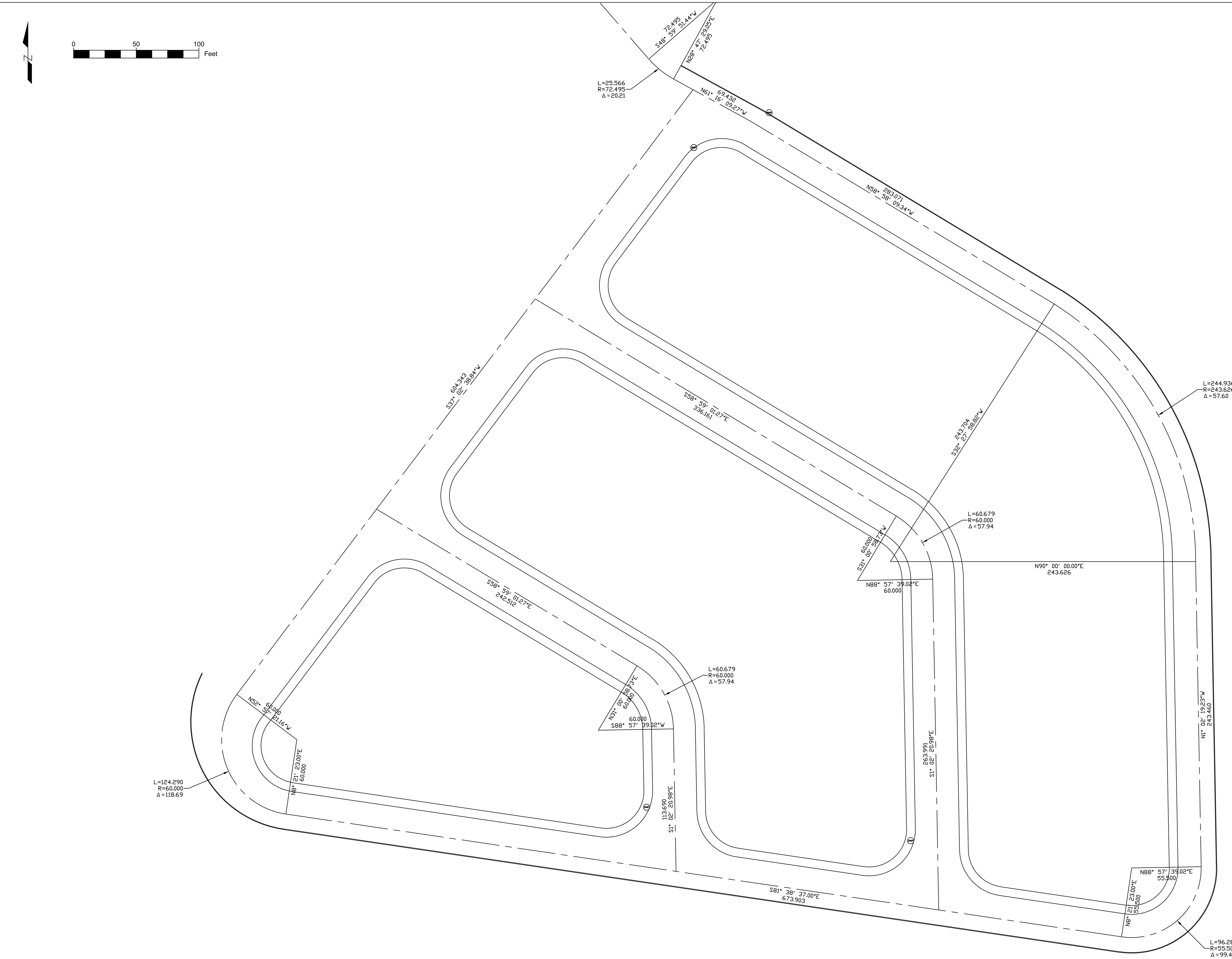
File No.
BOUNDARY DIMS

Scale
1:50

Sheet 3 of 14



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File No.
CENTERLINE DIMS

Scale
1:40

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Approved	Date
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File No.
LOT DIMS

Scale
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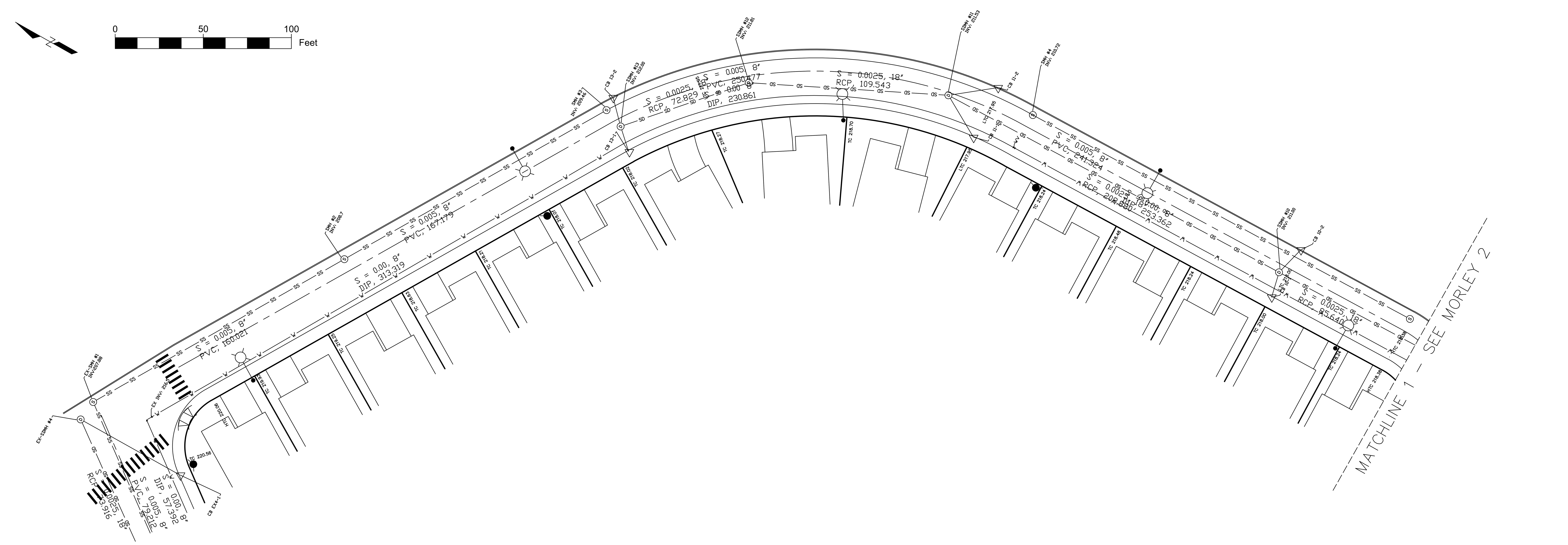
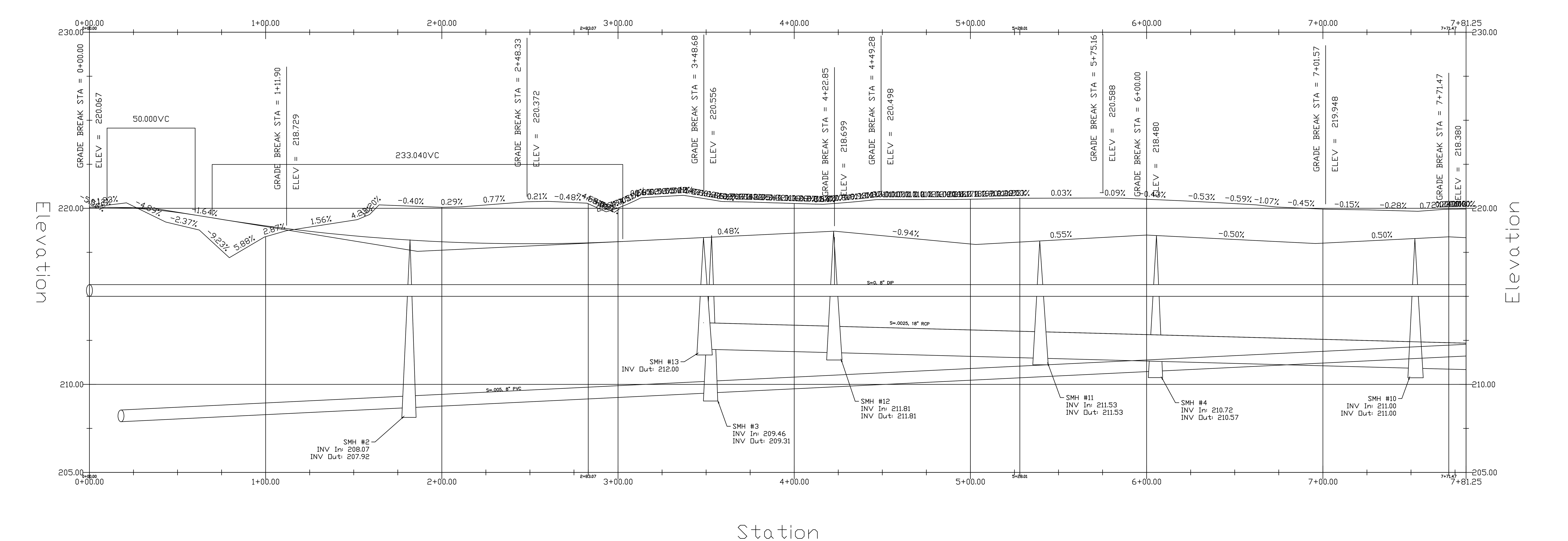
Sheet 5 of 14





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Date
Job Class
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Title

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Date
Description
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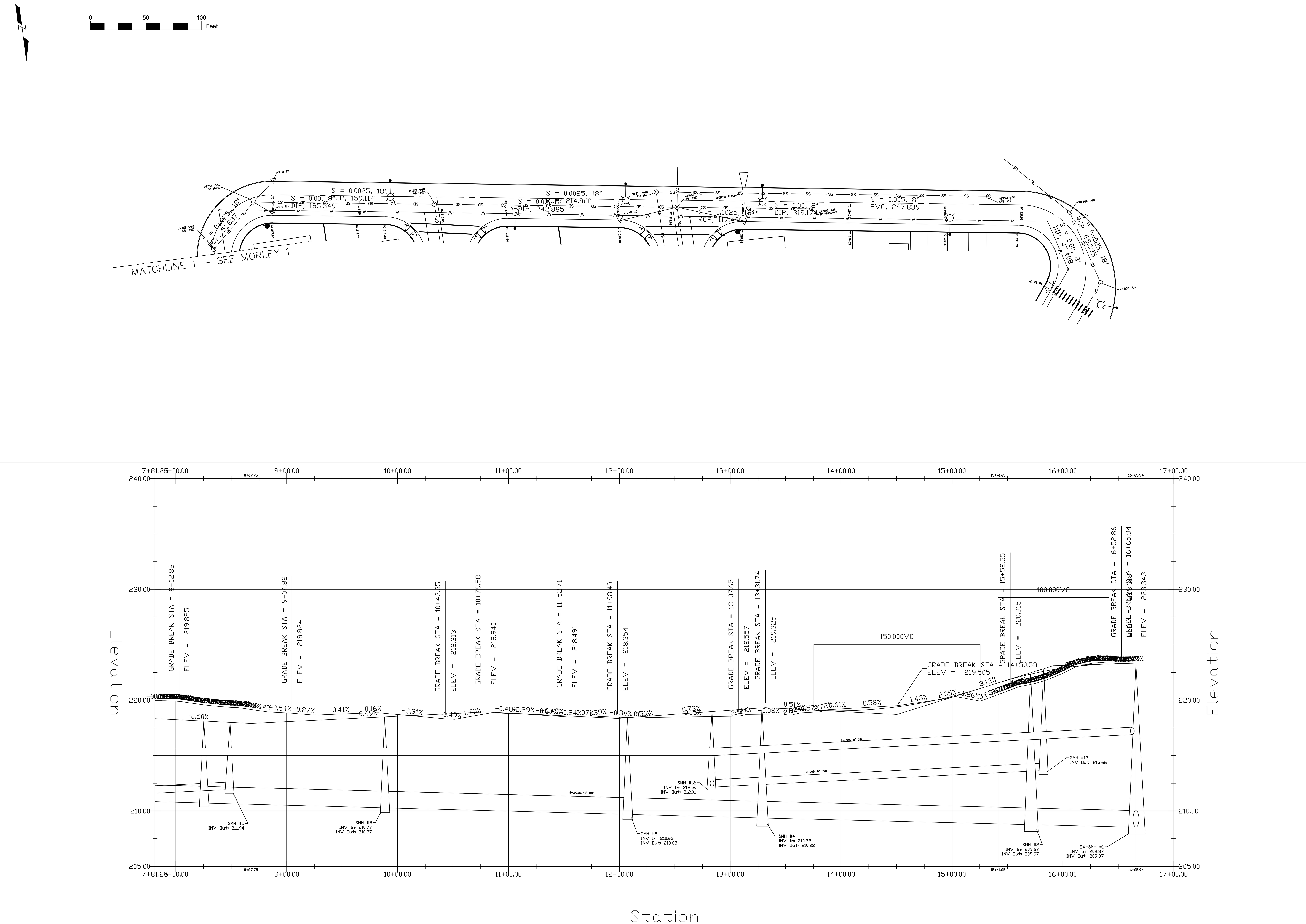
File No.
BRONCO 1

Scale
1:30

Sheet 6 of 14



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Job Class

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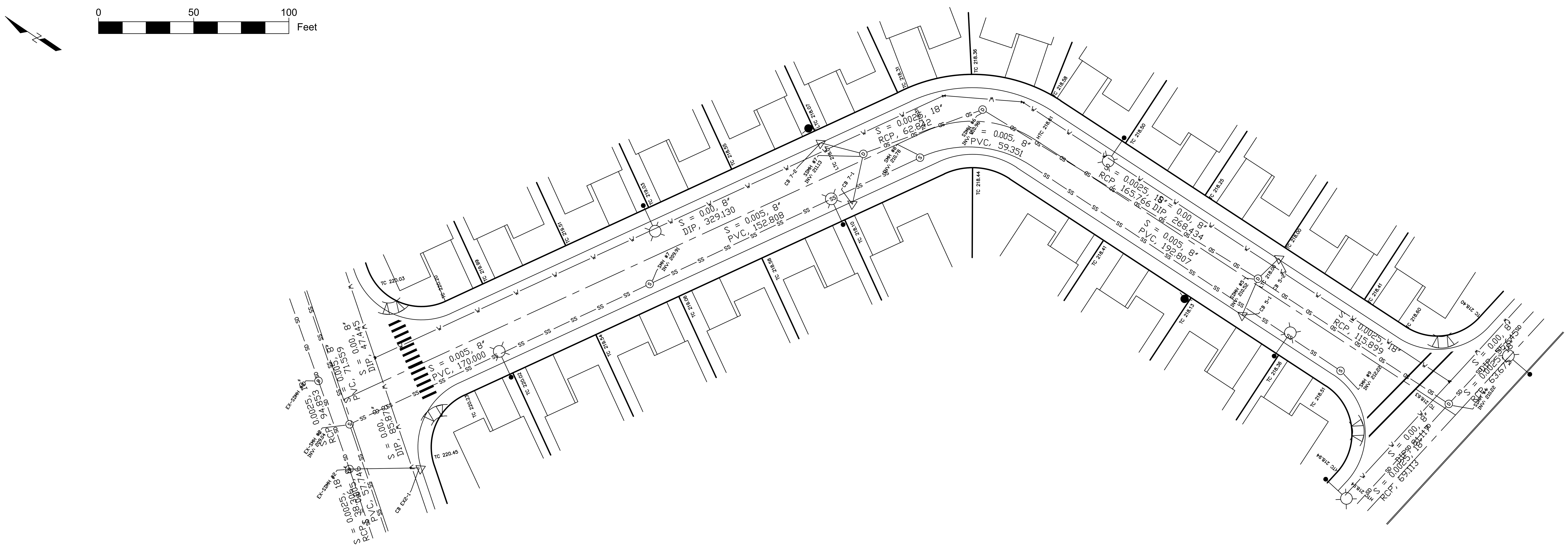
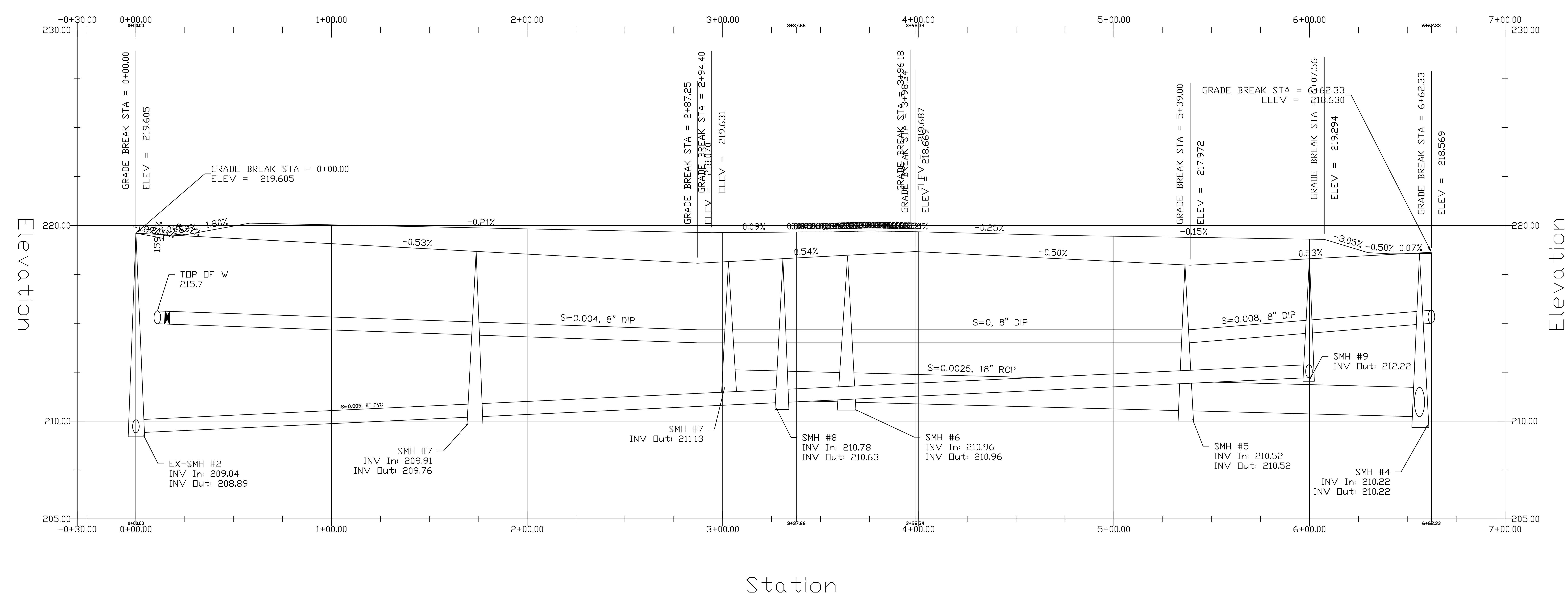
Date	Description	Approved

File No. BRONCO 2

Scale 1:30

Sheet 7 of 14





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Title ______ Job Class ______

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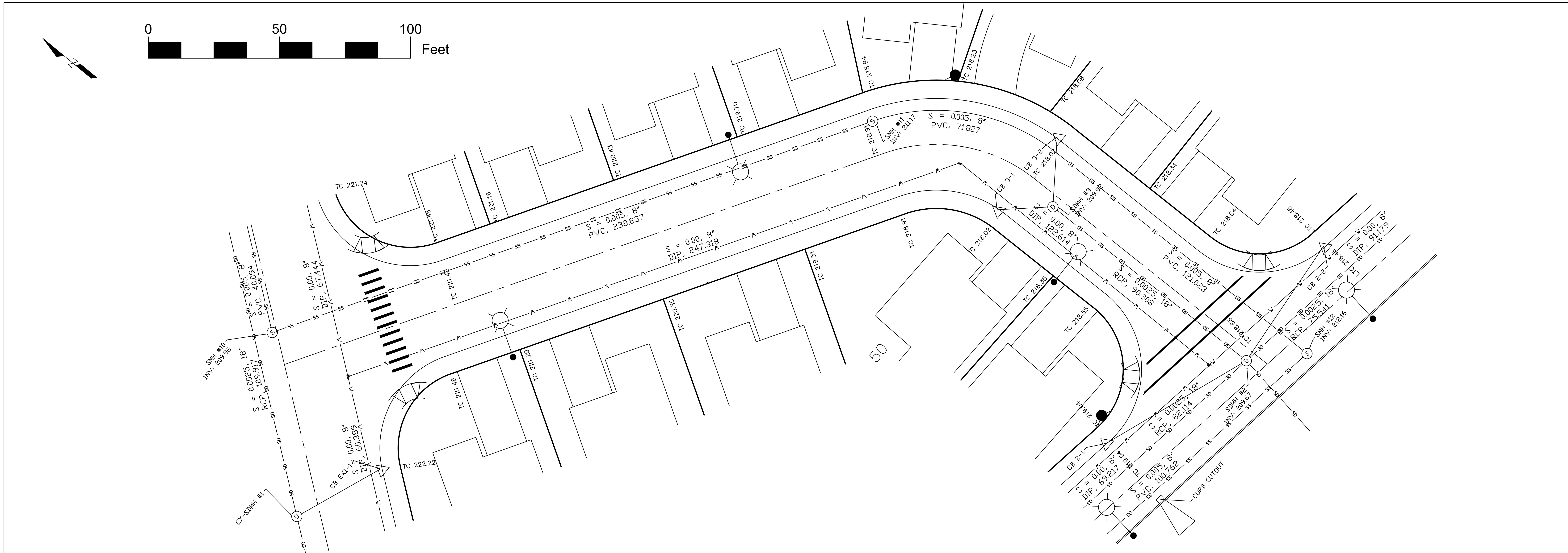
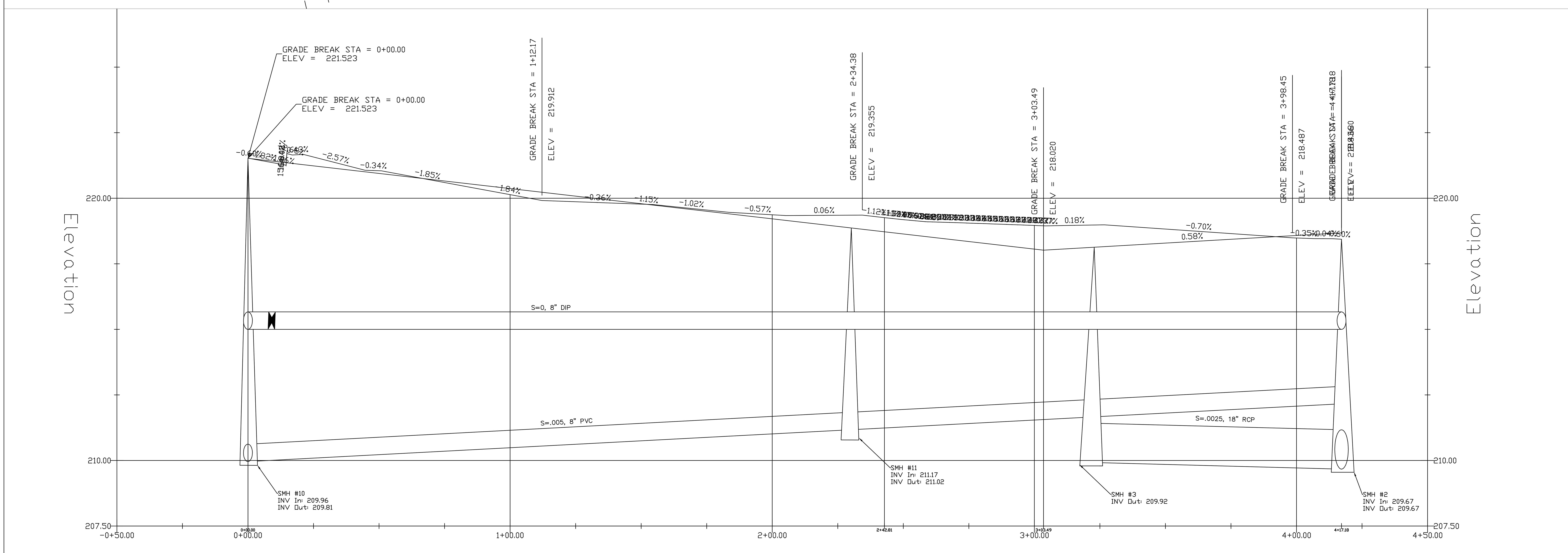
Date	Description	Approved

File No.
BRONCO

Scale
1:30

Sheet 8 of 14





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MM/YY

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Job Class

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Date
Description
Approved

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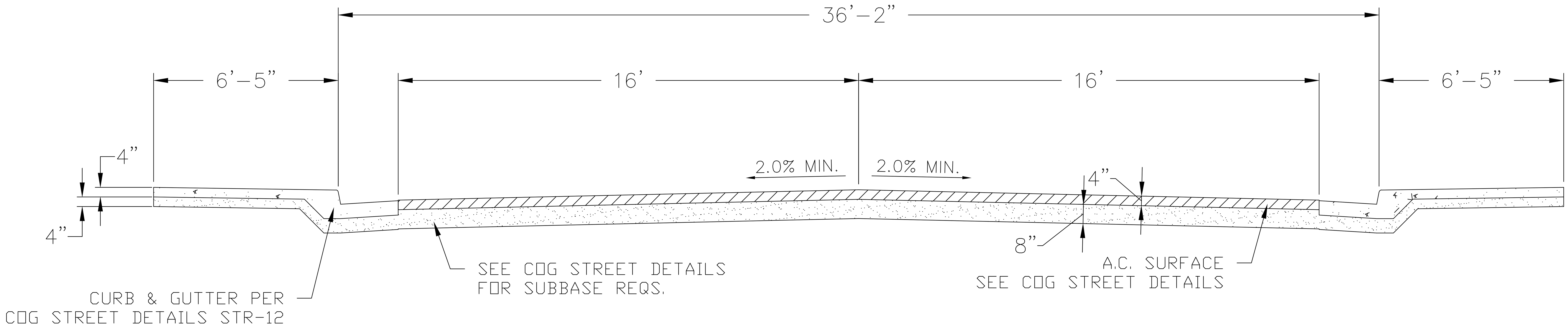
BRONCO

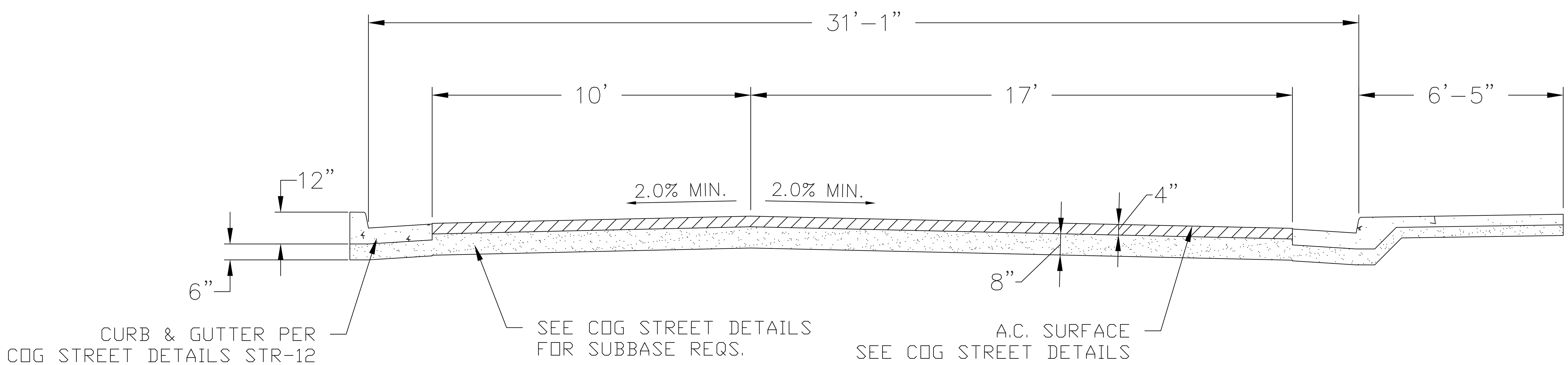
Scale
1:30

Sheet 9 of 14

49' TYPICAL ROAD SECTION – MONOLITHIC CURB/SIDEWALK



38'–1" ROAD SECTION – PARKING/SIDEWALK 1–SIDE



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Checked
Approved ______ Date ______
Title ______ Job Class ______

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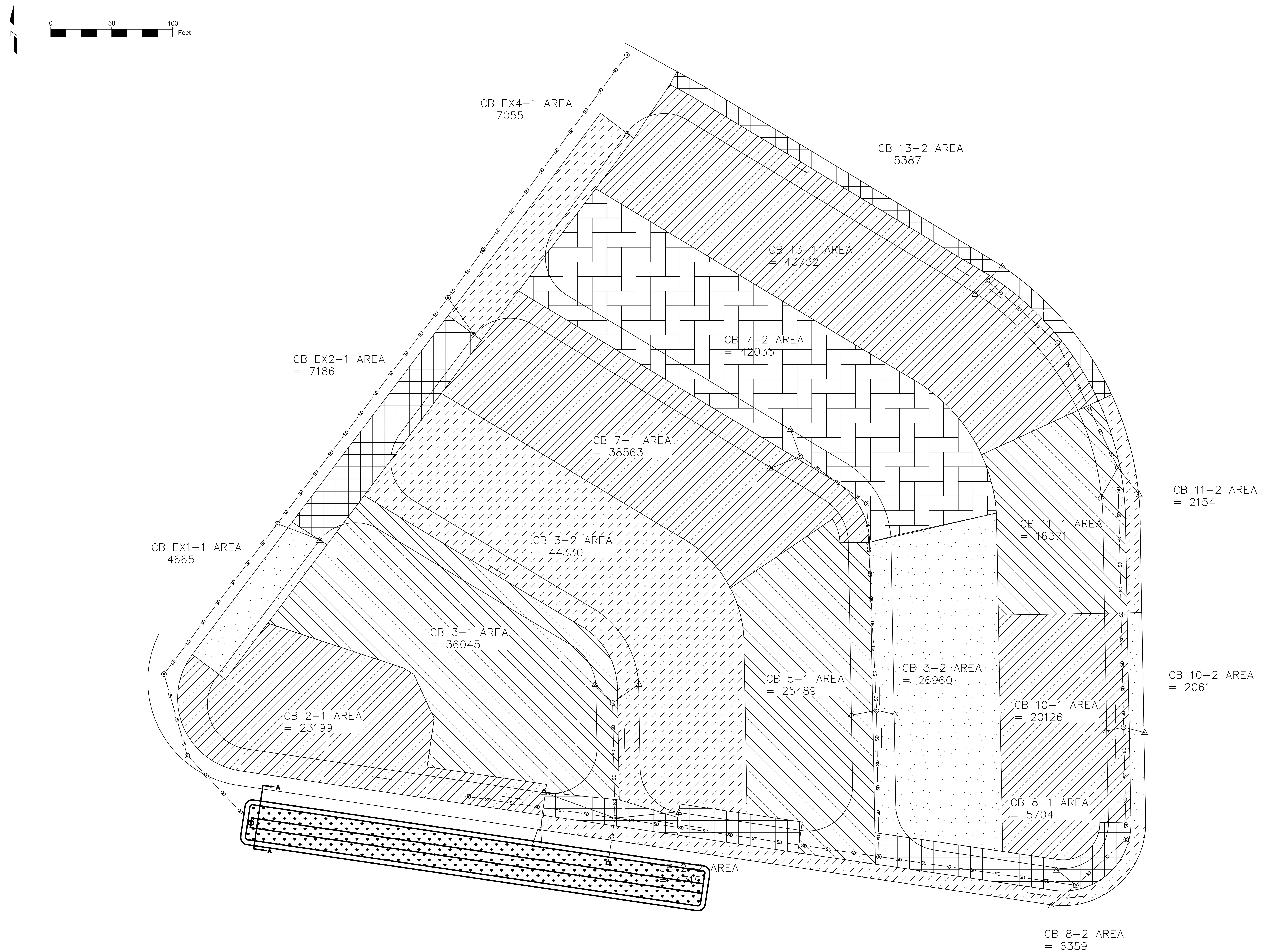
REVISIONS

Date	Description	Approved

File No.
ROAD SECTIONS

Scale
1:2

Sheet 10 of 14



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Approved ______ Date ______

Title ______ Job Class ______

CITY OF GILROY

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REVISIONS		
Date	Description	Approved

File No.
STORM

Scale
1:40

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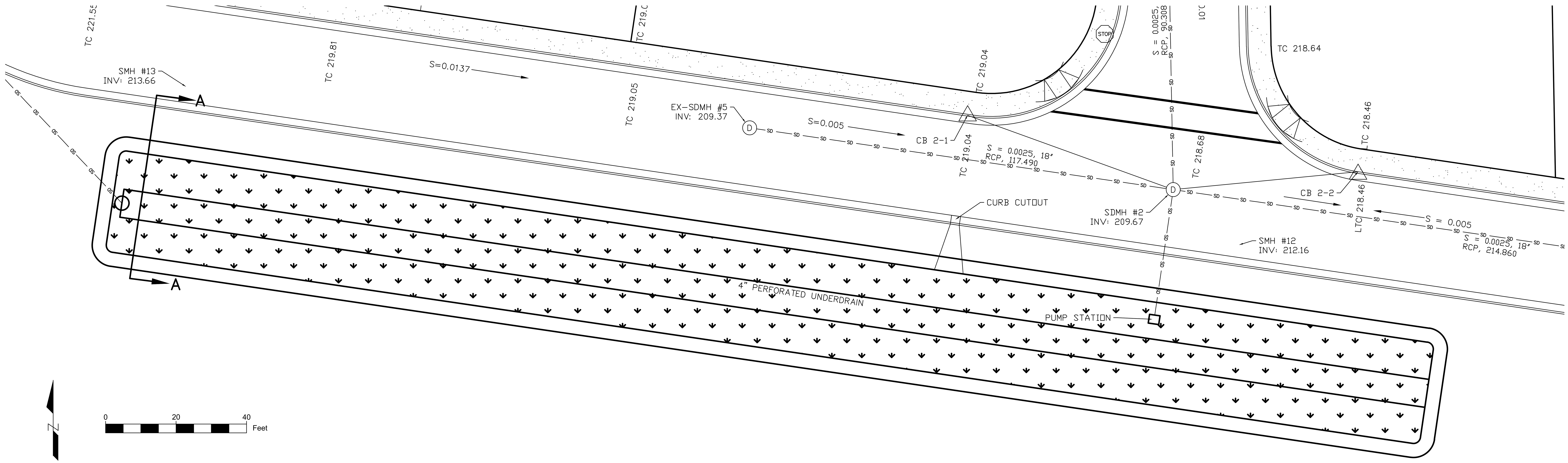

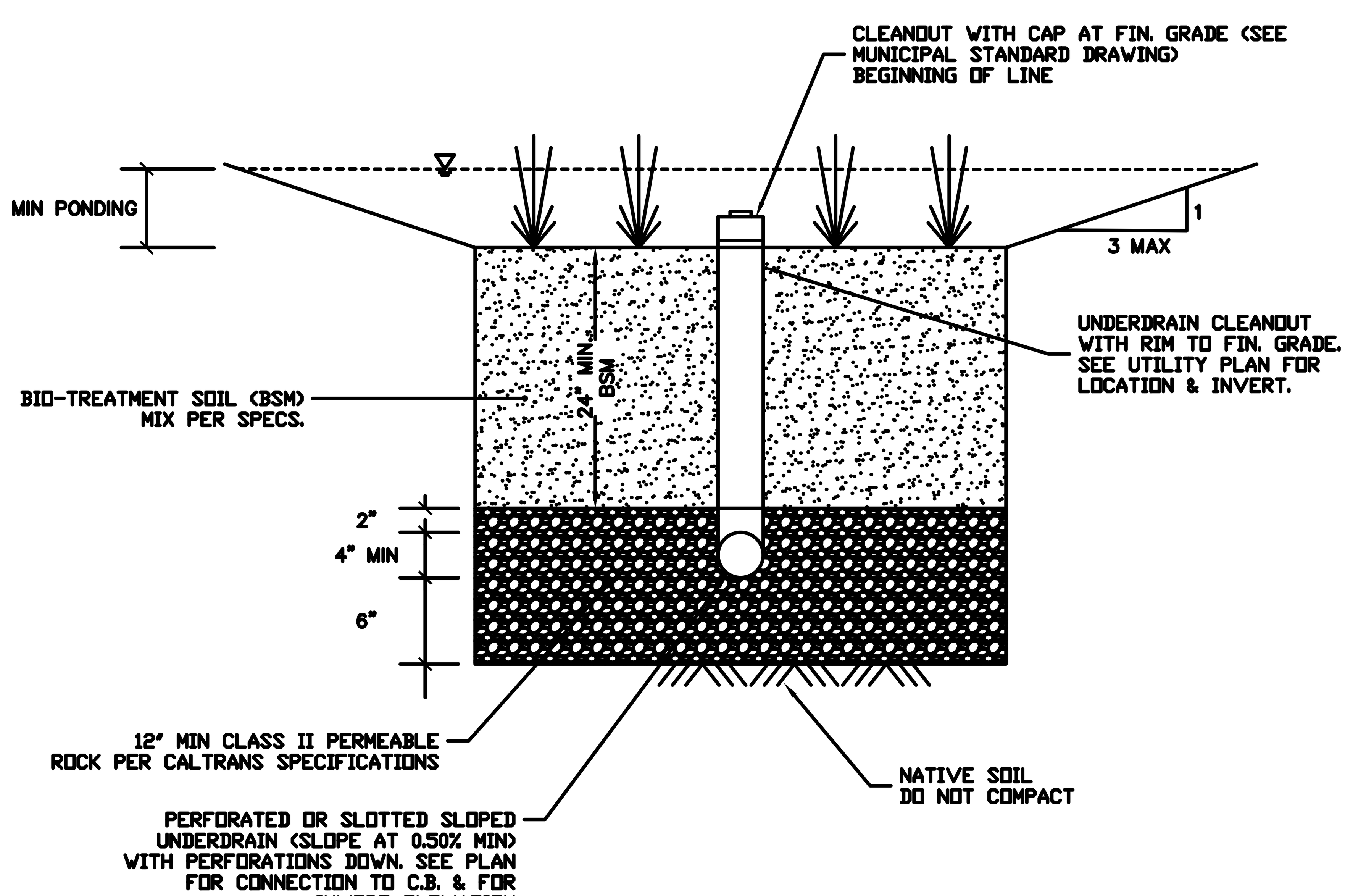

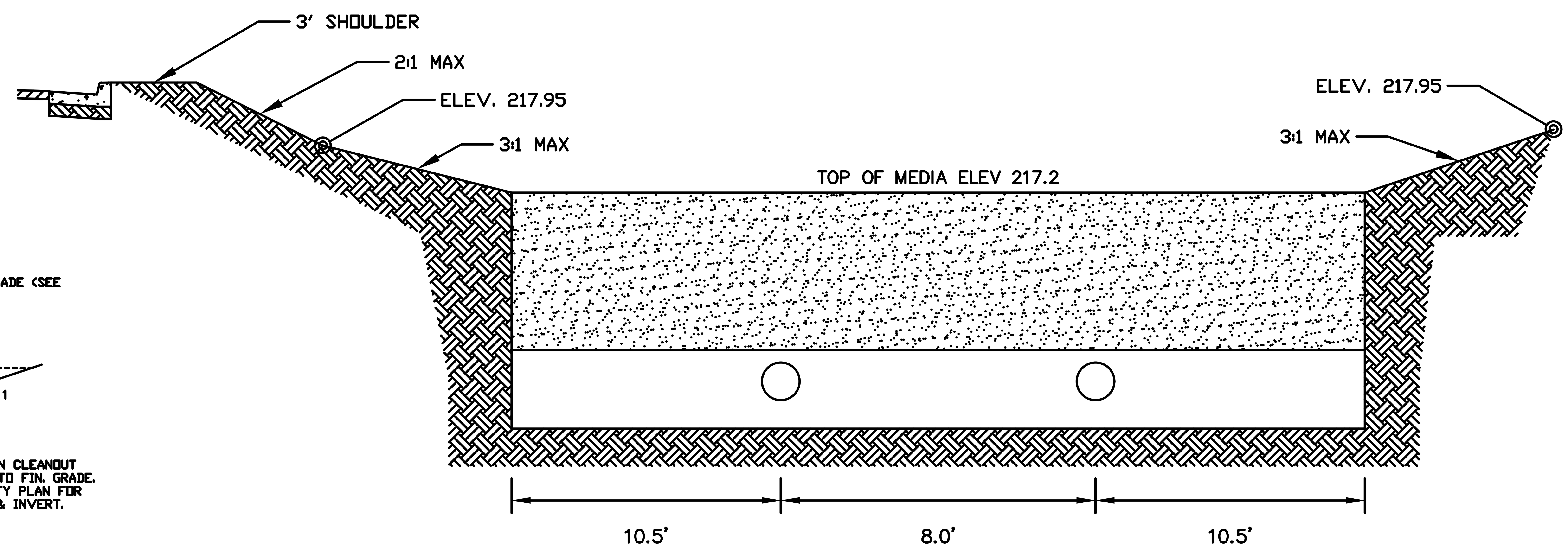

SECTION A–A

BIORETENTION CROSS SECTION

Designed	MM/YY
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Approved	Date
Title	Job Class

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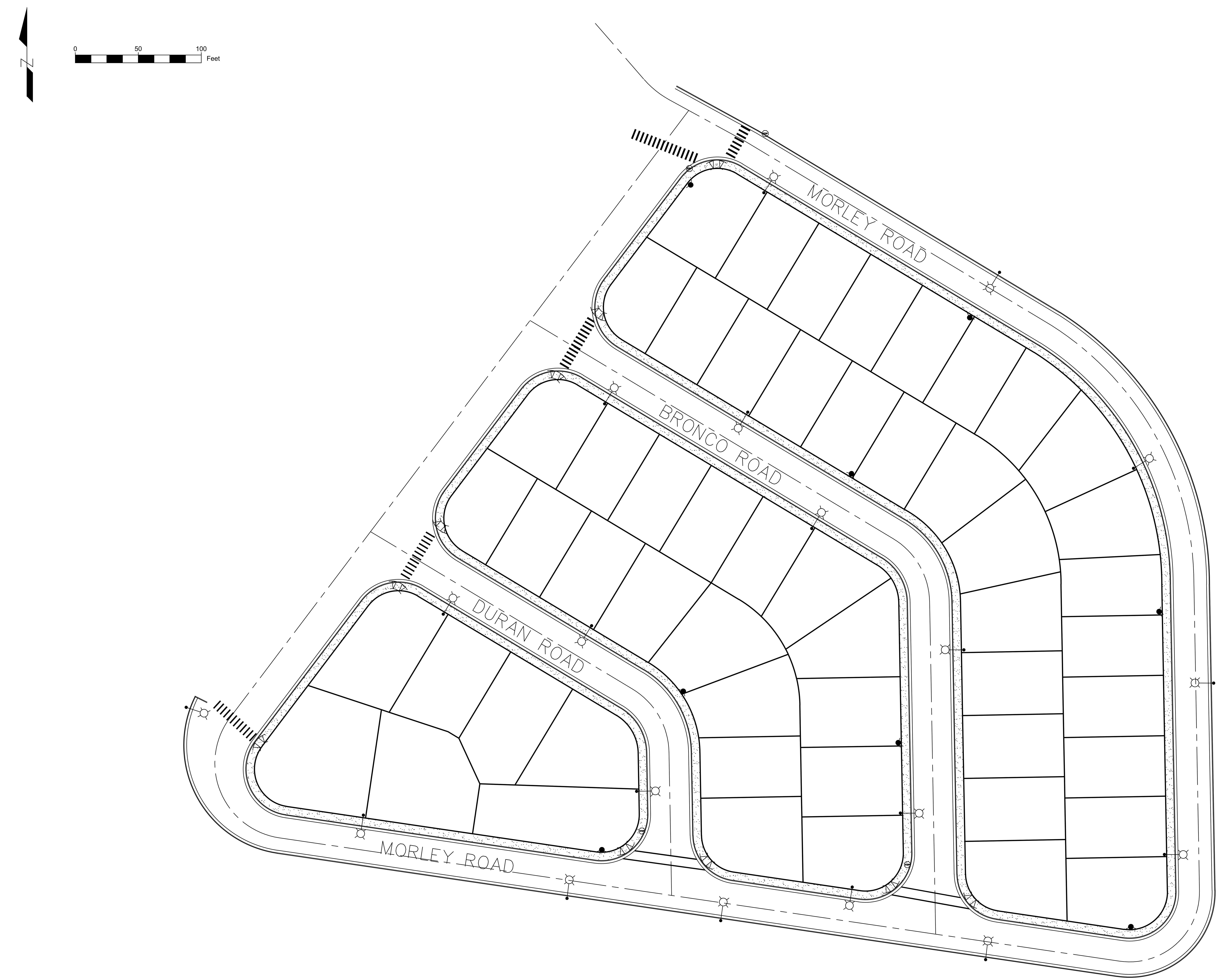
Date	Description	Approved

File No.
BIORETENTION

Scale
1:15

Sheet 12 of 14



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Approved ______	Date ______
Title ______	Job Class ______

CITY OF GILROY

Home Ranch

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Date	Description	Approved

File No.
SIGNS

Scale
1:40

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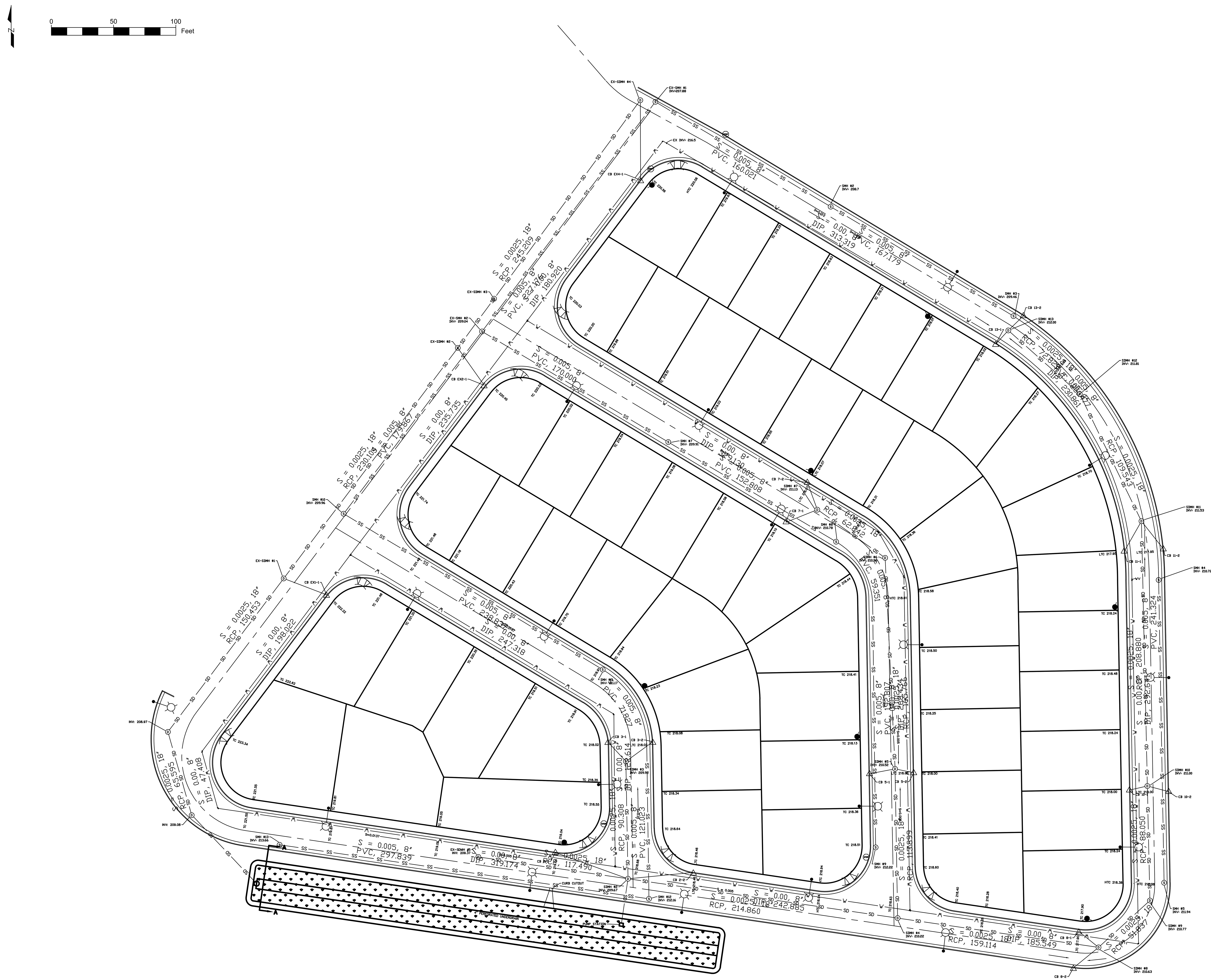

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Date
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Job Class

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REVISIONS		
Date	Description	Approved

File No.
ROAD SECTIONS

Scale
1:40

Appendix H - Engineer’s Estimate

Preliminary Opinion of Probable Cost of Developing Home Ranch

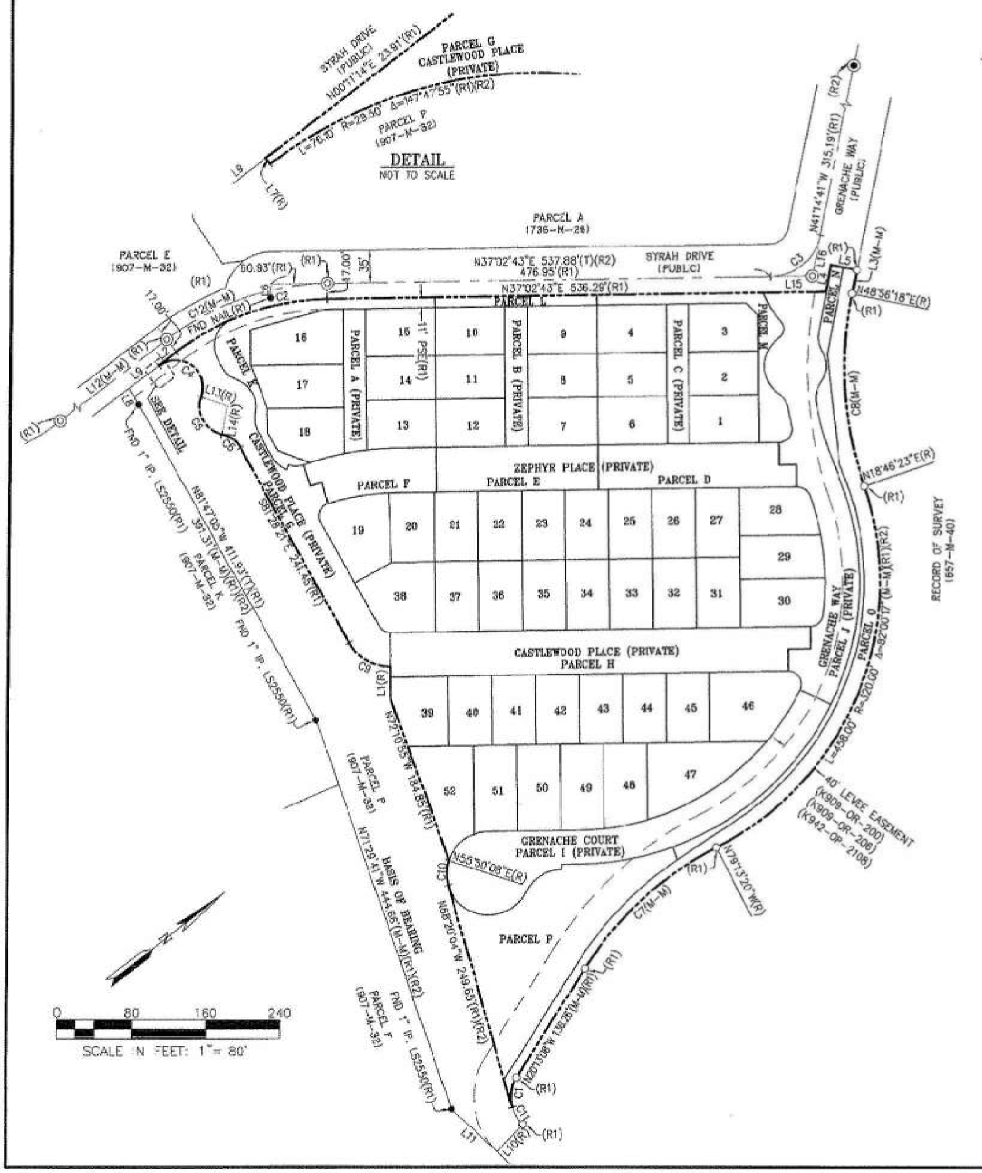
Summary

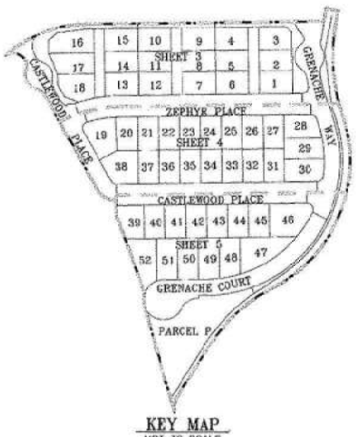
- **A. Grading**
- **B. Paving & Concrete**
- **C. Storm Drain**
- **D. Sanitary Sewer**
- **E. Water**
- **F. Miscellaneous**
- **G. Fees**
- **H. Total**

Item	Description	Quantity	Unit	Unit Price	Total
A. Grading					
1	Clear and Grub	8.31	AC	$1,750.00	$14,542.50
2	Excavation and Placement	7644.35	CY	$3.50	$26,755.23
3	Lot Fine Grading	53	EA	$610.00	$32,330.00
B. Paving & Concrete					
1	Street Fine Grading	104000	SF	$0.55	$57,200.00
2	Grind and Overlay	1000	SF	$4.00	$4,000.00
3	Street AC Pavement	100093	SF	$3.15	$315,292.95
4	Standard Curb and Gutter	3907	LF	$23.85	$93,181.95
5	4" PCC Sidewalk & Base	24699.22	SF	$5.05	$124,731.06
6	6" PCC Driveway	20300	SF	$7.20	$146,160.00
7	Accessible Ramp	10	EA	$1,320.00	$13,200.00
C. Storm Drain					
1	18" Storm Drain	1800	LF	$60.00	$108,000.00
2	Curb Inlet	15	EA	$1,975.00	$29,625.00
3	Bioretention Basin Inlets	1	EA	$1,975.00	$1,975.00
4	Manhole (less than 10')	12	EA	$4,000.00	$48,000.00
5	Manhole (10' to 15' deep)	3	EA	$6,750.00	$20,250.00
6	Connect to existing	1	EA	$1,050.00	$1,050.00
7	Bioretention Basin material	11120	SF	$20.00	$222,400.00
8	Storm Drain Pump Station	1	EA	$75,000.00	$75,000.00
D. Sanitary Sewer					
1	8" PVC SS	2540	LF	$37.00	$93,980.00
2	Manhole (less than 10')	11	EA	$4,500.00	$49,500.00
3	Connect to existing	1	EA	$1,050.00	$1,050.00
E. Water					
1	12" Water with Valves	615	LF	$70.00	$43,050.00
2	8" Water with Valves	2639	LF	$55.00	$145,145.00
3	Fire Hydrant	8	EA	$5,390.00	$43,120.00
4	Connect to existing	2	EA	$10,000.00	$20,000.00
F. Miscellaneous					
1	Signing and Striping	1	LS	$25,000.00	$25,000.00
2	Street Lighting	19	EA	$8,000.00	$152,000.00
G. Development Fees					
1	Public Facilities Fee	53	Unit	$18,474.00	$979,122.00
2	Sewer Development Impact Fee	53	Unit	$6,967.00	$369,251.00
3	Storm Development Impact Fee	8.31	Acre	$913.00	$7,587.03
4	Traffic Impact Fee	53	Unit	$10,241.00	$542,773.00
5	Water Development Impact Fee	53	Unit	$1,789.00	$94,817.00
6	Plan and Inspection Checks	12.6	%	-	$221,071.87
H. Total					
1	Total				$4,121,160.59

Item	Description	Quantity	Unit	Unit Price	Total
	D. Sanitary Sewer				
1	8" PVC SS	2540	LF	$37.00	$93,980.00
2	Manhole (less than 10')	11	EA	$4,500.00	$49,500.00
3	Connect to existing	1	EA	$1,050.00	$1,050.00
	E. Water				
1	8" Water with Valves	3254	LF	$55.00	$178,970.00
2	Fire Hydrant	8	EA	$5,390.00	$43,120.00
3	Connect to existing	2	EA	$10,000.00	$20,000.00
	F. Miscellaneous				
1	Signing and Striping	1	LS	$25,000.00	$25,000.00
	G. Development Fees				
1	Public Facilities Fee	53	Unit	$18,474.00	$979,122.00
2	Sewer Development Impact Fee	53	Unit	$6,967.00	$369,251.00
3	Storm Development Impact Fee	8.31	Acre	$913.00	$7,587.03
4	Traffic Impact Fee	53	Unit	$10,241.00	$542,773.00
5	Water Development Impact Fee	53	Unit	$1,789.00	$94,817.00
6	Plan and Inspection Checks	12.6	%	-	$219,909.52
	H. Total				
1	Total				$3,958,773.24

Appendix I - Applicable City and State Design Codes, Standards, and Reports





KEY MAP
NOT TO SCALE

LEGEND

	BOUNDARY LINE (DISTINCTIVE SYMBOL LINE)
	EXISTING LOT LINE
	NEW LOT LINE
	MONUMENT LINE/CENTERLINE
	EXISTING EASEMENT LINE
	NEW EASEMENT LINE
	TIE LINE
●	FOUND POINT, AS NOTED
○	1" IP, PLS 8859 TO-BE-SET
◉	FOUND STANDARD CITY MONUMENT
◎	SET STANDARD CITY MONUMENT, PLS 8859
FND	FOUND
IP	IRON PIPE
PSE	PUBLIC SERVICE EASEMENT
EVAE	EMERGENCY VEHICLE ACCESS EASEMENT
PSDE	PRIVATE STORM DRAIN EASEMENT
PSSE	PRIVATE SANITARY SEWER EASEMENT
(M-M)	MONUMENT TO MONUMENT
(T)	TOTAL DIMENSION
(R)	RADIAL BEARING
( )	RECORD DATA

LINE TABLE

LINE	BEARING	DIST	
L1	N52°57'17"W	35.24'	(R1)
L2	N00°11'14"E	23.91'	(R1)
L3	N41°03'25"W	26.14'	(R1)
L4	N41°57'06"W	29.39'	(R1)
L5	N48°56'35"E	28.47'	(R1)
L6	N52°57'17"W	15.00'	(R1)
L7	N89°48'46"W	0.50'	(R1)
L8	N81°47'05"W	20.52'	(R1)
L9	N00°11'14"E	40.03'	(R1)
L10	N09°25'04"W	40.00'	(R1)
L11	N80°34'56"E	67.41'	(R1)(R2)
L12	N00°11'14"E	346.56'	(R1)
L13	N57°59'09"E	30.50'	
L14	N40°55'51"W	30.50'	
L15	N37°02'43"E	44.77'	
L16	N41°14'41"W	44.77'	

CURVE TABLE

CURVE	LENGTH	RADIUS	DELTA	
C1	33.59'	40.00'	48°06'56"	(R1)
C2	175.62'	273.00'	36°51'29"	(R1)
C3	75.15'	55.00'	78°17'24"	(R1)
C4	76.10'	29.50'	147°47'55"	(R1)
C5	52.66'	30.50'	98°55'00"	(R1)
C6	25.46'	29.50'	49°27'30"	(R1)
C7	194.76'	360.00'	30°59'48"	(R1)(R2)
C8	210.59'	400.00'	30°09'55"	(R1)(R2)
C9	54.19'	50.50'	61°28'56"	(R1)
C10	26.84'	45.00'	34°10'11"	(R1)
C11	21.70'	40.00'	31°05'00"	(R1)
C12	186.55'	290.00'	36°51'29"	(R1)

BASIS OF BEARINGS

THE BEARING OF N71°29'41"W BETWEEN FOUND IRON PIPES ALONG THE SOUTH LINE OF "DESIGNATED REMAINDER C", AS SHOWN ON THE PARCEL MAP FILED JANUARY 25, 2001 IN BOOK 736 OF MAPS, AT PAGES 26 THROUGH 29, RECORDS OF SANTA CLARA COUNTY, CALIFORNIA WAS USED AS THE BASIS OF BEARINGS FOR THIS MAP.

REFERENCES

(R1) TRACT 10301 – (907-M-32)
(R2) PARCEL MAP – 736-M-26

NOTES

1. DISTANCES AND DIMENSIONS ARE IN FEET AND DECIMALS THEREOF.
2. TIELINES ARE 90° OR PERPENDICULAR TO THE MONUMENT LINE UNLESS OTHERWISE NOTED.
3. CHISELED CROSS SHALL BE SET ON CURB ALONG THE PROPERTY LINE OR ITS PROLONGATION.

EASEMENT NOTE:

THE EASEMENTS DESCRIBED IN THE AGREEMENT RECORDED OCTOBER 17, 1990 IN BOOK L511, PAGE 1739, OFFICIAL RECORDS OF SANTA CLARA COUNTY, CALIFORNIA, ARE NOT DEFINED IN THE DOCUMENT AND THEREFORE ARE NOT SHOWN ON THIS MAP.

TRACT 10302
HOME RANCH

CITY OF GILROY
SANTA CLARA COUNTY, CALIFORNIA

BEING A SUBDIVISION OF "PARCEL D" AS SHOWN ON THE MAP ENTITLED "TRACT 10301, WILD CHESTNUT", FILED SEPTEMBER 20, 2017 IN BOOK 907 OF MAPS, AT PAGES 32 THROUGH 43, RECORDS OF SANTA CLARA COUNTY, CALIFORNIA

Prepared By:
RUGGERI–JENSEN–AZAR
8055 Camino Arroyo, Gilroy, CA 95020
FEBRUARY 2018

JOB #102009

pg 4

City of Gilroy

GENERAL GUIDELINES

TABLE OF CONTENTS

Section 1

GENERAL

1. PURPOSE AND INTENT

The purpose and intent of this document is to clarify and consolidate present design criteria in the City of Gilroy. These standards are understood to be the minimum acceptable and more rigorous standards may be required depending on the nature of the development. These Standard Details, General Guidelines, and Technical Specifications (collectively, the “Standards”) apply to all new development, including streets, and utilities, within the City of Gilroy. Exceptions to these Standards are at the discretion of the City Engineer.

Per Resolutions _______ the City of Gilroy recommends that the most current Community Design and Transportation Guidelines published by the Santa Clara Valley Transportation Authority (VTA) be followed for design where possible. The Community Design and Transportation Guidelines emphasize a roadway design that encourages all to walk, bike, and to take transit as a viable choice as opposed to a means of last resort.

All projects shall be designed to Complete Streets standards, Complete Streets are designed, operated and maintained so they are safer, more comfortable, materially sustainable, and convenient for all users – pedestrians, bicyclists, transit users, commercial delivery services, and motorists, - of all ages and abilities. See Section 3 for further information.

All projects shall include a storm water control plan and detail how storm water quality, post-construction is being addressed. See Section 7 for further information.

2. SCOPE

The Design Standards as hereinafter specified shall be used as the basis of design for all development within the jurisdiction of the City of Gilroy.

3. FINAL AUTHORITY

The City Engineer is the final authority on all questions which may arise as to the interpretation of these standards. All exceptions to these General Guidelines, Technical Specifications, and Standard Details shall be requested in writing, clearly identified on the tentative map and/or improvement plans and shall be approved by the City Engineer prior to approval of the tentative map and/or improvement plans.

4. GENERAL NOTES

Required City General Notes for all improvement plans are included as Appendix A – Section 1 of these Design Standards.

5. DRAWINGS

5.1 GENERAL

- Final original plans shall be mylar.
- Mylars shall be 24 in x 36 in.
- All construction documents shall be signed along with the Engineer’s seal by a qualified individual appropriately licensed in the State of California.
- All plans shall have a sheet index on the title (cover) page of the plans that

includes a sheet number, sheet name and description. (See example below)

SHEET INDEX

SHEET NO.	SHEET NAME	DESCRIPTION
1	T–1	TITLE SHEET
2	K–1	KEY MAP
3	F–1	FENCING AND SIGNAGE PLAN
4	F–2	FENCE DETAILS
5	F–3	FENCE DETAILS
6	LGU–1	LAYOUT, GRADING & UTILITY PLAN – GRID B2
7	LGU–2	LAYOUT, GRADING & UTILITY PLAN – GRID B3
8	LGU–3	LAYOUT, GRADING & UTILITY PLAN – GRID B4
9	LGU–4	LAYOUT, GRADING & UTILITY PLAN – GRID C4
10	LGU–5	LAYOUT, GRADING & UTILITY PLAN – GRID D4
11	LGU–6	LAYOUT, GRADING & UTILITY PLAN – GRID E4

5.2 DRAWING SUBMITTALS

All Tract Maps, Parcel Maps, Improvement Plans, and Capital Project Plans will require submittal of AutoCAD and Mylar plans as follows:

PLAN TYPE	WHAT IS SUBMITTED	WHEN PLANS ARE SUBMITTED
Tract Maps and Parcel Maps	Mylar AutoCAD Site Plan	Mylar to be submitted after review is complete AutoCAD files will need to be submitted with Mylar set. 8.5"x11" Site Plan to be submitted with final plan review set for addressing.
Improvement Plans	Mylar AutoCAD	Mylar to be submitted after review is complete AutoCAD files will need to be submitted with Mylar set.
Capital Projects	Mylar AutoCAD	Mylar to be submitted after review is complete AutoCAD files will need to be submitted with Mylar set.

5.3 SITE PLANS (ADDRESSING)

8.5" x 11 Site Plans shall be submitted so that addressing can be assigned to the project and shall show the following (Submitted in AutoCAD or PDF format):

1. Tract Number or Parcel Map Number
2. Tract Name or Parcel Map Name
3. Lot Numbers
4. Street Names
5. Property and Right of Way Lines
6. North Arrow

7. Curb Cuts for driveway (if possible)
8. Location of existing and proposed Fire hydrants
9. Vicinity Map

5.4 RECORD DRAWINGS

The Contractor shall be responsible for regularly maintaining and a complete marked up "As-Built" job set of Contract Documents throughout the duration of the project construction. These plans shall indicate all approved deviations from original contract documents and precise physical layouts of exposed and concealed work. Before final inspection, the Contractor shall submit the marked up "As-Built" job set to the City for review (for Development Projects: See Appendix A – Section 3 "Development Project Closeout").

For City Capital projects, once approved by the City, the Contractor shall submit a marked up "As-Built" job set to the Designer to draft on mylar with permanent ink. All deviations shall be outlined with a "cloud" with pertinent notations. Each sheet shall be stamped "Record Drawings" along with the Designer's signature and date. After the Designer has incorporated all the Record drawing information, the "Record Drawing Set" shall then be submitted back to the City in mylar form.

In addition to the mylar form, AutoCAD files of the Record Drawing set shall be submitted. The AutoCAD file shall be submitted as single drawings via the "x-bind" command. Separate "x-reference" files shall not be allowed. Please call the City for the latest version of AutoCAD.

5.5 AUTOCAD SUBMISSION STANDARDS

AutoCAD files shall be submitted for all Tract Maps, Parcel Map, Improvement Plans, and Capital Project Plans.

(A) Projection information – Drawing Environment
- U.S. Foot Units
- California State Plane Coordinates, Zone III, NAD83 Datum
- Reference monument with tie line

Optional Drawing environment

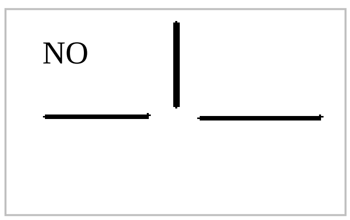
- U.S. Foot Units
- Start at 0,0 and proceed in a positive, Cartesian grid (World). For example, set drawing up on a standard 10,000 x 10,000 grid.
- Reference information of *at least* two *existing* points or features, separated onto a different layer. The reference points should be in opposite corners of the project area. This can take various forms. For example, two street intersections and their centerlines will usually work, or the original parcel boundaries that circumscribe the development.

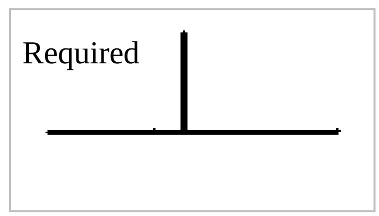
(B) File Parameters
- AutoCAD DWG or DXF file format, (contact City for version).
- Submit an index or graphical legend:
  - Layer Names and descriptions
  - Blocks with description and insertion point
- System Variables
- UCS = World
- DVIEW ➔ Twist = 0, SNAP Angle = 0

- Basepoint = 0,0
- No XREFS, Queries, or Cataloged Files, No Attached Images of any kind
- No BIG Fonts or shape files (SHX)
- No ARX or other Proxy Objects
- Purge all unused Blocks, Layers, Styles, etc
- Do an AUDIT before submittal
- Do not put any objects in Paper Space
- Test for 'UFOs' i.e. do a Zoom Extents; if the drawing disappears, you have a feature at the limits of the drawing that should be eliminated.

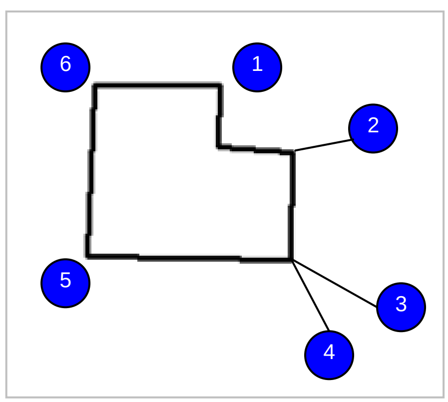
(C) Feature Element Parameters

- No Ellipses
- No 3D Objects, Extruded features
- All features should be coplanar, no vertical curves, all with ELEV set to 0
- No Solids or hatching
- No Dimension Objects or Leaders
- Intersecting lines should meet at the same coordinate. For example, many survey-based documents use and iron pin (IP) at intersecting lots. When the IP is removed, it creates a whole as in the following figure:

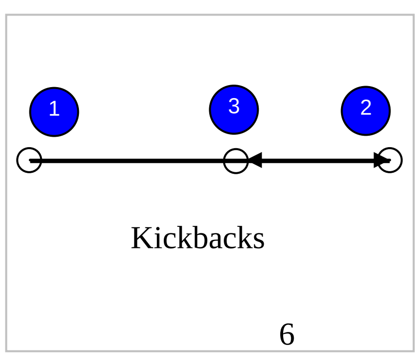


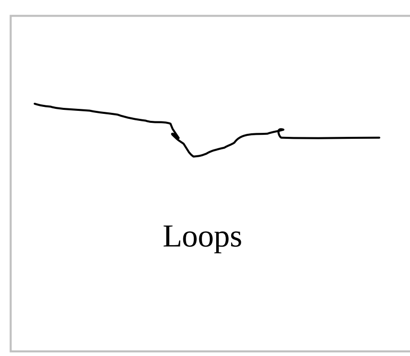


- Polygons.
  - Should be closed (use the Close Option)
  - Do not contain vertices that have the same coordinate:



- Polylines should not have a thickness or custom linetype. Test and eliminate any kickbacks or loops.





    - Sewer and Storm digitized in the direction of flow
    - Streets digitized in the direction of increasing address range
    - Use simple 2-point lines and true curves (no vertical curves)
- Test and eliminate any zero-length lines, polylines LWPolylines. Test for, and eliminate 'null' text.
- No Sketched linework
- Blocks.
    - Insertion point should be the centerpoint of the object
    - Unitless values, all with the same scale factor
    - Do not use blocks that represent anything other than a point feature. For example, model homes and condominiums are polygon features that can be represented as a block inserted into a drawing many times.
    - As an alternative, blocks can be represented as simple point features provided that each point feature class is placed on its own layer. For example, all fire hydrants are points on a FHYD layer and all water valves are points on a WTRV layer.
- Text.
    - Simple text strings or MTEXT (limited to 254 characters) only.
    - Do not use special characters or formatting options (e.g. %%d, %%u etc).

(D) Critical Layers/Features
The WBLOCK feature will be used for the following layers for GIS. All linear features can be drawn as simple lines, true curves polylines.

Core Features
- Parcels
- Street Centerlines
- R/W
- Easements (Ingress/Egress)
- Situs Address
- APN*
- Street Name
- Building Footprint
- Fire Hydrants

Utilities
- Water, Sewer, Storm Utilities
- Street Lights
- Handicap Ramps

Structure – Target Hazards
- Building Footprint
- Structural Load – bearing Walls
- Elevators
- Stairs
- Standpipes
- Shut-off valves
- Alarm Panels

* Could be supplied by Cross Table by Lot #

5.6 SCANNING

Contractor shall contact the City for <u>file name convention</u>. Scanning Specifications are as follows:

File type: PDF
Resolution: 300 dots per inch
Media: CD, DVD, or Flash Drive

All PDF images shall be placed on a CD, DVD, or Flash Drive. The CD, DVD, or Flash Drive shall be labeled appropriately as shown below:

- Tract Map shall contain Tract # and Tract Name
- Parcel Map shall contain Parcel Map Name and Parcel Map # (book and page)
- Improvement Plans shall contain Tract# and Tract Name;
- Capital Projects shall contain the Project Number and name of the Capital project

Scanning shall occur at the following times:

PLAN TYPE	WHEN PLAN IS SCANNED
Tract Map	After the Final Map has been Recorded
Parcel Map	After the Map has been Recorded
Improvement Plans	After the plans have been approved AND after the project is completed and Record Drawings have been submitted.
Capital Projects	After the plans have been approved AND after the project is completed and Record Drawings have been submitted.

ELECTRONIC FILES

All electronic files submitted to the City shall follow the following format:

Type	Comments
CD, DVD, or Flash Drive	CD, DVD, or Flash Drive shall be labeled appropriately. If necessary, large files may be compressed via "WINZIP"
Text	Microsoft Word – Contact City for latest minimum version
Spreadsheet	Microsoft Excel, – Contact City for latest minimum version.
CAD	AutoCAD – Contact City for latest minimum version

6. CHECK LISTS

An Improvement Plan and Final Map checklist are included as Appendix A & B of these General Guidelines. Their purpose is to familiarize the development engineer with most of the items checked by the City to ensure compliance and completeness of improvement plans and Subdivision Final Maps submitted for review.

The development engineer shall provide a checked-off copy of the appropriate checklist when submitting the plans for initial review. Any areas not applicable, not in compliance or requiring a variance from these General Guidelines shall be so noted.

7. EXCEPTIONS

All standards listed herein shall be followed unless an exception or deviation is approved in writing by the Public Works Director/City Engineer.

8. FLOODPLAIN MANAGEMENT

See City of Gilroy Floodplain Management Ordinance (Ordinance No. 98-17).

9. STORM WATER MANAGEMENT

Refer to the City of Gilroy Municipal Code, Chapter 27C (Municipal Storm Water Quality Protection and Discharge Control), Chapter 27D (Post-Construction Storm Water Pollution Prevention) Regional Storm Water Management plan (SWMP) and NPDES General Permit for City of Gilroy, and Storm Water Guidance.

Section 2

TENTATIVE MAPS

Section 2

TENTATIVE MAPS

1. FILING

(a) No tentative map involving residential sites except for those specifically exempted by the residential development ordinances will be received for filing unless the city council, through competitive evaluation, has given the project a ranking and a build out schedule assignment. The number of copies required by the tentative map application of any proposed subdivision shall be filed with the planning department by the developer or by his agent.

(b) The tentative map submitted shall not be considered to be complete or ready for filing until a completed environmental clearance document for the project has been approved.

(c) Vesting tentative map submittals shall not be considered to be complete or ready for filing until submitted simultaneously with a completed application for architectural and site review. (Ord. No. 81-11, 1, 3-16-81; Ord. No. 85-15, 1, 8-19-85)

2. FORM

The tentative map shall show the following information:

(a) The tentative map number (once assigned) and name, or designation;

(b) Sufficient legal description of the land as to define the boundaries of the proposed tract;

(c) Name and address of the owner, the developer, and of the registered civil engineer or licensed surveyor who prepared the map;

(d) The location, names and widths of all adjoining highways, streets and roads;

(e) The width and approximate grades of rights-of-way and roadways for all highways, streets and roads within such proposed development, with typical cross-sections showing proposed improvements;

(f) The widths and approximate locations of all existing or proposed easements, whether public or private, for roads, drainage, sewers, slope, or public utility purposes;

(g) Approximate radii of all curves;

(h) The proposed lot layout and the approximate dimensions of each lot;

(i) Approximate location, names and directions of flow of all watercourses and natural drainage channels; and approximate locations of all areas covered by water or subject to overflow by one percent flood;

(j) Draft Storm Water Control Plan per the Storm Water Management Guidance Manual for Low Impact Development and Post-Construction Requirements;

(k) Source of water supply and proposed distribution system;

(l) Nearest source of recycled water, if available within 1,000’ of project boundary or description of location if greater than 1,000’ from the project boundary;

(m) Proposed method of sewage collection and disposal;

(n) Proposed route of drainage system;

(o) Proposed use of property;

(p) Proposed public areas, if any;

(q) Identify any public landscape areas that will be dedicated to the city (the project will be conditioned to annex into the Citywide Landscape Maintenance Community Facilities District No. 2012-1 to fund new landscape maintenance);

(r) Approximate contours where topography controls the street layout;

(s) Date, north point, and scale;

(t) Approximate location and outline to scale of each: Building, tree with six-inch or greater caliper trunk at a level of four and half (4.5) feet above existing ground, or structure on the site and the identification of which of the above will not be moved or removed by development;

(u) Each street shown by its actual street name or by temporary name or letter for purpose of identification until the proper name of such street is determined. All names shall be as accepted by the street naming committee, the county communications agency and the fire chief and then approved by the city council. Duplication of existing names will not be allowed.

(v) Identify phasing, if phasing is proposed.

The following information shall be required for all vesting tentative maps at the time of application submittal:

(a) A soils report shall be prepared that examines the property of all phases from the proposed subdivision.

(b) Proposed off-site routing plans for sewer, water, storm drainage, primary vehicular street access, and secondary emergency access shall be provided.

(c) Complete grading plans shall be prepared that illustrate all proposed cuts and fills. (Ord. No. 85-15, 2, 8-19-85)

If it is impossible or impracticable to place upon the tentative map any matter hereinabove in this section required, such matter or information shall be furnished in a written statement which shall be submitted with such map. (Ord. No. 81-11, 1, 3-16-81; Ord. No. 85-15, 2, 8-19-85)

Section 3

STREETS

Section 3

STREETS

1. GENERAL

All streets shall be designed in accordance with accepted engineering principles and shall conform to these Design Standards, the Standard Details, and the Complete Streets Resolution approved by City Council. These standards apply equally to public and private streets and shall not be diminished by zoning ordinance changes through the PUD process.

