Appendix E

Preliminary Stormwater Control Plan

MH engineering Co.
16075 Vineyard Blvd. Morgan Hill, CA 95037 - (408) 779-7381

Preliminary Stormwater Control Plan

for

The Gates
Tract Number Will be Provided Later
18545 & 18565 Monterey Road, Morgan Hill, CA 95037

June 29, 2022

City Ventures Homebuilders, LLC, Owner
Samantha Hauser, Legally Responsible Party
444 Spear Street, Suite 200, San Francisco, CA 94105
samantha@cityventures.com
646.522.4260

Prepared by:
Kristian Wallace, PE
MH engineering Co.
16075 Vineyard Blvd, Morgan Hill, CA 95037
408.779.7381
kristianw@mhengineering.com

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I. Project Data

I.A. Purpose of the Report

The general purpose of this Stormwater Control Plan (SWCP) is to demonstrate compliance with the Central Coast Regional Water Quality Control Board's (CCRWQCB) Post-Construction Stormwater Compliance Resolution R3-2013-0032 and the 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.

All new construction and redevelopment projects are required to comply with these regulations if they create and/or replace at least 2,500 square feet of impervious area. The requirements are designed preserve the health of watersheds that may be impacted by the improvement of the subject property. Developments are encouraged to maximize the use of Low Impact Development (LID) techniques and incorporate as many Stormwater Control Measures (SCM) and Best Management Practices (BMP) as possible to reduce contaminants leaving the site and affecting downstream water bodies. A Stormwater Control Plan prepared by, or under the direction of, a Professional Civil Engineer is required to detail the potential impacts and mitigation measures implemented by the project.

Table 1: Project Data Summary

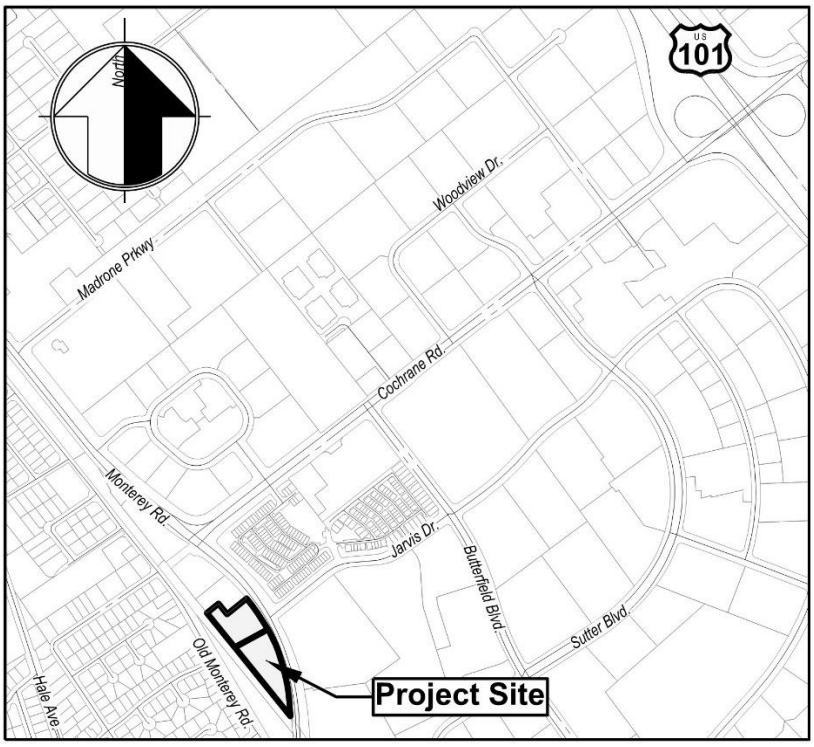
Project Name/Number	221005.1 - The Gates
Application Submittal Date	6/29/2022
Project Location	18545 & 18565 Monterey Road, Morgan Hill, CA 95037
Project Phase	N/A
Project Type and Description	Mixed Use development. Project consists of 5 commercial units and 49 residential units.
Total Project Area	174,172 SF
Total New Impervious Area	112,024 SF
Total Replaced Impervious Area	0 SF
Total Pre-Project Impervious Area	0 SF
Total Post-Project Impervious Area	112,024 SF
Net Impervious Area	112,024 SF
Watershed Management Zone	1
Design Storm Frequency	95th Percentile
Design Storm Depth	1.85

II. Setting

II.A. Project Location and Description

This project is located at 18545 & 18565 Monterey Road in Morgan Hill, CA. The site is located between existing Monterey Road, Southern Pacific Railroad tracks, and just south of a commercial development. The project sits on the upper tributary of Fisher Creek and the border of San Francisco Bay Regional Water Quality Control Board jurisdiction and Central Coast Regional Water Quality Control Board jurisdiction. The proposed development seeks to extend the 18" and triple 24" culverts through the project and backfill the man-made ditch to allow for development of 5 commercial units and 49 residential units. The temporary detention basin will be relocated into a public Storm Drain Easement in the southern tip of the subject property and will be sized to mitigate both the proposed development's impact as well as the existing commercial development to the north of the property.

Figure 1: Vicinity Map



II.B. Existing Site Features and Conditions

The existing site has a manmade ditch that runs through the center of the project that is an outfall for an 18" culvert from the northeast corner of the intersection of Jarvis Drive and Monterey Road and triple 24" culverts from a storm drain pump station maintained by the City of Morgan Hill. The City of Morgan Hill has stated that this pump station will is no longer utilized after the construction of a retention/detention pond located just south of the pump station and drains into a drainage channel along Butterfield Boulevard southeast of the proposed development. Existing drainage patterns for the site drain via sheet flow into this man-made ditch and into a temporary detention basin that was constructed in 2005 for the use of all parcels in this commercial area to mitigate increased runoff. See Attachment A for details.

II.C. Opportunities and Constraints for Stormwater Control

II.C.1. Opportunities.

Opportunities for stormwater control include measures such as limiting disturbance of natural drainage features, permeable soils, or native vegetation; minimizing impervious areas; routing runoff through vegetation; and use of permeable surfaces such as pavers. Opportunities presented and implemented by this site include:

The existing conditions of the site leave a large area that is in the public storm drainage easement that allows us to provide adequate treatment and mitigation of increased runoff. The site layout has been optimized to reduce pavement to the maximum extent allowed by the City of Morgan Hill and as feasible to provide adequate access and amenities on site. The site has existing drainage facilities that present both opportunities as well as constraints. The existing storm drainage system has existing outfalls that allow us to maintain the existing drainage patterns without changing existing outfall locations.

II.C.2. Constraints

Stormwater Control Constraints include site conditions such as impermeable soils, high groundwater, groundwater and/or soil contamination, geotechnical hazards, project density, or high-intensity land use. Constraints presented by this project include:

This site is located within an area of ponding per FEMA FIRM map 06085C0443H, effective May 18, 2009. This limits the grading on the site to maintain a finish floor elevation a minimum of 1' above the base flood elevation of 354.00. The existing culverts that will be extended through the project must flow across the project and daylight at the railroad tracks to outlet into the box culvert located under the railroad tracks. This is to maintain the drainage pattern existing on the site prior to the ditch being backfilled. The site is also located adjacent to the underpass for Monterey Road to cross the railroad tracks. The grades necessary for maintaining the existing drainage pattern to Fisher Creek means that a small portion of Monterey Road as it goes under the railroad tracks is unable to be routed through the pond. This area has been accounted for in the peak flow mitigation calculations even though it is not being routed through the pond.

III. Low Impact Development Design Strategies

III.A. Performance Requirements

The CCRWQCB Resolution R3-2013-0032 as well as the *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* describe levels of Post-Construction Requirements based upon the amount of impervious area created/replaced. Below is a discussion of each of the performance requirements and mitigation measures intended to comply with each Performance Requirement Tier.

III.A.1. Performance Requirement No. 1 (PR-1): Site Design and Runoff Reduction

Development projects that create and/or replace at least 2,500 square feet of impervious areas are subject to PR-1. PR-1 requires the following:

- Limit Disturbance of creeks and natural drainage features
- Limit disturbance of highly permeable soils
- Limit disturbance of native vegetation
- Minimize creation and/or replacement of impervious areas
- Minimize runoff using:
    - Cisterns or rain barrels for reuse
    - Route runoff through vegetation
    - Use of permeable pavements

This site has been designed to minimize the proposed impervious areas by proposing minimum street widths while still complying with City of Morgan Hill and Fire Department access requirements and utilizing a shared parking agreement with the commercial development to the north to minimize the required impervious area required for access and parking. The site is proposing large amenity areas that will remain pervious for recreational purposes for residents.

The site has an existing drainage ditch running across the property to the railroad tracks along the westerly boundary. This site has been evaluated by the Army Corps of Engineers and has been determined to not be a jurisdictional creek. This ditch serves the City maintained pump station on the east side of Monterey Road that is only used to drain the City maintained detention pond in the event of back-to-back storm events. The proposed development will be extending the triple culverts and 18" culvert that feeds into this ditch and outlet them at the westerly property line in an energy dissipation structure. Since the existing ditch drains to this same location, pre-development drainage patterns have been preserved.

The site has an existing detention pond located on the site that serves the first two phases of the original commercial development. This pond is to be relocated into a storm drain easement located at the southern tip of the property. The existing commercial development drains to the existing detention pond via a storm drain pipe that will be modified to carry the water to the newly relocated detention pond. This existing pond outlets via a headwall and culvert at the westerly property line. To preserve the existing drainage patterns and release points, this headwall and outlet pipe has been reused.

III.A.2. Performance Requirement No. 2 (PR-2): Water Quality Treatment

Development projects that create and/or replace at least 5,000 square feet (15,000 square feet for Single-Family Detached Homes) Net Impervious Area are subject to PR-2 in addition to PR-1. Net Impervious Area

credits apply when the Post-Development Impervious Area is less than Pre-Development Conditions and is calculated below:

Net Impervious Area=(Total Post Development Impervious Area)-(Reduced Impervious Area Credit)

Where

Reduced Impervious Area Credit =
(Total Pre-Development Impervious Area) – (Total Post-Development Impervious Area)

Projects subject to the requirements of PR-2 are responsible for treating any contaminants that are created by the development. Table 2 below corresponds to Table 4 in *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* and is listed in order of preference according to said manual.

Table 2 - Water Quality Treatment Measures Design Criteria (Guidance Manual Table 4)

Water Quality Treatment Measure*	**Design Criteria**
LID Treatment System – *Harvesting and use, infiltration, evapotranspiration, and bioretention (without an underdrain) SCMs*	Retain stormwater from the 85th 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 of rain event of 0.2 in/hr intensity or 2 x 85th percentile hourly rainfall intensity or other specified design criteria include: • Maximum surface loading rate of 5 in/hr • Minimum surface reservoir depth (6") • Minimum planting minimum depth (24") • Proper plant selection • Subsurface gravel layer (minimum depth of 12") • Underdrain placement near the top of the gravel layer • No compaction of soils beneath the 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: 85th Percentile 24-hour storm event Flow Hydraulic Design Basis: 0.2 in/hr intensity OR 2 x 85th Percentile hourly rainfall intensity
*Multiple SCMs may be used to collectively achieve the design criteria.	

This project utilizes an above ground bioretention pond located at the southern end of the proposed development. This system uses surface storage, biofiltration media, and ¾ inch drain rock to retain the 95th Percentile 24-hour storm event. This site is required to retain the 95th Percentile Storm Event in compliance with Performance Requirement 3 (see Section III.A.3) and the 95th Percentile event is a larger storm event, this pond is designed in compliance with Performance Requirement 2 by exceeding the required 85th Percentile 24-hour storm event volume. The proposed bioretention pond consists of surface storage with 4:1 maximum side slopes with 24" of bioswale media mix (min. 5 inch/hour loading rate as required by *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*) on top of 24" of ¾" clean drain rock for subsurface retention volume. The surface pond utilizes 12" of surface ponding as recommended by the Guidance Manual.

In addition to the LID Treatment System, the City of Morgan Hill requires flow-based Biofiltration Treatment Systems. This system uses biofiltration media and special plant selection to break down contaminants in the water before entering the underground storage system. Figure 2 below shows a typical bioswale detail. The

simplified sizing method (also known as the 4% sizing method) was used to size these biofiltration systems. Figure 3 below shows simplified sizing methodology per the *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* and Table 3 below show the sizing of each of the biofiltration SCMs.

Figure 2: Bioretention Pond Detail

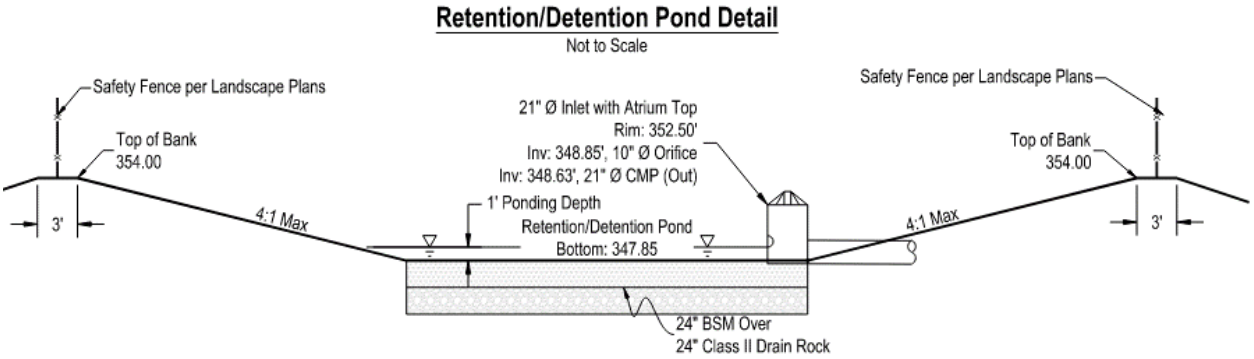


Figure 3: Simplified Biofiltration Sizing Method (Guidance Manual Figure 6)

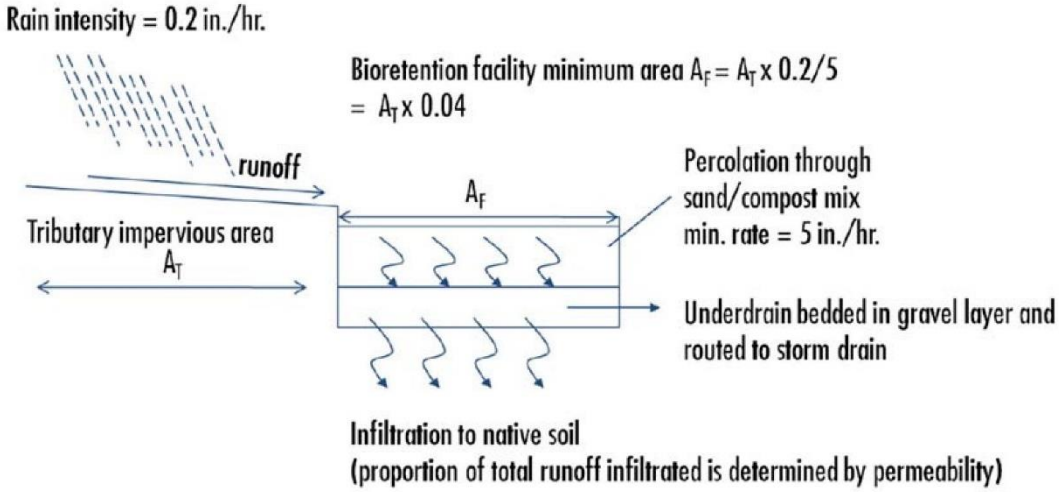


Table 3: LID Treatment Sizing Summary

LID Treatment Sizing Table					
DMA	**BMP**	**Total DMA Area**	**DMA Impervious Area**	**Required Treatment Area**	**Provided Treatment Area**
1	SCM 1	174,172 SF	112,024 SF	4,481 SF	4,888 SF

III.A.3. Performance Requirement No. 3 (PR-3): Runoff Retention

Development projects that create and/or replace 15,000 square feet of impervious area (Single Family Detached Homes are allowed to use Net Impervious Area as defined in PR-2) and are located within Watershed Management Zones 1, 2, 5, 6, 8, 9, and portions of Watershed Management Zones 4, 7, and 10 that lie in designated Groundwater Basins are subject to Performance Requirement 3 as we well as PR-1 and PR-2. PR-3 requires the retention of the volume of runoff that could contain contaminants and that would naturally infiltrate in pre-development conditions. Appendix D of the *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 details the calculations for the required retention volume. Attachment E has detailed calculations for this project following the calculations in Appendix D of said Guidance Manual and is summarized below in Table 4 below.

Table 4: LID Volume Sizing Summary

LID Volume Sizing Table							
DMA	**BMP**	**Total DMA Area**	**DMA Impervious Area**	**i**	**C**	**Required Retention Volume**	**Provided Retention Volume**
1	SCM 1	174,172 SF	112,024 SF	0.64	0.44	11,907 CF	11,961 CF

This retains the required retention volume as calculated in Attachment D using an above ground retention/detention pond. The bioretention pond is placed at placed at the lowest point on site to conform to existing terrain and watersheds with a bottom elevation of 347.85'. The bioretention pond consists of surface storage with 4:1 side slopes and 12" of ponding on top of 24 inches of biofiltration media on top of 24 inches of ¾ inch drain rock. Retention volume calculations provided in Attachment D calculate the surface storage from the bottom of the surface pond to the invert of the outlet, the volume in the biofiltration media using 25% voids, and the volume in the voids of the drain rock using 40% voids. The pond releases via a stand pipe with a 10 inch orifice at an elevation of 348.85' and a top (release) elevation of 352.50' to retain the required retention volume. The 10" orifice elevation was set using a maximum ponding depth of 12" per C.3 handbook recommendations and the top of the stand pipe elevation set to bypass higher intensity storms while maintaining a minimum of 1 foot of freeboard in the pond. The 95th Percentile Storm Event was modeled in HydroCAD to ensure no release of the 95th Percentile Event as required by the *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* continuous simulation of hydrologic model. See Section IV and Attachment F for detailed HydroCAD modeling data.

Infiltration Testing was conducted by Quantum Geotechnical, Inc. around the proposed bioretention pond at approximately the elevation of the bottom of the drain rock. Design infiltration rates have been determined using an average of the four tests conducted and an application of a factor of safety of 2. See Attachment B for excerpts from Geotechnical Investigation Report discussing infiltration testing. Design infiltration rate used for this pond is 1.625 inches per hour. Using this design infiltration rate applied to the bottom surface area of the rock, drawdown of the calculated retention volume is 24 hours. The design infiltration rate has been applied to the surface storage, biomedia, and drain rock in the HydroCAD model as all of these layers will allow infiltration into native soils through side slopes and sides of the media. Drawdown calculations in Attachment D are calculated using the bottom area of the drain rock to determine the longest time it could take to infiltrate.

III.A.4. Performance Requirement No. 4 (PR-4): Peak Management

Development Projects that create and/or replace at least 22,500 square feet of impervious areas and within Watershed Management Zones 1, 2, 3, 6, and 9 are required to comply with Performance Requirement 4 in addition to previously discussed performance requirements. PR-4 is intended to mitigate the increased runoff created by the project's increase in impervious areas, thus preventing any adverse flooding conditions downstream of the project. PR-4 requires developments to detain increased runoff from the 2-, 5-, and 10-year events such that they release at rates at, or below, pre-development conditions.

This project retains the required retention volume as calculated in Attachment D using an above ground bioretention/detention pond. The bioretention/detention pond is placed at placed at the lowest point on site to conform to existing terrain and watersheds with a bottom elevation of 347.85'. The bioretention pond consists of surface storage with 4:1 side slopes and 12" of ponding on top of 24 inches of biofiltration media on top of 24 inches of ¾ inch drain rock. The pond releases via a stand pipe with a 10" orifice at an elevation of 348.85' and a top (release) elevation of 352.50' to retain the required retention volume. Outfall elevation and size has been designed to meter the outflow from the project at, or below, pre-development conditions up to the 100-year event. See Section IV below for detailed description of model and results.

III.A.5. Performance Requirement No. 5 (PR-5): Special Circumstances
This Performance Requirement applies to projects that are exempt from the runoff retention and/or peak flow mitigation requirements described in previous performance requirements because they discharge to highly altered channels, flow control facilities, or historic lake and wetland areas.

This project does not fall under this performance requirement.

IV. Documentation of Drainage Design

IV.A. Drainage Management Area Characterization

The Drainage Management Areas (DMAs) shown on Attachment G have been delineated based upon the tributary areas to each Source Control Measure (SCM). This site has been simplified to use one DMA and one SCM. The entire site is designed to be piped to the bioretention pond at the southern end of the site and bubble up into the bioretention pond. Table 4 below shows a summary of each of the DMAs. See Attachment G for details.

Table 5: DMA Summary Table

DMA Summary Table						
DMA	**BMP**	**Total DMA Area**	**Existing Impervious Area**	**Post-Development Impervious Area**		
				Replaced	New	**Total**
1	SCM 1	174,172 SF	0 SF	0 SF	112,024 SF	**112,024 SF**

IV.B. Hydrologic Modeling

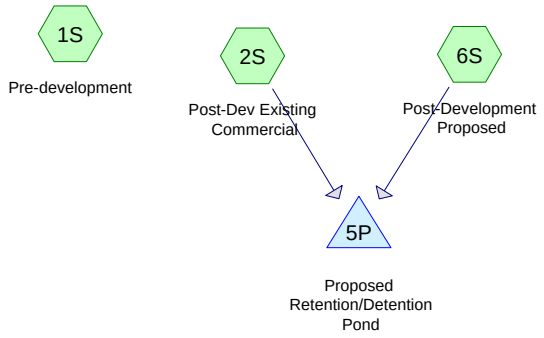
Hydrologic modeling has been completed utilizing the HydroCAD program. This program uses the SCS Unit Hydrograph method to route the design storms through the proposed SCMs to determine the runoff impact generated by the project. The model utilizes a unit hydrograph of Valley Water's Santa Clara Valley 1956 design storm combined with rainfall depths determined by the National Oceanic and Atmospheric Administration (NOAA). NOAA rainfall data has been provided as Attachment E. This rainfall data has been determined to be more conservative and provide the worst-case scenario when determining hydrologic impact of the development. Figure 4 below shows a schematic of the model created in HydroCAD. Detail input and output data can be found in Attachment F.

This development site has an existing detention pond that was used to mitigate the first two phases of the initial commercial development. The pond was intended to be relocated when the two parcels that make up The Gates development were to be developed. This development has relocated this detention pond to the southern tip of the project, within a Storm Drainage Easement to service the proposed development and the existing commercial development to the north.

The "Pre-development" node in the schematic shown below is modeled as bare dirt for the proposed development and the existing commercial development. "Post Dev Existing Commercial" node represents the developed commercial parcels to the north of the project. This node uses the area of the parcels to the north with a SCS Curve Number of 94 to represent 85% impervious coverage of the site. "Post Development Proposed" node represents the proposed developments of this project.

The proposed development also includes the extension of three (3) 24" culverts and one (1) 18" culvert through the property. These culverts accept water from developments on the east side of Monterey Road and are pipe through the property, having no effect on peak flow calculations and maintaining the existing drainage pattern of the site.

Figure 4: HydroCAD Model Schematic



This project uses a bioretention/detention pond for both required retention volume storage and peak-flow mitigation. The bioretention/detention pond is placed at placed at the lowest point on site to conform to existing terrain and watersheds with a bottom elevation of 347.85'. The bioretention pond consists of surface storage with 4:1 side slopes and 12" of ponding over 24 inches of biofiltration media and 24 inches of ¾ inch drain rock for runoff treatment and storage. The pond releases via a stand pipe with a 10" orifice at an elevation of 348.85' and a top (release) elevation of 352.50' to retain the required retention volume and meter the outflow from the pond. The proposed pond will retain stormwater until an elevation of 348.85' to meet required retention volumes discussed in Section III.A.3. Once the water surface elevation rises above 348.85', it will begin to release below pre-development levels. Pre-development levels have been considered to be bare dirt for this model to account for the relocation of the existing detention pond on site.

In addition to the outfall mentioned above, infiltration has been modeled out of the system using the infiltration report mentioned in the Geotechnical Investigation conducted by Quantum Geotechnical, Inc. A factor of safety of 2 has been applied to the average of the four infiltration tests conducted and modeled as "Discarded" in the HydroCAD model. This is the water that will infiltrate into the native soil through the bottom and sides of the drain rock, biomedia, and surface storage during the modeling window. HydroCAD modeling shows that with this infiltration rate included in the system, 95th Percentile water surface elevation (WSE) is at 348.02', 10 inches below the outlet elevation. Using the factored infiltration rate in the HydroCAD model, retained runoff in the system will be fully infiltrated after 24 hours.

The maximum water surface elevation in the system for the event has been determined to be 350.59' for the 100-year event. The system is designed to detain the 100-year event; however overland release has been provided along the westerly bank. Stormwater will also be able to bubble up into Monterey Road through the catch basin provided intercept the water and route the runoff to the bioretention pond before reaching an elevation that would threaten any proposed or existing structures. This system would only be used in the event of failure of the outfall system of collection pipes. Tables 5 and 6 below shows a summary of each event. See Attachment G for detailed model input and output data.

