Preliminary Stormwater Control Plan

E

APPENDIX

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Preliminary Stormwater Control Plan

for

Hecker Pass Specific Plan - Low Income Housing
Tract No. TBD
2740 & 2480 Hecker Pass Hwy, Gilroy, CA 95020



February 16, 2024
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G. NDS SC-44 Volume Tables
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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

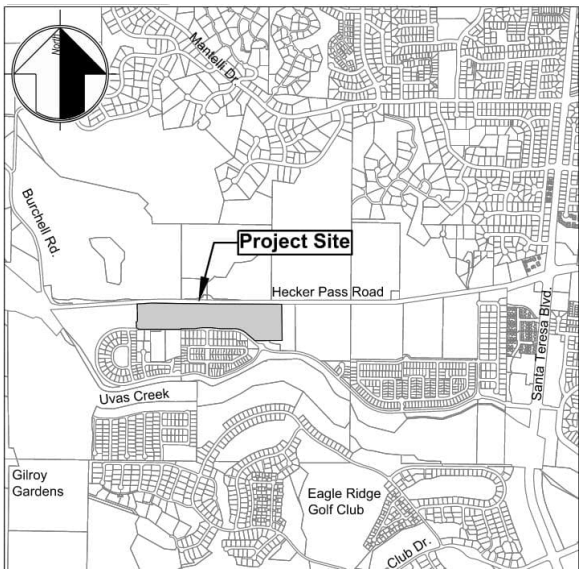
Project Name/Number	223026
Application Submittal Date	2/16/2024
Project Location	Northeast and Northwest corners of Third Street and Autumn Drive.
Project Phase	N/A
Project Type and Description	Single-Family Detached
Total Project Area	695,522 SF
Total New Impervious Area	384,724 SF
Total Replaced Impervious Area	0 SF
Total Pre-Project Impervious Area	7,793 SF
Total Post-Project Impervious Area	384,724 SF
Net Impervious Area	384,724 SF
Watershed Management Zone	1
Design Storm Frequency	95th Percentile
Design Storm Depth	0.98in. - 85th Percentile Storm
	1.58in. - 95th Percentile Storm

II. Setting

II.A. Project Location and Description

The proposed project is the development of 113 single-family detached homes at the northeast and northwestern corners of the intersection of Third Street and Autumn Drive in Gilroy, California, see Figure 1 below. The project proposed to convert 24.31 acres of vacant land to single family homes outside of Gilroy, California. The project is bordered by Hecker Pass Highway/State Route 152 to the north, vacant land to the west, residential development to the south, and agricultural land to the east. The surrounding residential and public roads were all developed as part of the Hecker Pass Specific Plan and the last parcels with planned development as part of the Specific Plan are currently in construction to the north of Hecker Pass Highway. The Hecker Pass Specific Plan installed a common detention pond located on the easterly portion of this development that his project is not disturbing. The project utilizes underground infiltration systems to mitigate its increased runoff generated by the 366,735 square feet of new impervious areas.

Figure 1: Project Vicinity Map



II.B. Existing Site Features and Conditions

The majority of the site is relatively flat with a general slope towards the south. The existing site drains to the south via sheet flow into either field inlets or the stormwater detention basin that was constructed with Third Street and Lone Oak Drive. No existing wells, wetlands, or watercourses are present on the site.

The proposed site conditions seek to maintain this drainage pattern by designing the stormwater infiltration systems along the south end of the site and maintaining the existing drainage patterns on the site in post-construction conditions. Areas along the eastern portion of the development have been found to contain clay soils. Stormwater design has avoided these areas to promote infiltration in the areas with higher natural infiltration rates.

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:

Infiltration testing on the site has found the site to have high infiltration rates, making the site a great candidate for infiltration-based treatments as encouraged by the Regional Water Quality Control Board. The site minimized impervious areas by using the minimum roadway widths per City of Gilroy Standards, and open spaces have been preserved around the perimeter of the development to maintain vegetation buffers around the perimeter and even the middle of the westerly portion of the development. These areas allow for landscaping and other benefits for residents and stormwater treatment.

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:

Street width minimums and minimum lot sizing leave inadequate space for surficial treatment of runoff for this project. For this reason, the site proposes to utilize underground infiltration systems located throughout the site to collect and infiltrate the stormwater runoff that would previously infiltrate into the ground.

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 project seeks to minimize impervious areas by using the minimum street widths per City of Gilroy Design Guidelines and providing open spaces around the perimeter of the proposed development. More permeable soils are utilized for stormwater mitigation areas, thus, minimizing impervious surfaces in those areas. Runoff from individual lots will be run through vegetation on the lots prior to entering the storm drain system to reduce contaminants entering the infiltration areas.

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.	

According to 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 accompanying Technical Guide, the water quality volume is the volume that runs off during the 85th Percentile Rain Event. This project utilizes the LID Treatment system using an underground NDS StormChamber system to capture the water quality volume as described in Table 2 above, see Attachment D for detailed calculations. Runoff is routed from impervious areas into vegetation wherever possible and then into the underground system. This system is placed in the most permeable soil on site to promote infiltration and mimic pre-development conditions of the site. This system is an open bottom design allowing more of the collected runoff to enter the surrounding drain rock and infiltrate into the native soil, see Figures 2 through 4 below. 2-foot sumps are placed before entering the NDS StormChamber system to collect heavy contaminants and the start chamber of each underground system has a 30" sump and weir combination to mimic a sedimentation tank where pipes enter the system. These sumps and sedimentation measures prolong the life of the underground system by preventing clogging of the drain rock under the chambers and ease maintenance of the system by providing localized areas for sediments to collect and be removed. See Attachment H for location and details.

Figure 2: NDS StormChamber SC-44 Typical Front View

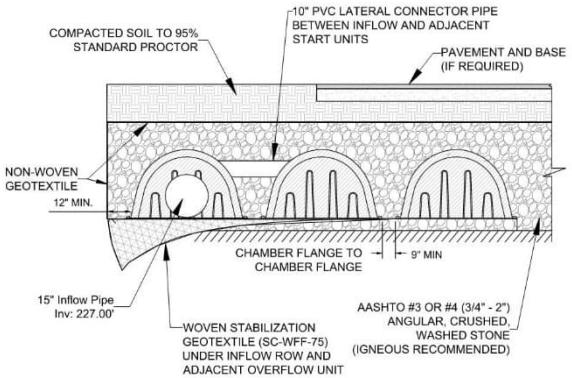


Figure 3: NDS StormChamber SC-44 Typical Side View

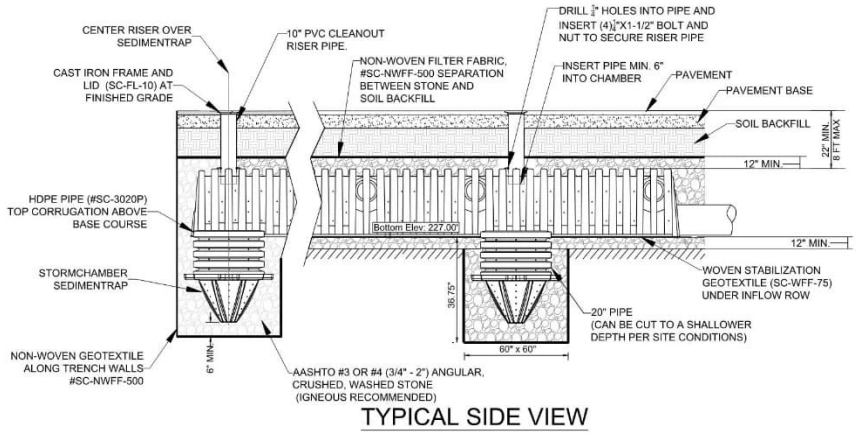
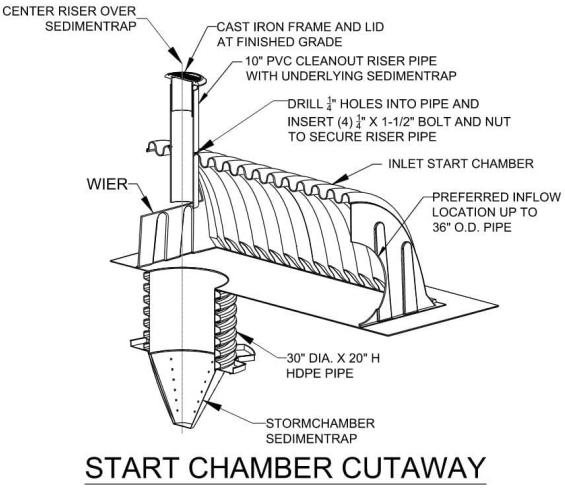


Figure 4: NDS StormChamber SC-44 Typical Start Chamber



In addition to the retention and infiltration of the 85th Percentile Rain Volume, a Contech Cascade Separator is provided prior to runoff entering the NDS StormChambers. This system is designed to capture trash and reduce sediment before entering the underground infiltration system. The runoff will enter into the chamber, where it is routed to form a vortex in the chamber, pulling sediment to the bottom of the chamber. A screen is located a few feet above the bottom of the chamber to capture the sediment, but allowing water to release into the downstream pipe. The vortex chamber also extends above the outlet pipe to ensure floating debris remains in the separator and does not enter the underground infiltration chambers, prolonging the life of the chambers and easing maintenance. See Attachment H for details.