The City of Gilroy recommends that the Community Design and Transportation Guidelines published by the Santa Clara Valley Transportation Authority (VTA) be followed for design where possible. The Community Design and Transportation Guidelines emphasize a roadway design that encourages all to walk, bike, and to take transit.

All projects shall be designed to Complete Streets standards, Complete Streets are designed, operated and maintained so they are safer, more comfortable, materially sustainable, and convenient for all users – pedestrians, bicyclists, transit users, commercial delivery services, and motorists, - of all ages and abilities.

Complete Streets, shall provide:

- Safer Conditions for all
- Choices for travel
- Cost effectiveness and sustainability
- Options to reduce climate change
- Encouragement toward healthy/active living

Consistent with 2013 City Council priorities, Complete Streets fulfill the desire of Gilroy residents to walk and bike more, to have streets accessible to everyone, to accommodate all users during all phases of a project, promote conservation of limited city resources including condition of pavement, and promote land use - transportation connections choices for all its residents. Complete Streets as outlined herein and in Section 3: Streets, is provided to assist the development community to fulfill the minimum standards of the Complete Streets Resolution, approved by City Council on November 5, 2012.

Ultimately, the safety and convenience of all users of the transportation system including pedestrians, bicyclists, transit users, and motor vehicle drivers, shall be accommodated and balanced in all types of transportation and development projects and through all phases of a project, so that even the most vulnerable – children, elderly, disabled veteran, and persons with disabilities – can travel safely within the public right-of-way.

All projects shall be designed to reduce pollutant discharge to the maximum extent practicable, after the construction of the project. Projects shall incorporate low impact development design strategies and treatment systems.

Underground Service Alert shall be contacted at 811 or (800) 227-2600 (www.usanorth.org) a minimum of two working days prior to any work being done.

2. STREET RIGHTS OF WAY

(a) Right-of-way widths and typical sections for various classes of streets, including private roads, shall conform to the latest edition of the City of Gilroy Standard Details.

(b) Additional right-of-way and improved street width may be required at intersections for turn lanes. The need for turn lanes and the lengths of turn pockets and transitions will be based on anticipated traffic volumes, design speed, level of service, and other design factors.

(c) Non Standard Street design shall comply with the intent of the Complete Streets Resolution.

3. ALLEY RIGHTS OF WAY

See City of Gilroy Code Section 2112.

4. STRUCTURAL SECTION

(a) The top 8 inches of subgrade shall be compacted per the geotechnical recommendations but to not less than 95% maximum density. In areas of fill, a minimum of 24 inches from finished grade shall be compacted to not less than 95%maximum density.

(b) The minimum Traffic Index shall be as follows:

	T.I. (Minimum)
• Local & Collector Streets	8.5
• Industrial	9.0
• Arterial	9.0
• Expressway	9.0

(c) A qualified geotechnical engineer shall prepare the necessary soils report and shall recommend the pavement section and address the relative expansiveness of the soil.

(d) The structural section shall be a minimum of 4-inches of asphalt concrete over 8-inches of aggregate base.

5. DESIGN SPEEDS

Design speeds will be as follows:

	Speed	**Minimum Normal Crown (Centerline Radius)**
Local Streets – (to a maximum of)	25 mph	290 ft
Collector and Industrial Streets	35 mph	610 ft
Arterial Streets	45 mph	1090 ft
Expressways	55 mph	1840 ft

Design criteria specified in the Caltrans Design Manual is applicable.

6. HORIZONTAL ALIGNMENT

(a) Intersection Angle: Streets shall intersect at right angles. Curved streets shall have at least 50 feet of centerline tangent from the projected curb line of the intersecting street.

(b) Opposing Streets: All streets entering upon opposite sides of any given street shall have their centerline directly opposite each other or separated by at least 100 feet.

(c) Street Curvature: Design of curved arterial and collector streets shall be based on the State of California Department of Transportation Highway Design Manual.

(d) There shall be a tangent between reversing curves of at least 150 feet on arterial and collector streets, and 50 feet on all other streets.

(e) Cul-de-sac: The maximum number of lots on a cul-de-sac street, from center of intersecting street to center of turn-around, shall be 25. If cul-de-sac is longer than 500 feet, it shall require a mid-block turn around.

(f) Curb Return Radii (Face of Curb)

1. Residential and Non-Residential - Maximum radius shall be 12 feet.
2. Commercial - Minimum radius shall be 25 feet.
3. Industrial - Minimum radius shall be 30 feet.

(g) Minor Streets: Minor streets shall be laid out in such a way that their use by through traffic is discouraged, but shall be designed to fit intended uses.

7. VERTICAL ALIGNMENT

(a) Gutter Flowline Grades: Grades shall not be less than 0.5 percent from centerline of nearest intersection to centerline of next street intersection and not greater than 15 percent average. Where matching existing controls, the minimum grade may be reduced with the approval of the City Engineer.

(b) Grades on opposite sides on the street shall be the same wherever practical.

(c) Curves: Where the curb radius is less than 100 feet it shall have a grade of not less than 0.50 percent.

(d) Curb Returns: The minimum fall around returns shall be 0.20 feet.

(e) Cross Slope: The standard cross slope of the street shall be 2.0 percent. Where necessary when matching existing facilities, the cross slope may vary between 2 percent and 4 percent, as approved by the City Engineer.

(f) Vertical Curves: Vertical parabolic curves shall be used to connect grade profiles where the algebraic difference in grade rates exceeds 1.5 percent. The length of vertical curve required shall be determined by the following:

Class of Street	**Minimum Stopping Sight Distance**	**Minimum Length of Curve**
Arterial and Industrial	350 feet	200 feet
Collector	200 feet	100 feet

Minor	100 feet	100 feet
Cul-de-Sac	100 feet	100 feet

* The minimum length may be reduced in specific design situations upon approval of the City Engineer.

8. SIGNALIZED INTERSECTIONS and INTER-SIGNAL COMMUNICATIONS and CONTROL CONDUIT

(a) Traffic signals shall be designed and installed in conformance with the latest Caltrans Standard Specifications and Plans unless otherwise specified by the City Engineer in writing.

(b) Light emitting diode (LED) signal modules shall be used for all 8" & 12" red/yellow/green sections, red/yellow/green arrow sections and pedestrian signal faces. All LED signal modules shall meet CaltransStandards.

(c) A model 170E Traffic Controller Assembly unit with BI Tran Systems, Inc., 233 Program and internal modem (GDI Model 5M 2400SA) shall be installed in a Caltrans Model 332 cabinet. The front door shall face away from the intersection.

(d) Type III-AF Service Equipment Enclosure shall conform to Caltrans Standard Plans.

(e) One internally illuminated LED street name sign shall be mast arm mounted for each approach (a four-leg intersection would have four signs). Signs shall be Type A and "double sided." Lettering shall be series E, 8-inch uppercase and 6-inch lowercase. Refer to Caltrans Standard Plans for mounting and wiring requirements.

(f) One pole mounted reflective street name sign with associated block numbers conforming to City of Gilroy Standards shall be provided per east-west and north-south direction. A four-leg intersection would have two signs, one installed at the northwest corner and one at the southeast corner.

(g) At signalized intersections, street name signs shall follow the naming conventions:

- First St
- Church St
- Wren Ave
- Santa Teresa Blvd

Numbered Streets shall be spelled out and Street, Avenue, Drive, Boulevard, Place, Court, shall be abbreviated as St, Ave, Dr, Blvd, Pl, and Ct respectively (no period at end of abbreviation)

(h) Traffic Signal Priority Control System for Emergency Vehicle Preemption shall be installed. The system shall be compatible with Type 170 Controller and existing Opticom components and software. Two Emergency Preemption Phase Selectors (Opticom Model 752, as manufactured by 3M Corporation) or approved equal, Four Optical 2-channel Detectors(Opticom Model 721) or equal, and 3-M 757 Auxiliary Wiring Harness shall be installed with the 3M Opticom Priority Control System/Model170E controller.

(i) Battery Backup System (BBS) shall be included in the controller cabinet. The BBS shall provide sufficient backup power to operate the intersection traffic signal equipment for a minimum of 4 hours.

(j) Underground Conduit shall be provided to connect new traffic signals to closest practical existing traffic signal within paved street ROW. Conduit shall be Quad

Innerduct Schedule 40, consisting of one white 1.5 inch, one grey 1.5 inch, one pink 1.5 inch, and one sky blue 1.5 inch conduit held at uniform spacing by an innerduct lattice/banding of appropriate spacing as common in industry standard for underground work. Pull boxes shall join innerduct conduit together, preferably along street side planter strips at spacing no farther than 800 feet apart, or at one corner of major intersections, whichever occur sooner. Each conduit run shall include a nylon pull rope sufficient in design to act as a pull rope for up to 144 strand fiber optic cable. Pull box and trenching details are as outlined in traffic signal standard details.

(k) All new traffic signal will be fitted with ADA compliant pedestrian activated call devices (PPB). Where necessary, a supplemental PPB may be provided for the ease of use of differently baled individuals.

(l) All new traffic signals will be fitted with countdown pedestrian walking phase modules.

9. CURB, GUTTER, SIDEWALK, CURB RAMPS

(a) Curb, gutter and sidewalk shall be installed in conformance with the City of Gilroy Standard Details and in conformance with the latest version of the Caltrans Standard Specifications, Section 90 and consistent with Federal Guidelines of the Americans with Disabilities Act.

(b) Curb and Gutter

1. Rolled curb shall not be allowed.
2. Depressed-type curb and gutter, 1" minimum height, shall be installed at all driveway locations.
3. All private streets and commercial/industrial driveways shall have a standard driveway curb cut. Exceptions to be approved by the City Engineer.

(c) Sidewalk

1. Residential: Minimum sidewalk width shall be 5 feet (excluding curb width on monolithic curb, gutter, and sidewalk.)
2. Industrial: Minimum sidewalk shall be 5 feet.
3. Commercial: Minimum sidewalk width shall be 10 feet (excluding curb width on monolithic curb, gutter, and sidewalk).
4. Sidewalk widths shall provide a minimum of a 4-foot clearance around street lights and fire hydrants.

(d) Pedestrian Access Ramps

Pedestrian access ramps shall be installed according to the City of Gilroy Standard Details and in accordance with current Americans with Disabilities Act (ADA) Standard requirements

(e) Replacement and Repair

Where existing curb, gutter, sidewalk and driveways do not meet the current City standards and are in need of repairs, it shall be the developer's responsibility to remove and replace the deficient curb, gutter and sidewalk. Where curb, gutter, sidewalk and/or driveways are removed, the concrete shall be removed to the nearest expansion, weakened plane or construction joint or sawed at the nearest score line to a minimum depth of 1-1/2 inches.

(f) Street name Signs

The permanent street name signs shall be installed per City of Gilroy Standard Details and immediately after the curb and gutter construction is completed.

10. DRIVEWAY

(a) The following driveway approach standards are not applicable to freeway or controlled access highways where access is limited by deed restrictions or other controls.

1. The number and width of permitted driveway approaches is regulated by the Public Works Department and shall be based on the needs of the parcel served. They shall not be detrimental to the abutting streets capacity, safety, and/or efficiency.

2. Driveway approach width is measured at the curb line and includes only the width of the fully depressed section.

(b) The City Engineer may modify any of the following standards to improve traffic flow or because of special or unusual conditions.

1. Width

   i. Residential - Maximum driveway approach width is 24 feet. Minimum driveway approach width is 16 feet or clear opening of garage space whichever is greater.

   ii. Industrial/Commercial - Maximum driveway approach width is 45 feet. Minimum driveway approach width is 35 feet.

2. Driveway transitions are not permitted closer than 10 feet from the nearest BCR/ECR on residential streets and 7 feet on collectors and arterials.

3. Distance from Utility or Safety Devices: The driveway transition shall clear all public facilities such as electroliers, traffic signal standards, utility poles, fire hydrants, and street trees by a minimum of 5 feet in residential and 10-foot in commercial. Any relocation of public facilities required to maintain such clearance shall be at the expense of the owner who is installing the driveway.

4. Distance From Property Line: A minimum of 2 feet of full curb height shall be maintained between the property line and top of driveway transition.

5. Common Use Driveways: Common use driveways may be permitted in special cases.

6. Grade: Driveway grades shall be designed to keep the automobile from dragging or “bottoming out” on the street or driveway and to keep water collected in the street from flowing onto the lots.

11. FIRE ACCESS ROADWAYS

A. Required location, width, and vertical Clearance

A Fire Access Roadway greater than or equal to twenty feet (20’) in width (inside of curb-to-curb with no parking) is applicable to all commercial, industrial, and residential building. A Fire Access Roadway shall also be provided within one-hundred and fifty feet (150’) of other structures, public or private use areas, and combustible or hazardous material storage areas. Access Roadways shall be constructed to City of Gilroy Engineering Standards. Vertical clearance shall not be less than thirteen feet-six inches (13'-6").

Exception:

1. Private roadways not exceeding one-hundred and fifty feet (150') in length and serving no more than two sprinkled single-family residences may be reduced to twelve feet (12') in width.

2. Temporary Fire Access Roadways may be provided under permit and approval until such time that the permanent road or driveway is installed.

A Secondary Access Roadway is required when there are twenty-five or more residents or more residential units.

B. Parking Along Fire Access Roadways

The required width of the fire access roadways shall not be obstructed in any manner. Parking shall not be allowed along roadways of less than twenty-eight feet (28') in width. Parking will be allowed along one side of the street for roadways twenty-eight feet (28') to thirty-five feet (35') in width. Roadway widths shall be measured face to face of curb. Parking is not allowed in required turnarounds. The entire area of required turnarounds shall remain unobstructed at all times.

C. Transition and Driveways

A curb cut and apron shall be provided pursuant to the City of Gilroy Standard Driveway design.

D. Grade

Maximum grade shall not exceed 15% (6.75 degrees). No total grade changes greater than 10% in a thirty-foot (30') length shall be allowed. In some cases, short runs of fifty-feet (50') or less with 16% to 20% grade may be allowed if approved by the Public Works Director/City Engineer and the approval of the Fire Chief.

E. Turning Radius

An inside turn radius of 32' (curb to curb) and an outside turning radius of 39' (curb to curb) shall be provided.

F. Dead Ends and Turnarounds

Dead End Public Street shall terminate in a cul-de-sac per the City of Gilroy City Standard Details. Dead end Private streets and roadways shall terminate in an approved turnaround when the street is in excess of one-hundred and fifty feet (150') in length.

Exceptions:

Private driveways longer than one-hundred and fifty feet (150') serving up to two single family dwellings may provide an eight foot wide, forty foot long turn out with tapered ends, at one-hundred and fifty feet (150') from a public hydrant way to accommodate fire apparatus as long as:

1. Turn pout is not more than one-hundred and fifty feet (150') from the most distant portion of the dwelling unit,

2. Residential fire sprinkler system is in the dwelling units, and

3. The driveway is straight with no bends or curves.

When the three conditions are not met than a full turn around shall be provided at the turn outpoint.

G. Pavement Surface

Roadway shall be surfaced roads of asphalt, concrete, or another engineered surface acceptable to the Fire Chief and shall be designed to accommodate an imposed load of 40,000 pounds. When the access roadway is not a standard city street, the design shall be certified by a licensed soils engineer.

H. Bridges and Culverts

All bridges and culverts shall be designed to support a minimum of 75,000 pounds.

I. Marking of Roadways and Turnarounds

When parking is restricted, curb painting and signage is required as follows:

1. Curb top and side shall be painted red. Alternatively, if the roadway has no curbing, a twelve inch wide red stripe with the words “FIRE LANE” in while may be painted along and parallel with the edge of the roadway. The lettering shall be eight inches high with a ¾” stroke.
2. Signs shall be of metal construction measuring twelve inches wide, eighteen inches high and of a reflective type. Plastic or wooden signs are not acceptable.
3. Signs shall read, “No STOPPING – FIRE LANE 225000.1 CVC.” Lettering shall be not less than one-inch in height and clearly visible from a vehicle.
4. Signs shall be in visible locations and mounted on galvanized metal poles at a height of 84”. Signs shall be maintained unobstructed by foliage, trees, etc.
5. The first sign shall be posted within the first fifty-feet (50’) of the restricted street area, and subsequent signage posted along the street shall not exceed one-hundred feet (100’) from the center of the prior post. Not less than two signs shall be posed in each block. If traffic in two directions, signs must be posted to be readable from either direction.
6. Signage shall be provided in the cul-de-sac(s) and/or turn-around(s) if a nine-foot (9’)wide parking strip is not provided in addition to the dimensions herein.

J. Enforcement of Fire Access Roads and Fire Lanes

The enforcement of fire access roads and fire lanes on private roads and property are the responsibility of the property owner. The development shall have “Covenants, Conditions, and Restrictions” (CC&Rs) to provide a Home Owner’s Association’s (HOA) implement parking enforcement program that shall utilize the services of towing firms to assist in keeping fire access roadway and fire lanes clear. The California Vehicle Code (CVC_ Section 22500.1 provides for public safety agencies to enforce fire roads and lanes. If the HOA does not take actions to enforce fire access, the HOA can be cited.

K. Impairment of Access for Fire and Emergency Response

In Planned Unit Developments (PUDs), residential fire sprinklers systems shall be provided in the homes where firefighting operations will be impeded by:

- Lack of cul-de-sac street terminations
- Street widths that would limit application of fire flow to less than required (1,500 gallons per minute for up to 3,000 square feet).
- Excessive response time (port to Port) of greater than 4 minutes.

- Insufficient hydrant spacing and flow.
- Lack of adequate secondary access.

SECONDARY ACCESS REQUIREMENTS

A. When Required

Secondary access shall be provided for all residential projects of 25 units or more. In addition, secondary access may be required in Residential Hillside and/or Hazardous Fire Areas when determined by the Fire Chief as necessary to protect the area.

Secondary access will be provided by utilization of connected roadways that conform to City Of Gilroy Standards. Connections may be made to private or public way s along path of travel.

B. Maintenance of Existing Emergency Vehicle Access (EVA)

Existing EVAs shall be maintained typical of fire access roadway requirements with the following modifications:

<u>Required Turn-Around Areas:</u>
Dead-end street terminating at the AVA shall be provided with an approved Fire Department turn around area.

<u>Maintenance:</u>
Maintenance of EVAs on commonly held lands shall be clearly stated in the CC&Rs or Landscape Maintenance Agreements of the development project. The CC&Rs shall mandate that the HOA shall retain professio0nal to oversee maintenance responsibilities.

<u>Easement:</u>
All EVAs shall be recorded as EVAs granted to the City of Gilroy.

<u>Making and Identification</u>
Approved signs or other approved notices shall be provided and maintained for EVAs to identify such and to prohibit the obstruction thereof.

<u>Closure of Emergency Secondary Roadways:</u>
Gates shall not be used to control traffic on EVAs unless the gate is electronic and provided with the Opticom Emergency Vehicle Preemption System compatible with the Gilroy Fire Department. Other means to discourage unwanted traffic can include removable bollards, combining private driveway access with EVA design, lessening of the street width, and elimination of curb and gutter.

TEMPORARY ACCESS ROADWAYS

When approved by the Fire Chief, a temporary access road may be installed for Fire Department access to buildings under construction until such time that the permanent road or driveway is in place. A BLES Divisions application for a temporary road along with the detailed plans shall e submitted to the Fire Marshal for review and approval prior to installation.

The plan submitted shall also include timelines for use of the temporary roadway and acknowledgement that the integrity of the roadway will be maintained at all times. The width and turn radius dimensions shall be the same as required for the permanent roadway. As a minimum, the roadway shall consist of a compacted sub-base and 6-inches of road base material (Class 2 aggregate base rock) both compacted to a minimum 95%. The perimeter edges of the roadway shall be contained and delineated by curb and gutter or other approved method. The use of

Geotextile reinforcing fabric underlayment or soil lime-treatment may be required if so determined by the project civil engineer.

Provisions for surface drainage shall also be provided where necessary. Engineering certifications of the temporary roadway construction shall be documented and submitted to the Fire Department prior to or at the time of acceptance inspection of the temporary roadway.

12. STREET LIGHTING

New Development shall include LED Street Lighting. All electroliers shall consist of a Light Emitting Diode (LED) luminaire with electrolier ownership dedicated to the City of Gilroy. Any proposed deviation on street light type must be approved by the City.

All residential, commercial, and industrial areas shall consist of a minimum of 27 WLED.

Streetlights shall be staggered maximum 300 feet on center. Wider streets may require closer spacing.

(a) LED LIGHTING GUIDELINES – General Requirements

LED Streetlights shall meet or exceed these guidelines and as shown on the City of Gilroy Standards Details, and as minimum shall include:

1. Photometric Analysis – based on the existing streetlight electorlier placement standards, height, posted speed limit and street width, an analysis shall be done of the proposed replacement lights to show safe and adequate lighting levels per listed standards. This information shall be submitted to the City in both digital and hard copies as part of the requirements for the Installer to obtain a Notice to Proceed.
2. Removal and Disposal – removal and disposal of existing luminaire heads at locations where existing shall be replaced with LED, shall be in compliance with City of Gilroy current practice and all applicable laws and regulations in such a manner as to minimize potential adverse environmental impacts, and at no additional cost to the City.
3. Installation – installation of newest energy-efficient LED luminaire heads that meet or exceed City Guidelines.
4. Notifications and related work – provide notifications and process paperwork as necessary to update PG&E’s GIS inventory, revise the rate schedule for the new lights; and related work as necessary.
5. “As-Built” drawings – provide “as-built” drawings, and any applicable warranties, service, maintenance and operations manuals, and similar information.
6. Compliance with all laws – compliance with all laws, regulations and PG&E rebate requirements, and appropriate safety measures.
7. The City will consider any energy-efficient solution that achieves the goals of this project as specified in these LED Guidelines.

(b) DETAILED GUIDELINES

1. **Photometric Analysis**

Provider shall conduct a photometric analysis to illustrate that optimal roadway lighting levels are met or exceeded by new fixtures in conformance with

ANSI/IESNA RP-8-00 Roadway Lighting standards. Provider shall provide the City with the analysis results in hard-copy and digital format. The hard copy must include an 11x17 or larger plot plan of the selected locations; showing the following:

a) graphic representation and written description of light fixtures

b) pole spacing

c) roadway geometry to include median islands, sidewalks, and adjacent properties

d) a point-by-by-point foot-candles diagram that indicates the foot-candles that cover the site and associated areas, including just beyond the property line to indicate the amount of light trespass

e) Iso-foot-candle curve diagram (contours of the lighting levels)

f) Photometric summary table showing maintained foot-candles, minimum, maximum and average levels, average to minimum uniformity ratio, maximum to minimum uniformity ratio.

2. Luminaire Efficacy

Efficacy shall be determined as the total luminous flux emitted by the luminaire divided by the total power input to the luminaire, and is expressed in lumens per watt (lm/W). Luminaire shall allow for thermal and optical losses.

<u>Minimum</u> values of initial delivered lm/W are as follows:

a) 60 Lumens per watt (lm/W) at 350mA drive current

b) 50 Lumens per watt (lm/W) at 525mA drive current

Required values shall be verified by providing an independent testing lab certification per IESNA LM-79-08 requirements.

3. Lumen Depreciation

Lighting instruments in the luminaire shall be rated for "life" in hours as defined by the Illuminating Engineering Society of North America (IESNA) standards (IESNA LM-80)

The following are minimum values required (based on LM-80 data from the LED chip manufacturer, in-situ junction temperature testing results need to be provided from the fixture manufacturer to determine L70 life):

a) Delivered lumens for 350 mA drive current shall be 70% of initial delivered lumens after > 150,000 hours of operation at 15°C ambient

b) Delivered lumens for 525 mA drive current shall be 70% of initial delivered lumens after 117,000 hours of operation at 15 °C ambient

4. Luminaire Classification and Light Distribution

Light Distribution and Luminaire Classification (LCS) shall be in accordance with IESNA for a Type III distribution, and should also be commercially available in a Type II distribution. Fixture should have Forward Very High (FVH) and Back Very High (BVH) values of equal to or less than 0.5%, and Up Low (UL), Up High (UH) of 0%. The LCS values are intended to replace previous "Full Cutoff" designation which is no longer printed on test reports per the Illuminating Engineering Society (IES) TM-15-07 standard. Luminaire should have independent photometric test reports and shall be “Dark Sky” (UC Santa Cruz – Mt. Hamilton Observatory) compliant.

5. Maximum System Wattage (Including Driver Loss)

LED only wattage will not be accepted. Installer shall provide calculation of delivered lumens/total wattage in the proposal.

If LED lumens/watt increases, between the time that the specifications are released and the time that the product is ordered, the additional benefit of more light for the same energy or the reduction in wattage usage to obtain the same delivered lumens shall not be a cause for a pricing increase or failure to deliver the required products.

6. Correlated Color Temperature (CCT) And Color Rendering Index (CRI) Values

Luminaire shall have a minimum CRI and maximum CCT values per IESNA LM-7908 as follows:

a) CRI: 70

c) CCT: 6,000 °Kelvin

7. Power Supply And Driver Requirements

Note: Provider shall verify the existing line power and wiring, and make any required modification necessary to provide optimum performance of the lighting.

a) Driver shall be the Electronic type

b) Voltage range (120 – 277V) +/- 10%, (347-480V) +/-10% optional

c) Current .350 Adc (+/- 5%), .525 Adc (+/-5%), .700 Adc (+/-5%)

d) Frequency 50/60 Hz

e) Power Factor >90% at full load

f) Total Harmonic Distortion (THD) < 20% at full load

g) Load Regulation: +/- 1% from no load to full load

h) Output ripple < 10%

i) Output should be isolated

j) Case temperature: rated for -40 through +80 °C

k) Fully encased and potted

l) Overheat protection, self-limited short circuit protection and overload protected.

m) The luminaire shall contain circuitry that will automatically reduce the power to the lighting instrument to 50% of normal operating power, or to a level that will insure that the maximum junction temperature is not exceeded, when the ambient, outside air temperature is 100°F or greater.

n) Primary Fused

o) Driver Life Rating - less than 0.5% failure rate at 150,000 operating hours

(@ 350mA drive current and a minimum fixture operating ambient of 22°C)

p) Electrical Safety - Wet listed in the US and Canada, ENEC, CE, ROHS and EMI. Class 1 rated. Internal surge protection – ≥9kV

8. Mechanical Requirements

a) Tool-less entry

b) Utilizes terminal block for power input suitable for #6 AWG wire

c) Designed to mount on 1.25” IP and / or 2” IP horizontal tendon and is adjustable +/-5 Degrees to allow for fixture leveling.

d) Bubble leveling

e) Finish – Finish includes cleaning and preparing metal surface, electro-deposited epoxy primer and baked-on ultra-durable powder coat. Salt fog test data to validate corrosion residence performance to be provided in accordance with the ASTM B 117 standard @ ≥ 5,000 hours.

9. Factory Installed Options

At minimum, the following options shall be included:

a) IP66 Rating

b) Fuse

c) NEMA photo control receptacle

10. Photoelectric Controls Requirements

Luminaires shall be provided with a photoelectric control receptacle, compatible with the new photo-electric controller

Contactors shall be the mechanical armature type.

Photoelectric control shall be installed in accordance with Section 86-6 of the State Standard Specifications.

The provider shall supply 15% of the total units provided under this project in photoelectric controls to be used as a spares. Spare photo-electric controls shall be new, unused, in original boxes.

11. Fixtures

Streetlight Fixtures shall comply with Section 1605 of the ARRA: Required Use of American Iron, Steel, and Manufactured Goods, and all other applicable provisions.

Luminaires heads shall be the slim, low-profile type, constructed from rugged extruded aluminum and cast aluminum components. The luminaire shall be a single, self-contained device, not requiring on site assembly for installation. The transformer for the luminaire shall be integral to the unit. LED or other drivers shall be mounted internally, and be replaceable. All components must be accessible without special or additional tools, and shall be suitable for wet listed operation (per UL 1508 requirements). The optical assembly of the luminaire shall be protected against dust and moisture intrusion per the requirements of Ingress Protection (IP)-66 minimum to protect all internal components. The electronics/power supply enclosure shall be protected per the requirements of IP-65 (minimum).

Thermal management shall be passive by design. Units shall have a high performance aluminum heat-sink (minimum heat sink surface of 3.5 square inches per watt) with no fans, pumps, or liquids and shall be resistant to debris buildup. Fixture shall be designed for energy-efficient or LED ‘Area Light’ applications. Finish shall be gray in color, shall include an exterior E-coat epoxy primer with an ultra-durable powder topcoat to provide resistance to corrosion, ultraviolet degradation and abrasion. IP ratings must be provided.

The housing shall be designed to prevent the build-up of water or debris on the top of the housing. Exposed heat sink fins shall be oriented so that water can freely run off the luminaire, and carry dust and other accumulated debris away from the unit.

When the components are mounted on a down-opening door, the door shall be hinged and secured to the luminaire housing separately from the refractor or flat lens frame. The door shall be secured to the housing in a manner to prevent its accidental opening.

All screws shall be stainless steel. Captive screws are needed on any component that requires maintenance after installation. No parts shall be constructed of polycarbonate unless it is UV stabilized. Lens discoloration will be considered a failure under warranty.

Luminaires shall comply with the most current codes, standards and requirement relating to the installation and usage of solid-state lighting products, such as but not limited to NFPA-NEC, FCC (Title 47 CFR Part 15), and UL Standards (8750, 1598, 1012, 1310, 2108).

Individual LEDs shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.

Provider shall verify that the existing in-line fuse is sized appropriately for the new fixture per manufacturer’s recommendations, or replace the in-line fuse with the appropriately sized item.

(c) WARRANTIES

A minimum five (5) year warranty shall apply to all lamps or LEDs, and the drivers. A minimum ten (10) year warranty shall apply to the paint finish of the fixtures, and overall luminaire head. Providers to provide warranties offered in writing. Any lamp not meeting all criteria during its expected life shall be deemed failed and must be replaced. No pro-rata warranty will be accepted.

13. LANDSCAPING

(a) Planter strips on arterial roads adjacent to residential uses shall be a minimum of 6 to accommodate larger trees. Where sound walls are required, the planter strip will be adjacent to the sound wall and the sidewalk a minimum of 10’ and monolithic with curb and gutter.

(b) Two samples of all landscape materials (mulch, amendments, fertilizers, chemicals, etc.) are to be submitted to the City Engineer or his/her designee.

(c) A list of all irrigation components (with cut sheet) to be used on the project are to be submitted to the City Engineer or his/her designee.

(d) All trees must be inspected by the City Engineer or his/her designee. If the location of the trees precludes timely inspection, a picture showing height, structure, and trunk caliper must be submitted to the City Engineer or his/her designee for approval.

(e) All plants are to be inspected by the City Engineer or his/her designee when they are received on site.

(f) The City Engineer or his/her designee will coordinate submittal reviews by the Project Landscape Architect at the expense of the Project Proponent.

(g) The City Engineer or his/her designee will coordinate submittal reviews by other City Staff.

(h) Notify the City Engineer or his/her designee two working days prior to the application of any pesticide. Provide the City with a current specimen label and material safety data sheet for any pesticide to be applied. Follow all label directions.

(i) On arterials and major thoroughfares, the water meter, backflow prevention device, and irrigation controller shall be located where accessible to service vehicles. Two service vehicles shall be able to park in proximity to the point of connection/irrigation controller. The vehicles shall be able to park out travel and bike lanes. The vehicle shall not be required to back into traffic to leave the site. If safe parking is not available, a vehicle turnout is required.

(j) Possible new sections for Conduit for Fiber Optic and Conduit for Signal Interconnect

14. EROSION CONTROL

(a) An Erosion Control Plan shall be required prior to any physical development of a property planned between October 15th and April 15th. There is currently an exception for non-hillside properties that disturb an area less than one (1) acre.

(b) Erosion Control Plan shall be required for all Hillside development regardless of the time of year.

(k) Erosion Control Bonds are required on all hillside development projects regardless of the time of year.

Section 4

SOUND WALLS

Section 4

SOUND WALLS

1. SOUND WALLS

1. Sound walls may be required on all expressways, and on divided arterials adjacent to residential areas. Sound wall shall follow the requirements of the Consolidated Landscaping Policy and the Guidelines for Sound Attenuation and Visual Preservation of the Santa Teresa Boulevard Corridor Policy.

2. The minimum design standard shall conform to the latest revision of the California Building Code as amended and adopted by the City of Gilroy.

Section 5

WATER

Section 5

WATER

1. GENERAL

(a) Water facilities shall be designed in accordance with accepted engineering principles and shall conform to these Design Standards and the Standard Details.

(b) All materials shall conform to current American Water Works Association Standards.

(c) The latest edition of the California State Department of Health Services "Criteria for the Separation of Water Mains and Sanitary Sewers" shall take precedence in horizontal and vertical alignment issues.

(d) All water facilities shall be designed and installed with line and grade.

2. VERTICAL ALIGNMENT

The minimum cover on water mains shall be 36 inches. When crossing a sanitary sewer it is required that the water main be installed crossing the sanitary sewer with a minimum clearance of 12 inches. It is preferred to have water mains over the sanitary sewer.

3. HORIZONTAL ALIGNMENT

(a) Water mains shall be installed within street rights-of-way 7 feet from face of curb. Alignment shall be parallel to the street centerline wherever possible.

(b) The alignment may vary, but in no case shall there be less than 10 feet horizontal clearance to a sanitary sewer, or 6 feet horizontal clearance to a storm drain.

4. PIPE

(a) Water mains shall be sized according to the City's Master Water Plan and Grid system. For waterlines in residential and commercial areas the minimum diameter shall be 8 inches. For waterlines in industrial areas the minimum diameter shall be 12 inches.

(b) All pipes shall be Ductile Iron Pipe. Strength of pipe shall depend on installation conditions.

(c) Installation, inspection, and testing shall conform to 1999 NFPA 13 and 1995 NFPA 24.

(c) All pipes shall be approved for use in Fire service systems (Class 150 minimum). Class 200 pipe shall be used where the pressure may exceed 150 PSI.

(d) A 4" bed of clean fill sand shall be provided below and 12" above the pipe.

5. WATER SERVICE

(a) The minimum size service for potable water for residential is 1-1/2 inch except for hillside lots which shall be 2 inches. Irrigation service size may be 1 inch.

(b) All pipe material shall be copper.

(c) Commercial and industrial services shall be increased from the minimum and sized according to use.

6. FIRE HYDRANTS

(a) All fire hydrants must be supplied from the largest available main, minimum 8 inch diameter.

(b) Fire hydrant spacing and distribution shall be determined as follows:

1. The maximum fire hydrant spacing in residential areas shall be 300 feet.
2. The maximum fire hydrant spacing in commercial and industrial areas shall be 300 feet on both sides of the street.
3. On divided streets, planned divided streets or state highway, the above spacing shall apply to both sides of the street.
4. On-site hydrants may also be required by the Fire Marshal.

(c) Fire flow and fire hydrant distribution, including the number of hydrants required and specific locations, shall be approved by the City Engineer and the Fire Marshal.

1. Upon installation, a fire flow test must be performed prior to acceptance.

(d) Fire hydrants are to be located at mid-block on cul-de-sac streets.

(e) Fire Hydrants to be painted according to the following:

1. **Public Fire Hydrants** shall be painted enamel safety yellow (KEL-GUARD #1700-63 paint inhibitive enamel by KELLY-MOORE or approved equal)
2. **Private Fire Hydrants** shall be painted enamel safety red (KEL-GUARD #1700-62 paint inhibitive enamel by KELLY-MOORE or approved equal)

7. VALVES

Valves shall be spaced and located in conformance with the following criteria:

1. 700 foot maximum spacing in residential areas and 600 foot maximum spacing in commercial/industrial areas.
2. Water mains shall be valved on each side of railroad, freeway and canal right-of way crossings.
3. At "tees", 3 valves will be required.
4. At "crosses", 4 valves will be required.
5. At fire hydrant tees, only one valve, on the line to the fire hydrant is required or allowed.
6. At locations so that future tie-ins will not interrupt service and provide isolation and pressure testing of new systems.
7. Valves shall be located at the extension of the line of the face of curb.
8. All control valves shall be locked in the open position. Valves shall be monitored if they serve 20 or more fire sprinkler heads.
9. Provide conduit to both riser and control valves for a monitoring system even if system is below the monitoring level threshold. Future tenant improvements and/or code changes could require monitoring.

8. BLOW OFFS

Blow-offs shall be constructed at the end of all dead-end runs.

9. AIR VACUUM / AIR RELIEF VALVES

Air vacuum/air relief valves shall be installed at high points. Air reliefs shall be installed above ground a minimum of 12”.

10. THRUST BLOCKS

(a) Thrust blocks shall be installed in conformance with the City of Gilroy Standard Details.

(b) Mechanically restrained joints will be allowed in place of thrust blocks.

(c) All permits required prior to installation shall be obtained from the Public Works Department.

(d) Thrust blocks, or other approved method of thrust restraint, shall be provided wherever pipe changes direction.

(e) The trench shall be excavated for thrust blocks and inspected prior to pour. All corrosion protection shall be in place.

11. WATER LINE ACCEPTANCE TEST

(a) Water lines shall be pressure tested, disinfected, flushed, and tested for bacteria prior to final acceptance by the City of Gilroy. Flow shall be through a minimum of a 4" hose or pipe and achieve 10 feet per second velocity, unless otherwise approved by the City Engineer or his/her designee. A City Engineer or his/her designee shall witness the flush.

(b) Schedule all inspections 48 hours in advance. Inspections canceled after 1 p.m. on the day before the scheduled date will be subject to a re-inspection fee.

(c) A hydrostatic test (2000 psi for two hours or 50 psi over maximum static pressure, whichever is greater) shall be witnessed by the City Engineer or his/her designee. Joints shall remain exposed for the inspection. Tracer wire shall be installed at time of inspection.

Section 6

SANITARY SEWER

Section 6

SANITARY SEWER

1. GENERAL

(a) Sanitary sewers shall be designed as a gravity system without the use of pump stations or siphons, unless approved by the City Engineer, in accordance with accepted engineering principles and shall conform to these Design Standards and the Standard Details.

(b) Storm water shall not be connected or discharged into a sanitary sewer.

(c) The latest edition of the California State Department of Health Services "Criteria for the Separation of Water Mains and Sanitary Sewers" shall take precedence in horizontal and vertical alignment issues.

(d) Engineering calculations are required for the design of proposed sanitary sewer systems and shall be submitted to the City Engineer. The calculations shall include the following items:

1. A plan showing the proposed street system, tributary sub-areas, existing and future tributary areas, outside the project limits, zoning, projected land use, and any features affecting the system design.
2. Design flows at major junction points including flows coming from outside the project limits.
3. Size, length, slope, and invert elevations of all proposed lines and locations of manholes.
4. Engineering calculations may be waived by the City Engineer.

(e) Design of sanitary sewers shall not require backflow devices to be installed on sewer laterals unless required by the City Engineer.

(f) Sanitary sewer mains shall be designed and sized at a minimum, in compliance with the City's Sanitary Sewer Master Plan. For commercial or industrial projects, project specific requirements shall be reviewed and used if they exceed the design assumptions in the Sanitary Sewer Master Plan.

2. AVERAGE FLOW

(a) The average residential flows shall be computed on a per-capita basis using a minimum of 80 gallons per capita per day. Commercial and light industrial shall be computed at 500 gallons per acre per day. All other industrial shall be computed utilizing 2500 gallons per acre per day. When the exact density is not known, the zoning map and the General Plan shall be used to determine the appropriate densities. Multi-family residential shall be 2.5 persons per unit. All other uses shall be 3.5 persons per unit.

(b) Schools and churches shall be computed at commercial/light industrial rates.

(c) The averages indicated above are minimum flows and in some situations may have to be increased due to large point loads, higher densities or differing land uses.

3. DESIGN FLOW

The total design flow shall be determined by multiplying the average base water flow by a peak factor of 3.0.
Sewer size/capacity shall be determined using Manning's equation, with "n" value equal to 0.013.

$$Q = \frac{0.000039748 * D^{2.6667} \sqrt{S}}{n}$$

Where:

Q	=	the capacity in million gallons per day	n	=	the Manning roughness coefficient
D	=	the diameter of the pipe in inches	S	=	the sewer slope in percent

Check downstream capacity of sewer using Sanitary Sewer Master Plan and computerized hydraulic sewer model.

4. VERTICAL ALIGNMENT

(a) The minimum cover on sanitary sewer lines shall be 36 inches. When minimum cover cannot be achieved, polyurethane-lined ductile iron, or PVC C900 shall be used.

(b) Vertical separation between potable water and sanitary sewers, building drains or storm drains shall be in accordance with regulations and criteria set forth by the State of California Department of Public Health.

Sewers shall have a minimum of 12 inches clearance when crossing drains, gas mains, and other unspecified utilities. If 12 inches cannot be maintained at crossings, provide encasement of sewer for the width of the utility trench.

(c) At points of convergence of pipes of various sizes, the crown of the pipe elevations shall match within a manhole structure.

5. HORIZONTAL ALIGNMENT

(a) Sanitary sewers shall be placed within street rights-of-way unless placement in an easement is specifically approved by the City Engineer.

(b) Alignment shall be parallel to the street centerline wherever possible.

(c) Curved sewers are not allowed, unless approved in writing by the City Engineer.

(d) Sanitary sewers shall not be constructed within 50 feet of any existing or proposed well site.

(d) Horizontal separation between potable water and sanitary sewers, building drains or storm drains shall be in accordance with regulations and criteria set forth by the State of California Department of Public Health.

6. SLOPE

(a) Sanitary sewer design capacity shall be sized as follows:

1. For sewers eight (8) and ten (10) inches in diameter, design capacity shall be based on pipes flowing two-thirds full (d/D < or = 0.67).
2. For sewers twelve (12) inches and larger in diameter, design capacity shall be based on pipes flowing full without surcharging (d/D < or = 1.0) to flow at

d/D=1.0.

(b) Design the sewers to have a scour velocity of 2.5 ft/sec at half flow capacity and a maximum velocity of 10 feet per second. See Table below for acceptable pipeline slope.

Nominal Pipe Size In Inches	Minimum Design Flow (Cubic feet per second)	Maximum Design Flow (Cubic feet per second)	Minimum Slope In Feet Per Foot
8	0.0	0.81	0.0077
10	0.82	1.28	0.0057
12	1.29	1.57	0.0022
15	1.58	2.45	0.0015
18	2.46	3.53	0.0012
21	3.54	4.81	0.00095
24	4.82	6.28	0.0008

(c) As required by the City Engineer for areas with known odor and corrosion problems, the system design shall consider the potential generation of hydrogen sulfide and include mitigation for such generation such as odor control and corrosion prevention.

7. PIPE

(a) Pipe used for sanitary sewers shall have a minimum diameter of 8-inches when located in the street right-of-way. The pipe shall have rubber gasket joints or heat fused joints and shall conform to the latest edition of the following ASTM Standards. Unless other pipe materials are approved for a specific project by the City Engineer, acceptable pipe materials, for pipe up to 24” in diameter, area as follows:

i. VITRIFIED CLAY PIPE (Extra Strength)

ii. PVC Solid Wall SDR 26

iii. PVC Solid Wall C900 or C905

iv. HDPE SDR 17

(b) Other pipe material may be considered on a project by project basis by the City Engineer.

(c) Pipe material for pipe over 24” shall be approved by the City Engineer.

8. BUILDING LATERALS

(a) The minimum size lateral shall be 4 inches ABS Schedule 40 or PVC SDR 26 and installed per Standard Detail.

(b) Lateral shall have a minimum of 2% slope. The minimum size of the 2-way cleanout shall be 4” and shall be accessible at all times.

(c) A 2-way cleanout shall be installed at the back of walk, unless otherwise approved by the City Engineer.

(d) Cleanout shall be topped with a removable sewer relieve valve and cap.

(e) Other pipe material may be considered on a project by project basis by the City

Engineer.

9. MANHOLES

Manholes shall be placed at the intersections of all sanitary sewers, at all locations where there is change in size, grade or direction.

Manhole spacing shall not exceed the following limits:

Diameter	Maximum Spacing
8" to 24"	300 feet
> 24".	600 feet

Manholes shall be constructed at all service lateral connections where the main line is not at least 1.5 times the size of the service lateral.

Section 7

STORM DRAIN
&
STORM WATER
QUALITY

Section 7

STORM DRAIN & STORM WATER QUALITY

1. GENERAL

All drainage facilities shall be designed in accordance with accepted engineering principles, and shall conform to these Design Standards and the Standard Details.

2. STORM WATER QUALITY

(a) Projects shall incorporate Low Impact Development design strategies to minimize the post-construction impacts on storm water quality and shall conform to the water quality treatment, runoff retention and peak flow management per the Municipal Code Section 27.D.

(b) Provide a copy of the SWPP, the WDID number, the name and phone number of the QSD and the QSP for the project.

(c) An erosion control plan shall be required prior to any physical development of a property planned between October 15th and April 15.

(d) Erosion control plans shall be required for all Hillside single family residential development regardless of time of year.

(e) Erosion control bonds are required on all hillside single family residential development regardless of time of year.

3. STREET DESIGN FOR FLOOD CONTROL

Street gradients shall be designed to fall toward the nearest existing or proposed 100 year design capacity flood control facility.

Overland release shall be shown and clearly noted on the plans.

4. PAD ELEVATION AND LOT GRADING

House pad elevations shall be determined by the following criteria while assuming construction of a slab on grade foundation (first floor seven inches (7') minimum above pad). The latest Flood Insurance Rate map shall be used.

(a) In a Flood Zone "AO", the lowest floor shall be at least 12" higher than the depth number specified on the FIRM or 12" above the nearest high point in the drainage release path, or 2 feet higher than lowest top of curb, whichever is greater.

(b) In a Flood Zone "A", the lowest floor shall be at least 12" higher than the base flood elevation, as determined by this community or 12" above the nearest high point in the drainage release path, or 2 feet higher than lowest top of curb, whichever is greater.

(c) In all other zone the lowest floor shall be at least 12" higher than the base flood elevation, as determined by this community or 12" above the nearest high point in the drainage release path, or 2 feet higher than lowest top of curb, whichever is greater.

(d) Minimum finish floor grade of lots shall be 1%. No slopes shall be greater than 2:1 unless allowed by the soils report and approved by the Public Works Director/City Engineer.

5. HYDRAULIC GRADE LINE

All storm drains shall be designed for the 10 year flow storm water entering the drain at the point of concentration and shall have a minimum of 1 foot of freeboard between the top of curb and the Hydraulic Grade Line at the 10 year event.

6. VERTICAL ALIGNMENT

(a) The minimum cover on main line storm drains shall be 3 feet from finished grade.

(b) Catch basin laterals that have less than 36 inches of cover from finished grade shall be encased in concrete.

(c) A minimum vertical clearance of 6 inches shall be maintained between a sanitary sewer, water main, and other underground utility.

(d) At points of convergence of pipes of various sizes, the crowns of the pipe elevations shall match unless specifically approved by the City Engineer.

7. HORIZONTAL ALIGNMENT

(a) Storm drains shall be placed within street rights-of-way.

(b) Alignment shall be parallel to the street centerline wherever possible.

(c) Curved storm drains are not allowed unless special approval is given by the City Engineer.

8. SLOPE

(a) Storm drains shall have minimum slopes equal to that necessary to give a velocity of 2.0 feet per second when flowing full regardless of the slope of the Hydraulic Grade Line.

(b) Catch basin laterals shall have a minimum fall of 0.30 feet between the catch basin and manhole.

9. PIPE

(a) The minimum size for storm drains shall be 18-inch diameter.

(b) All catch basin laterals shall have a minimum diameter of 15 inches.

(c) All pipes shall conform to the following ASTM specifications:

CONCRETE PIPE

Reinforced pipe with rubber gasket joint	C 76
Rubber Gasketed Joints	C 361 Joint & C 443 Gasket

(d) Cast-in-place concrete pipe may be used for pipelines 24 inches and larger.

(a) Corrugate Metal Pipe (CMP) is not allowed, except outfall to SCVWD, as required by the SCVWD.

10. MANHOLES

(a) Manholes shall be placed at the intersections of all storm drains, at all locations where there is a change in size, change in horizontal or vertical alignment and at the ends of all permanent lines.

(b) Manhole spacing shall conform to the following limits:

Diameter	Maximum Spacing
18" to 36". . . . . 400 feet	
> 36". . . . . 600 feet	

(c) All storm drain manholes shall be constructed in conformance with the Standard Details.

11. CATCH BASINS

(a) Side inlet catch basins shall be located at all low points and shall be spaced in such a manner that design flows will be contained within the gutter pan.

(b) The total gutter run contributing to any catch basin shall not exceed 350 feet. It is desirable to locate catch basins on the BCR or ECR which will intercept the most runoff and also keep the main pedestrian crossing as dry as possible. Additional catch basins may be required at the direction of the City Engineer.

(c) Side inlet catch basins shall be used for all new storm drain inlets, except on steep roads where a combination side opening and vaned grate inlet should be used. Except as noted, no grated inlets are allowed on new installations.

12. ON-SITE DRAINAGE

All developed areas larger than one acre shall tie on-site drainage into the City of Gilroy storm drain system.

13. DETENTION BASINS FOR FLOOD CONTROL

Detention basins for flood control on private or public property shall be designed using the following criteria:

(a) A 24-hour, 25-year storm, total rainfall of 4.79 inches shall be used if a reasonable outlet is provided (detention). If no disposal other than evaporation, percolation or irrigation is provided (retention), a 24-hour, 100-year storm, total rainfall of 5.59 inches, shall be used. 25% of the total basin volume shall be considered as freeboard.

(b) The maximum water surface of the basin shall be 1 foot below the elevation of the top of curb at the lowest catch basin inlet within the tributary area and a maximum of one foot above the design hydraulic grade line at the basin.

(c) Fencing with gates shall be provided around all basins greater than 3 feet in depth.

(d) Adequate “all weather” access shall be provided.

(e) The tributary drainage system shall be designed to connect to the City's future storm drainage system.

(f) The maximum slope ratio for turfed or landscaped side slopes shall be 4:1.

Section 8

HILLSIDE DEVELOPMENT

Section 8

HILLSIDE DEVELOPMENT

1. GENERAL

All projects within the RH (Residential Hillside) zone shall meet the requirements of Section 9 of the Zoning Code and the Community Development Department's Hillside Development Guidelines.

The purpose of the Hillside Development Guidelines is to provide specific requirements and guidelines for development in the City's hillside areas. These guidelines are incorporated by reference into the RH (Residential Hillside) zone and shall be used in conjunction with the City of Gilroy Standard Specifications and Details as criteria for design review of all projects within the RH zone.

Section 9

LANDSCAPING

Section 9

LANDSCAPING

1. PURPOSE

All projects shall include landscaping in conformance with Zoning Code Section 38 and the City of Gilroy Consolidated Landscape Policy. In the case that a discrepancy is identified, the Zoning Code Section 38 and the City of Gilroy Consolidated Landscape Policy shall take precedence over these General Guidelines.

The purpose of the Landscaping guidelines is to provide specific requirements and guidelines for all Landscaping within the City of Gilroy. These guidelines are to be incorporated into all new developments within the City of Gilroy's Residential, Commercial, and Industrial areas. These guidelines shall be used in conjunction with the City of Gilroy Standard Specifications and Details and Technical Specifications as criteria for design review of all projects within the City of Gilroy.

2. LANDSCAPE MEDIANS IN PUBLIC RIGHT-OF-WAY

1. If a median is less than three feet wide from face of curb to face of curb, no landscape shall be installed. Areas that are less than three feet from face of curb to face of curb shall be covered with dyed red, stamped concrete.
2. All public landscaped medians shall include an eighteen inch maintenance strip inside curb constructed of red dyed, stamped concrete.
3. Trees shall only be planted in medians that are more than ten feet in width from face of curb to face of curb.

3. GENERAL DESIGN GUIDELINES

1. Residential Development

   A. Multi-family residential developments shall landscape all yard areas, which are not specifically used for driveways, walkways, patios or similar purposes. At least 35% of the required landscaped area shall be designed to be usable as open recreational area.

   B. All residential development in the RH Zoning District shall provide landscaping plans consistent with the following criteria:

      1. Native vegetation shall be thinned of all dead limbs to reduce foliage mass, and all dead plants and plant litter shall be removed within a distance of thirty (30) feet from all proposed structures and fifteen (15) feet from the main access drive to a dwelling.
      2. New landscaping introduced to the site, which is within thirty (30) feet from any structure, shall be fire-resistant and shall be augmented with an irrigation system.
      3. New landscaping within fifteen (15) feet from any structure shall consist of selected vegetation with low-growing characteristics;
      4. New trees shall be kept a minimum distance of twenty (20) feet from all proposed chimneys.

5. New landscaping within twenty (20) feet from a publicly dedicated street shall consist of selected vegetation with low-growing and fire-resistant characteristics.

2. Commercial Development

A. All commercial development shall provide landscaping within the areas of the development most visible from adjacent streets.

B. A minimum twenty-one (21) foot wide planter area, measured from the face of curb, shall be provided along each street frontage.

C. At least eight percent (8%) of the gross land area in addition to the public right-of-way shall be landscaped, except in the Downtown Specific Plan districts where front and side yard setbacks are not utilized.

D. All portions of a site over forty (40) square feet in area not specifically used for parking, driveways, walkways or similar access shall be landscaped.

E. Landscaped islands shall be located in parking lots at the rate of fifty (50) square feet for every twelve (12) stalls, and shall be evenly distributed throughout the parking area.

F. All planter areas shall be at least five (5) feet wide, except as approved by the Director of Planning due to a specific site situation where the minimum width is impractical.

3. Industrial Development

All industrial developments are required by City Zoning Ordinance to landscape the front and side yard areas adjacent to streets that are not specifically used for parking, driveways, walkways, or similar paved access. Such paved areas shall not exceed fifty percent (50%) of the area of said setbacks. In no case shall landscaping planters adjacent to a street be less than 18.5 feet wide (measured from the face of curb). Additional landscaping shall be required to fully screen exposed storage yards. Industrial development in the CI (Campus Industrial) zoning district shall provide a minimum of 15 percent of the gross land area in landscaping. In all industrial zones, planter areas shall be at least five (5) feet wide.

4. IRRIGATION

(Per Zoning Ordinance Section 38)

1. Dedicated landscape water meters shall be provided for landscape areas greater than 5,000 square feet, except where irrigation water if provided by recycled water or an onsite well.

2. A minimum 2” water service line shall be provided for all landscape irrigation systems that are to be owned and maintained by the City.

3. Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data for irrigation scheduling are required.

4. Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather shall be provided on all irrigation systems.

5. The irrigation hardware for each hydrozone shall include a separate valve. Where feasible, trees shall be placed on separate valves from shrubs, groundcover, and turf.

6. The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions.

7. Low-volume irrigation shall be required in mulched areas, in areas with slopes greater than 25%, within 24"of non-permeable surface, or in any narrow or irregularly shaped areas that are less than 8' in width in any direction.

8. Average irrigation efficiency is assumed to be 70%. Irrigation systems shall be designed, maintained and managed to meet or exceed an average landscape irrigation efficiency of 70%.

9. Irrigation shall be scheduled between 8:00 p.m. and 10:00 a.m., unless unfavorable weather prevents it or otherwise renders irrigation unnecessary. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

10. For all utility design and installation, contact the following (contact information can be found in the Reference section on page four of the Landscape Standards):

    (a) City of Gilroy Water and Sewage to obtain the correct static water pressures and the correct locations and elevations of water and sanitary sewer lines.

    (b) Pacific Gas and Electric for all electrical applications, such as line placement, regulations, etc.

5. STREET TREES

Street trees shall be specified on the landscape improvement plans per the City of Gilroy Master Street Tree Planting and Tree Removal Policy and Chapter 26 for the City of Gilroy Municipal Code.

6. PLAY AREA IMPROVEMENTS

All components of the play equipment shall be International Play Equipment Manufacturers Association (IPEMA) certified, and conform to the California Health and Safety Code.

7. SPORT & RECREATION SITE IMPROVEMENTS

Mandatory park amenities include the following item and shall be in compliance with approved mater plans and as may be determined by the Gilroy City Council.

A. Mandatory Amenities

- Play structures (applicable to age types).
- Picnic area with tables and seating.
- Shade structures (all weather).
- Benches.
- Trash Receptacles.
- Park trial (with lighting).
- Turf area.
- Trees.

B. Acceptable Amenity Options

- Basketball Court (non-lighted).
- Tennis Court (non-lighted).
- Bocce/Petanque Court
- Volleyball Court.
- Horseshoe Court.
- Game Table (chess).
- Fitness Stations.
- Drinking Fountain.
- Barbecue Grill
- Bike Racks.
- Climbing Wall.
- Additional Shade Structure.

C. Acceptable Amenities with a Public Art Flair: Consider including a public art flair to the acceptable amenities already being installed, such as:

- Include Decorative bike racks with vibrant colors in cool and creative shapes (i.e. Gilroy's Library red bike rack shaped like a stack of books).
- Include colored or textured concrete walkways.
- Include curved or playful walks (rather than just straight).
- Include permanent hop-scotch lining the walkways or concreted areas.
- Include decorative trash receptacles.
- Include decorative water faucets where their foundations or lower portions can include decorative tiles, colored concrete and/or textures.
- Include colorful, decorative rounded tables with attached round benches that may include accent tiles or other interesting features.
- Include a vibrant, colorful and creative park sign.

D. Unacceptable Amenity Options

- Skateboard, BMX Park.
- Water Feature.
- Restrooms.
- Dog Park.
- Off Street Parking.
- Other Amenities with Regional Appeal.
- Lighting other than on Park Trail.

8. OTHER LANDSCAPE FACILITIES

All other Landscape Facilities, such as pump stations, parking lots, etc. must comply with the standard specifications and details presented by the City of Gilroy. Any designs which do not comply will be reviewed in a case by case manner.

Appendix A

IMPROVEMENT PLANS

Appendix A – Section 1

IMPROVEMENT PLAN REQUIRED GENERAL NOTES

The following General Notes are required on all improvement plans submitted for approval to the City of Gilroy Public Works Department, Engineering Division, and shall not be modified. Additional notes may be added under the title of Project Notes. However, conflicts between the City's required General Notes and the Project Notes shall be resolved by the City Engineer.

1. Temporary Bench Mark - Based on a City approved benchmark as shown on these plans. Elevation__________ Location__________
2. All existing elevations shall be field verified by contractor unless otherwise noted.
3. All survey monuments shall be installed at locations shown on the corresponding final map before acceptance of the subdivision.
4. Contractor shall not destroy existing permanent survey monuments. Any monuments destroyed shall be replaced at the contractor's expense.
5. All work shall conform to the latest edition of the City of Gilroy Standards which is hereby made a part of these plans. Deviations from the Standards must be approved by the City Engineer in writing.
6. Developer shall arrange for a pre-construction meeting with the City Engineer (Municipal Code 17.32.250b) prior to commencing any construction. An encroachment permit shall be obtained from the City of Gilroy Public Works Department, Engineering Division upon completion of said meeting and prior to construction of any improvements within an existing or offered for dedication right-of-way, public utility easement or public service easement. A completed set of plans signed by the City Engineer is equal to an encroachment permit.
7. A grading permit shall be obtained from the City of Gilroy Building Division prior to any grading of building pads. Applicant for the grading permit shall provide a plan review letter from the Soils Engineer. A grading permit does not give contractor permission to commence off-site (street) grading. Only upon City approval (plans signed by City Engineer) of the improvement plans and completion of a pre-construction meeting, shall contractor commence off-site grading.
8. The final lot grading shall be confirmed by letter by the project engineer prior to the final inspection of the building.
9. Contractor shall notify the Public Works Department two (2) working days prior to commencement of any work phase.
10. Contractor shall preserve all surrounding property by confining operations to within the "Limits of Work" and/or within site property lines. Contractor shall be responsible for maintaining access for all adjoining residents, places of business, and properties at all times and in a safe manner. Contractor shall make proper notification two weeks in advance and again three days in advance of any interruption in access or service to the above property owners as well as to the City Engineer's Representative.
11. Contractor shall only use equipment provided with a spark arrestor device to reduce a potential fire hazard.
12. Right of Modification:
    a. Approval of this plan does not release Developer of the responsibility for correction of mistakes, errors, or omission, contained therein. If during the course of construction, public interest requires a modification of or a departure from these improvement plans or

the City Standards, the City Engineer shall have the authority to require such modifications and departures and to specify the manner in which the same is to be made.

13. Off-Site Water & Dust Control:
    a. Contractor shall provide a water truck onsite at all times. Contractor will be allowed to draw water from the City of Gilroy Water Distribution System only after paying for construction water as a part of the Final Map and Improvement Plan approval or after obtaining a hydrant meter from the Public Works Department and an inspection of the water truck for a proper backflow device or air-gap filling pipe. Developer has paid for off-site construction water which shall be used for site grading only. Contractor shall keep down dust from construction activity to the maximum extent possible. Contractor shall clean all existing streets, curbs, gutters, and sidewalks affected by the project at the end of each working day.
    b. Water all active construction areas at least twice daily or as often as needed to control dust emissions.
    c. Cover all trucks hauling soil, sand, and other loose materials and/or ensure that all trucks hauling such materials maintain at least two feet of freeboard.
    d. Pave, place aggregate, apply water twice daily, or as often as necessary, to control dust, or apply non-toxic soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
    e. Sweep daily, or as often as needed, with water sweepers all paved access roads, parking areas and staging areas at construction sites to control dust.
    f. Sweep adjacent public streets daily, or as often as needed, to keep streets free of visible soil material.
    g. Hydroseed or apply non-toxic soil stabilizers to inactive construction areas.
    h. Enclose, cover, water twice daily or apply non-toxic soil binders to exposed stockpiles (dirt, sand, etc.).
    i. Limit vehicle traffic speeds on unpaved areas including roads to 15 mph.
    j. Replant vegetation in disturbed areas as quickly as possible.
    k. Install erosion control measures, per the erosion control plan, as necessary to prevent silt runoff to public roadways

14. Material Storage:
    a. No material shall be stored near the edge of pavement, traveled way, sidewalk, gutters, driveway, or shoulder line which may create a hazard for vehicular and pedestrian traffic, or wash into the storm drain system.

15. Traffic Control:
    a. If traffic control plans are not included with the Improvement Plans, traffic control plans shall be prepared in accordance with latest edition of the *California Manual on Uniform Traffic Control Devices (CA MUTCD).* Plans shall be prepared by a California-licensed Professional Engineer with experience in preparing traffic control plans for approval a minimum of 10 working days prior to any work within the existing public street. Traffic control plan shall be designed to address specific site/project conditions. Examples, samples, or “typical” drawings are not allowed. Traffic control plan shall be submitted for each phase of work, particularly when phases alter traffic patterns/flow. Two traffic lanes (10' min.) shall be open to vehicular traffic during all hours, weekends, and holidays. One lane one way traffic, may be permitted under the control of not less than 2 (two) competent flagmen during construction operations. Lane closures**,** Street closures and detours shall only take place upon City Engineer approval. Improvement plans must be approved by the City before or concurrent with traffic control plan approval. The City

Engineer shall be notified of any closure date and its duration at least 5 working days in advance of closure.

16. Trench restoration shall be according to City of Gilroy Standards.

17. Trench Safety:
    a. It shall be Contractor's responsibility to provide all necessary trench safety measures for excavations. All trench safety measures shall be in accordance with the latest CAL-OSHA guidelines. Contractor shall provide evidence of a CAL-OSHA trenching permit at the pre-construction meeting for all trenching over 4 feet.

18. Excavations within the public right-of-way shall be backfilled, compacted, and temporarily paved with cold mix cut back type A.C. to allow for vehicular and pedestrian traffic prior to 4:00 P.M. The use of trench plates is allowed, provided the Contractor covers all edges of the plates with cold mix material. Non-skid trench plates shall be used in the pavement areas on all arterials. It shall be the Contractor's responsibility to maintain on a daily basis, including weekends, the amount of material necessary to maintain the trench surface flush with the existing street or sidewalk. In addition, the Contractor shall respond to and correct shifting trench plates regardless of the time of day. If Contractor fails to correct sinking backfill material or shifting trench plates in a timely manner, City shall reserve the right to correct the problem and back charge the contractor.

19. Joining Existing Pavement:
    a. Existing pavement which is to be joined by new pavement shall be saw cut vertical to provide straight, true and neat joints. Overlapping of existing pavement without saw cutting or grinding shall not be permitted. The vertical edges shall be tacked prior to paving. Terminals of all surfacing indicated on the plans shall join any existing surface in a smooth butt joint. Conform paving by method of abrasive grinding will be allowed upon approval of the City Engineer.

20. Sanitary Sewers:
    a. All manholes, sewer mains, and laterals must pass a leakage test as described in the City of Gilroy Standard Details for Construction. After all backfill, testing, and pavement restoration has been completed, the contractor shall flush and clean all sewer lines 24 inches or less in diameter by the Wayne Ball Method. After the leakage test, but prior to paving, a television inspection shall be performed at all locations of newly installed sewer mains at contractor's expense. The underground contractor must keep an accurate record of manholes and the distance between them and each wye branch lateral, and their direction.
    b. Before any upstream sewers are constructed, the contractor shall expose and verify the elevation and location of existing sewer lines to be connected.

21. Water Lines:
    a. All water lines shall be installed with line and grade.
    b. Contractor shall not turn off or on any valves belonging to the City's water system without permission of the Water Division. Only (Public Department) personnel shall open the necessary valves to connect new lines. Failure to follow this requirement shall be considered an "unlawful connection" and may result in issuing of a citation and fines as specified in Section 13.04 of the Gilroy Municipal Code. The Water Division may authorize the contractor to operate designated valves.
    c. If an existing water main is being replaced, all laterals shall be replaced if fed from the main being replaced. All laterals shall be copper.
    d. Connections requiring shut down of the system shall be done between the hours of Midnight and 6:00 AM, and only upon coordination with the Public Works Department.

e. All water lines shall be tested after completion of the trench backfill and compaction of the final base material, but prior to placement of the final roadway surface.
f. Contractor shall place marker posts adjacent to all air relief valves and blow off assemblies along water mains located in unimproved areas or fields. The markers shall be blue 72" curb-flex utility markers with an appropriate label.

22. Backfill & Compaction:
    a. Backfill material shall be in accordance with City Standards.
    b. Jetting and/or flooding of trench backfill material will **not** be permitted.
    c. Any excess excavation material may be deposited onsite in areas and at depths designated by the Owner, and with written approval of the City Engineer and the Soils Engineer.
    d. The minimum relative compaction for trench backfill, subgrade and base material shall be 95% throughout the project unless recommended otherwise in the Soils Report and approved by the City Engineer.
    e. Contractor shall provide compaction test results of the lifts specified in the soils report to the City Engineer from a certified testing laboratory at contractor's expense.
    f. Any aggregate base that becomes contaminated during construction shall be removed and replaced with uncontaminated base.

23. Erosion Control:
    a. An erosion control plan shall be required prior to any physical development of a property planned between September 15th and May 1st. Said plan shall meet the minimum standards and specifications of the City of Gilroy Code, Chapter 27C and NPDES General Permit for the City of Gilroy.. Contractor shall be responsible for initiating the required erosion control measures during the above time period.

24. Electroliers:
    a. All electroliers shall be installed per City Standards, at the locations shown on the approved plans. See Electrical Section of the Standard Details.

25. Streets:
    a. All work shall be installed in accordance with the latest edition of the State of California Department of Transportation (Cal-Trans) Standard Specifications and shall conform to the minimum standards and/or specifications of any applicable local, state, or federal governing codes.

    b. Permits required for any construction depicted in these plans shall be paid for and obtained by the contractor unless otherwise noted.

    c. The contractor shall verify the locations of all existing utilities, structures, and services before commencing work. The locations of utilities, structures and services shown in the contract documents shall be deemed to be approximations only. All discrepancies between what is shown and the actual field conditions shall be reported to the owner's representative. The contractor shall contact Underground Service Alert (USA) at 811/1-800-227-2600 a minimum of 2 working days prior to any demolition or excavation upon completion of USA marking operations, contractor shall record all utility markings on a separate set of drawings. This set shall be kept on-site for reference for duration of contract. Notify the owner's representative immediately should conflicts arise and redirect work to avoid delay.

    d. The contractor shall protect all existing utilities and features on and adjacent to the project site during construction. The contractor shall repair, at no additional cost to the owner, all damage resulting from construction operations or negligence. All repairs shall be made to an "as-was" or better condition per the discretion of the owner(s).

e. The contractor shall be responsible for coordinating the work with the owner(s), owner's representative, utility companies, and other construction trades and governing agencies.

f. For items of work requiring inspection or observation, the contractor shall give the owner's representative a minimum of two working day notice prior to the time of required inspection or observation.

g. Prior to bidding, the contractor shall visit the site and familiarize themselves with the existing site conditions. Contractor shall immediately notify the owner's representative if discrepancy is suspected between the site and what is contained in the contract documents. No allowances will be made to the contractor due to their lack of familiarity with the site conditions.

h. Contractor shall provide and maintain erosion control measures in conformance with the standard construction practices as required to protect the project and/or adjacent properties from damages due to natural or man-made erosive forces. Contractor shall be responsible for repairing or replacing damages or damaged areas to an "as-was" or better condition if it can be reasonably construed that such damages were due to the contractors construction activity or lack of ample protective measures. Repairs shall be made subject to the discretion of the owner's representative.

i. Upon completion of the work, the contractor shall certify that all work has been installed in accordance with the contract documents. All variations from the documentation must be presented to the owner's representative accurately and/or graphically on record drawings prior to final acceptance. Refer to specifications for additional closeout information and procedures.

j. Contractor shall diligently strive to protect the project site and all construction materials from vandalism damage until project final acceptance. Contractor shall be responsible for all damages and/or losses due to vandalism until project final acceptance.

k. Contractor shall develop and implement a Safety Program and diligently protect workers and the public from injury due to any construction activity. Protective measures shall conform to those described in Cal-Trans State specification section 7-1.09 "Public Safety" at a minimum.

l. Contractor shall provide drinking water and portable restroom facilities for worker use during construction at contractor expense.

m. All permanent street name signs shall be installed immediately after the curb and gutter construction is completed.

26. Landscaping:

a. For those areas that will be planted with publicly maintained landscaping, after grading, but prior to planting, a horticulture suitability soil test shall be completed. Soil amendments will be based on lab recommendations from the tests. Testing shall be the Perry Laboratory Horticulture Appraisal Package or approved equal. Soil samples shall be a composite of the planting area. Contact the soil labor the city for information on the number of samples required based on the project area. Submit lab results to the city.

Capital Improvement Projects shall include the following notes:

1. General Notes:

   These notes are for the general reference in conjunction with, and as a supplement to the written specifications and details associated with any city issued contract documentation.

   a. The contractor shall visit the site prior to bid submittal to determine the exact extent of the site demolition required and verify compliance with drawings. The project manager shall be notified immediately of any discrepancies.

   b. The contractor shall perform all clearing, demolition, removal of obstructions and site preparations necessary for the proper execution of all work shown on the plans and as described within the specifications.

   c. Locations of Existing structures and utilities shown on the plans are based on the best available information. Contractor is responsible for the removal of all designated items per site conditions at direction of the City. The project manager and landscape architect assume no responsibility for the accuracy of this information or inadvertent omission of any such information.

   d. Prior to beginning of work, verify all existing utilities in the field. Failure to do so shall act as acceptance by the contractor of existing conditions and utilities in the field. Locations shown on the plans are approximate.

   e. The contractor shall become familiar with the locations of existing and future underground services and improvements which may affect the work being done. Contractor shall be responsible for notification of all the utility companies, 48 hours prior to beginning work. Contact the Underground Service Alert (USA) at 811/1-800-227-2600, a minimum of 48 working hours prior to start of construction. Notify the City Engineer or his/her designee immediately should conflict arise.

   f. The contractor shall be responsible for repairing and replacing at contractor's expense, any structure, paving, fencing, walls, or plant material damaged or destroyed by the subcontractor's operations. Contractor shall be responsible for repairing or replacing any and all damaged on site and adjacent properties. The damaged items will be restored to their original condition or replaced and to the satisfaction of the city.

   g. All existing items and/or structures are to remain unless otherwise noted on the plan.

   h. For protection of existing trees refer to tree protection specifications.

   i. Notify the project manager in writing two weeks prior to start of demolition phase, before removal of any items.

   j. When construction fencing is shown within limit of work, contractor shall provide and maintain full access as required. When work is required between limit of work and construction fencing, submit a written request to the owner stating work to be performed and approximate time of completion. No work shall be allowed within these areas without prior approval of the owner. Fencing shall be replaced promptly following completion of said work.

   k. Demolition shall include: Removal of item and any foundation or structural support related to item and to dispose of offsite in a manner acceptable to the owner and in compliance with all Federal, State and Local codes and ordinances.

   l. "Remove and Return" shall mean carefully disassemble or dismantle without damage. Any unnecessary damage, as deemed by the owner during removal, shall be repaired and replaced by the contractor at no additional cost.

2. Demolition

3. The contractor shall perform all clearing, demolition, removal of obstructions and site preparations necessary for the proper execution of all work shown on the plans and as described within the specifications.

4. The contractor shall visit the site prior to bid submittal to determine the exact extent of the site demolition required and verify compliance with drawings. The project manager shall be notified immediately of any discrepancies.

5. The contractor shall verify the locations of all existing structures, utilities, and services prior to commencing work. Contractor is responsible for the removal of all designated items per site conditions at direction of the Public Works Director/City Engineer or his/her designee. The City Engineer or his/her designee and project design engineer or architect assume no responsibility for the accuracy of this information or inadvertent omission of any such information. The locations of structures, utilities, and services shown in the plans, specification, and contract documents shall be deemed to be approximations only. All discrepancies between what is shown and the actual field conditions shall be reported to the Public Works Director/City Engineer or their designee. The contractor shall contact Underground Service Alert (USA) at 811/1-800-227-2600, a minimum of 48 hours prior to any demolition or excavation. Upon completion of USA Marking operations, contractor shall record all utility markings on a separate set of drawings. This set shall be kept on site for reference for the duration of the contract/project. Notify the Public Works Director/City Engineer or their designee immediately should conflicts arise and redirect work to avoid delay.

6. All existing items are to remain unless otherwise noted. The contractor shall be responsible for repairing and replacing at contractor's expense, any existing item damaged or destroyed by construction operations. Contractor shall be responsible for repairing or replacing any and all damages to adjacent properties. The damaged items shall be restored to an "as-was" or better condition or replaced per the discretion of the owner's representative.

7. Prior to any demolition work, contractor shall install self-supporting interlocking chain-link temporary construction fencing to enclose and secure the project area limit of work. The fencing shall contain pedestrian and/or vehicular access gates as necessary and shall be minimum 6 feet high with a top and bottom rail with knuckled top and bottom selvage (no barbed wire permitted). The construction fencing work shall be subject to the discretion of the Public Works Director/City Engineer or their designee.

8. Prior to any demolition work, contractor shall protect all existing plant material not scheduled for removal by installing temporary 4-foot high "Blaze Orange" construction safety fencing at the drip line or perimeter. The fencing shall be secured with driven metal stakes. All tree protection work shall be subject to the discretion of the Public Works Director/City Engineer or their designee.

9. Contractor shall verify location of all exiting utilities and provide the required coordination for their temporary disconnection, protection, removal and/or storage as may be required during construction. Contractor shall coordinate with the owner to determine whether temporary services are necessary.

10. Demolition shall include the removal of item(s) and any foundation or structural support related to the item(s) for plan material. This shall include stumps and roots over 2 inches in diameter. Disposal shall be off site in a legal manner acceptable to the City Engineer or his/her designee and in compliance with all Federal, State and Local codes and ordinances.

11. Refer to specifications for additional clearing, grubbing, topsoil, stockpiling and other pertinent

information.

12. Grading & Drainage Notes

    a. Existing grades are based on information provided by a surveyor. Contractor shall verify existing grades for accuracy prior to the start of grading. Contractor shall notify the City Engineer or his/her designee immediately should conflict arise and should redirect work to avoid delay.

    b. The contractor shall verify the locations of all existing structures, utilities, and services prior to commencing work. The locations of structures, utilities and services shown within the plans, specifications and contract documents shall be deemed to be approximations only. All discrepancies between what is shown and the actual field conditions shall be reported to the Public Works Director/City Engineer or their designee. The contractor shall contact Underground Service Alert (USA) at 811/1-800-227-2600, a minimum of 48 hours prior to any demolition or excavation. Upon completion of USA Marking operations, contractor shall record all utility markings on a separate set of drawings. This set shall be kept on site for reference for the duration of the contract/project. Notify the City Engineer or his/her designee immediately should conflicts arise and redirect work to avoid delay.

    c. Proposed grades shall meet existing grades with a smooth and continuous transition as to avoid trapping water. Contractor shall notify Public Works Director/City Engineer or his/her designee if puddling is suspected and redirect work so as to avoid delay while awaiting response.

    d. All existing drainage structures, boxes, utility vaults, etc., shall be brought to final finish grade prior to final surface treatment.

    e. Any conditions not specifically noted or detailed on the plans shall be called to the attention of the Public Works Director/City Engineer or his/her designee for review prior to installation.

    f. Contractor shall be responsible for adjusting all existing drainage structures and existing utilities to finished grades. If final grades differ from those noted on plans, contact district representative for approval. Any changes to grades shown shall be recorded on as-built plans.

    g. Contractor shall be responsible for cleaning all existing drainage structures and pipes to remain.

13. Layout/Material

    a. The contractor shall coordinate all construction elements including utility locations and required sleeving prior to installation. Verify critical dimension, reference point locations and construction conditions prior to initiating construction. Temporary benchmarks or reference points shall be set by the contractor as necessary. Notify the City Engineer or his/her designee immediately should discrepancy arise and redirect work to avoid delays.

    b. All dimensions shall be verified in field and chalked, string-lined or flagged by the contractor prior to construction. Any minor adjustments made to achieve overall design layout shall be accepted by the City Engineer or his/her designee prior to construction.

    c. Layout is based on the point(s) of beginning (P.O.B.) and baseline(s) or grid system as shown. Dimensions shown are rounded to the nearest inch.