Table 6: Pre-Development Event Summary

Events for Subcatchment 1S: Pre-development

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95th	1.85	0.58	0.226	0.44
1 year	2.05	0.72	0.286	0.55
2 year	2.66	1.16	0.490	0.95
5 year	3.48	1.79	0.802	1.55
10 year	4.18	2.34	1.092	2.11
25 year	5.16	3.13	1.521	2.94
50 year	5.94	3.77	1.876	3.63
100 year	**6.77**	**4.44**	**2.263**	**4.37**

Table 7: Post-Development Existing Commercial Development Event Summary

Events for Subcatchment 2S: Post-Dev Existing Commer

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95th	1.85	0.53	0.275	1.26
1 year	2.05	0.60	0.316	1.44
2 year	2.66	0.80	0.442	2.02
5 year	3.48	1.08	0.616	2.82
10 year	4.18	1.31	0.766	3.50
25 year	5.16	1.63	0.977	4.47
50 year	5.94	1.89	1.145	5.24
100 year	**6.77**	**2.16**	**1.325**	**6.06**

Table 8: Post Development Proposed Development Event Summary

Events for Subcatchment 6S: Post-Development Propos

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95th	1.85	0.71	0.344	1.03
1 year	2.05	0.82	0.402	1.21
2 year	2.66	1.14	0.585	1.76
5 year	3.48	1.56	0.840	2.52
10 year	4.18	1.92	1.063	3.19
25 year	5.16	2.42	1.379	4.14
50 year	5.94	2.82	1.632	4.90
100 year	**6.77**	**3.24**	**1.903**	**5.71**

Table 9: Bioretention Pond Event Summary

Events for Pond 5P: Proposed Retention/Detention Pond

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Tertiary (cfs)	Elevation (feet)	Storage (cubic-feet)
95th	1.24	0.57	0.57	0.00	**0.00**	348.16	8,146
1 year	1.41	0.58	0.58	0.00	0.00	348.43	9,772
2 year	1.94	0.96	0.62	0.33	0.00	349.15	14,612
5 year	2.64	2.07	0.65	1.43	0.00	349.56	17,665
10 year	3.23	2.52	0.66	1.86	0.00	349.77	19,258
25 year	4.06	3.01	0.68	2.33	0.00	350.06	21,612
50 year	4.71	3.37	0.69	2.68	0.00	350.31	23,766
100 year	**5.40**	**3.73**	**0.71**	**3.02**	0.00	**350.59**	**26,333**

Inflow = Post-Development peak runoff flow entering the SCM
Outflow = Total outflow from the SCM, including infiltration and overflow
Discarded = Runoff leaving the system via infiltration using the factored infiltration rate
Primary = Ruoff leaving the system through the 10” orifice and/or stand pipe top.
Tertiary = Pond overtopping
Elevation = Maximum water surface elevation during the storm event

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

Common sources of potential pollutants in residential projects include pesticides/herbicides from landscape maintenance, fertilizers, oil/fuel leaking from poor vehicle maintenance, and airborne contaminants settling on the site.

V.B. Source Control Table

Table 10: Potential Pollutants and Source Control BMPs

	Pollutants Associated with Activity						
Potential Pollutant Source	Sediment/ Litter/ Debris	Nutrients/ Organic Matter	Bacteria	Hydro-carbons	Toxics/ Chemicals/ Paint	Other	Source Control BMP Proposed
Pets		X	X				Good housekeeping/ Illicit Discharge Control/Pet Waste Station
Parked Vehicles	X			X			Vehicle Maintenance, Fueling and Storage
Roads, Fertilizers, Pesticides, Storm Drains, Etc.							Plant Selection and integrated pest management

Table 11: Source Control Measures

Source Control Measure	Description
Storm Drain Inlets	Structural: Inlets clearly marked with "No Dumping" or similar message Operational: Inlets will have routine inspection and cleaning.
Pesticides	Structural: Pest-resistant plans will be selected when possible near impervious surfaces Operational: Landscape maintenance to utilize integrated pest management methods.
Bioswales	Operational: Bi-annual inspections required by the City to assess performance of the filtration media.
Underground Retention System	Structural: Installed sumps for sedimentation and ADS Envirohood for floating contaminants. Operational: Routine inspection and maintenance of sumps.

V.C. Features, Materials, and Methods of Construction of Source Control BMPs

Structural Control Measures are facilities designed and implemented to contain and remove contaminants found in stormwater runoff generated from development. These facilities break down and remove contaminants using filtration, infiltration, sedimentation, and evapotranspiration on the site before releasing runoff from the site.

This project has installed a bioretention facility for the proposed development. The bioretention pond uses biofiltration media that will break down contaminants in runoff using special sand and compost material that will filter contaminants in the runoff. These biofiltration facilities feature a special selection of plants that will break down contaminants such as oils and metals that enter the facility. Runoff will pass through the filtration media and enter the storm drain system via an underdrain and be routed to the retention facility to promote infiltration and further treatment of the runoff.

Bioretention facilities are also used to capture runoff and allow time for runoff the infiltrate into native soil as it did prior to the development. The biofiltration media will allow sediment to remain on the surface and will filter out contaminants prior to infiltrating into native soils. The retained volume provided by the voids in the biofiltration media and drain rock and the above ground storage will capture contaminated runoff and keep all contaminants on site, preventing contamination of receiving waters.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

Projects that trigger Performance Requirements 2, 3, or 4, are required to record a *Stormwater Best Management Practices, Operation, and Maintenance Agreement* with the City and incorporate language into the CC&Rs accepting responsibility for inspection, operation and maintenance of facilities. An HOA will be established at permitting to own and maintain the proposed stormwater mitigation facilities. Executed BMP O&M Agreement, inspections contract, and maintenance documentation will be provided at permitting.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

As stated in the *Stormwater Best Management Practices, Operation, and Maintenance Agreement*, the project shall submit two (2) annual inspections per year in perpetuity. One inspection is due every June and shall follow the instructions outlined in the *BMP RAM Field Protocols* (added as attachment). The second inspection shall be submitted every November and will include a certification from the Engineer or QSP verifying all SCM(s) are in working conditions. Maintenance shall be performed whenever the SCM(s) are in poor conditions as per the annual inspections, or regular maintenance.

VII. Construction Checklist

Table 12: Construction Checklist

SWCP Page No.	Structural Control Measure SCMs	Plan Sheet No.	SCM Detail No.
Attachment G	SCM 1	C.9	Bioretention Pond Detail

VIII. Certifications

The design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the Post-Construction Stormwater Management Resolution R3-2013-0032 and the current edition of the City's LID and Post-Construction Requirements Handbook.

See Attachment B for Performance Requirement Certifications

MH engineering Co.
16075 Vineyard Blvd. Morgan Hill, CA 95037 - (408) 779-7381

Attachment A:
Existing Site Topography

AC	Asphalt Concrete	HP	High Point
BC	Beginning of Curve	INV	Invert
BVC	Beginning of Vertical Curve	JP	Joint Pole
BW	Back of Walk	LP	Low Point
℄	Centerline	Max	Maximum
CL D/W	Centerline Driveway	Min	Minimum
CMP	Corrugated Metal Pipe	NG	Natural Ground
CO	Clean Out	PB	Pull Box
DI	Drop Inlet	℘	Property Line
DIP	Ductile Iron Pipe	PSE	Public Service Easement
DWY	Driveway	PSDE	Private Storm Drain Easement
EC	End of Curve	PVI	Point of Vertical Intersection
EG	Existing Ground	PUE	Public Utility Easement
ELCT	Electrolier	RCP	Reinforced Concrete Pipe
EP	Edge of Pavement	R/W	Right of Way
ER	End of Return	SDMH	Storm Drain Manhole
EVC	End of Vertical Curve	SSMH	Sanitary Sewer Manhole
EX, EXST	Existing	Std	Standard
FC	Flush Curb	SW	Sidewalk
FF	Finish Floor	TBM	Temporary Benchmark
FG	Finish Grade	TC	Top of Curb
FL	Flowline	TWC	Top of Wedge Curb
GB	Grade Break	Typ	Typical

Engineer:

Harrinder Singla, C49717
MH Engineering
16075 Vineyard Blvd.
Morgan Hill, CA 95037
408.779.7381
harrys@mhengineering.com

Project Information:

APN	764-10-013 & 015
Present Use:	Vacant
Proposed Use:	Mixed Use Flex
Present Zoning:	PUD
Proposed Zoning:	Mixed Use Flex
Sanitary Sewer:	City of Morgan Hill
Gas and Electric:	PG&E
Water:	City of Morgan Hill
Telephone:	Verizon
Existing Improvements:	As Shown
Area:	3.816
Topo:	Field Topo

Basis of Bearings: Bearings shown on this map are based up on the centerline of Old Montery Road as found and monumented as North 31°44'59" West as shown on that certain Tract Map recorded at Book 677 of Map, Page 52-53, Santa Clara County Records.

Benchmark: Elevations shown on this map are based upon Santa Clara Valley Water Benchmark BM1067 located at the railroad tracks for Union Pacific Railroad (UPRR); 300 southeast from Cochrane Road along Old Monterey Road; opposite to address 18515 Old Monterey Road; disk is on top of 1.7 feet wide by 8.5 feet long concrete headwall on northewesterly side of tracks and over 2 feet diameter steel pipe culvert; 9.5 feet southwesterly from the most southwesterly rail fro railroad tracks; 37.5 feet northeasterly from telephone pole No. GT109368. City of Morgan Hill
Elevation= 353.25' (NAVD '88)

Flood Zone: Project lies within Flood Zone AH: Flood depths of 1-3 feet (usually areas of ponding); Base flood elevations determined.
Base Flood Elevation = 354.00'

Underground Utility Note: Observed surface evidence of utility lines including facilities, appurtenances and markings were used in depicting the location of underground utilities shown on these plans. However, lacking excavation, the exact location and depth of underground features cannot be accurately, completely and reliably depicted. Where additional or more detailed information is required, the client is advised that excavation may be necessary.

Construction Staking Note: Owner's Engineer shall provide construction staking for all improvements shown. It shall be the contractor's responsibility to verify the accuracy of all staking prior to the installation of all improvements shown on these plans. It is recommended that the contractor check line and grade from at least three (3) stakes provided. Any descrepancies shall be reported immediately to MH engineering Co. or the Owner's representative. The contractor shall also field verify all existing tulities' location and elevation prior to the installation of any proposed utilities. Any discrepancies shall be reported to MH engineering Co. or the Owner's representative.

Underground Service Alert Note

Observed surface evidence of utility lines including facilities, appurtenances, and markings were used in depicting the locations of the underground features shown on these plans. Underground features depicted are approximate and it is the responsibility of the contractor to determine the actual location and depth of underground utilities prior to starting excavation.
Call USA North: 1.800.227.2600 OR 811

06/16/2022 9:32am
FOR PLANCHECK ONLY
REGISTERED PROFESSIONAL ENGINEER · HARINDER SINGLA · C49717 · STATE OF CALIFORNIA
FOR PLANCHECK ONLY
signature shall be provided upon approval

NO.	DESCRIPTION	DATE	BY

REVISIONS

WORK ACCEPTED: INSPECTOR:
BY: DATE:

City of Morgan Hill
Public Works Department
CITY OF MORGAN HILL
17575 PEAK AVE. MORGAN HILL, CA 95037
(408) 776-6480 FAX (408) 779-7236

DRAWN: KW	DESIGN: HS	HOR. 1"=40'
CHECKED: CH	DATE:	VERT.
APPROVED:	DATE:	JOB NO. 221005.1

Scott C. Creer, RCE 58879 — CITY ENGINEER, EXP. DATE 06-30-2021

SUPERVISED BY:
SIGNATURE DATE

MH engineering Co.
SUBDIVISIONS - LAND PLANNING - LAND SURVEYS
16075 VINEYARD BOULEVARD MORGAN HILL, CA 95037
(408) 779-7381 FAX: (408) 226-5712

Site Topography & Prelminary Demo Plan
The Gates

MORGAN HILL CALIFORNIA

CITY FILE NO. SR2021-0020
PLAN SET: 6/28/22
DRAWING: C.3 of 13

Site Topography & Prelminary Demo Plan
The Gates

MH engineering Co.
16075 Vineyard Blvd. Morgan Hill, CA 95037 - (408) 779-7381

Attachment B:
Central Coast Performance Requirement Checklist

LOW IMPACT DEVELOPMENT

AND

POST-CONSTRUCTION

STORMWATER MANAGEMENT REQUIREMENTS

APPLICANT PACKET

FOR PROJECTS IN SOUTH SANTA CLARA COUNTY

COUNTY OF SANTA CLARA

REV 6/11/15

Post Construction Stormwater Management Requirements
Project Requirements Determination

PROJECT INFORMATION

County File No: GPA2021-0005

Project Name: **The Gates** APN#: **764-10-013 & 015**

Project Address: **18545 & 18565 Monterey Rd. - 764-10-013 & 015**

Cross Streets: **Monterey Rd & Jarvis Dr.**

Applicant/Developer Name: **City Ventures Homebuilders, LLC**

Project Phase(s): 1 of 1 Engineer: **Kristian Wallace, PE**

Project Type (Check all that apply): ☐ New Development ☐ Redevelopment
☐ Residential ☐ Commercial ☐ Industrial ☒ Mixed Use ☐ Public ☐ Institutional
☐ Restaurant ☐ Uncovered Parking ☐ Retail Gas Outlet ☐ Auto Service (SIC code)____
☐ Other _____

Project Description: **Mixed use development with 49 Residential Units and 5 Commercial Units.**

Project Watershed/Receiving Water (creek, river): **Fisher Creek**

1. Total Project Area	**174,172**	ft^2
2. Pre-Project		
(a) Impervious Area	**0**	ft^2
(b) Pervious Area	**174,172**	ft^2
3. Post-Project		
(a) Replaced Impervious Area	**0**	ft^2
(b) New Impervious Area	**112,024**	ft^2
(c) Total Post-Project Impervious Area (*sum of Line 3a and Line 3b*)	**112,024**	ft^2
(d) Post-Project Pervious Area	**62,148**	ft^2
Net Impervious Area		
4. Reduced Impervious Area Credit *(Line 2a minus Line 3c)*	**0**	ft^2
5. Net Impervious Area *(Line 3c minus Line 4)*	**112,024**	ft^2

6. Is Line 3c greater than or equal to 2,500 sq. ft?

☐ No, the project does not need to meet Post-Construction Stormwater Management Requirements **- STOP HERE**.

☒ Yes, the project is subject to Performance Requirement No. 1: Site Design and Runoff Reduction. Complete the **Site Design and Runoff Reduction Checklist** on **Page 4**. Continue to #7.

7. Is the Project a detached single-family home?

☒ No, go to #8.

☐ Yes, continue to #7.a. below.

7a. Is Line #5, Net Impervious Area greater than or equal to 15,000 sq ft?

☐ No, the project does not have any additional requirements – **STOP HERE**.

☒ Yes, this project is subject to Performance Requirement No. 2: Water Quality Treatment. Complete the **Water Quality Treatment Checklist** on **Page 6**. Continue to #7.b.

☒ Yes, this project is subject to Performance Requirement No. 3: Runoff Retention. Complete the **Runoff Retention Checklists** on **Pages 8-11**. Continue to #7.b.

7b. Is Line #3.c, amount of impervious surface created and/or replaced, greater than or equal to 22,500 sq ft?

☐ No, go to #12.

☒ Yes, this project is subject to Performance Requirement No. 4: Peak Management (refer to the Stormwater Management Guidance Manual for instructions).
Go to #12.

8. For projects that are not detached single family homes, is Line #5, Net Impervious Area, greater than or equal to 5,000 sq ft?

☐ No, the project does not have any additional requirements – **STOP HERE**.

☒ Yes, this project is subject to Performance Requirement No. 2 Water Quality Treatment. Complete the **Water Quality Treatment Checklist** on **Page 6**. Continue to #9.

9. Is Line #3.c, amount of impervious surface created and/or replaced, greater than or equal to 15,000 sq ft?

☐ No, go to #11.

☒ Yes, this project is subject to Performance Requirement No. 3 Runoff Retention. Complete all **Runoff Retention Checklists** on **Pages 8-11**, as applicable. Continue to #10.

10. Is Line #3.c, amount of impervious surface created and/or replaced, greater than or equal to 22,500 sq ft?

☐ No. Continue to #11.

☒ Yes, this project is subject to Performance Requirement No. 4: Peak Management (refer to the Stormwater Management Guidance Manual for instructions). Continue to #11.

11. Is there a pollutant generating activity or source included in the project (e.g., restaurants, grocery stores, food service operations, outdoor storage, vehicle service facilities, retail gas outlets, outdoor parking lots, loading docks, pools, spas, or fountains)?

☐ No, go to #12.

☒ Yes, your Project is required to implement structural or operational source control measures. Complete the **Source Control Checklist** on **page 5**. Continue to #12.

12. **Operation and Maintenance Information**

a) Property Owner's Name **City Ventures Homebuilders, LLC**

b) Responsible Party for Stormwater Treatment/Hydromodification Control O&M:

i. Name: **City Ventures Homebuilders, LLC**

ii. Address: **444 Spear St., St. 200, San Francisco, CA 94105**

iii. Phone/E-mail: **646.522.4260 / samantha@cityventures.com**

13. Submit a Stormwater Control Plan with the required information, and complete the **Stormwater Control Plan Checklist** on **page 12**.

☒ Yes **See Improvement Plan Sheets C.9**

☐ No

File No.: GPA2021-0005

PERFORMANCE REQUIREMENT NO. 1: SITE DESIGN AND RUNOFF REDUCTION

Certification

	DESIGN STRATEGY	INCORPORATED INTO PROJECT?
1.	Limit disturbance of creeks and natural drainage features. *No jurisdictional creeks were disturbed in the proposed development. An existing drainage ditch is being backfilled and culverts extended across the project to maintain existing drainage patterns*	☐ **No**
2.	Minimize compaction of highly permeable soils.	☐ **yes**
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.	☐ **yes**
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.	☐ **yes**
5.	Minimize stormwater runoff by implementing one or more of the following design measures:	☐ **yes**
	a) Direct roof runoff into cisterns or rain barrels for reuse.	☐ **no**
	b) Direct roof runoff onto vegetated areas safely away from building foundations and footings. *yes, runoff is routed through vegetated areas and vegetated swales to underground storage system wherever possible*	☐ **yes**
	c) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings. *yes, sidewalk, driveway, walkway and patio runoff is directed over adjacent vegetation and collected in an underground storage system wherever possible.*	☐ **yes**
	d) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings.	☐ **no**
	e) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces.	☐ **no**

I, Kristian Wallace, PE, acting as the Project Engineer for City Ventures Homebuilders, LLC project, located at 18545 & 18565 Monterey Rd., hereby state that the Site Design and Runoff Reduction design strategies indicated above have been incorporated into the design of the project.

Signature

REGISTERED PROFESSIONAL ENGINEER
KRISTIAN A. WALLACE
No. 93207
EXP. 03-31-2024
CIVIL
STATE OF CALIFORNIA

6/16/2022
Date

REV 6/11/15

SOURCE CONTROL CHECKLIST

On-site Source Control Measures	Incorporated Into Project?
Wash area/racks, drain to sanitary sewer or septic system[1]	☐ yes
Covered dumpster area, drain to sanitary sewer/septic system[1] or landscaped area	☐ yes
Accessible cleanout for draining swimming pool/spa/fountain	☐ n/a
Parking garage floor drains plumbed to sanitary sewer[1]	☐ n/a
Fire sprinkler test water/condensate drain lines drain to sanitary sewer/septic system[1] or landscaped area	☐ yes
Interior floor drains/boiler drain lines plumbed to sanitary sewer	☐ yes
Beneficial landscaping/IPM (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment)	☐ yes
Outdoor material storage protection	☐ n/a
Covers, drains for loading docks, maintenance bays, fueling areas	☐ n/a
Maintenance (pavement sweeping, catch basin cleaning, good housekeeping)	☐ yes
Storm drain labeling	☐ yes
Other[2] **all proposed runoff routed through vegetated areas**	☐ yes

Notes:

[1] Subject to sanitary sewer authority and/or Department of Environmental Health 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

 File No.: GPA2021-0005

PERFORMANCE REQUIREMENT NO. 2: WATER QUALITY TREATMENT

Certification

ON-SITE WATER QUALITY TREATMENT MEASURES	INCORPORATED?
1. Low Impact Development (LID) Treatment Systems designed to retain stormwater runoff generated by the 85th percentile 24-hour storm. Stormwater Control Measures Implement (check all that apply, design documentation is required)	
a) Harvesting and Use,	☐ No
b) Infiltration,	☐ Yes
c) Evapotranspiration	☐ Yes
2. Biofiltration Treatment Systems[1] – 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: (a) 0.2 inches per hour intensity; or (b) Two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depth	☐ yes
b) Minimum surface reservoir volume equal to the biofiltration treatment system surface area times a depth of 6 inches	☐ yes
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 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.	☐ yes
d) Proper plant selection[2]	☐ yes
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	☐ yes
f) Underdrain with discharge elevation at top of gravel layer	☐ No underdrain provided
g) No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted)	☐ yes

h) No liners or other barriers interfering with infiltration, except for situations where lateral infiltration is not technically feasible ☐ Yes

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. ☐ Yes

(b) Flow Hydraulic Design Basis – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat: ☐ No
   (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, Kristian Wallace, PE, acting as the Project Engineer for City Ventures Homebuilders, LLC project, located at 18545 & 18565 Monterey Rd., hereby state that the Water Quality Treatment Measures indicated above have been incorporated into the design of the project.

Signature

REGISTERED PROFESSIONAL ENGINEER
KRISTIAN A. WALLACE
No. 93207
EXP. 03-31-2024
CIVIL
STATE OF CALIFORNIA

6/16/2022
Date

[1] Facilities or a combination of facilities, of a different design than in Item #2 may be permitted if all of the following measures of equivalent effectiveness are demonstrated: 1) equal or greater amount of runoff infiltrated or evapotranspired; 2) equal or lower pollutant concentrations in runoff that is discharged after biofiltration; 3) equal or greater protection against shock loading and spills; and 4) equal or greater accessibility and ease of inspection and maintenance.
[2] 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)

PERFORMANCE REQUIREMENT NO. 3 – RUNOFF RETENTION

Design Rainfall Events & Treatment Requirements for Watershed Management Zones (WMZs)[1]

WMZ[2]	Treatment Options & Design Rainfall	Check Applicable WMZs
WMZ 1	Via optimized infiltration[3], 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	☐

1. Includes only those WMZs located in Santa Clara County.
2. Use the Santa Clara County Department of Planning and Development Online Property Profile database to determine the WMZ in which your project is located: http://www.sccplanning.org/gisprofile/

   Search for your project site by APN or Address to retrieve the Property Profile. At the bottom of the property profile page, under Special Resources/Hazards/Constraints Areas, look for the "Central Coast Watershed Management Zone Value".
3. Storage, rainwater harvesting, and/or evapotranspiration may be used when infiltration is optimized.

* Applicable only to those areas that overlay designated Groundwater Basins.

PERFORMANCE REQUIREMENT NO. 3 – RUNOFF RETENTION

LID Site Assessment Checklist

ITEMS TO DOCUMENT:		INCLUDED IN PROJECT DOCUMENTS?
1.	Site topography	☐ Yes
2.	Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs	☐ Yes
3.	Depth to seasonal high groundwater	☐ Yes
4.	Locations of groundwater wells used for drinking water	☐ Yes
5.	Depth to an impervious layer such as bedrock	☐ N/A
6.	Presence of unique geology (e.g., karst)	☐ N/A
7.	Geotechnical hazards	☐ N/A
8.	Documented soil and/or groundwater contamination	☐ N/A
9.	Soil types and hydrologic soil groups	☐ No
10.	Vegetative cover/trees	☐ Yes
11.	Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)	☐ N/A
12.	Existing drainage infrastructure for the site and nearby areas including the location of municipal storm drains	☐ Yes
13.	Structures including retaining walls	☐ Yes
14.	Utilities	☐ Yes
15.	Easements	☐ Yes
16.	Covenants	☐ No
17.	Zoning/Land Use	☐ Yes
18.	Setbacks	☐ Yes
19.	Open space requirements	☐ N/A
20.	Other pertinent overlay(s)	☐ N/A

 File No.: GPA2021-0005

PERFORMANCE REQUIREMENT NO. 3 – RUNOFF RETENTION

LID Site Design Measures

The Project Engineer shall certify the Project design optimizes the use of the following design measures to augment the design strategies required by Performance Requirement No. 1. Initial each runoff retention measure that has been incorporated and optimized into the design or mark NA if not applicable.

PERFORMANCE REQUIREMENT NO. 3 CERTIFICATION OF LID SITE DESIGN MEASURES

	DESIGN MEASURE	INCORPORATED/ OPTIMIZED
1.	Defining the development envelope, identifying the protected areas, and identifying areas that are most suitable for development and areas to be left undisturbed	Incorporated
2.	Identifying conserved natural areas, including existing trees, other vegetation, and soils (shown on the plans)	Incorporated
3.	Limit the overall impervious footprint of the project	Incorporated
4.	Design of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised	Incorporated
5.	Set back development from creeks, wetlands, and riparian habitats	N/A
6.	Design conforms the site layout along natural landforms	Optimized
7.	Design avoids excessive grading and disturbance of vegetation and soils	Optimized

I, Kristian Wallace, PE, acting as the Project Engineer for City Ventures Homebuilders, LLC project, located at 18545 & 18565 Monterey Rd., hereby state that LID Site Design Measures initialed have been incorporated into the design of the project.

Signature

REGISTERED PROFESSIONAL ENGINEER
KRISTIAN A. WALLACE
No. 93207
EXP. 03-31-2024
CIVIL
STATE OF CALIFORNIA

6/16/2022
Date

File No.: GPA2021-0005

PERFORMANCE REQUIREMENT NO. 3 – RUNOFF RETENTION

TECHNICAL INFEASIBILITY CHECKLIST

	Site Conditions	Check Applicable
1.	Depth to seasonal high groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures[3]	☐ N/A
2.	Depth to an impervious layer such as bedrock limits infiltration	☐ N/A
3.	Sites where soil types significantly limit infiltration	☐ N/A
4.	Sites where pollutant mobilization in the soil or groundwater is a documented concern	☐ N/A
5.	Space constraints (e.g., infill projects, some redevelopment projects, high density development)	☐ N/A
6.	Geotechnical hazards	☐ N/A
7.	Stormwater Control Measures located within 100 feet of a groundwater well used for drinking water	☐ N/A
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)	☐ N/A

[3] According to the CASQA Frequently Asked Questions about LID, "some MS4 permits and BMP guidance manuals require anywhere from 3-10 feet of separation from the groundwater level for infiltration practices. This distance depends on the soil type, pollutants of concern, and groundwater use. In some cases, however, where there may be groundwater or soil contamination, LID infiltrative practices may be restricted completely. (p. 7 in https://www.casqa.org/Portals/0/LID/CA_LID_FAQ_06-28-2011.pdf)

 File No.: GPA2021-0005

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	☑

Attachment C:
Geotechnical Investigation Report

PRELIMINARY GEOTECHNICAL UPDATE

On

PROPOSED TOWNHOME AND COMMERCIAL DEVELOPMENT

At

18605 Monterey Road
Morgan Hill, California

For

City Ventures

By
Quantum Geotechnical, Inc.