Table 3: LID Treatment Summary

LID Treatment Sizing Table					
DMA	**BMP**	**Total DMA Area**	**DMA Impervious Area**	**Required Treatment Volume**	**Provided Treatment Volume**
1	SCM 1	339,642 SF	192,038 SF	10,633 CF	17,186 CF
2	SCM 2	355,881 SF	192,686 SF	10,655 CF	17,197 CF

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 D 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	339,642 SF	192,038 SF	0.57	0.38	17,144 CF	17,186 CF
2	SCM 2	355,881 SF	192,686 SF	0.54	0.37	17,178 CF	17,197 CF

This project has been split into two drainage management areas (DMAs), each retaining its own required retention volume using the NDS SC-44 StormChambers. The systems are sized using the simplified retention volume calculation method as described in 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 the 95th Percentile Storm event has been modeled in the HydroCAD model used to evaluate the post-construction runoff (See Section III.A.4 and Section IV for details).

The westerly portion of the site has been called DMA 1 for this project and retains the required retention volume using the underground NDS SC-44 StormChamber system surrounded by 12" of 1"-2" clean drain rock. This system is placed in the most permeable soil on site to promote infiltration and mimic pre-development conditions of the site. The system consists of 4 groupings of the NDS chambers ranging from 1 row of 46 chambers to 3 rows of 15 chambers as space allows. Each of these groupings are labeled SCM 1a through 1d and are designed to be at the same bottom elevation of 232.99 to fill as one system. Runoff will fill the underground system until the release elevation of 234.98' and out to the storm drain via connecting to existing double field inlets located at the northeast corner of Lone Oak Drive and Two Oaks Lane. This elevation was determined by evaluating the partial volume provided in the NDS StormChambers to meet the minimum retention volume using the simplified retention sizing methodology. The 95th Percentile Storm Event was also analyzed using the routing method as allowed. This ensures 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. This volume will be retained on site and will be infiltrated into the native soil beneath the underground NDS StormChambers. Utilizing a design infiltration rate of 3.20 inches per hour after applying a factor of safety of 2, the retained volume in the system will drain in 7 hours. See Attachment D for drawdown calculations and Attachment H for NDS StormChamber locations and details.

The easterly portion of the site has been called DMA 2 for this project and retains the required retention volume using the underground NDS SC-44 StormChamber system surrounded by 12" of 1"-2" clean drain rock. This system is placed in the most permeable soil on site to promote infiltration and mimic pre-development conditions of the site. The system consists of 2 groupings of the NDS chambers with differing row and lengths to fit the available space, see Attachment H for locations and details. These groupings are labeled SCM 2a and 2b and are designed to be at the same bottom elevation of 227.52 to fill as one system. Runoff will fill the underground system until the release elevation of 229.27' and out to the storm drain basin outfall pipe located south of the proposed development. This elevation was determined by evaluating the partial volume provided in the NDS StormChambers to meet the minimum retention volume using the simplified retention sizing methodology. The 95th Percentile Storm Event was also analyzed using the routing

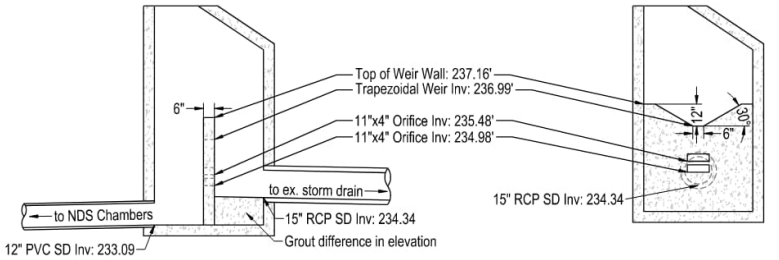
method as allowed. This ensures no release of the 95th Percentile Event as required by the *Stormwater Management Guidance Manual for Low Impact Development & Post Construction Requirements, June 2015, City of Gilroy, City of Morgan Hill and County of Santa Clara* continuous simulation of hydrologic model. This volume will be retained on site and will be infiltrated into the native soil beneath the underground NDS StormChambers. Utilizing a design infiltration rate of 1.65 inches per hour after applying a factor of safety of 2, the retained volume in the system will drain in 13 hours. See Attachment D for drawdown calculations and Attachment H for NDS StormChamber locations and details.

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 has been split into two drainage management areas (DMAs), each mitigating its own increase in runoff. The two DMAs use the NDS StormChambers described in Section III.A.3 and orifice structures to detain the increased runoff and release the water at, or below, pre-development levels. DMA 1 uses the two groupings of NDS StormChambers (SCMs 1a and 1b) at an elevation of 232.99 with a series of orifices placed at the manhole downstream of SCB 1b near Lots 31 and 32 (see Attachment H for location and details). Figure 5 below shows the Outlet Structure 1 details. The structure is comprised of a 60" diameter manhole with a weir wall poured in the center of the structure. Two 11"x4" orifices are constructed in the wall at elevations 234.98' and 235.48'. A 6" wide trapezoidal weir will also be constructed at the top of the weir wall at an elevation of 236.99' to be used with the higher volume storm events to allow more release and limit the water surface elevation in the system. These two orifices, combined with the infiltration in the system and the trapezoidal weir slow the post-construction runoff to be released at, or below, pre-development levels of runoff for up to the 100-year, 24-hour storm event.

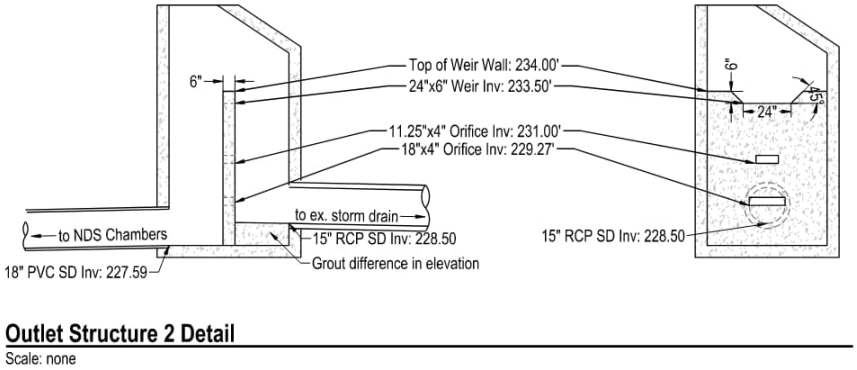
Figure 5: Outlet Structure 1 Detail



Outlet Structure 1 Detail
Scale: none

DMA 2 the two groupings of NDS SC-44 StormChambers (SCM 2a and 2b) at an elevation of 227.52; with a series of orifices in Outlet Structure 2 (see Attachment H for location and details) to limit post-development runoff to pre-development levels, or below. Similarly to Outlet Structure 1, DMA 2 uses a 60" diameter manhole structure with a weir wall poured in the center of the manhole to allow for orifices to be place two rectangular orifices to limit the post-development flows. An 18"x4" orifice is placed at elevation 229.27' and an 11.25"x4" orifice is placed at 231.00'. A 24"x6" trapazoidal weir is cut into the top of the weir wall at an elevation of 233.50' to be used in the event of an orifice failure or a storm that exceeds the design storms to limit the water surface elevation in the system. Figure 6 below shows the Outlet Structure 2 detail. These two orifices, combined with the infiltration in the system and the trapezoidal weir slow the post-construction runoff to be released at, or below, pre-development levels of runoff for up to the 100-year, 24-hour storm event.

Figure 6: Outlet Structure 2 Detail



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 C have been delineated based upon the tributary areas to each Source Control Measure (SCM). This project is split into two DMAs split by the existing roadways. The portion of the project that is west of Autumn Drive has been denoted as DMA 1 and the easterly portion of the development has been denoted as DMA 2. Table 5 below shows a summary of each of the DMAs. See Attachment H 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	339,642 SF	0 SF	0 SF	192,038 SF	192,038 SF
2	SCM 2	355,881 SF	7,793 SF	0 SF	192,686 SF	192,686 SF

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). This rainfall data has been determined to be more conservative and provide the worst-case scenario when determining hydrologic impact of the development. Figures 7 & 8 below shows a schematic of the model created in HydroCAD. Detail input and output data can be found in Attachment F.

Figure 7: HyrdoCAD Schematic for DMA 1

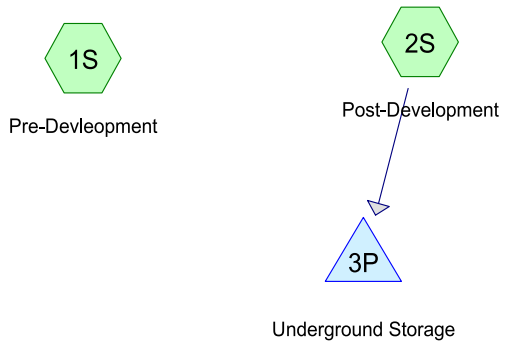
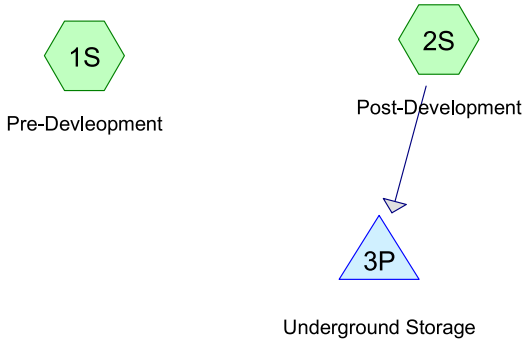


Figure 8: HydroCAD Schematic for DMA 2



This project has been split into two drainage management areas (DMAs), each mitigating its own increase in runoff. The two DMAs use the NDS StormChambers described in Section III.A.3 and orifice structures to detain the increased runoff and release the water at, or below, pre-development levels. DMA 1 uses the two groupings of NDS StormChambers (SCMs 1a and 1b) at an elevation of 232.99 with a series of orifices placed at the manhole downstream of SCB 1b near Lots 31 and 32 (see Attachment H for location and details). Figure 5 below shows the Outlet Structure 1 details. The structure is comprised of a 60" diameter manhole with a weir wall poured in the center of the structure. Two 11"x4" orifices are constructed in the wall at elevations 234.98' and 235.48'. A 6" wide trapezoidal weir will also be constructed at the top of the weir wall at an elevation of 236.99' to be used with the higher volume storm events to allow more release and limit the water surface elevation in the system. These two orifices, combined with the infiltration in the system and the trapezoidal weir slow the post-construction runoff to be released at, or below, pre-development levels of runoff for up to the 100-year, 24-hour storm event.