Appendix A – Section 2

CHECKLIST FOR IMPROVEMENT PLANS

Planning Division Name:________________________________ Tentative Map No:______________

Subdivision Name: ______________________________________ Tract No:_______________

Assessor's Parcel No: ________________

Tentative Map Approval Date:____

Engineering Firm: _______________________________ Job Number: ________________

Project Engineer:________________________________ Telephone Number:_____________

(Appropriate sections to be checked off by the Engineering firm and provided along with 1st submittal)

	Engineers Checklist
( ) 1st Check ( ) 2nd Check ( ) 3rd Check	______________________
4 Sets of Improvement Plans (including all utilities, streets, Landscaping, irrigation, and joint trench)	______________________
2 copies of Irrigation Water Budget Calculations	______________________
2 Sets of Hydrology Map and Calculations	______________________
2 Sets of Storm Water Control Plans	______________________
2 Copies of Engineer's Estimate	______________________
2 Copies of Soils Report and Pavement Design Calculations	______________________
2 Sets of Sewer Map and Calculations	______________________
2 Sets of Water System Analysis (MDD & MDD+Fire), including phasing if applicable	______________________
1 Copy of Final Conditions of Approval (Resolutions)	______________________
Copies of Fireflow Calculations (commercial)	______________________
Accompanying list of requested deviations from the City's General Guidelines, Technical Specifications, and/or Standard Details	______________________

REVIEWED BY:

1. Planning Division	______________________
2. Engineering Division	______________________
3. City of Gilroy Fire Marshal	______________________
4. Sent to PG&E, Telephone & Cable TV by Engineer	______________________
5. Other Agency Review – by Engineer	______________________
a. Santa Clara Valley Water District	______________________
b. Other (specify)	______________________

SECTION 1 -- DRAWINGS

A. GENERAL (Applicable to every sheet)

1. Sheet size is 24"x36" with 2" space on left side of border and 1" space on right side ______________________

2. Title Block/Border of each sheet (contains as a minimum):

   a. City Engineer's signature block (Sheet 1 only) ______________________

   b. Design Engineer's signature block (Sheet 1 only) ______________________

   c. Design Engineer's seal, R.C.E. number and <u>original signature</u>

   d. (stamped signatures are not acceptable on final submittal) ______________________

   e. Horizontal scale (1"=40' max) & Vertical scale (1"=4' max) ______________________

   f. Name of Subdivision or Project and Sheet Name ______________________

3. Stationing referenced to nearest intersection ______________________

4. All offset distances measured from centerline ______________________

5. City Standard Details referenced correctly & unchanged (with border) ______________________

6. Details other than standard, properly detailed ______________________

B. TITLE SHEET

1. Project Area Diagram:

   a. Project limits shown as well as any City-County boundaries ______________________

   b. Phase boundaries (if applicable) ______________________

   c. Lots and lot numbers ______________________

   d. New/existing abutting right of ways, easements & street names ______________________

   e. New electroliers ______________________

   f. TBM shown with reference to an approved City benchmark ______________________

   g. Plan Sheet references ______________________

2. Sheet Index ______________________

3. Symbol/Abbreviations Legend ______________________

4. Location Map with North Arrow ______________________

5. Construction quantities/Scope of Work shown and itemized ______________________

6. Required City General Standard Notes - can be on separate sheet ______________________

<u>SECTION 2 -- GRADING PLANS</u>

1. Erosion control plan. ______________________

2. Existing elevations or contours shown ______________________

3. Existing and proposed storm drain lines and structures shown ______________________

4. Proposed pad grades & lot numbers shown

a. Minimum grade of lots 1% - Commercial & Multifamily ______________________

b. Minimum finish grade of residential lots 1% (shown on plot plans) ______________________

5. Lowest Floor shall be minimum 1' above calculated high water point or FIRM base flood elevation, whichever is greater. See Design Standards for further details. ______________________

6. Retaining walls and sound walls shown ______________________

7. Section of typical lot shows property lines and slopes/grades ______________________

8. Elevations at rear of lots shown – Commercial & Multifamily (Elevations at rear of lots for residential shown on plot plan) ______________________

9. Elevation of surrounding lots shown within 50'or as needed to show area wide drainage ______________________

10. Show grading required to manage existing off-site drainage ______________________

11. Profile shows back-of-curb/sidewalk and original ground ______________________

12. Grading conforms to adjacent properties per LID design concepts ______________________

13. Drainage does not occur across lot lines. Lots shall drain to streets where practicable ______________________

14. All slopes are maximum 2:1 or per Soils Report ______________________

15. Show overland drainage release ______________________

SECTION 3 -- STREETS

A. PLAN VIEWS

1. Access ramps are designed per Standard Details and meet ADA req. ______________________

2. Property corner cutoffs used where handicap ramps installed otherwise concentric with curb. ______________________

3. Curb curve data given-central angle, length, and radius. ______________________

4. Phase boundary shown (if applicable). ______________________

5. R/W and street width dimensions shown. ______________________

6. Centerline stationing at 100' and at BC & EC of horizontal curves. ______________________

7. Lot/parcel lines and numbers/letters shown. ______________________

8. Cul-de-sac cross slopes from high point to gutter lip-.020 min. ______________________

9. Rim and invert elevation and station given at all drainage structures. ______________________

10. TC elevation and station at property line extensions. ______________________

11. TC elevation and station at grade breaks and at curb returns. ______________________

12. 0.0050 minimum slope observed on all streets at curb line with minimum 0.2 foot fall around returns. ______________________

13. Location of underground pipes and utilities shown. ______________________

14. Fire hydrant and electrolier per Standard Detail ____________________
15. Street monuments shown. ___________________________
16. Street names shown. ___________________________
17. All notes and standard symbols conform to legend. ___________________________
18. All ex. utility poles, manholes, valves, signs, mail, boxes, trees, etc. shown. Indicates those to be removed, relocated or adjusted to grade. ________________________
19. Continuations and cross streets properly referenced i.e. (see sheet #___) ____________________
20. Street signs, traffic signs and barricades shown in proper locations. ___________________________
21. Driveway locations & stationioning shown. Width 16'-24' (residential). ____________________
22. Shows existing manholes, water valves and other facilities to be adjusted to grade. ____________________
23. North arrow shown for each plan view area. ___________________________

B. PROFILES

1. Vertical curves designed for proper speeds per Highway Design Manual. ______________________
2. Minimum vertical curve lengths observed. ___________________________
3. Vertical scale 1" = 2' or 1" = 4' ___________________________
4. Vertical curves used for grade-breaks where algebraic difference exceeds 1%. (Except at crown of two intersecting streets; grade-break shall not exceed 4%) ________________
5. Cul-de-sacs, show profiles @ centerline through radius point to TC at end of cul-de-sac (dashed line). ___________________________
6. 2% maximum grade observed across intersections. ___________________________
7. All underground pipes and utilities shown; including storm drain, water and sewer. ____________________
8. Existing grade on centerline shown. ___________________________
9. Finished grade profile at centerline or crown. ___________________________
10. Centerline profiles of intersecting streets shown to their point of intersection. _____________
11. New road profile conforms to off-site existing road profile. ___________________________
12. Centerline stations and elevations shown @ all BVC, EVC, PIVC, grade breaks, low points and high points. ___________________________
13. All slopes in profile shown. ___________________________
14. Shows all utility crossings with clearances indicated, 12”min ___________________________
15. Manhole invert, rim, and flowline elevations shown. ___________________________
16. Elevation at high and low points of water mains shown. ____________________

SECTION 4 -- WATER

1. Design conforms to City of Gilroy Design Standards and the Standard Details. ________________
2. Design conforms to Water Master Plan, water system analysis w/ recent fire flow test from City, including phasing if applicable ________________
3. Show minimum distances to sanitary sewer and storm lines maintained.________________
4. Length shown as distance between crosses or tees. ________________
5. Air relief valves at high points. ________________
6. Invert elevations shown at all grade breaks and air relief valves. ________________
7. Sizes of all existing lines shown. ________________
8. Fire services shown. *(if applicable)* ________________
9. Size and type of pipe shown in profile. ________________
10. Blowoffs at dead-end lines. ________________
11. Valves on all legs of a "cross" or "tee" (except at fire hydrants). ________________
12. Minimum cover 36 inches. ________________
13. Minimum water service size 1 inch. ________________
14. Size and location of water services laterals and meter boxes shown. ________________
15. Fire Hydrant spacing per General Guidelines Section 5.6. ________________
16. Valves spaced per General Guidelines Section section 5.7. ________________

SECTION 5 -- SANITARY SEWERS

1. System in agreement with approved tentative map and master plan. ________________
2. Design conforms to City Design Standards and Details. ________________
3. Adequate cover. 3' min to top of pipe finished grade. ________________
4. Minimum horizontal and vertical clearances from water main. ________________
5. Pipe size, type, slope, and length between structures shown. ________________
6. Connection to existing facilities shown. Manhole installed when tying to existing lines. ________________
7. Extend sewer lines to subdivision boundary ________________
8. Station and invert & rim of manhole elevations shown. ________________
9. Sizes of existing lines shown. ________________
10. 300' maximum distance from manhole to manhole for pipe less than or equal to 24”, 600’ spacing for manholes on trunk lines greater than 24” and 150' from manhole to clean out (at end of line). ________________
11. Scour velocity shall be 2.5 fps half flow capacity,10 fps maximum

velocity ____________________

12. 0.1' drop around corner through manhole, or matches soffit elevation. ____________________
13. Points of convergence of pipes shall be crown to crown. ____________________
14. Lockable manhole covers for any off street manholes. ____________________
15. In unimproved areas, manholes extended 1' above ground. ____________________
16. Elevations, slopes and distances all mathematically correct. ____________________
17. Minimum vertical and horizontal distances to water lines maintained. ____________________

SECTION 6 -- DRAINAGE

A. HYDROLOGY-HYDRAULICS REPORT

1. Calculations conform to City Design Standards. Underground system designed to handle a 10-year storm, streets designed to carry a 100 year storm. ____________________
2. Tributary drainage system designed to connect to City's future storm drainage system and conforms to Storm Drainage Master Plan. ____________________
3. Calculations shall include: HGL, FL El, Q, A, S, V, freeboard at structures, structure losses, & tailwater assumptions. ____________________
4. All starting water surface calculations adequately verified. ____________________
5. Drainage map showing street system, existing and proposed drainage system, slope arrows, tributary sub-areas in acres, peak flow in all pipes (1" = 100' preferred) ____________________
6. All pipe in tributary areas labeled to correspond with calculations. ____________________
7. Base Flood Elevation verified for the project area. ____________________
8. Show overland storm water release path. ____________________

B. EASEMENTS

1. Off-tract improvements (plan and profile) and accompanying easements shown. ____________________
2. Prior to final approval, executed grant deed, plan, and legal description for off-tract offers of dedication for drainage easement or right of way submitted for review. ____________________
3. Off-tract work to be done but no easement required; right-of-entry submitted for review. ____________________
4. Easement widths indicated. ____________________

C. STRUCTURES

1. 1.00' minimum HGL to TC at DIs and manholes for 10 year storm. ____________
2. Special structure calculations provided. ____________

D. PIPE

1. Minimum slope for flow of 2 fps. Size (15" min. laterals & 18" min. mains), class, slope, length, and, type of pipe (RCP) shown in profiles. ____________
2. Indicate clearly on plans where non-standard pipes are used. ____________
3. Elevations, slopes and distances all mathematically correct. ____________
4. Matches hydraulic/hydrology calculations. ____________
5. Manhole inverts and rim elevations shown along with catch basin invert elevations. ____________

E. CHANNELS

1. Maximum velocity in earth channel verified by soils report. ____________
2. Channel side slopes as specified by soils report. ____________
3. Channel design per City Specific Plan (if applicable) ____________

F. STORM DRAIN DETENTION BASINS FOR FLOOD CONTROL

1. Runoff and volume calculations per City Design Standards. ____________
2. High water level shown on basin section. ____________
3. Basin bottom 5' above water table unless statement from soils engineer indicates range of depths, then 2' minimum allowed. ____________
4. Outfall protection using rip-rap required. ____________
5. Chain link fence with slats required around basins greater than 3 feet in depth. ____________
6. Basins have an access road around the basin. ____________
7. Easement boundary shown. ____________
8. Maximum sloped ratios for turfed or landscaped side slopes = 4:1 ____________

<u>SECTION 7 – STORM WATER QUALITY FOR POST-CONSTRUCTION</u>

1. Storm Water Control Plan per Municipal Code Chapter 27.D.
2. Storm Water Control Plan Checklist
3. Performance Requirement Certifications
4. Show overland release path.

<u>SECTION 8 – LANDSCAPE PLANS</u>

1. Specify all planting materials ____________

2. Specify irrigation system ____________________
3. Provide water budget calculations ____________________
4. Show point of connection to water system ____________________
5. Show point of connection to electrical power ____________________

SECTION 9 – JOINT TRENCH INTENT PLANS

1. Show all utility box locations ____________________
2. Show all conduit runs ____________________
3. Show all points of connection ____________________
4. Provide PG&E approval (prior to final approval) ____________________
5. Project Engineer shall review improvement plans, landscape plans, and Joint Trench and attest there are no conflicts ____________________

SECTION 8 - GENERAL

1. Shows winterization procedures and erosion control measures. ____________________
2. SWPPP with QSP name and phone number, & WDID Number ____________________
3. Santa Clara Valley Water District Well Map/Site must be checked ____________________
4. Trash can pad for roads less than 30' wide ____________________
5. Street Names approved by Street Naming Committee ____________________
6. Lot numbers on improvement plans match lot numbers on Final Map ____________________
7. Tract number on First Plan Sheet ____________________

Appendix A – Section 3

Development Project Closeout

The following information serves as an informational checklist for contractors and/or developers to identify the process for the completion of a new development.

1. City of Gilroy, Engineering Division provides a Punch List of final items required for completion and acceptance of the project.

2. Developer/Contractor shall complete all field work identified on the Punch List to the City of Gilroy, Engineering Division.

3. Developer shall provide the contractor's final pay request in Excel format, and copies of all invoices.

4. Developer shall provide electronic files of all job site mark-ups and "as-built" plans and maps.

5. Developer shall provide operation and maintenance manual for storm water quality structural control measure maintenance.
6. Engineering Division will review contractor's final pay request cost and compare with Engineer's Estimate of Probable Costs included with Improvement Plans, and determine final plan check and inspection fee.

7. Upon the determination of the fees, If they are:

    i. Due by the Developer to the City of Gilroy, a request for payment is sent to Developer.
    ii. Owed to the Developer by the City of Gilroy, a refund will be processed for the over-payment.

8. The Engineering Division shall review electronic files as-built to determine completeness.

9. Developer requests final inspection.
    i. Final inspection by City includes a review by ALL City Departments. All Departments are to make comments at which time, comments will be forwarded to the Developer to address.

10. After Final Inspection is complete, Developer to shall submit within 14 days Record Drawings, prepared per job site mark-up, for Improvement Plans as per General Guidelines Section 1.5 of Standards. Submittal shall include:
    i. Mylar set of plans
    ii. Electronic set of plans in the following format:
        1. Autocad - DWG format, Autocad (call city for latest version)

11. Items 1-9 to be completed prior to sending the Notice of Completion of Project to the City Council.

12. Once approved by Council, the NOC is recorded.

13. Developer to request a partial release of their bond (bond release cannot occur until 35 days after county notification of recording of the Notice of Completion and no liens have been filed against the City).

14. City sends Developer in writing the determination of the bond reduction.
    i. If approved, Bond reduction released in exchange for maintenance bond. Maintenance bond is to be for a one-year period (one year from the Council meeting date of acceptance), automatically renewable.

15. Inspectors review project one month prior to expiration of maintenance bond and advises contractor/developer of any deficiencies to be completed prior to release of maintenance bond.
    i. This inspection by City includes a review by ALL City Departments. All Departments are allotted two weeks (Minimum) to make comments at which time, comments will be forwarded to the Developer to address

Appendix B

FINAL MAPS

CHECKLIST FOR FINAL MAPS

Date:________________________ Subdivision No.______________________

A. <u>GENERAL</u> <u>Engineers Checklist</u>

1. Agrees with the approved Tentative Map. __________________
2. Compliance with conditions of approval:
   (i.e. survey, dedications, notes). __________________
3. Easements and monuments correspond with Improvement Plans. __________________
4. Title Report current (within six months) __________________

B. <u>DEDICATION AND CERTIFICATION</u>

1. Owner's Statement. __________________
2. Trustee's Statement. Note: Check signature requirements,
   Land Development. __________________
3. Surveyor's/Engineer's Statement, including signature, seal and number. ______________
4. Name of person authorizing map. __________________
5. All certificates signed and acknowledged with signatures and
   Notary seals legible, using black India ink (final submittal). __________________
6. Statement of the Planning Commission. __________________
7. Certificate of the City Clerk. __________________
8. Recorder's Certificate __________________
9. City Engineer's Statement __________________

C. <u>MONUMENTATION</u>

1. All found monuments tied by survey and described with tag
   numbers and recorded reference. __________________
2. Basis of Bearings, two found monuments of record must appear
   in a statement and be labeled on each sheet of the map. __________________
3. Tie to Basis of Bearings. __________________
4. Monument R/W at B.C., E.C. and property line, if necessary. __________________
5. A monumented line shall be shown on all new subdivision streets,
   with ties to right-of-way. __________________
6. Chisseled "+"at the <u>prolongation</u> of property line to curb or
   back of walk, whichever applies __________________

D. <u>MATHEMATICAL ACCURACY AND GEOMETRY</u>

1. All bearings, distances and curve information shown to
   nearest .01 ft. and nearest second. __________________
2. Curve data (Delta, Radius, Length). __________________
3. Radial bearing, non-tangent curve. __________________
4. Sum of increments equals total distance or delta. __________________
5. Areas net and gross (as required to nearest .01 of area). __________________
6. Minimum road centerline radius; 750, 500, 250. Street width
   setback lines, and/or required widening must be shown on map. __________________
7. Math closures must be correct to 1 part in 20,000 and they
   must be certified. __________________

8. Individual parcel area, table form or per lot. ____________________

E. MAP BODY Engineers Checklist

2. Full map size 18" x 26" on mylar with 1" border (16" x 24" inside border). Should have scale 40 ft., 50 ft., or 60 ft. to 1"; other scales must have Engineering Division's approval. ____________________
3. Legend: Found mon., solid; set mon., open; show corner monument type, size and tag no.; show on each map sheet. ____________________
4. Distinctive border. ____________________
5. Map tie to next street intersection or a vicinity map. ____________________
6. Road names, spelling R/W width, setback lines and/or required widening. ____________________
7. Parcel designation, lots designated by numbers; parcels designated by letters. ____________________
8. City boundaries must appear on the map, when applicable. ____________________
9. Future street lines and original property lines. ____________________
10. Each lot/parcel must be shown completely on one sheet. If more than one sheet is required, the first sheet shall contain a small-scale, undimensioned map of the parcel. ____________________
11. Key or index map showing sheet numbers. ____________________
12. Chisseled “+”at the <u>prolongation</u> of property line to curb or back of walk, whichever applies ____________________

Appendix B – Section 2

Requirements for Council Approval

Upon completion of Final Map the following listed items are to be provided. When all items have been received the project will be agendized for City Council approval.

1. Property Improvement Agreement signed, sealed, notarized and returned to the City of Gilroy.
2. Payment of plan check and inspection fees and storm impact fee, street tree fee, and construction water per the Final Development Cost Schedule.
3. Performance Bond and Payment Bond to be provided to the City of Gilroy. Amounts outlined within the Development Cost Schedule.
4. A check made payable to the County of Santa Clara Recorder. This will cover the recording fee for the Property Improvement Agreement and Tract Map.
5. Subdivision Guarantee.
6. Current City of Gilroy Business License.
7. Developer's liability insurance certificates and Additional Insured form specifically naming the City of Gilroy as additionally insured.
8. Provide two (2) Mylar sets of the Improvement Plans. Both complete sets will be signed by the City Engineer. Once signed/approved, one set will be given to the developer/owner and one will be for the City of Gilroy.
9. Provide two (2) original Mylar sets of the Final map. Both Council approved sets will be sent to the title company for recording. One recorded copy will be returned to the City of Gilroy.
10. Provide on the same CD, as an Autocad File and PDF, for both Improvement Plans and Final Maps that conform to the Digital Standard Requirements.
11. An 8-1/2 x 11 paper copy and AutoCad Drawing of the site plan for the Final Map showing fire hydrants, lot numbers (in the upper right hand corner), street names and Tract number and name.
12. An 11 x 17 reduced paper copy of the final project improvement plans and final map.

Note:

A. **After Council Approves Final Map**, Developer to submit to City within 30 days a mylar copy of the **Recorded** map**.**

   At the End of the Project, Developer to submit Improvement Plan **Record Drawings** as a Mylar and Autocad file and contractor's final pay request (see Appendix A – Section 3).

Appendix C

TRAFFIC CONTROL PLANS

Appendix D

TRAFFIC CONTROL PLANS

Traffic control plans shall be submitted to the Engineering Division for all work conducted within City right-of-way and shall meet the minimum requirements outlined below.

GENERAL

1. Traffic control plans shall be prepared in accordance with latest edition of the *California Manual on Uniform Traffic Control Devices (CA MUTCD)*
2. Plans shall be prepared by a California-licensed Professional Engineer with experience in preparing traffic control plans
3. Traffic control plan shall be designed to address specific site/project conditions. Examples, samples, or "typical" drawings are not allowed.
4. Traffic control plan shall be submitted a minimum of 10 working days prior to work commencing, for each phase of work, particularly when phases alter traffic patterns/flow
5. Improvement plans must be approved by the City before traffic control plan can be approved
6. Place all "Notes" on traffic control plan (see below for required notes)

PERMITS

1. Submit copy of approved Caltrans Encroachment Permit if any portion of plan is within state right-of-way. Traffic control plan cannot be finalized and approved by the City until receipt of approved Caltrans permit.
2. Submit copy of approved Santa Clara County Encroachment Permit if any portion of plan is within county right-of-way. Traffic control plan cannot be finalized and approved by the City until receipt of approved county permit.

TRAFFIC PLAN

1. Identify north point and scale
2. Identify/shade construction area(s)
3. Identify area(s) where parking will be prohibited
4. Identify all symbols in a legend
5. Identify all signs and striping; provide key for sign and striping designations
6. Construction signs shall be black on orange (not black on yellow or black on pink)
7. Indicate sign designation and spacing
8. Indicate type and spacing of delineators, where applicable
9. Specify type(s) of barricade(s) to be used, where applicable
10. Identify and dimension all travel lanes
11. Show, identify, and provide/maintain access to existing driveways, cross streets, alleys, etc.

12. Provide pedestrian detour for sidewalk closures

13. Depending on duration of work, temporary striping may be required instead of delineators

14. For signalized intersections, the following shall apply:
    a) All active travel lanes shall have temporary or permanent detection
    b) All permanent detection shall be installed within 48 hours of end of temporary traffic control

<u>NOTES</u>

Including the following notes:

1. Specify working days and hours.

2. Construction signs shall be black on orange (not black on yellow or black on pink).

3. Access to all private properties shall be maintained at all times during construction.

4. Temporary traffic control signs shall not block fire hydrants and/or driveways at all times.

5. All traffic control devices (signs, channelizers, etc.) shall be retroreflective and/or illuminated during nighttime traffic control.

6. All existing roadway signs conflicting with traffic control plan shall be covered for duration of work and uncovered when roadway is reopened.

7. For signalized intersections, all active travel lanes shall have temporary or permanent detection. All permanent detection shall be installed within 48 hours of end of temporary traffic control.

8. Contractor shall post temporary “No Parking,” “No Stopping,” and/or “Tow Away” signs along roadway frontage, where applicable, a minimum three (3) working days prior to commencement of work. Signs shall state days and hours when restrictions apply.

9. Contractor shall display on its barricades company name and 24-hour emergency telephone number in case of emergency callouts.

10. Contractor shall furnish, erect, and maintain barricades, lights, signs, flagmen, fencing, and other safety measures to give adequate protection to the public at all times. Contractor shall provide access to all areas in the vicinity of the encroachment and shall provide necessary temporary sidewalk and warning signs.

11. The parking of any construction-related vehicles or storage of any material is not allowed on a public street or sidewalk unless approved in advance by the City Engineer.

12. Any traffic striping, pavement markings, pavement surface, etc. damaged or destroyed by Contractor’s work shall be replaced by Contractor to the satisfaction of the City Engineer at Contractor’s sole expense.

13. Contractor shall notify all private property owners in writing a minimum three (3) working days prior to any construction that may affect access. Notice shall contain
    a) Company Name
    b) Contact Name

c) Company and/or Contact Phone Number

14. Contractor shall notify City of Gilroy Engineering Division in writing a minimum five (5) working days prior to beginning of work.

HAUL ROUTES

Haul routes shall be identified prior to the start of construction and shall conform to all city and state regulations.

Appendix E

GENERAL REFERENCES

City of Gilroy
References

Governmental Agencies

City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020
Ph: (408) 846-0450
Fax: (408) 842-0451
Website: www.ci.gilroy.ca.us

County of Santa Clara (County Governement Center)
70 West Hedding Street, Tenth Floor
San Jose, CA 95110
Ph: (408) 299-2323
Fax: (408) 298-8460
Website: www.sccgov.org

Flood Control and Waterways
Santa Clara Valley Water District (SCVWD)
5750 Almaden Expressway
San Jose, CA 95118-3686
Ph: (408) 265-2600
Fax: (408) 266-9751
Website: www.valleywater.org

State of California-Department of Fish and Wildlife (Bay Delta Region, Region 3)
7329 Silverado Trail
Napa, CA 94558
P.O. Box 47
Yountville, CA 94599
Ph: (707) 944-5500
F: (707) 944-5563
Website: www.dfg.ca.gov

California Department of Transportation - District 4
111 Grand Ave.
Oakland, CA 94612
Ph: (510) 286-4444
Website: www.dot.ca.gov

U.S. Army Corps of Engineers
333 Market Street
San Francisco, CA
Ph: (415) 977-8618
Website:

Utility Companies

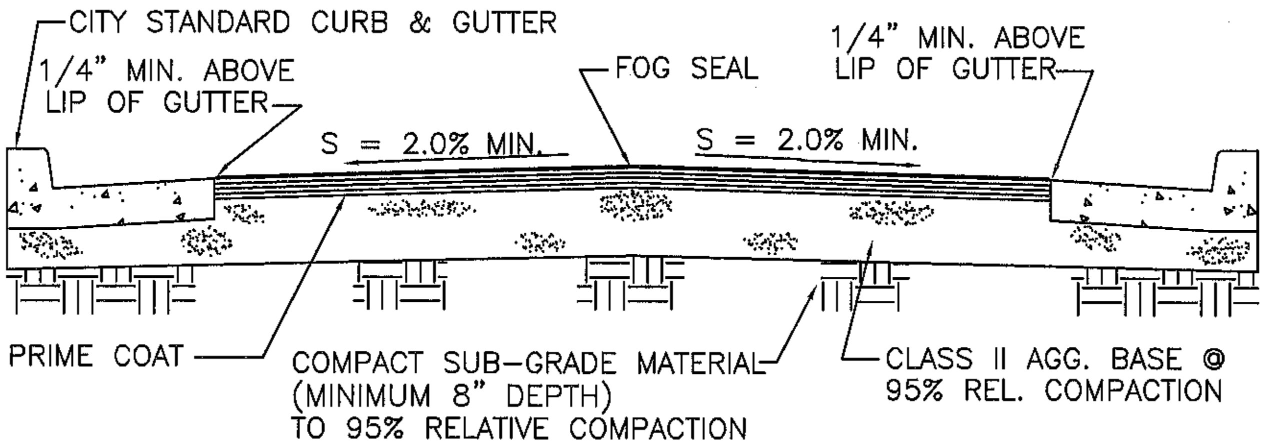
Pacific Gas and Electric
Service and Planning
Ph: (408) 494-1700
Toll Free: (800) 743-5000

Water and Sewage
City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020
Ph: (408) 846-0400
Fax: (408) 842-0429
Website: www.ci.gilroy.ca.us

Telephone
Verizon
7373 Monterey Street
Gilroy, CA 95020
Ph: (800) 483-4000 (RES)
Ph: (800) 483-5000 (COM)

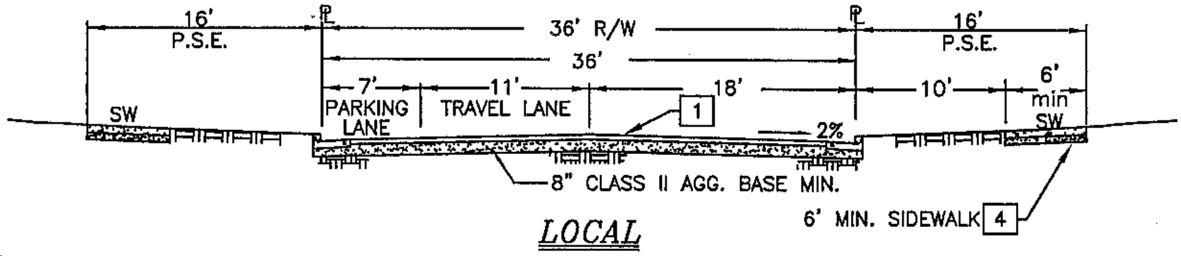
Garbage Removal
Recology South Valley
1351 Pacheco Pass Highway
Gilroy, CA 95020
Ph: (408) 842-3358
Website:
http://recologysouthvalley.com

Cable Television
Charter Communications
8100 Camino Arroyo
Gilroy, CA 95020
Ph: (408) 842-5653
F: (408) 842-5664



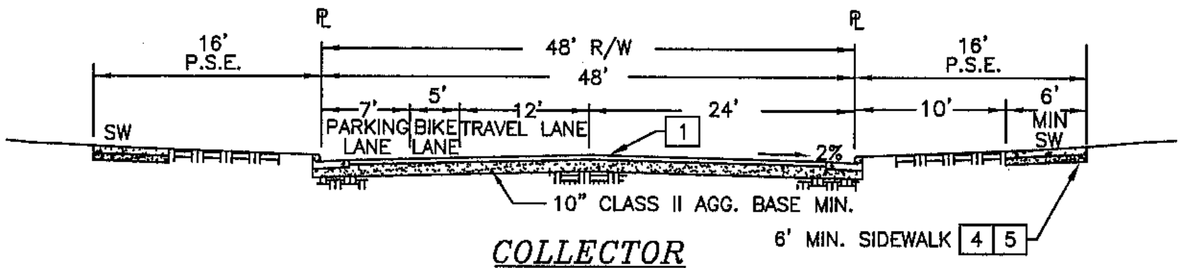
NOTE: TRAFFIC INDEXES (T.I.) SHOWN ON SECTIONS ARE MINIMUMS. ALL STRUCTURAL SECTIONS SHALL BE BASED ON A 20 YEAR DESIGN LIFE AS DETERMINED BY EXISTING R-VALUE AND T.I. WHICH SHALL INCLUDE ANTICIPATED TRAFFIC AS WELL AS EXISTING TRAFFIC CONDITIONS. SECTIONS ARE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER. REFER TO CITY STANDARD SPECIFICATION 3.4 FOR MINIMUM ALLOWABLE T.I. VALUES.

STREET SECTION REQUIREMENTS	DRAWN BY: CSG CHECKED BY: LAST REVISED: 10/08/14	SCALE: N.T.S.
APPROVED BY CITY ENGINEER — DATE 8-18-14	SECTION: STREETS	
	DRAWING NO.: STR-1	



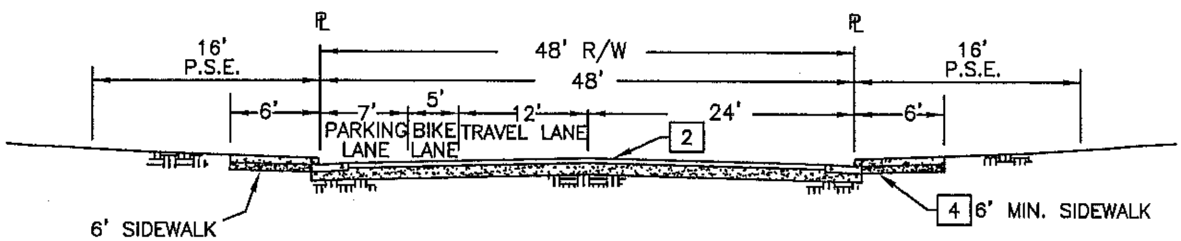
LOCAL

NOTES:
1. T.I. = 6.5 MINIMUM; DESIGN SPEED = 25 MPH
2. A.C. PAVEMENT SHALL BE 4" A.C. MIN. THICKNESS AND 1/2" TYPE A–A.C.
3. P.S.E. = PUBLIC SERVICE EASEMENT.
4. SIDEWALK ALIGNMENT MAY MEANDER.



COLLECTOR

NOTES:
1. T.I. = 8.0 MINIMUM; DESIGN SPEED = 35 MPH
2. A.C PAVEMENT SHALL BE 4" A.C. MIN. THICKNESS AND 1/2" TYPE A
3. P.S.E. = PUBLIC SERVICE EASEMENT.
4. SIDEWALK ALIGNMENT MAY MEANDER.
5. SCHOOL FRONTAGES SHALL HAVE 10' MONOLITHIC SIDEWALKS WITH TREES TO BE PLACED BEHIND SIDEWALK.



NON–RESIDENTIAL

NOTES:
1. T.I. = 9.0 MINIMUM; DESIGN SPEED = 35 MPH
2. A.C. PAVEMENT SHALL BE 6" A.C. MIN. THICKNESS AND 3/4" TYPE A
3. P.S.E. = PUBLIC SERVICE EASEMENT.
4. SIDEWALK SHALL BE 10' WIDE IN COMMERCIAL AREA.

STREET SECTIONS

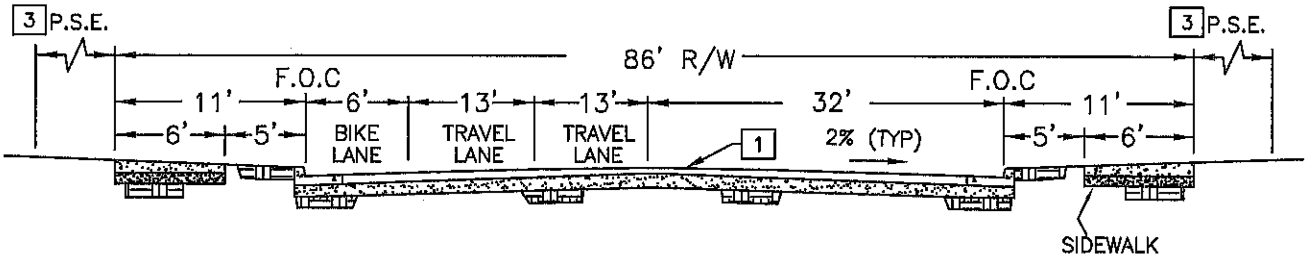
DRAWN BY: CSG		SCALE:
CHECKED BY:		N.T.S.
LAST REVISED: 10/08/14		

APPROVED BY:

CITY ENGINEER 8-18-14 DATE

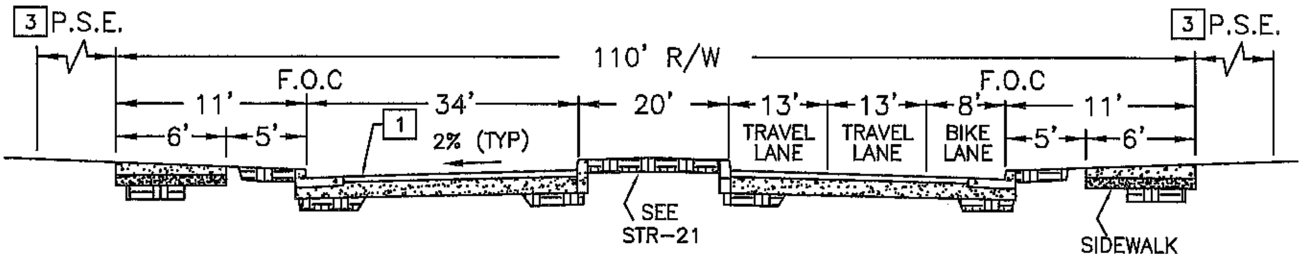
SECTION: STREETS

DRAWING NO.: STR–2A



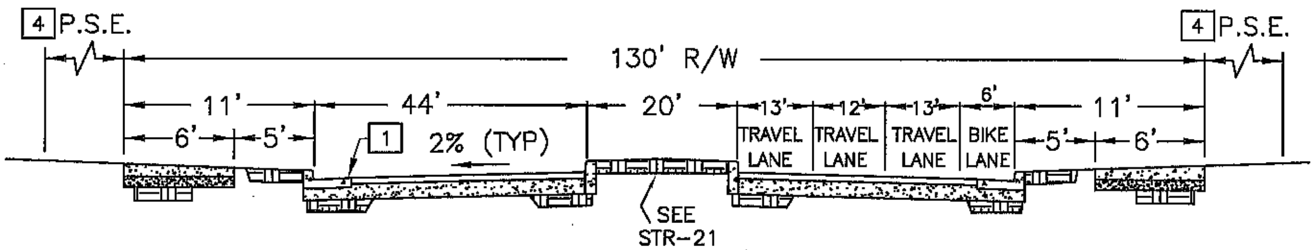
4-LANE UNDIVIDED ARTERIAL

NOTES:
1. FINISHED PAVEMENT SURFACE 1-½" LAYER OF ¾" OPEN GRADED MIX.
2. T.I. = 9.0 MINIMUM, DESIGN SPEED = 45 M.P.H., NO PARKING.
3. P.S.E. VARIES AS DETERMINED BY PUBLIC WORKS DIRECTOR/CITY ENGINEER.



4-LANE DIVIDED ARTERIAL

NOTES:
1. ¾" TYPE "A" A.C.
2. T.I. = 9.0 MINIMUM, DESIGN SPEED = 45 M.P.H., NO PARKING.
3. P.S.E. VARIES AS DETERMINED BY PUBLIC WORKS DIRECTOR/CITY ENGINEER.



6-LANE DIVIDED ARTERIAL

NOTES:
1. ¾" TYPE "A" A.C.
2. T.I. = 9.0 MINIMUM, DESIGN SPEED = 45 M.P.H., NO PARKING.
3. A HIGHER T.I MAY BE REQUIRED AT THE DISCRETION OF THE PUBLIC WORKS DIRECTOR/CITY ENGINEER.
4. P.S.E. VARIES AS DETERMINED BY PUBLIC WORKS DIRECTOR/CITY ENGINEER.

STREET SECTIONS

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 10/9/14

SCALE: N.T.S.

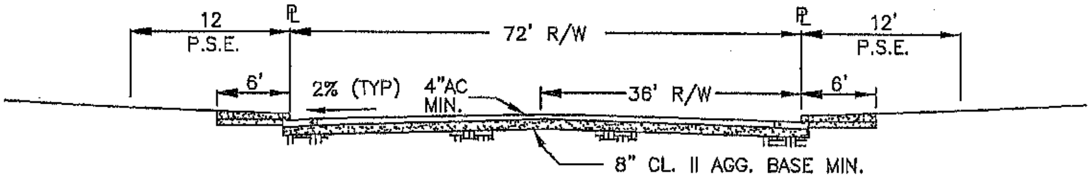
APPROVED BY:

8-18-14

CITY ENGINEER DATE

SECTION: STREETS

DRAWING NO.: STR-2B

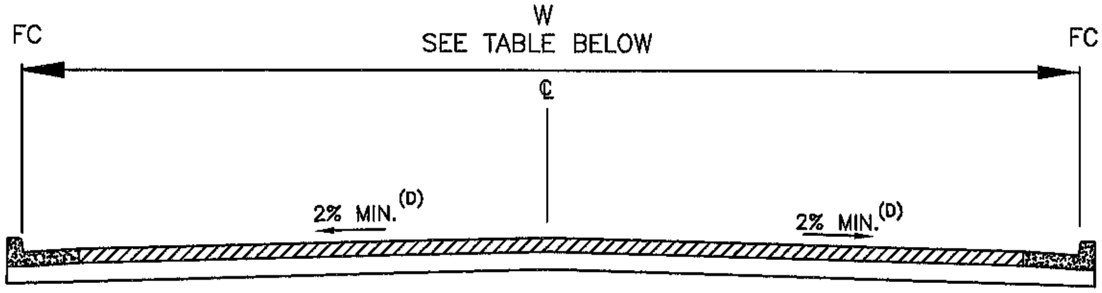


LOCAL CUL-DE-SAC BULB

NOTES:

1. LOCAL STREET SECTION APPLIES WHEN CUL-DE-SAC IS AN EXTENSION OF A LOCAL STREET.
2. T.I. = 6.5 MINIMUM, DESIGN SPEED = 25 M.P.H.
3. P.S.E. = PUBLIC SERVICE EASEMENT.

STREET SECTIONS	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/1/14	SCALE: N.T.S.
CITY OF GILROY — APPROVED BY: [signature] 8-18-14 CITY ENGINEER DATE	SECTION: STREETS DRAWING NO.: STR-2C	



PRIVATE LOCAL STREET

TWO-WAY TRAFFIC

STREET TYPE	STREET CONFIGURATION		CORRESPONDING LANE WIDTH		W (2)
	NUMBER TRAVEL LANES	NUMBER PARKING LANES	TRAVEL LANE (1)	PARKING (WIDTH/SIDE) 7FT.	TOTAL PRIVATE STREET WIDTH CURB-CURB (WIDTH)
ONE-WAY STREET					
NO PARKING	1	NONE	20	0	20
PARKING ON ONE SIDE	1	1	20	7	27
PARKING ON BOTH SIDES	1	2	20	14	34
TWO-WAY STREET					
NO PARKING	2	NONE	26	0	26
PARKING ON ONE SIDE	2	1	24	7	31
PARKING ON BOTH SIDES	2	2	22	14	36

(1) -THE TRAVEL LANE WIDTH FOR TWO-WAY TRAVEL WITHOUT PARKING OR BIKE LANES IS A MINIMUM OF 13' PER LANE.
-THE TRAVEL LANE WIDTH FOR ONE-WAY TRAVEL WITHOUT PARKING OR BIKE LANES IS A MINIMUM OF 20' PER LANE.
(2) IF CLASS II BIKE LANES ARE TO BE INCLUDED, ADD 5' FOR ONE WAY BIKE LANES OR 10' FOR TWO WAY BIKE LANES.
(3) EACH LANE ON A LOCAL PRIVATE STREET WITH MEDIANS SHALL BE CONSIDERED A ONE-WAY STREET.

NOTES:

A. MODIFIED CURB & GUTTERS (PER STR-17) MAY BE USED AT DRIVEWAYS IN LIEU OF DRIVEWAY DEPRESSION IN VERTICAL CURB & GUTTER.
B. MINIMUM SIDEWALK WIDTH SHALL BE 5 FEET (WHERE PROVIDED).
C. LOCAL PRIVATE STREETS SHALL BE DESIGNED FOR A MINIMUM TRAFFIC INDEX OF 6.5 AND SHALL HAVE A MINIMUM STRUCTURAL SECTION OF 4" OF ASPHALT OVER 8" OF AGGREGATE BASE.
D. PRIVATE STREETS MAY BE CROSS-SLOPED IN ONE DIRECTION.
E. SIDEWALKS MAY BE MONOLITHIC, AND NOT LESS THAN 5' WIDE, AT 1.5% MAX. CROSS-SLOPE.

PRIVATE LOCAL STREET

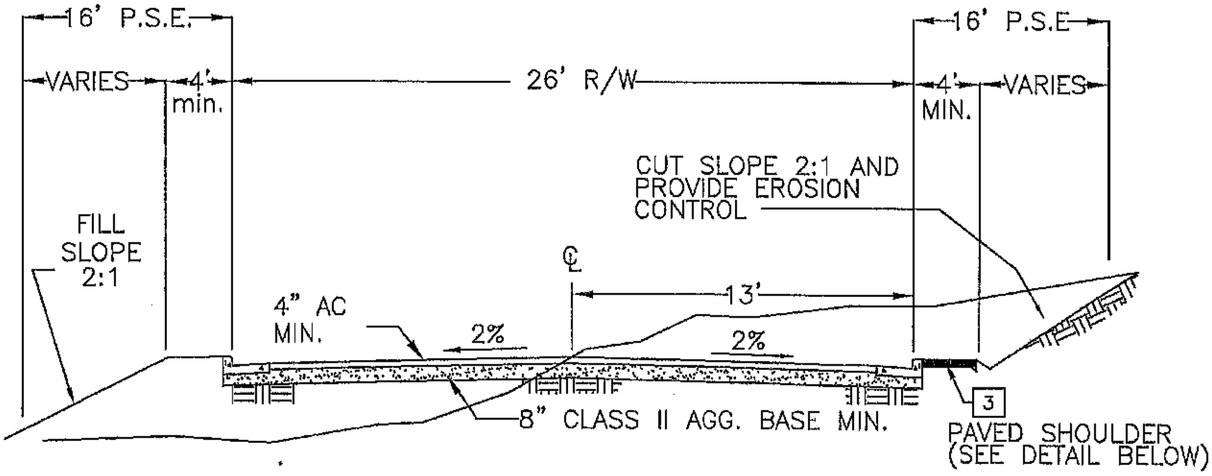
DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 10/8/14

SCALE: N.T.S.

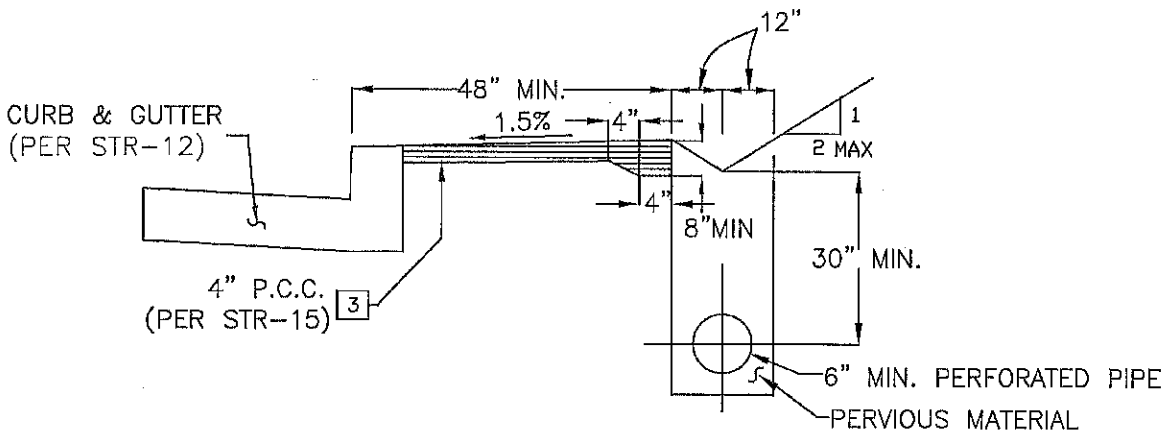
APPROVED BY: 8-18-14
CITY ENGINEER DATE

SECTION: STREETS

DRAWING NO.: STR-2D



LOCAL HILLSIDE

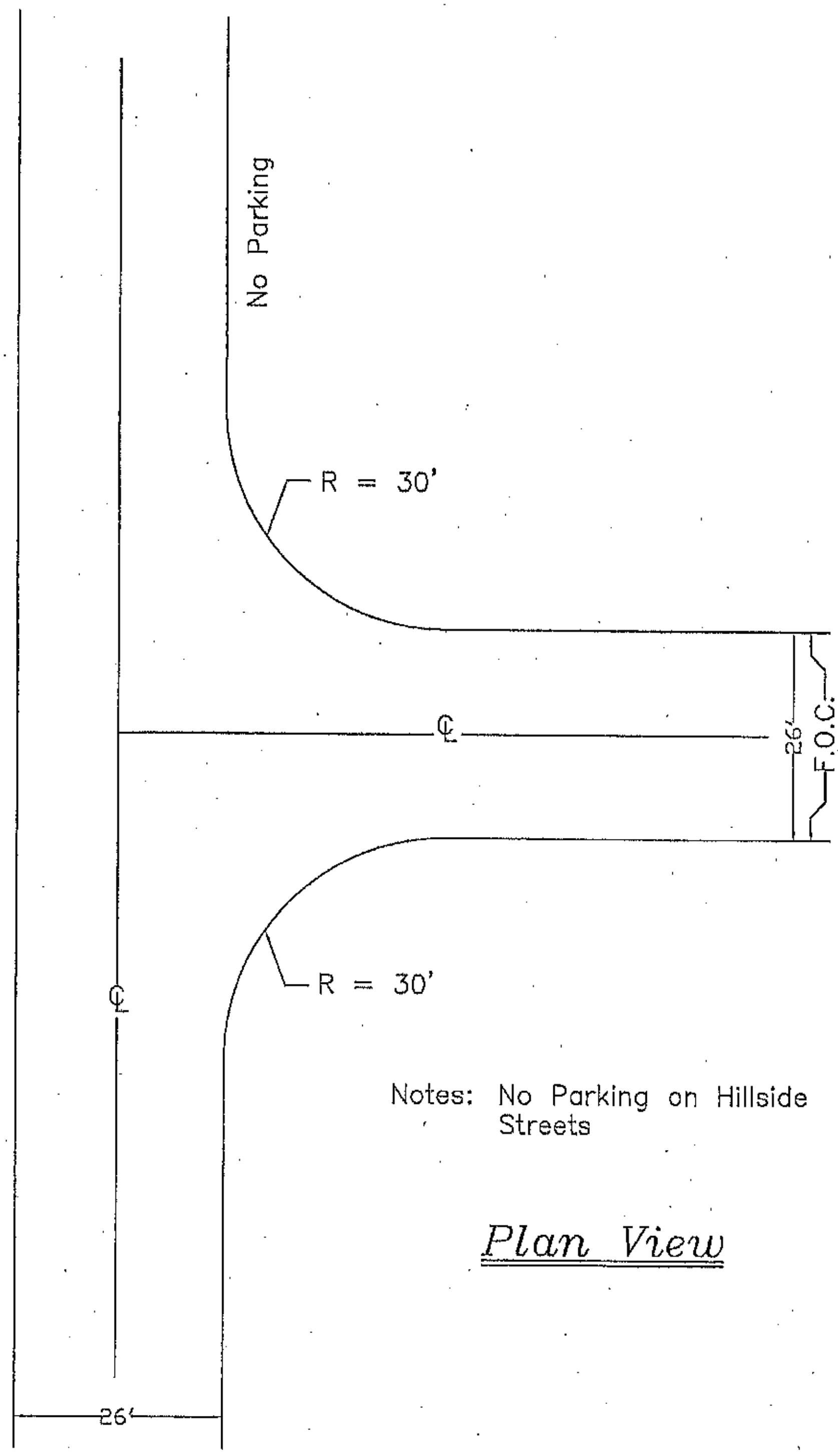


DETAIL: PAVED SHOULDER AND SUBDRAIN

NOTES:

1. P.S.E. = PUBLIC SERVICE EASEMENT.
2. T.I = 7.0 MINIMUM, DESIGN SPEED = 25 M.P.H.
3. SIDEWALK SHALL BE PLACED ADJACENT TO CUT-SLOPE ONLY.

STREET SECTION - HILLSIDE	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/6/14	SCALE: N.T.S.
APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-2E	



Notes: No Parking on Hillside Streets

Plan View

HILLSIDE INTERSECTION-LOCAL TO LOCAL ROAD

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 06/14

SCALE: N.T.S.

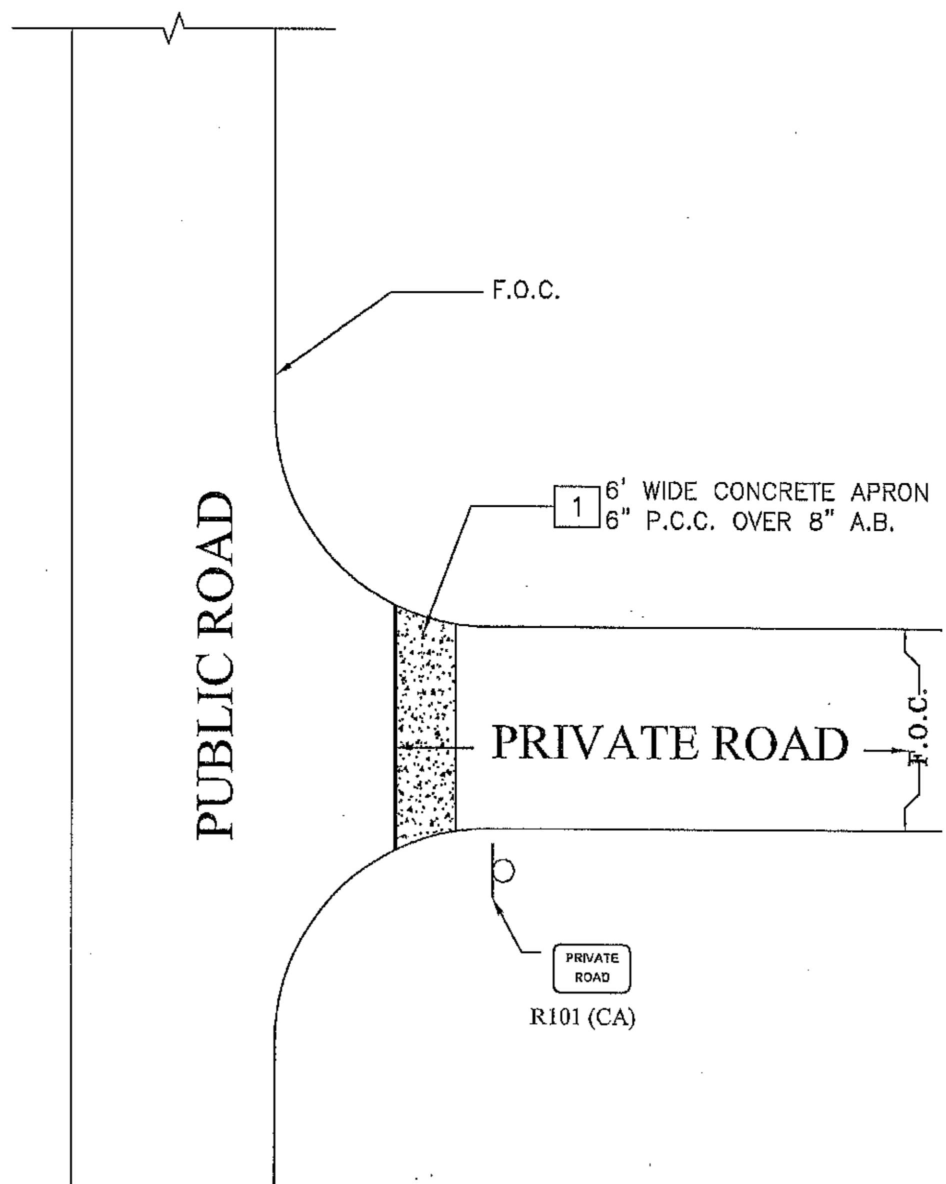
APPROVED BY:

8-18-14

CITY ENGINEER DATE

SECTION: STREETS

DRAWING NO.: STR-3

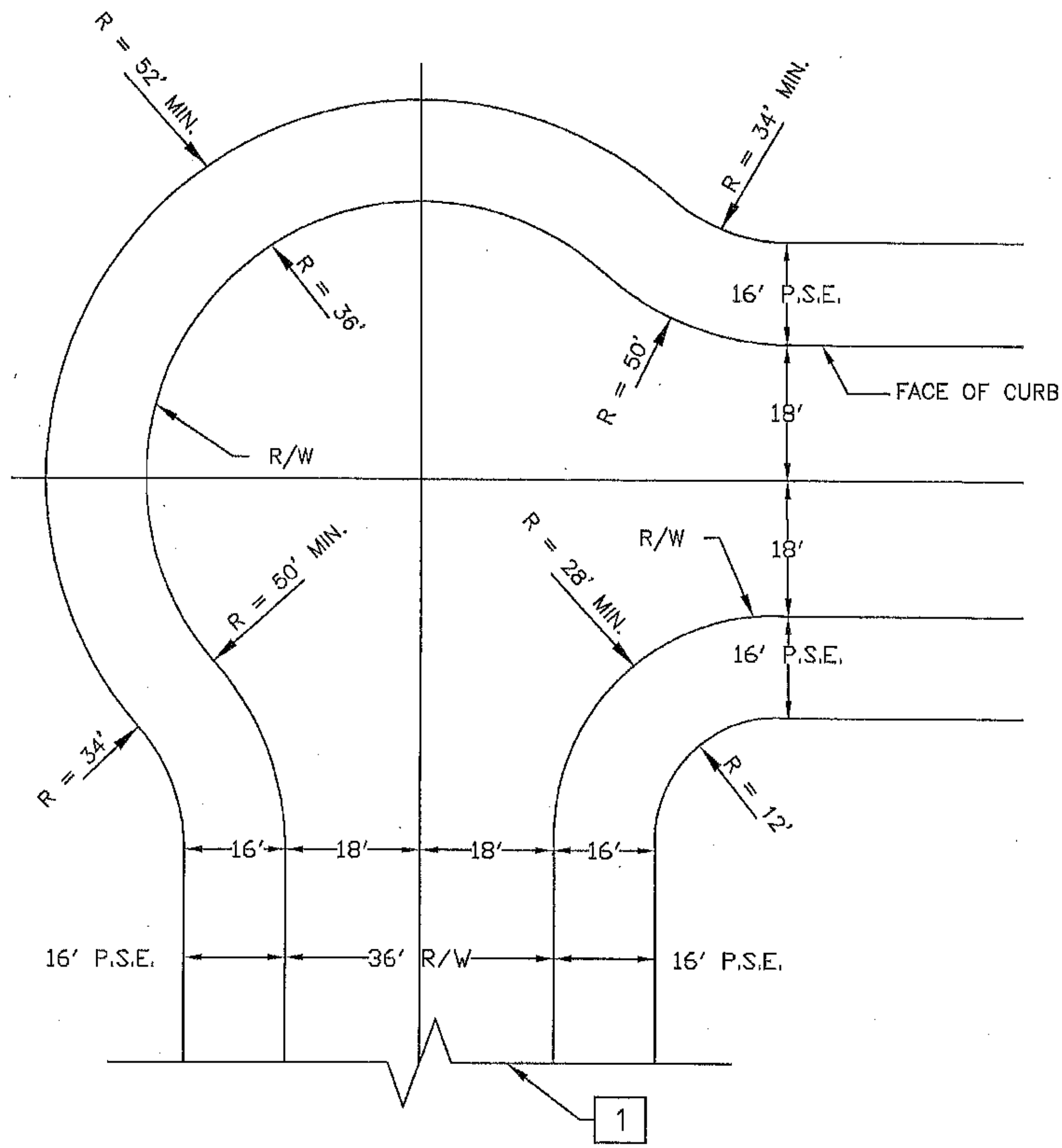


PLAN VIEW

NOTES:

1. CONSTRUCT DECORATIVE APRON AT BEGINNING OF PRIVATE ROAD BEHIND CROSSWALK TO DIFFERENTIATE THE PUBLIC/PRIVATE ROAD BOUNDARY.
2. CONCRETE APRON SHALL BE 6" P.C.C. OVER 8" A.G. DECORATIVE TREATMENT TO BE APPROVED BY THE PUBLIC WORKS DIRECTOR/CITY ENGINEER.

PUBLIC TO PRIVATE ROAD TRANSITION	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/8/14	SCALE: N.T.S.
APPROVED BY: [illegible] 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-4	



NOTES:
1. TRANSITION TO STANDARD CROSS-SECTION PER STR-2.
2. P.S.E. = PUBLIC SERVICE EASEMENT

TWO-LEGGED INTERSECTION - LOCAL

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 8/1/14

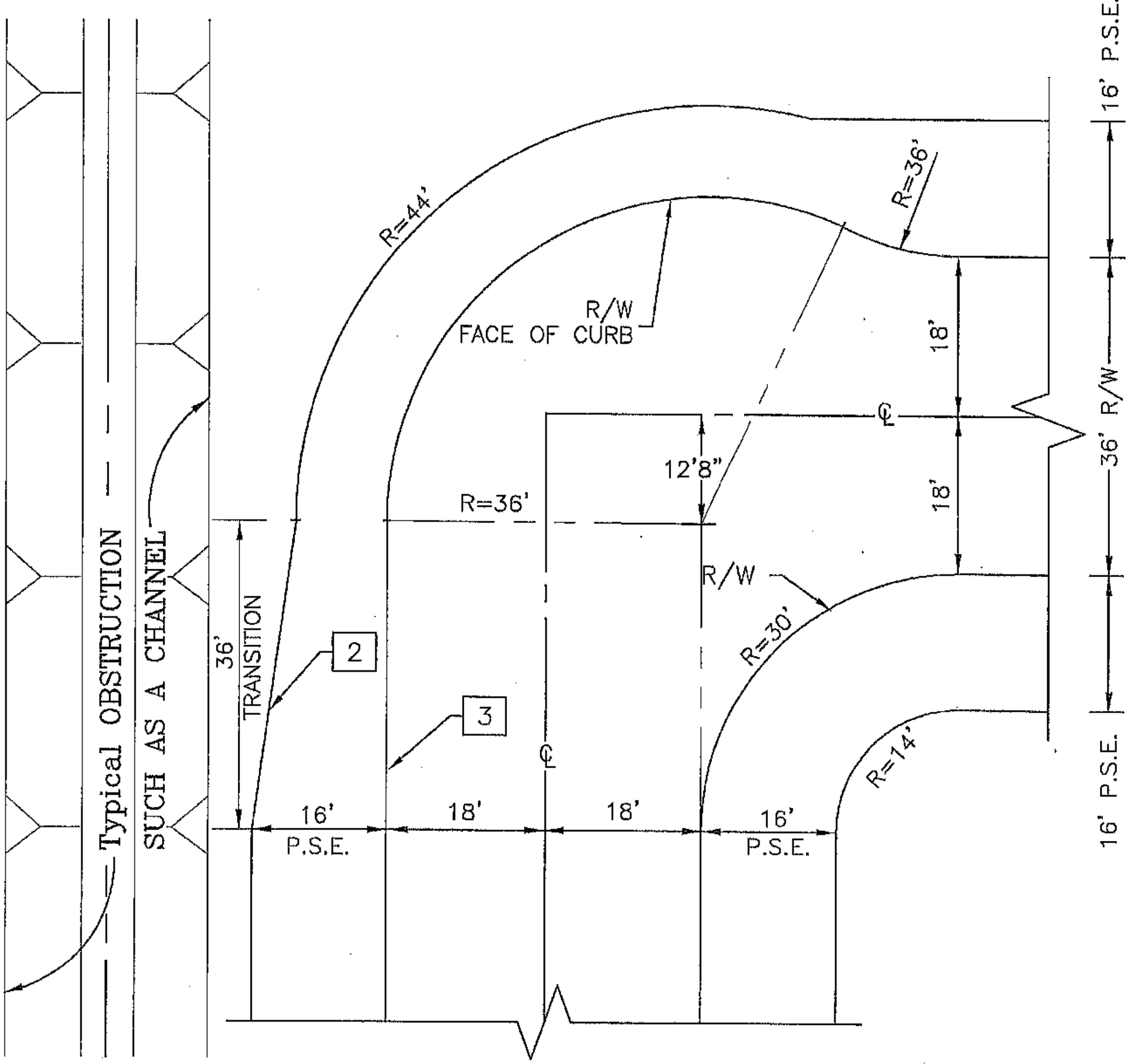
SCALE: N.T.S.

APPROVED BY: [signature] 8-18-14

CITY ENGINEER DATE

SECTION: STREETS

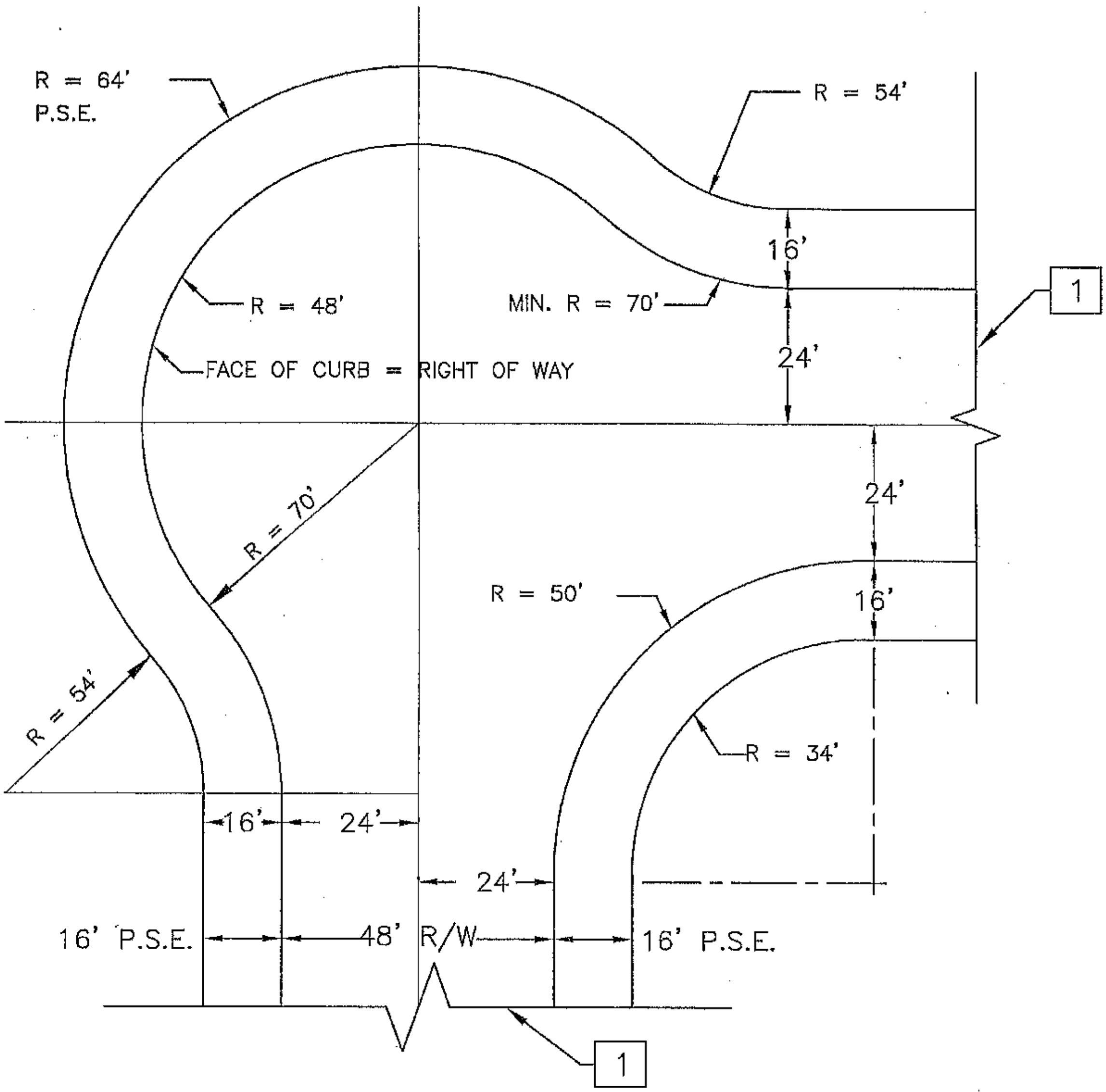
DRAWING NO.: STR-5



LOCAL & COLLECTOR ONLY

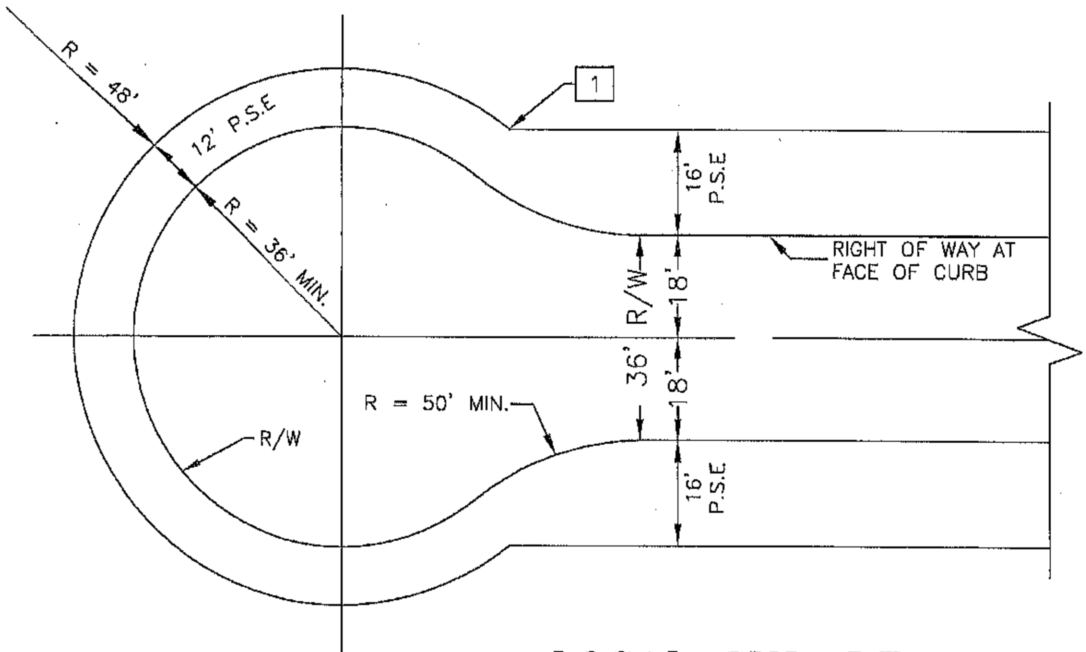
NOTES:
1. P.S.E. = PUBLIC SERVICE EASEMENT.
2. TRANSITION TO STANDARD CROSS-SECTION PER STR-2.
3. PARKING MAY BE REMOVED ON OBSTRUCTION/CHANNEL SIDE WHEN IN A RESIDENTIAL AREA AS DETERMINED BY PUBLIC WORKS DIRECTOR/CITY ENGINEER.

TWO-LEGGED INTERSECTION CONSTRAINT ON ONE SIDE	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/8/14	SCALE: N.T.S.
APPROVED BY: ______ CITY ENGINEER 8-18-14 DATE	SECTION: STREETS	
	DRAWING NO.: STR-6	



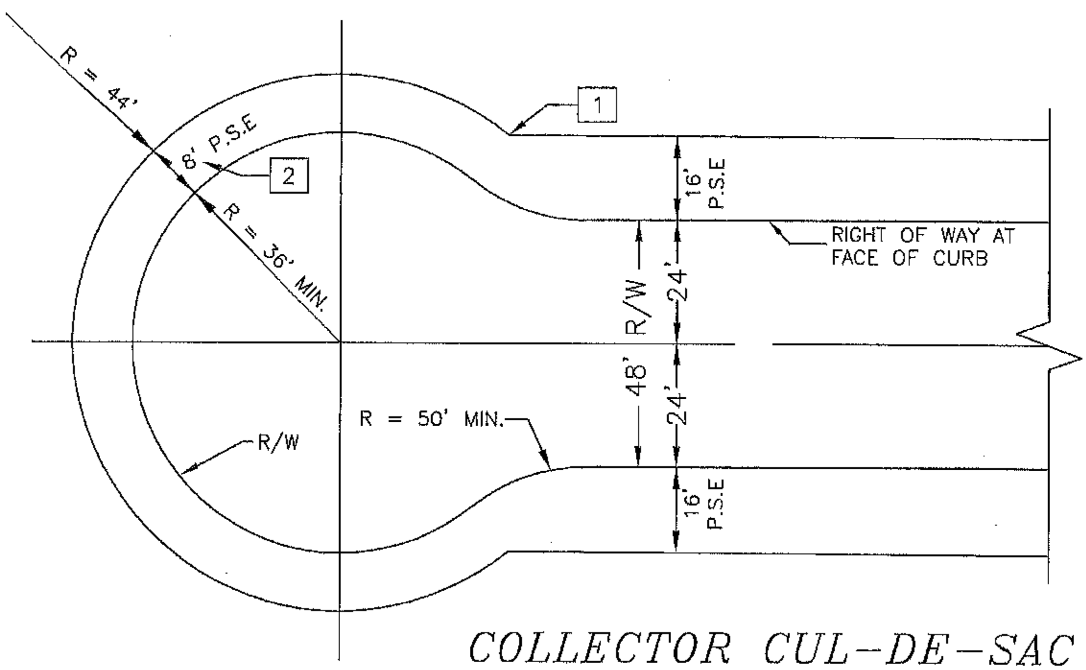
NOTES:
1. TRANSITION TO STANDARD CROSS-SECTION PER STR-2A "NON RESIDENTIAL".
2. P.S.E. = PUBLIC SERVICE EASEMENT.

TWO-LEGGED INTERSECTION - NON-RESIDENTIAL		DRAWN BY: CSG CHECKED BY: LAST REVISED: 7/29/14	SCALE: N.T.S.
	APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS DRAWING NO.: STR-7	



LOCAL CUL-DE-SAC

NOTES:
1. TRANSITION TO LOCAL CROSS-SECTION PER STR-2A "LOCAL".



COLLECTOR CUL-DE-SAC

NOTES:
1. TRANSITION TO COLLECTOR CROSS-SECTION PER STR-2A "COLLECTOR".
2. 8' P.S.E. MAY INCREASE AT DISCRETION OF PUBLIC WORKS DIRECTOR/CITY ENGINEER.

CUL-DE-SAC TURN AROUND

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 8/8/14

SCALE: N.T.S.

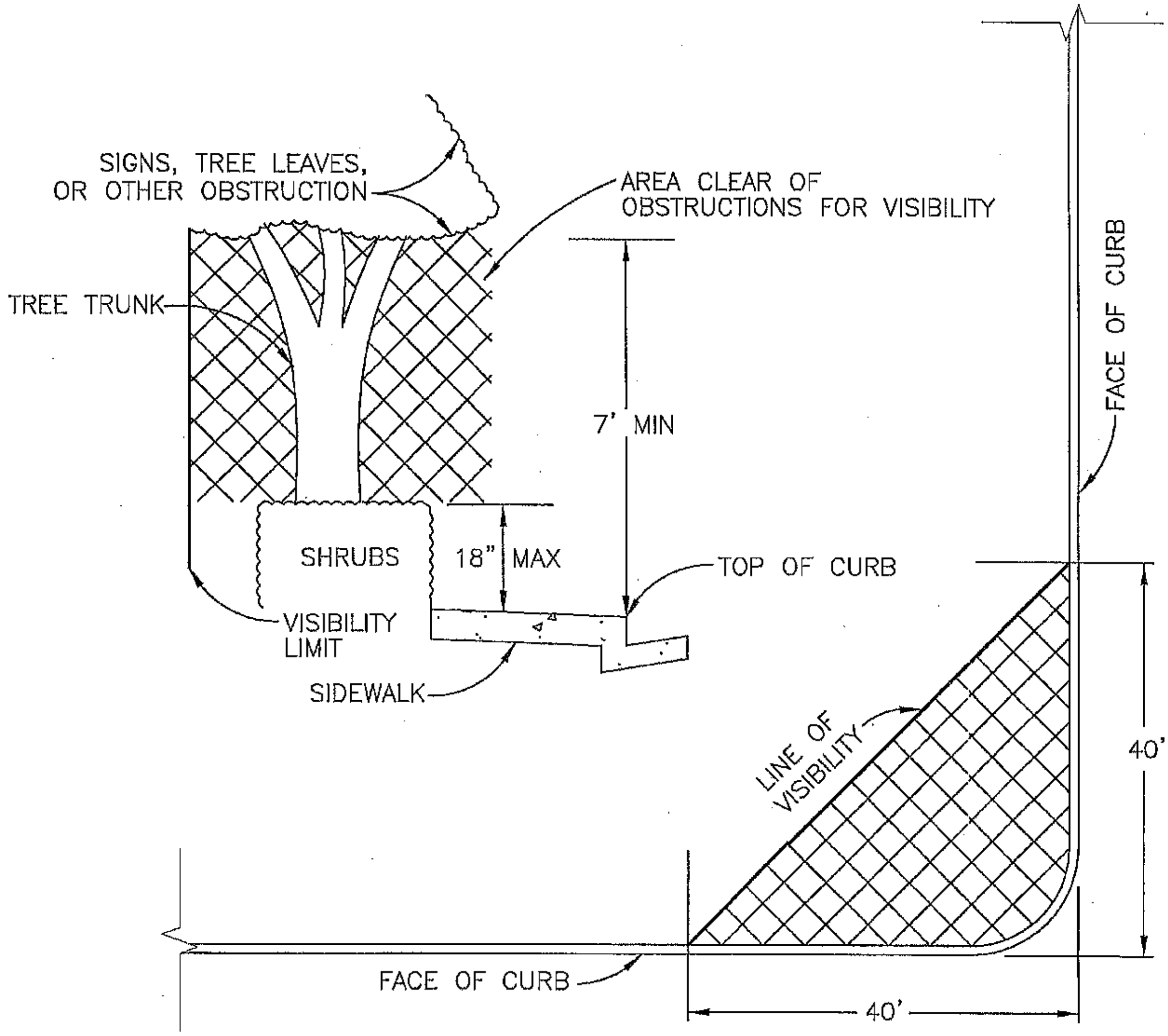
APPROVED BY:

8-18-14

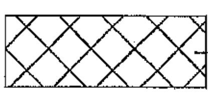
CITY ENGINEER DATE

SECTION: STREETS

DRAWING NO.: STR-8

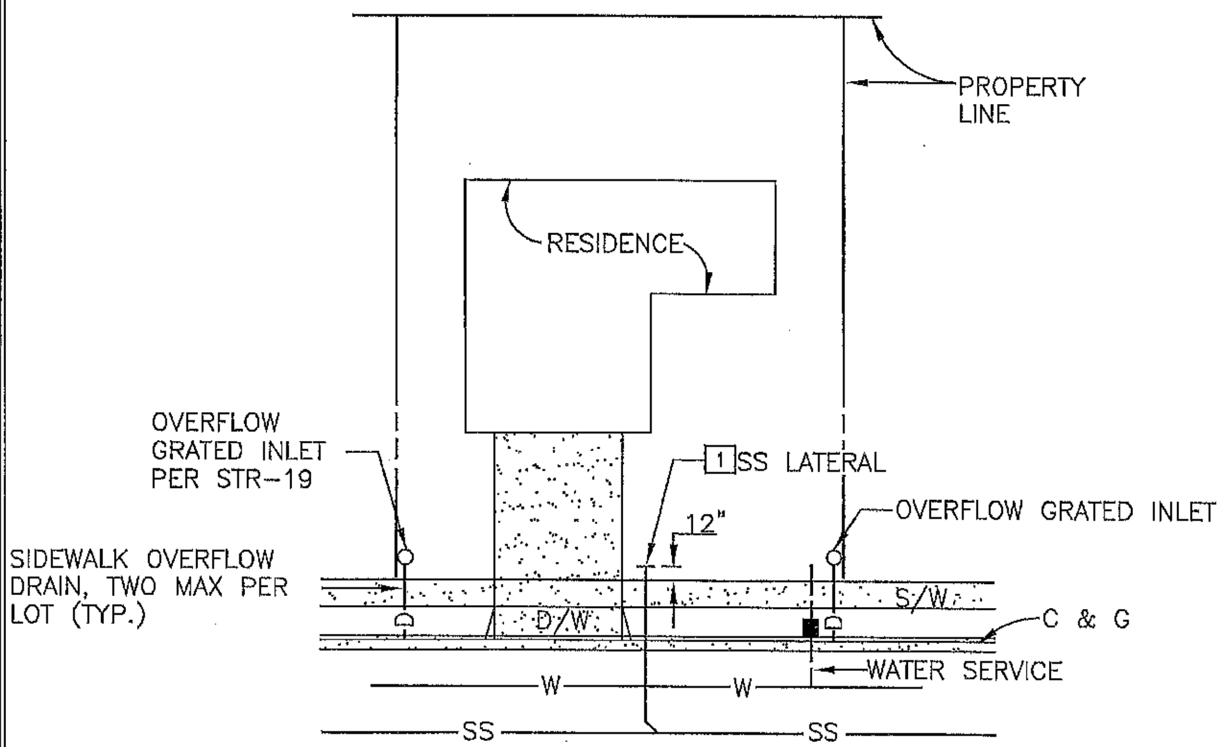


LEGEND



NO PLANT, HEDGE, FENCE OR OTHER OBSTRUCTION MAY BE OVER 18" OR LOWER THAN 7' ABOVE THE TOP OF CURB WITHIN THIS AREA.