Project No. H052.G
June 1, 2022

QUANTUM GEOTECHNICAL INC.

Project No. H052.G
June 1, 2022

Ms. Samantha Hauser
Senior Vice President of Development
City Ventures
444 Spear Street
Suite 200
San Francisco, CA 94105

Subject: Proposed Townhome and Commercial Development
18605 Monterey Road
Morgan Hill 8
Morgan Hill, California
PRELIMINARY GEOTECHNICAL UPDATE

Reference: Geotechnical Investigation Report
Project No. 10218.G
Gateway Center Business Park
By Terrasearch, Inc
Dated 7 May 2004

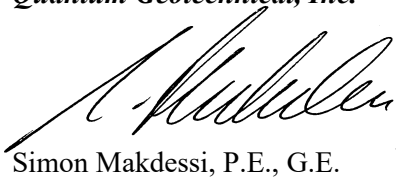
Dear Ms. Hauser:

In accordance with your authorization, ***Quantum Geotechnical, Inc.,*** has reviewed the previous referenced geotechnical investigation report for the purpose of providing an updated geotechnical report for the subject project located in Morgan Hill, California

The accompanying report presents a summary of the findings and an update the geotechnical recommendations from the previous referenced report. Our update indicates that development of the site for the proposed new residential and commercial development is feasible provided the recommendations of this report are carefully followed and are incorporated into the project plans and specifications.

Should you have any questions relating to the contents of this report or should additional information be required, please contact our office at your convenience.

Sincerely,
Quantum Geotechnical, Inc.



Simon Makdessi, P.E., G.E.
President

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GEOTECHNICAL IVESTIGATION

PURPOSE AND SCOPE

The purpose of this update report was to review the referenced previous geotechnical investigation report performed in 2007, summarize the surface and subsurface soil conditions at the subject site, and prepare update geotechnical design criteria and recommendations for the grading of the site, the design of foundations for the proposed development and the construction of other related facilities on the property.

Our geotechnical update involved the following tasks:

a) An initial reconnaissance of the site by the Soil Engineer to observe local and regional site conditions and document the current condition of the site.

b) Review the referenced geotechnical report and any other available published and unpublished geotechnical data for the site and surrounding area.

c) Perform four (4) percolation tests to a depth of 5 to 6 feet at locations designated by the project civil engineer

d) Preparation of a stand alone design level geotechnical update report summarizing the previous geotechnical work, and provide geotechnical recommendations pertinent to the project, including 2019 CBC seismic design criteria, grading, foundations, slab-on-grade construction, percolation tests results, pavement section design, retaining walls, and drainage.

PROPOSED DEVELOPMENT

It is our understanding that the proposed project consists of developing the site for the construction of seven residential townhome buildings, one commercial building and associated improvements including a large detention pond. Preliminary development plans indicate that the site will receive approximately 2 feet of import soil to raise the site. The buildings will be of wood frame construction and the townhomes will be founded on a post-tensioned slab foundation, while the commercial building will be supported on a conventional spread footing in conjunction with a slab-on-grade floor.

SITE LOCATION AND DESCRIPTION

The site is located in the northern part of Morgan Hill within level terrain. The site is triangular in shape, approximately 3.0 acres in size and has a culvert that runs through the middle of the site. The site is bounded by Monterey Road to the east, railroad tracks to the west and a commercial development to the north. Currently, the site is vacant and covered with short to tall grasses, some shrubs and trees. The surface grade of the site is uneven and it appears that some grading has been performed in the by excavating some areas 3 to 4 feet in depth and creating stockpiles up to 4 feet high. Based on a review of historic aerial photos from Google Earth®, it is not clear as to when such grading may have occurred, but it likely appears that the grading was performed in 2004, the same year the referenced geotechnical investigation was performed.

GENERAL GEOLOGIC CONDITIONS

The site is located within the Coast Ranges Geomorphic Province of California. Throughout the Cenozoic Era, the western part of California has been affected by tectonic forces associated with lateral or transform plate motion between the North American and Pacific crustal plates, which has produced a complex system of northwest-trending faults - the San Andreas, Hayward, and Calaveras Fault systems being the most prominent. Uplift, erosion and subsequent re-deposition of sedimentary rocks within this province have been driven primarily by the northwest-southeast directed strike-slip movement of the tectonic plates and the associated northeast oriented compressional stress. The northwest-trending coastal mountain ranges are the result of an orogeny believed to have been occurring since the Pleistocene epoch (approximately 2-3 million years before present).

Based on a review of geologic maps, the site is underlain by Pleistocene age alluvial fan deposits. These deposits will generally consist of well consolidated coarser grained material nearer to the crown of the fan and around the area of paleochannels, and finer grained silt and clay deposits nearer to the toe.

The USGS Quaternary Fault database provides a record of quaternary fault surface traces based on historic mapping and observations. Table I, below, lists the USGS Quaternary active fault traces located within 10 miles of the site location.

The California Geological Survey seismic hazard zone report for the Morgan Hill quadrangle (2) excludes the site from areas mapped for liquefaction, landslide, and fault surface rupture hazards. According to the California Department of Water Resources, Water Data Library (1), groundwater may be encountered around 20 feet below ground surface within the site vicinity.

Table I
List of Quaternary Faults

Fault ID	Distance from Site (mi)	USGS Activity Level (yrs)
Calaveras	1.0	< 150 ya
Tres Pinos	2.0	<15 kya
Quien Sabe	3.3	< 15 kya
Sargent	3.7	< 15 kya
San Andreas	5.6	< 150 ya
Vergeles	6.1	1.6 mya – 15 kya

Note: mya and kya are abbreviations for million years (mya) and thousand years (kya) ago.

INVESTIGATION

A total of four percolation tests were performed between April 16 and April 20, 2022, at the locations shown on the attached Figure 1, Site Plan, attached to Appendix A.

The percolation tests were performed by drilling an 8 inch diameter hole to depths ranging from 5’7” to 8’3” to the base of the pond design elevation of 344.35. The percolation hole comprised placing a 4 inch perforated pipe centered in the hole on a bed of 6 inches of gravel, with the pipe extending a few inches above the ground surface, and filling the annulus with pea gravel to the ground surface. The material encountered in the test holes ranged from a silty sand to silty clay. Each percolation hole was filled with water to saturate the hole overnight.

The percolation test was performed the next day by filling water to the top and the drop in water level within the pipe was measured at 60 minute intervals. The depth was measured relative to the top of pipe. The test was terminated when the water level drop was similar for 3 consecutive readings. The average water level drop during the last 3 readings is recorded as the percolation rate. The measured percolation rates are as follows;

Percolation Test #	Depth (ft)	Percolation Rate (in/hr)
220	5'7"	3
221	8'3"	3
222	8'0"	2
223	6'9"	5

SUBSURFACE CONDITIONS

Terrasearch advanced a total of three borings to a maximum depth of 30 feet. The locations of the the borings are unknown as the site plan was not included in the copy of the report provided. The subsurface conditions as encountered in the three previous borings somewhat varied in the upper 6 to 9 feet, but generally consisted of layers of clay, silty sand, sand and clayey sand in the upper 6 to 9 feet and then underlain by medium dense sand and gravel to 16 feet where very stiff to hard silty clay or clayey silt was encountered and extended to the maximum depth explored of 30 feet.

No groundwater was encountered in the borings. Fluctuations in the groundwater table may occur due to tidal influences, seasonal rainfall and urbanization or nearby development activities.

The near surface soil registered a Plasticity Index (PI) value of 12, indicating the material to be of low expansion potential.

A more thorough description and stratification of the soil conditions are presented on the respective "Logs of Test Borings" attached in Appendix A.

2019 CBC SEISMIC DESIGN CRITERIA

The seismic design should be in accordance with Chapter 16 of the 2019 California Building Code (CBC). The 2019 CBC utilizes the design procedures outlined in the ASCE 7-16 Standard.

Using the criteria in Chapter 20 of ASCE 7-16, the site is classified as Site Class D. The seismic design parameters have been developed using the online "Seismic Design Maps" tool by the Structural Engineering Association (SEA) and Office of Statewide Health Planning and Development (OSHPD) and a site location based on longitude and latitude. The parameters generated for the center of the site for a latitude 37.143025° N, and longitude 121.663553° W, are presented in the following Table II.

According to Section 11.4.8 of ASCE 7-16, a ground motion hazard analysis shall be performed when the coefficient S_1 has a value greater than or equal to 0.2 for Site Class D and E sites. A ground motion hazard analysis is excepted if the C_s value is determined by equation 12.8-2 of ASCE 7-16. This is to be determined by the structural engineer. In the event that the calculated C_s values do not trigger a ground motion hazard analysis, the following parameters may be used.

Table II
2019 CBC Seismic Design Criteria

Seismic Parameter	Coefficient	Value
Site Class		D
Peak Ground Acceleration (Site Modified)	PGA_M	0.742
Mapped MCE Spectral Acceleration at Short-Period 0.2 secs	S_s	1.617
Mapped MCE Spectral Acceleration at a Period of 1.0s	S_1	0.600
Adjusted MCE, 5% Damped Spectral Response Acceleration at Short Period of 0.2s	S_{MS}	1.617
Adjusted MCE, 5% Damped Spectral Response Acceleration at Period of 1.0s	S_{M1}	1.020
Design 5% Damped Spectral Response Acceleration at Short Period of 0.2s for Occupancy Category I/II/III	S_{DS}	1.078
Design 5% Damped Spectral Response Acceleration at Period of 1.0s for Occupancy Category I/II/III	S_{D1}	0.680

LIQUEFACTION POTENTIAL EVALUATION

Liquefaction occurs primarily in relatively loose, saturated, cohesionless soils. Under earthquake stresses, these soils become “quick”, lose their strength and become incapable of supporting the weight of the overlying soils or structures. The data used for evaluating liquefaction potential of the subsurface soils consisted of the penetration resistance, the soil gradation, the relative density of the materials, and the groundwater level.

Loose to medium dense cohesionless soil such as sands and some soft to firm silts and low plasticity clays are potentially liquefiable, while very stiff to hard silts and clays and dense and very dense cohesionless sands and gravels are considered to have a very low potential for liquefaction. Based on the data from the borings, no potentially liquefiable layers were encountered and the potential of liquefaction at this site is considered nil.

DISCUSSIONS, CONCLUSIONS AND UPDATED RECOMMENDATIONS

GENERAL

1. From a geotechnical point of view, the site is suitable for the construction of the proposed residential and commercial development provided the recommendations presented in this report are incorporated into the project plans and specifications.

2. The most prominent geotechnical feature of this site is the presence of low expansive clay or sand materials within the upper 6 to 9 feet, and the presence of large stockpiles from previous grading activities.

3. Due to the previous grading activities, some areas of site disturbance may have occurred and some areas of loose fill may be present in areas. Any areas of loose fill must be removed to native ground, and can be reused as engineered fill. Hand digging into the stockpiles revealed a mixture of silt, clay and some sand and gravel material, which is suitable to re-use as engineered fill.

4. The proposed structures may be satisfactorily supported on structural post tensioned slabs or a spread footing foundation. Specific foundation design recommendations are provided under the heading Foundations.

GRADING

5. The grading requirements presented herein are an integral part of the grading specifications presented in Appendix B of this report and should be considered as such.

6. Currently, the site contains significant vegetation and stripping of vegetation will be required. Vegetation conditions may be different at the time of grading, and the extent of any stripping, mowing or discing as part of site preparation, will be revaluated at the time of grading. Any strippings will be stockpiled in an approved area that is unaffected by grading operations until their future use. Organically contaminated soil material may be utilized in landscape areas located outside the building footprint.

7. After site preparation, and removal of any areas of old fill, the top 8 inches of exposed ground should be scarified and compacted to a degree of relative compaction of at least 90% at 2 percent above optimum moisture content as determined by ASTM D1557-12 Laboratory Test Procedure.

8. The site may be brought to the desired finished grades by placing engineered fill in lifts of 8 inches in uncompacted thickness and compacting to a minimum relative compaction of 90% at 2 percent above optimum moisture content for lean clay soil as determined by ASTM D1557-12 Laboratory Test Procedure.

9. All soils encountered during our investigation except those within the top few inches of predominantly organic material, are suitable for use as engineered fill when placed and compacted at the recommended moisture content and provided it does not contain any debris.

SURFACE AND SUBSURFACE DRAINAGE

10. All finish grades should be provided with a positive gradient to an adequate discharge point in order to provide rapid removal of surface water runoff away from all foundations. No ponding of water should be allowed on the pad or adjacent to the foundations. Surface drainage must be designed by the project Civil Engineer and maintained by the property owners at all times. The pad should be graded in a manner that surface flow is to a controlled discharge system.

11. Lot slopes and drainage must be provided by the project Civil Engineer to remove all storm water from the pad and to minimize storm and/or irrigation water from seeping beneath the structures. Should surface water be allowed to seep under the structure, foundation movement resulting in structural cracking and damage will occur. Where possible, finished grades around the perimeter of the structures should be compacted and should be sloped at a minimum 2% gradient away from the exterior foundation. Surface drainage requirements constructed by the builder should be maintained during landscaping. In particular, the creation of planter areas confined on all sides by concrete walkways or decks and the residence foundation is not desirable since any surface water due to rain or irrigation becomes trapped in the planter area with no outlet. If such a landscape feature is necessary, surface area drains in the planter area or a subdrain along the foundation perimeter must be installed.

12. Continuous roof gutters are recommended. According to local government requirements, roof downspout and drain flows should be directed to at grade bio-filtration areas, or raised planter boxes next to the building perimeter, where possible. From a geotechnical and maintenance point of view it is undesirable to discharge water into at grade bio-filtration areas near foundations, because of the possibility of water ponding for sustained periods of time.

BIO-FILTRATION FACILITIES

13. As mentioned earlier, it is undesirable to discharge water into at grade bio-filtration areas near foundations, because of the possibility of water ponding for sustained periods of time, potentially creating excessive moisture related issues. However, certain design features could be made to minimize such potential effects. In addition, the property owners must always maintain the bio-filtration area to ensure that they are performing as designed and that water does not pond in the area for longer than 48 hours.

14. Typically, the bio-filtration areas consist of an 18 inch layer of sandy loam over 18 inches of permeable gravel material. The top of the bio-filtration area is typically approximately 1 foot below pad grade, therefore, the base of the bio-filtration area will be approximately 4 feet below pad grade. The base of the bio-filtration area will typically contain a perforated pipe to drain any water that may collect within 24 hours. In some situations, the bio-filtration areas may be located immediately adjacent the building structure.

15. Where bio-filtration areas are located closer than 5 feet of the building, the section of loose loam and gravel will provide reduced lateral support, and we recommend a deepened footing be constructed along the perimeter the building adjacent to the bio-filtration area and extending 3 feet beyond in plan length. The depth of the deepened footing will depend on how close the bio-filtration area is located to the building perimeter. As a guide, the footing is to be deepened such that when an imaginary line inclined at 45 degrees from the outside edge base of the footings, it extends below the base of the bio-filtration area excavation. Where bio-filtration areas are located further than 5 feet, no special design is required. Provided the bio-filtration facility is lined with an impermeable liner, no waterproofing of the deepened footing is required.

16. Where bio-filtration areas are located closer than 3 feet of street pavements, a deepened curb footing is required. Where bio-filtration areas are located closer than 1 foot of street pavements, because pavements do not have a positive connection to a deepened curb/footing, the deepened curb/footing may need to be designed as a retaining wall rigid enough to create minimal lateral deflections.

17. Where bio-filtration areas are located closer than 2 feet of hardscape areas, a deepened edge footing is required. The deepened edge should extend at least 1 foot below the subgrade. Where the bio-filtration area is immediately adjacent the hardscape, the deepened edge is to extend at least 3 inches below the base of the bio-filtration system.

FOUNDATIONS

13. Provided the site is prepared as recommended in the "Grading" section, a post-tensioned slab foundation may be satisfactorily used for the residential townhome buildings and a spread footing in conjunction with a slab-on-grade floor for the commercial building.

Post Tensioned Slab on Grade

14. Post-tensioned slabs should be designed using the following criteria which is based on the design method presented in the Post-Tensioning Institute, Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils (PTI DC10.5-12), 2012. Using the relevant site soil and climatic parameters, the recommended geotechnical criteria for use in the design of the post-tensioned slabs is as follows;

	Swelling Mode	
	Center Lift	Edge Lift
Edge Moisture Variation Distance (e_m)	9.0 feet	5.1 feet
Differential Soil Movement (y_m)	0.59 inches	1.09 inches

The maximum allowable bearing pressure at the base of the slab and for localized thickened footings should not exceed 2,000 p.s.f. for dead plus sustained live loads.

15. As indicated earlier, bio-filtration areas may be designed close to the foundation. Where bio-filtration areas are located closer than 5 feet of the building, the section of loose loam and gravel, will provide reduced lateral support, and we recommend a deepened footing be constructed along the perimeter the building adjacent to the bio-filtration area and extending 3 feet beyond in plan length. The depth of the deepened footing will depend on how close the bio-filtration area to the building perimeter. As a guide, the footing is to be deepened such that when an imaginary line inclined at 45 degrees from the outside edge base of the footings, it extends below the base of the bio-filtration area excavation.

General Construction Requirements for Post-Tensioned Slab

16. Prior to construction of the slab, the slab subgrade should be observed by the Soil Engineer to verify that all under-slab utility trenches greater than 18 inches in width have been properly backfilled and compacted, and that no loose or soft soils are present on the slab subgrade.

17. The on site near surface soil is non-expansive and if the on-site soil is used to form the building pads, slab subgrade saturation and moisture conditioning is not required. If clayey import material is used to grade the site the slab subgrade should be soaked to saturation (minimum 5% above optimum) to a depth of 12 inches prior to placement of the capillary break or vapor retarder/barrier. This should be verified and approved by the Soil Engineer. The penetration of a thin metal probe to a depth of 10-12 inches generally indicates sufficient saturation.

18. The four (4) inch (minimum thickness) layer of gravel typically placed to provide a capillary break beneath concrete slab-on-grade floors may be omitted beneath the monolithically poured mat slab foundations provided that the slabs are at least 10 inches thick. If it is desired to use a 4 inch layer or thinner of gravel section, the gravel should consist of broken stone, crushed or uncrushed gravel, quarry waste, or a combination thereof. The aggregate shall be free from deleterious substances. It shall be of such quality that the absorption of water in a saturated dry condition does not exceed 3% of the oven dry weight of the sample. The material shall be ¾" minus material with no more than 3% passing the #200 sieve, as specified in Appendix C.

19. A moisture vapor retarder/barrier is recommended beneath all slabs-on-grade that will be covered by moisture-sensitive flooring materials such as vinyl, linoleum, wood, carpet, rubber,

rubber-backed carpet, tile, impermeable floor coatings, adhesives, or where moisture-sensitive equipment, products, or environments will exist. We recommend that design and construction of the moisture vapor retarder/barrier conform to Section 1805 of the 2013 CBC and relevant sections of American Concrete Institute (ACI) guidance documents 302.1R-04, 302.2R-06 and 360R-10.

20. The moisture vapor retarder/barrier can be placed above the 4 inches of gravel or directly on the soil subgrade and should consist of a minimum 10 mils thick polyethylene with a maximum perm rating of 0.1 in accordance with ASTM E 1745. Seams in the moisture vapor retarder/barrier should be overlapped no less than 6 inches or in accordance with the manufacturer's recommendations. Joints and penetrations should be sealed with the manufacturer's recommended adhesives, pressure-sensitive tape, or both. The contractor must avoid damaging or puncturing the moisture vapor retarder/barrier and repair any punctures with additional polyethylene properly lapped and sealed. The installation of the vapor retarder membrane must be in conformance with ASTM E1643.

21. A minimum of two inches of wetted sand should be placed over the vapor retarder membrane to facilitate curing of the concrete and to act as a cushion to protect the membrane. The perimeter of the mat should be thickened to bear on the prepared building pad and to confine the sand. During winter construction, sand may become saturated due to rainy weather prior to pouring. Saturated sand is not desirable because the sand cushion may become over saturated, and boil into the concrete causing undesirable structural monopolies of sand pockets within the slab. As an alternate, a sand-fine gravel mixture that is stable under saturated conditions may be used. However, the material must be approved by the Soil Engineer prior to use.

22. Alternatively, the sand layer may be eliminated provided the concrete has a maximum water/cement ratio of 0.45 and a 10 mil Class A vapor retarder membrane, such as Stego® Wrap. In any case, the vapor retarder/barrier should have a maximum perm rating of 0.3 in accordance with ASTM E 1745. Seams in the moisture vapor retarder/barrier should be overlapped no less than 6 inches or in accordance with the manufacturer's recommendations. Joints and penetrations should be sealed with the manufacturer's recommended adhesives, pressure-sensitive tape, or both. The contractor must avoid damaging or puncturing the vapor retarder/barrier and repair any punctures with additional polyethylene properly lapped and sealed.

23. Any exterior concrete flatwork such as steps, patios, or sidewalks should be designed independently of the slab, and expansion joints should be provided between the flatwork and the structural unit.

Spread Footing Foundations in Conjunction with Interior Concrete Slab-on Grade Floor for Commercial Building

24. Continuous and spread footing foundations should extend to a minimum depth of 18 inches below the lowest adjacent pad grade (trenching depth below slab subgrade elevation). At this depth, continuous footings may be designed for an allowable bearing pressure of 2,500 p.s.f. due to dead plus sustained live loads, and 3,300 p.s.f. due to all loads which include wind or seismic. Isolated spread footings for columns may be designed for an allowable bearing pressure of 2,800 p.s.f. due to dead plus sustained live loads, and 3,700 p.s.f. due to all loads which include wind or seismic. The specification of structural reinforcement for all foundations is to be performed by a structural engineer. The settlements of footings designed and constructed in accordance with the aforementioned criteria are estimated to be less than one-half inch. The differential settlement between individual column or wall footings can be estimated as the difference between the settlements at any two points and should not exceed one-quarter inch.

25. Lateral loads resulting from wind or earthquake may be resisted in the form of passive pressure on the site of footings and friction between the bottom of the footings and soils on which these are supported. The passive soil resistance against footings may be taken equal to a fluid having an equivalent fluid pressure of 250 p.c.f, below a depth of 1 foot. This assumes that the footings are placed neat against the soil face or that properly compacted backfill is placed in the space between the footings and the soil faces. A coefficient of friction of 0.30 may be used at the base of the footing.

26. It is expected that the interior concrete slab-on-grade floor may experience some cracking due to normal concrete shrinkage. To reduce the potential cracking of the concrete slab floor, the following are recommended:

a. Prior to construction of the slab, the slab subgrade should be observed by the Soil Engineer to verify that all under-slab utility trenches greater than 18 inches in width have been properly backfilled and compacted, and that no loose or soft soils are present on the slab subgrade.

c. Slabs should be underlain by a minimum of 4 inches of angular gravel or clean crushed rock material placed between the finished subgrade and the slabs to serve as a capillary break between the subsoil and the slab. The gravel or crushed rock material should consist of broken stone, crushed or uncrushed gravel, quarry waste, or a combination thereof. The aggregate shall be free from deleterious substances. It shall be of such quality that the absorption of water in a saturated dry condition does not exceed 3% of the oven dry weight of the sample. The material shall be ¾" minus material with no more than 3% passing the #200 sieve.

d. The thickness of the slab and reinforcement is to be determined by the project Structural Engineer. We recommend that the slabs be reinforced with reinforcing bars or welded wire fabric sheets. Wire mesh must not be used for reinforcement.

e. It is expected that moisture sensitive floor coverings will be used on the slab, and we recommend that a 15-mil or thicker vapor retarder membrane should be placed between the rock cushion and the slab to provide an effective vapor barrier and to minimize moisture condensation under floor coverings. It is further recommended that a two inch thick sand layer be placed on top of the membrane to assist in the curing of the concrete and to prevent puncture of the membrane. During winter construction, the sand may become saturated due to rainy weather prior to pouring. Saturated sand is not desirable because the sand cushion may become over saturated, and boil into the concrete causing undesirable structural monopolies of sand pockets within the slab. As an alternate, a sand-fine gravel mixture that is stable under saturated conditions may be used. However, the material must be approved by the Soil Engineer prior to use.

MISCELLANEOUS CONCRETE FLATWORK

27. Miscellaneous flatwork, driveways, and walkways may be designed with a minimum thickness of 4.0 inches. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15 feet on large slab areas. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into walkways at a maximum of 5 feet spacing.

RETAINING WALLS

28. Retaining walls should be designed to resist lateral pressures exerted from a media having an equivalent fluid weight as follows:

Active Condition	=	45 p.c.f. for horizontal backslope
At-rest Condition	=	65 p.c.f.
Passive Condition	=	300 p.c.f.
Coefficient of Friction	=	0.35

29. For a non-horizontal backslope, the active condition equivalent fluid weight can be increased by 1.5 p.c.f. for each 2 degree rise in slope from the horizontal.

30. Active conditions occur when the top of the wall is free to move outward. At-rest conditions apply when the top of wall is restrained from any movement.

31. It should be noted that the effects of any surcharge, traffic or compaction loads behind the walls must be accounted for in the design of the walls.

32. The above criteria are based on fully drained conditions. If drained conditions are not possible, then the hydrostatic pressure must be included in the design of the wall. An additional linear distribution of hydrostatic pressure of 63 p.c.f. should be adopted, in this case.