DMA 2 the two groupings of NDS SC-44 StormChambers (SCM 2a and 2b) at an elevation of 227.52; with a series of orifices in Outlet Structure 2 (see Attachment H for location and details) to limit post-development runoff to pre-development levels, or below. Similarly to Outlet Structure 1, DMA 2 uses a 60" diameter manhole structure with a weir wall poured in the center of the manhole to allow for orifices to be place two rectangular orifices to limit the post-development flows. An 18"x4" orifice is placed at elevation 229.27' and an 11.25"x4" orifice is placed at 231.00'. A 24"x6" trapazoidal weir is cut into the top of the weir wall at an elevation of 233.50' to be used in the event of an orifice failure or a storm that exceeds the design storms to limit the water surface elevation in the system. Figure 6 above in Section III.A.4 shows the Outlet Structure 2 detail. These two orifices, combined with the infiltration in the system and the trapezoidal weir slow the post-construction

runoff to be released at, or below, pre-development levels of runoff for up to the 100-year, 24-hour storm event.

In addition to the outfall mentioned above, infiltration has been modeled out of the system using the infiltration report mentioned in Geotechnical Investigation Hecker Pass Residential Development by Baez Geotechnical Group. A factor of safety of 2 has been applied to this infiltration and modeled as "Discarded" in the HydroCAD model. The design infiltration rate has been determined by averaging the infiltration test results for the tests completed in the area of the infiltration systems. The factor of safety is then applied to the average rate, resulting in the design infiltration rate used for the system. The design infiltration rate used for DMA 1 as been determined to be 3.20 inches per hour. Using this infiltration rate, the retained volume in SCM 1 will infiltrate in 7 hours. The design infiltration rate used for DMA 2 has been determined to be 1.65 inches per hour, resulting in the infiltration of retained volume in SCM 2 to be 13 hours. See Attachment D for drawdown calculations.

The maximum water surface elevation in the system for the event has been determined in SCM 1 to be 237.24' for the 100-year event. The system is designed to detain the 100-year event; however overland release has been provided via roadways out to Lone Oak Drive. This system would only be used in the event of failure of the outfall system of collection pipes. Table 6 below shows a summary of each event in the pre-development conditions for DMA 1 and Table 7 below shows the post-development event summary that leaves the NDS StormChamber system. See Attachment F for detailed model input and output data.

Table 6: DMA 1 Pre-Development Event Summary

Events for Subcatchment 1S: Pre-Devleopment

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95%	1.50	0.12	0.046	0.07
1 year	2.05	0.43	0.153	0.23
2 year	2.76	0.94	0.354	0.55
5 year	3.70	1.73	0.699	1.08
10 year	4.48	2.44	1.032	1.59
25 year	5.56	3.48	1.542	2.37
50 year	6.41	4.32	1.973	3.04
100 year	**7.28**	**5.19**	**2.433**	**3.74**

Table 7: DMA 1 Post-Development SCM 1 Event Summary

Events for Pond 3P: Underground Storage

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Tertiary (cfs)	Elevation (feet)	Storage (cubic-feet)
95%	0.72	0.62	0.62	0.00	**0.00**	232.29	1,011
1 year	1.24	0.63	**0.63**	0.00	0.00	232.89	3,085
2 year	1.94	0.63	0.63	0.00	0.00	233.81	9,260
5 year	2.89	1.11	0.63	0.48	0.00	235.28	19,117
10 year	3.69	2.74	0.63	2.11	0.00	235.95	23,187
25 year	4.78	3.80	0.63	3.17	0.00	236.57	26,339
50 year	5.64	4.50	0.63	3.86	0.00	237.13	28,290
100 year	**6.51**	**5.76**	0.63	**5.13**	0.00	**237.54**	**29,672**

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 = Runoff leaving the system and into the storm drain system
Tertiary = Runoff bubbling up via lowest catch basin and exiting via overland release
Elevation = Maximum water surface elevation during the storm event

The maximum water surface elevation in the system for the event has been determined in SCM 2 to be 232.08' for the 100-year event. The system is designed to detain the 100-year event; however overland release has been provided via roadways to the southerly property line near the existing stormwater detention basin. Overland release would spill over the curb and south towards Uvas Creek. This system would only be used in the event of failure of the outfall system of collection pipes. Table 6 below shows a summary of each event in the pre-development conditions for DMA 1 and Table 7 below shows the post-development event summary that leaves the NDS StormChamber system. See Attachment F for detailed model input and output data.

Table 8: DMA 2 Pre-Development Event Summary

Events for Subcatchment 1S: Pre-Devleopment

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95%	1.50	0.15	0.057	0.08
1 year	2.05	0.49	0.177	0.26
2 year	2.76	1.04	0.398	0.59
5 year	3.70	1.88	0.772	1.13
10 year	4.48	2.64	1.130	1.66
25 year	5.56	3.74	1.675	2.46
50 year	6.41	4.63	2.134	3.13
100 year	**7.28**	**5.55**	**2.623**	**3.85**

Table 9: DMA 2 Post-Develoment SCM 2 Event Summary

Events for Pond 3P: Underground Storage

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Tertiary (cfs)	Elevation (feet)	Storage (cubic-feet)
95%	0.75	0.36	**0.36**	0.00	**0.00**	226.91	1,465
1 year	1.29	0.36	0.36	0.00	0.00	228.01	7,626
2 year	2.03	0.63	0.36	0.27	0.00	229.41	18,259
5 year	3.03	2.12	0.36	1.76	0.00	229.98	22,277
10 year	3.86	2.78	0.36	2.42	0.00	230.45	25,418
25 year	5.01	3.70	0.36	3.34	0.00	231.15	29,278
50 year	5.91	4.93	0.36	4.57	0.00	231.63	31,074
100 year	**6.82**	**5.74**	0.36	**5.39**	0.00	**232.11**	**32,882**

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 = Runoff leaving the system and into the storm drain system
Tertiary = Runoff bubbling up via lowest catch basin and exiting via overland release
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 uses underground volume capture system to capture runoff and allow time for runoff the infiltrate into native soil as it did prior to the development. These facilities contain a sump prior to entering this underground system that will allow heavy contaminants, such as metals and debris, to settle out before

entering the underground system and infiltrating into the ground. The system also proposes a Contech Cascade hydrodynamic separator prior to entering the underground NDS StormChamber system to remove a large portion of sediments and remove trash from the runoff before entering the infiltration system.

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. During permitting, the developer will enter into an operations and maintenance agreement provided by City staff to be ensure maintenance of the system and long-term performance of the system. Upon completion of the project, the established Homeowners Association will assume the operation and maintenance of the system.

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* (to be added as an attachment during permitting). 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 H	SCM 1	23 & 26	SCM 1 Outlet Structure 1
Attachment H	SCM 2	24 & 26	SCM 2 Outlet Structure 2
Attachment H	Contech Cascade Separator	25	Contech Cascade Separator