VISIBILITY AT INTERSECTIONS WITH INTERSECTING PROPERTY LINE	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/8/14	SCALE: N.T.S.
APPROVED BY: CITY ENGINEER 8-18-14 DATE	SECTION: STREETS	
	DRAWING NO.: STR-9	

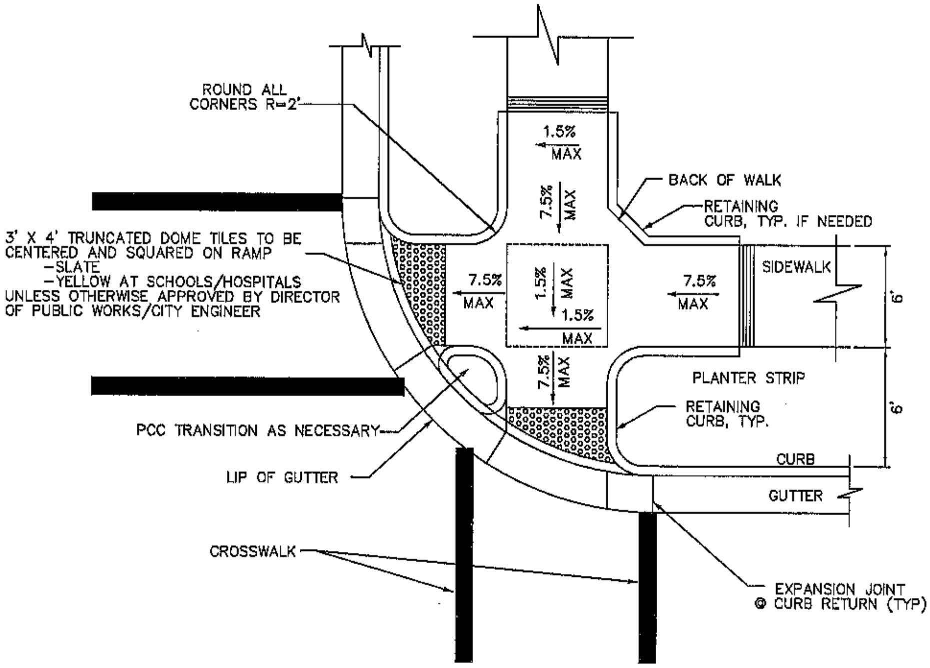


PLAN: LOT UTILITY LOCATION

NOTES:
1. CLEANOUTS TO BE PROVIDED PER SWR-6.

TWO MAX PER LOT (TYP.)

TYPICAL LOT UTILITY LOCATION	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/8/14	SCALE: N.T.S.
APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-10	

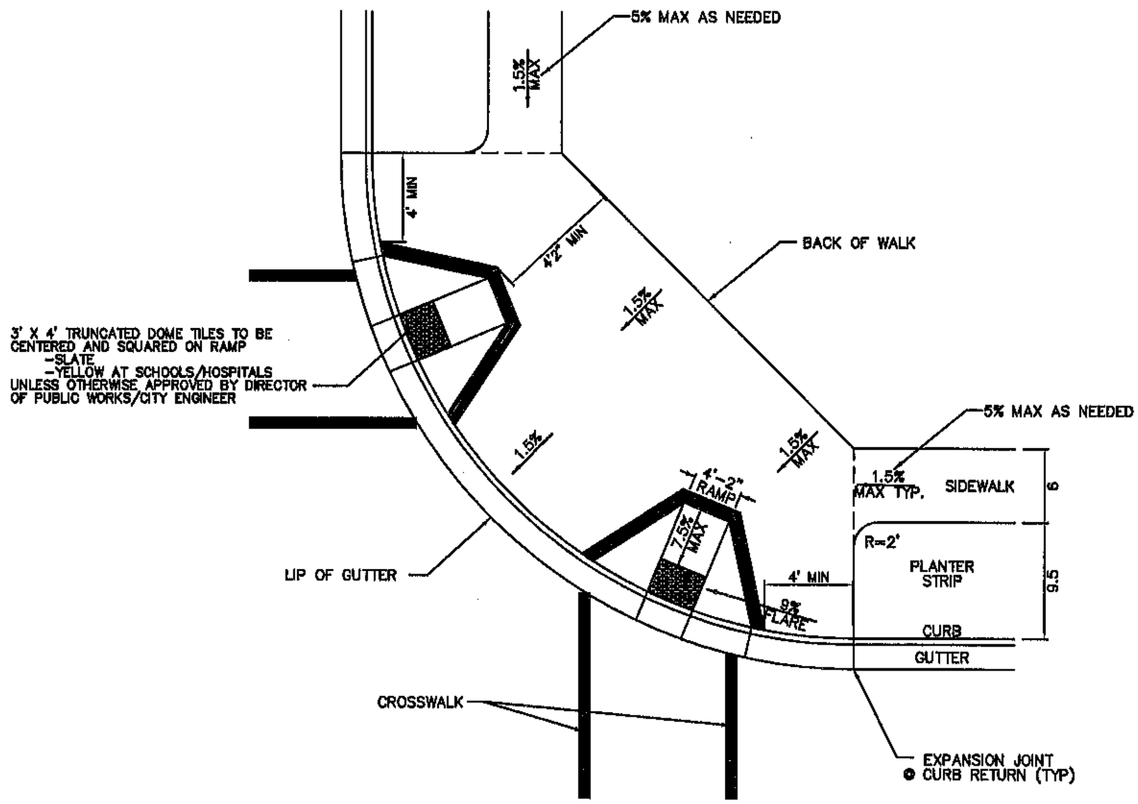


ADA RAMP CONFIGURATION FOR 15' TO 20' RADIUS CORNER

NOTES:

1. ALL LOCAL STREETS TO HAVE TWO RAMPS.
2. USE CURRENT CALTRANS ADA ACCESS RAMP DETAILS, EXCEPT AS FOLLOWS FOR THE 15' RADIUS TO 20' RADIUS CORNERS AS APPROPRIATE AND AS DETERMINED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER.
3. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERANCES; IMPROVEMENTS SHALL NOT EXCEED ADA STANDARDS.
4. RAMP WIDTHS SHALL MATCH THE SIDEWALK WIDTHS AND SHALL NOT BE LESS THAN 4'-2' WIDE.
5. ALL RAMPS MUST BE LOCATED INSIDE THE CROSSWALKS OR IN FRONT OF THE STOP BAR.
6. ALL JOINTS BETWEEN ELEMENTS EXCEPT BETWEEN RAMP AND FLARE, ARE RADIAL. RAMP WIDTH SHALL REMAIN CONSTANT FROM TOP TO BOTTOM.

ADA RAMP CONFIGURATION, 15' TO 20' RADIAL CORNER	DRAWN BY: CSG CHECKED BY: LAST REVISED: 10/8/14	SCALE: N.T.S.
CITY OF GILROY · INCORPORATED MARCH 12, 1870 — APPROVED BY: [signature] 8-18-14 — CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-11A	

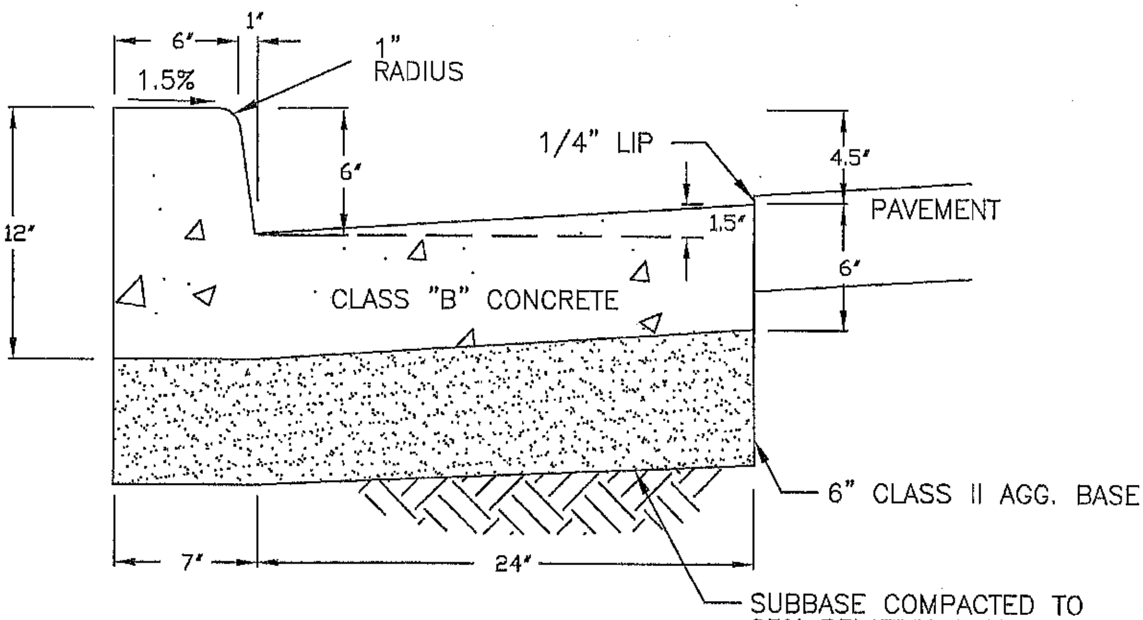


ADA RAMP CONFIGURATION FOR GREATER THAN 20' RADIUS CORNER

NOTES:

1. ALL LOCAL STREETS TO HAVE TWO RAMPS.
2. USE CURRENT CALTRANS ADA ACCESS RAMP DETAILS, EXCEPT AS FOLLOWS FOR RADII GREATER THAN 20' RADIUS CORNERS AS APPROPRIATE AND AS DETERMINED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER.
3. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERANCES; IMPROVEMENTS SHALL NOT EXCEED ADA STANDARDS.
4. RAMP WIDTHS SHALL MATCH THE SIDEWALK WIDTHS AND SHALL NOT BE LESS THAN 4'-2' WIDE.
5. ALL RAMPS MUST BE LOCATED INSIDE THE CROSSWALKS OR IN FRONT OF THE STOP BAR.
6. ALL JOINTS BETWEEN ELEMENTS EXCEPT BETWEEN RAMP AND FLARE, ARE RADIAL. RAMP WIDTH SHALL REMAIN CONSTANT FROM TOP TO BOTTOM.

ADA RAMP CONFIGURATION, GREATER THAN 20' RADIAL CORNER	DRAWN BY: CSG CHECKED BY: LAST REVISED: 10/8/14	SCALE: N.T.S.
CITY OF GILROY — INCORPORATED MARCH 12, 1870 APPROVED BY: [signature] 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-11B	

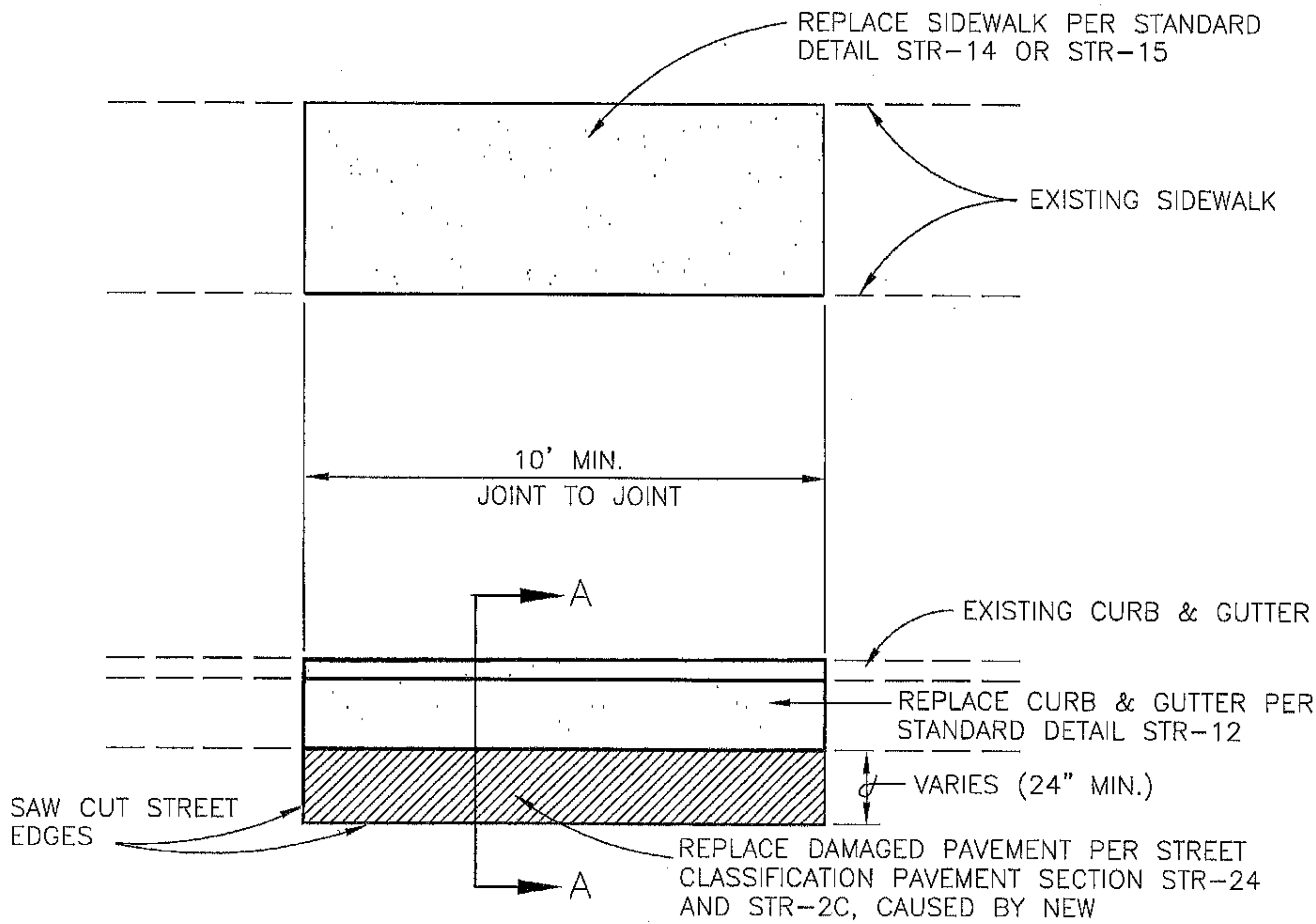


TYPICAL SECTION

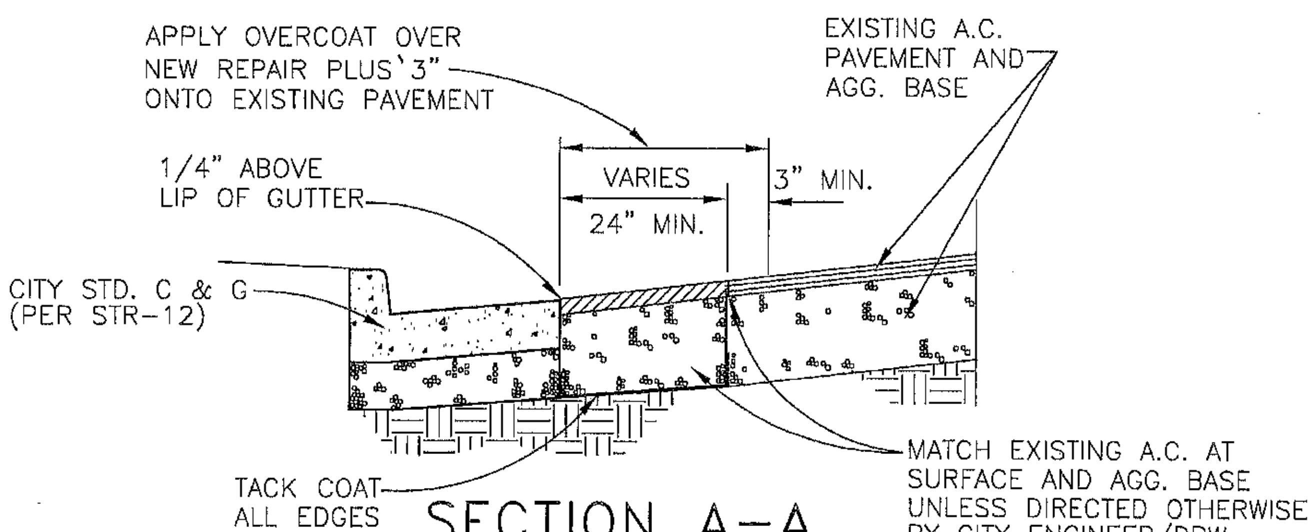
NOTES:

1. EXPANSION JOINTS SHALL BE PLACED AS FOLLOWS:
   A. ON EACH SIDE OF DRIVEWAY.
   B. ON EACH END OF RADIUS.
   C. AT A MAXIMUM DISTANCE OF 60 FEET.
   D. (2) 18" #4 SMOOTH DOWEL CENTERED ON EXPANSION JOINT.
   E. EXPANSION JOINTS SHALL BE PRE-MOLDED JOINT FILLER STRIP $\frac{1}{2}$" THICK.
   F. FILL GAP WITH POLYURETHANE ADHESIVE SEALANT.
2. A $1\frac{1}{4}$" DEEP WEAKENED PLANE JOINT SHALL BE PLACED EVERY 10 FEET.
3. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERANCES; IMPROVEMENTS SHALL NOT EXCEED ADA STANDARDS.

Monolithic Curb & Gutter	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/8/14	SCALE: N.T.S.
APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-12	



PLAN:



SECTION A-A

CURB & GUTTER REPLACEMENT IN EXISTING STREET

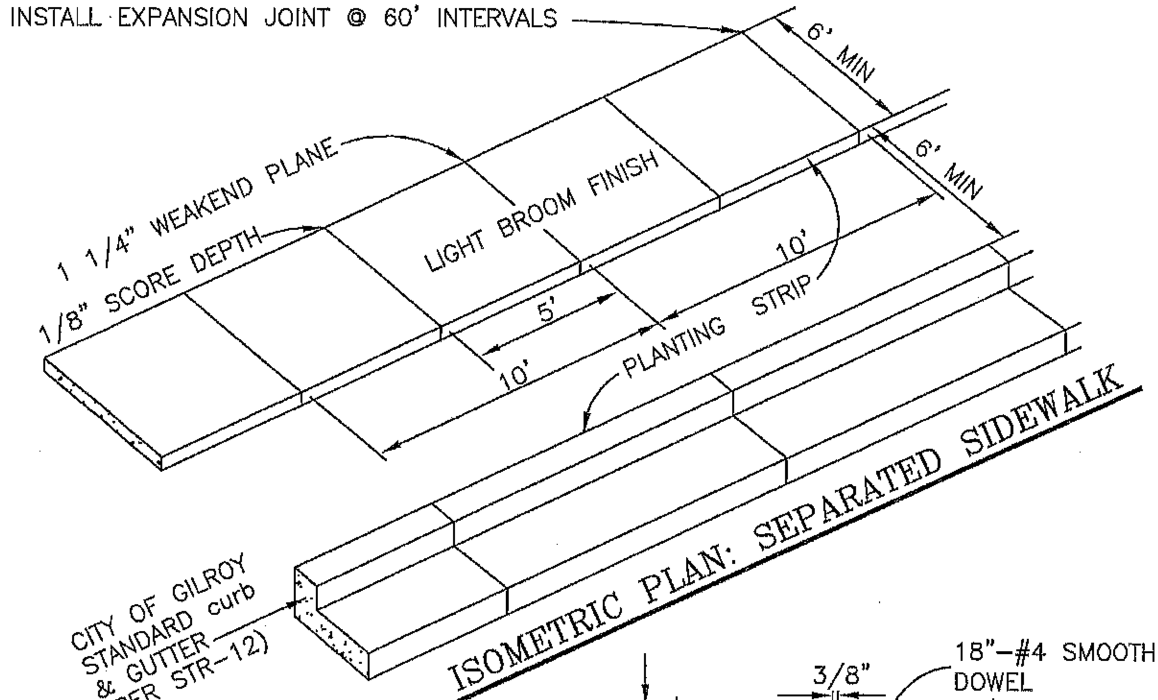
DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 8/8/14

SCALE: N.T.S.

APPROVED BY: 8-18-14
CITY ENGINEER DATE

SECTION: STREETS

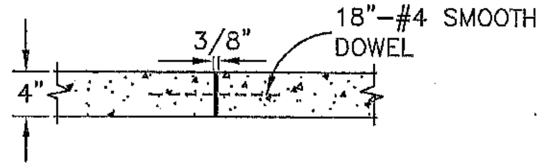
DRAWING NO.: STR-13



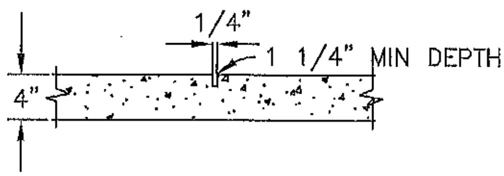
ISOMETRIC PLAN: SEPARATED SIDEWALK

NOTES:

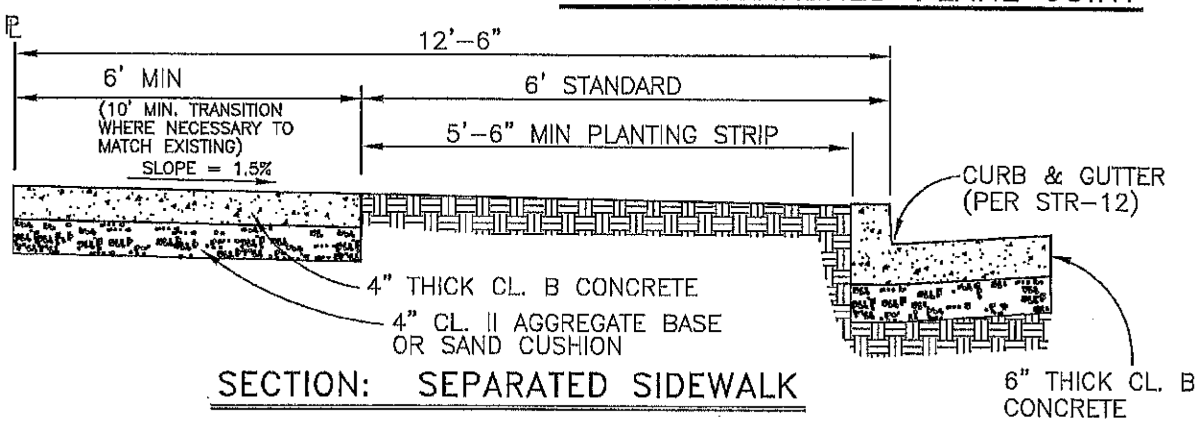
1. EXPANSION JOINTS SHALL BE PLACED AS FOLLOWS:
   A. ON EACH SIDE OF DRIVEWAY.
   B. AT A MAXIMUM DISTANCE OF 60 FEET.
2. A 1-1/4" WEAKENED PLANE JOINT SHALL BE PLACED EVERY 10' AND AT EACH SIDE OF WATER METER BOX.
3. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERENCES; IMPROVEMENTS SHALL NOT EXCEED ADA STANDARDS.



DETAIL: EXPANSION JOINT

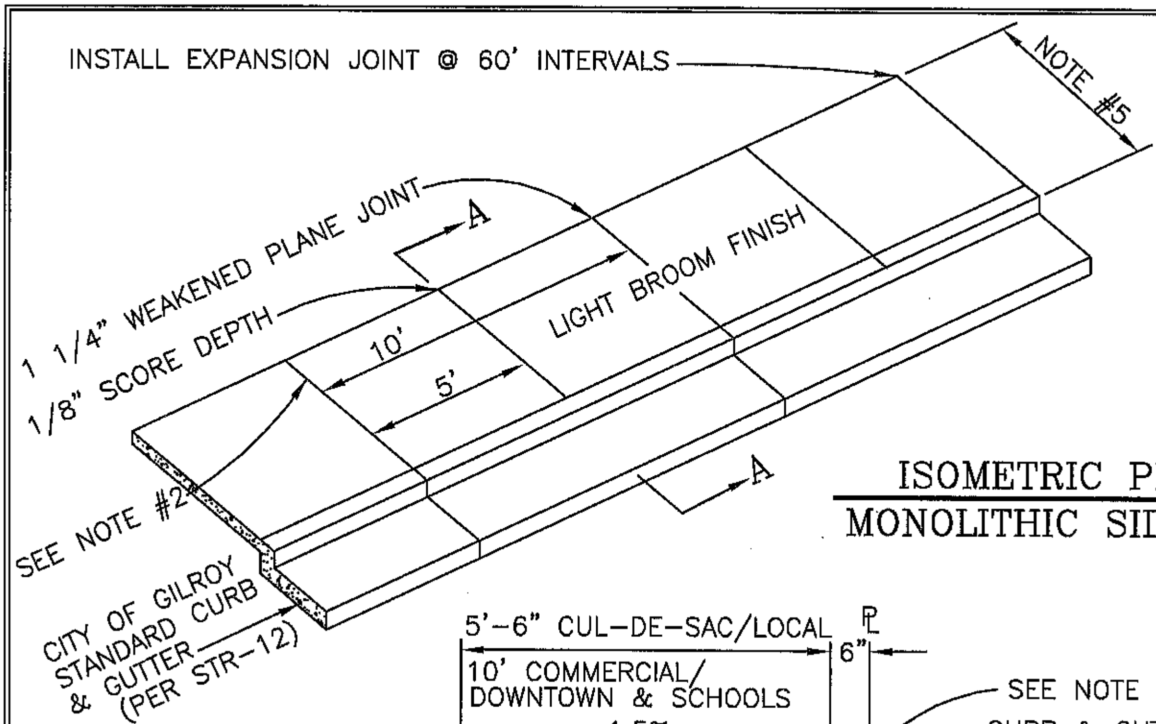


DETAIL: WEAKENED PLANE JOINT

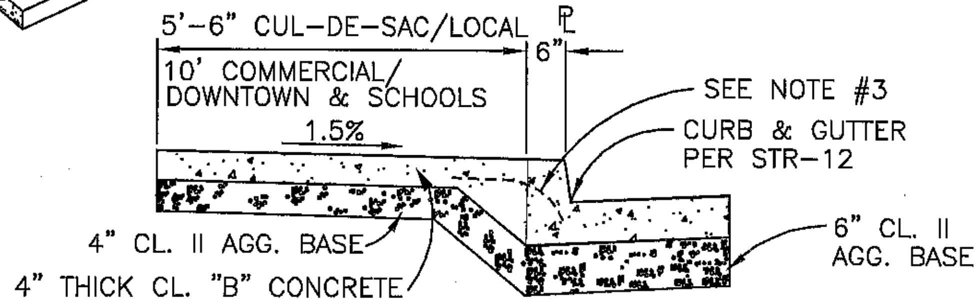


SECTION: SEPARATED SIDEWALK

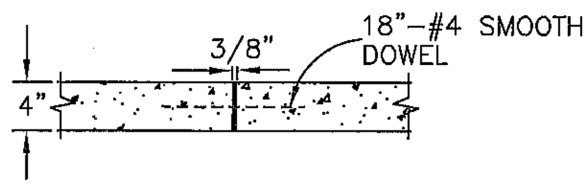
SEPARATED SIDEWALK	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/8/14	SCALE: N.T.S.
APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-14	



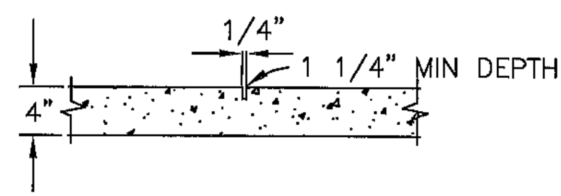
ISOMETRIC PLAN
MONOLITHIC SIDEWALK



SECTION A–A



DETAIL: EXPANSION JOINT



DETAIL: WEAKENED PLANE JOINT

NOTES:

1. EXPANSION JOINTS SHALL BE PLACED AS FOLLOWS:
   a. ON EACH SIDE OF DRIVEWAY.
   b. AT A MAXIMUM DISTANCE OF 60 FEET.
2. A 1 1/4" WEAKENED PLANE JOINT SHALL BE PLACED EVERY 10' AND AT EACH SIDE OF WATER METER BOX.
3. MONOLITHIC SIDEWALK (WHEN SIDEWALK TOUCHES CURB) SHALL ALWAYS BE POURED SEPARATE OF THE CURB & GUTTER USE ONE 18" MIN. LENGTH OF #4 BAR EACH 24" OF CURB AS DOWELLING WITH 8" PENETRATION INTO CURB.
4. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERANCES. IMPROVEMENTS SHALL MEET ADA STANDARDS.
5. REFER TO STR-2D FOR MINIMUM SIDEWALK WIDTHS ON PRIVATE OR LOCAL STREETS.

MONOLITHIC SIDEWALK

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 10/9/14

SCALE: N.T.S.

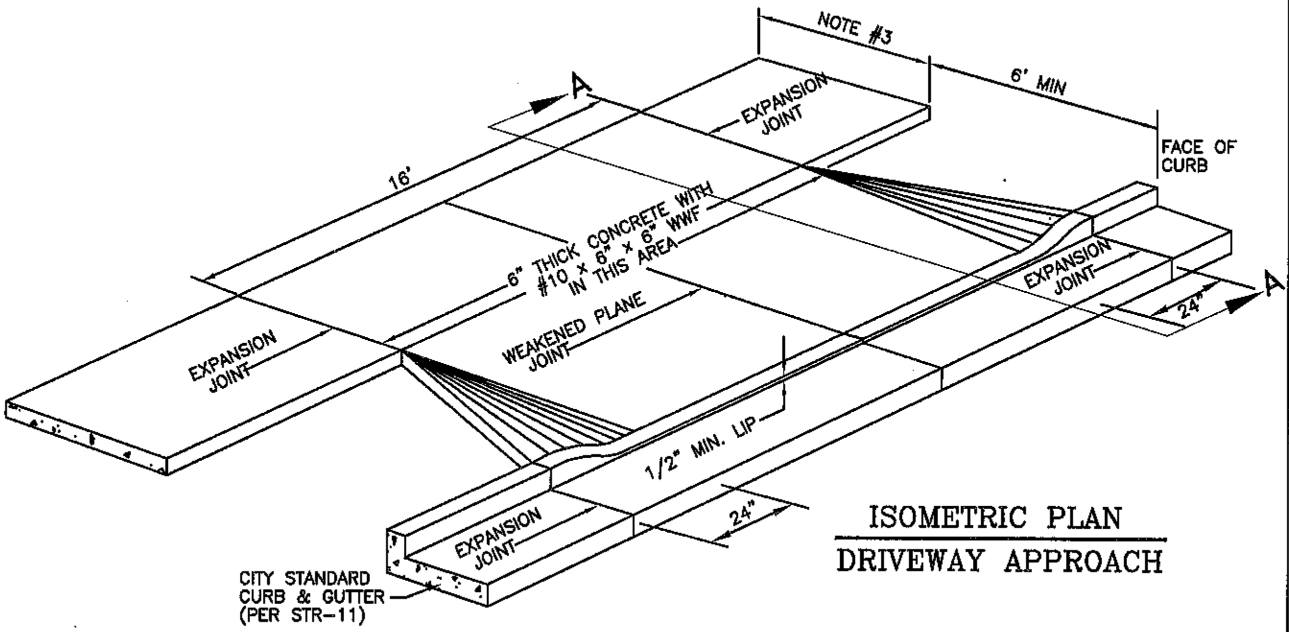
APPROVED BY:

8-18-14

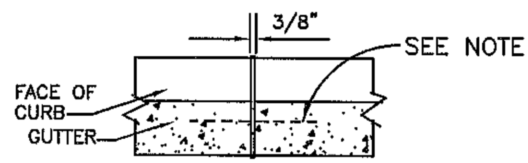
CITY ENGINEER DATE

SECTION: STREETS

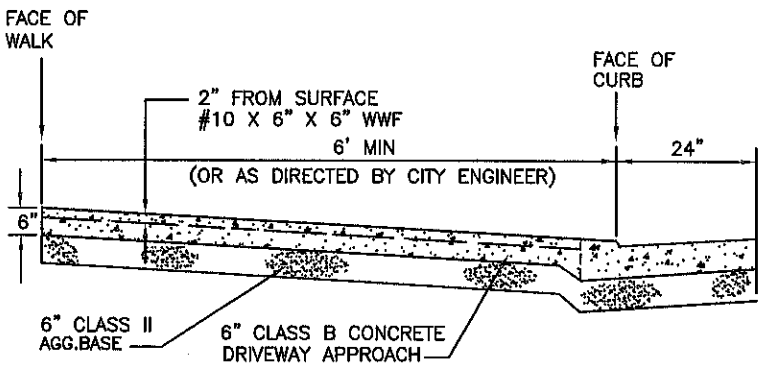
DRAWING NO.: STR-15



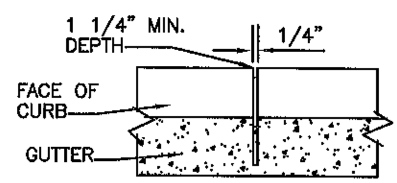
ISOMETRIC PLAN
DRIVEWAY APPROACH



DETAIL: EXPANSION JOINT



SECTION A–A: DRIVEWAY APPROACH



WEAKENED PLANE JOINT

NOTES:

1. WHEN GUTTER AND APPROACH ARE POURED SEPARATELY, USE ONE 18" LENGTH OF #4 SMOOTH REBAR EACH 24" OF CURB AS DOWELING.
2. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERENCES; IMPROVEMENTS SHALL NOTE EXCEED ADA STANDARDS.
3. REFER TO NOTES ON STR–2D FOR MINIMUM SIDEWALK WIDTHS ON PRIVATE OR LOCAL STREETS.

RESIDENTIAL DRIVEWAY

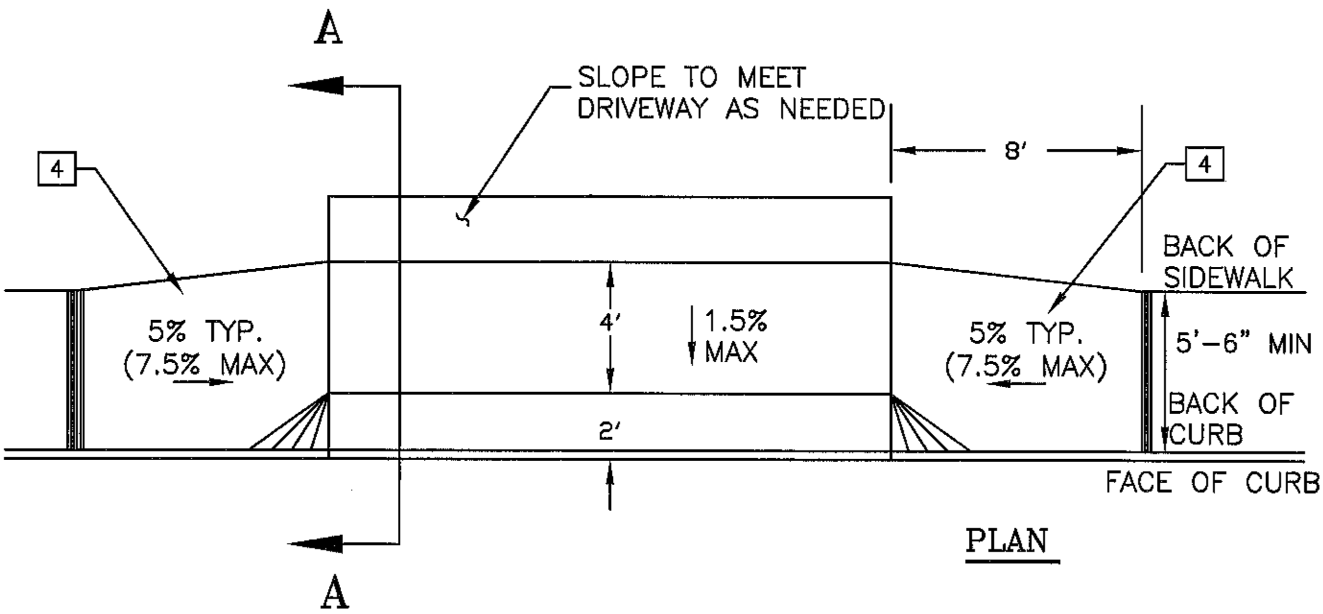
DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 10/8/14

SCALE: N.T.S.

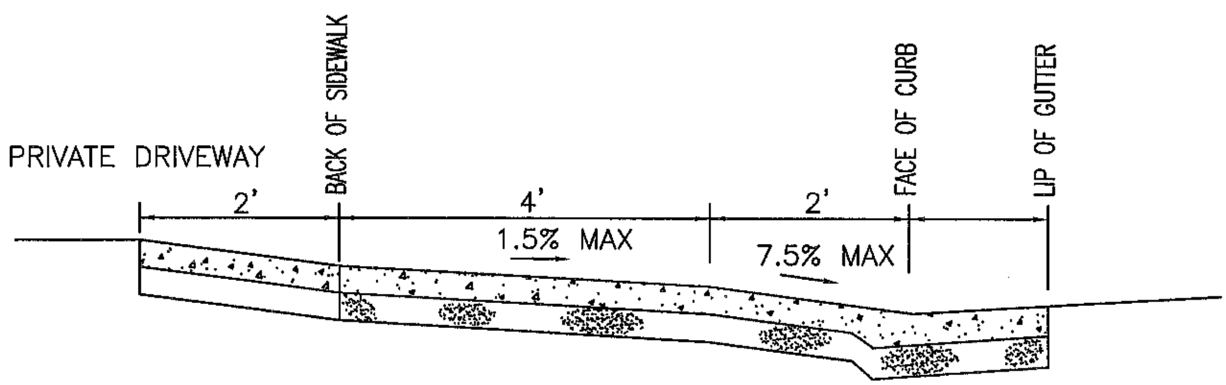
APPROVED BY:
CITY ENGINEER
DATE 8-18-14

SECTION: STREETS

DRAWING NO.: STR–16A



PLAN

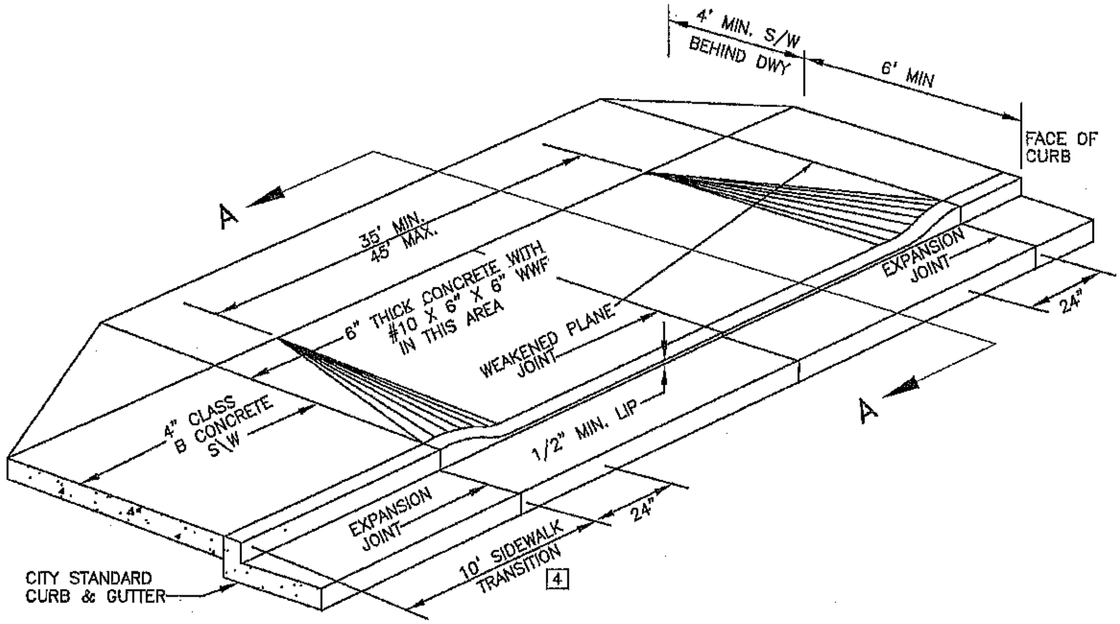


SECTION A–A

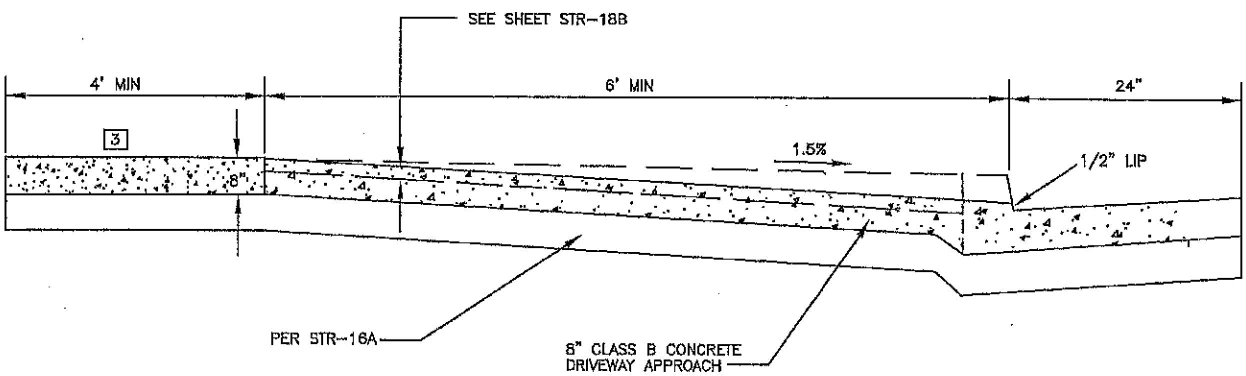
NOTES:

1. APPLICABLE ONLY WHEN RIGHT–OF–WAY IS LIMITED AND WITH APPROVAL FROM THE CITY ENGINEER/PUBLIC WORKS DIRECTOR.
2. WHEN DRIVEWAY AND GUTTER APPROACH ARE POURED SEPARATELY, USE ONE–8" LENGTH OF #4 BAR EACH 5' OF CURB AS DOWELING.
3. SEE CURB & GUTTER DETAIL (STR–11) FOR PLACEMENT OF EXPANSION JOINTS AND WEAKENED PLANE JOINTS.
4. FLAT AS POSSIBLE WITH 7.5% MAXIMUM SLOPE.
5. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERANCES; IMPROVEMENTS SHALL MEET ADA STANDARDS.

RESIDENTIAL DEPRESSED DRIVEWAY	DRAWN BY: CSG CHECKED BY: LAST REVISED: 10/8/14	SCALE: N.T.S.
APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR–16B	



ISOMETRIC PLAN: DRIVEWAY APPROACH

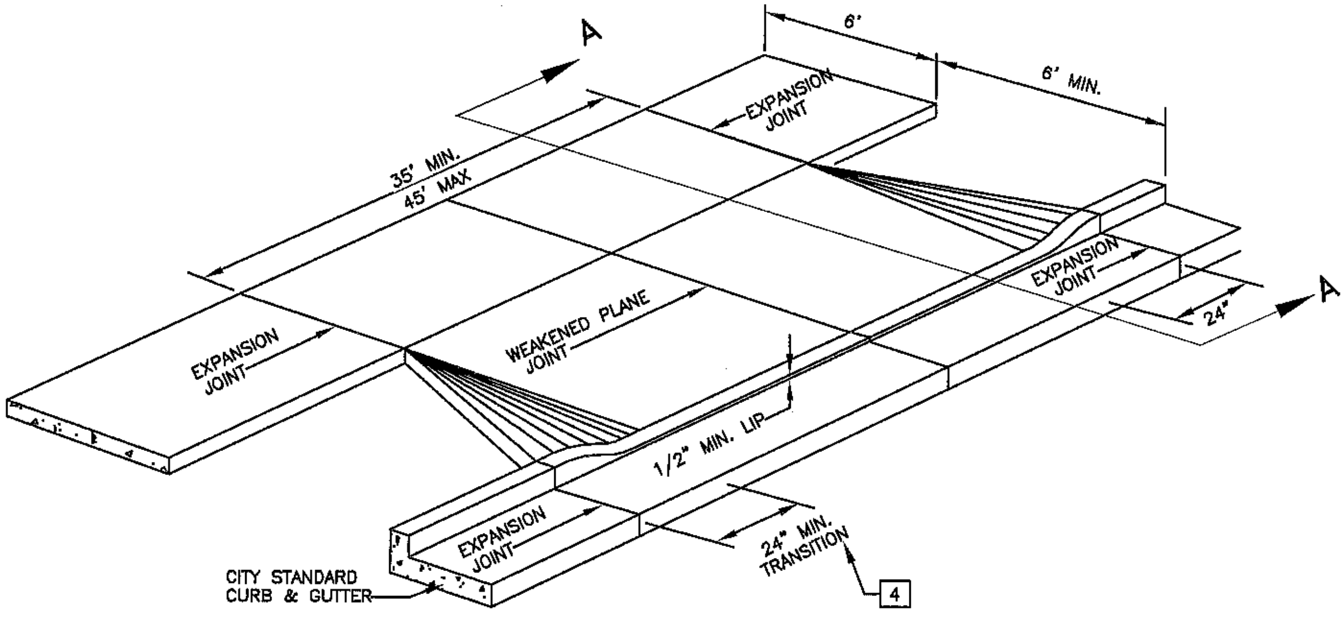


SECTION A–A: DRIVEWAY APPROACH

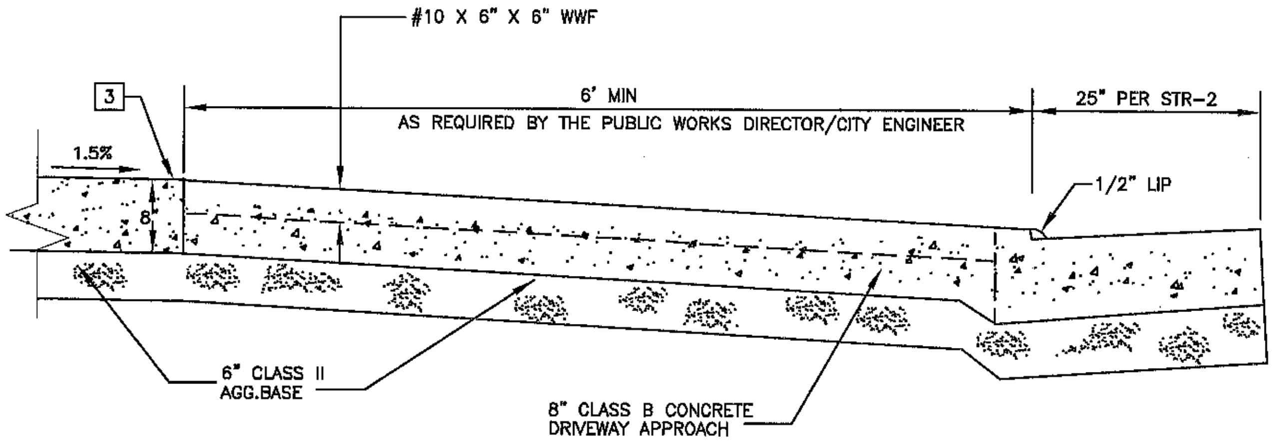
NOTES:

1. WHEN DRIVEWAY AND GUTTER APPROACH ARE POURED SEPARATELY, USE ONE 18" LENGTH OF #4 SMOOTH REBAR EACH 24" OF CURB AS DOWELING.
2. SEE CURB & GUTTER DETAIL (STR-14) FOR PLACEMENT OF EXPANSION JOINTS AND WEAKENED PLANE JOINTS.
3. USE SAME THICKNESS FOR "SIDEWALK" SECTION OF DRIVEWAY.
4. 24" MIN. TRANSITION UNLESS OTHERWISE APPROVED BY PUBLIC WORKS DIRECTOR/CITY ENGINEER.
5. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERANCES; IMPROVEMENTS SHALL NOT EXCEED ADA STANDARDS.

NON-RESIDENTIAL DRIVEWAY: MONOLITHIC SIDEWALK	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/8/14	SCALE: N.T.S.
APPROVED BY: [signature] 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-18A	



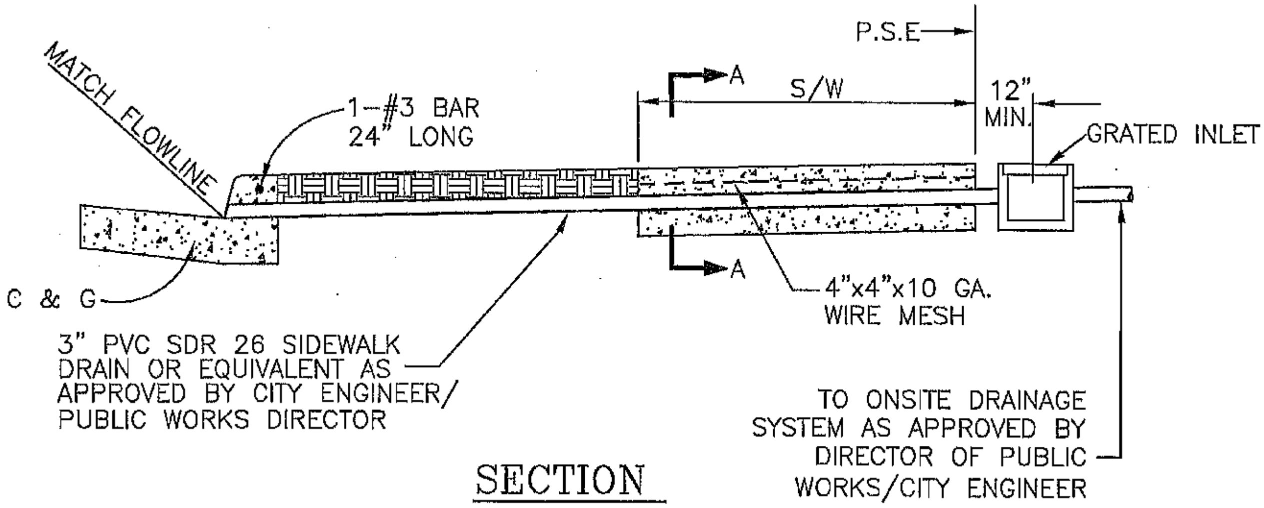
ISOMETRIC PLAN: DRIVEWAY APPROACH



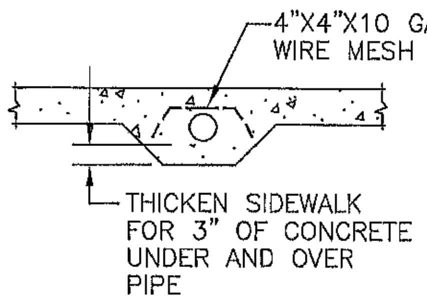
SECTION A-A: DRIVEWAY APPROACH

NOTES:
1. WHEN DRIVEWAY AND GUTTER APPROACH ARE POURED SEPARATELY, USE ONE 18" LENGTH OF #4 SMOOTH REBAR EACH 24" OF CURB AS DOWELING.
2. SEE CURB & GUTTER DETAIL (STR-14) FOR PLACEMENT OF EXPANSION JOINTS AND WEAKENED PLANE JOINTS.
3. USE SAME THICKNESS FOR "SIDEWALK" SECTION OF DRIVEWAY.
4. 24" MIN. TRANSITION UNLESS OTHERWISE APPROVED BY PUBLIC WORKS DIRECTOR/CITY ENGINEER.
5. SLOPES/DIMENSIONS INCLUDE CONSTRUCTION TOLERANCES; IMPROVEMENTS SHALL NOT EXCEED ADA STANDARDS.

NON-RESIDENTIAL DRIVEWAY: SEPARATED SIDEWALK	DRAWN BY: CSG CHECKED BY: LAST REVISED: 10/8/14	SCALE: N.T.S.
CITY OF GILROY — APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-18B	



SECTION



SECTION A-A

OVERFLOW SIDEWALK DRAIN

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 8/11/14

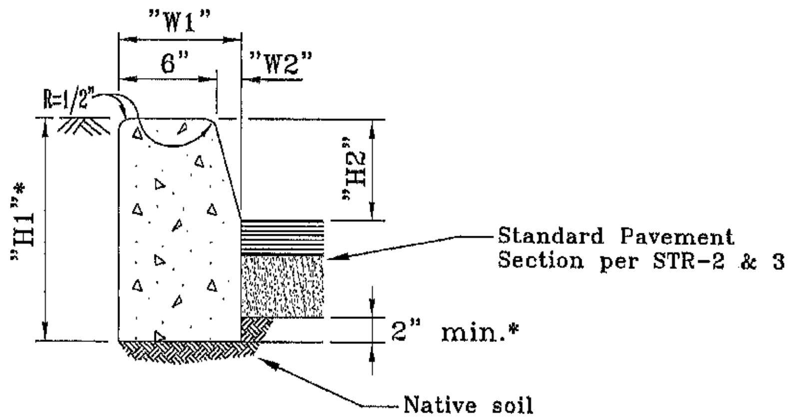
SCALE: N.T.S.

APPROVED BY: 8-18-14

CITY ENGINEER DATE

SECTION: STREETS

DRAWING NO.: STR-19



TYPE A1 CURBS

See Table A

TABLE A

CURB TYPE	DIMENSIONS			
	"H1"*	"H2"	"W1"	"W2"
A1-6	1'-2"	6"	7½"	1½"
A1-8	1'-4"	8"	8"	2"

* "H1" DIMENSION SHALL BE INCREASED AS NEEDED FOR A 2" MIN. EMBEDMENT INTO NATIVE SOIL.

CURB QUANTITIES

TYPE	CUBIC YARDS PER LINEAR FOOT
A1-6	0.02585
A1-8	0.03084

TYPE "A-1" CURB

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 8/7/14

SCALE: N.T.S.

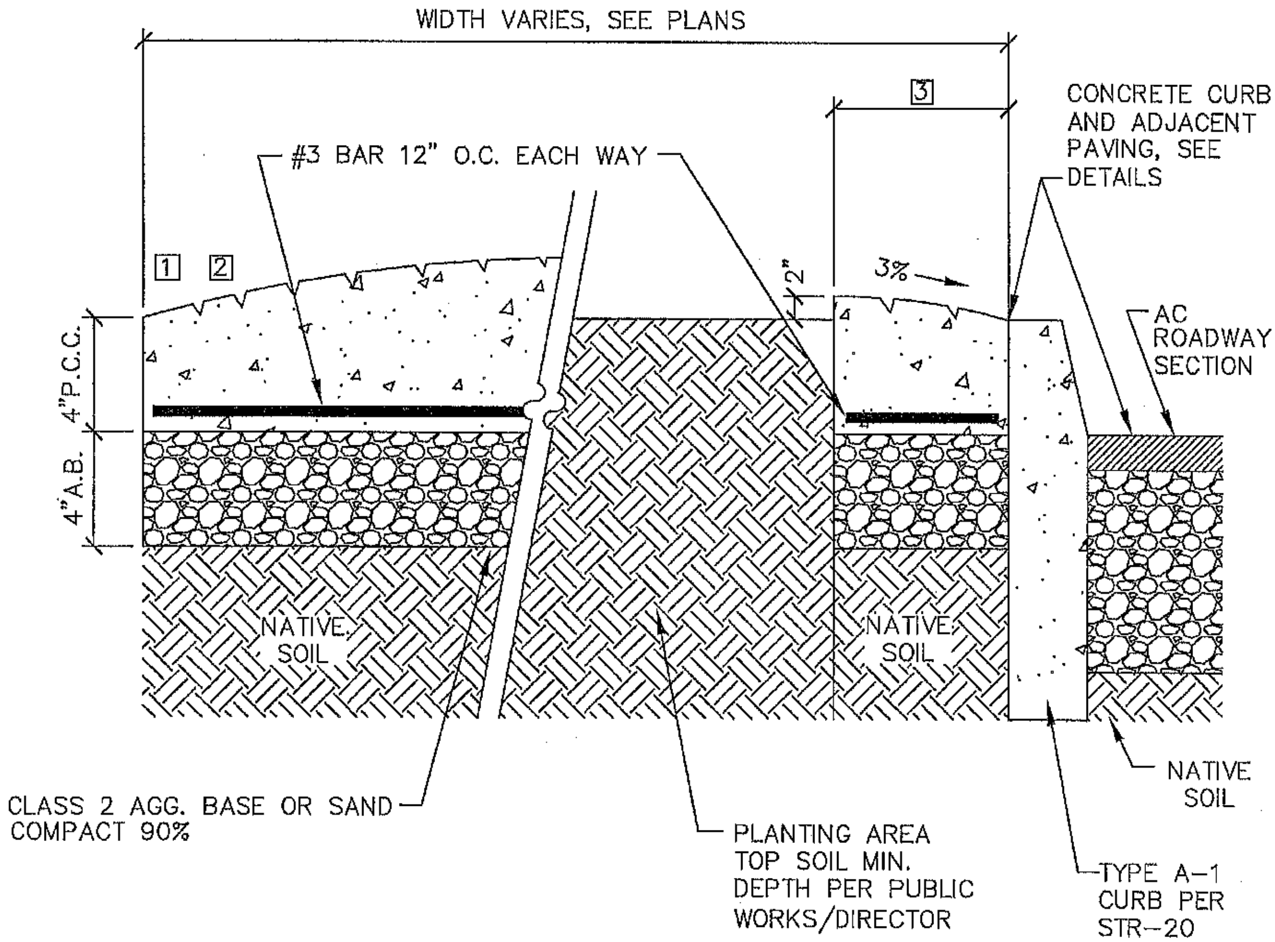
CITY OF GILROY

APPROVED BY:

CITY ENGINEER 8-18-14 DATE

SECTION: STREETS

DRAWING NO.: STR-20



NOTES:

1. HARDSCPAE DESIGN/THEME PER TENTATIVEMAP/ARCHITECTURAL AND APPROVED PROJECT.
2. WHEN MEDIAN NARROWS TO 24" HARDSCAPE MEDIAN AREA ROUND CROWN ALONG CENTERLINE OF MEDIAN AND SLOPE TO CURB.
3. 18" WIDE MIN. BAND VARIES WHERE SHOWN ON PLANS. SLOPE AWAY FROM PLANTING AREA.

MEDIAN/STAMPED CONCRETE

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 7/30/14

SCALE: N.T.S.

CITY OF GILROY

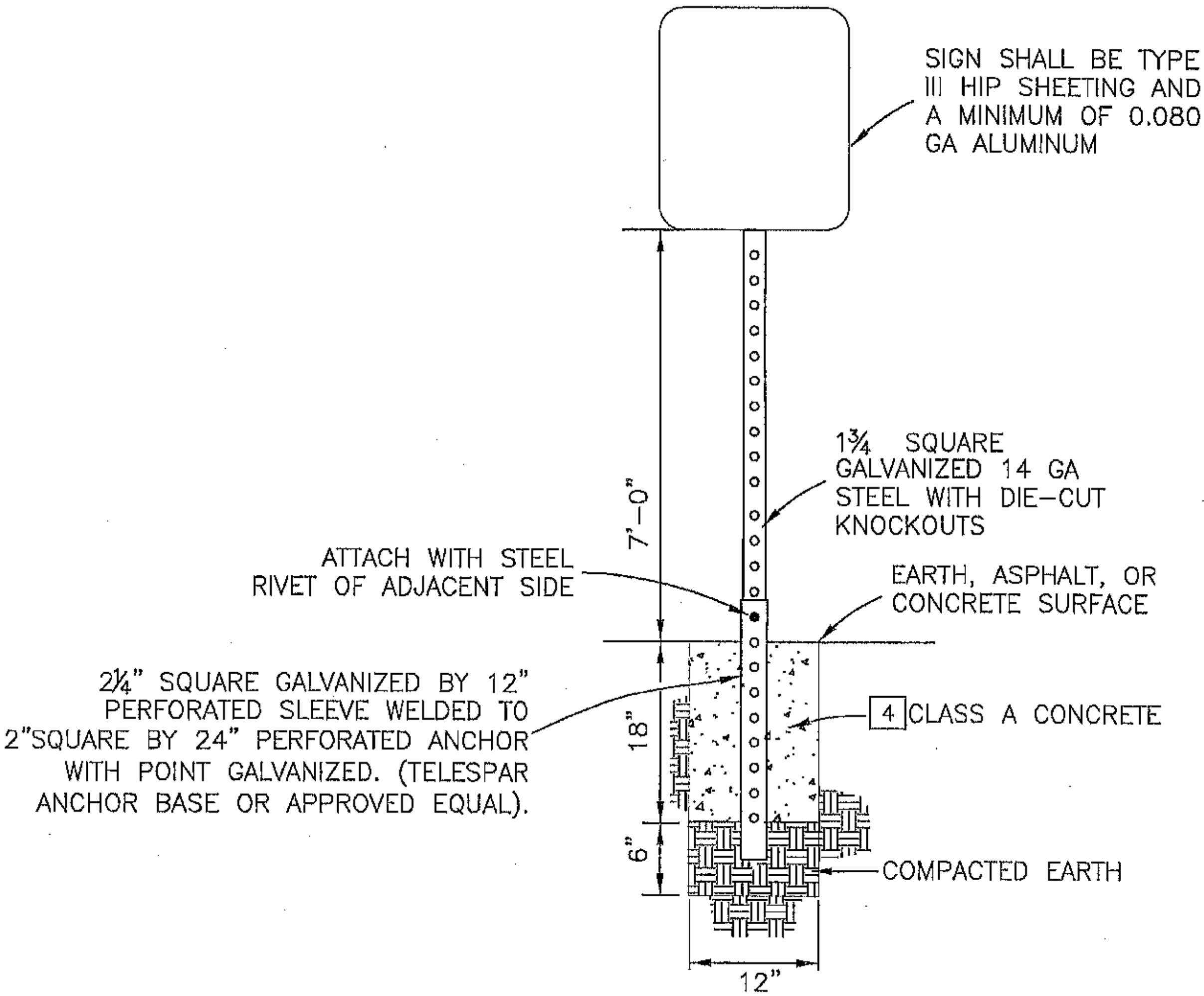
APPROVED BY:

8-18-14

CITY ENGINEER DATE

SECTION: STREETS

DRAWING NO.: STR-21



NOTES:

1. REGULATORY AND WARNING SIGNS SHALL MEET ALL 2012 MUTCD STANDARDS.
2. STREET SIDE EDGE OF SIGN SHALL BE NOT LESS THAN 12" FROM FACE OF CURB.
3. ALL SIGNS ARE TO BE INSTALLED USING THEFT-PROOF HARDWARE.
4. MAY USE ALTERNATE POST BACKFILL AT DISCRETION OF PUBLIC WORKS DIRECTOR/CITY ENGINEER.

SIGN POST INSTALLATION

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 8/8/14

SCALE: N.T.S.

APPROVED BY:

8-18-14

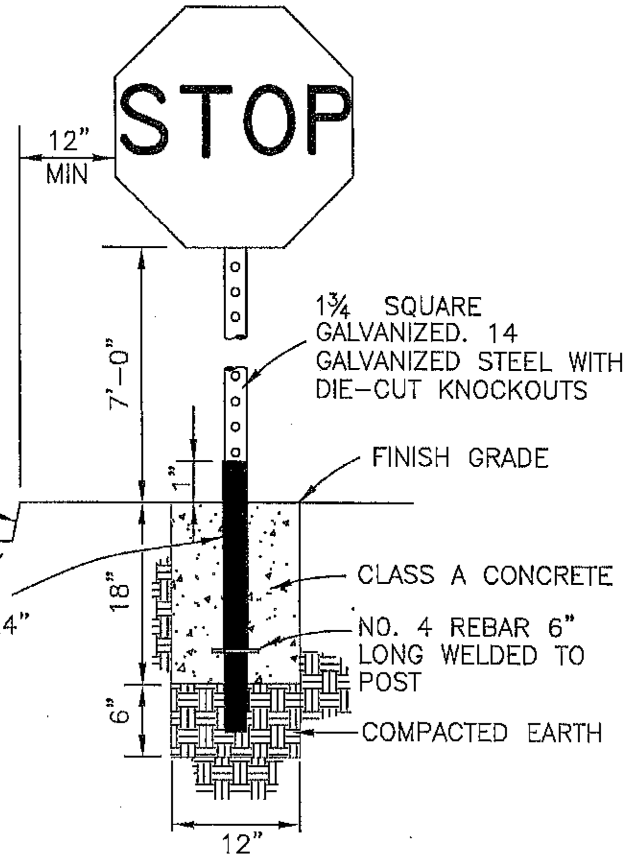
CITY ENGINEER DATE

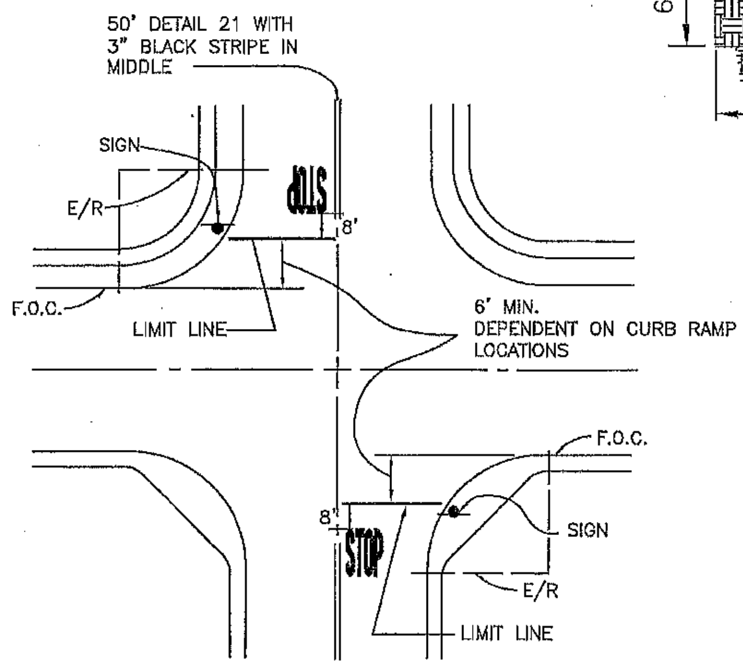
SECTION: STREETS

DRAWING NO.: STR-22

NOTES:

1. STOP SIGNS SHALL BE CA STANDARD R1-1 (30"X30" SIGN)
2. STREET-SIDE EDGE OF SIGN SHALL BE NOT LESS THAN 12" FROM FACE OF CURB.
3. ALL SIGNS ARE TO BE INSTALLED USING THEFT-PROOF HARDWARE SUCH AS HAWKINS & HAWKINS M2G-C2B-TP OR APPROVED EQUAL.
4. MAY USE ALTERNATE POST BACKFILL AT DISCRETION OF PUBLIC WORKS DIRECTOR/CITY ENGINEER.





PLAN: SIGN & LIMIT LINE LOCATION

STANDARD STOP SIGN

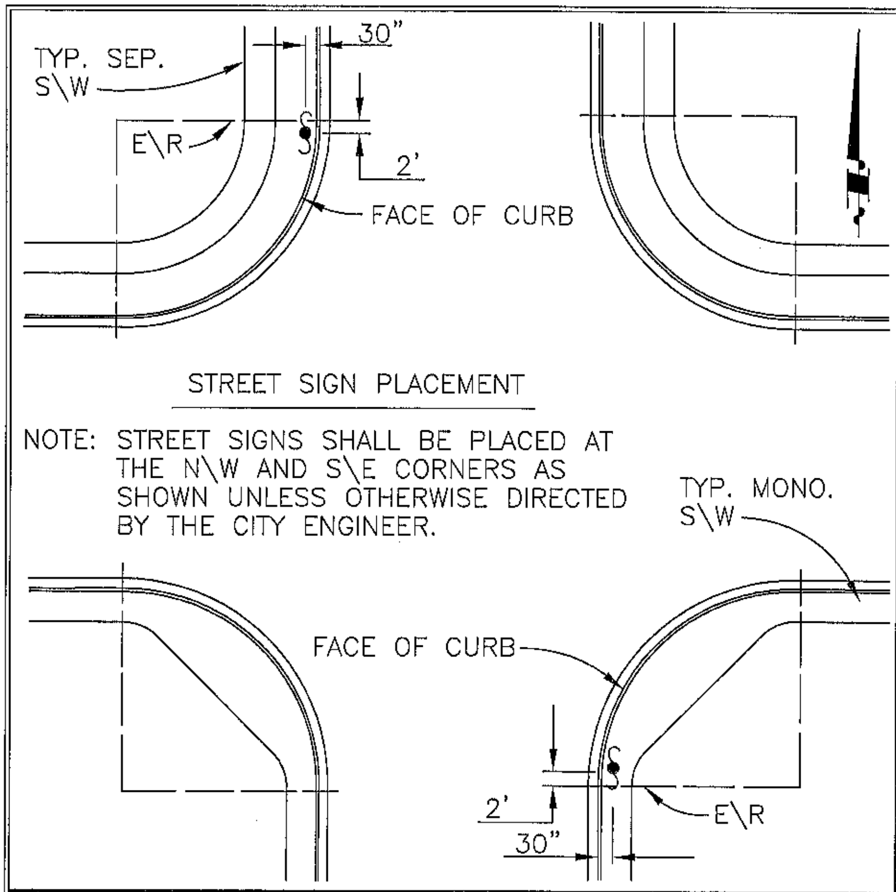
DRAWN BY: CSG	SCALE:
CHECKED BY:	N.T.S.
LAST REVISED: 8/8/14	

SECTION:
STREETS

APPROVED BY: [signature] 8-18-14

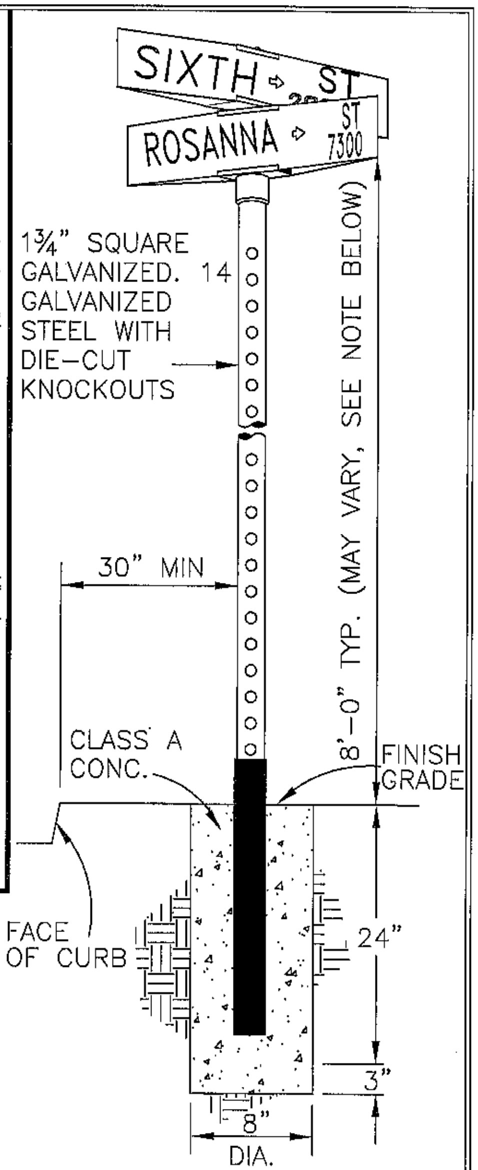
CITY ENGINEER DATE

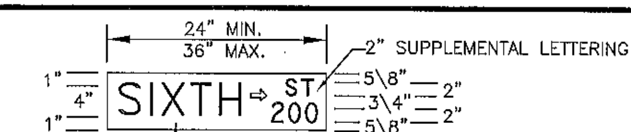
DRAWING NO.: STR-23



STREET SIGN PLACEMENT

NOTE: STREET SIGNS SHALL BE PLACED AT THE N\W AND S\E CORNERS AS SHOWN UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER.





STANDARD STREET NAME SIGN

CITY ENGINEER/DPW APPROVES FONT
USE PRISMATIC 4" LETTERING

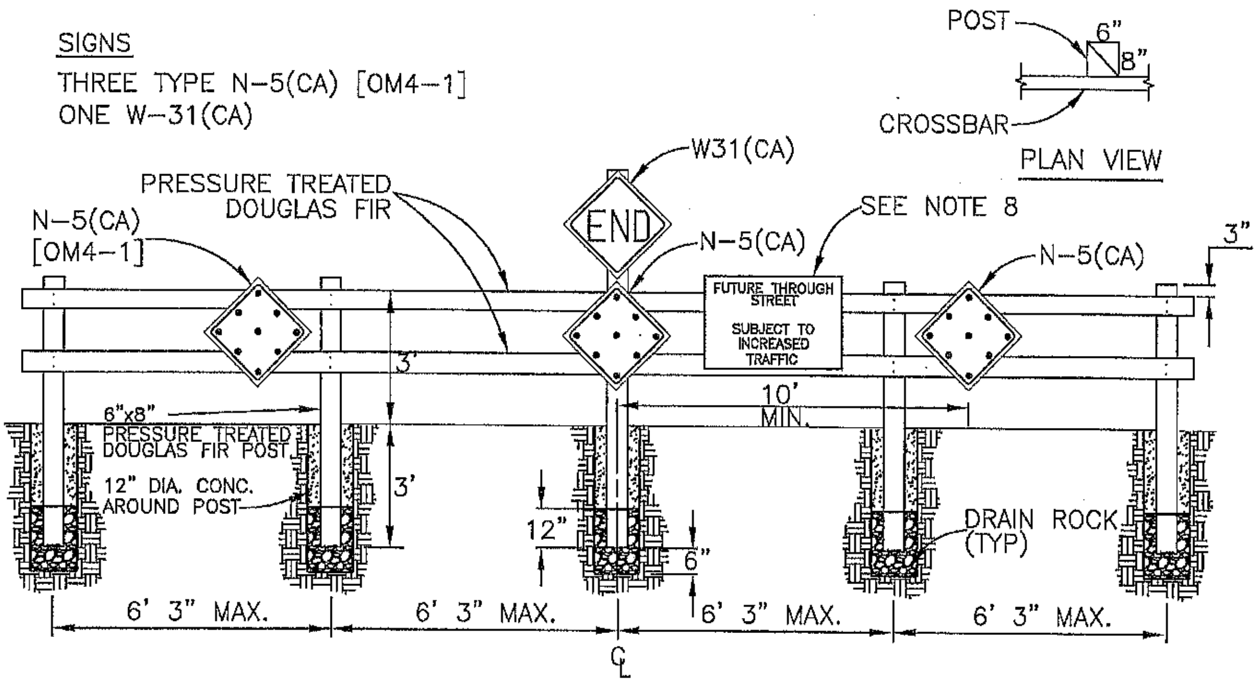
SPECIFIATIONS

1) SIGN PLATES SHALL BE "SCOTCHLITE" REFLECTIVE SHEETING APPLIED TO DEGREASED AND ETCHED FB 118, .080 ALUMINUM BY 3M CO. OR EQUAL. PLATES SHALL HAVE SILVER NO. 2270, 3M SCOTCHLITE LETTERS ON GREEN NO. 2277 ENGINEER GRADE BACKGROUND, WITHOUT BORDERS, BOTH COLORS REFLECTORIZED (PUBLIC), OR WHITE LETTERS ON DARK BROWN BACKGROUND (PRIVATE).
2) STREET NAME TO BE IN 6" UPPER CASE AND 4 1/2" LOWER CASE SERIES C LETTERS WITH 3" HIGH SERIES C UPPER CASE LETTERS FOR AVE., BLVD., CT., DR., PL., RD., ST., LANE AND WAY NOT TO BE ABBREVIATED.
3) ASSEMBLY HARDWARE FOR 4-WAY SIGN INSTALLATION SHALL BE HAWKINS-HAWKINS CO. NO. V14E-(S)PL-2C2P.
4) STREET NAME SIGNS SHALL BE LOCATED ON N/W AND S/E CORNERS AS DIRECTED ABOVE.

NOTE:

WHEN STOP SIGN OR ANY OTHER SIGNS ARE TO BE INSTALLED ON STREET SIGN POLE, HEIGHT OF REGULATORY SIGN SHALL HAVE PRECEDENCE. A 7'-0" MINIMUM CLEARANCE FROM BOTTOM OF REGULATORY SIGN TO TOP OF GROUND SHALL BE REQUIRED WITH STREET NAME SIGN MOUNTED ABOVE.

STANDARD STREET NAME SIGN	DRAWN BY: CSG CHECKED BY: LAST REVISED: 10/8/14	SCALE: N.T.S.
CITY OF GILROY — APPROVED BY: [signature] 8-18-14 CITY ENGINEER DATE	SECTION: STREETS DRAWING NO.: STR-24	



NOTES:

1. INSTALL 6"X8" PRESSURE TREATED DOUGLAS FIR POSTS NO MORE THAN 6' 3" APART AND NO LESS THAN 3' INTO THE GROUND.

2. POUR A 12" DIAMETER CONCRETE COLLAR AROUND EACH POST TO A DEPTH OF 12" ABOVE THE POST BASE.

3. CROSSBARS SHALL BE 2"X6" PRESSURE TREATED DOUGLAS FIR SELECT AND BE SUPPORTED BY A MINIMMUM OF 3 POSTS.

4. ATTACH CROSSBAR WITH 1/2"X8" GALVANIZED BOLTS. 2 MINIMUM AT EACH POST. USE 4 BOLTS AT SPLICE.

5. PAINT WITH NO LESS THAN 2 COATS OF EXTERIOR WHITE HI-GLOSS ENAMEL PAINT.

6. INSTALL 3-18" TYPE N-5(CA) [OM4-1] OBJECT MARKERS. INSTALL 1-W31(CA) AS SHOWN. MOUNT SIGNS ON 18"X18"X3/4" PLYWOOD BACKING ALSO PAINTED WITH 2 COATS OF EXTERIOR WHITE HI-GLOSS ENAMEL PAINT. ADDITIONAL REFLECTOR SIGNS MAY BE REQUIRED FOR WIDE STREETS.

7. LOCATE BARRICADE IN FRONT OF SIDEWALK WHEN SIDEWALK EXISTS OR IS TO BE TEMPORARILY INSTALLED.

8. AT THE DIRECTION OF THE CITY ENGINEER/DPW, INSTALL 24"X36" REFLECTORIZED SIGN WITH 4" BLACK LETTERS ON WHITE BACKGROUND STATING "FUTURE THROUGH STREET SUBJECT TO INCREASED TRAFFIC"

STANDARD BARRICADE

DRAWN BY: CSG
CHECKED BY:
LAST REVISED: 8/12/14

SCALE: N.T.S.