33. In order to achieve fully-drained conditions, a drainage filter blanket should be placed behind the wall. The blanket should be a minimum of 12 inches thick and should extend the full height of the wall to within 12 inches of the surface. If the excavated area behind the wall exceeds 12 inches, the entire excavated space behind the 12-inch blanket should consist of compacted engineered fill or blanket material. The drainage blanket material may consist of either granular crushed rock and drain pipe fully encapsulated in geotextile filter fabric or Class II permeable material that meets CalTrans Specification, Section 68, with drainage pipe but without fabric. A 4-inch perforated drain pipe should be installed in the bottom of the drainage blanket and should be underlain by at least 4 inches of filter type material. A 12-inch cap of clayey soil material should be placed over the drainage blanket. All back drains should be outlet to suitable drainage devices. Retaining wall less than 3 feet in height should be provided with backdrains or weep holes.

34. As an alternate to the 12-inch drainage blanket, a pre-fabricated strip drain (such as Miradrain) may be used between the wall and retained soil. In this case, the wall must be designed to resist an additional lateral hydrostatic pressure of 30 p.c.f.

35. Piping with adequate gradient shall be provided to discharge water that collects behind the walls to an adequately controlled discharge system away from the structure foundation.

36. The retaining walls or soundwalls may be founded on a friction pier foundation or on spread footing foundations. Spread footing and pier design criteria are given below.

RETAINING WALL/SOUNDWALL FOUNDATION - SPREAD FOOTINGS

37. Spread footings should have a minimum depth of eighteen (18) inches below lowest adjacent pad grade (i.e., trenching depth) for soil subgrade. At this depth, the recommended design bearing pressure for continuous footings should not exceed 2,500 p.s.f. due to dead plus sustained live loads and 3,300 p.s.f. due to all loads which include wind and seismic.

38. To accommodate lateral loads, the passive resistance of the foundation soil can be utilized. The passive soil pressures can be assumed to act against the front face of the footing below a depth of one foot below the ground surface. It is recommended that a passive pressure equivalent to that of a fluid weighing 300 p.c.f. be used. The weight of the soil above the footing can be used in the frictional calculations. For design purposes, an allowable friction coefficient of 0.35 can be assumed at the base of the spread footing.

RETAINING WALL/SOUNDWALL FOUNDATION - PIER FOOTINGS

39. The piers should be designed on the basis of skin friction acting between the soil and the pier. For the soils at the site, an allowable skin friction value of 500 p.s.f. can be used for combined dead and live loads, below a depth of 1 foot. This value can be increased by one-third for total loads which include wind or seismic forces. The size, depth and spacing of the piers is to be determined by the structural engineer.

40. To resist lateral loads, the passive resistance of the soil can be used. The soil passive pressures can be assumed to act against the lateral projected area twice the pier diameter. It is recommended that a passive pressure equivalent to that of a fluid weighing 300 p.c.f be used below 1 foot of final pad grade.

PAVEMENT AREAS

41. R-value tests were not performed as part of this investigation, as the soil expected at subgrade level is not known and depends on the planned grading. Assuming the subgrade material will consist of on site silty or imported low expansive clay material, we will assume an R-value of 10 for preliminary design.

42. Based on an R-Value of 10, the following flexible pavement sections are recommended. It is noted that the City of Morgan Hill's minimum pavement section is 4 inches asphaltic concrete (AC) over 8 inches Class II aggregate base (AB).

Traffic Index	AC (inches)	Class II[1] AB (inches)
4.5	4.0	8.0
5.0	4.0	8.0
6.0	4.0	11.0
7.0	4.0	14.5
8.0	6.0	16.0

Notes: [1]Minimum R-Value = 78
R-Value = Resistance Value
All Layers in compacted thickness to Cal-Trans Standard Specifications

43. After underground facilities have been placed in the areas to receive pavement and removal of excess material has been completed, the upper 6 inches of the sub-grade soil shall be scarified, moisture conditioned, and compacted to a minimum relative compaction of 95% in accordance with the grading recommendations specified in this report.

44. All aggregate base material placed subsequently should be compacted to a minimum relative compaction of 95% based on the ASTM Test Procedure of D1557-12 (latest edition). The construction of the pavement areas should conform to the requirements set forth by the latest Standard Specifications of the Department of Transportations of the State of California and/or City of Morgan Hill, Department of Public Works.

45. If planter areas are provided within or immediately adjacent to the pavement areas, or if permeable pavers are used for some areas of pavement, provisions should be made to control irrigation and surface water from entering the pavement subgrade. Water entering the pavement section at subgrade level, which does not have a means for discharge, could cause softening of this zone and lead to pavement failure. We recommend that for areas of permeable pavers, the subgrade be graded to a low point where a subdrain is constructed to discharge any accumulated water.

UTILITY TRENCHES

46. Applicable safety standards require that trenches in excess of 5 feet must be properly shored or that the walls of the trench slope back to provide safety for installation of lines. If trench wall sloping is performed, the inclination should vary with the soil type. The underground contractor should request an opinion from the Soil Engineer as to the type of soil and the resulting inclination.

47. With respect to state-of-the-art construction or local requirements, utility lines are generally bedded with granular materials. These materials can convey surface or subsurface water beneath the structures. It is, therefore, recommended that all utility trenches which possess the potential to transport water be sealed with a compacted impervious cohesive soil material or lean concrete where the trench enters/exits the building perimeter.

48. Utility trenches extending underneath all traffic areas must be backfilled with native or approved import material and compacted to a relative compaction of 90% to within 6 inches of the subgrade. The upper 6 inches should be compacted to 95% relative compaction in accordance with Laboratory Test Procedure ASTM D1557 (latest edition). Backfilling and compaction of these trenches must meet the requirements set forth by the City of Morgan Hill, Department of Public Works. Utility trenches within landscape areas may be compacted to a relative compaction of 85%.

PROJECT REVIEW AND CONSTRUCTION MONITORING

49. All grading and foundation plans for the development must be reviewed by the Soil Engineer prior to contract bidding or submitted to governmental agencies so that plans are reconciled with soil

conditions and sufficient time is allowed for suitable mitigative measures to be incorporated into the final grading specifications.

50. ***Quantum Geotechnical, Inc.*** should be notified at least two working days prior to site clearing, grading, and/or foundation operations on the property. This will give the Soil Engineer ample time to discuss the problems that may be encountered in the field and coordinate the work with the contractor.

51. Field observation and testing during the demolition and/or foundation operations must be provided by representatives of ***Quantum Geotechnical, Inc.*** to enable them to form an opinion regarding the adequacy of the site preparation, the acceptability of fill materials, and the extent to which the earthwork construction and the degree of compaction comply with the specification requirements. Any work related to the grading and/or foundation operations performed without the full knowledge and under the direct observation of the Soil Engineer will render the recommendations of this report invalid. This does not imply full-time observation. The degree of observation and frequency of testing services would depend on the construction methods and schedule, and the item of work.

REFERENCES

1. California Department of Water Resources. Water Resources Library. Accessed on May 31, 2022 via website: http://wdl.water.ca.gov/waterdatalibrary/.

2. California Geological Survey. 2004. “Seismic Hazard Zone Report for the Morgan Hill 7.5-Minute Quadrangle, Santa Clara County, California”. Seismic Hazard Zone Report 096.

3. Graymer, R.W., Moring, B.C., Saucedo, G.J., Wentworth, C.M., Brabb, E.E., and Knudsen, K.L. 2006. “Geologic Map of the San Francisco Bay Region”. U.S. Geological Survey. Scientific Investigations Map 2918.

4. Structural Engineers Association and Office of Statewide Health Planning and Development. 2018. “Seismic Design Maps”. Accessed May 31, 2022 from web site: https://seismicmaps.org/.

5. U.S. Geological Survey. 2019. "Quaternary fault and fold database for the United States". Accessed May 31, 2019 from USGS web site: http//earthquakes.usgs.gov/regional/qfaults/.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. It should be noted that it is the responsibility of the owner or his representative to notify ***Quantum Geotechnical, Inc.,*** in writing, a minimum of two working days before any clearing, grading, or foundation excavations can commence at the site.

2. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings and from a reconnaissance of the site. Should any variations or undesirable conditions be encountered during the development of the site, ***Quantum Geotechnical,*** will provide supplemental recommendations as dictated by the field conditions.

3. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the Architect and Engineer for the project and incorporated into the plans and the necessary steps are taken to see that the Contractor and Subcontractors carry out such recommendations in the field.

4. At the present date, the findings of this report are valid for the property investigated. With the passage of time, significant changes in the conditions of a property can occur due to natural processes or works of man on this or adjacent properties. In addition, legislation or the broadening of knowledge may result in changes in applicable standards. Changes outside of our control may render this report invalid, wholly or partially. Therefore, this report should not be considered valid after a period of two (2) years without our review, nor should it be used, or is it applicable, for any properties other than those investigated.

5. Not withstanding all the foregoing, applicable codes must be adhered to at all times.

APPENDIX A

Figure 1, Site Plan

Logs of Terrasearch Test Borings

EXISTING COMMERCIAL

MONTEREY ROAD

RAILROAD TRACKS

10' PSE

1" = 40'

Percolation Test 220

Percolation Test 221

Percolation Test 223

Percolation Test 224

SHEET	1
OF	1
JOB NO.	221005.1
DATE:	12/5/21
SCALE:	1" = 40'
DRAWN BY:	KW
CHECKED BY:	HS

Site Layout

The Gates

MH engineering Co.
16075 Vineyard Boulevard Morgan Hill, CA 95037

LOGGED BY RJP DATE DRILLED 26 April 2004 BORING DIAMETER 6" BORING NO. B-1

Depth, ft.	Sample No. and Type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft-lbs	Qu - tsf Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
			Medium brown SAND & GRAVEL; damp, medium dense, Af	SW					
			Medium brown Silty CLAY; damp, medium stiff to hard	CL	12		110.8	14.0	c = 400psf ø = 30° LL = 28 PI = 12
5					39		116.5	15.6	
			Orangish brown Clayey Silty SAND; damp, dense	SM					
10			Medium brown SAND & GRAVEL; damp, dense, gravel sub-rounded to 2"ø	GW	28		123.3	7.7	
15									
			Slightly orange brown Silty CLAY; damp, hard, some gravel	CL					
20					>50		118.3	13.4	
25			@ 25' some rounded gravel to ¾"ø						
			@ 28½' heavy gravel	GW					
30			Terminated @ 30' bgs No Groundwater encountered						

TERRASEARCH, inc. | **PROJECT NO. 10218.G** | **FIGURE NO. 3**

LOGGED BY RJP DATE DRILLED 26 April 2004 BORING DIAMETER 6" BORING NO. B-2

Depth, ft.	Sample No. and Type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft-lbs	Qu - tsf Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
			Medium brown SILT, SAND & GRAVEL; damp, medium dense, Af	SW					
5			Medium brown f. Sandy SILT; damp, stiff	ML	10		106.7	11.8	
10			Medium brown Silty SAND & GRAVEL; damp, medium dense	SW	17		118.0	12.7	
15			Slightly orange brown Clayey SILT; damp, hard, some gravel	ML					
20			Terminated @ 20' bgs No Groundwater encountered						
25									
30									

TERRASEARCH, inc. **PROJECT NO. 10218.G** **FIGURE NO. 4**

LOGGED BY RJP DATE DRILLED 26 April 2004 BORING DIAMETER 6" BORING NO. B-3

Depth, ft.	Sample No. and Type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft-lbs	Qu - tsf Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
			Medium brown Silty CLAY; damp, hard	CL	32		109.7	18.6	
5			Orangish brown Clayey SAND; damp, dense, some Gravel	SC	37		123.0	8.9	
			Orange brown Silty SAND & GRAVEL; damp, dense	SW					
10					22		117.4	12.1	
15									
			Slightly orange brown Silty CLAY; damp, hard, some gravel	CL					
20					29		105.6	14.7	
			increasing Clay ↓						
25									
			Olive brown Silty CLAY; damp, stiff	CL					
30			Terminated @ 30' bgs No Groundwater encountered						

TERRASEARCH, inc. | **PROJECT NO. 10218.G** | **FIGURE NO. 5**

Appendix B

The Grading Specification

Guide Specifications for Rock Under Floor Slabs

THE GRADING SPECIFICATIONS
on
Proposed Residential & Commercial Development
18605 Monterey Road
Morgan Hill, California

1. General Description

1.1 These specifications have been prepared for the grading and site development of the subject residential development. ***Quantum Geotechnical Inc.***, hereinafter described as the Soil Engineer, should be consulted prior to any site work connected with site development to ensure compliance with these specifications.

1.2 The Soil Engineer should be notified at least two working days prior to any site clearing or grading operations on the property in order to observe the stripping of organically contaminated material and to coordinate the work with the grading contractor in the field.

1.3 This item shall consist of all clearing or grubbing, preparation of land to be filled, filling of the land, spreading, compaction and control of fill, and all subsidiary work necessary to complete the grading of the filled areas to conform with the lines, grades, and slopes as shown on the accepted plans. The Soil Engineer is not responsible for determining line, grade elevations, or slope gradients. The property owner, or his representative, shall designate the person or organizations who will be responsible for these items of work.

1.4 The contents of these specifications shall be integrated with the soil report of which they are a part, therefore, they shall not be used as a self-contained document.

2. Tests

The standard test used to define maximum densities of all compaction work shall be the ASTM D1557-12 Laboratory Test Procedure. All densities shall be expressed as a relative compaction in terms of the maximum dry density obtained in the laboratory by the foregoing standard procedure.

3. Clearing, Grubbing, and Preparing Areas To Be Filled

3.1 If encountered, all vegetable matter, trees, root systems, shrubs, debris, and organic topsoil shall be removed from all structural areas and areas to receive fill.

3.2 If encountered, any soil deemed soft or unsuitable by the Soil Engineer shall be removed. Any existing debris or excessively wet soils shall be excavated and removed as required by the Soil Engineer during grading.

3.3 All underground structures shall be removed from the site such as old foundations, abandoned pipe lines, septic tanks, and leach fields.

3.4 The final stripped excavation shall be approved by the Soil Engineer during construction and before further grading is started.

3.5 After the site has been cleared, stripped, excavated to the surface designated to receive fill, and scarified, it shall be disked or bladed until it is uniform and free from large clods. The native subgrade soils shall be moisture conditioned and compacted to the requirements as specified in the grading section of this report. Fill can then be placed to provide the desired finished grades. The contractor shall obtain the Soil Engineer's approval of subgrade compaction before any fill is placed.

4. Materials

4.1 All fill material shall be approved by the Soil Engineer. The material shall be a soil or soil-rock mixture which is free from organic matter or other deleterious substances. The fill material shall not contain rocks or lumps over 6 inches in greatest dimension and not more than 15% larger than 2-1/2 inches. Materials from the site below the stripping depth are suitable for use in fills provided the above requirements are met.

4.2 Materials existing on the site are suitable for use as compacted engineered fill after the removal of all debris and organic material. All fill soils shall be approved by the Soil Engineer in the field.

4.3 Should import material be required, it should be approved by the soil Engineer before it is brought to the site.

5. Placing, Spreading, and Compacting Fill Material

5.1 The fill materials shall be placed in uniform lifts of not more than 8 inches in uncompacted thickness. Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to obtain uniformity of material in each layer. Before compaction begins, the fill shall be brought to a water content that will permit proper compaction by either (a) aerating the material if it is too wet, or (b) spraying the material with water if it is too dry.

5.2 After each layer has been placed, mixed, and spread evenly, either import material or native material shall be compacted to a relative compaction designated for engineered fill.

5.3 Compaction shall be by footed rollers or other types of acceptable compacting rollers. Rollers shall be of such design that they will be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is within the specified moisture content range. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to ensure that the required density has been obtained. No ponding or jetting shall be permitted.

5.4 Field density tests shall be made in each compacted layer by the Soil Engineer in accordance with Laboratory Test Procedure ASTM D1556-15 or D6938-10. When footed rollers are used for compaction, the density tests shall be taken in the compacted material below the surface disturbed by the roller. When these tests indicate that the compaction requirements on any layer of fill, or portion thereof, has not been met, the particular layer, or portion thereof, shall be reworked until the compaction requirements have been met.

5.5 No soil shall be placed or compacted during periods of rain nor on ground which contains free water. Soil which has been soaked and wetted by rain or any other cause shall not be compacted until completely drained and until the moisture content is within the limits hereinbefore described or approved by the Soil Engineer. Approval by the Soil Engineer shall be obtained prior to continuing the grading operations.

6. Pavement

6.1 The proposed subgrade under pavement sections, native soil, and/or fill shall be compacted to a minimum relative compaction of 95% at 2% above optimum moisture content for a depth of 12 inches.

6.2 All aggregate base material placed subsequently should also be compacted to a minimum relative compaction of 95% based on the ASTM Test Procedure D1557-12. The construction of the pavement in the parking and traffic areas should conform to the requirements set forth by the latest Standard Specifications of the Department of Transportation of the State of California and/or City of Morgan Hill, Department of Public Works.

6.3 It is recommended that soils at the proposed subgrade level be tested for a pavement design after the preliminary grading is completed and the soils at the site design subgrade levels are known.

7. Utility Trench Backfill

7.1 The utility trenches extending under concrete slabs-on-grade shall be backfilled with native on-site soils or approved import materials and compacted to the requirements pertaining to the adjacent soil. No ponding or jetting will be permitted.

7.2 Utility trenches extending under all pavement areas shall be backfilled with native or approved import material and properly compacted to meet the requirements set forth by the City of Morgan Hill, Department of Public Works.*

7.3 Where any opening is made under or through the perimeter foundations for such items as utility lines and trenches, the openings must be resealed so that they are watertight to prevent the possible entrance of outside irrigation or rain water into the underneath portion of the structures.

8. Subsurface Line Removal

8.1 The methods of removal will be designated by the Soil Engineer in the field depending on the depth and location of the line. One of the following methods will be used.

8.2 Remove the pipe and fill and compact the soil in the trench according to the applicable portions of sections pertaining to compaction and utility backfill.

8.3 The pipe shall be crushed in the trench. The trench shall then be filled and compacted according to the applicable portions of Section 5.

8.4 Cap the ends of the line with concrete to prevent entrance of water. The length of the cap shall not be less than 5 feet. The concrete mix shall have a minimum shrinkage.

9. Unusual Conditions

9.1 In the event that any unusual conditions not covered by the special provisions are encountered during the grading operations, the Soil Engineer shall be immediately notified for additional recommendations.

10. General Requirements

Dust Control

10.1 The contractor shall conduct all grading operations in such a manner as to preclude windblown dirt and dust and related damage to neighboring properties. The means of dust control shall be left to the discretion of the contractor and he shall assume liability for claims related to windblown material.

GUIDE SPECIFICATIONS FOR ROCK UNDER FLOOR SLABS

Definition

Graded gravel or crushed rock for use under slabs-on-grade shall consist of a minimum thickness of mineral aggregate placed in accordance with these specifications and in conformance with the dimensions shown on the plans. The minimum thickness is specified in the accompanying report.

Material

The mineral aggregate shall consist of broken stone, crushed or uncrushed gravel, quarry waste, or a combination thereof. The aggregate shall be free from deleterious substances. It shall be of such quality that the absorption of water in a saturated dry condition does not exceed 3% of the oven dry weight of the sample.

Gradation

The mineral aggregate shall be of such size that the percentage composition by dry weight, as determined by laboratory sieves (U.S. Sieves) will conform to the following gradation:

Sieve Size	Percentage Passing
¾''	90-100
No. 4	25-60
No. 8	18-45
No. 200	0-3

Placing

Subgrade, upon which gravel or crushed rock is to be placed, shall be prepared as outlined in the accompanying soil report.

MH engineering Co.
16075 Vineyard Blvd., Morgan Hill, CA 95037 - (408) 779-7381

Project: The Gates
Project No.: 221005.1
Date: 6/28/2022

Attachment D:
Retention Volume Calculations

Project: The Gates
Project No.: 221005.1
Date: 6/28/2022

Retention Volume Calculations

Post Construction Storm Water Management Calculations
Per Resolution No. R3-2013-0032

1.) Determination of the Retention Tributary Area

a.)

Impervious Areas									
	Pre-Development			Post-Development					
				Replaced			New		
DMA	Roof	PCC	AC	Roof	PCC	AC	Roof	PCC	AC
1	0	0	0	0	0	0	39,429	25,836	46,760

Pervious vs Impervious Areas									
		Pre-Development		Post-Development					
					Impervious			i	C
DMA	Total Area	Pervious	Impervious	Pervious	Replaced	New	Total		
1	174,172	174,172	0	62,148	0	112,024	112,024	0.64	0.44
Total	174,172	174,172	0	62,148	0	112,024	112,024	0.64	0.44

A_{total} = drainage area (sf)
A_{roofs} = roof areas (sf)
$A_{pcc\text{-}walks/parking}$ = area of pcc walks & parking lot
$A_{pcc\ -streets}$ = area of pcc walks and curbs (sf)
$A_{AC\text{-}streets}$ = Street pavement areas (sf)
$A_{pervious}$ = Planted & Open Areas (sf)
$A_{impervious}$ = total impervious roof areas, PCC areas & AC areas (sf)
i = fraction of the tributary area that is impervious = $A_{impervious}$ / A_{area}
$C_{area\#}$ = Area runoff coefficient=C = $0.858i^3 - 0.78i^2 + 0.774i + 0.04$

b.)adjustments for redevelopment project

DMA	DMA Area	A_{PA}	A_{other}	$A_{replaced}$	$A_{retention}$
1	174,172	0	0	0	174,172
Total	174,172	0	0	0	174,172

A_{PA} = Undisturbed or Self-Retaining Planted or Open Areas
A_{other} = Impervious Areas that discharge to independent infiltrating Areas
$A_{replaced}$ = Replaced Impervious Areas
$A_{retention}$ = Retention Tributary Area = DMA Area - A_{PA} - A_{other} - (0.5 x $A_{replaced}$)

2.) Determination of Retention Volume

a.) retention requirement

1 = WMZ = watershed management zone per WMZ map

b.) WMZ 1 Runoff Retention Requirement = Retain 95th percentile 24-hour rainfall event

1.85 = D_{95} = 95th Percentile Rainfall Depth

c.) compute the runoff coefficient

DMA	DMA Area	Impervious Area	i	C
1	174,172	112,024	0.64	0.44
Total	174,172	112,024	0.64	0.44

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

i = fraction of the tributary area that is impervious = $A_{impervious} / A_{project}$

d.) Project Type

Mixed Use

e.) Compute Retention Volume required

DMA	$A_{retention}$	i	C	D_{95}	$V_{retention}$
1	174,172	0.64	0.44	1.85	11,907
Total	**174,172**	0.64	0.44	1.85	11,907

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

i = fraction of the tributary area that is impervious = $A_{impervious} / A_{project}$

$V_{retention}$ = Required Retention Volume = $A_{retention}$ x C x (D_{95}/12)

3.) Retention Volume Provided

Surface Volume Calculations			
Elevation	Surface Area	Incremental Volume	Cumulative Volume
347.85	4,888.43 SF	0.00 CF	0.00 CF
348	5,096.78 SF	748.89 CF	748.89 CF
348.85	6,330.85 SF	4,856.74 CF	5,605.63 CF

Bioretention Volume				
Material	Area	Depth	% Voids	Volume
Biomedia	4,888.43 SF	24 in.	25%	2,444.22 CF
Drainrock	4,888.43 SF	24 in.	40%	3,910.75 CF

3d.) Total Volume Provided

Total Volume: $V_{total} = V_{surface} + V_{bioretention}$ = 11,961 CF

11,961CF ≥ 11,907; therefore ok

4.) Summary of HydroCAD Output

1.625 in/hr = Exfiltration Rate (See Appendix A for details)

Return	Pre Dev. (cfs)	Post Dev. (cfs)	Out from Storage (cfs)	Infiltration (cfs)	Water Elev (ft)	Storage (cf)
95th	0.58	1.24	0.00	0.57	348.16	8,146
2 year	1.16	1.94	0.33	0.62	349.15	14,612
5 year	1.79	2.64	1.43	0.65	349.56	17,665
10 year	2.34	3.23	1.86	0.66	349.77	19,259
25 year	3.13	4.06	2.33	0.68	350.06	21,612
100 year	4.44	5.40	3.02	0.71	350.59	26,333

see detailed HydroCAD Output on following sheets

5.) Drawdown Time Calculations

Retention Volume = 11,961 CF
Infiltration Area = 4,888.43 ft.
Design Infiltration Rate = 1.625 in/hr

Infiltration Flow Rate = Infiltration Area x Design Infiltration Rate x (1 ft./12 in) = 661.98 CF/Hour

Drawdown Time = (Storage Volume/Infiltration Flow Rate) = 18 hours

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Project: The Gates
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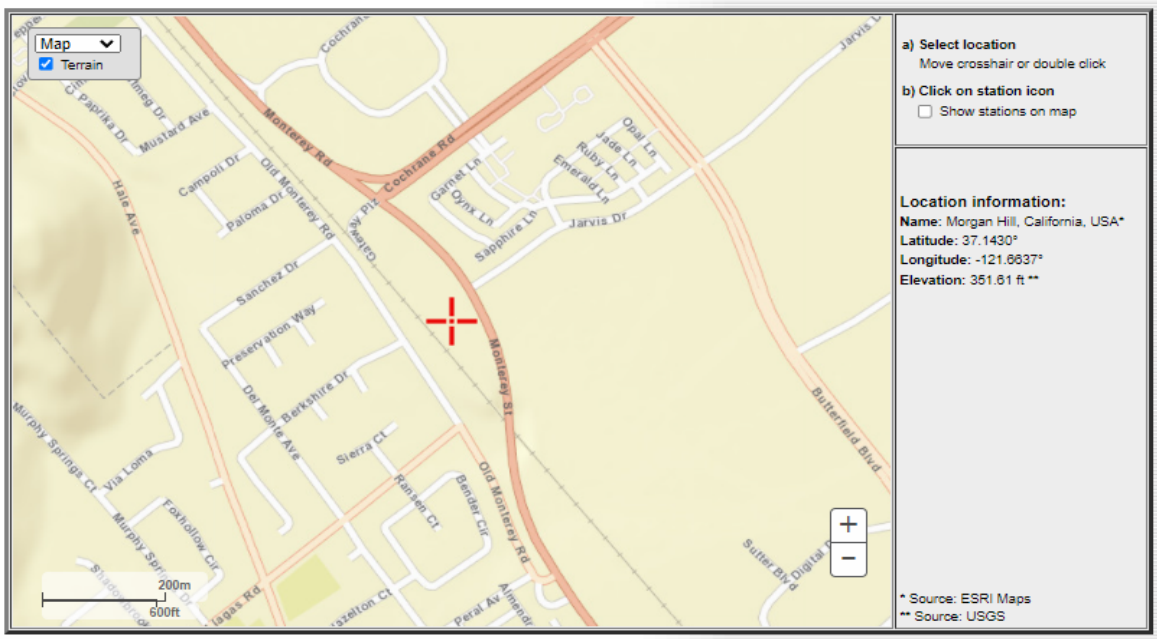
Attachment E:
NOAA Rainfall Data