VIII. Certifications

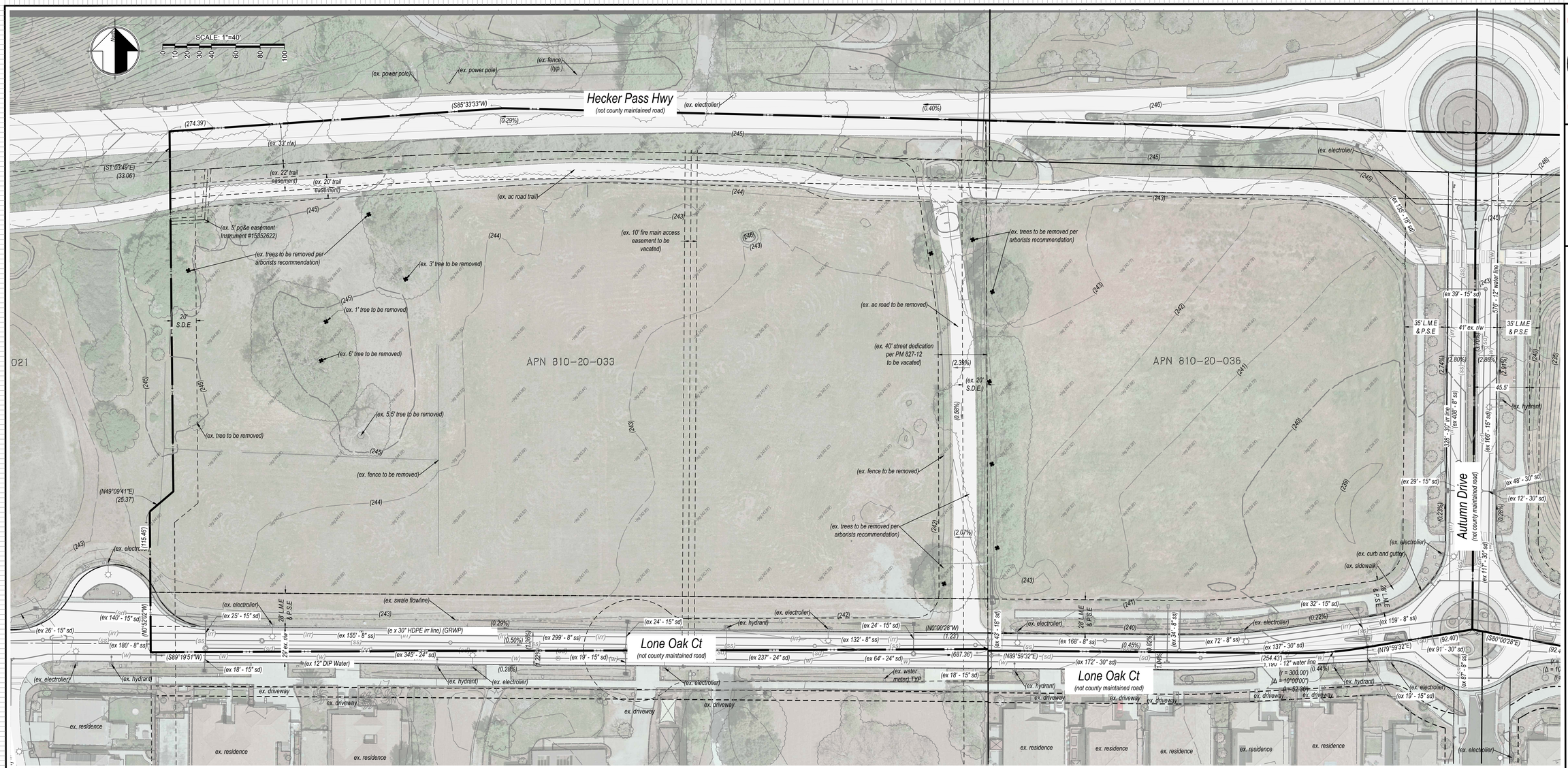
The design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the Post-Construction Stormwater Management Resolution R3-2013-0032 and the current edition of the City's LID and Post-Construction Requirements Handbook.

See Attachment B for Performance Requirement Certifications

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

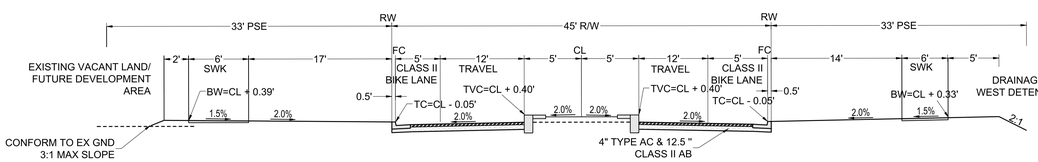
Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment A:
Existing Topography

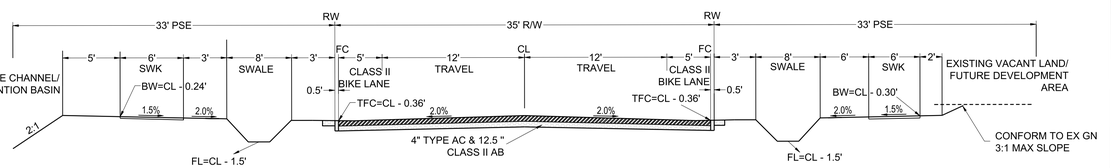


Existing Utility Notes:

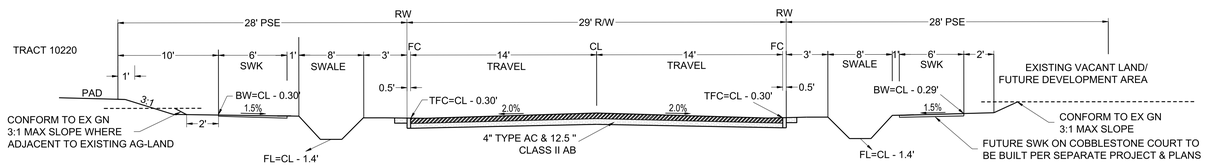
1. Existing sanitary sewer lines are constructed of VCP.
2. Existing storm drain lines are constructed of RCP.



AUTUMN DRIVE (PUBLIC)
Scale: None



3RD STREET (PUBLIC)
Scale: None



COBBLESTONE COURT AND LONE OAK LANE (PUBLIC)
Scale: None

02/14/2024 12:17pm
FOR PLANCHECK ONLY

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

FOR PLANCHECK ONLY
signature shall be provided upon approval

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

Topo Demo Plan - West Side
Hecker Pass Specific Plan - Low Income Housing

DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: KW
CHECKED BY: WJM

JOB NO. 223026

SHEET C.11
OF 31

K:\Projects\223026 Watsonville Hecker Pass Ranch\223026 C11 Existing Topography.dwg, 2/15/2024 12:17:09 PM, Richard, 1:1, 1:1, Plotted by Kevin Wheeler

SCALE: 1"=40'

Hecker Pass Hwy
(not county maintained road)

Autumn Drive
(not county maintained road)

Plum St
(not county maintained road)

3rd St
(not county maintained road)

APN 810-20-037

(ex. ac road trail)

27' Trail Easement (Width Varies)

(ex. fence to be removed) (typ.)

(ex. pcc driveway to be removed)

(ex. barn to be removed) ± 3870 sf

80' (ex. residence to be removed) ± 2595 sf

(ex. shed to be removed) ± 104 sf

(ex. shed to be removed) ± 1025 sf

(ex. shed to be removed) ± 198 sf

(ex. trees to be removed per arborists recommendation)

(ex. trees to be removed per arborists recommendation) (typ.)

(ex. utility box)

(ex. hydrant)

(ex. fire hydrant)

(ex. electrolier)

(ex. curb and gutter, end)

(ex. edge of pavement)

(ex. swale flowline)

(ex. sidewalk)

(ex. tree, to remain)

(ex. trees, to remain)

(ex. trees to be removed per arborists recommendation) (typ.)

(ex. seed manufacturing facility)

(ex. residence)

(ex. driveway)

35' L.M.E & P.S.E

41' ex. r/w

75' S.D.E width varies

33' ex. r/w

33' P.S.E

78' S.D.E width varies

(ex 1060' - 30" irr line)

(ex 328' - 30" irr line)

(ex 576' - 12" water line)

(ex 523' - 12" water line)

(ex 134' - 12" water line)

(ex 1,060' - 30" irr line)

(e x 30" HDPE irr line) (GRWP)

(ex 12" DIP Water)

(ex 164' - 30" sd)

(ex 100' - 30" sd)

(ex 105' - 30" sd)

(ex 45' - 18" sd)

(ex 48' - 18" sd)

(ex 39' - 15" sd)

(ex 408' - 8" ss)

(ex 166' - 15" sd)

(ex 48' - 30" sd)

(ex 12' - 30" sd)

(ex 117' - 30" sd)

(ex 87' - 8" ss)

(ex 212' - 8" ss)

(ex 158' - 8" ss)

(ex 117' - 8" ss)

(ex 53' - 15" sd)

(ex 46' - 15" sd)

(ex 426' - 8" ss)

(ex 81' - 8" ss)

(ex 278' - 8" ss)

(ex 25' - 15" sd)

(ex 32' - 18" sd)

(ex 137' - 18" sd)

(ex 41' - 36" sd)

(ex 63' - 36" sd)

(ex 200' - 8" ss)

(ex 20' - 15" sd)

(ex 85' - 30" sd)

(ex 49' - 15" sd)

(783.78')

(167.20')

(359.85')

(453.10')

(92.40')

(r = 300.00')
(Δ = 10°00'00")
(l = 52.35')

(r = 300.00')

(r = 204.23')

(263.92')

(162.16')

(S89°32'54"W)

(S89°20'13"W)

(N1°08'08"W)
(33.00')

(S80°00'28"E)

(N89°59'32"E)

(N88°53'41"E)

(N1°08'08"W)

(0.86%)

(1.36%)

(3.12%)

(1.22%)

(4.49%)

(2.80%)

(2.86%)

(2.91%)

(0.28%)

(1.30%)

(0.38%)

(1.82%)

(1.76%)

(2.16%)

(0.78%)

(1.43%)

(0.70%)

(0.66%)

(0.27%)

(0.30%)

(0.21%)

(0.27%)

(3) (ex 149' - 18" sd)

Existing Utility Notes:
1. Existing sanitary sewer lines are constructed of VCP.
2. Existing storm drain lines are constructed of RCP.