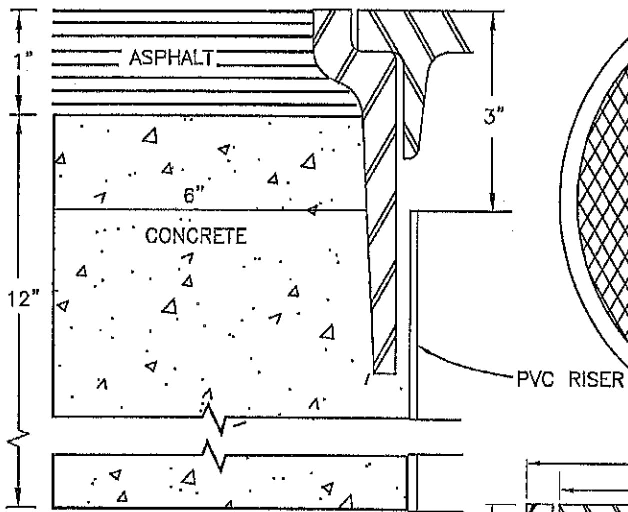
APPROVED BY:

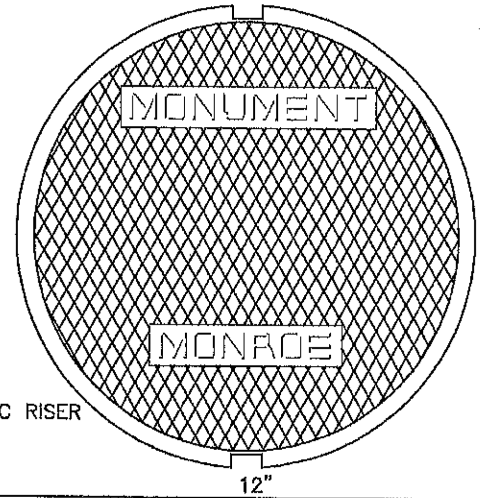
8-18-14

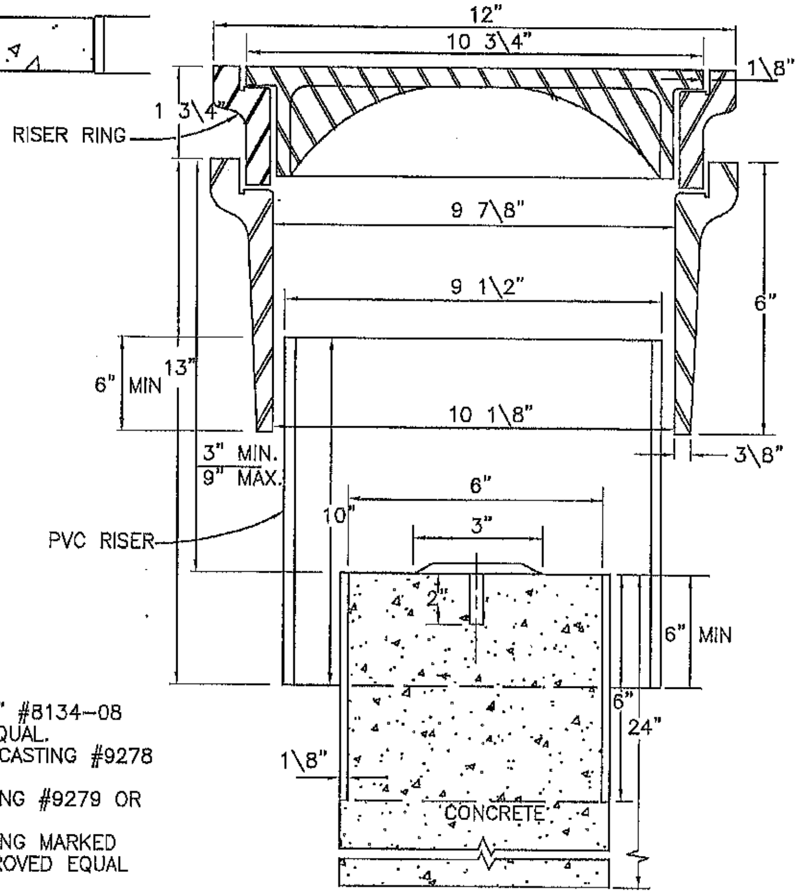
CITY ENGINEER DATE

SECTION: STREETS

DRAWING NO.: STR-25







NOTES:

1. SURVEY MARKER TO BE "LIETZ" #8134-08 OR 8134-18 OR APPROVED EQUAL.
2. RISER RING TO BE "MONROE" CASTING #9278 OR APPROVED EQUAL.
3. FRAME TO BE "MONROE" CASTING #9279 OR APPROVED EQUAL.
4. COVER TO BE "MONROE" CASTING MARKED "MONUMENT" #9277M OR APPROVED EQUAL WITH H20 LOADING.

STANDARD MONUMENT	DRAWN BY: CSG CHECKED BY: LAST REVISED: 8/12/14	SCALE: N.T.S.
APPROVED BY: 8-18-14 CITY ENGINEER DATE	SECTION: STREETS	
	DRAWING NO.: STR-26	

Stevens Ferrone & Bailey
Engineering Company, Inc

Geotechnical Engineering
Engineering Geology
Storm Water Management
Construction Observation & Testing Services

July 12, 2017

Ms. Trece Herder
CalAtlantic Group, Inc.
4750 Willow Road, Suite 150
Pleasanton, CA 94588

Re: Geotechnical Investigation
Glen Loma Phase 2, Gilroy, California
SFB Project No.: 122-11

Ms. Herder:

As requested, Stevens, Ferrone & Bailey Engineering Company, Inc. has performed a geotechnical investigation for the proposed Glen Loma Phase 2 residential development project in Gilroy, California. The accompanying report presents the results of our field investigation, laboratory tests, and engineering analysis. The geotechnical conditions are discussed, and recommendations for the geotechnical engineering aspects of the project are presented. Conclusions and recommendations contained herein are based upon applicable standards of our profession at the time this report has been prepared. Should you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Stevens, Ferrone & Bailey
Engineering Company, Inc.

Ken Ferrone
President

TC/KCF:lc\encl.
Copies: Addressee (1 by email)

July 12, 2017

GEOTECHNICAL INVESTIGATION
GLEN LOMA PHASE 2 RESIDENTIAL DEVELOPMENT
GILROY, CALIFORNIA
SFB PROJECT NO. 122-11

Prepared For:

CalAtlantic Group, Inc.
4750 Willow Road, Suite 150
Pleasanton, CA 94588

Prepared By:

Stevens, Ferrone & Bailey Engineering Company, Inc.

Taiming Chen, P.E., G.E.
Civil/Geotechnical Engineer

Kenneth C. Ferrone, P.E., G.E., C.E.G.
Civil/Geotechnical Engineer
Certified Engineering Geologist

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1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for the proposed Glen Loma Phase 2 residential development to be located in Gilroy, California as shown on the Site Plan, Figure 1. The purpose of our investigation was to evaluate the geotechnical conditions at the site and provide recommendations regarding the geotechnical engineering aspects of the project.

Based on the information indicated on the Site Plan, as well as information provided by Ms. Trece Herder of CalAtlantic Group, Inc., it is our understanding that the project will consist of developing the Wild Chestnut, Home Ranch, and Montonico neighborhoods of the Glen Loma Ranch master planned community. The development will include single-family residential lots and homes. Associated underground utilities and asphalt concrete paved roadways are also proposed. The new development will be setback considerably from the edges of the existing site slopes. Open spaces and trails are planned for the setback areas. Some cut and fill grading is anticipated.

The conclusions and recommendations provided in this report are based upon the information presented above; Stevens, Ferrone & Bailey Engineering Company, Inc. (SFB) should be consulted if any changes to the project occur to assess if the changes affect the validity of this report.

2.0 SCOPE OF WORK

This investigation included the following scope of work:

- Reviewing published and unpublished geotechnical and geological literature relevant to the site;
- Reviewing a previous geotechnical engineering report prepared for Glen Loma Ranch community by Earth Systems Pacific dated September 23, 2013, including the results of exploratory borings at the Wild Chestnut, Home Ranch, Montonico sites and the vicinity;
- Reviewing our previous geotechnical investigation work at the site;
- Reviewing our previous fault rupture hazard investigation work performed in the southern portion of the Glen Loma Phase 2 site;
- Performing reconnaissance of the site and surrounding area;
- Performing three supplemental exploratory borings to a maximum depth of about 6 feet;
- Performing engineering analysis of the field and laboratory data; and
- Preparing this report.

The data obtained and the analyses performed were for the purpose of providing geotechnical design and construction criteria for site earthwork, underground utilities, drainage, building foundations, retaining walls and soundwalls, and pavements. Evaluating the potential for flooding and toxicity potential assessment of onsite materials or groundwater (including mold) was beyond our scope of work.

3.0 SITE INVESTIGATION

Reconnaissance of the site and surrounding area was performed on July 3, 2017. Subsurface exploration was performed using a 2-inch diameter hand auger. Three exploratory borings were drilled on July 3, 2017 to a maximum depth of about 6 feet. Previously, six exploratory borings were performed by SFB at the site on May 11, 2016 to a maximum depth of about 4 feet. In addition, several exploratory borings were drilled by Earth Systems Pacific in June 2013 to a maximum depth of about 25 feet at the site and surrounding area.

In July 2016, SFB performed an approximately 260 foot long trench to an average depth of about 10 feet through the portion of the County fault zone that extends across the Montonico site. The approximate location of the fault zone is shown on Figure 1. The summary of our fault rupture hazard investigation is provided under separate cover. The trench was loosely backfilled upon completion. At the time of construction, the trench will require over-excavation and re-compaction to the standards described in this report.

The approximate locations of all the borings and the previous fault trench are shown on the Site Plan, Figure 1. Logs of SFB's borings and details regarding SFB's field investigation are included in Appendix A. The results of SFB's laboratory tests are discussed in Appendix B. Logs of the previous borings and results of previous laboratory testing on the onsite soils by others are provided in Appendix C for reference. It should be noted that changes in the surface and subsurface conditions can occur over time as a result of either natural processes or human activity and may affect the validity of the conclusions and recommendations in this report.

3.1 Surface

At the time of our investigation and as shown on Figure 1, the site consists of three proposed new neighborhoods (Home Ranch, Wild Chestnut, and Montonico) of the Glen Loma Ranch master planned community. The site is bounded by Santa Teresa Blvd on the southwest, the Ascencion Solorsano Middle School on the north, and undeveloped lands and open spaces on the other sides.

The Home Ranch site is located at an elevation of about 220 feet (datum unknown), and the existing site surface grades are approximately level. A large soil stockpile (approximately 450 feet long by 120 feet wide and up to about 3 feet high) was located near the center of the site at the time of inspection. Based on our review of historical aerial photographs of the site, it is our understanding some grading activities occurred at the Home Ranch site in 2002. The details of the grading are unknown. The Wild Chestnut and Montonico sites are located at elevations varying from 270 to 330 feet, and the existing site surface grades slope very gently downward toward the north. At the time of our field exploration, the surface vegetation at these sites generally consisted of heavy growths of weeds and grasses.

Natural terrace escarpment slopes are located between the low-lying Home Ranch site and the Wild Chestnut and Montonico sites above. These slopes are up to about 50 feet high and have slope inclinations varying from about 10:1 (horizontal to vertical) up to about 1-1/2:1. The slopes are generally covered with heavy surface vegetation and numerous trees. An unpaved road provides access from the Home Ranch site to the Montonico site.

3.2 Subsurface

The near-surface soil materials (as described on the exploratory boring logs by others) generally consist of interbedded stiff to hard sandy and silty clays and loose to very dense clayey sands and gravels that extend to the maximum depth explored of about 25 feet. SFB's borings generally encountered clayey and sandy soils similar to those described by previous boring logs to the maximum depth explored of about 4 feet. The upper one to two feet of the surface soils are generally loose, weak, and potentially compressible due to historical farming practices at the site. Weak colluvial soils also blanket the surface of the terrace escarpment slopes and extend to an estimated depth up to about 5 feet deep.

In addition, clayey fills about 2 feet thick was also encountered in our Boring SFB-6. These fills appear to be derived from the previous grading activities at the Home Ranch site. Fills may also exist below the unpaved access road between the Home Ranch and Montonico sites. These fills may be heterogeneous, potentially weak and compressible if they were not placed and compacted in accordance with acceptable engineering standards.

The results of laboratory testing indicate that the more clayey surficial soils have a low to medium plasticity and expansion potential. Detailed descriptions of the materials encountered in our exploratory borings and borings by others are presented on the boring logs in Appendices A and C. Our attached boring logs and related information depict location-specific subsurface conditions encountered during our field investigation. The approximate locations of our borings were determined using pacing or landmark references, and should be considered accurate only to the degree implied by the method used.

3.3 Groundwater

No groundwater was reported in the previous borings to a maximum depth explored of about 25 feet (an estimated elevation of about 195 feet; datum unknown). It should be noted that borings might not have been left open for a sufficient period of time to establish equilibrium groundwater conditions. In addition, fluctuations in the groundwater level could occur due to change in seasons, variations in rainfall, and other factors.

3.4 Hydrologic Soil Group

The surface soils of the Home Ranch site have been mapped as Garretson loam (gravel substratum, 0 to 2 percent slopes) and Yolo loam (0 to 7 percent slopes, MLRA14). These soils were assigned to Hydrologic Soil Group B by USDA Natural Resources Conservation Service (NRCS); the soils have been categorized as having moderately high to high transmission rates (approximately 0.6 to 2.0 inches per hour). Group B soil is defined as having a moderate infiltration rate when thoroughly wet and may consist chiefly of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture.

The surface soils of the Wild Chestnut and Montonico sites have been mapped as Pleasanton gravelly loam (2 to 9 percent slopes). These soils were assigned to Hydrologic Soil Group C by USDA Natural Resources Conservation Service (NRCS); the soils have been categorized as having moderately low to moderately high transmission rates (approximately 0.2 to 0.6 inches per hour). Group C soil is defined as having a slow infiltration rate when thoroughly wet and may consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.

3.5 Geology and Seismicity

According to Graymer (1997)[1], the Home Ranch site (below fills, if any) is underlain by Holocene Floodplain deposits that are generally composed of medium to dark gray, dense, sandy to silty clay. Lenses of coarser material (silt, sand, and pebbles) may be locally present. The Wild Chestnut and Montonico sites are underlain by Pleistocene first alluvial terrace deposits that are generally composed of crudely-bedded, clast-supported, gravels, cobbles, and boulders with a sandy matrix. Coarse sand lenses may be locally present.

According to U.S. Geological Survey Open-File Report 97-745 (landslide folio of the San Francisco Bay Area), the development site and the terrace escarpment slopes are not mapped as having been previously identified as landslides or earthflows. Based on the results of our reconnaissance and review of documents, we did not observe evidence of adverse slope stability, erosion, or drainage conditions at the development site and on the escarpment slopes. We did not observe evidence of active, deep seated slope movement onsite or adjacent to the site. It is not uncommon, however, for relatively shallow slope movements to occur within the soils blanketing

[1]Graymer, 1997, *Geology of Southernmost Santa Clara County, California: A Digital Database*, USGS Open File Report 97-710.

the escarpment slopes. These movements may include downslope creep, erosion, and slumping. It is our opinion that there is a low potential for slope instability occurring at the development site provided the recommendations in this report are followed and adequate slope setbacks or retention systems are used for the proposed residential lots and improvements.

The project site is located in the San Francisco Bay Area, which is considered one of the most seismically active regions in the United States. Significant earthquakes have occurred in the San Francisco Bay Area and are believed to be associated with crustal movements along a system of sub-parallel fault zones that generally trend in a northwesterly direction. According to the Alquist-Priolo Earthquake Fault Zones Map of the Chittenden Quadrangle, the site is not located in an earthquake fault zone as designated by the State of California[2]. According to Santa Clara County Hazard Zone Map No. 67, the southernmost area of the Glen Loma Phase 2 site is located in a fault rupture hazard zone as designated by the County; the fault shown within the zone may be part of the Carnadero fault complex. This section of the County designated fault rupture hazard zone is classified as pre-Quaternary fault by Jennings and Bryant (2010)[3], which is defined as a fault showing no evidence of displacement within the last 1.6 million years.

In July 2016, SFB performed a fault rupture hazard investigation which included excavating an approximately 260 foot long trench to an average depth of about 10 feet through the portion of the County fault zone that extends across the Montonico site. The results of our work indicate that no active fault (defined as a fault that has ruptured the ground surface in the past 11,000 years) exists within the portion of the Santa Clara County fault zone that extends across the Montonico site. The summary of our previous fault rupture hazard investigation is provided under separate cover.

Earthquake intensities will vary throughout the San Francisco Bay Area, depending upon numerous factors including the magnitude of earthquake, the distance of the site from the causative fault, and the type of materials underlying the site. The U.S. Geological Survey (2008) indicated that there is a 63 percent chance of at least one magnitude 6.7 or greater earthquake striking the San Francisco Bay region between 2008 and 2037[4]. Therefore, the site will probably be subjected to at least one moderate to severe earthquake that will cause strong ground shaking.

According to the Unified Hazard Tool (Dynamic: Conterminous U.S. 2014 v4.1.1) deaggregation model developed by U.S. Geological Survey (2016)[5], the site has a 10 percent probability of

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[2]State of California, Earthquake Fault Zones, Chittenden Quadrangle, Revised Official Map, Effective: January 1, 1982.
[3]Information based on Jennings and Bryant, 2010, *Fault Activity Map of California*, CGS Geological Data Map No.6.
[4]Field, Edward H., Milner, Kevin R., and the 2007 Working Group on California Earthquake Probabilities, 2008, *Forecasting California's earthquakes; what can we expect in the next 30 years?*: U.S. Geological Survey, Fact Sheet 2008-3027, 4 p.
[5]https://earthquake.usgs.gov/hazards/interactive/

exceeding a peak ground acceleration of about 1.0g in 50 years (design basis ground motion based on stiff soil site condition; mean return time of 475 years). The actual ground surface acceleration might vary depending upon the local seismic characteristics of the underlying bedrock and the overlying unconsolidated soils.

3.6 Liquefaction & Lateral Spreading

Soil liquefaction is a phenomenon primarily associated with saturated, cohesionless, soil layers located close to the ground surface. These soils lose strength during cyclic loading, such as imposed by earthquakes. During the loss of strength, the soil acquires mobility sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, uniformly graded, saturated, fine-grained sands that lie close to the ground surface. According to ABAG and the U.S. Geological Survey, the Home Ranch site is located in an area that has been characterized as having moderate liquefaction susceptibility[6,7]. The Wild Chestnut and Montonico sites are located in areas that have been characterized as having low liquefaction susceptibility. As of the date of this report, the liquefaction potential of the site has not been evaluated by the State of California[8]. According to Santa Clara County Hazard Zone Map No. 67, all the sites are not located in a liquefaction hazard zone as designated by the County. Based on our review of available literature and the results of field explorations at the site, it is our opinion that the potential for ground surface damage at the site resulting from liquefaction is low.

As part of our analyses, we evaluated the potential for lateral spreading impacting the site. Lateral spreading occurs when soils liquefy during an earthquake event and the liquefied soils with the overlying soils move laterally to unconfined spaces (for example, the Uvas creek banks), which causes significant horizontal ground displacements. Since the site has low potential for liquefaction induced ground surface damage and the Uvas Creek is located at least 500 feet away from the site (at its closest distance), it is our opinion that the potential for ground surface damage at the development resulting from lateral spreading adjacent to the creek is low.

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[6]Witter, Knudsen, Sowers, Wentworth, Koehler, and Randolph, 2006, *Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California*", USGS Open File Report 2006-1037.
[7]Knudsen, Sowers, Witter, Wentworth, and Helly, 2000, "*Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California*", USGS Open File Report 00-444.
[8]Seismic Hazards Mapping Act, 1990.

4.0 CONCLUSIONS AND RECOMMENDATIONS

It is our opinion that the site is suitable for the proposed project from a geotechnical engineering standpoint. The conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to reduce soil or foundation related issues. The following are the primary geotechnical considerations for development of the site.

SANTA CLARA COUNTY FAULT ZONE: According to Santa Clara County Hazard Zone Map No. 67, the southernmost area of the Glen Loma Phase 2 site is located in a fault rupture hazard zone as designated by the County. The approximate location of this fault zone is shown on Figure 1. In July 2016, SFB performed a fault rupture hazard investigation which included excavating an approximately 260 foot long trench to an average depth of about 10 feet through the portion of the County fault zone that extends across the Montonico site. The results of our work indicate that no active fault (defined as a fault that has ruptured the ground surface in the past 11,000 years) exists within the portion of the Santa Clara County fault zone that extends across the Montonico site. The summary of our previous fault rupture hazard investigation is provided under separate cover.

EXISTING WEAK SOIL AND FILL MATERIALS: As described previously, the upper one to two feet of the surface soils are generally loose, weak, and potentially compressible due to historical farming practices at the site. Weak colluvial soils also blanket the surface of the terrace escarpment slopes and extend to an estimated depth up to about 5 feet deep. In addition, clayey fills up to 2 feet thick were also encountered in Boring SFB-6. These fills appeared to be derived from the previous grading activities at the Home Ranch site. Fills may also exist below the unpaved access road between the Home Ranch and Montonico sites. These fills may be heterogeneous, potentially weak, and compressible if they were not placed and compacted in accordance with acceptable engineering standards.

In order to reduce the potential for damaging differential settlement of overlying improvements (such as new fills, building foundations, driveways, exterior flatwork, and pavements), we recommend that these weak soils and fills be completely removed and re-compacted. The over-excavation should extend to depths where competent soil is encountered.

We estimate the process can consist of removing the upper one foot of weak soils and fills, scarifying and re-compacting the bottom 12 inches, and placing moisture-conditioned, properly compacted engineered fill over the properly prepared subgrade. Deeper removal may be required within the Home Ranch site, the unpaved access road area, and areas on the terrace escarpment slopes. The over-excavation and re-compaction work should also extend at least 5 feet beyond building footprints and at least 3 feet beyond exterior flatwork (including driveways) and pavement wherever possible. Where the over-excavation limits abut adjacent property, SFB should be consulted to determine the actual vertical and lateral extent of over-excavation so that adjacent property is not adversely impacted. Over-excavations should be performed so that no more than 5 feet of differential fill thickness exists below the proposed building foundations. The removed soil material can be used as new fill provided it is placed and compacted in accordance with the recommendations presented in this report. The extent of the removal and re-compaction will vary across the site and should be determined in the field by SFB at the time of the earthwork operations.

EXPANSION POTENTIAL: The more clayey, moderately expansive surface soil materials will be subjected to volume changes during seasonal fluctuations in moisture content. To reduce the potential for post-construction distress to the proposed structures resulting from swelling and shrinkage of these materials, we recommend that the proposed buildings be supported on a foundation system that is designed to reduce the impact of the expansive soils. It should be noted that special design considerations will be required for exterior slabs.

SETBACKS FROM TERRACE ESCARPMENT SLOPES: In order to reduce the potential for property damage caused by terrace escarpment slopes erosion and slumping, appropriate slope setbacks should be used. We recommend setbacks be established by projecting a 3:1 (horizontal to vertical) line from the toe of the existing escarpment slopes upward toward the development. Where the projected line intersects the finished ground surface, we recommend improvements (including residential lots) be setback at least 10 feet from the intersection or top of the slopes, whichever is greater. If it is impractical to setback improvements, retaining systems (walls and/or geogrid reinforced earth) can be used that are designed and constructed to resist downslope ground movements. During a major earthquake, it should be anticipated that some ground movement toward the toe of the slopes will occur. We recommend the project's Civil Engineer determine the actual property, building, and improvement setback based upon the recommendations provided in this report, the final grading plans, California Building Code and local ordinances, and any other restrictions such as environmental regulations. Property located between the setback line and the slopes may experience movement as a result of slope erosion, localized slumping, and other factors.

CORROSION POTENTIAL: Two onsite soil samples were previously tested for pH (ASTM D4972), chlorides (ASTM D4327), sulfates (ASTM D4327), sulfides (ASTM D4658M), resistivity at 100% saturation (ASTM G57), and Redox potential (ASTM D1498) for use in evaluating the potential for corrosion on concrete and buried metal such as utilities and reinforcing steel. The results of these tests are included in Appendix B. We recommend these test results be forwarded to your underground contractors, pipeline designers, and foundation designers and contractors so that they can design and install corrosion protection measures. Please be aware that we are not corrosion protection experts; we recommend corrosion protection measures be designed and constructed so that all concrete and metal is protected against corrosion. We also recommend additional testing be performed if the test results in Appendix B are deemed insufficient by the designers and installers of the corrosion protection.

SEEPAGE, SURFACE, AND SUBSURFACE WATER: Water seepage will occur during and after periods of rainfall and as a result of irrigation by “upstream” neighbors. To reduce the potential for seepage below and within planned improvements, we recommend installing subdrains where surface and seepage water is directed toward planned improvements such as at the base of the existing terrace escarpment slopes and along the upslope side of roadways. After construction is complete, seepage may occur as the seepage patterns below the ground surface resulting from irrigation and storm water flow develop over time. Surface water should not be allowed to flow over the top of slopes and retaining walls. The actual location and extent of subdrains should be assessed by SFB during the development of the grading and improvement plans, and determined in the field by SFB at the time of construction.

EROSION AND SLOPE MAINTENANCE: Drainage and erosion control measures should be maintained during and after construction. Short-term and long-term erosion control are critical for the stability of any exposed cut and fill slopes, and may be necessary for the natural slopes in order to reduce sediment accumulation in the drainage systems. We recommend all exposed cut and fill slopes be seeded or planted with appropriately designed erosion resistant vegetation and fertilizer. The vegetation should be appropriately irrigated in order to establish and maintain growth. Over-watering must be avoided in order to reduce surficial instability and erosion. Vegetation should be deeply rooted to aid in the interlocking of the near-surface soils. Additional seeding and planting may be necessary in localized areas if the initial seeding or planting is unsuccessful. After seeding, fertilizing, and planting, staked erosion control blankets might be necessary to further stabilize the surficial soils.

Additional erosion control measures will need to be designed and implemented prior to the rainy season based upon the site's configuration. The measures could include straw wattles, silt fencing, hay bales, sediment collection basins, and filtration systems. Silt fencing should be designed for the site's soil type. Storm water discharge and release points from silt fencing should be designed to reduce erosion. In areas exposed to winter rains, we recommend an erosion control plan be prepared and implemented at least one month prior to the beginning of the rainy season. The erosion control measures will require inspection, modification, and re-mediation during the rainy season in order to comply with regulatory requirements.

ADDITIONAL RECOMMENDATIONS: Based on the project improvement and grading plans Prepared by RJA and dated March 24, 2016, SFB had prepared a preliminary geotechnical improvement plan showing areas of the site that would require fill keys, benches, subdrains, and areas of over-excavation and re-compaction in accordance with the recommendations of this report. Our preliminary geotechnical improvement plan is included as Figure 2. The preliminary geotechnical improvement plan can be updated to include the estimated over-excavation depths and subdrain elevations once the project plans are finalized.

Detailed drainage, earthwork, foundation, retaining wall/soundwall, and pavement recommendations for use in design and construction of the project are presented below. We recommend SFB review the design and specifications to verify that the recommendations presented in this report have been properly interpreted and implemented in the design, plans, and specifications. We also recommend SFB be retained to provide consulting services and to perform construction observation and testing services during the construction phase of the project to observe and test the implementation of our recommendations, and to provide supplemental or revised recommendations in the event conditions different than those described in this report are encountered. We assume no responsibility for misinterpretation of our recommendations.

4.1 Earthwork

4.1.1 Clearing and Site Preparation

The site should be cleared of all obstructions including any existing structures and their entire foundation systems, undocumented fill materials, designated pavements, abandoned pipes and their backfill, any fill stockpiles (including the unpaved access road), designated trees and their associated entire root systems, and debris. Holes resulting from the removal of underground obstructions extending below the proposed finish grade should be cleared and backfilled with fill materials as specified in **Section 4.1.4, *Fill Material***, and compacted to the requirements in **Section 4.1.5, *Compaction***. Tree roots may extend to depths of about 3 to 4 feet. Wells, if any, should be abandoned in accordance with Santa Clara County standards.

From a geotechnical standpoint, any existing trench backfill materials, clay or concrete pipes, pavements, and concrete (if any) that are removed can be used as new fill onsite provided debris is removed and it is broken up to meet the size requirement for fill material in **Section 4.1.4, *Fill Material***. We recommend fill materials composed of broken up concrete or asphalt concrete not be located within 3 feet of the ground surface in yard areas. Consideration should be given to placing these materials below pavements, directly under building footprints, or in deeper excavations. We recommend backfilling operations for any excavations be performed under the observation and testing of SFB.

At least two weeks prior to grading, areas containing surface vegetation should be mowed and the cut grasses and weeds removed from the site or stockpiled for use in landscaping. After mowing, the site should be disced. Portions of the site containing heavy surface vegetation that is not removed by discing should be stripped to an appropriate depth to remove these materials. The amount of actual stripping should be determined in the field by SFB at the time of construction.

Stripped materials should be removed from the site or stockpiled for later use in landscaping, if desired.

4.1.2 Existing Weak Soil and Fill Re-Compaction

As described previously, the upper one to two feet of the surface soils are generally loose, weak, and potentially compressible due to historical farming practices at the site. In addition, some shallow clayey fills were encountered in Boring SFB-6. Weak colluvial soils also blanket the surface of the terrace escarpment slopes and extend an estimated depth up to about 5 feet deep. Fills may also exist below the unpaved access road between the Home Ranch and Montonico sites. In order to reduce the potential for damaging differential settlement of overlying improvements (such as new fills, building foundations, driveways, exterior flatwork, and pavements), we recommend that these weak soils and fills be completely removed and re-compacted. The over-excavation should extend to depths where competent soil is encountered.

We estimate the process can consist of removing the upper one foot of weak soils and fills, scarifying and re-compacting the bottom 12 inches, and placing moisture conditioned, properly compacted engineered fill over the properly prepared subgrade. Deeper removal may be required within the Home Ranch site, the unpaved access road area, and areas on the terrace escarpment slopes. The over-excavation and re-compaction should also extend at least 5 feet beyond building footprints and at least 3 feet beyond exterior flatwork (including driveways) and pavement wherever possible. Where the over-excavation limits abut adjacent property, SFB should be consulted to determine the actual vertical and lateral extent of over-excavation so that adjacent property is not adversely impacted. Over-excavations should be performed so that no more than 5 feet of differential fill thickness exists below the proposed building foundations. The extent of the removal and re-compaction may vary across the site and should be determined in the field by SFB at the time of the earthwork operations.

Removed soil and fill materials may be used as new fill onsite provided it satisfies the recommendations provided in **Section 4.1.4, *Fill Material***. Compaction should be performed in accordance with the recommendations in **Section 4.1.5, *Compaction***.

4.1.3 Subgrade Preparation

After the completion of clearing, site preparation, and weak soil and fill re-compaction, soil exposed in areas to receive improvements (such as structural fill, building foundations, driveways, exterior flatwork, and pavements) should be scarified to a depth of about 12 inches, moisture conditioned to approximately 2 to 3 percent over optimum water content, and compacted to the requirements for structural fill.

If building pads or pavement subgrade are allowed to remain exposed to sun, wind or rain for an extended period of time, or are disturbed by borrowing animals, the exposed subgrade or pavement subgrade may need to be reconditioned (moisture conditioned and/or scarified and re-compacted) prior to foundation or pavement construction. SFB should be consulted on the need for subgrade reconditioning when the subgrade is left exposed for extended periods of time.

4.1.4 Fill Material

From a geotechnical and mechanical standpoint, onsite soils having an organic content of less than 3 percent by volume can be used as fill. Fill should not contain rocks or lumps larger than 6 inches in greatest dimension with not more than 15 percent larger than 2.5 inches. Larger sized rock may be used as fill onsite provided it is closely monitored, placed properly to achieve compaction, and are located at depths below anticipated, future excavations; SFB should be consulted regarding the use of larger rock pieces in fill materials. If required, imported fill should have a plasticity index of 15 or less and have a significant amount of cohesive fines.

In addition to the mechanical properties specifications, all imported fill material should have a resistivity (100% saturated) no less than the resistivity for the onsite soils, a pH of between approximately 6.0 and 8.5, a total water soluble chloride concentration less than 300 ppm, and a total water soluble sulfate concentration less than 500 ppm. We recommend import samples be submitted for corrosion and geotechnical testing at least two weeks prior to being brought onsite.

4.1.5 Compaction

Within the upper 5 feet of the finished ground surface, we recommend structural fill be compacted to at least 90 percent relative compaction, and structural fill below a depth of 5 feet be compacted to at least 95 percent relative compaction, as determined by ASTM D1557 (latest edition). We recommend the new fill be moisture conditioned approximately 3 to 5 percent over optimum water content. The upper 6 inches of subgrade soils beneath pavements should be compacted to at least 95 percent relative compaction. Fill material should be spread and compacted in lifts not exceeding approximately 8 to 12 inches in un-compacted thickness.

4.1.6 Utility Trench Backfill

Pipeline trenches should be backfilled with fill placed in lifts of approximately 8 inches in un-compacted thickness. Thicker lifts can be used provided the method of compaction is approved by SFB and the required minimum degree of compaction is achieved. Backfill should be placed by mechanical means only. Jetting is not permitted.

Onsite trench backfill should be compacted to at least 90 percent relative compaction. Imported sand trench backfill should be compacted to at least 95 percent relative compaction and sufficient water is added during backfilling operations to prevent the soil from "bulking" during compaction. The upper 3 feet of trench backfill in foundation, slab, and pavement areas should be entirely compacted to at least 95 percent relative compaction. To reduce piping and settlement of overlying improvements, we recommend rock bedding and rock backfill (if used) be completely surrounded by a filter fabric such as Mirafi 140N (or equivalent); alternatively, filter fabric would not be necessary if Caltrans Class 2 permeable material is used in lieu of rock bedding and rock backfill.

Sand or gravel backfilled trench laterals that extend toward driveways, exterior slabs-on-grade, or under the building foundations, and are located below irrigated landscaped areas such as lawns or planting strips, should be plugged with onsite clays, low strength concrete, or sand/cement slurry. The plug for the trench lateral should be located below the edge of pavement or slabs, and under the perimeter of the foundation. The plug should be at least 24 inches thick, extend across the entire width of the trench, and extend from the bottom of the trench to the top of the sand or gravel backfill.

4.1.7 Exterior Flatwork

We recommend that exterior slabs (including patios, sidewalks, and driveways) be placed directly on the properly compacted fills. We do not recommend using aggregate base, gravel, or crushed rock below these improvements. If imported granular materials are placed below these elements, subsurface water can seep through the granular materials and cause the underlying soils to saturate or pipe. Prior to placing concrete, subgrade soils should be moisture conditioned to increase their moisture content to approximately 2 to 3 percent above laboratory optimum moisture (ASTM D-1557).

The more expansive clayey soils at the site could be subjected to volume changes during fluctuations in moisture content. As a result of these volume changes, some vertical movement of exterior slabs (such as driveways, sidewalks, patios, exterior flatwork, etc.) should be anticipated. This movement could result in damage to the exterior slabs and might require periodic maintenance or replacement. Adequate clearance should be provided between the exterior slabs and building elements that overhang these slabs, such as window sills or doors that open outward.

Consideration should be given to reinforcing exterior slabs (including the concrete trash enclosure slab) with steel bars in lieu of wire mesh. To reduce potential crack formation, the installation of #4 bars spaced at approximately 24 inches on center in both directions should be considered. Score joints and expansion joints should be used to control cracking and allow for expansion and contraction of the concrete slabs. We recommend appropriate flexible, relatively impermeable fillers be used at all cold/expansion joints. The installation of dowels at all expansion and cold joints will reduce differential slab movements; if used, the dowels should be at least 30 inches long and should be spaced at a maximum lateral spacing of 24 inches. Although exterior slabs that are adequately reinforced will still crack, trip hazards requiring replacement of the slabs will be reduced if the slabs are properly reinforced.

4.1.8 Construction during Wet Weather Conditions

If construction proceeds during or shortly after wet weather conditions, the moisture content of the onsite soils could be significantly above optimum. Consequently, subgrade preparation, placement and/or reworking of onsite soil or fills as structural fill might not be possible. Alternative wet weather construction recommendations can be provided by our representative in the field at the time of construction, if appropriate. All the drainage measures recommended in this report should be implemented and maintained during and after construction, especially during wet weather conditions.

4.1.9 Surface Drainage, Irrigation, and Landscaping

Ponding of surface water must not be allowed on pavements, adjacent to foundations, at the top or bottom of slopes, and at the top or adjacent to retaining walls. Ponding of water should also not be allowed on the ground surface adjacent to or near exterior slabs, including driveways, walkways, and patios. Surface water should not be allowed to flow over the top of slopes, down slope faces, or over retaining walls.

We recommend positive surface gradients of at least 2 percent be provided adjacent to foundations to direct surface water away from the foundations and toward suitable discharge facilities. Roof downspouts and landscaping drainage inlets should be connected to solid pipes that discharge the collected water into appropriate water collection facilities. We recommend the surface drainage be designed in accordance with the latest edition of the California Building Code.

In order to reduce differential foundation movements, landscaping (where used) should be placed uniformly adjacent to the foundation and exterior slabs. We recommend trees be no closer to the structure or exterior slabs than half the mature height of the tree; in no case should tree roots be allowed to extend near or below the foundations or exterior slabs.

Drainage inlets should be provided within enclosed planter areas and the collected water should be discharged onto pavement, into drainage swales, or into storm water collection systems. In order to reduce the potential for heaving, consideration should be given to lining planting areas and collecting the accumulated surface water in subdrain pipes that discharge to appropriate collection facilities. The drainage should be designed and constructed so that the moisture content of the soils surrounding the foundations do not become elevated and no ponding of water occurs. The inlets should be kept free of debris and be lower in elevation than the adjacent ground surface.

We recommend regular maintenance of the drainage systems be performed, including maintenance prior to rainstorms. The inspection should include checking drainage patterns to make sure they are performing properly, making sure drainage systems and inlets are functional and not clogged, and checking that erosion control measures are adequate for anticipated storm events. Immediate repairs should be performed if any of these measures appears to be inadequate.

Irrigation should be performed in a uniform, systematic manner as equally as possible on all sides of the foundations and exterior slabs to maintain moist soil conditions. Over-watering must be avoided. To reduce moisture changes in the natural soils and fills in landscaped areas, we recommend that drought resistant plants and low flow watering systems be used. All irrigation systems should be regularly inspected for leakage.

4.1.10 Subsurface Drainage

In order to reduce the potential for subsurface water related issues, we recommend subdrains be installed below engineered fill placed on slopes, at the toe of slopes, where open space areas direct water toward improvements, and also along the upslope sides of roadways when roadways are located on or near hillsides. During the earthwork operations, additional subdrains may be necessary in areas of encountered or anticipated seepage. We recommend a subdrain be located below lined ditches or earthen swales that collect surface water from open space areas and also below storm water detention/collection basins. Our preliminary recommended subdrain locations are shown on Figure 2, *Preliminary Geotechnical Improvement Plan* for reference. The actual location and extent of subdrains should be assessed by SFB during the development of the grading and improvement plans, and determined in the field by SFB at the time of construction.

Where used, subdrains should consist of 4 inch diameter, rigid perforated pipe (perforations down) surrounded by free draining, uniformly graded, 1/2 to 3/4 inch crushed gravel wrapped in filter fabric such as Mirafi 140N or equivalent. The pipe should be underlain by about 1/2 to 1 inch of the gravel, and on the sides by at least 4 inches of gravel. The filter fabric should overlap approximately 12 inches or more at joints. Subdrains should be connected to a solid, rigid, collector pipe with a minimum diameter of 4 inches. Subdrain pipes should consist of rigid ABS (SDR-35) or PVC A-2000 (or equal) for fills less than 20 feet in height, ABS (SDR-23.5) or PVC Schedule 40 (or equal) for fills 20 to 50 feet in height, and ABS (SDR-15.3) or PVC Schedule 80 (or equal) for fill greater than 50 feet in height. Collector pipes should be connected to appropriate discharge facilities such as storm drains, drainage inlets, or storm drain manholes. Subdrain clean-outs should be provided. The clean-out locations should be based upon the reach of the rotary cleaning systems and the restrictions of pipe bends. Caltrans Class 2 permeable material may be used in lieu of gravel and filter fabric. The recommended subdrain details are shown on Figure 3 for reference.

Where used, subdrain trenches should be at least 12 inches wide and about 4 feet deep below adjacent ground surface. If a subdrain trench extends to the ground surface and is not covered with concrete lined ditch or concrete flatwork, we recommend the subdrain trench be covered with a 12-inch thick cap consisting of native soil compacted to at least 90 percent relative compaction.

4.1.11 Storm Water Runoff Structures

To satisfy local and state permit requirements, most new development projects must control pollutant sources and reduce, detain, retain, and treat specified amounts of storm water runoff. The types of improvements that are designed to accomplish these goals are known as Post-Construction Requirements (PCR's) and/or Low Impact Development (LID). The intent of these types of improvements is to conserve and incorporate on-site natural features, together with constructed hydrologic controls, to more closely mimic pre-development hydrology and watershed processes.

To aid in the Civil Engineering design and analyses of appropriate treatment facilities, we recommend the onsite soils be categorized as Hydrologic Soil Group C[9]. No groundwater was reportedly encountered by previous borings at to a maximum depth explored of about 25 feet (an estimated elevation of about 195 feet; datum unknown).

We recommend PCR/LID improvements that are designed to detain or retain water such as bio-swales, porous pavement structures, and water detention basins, be lined with a relatively impermeable membrane in order to reduce water seepage and the potential for damage to other infrastructure improvements (such as pavements, foundations, and walkways). We recommend a relatively impermeable membrane such as STEGO Wrap 15-mil or equivalent be installed below and along the sides of these facilities that direct the collected water into subdrain pipes. The membrane should be lapped and sealed in accordance with the manufacture's specifications, including taping joints where pipes penetrate the membrane.

The soil filter materials within basins and swales will consolidate over time causing long-term ground surface settlement. Additional filling within the basins and swales over time may be needed to maintain design surface elevations. The soil filter materials and associated compaction requirements should be specified by the Civil Engineer and shown in detail on the grading and improvement plans.

Sidewalls of earthen swales and basins steeper than 2:1 (horizontal to vertical) will experience downward and lateral movements that can cause significant ground surface movements. The magnitude and rate of movement depends upon the swale and basin backfill material type and

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[9]U.S. Department of Agriculture, Natural Resources Conservation Service, *National Engineering Handbook Part 630, Chapter 7, Hydrologic Soil Groups*, updated January 2009.

compaction. To reduce the potential for damaging movements, we recommend 2:1 sidewall slopes be used or the slopes be appropriately restrained. SFB should be consulted to evaluate the need for sidewall restraint when swales or basins are planned.

Where swales and basins are located adjacent to improvements (such as foundations, pavements, curbs, driveways, and sidewalks), the improvements will be susceptible to settlement and lateral movements. To reduce the potential for vertical and lateral movement of the improvements, we recommend either the improvements be setback beyond a 1:1 (horizontal to vertical) plane projected upward from the bottom of the swale/basin or lateral restraint (such as deepened curbs or walls) be provided that is designed to resist the soil's lateral pressures. In order to resist the lateral pressures, the lateral restraint will need to extend below the bottom of the swale/basin and should be engineered. Where foundations are located near swales or basins, we recommend the foundations be extended below the projected 1:1 plane projected upward from the bottom of the swale or basin.

4.1.12 Engineered Slopes

4.1.12.1 General

We recommend cut and non-reinforced fill slopes not exceed an inclination of 2:1 (horizontal to vertical) provided the slopes are 10 feet or less in height. Slopes higher than 10 feet should not exceed an inclination of 3:1. Steeper fill slopes are feasible provided they are mechanically reinforced with geogrid; if requested, SFB can provide detailed designs of slope reinforcing if needed. We recommend all cut and fill slopes be constructed with surface drainage collection and discharge facilities. Shallow slope movements such as surficial sloughing, toppling, and flows, however, could still occur as a result of erosion and unanticipated water infiltration. To decrease the potential for shallow slope movement, the drainage and erosion control recommendations presented in this report should be implemented in the design and construction of the site. The implemented drainage and erosion control measures should be maintained during and after construction. Slope benches should be constructed in accordance with the latest edition of the California Building Code. Slope maintenance may include re-establishing drainage patterns, controlling water infiltration, and repairing shallow slope movements.

4.1.12.2 Fill Slopes

We recommend the proposed fill slopes be built using well-mixed, moisture conditioned, and well blended engineered fill to reduce the potential for slope expansion and creeping. We also recommend that fill slopes be over-built approximately 2 feet horizontally and then trimmed back to finished grades. Where fills are placed on slopes steeper than 10:1 (horizontal to vertical), the fills should be keyed at least 5 feet into competent native soils. Keyways should be at least 10 feet wide and a subdrain should be placed at the bottom and to the rear of each keyway. The keyway should be sloped toward the back of the key at 2 percent or steeper. A subgrade bench and subdrain should be provided for approximately every 10 feet of vertical elevation gain, and the bench should extend at least one foot into competent soils. Subdrain construction is described in **Section 4.1.10, *Subsurface Drainage***. Our preliminary recommended keyway, bench, and subdrain locations are shown on Figure 2, *Preliminary Geotechnical Improvement Plan* for reference. The actual extent of the keying, benching, and subdrainage should be determined by SFB during earthwork operations.

4.1.12.3 Unstable Cut Slopes

Where cut slopes expose unstable soils, the unstable materials should be removed in accordance with the recommendations provided in **Section 4.1.2, *Existing Weak Soil and Fill Removal***. Cut slopes should be observed by SFB at the time of grading to determine the actual extent of over-excavation and to assess the need for any additional remedial work.

4.1.13 Setbacks

In order to reduce the potential for property damage caused by terrace escarpment slopes erosion and slumping, appropriate slope setbacks should be used. We recommend setbacks be established by projecting a 3:1 (horizontal to vertical) line from the toe of the existing escarpment slopes upward toward the development. Where the projected line intersects the finished ground surface, we recommend improvements (including residential lots) be setback at least 10 feet from the intersection or top of the slopes, whichever is greater. If it is impractical to achieve this setback for project improvements, retaining systems (walls and/or geogrid reinforced earth) can be used that are designed and constructed to resist downslope ground movements. During a major earthquake, it should be anticipated that some ground movement toward the toe of the slopes will occur. We recommend the project's Civil Engineer determine the actual property, building, and improvement setback based upon the recommendations provided in this report, the final grading plans, California Building Code and local ordinances, and any other restrictions such as environmental regulations. Property located between the setback line and the slopes may experience movement as a result of slope erosion, localized slumping, and other factors.

In addition, we recommend the roadway pavement section or improvements be setback at least 5 feet from the top or toe of the adjacent slope for slopes less than 10 feet high, and setback at least 10 feet where the slopes are greater than 10 feet in height.

4.1.14 Future Maintenance

In order to reduce water related issues, we recommend regular maintenance of the site and each lot be performed, including maintenance prior to rainstorms. Maintenance should include the re-compaction of loosened soils, collapsing and infilling holes with compacted soils or low strength sand/cement grout, removal and control of digging animals, modifying storm water drainage patterns to allow for sheet flow into drainage inlets or ditches rather than concentrated flow or ponding, removal of debris within drainage ditches and inlets, and immediately repairing any erosion or soil flow. The inspection should include checking drainage patterns, making sure drainage systems are functional and not clogged, and erosion control measures are adequate for anticipated storm events. Immediate repair should be performed if any of these measures appears to be inadequate. Temporary and permanent erosion and sediment control measures should be installed over any exposed soils immediately after repairs are made.

Differential movement of exterior slabs can occur over time as a result of numerous factors. We recommend homeowners, the HOA, and development owners perform inspections and maintenance of the slabs, including infilling significant cracks, providing fillers at slab offsets, and replacing slabs if severely damaged.

4.1.15 Additional Recommendations

We recommend the drainage, irrigation, landscaping, and maintenance recommendations provided in this report be forwarded to your designers and contractors, and we recommend they be included in disclosure statements given to homeowners, development owners, and their maintenance associations.

4.2 Foundation Support

4.2.1 Post-Tensioned Slabs

The proposed residential buildings can be supported on a post-tensioned slab foundation that is designed for the expansion potential of the onsite soils. The slab foundation should bear entirely on properly prepared, compacted structural fill. In no case should a slab foundation bear upon fills with differential expansion characteristics. Recommendations for building pad preparation are described previously in **Sections 4.1.3, *Subgrade Preparation.*** Prior to the concrete pour, we recommend the moisture content of the subgrade materials be approximately 2 to 3 percent above laboratory optimum moisture. If the building pads are left exposed for an extended period of time prior to constructing foundations, we recommend SFB be contacted for recommendations to re-condition the pads in order provide adequate building support.

The post-tensioned slab thickness should be determined by the Structural Engineer, however we recommend the post-tensioned slabs be at least 10 inches thick. An allowable bearing pressure of 1,500 pounds per square foot can be used for localized point and line loads. Deflection of the slab foundations should not exceed the values recommended in the most recent PTI Manual. Lateral loads, such as derived from earthquakes and wind, can be resisted by friction between the post-tensioned slab foundation bottom and the supporting subgrade. A friction coefficient of 0.25 is considered applicable.

At least 10 feet of cover should be provided between the outer face of slabs and un-retained slope faces, as measured laterally between slope faces and the slabs. Where less than 10 feet of cover exists, deepening of the edge of slabs may be necessary in order to achieve 10 feet of cover for buildings located near tops of slopes. Where slabs are located adjacent to utility trenches, the slab bearing surface should bear below an imaginary 1 horizontal to 1 vertical plane extending upward from the bottom edge of the adjacent utility trench. Alternatively, the slab reinforcing could be increased to span the area defined above assuming no soil support is provided.

A vapor retarder must be placed between the subgrade soils and the bottom of the slabs-on-grade. We recommend the vapor retarder consist of a single layer of Stego Wrap Vapor Barrier 15 mil Class A or equivalent provided the equivalent satisfies the following criteria: a permeance as tested before and after mandatory conditioning of less than 0.01 Perms and strength of Class A as determined by ASTM E 1745 (latest edition), and a thickness of at least 15 mils. Installation of the vapor retarder should conform to the latest edition of ASTM E 1643 (latest edition) and the manufacturers requirements, including all joints should be lapped at least 6 inches and sealed with Stego Tape or equal in accordance with the manufacturer's specifications. Protrusions where pipes or conduit penetrate the membranes should be sealed with either one or a combination of Stego Tape, Stego Mastic, Stego Pipe Boots, or a product of equal quality as determined by the manufacturer's instructions and ASTM E 1643. Care must be taken to protect the membrane from tears and punctures during construction. We do not recommend placing sand or gravel over the membrane.

Concrete slabs retain moisture and often take many months to dry; construction water added during the concrete pour further increases the curing time. If the slabs are not allowed to completely cure prior to constructing the super-structure, the concrete slabs will expel water vapor and the vapor will be trapped under impermeable flooring. The concrete mix design for the slabs should have a maximum water/cement ratio of 0.45; the actual water/cement ratio may need to be reduced if the concentration of soluble sulfates or chlorides in the supporting subgrade is detrimental to the concrete. We recommend the foundation designer determine if corrosion protection is needed for the foundation concrete and reinforcing steel. The results of sulfate and chloride testing of onsite soil samples are included in Appendix B; the foundation designer should determine if additional testing is needed. In addition, we recommend you consult with your concrete slab designers and concrete contractors regarding methods to reduce the potential for differential concrete curing.

An experienced Structural Engineer should design the post-tensioned slabs to resist the differential soil movement. The preliminary soil design parameters presented below were generated using the procedures presented in the 3rd edition of the PTI design manual[10], PTI standard requirements[11], and a PTI preferred computer program, VOLFLO (Version 1.5 Build 120704), was employed to simulate the wetting and drying scenarios of the soils beneath the post-tensioned slabs.

The values provided below are based upon the post-tensioned slab foundations being entirely surrounded by uniform, properly drained, moderately irrigated landscaping; if differing conditions will exist that will cause differential soil moisture adjacent or below the slabs, or if portions of the foundations will be located adjacent to relatively dry or wet soils, then we should be consulted and modifications to the values below would need to be modified in writing. Please refer to **Section 4.1.9, *Surface Drainage, Irrigation, and Landscaping***, for additional recommendations. We recommend the slab-subgrade friction values provided in the most recent PTI Manual be used in order to determine the friction that might be expected to exist during tendon stressing.

SWELLING MODE

	Center Lift	Edge Lift
Edge Moisture Variation Distance (e_m)	9.0 feet	5.0 feet
Differential Soil Movement (y_m)	0.5 inch	1.0 inch

We recommend SFB review the foundation drawings and specifications prior to submittal to verify that the recommendations provided in this report have been used and properly interpreted in the design of the slabs.

4.2.2 Retaining Walls and Soundwalls

If segmental block walls with geogrid will be used at the site, SFB should be contacted to provide block wall and geogrid designs and specifications.

Where walls retain soil, they must be designed to resist both lateral earth pressures and any additional lateral loads caused by surcharging such as building and roadway loads. Where concrete or masonry walls are used to retain soil, we recommend unrestrained walls (walls free to deflect and disconnected from other structures) be designed to resist an equivalent fluid pressure of 40 pounds per cubic foot. This assumes a level backfill. Restrained walls (walls restrained from deflection) should be designed to resist an equivalent fluid pressure of 40 pounds per cubic foot plus a uniform pressure of 8H pounds per square foot, where H is the height of the wall in feet.

[10]Post-Tensioning Institute, 2008, *Design of Post-Tensioned Slabs-On-Ground (PTI DC10.1-08),* Third Edition.
[11]Post-Tensioning Institute, 2012, *Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils (PTI DC10.5-12).*

Walls with inclined backfill should be designed for an additional equivalent fluid pressure of 1 pound per cubic foot for every 2 degrees of slope inclination. Walls subjected to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third and one-half the anticipated surcharge load for unrestrained and restrained walls, respectively. These lateral pressures depend upon the moisture content of the retained soils to be constant over time; if the moisture content of the retained soils will fluctuate or increase compared to the moisture content at time of construction, then SFB should be consulted and provide written modifications to this design criteria.

For retaining walls that need to resist earthquake induced lateral loads from nearby foundations, walls that are to be designed to resist earthquake loads, and any retaining walls that are higher than 6 feet (as required by the 2016 CBC), we recommend the walls also be designed to resist a triangular pressure distribution equal to an equivalent fluid pressure of 90 pounds per cubic foot based on the ground acceleration from a design basis earthquake. This seismic induced earth pressure is in addition to the pressures noted above. Due to the transient nature of the seismic loading, a factor of safety of at least 1.1 can be used in the design of the walls when they resist seismic lateral loads. Some movement of the walls may occur during moderate to strong earthquake shaking and may result in distress as is typical for all structures subjected to earthquake shaking.

The recommended lateral pressures assume walls are fully-back drained to prevent the build-up of hydrostatic pressures. This can be accomplished by using ½ to ¾ inch crushed, uniformly graded gravel entirely wrapped in filter fabric such as Mirafi 140N or equal (an overlap of at least 12 inches should be provided at all fabric joints). The gravel and fabric should be at least 8 inches wide and extend from the base of the wall to within 12 inches of the finished grade at the top (Caltrans Class 2 permeable material (Section 68) may be used in lieu of gravel and filter fabric). A 4-inch diameter, perforated pipe should be installed at the base and centered within the gravel. The perforated pipe should be connected to a solid collector pipe that transmits the water directly to a storm drain, drainage inlet, or onto pavement. If weep holes are used in the wall, the perforated pipe within the gravel is not necessary provided the weep holes are kept free of animals and debris, are located no higher than approximately 6 inches from the lowest adjacent grade, and are able to function properly. As an alternative to using gravel, drainage panels (such as AWD SITEDRAIN Sheet 94 for walls or equal) may be used behind the walls in conjunction with perforated pipe (connected to solid collector pipe), weep holes, or strip drains (such as SITEDRAIN Strip 6000 or equal). If used, the drainage panels can be spaced on-center at approximately 2 times the panel width.

If heavy compaction equipment is used behind the walls, the walls should be appropriately designed to withstand loads exerted by the heavy equipment and/or temporarily braced. Fill placed behind walls should conform to the recommendations provided in **Section 4.1.4, *Fill Material***, and **Section 4.1.5, *Compaction***.

Retaining walls and soundwalls can be supported on drilled, cast-in-place, straight shaft friction piers that develop their load carrying capacity in the materials underlying the site. The piers should have a minimum diameter of 12 inches and a center-to-center spacing of at least three times the shaft diameter. We recommend that piers be at least 6 feet long. The pier reinforcing should be based on structural requirements but in no case should less than two #4 bars for the entire length of the pier be used.

The actual design depth of the piers should be determined using an allowable skin friction of 500 pounds per square foot (psf) for dead plus live loads, with a one-third increase for all loads including wind or seismic. Seventy percent of the skin friction value can be used to resist uplift. Lateral load resistance can be developed in passive resistance for pier foundations. A passive resistance equal to an equivalent fluid weighing 350 pounds per cubic foot acting against twice the projected diameter of pier shafts can be used. The upper two feet of pier embedment should be neglected in the vertical and passive resistance design as measured from finished grade. The portion of the pier shaft located within 10 feet (as measured laterally) of the nearest slope face should also be ignored in the design.

We recommend the pier foundations be located outside of (or beyond) a 1:1 (horizontal to vertical) plane projected upward from the base of any wall or utility trench, or the portion of a pier located within this zone should be ignored in the design of the pier.

The bottoms of the pier excavations should be relatively dry and free of all loose cuttings or slough prior to placing reinforcing steel and concrete. Any accumulated water in pier excavations should be removed prior to placing concrete. We recommend that the excavation of all piers be performed under the direct observation of SFB to confirm that the pier foundations are founded in suitable materials and constructed in accordance with the recommendations presented herein. Preliminarily, we recommend concrete pours of pier excavations be performed within 24 hours of excavation and prior to any rainstorms. Where caving or high groundwater conditions exist, additional measures such as using casing, tremie methods, and pouring concrete immediately after excavating may be necessary. SFB should be consulted on the need for additional measures for pier construction as needed during construction.

4.2.3 Seismic Design Criteria

The following parameters were calculated using the U.S. Seismic Design Map program[12], and were based on the site being located at approximate latitude 36.997°N and longitude 121.594°W. For seismic design using the 2016 California Building Code (CBC), we recommend the following tabulated seismic design values be used.

2016 CBC SEISMIC PARAMETERS		
Seismic Parameter	Design Value	CBC Reference
Site Class	D	Section 1613.3.2
S_S	1.52	Figure 1613.3.1(1)
S_1	0.69	Figure 1613.3.1(2)
F_a	1.0	Table 1613.3.3(1)
F_v	1.5	Table 1613.3.3(2)

4.3 Pavements

Based on the results of previous laboratory testing of onsite materials by others, we recommend that an R-value of 10 be used in preliminary asphalt concrete pavement design. We recommend additional R-value tests be performed once the pavement subgrade is established to confirm the R-value used in the design. Pavement subgrade completely composed of sandy and gravelly fills will result in higher R-values and thinner pavement sections.

We developed the following alternative preliminary pavement sections using Topic 608 of the State of California Department of Transportation Highway Design Manual, the recommended R-value, and typical traffic indices for residential developments. The project's Civil Engineer or appropriate public agency should determine actual traffic indices. The pavement thicknesses shown below are SFB's recommended minimum values; governing agencies may require pavement thicknesses greater than those shown.

[12]USGS Website, *http://earthquake.usgs.gov/hazards/designmaps/usdesign.php*, last updated 6/23/14.

PRELIMINARY PAVEMENT DESIGN ALTERNATIVES SUBGRADE R-VALUE = 10			
Location	Pavement Components		Total Thickness (inches)
	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)	
T.I. = 4.5 (auto & light truck parking)	4.0*	8.0*	12.0
T.I. = 5.0 (access ways/courts)	4.0*	8.0*	12.0
T.I. = 6.0 (primary roadways)	4.0	11.0*	15.0
T.I. = 7.0	4.0	14.0	18.0

* City of Gilroy minimum thickness

If the pavements are planned to be placed prior to or during construction, the traffic indices and pavement sections may not be adequate for support of what is typically more frequent and heavier construction traffic. If the pavement sections will be used for construction access by heavy trucks or construction equipment (especially fork lifts with support footings), SFB should be consulted to provide recommendations for alternative pavement sections capable of supporting the heavier use and heavier loads. If requested, SFB can provide recommendations for a phased placement of the asphalt concrete to reduce the potential for mechanical scars caused by construction traffic in the finished grade. Preliminary pavement sections should be revised, if necessary, when actual traffic indices are known and pavement subgrade elevations are determined.

Pavement baserock and asphalt concrete should be compacted to at least 95 percent relative compaction. The asphalt concrete compacted unit weight should be determined using Caltrans Test Method 308-A or ASTM Test Method D1188. Asphalt concrete should also satisfy the S-value requirements by Caltrans.

We recommend regular maintenance of the asphalt concrete be performed at approximately five year intervals. Maintenance may include sand slurry sealing, crack filling, and chip seals as necessary. If regular maintenance is not performed, the asphalt concrete layer could experience premature degradation requiring more extensive repairs.

5.0 CONDITIONS AND LIMITATIONS

SFB is not responsible for the validity or accuracy of information, analyses, test results, or designs provided to SFB by others or prepared by others. The analysis, designs, opinions, and recommendations submitted in this report are based in part upon the data obtained from our field work and upon information provided by others. Site exploration and testing characterizes subsurface conditions only at the locations where the explorations or tests are performed; actual subsurface conditions between explorations or tests may be different than those described in this report. Variations of subsurface conditions from those analyzed or characterized in this report are not uncommon and may become evident during construction. In addition, changes in the condition of the site can occur over time as a result of either natural processes (such as earthquakes, flooding, or changes in ground water levels) or human activity (such as construction adjacent to the site, dumping of fill, or excavating). If changes to the site's surface or subsurface conditions occur since the performance of the field work described in this report, or if differing subsurface conditions are encountered, we should be contacted immediately to evaluate the differing conditions to assess if the opinions, conclusions, and recommendations provided in this report are still applicable or should be amended.

We recommend SFB be retained to provide geotechnical services during design, reviews, earthwork operations, paving operations, and foundation installation to confirm and observe compliance with the design concepts, specifications and recommendations presented in this report. Our presence will also allow us to modify design if unanticipated subsurface conditions are encountered or if changes to the scope of the project, as defined in this report, are made.

This report is a design document that has been prepared in accordance with generally accepted geological and geotechnical engineering practices for the exclusive use of CalAtlantic Group, Inc. and their consultants for specific application to the proposed Glen Loma Phase 2 residential development project in Gilroy, California, and is intended to represent our design recommendations to CalAtlantic Group, Inc. for specific application to the Glen Loma Phase 2 project. The conclusions and recommendations contained in this report are solely professional opinions. It is the responsibility of CalAtlantic Group, Inc. to transmit the information and recommendations of this report to those designing and constructing the project. We will not be responsible for the misinterpretation of the information provided in this report. We recommend SFB be retained to review geological and geotechnical aspects of the construction calculations, specifications, and plans; we should also be retained to participate in pre-bid and preconstruction conferences to clarify the opinions, conclusions, and recommendations contained in this report.

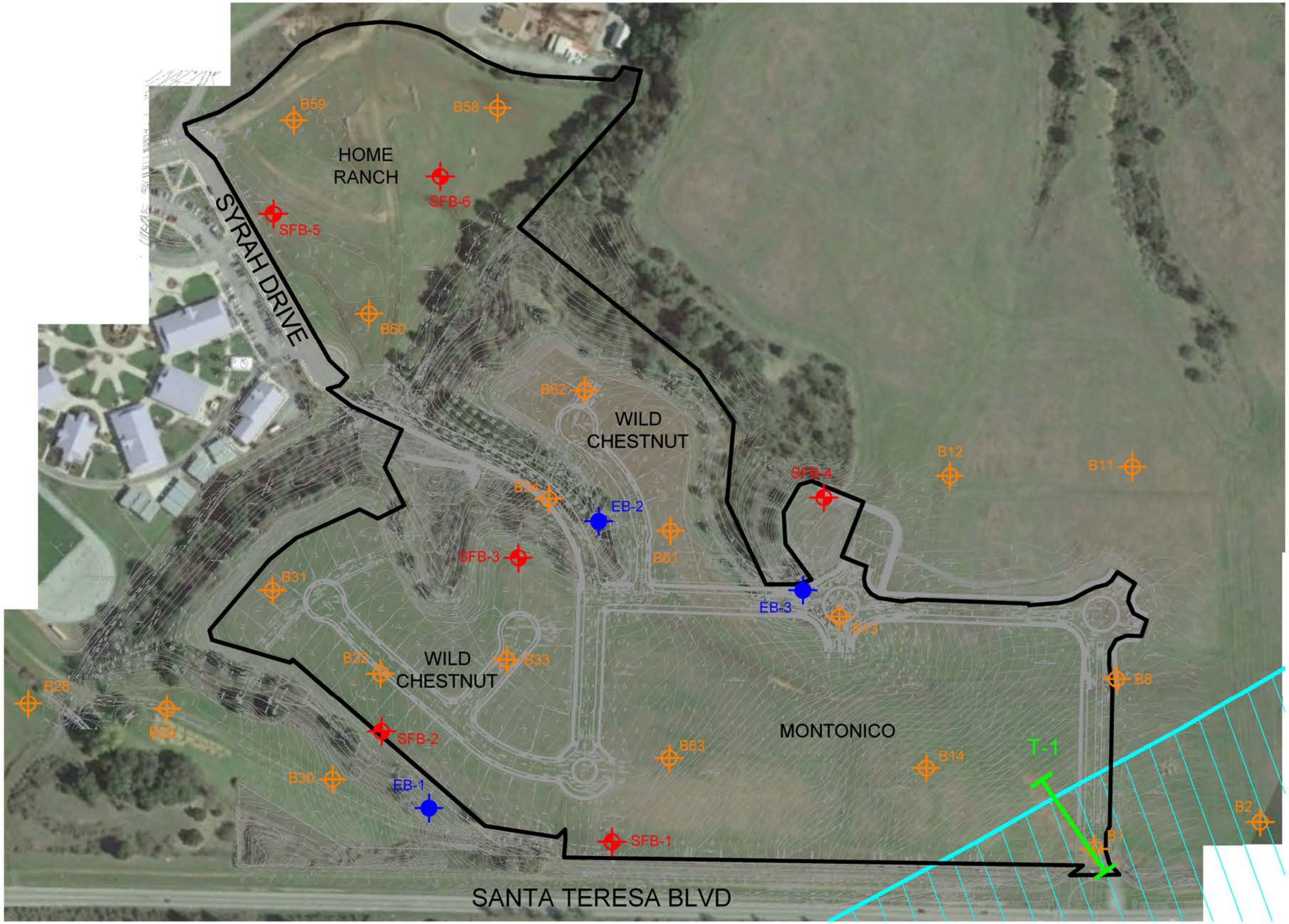
It should be understood that advancements in the practice of geotechnical engineering and engineering geology, or discovery of differing surface or subsurface conditions, may affect the validity of this report and are not uncommon. SFB strives to perform its services in a proper and professional manner with reasonable care and competence but we are not infallible. Geological engineering and geotechnical engineering are disciplines that are far less exact than other engineering disciplines; therefore we should be consulted if the limitations to using this are not completely understood.

In the event that there are any changes in the nature, design or location of the project, as described in this report, or if any future additions are planned, the conclusions and recommendations contained in this report shall not be considered valid unless we are contacted in writing, the project changes are reviewed by us, and the conclusions and recommendations presented in this report are modified or verified in writing. The opinions, conclusions, and recommendations contained in this report are based upon the description of the project as presented in the introduction section of this report.

This report does not necessarily represent all of the information that has been communicated by us to CalAtlantic Group, Inc. and their consultants during the course of this engagement and our rendering of professional services CalAtlantic Group, Inc.. Reliance on this report by parties other than those described above must be at their own risk unless we are first consulted as to the parties' intended use of this report and only after we obtain the written consent of CalAtlantic Group, Inc. to divulge information that may have been communicated to CalAtlantic Group, Inc. We cannot accept consequences for use of segregated portions of this report.

Please refer to Appendix D for additional guidelines regarding use of this report.

FIGURES



KEY

EB-3	APPROXIMATE LOCATION OF SFB EXPLORATORY BORING (7/3/17)
SFB-6	APPROXIMATE LOCATION OF PREVIOUS SFB EXPLORATORY BORING (5/11/16)
B63	APPROXIMATE LOCATION OF PREVIOUS EXPLORATORY BORING BY OTHERS (June 2013)
T-1	APPROXIMATE LOCATION OF SFB FAULT TRENCHING (July 2016)
	APPROXIMATE PROJECT LIMIT
	SANTA CLARA COUNTY FAULT RUPTURE HAZARD ZONE (From Santa Clara County Geologic Hazard Zone Map - 10/26/12)

Note: Base map was created by overlaying the Wild Chestnut - Tract 10301 project improvement and grading plan Sheets 14 to 31 prepared by RJA and dated 3/24/16 on Google Earth Image dated 11/2/16.

APPROXIMATE SCALE: 1" = 240'	DATE	Stevens Ferrone & Bailey Engineering Company, Inc	1600 Willow Pass Court, Concord, CA 94520, Tel 925.688.1001, Fax 925.688.1005, www.SFandB.com	SITE PLAN	FIGURE
0 240' 480'	July 2017			GLEN LOMA PHASE 2	1
	PROJECT NO.			Gilroy, California	
	122-11				

GEOTECHNICAL IMPROVEMENT KEY*

- ESTIMATED KEYWAY LOCATION
- ESTIMATED SUBGRADE BENCH & SUBDRAIN LOCATION
- ESTIMATED SUBDRAIN COLLECTOR PIPE AND DISCHARGE
- ESTIMATED ROADWAY SUBDRAIN LOCATION

PREVIOUS FIELD EXPLORATION KEY

- EB-3 — APPROXIMATE LOCATION OF SFB EXPLORATORY BORING (7/3/17)
- SFB-6 — APPROXIMATE LOCATION OF SFB EXPLORATORY BORING (5/11/16)
- B63 — APPROXIMATE LOCATION OF PREVIOUS EXPLORATORY BORING BY OTHERS (June 2013)
- T-1 — APPROXIMATE LOCATION OF SFB FAULT TRENCHING (July 2016)

*NOTE: KEYWAY AND SUBDRAIN LOCATIONS ARE APPROXIMATE; THE ACTUAL LOCATION AND EXTENT OF KEYWAY AND SUBDRAINS SHOULD BE VERIFIED IN THE FIELD BY SFB AT THE TIME OF CONSTRUCTION. SEE SFB REPORT DATED 7/12/17 FOR ADDITIONAL RECOMMENDATIONS AND DETAILS. THIS PLAN SUPPLEMENTS SFB REPORT; ALL CONDITIONS AND LIMITATIONS APPLY.

NOTE:
Base map taken from the Wild Chestnut - Tract 10301 project improvement and grading plan Sheets 14 to 31 prepared by RJA and dated 3/24/16. Site topographic map was provided by RJA.

APPROXIMATE SCALE: 1" = 100'
0 100' 200'

REV. NO.	REV. DATE	BY	DESCRIPTION	DATE
				July 2017
				PROJECT NO.
				122-11

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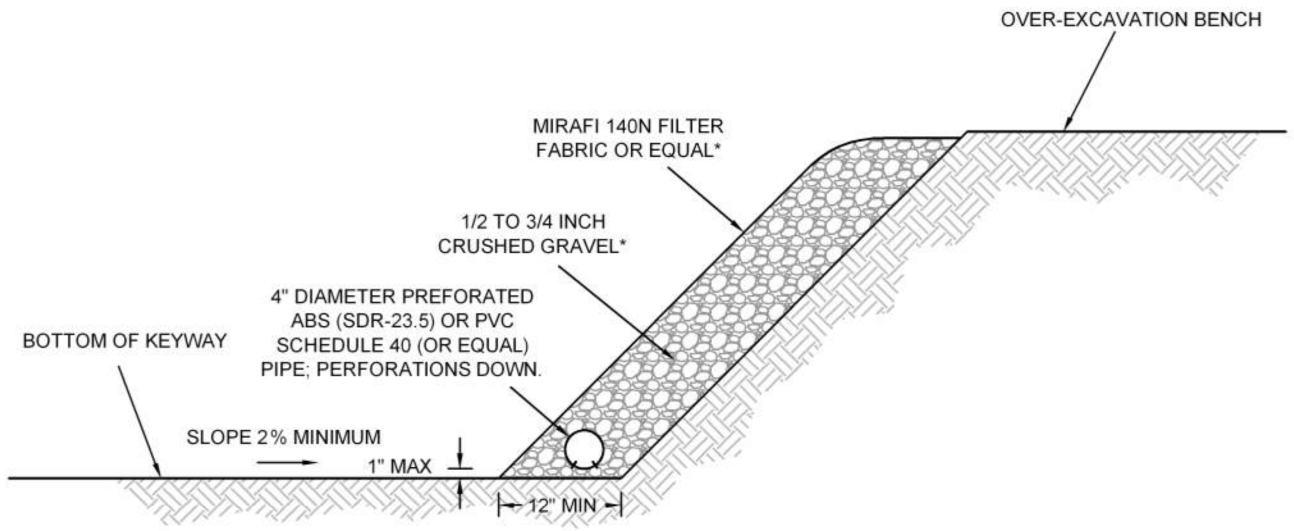
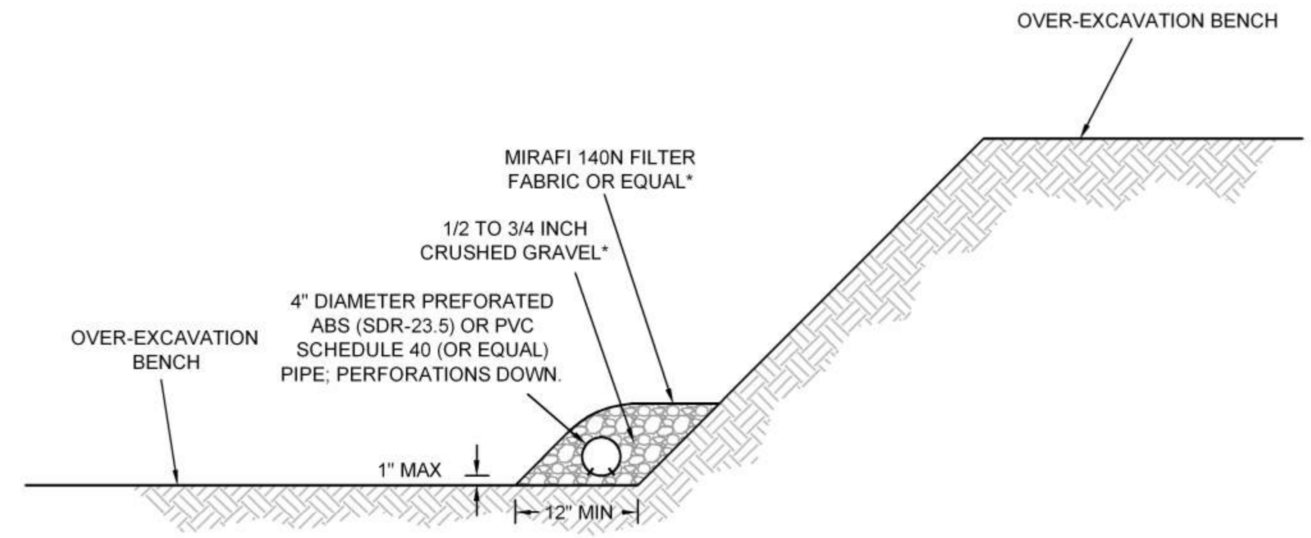
PRELIMINARY GEOTECHNICAL IMPROVEMENT PLAN

GLEN LOMA PHASE 2
Gilroy, California

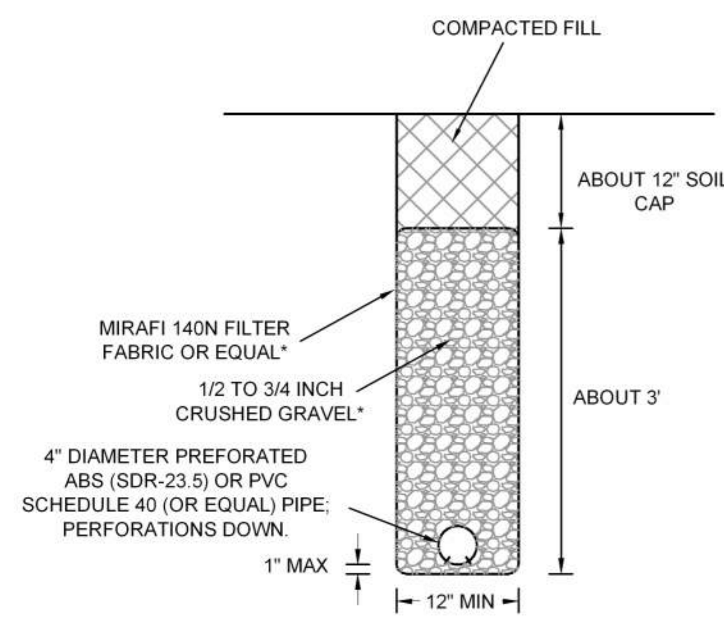
FIGURE 2



KEYWAY & SUBDRAIN**
DETAIL NTS



SUBGRADE BENCH & SUBDRAIN
DETAIL NTS



ROADWAY SUBDRAIN
DETAIL NTS

*NOTE: ALTERNATIVELY, CALTRANS CLASS 2 PERMEABLE MATERIAL CAN BE USED IN LIEU OF GRAVEL AND FILTER FABRIC.

**NOTE: ALTERNATIVELY, A SHEET DRAIN SUCH AS AWD SITEDRAIN DS-180 OR EQUIVALENT MAY BE USED IN CONJUNCTION WITH A STRIP DRAIN SUCH AS AWD SITEDRAIN STRIP 6000 AT THE KEYWAY BACK-CUT. IF SHEET DRAINS ARE USED AT THE BACK-CUT, THE PANELS SHOULD BE PLACED NO GREATER THAN APPROXIMATELY 2-WIDTHS ON-CENTER (TYPICALLY 8 FEET ON-CENTER).

SCHEMATIC ONLY
NOT TO SCALE

DATE	Stevens Ferrone & Bailey Engineering Company, Inc	1600 Willow Pass Court Concord, CA 94520 Tel 925.688.1001 Fax 925.688.1005 www.SFandB.com	SUBDRAIN DETAILS	FIGURE
July 2017			GLEN LOMA PHASE 2 Gilroy, California	3
PROJECT NO.				
122-11				

APPENDIX A

Field Investigation

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		grf	ltr	Description
Coarse Grained Soils	Gravel Gravelly Soils		GW	Well-graded gravels or gravel sand mixtures, little or no fines
			GP	Poorly-graded gravels or gravel sand mixture, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sand And Sandy Soils		SW	Well-graded sands or gravelly sands, little or no fines
			SP	Poorly-graded sands or gravelly sands, little or no fines
			SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, and-clay mixtures

Major Divisions		grf	ltr	Description
Soils	Silts And Clays LL < 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silt-clays of low plasticity
	Silts And Clays LL > 50		MH	Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat and other highly organic soils

GRAIN SIZES

U.S. STANDARD SERIES SIEVE — CLEAR SQUARE SIEVE OPENINGS

	200	40	10	4	3/4"	3"	12"

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

RELATIVE DENSITY

Sands and Gravels	Blows/Foot*
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

CONSISTENCY

Silts and Clays	Blows/Foot*	Strength (tsf)**
Very Soft	0 - 2	0 - 1/4
Soft	2 - 4	1/4 - 1/2
Firm	4 - 8	1/2 - 1
Stiff	8 - 16	1 - 2
Very Stiff	16 - 32	2 - 4
Hard	Over 32	Over 4

*Number of Blows for a 140-pound hammer falling 30 inches, driving a 2-inch O.D. (1-3/8" I.D.) split spoon sampler.
**Unconfined compressive strength.