Project: The Gates
Project No.: 221005.1
Date: 6/28/2022

Rainfall Data



POINT PRECIPITATION FREQUENCY (PF) ESTIMATES
WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.121 (0.103-0.144)	0.153 (0.130-0.182)	0.197 (0.167-0.235)	0.235 (0.197-0.282)	0.288 (0.232-0.361)	0.331 (0.261-0.426)	0.377 (0.288-0.499)	0.427 (0.316-0.583)	0.497 (0.350-0.713)	0.555 (0.376-0.828)
10-min	0.174 (0.148-0.206)	0.220 (0.187-0.261)	0.283 (0.239-0.337)	0.336 (0.282-0.405)	0.413 (0.333-0.517)	0.475 (0.374-0.610)	0.541 (0.413-0.715)	0.612 (0.452-0.836)	0.713 (0.502-1.02)	0.796 (0.539-1.19)
15-min	0.210 (0.179-0.250)	0.266 (0.226-0.316)	0.342 (0.290-0.407)	0.407 (0.341-0.490)	0.499 (0.403-0.626)	0.574 (0.452-0.738)	0.654 (0.500-0.865)	0.740 (0.547-1.01)	0.862 (0.608-1.24)	0.962 (0.651-1.44)
30-min	0.293 (0.250-0.348)	0.371 (0.315-0.440)	0.477 (0.404-0.568)	0.567 (0.478-0.683)	0.697 (0.562-0.873)	0.801 (0.630-1.03)	0.913 (0.698-1.21)	1.03 (0.763-1.41)	1.20 (0.848-1.73)	1.34 (0.909-2.00)
60-min	0.435 (0.371-0.517)	0.550 (0.467-0.653)	0.708 (0.599-0.844)	0.842 (0.706-1.01)	1.03 (0.834-1.30)	1.19 (0.936-1.53)	1.35 (1.03-1.79)	1.53 (1.13-2.09)	1.79 (1.26-2.56)	1.99 (1.35-2.97)
2-hr	0.665 (0.566-0.790)	0.840 (0.714-0.998)	1.08 (0.915-1.29)	1.28 (1.08-1.55)	1.58 (1.27-1.97)	1.81 (1.42-2.33)	2.06 (1.57-2.72)	2.33 (1.72-3.18)	2.71 (1.91-3.88)	3.02 (2.04-4.50)
3-hr	0.835 (0.711-0.991)	1.06 (0.897-1.25)	1.36 (1.15-1.62)	1.61 (1.35-1.94)	1.98 (1.60-2.48)	2.27 (1.79-2.92)	2.59 (1.98-3.42)	2.92 (2.18-3.99)	3.40 (2.39-4.87)	3.78 (2.56-5.64)
6-hr	1.18 (1.00-1.40)	1.50 (1.27-1.78)	1.93 (1.63-2.30)	2.30 (1.93-2.76)	2.82 (2.27-3.53)	3.24 (2.55-4.16)	3.68 (2.81-4.87)	4.16 (3.07-5.68)	4.83 (3.40-6.92)	5.37 (3.64-8.02)
12-hr	1.58 (1.35-1.88)	2.03 (1.72-2.41)	2.63 (2.23-3.14)	3.15 (2.64-3.79)	3.88 (3.13-4.86)	4.46 (3.51-5.73)	5.08 (3.88-6.72)	5.74 (4.25-7.85)	6.68 (4.71-9.58)	7.44 (5.04-11.1)
24-hr	2.05 (1.82-2.37)	2.66 (2.35-3.07)	3.48 (3.07-4.04)	4.18 (3.65-4.88)	5.16 (4.38-6.20)	5.94 (4.95-7.28)	6.77 (5.51-8.48)	7.64 (6.07-9.82)	8.88 (6.79-11.9)	9.88 (7.32-13.6)
2-day	2.61 (2.31-3.02)	3.41 (3.01-3.94)	4.45 (3.95-5.20)	5.36 (4.70-6.28)	6.62 (5.62-7.96)	7.60 (6.33-9.31)	8.61 (7.02-10.8)	9.80 (7.69-12.4)	11.2 (8.53-14.9)	12.3 (9.14-17.0)

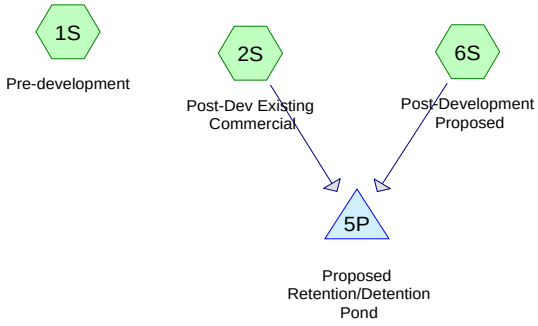
Project: The Gates
Project No.: 221005.1
Date: 6/28/2022

Attachment F:
HydroCAD Modeling Output

Project: The Gates
Project No.: 221005.1
Date: 6/28/2022

SCS Routing

Event Summary



Events for Subcatchment 1S: Pre-development

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95th	1.85	0.58	0.226	0.44
1 year	2.05	0.72	0.286	0.55
2 year	2.66	1.16	0.490	0.95
5 year	3.48	1.79	0.802	1.55
10 year	4.18	2.34	1.092	2.11
25 year	5.16	3.13	1.521	2.94
50 year	5.94	3.77	1.876	3.63
100 year	**6.77**	**4.44**	**2.263**	**4.37**

Events for Subcatchment 2S: Post-Dev Existing Commer

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95th	1.85	0.53	0.275	1.26
1 year	2.05	0.60	0.316	1.44
2 year	2.66	0.80	0.442	2.02
5 year	3.48	1.08	0.616	2.82
10 year	4.18	1.31	0.766	3.50
25 year	5.16	1.63	0.977	4.47
50 year	5.94	1.89	1.145	5.24
100 year	**6.77**	**2.16**	**1.325**	**6.06**

Events for Subcatchment 6S: Post-Development Propos

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95th	1.85	0.71	0.344	1.03
1 year	2.05	0.82	0.402	1.21
2 year	2.66	1.14	0.585	1.76
5 year	3.48	1.56	0.840	2.52
10 year	4.18	1.92	1.063	3.19
25 year	5.16	2.42	1.379	4.14
50 year	5.94	2.82	1.632	4.90
100 year	**6.77**	**3.24**	**1.903**	**5.71**

Events for Pond 5P: Proposed Retention/Detention Pond

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Tertiary (cfs)	Elevation (feet)	Storage (cubic-feet)
95th	1.24	0.57	0.57	0.00	**0.00**	348.16	8,146
1 year	1.41	0.58	0.58	0.00	0.00	348.43	9,772
2 year	1.94	0.96	0.62	0.33	0.00	349.15	14,612
5 year	2.64	2.07	0.65	1.43	0.00	349.56	17,665
10 year	3.23	2.52	0.66	1.86	0.00	349.77	19,258
25 year	4.06	3.01	0.68	2.33	0.00	350.06	21,612
50 year	4.71	3.37	0.69	2.68	0.00	350.31	23,766
100 year	**5.40**	**3.73**	**0.71**	**3.02**	0.00	**350.59**	**26,333**

Event = rainfall event

Inflow = total inflow into storm water control

Outflow = total outflow from storm water control (discarded+primary+tertiary)

Discarded = flow via infiltration

Primary = Flow released from the retention/detention pond through the 10" orifice at 348.85' and (if needed) the stand pipe top at 352.50'

Tertiary = Flow over the top of bank in emergency situations (occurs at elevation 353.50')

Pre-Development

Note: Pre-Development Node is taken to be bare dirt for this calcuations due to the relocation of the existing detention pond proposed by the development.

Summary for Subcatchment 1S: Pre-development

Runoff = 4.44 cfs @ 18.14 hrs, Volume= 2.263 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
SCVWD 1956 Storm 100 year Rainfall=6.77"

Area (sf)	CN	Description
270,379	79	50-75% Grass cover, Fair, HSG C
270,379		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Post-Development - Existing Commercial Development

Note: Existing Commercial Development Node is considered for **PEAK MITIGATION ONLY**. This area relied on the detention pond located on the proposed development that The Gates will be relocating. As mentioned above, Pre-Development Node is considered to be bare dirt (before the existing commercial development) to ensure that peak flow mitigation is maintained with new pond design.

Summary for Subcatchment 2S: Post-Dev Existing Commercial

Runoff = 2.16 cfs @ 18.12 hrs, Volume= 1.325 af, Depth= 6.06"
Routed to Pond 5P : Proposed Retention/Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
SCVWD 1956 Storm 100 year Rainfall=6.77"

Area (sf)	CN	Description
114,303	94	Urban commercial, 85% imp, HSG C
17,145		15.00% Pervious Area
97,158		85.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Post-Development - Proposed Development

Note: This Proposed Development area is what is being proposed in The Gates development. This area is used for retention calculations and peak-flow mitigation.

Summary for Subcatchment 6S: Post-Development Proposed

Runoff = 3.24 cfs @ 18.14 hrs, Volume= 1.903 af, Depth= 5.71"
Routed to Pond 5P : Proposed Retention/Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
SCVWD 1956 Storm 100 year Rainfall=6.77"

	Area (sf)	CN	Description
*	39,429	98	roof
*	25,836	98	concrete
*	46,760	98	asphalt
	62,148	79	50-75% Grass cover, Fair, HSG C
	174,173	91	Weighted Average
	62,148		35.68% Pervious Area
	112,025		64.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Proposed Retention/Detention Pond Summary - 95th Percentile Event

Summary for Pond 5P: Proposed Retention/Detention Pond

Inflow Area = 6.622 ac, 72.51% Impervious, Inflow Depth = 1.12" for 95th event
Inflow = 1.24 cfs @ 18.14 hrs, Volume= 0.619 af
Outflow = 0.57 cfs @ 19.07 hrs, Volume= 0.619 af, Atten= 54%, Lag= 55.9 min
Discarded = 0.57 cfs @ 19.07 hrs, Volume= 0.619 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 348.16' @ 19.07 hrs Surf.Area= 15,105 sf Storage= 8,146 cf

Plug-Flow detention time= 189.3 min calculated for 0.619 af (100% of inflow)
Center-of-Mass det. time= 189.4 min (1,183.1 - 993.8)

Volume	Invert	Avail.Storage	Storage Description
#1	347.85'	60,359 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	349.35'	178 cf	**18.0" Round RCP_Round 18"** -Impervious L= 101.0' S= 0.0022 '/'
#3	347.08'	30 cf	**18.0" Round RCP_Round 18"** -Impervious L= 17.0' S= 0.1440 '/'
#4	347.08'	792 cf	**18.0" Round RCP_Round 18"** -Impervious L= 448.0' S= 0.0032 '/'
#5	345.85'	2,444 cf	**BSM (Prismatic)** Listed below (Recalc) 9,776 cf Overall x 25.0% Voids
#6	343.85'	3,910 cf	**Drain Rock (Prismatic)** Listed below (Recalc) 9,776 cf Overall x 40.0% Voids
		67,713 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
347.85	4,888	0	0
348.00	5,097	749	749
348.85	6,331	4,857	5,606
349.00	6,556	967	6,572
350.00	8,116	7,336	13,908
351.00	9,776	8,946	22,854
352.00	11,537	10,657	33,511
353.00	13,399	12,468	45,979
354.00	15,361	14,380	60,359

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
345.85	4,888	0	0
347.85	4,888	9,776	9,776

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
343.85	4,888	0	0
345.85	4,888	9,776	9,776

Device	Routing	Invert	Outlet Devices
#1	Tertiary	353.50'	**10.0' long + 23.0 '/' SideZ x 7.0' breadth Emergency Overflow Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78
#2	Discarded	343.85'	**1.625 in/hr Exfiltration over Surface area**
#3	Primary	352.50'	**21.0" Horiz. Top of Stand Pipe** C= 0.600 Limited to weir flow at low heads
#4	Primary	348.85'	**10.0" Vert. 10" Orifice** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.57 cfs @ 19.07 hrs HW=348.16' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.57 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=343.85' (Free Discharge)
├**3=Top of Stand Pipe** (Controls 0.00 cfs)
└**4=10" Orifice** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=343.85' (Free Discharge)
└**1=Emergency Overflow Weir** (Controls 0.00 cfs)

Proposed Retention/Detention Pond Summary - 100-Year Event

Summary for Pond 5P: Proposed Retention/Detention Pond

Inflow Area = 6.622 ac, 72.51% Impervious, Inflow Depth = 5.85" for 100 year event
Inflow = 5.40 cfs @ 18.14 hrs, Volume= 3.229 af
Outflow = 3.73 cfs @ 18.69 hrs, Volume= 3.229 af, Atten= 31%, Lag= 32.8 min
Discarded = 0.71 cfs @ 18.69 hrs, Volume= 1.384 af
Primary = 3.02 cfs @ 18.69 hrs, Volume= 1.845 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 350.59' @ 18.69 hrs Surf.Area= 18,876 sf Storage= 26,333 cf

Plug-Flow detention time= 163.6 min calculated for 3.229 af (100% of inflow)
Center-of-Mass det. time= 163.6 min (1,066.0 - 902.4)

Volume	Invert	Avail.Storage	Storage Description
#1	347.85'	60,359 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	349.35'	178 cf	**18.0" Round RCP_Round 18"** -Impervious L= 101.0' S= 0.0022 '/'
#3	347.08'	30 cf	**18.0" Round RCP_Round 18"** -Impervious L= 17.0' S= 0.1440 '/'
#4	347.08'	792 cf	**18.0" Round RCP_Round 18"** -Impervious L= 448.0' S= 0.0032 '/'
#5	345.85'	2,444 cf	**BSM (Prismatic)** Listed below (Recalc) 9,776 cf Overall x 25.0% Voids
#6	343.85'	3,910 cf	**Drain Rock (Prismatic)** Listed below (Recalc) 9,776 cf Overall x 40.0% Voids
		67,713 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
347.85	4,888	0	0
348.00	5,097	749	749
348.85	6,331	4,857	5,606
349.00	6,556	967	6,572
350.00	8,116	7,336	13,908
351.00	9,776	8,946	22,854
352.00	11,537	10,657	33,511
353.00	13,399	12,468	45,979
354.00	15,361	14,380	60,359

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
345.85	4,888	0	0
347.85	4,888	9,776	9,776

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
343.85	4,888	0	0
345.85	4,888	9,776	9,776

Device	Routing	Invert	Outlet Devices
#1	Tertiary	353.50'	**10.0' long + 23.0 '/' SideZ x 7.0' breadth Emergency Overflow Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65

2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

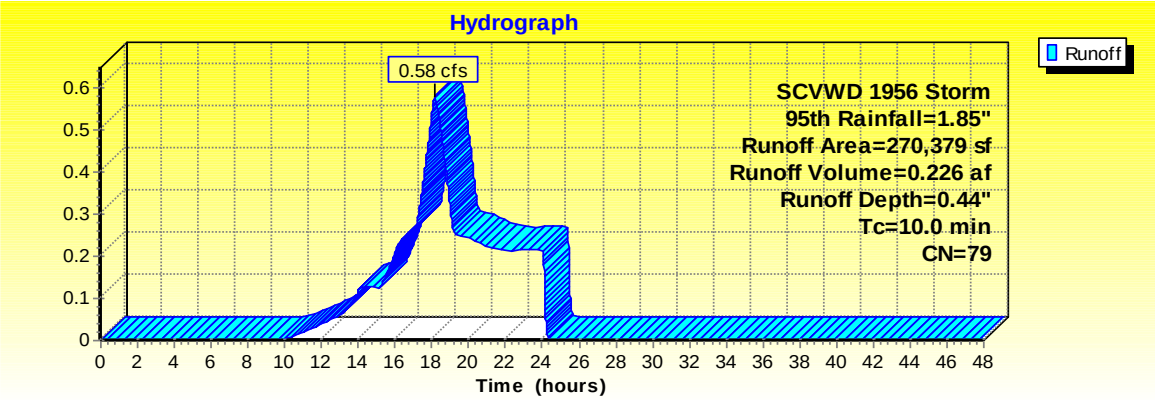
#2	Discarded	343.85'	**1.625 in/hr Exfiltration over Surface area**
#3	Primary	352.50'	**21.0" Horiz. Top of Stand Pipe** C= 0.600 Limited to weir flow at low heads
#4	Primary	348.85'	**10.0" Vert. 10" Orifice** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.71 cfs @ 18.69 hrs HW=350.59' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.71 cfs)

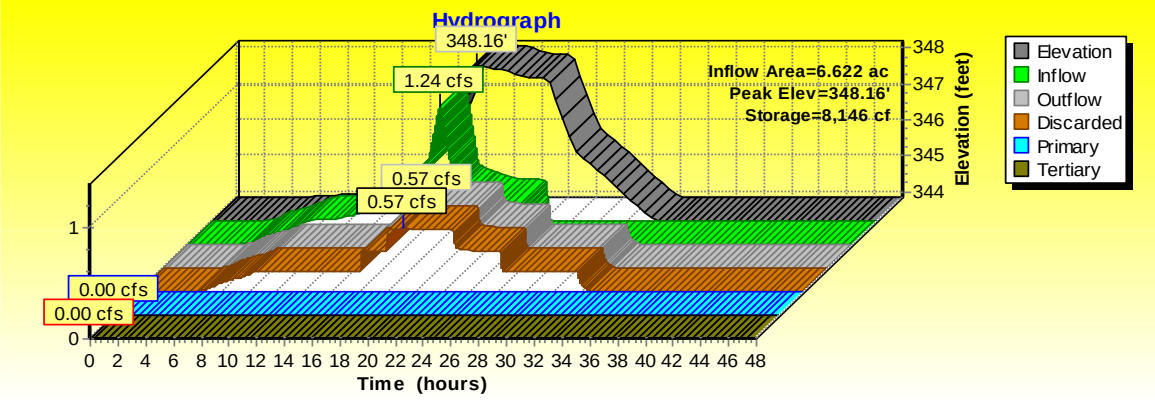
Primary OutFlow Max=3.02 cfs @ 18.69 hrs HW=350.59' (Free Discharge)
├**3=Top of Stand Pipe** (Controls 0.00 cfs)
└**4=10" Orifice** (Orifice Controls 3.02 cfs @ 5.55 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=343.85' (Free Discharge)
└**1=Emergency Overflow Weir** (Controls 0.00 cfs)

95th% Event - Pre-Development

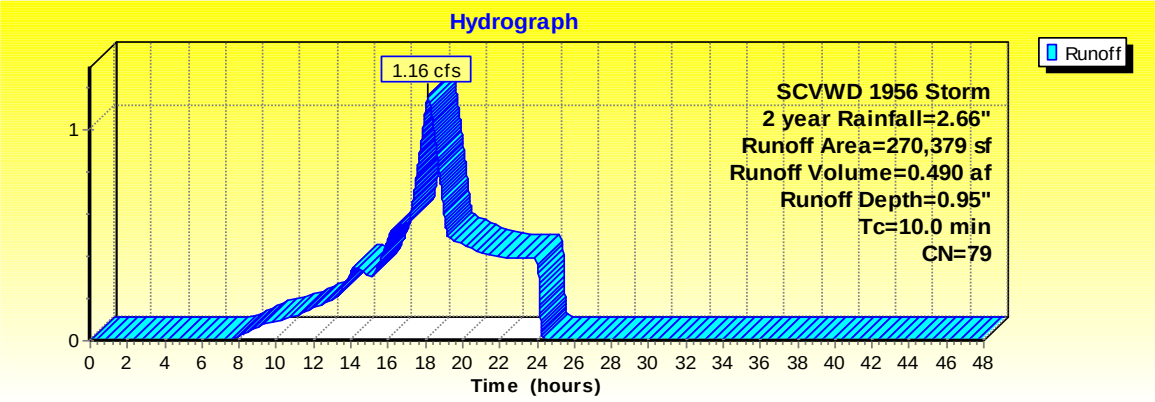


95th% Event - Post Development

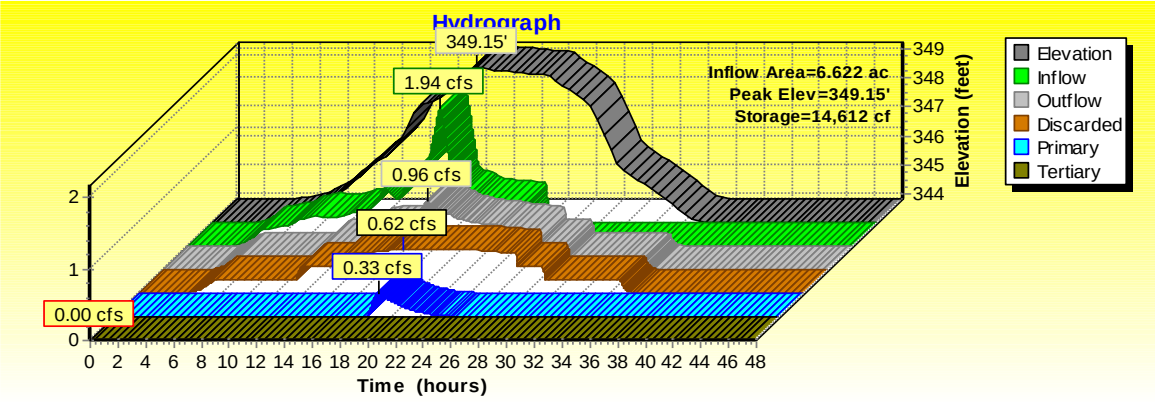


Note: 0cfs discharge for 95th% event
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out of the 10" orifice and/or the top of the stand pipe (Orifice elevation=348.85, Stand Pipe Top Elevation=352.50)
Tertiary = flow out via over the emergency overflow weir (occurs when water surface elevation exceeds 353.50)
Note: full dewatering of subsurface retention occurs at hour 32.65, 8.65 hours after storm ends.

2-year Event - Pre-Development

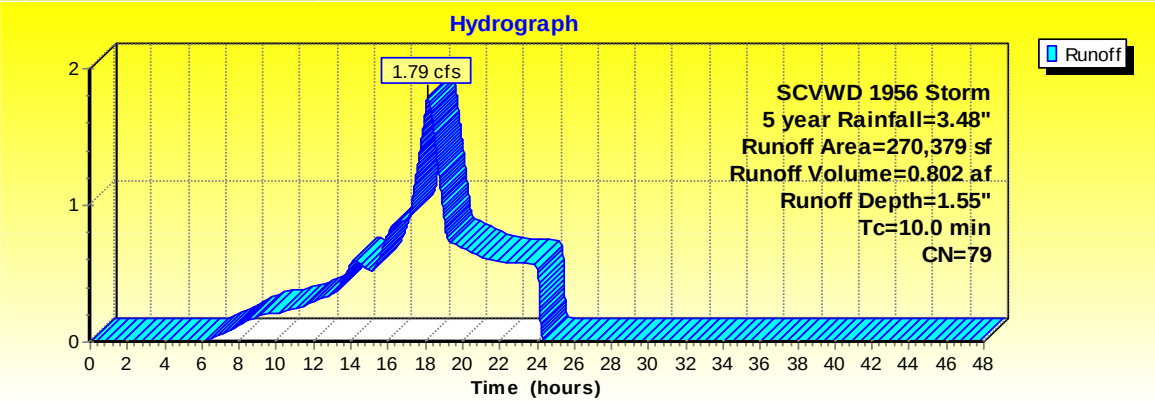


2-year Event - Post Development

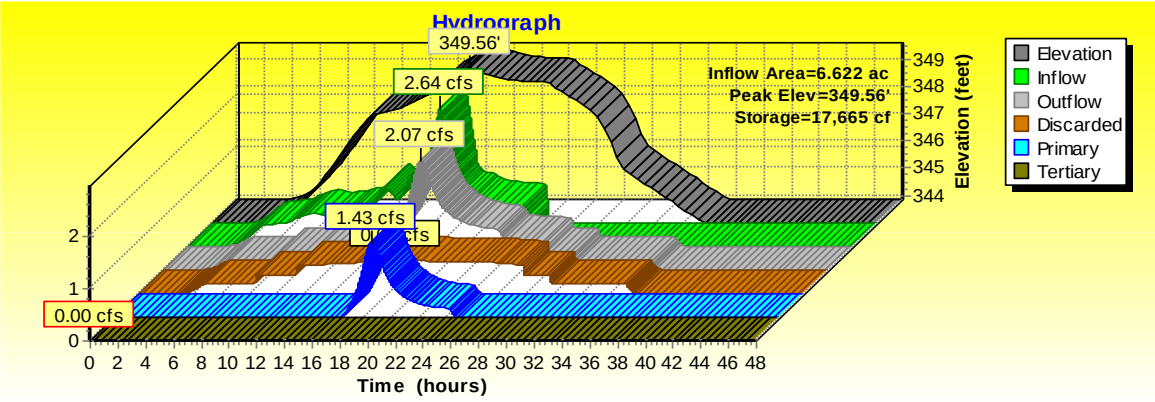


Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out of the 10" orifice and/or the top of the stand pipe (Orifice elevation=348.85, Stand Pipe Top Elevation=352.50)
Tertiary = flow out via over the emergency overflow weir (occurs when water surface elevation exceeds 353.50)
Note: full dewatering of subsurface retention occurs at hour 32.65, 8.65 hours after storm ends.