02/16/2024 12:17pm
FOR PLANCHECK ONLY

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

FOR PLANCHECK ONLY
signature shall be provided upon approval

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

Topo Demo Plan - East Side

Hecker Pass Specific Plan - Low Income Housing

DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: KW
CHECKED BY: WJM

JOB NO. 223026

SHEET C.12
OF 31

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment B:
Central Coast Post Construction Performance Requirements 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: TBD

Project Name: **Hecker Pass Specific Plan - Low Income Housing** APN#: **810-20-033, 036, & 037**

Project Address: **2740 & 2780 Hecker Pass Hwy - 810-20-033, 036, & 037**

Cross Streets: **Autumn Drive And Third Street**

Applicant/Developer Name: **Mana Camden Fund, LLC**

Project Phase(s): 1 of 2 Engineer: **William J. McClintock, 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: **113 Single-Family Detached homes**

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

1. Total Project Area	**695,522**	ft^2
2. Pre-Project		
(a) Impervious Area	**7,793**	ft^2
(b) Pervious Area	**687,729**	ft^2
3. Post-Project		
(a) Replaced Impervious Area	**0**	ft^2
(b) New Impervious Area	**384,724**	ft^2
(c) Total Post-Project Impervious Area (*sum of Line 3a and Line 3b*)	**384,724**	ft^2
(d) Post-Project Pervious Area	**310,798**	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)*	**384,724**	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 **Mana Camden Fund, LLC**

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

i. Name: **Mana Camden Fund, LLC**

ii. Address: **5927 Balfour Ct., Suite 208**

iii. Phone/E-mail: **408.406.6000 / sm@manainv.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.23-C.26**

☐ No

 File No.: TBD

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 creeks or other natural drainage features located on site*	☐ yes
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. *yes, driveway and parking area runoff is directed for collection through vegetated swales wherever possible.*	☐ yes
	e) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces.	☐ no

I, William J. McClintock, PE, acting as the Project Engineer for Mana Camden Fund, LLC project, located at 2740 & 2780 Hecker Pass Hwy, hereby state that the Site Design and Runoff Reduction design strategies indicated above have been incorporated into the design of the project.

10/25/2023 5:38pm
FOR PLANCHECK ONLY

Signature

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

10/25/23
Date

FOR PLANCHECK ONLY
signature shall be provided upon approval

SOURCE CONTROL CHECKLIST

On-site Source Control Measures	**Incorporated Into Project?**
Wash area/racks, drain to sanitary sewer or septic system[1]	☐ **N/A**
Covered dumpster area, drain to sanitary sewer/septic system[1] or landscaped area	☐ **N/A**
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	☐ **N/A**
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

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	☐ No Biofiltration Systems proposed
b) Minimum surface reservoir volume equal to the biofiltration treatment system surface area times a depth of 6 inches	☐ N/A
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.	☐ N/A
d) Proper plant selection[2]	☐ N/A
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	☐ N/A
f) Underdrain with discharge elevation at top of gravel layer	☐ N/A
g) No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted)	☐ N/A

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, William J. McClintock, PE, acting as the Project Engineer for Mana Camden Fund, LLC project, located at 2740 & 2780 Hecker Pass Hwy, hereby state that the Water Quality Treatment Measures indicated above have been incorporated into the design of the project.

10/25/2023 5:38pm
FOR PLANCHECK ONLY

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

FOR PLANCHECK ONLY
signature shall be provided upon approval

Signature

10/25/23
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	☐ Yes
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	☐ yes
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	☐ Yes
20.	Other pertinent overlay(s)	☐ N/A

 File No.: TBD

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	Optimized
4.	Design of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised	Optimized
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, William J. McClintock, PE, acting as the Project Engineer for Mana Camden Fund, LLC project, located at 2740 & 2780 Hecker Pass Hwy, hereby state that LID Site Design Measures initialed have been incorporated into the design of the project.

10/25/2023 5:38pm
FOR PLANCHECK ONLY

Signature

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

Date 10/25/23

REV 6/11/15

FOR PLANCHECK ONLY
signature shall be provided upon approval

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)

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	☑

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment B:
Soils Report

GEOTECHNICAL INVESTIGATION

HECKER PASS RESIDENTIAL DEVELOPMENT
HECKER PASS ROAD AT PLUM STREET
GILROY, CALIFORNIA

for
Mana Hanalei, LLC
October 13, 2023

BGG Project No. G369.01

Via E-Mail

October 13, 2023
BGG Project No. G368.01

Scott Murray
Mana Hanalei, LLC
5927 Balfour Court, Suite 208
Carlsbad, California 92008

Subject: **Geotechnical Investigation**
Hecker Pass Residential Development
Hecker Pass Road at Plum Street
Gilroy, California

Dear Mr. Murray:

Baez Geotechnical Group (BGG) has completed a geotechnical investigation for the design and construction of the subject project in Gilroy, California. The site is located on the south side of Hecker Pass Road, southeast of Burchell Road and Gilroy Golf Course. It is our understanding that the approximately 25-acre site will be developed with 113 single-family detached residences. Other improvements will include paved streets, sidewalks, bioretention areas, subsurface stormwater retention chambers, and possible site walls that may be partially retaining. The site is relatively flat, hence minor grading is anticipated.

PURPOSE AND SCOPE OF SERVICES

The purpose of our investigation was to evaluate the subject site with respect to soil, bedrock, and groundwater conditions, and to provide geotechnical recommendations for the design and construction of the proposed improvements. The scope of our services included a review of available geologic literature covering the site, field exploration, field percolation testing, laboratory testing, engineering analyses, and preparation of this report.

FIELD EXPLORATION, PERCOLATION TESTING, AND LABORATORY TESTING

FIELD EXPLORATION

Our field exploration was conducted on August 30, 2023, which consisted of drilling six borings and excavating six test pits in the locations shown on Plate 2, Site Plan. The borings were drilled to depths between 9 to 26 feet below the ground surface (bgs) using a truck-mounted drill rig equipped with hollow stem augers. Materials encountered in the borings were visually classified in the field and logs were recorded. Driven Standard Penetration Test (SPT) and Modified California split spoon tube soil samples were obtained for laboratory testing. Upon completion of drilling, the borings were backfilled with grout in accordance with local agency requirements. The boring logs, showing soil classifications and blow counts, are contained in Appendix A.

The test pits were excavated to depths between 5 to 7-feet bgs using a subcompact excavator equipped with a 2-feet-wide bucket. Materials encountered in the test pits were visually classified in the field and logs were recorded. Bulk soil samples were obtained for laboratory testing, and the test pits were backfilled loosely and track-walked upon completion. The test pit logs showing detailed descriptions of the materials encountered are contained in Appendix B.

FIELD PERCOLATION TESTING

Field percolation testing was performed during our field exploration on August 30, 2023 in the bottom of four borings (P1 to P4). Supplemental percolation testing was performed on October 3, 2023 in the bottom of seven additional borings (P5 to P11). Tests P1, P2, P5, P6, and P7 were performed in the western portion of the site and tests P3, P4, P8, P9, P10, and P11 were performed in the eastern portion of the site. The locations of the field percolation tests are shown on Plate 2, Site Plan. After drilling to the test depth at east location, an open-ended PVC pipe was placed in the borehole and approximately 2-inches of clean pea gravel was placed in the bottom of the hole. Water was poured into the bottom of the borehole to saturate the soil at depth. Subsequently, an approximately two-foot-tall column of water was poured into the test pipe and the testing began. The time elapsed for the water level to drop in the pipes was monitored until stabilized rates were observed and recorded. The following is a summary of the stabilized percolation rates recorded for the soils encountered at the specified depths in our percolation test locations.

SUMMARY OF FIELD PERCOLATION RATES – WEST

Test Location and Depth (below ground surface)		Soil Type at Test Depth	Infiltration Rate (inches/hour)
P1	12 feet	SM – Silty Sand with Gravel	5.8
P2	11 feet	SM – Silty Sand with Gravel	5.1
P5	12 feet	SM – Silty Sand with Gravel	7.9
P6	11.5 feet	SM – Silty Sand with Gravel	6.9
P7	9 feet	SM – Silty Sand with Gravel	6.4

SUMMARY OF FIELD PERCOLATION RATES – EAST

Test Location and Depth (below ground surface)		Soil Type at Test Depth	Infiltration Rate (inches/hour)
P3	10 feet	CL – Silty Clay with Sand	1.2
P4	9 feet	CL – Silty Clay with Sand	1.5
P8	12 feet	CL – Silty Clay with Sand	3.3
P9	11 feet	CL – Silty Clay with Sand	1.8
P10	11 feet	CL – Silty Clay with Sand	4.5
P11	10.5 feet	CL – Silty Clay with Sand	3.5

The project civil engineer or stormwater management system designer should determine the appropriate infiltration rate to be used for design purposes, based upon these test results. An appropriate safety factor should be applied to the field percolation rates.

LABORATORY TESTING

Laboratory testing was performed on selected samples obtained from our borings and test pits, including tests for sieve analysis, hydrometer, Atterberg Limits, consolidation/swell, direct shear, and R-Value. Some of the laboratory test results are summarized below and within the boring and test pit logs, and the complete test results are contained in Appendix C. The following is a summary of the R-Value test results.

LABORATORY TEST RESULTS – R-VALUE

Location and Depth	Soil Type	R-Value
TP3: 1-5 feet	SM – Silty Sand	23
TP5: 1-5 feet	CL – Silty Clay with Sand	<5

The following is a summary of the sieve, hydrometer, and Atterberg limits test results:

LABORATORY TESTS – SIEVE, HYDROMETER, ATTERBERG LIMITS

Location & Depth	% Gravel/Cobbles	% Sand	% Fines [1]	PI [2]	LL [3]
TP3: 1-5 feet	1	68	31	NV [4]	NP [5]
TP5: 1-5 feet	2	34	64	14	30

[1] *% Fines = % Passing No. 200 sieve, percentage of silt and clay sized particles*
[2] *PI – Plasticity Index,* [3] *LL – Liquid Limit,* [4] *NV – No Value,* [5] *NP – Not Plastic*

The single-point consolidation/swell tests consisted of loading relatively undisturbed soil samples with an initial seating load approximately equivalent to the in-situ overburden pressure, then recording the amount of long-term consolidation/swell after adding a surcharge load of 1,500 psf or 2,500 psf and again after saturation.