SYMBOLS & NOTES

- Standard Penetration sampler (2" OD Split Barrel)
- Modified California sampler (3" OD Split Barrel)
- California Sampler (2.5" OD Split Barrel)
- Shelby Tube
- Pitcher Barrel
- HQ Core
- Ground Water level initially encountered
- Ground Water level at end of drilling

PI = Plasticity Index
LL = Liquid Limit
R = R-Value

Increasing Visual Moisture Content

Saturated
Wet
Moist
Damp
Dry

Constituent Percentage

trace	<5%
some	5-15%
with	16-30%
-y	31-49%

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KEY TO EXPLORATORY BORING LOGS

GLEN LOMA PHASE 2
Gilroy, CA

PROJECT NO.	DATE	FIGURE NO.
122-11	July 2017	A-1

APPENDIX A
Field Investigation

Our field investigation for the proposed Glen Loma Phase 2 residential development project in Gilroy, California, consisted of a surface reconnaissance and a subsurface exploration program. Geotechnical reconnaissance of the site and surrounding area was performed on July 3, 2017.

Subsurface exploration was performed using a 2-inch diameter hand auger. Three exploratory borings were drilled on July 3, 2017 to a maximum depth of about 6 feet. Previously, six exploratory borings were also performed by SFB at the site on May 11, 2016 to a maximum depth of about 4 feet. Our representative continuously logged the soils encountered in the borings in the field. The soils are described in general accordance with the Unified Soil Classification System (ASTM D2487). The logs of the borings as well as a key for the classification of the soil (Figure A-1) are included as part of this appendix.

Representative samples were obtained from our exploratory borings at selected depths appropriate to the investigation. The attached boring logs and related information show our interpretation of the subsurface conditions at the dates and locations indicated, and it is not warranted that they are representative of subsurface conditions at other locations and times.

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY TC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 07/03/17

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
COLLUVIUM: SAND (SM)/CLAY (CL,) brown, fine- to medium-grained, silty, with clay, some gravel, (fine to coarse, subangular to subrounded), dry.	loose to medium dense		0.0						
COLLUVIUM: CLAY (CL), mottled dark gray red yellowish brown, silty, some sand, (fine- to medium-grained), trace gravel, (fine to coarse, subangular to subrounded), dry to damp.	stiff to very stiff		2.5						
			5.0						
CLAY (CL), mottled orange yellowish brown, sandy(fine- to medium-grained), silty, some gravel(fine, subangular to subrounded), dry to damp.	hard								
Bottom of Boring = 6 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.									
			7.5						

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EXPLORATORY BORING LOG

GLEN LOMA PHASE 2
Gilroy, CA

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**EB-1**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY TC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 07/03/17

DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
FIILL COLLIVIUM: SAND (SM), brown, fine- to medium-grained, silty, some gravel, (fine to coarse, subangular to subrounded), dry.	loose to medium dense		0.0						
COLLIVIUM: CLAY (CL)/SAND (SM), mottled light yellowish brown, silty, with to sandy(fine- to medium-grained), some gravel, (fine to coarse, subangular to subrounded), dry to damp.	stiff		2.5						
SAND (SM), light yellowish brown, fine- to medium-grained, some silt, some gravel, (fine, subangular to subrounded), dry.	very dense								
Bottom of Boring = 3.5 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.			5.0 7.5						

EXPLORATORY BORING LOG 122-11.GPJ STEVENS FERRONE BAILEY.GDT 7/12/17

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EXPLORATORY BORING LOG

GLEN LOMA PHASE 2
Gilroy, CA

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**EB-2**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY TC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 07/03/17

DESCRIPTION AND CLASSIFICATION: DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
COLLIVUIUM: SAND (SM), light yellowish brown, fine- to medium-grained, silty, some gravel(fine to coarse, subangular to subrounded), dry. Large gravel at 1.5'.	loose to dense		0.0						
Bottom of Boring = 1.5 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.									
			2.5						
			5.0						
			7.5						

EXPLORATORY BORING LOG 122-11.GPJ STEVENS FERRONE BAILEY.GDT 7/12/17

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EXPLORATORY BORING LOG

GLEN LOMA PHASE 2
Gilroy, CA

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**EB-3**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY RAC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 05/11/16

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
CLAY(CL)/SAND(SC), brown, sandy(fine- to coarse-grained), silty some gravel(fine, subrounded to subangular), dry.	stiff		0						
Gravelly(fine to coarse, subangular to subrounded).	very stiff								
Bottom of Boring = 2 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.			5						
			10						
			15						
			20						
			25						
			30						

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EXPLORATORY BORING LOG

GLEN LOMA RANCH
Gilroy, California

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**SFB-1**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY RAC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 05/11/16

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
CLAY(CL)/SAND(SC), brown, sandy(fine- to coarse-grained), silty with gravel(fine to coarse, angular to subrounded), dry.	stiff very stiff		0						
Bottom of Boring = 2 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.			5 10 15 20 25 30						

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EXPLORATORY BORING LOG

GLEN LOMA RANCH
Gilroy, California

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**SFB-2**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY RAC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 05/11/16

DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
CLAY(CL)/SAND(SC), (CL), brown, silty, sandy(fine- to coarse-grained), with gravel(fine to coarse, subangular to subrounded), dry.	stiff		0						At 2.5': Liquid Limit = 36 Plasticity Index = 17 Fine Gravel = 3% Coarse Sand = 7% Medium Sand = 12% Fine Sand = 24% Silt = 25% Clay = 29%
Dry to damp.	very stiff					14			
Bottom of Boring = 4 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.			5						
			10						
			15						
			20						
			25						
			30						

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EXPLORATORY BORING LOG

GLEN LOMA RANCH
Gilroy, California

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**SFB-3**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY RAC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 05/11/16

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
CLAY(CL)/SAND(SC), orange brown, silty, sandy(fine- to coarse-grained), dry. Some gravel(fine to coarse, subangular to subrounded).	stiff		0						
Change color to yellowish brown, some sand clast, dry to damp.	very stiff								
Bottom of Boring = 3 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.			5						
			10						
			15						
			20						
			25						
			30						

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EXPLORATORY BORING LOG

GLEN LOMA RANCH
Gilroy, California

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**SFB-4**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY RAC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 05/11/16

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
SAND(SC)/CLAY(CL), grayish brown, fine- to coarse-grained, clayey & silty, some gravel(fine, subrounded to subangular), dry. Gravelly(fine to coarse, angular to subrounded).	medium dense dense		0						
Bottom of Boring = 2 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.									
			5						
			10						
			15						
			20						
			25						
			30						

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EXPLORATORY BORING LOG

GLEN LOMA RANCH
Gilroy, California

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**SFB-5**

DRILL RIG Hand Auger	SURFACE ELEVATION ---	LOGGED BY RAC
DEPTH TO GROUND WATER Not Encountered	BORING DIAMETER 2-inch	DATE DRILLED 05/11/16

DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	SPT N-VALUE	WATER CONTENT (%)	DRY DENSITY (PCF)	UNC. COMP. (KSF)	OTHER TESTS
FILL: CLAY (CL), mottled gray brown, silty, with gravel(fine, angular to subrounded), with sand(fine- to coarse-grained), dry. Dry to damp.	stiff		0						At 2.5': Liquid Limit = 31 Plasticity Index = 12 Fine Gravel = 1% Coarse Sand = 2% Medium Sand = 5% Fine Sand = 17% Silt = 42% Clay = 33%
CLAY (CL), brown, silty, with sand(fine- to coarse-grained), damp.	stiff					18			
Bottom of Boring = 4 feet Notes: Stratification is approximate, variations must be expected. Blowcounts converted to SPT N-values. See Report for additional details.			5						
			10						
			15						
			20						
			25						
			30						

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EXPLORATORY BORING LOG

GLEN LOMA RANCH
Gilroy, California

PROJECT NO.	DATE	BORING NO.
122-11	**July 2017**	**SFB-6**

APPENDIX B

Laboratory Investigation

APPENDIX B
Laboratory Investigation

Our laboratory testing program for the proposed Glen Loma Phase 2 residential development project in Gilroy, California was directed toward a quantitative and qualitative evaluation of the physical and mechanical properties of the soils underlying the site.

The natural water content was determined on two samples of the subsurface soils. The water contents are recorded on the boring logs at the appropriate sample depths.

Atterberg Limit determinations were performed on two samples of the subsurface soils to determine the range of water content over which these materials exhibit plasticity. These values are used to classify the soil in accordance with the Unified Soil Classification System and to indicate the soil's compressibility and expansion potentials. The results of the tests are presented on the boring logs at the appropriate sample depths and are also attached to this appendix.

Gradation and hydrometer tests were performed on two samples of the subsurface soils. These tests were performed to assist in the classification of the soils and to determine their grain size distribution. The results of the tests are presented on the boring logs at the appropriate sample depths and are also attached to this appendix.

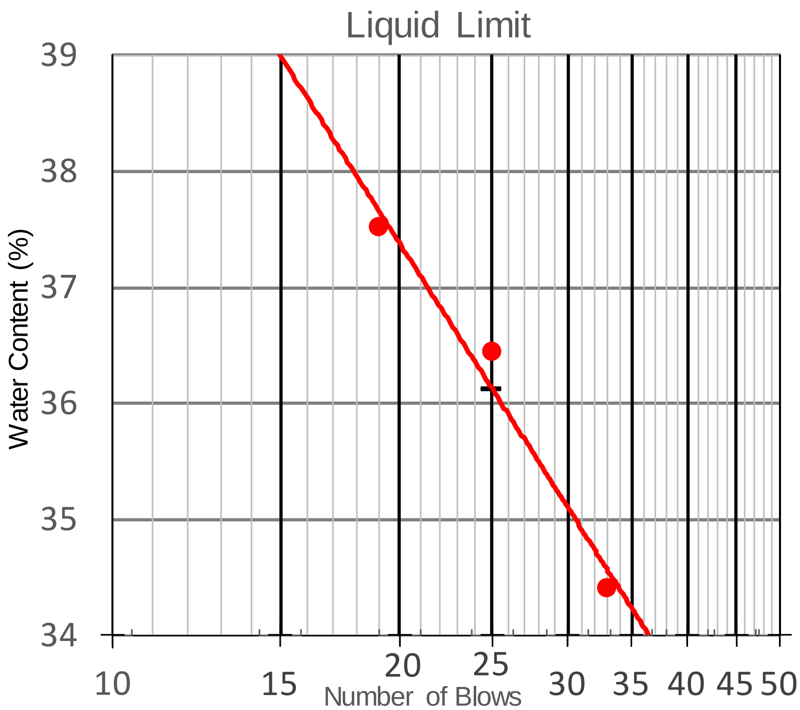
Two onsite soil samples were tested for pH (ASTM D4972), chlorides (ASTM D4327), sulfates (ASTM D4327), sulfides (ASTM D4658M), resistivity at 100% saturation (ASTM G57), and Redox potential (ASTM D1498) for use in evaluating the potential for corrosion on concrete and buried metal such as utilities and reinforcing steel. The results of these tests are included in this Appendix. We recommend these test results be forwarded to your underground contractors, pipeline designers, and foundation designers and contractors.

Atterberg Limits Test – ASTM D4318

Project Number: 122-11 **Project Name:** Glen Loma

Boring/Sample Number: SFB-3 **Depth:** 28”-37” **Date:** 05-13-16

Description of Sample: Rust brown sandy silty CLAY (CL) **Tested By:** R

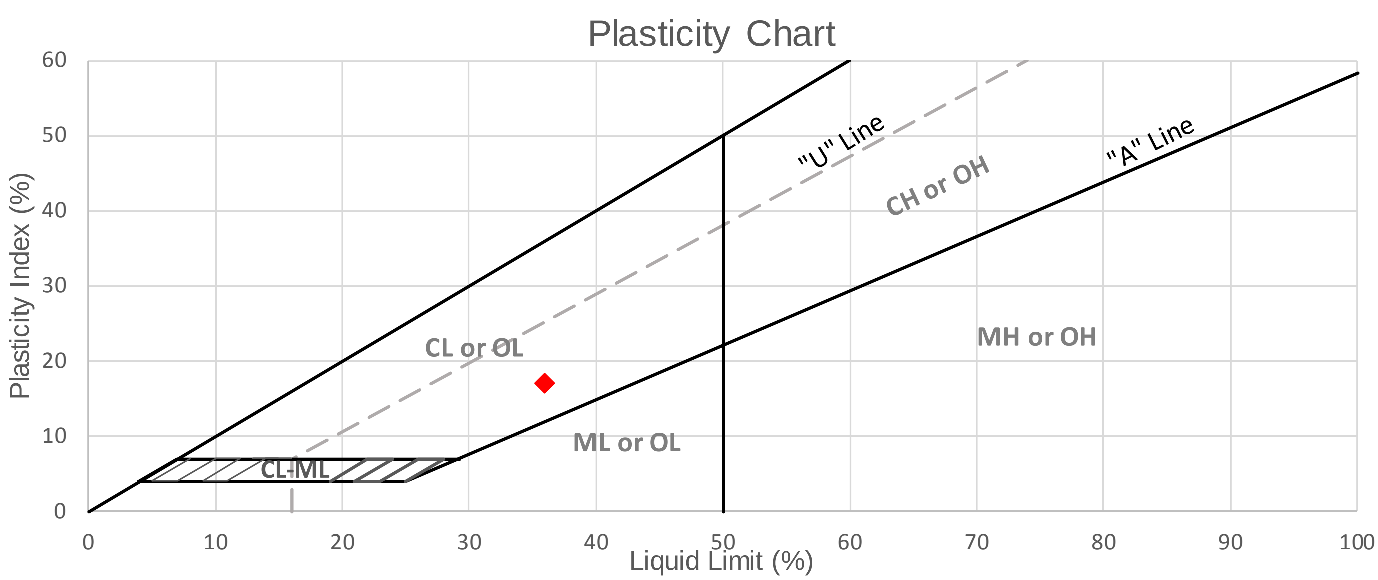


Plastic Limit Data

Trial	1	2	Ave
Water Content (%)	18.6	18.5	19

Data Summary

Liquid Limit	**36**
Plastic Limit	**19**
Plasticity Index	**17**
Natural Water Content	**14.4**
Liquidity Index	**-0.271**
% Passing #200	**54.0**

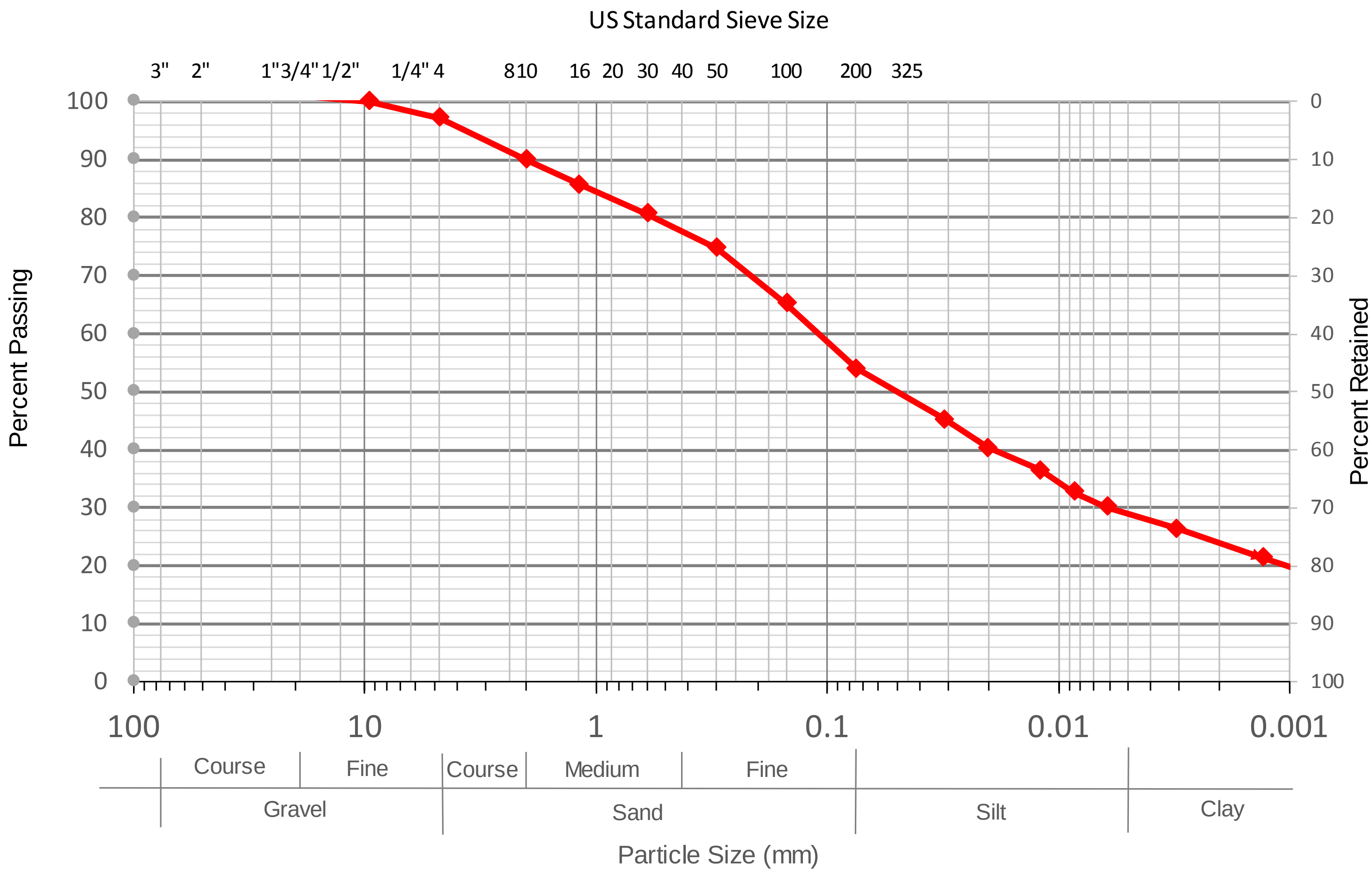


Hydrometer Analysis – ASTM D422

Project Number: 122-11 **Project Name:** Glen Loma

Sample Number: SFB-3 **Description:** Rust brown sandy silty CLAY (CL)

Depth: 28"-37" **Test Date:** 05-16-16 **Tested By:** R



Composite Sieve Data

Standard Sieve Size	Percent Passing
3”	
1.5”	
3/4”	
3/8”	100
#4	97.2
#10	90.0
#16	85.7
#30	80.7
#50	74.8
#100	65.3
#200	54.0

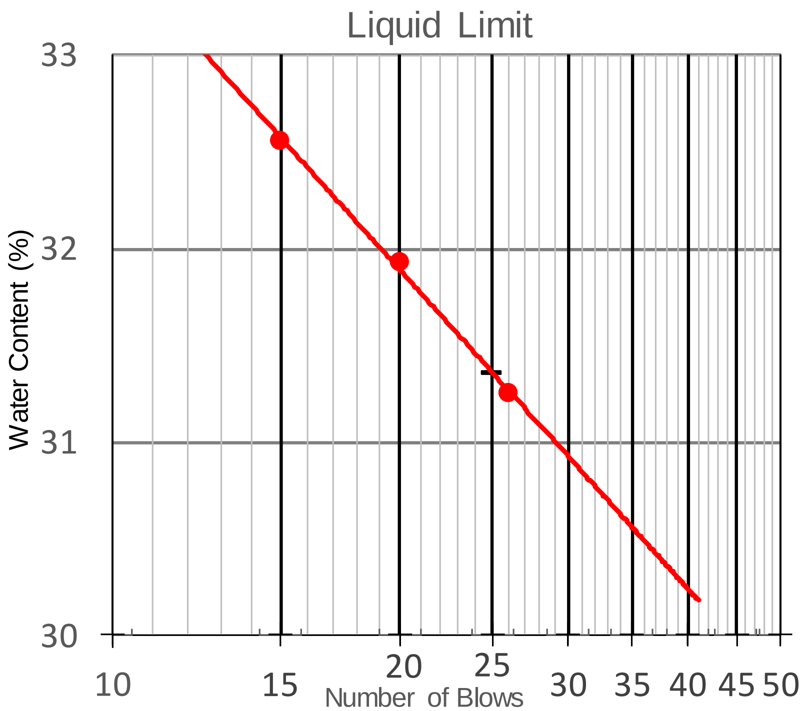
Particle Diameter (mm)	Percent Soil in Suspension
0.0311	45.3
0.0203	40.3
0.0120	36.5
0.0086	32.7
0.0062	30.2
0.0031	26.4
0.0013	21.4

Atterberg Limits Test – ASTM D4318

Project Number: 122-11 **Project Name:** Glen Loma

Boring/Sample Number: SFB-6 **Depth:** 24”-38” **Date:** 05-13-16

Description of Sample: Dark brown silty CLAY with sand (CL) **Tested By:** R

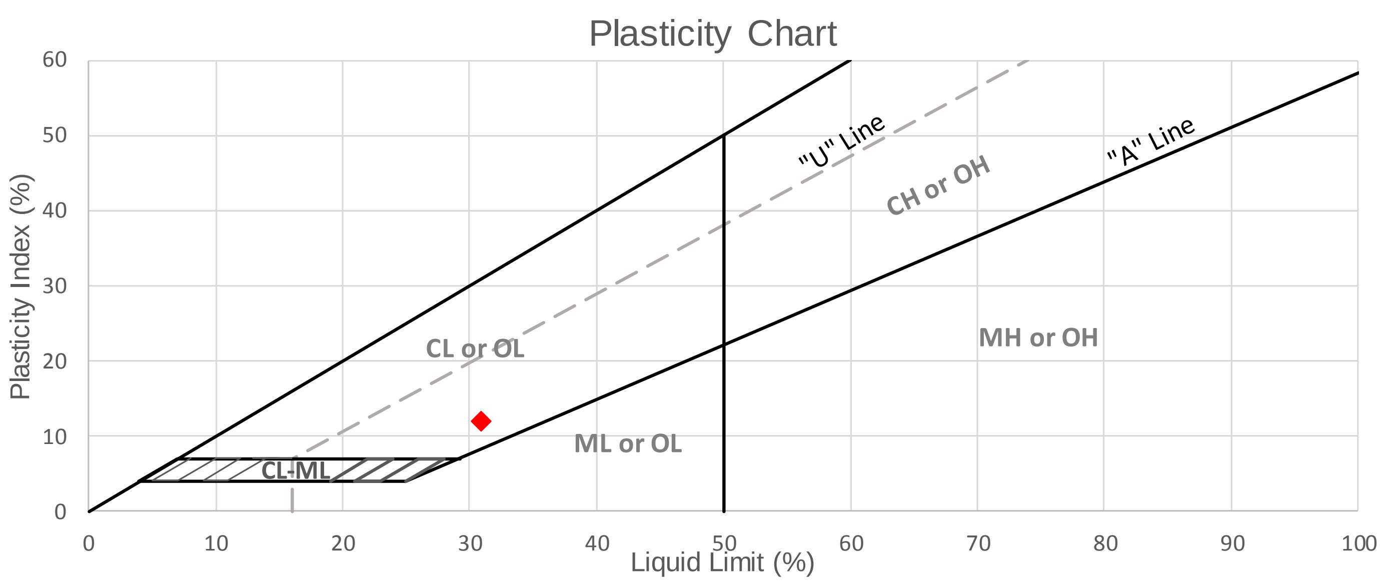


Plastic Limit Data

Trial	1	2	Ave
Water Content (%)	18.7	18.8	19

Data Summary

Liquid Limit	**31**
Plastic Limit	**19**
Plasticity Index	**12**
Natural Water Content	**18.4**
Liquidity Index	**-0.050**
% Passing #200	**75.4**



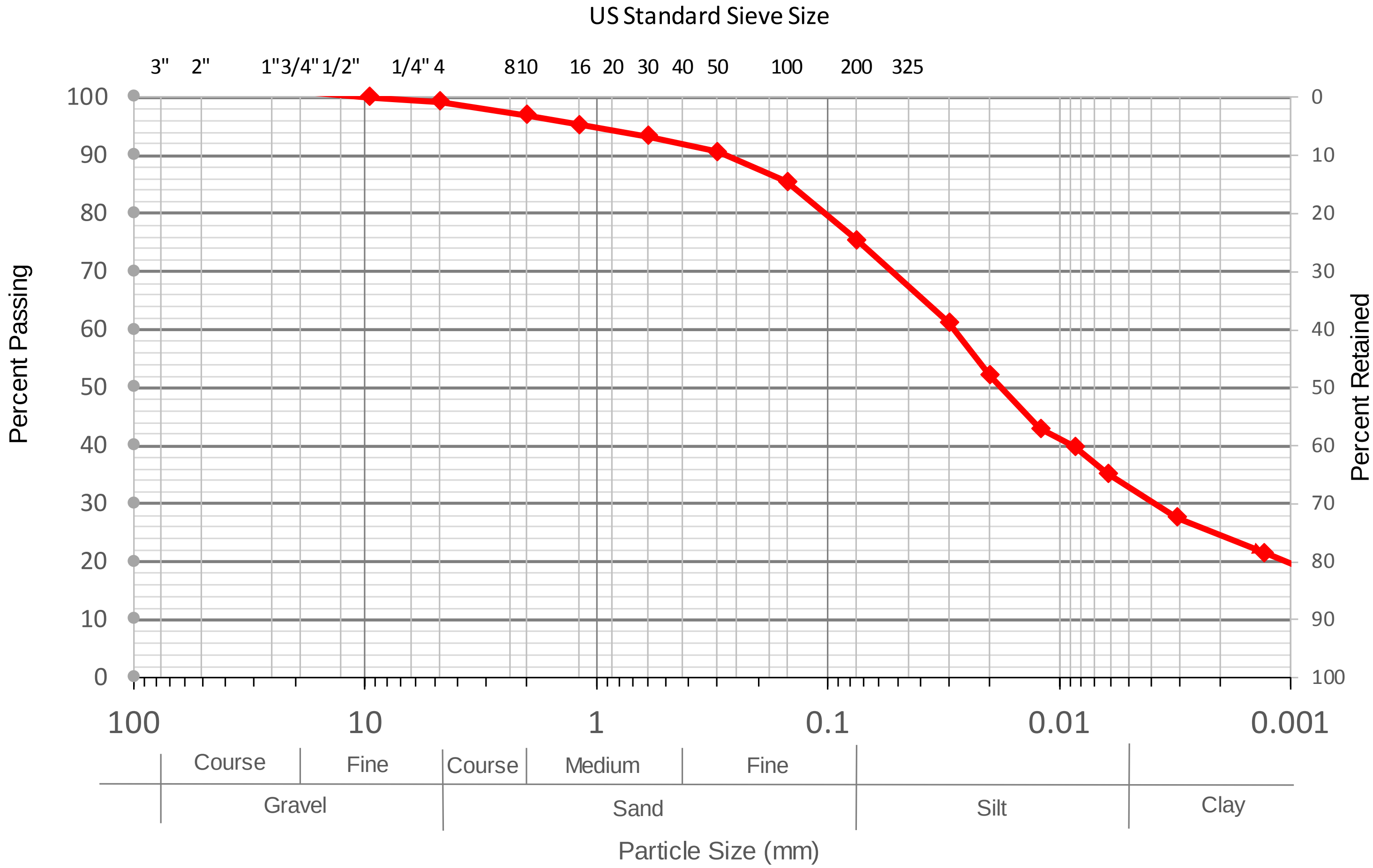
Stevens Ferrone & Bailey Engineering Company, Inc

Hydrometer Analysis – ASTM D422

Project Number: 122-11 **Project Name:** Glen Loma

Sample Number: SFB-6 **Description:** Dark brown silty CLAY with sand (CL)

Depth: 24"-38" **Test Date:** 05-16-16 **Tested By:** R



Composite Sieve Data

Standard Sieve Size	Percent Passing
3”	
1.5”	
3/4”	
3/8”	100
#4	99.3
#10	96.9
#16	95.3
#30	93.3
#50	90.6
#100	85.5
#200	75.4

Particle Diameter (mm)	Percent Soil in Suspension
0.0301	61.3
0.0200	52.1
0.0121	42.9
0.0086	39.8
0.0062	35.2
0.0031	27.6
0.0013	21.5

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Stevens, Ferrone & Bailey
Client's Project No.: 122-11
Client's Project Name: Glen Loma, Gilroy
Date Sampled: 11-May-16
Date Received: 12-May-16
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 20-May-2016

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
1605106-001	SFB-3 @ 21"-28"	430	6.90	-	4,600	N.D.	N.D.	N.D.
1605106-002	SFB-6 @ 9"-21"	420	8.46	-	2,000	N.D.	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	18-May-2016	18-May-2016	-	18-May-2016	16-May-2016	18-May-2016	18-May-2016

* Results Reported on "As Received" Basis
N.D. - None Detected

Cheryl McMillen
Laboratory Director

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

APPENDIX C

Logs of Previous Borings and Results of Previous Lab Testing by Others

Earth Systems Pacific

Boring No. 1

LOGGED BY: C. Cecile
DRILL RIG: B-40
AUGER TYPE: 8" Hollow Stem

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/4/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL		Reddish brown sandy lean CLAY, slightly moist, very stiff, with trace coarse gravel	0.0–5.0	Bulk			
1.5				1.5–3.0	Ring	103.0	8.8	10 17 16
3.5			–brown, moist, hard	3.5–5.0	Ring	113.8	8.8	10 19 23
8.5				8.5–10.0	Ring			9 18 40
9	CL		Orange brown sandy lean CLAY with gravel, moist, hard, fine to coarse gravel					
13.5			–Light brown	13.5–15.0	SPT			10 15 21
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: C. Cecile
DRILL RIG: B-40
AUGER TYPE: 8" Hollow Stem

Boring No. 2

JOB NO.: SH-12116-SA
DATE: 06/4/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
CL	Light brown sandy lean CLAY, dry, very stiff					
	-moist	1.5-3.0	Ring	120.1	11.8	30 40 50/5"
CL	Reddish brown sandy lean CLAY with gravel, moist, hard, fine to coarse subangular gravel	3.5-5.0	Ring	107.1	14.5	21 30 40
	-less gravel, fine					
	-Yellow to orange brown					
		8.0-13.0	Bulk			
		8.5-10.0	SPT			12 20 26
SC	Yellow to orange brown clayey SAND, moist, very dense, weakley cemented	13.5-14.5	SPT			25 50/6"
		18.5-20.0	SPT			21 32 50/6"
	End of Boring @ 20.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 8

LOGGED BY: C. Cecile
DRILL RIG: B-40
AUGER TYPE: 8" Hollow Stem

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/4/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL		Gray brown lean CLAY, dry, very stiff, trace subangular gravel					
1	CL		Red brown lean CLAY with sand and gravel, moist, hard, with a few cobbles	1.5–3.0	Ring Sample	116.3	10.0	27 31 41
3.5				3.5–5.0	Ring Sample	124.8	11.2	30 42 41
5			–subrounded to subangular gravel					
8.5				8.5–10.0	SPT			12 18 22
9			–increasing gravel content					
13.5				13.5–15.0	SPT			6 7 9
14			–sandy, very moist, very stiff					
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 11

PAGE 1 OF 1

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

JOB NO.: SH-12116-SA
DATE: 06/5/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL-ML		Gray brown silty CLAY, dry, hard					
1.5				1.5-3.0	Ring Sample	116.1	12.4	9 19 24
2	CL		Red brown lean CLAY with sand and gravel, moist, hard, fine to coarse subangular decomposed gravel					
3.5				3.5-5.0	Ring Sample	120.2	12.7	24 27 36
8.5				8.5-10.0	SPT			9 14 22
10			-mostly decomposed sandstone clasts					
13.5				13.5-15.0	SPT			11 16 21
14.5			-gravel fine					
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 12

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/5/13

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL–ML	Brown silty CLAY, dry, hard					
1.5	CL	Red brown lean CLAY with sand and gravel, moist, hard, coarse decomposed sandstone clasts and fine gravel	1.5–3.0	▬	124.9	9.1	17 28 30
3.5			3.5–5.0	▬	125.7	9.3	26 37 28
5		–sandstone and basaltic clasts					
8.5			8.5–10.0	●			10 19 30
10		–fine subrounded gravel					
13	CL	Yellow brown sandy lean CLAY, moist, hard	13.5–15.0	●			13 16 18
15		End of Boring @ 15.0' No subsurface water was encountered					

Depth scale: 0 – 26 feet

LEGEND: ▬ Ring Sample ○ Bulk Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

JOB NO.: SH-12116-SA
DATE: 06/5/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

SOIL DESCRIPTION

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL–ML	Gray brown silty CLAY, dry, hard					
1.5			1.5–3.0	Ring Sample	118.9	12.2	9 22 31
2.5	CL	Red brown sandy lean CLAY with gravel, moist, hard, fine subangular gravel					
3.5			3.5–5.0	Ring Sample	98.7	13.9	18 27 27
5		–gravels up to coarse					
8.5			8.5–10.0	SPT			11 14 28
13.5			13.5–15.0	SPT			16 21 31
15		End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 14

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/5/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL–ML		Gray brown silty CLAY, slightly moist					
1.5				1.5–3.0	Ring Sample	115.5	11.9	15 27 58
2.5	CL		Red brown lean CLAY with sand and gravel, moist, hard					
3.5				3.5–5.0	Ring Sample	113.0	8.0	23 33 46
5			–increasing gravel content					
8.5				8.5–10.0	SPT			11 12 21
8.5	CL		Orange brown to gray mottled lean CLAY with sand, moist, hard					
13.5				13.5–15.0	SPT			22 32 42
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample ◯ Bulk Sample ☐ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 28

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/7/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL		Gray brown sandy lean CLAY with gravel, slightly moist, very stiff; Fill	1.5–3.0	Ring Sample	122.9	7.2	18 11 9
2	CH		Dark brown SANDY FAT CLAY, moist, very stiff, with trace fine subangular gravel; Fill	2.0–6.0	Bulk Sample			
				3.5–5.0	Ring Sample	130.2	12.4	5 5 5
5			–stiff					
7.5	CL		Brown lean CLAY, moist, medium stiff, with some sand and trace fine subrounded gravel; Native	8.5–10.0	SPT			3 3 4
12	SC		Light brown clayey SAND, very moist, loose, with trace fine gravel	13.5–15.0	SPT			4 4 5
17	CL		Reddish brown sandy lean CLAY, moist, hard, with some fine to coarse gravel	18.5–20.0	SPT			22 25 12
20			End of Boring @ 20.0' No subsurface water was encountered					

LEGEND: Ring Sample ◯ Bulk Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

Boring No. 29
PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/7/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL		Gray brown lean CLAY with sand and gravel, dry, very stiff					
1	CL		Brown lean CLAY, moist, stiff, with some sand	1.5–3.0	Ring Sample	119.7	9.8	5 7 8
3	CL		Reddish brown sandy lean CLAY with gravel, moist, very stiff, with fine subangular to subrounded gravel	3.5–5.0	Ring Sample	109.8	10.3	10 7 12
7.5	SC		Brown clayey SAND, moist, medium dense, with some fine to coarse gravel	8.5–10.0	SPT			6 7 7
12	CL		Reddish brown lean CLAY with gravel, stiff, moist, fine subangular to subrounded gravel	13.5–15.0	SPT			10 6 8
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 30

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/7/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL		Gray brown lean CLAY, with fine to coarse subrounded to subangular gravel, slightly moist, hard					
1.5				1.5–2.5	Ring Sample	124.1	9.3	40 50/5"
2			–moist					
3.5				3.5–4.5	Ring Sample	116.0	11.6	40 50/5"
4			–becoming reddish brown					
8	SC/ GC		Light brown clayey SAND to clayey GRAVEL, very moist, very dense	8.5–10.0	SPT			23 32 43
13.5				13.5–14.0	SPT			75/6"
14			End of Boring @ 14.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

Boring No. 31
PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/7/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL–ML		Gray brown silty CLAY, dry, very stiff					
1	CL		Red brown sandy lean CLAY, moist, hard, with trace fine gravel	1.5–3.0	Ring Sample	99.5	10.3	12 16 21
3				3.5–5.0	Ring Sample			20 44 50/5"
5			–some fine decomposed gravel and a few charcoal flecks					
8				8.5–10.0	SPT			8 12 17
13				13.5–15.0	SPT			10 17 18
14			–with intervals of clayey gravel					
15			End of Boring @ 15.0' No subsurface water was encountered					

Depth scale: 0 to 26 feet.

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

Boring No. 32
PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/7/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL–ML		Gray brown silty CLAY, dry, very stiff					
1	CL		Red brown lean CLAY, slightly moist, hard, with some fine gravel	1.5–3.0	Ring	106.0	10	14 22 25
3			–moist	4.0–4.5	Ring	125.0	10.4	32 50/6"
8				8.5–10.0	SPT			11 13 15
10			–very stiff, with intervals of clayey gravel					
12	CL		Brown sandy lean CLAY, moist, very stiff, with some fine gravel	13.5–15.0	SPT			7 8 12
15			End of Boring @ 15.0' No subsurface water was encountered					

Depth scale: 0 – 26 feet

LEGEND: Ring Sample ◯ Bulk Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: C. Cecile
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

Boring No. 33
PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/7/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL–ML		Gray brown silty CLAY, dry, very stiff					
1.5	CL		Red brown lean CLAY with sand and gravel, slightly moist, hard	1.5–3.0	Ring Sample	125.7	7.8	19 18 12
				3.5–5.0	Ring Sample	106.4	7.8	13 16 23
			–moist					
				8.5–10.0	SPT			15 24 38
			–with intervals of clayey gravel					
				13.5–15.0	SPT			15 21 32
			–very moist					
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 34

LOGGED BY: B. Faust
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

JOB NO.: SH-12116-SA
DATE: 06/7/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL		Medium yellow brown sandy lean CLAY, slightly moist, hard, fine to coarse sand					
1				1.0–2.5	Ring Sample	122.4	9.7	38 37 44
3.5			–locally some gravel, moist	3.5–5.0	Ring Sample	112.7	14.8	23 33 50/5"
5			–gray brown					
8.5				8.5–10.0	SPT			15 27 29
9			–red brown					
13.5				13.5–15.0	SPT			12 19 25
14			–light yellow to tan, silty, little to no sand					
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample ◯ Bulk Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 58

LOGGED BY: X. Mejia
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

JOB NO.: SH-12116-SA
DATE: 06/21/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SC		Yellow brown clayey SAND, slightly moist, very dense					
2				2.0–2.5	Ring Sample	123.7	9.8	40 44 51
3.5			–moist	3.5–4.0	Ring Sample	115.2	10.9	50/5"
7	CL		Dark brown sandy lean CLAY, very moist, stiff					
9.5				9.5–10.0	SPT			6 8 9
14	SP		Orange brown poorly graded SAND with gravel, moist, medium dense	14.5–15.0	SPT			10 11 13
19.5				19.5–20.0	SPT			10 8 6
23			–dense					
24.5				24.5–25.0	SPT			22 20 19
25			End of Boring @ 25.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: X. Mejia
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

Boring No. 59

JOB NO.: SH-12116-SA
DATE: 06/21/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	GC	Brown clayey GRAVEL with sand, slightly moist, very dense, fine gravel, fine to medium sand	1.0–1.5	Ring Sample	102.5	4.3	50/6"
3	SC	Orange brown clayey SAND, moist, dense, trace sandstone gravels, fine gravels	3.5–5.0	Ring Sample	121.9	12.5	20 22 39
6.5	CL	Dark brown sandy lean CLAY, very moist, stiff	8.5–10.0	SPT			8 7 7
10		End of Boring @ 10.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 60

LOGGED BY: X. Mejia
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/21/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CH		Brown sandy FAT CLAY, moist, hard	0.5–3.0	Bulk Sample			
1				1.0–2.5	Ring Sample	100.3	14.7	13 19 21
3				3.5–5.0	Ring Sample	108.5	18.3	6 8 11
4	CL		Brown lean CLAY with sand, moist, very stiff					
8				8.5–10.0	SPT			5 9 12
10			End of Boring @ 10.0' No subsurface water was encountered					

Depth scale: 0 – 26 feet

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: X. Mejia
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

Boring No. 61
PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/21/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SC		Reddish brown clayey SAND, slightly moist, medium dense, trace coarse gravel, fine sand	1.0–2.5	Ring Sample	113.0	9.9	12 15 10
3	CL		Reddish brown sandy lean CLAY, moist, hard	3.5–5.0	Ring Sample	120.7	13.3	15 24 37
				8.5–10.0	SPT			17 26 31
				13.5–15.0	SPT			18 25 48
14	SC		Orange brown clayey SAND, moist, very dense					
15			End of Boring @ 15.0' No subsurface water was encountered					

LEGEND: Ring Sample ○ Bulk Sample ☐ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 62

PAGE 1 OF 1

LOGGED BY: X. Mejia
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

JOB NO.: SH-12116-SA
DATE: 06/21/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SC-SM		Brown to reddish brown silty clayey SAND, moist, medium dense	0.5–3.0	Bulk Sample			
1				1.0–2.5	Ring Sample	105.1	8.2	14 10 15
3.5				3.5–5.0	Ring Sample	114.0	11.6	29 50/6"
4			–less clay to silty sand, very dense					
6	CL		Orange brown sandy lean CLAY with gray mottles, moist, hard, few subangular gravels and coarse sand					
8.5				8.5–10.0	SPT			14 25 39
10			End of Boring @ 10.0' No subsurface water was encountered					

LEGEND: Ring Sample, Bulk Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 63

LOGGED BY: X. Mejia
DRILL RIG: B-53
AUGER TYPE: 8" Hollow Stem

PAGE 1 OF 1
JOB NO.: SH-12116-SA
DATE: 06/21/13

GLEN LOMA RANCH
Santa Teresa Boulevard
Gilroy, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SC		Reddish brown clayey SAND with gravel, slightly moist, dense					
1				1.0–2.5	Ring Sample	112.5	9.9	21 25 25
3.5				3.5–5.0	Ring Sample	111.2	13.4	23 22 14
4.5	CL		Brown sandy lean CLAY, very moist, hard, trace gravels					
8.5	CL		Brown lean CLAY with sand, very moist, hard, trace gravels	8.5–10.0	SPT			9 15 22
10			End of Boring @ 10.0' No subsurface water was encountered					

LEGEND: Ring Sample ◯ Bulk Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Glen Loma Ranch

SH-12116-SA
July 2013

PLASTICITY INDEX TEST RESULTS

ASTM D 4318-10

SAMPLE NO.	DEPTH feet	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
B3-1	2.5 - 3.0	31	22	9
B16-1	2.5 - 3.0	23	17	6
B21-1	2.5 - 3.0	26	19	7
B31-1	2.5 - 3.0	25	17	8
B36-1	2.0 - 2.5	27	18	9
B41-1	3.5 - 4.0	32	20	12
B53-1	1.0 - 1.5	35	21	14
B56-1	2.0 - 2.5	56	16	40
B69-1	2.0 - 2.5	43	19	24

Glen Loma Ranch

SH-12116-SA
July 2013

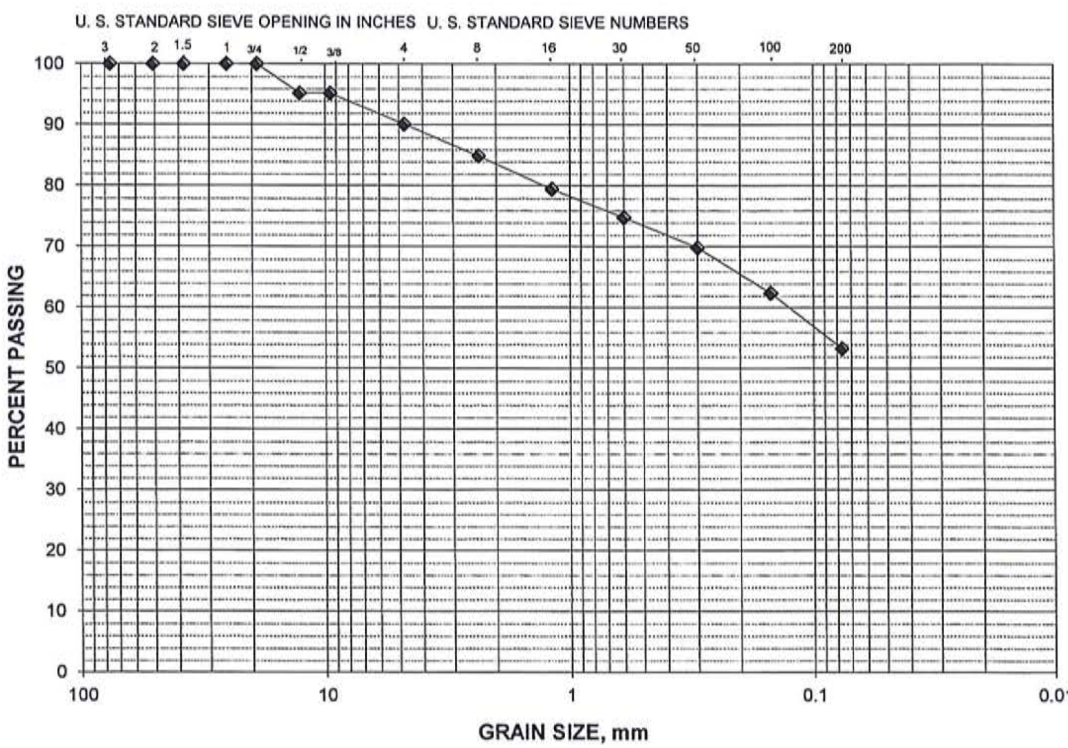
PARTICLE SIZE ANALYSIS

ASTM D 422-63(2007); D 1140-00 (2006)

B31-1 @ 2.5' - 3.0'

Sandy Lean CLAY (CL)

Sieve size	% Retained	% Passing
3"	0	100
2"	0	100
1.5"	0	100
1"	0	100
3/4"	0	100
1/2"	5	95
3/8"	5	95
#4	10	90
#8	15	85
#16	21	79
#30	25	75
#50	30	70
#100	38	62
#200	47	53



Glen Loma Ranch

SH-12116-SA
July 2013

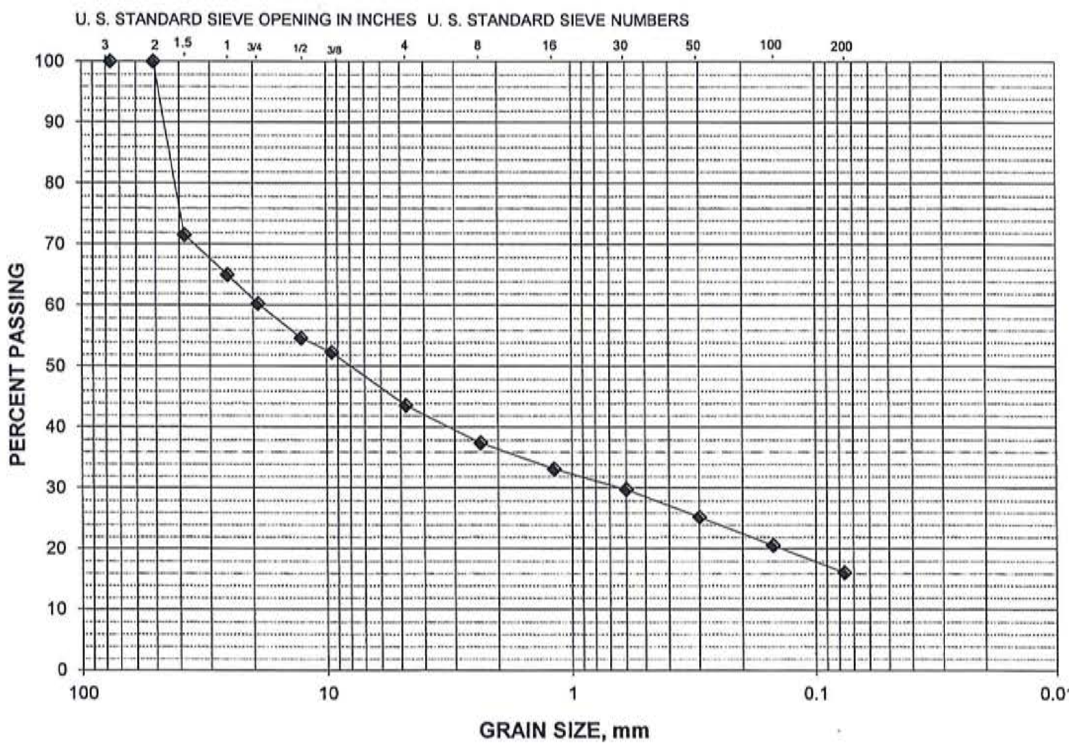
PARTICLE SIZE ANALYSIS

ASTM D 422-63(2007); D 1140-00 (2006)

B59-1 @ 2.0' - 2.5'

Clayey GRAVEL with Sand (GC)

Sieve size	% Retained	% Passing
3"	0	100
2"	0	100
1.5"	28	72
1"	35	65
3/4"	40	60
1/2"	45	55
3/8"	48	52
#4	56	44
#8	63	37
#16	67	33
#30	70	30
#50	75	25
#100	79	21
#200	84	16



Glen Loma Ranch

SH-12116-SA
July 2013

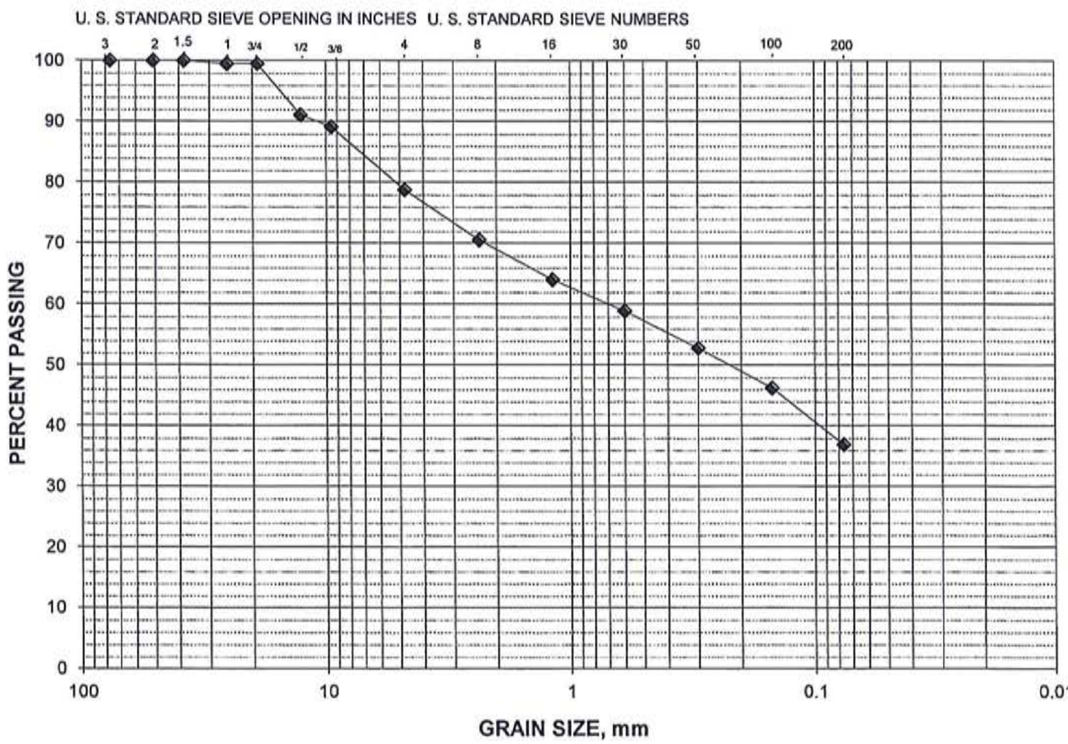
PARTICLE SIZE ANALYSIS

ASTM D 422-63(2007); D 1140-00 (2006)

B63-1 @ 2.0' - 2.5'

Clayey SAND with GRAVEL (SC)

Sieve size	% Retained	% Passing
3"	0	100
2"	0	100
1.5"	0	100
1"	1	99
3/4"	1	99
1/2"	9	91
3/8"	11	89
#4	21	79
#8	29	71
#16	36	64
#30	41	59
#50	47	53
#100	54	46
#200	63	37



Glen Loma Ranch

SH-12116-SA
July 2013

UNCONFINED COMPRESSION ON COHESIVE SOIL

ASTM D 2166-06

Boring #11; S-1 @ 2.5 - 3.0'
Red Brown Lean Clay with Sand and Gravel (CL)
Undisturbed Sample
Initial Height: 2.69-in.; Initial Diameter: 2.41-in.
COMPRESSIVE STRENGTH: 86.3 psi (12,423 psf)

Initial Dry Density: 116.1 pcf
Moisture Content: 12.4%
Specific Gravity: 2.70 (assumed)
Degree Saturation: 74.2%
Height/Diameter Ratio: 1.12

TIME minutes	STRAIN DIAL, inches x 0.0001	AXIAL STRAIN percent	AVERAGE AREA sq. in.	APPLIED LOAD lbs	COMPRESSIVE STRENGTH psi	COMPRESSIVE STRENGTH psf
0.5	20	0.7	4.60	89.9	19.6	2,816
1.0	40	1.5	4.63	209.7	45.3	6,522
1.5	60	2.2	4.67	312.4	67.0	9,643
2.0	80	3.0	4.70	376.6	80.1	11,536
2.5	100	3.7	4.74	408.7	86.3	12,423
3.0	120	4.5	4.77	406.6	85.2	12,263

Glen Loma Ranch

SH-12116-SA

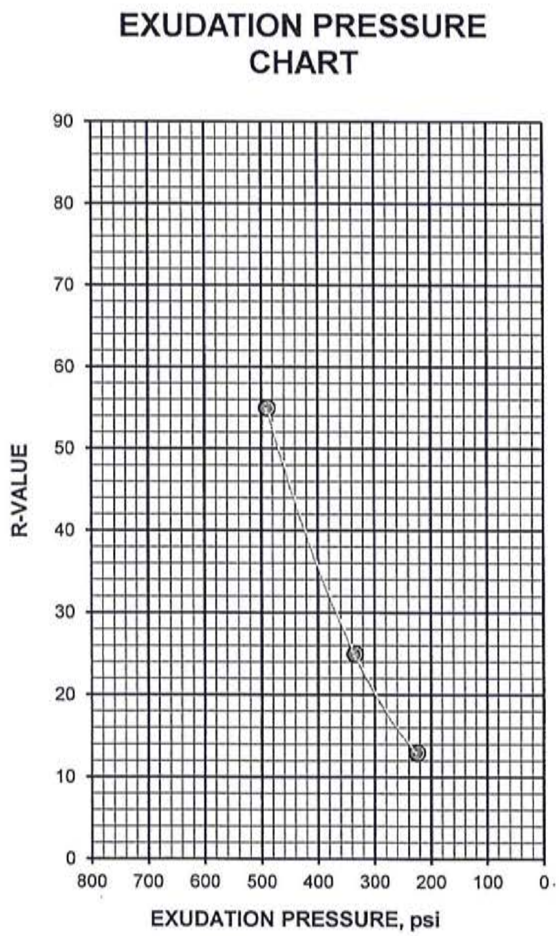
RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

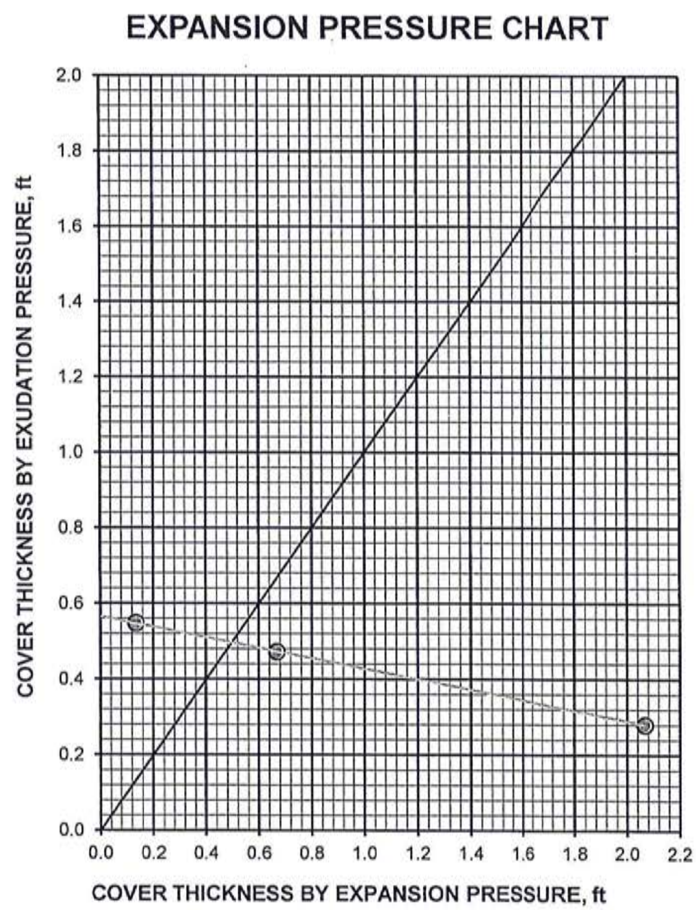
ASTM D 2844-07

June 19, 2013

Boring #1 @ 0.0 - 5.0'
Reddish Brown Sandy Lean Clay (CL)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 110.9-pcf
%Moisture @ 300 psi Exudation Pressure: 15.6%
R-Value - Exudation Pressure: 20
R-Value - Expansion Pressure: 21
R-Value @ Equilibrium: 20





Glen Loma Ranch

SH-12116-SA

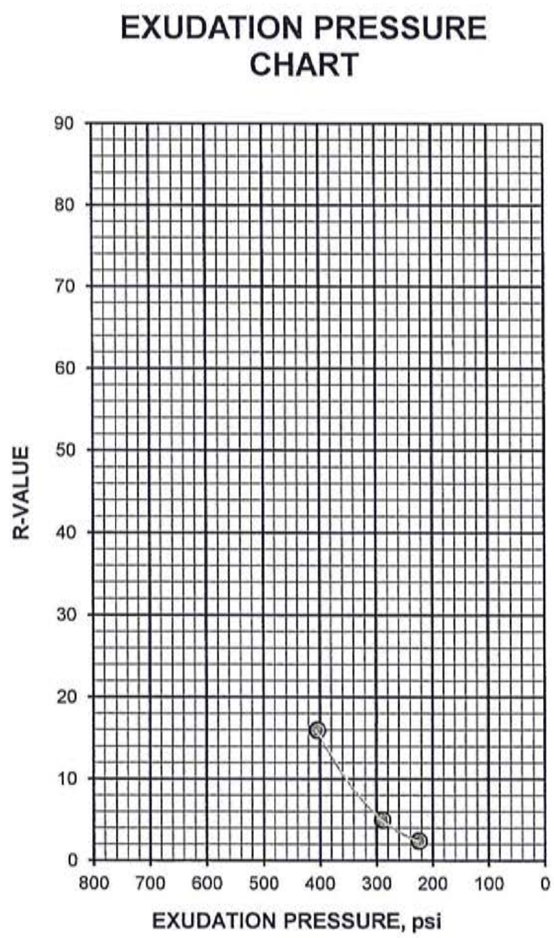
RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

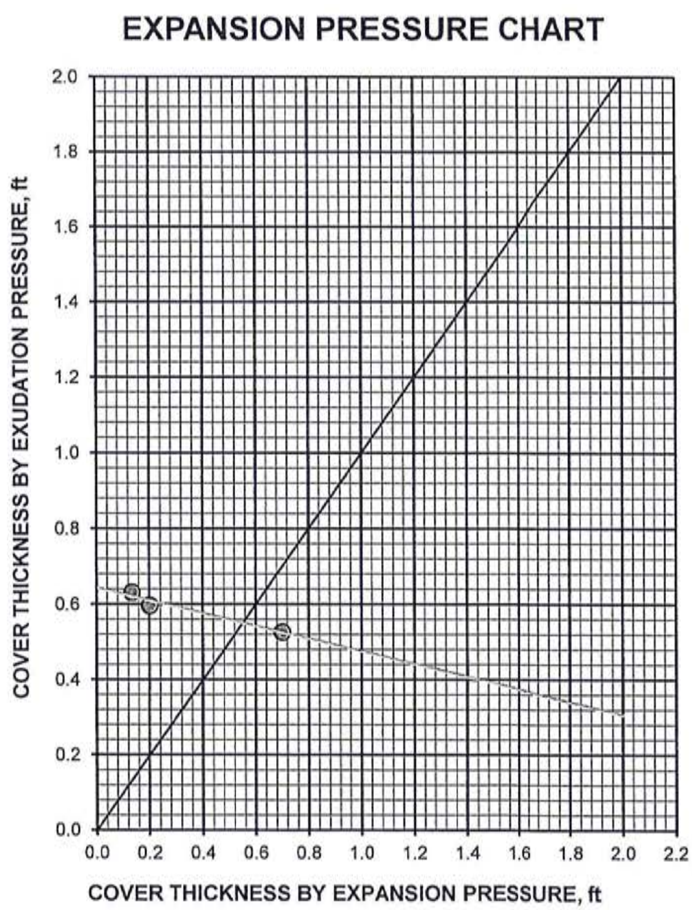
ASTM D 2844-07

June 19, 2013

Boring #28 @ 2.0 - 6.0'
Dark Brown Sandy Fat Clay (CH)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 108.4-pcf
%Moisture @ 300 psi Exudation Pressure: 16.2%
R-Value - Exudation Pressure: 6
R-Value - Expansion Pressure: 13
R-Value @ Equilibrium: 6





Glen Loma Ranch SH-12116-SA

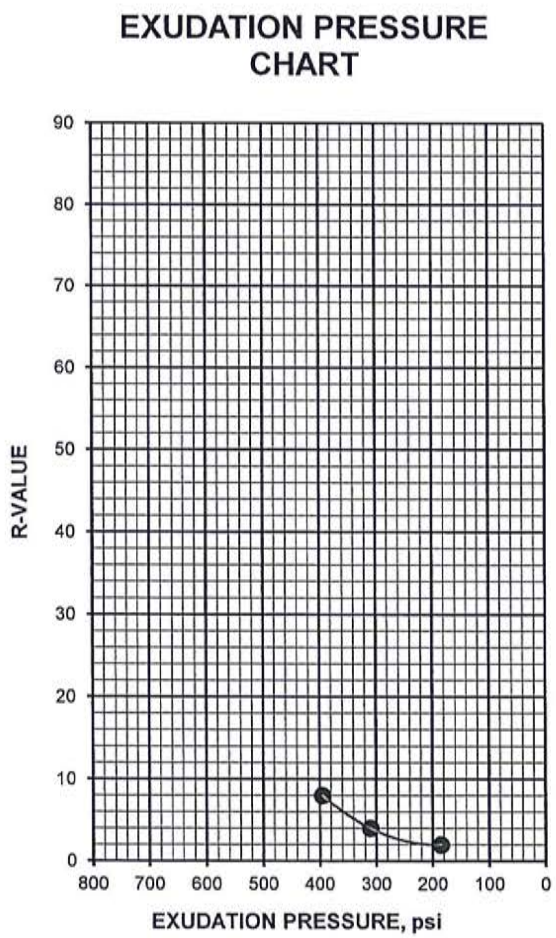
RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

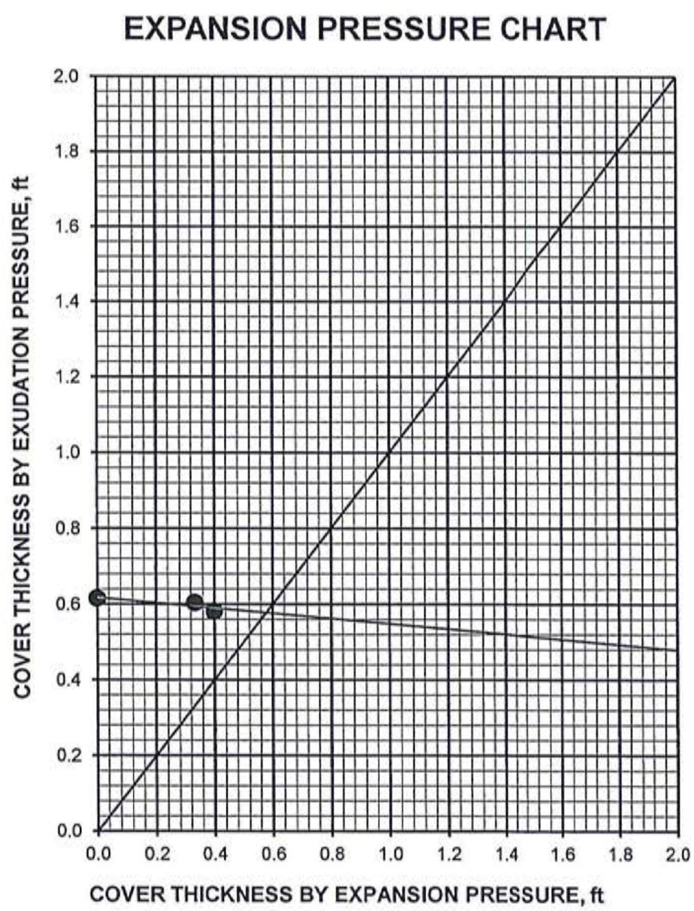
ASTM D 2844-07

July 3, 2013

Boring #60 @ 0.5-3.0'
Brown Sandy Fat Clay (CH)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 110.4-pcf
%Moisture @ 300 psi Exudation Pressure: 17.1%
R-Value - Exudation Pressure: 4
R-Value - Expansion Pressure: 8
R-Value @ Equilibrium: 4





APPENDIX D

ASFE Guidelines

Important Information about Your
Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE THE GEOPROFESSIONAL BUSINESS ASSOCIATION

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

IIGER01115.0MRP

BURGUNDY

GILROY, CA

SINGLE FAMILY HOMES

LENNAR®

4750 WILLOW ROAD, SUITE 150
PLEASANTON, CA 94588

ARCHITECTURAL DESIGN REVIEW SUBMITTAL DRAWINGS

BUILDING SUMMARY

PLAN TYPE	FIRST FLOOR	SECOND FLOOR	TOTAL	2-CAR GARAGE
PLAN 1 4 BEDROOM / LOFT / 3 BATHS	1,069 SQ.FT.	1,337 SQ.FT.	2,406 SQ.FT.	429 SQ.FT.
PLAN 2 4 BEDROOM / LOFT / 3 BATHS	1,151 SQ.FT.	1,437 SQ.FT.	2,588 SQ.FT.	431 SQ.FT.
PLAN 3 4 BEDROOM / LOFT / 3 BATHS	1,207 SQ.FT.	1,580 SQ.FT.	2,787 SQ.FT.	425 SQ.FT.

SEQUENCE OF ARCHITECTURAL DRAWINGS

SHEET		DESCRIPTION
A1.0	PLAN 1	FRONT ELEVATION
A1.1		PLAN 1 SPANISH FLOOR PLAN - 1ST & 2ND FLOOR
A1.2		PLAN 1 SPANISH ELEVATIONS
A1.3		PLAN 1 CRAFTSMAN FLOOR PLAN - 1ST & 2ND FLOOR
A1.4		PLAN 1 CRAFTSMAN ELEVATIONS
A1.5		PLAN 1 PRAIRIE FLOOR PLAN - 1ST & 2ND FLOOR
A1.6		PLAN 1 PRAIRIE ELEVATIONS
A2.0	PLAN 2	FRONT ELEVATION
A2.1		PLAN 2 SPANISH FLOOR PLAN - 1ST & 2ND FLOOR
A2.2		PLAN 2 SPANISH ELEVATIONS
A2.3		PLAN 2 CRAFTSMAN FLOOR PLAN - 1ST & 2ND FLOOR
A2.4		PLAN 2 CRAFTSMAN ELEVATIONS
A2.5		PLAN 2 PRAIRIE FLOOR PLAN - 1ST & 2ND FLOOR
A2.6		PLAN 2 PRAIRIE ELEVATIONS
A3.0	PLAN 3	FRONT ELEVATION
A3.1		PLAN 3 SPANISH FLOOR PLAN - 1ST & 2ND FLOOR
A3.2		PLAN 3 SPANISH ELEVATIONS
A3.3		PLAN 3 CRAFTSMAN FLOOR PLAN - 1ST & 2ND FLOOR
A3.4		PLAN 3 CRAFTSMAN ELEVATIONS
A3.5		PLAN 3 CRAFTSMAN ELEVATIONS W/ EXPANDED PORCH
A3.6		PLAN 3 PRAIRIE FLOOR PLAN - 1ST & 2ND FLOOR
A3.7		PLAN 3 PRAIRIE ELEVATIONS

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SPANISH

CRAFTSMAN

PRAIRIE

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PLAN 1
Front Elevation

BURGUNDY
Gilroy, California

0 2 4 8

850.17209

08.14.18

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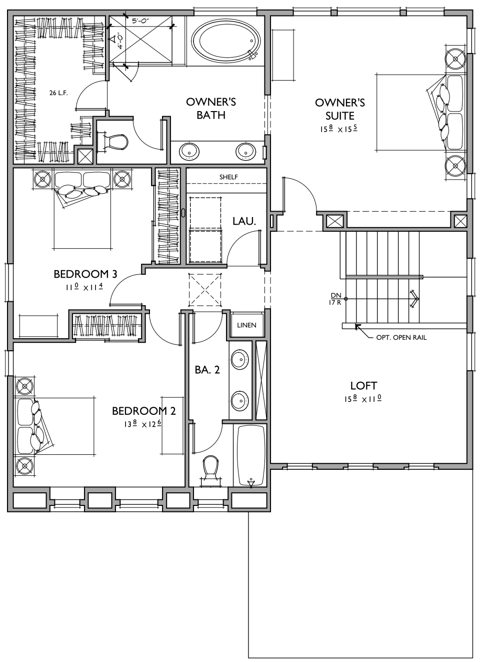
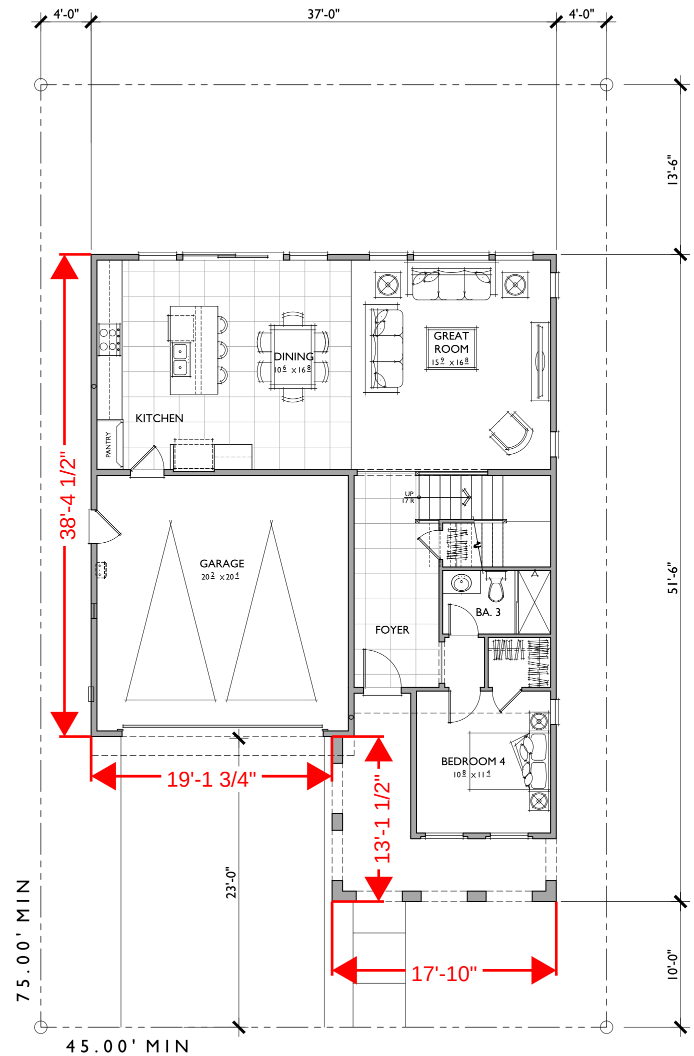
SHEET NO.
A 1.0





PLAN 1

2,408 SQ. FT.