5-year Event - Pre-Development

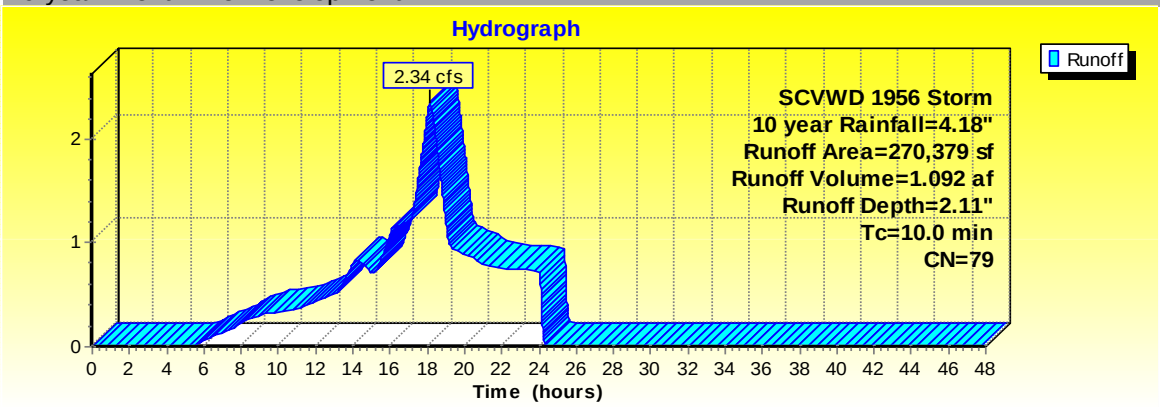


5-year Event - Post Development

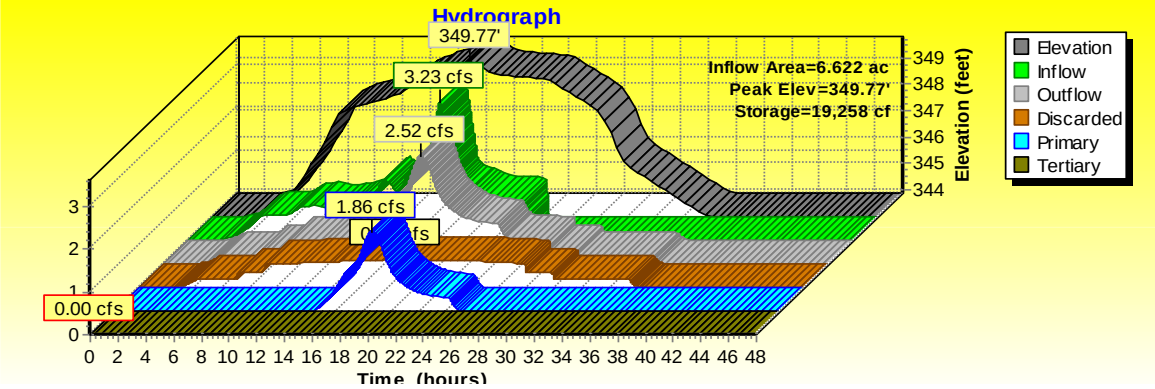


Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out of the 10" orifice and/or the top of the stand pipe (Orifice elevation=348.85, Stand Pipe Top Elevation=352.50)
Tertiary = flow out via over the emergency overflow weir (occurs when water surface elevation exceeds 353.50)
Note: full dewatering of subsurface retention occurs at hour 32.65, 8.65 hours after storm ends.

10-year Event - Pre-Development

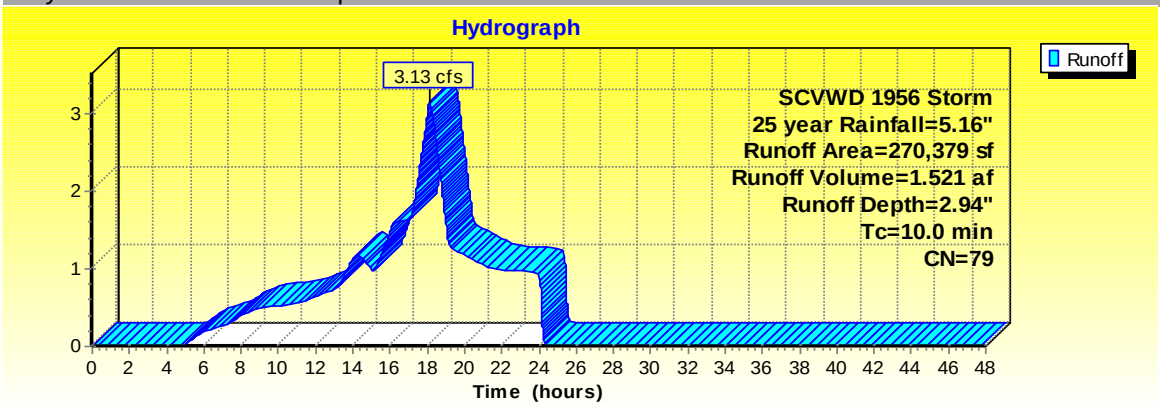


10-year Event - Post Development

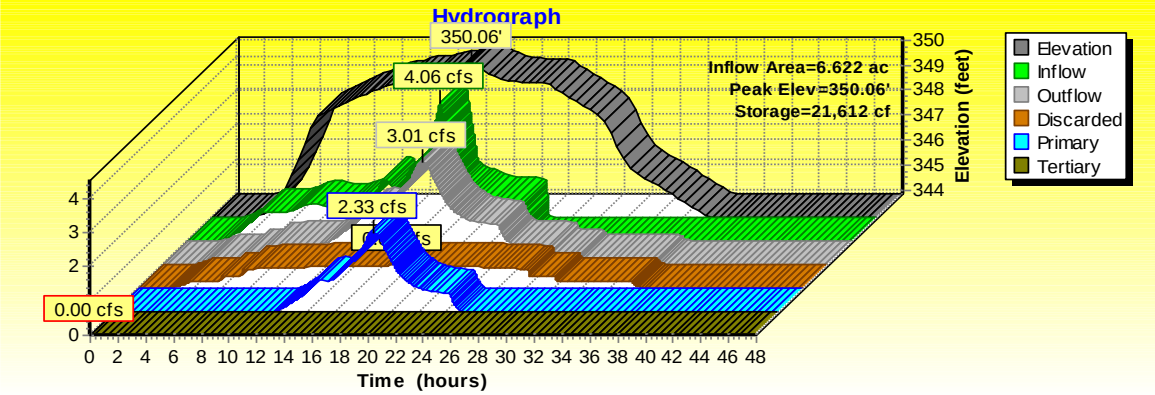


Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out of the 10" orifice and/or the top of the stand pipe (Orifice elevation=348.85, Stand Pipe Top Elevation=352.50)
Tertiary = flow out via over the emergency overflow weir (occurs when water surface elevation exceeds 353.50)
Note: full dewatering of subsurface retention occurs at hour 32.65, 8.65 hours after storm ends.

25-year Event - Post Development

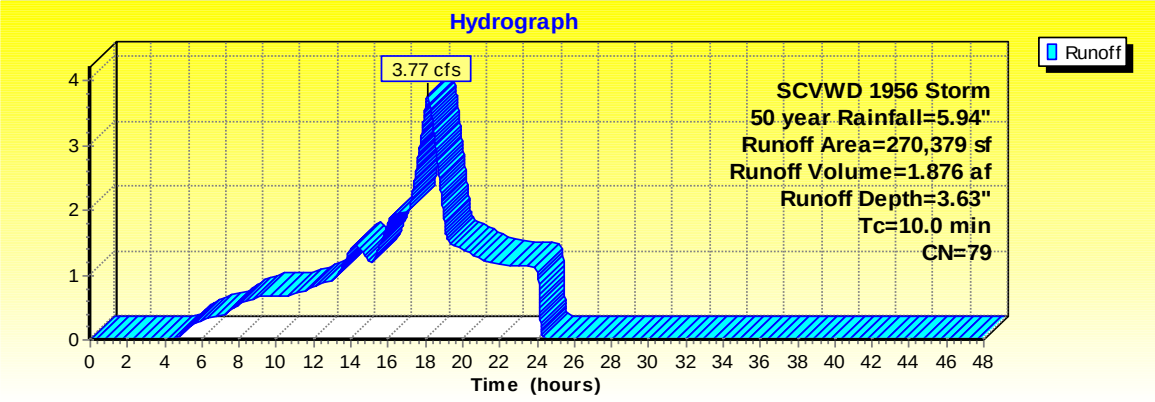


25-year Event - Post Development

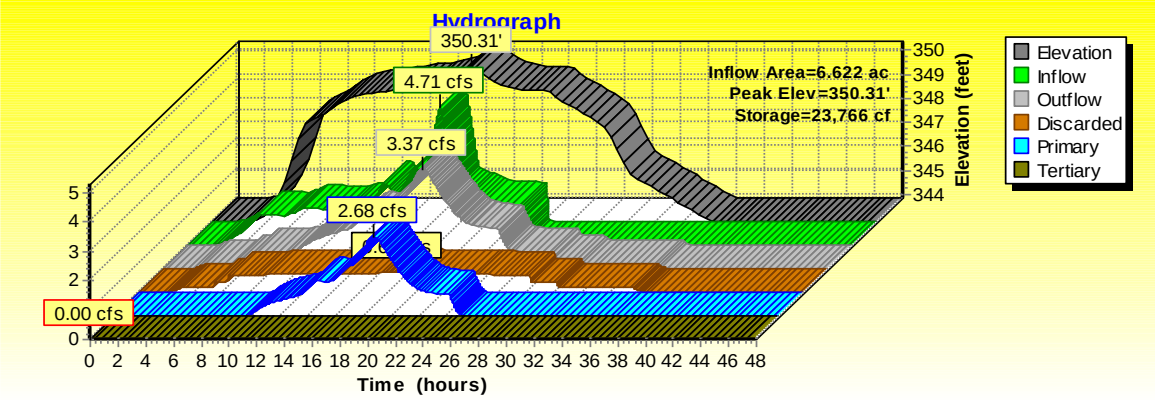


Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out of the 10" orifice and/or the top of the stand pipe (Orifice elevation=348.85, Stand Pipe Top Elevation=352.50)
Tertiary = flow out via over the emergency overflow weir (occurs when water surface elevation exceeds 353.50)
Note: full dewatering of subsurface retention occurs at hour 32.65, 8.65 hours after storm ends.

50-year Event - Pre-Development

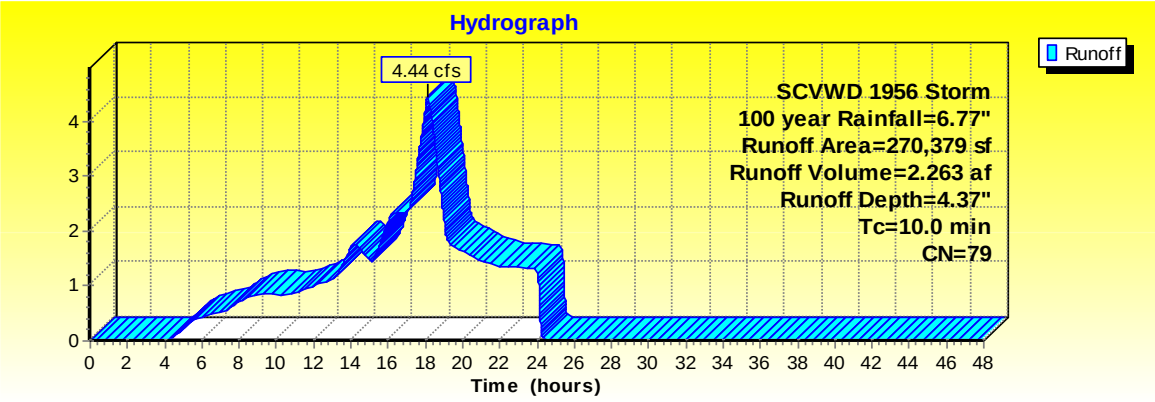


50-year Event - Post Development

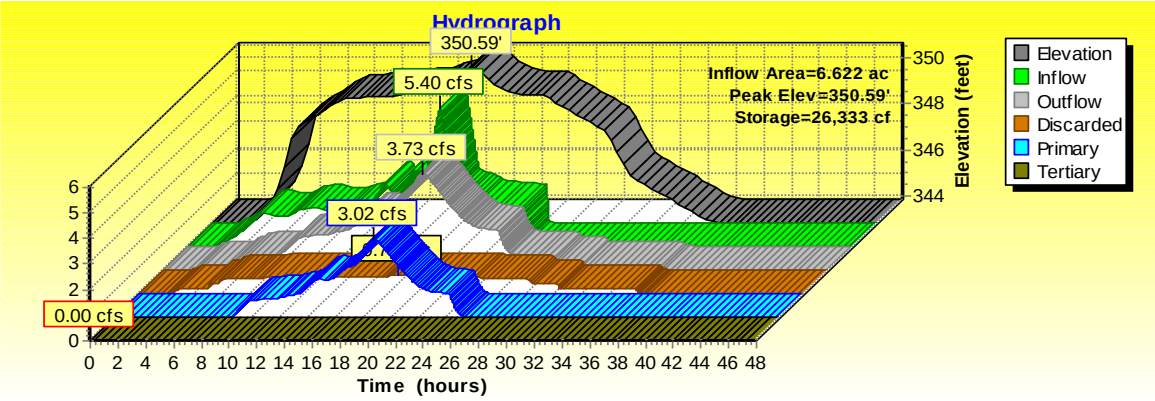


Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out of the 10" orifice and/or the top of the stand pipe (Orifice elevation=348.85, Stand Pipe Top Elevation=352.50)
Tertiary = flow out via over the emergency overflow weir (occurs when water surface elevation exceeds 353.50)
Note: full dewatering of subsurface retention occurs at hour 32.65, 8.65 hours after storm ends.

100-year Event - Pre-Development



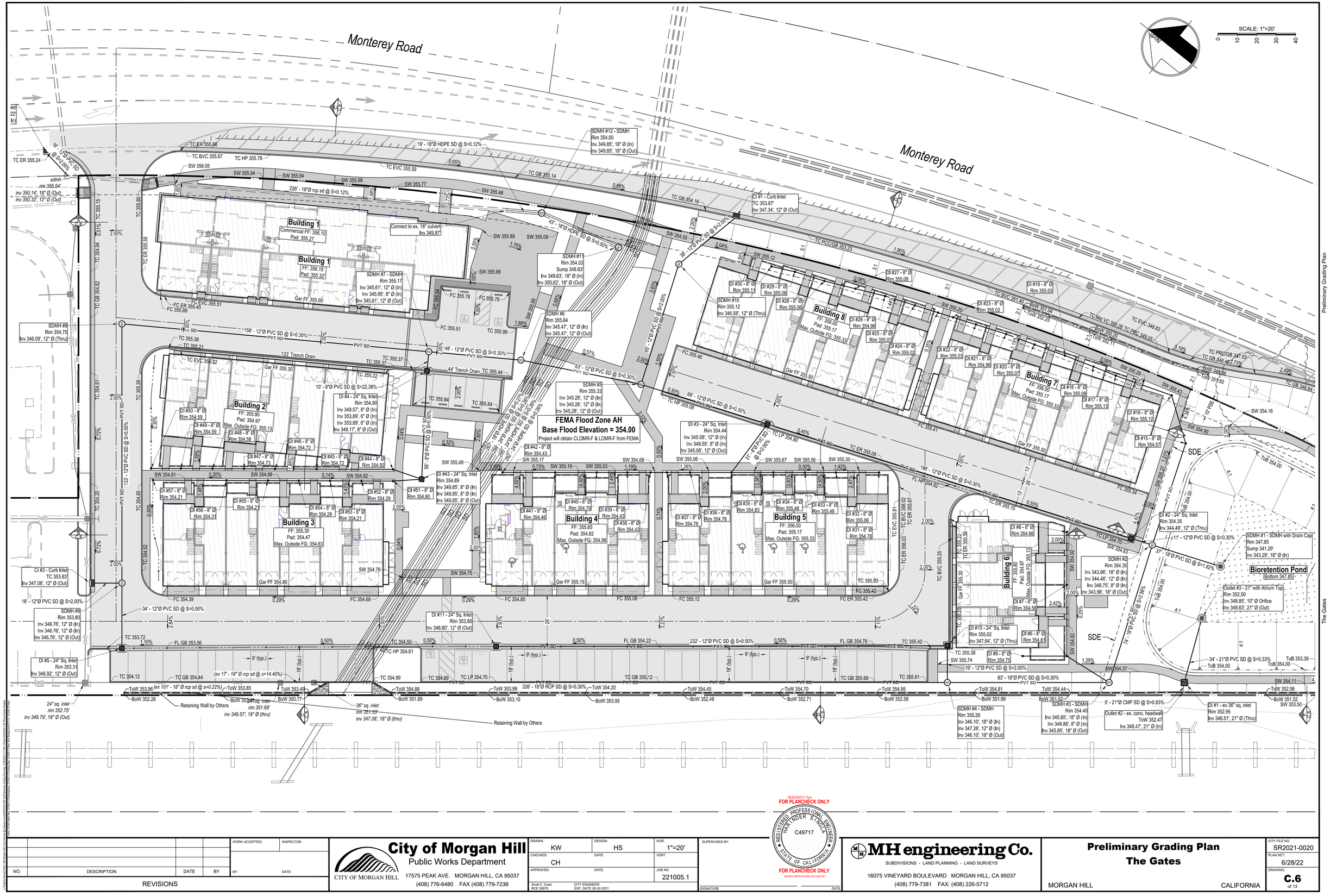
100-year Event - Post Development



Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out of the 10" orifice and/or the top of the stand pipe (Orifice elevation=348.85, Stand Pipe Top Elevation=352.50)
Tertiary = flow out via over the emergency overflow weir (occurs when water surface elevation exceeds 353.50)
Note: full dewatering of subsurface retention occurs at hour 32.65, 8.65 hours after storm ends.

MH engineering Co.
16075 Vineyard Blvd. Morgan Hill, CA 95037 - (408) 779-7381

Attachment G:
Stormwater Management Plan & Details



NO.	DESCRIPTION	DATE	BY

REVISIONS

WORK ACCEPTED: INSPECTOR:
BY: DATE:

City of Morgan Hill
Public Works Department
CITY OF MORGAN HILL
17575 PEAK AVE. MORGAN HILL, CA 95037
(408) 776-6480 FAX (408) 779-7236

DRAWN:	DESIGN:	HOR.
KW	HS	1"=20'
CHECKED:	DATE:	VERT.
CH		
APPROVED:	DATE:	JOB NO.
		221005.1

Scott C. Creer
RCE 58879
CITY ENGINEER
EXP. DATE 06-30-2021

SUPERVISED BY:
SIGNATURE DATE

09/28/2022 4:17pm
FOR PLANCHECK ONLY
REGISTERED PROFESSIONAL ENGINEER
HARVINDER S. NAGRA
C49717
STATE OF CALIFORNIA
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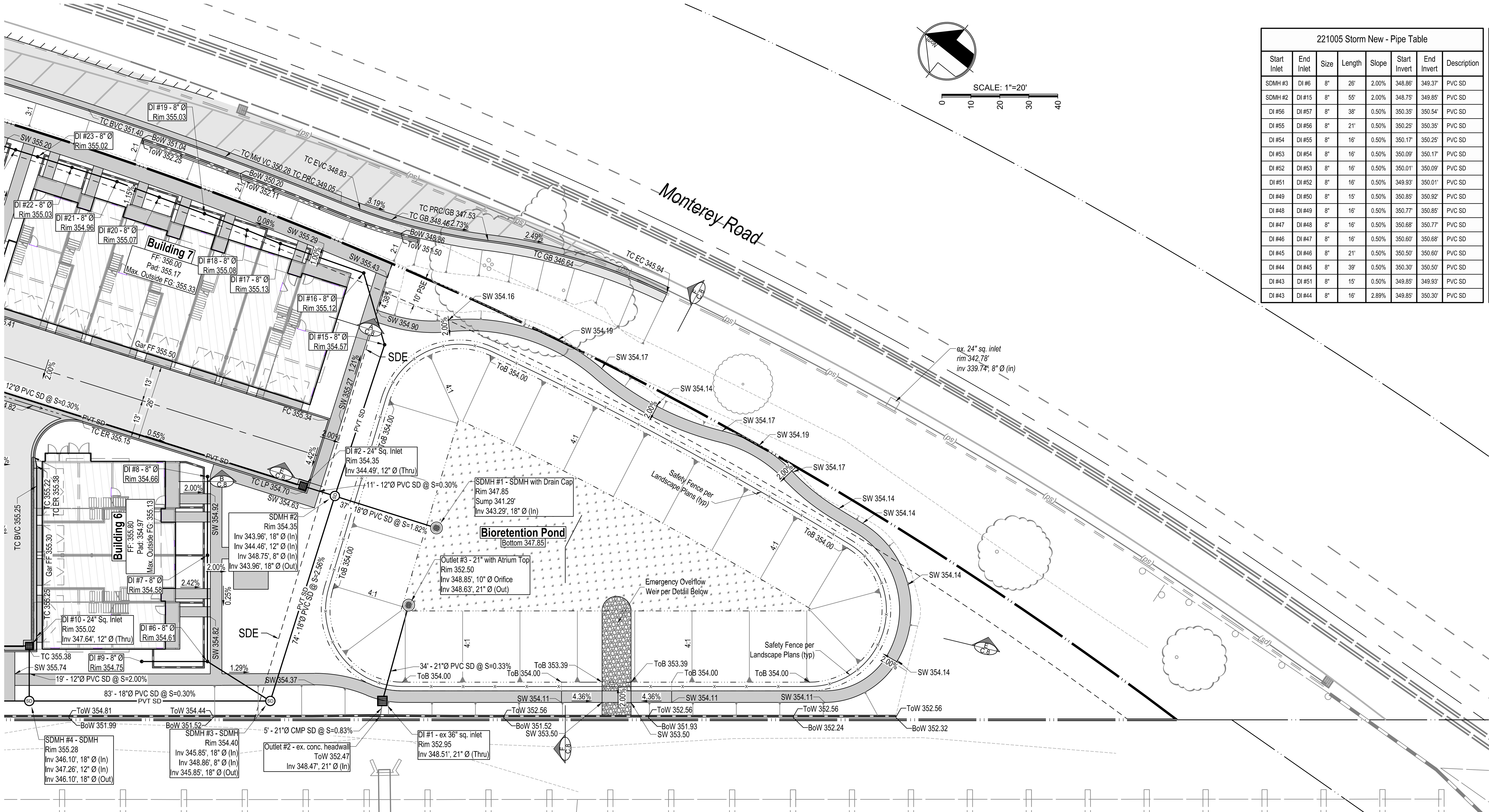
MH engineering Co.
SUBDIVISIONS - LAND PLANNING - LAND SURVEYS
16075 VINEYARD BOULEVARD MORGAN HILL, CA 95037
(408) 779-7381 FAX: (408) 226-5712

Preliminary Grading Plan
The Gates
MORGAN HILL CALIFORNIA

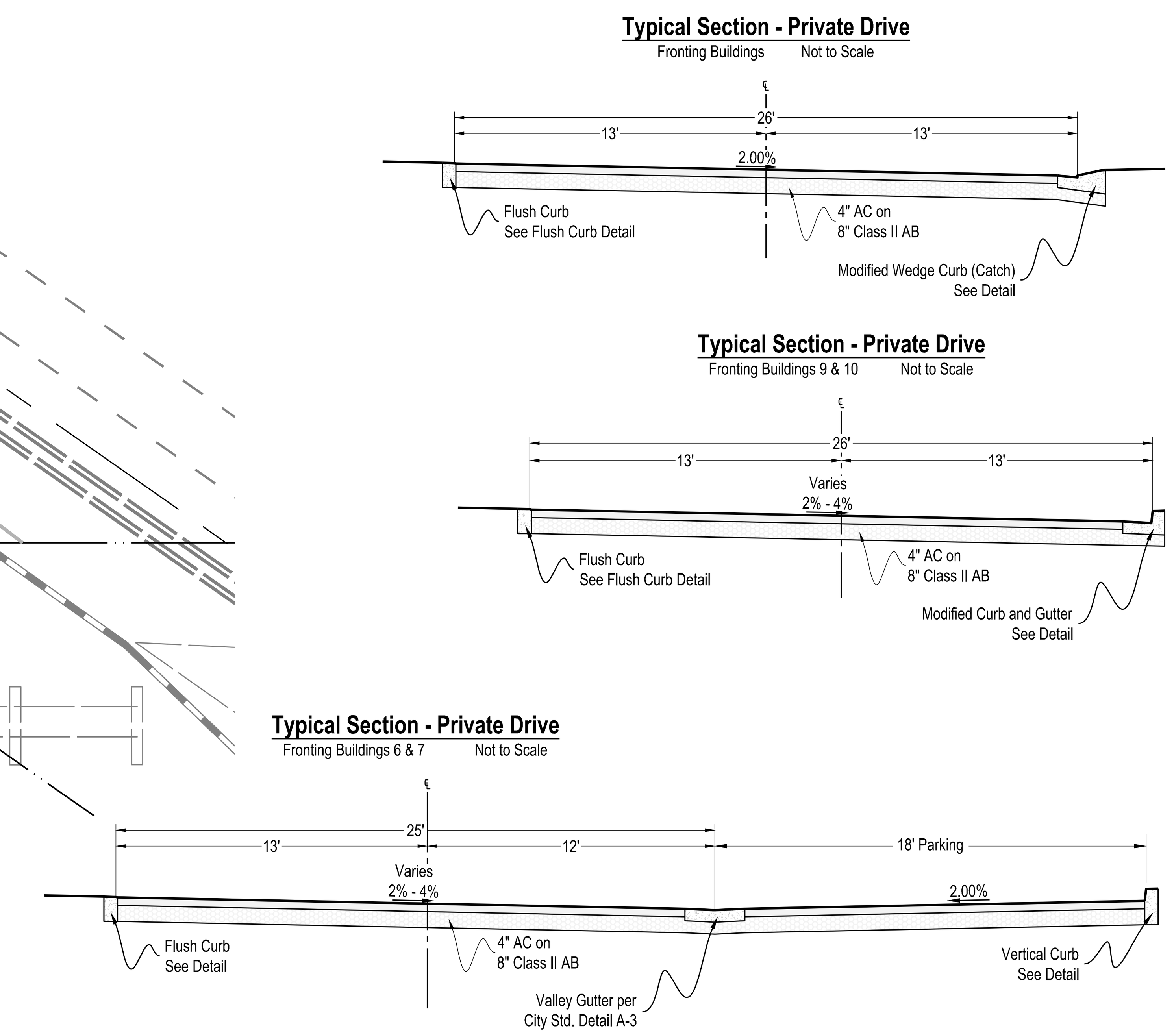
CITY FILE NO. SR2021-0020
PLAN SET: 6/28/22
DRAWING: **C.6** of 13