LABORATORY TEST RESULTS – CONSOLIDATION/SWELL – 2,500 PSF

Location and Depth	Soil Type	Percent Moisture In-situ / Saturation	Consolidation or Swell [6]	Consolidation or Swell [7]
B1: 2.5-3.5 ft	SM/ML – Silty Sand to Sandy Silt	9.5% / 30%	-0.6%	-3.6%
B2: 3.5-4 ft	SM/SC – Silty Sand to Clayey Sand with Gravel	3.4% / 18%	-1.0%	-0.8%

LABORATORY TEST RESULTS – CONSOLIDATION/SWELL – 1,500 PSF

Location and Depth	Soil Type	Percent Moisture In-situ / Saturation	Consolidation or Swell [6]	Consolidation or Swell [7]
B4: 2.5-3 ft	CL – Sandy Clay with Silt	5.9% / 19%	-0.4%	-6.9% [8]
B3: 3.5-4 ft	CL/ML – Sandy Clay to Sandy Silt	10.5% / 26%	-0.4%	-8.2% [8]
B5: 3-3.5 ft	CL/ML – Sandy Clay to Sandy Silt	20.5% / 72%	-0.6%	-0.2%
B6: 4-4.5 ft	CL/ML – Sandy Clay to Sandy Silt	12.1% / 42%	-0.4%	-3.6%

[6] *Consolidation or swell percent after adding surcharge load*
[7] *Additional consolidation or swell after saturation*
[8] *Sample likely disturbed*

The following are the results of the two-point Direct Shear test results:

LABORATORY TEST RESULTS – DIRECT SHEAR

Location	Soil Type	Friction Angle	Cohesion
B1: 3-3.5 feet	SM/ML – Silty Sand to Sandy Silt	27 degrees Peak and Residual	88 psf Peak 77 psf Residual
B4: 3-3.5 feet	CL/ML – Sandy Clay to Sandy Silt	27 degrees Peak and Residual	25 psf Peak 5 psf Residual

SOIL CORROSIVITY TESTING

Two soil samples obtained from the site, from depths of 1 to 5-feet bgs in test pits TP3 (West) and TP6 (East), were submitted to CERCO Analytical, a state-certified analytical laboratory, for corrosion testing. A full suite of soil corrosivity tests were performed, including tests for Redox, pH, Resistivity, Sulfide, Chloride and Sulfate. The corrosion test results and a brief evaluation are contained in Appendix D. The soil was found to be mildly to moderately corrosive to buried metals and not corrosive to concrete in contact with the ground. The corrosion test results should be forwarded to the civil and structural design engineers.

GEOTECHNICAL FINDINGS

SITE DESCRIPTION

The site is located along the margins of an alluvial valley within the Uvas Creek drainage. The nearly rectangular-shaped, elongated site fronts approximately 2,200-feet on the south side of Hecker Pass Road and is approximately bisected by Plum Street. The portion of the site east of Plum Street is about 300-feet-wide near Plum Street and widens to about 600-feet-wide on the eastern end. An existing ranch residence with several surrounding barns and outbuildings is located southeast of the intersection of Hecker Pass Road and Plum Street. The existing structures will be demolished for the proposed site development. The site is covered in weeds and grasses with a few medium to tall trees. The site is relatively flat with surface elevations varying between about 245-feet above mean sea level (MSL) at the northwest corner to about 237-feet MSL in the southeast corner.

Undeveloped land borders the site to the west and a commercial seed and flower cultivation facility borders the site to the east. An existing residential subdivision is located south of the site and Eagle Ridge Golf Club is located to the southeast.

SUBSURFACE CONDITIONS

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey, the site is mantled by predominantly three different soil series: Garretson loam gravel substratum, Yolo Loam, and Zamora loam. These soils are classified in Hydrologic Group B and C with infiltration rates varying between 0.2 to 20 inches per hour (depending on the soil and depth). The following are the reported characteristics of these soils.

Soil Series	Soil Type	Percent Gravel	Percent Fines	Liquid Limit	Plasticity Index
Garretson loam	0-3 ft - CL/ML 3-5 ft - GP	5 to 20 45 to 70	50 to 65 Zero to 5	25 to 35 Zero	5 to 15 Zero
Yolo loam	0-6 ft - CL	Zero	73 to 100	26 to 40	6 to 21
Zamora loam	0-5-ft – CL 5-6 ft - SC	0 to 5 17 to 24	61 to 87 36 to 57	27 to 45 29 to 36	9 to 25 13 to 17

Note: Percent fines = amount of silt and clay sized particles.

The soil covering the site is colluvium and alluvium derived from bedrock uphill from the site and alluvium from bedrock sources upstream from the site that was transported during flooding of Uvas Creek. Hence, the soil and bedrock conditions vary across the site with flood deposits consisting of predominantly clay, silt, and fine-grained sand and riverine channel deposits of predominantly sand and gravel.

The following is a general summary of the subsurface soil and bedrock conditions encountered in our borings and test pits. More detailed descriptions of the subsurface conditions encountered at the site are contained in the boring and test pit logs in Appendix A and B, respectively.

Western Portion of the Site
In the upper 5 to 10 feet, generally consists of medium stiff, sandy silt with clay and gravel up to 2-inches in diameter. Dense sandy gravel to clayey gravel was encountered below the surficial soil. Approximately 1-foot of fill containing 1-foot-diameter cobbles was encountered in isolated locations.

Eastern Portion of the Site
In the upper 10 feet, generally consists of medium stiff to stiff, silty sandy clay and sandy clay with some 2-inch gravel. Hard clayey gravel was encountered below the surficial soil.

Bedrock
Temblor Sandstone was encountered at a depth of 36-feet bgs in the southwest corner of the site in boring B2. Temblor Sandstone was found in boring B6 in the northeast corner of the site at a depth of 14-feet bgs.

GROUNDWATER

According to the California Department of Water Resources (DWR) Water Data Library website, three groundwater monitoring wells are located within four to five miles from the site. Nearby monitoring wells were not reported in the DWR database.

Groundwater was encountered in our deepest boring B2 at a depth of 22-feet bgs. Numerous factors contribute to groundwater level fluctuations including precipitation, irrigation, and well pumping. A detailed evaluation of these and other factors, which may be responsible for groundwater fluctuations, was beyond the scope of this investigation.

RELEVANT GEOLOGIC HAZARDS

The site is located within a seismically active region and will experience seismic shaking from large, distant earthquakes. According to the ASCE 7 Hazard Tool website (utilizing ASCE7-16), the site modified peak ground acceleration is 0.73g. Alternately, the site modified peak ground acceleration utilizing ASCE7-22 is 0.70g. The site is not located within a seismic hazard zone mapped for earthquake faults by the California Geological Survey. Hence, the likelihood for surface fault rupture to occur at the site is nil.

Liquefaction is the temporary transformation of saturated, loose to medium dense, sandy and silty soils from a solid state to a liquid state due to strong ground shaking during a major earthquake. Groundwater was encountered at a depth of 22-feet bgs. It is our opinion that the potential for liquefaction induced differential ground settlement and/or lateral spreading to impact the proposed project is very low since the site is underlain by dense to very dense gravelly soil underlain by shallow bedrock that was encountered between 14-feet to 36-feet-deep. The potential for seismically induced dry ground settlement caused by the consolidation of sandy soils above the water table is also low due to the predominantly gravelly and clayey soils.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

We conclude, from a geotechnical engineering standpoint, that the proposed residential development can generally be constructed as planned, provided that the conclusions and recommendations contained in this report are incorporated into the project design and during construction. The predominant geotechnical considerations for this project, summarized below, are the varied subsurface soil conditions, the demolition of existing structures, and the presence of expansive clays. We recommend that the existing soil in the upper 1-foot be reworked as engineered fill in building and fill areas.

- The near surface soils vary from silty and sandy soil with gravel to expansive clay.
- Isolated pockets of fill, with cobbles in some areas, were encountered in the upper foot.
- Excavations from the demolition of the existing structures, septic systems, and underground utilities will need to be backfilled with engineered fill.
- The proposed single-family residences should be supported on Post-Tensioned slab foundations.

SITE PREPARATION AND GRADING

Our general site preparation and grading recommendations are as follows:

1. Existing grass, weeds, crops, trees, underground utilities, and structures should be removed. Excavations from the removal of tree roots, foundations, septic systems, and underground utility lines will need to be backfilled with properly compacted engineered fill.