4 BEDROOMS / 3 BATHS

2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,071 SQ. FT.
2ND FLOOR	1,337 SQ. FT.
TOTAL	2,408 SQ. FT.
2 - CAR GARAGE	427 SQ. FT.
PORCH	156 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

08.14.18

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Newport Beach, CA USA 92660
tel. +1 949 553 9100
fax +1 949 553 0548

PLAN 1
Reflects Spanish Elevation

BURGUNDY
Gilroy, California

0 2 4 8

850.17209

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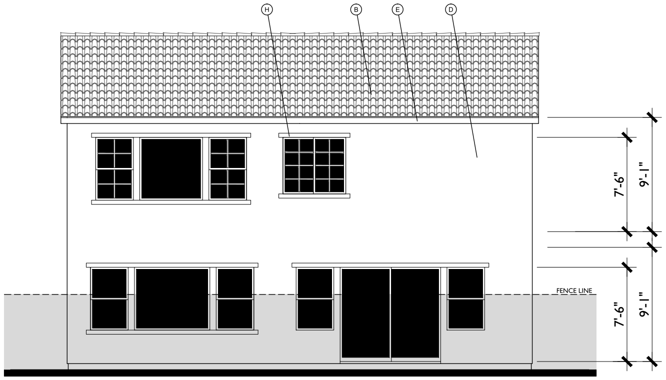
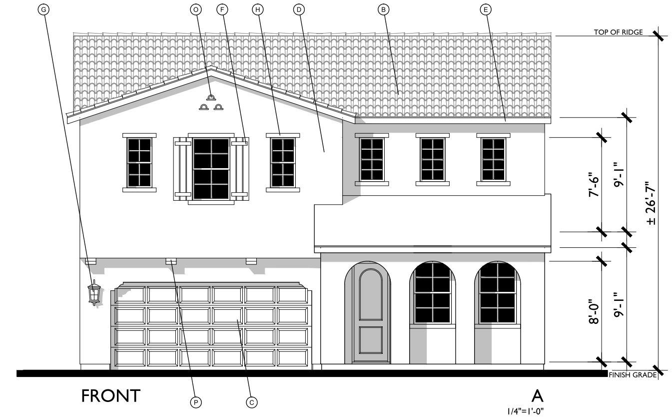
SHEET NO.
A 1.1



REAR

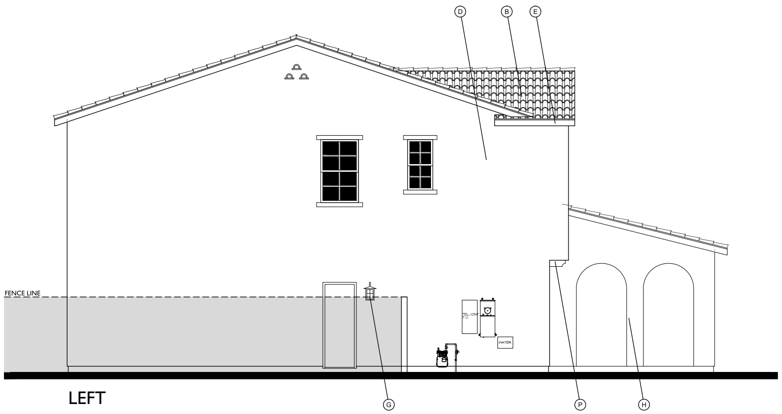


FRONT A

1/4"=1'-0"

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE



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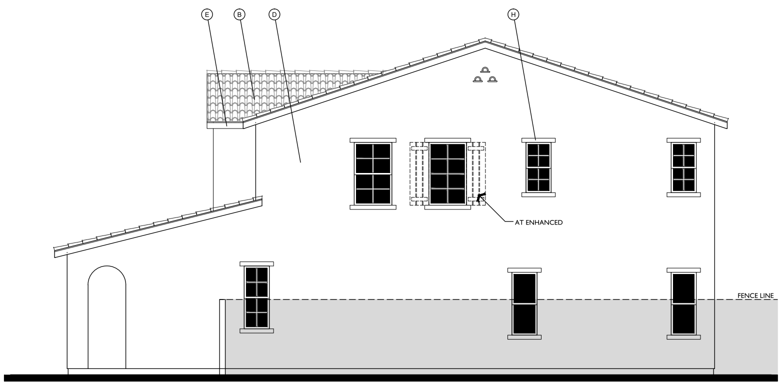

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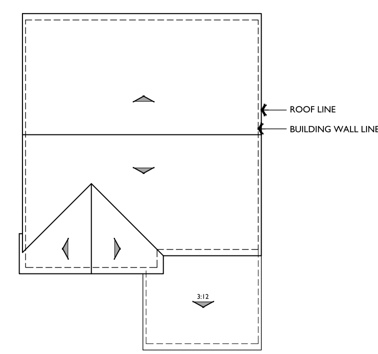

ROOF PLAN A

PITCH: 4:12
RAKE: 6"
EAVE: 12"
ROOF MATERIAL: CONCRETE 'S' TILE

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fax +1 949 553 0548

PLAN 1
Spanish Elevation
BURGUNDY
Gilroy, California

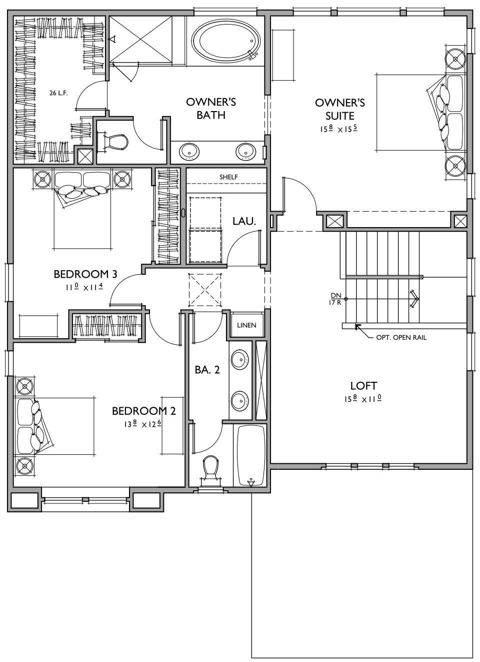
0 2 4 8

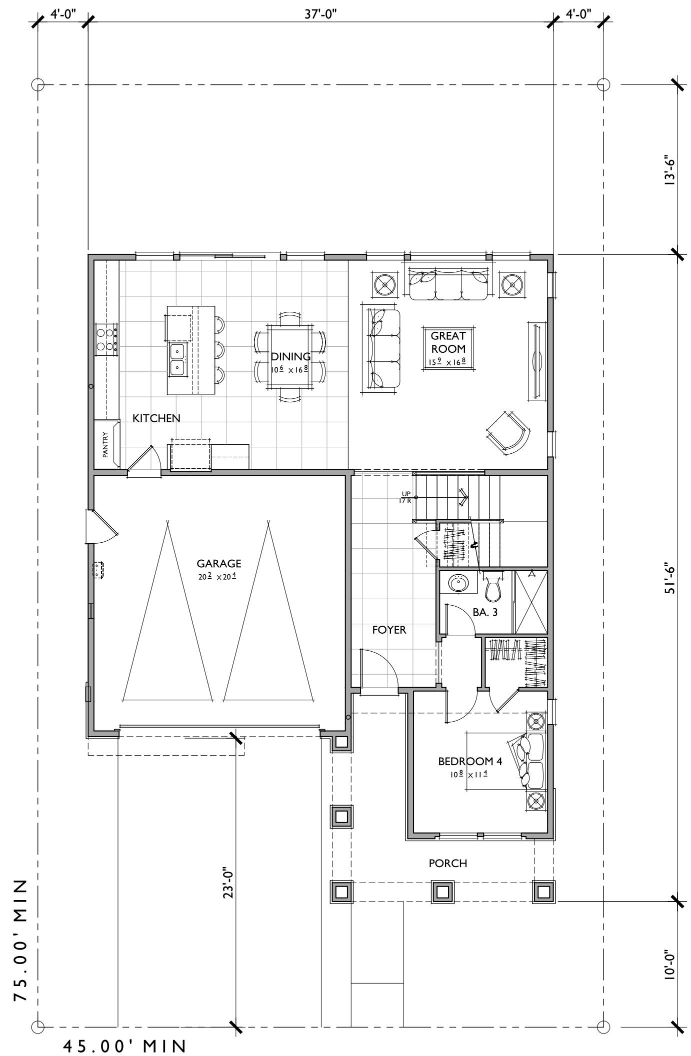
850.17209

08.14.18

LENNAR

SHEET NO.
A 1.2





PLAN 1
2,408 SQ. FT.
4 BEDROOMS / 3 BATHS
2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,071 SQ. FT.
2ND FLOOR	1,337 SQ. FT.
TOTAL	2,408 SQ. FT.
2 - CAR GARAGE	427 SQ. FT.
PORCH	152 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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fax +1 949 553 0548

PLAN 1
Reflects Craftsman Elevation

BURGUNDY
Gilroy, California

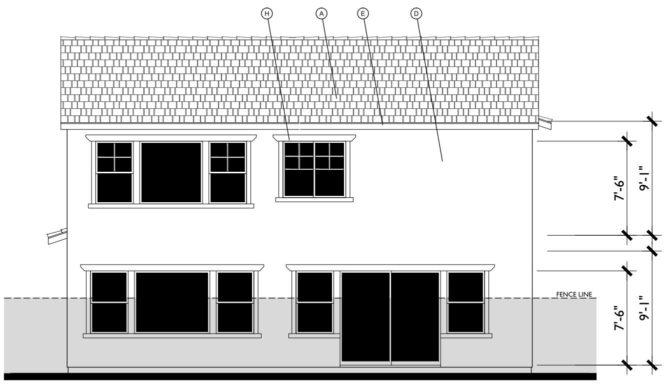
0 2 4 8

850.17209

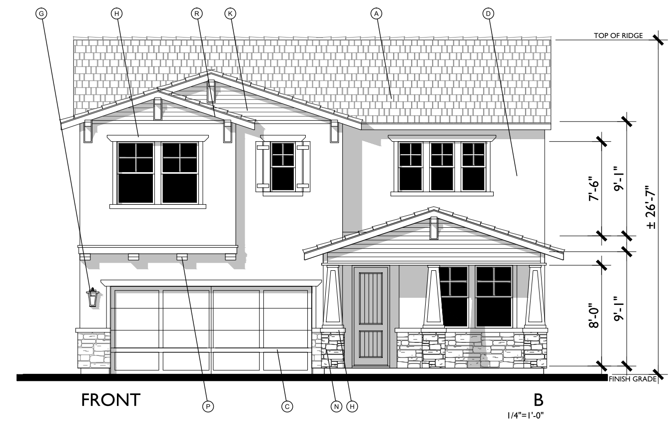
08.14.18

LENNAR

SHEET NO.
A1.3



REAR



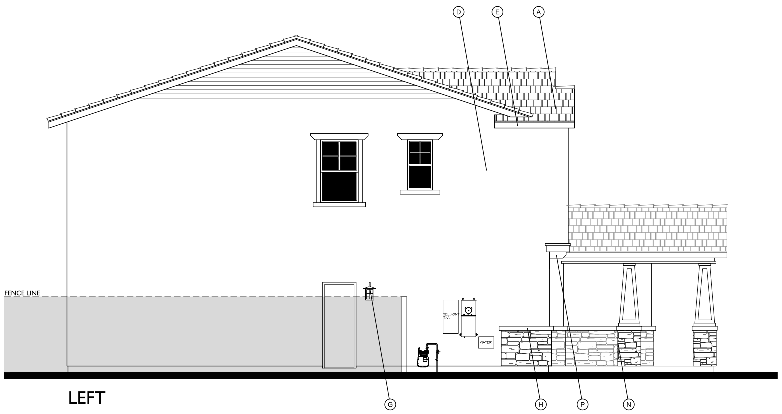
FRONT

B

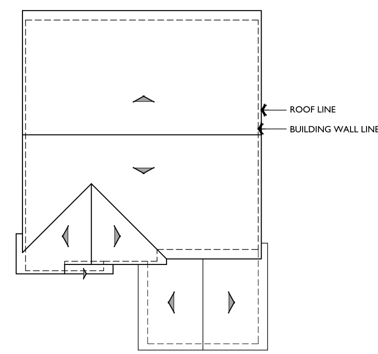
1/4"=1'-0"

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE



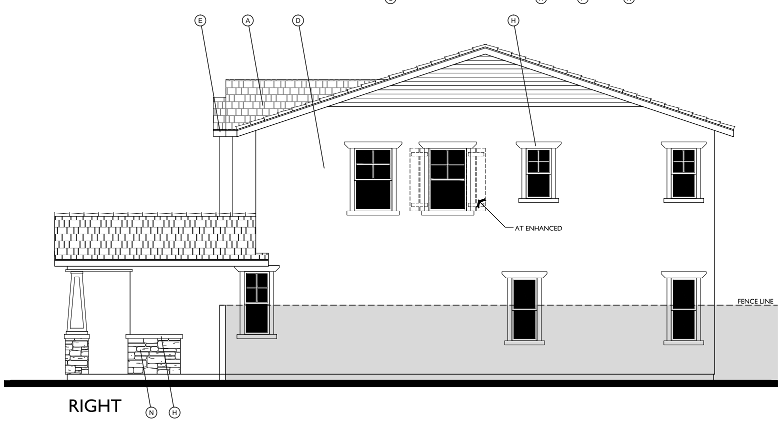
LEFT



ROOF PLAN B

1/8"=1'-0"

PITCH: 4:12
RAKE: 12" OR 6" PER LOCATION
EAVE: 18"
ROOF MATERIAL: CONCRETE FLAT TILE



RIGHT

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PLAN 1
Craftsman Elevation
BURGUNDY
Gilroy, California

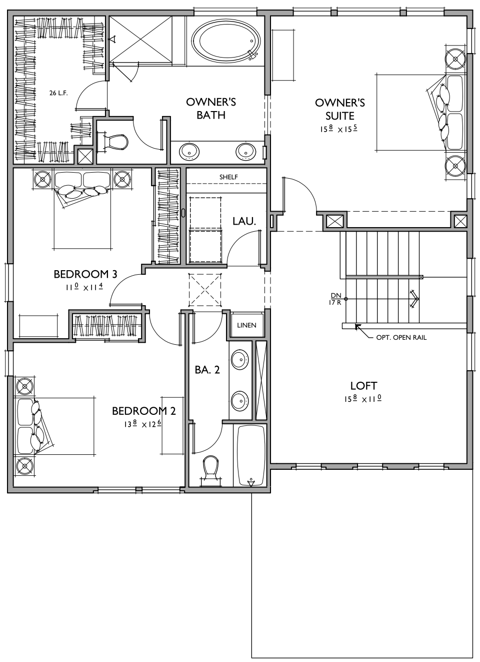
0 2 4 8

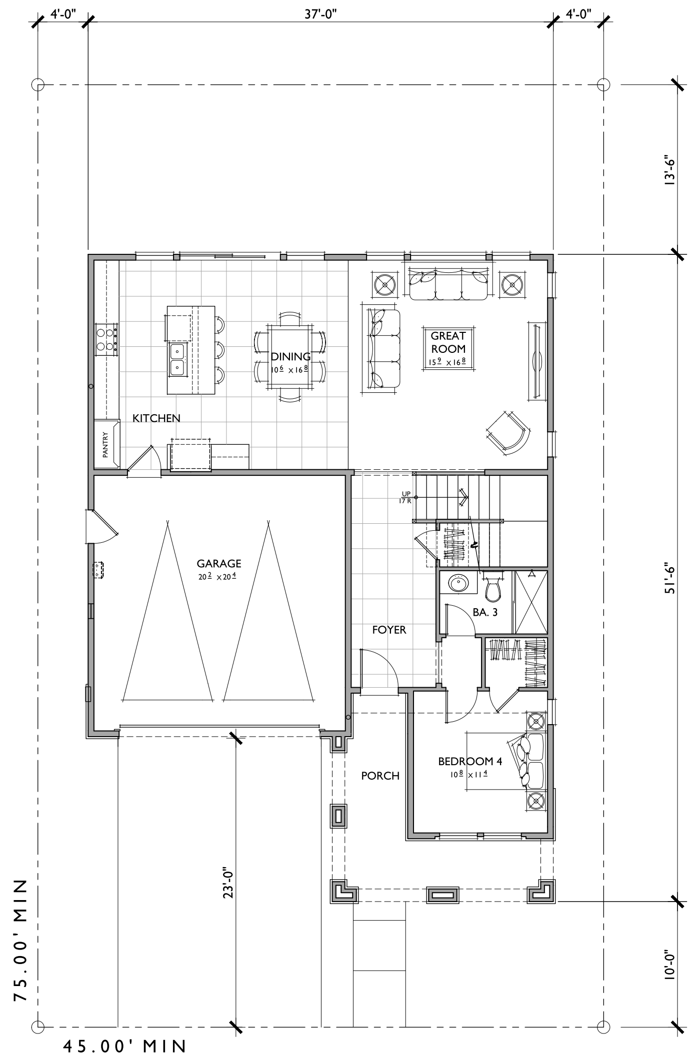
850.17209

08.14.18

LENNAR

SHEET NO.
A1.4





PLAN 1
2,408 SQ. FT.
4 BEDROOMS / 3 BATHS
2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,071 SQ. FT.
2ND FLOOR	1,337 SQ. FT.
TOTAL	2,408 SQ. FT.
2 - CAR GARAGE	427 SQ. FT.
PORCH	156 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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PLAN 1
Reflects Prairie Elevation
BURGUNDY
Gilroy, California

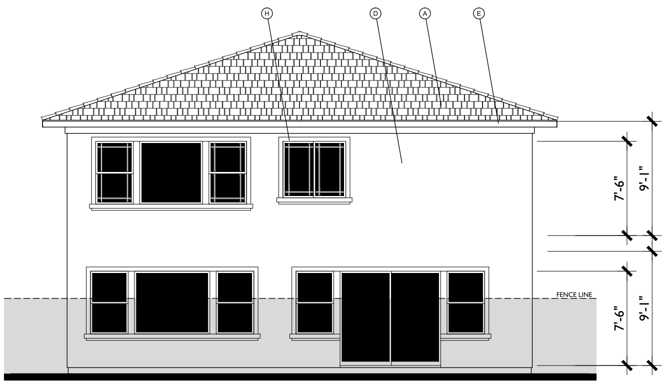
0 2 4 8

850.17209

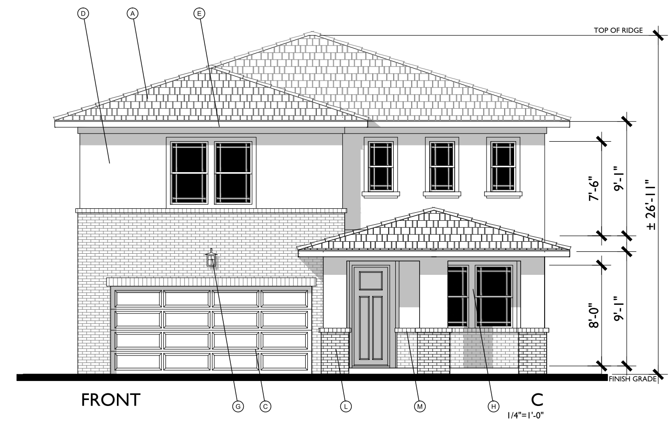
08.14.18

LENNAR

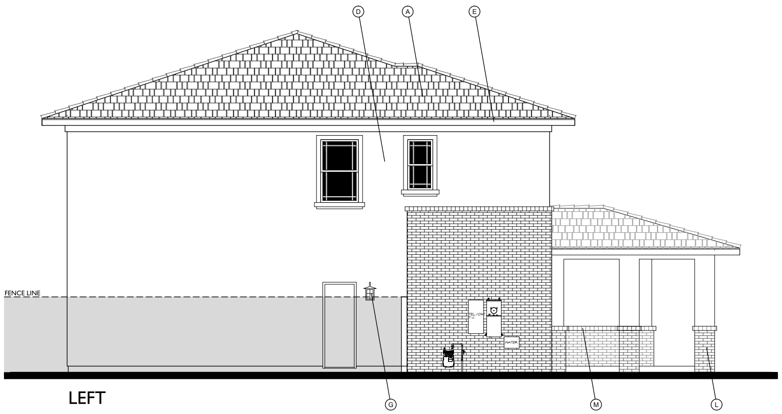
SHEET NO.
A1.5



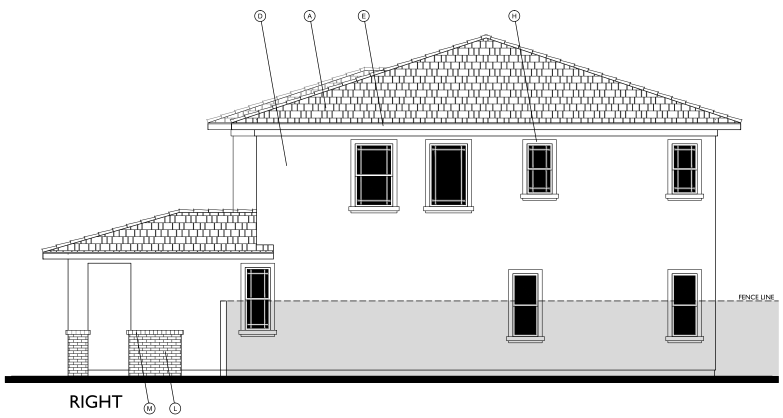
REAR



FRONT C
1/4"=1'-0"



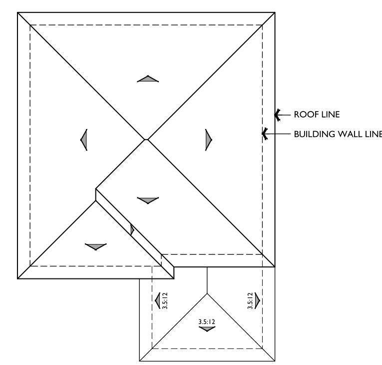
LEFT



RIGHT

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE



ROOF PLAN C

PITCH: 4:12
RAKE: N/A
EAVE: 24"
ROOF MATERIAL: CONCRETE FLAT TILE

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PLAN 1
Prairie Elevation
BURGUNDY
Gilroy, California

0 2 4 8

850.17209

08.14.18

LENNAR®

SHEET NO.
A1.6

SPANISH

CRAFTSMAN

PRAIRIE

Bassenian | Lagoni
ARCHITECTURE • PLANNING • INTERIORS

PLAN 2
Front Elevation
BURGUNDY
Gilroy, California

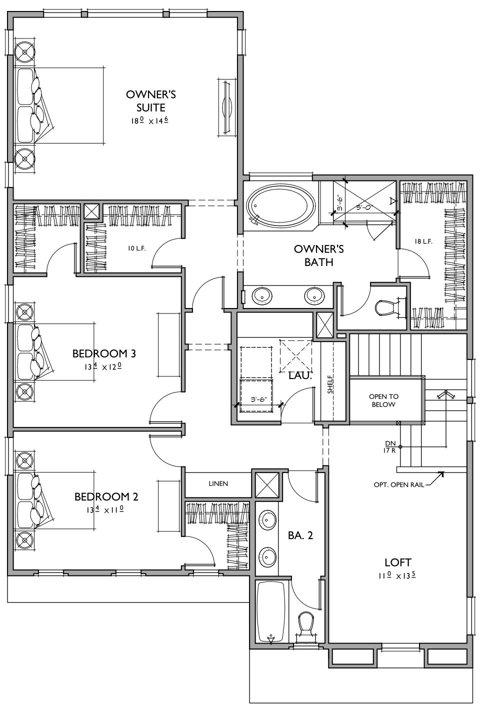
0 2 4 8

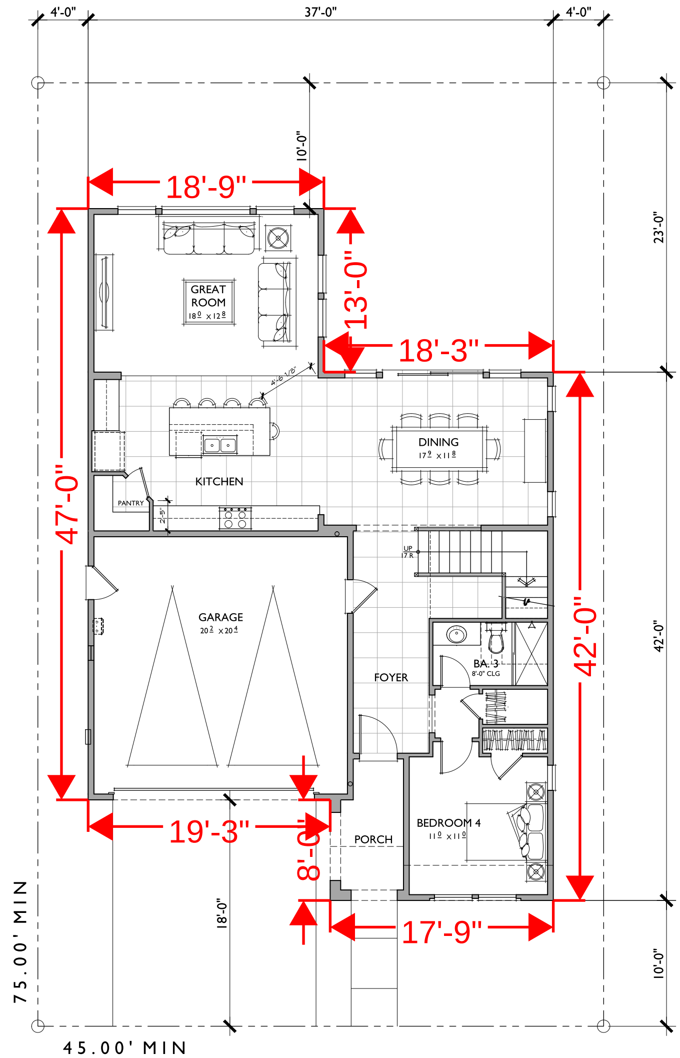
850.17209

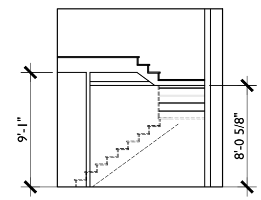
08.14.18

LENNAR

SHEET NO.
A 2.0







SECTION
AT BATH 3

PLAN 2
2,589 SQ. FT.
4 BEDROOMS / 3 BATHS
2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,151 SQ. FT.
2ND FLOOR	1,438 SQ. FT.
TOTAL	2,589 SQ. FT.
2 - CAR GARAGE	433 SQ. FT.
PORCH	60 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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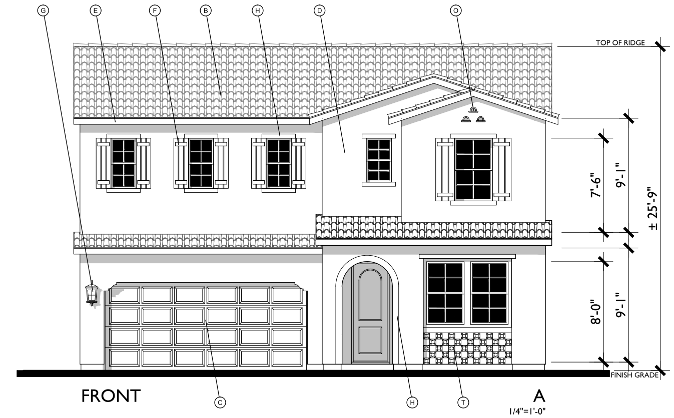
PLAN 2
Reflects Spanish Elevation
BURGUNDY
Gilroy, California
0 2 4 8
850.17209

08.14.18

SHEET NO.
A 2.1

REAR

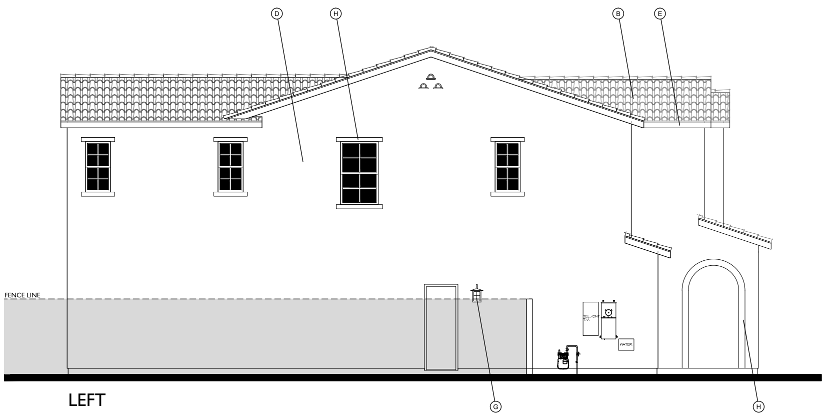


FRONT A

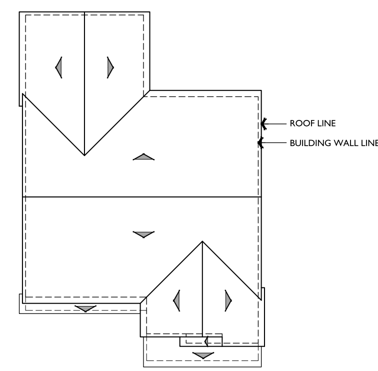
1/4"=1'-0"

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE

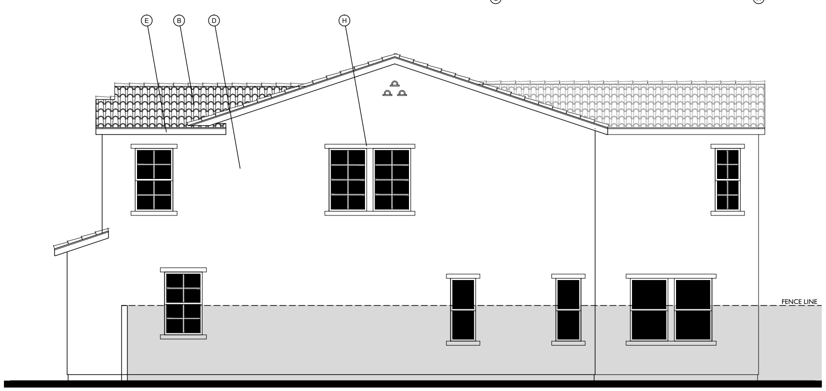


LEFT



ROOF PLAN A

PITCH: 4:12
RAKE: 6"
EAVE: 12"
ROOF MATERIAL: CONCRETE 'S' TILE



RIGHT

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PLAN 2
Spanish Elevation
BURGUNDY
Gilroy, California

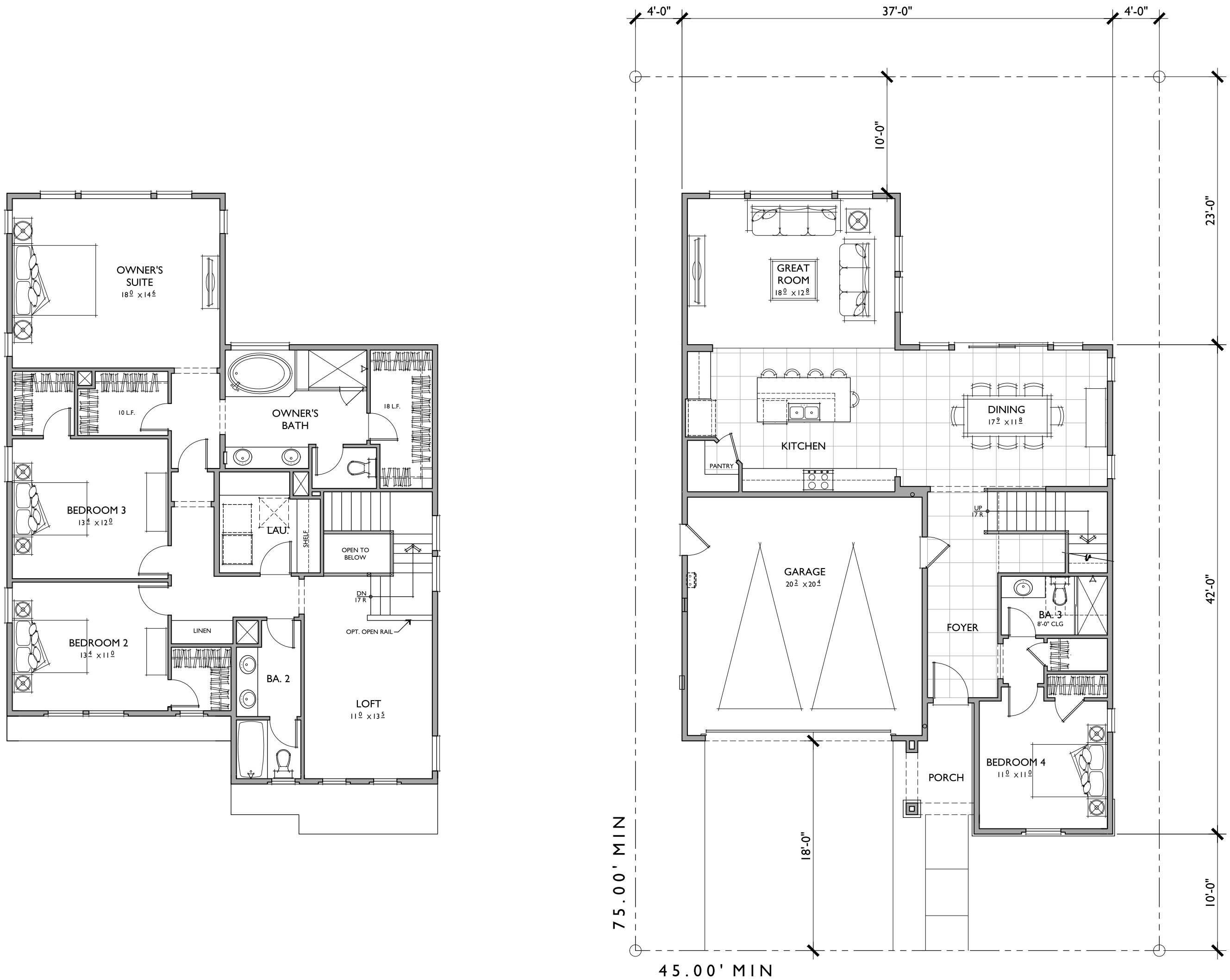
0 2 4 8

850.17209

08.14.18

LENNAR

SHEET NO.
A 2.2



PLAN 2

2,589 SQ. FT.
4 BEDROOMS / 3 BATHS
2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,151 SQ. FT.
2ND FLOOR	1,438 SQ. FT.
TOTAL	2,589 SQ. FT.
2 - CAR GARAGE	433 SQ. FT.
PORCH	60 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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PLAN 2
Reflects Craftsman Elevation

BURGUNDY
Gilroy, California

0 2 4 8

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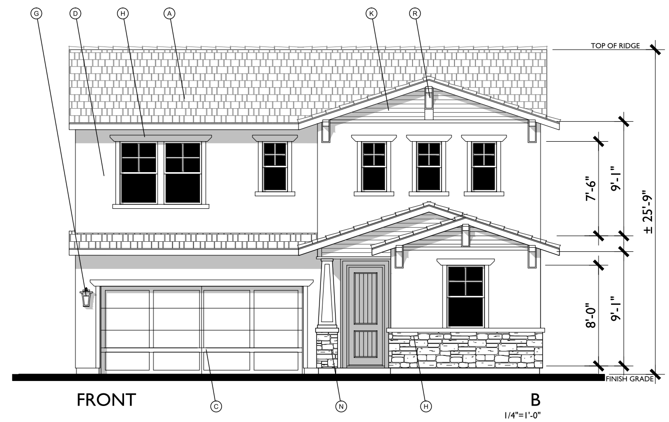
LENNAR

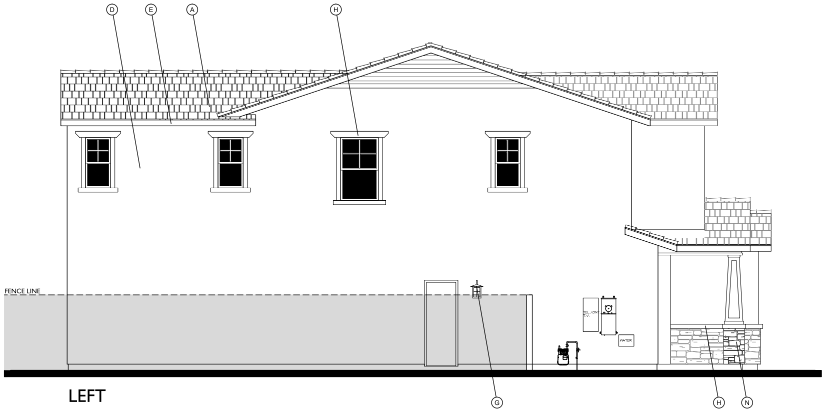
SHEET NO.
A 2.3

REAR

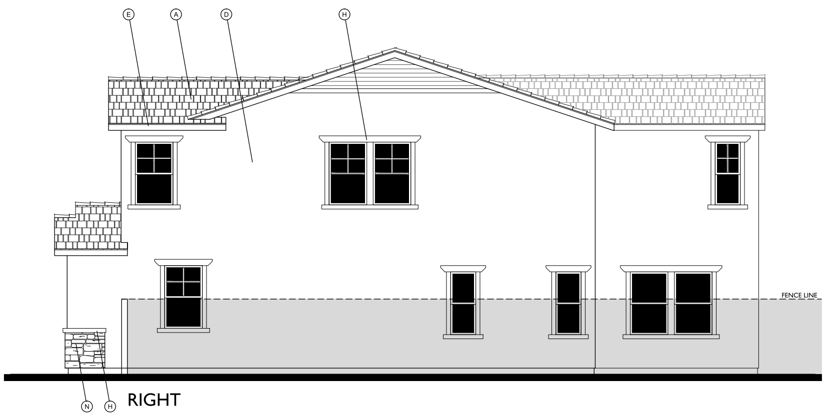


FRONT B

1/4"=1'-0"



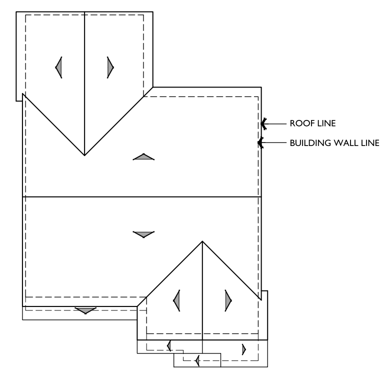
LEFT



RIGHT

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE



ROOF PLAN B

PITCH: 4:12
RAKE: 12" OR 6" PER LOCATION
EAVE: 18"
ROOF MATERIAL: CONCRETE FLAT TILE

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PLAN 2
Craftsman Elevation
BURGUNDY
Gilroy, California

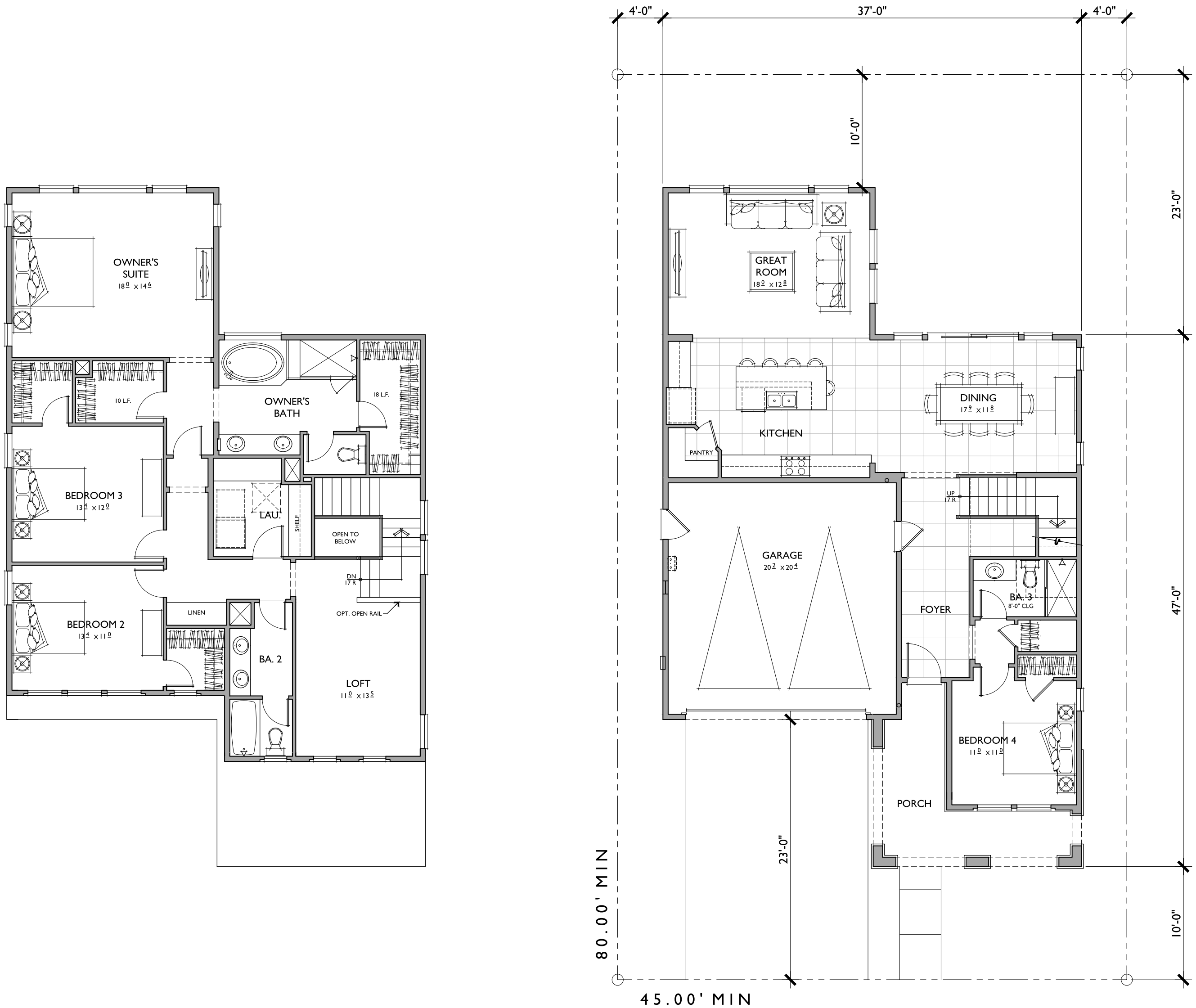
0 2 4 8

850.17209

08.14.18

LENNAR

SHEET NO.
A 2.4



PLAN 2
2,589 SQ. FT.
4 BEDROOMS / 3 BATHS
2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,151 SQ. FT.
2ND FLOOR	1,438 SQ. FT.
TOTAL	2,589 SQ. FT.
2 - CAR GARAGE	433 SQ. FT.
PORCH	157 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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PLAN 2
Reflects Prairie Elevation

BURGUNDY
Gilroy, California

0 2 4 8

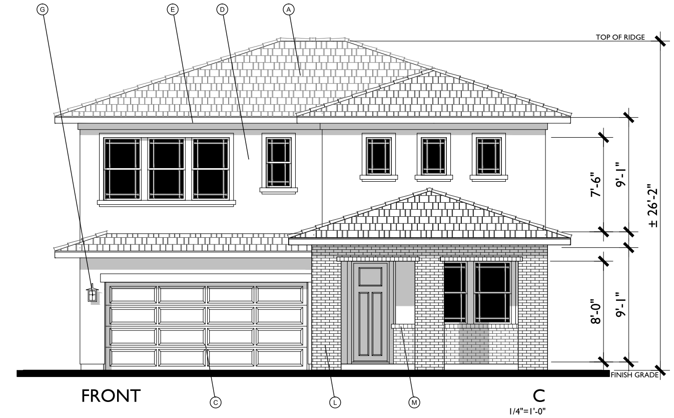
850.17209

08.14.18

LENNAR

SHEET NO.
A 2.5

REAR



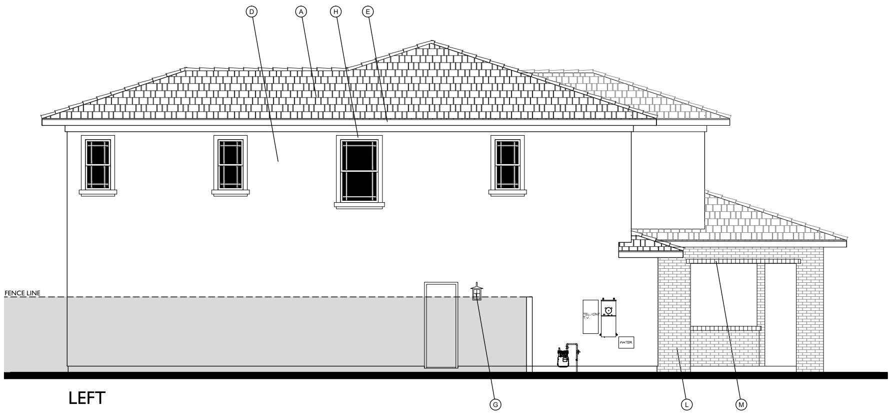
FRONT

C

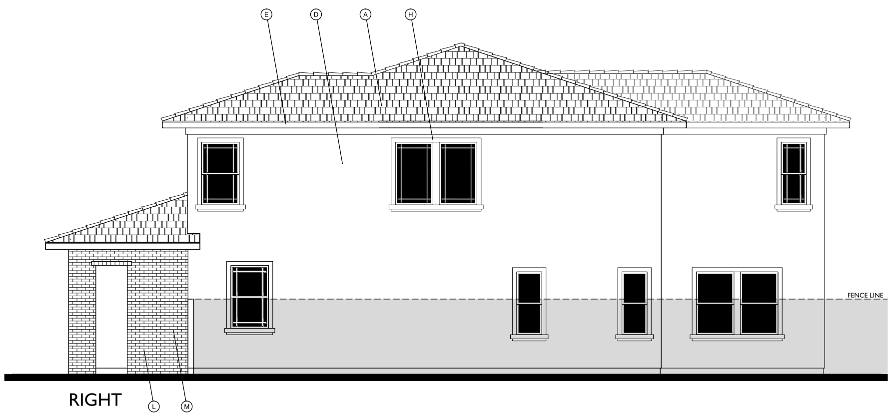
1/4"=1'-0"

MATERIAL LEGEND

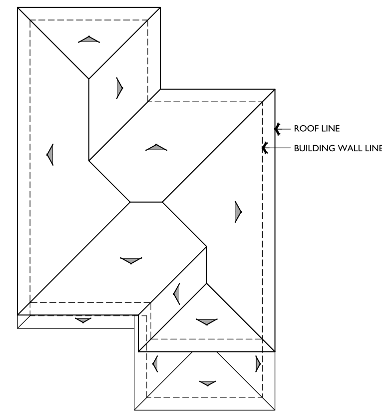
A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE



LEFT



RIGHT



ROOF PLAN C

PITCH: 4:12
RAKE: N/A
EAVE: 24"
ROOF MATERIAL: CONCRETE FLAT TILE

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PLAN 2
Prairie Elevation
BURGUNDY
Gilroy, California

0 2 4 8

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08.14.18

LENNAR

SHEET NO.
A 2.6

SPANISH

CRAFTSMAN

PRAIRIE

Bassenian | Lagoni
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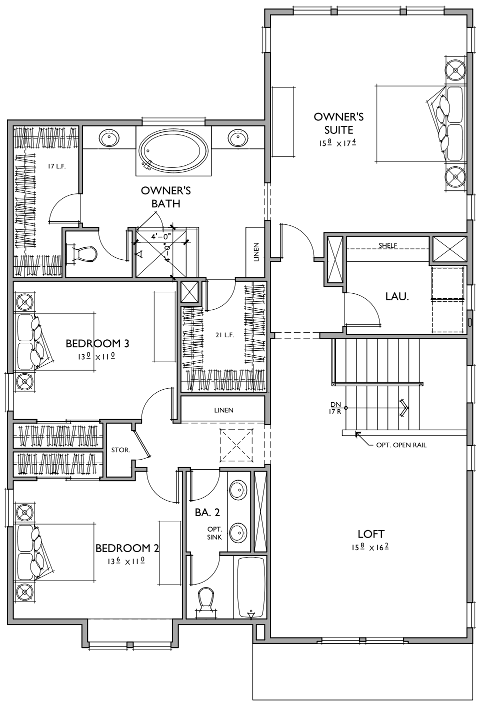
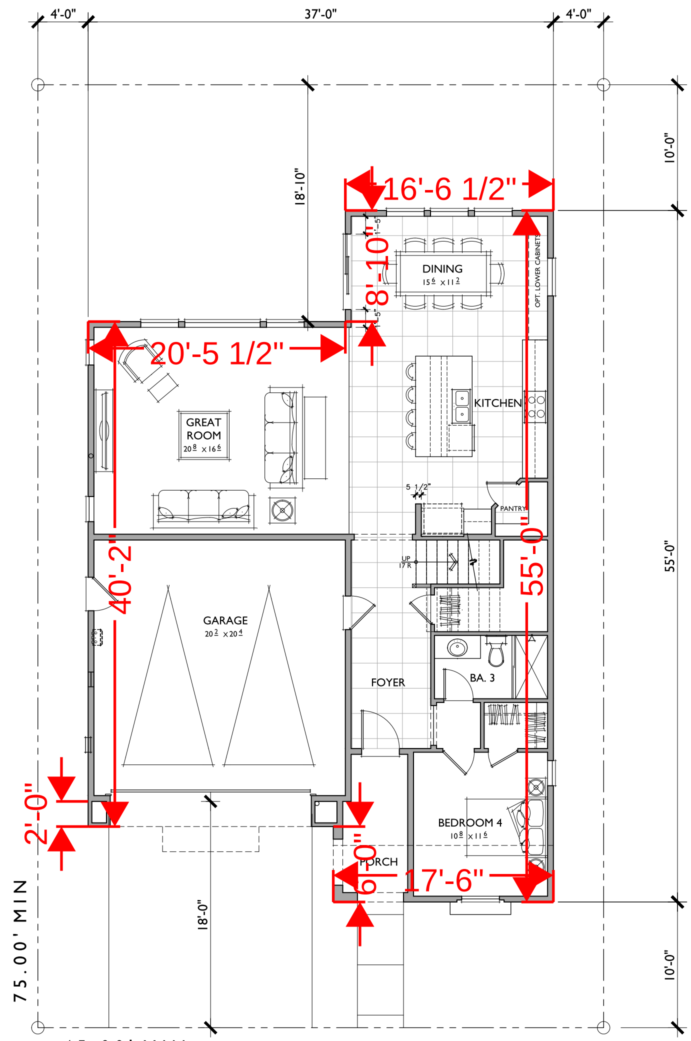
PLAN 3
Front Elevation
BURGUNDY
Gilroy, California
0 2 4 8
850.17209

08.14.18

LENNAR®

SHEET NO.
A 3.0





PLAN 3
2,787 SQ. FT.
4 BEDROOMS / 3 BATHS / LOFT
2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,207 SQ. FT.
2ND FLOOR	1,580 SQ. FT.
TOTAL	2,787 SQ. FT.
2 - CAR GARAGE	427 SQ. FT.
PORCH	64 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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ARCHITECTURE • PLANNING • INTERIORS

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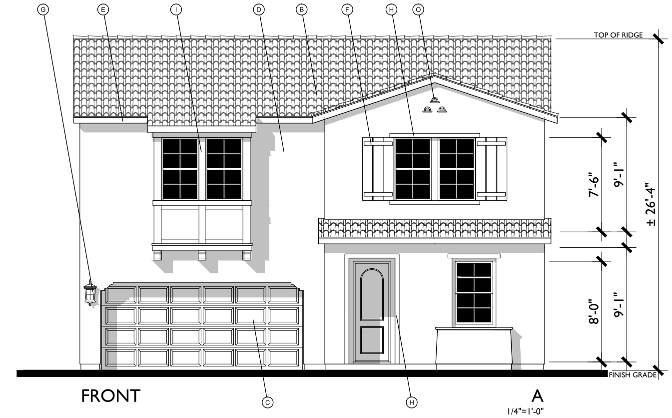
PLAN 3
Reflects Spanish Elevation
BURGUNDY
Gilroy, California
0 2 4 8
850.17209

08.14.18

LENNAR

SHEET NO.
A 3.1

REAR



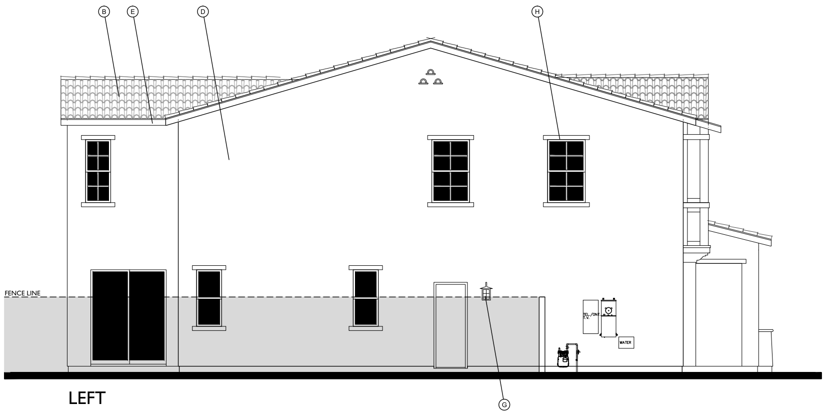
FRONT

A

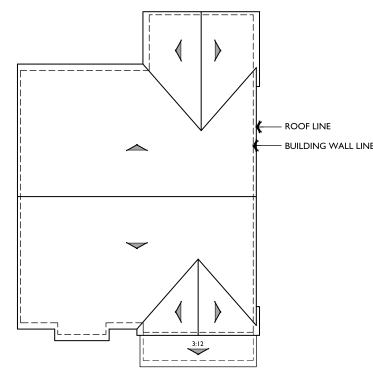
1/4"=1'-0"

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE

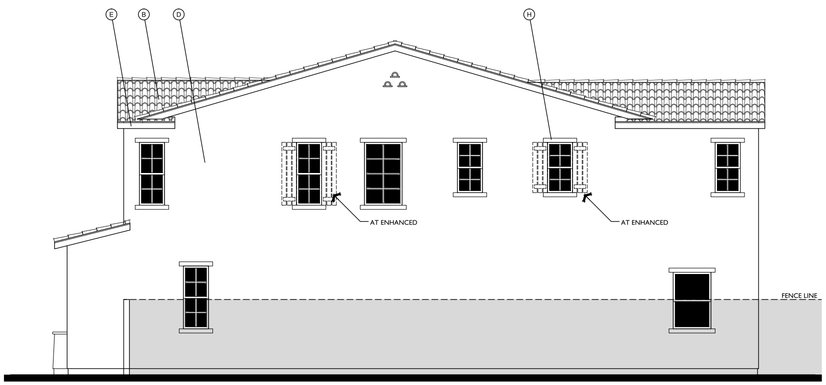


LEFT



ROOF PLAN A

PITCH: 4:12
RAKE: 6"
EAVE: 12"
ROOF MATERIAL: CONCRETE 'S' TILE



RIGHT

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PLAN 3
Spanish Elevation
BURGUNDY
Gilroy, California

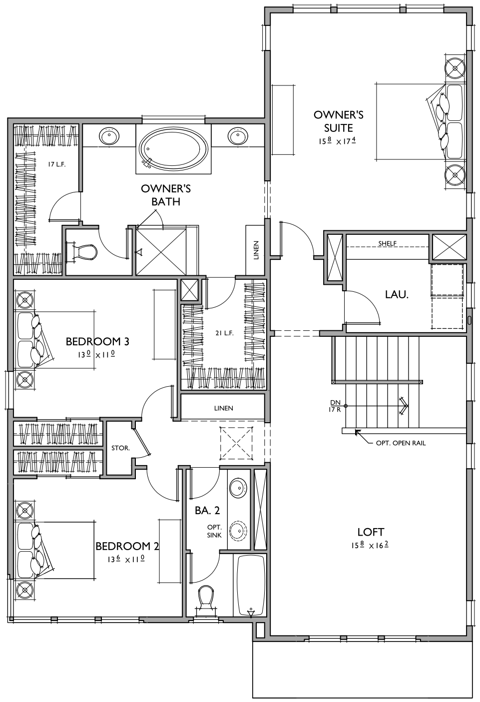
0 4 8 16

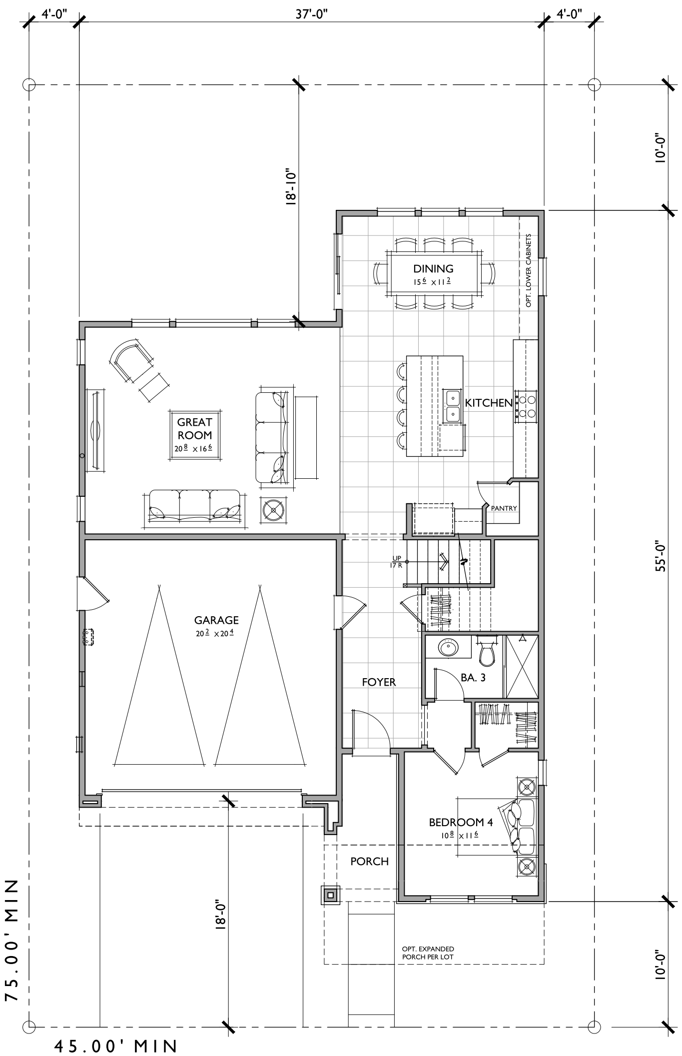
850.17209

08.14.18

LENNAR

SHEET NO.
A 3.2





PLAN 3

2,787 SQ. FT.
4 BEDROOMS / 3 BATHS / LOFT
2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,207 SQ. FT.
2ND FLOOR	1,580 SQ. FT.
TOTAL	2,787 SQ. FT.
2 - CAR GARAGE	427 SQ. FT.
PORCH	64 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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PLAN 3
Reflects Craftsman Elevation
BURGUNDY
Gilroy, California

0 2 4 8

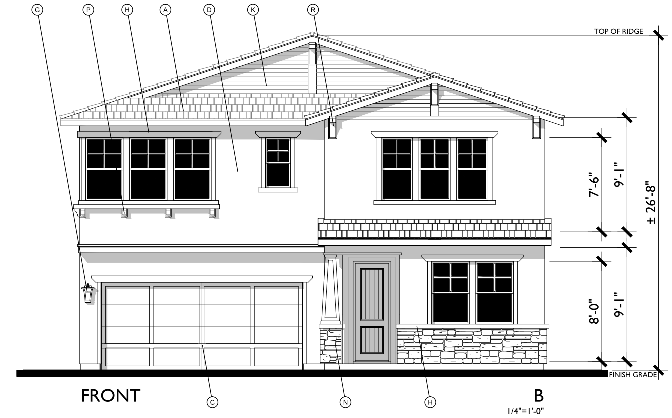
850.17209

08.14.18

LENNAR

SHEET NO.
A 3.3

REAR



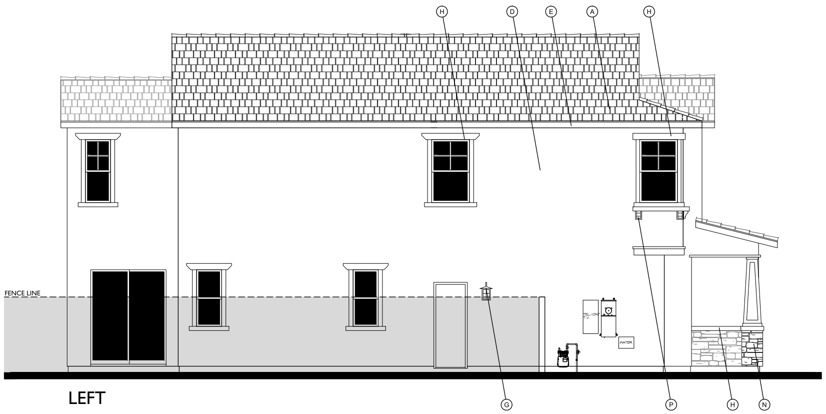
FRONT

B

1/4"=1'-0"

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE



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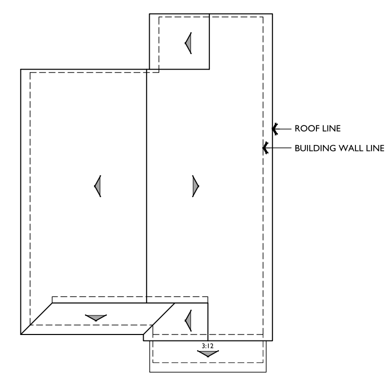
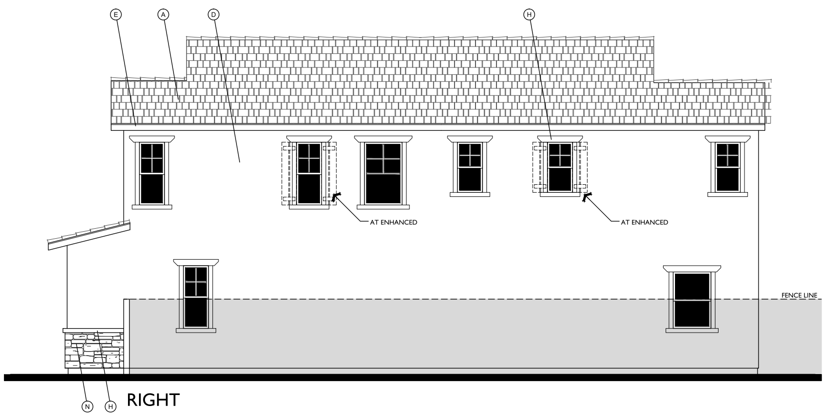


ROOF PLAN B

PITCH: 4:12
RAKE: 12" OR 6" PER LOCATION
EAVE: 18"
ROOF MATERIAL: CONCRETE FLAT TILE



RIGHT

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Newport Beach, CA USA 92660
tel +1 949 553 9100
fax +1 949 553 0548

PLAN 3
Craftsman Elevation
BURGUNDY
Gilroy, California

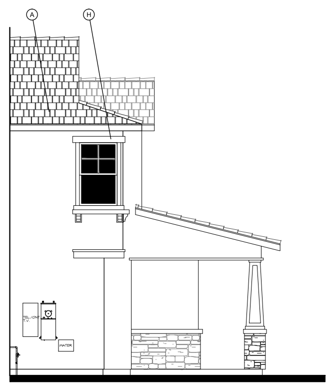
0 2 4 8

850.17209

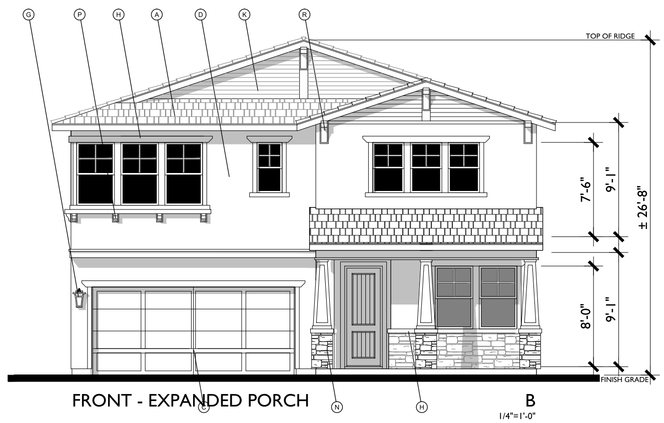
08.14.18

LENNAR

SHEET NO.
A 3.4



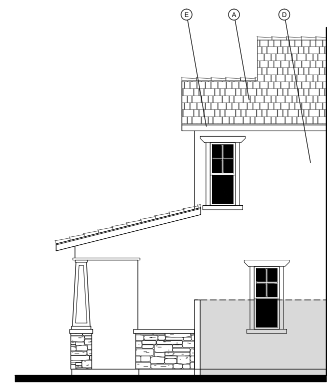
LEFT - EXPANDED PORCH



FRONT - EXPANDED PORCH

B

1/4"=1'-0"



RIGHT - EXPANDED PORCH

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE

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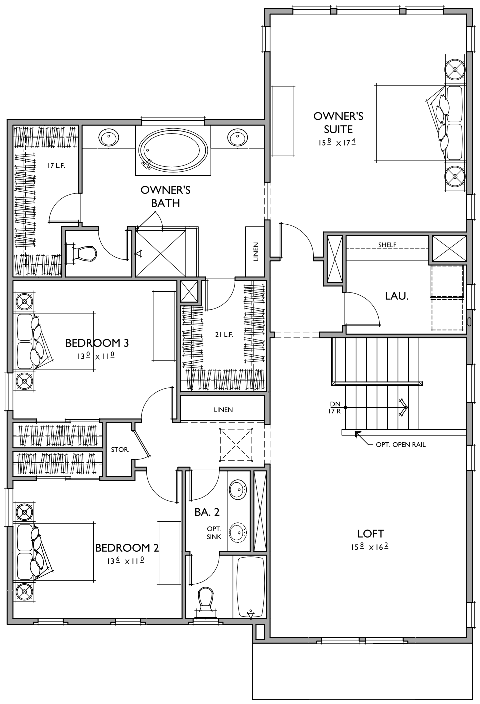
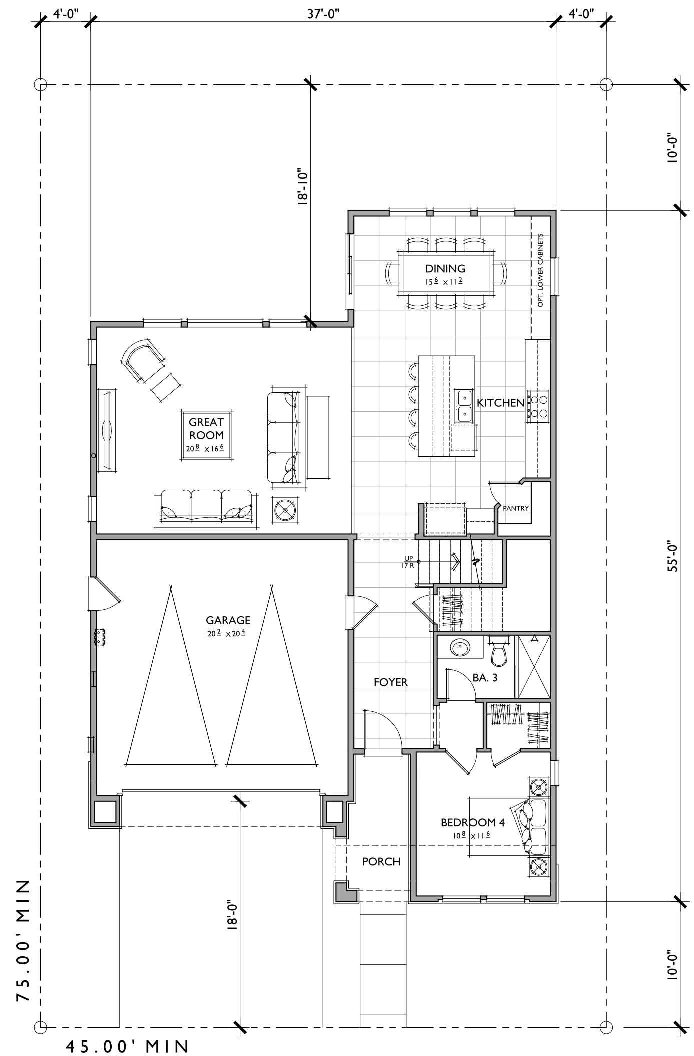
LENNAR

SHEET NO.
A 3.5





PLAN 3

2,787 SQ. FT.

4 BEDROOMS / 3 BATHS / LOFT

2 - CAR GARAGE

FLOOR AREA TABLE	
1ST FLOOR	1,207 SQ. FT.
2ND FLOOR	1,580 SQ. FT.
TOTAL	2,787 SQ. FT.
2 - CAR GARAGE	427 SQ. FT.
PORCH	64 SQ. FT.

NOTE: SQUARE FOOTAGE MAY VARY DUE TO METHOD OF CALCULATION

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PLAN 3

Reflects Prairie Elevation

BURGUNDY

Gilroy, California

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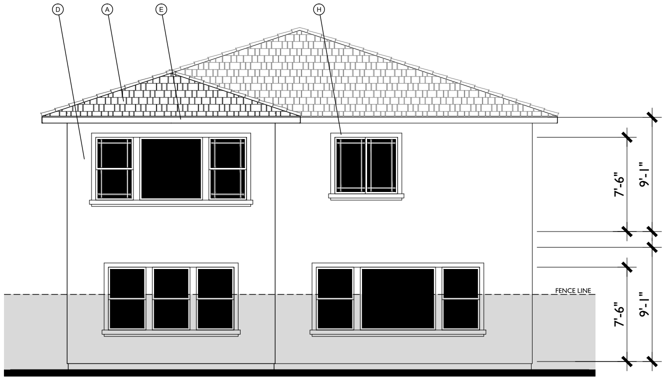
LENNAR

SHEET NO.
A 3.6



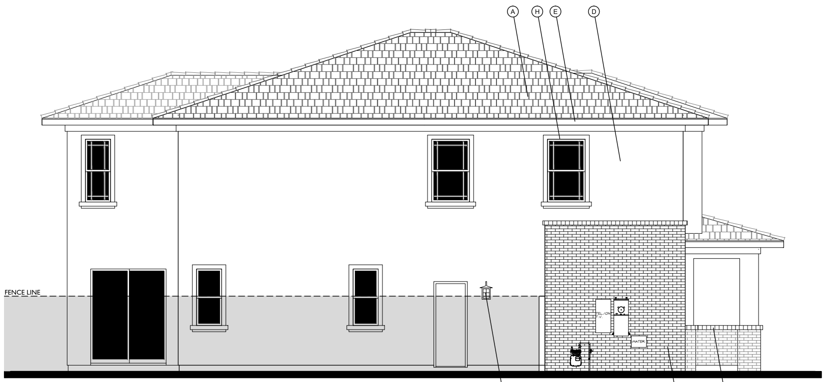
REAR

FRONT C

1/4"=1'-0"

MATERIAL LEGEND

A. CONCRETE FLAT TILE
B. CONCRETE 'S' TILE
C. ROLL UP GARAGE DOOR
D. STUCCO
E. WOOD FASCIA
F. COMPOSITE SHUTTER
G. LIGHT FIXTURE
H. STUCCO OVER FOAM TRIM
I. WOOD / CEMENTITIOUS TRIM
J. VERTICAL BOARD AND BATTEN SIDING
K. HORIZONTAL SIDING
L. BRICK VENEER
M. BRICK TRIM
N. STONE VENEER
O. DECORATIVE GABLE DETAIL
P. SHAPED CORBEL
Q. POTSHELF
R. WOOD BRACKET
S. WOOD POST
T. DECORATIVE TILE



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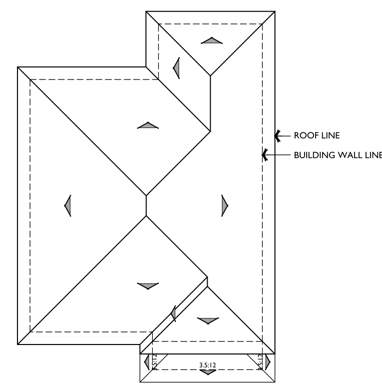
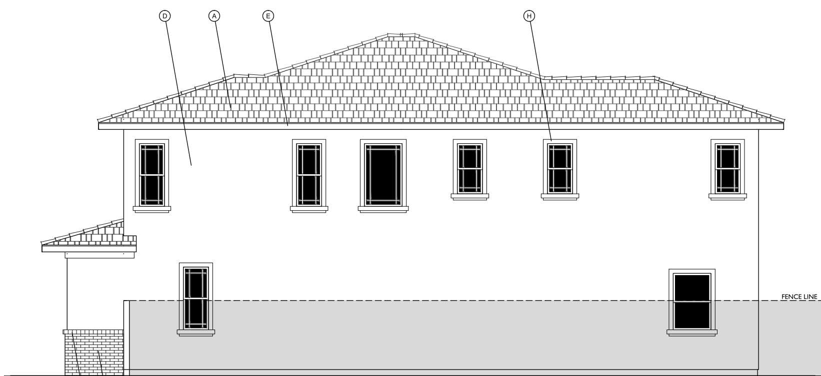


ROOF PLAN C

1/8"=1'-0"

PITCH: 4:12
RAKE: N/A
EAVE: 24"
ROOF MATERIAL: CONCRETE FLAT TILE



RIGHT

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PLAN 3
Prairie Elevation

BURGUNDY
Gilroy, California

0 2 4 8

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08.14.18

LENNAR

SHEET NO.
A 3.7

STORMWATER MANAGEMENT

Guidance Manual

for

LOW IMPACT DEVELOPMENT &

POST-CONSTRUCTION REQUIREMENTS

June 2015

City of Gilroy, City of Morgan Hill and County of Santa Clara

Contents

Section 1

Does My Project Need to Meet Post-Construction Performance Requirements?

Introduction

Gilroy, Morgan Hill and the portion of Santa Clara County that drains to the Pajaro River-Monterey Bay watershed (herein referred to as South Santa Clara County) are traditional Permittees under the State's Phase II Small MS4 General Permit ("Phase II Permit"). Since Gilroy, Morgan Hill and South Santa Clara County are located in Regional Water Quality Control Board Region 3 (Central Coast Region), they are subject to the Central Coast Post-Construction Requirements per Provision E.12.k of the Phase II Permit. The Central Coast Post-Construction Requirements were adopted in Resolution R3-2013-0032 and are specific to the Central Coast Region. These Post-Construction Requirements became effective March 6, 2014.

Post-construction controls are permanent features of a new development or redevelopment project designed to reduce pollutants in stormwater and/or erosive flows during the life of the project. Types of post-construction controls include low impact development (LID) site design, pollutant source control, stormwater treatment, and hydromodification management measures. The LID approach reduces stormwater runoff impacts by minimizing disturbed areas and impervious surfaces, maximizing opportunities for infiltration and evapotranspiration, and using stormwater as a resource (e.g. rainwater harvesting for non-potable uses).

Regulated Projects

Projects subject to the Central Coast Post-Construction Requirements include all New Development or Redevelopment projects that create and/or replace $\geq$2,500 square feet of impervious surface (collectively over the entire project site). This includes single family homes and the following road projects:

a) Removing and replacing a paved surface resulting in alteration of the original line and grade, hydraulic capacity or overall footprint of the road.

b) Extending the pavement edge, or paving graveled shoulders.

c) Resurfacing by upgrading from dirt to asphalt, or concrete; upgrading from gravel to asphalt, or concrete; or upgrading from a bituminous surface treatment ("chip seal") to asphalt or concrete.

Excluded Projects

Projects that are exempt from the Post-Construction Requirements are as follows:

a) New Development or Redevelopment projects that create and/or replace $\leq$2,500 square feet of impervious surface (collectively over the entire project site)

b) Road and Parking Lot maintenance:

- Road surface repair including slurry sealing, fog sealing, and pothole and square cut patching
- Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage
- Shoulder grading
- Cleaning, repairing, maintaining, reshaping, or re-grading drainage systems
- Crack sealing
- Resurfacing with in-kind material without expanding the road or parking lot
- Practices to maintain original line and grade, hydraulic capacity, and overall footprint of the road or parking lot
- Repair or reconstruction of the road because of slope failures, natural disasters, acts of God or other man-made disaster

c) Sidewalk and bicycle path or lane projects, where no other impervious surfaces are created or replaced, built to direct stormwater runoff to adjacent vegetated areas

d) Trails and pathways, where no other impervious surfaces are replaced or created, and built to direct stormwater runoff to adjacent vegetated areas

e) Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics

f) Curb and gutter improvement or replacement projects that are not part of any additional creation or replacement of impervious surface area (e.g., sidewalks, roadway)

g) Second-story additions that do not increase the building footprint

h) Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage

i) Photovoltaic systems installed on/over existing roof or other impervious surfaces, and panels located over pervious surfaces with well-maintained grass or vegetated groundcover, or panel arrays with a buffer strip at the most down gradient row of panels

j) Temporary structures (in place for less than six months)

k) Electrical and utility vaults, sewer and water lift stations, backflows and other utility devices

l) Above-ground fuel storage tanks and fuel farms with spill containment system

A checklist of the excluded projects is available in Appendix A.

Performance Requirements

A project may be required to meet different post-construction requirements or Performance Requirements (PR) depending on the type and location of the project and amount of impervious surface created and/or replaced. Performance Requirements include:

- PR-1 - Site Design and Runoff Reduction
- PR-2 - Water Quality Treatment
- PR-3 - Runoff Retention
- PR-4 - Peak Management

See the Table 1 for a summary of the Performance Requirements. Details on the implementation of these Performance Requirements are provided in the following Chapters.

Table 1. Post Construction Requirements at a Glance[1]

Type of Project	Requirements
Tier 1 Projects, including single-family homes, that create or replace 2,500 square feet or more of impervious surface	**PR-1 - Implement LID Measures:** • Limit disturbance of natural drainage features. • Limit clearing, grading, and soil compaction. • Minimize impervious surfaces. • Minimize runoff by dispersing runoff to landscape or using permeable pavements.
Tier 2 Projects, other than single-family homes, that create or replace 5,000 SF or more of net impervious surface[2] Detached single-family homes that create or replace 15,000 SF or more of net impervious surface	**PR-1 requirements, plus PR-2:** • Treat runoff with an approved and appropriately sized LID treatment system prior to discharge from the site.
Tier 3 Projects, other than single-family homes, that create or replace 15,000 SF or more of impervious surface. Detached single-family homes that create or replace 15,000 SF or more of net impervious surface[2].	**PR-2 requirements, plus PR-3:** • Prevent offsite discharge from events up to the 95th percentile rainfall event using Stormwater Control Measures[3].
Tier 4 Projects, including single-family homes, that create or replace 22,500 square feet or more of impervious surface.	**PR-3 requirements, plus PR-4:** • Control post-project peak flows to not exceed pre-project peak flows for the 2- through 10-year storm events. (May be satisfied by Tier 3 requirements for some projects.)

Notes:
[1]Adapted from "Stormwater Technical Guide for Low Impact Development: Compliance with Stormwater Post-Construction Requirements in Santa Barbara County", Project Clean Water, County of Santa Barbara, Water Resources Division, February 18, 2014
[2]Net impervious surface equals new and replaced impervious area minus the total pre-project to post-project reduction in impervious area (if any).
[3]Single-family home projects in some areas of Santa Clara County may be allowed to retain runoff from the 85th percentile rainfall event if they are in Watershed Management Zones 5, 6 or 9.

Source Control Measures

Regulated Projects with pollutant-generating activities and sources are required to implement structural and/or operational source control measures. Structural source controls are permanent design features that reduce pollutant sources. For example, some structural source controls are covered trash enclosures, labels on storm drain inlets and draining non-stormwater discharges to landscaping or the sanitary sewer. Operational source controls are practices conducted on an ongoing basis to reduce pollutant sources. An example operational source control is integrated pest management for landscaping. Source control measures should be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment[1] (or equivalent). Pollutant generating activities and sources include:

- Accidental spills or leaks
- Interior floor drains
- Parking/storage areas and maintenance
- Indoor and structural pest control
- Landscape/outdoor pesticide use
- Pools, spas, ponds, decorative fountains and other water features
- Restaurants, grocery stores and other food service operations
- Refuse areas
- Industrial processes
- Outdoor storage of equipment and materials
- Vehicle and equipment cleaning
- Vehicle and equipment repair and maintenance
- Fuel dispensing areas
- Loading docks
- Fire sprinkler test water
- Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources
- Unauthorized non-stormwater discharges
- Building and grounds maintenance

A Source Control Checklist is provided in Appendix A.

Site Design and Stormwater Control Measures Concepts

The key to meeting the performance requirements is to plan and design stormwater control measures (SCMs) integrally with the conceptual site plan and landscaping for the project. Lay out the site to protect and preserve natural areas and drainage patterns. Delineate drainage management areas (DMAs) on your site. Develop your stormwater control plan to take

[1] https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook

advantage of vegetated areas for infiltration. If applicable, locate and size your LID facilities as part of the site plan.

Small, Tier 1 projects only need to implement site design measures to reduce runoff from the site. Site design measures include dispersing runoff to landscaping, using permeable pavement or capturing runoff (rain barrels and cisterns) for reuse. Site design measures are also required in larger projects and should be used to reduce the amount of runoff that must be treated (PR-2) or retained (PR-3). This is accomplished by designing self-treating and/or self-retaining areas.

Self-Treating Areas

A self-treating area is a pervious area that treats rain falling on itself only, by ponding, infiltration and evapotranspiration. The pervious area can be undisturbed vegetation, planted with native drought tolerant or LID appropriate vegetation, pervious paving, artificial turf or a green roof. Self-treating areas are flat or slightly concave, and retain and infiltrate rainfall up to the design rainfall depth. If the pervious area infiltrates the design rainfall, then the additional runoff can be directed directly to the storm drain system with no additional treatment. The example in Figure 1 demonstrates that by having a pervious self-treating area on the site, the runoff from the impervious areas may flow to a smaller treatment measure.

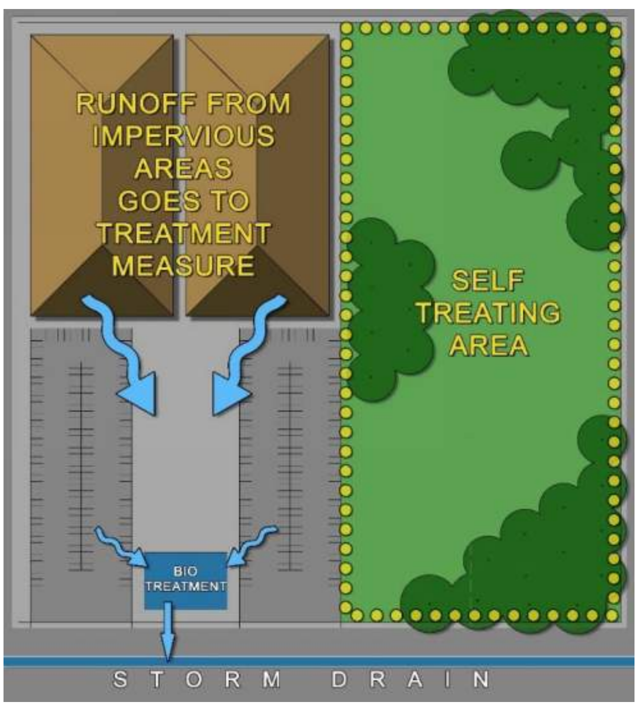

Figure 1. Schematic Diagram of a Site with a Self-Treating Area
(Reference: SCVURPPP C.3 Stormwater Handbook, 2012)

Self-Retaining Areas

A self-retaining area is a pervious area that retains rainfall that falls on itself and the runoff from an adjacent impervious area. A maximum 2:1 ratio of impervious area to the receiving pervious area is acceptable[2]. The pervious area is designed as a landscaped area that is slightly concave to allow up to 3 inches of ponding or pervious paving with additional storage. If the pervious area is able to infiltrate the design runoff volume without discharge to the storm drain system and without creating nuisance ponding that may affect vegetation health or contribute to vector problems, then no additional stormwater management is required for the contributing impervious area. The example in Figure 2 demonstrates that self-retaining areas reduce the amount of impervious area that requires treatment and allow a smaller treatment measure to be used.

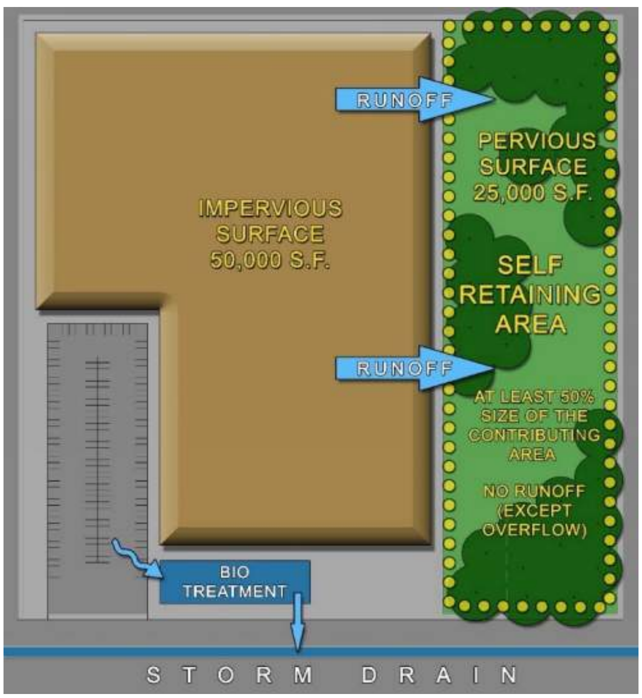

Figure 2. Schematic Drainage Plan for Site with a Self-Retaining Area
(Reference: SCVURPPP C.3 Stormwater Handbook, 2012)

LID Treatment and Retention Options

LID treatment methods are the preferred option when stormwater treatment (PR-2) is required. LID treatment is defined as rainwater harvesting/use, infiltration, and evapotranspiration, and biotreatment. LID options can also be used to meet the runoff retention requirements (PR-3) where site conditions allow.