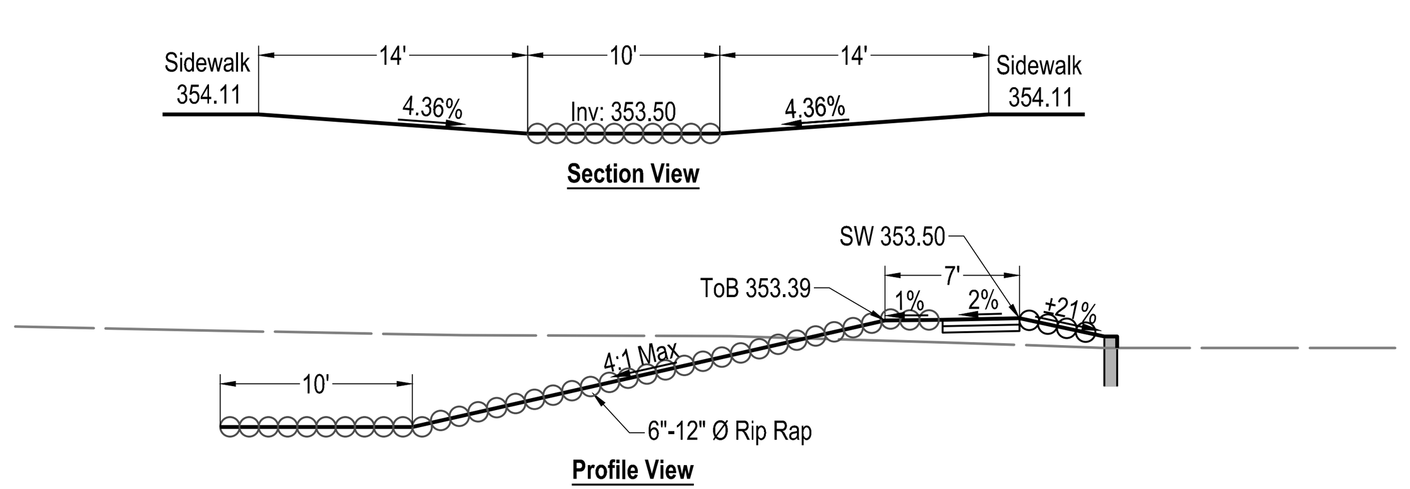


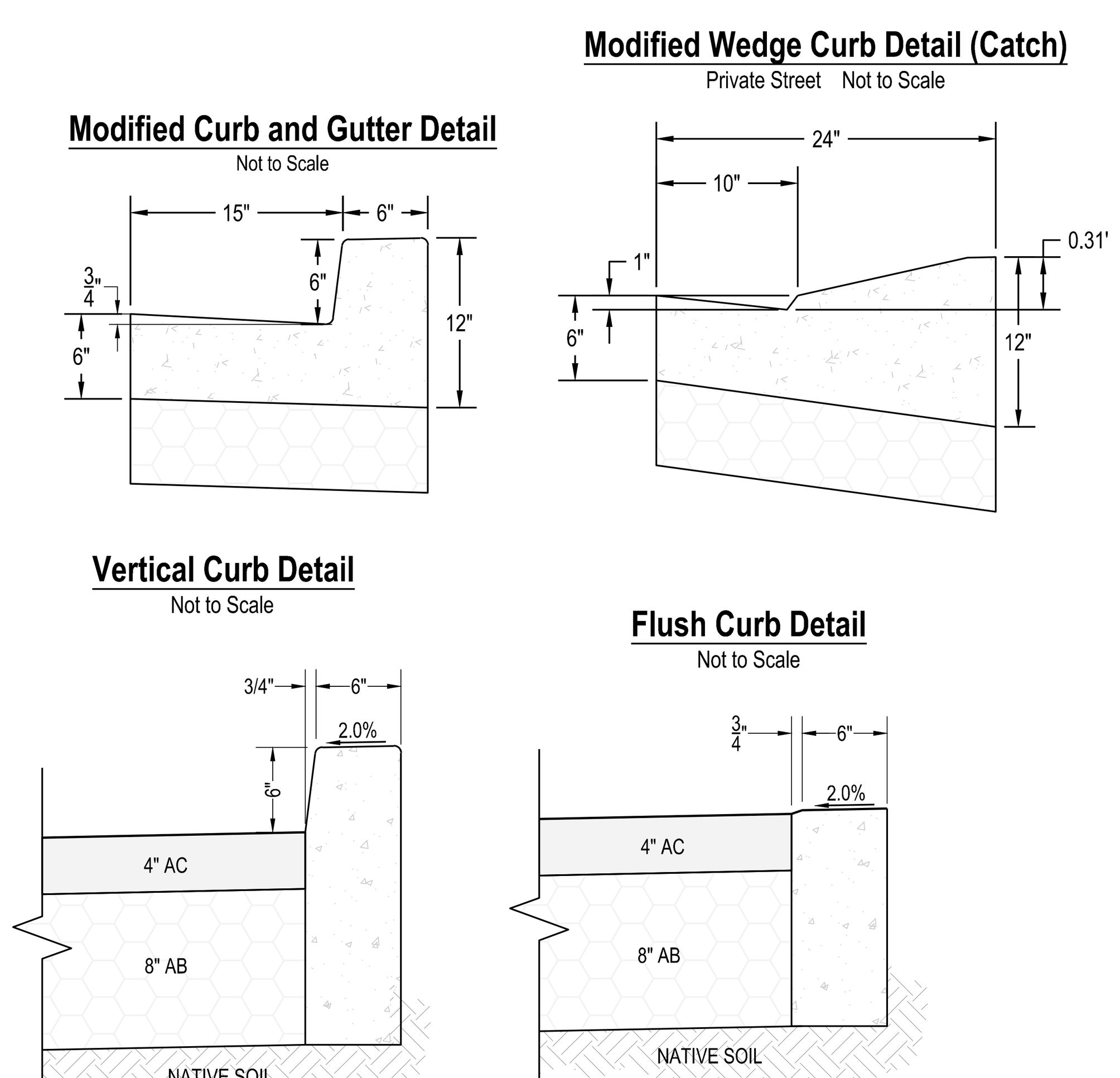
221005 Storm New - Pipe Table							
Start Inlet	End Inlet	Size	Length	Slope	Start Invert	End Invert	Description
SDMH #3	DI #6	8"	26'	2.00%	348.86'	349.37'	PVC SD
SDMH #2	DI #15	8"	55'	2.00%	348.75'	349.85'	PVC SD
DI #56	DI #57	8"	38'	0.50%	350.35'	350.54'	PVC SD
DI #55	DI #56	8"	21'	0.50%	350.25'	350.35'	PVC SD
DI #54	DI #55	8"	16'	0.50%	350.17'	350.25'	PVC SD
DI #53	DI #54	8"	16'	0.50%	350.09'	350.17'	PVC SD
DI #52	DI #53	8"	16'	0.50%	350.01'	350.09'	PVC SD
DI #51	DI #52	8"	16'	0.50%	349.93'	350.01'	PVC SD
DI #49	DI #50	8"	15'	0.50%	350.85'	350.92'	PVC SD
DI #48	DI #49	8"	16'	0.50%	350.77'	350.85'	PVC SD
DI #47	DI #48	8"	16'	0.50%	350.68'	350.77'	PVC SD
DI #46	DI #47	8"	16'	0.50%	350.60'	350.68'	PVC SD
DI #45	DI #46	8"	21'	0.50%	350.50'	350.60'	PVC SD
DI #44	DI #45	8"	39'	0.50%	350.30'	350.50'	PVC SD
DI #43	DI #51	8"	15'	0.50%	349.85'	349.93'	PVC SD
DI #43	DI #44	8"	16'	2.89%	349.85'	350.30'	PVC SD

221005 Storm New - Pipe Table							
Start Inlet	End Inlet	Size	Length	Slope	Start Invert	End Invert	Description
DI #41	DI #42	8"	27'	0.50%	350.63'	350.76'	PVC SD
DI #40	DI #41	8"	21'	0.50%	350.52'	350.63'	PVC SD
DI #39	DI #40	8"	16'	0.50%	350.44'	350.52'	PVC SD
DI #38	DI #39	8"	12'	0.50%	350.38'	350.44'	PVC SD
DI #37	DI #38	8"	9'	0.50%	350.34'	350.38'	PVC SD
DI #36	DI #37	8"	12'	0.50%	350.28'	350.34'	PVC SD
DI #35	DI #34	8"	22'	0.50%	350.17'	350.28'	PVC SD
DI #35	DI #36	8"	21'	0.50%	350.17'	350.28'	PVC SD
DI #34	DI #33	8"	16'	0.50%	350.28'	350.36'	PVC SD
DI #33	DI #32	8"	16'	0.50%	350.36'	350.44'	PVC SD
DI #32	DI #31	8"	22'	0.50%	350.44'	350.55'	PVC SD
DI #29	DI #30	8"	12'	0.50%	351.38'	351.44'	PVC SD
DI #28	DI #29	8"	16'	0.50%	351.30'	351.38'	PVC SD
DI #27	DI #28	8"	16'	0.50%	351.22'	351.30'	PVC SD
DI #26	DI #27	8"	16'	0.50%	351.14'	351.22'	PVC SD
DI #25	DI #26	8"	16'	0.50%	351.06'	351.14'	PVC SD

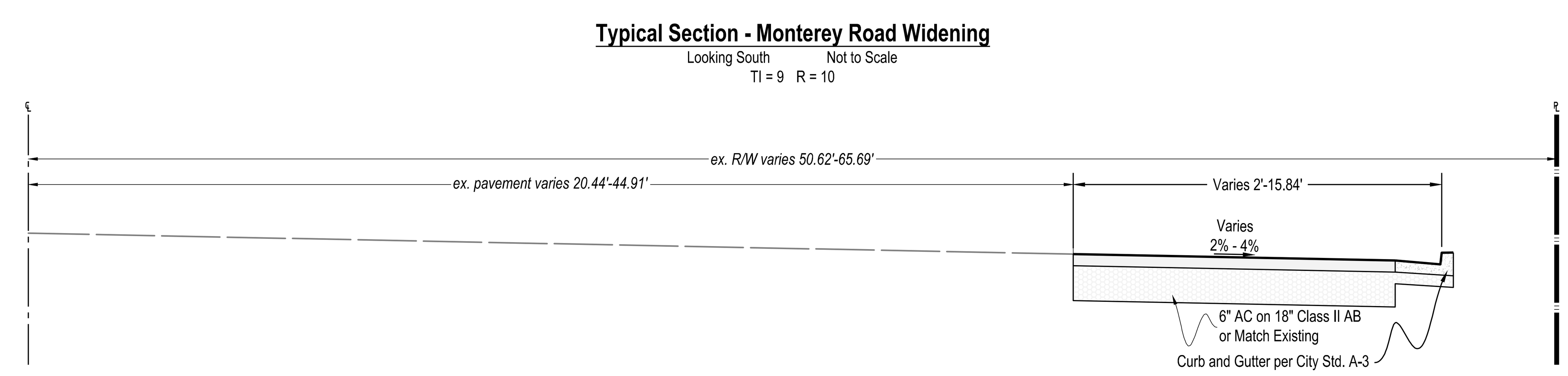
221005 Storm New - Pipe Table							
Start Inlet	End Inlet	Size	Length	Slope	Start Invert	End Invert	Description
DI #24	DI #25	8"	13'	0.50%	351.00'	351.06'	PVC SD
DI #23	DI #24	8"	8'	0.50%	350.96'	351.00'	PVC SD
DI #22	DI #23	8"	12'	0.50%	350.90'	350.96'	PVC SD
DI #21	DI #22	8"	16'	0.50%	350.81'	350.90'	PVC SD
DI #20	DI #21	8"	16'	0.50%	350.74'	350.81'	PVC SD
DI #19	DI #20	8"	17'	0.50%	350.65'	350.74'	PVC SD
DI #18	DI #19	8"	16'	0.50%	350.57'	350.65'	PVC SD
DI #17	DI #18	8"	12'	0.50%	350.51'	350.57'	PVC SD
DI #16	DI #17	8"	30'	0.50%	350.36'	350.51'	PVC SD
DI #15	DI #16	8"	26'	2.00%	349.85'	350.36'	PVC SD
DI #7	DI #8	8"	27'	2.00%	350.10'	350.65'	PVC SD
DI #6	DI #9	8"	23'	2.00%	349.37'	349.82'	PVC SD
DI #6	DI #7	8"	37'	2.00%	349.37'	350.10'	PVC SD
DI #3	DI #35	8"	31'	2.00%	349.55'	350.17'	PVC SD

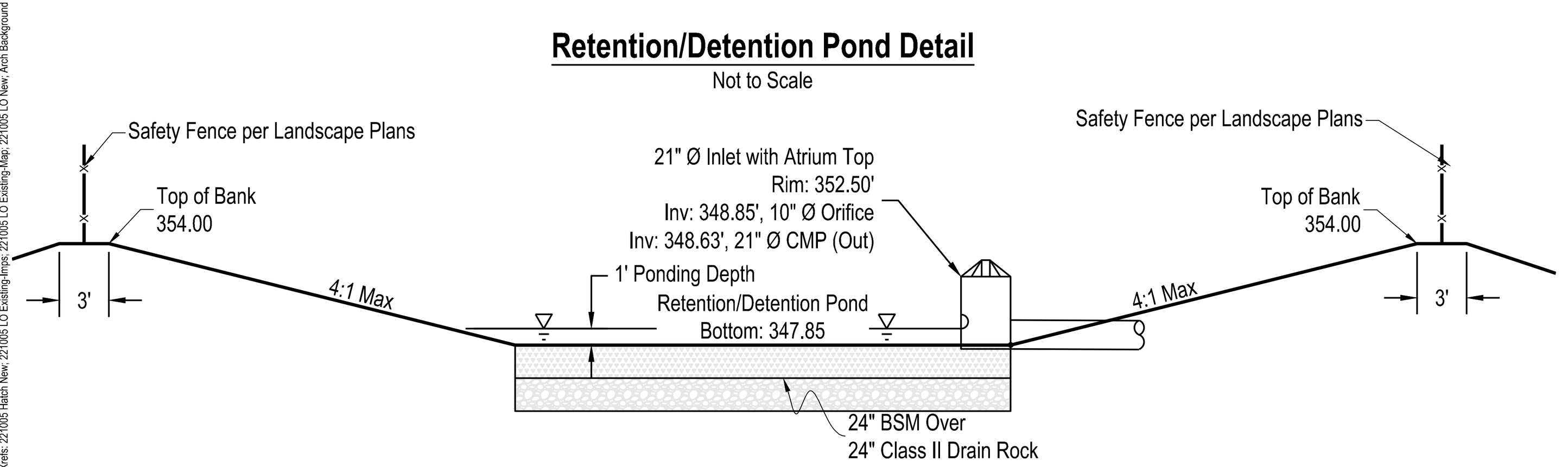


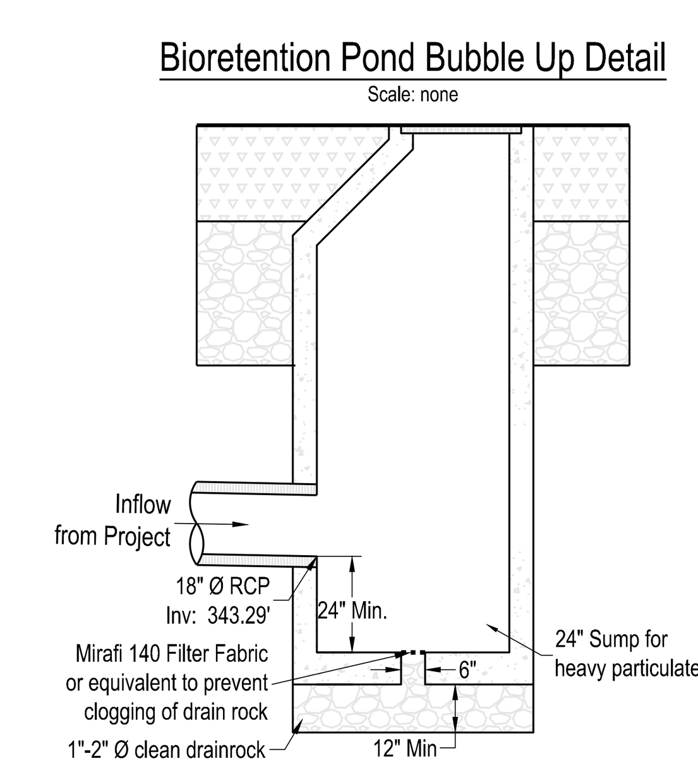




Preliminary Earthwork			
	Cut	Fill	Net
Rough Grade	8,577 CY	6,132 CY	2,445 CY (Cut)
Trench Spoils	1,481 CY	0 CY	1,481 CY (Cut)
Total	10,058 CY	6,132 CY	3,926 CY (Cut)







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REGISTERED PROFESSIONAL ENGINEER HARINDER SINGLA C49717 STATE OF CALIFORNIA
FOR PLANCHECK ONLY

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

WORK ACCEPTED: BY: DATE: INSPECTOR: DATE:

City of Morgan Hill
Public Works Department
17575 PEAK AVE. MORGAN HILL, CA 95037
(408) 776-6480 FAX (408) 779-7236
CITY OF MORGAN HILL

DRAWN: KW DESIGN: HS HOR. 1"=20'
CHECKED: CH DATE: VERT.
APPROVED: DATE: JOB NO. 221005.1
Scott C. Creer RCE 58879 CITY ENGINEER EXP. DATE 06-30-2021
SUPERVISED BY: SIGNATURE DATE

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SUBDIVISIONS - LAND PLANNING - LAND SURVEYS
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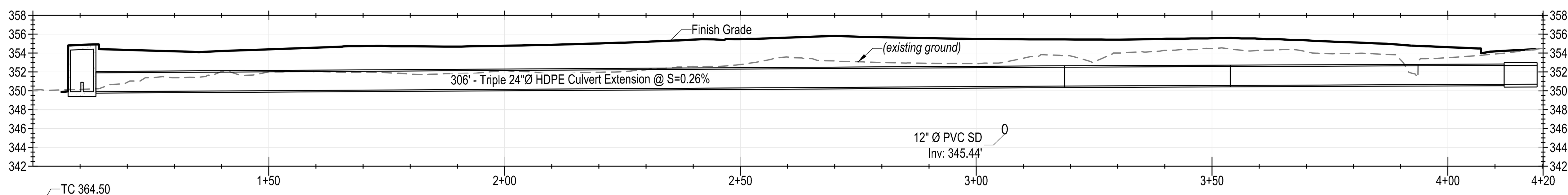
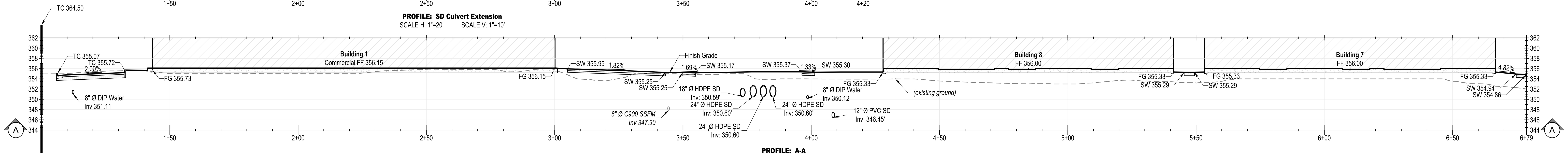
Preliminary Grading Plan
The Gates
MORGAN HILL CALIFORNIA

CITY FILE NO. SR2021-0020
PLAN SET: 6/28/22
DRAWING: C.7 of 13

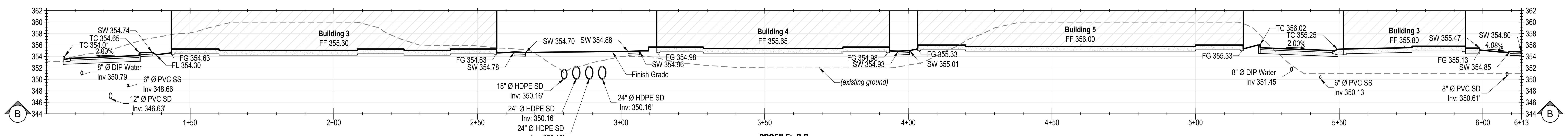
Preliminary Grading Plan
The Gates



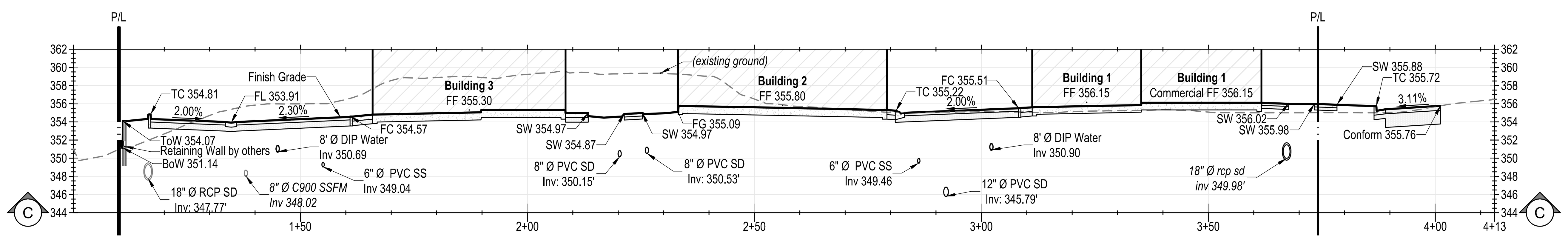
PROFILE: SD Culvert Extension
SCALE H: 1"=20' SCALE V: 1"=10'



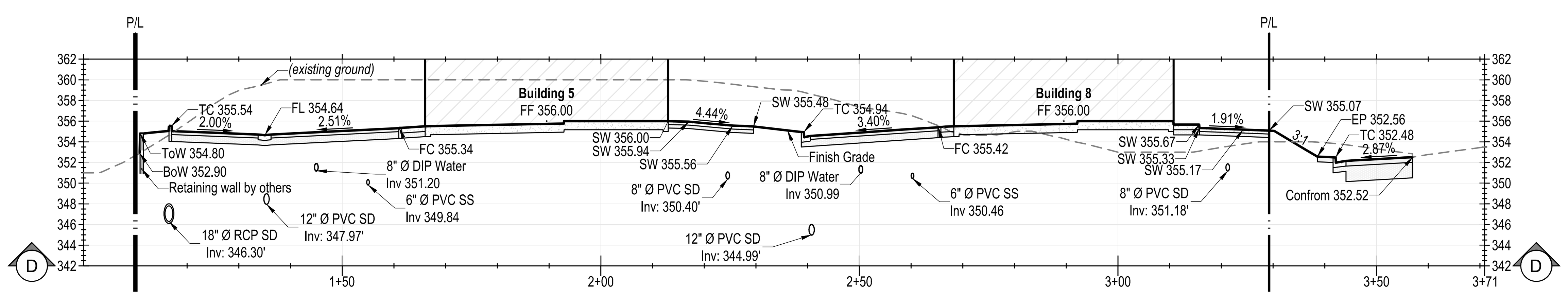
PROFILE: A-A
SCALE H: 1"=20' SCALE V: 1"=10'



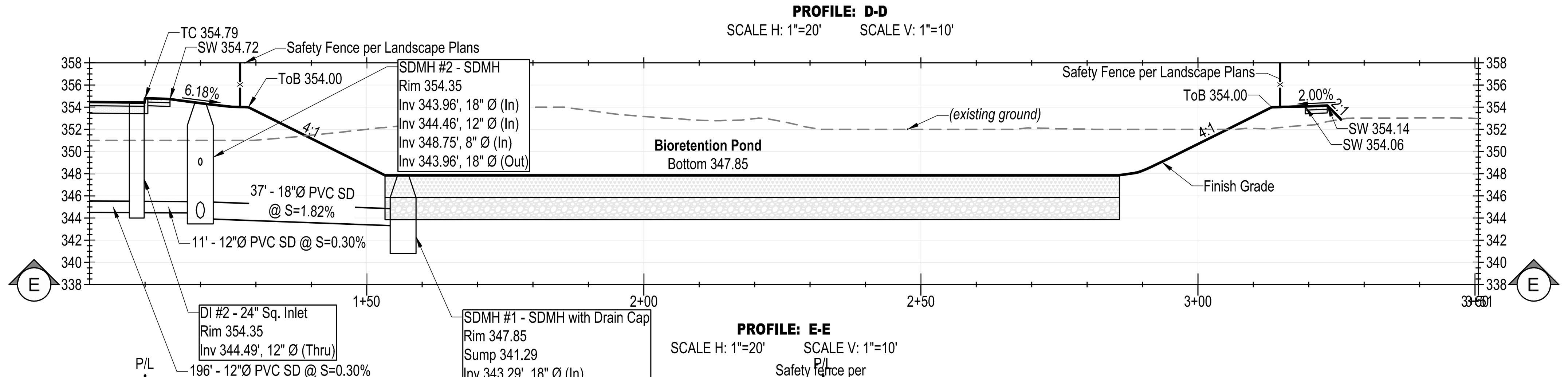
PROFILE: B-B
SCALE H: 1"=20' SCALE V: 1"=10'