2. The upper foot of the existing ground in building pad and fill areas should be reworked as engineered fill. This can be accomplished by scarifying the existing ground to a depth of 1-foot and compacting as prescribed below.
3. If zones of soft or loose soil are encountered during grading or soil processing operations, additional overexcavation of the loose soils may be required to expose deeper, firm soils. This should be determined in the field by the soils engineer.
4. Engineered fill soils should be compacted to 90 percent relative compaction at moisture contents not less than 3 percent over the optimum moisture.
5. Relative compaction refers to the in-place dry density of soil expressed as a percentage of its maximum dry density as determined by ASTM D1557 maximum density test procedure. Optimum moisture is the water content (percentage by dry weight) corresponding to the maximum dry density.
6. Fill should be properly moisture conditioned and placed in thin lifts (normally 6 to 8 inches, depending on the compaction equipment used) and compacted as prescribed above.
7. The onsite soils are generally suitable for engineered fill, provided they are free of debris, significant vegetation, rocks greater than 4 inches in largest dimension, and other deleterious matter. Debris, if encountered during grading, will need to be removed from the site.
8. Import fill, if required, should be subject to the evaluation of the soil engineer prior to its use. Import fill should have a Plasticity Index less than 12, contain no deleterious matter, and contain no rocks greater than 6 inches in largest dimension. Imported soil should be evaluated for potential environmental contamination prior to importing to the site.
9. Observation and soil density tests should be performed during site preparation and grading to assist the contractor in obtaining the required degree of compaction and proper moisture content. Where the compaction and moisture content are outside the range required, additional effort and adjustments to the moisture content should be made until the specified compaction and moisture conditioning is achieved.
10. The soil engineer should be notified at least 48 hours prior to the start of any grading operations. The procedure and methods of grading may then be discussed between the contractor and the soils engineer.

UTILITY TRENCH EXCAVATION AND BACKFILL

Excavations should conform to applicable State and Federal industrial safety requirements. Temporary trench sidewalls more than 4-feet deep may have to be laid back to 1H:1V or flatter to have stable sidewalls.

Materials quality, placement procedures, and compaction operations for utility line bedding and shading materials should meet local agency and/or other applicable agency requirements. Utility trench backfill above the shading materials may be comprised of the onsite soils, provided they are processed to remove gravel larger than 4-inches in largest dimension, rubbish, vegetation, and other undesirable substances. Backfill materials should be placed in level lifts about 8 to 10 inches in loose thickness, moisture conditioned, and mechanically compacted according to the requirements contained in the “Site Preparation and Grading” section.

CALIFORNIA BUILDING CODE (CBC) SEISMIC DESIGN PARAMETERS

The subject site is located at approximately 37.0111 degrees north latitude and -121.6178 degrees west longitude. The site is located in an alluvial valley; hence the structural engineer should utilize Site Class D – Stiff Soil for determining seismic response spectra parameters. According to the ASCE 7 Hazard Tool website (utilizing ASCE7-16), the site modified peak ground acceleration is 0.73g. Alternately, the site modified peak ground acceleration utilizing ASCE7-22 is 0.70g.

FOUNDATIONS

We recommend that the proposed residences be supported on Post-Tensioned (PT) Slab foundations designed with the following parameters. The design criteria contained in the third edition of the PTI design manual was utilized to develop the following PT slab design parameters.

PT SLAB DESIGN PARAMETERS

Allowable Bearing Capacity (may be increased by 1/3 for temporary seismic and wind loads, at the discretion of the structural engineer)	2,000 psf overall 2,500 psf isolated
Passive Equivalent Fluid Pressure (neglect the upper foot if the ground surface is not confined by slabs or pavement)	300 pcf
Base Friction Coefficient	0.30
Edge Moisture Variation Distance Center Lift Edge Lift	 9.0 feet 4.9 feet
Differential Swell Center Lift Edge Lift	 0.90 inches 1.40 inches

PT slab foundations can be constructed directly on properly prepared subgrade soils. The upper foot of the building pad subgrades should be presoaked to at least 4% over the optimum moisture content and the subgrade soils should not be permitted to dry out before placement of the vapor retarder. Where moisture vapor through the slabs would be objectionable, the use of a vapor retarder should be considered. From a geotechnical standpoint, we do not require a sand layer above the vapor retarder. Compacted subgrade soils may become disturbed during utility trench excavation and backfilling. Disturbed soils should be uniformly moisture conditioned and recompacted prior to concrete placement.

DRILLED REINFORCED CONCRETE PIERS

Allowable Skin Friction Vertically Down, Ignore the upper foot	400 psf
Allowable Skin Friction Vertically Up, Ignore the upper foot	250 psf
Allowable Lateral Passive Resistance, equivalent fluid pressure Acting on 1.5 pier diameters, Ignore the upper 2-feet	300 pcf
Minimum Pier/Pile Diameter	12 inches

After drilling, the drilled pier holes should be cleaned to remove loose soil, gravel, cobbles, and slough prior to the placement of reinforcing steel and concrete.

EXTERIOR FLATWORK SUGGESTIONS

We suggest that exterior concrete flatwork, such as sidewalks, walkways, and patios, be at least 5-inches-thick and reinforced with reinforcing bars. Driveways should be at least 6-inches-thick and reinforced. Where possible, flatwork should be doweled to adjacent flatwork and driveways to reduce the potential for differential vertical movement caused by the shrinking and swelling of expansive soils. Flatwork can be constructed directly on properly prepared subgrade soil that has been presoaked to at least 3% over the optimum moisture content, compacted, and rolled smooth. The subgrade soils should be maintained in a saturated condition and should not be permitted to dry out prior to concrete placement.

RETAINING WALLS

The following lateral pressures should be utilized in the design for retaining walls. The recommended lateral pressures assume drained conditions and that retaining walls will have drainage. Exterior retaining walls less than 2-feet-tall do not require drainage.

Active Equivalent Fluid Pressure (Level backfill and drained conditions)	40 pcf
At-Rest Equivalent Fluid Pressure (Level backfill and drained conditions)	60 pcf
Surcharge Load, where applicable	Designated by structural engineer

PAVEMENT RECOMMENDATIONS

We are providing recommendations for structural pavements that will be supported by the onsite soils. Our pavement analyses are based upon an R-Value of 5 using the Caltrans Design Method for Flexible Pavement for a 20-year design life. The following are our recommendations for Asphalt Concrete (AC) pavement sections along with their corresponding traffic indices (TI), which are indications of load frequency and intensity.

AC PAVEMENT SECTIONS

Traffic Index	AC (in)	Class 2 AB (in)	Total (in)
TI=4.5	3	8	11
TI=5	3	10	13
TI=6	3	14	17
TI=7	4	15	18

The upper foot of the subgrade soils in pavement areas should be compacted and rolled to provide a smooth and unyielding surface. Class 2 aggregate base (AB) should be compacted to at least 95 percent relative compaction in pavement areas.

ADDITIONAL SOIL ENGINEERING SERVICES

To a degree, the performance of the proposed project is dependent on the procedures and quality of the construction. Therefore, we should provide observation of the contractor's procedures and the exposed soil conditions, and field and laboratory testing during site clearing, mass grading, building pad preparation, placement and compaction of fill, underground utility and retaining wall backfilling, and foundation and pavement construction. These observations will allow us to check the contractor's work for conformance with the intent of our recommendations and to observe any unanticipated soil conditions that could require modification of our recommendations. In addition, we would welcome the opportunity to meet with the contractor prior to the start of earthwork operations to discuss the procedures and methods of construction. This can facilitate the performance of the construction operations and minimize possible misunderstandings and construction delays.

LIMITATIONS

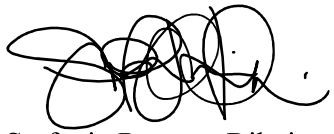
The conclusions and recommendations contained in this report are based upon the information provided to us regarding the proposed site improvements, subsurface conditions encountered in our field explorations, laboratory testing, and professional judgment. This study has been conducted in accordance with current professional geotechnical engineering standards; no other warranty is expressed or implied.

If changes are planned or implemented regarding the nature, design, and/or location of the proposed improvements, or if it is found during construction that subsurface conditions differ from those described in this report, then the conclusions and recommendations in this report shall be considered invalid, unless the changes are reviewed, and the conclusions and recommendations are modified or approved in writing.

Should you have questions or need additional information, please contact us. We appreciate the opportunity to provide professional services to you and to be involved in the design of this project.