---

[2]This rule of thumb may not be applicable if designing for 95th percentile storm retention (PR-3). It is being investigated and this Manual will be updated when new information is available.

For rainwater harvesting and use, rainwater is collected in rain barrels or cisterns and used for non-potable uses such as toilet flushing or irrigation. Possible barriers to large scale rainwater harvesting systems are a lack of demand to use the entire water quality design volume, competition with recycled water use, complex maintenance requirements, and higher capital and O&M costs than other options.

Infiltration facilities (e.g., infiltration trench, as in Figure 3) store water in the void space of rocks, allowing it to infiltrate to the surrounding soils. This approach requires reasonably infiltrative soils (i.e., minimum infiltration rate of 0.5 in/hr). There are also subsurface infiltration systems that use underground pipes, vaults, or modular units to store and infiltrate runoff. These systems provide more capacity in a smaller footprint but are not recommended for poorly infiltrating soils due to the potential for standing water. These systems can be installed under parking lots, vegetated areas or other at-grade features.

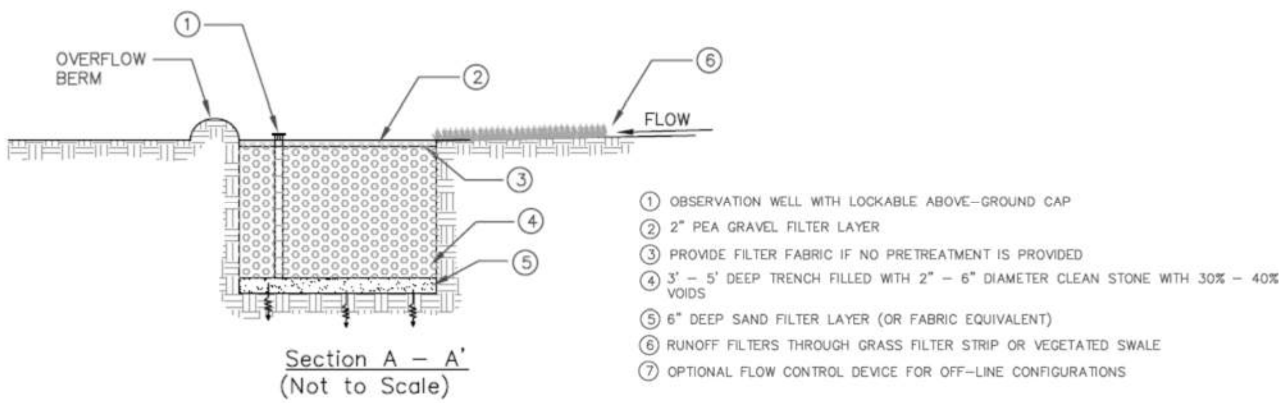

Figure 3. Example Infiltration Trench Design
(Reference: SCVURPPP C.3 Stormwater Handbook, 2012)

Bioretention areas are concave landscaped areas, of any shape, that provide treatment via filtration through special biotreatment soil that has a specified infiltration rate (typically 5 inches per hour). Bioretention design details are available at the Central Coast Low Impact Development Initiative (LIDI) website.[3]

When bioretention areas are unlined and have no underdrain (Figure 4), they are able to provide runoff retention via infiltration and evapotranspiration in addition to treatment. If the bioretention area has an underdrain placed near the top of the subsurface drainage/storage (gravel) layer (Figure 5), it provides some infiltration and evapotranspiration prior to discharge of treated stormwater through the underdrain. This is a typical design used on sites with C & D type (loamy or clayey) soils. If a bioretention area is lined, with an underdrain placed at the bottom of the facility, it is often referred to as a biotreatment area and is considered a non-

[3] http://www.centralcoastlidi.org/Central_Coast_LIDI/LIDI_Details.html

retention based treatment system. Other non-retention based treatment systems include flow-through planters, manufactured tree well filters, and media filters.

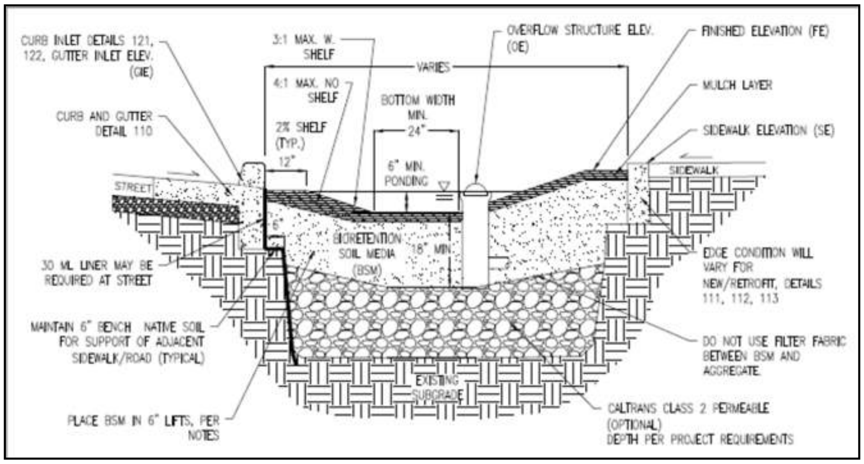

Figure 4. Street Bioretention Facility (sloped sided, without underdrain)
(Reference: Central Coast LIDI)

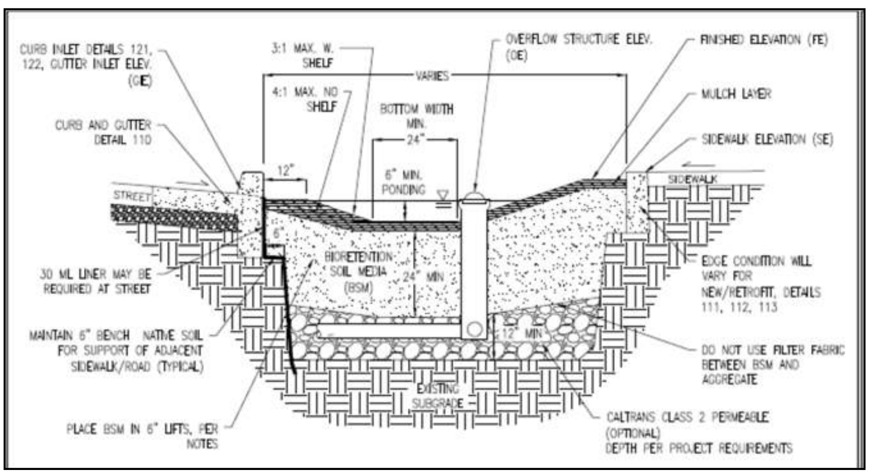

Figure 5. Street Bioretention Facility (sloped sided, <u>with</u> underdrain)
(Reference: Central Coast LIDI)

For additional resources on site design and stormwater control measures, see Appendix J.

<u>Peak Management Stormwater Control Measures</u>

SCMs used to manage peak flows include ponds, detention basins, tanks or vaults that have a specialized outlet to control the rate of flow to match pre-project conditions. SCMs used to meet the runoff retention requirements also help reduce peak flows and may be able to meet peak management requirements if additional storage capacity is provided.

Stormwater Control Measures Sizing Methodology

Drainage Management Areas

The first step for sizing water quality treatment (PR-2) or runoff retention (PR-3) SCMs is to delineate the site's drainage management areas (DMAs). DMAs are catchments or portions of a project site that drain to a common point. Follow roof ridges and grade breaks when delineating DMAs. There must be a different DMA for each type of surface (e.g, landscaped, impervious, or pervious pavement). There are four types of DMAs:

- Self-treating area,
- Self-retaining area,
- Area draining to self-retaining area and
- Area draining to a SCM.

Note, multiple DMAs may drain to one SCM, but one DMA may not drain to multiple SCMs. For each DMA draining to a SCM, determine the square footage, type of surface, and corresponding runoff factor. This information is used for sizing runoff retention and/or water quality treatment SCMs.

The runoff factors used will depend on the chosen tools for sizing SCMs:

- Table 2 lists runoff factors that are used for the 4% simplified sizing method discussed in Section 3 for water quality treatment SCMs.
- The Santa Barbara Sizing Calculator, used for designing water quality treatment or runoff retention SCMs (see Section 4), uses slightly different runoff factors, e.g., 0.9 for impervious surfaces instead of 1.0, and 0.2 for unit pavers on sand instead of 0.5.
- Attachment D of the Central Coast Post-Construction Requirements sizing guidance provides a formula that utilizes the fraction of impervious area to calculate the runoff coefficient for the runoff retention simple sizing method (see Appendix D).
- Attachment E of the Central Coast Requirements provide specific correction factors the Regulated Project must use when calculating the ten percent adjustment to the runoff retention requirement (see Appendix F).

Table 2. Runoff Factors for LID Design (small storms)

DMA Surface Type	Runoff Factor
Roofs and paving	1.0
Landscaped areas	0.1
Bricks or solid pavers on sand base	0.5
Pervious concrete or asphalt	0
Turf block or gravel – total section ≥ 6" deep	0

(Reference: Santa Barbara County Stormwater Technical Guide, 2014)

Hydraulic Sizing Criteria

SCMs can be sized using a flow-based or volume-based hydraulic sizing method. An example of using flow-based sizing criteria will be discussed in Section 3 and volume based criteria discussed in Section 4. Table 3 shows which hydraulic sizing method is appropriate for commonly used SCMs.

Table 3. Flow and Volume Based Stormwater Control Measure Sizing Criteria

SCM Type	**Hydraulic Sizing Criteria**
Rainwater harvesting and reuse	Volume-based
Infiltration trench	Volume–based
Subsurface infiltration system	Volume-based
Bioretention area	Flow- or volume-based
Tree well filter	Flow-based
Media filter	Flow-based
Extended detention basin	Volume-based

Section 2

Performance Requirement No. 1

Site Design and Runoff Reduction

Projects subject to Performance Requirement No. 1 (PR-1) Site Design and Runoff Reduction are Projects that create and/or replace $\geq$ 2,500 square feet of impervious surface (collectively over the entire project site), including detached single-family homes. PR-1 requires the use of site design LID strategies. Projects are required to implement at least the following measures:

- Limit disturbance of creeks and natural drainage features
- Minimize compaction of highly permeable soils
- Limit clearing and grading of native vegetation
- Minimize impervious surfaces
- Minimize stormwater runoff by implementing one or more of the following site design measures:
    - Direct roof runoff into cisterns or rain barrels for reuse
    - Direct roof runoff onto vegetated areas
    - Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas
    - Direct runoff from driveways and/or uncovered parking lots onto vegetated areas
    - Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways and patios with permeable surfaces

When dispersing runoff to landscape areas, ensure it is safely away from building foundations and footings, consistent with the California Building Code.

The Project Engineer must submit a stamped and signed copy of the Performance Requirement No. 1 Certification, as included in Appendix A, stating that LID design strategies are included in the project design.

Section 3

Performance Requirement No. 2

Water Quality Treatment

Projects subject to Performance Requirement No. 2 (PR-2) Water Quality Treatment are:

- Projects with ≥ 5,000 square feet (sf) of Net Impervious Area, except detached single-family homes.
- Detached single-family homes ≥ 15,000 sf of Net Impervious Area.

For the purpose of determining if a project is subject to PR-2, Net Impervious Area is the total (including new and replaced) post-project impervious area, minus any reduction in total imperviousness from the pre-project to post-project condition:

Net Impervious Area = (New and Replaced Impervious Area) - (Reduced Impervious Area Credit)

where

Reduced Impervious Area Credit = (Total Pre-Project Impervious Area) - (Total Post-Project Impervious Area)

Two example calculations of Net Impervious Area are provided below:

Net Impervious Area Calculation Example 1

1. An existing commercial shopping center has 100,000 sf of impervious surface.
2. The new project will have a total impervious area of 85,000 sf.
3. The **Reduced Impervious Area Credit** is: 100,000 – 85,000 = 15,000 sf
4. The **Net Impervious Area** is: 85,000 – 15,000 = 70,000 sf
5. The Net Impervious Area is > 5,000 sf therefore the project is subject to PR-2 Water Quality Treatment

Net Impervious Area Calculation Example 2

1. An existing commercial shopping center has 100, 000 sf of impervious surface.
2. The new project will redesign the site with a total impervious area of 50,000 sf (the developer proposes a significant amount of landscaping and green roofs).
3. The **Reduced Impervious Area Credit** is: 100,000 – 50,000 = 50,000 sf
4. The **Net Impervious Area** is: 50,000 – 50,000 = 0 sf
5. The Net Impervious Area is < 5,000 sf; therefore the project is NOT subject to PR-2 Water Quality Treatment.

If it is determined that a project is subject to the PR-2 requirements, the Water Quality Treatment measure must be designed to treat runoff from all post-project impervious surfaces (except those that drain to self-retaining areas), unless runoff from the existing surfaces can be separated from the new and replaced impervious surfaces.

A Stormwater Control Plan is required for all Regulated Projects subject to PR-2. Appendix B provides a checklist of the Stormwater Control Plan required information. A Stormwater Control Plan template with additional guidance is available on the Central Coast Regional Water Board website[4]. Note that Regulated Projects subject to PR-2 must also meet PR-1 requirements and submit a Performance Requirement No. 1 Certification.

The on-site Water Quality Treatment measures available to Regulated Projects (in order of preference) and the associated design criteria are provided in Table 4:

Table 4. Water Quality Treatment Measures Design Criteria

Water Quality Treatment Measure*	Design Criteria
LID Treatment System - *Harvesting and use, infiltration, evapotranspiration, and bioretention (without an underdrain) SCMs*	Retain stormwater runoff from 85^{th} percentile 24-hour storm event (based on local rainfall data)
Biofiltration Treatment System - *Bioretention with raised underdrain, or other facilities at least as effective as a system with the specified design criteria*	Design rain event of 0.2 in/hr intensity OR 2 x 85^{th} percentile hourly rainfall intensity Other specified design criteria include: • Maximum surface loading rate 5 in/hr • Minimum surface reservoir depth (6") • Minimum planting medium depth (24") • Proper plant selection • Subsurface gravel layer (minimum depth of 12") • Underdrain placement near top of gravel layer • No compaction of soils beneath facility • No liners preventing infiltration
Non-Retention Based Treatment Systems - *Lined bioretention, flow-through planters, and high rate tree well filters and media filters*	Volume Hydraulic Design Basis: 85^{th} percentile 24-hr storm event Flow Hydraulic Design Basis: 0.2 in/hr intensity OR 2 x 85^{th} percentile hourly rainfall intensity

*Multiple SCMs may be used to collectively achieve the design criteria.

[4] http://www.swrcb.ca.gov/rwqcb3/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml

The 85th percentile rainfall map is available in Appendix C and can be obtained as GIS shape files on the Central Coast Water Board website[5]. There are several methods and tools for sizing water quality treatment measures to meet the design criteria above. These are discussed in more detail in Section 4.

There is a simplified sizing method for bioretention facilities meeting the design loading rate (infiltration rate) of 5 inches per hour to detain and treat runoff produced by a rainfall intensity of 0.2 inches per hour . If it is assumed that 100% of rainfall ends up as inflow to the bioretention facility, then the ratio of bioretention surface area to tributary impervious area (or sizing factor) needs to be 0.04 (0.2 in/hr ÷ 5 in/hr) (see Figure 6). An example calculation is shown in Table 5.

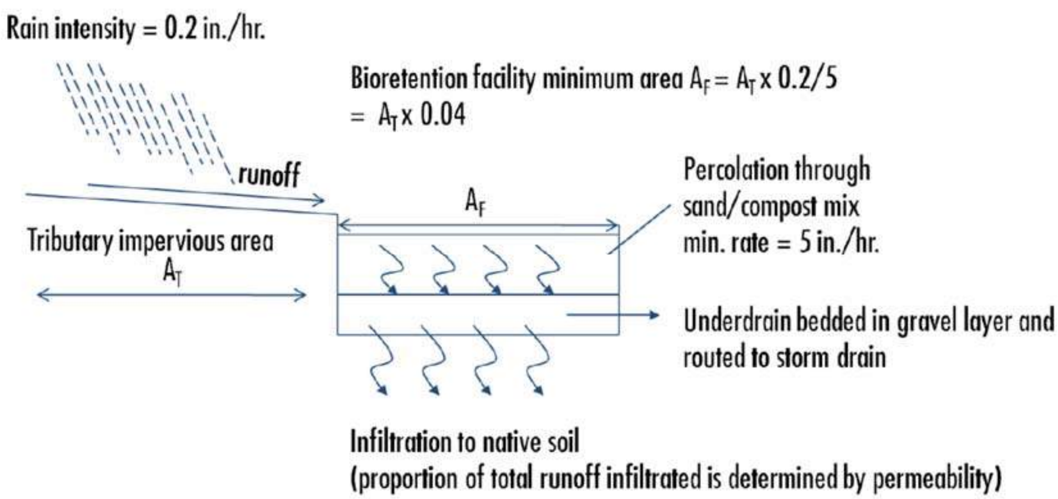

Figure 6. Derivation of Sizing Factor of 0.04 for Sizing Tier 2 Bioretention Facilities
(Reference: Santa Barbara County Stormwater Technical Guidance February 2014).

Table 5. Sizing Example for Water Quality Treatment Bioretention Facility

DMA Name	DMA Area (sq ft)	Post-project surface type	DMA Runoff Factor	DMA Area x runoff factor	Facility Sizing Factor	Minimum Facility Size (sq ft)
DMA-1	2,200	Roof	1.0	2,200		
DMA-2	2,200	Roof	1.0	2,200		
DMA-4	9,100	Paved	1.0	9,100		
Total				13,500	0.04	540

[5] http://www.waterboards.ca.gov/rwqcb3/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml

The Project Engineer shall identify which of the on-site water quality treatment measures are included in the design, as identified on the PR-2 Certification in Appendix A. The on-site water quality treatment measures are listed in order of preference. The plans shall clearly identify the type, location, and size of all on-site water quality treatment measures. Initial each on-site water quality treatment measure and note the plan sheet that shows the location and detail, or mark NA if not applicable. Submit a signed copy of the PR-2 Certification.

Section 4

Performance Requirement No. 3

Runoff Retention

Regulated Projects subject to Performance Requirement No. 3 (PR-3) Runoff Retention are:

- Projects that create and/or replace ≥15,000 sf of impervious surface, except detached single-family homes
- Detached single-family homes with ≥15,000 sf of Net Impervious Area (as defined in PR-2)

These requirements apply to Regulated Projects located in the following areas:

- Watershed Management Zones (WMZs) 1, 2, 5, 6, 8 and 9; and
- Portions of WMZs 4, 7, and 10 that overlie designated Groundwater Basins.

Regulated Projects subject to PR-3 must also meet PR-1 and PR-2 requirements and submit PR-1 and PR-2 Certifications. In addition to the Stormwater Control Plan requirements in PR-2, there is specific information that must be included in the Stormwater Control Plan for Regulated Projects subject to PR-3. See Appendix B for a checklist of information required in the Stormwater Control Plan. A Stormwater Control Plan template with additional guidance is available on the Central Coast Regional Water Board website[6].

PR-3 requires the applicant to retain stormwater runoff on the site. The retention volumes and method depend on the Watershed Management Zone (WMZ) in which the project is located (see checklist in Appendix A). WMZ maps are available in Appendix C and can be found on the County of Santa Clara Development Services Office webpage[7].

Most developable land in Morgan Hill, Gilroy and South Santa Clara County is in WMZ 1 or 2. The Runoff Retention Performance Requirements for WMZ 1 and 2 are as follows:

- WMZ 1: Retain the 95th percentile 24-hour rainfall event by optimizing infiltration. Retention of the remaining volume must be achieved via storage, rainwater harvesting and/or evapotranspiration.
- WMZ 2: Retain the 95th percentile 24-hour rainfall event through storage, rainwater harvesting, infiltration, and/or evapotranspiration.

The 95th percentile rainfall map is available in Appendix C and can be found on the County of Santa Clara Development Services Office webpage[7]. The map can be used to determine the design storm depth based on the project's location.

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[6] http://www.swrcb.ca.gov/rwqcb3/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml

[7] http://www.sccgov.org/sites/dso/Stormwater/Pages/Clean-Water-Program.aspx

Regulated Projects are required to meet the Runoff Retention Performance Requirements using specified LID development standards related to:

- Site Assessment Measures – identify opportunities and constraints to implement LID Stormwater Control Measures (see Checklist in Appendix A),
- Site Design Measures – optimize site design measures from PR-1 and augment with additional measures (see Checklist in Appendix A),
- Delineation of discrete Drainage Management Areas, and
- Use of undisturbed natural landscaped areas[8] as self-treating or self-retaining areas

Once site design measures, self-treating areas and self-retaining areas have been maximized to the extent feasible, the Project Applicant can use structural Stormwater Control Measures (SCM) to retain runoff.

The size of the SCMs is calculated based on the Retention Tributary Area.

Retention Tributary Area = (Entire Project Area) – (Self-treating Areas) – (Self-Retaining Areas and the Impervious Areas that Drain to Them)

This is accounted for in the method used in Section 1 to delineate DMAs into four categories: self-treating area, self-retaining area, area draining to self-retaining area and area draining to a LID facility.

Adjustments can be made to the Retention Tributary Area if the Regulated Project includes replaced impervious surface. The adjustments are based on whether the project is located outside or inside of an Urban Sustainability Area (USA). **There are currently no USAs in Morgan Hill, Gilroy or South Santa Clara County**. Therefore, all projects are considered to be outside of an approved USA and the total amount of replaced impervious surface area is multiplied by 0.5 when calculating the Retention Tributary Area. See the example calculation below.

Adjusted Retention Tributary Area Example 1

Total DMA surface area: 12,400
New Impervious surface in DMA: 11,100 sq ft
Replaced Impervious surface in DMA: 1,300 sq ft
Adjusted Retention Tributary Area = (1,300 x 0.5) + 11,100 = 11,750 sq ft

The SCMs can be sized using one of three methodologies: 1) continuous simulation hydrologic modeling, calibrated to local conditions; 2) the simple method (single event-based); or 3) the routing method (single event-based). Sizing guidance for the simple method and the routing method can be found in Appendix D. The simple method sizes the SCM with a volume equal to

[8]Natural landscaped areas are those planted with native, drought-tolerant, or LID appropriate vegetation.

the runoff volume produced by the design storm. The routing method uses iterative calculations routing the design storm hydrograph through the facility to account for infiltration that occurs simultaneously with inflow, which results in a smaller facility. Santa Barbara County developed a "Stormwater Control Measures Sizing Calculator" Excel Workbook that uses the routing method. The calculator and instructions are available on the Santa Barbara County website[9]. The State Water Resources Control Board developed a Phase II LID Sizing Tool that is web based[10]. This Phase II tool was primarily developed to calculate SCM sizes to meet the statewide Phase II Permit requirements. The tool was amended to include results for the Central Coast (Region 3) simple sizing method.

Two examples of sizing SCMs for development projects can be found in Appendix H. The Project Engineer must certify that the Runoff Retention requirements were included in the design either onsite or through an Alternative Compliance agreement (see Section 7).

Technical Infeasibility Adjustment

If a Regulated Project demonstrates it is technically infeasible, as described in Section 7, to retain the full Retention Volume on-site, as required by PR-3, then the project must dedicate at least 10% of the Equivalent Impervious Surface Area to retention based SCMs.

> *Equivalent Impervious Surface Area = (Impervious Tributary Surface Area) + [(Pervious Tributary Surface Area) * (Runoff Coefficient)]*

Use the Appendix F instructions to calculate the ten percent adjustment. PR-2 Water Quality Treatment is not subject to this adjustment. Water quality treatment must be provided for impervious area on the entire site.

Off-Site Mitigation

Off-site mitigation is required when Regulated Projects do not retain the full Retention Volume and fail to demonstrate technical infeasibility, as described in Section 7, or technical infeasibility was demonstrated and less than ten percent of a project's Equivalent Impervious Surface Area has been dedicated to retention-based SCMs. Use the Appendix G instructions to calculate the off-site retention requirements when a Project cannot allocate the full ten percent of the project site's Equivalent Impervious Surface Area to retention-based SCMs.

9 http://www.sbprojectcleanwater.org/development.aspx?id=76

10 http://owp-web1.saclink.csus.edu/LIDTool/Start.aspx

Section 5

Performance Requirement No. 4

Peak Management

Regulated Projects subject to Performance Requirement No. 4 (PR-4) Peak Management are:

- Projects that create and/or replace ≥22,500 square feet of impervious surface (collectively over the entire project site); and are In Watershed Management Zones 1, 2, 3, 6, and 9

Regulated Projects subject to PR-4 must also meet PR-1, PR-2 and PR-3 requirements and submit Performance Requirement No. 1, 2 and 3 Certifications. In addition to the Stormwater Control Plan requirements in PR-2 and PR-3, there is specific information that must be included in the Stormwater Control Plan for Regulated Projects subject to PR-4. See Appendix B for a checklist of information required in the Stormwater Control Plan. A Stormwater Control Plan template with additional guidance is available on the Central Coast Regional Water Board website[11].

PR-4 requires the applicant to manage post-development peak flows discharged from the site. The Project Engineer shall provide a Hydrology Report demonstrating that post-development stormwater runoff peak flows discharged from the site do not exceed pre-project peak flows for the 2- through 10- year storm events. Peak flow controls must also meet the flood control standards established by the Santa Clara County Drainage Manual (2007)[12].

Pre-project refers to the stormwater runoff conditions that exist onsite immediately before development occurs. Since PR-4 applies to additional runoff from increased impervious surfaces on site, redevelopment sites may be exempt from PR-4 if they do not increase the impervious area above the pre-project condition, or may be able to meet PR-4 requirements without any additional control measures.

[11] http://www.swrcb.ca.gov/rwqcb3/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml

[12] The Drainage Manual requires projects to be designed such that the stormwater runoff generated from the 10-year design storm is conveyed in the storm drainage system (underground pipes and/or stable open channels) and the stormwater runoff generated from the 100-year design storm is safely conveyed away from the project site without creating and/or contributing to downstream or upstream flooding conditions. The Manual is available at: http://www.sccgov.org/sites/dso/Land%20Development%20Engineering/Documents/Manual_Drainage.pdf

Section 6

Performance Requirement No. 5

Special Circumstances

Regulated Projects may be designated by the Municipality as subject to Performance Requirement No. 5 (PR-5) Special Circumstances based on certain site and/or receiving water conditions. Special Circumstances designation exempts the Regulated Project from Runoff Retention and/or Peak Management Performance Requirements where those Performance Requirements would be ineffective to maintain or restore beneficial uses of receiving waters.

Special Circumstances are defined as projects that discharge stormwater to the following:

- Highly Altered Channels
- Intermediate Flow Control Facility
- Historic Lake and Wetland

Projects subject to Special Circumstances must still comply with the Water Quality Treatment Performance Requirements.

These Special Circumstances do not apply to any property within the City of Gilroy, the City of Morgan Hill, or South Santa Clara County.

Section 7

Alternative Compliance (Off-Site Measures)

Regulated Projects may be allowed to comply with PR-2, PR-3 and PR-4 through off-site mechanisms (e.g. regional facilities, developer fee-in-lieu arrangement) under the following conditions:

- Technical infeasibility is established
- Project is in a Watershed or Regional Management Plan,
- Project is in an Urban Sustainability Area, or
- Other situations approved by the Central Coast Water Board Executive Officer.

Morgan Hill, Gilroy and South Santa Clara County do not have approved Watershed/Regional Management Plans or an approved Urban Sustainability Area, so these options are not available to projects within these jurisdictions.

Technical Infeasibility

An application for approval of Alternative Compliance based on technical infeasibility must include a site-specific hydrologic design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect, demonstrating that compliance with the applicable numeric Post-Construction Stormwater Management Requirements is technically infeasible.

Technical infeasibility may be caused by site conditions, including:

a) Depth to seasonal high groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures;

b) Depth to an impervious layer such as bedrock limits infiltration;

c) Sites where soil types significantly limit infiltration;

d) Sites where pollutant mobilization in the soil or groundwater is a documented concern;

e) Space constraints (e.g., infill projects, some redevelopment projects, high density development);

f) Geotechnical hazards;

g) Stormwater Control Measures would be located within 100 feet of a groundwater well used for drinking water;

h) Incompatibility with surrounding drainage system (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning treatment or flow control facility).

Technical Infeasibility Related to Groundwater Protection

The Santa Clara Valley Water District (SCVWD) manages drinking water resources and provides stewardship for Santa Clara County's watersheds, reservoirs, streams and groundwater basins. As such, the SCVWD is responsible for groundwater quality protection. Concerns regarding the contamination of groundwater may limit the types and locations of stormwater treatment measures that may be used on a project site. The treatment measures of most concern are "infiltration devices", defined as structures that are designed to bypass the natural filtration of surface soils and to transmit runoff directly to subsurface soils and groundwater aquifers. Other treatment measures that treat stormwater prior to subsurface infiltration, including landscape measures that utilize infiltration through surface or imported soils (indirect infiltration), and treatment measures that discharge directly to storm drains without infiltration pose minimal risk to groundwater quality.

The Santa Clara Valley Water District's guidelines for infiltration devices are provided in Table 6 on the following page. The guidelines include required horizontal setbacks from drinking water wells, septic systems, underground storage tanks and known contamination sites; required vertical separation from seasonally high groundwater; and whether pretreatment prior to infiltration is required. Pretreatment can be provided by infiltration through surface soils, such as the use of an indirect infiltration measure. ***If the guidelines are not met, i.e., if there are any variances from the required setbacks or separations, SCVWD review and approval of the stormwater treatment plan is required.***

Table 6 – SCVWD Guidelines for Stormwater Infiltration Devices (from SCVURPPP C.3 Stormwater Handbook, Appendix A)

Site Use/Condition		Required Horizontal Setbacks (feet)				Required Vertical Separation from Seasonally High Groundwater (feet)	Pretreatment Required[i]
		Drinking Water Wells	Septic Systems	Underground Storage Tanks	Known Contamination Site[d]		
Residential	Single Residential Lot (<10,000 sq. feet)	Exempt from setback and separation requirements; however, should still comply with construction and maintenance BMPs					
Residential	Single Residential Lot (10,000 sq. feet to 1 acre)	600[e]	100[g]	Dependent upon depth to water[h]	Regulatory Agency Approval Required if within 1,500 feet	10	No
Residential	Residential Subdivision (>1 acre)	600[e]	100[g]	Dependent upon depth to water[h]	Regulatory Agency Approval Required if within 1,500 feet	10	Individual Residences - No Runoff from Subdivision Roads - Yes
Commercial, Industrial, and Transportation	Transportation Corridor - Main Roads[a]	1,500[f]	100[g]	Dependent upon depth to water[h]	Regulatory Agency Approval Required if within 1,500 feet	30	Yes
Commercial, Industrial, and Transportation	Transportation Corridor - Minor Roads[a]	1,500[f]	100[g]	Dependent upon depth to water[h]	Regulatory Agency Approval Required if within 1,500 feet	10	Yes
Commercial, Industrial, and Transportation	Transportation Corridor - Other[a]	Not Allowed					
Commercial, Industrial, and Transportation	High Risk Commercial/Industrial[b]	Not Allowed					
Commercial, Industrial, and Transportation	Other Commercial/Industrial[c]	1,500[f]	100[g]	Dependent upon depth to water[h]	Regulatory Agency Approval Required if within 1,500 feet	30	Yes
Other	Known Contamination Sites[d]	Not allowed					

Alternative Compliance Project(s) Requirements

If the technical infeasibility analysis is approved, an Alternative Compliance Plan detailing the project(s) that will provide off-site mitigation must be submitted. The proposed off-site projects may be existing facilities and/or prospective projects that are as effective in maintaining watershed processes as implementation of the applicable Post-Construction Stormwater Requirements on-site. The Plan must include:

- The location of the proposed off-site project(s), which must be within the same watershed as the Regulated Project. Alternative Compliance project sites located outside the watershed may be approved by the Central Coast Water Board Executive Officer.
- A schedule for completion of offsite mitigation project(s), including milestone dates to identify funding, design, and construction of the off-site projects, where the off-site mitigation project(s) has not been constructed.

Additional requirements include the following:

a) The off-site mitigation project(s) must be completed as soon as practicable and no longer than four years from the date of the certificate of occupancy for the project for which off-site mitigation is required, unless a longer period is authorized by the Central Coast Water Board Executive Officer.

b) The timeline for completion of the off-site mitigation project may be extended up to five years with prior Central Coast Water Board Executive Officer approval. Central Coast Water Board Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement an Alternative Compliance project, such as having funds encumbered and applying for the appropriate regulatory permits.

c) Off-site mitigation projects on public property must be fully funded by the applicants.

d) Off-site mitigation projects on private property must include all documentation necessary to provide legal authority to use the property for the mitigation and must include project bonding.

Section 8

Operation and Maintenance Requirements

Stormwater Control Measures (SCMs) designed for Water Quality Treatment, Runoff Retention and/or Peak Management must be maintained to ensure proper performance. Regulated Projects with structural SCMs (i.e., meeting PR-2, PR-3 and/or PR-4 requirements) are required to have an Operation and Maintenance (O&M) Plan and Maintenance Agreement that clearly establishes responsibility for all structural SCMs.

The O&M Plan must include

- A site map with the location of all structural SCMs;
- O&M procedures for each structural SCM;
- Short and long term maintenance requirements, recommended frequency of maintenance and estimated cost for maintenance.

Where a property owner is responsible for maintenance, the property owner will be required to provide assurance of long term maintenance. This may be in the form of a maintenance agreement with the municipality, or conditions of approval, or another mechanism. The maintenance agreement must be transferred to the new owner if the land is sold. For residential properties where the SCMs are located within a common area that will be maintained by a homeowner’s association, language regarding the responsibility for maintenance must be included in the project’s conditions, covenants and restrictions (CC&Rs).

Example O&M Plans can be found in Appendix G of the SCVURPPP C.3 Stormwater Handbook (see list of resources in Appendix J of this Manual).

APPENDIX A

CHECKLISTS

EXEMPT PROJECTS CHECKLIST

Projects that are exempt from the Post-Construction Performance Requirements include the following:

- ☐ Road and Parking Lot maintenance:
  - o Road surface repair including slurry sealing, fog sealing, and pothole and square cut patching
  - o Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage
  - o Shoulder grading
  - o Cleaning, repairing, maintaining, reshaping, or re-grading drainage systems
  - o Crack sealing
  - o Resurfacing with in-kind material without expanding the road or parking lot
  - o Practices to maintain original line and grade, hydraulic capacity, and overall footprint of the road or parking lot
  - o Repair or reconstruction of the road because of slope failures, natural disasters, acts of God or other man-made disaster
- ☐ Sidewalk and bicycle path or lane projects, where no other impervious surfaces are created or replaced, built to direct stormwater runoff to adjacent vegetated areas
- ☐ Trails and pathways, where no other impervious surfaces are replaced or created, and built to direct stormwater runoff to adjacent vegetated areas
- ☐ Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
- ☐ Curb and gutter improvement or replacement projects that are not part of any additional creation or replacement of impervious surface area (e.g., sidewalks, roadway)
- ☐ Second-story additions that do not increase the building footprint
- ☐ Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage
- ☐ Photovoltaic systems installed on/over existing roof or other impervious surfaces, and panels located over pervious surfaces with well-maintained grass or vegetated groundcover, or panel arrays with a buffer strip at the most down-gradient row of panels
- ☐ Temporary structures (in place for less than six months)
- ☐ Electrical and utility vaults, sewer and water lift stations, backflows and other utility devices
- ☐ Above-ground fuel storage tanks and fuel farms with spill containment system

PERFORMANCE REQUIREMENT NO. 1
SITE DESIGN AND RUNOFF REDUCTION

CERTIFICATION

	DESIGN STRATEGY	INCORPORATED?
1.	Limit disturbance of creeks and natural drainage features.	
2.	Minimize compaction of highly permeable soils.	
3.	Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection.	
4.	Minimize impervious surfaces by concentrating improvements on the least sensitive areas of the site, while leaving the remaining land in a natural undisturbed state.	
5.	Minimize stormwater runoff by implementing one or more of the following design measures:	
	a) Direct roof runoff into cisterns or rain barrels for reuse.	
	b) Direct roof runoff onto vegetated areas safely away from building foundations and footings.	
	c) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings.	
	d) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings.	
	e) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces.	

I, ________________________________, acting as the Project Engineer for _____________________ project, located at ____, hereby state that the Site Design and Runoff Reduction design strategies indicated above have been incorporated into the design of the project.

____ ___________________________

Signature Date

SOURCE CONTROL CHECKLIST	
ON-SITE SOURCE CONTROL MEASURES	**INCORPORATED?**
Wash area/racks, drain to sanitary sewer[1]	☐
Covered dumpster area, drain to sanitary sewer[1]	☐
Sanitary sewer connection or accessible cleanout for swimming pool/spa/fountain[1]	☐
Parking garage floor drains plumbed to sanitary sewer[1]	☐
Fire sprinkler test water/condensate drain lines drain to landscape/sanitary sewer[1]	☐
Interior floor drains/boiler drain lines plumbed to sanitary sewer	☐
Beneficial landscaping/IPM (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment)	☐
Outdoor material storage protection	☐
Covers, drains for loading docks, maintenance bays, fueling areas	☐
Maintenance (pavement sweeping, catch basin cleaning, good housekeeping)	☐
Storm drain labeling	☐
Other[2] ____	☐

Notes:

[1] Subject to sanitary sewer authority requirements.

[2] See CASQA Stormwater BMP Handbook for New Development and Redevelopment for additional BMPs for vehicle service repair facilities, fuel dispensing areas, industrial processes, rooftop equipment and other pollutant generating activities and sources: https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook

PERFORMANCE REQUIREMENT NO. 2: WATER QUALITY TREATMENT

CERTIFICATION

	ON-SITE WATER QUALITY TREATMENT MEASURES (IN ORDER OF PRIORITY)	INCORPORATED?
1.	Low Impact Development (LID) Treatment Systems designed to retain stormwater runoff generated by the 85th percentile 24-hour storm. Stormwater Control Measures implemented (circle all that apply, design documentation is required): • Harvesting and Use, • Infiltration, • Evapotranspiration	
2.	Biofiltration Treatment Systems – with the following design parameters: a) Maximum surface loading rate appropriate to prevent erosion, scour and channeling within the biofiltration treatment system itself and equal to 5 inches per hour, based on the flow of runoff produced from a rain event equal to or at least: i. 0.2 inches per hour intensity; or ii. Two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depth b) Minimum surface reservoir volume equal to the biofiltration treatment system surface area times a depth of 6 inches c) Minimum planting medium depth of 24 inches. The planting medium must sustain a minimum infiltration rate of 5 inches per hour throughout the life of the project and must maximize runoff retention and pollutant removal. A mixture of sand (60%-70%) meeting the specifications of American Society for Testing and Materials (ASTM) C33 and compost (30%-40%) may be used. A Regulated Project may utilize an alternative planting medium if it demonstrates its planting medium is equal to or more effective at attenuating pollutants than the specified planting medium mixture. d) Proper plant selection[13] e) Subsurface drainage/storage (gravel) layer with an area equal to the biofiltration treatment system surface area and having a minimum depth of 12 inches f) Underdrain with discharge elevation at top of gravel layer g) No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted) h) No liners or other barriers interfering with infiltration, except for situations where lateral infiltration is not technically feasible	

[13] Technical guidance for designing bioretention facilities is available from the Central Coast LID Initiative. The guidance includes design specifications and plant lists appropriate for the Central Coast climate: http://www.centralcoastlidi.org/Central_Coast_LIDI/LID_Structural_BMPs.html

3.	Non-Retention Based Treatment Systems – designed to meet at least one of the following hydraulic sizing criteria:	
	(a) Volume Hydraulic Design Basis – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data.	
	(b) Flow Hydraulic Design Basis – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat: (i) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or (ii) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.	

I, ______________________________, acting as the Project Engineer for ____________________ project, located at ____, hereby state that the On-Site Water Quality Treatment Measures indicated above have been incorporated into the design of the project.

____ ________________________

Signature Date

PERFORMANCE REQUIREMENT NO. 3:
RUNOFF RETENTION

Design Rainfall Events & Treatment Requirements for WMZs

WMZ[1]	Treatment Options & Design Rainfall	Check Applicable WMZs
WMZ 1	Via optimized infiltration[2], prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 2	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.	
WM 4 *	Via optimized infiltration[2], prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 5	Via optimized infiltration[2] prevent offsite discharge from events up to the 85th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 6	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 85th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 9	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 85th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 10 *	Via optimized infiltration[2], prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data	

Notes:

* Applicable only to those areas that overlay designated Groundwater Basins

1. Includes only those WMZs contained in Santa Clara County.
2. Storage, rainwater harvesting, and/or evapotranspiration may be used when infiltration is optimized.

PERFORMANCE REQUIREMENT NO. 3:
RUNOFF RETENTION

LID Site Assessment Checklist

ITEMS TO DOCUMENT:	INCLUDED?
1. Site topography	☐
2. Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs	☐
3. Depth to seasonal high groundwater	☐
4. Locations of groundwater wells used for drinking water	☐
5. Depth to an impervious layer such as bedrock	☐
6. Presence of unique geology (e.g., karst)	☐
7. Geotechnical hazards	☐
8. Documented soil and/or groundwater contamination	☐
9. Soil types and hydrologic soil groups	☐
10. Vegetative cover/trees	☐
11. Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)	☐
12. Existing drainage infrastructure for the site and nearby areas including the location of municipal storm drains	☐
13. Structures including retaining walls	☐
14. Utilities	☐
15. Easements	☐
16. Covenants	☐
17. Zoning/Land Use	☐
18. Setbacks	☐
19. Open space requirements	☐
20. Other pertinent overlay(s)	☐

PERFORMANCE REQUIREMENT NO. 3:
RUNOFF RETENTION

LID Site Design Measures

	DESIGN MEASURE	INCORPORATED?
1.	Defining the development envelope, identifying the protected areas, and identifying areas that are most suitable for development and areas to be left undisturbed	
2.	Identifying conserved natural areas, including existing trees, other vegetation, and soils (shown on the plans)	
3.	Limit the overall impervious footprint of the project	
4.	Design of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised	
5.	Set back development from creeks, wetlands, and riparian habitats	
6.	Design conforms the site layout along natural landforms	
7.	Design avoids excessive grading and disturbance of vegetation and soils	

I, ______________________________, acting as the Project Engineer for ____________________ project, located at ____, hereby state that LID Site Design Measures indicated above have been incorporated into the design of the project.

____   ________________________
Signature   Date

PERFORMANCE REQUIREMENT NO. 3: RUNOFF RETENTION Technical Infeasibility Checklist		
	Site Conditions	**Check If Applicable**
1.	Depth to seasonal high groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures[14]	☐
2.	Depth to an impervious layer such as bedrock limits infiltration	☐
3.	Sites where soil types significantly limit infiltration	☐
4.	Sites where pollutant mobilization in the soil or groundwater is a documented concern	☐
5.	Space constraints (e.g., infill projects, some redevelopment projects, high density development)	☐
6.	Geotechnical hazards	☐
7.	Stormwater Control Measures located within 100 feet of a groundwater well used for drinking water	☐
8.	Incompatibility with surrounding drainage system (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning treatment or flow control facility)	☐

[14] See Santa Clara Valley Water District guidelines for minimum groundwater separation from stormwater infiltration devices (Section 7, Table 6, of this Manual).

APPENDIX B

Stormwater Control Plan Checklist

Stormwater Control Plan Required Contents	PR Level	Done?
1. Project Information	All	
• Project name		
• Application number		
• Address and assessor's parcel number		
• Name of Applicant		
• Project Phase number (if project is being constructed in phases)		
• Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description		
2. Project Areas	All	
• Total project site area		
• Total new impervious surface area		
• Total replaced impervious surface area		
• Total new pervious area		
• Calculation of Net Impervious Area		
3. Statement of Performance Requirements that apply to the project:	All	
• Performance Requirement No.1 – Site Design and Runoff Reduction		
• Performance Requirement No.2 – Water Quality Treatment		
• Performance Requirement No. 3 – Runoff Retention		
• Performance Requirement No. 4 – Peak Management		
4. Delineation of Drainage Management Areas (DMAs)	All	
5. Summary of Site Design and Runoff Reduction Performance Requirement measures selected for the project (see PR-1 checklist)	PR-1	
6. Description of Runoff Reduction Measures and Structural Stormwater Control Measures, by Drainage Management Area and for entire site	PR-2, 3, and 4	
7. Water quality treatment calculations used to comply with the Water Quality Treatment Performance Requirement and any analysis to support infeasibility determination	PR-2	
8. Documentation certifying that the selection, sizing, and design of the Stormwater Control Measures meet the full or partial Water Quality Treatment Performance Requirements (see PR-2 checklist)	PR-2	

Stormwater Control Plan Required Contents	**PR Level**	**Done?**
9. Statement that Water Quality Treatment Performance Requirement has been met on-site, or, if not achievable: • Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements • Statement of intent to comply with Water Quality Treatment Performance Requirement through Alternative Compliance	PR-2	
10. LID Site Assessment Summary (see PR-3 checklist)	PR-3	
11. LID Site Design Measures Used (see PR-3 checklist)	PR-3	
12. Supporting calculations used to comply with the applicable Runoff Retention Performance Requirements	PR-3	
13. Documentation demonstrating infeasibility where Site Design and Runoff Reduction measures and retention-based Stormwater Control Measures cannot retain required runoff volume	PR-3	
14. Documentation demonstrating percentage of the project's Equivalent Impervious Surface Area dedicated to retention-based Stormwater Control Measures	PR-3	
15. Statement that Runoff Reduction Performance Requirement has been met on-site, or, if not achievable: • Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements • Statement of intent to comply with Runoff Retention Performance Requirements through an Alternative Compliance agreement	PR-3	
16. Supporting calculations used to comply with the applicable Peak Management Performance Requirements	PR-4	
17. Documentation demonstrating infeasibility where on-site compliance with Peak Management Performance Requirements cannot be achieved	PR-4	
18. Statement that Peak Management Performance Requirement has been met on-site, or, if not achievable: • Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements • Statement of intent to comply with Peak Management Requirements through an Alternative Compliance agreement		
19. O&M Plan for all structural SCMs to ensure long-term performance	PR-2, 3, and 4	
20. Owner of facilities and responsible party for conducting O&M	PR-2, 3, and 4	

APPENDIX C

Rainfall Maps and Watershed Management Zone Map

[TO BE ADDED IN FINAL MANUAL]

APPENDIX D

Hydrologic Analysis and Stormwater Control Measure Sizing Guidance

Project site conditions will influence the ability to comply with the Water Quality Treatment and Runoff Retention Performance Requirements. This Appendix provides the acceptable Stormwater Control Measure (SCM) sizing methodology to evaluate runoff characteristics. This guidance provides a simple event-based approach and a runoff routing approach. Both of these approaches are based on sizing for a single-event and avoid the necessity of using a calibrated, continuous simulation hydrologic model. However, the project applicant may use a locally/regionally calibrated continuous simulation model to improve the hydrologic analysis and SCM sizing.

1) Determination of Retention Tributary Area

Determining the Retention Tributary Area is the basis for calculating the runoff volumes subject to Performance Requirement (PR) No. 3. Retention Tributary Area should be calculated for each individual Drainage Management Area (DMA) to facilitate the design of SCMs for each DMA. The generic equation below illustrates how various portions of the site are addressed when determining the Retention Tributary Area. The Retention Tributary Area calculation must also account for the adjustments for Redevelopment Projects subject to PR-3.

a) Development Projects: Compute the Retention Tributary Area, using the following equation:

Retention Tributary Area = (Entire DMA Area) – (Undisturbed or Planted Areas) – (Impervious Surface Areas that Discharge to Infiltrating Areas)***

*Undisturbed areas or areas planted with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas (i.e., self-treating areas).
** Impervious surfaces for which runoff from the design rainfall event will drain and infiltrate into undisturbed or planted areas without producing runoff to the storm drain system or receiving waterbody and without creating nuisance ponding that may affect vegetation health or contribute to vector problems (i.e., self-retaining areas).

b) Redevelopment Projects: If the Regulated Project includes replaced impervious surface, compute the Retention Tributary Area as follows:[15]

[15] Only one type of adjustment is allowed, since there are no Urban Sustainability Areas within Santa Clara County.

Retention Tributary Area = (Entire DMA Area) – (Undisturbed or Planted Areas) – (Impervious Surface Areas that Discharge to Infiltrating Areas) – [0.5 x (Replaced Impervious Surface Areas that do not Discharge to Infiltratng Areas)]

2) Determination of Retention Volume

a) Based on the Regulated Project's Watershed Management Zone (WMZ), determine the Regulated Project's Runoff Retention Requirement (e.g., retain 95th Percentile 24-hour Rainfall Event, or, retain 85th Percentile 24-hour Rainfall Event) from the WMZ map in Appendix C of this Manual.

b) Determine the 85th or 95th percentile 24-hour rainfall event depth from the Rainfall Maps in Appendix C of this Manual.

c) Compute the Runoff Coefficient[16] "C" for the area tributary to the SCM, using the equation:

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

Where "i" is the fraction of the tributary area that is impervious[17]

Note: If the Retention Tributary Area is 100% impervious (i.e., "I" = 1.0), then C = 0.89.

d) Compute the Retention Volume:

Retention Volume = C x Rainfall Depth x Retention Tributary Area

Retention Volume for 85th Percentile 24-hr Rainfall Depth = C x Rainfall Depth$_{85th}$ *x Retention Tributary Area*

3) Structural Stormwater Control Measure Sizing

The applicant must use structural SCMs that optimize retention and are designed to infiltrate, evapotranspirate, filter, or capture and use stormwater, to address the volumes calculated in 2 (above). If the Regulated Project is within a Watershed Management Zone where infiltration is required (with adjustments for technical infeasibility), SCM designs that provide infiltration of the entire Retention Volume are required, to minimize the potential need for off-site mitigation. Resources with design guidance for fully infiltrative SCMs are provided in Appendix J of this Manual.

[16] As set forth in WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178 and based on the translation of rainfall to runoff using a runoff regression equation developed using two years of data from more than 60 urban watersheds nationwide.

[17] As defined in Post-Construction Requirements Attachment D.

a) Calculate SCM Capture Volume – Calculate the required SCM Capture Volume, associated with the Regulated Project's Runoff Retention Requirement, by one of the following methods:

<u>Method 1: Simple Method</u>

SCM Capture Volume = Retention Volume for 95th Percentile 24-hr Rainfall Depth; OR

SCM Capture Volume = Retention Volume for 85th Percentile 24-hr Rainfall Depth

<u>Method 2: Routing Method</u>

Use a hydrograph analysis to determine the SCM Capture Volume needed to retain the Retention Volume for 95th or 85th Percentile 24-hr Rainfall Depth calculated in 2 (above). The SCM Capture Volume shall be based on both the rate of flow from tributary areas into the SCM, and the rate of flow out of the SCM through infiltration into the underlying soil during the rain event. The SCM shall be designed such that a single 95th or 85th Percentile 24-hr Rainfall Event will not overflow the SCM.

Several available tools for conducting the hydrograph analysis are discussed in Appendix E of this Manual. When conducting the hydrograph analysis, the applicant must adhere to the criteria included in Table D-1.

TABLE D-1: Routing Method Criteria

Parameter	Criteria
Hydrograph Analysis Method	National Resources Conservation Service or Santa Barbara Urban Hydrograph
Pond Routing Method	Storage-indication, unless otherwise justified to be more correct based on site and storage conditions.
Infiltration Rate	Underlying soil saturated infiltration rate, as indicated by locally accepted data approved by the Permittee and/or by on-site testing, whichever is more accurate.
Rainfall Distribution	National Resources Conservation Service Type I[18] or based on local rainfall data
Time of Concentration	Permittee's current drainage and flood control standard
Time Increment	0.10 hour, unless otherwise justified to be more correct based on rainfall distribution

[18] The National Resources Conservation Service developed standard 24-hour rainfall distributions for hydrograph analyses. These rainfall distributions were intended to represent intensities associated with shorter duration storms, ranging from durations of 30 minutes to 12 hours. The National Resources Conservation Service Type 1 storm applies to the California West Coast, including the Central Coast Region. The Type 1 rainfall distribution was derived using National Oceanic Atmospheric Administration Atlas 2 rainfall statistics for the 1-year through 100-year storm.

Note that if the Retention Volume cannot infiltrate within 48-hours, a multiplier of 1.20 must be applied to the SCM Capture Volume calculated through the routing method.

b) Demonstrate Compliance with Performance Requirements

i) Runoff Retention Performance Requirement – The applicant must demonstrate that site SCMs willinfiltrate and/or evapotranspirate the Retention Volume or provide sufficient Capture Volume to retain the Retention Volume. Any outlet (i.e., underdrain) installed in a structural SCM shall be installed above the elevation of any portion of the structural SCM dedicated to Retention Volume storage.

ii) Water Quality Treatment Performance Requirement – Projects that propose to use retention-based structural SCMs, must also meet the Water Quality Treatment Performance Requirement, and demonstrate in the Stormwater Control Plan that this requirement is being fully met.

APPENDIX E

Tools for Sizing Structural Control Measures for Runoff Retention

Central Coast Region Stormwater Control Measure Sizing Calculator (Santa Barbara County, Version February 26, 2014)

This sizing calculator was developed by the Santa Barbara County Clean Water Program for use in the Central Coast Region, using a grant obtained from the State Water Resources Control Board. The tool can be used to size SCMs to meet runoff retention requirements based on the routing method. Visit the following website for a copy of the calculator and instructions for its use:
http://www.sbprojectcleanwater.org/development.aspx?id=76

HydroCAD

HydroCAD is a commonly used and widely accepted program for performing hydrograph analyses and design of stormwater infrastructure, and can be used to size SCMs using the routing method. HydroCAD is based on U.S. Department of Agriculture Soil Conservation Service's (now Natural Resources Conservation Service) TR-55: Urban Hydrology for Small Watersheds. There is a fee to purchase the software, but there is a free trial version that can be downloaded from the developer's website: http://www.hydrocad.net/,

California Phase II Low Impact Development (LID) Sizing Tool

This web-based tool was developed by CSU Sacramento Office of Water Programs to assist stormwater practitioners in selecting and sizing LID Best Management Practices (BMPs) that meet the sizing requirements set forth in the State's Phase II Small MS4 General Permit. The tool allows users to input their location, soil type, and impervious areas, and then queries a database containing pre-solved sizing factors and design curves for a variety of LID BMP types, performs permit-based sizing calculations, and tabulates allowable sizes for each LID BMP type. Sizing results are provided based on three different sizing methods allowed by the Phase II Permit: a Design Storm Method, a Percent Capture Method, and a Baseline Bioretention or Equivalent Performance Method. Sizing results are also provided for the Central Coast RWQCB (Region 3) simple sizing method. **Note that this tool cannot be used to size SCMs using the routing method.** The tool can be found at:
http://owp-web1.saclink.csus.edu/LIDTool/Start.aspx

APPENDIX F

Ten Percent Adjustment to Retention Requirement – Calculation Instructions

Where technical infeasibility, as described in Section 7, Alternative Compliance, prevents full on-site compliance with the Runoff Retention Performance Requirement, on-site retention of the full Retention Volume per Section 4, PR-3, is not required and the Project is required to dedicate no less than ten percent of the Project's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures. The Water Quality Treatment Performance Requirement is not subject to this adjustment.

Calculating Ten Percent of a Project's Equivalent Impervious Surface Area

The area of the project that must be dedicated to structural SCMs to waive off-site compliance with the Runoff Retention Requirement is equal to ten percent of the project's Equivalent Impervious Surface Area, defined as:

Equivalent Impervious Surface Area (ft^2) = (Impervious Tributary Surface Area (ft^2) + [(Pervious Tributary Surface Area (ft^2)) x (Runoff Coefficient)]

Impervious Tributary Surface Area is defined as the sum of all of the site's conventional impervious surfaces. When calculating Impervious Tributary Area:

- <u>Do</u> include: concrete, asphalt, conventional roofs, metal structures and similar surfaces
- <u>Do not</u> include: green roofs

Pervious Tributary Surface Area is defined as the sum of all of the site's pervious surfaces, which is then corrected by a factor equal to the surface's runoff coefficient. When calculating Pervious Tributary Surface Area:

- <u>Do</u> include surfaces such as: unit pavers on sand; managed turf[19]; disturbed soils; and conventional landscaped areas (see Table 1 for correction factors).
  - *Example*:
    - Project Site includes 500 ft^2 of unit pavers on sand.
    - *Pervious Tributary Surface Area = 500 ft^2 x C = 50 ft^2*
    - Where C = Correction Factor for unit pavers, 0.1, from Table F-1.

[19] Managed Turf includes turf areas intended to be mowed and maintained as turf within residential, commercial, industrial, and institutional settings.

- Do not include: Infiltration SCM surfaces (e.g., SCMs designed to specific performance objectives for retention/infiltration) including, bioretention cells, bioswales; natural and undisturbed landscape areas, or landscape areas compliant with the Model Water Efficient Landscape Ordinance (California Code of Regulations, Title 23. Waters, Division 2. Department of Water Resources, Chapter 2.7.), or a local ordinance at least as effective as the Model Water Efficient Landscape Ordinance.

TABLE F-1: Correction Factors[20] for Use in Calculating Equivalent Impervious Surface Area

Pervious Surface	Correction Factor
Disturbed Soils/Managed Turf (dependent on original Hydrologic Soil Group)	A: 0.15 B: 0.20 C: 0.22 D: 0.25
Pervious Concrete	0.60
Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone (without grout)	0.25
Turf Block	0.15
Brick (without grout)	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10

[20] Factors are based on runoff coefficients selected from different sources: Turf and Disturbed Soils from *Technical Memorandum: The Runoff Reduction Method.* Center for Watershed Protection & Chesapeake Stormwater Network. p.13, April 18, 2008. http://town.plympton.ma.us/pdf/land/scheuler_runoff_reduction_method_techMemo.pdf. All other correction factors from *C.3 Stormwater Handbook, Santa Clara Valley Urban Runoff Pollution Prevention Program, Appendix F*, p. F-9., May 2004.

APPENDIX G

Calculating Off-Site Retention Requirements When Less Than 10 Percent of the Project Site Equivalent Impervious Surface Area is Allocated to Retention-Based Structural Stormwater Control Measures

The following instructions demonstrate how to determine the Off-Site Retention Requirements when a Project subject to the Runoff Retention Performance Requirement, cannot allocate the full 10% of the project site's Equivalent Impervious Surface Area (see Appendix F of this Manual) to retention-based Stormwater Control Measures (SCMs).

STEP A. Potential Off-Site Mitigation Retention Volume

First calculate the Potential Off-Site Mitigation Retention Volume, which represents the additional volume of runoff that would have been retained on-site, had the full 10% of Equivalent Impervious Surface Area been dedicated to retention-based SCMs.

Equation A:

Potential Off-Site Mitigation Retention Volume = (the portion of the 10% Equivalent Impervious Area not allocated on-site) X (the On-Site Retention Feasibility Factor)

Where:

- *The portion of the 10% Equivalent Impervious Surface Area not allocated on-site* is that portion not allocated to on-site structural retention-based SCMs. For example, if 10% of Equivalent Impervious Surface Area is 1,000 ft^2 and only 8% (800 ft^2) is allocated to retention-based SCMs, the remaining 2% (200 ft^2) is the value inserted in the equation.
- *The On-Site Retention Feasibility Factor* is the ratio of Design Retention Volume[21] managed on-site (ft^3), to actual area (ft^2) allocated to structural SCMs. This establishes the site's retained volume:area ratio, expressed as cubic feet of retained runoff volume per square foot of area. For example, if a project is able to infiltrate 3,500 ft^3 of runoff over an 800-ft^2 area, this ratio of 3,500:800, or 4.38, is the On-Site Retention Feasibility Factor.

STEP B. Actual Off-Site Mitigation Retention Volume

Next, determine the Actual Off-Site Mitigation Retention Volume, which may be less than the Potential Off-Site Mitigation Retention Volume. The Actual Off-Site Mitigation Retention Volume is the lesser of the volume calculated in Equation A, and the remaining portion of the

[21] Calculate Design Retention Volume using guidance in Appendix D of this Manual, or equivalent method. Final Design Retention Volumes should reflect the applicant's demonstrated effort to use non-structural design measures to reduce the amount of runoff (e.g., reduction of impervious surfaces) as required by the Post-Construction Requirements' LID Development Standards (see Section 4 and Appendix A of this Manual).

Design Retention Volume, calculated per Appendix D, not controlled on-site. There are two possible outcomes when the Runoff Retention Performance Requirement is not met on-site and less than 10% of the site's Equivalent Impervious Surface Area is allocated to retention-based SCMs:

- Potential Off-Site Mitigation Retention Volume is the Actual Off-Site Mitigation Retention Volume
- Remaining Design Retention Volume represents Actual Off-Site Design Retention Mitigation Volume

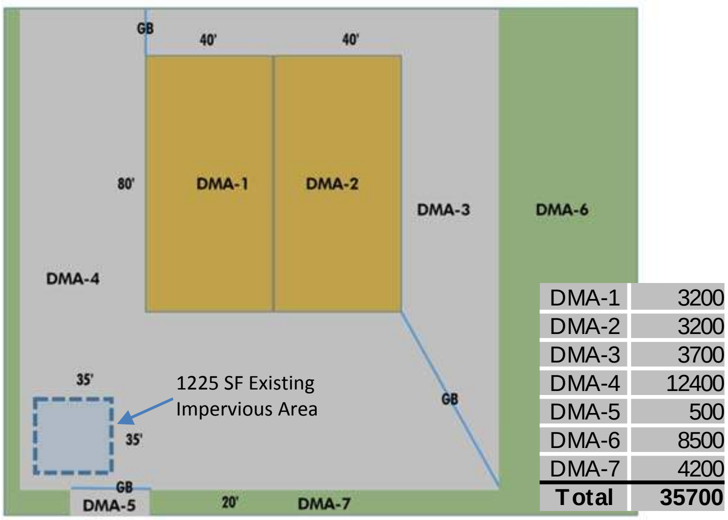
APPENDIX H

Stormwater Control Measures Sizing Examples

Example 1: New Building and Parking Lot[22]

1. Project Data

- Total Impervious Area created/replaced = 23,000 SF
- Existing Impervious Area being replaced = 1,225 SF



2. Assume the following Drainage Management Areas (DMAs) drain to the same Stormwater Control Measure (SCM). (DMAs 3 and 5 drain to landscaped areas.)

DMA Name	DMA Area (sq ft)	Post-project surface type	DMA Runoff Factor	DMA Area x runoff factor
DMA-1	3,200	Roof	1.0	3,200
DMA-2	3,200	Roof	1.0	3,200
DMA-4	12,400	Paved	1.0	12,400
Total				18,800

[22] Example courtesy of Dan Cloak Environmental Consulting and Santa Barbara County

3. Size the SCM for water quality treatment only:

DMA Name	DMA Area (sq ft)	Post-project surface type	DMA Runoff Factor	DMA Area x runoff factor	Facility Sizing Factor	Minimum Facility Size (sq ft)	Proposed Facility Size (sq ft)
DMA-1	3,200	Roof	1.0	3,200			
DMA-2	3,200	Roof	1.0	3,200			
DMA-4	12,400	Paved	1.0	12,400			
Total				18,800	0.04	752	900

4. Calculate the Design Retention Volume, assuming a storm depth of 1.4 inches (from the 95^{th} percentile 24-hour rainfall depth map)

DMA Name	DMA Area (sq ft)	Post-project surface type	DMA Runoff Factor[b]	DMA Area x runoff factor	95^{th} % storm depth (ft)	Retention Volume (cu. ft)
DMA-1	3,200	Roof	1.0	3,200		
DMA-2	3,200	Roof	1.0	3,200		
DMA-4	11,787[a]	Paved	1.0	11,787		
Total				18,187	0.12	2,182

Notes:

[a] Size reduced by 0.5 x 1,225 SF replaced impervious surface to calculate Retention Tributary Area.

[b] Runoff factor may be calculated using the WEF Manual of Practice equation: C = 0.858i 3- 0.78i2 + 0.774i + 0.04, resulting in a C factor of 0.89.

5. Resize SCM for Retention (Simple Method)

- Bioretention area for treatment = 900 square feet (SF)
- Required retention volume = 2,182 cubic feet (CF)
- Storage in gravel layer with 40% void space: 2,182 ÷ 0.4 = 5,455 CF of gravel (assume underdrain at top of gravel layer)
- If keep same footprint, need 6 feet of gravel depth (5,455 CF ÷ 900 SF = 6 ft).
- If reduce gravel to 2-foot depth, need 2,727 SF.

6. Use 10% Adjustment Factor

- Assume technical infeasibility was demonstrated
- Calculate Equivalent Impervious Surface Area:

*EISA = (Impervious Tributary Surface Area) + [(Pervious Tributary Surface Area) * (Runoff Coefficient)]*

DMA	SF	Factor	Product
DMA-1	3,200	1.0	3,200
DMA-2	3,200	1.0	3,200
DMA-3	3,700	1.0	3,700
DMA-4	12,400	1.0	12,400
DMA-5	500	1.0	500
DMA-6	8,500	0.1	850
DMA-7	4,200	0.1	420
Total	**35,700**		**24,270**

- EISA = 24,270 SF
- 10% of 24,270 = 2,427 SF
- Therefore, the surface area of the bioretention facility could be reduced from 2,727 to 2,427 SF if technical infeasibility is demonstrated.

7. Calculate Off-Site Retention Requirements If Less Than 10% of Project Site Equivalent Impervious Surface Area is Available for SCMs

- Say site can only provide 1,700 SF for retention-based SCMs (7% of 24,270 EISA)
- Volume retained = (1,700 SF) x (2 ft gravel depth) x 0.40 porosity = 1,360 CF
- On-Site Retention Feasibility Factor = Volume retained ÷ surface area = 1,360 ÷ 1,700 = 0.8 CF/SF
- Calculate the Potential Off-Site Mitigation Retention Volume:

  Potential Off-Site Mitigation Retention Volume = (the portion of the 10% Equivalent Impervious Area not allocated on-site) x (the On-Site Retention Feasibility Factor)

  Potential Off-Site Mitigation Retention Volume = (3% of 24,270 EISA) x 0.8 = 582 CF

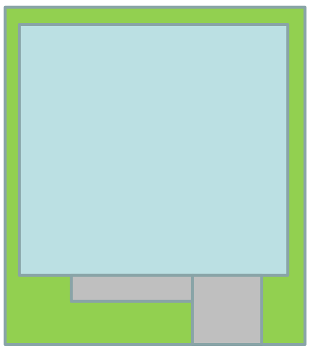
- Calculate the Actual Off-Site Mitigation Retention Volume – this is the lesser of the volume calculated just above (582 CF) and the remaining portion of the Design Retention Volume not retained onsite (2,182 – 1,360 = 822 CF).

  The Actual Off-Site Mitigation Retention volume is 582 CF.

Example 2: Commercial Building[23]

Project Data

- 1-acre commercial site
- 85% impervious
- Required to infiltrate the 95^{th} percentile storm (2.0 inches)



Impervious area = 37,026 sf
Pervious area = 6,534 sf

1. Calculate Required Retention Volume (using PCR Attachment D)

   - Fraction of impervous, i = 0.85

   - $C = 0.858i^3 – 0.78i^2 + 0.774i + 0.04 = 0.66$

   - Total area = 43,560 sf.

   - Rainfall depth = 2.0 in. (0.167 ft.)

   - Retention Volume = C × Depth × Trib. Area
     = 0.66 × 43,560 × 0.167 ft. = 4,801 cu. ft.

2. Calculate Required SCM Storage Capacity by Simple Method

   - Assume surface area = 10% of impervious area

   - Bioretention surface area = 0.10 (37,026) = 3,703 sf

   - Required water depth = Retention volume ÷ surface area =
     4,801÷3,703 = 1.29 feet (15.5”)

---

[23] Example from Central Coast Resolution Technical Support Document, Attachment G: Stormwater Control Measure Sizing: Evaluation of Attachment D to the Central Coast Post Construction Requirements (Wallace Group, April 8, 2013).

- Approach: Store volume in ponding area, biotreatment soil, and gravel (no underdrain)
- Surface ponding depth = 6”
- Soil depth = 24” × 0.25 porosity = 6”
- Remaining water depth = 15.5” – 12” = 3.5”
- Gravel depth required (porosity 0.35): 3.5” ÷ 0.35 = 10”
- Summary: Bioretention area has:
  - Ponding depth = 6 inches
  - Soil depth = 24 inches
  - Gravel depth = 10 inches

3. Calculate Required Storage Capacity and Surface Area using the Routing Method (model results for Example Project presented below:)

Soil Type	SCM Infiltration Rate (in/hr)	Required Storage Capacity (cubic feet)	Required Surface Area (square feet)	SCM Size as Percent of Retention Volume	Drawdown Time
A	5.0	800	1,600	17%	24 hours
B	1.0	2,394	1,850	50%	32 hours
B/C	0.6	2,912	2,250	61%	48 hours
C	0.23	3,818	2,950	80%[24]	94 hours
D	0.06	4,529	3,500	95%[25]	12 days

4. Compare to Simple Method (see Step 1 above):

- Required Storage Capacity = 4,801 cubic feet

[24] Note that because the facility has a drawdown time greater than 48 hours, the required storage capacity will need to be increased by 20% (multiplied by 1.2).

APPENDIX I

Definitions Related to Post-Construction Requirements[25]

Bioretention – A Stormwater Control Measure designed to retain stormwater runoff using vegetated depressions and soils engineered to collect, store, treat, and infiltrate runoff. Bioretention designs do not include underdrains.

Biotreatment or Biofiltration Treatment –A Stormwater Control Measure designed to detain stormwater runoff, filter stormwater through soil media and plant roots, and release the treated stormwater runoff to the storm drain system. Biotreatment systems include an underdrain.

Discretionary Approval – A project approval which requires the exercise of judgment or deliberation when the MS4 decides to approve or disapprove a particular activity, as distinguished from situations where the MS4 merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

Dispersion – The practice of routing stormwater runoff from impervious areas, such as rooftops, walkways, and patios, onto the surface of adjacent pervious areas. Stormwater runoff is dispersed via splash block, dispersion trench, or sheet flow and soaks into the ground as it moves slowly across the surface of the pervious area.

Drainage Management Area (DMAs) – Following the low impact development principle of managing stormwater through small-scale, decentralized measures, DMAs are designated individual drainage areas within a Regulated Project that typically follow grade breaks and roof ridge lines and account for each surface type (e.g., landscaping, pervious paving, or roofs). Stormwater Control Measures for runoff reduction and structural facilities are designed for each DMA.

Equivalent Impervious Surface Area – is equal to *Impervious Tributary Surface Area* (ft^2) + *Pervious Tributary Surface Area* (ft^2), where *Impervious Tributary Surface Area* is defined as the sum of all of the site's conventional impervious surfaces, and *Pervious Tributary Surface Area* is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient.

Evapotranspiration (ET) – The loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues).

Flow-Through Water Quality Treatment Systems – Stormwater Control Measures that are designed to treat stormwater through filtration and/or settling. Flow-through systems do not provide significant retention or detention benefits for stormwater volume control.

Groundwater Basins – Groundwater basin areas defined by the California Department of Water Resources (DWR) and used in the Central Coast Water Board Joint Effort for Hydromodification Control to identify groundwater receiving-water issues and areas where recharge is a key watershed process. DWR based

[25] From Attachment C to Attachment 1 of the Central Coast Region Post-Construction Requirements, Resolution R3-2013-0032.

identification of the groundwater basins on the presence and areal extent of unconsolidated alluvial soils identified on a 1:250,000 scale from geologic maps provided by the California Department of Conservation, Division of Mines and Geology. DWR then further evaluated identified groundwater basin areas through review of relevant geologic and hydrogeologic reports, well completion reports, court-determined adjudicated basin boundaries, and contact with local agencies to refine the basin boundaries.

Impervious Surface – A hard, non-vegetated surface area that prevents or significantly limits the entry of water into the soil mantle, as would occur under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether the thresholds for application of Performance Requirements are exceeded. However, for modeling purposes, open, uncovered facilities that retain/detain water (e.g., retention ponds, pools) shall be considered impervious surfaces.

Land recycling – The reuse of abandoned, vacant, or underused properties for redevelopment or repurposing

Landscaped Areas – Areas of soil and vegetation not including any impervious surfaces of ancillary features such as impervious patios, BBQ areas, and pools.

Large River – A river draining 200 square miles or more.

Low Impact Development (LID) – A stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

Ministerial Approval – A project approval which involves little or no personal judgment by the MS4 as to the wisdom or manner of carrying out the project and only involves the use of fixed standards or objective measurements.

Native Vegetation – Vegetation comprised of plant species indigenous to the Central Coast Region and which reasonably could have been expected to naturally occur on the site.

Net Impervious Area – The sum of new and replaced post-project impervious areas, minus any reduction in total imperviousness from the pre-project to post-project condition: *Net Impervious Area = (New and Replaced Impervious Area) – (Reduced Impervious Area Credit),* where *Reduced Impervious Area Credit* is the total pre-project to post-project reduction in impervious area, if any.

New Development – Land disturbing activities that include the construction or installation of buildings, roads, driveways and other impervious surfaces. Development projects with pre-existing impervious surfaces are not considered New Development.

Percentile Rainfall Event (e.g., 85th and 95th) – A percentile rainfall event represents a rainfall amount which a certain percent of all rainfall events for the period of record do not exceed. For example, the 95th percentile rainfall event is defined as the measured rainfall depth accumulated over a 24-hour period, for the period of record, which ranks as the 95th percentile rainfall depth based on the range of all daily event occurrences during this period.

Permeable or Pervious Surface – A surface that allows varying amounts of stormwater to infiltrate into the ground. Examples include pasture, native vegetation areas, landscape areas, and permeable pavements designed to infiltrate.

Pre-Project – Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

Project Site – The area defined by the legal boundaries of a parcel or parcels of land within which the new development or redevelopment takes place and is subject to these Post-Construction Stormwater Management Requirements.

Rainwater Harvest – Capture and storage of rainwater or stormwater runoff for later use, such as irrigation (without runoff), domestic use (e.g. toilets), or storage for fire suppression.

Receiving Waters – Bodies of water, surface water systems or groundwater that receive surface water runoff through a point source, sheet flow or infiltration.

Redevelopment – On a site that has already been developed, construction or installation of a building or other structure subject to the Permittee's planning and building authority including: 1) the creation or addition of impervious surfaces; 2) the expansion of a building footprint or addition or replacement of a structure; or 3) structural development including construction, installation or expansion of a building or other structure. It does not include routine road maintenance, nor does it include emergency construction activities required to immediately protect public health and safety.

Replaced Impervious Surface – The removal of existing impervious surfaces down to bare soil or base course, and replacement with new impervious surface. Replacement of impervious surfaces that are part of routine road maintenance activities are not considered replaced impervious surfaces.

Retention Tributary Area – The entire project area except for undisturbed areas, planted areas with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas, and impervious surface areas that discharge to infiltrating areas that will not produce runoff or create nuisance ponding. The Drainage Management Areas are smaller Retention Tributary Areas that cumulatively make up the Retention Tributary Area for the entire site.

Self-Retaining Areas – Areas (also called "zero discharge" areas) designed to retain some amount of rainfall (by ponding and infiltration and/or evapotranspiration) without producing stormwater runoff. Self-Retaining Areas include graded landscaped depressions and pervious pavement, and may receive runoff from adjacent impervious areas.

Self-Treating Areas – Areas in which infiltration, evapotranspiration and other natural processes remove pollutants from stormwater. Self-treating areas may include conserved natural open areas and areas of native landscaping. The self-treating area only treats the rain falling on itself and does not receive stormwater runoff from other areas.

Routine Road Maintenance – includes pothole and square cut patching; overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage; shoulder grading; reshaping/regrading drainage systems; crack sealing; resurfacing with in-kind material without expanding the road prism or altering the original line and grade and/or hydraulic capacity of the road.

Single-Family Residence – The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.

Stormwater Control Measures – Stormwater management measures integrated into project designs that emphasize protection of watershed processes through replication of pre-development runoff patterns (rate, volume, duration). Physical control measures include, but are not limited to, bioretention/rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, minimal excavation foundations, vegetated roofs, and water use. Design control measures include but are not limited to conserving and protecting the function of existing natural areas, maintaining or creating riparian buffers, using onsite natural drainage features, directing runoff from impervious surfaces toward pervious areas, and distributing physical control measures to maximize infiltration, filtration, storage, evaporation, and transpiration of stormwater before it becomes runoff.

Stormwater Control Plan – A plan, developed by the Regulated Project applicant, detailing how the project will achieve the applicable Post-Construction Stormwater Management Requirements (for both onsite and offsite systems).

APPENDIX J

Additional Resources

SANTA CLARA COUNTY CLEAN WATER PROGRAM

General information on local watersheds, stormwater management, and pollution prevention:
http://www.sccgov.org/sites/cwp/Pages/about.aspx

SANTA CLARA COUNTY DEVELOPMENT SERVICES OFFICE

Information on submitting an application for a development project and downloading the forms required for the Stormwater Control Plan:
http://www.sccgov.org/sites/dso/Stormwater/Pages/Clean-Water-Program.aspx

CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD

The Post-Construction Stormwater Management Requirements, 85th and 95th Percentile Rainfall Depth Maps, and Watershed Management Zone Maps are electronically available at:
http://www.waterboards.ca.gov/rwqcb3/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml

CENTRAL COAST LOW IMPACT DEVELOPMENT INITIATIVE (LIDI)

http://centralcoastlidi.org/

The Central Coast LIDI is a non-profit organization that provides resources for Low Impact Development. Standard details for LID design may be found at the following web-site:
http://centralcoastlidi.org/bioretention-details-and-specs.php

CALIFORNIA STORMWATER QUALITY ASSOCIATION (CASQA)

Additional information about Low Impact Development may be found at the CASQA LID Portal:
http://www.casqa.org/LID/tabid/240/Default.aspx

CALIFORNIA PHASE II LID SIZING TOOL

Developed by the Office of Water Programs at the California State University-Sacramento
http://owp-web1.saclink.csus.edu/LIDTool/Start.aspx

COUNTY OF SANTA BARBARA WATER RESOURCES DIVISION

Stormwater Technical Guide and Stormwater Control Measures Sizing Calculator
http://www.sbprojectcleanwater.org/development.aspx?id=76

SANTA CLARA VALLEY URBAN RUNOFF POLLUTION PREVENTION PROGRAM

C.3 Stormwater Handbook (2012) contains design guidelines for stormwater control measures.
http://www.scvurppp-w2k.com/c3_handbook_2012.shtml