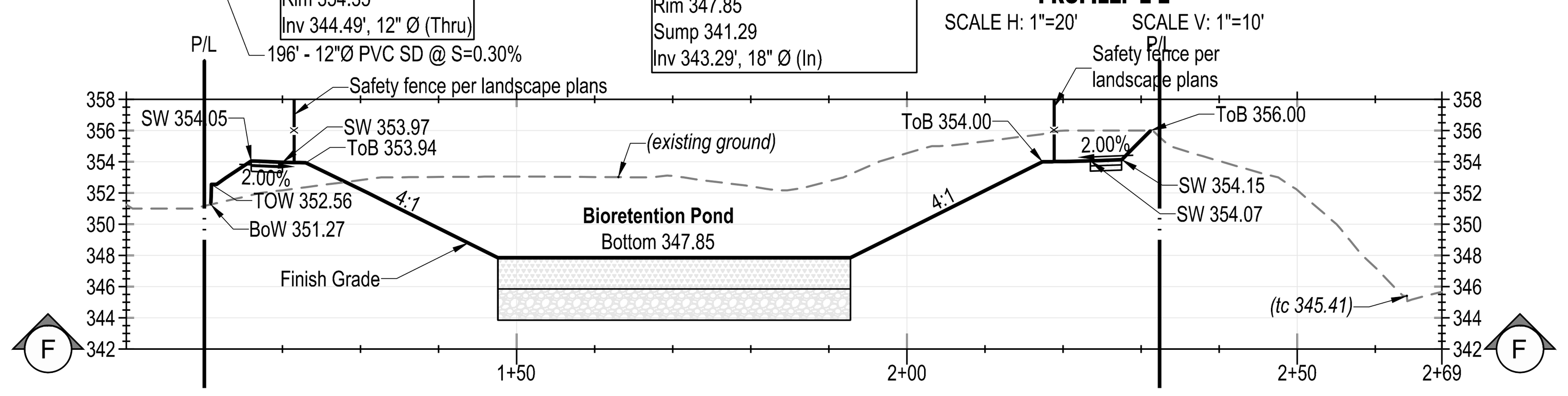
PROFILE: C-C
SCALE H: 1"=20' SCALE V: 1"=10'



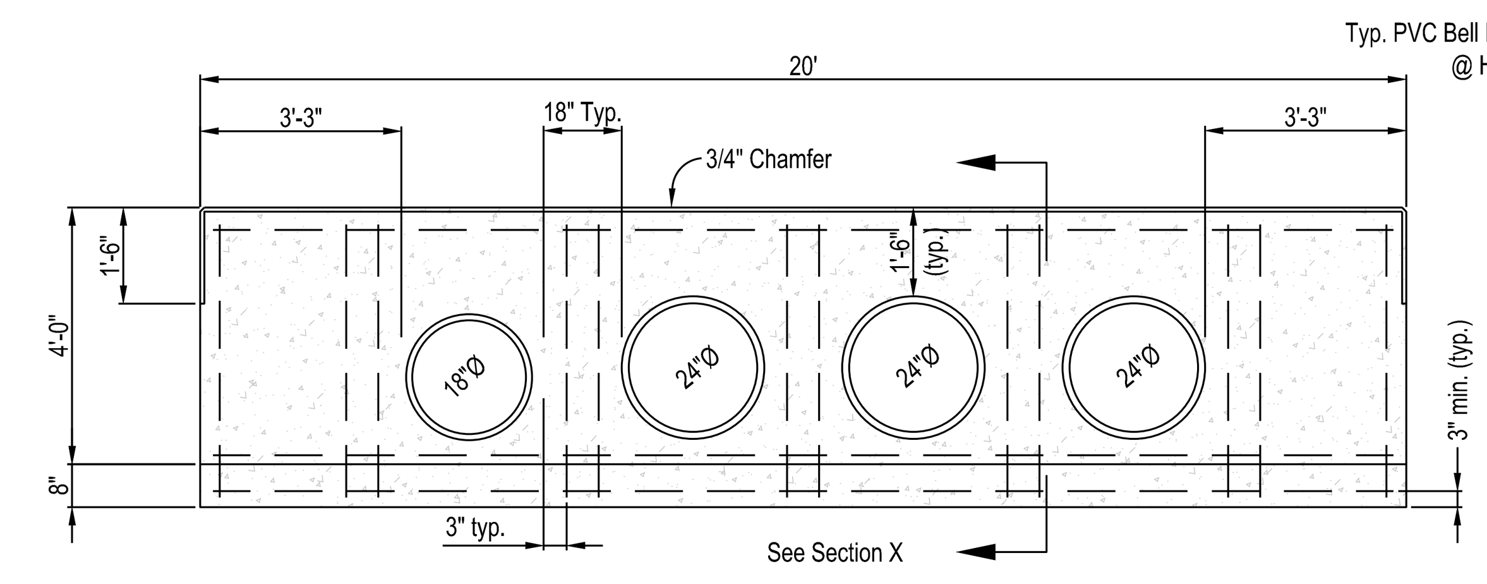
PROFILE: D-D
SCALE H: 1"=20' SCALE V: 1"=10'



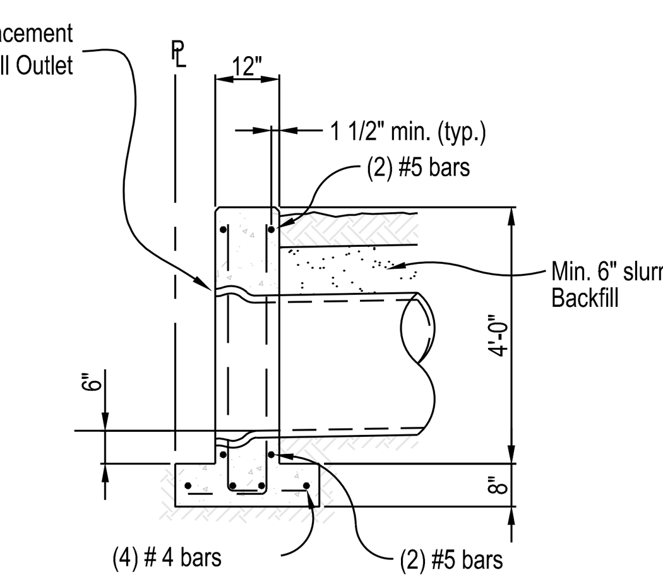
PROFILE: E-E
SCALE H: 1"=20' SCALE V: 1"=10'



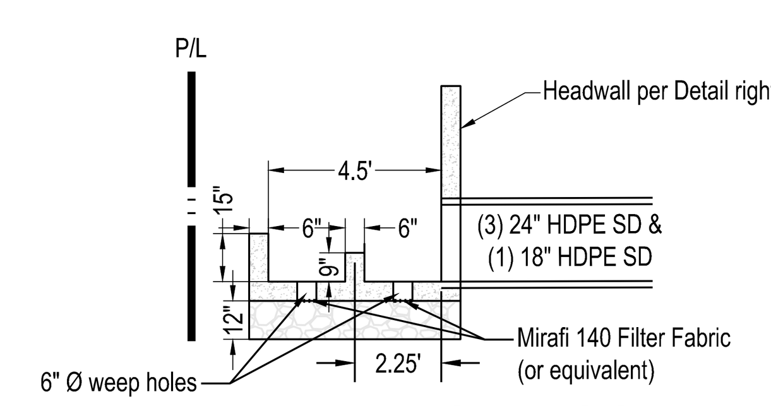
PROFILE: F-F
SCALE H: 1"=20' SCALE V: 1"=10'



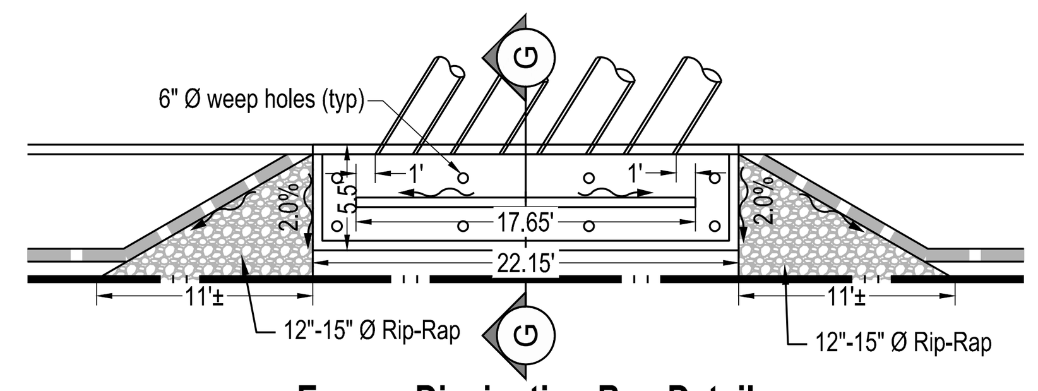
Headwall Detail
Scale: None



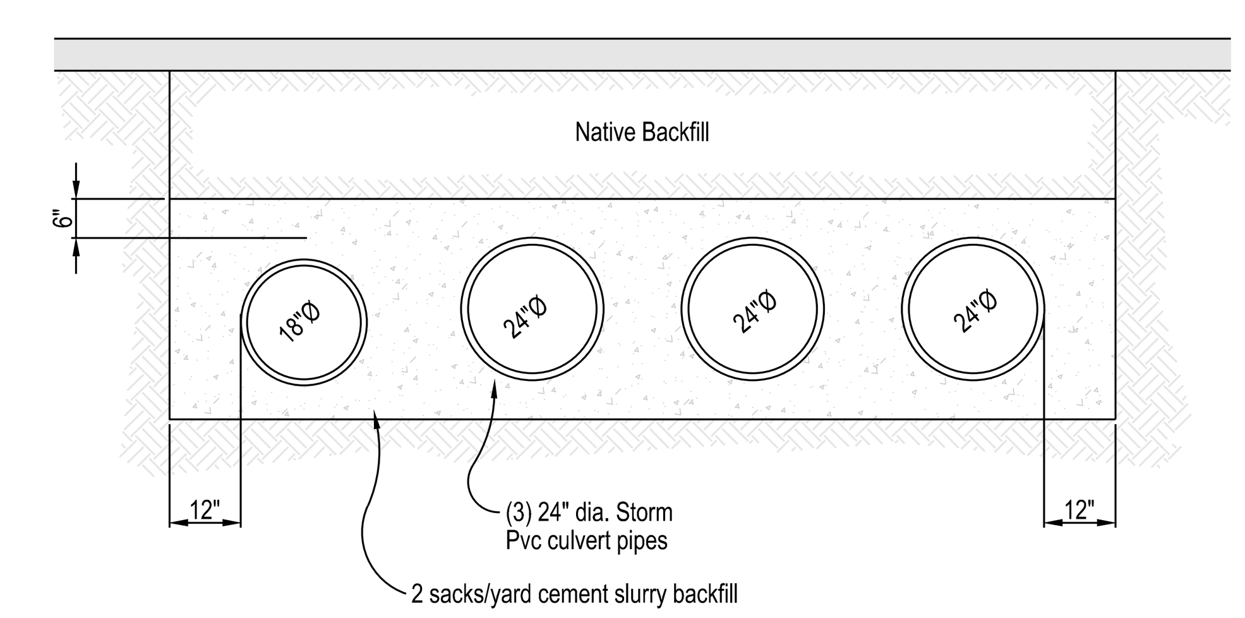
Section X
Scale: None



Energy Dissipation Box Section G-G



Energy Dissipation Box Detail
Scale: none



Culvert Extension Detail

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Scott C. Creer RCE 58879 CITY ENGINEER EXP. DATE 06-30-2021

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Preliminary Grading Plan - Sections
The Gates
MORGAN HILL CALIFORNIA

CITY FILE NO: SR2021-0020
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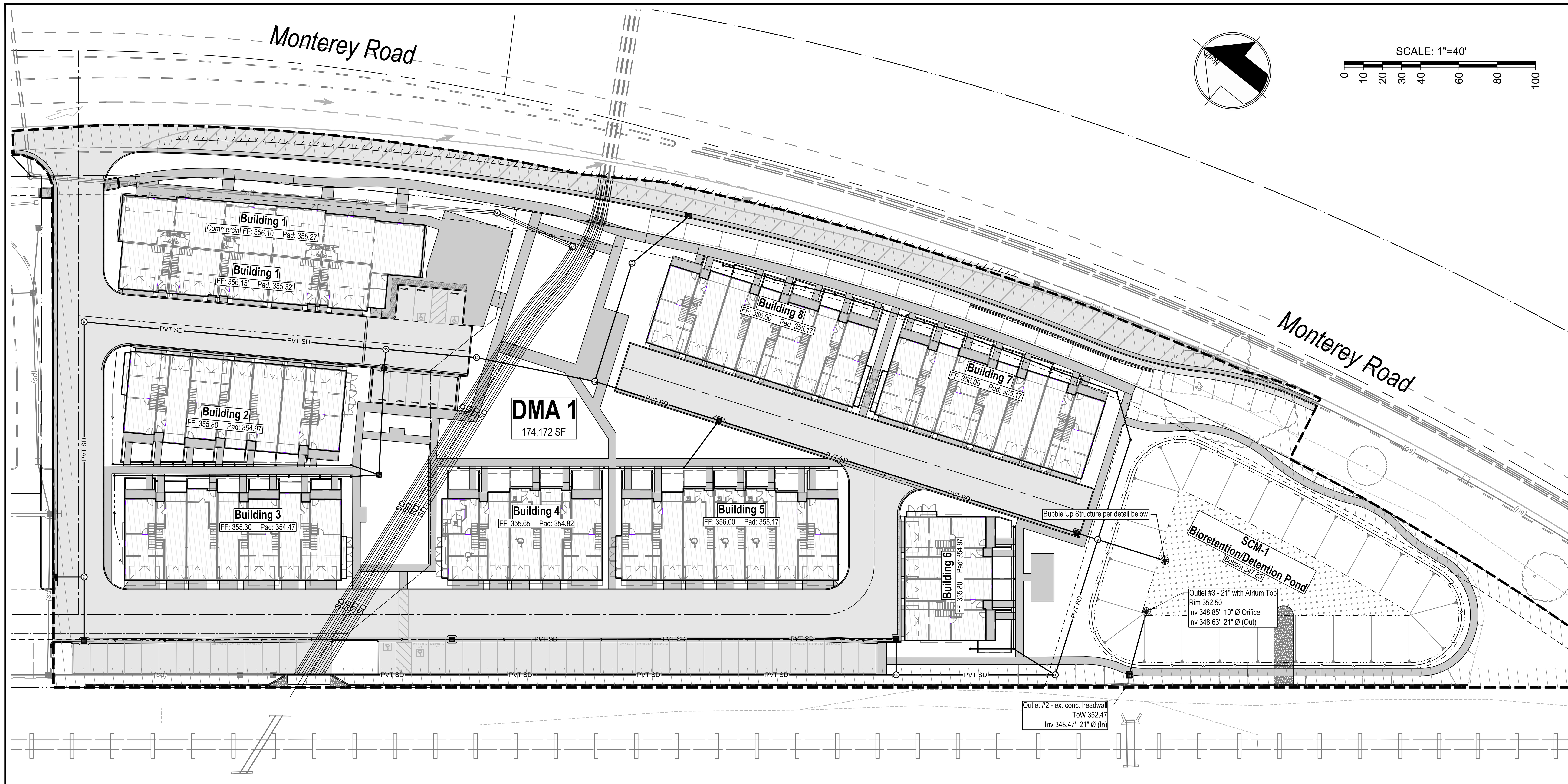
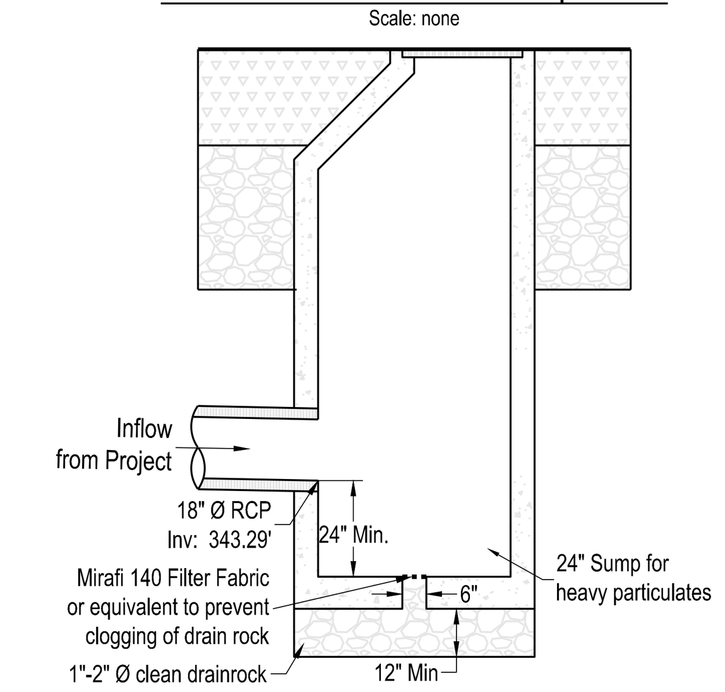
Preliminary Grading Plan - Sections
The Gates

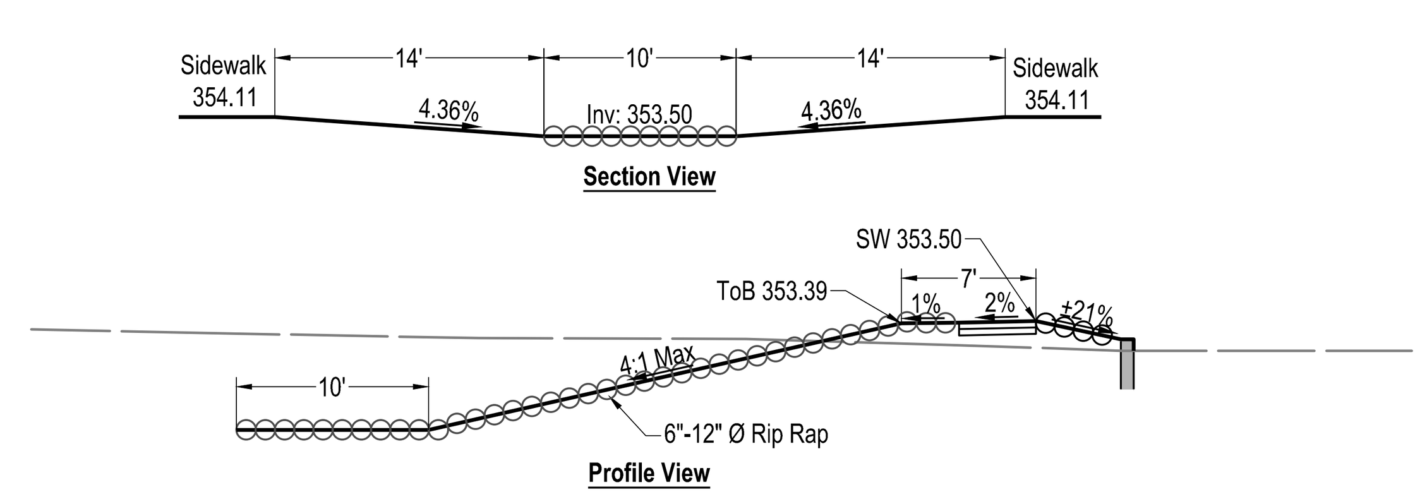


LID Sizing Table									
DMA	BMP	Total DMA Area	DMA Impervious Area	i	C	Required Treatment Area	Provided Treatment Area	Requied Retention Volume	Provided Retention Volume
1	SCM 1	174,172 SF	112,024 SF	0.64	0.44	4,481 SF	4,888 SF	11,907 CF	11,961 CF

Bioretention Pond Bubble Up Detail

Scale: none



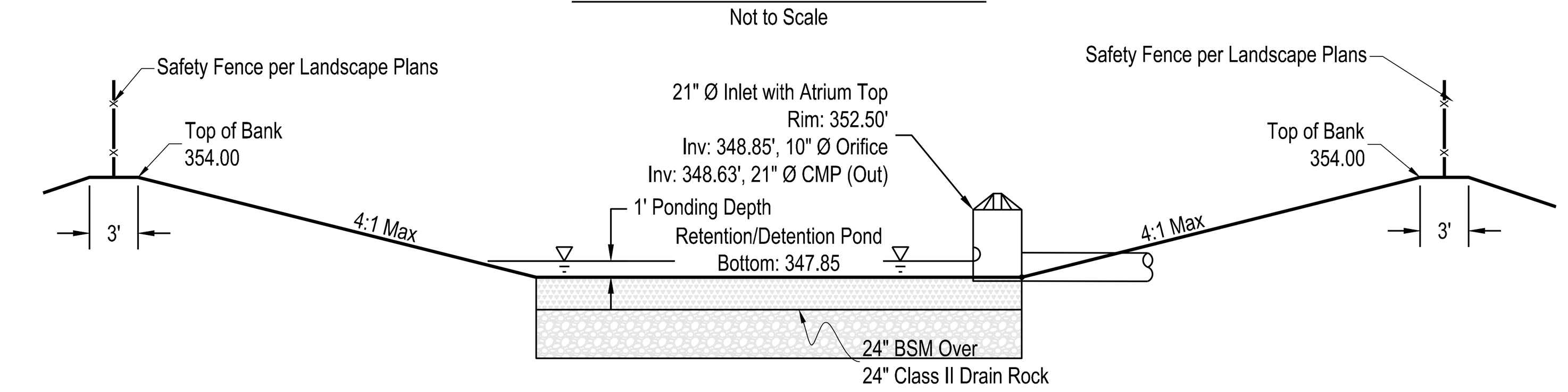


Bioretention Pond Weir Detail

Scale: none

Retention/Detention Pond Detail

Not to Scale



Retention Volume Calculations

Post Construction Storm Water Management Calculations
Per Resolution No. R3-2013-0032

1.) Determination of the Retention Tributary Area

a.)

Impervious Areas									
DMA	Pre-Development			Post-Development					
				Replaced			New		
	Roof	PCC	AC	Roof	PCC	AC	Roof	PCC	AC
1	0	0	0	0	0	0	39,429	25,836	46,760

Pervious vs Impervious Areas									
DMA	Total Area	Pre-Development		Post-Development					
		Pervious	Impervious	Pervious	Impervious			i	C
					Replaced	New	Total		
1	174,172	174,172	0	62,148	0	112,024	112,024	0.64	0.44
Total	174,172	174,172	0	62,148	0	112,024	112,024	0.64	0.44

Atotal = drainage area (sf)
Aroofs = roof areas (sf)
Apcc-walks/parking = area of pcc walks & parking lot
Apcc -streets = area of pcc walks and curbs (sf)
AAC-streets = Street pavement areas (sf)
Apervious = Planted & Open Areas (sf)
Aimpervious = total impervious roof areas, PCC areas & AC areas (sf)
i = fraction of the tributary area that is impervious = Aimpervious / Aarea
Carea# = Area runoff coefficient=C = $0.858i^3 - 0.78i^2 + 0.774i + 0.04$

b.)adjustments for redevelopment project

DMA	DMA Area	APA	Aother	Areplaced	Aretention
1	174,172	0	0	0	174,172
Total	174,172	0	0	0	174,172

APA = Undisturbed or Self-Retaining Planted or Open Areas
Aother = Impervious Areas that discharge to independent infiltrating Areas
Areplaced = Replaced Impervious Areas
Aretention = Retention Tributary Area = DMA Area - APA - Aother - (0.5 x Areplaced)

2.) Determination of Retention Volume

a.) retention requirement
1 = WMZ = watershed management zone per WMZ map

b.) WMZ 1 Runoff Retention Requirement = Retain 95th percentile 24-hour rainfall event
1.85 = D95 = 95th Percentile Rainfall Depth

c.) compute the runoff coefficient

DMA	DMA Area	Impervious Area	i	C
1	174,172	112,024	0.64	0.44
Total	174,172	112,024	0.64	0.44

C = $0.858i^3 - 0.78i^2 + 0.774i + 0.04$
i = fraction of the tributary area that is impervious = Aimpervious / Aproject

d.) Project Type
Mixed Use

e.) Compute Retention Volume required

DMA	Aretention	i	C	D95	Vretention
1	174,172	0.64	0.44	1.85	11,907
Total	**174,172**	0.64	0.44	1.85	11,907

C = $0.858i^3 - 0.78i^2 + 0.774i + 0.04$
i = fraction of the tributary area that is impervious = Aimpervious / Aproject
Vretention = Required Retention Volume = Aretention x C x (D95/12)

3.) Retention Volume Provided

Surface Volume Calculations			
Elevation	Surface Area	Incremental Volume	Cumulative Volume
347.85	4,888.43 SF	0.00 CF	0.00 CF
348	5,096.78 SF	748.89 CF	748.89 CF
348.85	6,330.85 SF	4,856.74 CF	5,605.63 CF

Bioretention Volume				
Material	Area	Depth	% Voids	Volume
Biomedia	4,888.43 SF	24 in.	25%	2,444.22 CF
Drainrock	4,888.43 SF	24 in.	40%	3,910.75 CF

3d.) Total Volume Provided
Total Volume: Vtotal = Vsurface + Vbioretention = 11,961 CF
11,961CF ≥ 11,907; therefore ok

Preliminary Stormwater Control Plan
The Gates

06/28/2022 3:28pm
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REGISTERED PROFESSIONAL ENGINEER
HARINDER SINGLA
C49717
STATE OF CALIFORNIA
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