Respectfully Submitted,

BAEZ GEOTECHNICAL GROUP



Stefanie Parman-Ribeiro
Project Engineer



William R. Stevens
Principal Engineer
GE 2339

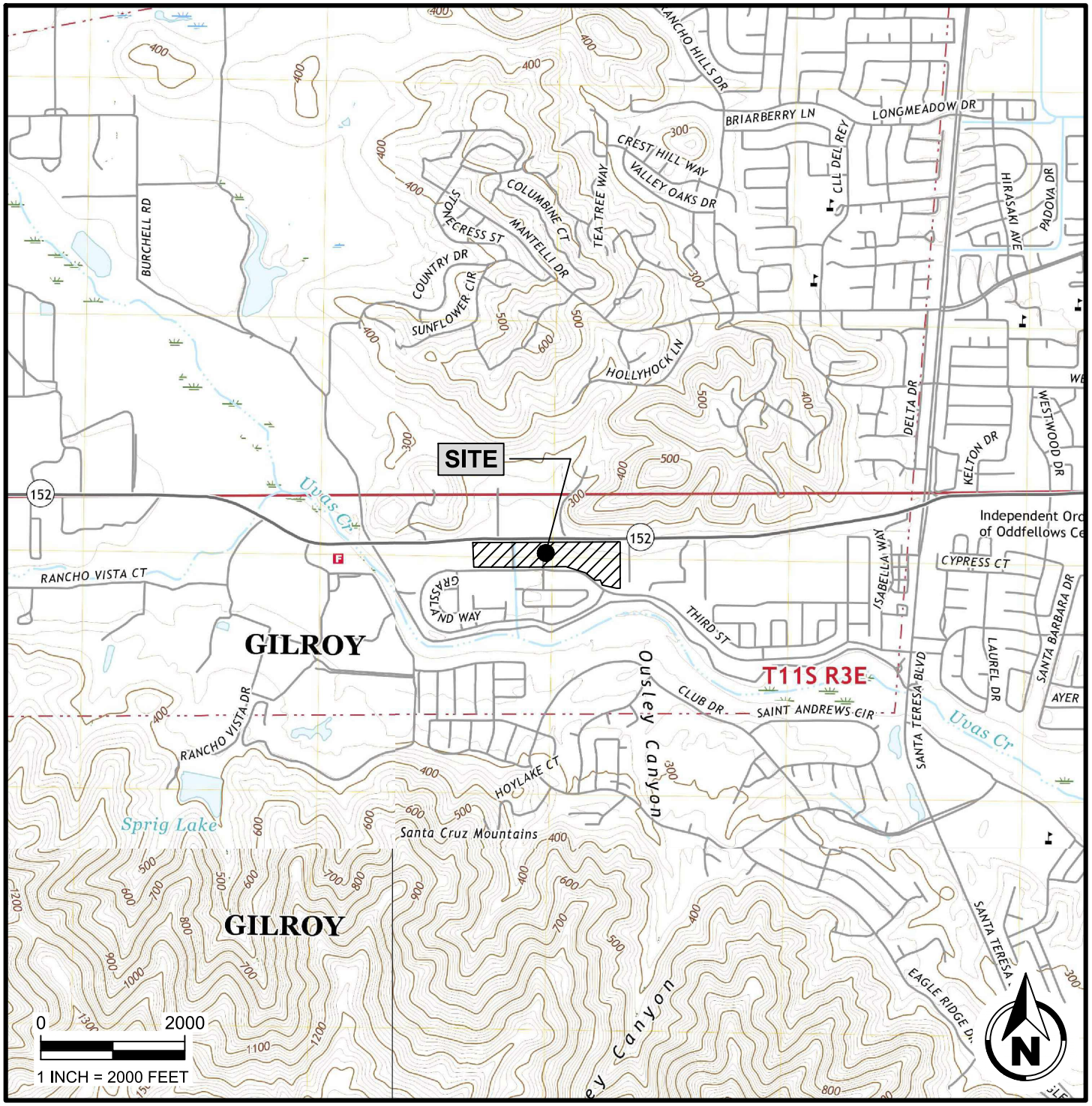
Attachments:
- Plate 1 – Vicinity Map
- Plate 2 – Site Plan
- Appendix A – Boring Logs
- Appendix B – Test Pit Logs
- Appendix C – Laboratory Test Results, Geotechnical
- Appendix D – Corrosion Test Results

E://1-BGG/G369-Hecker Pass/Report/GI G369 Manna Hecker.docx

DRAWN BY: SPR

DATE: 10/6/2023

BGG NUMBER: G369.01



BASE: PORTIONS OF U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLES, GILROY, WATSONVILLE, MOUNT MADONNA, AND CHITTENDEN, CALIFORNIA, PHOTOREVISED 2021, AT A SCALE OF 1:24,000.

VICINITY MAP

HECKER PASS RESIDENTIAL DEVELOPMENT

HECKER PASS ROAD AND PLUM STREET

GILROY, CALIFORNIA

FOR

MANA HANALEI, INC

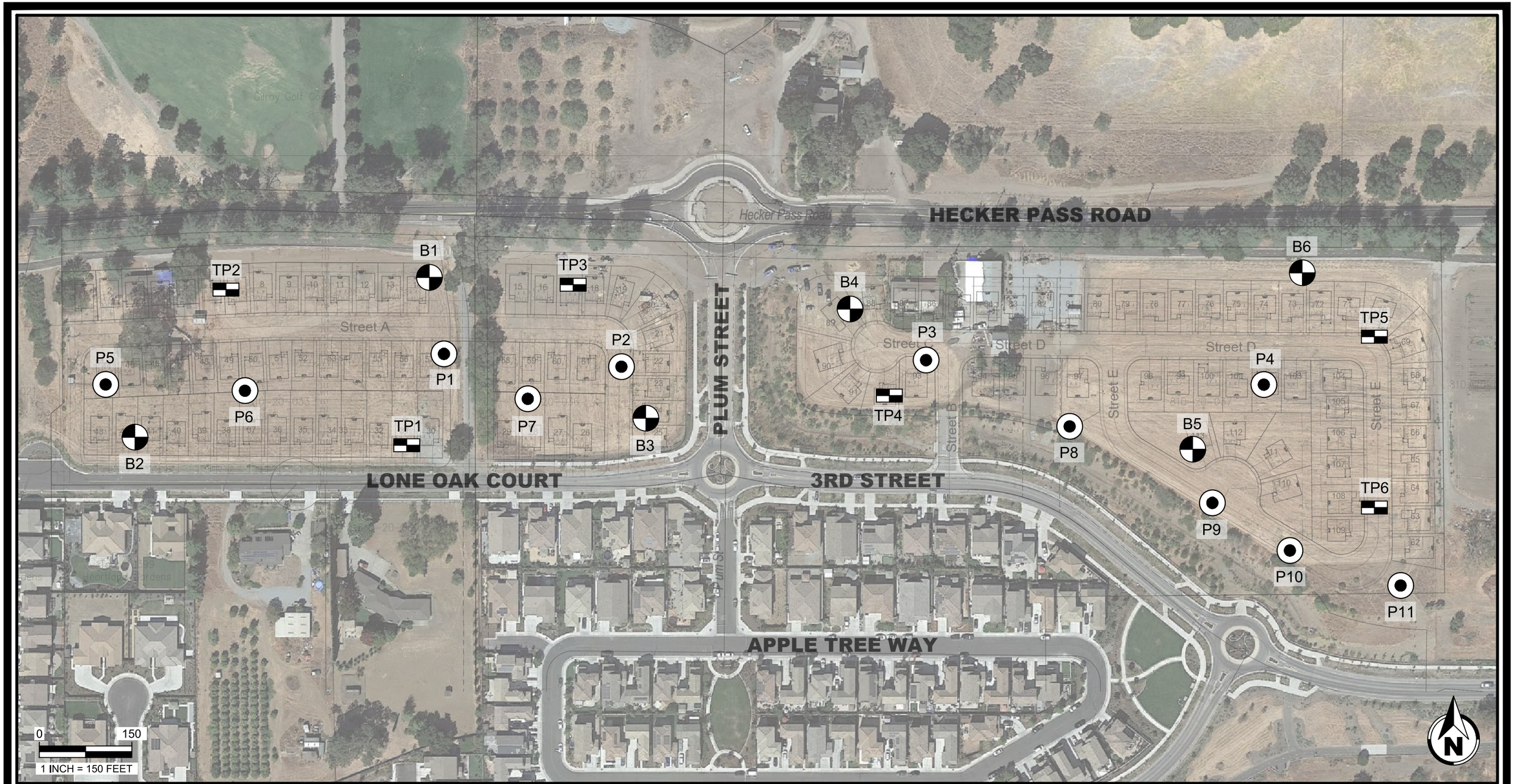
BAEZ GEOTECHNICAL GROUP

PLATE 1

DRAWN BY: SPR

DATE: 10/6/2023

BGG NUMBER: G369.01



BASE: GOOGLE EARTH IMAGE 9/27/2021 & DRAWINGS FROM MH ENGINEERING CO. DETAILS.

EXPLANATION

B6 — APPROXIMATE BORING LOCATION

P11 — APPROXIMATE PERCOLATION TEST LOCATION

TP6 — APPROXIMATE TEST PIT LOCATION

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SITE PLAN

HECKER PASS RESIDENTIAL DEVELOPMENT

HECKER PASS ROAD AND PLUM STREET

GILROY, CALIFORNIA

FOR

MANA HANALEI, INC

APPENDIX A

Boring Logs

BORING NUMBER: B1

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 243 feet above mean sea level (MSL)
GROUNDWATER ELEVATION: Not Encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SM/ ML	SILTY SAND to SANDY SILT, tan to medium brown with light brown mottling, dry to moist, medium dense to stiff, fine- to coarse-grained sand	243	0						
	in upper foot, rootlets present								
	(Sample consolidated 0.6% with a 2,500 psf load and an additional 3.6% upon saturation)				9	92	9.5		
		238	5						
	(ϕ = 27 degrees and c = 88 psf peak, 77 psf residual)				13	78	11.1		
SM	SILTY SAND with GRAVEL, tan to medium brown, moist, medium dense, fine- to coarse-grained sand, subrounded gravel up to 2-inch size								
					17				
		233	10						
	Bottom of Boring at 10 feet below the ground surface (bgs). Groundwater was not encountered.								
		228	15						
		223	20						

BORING NUMBER: B2

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 244 feet MSL
GROUNDWATER ELEVATION: 222 feet MSL
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SC/CL	CLAYEY SAND with GRAVEL to SANDY CLAY with GRAVEL, tan to medium brown with light brown mottling, dry to slightly moist, medium dense to stiff, fine- to coarse-grained sand, subrounded gravel up to 2-inch size	244	0						
SM/SC	SILTY SAND with GRAVEL to CLAYEY SAND with GRAVEL, tan to medium brown, moist, medium dense, fine- to coarse grained sand, subrounded gravel up to 2-inch size (Sample consolidated 1.0% with a 2,500 psf load and an additional 0.8% upon saturation)				17	115	3.4		
SM/GP	SILTY SAND with GRAVEL to SANDY GRAVEL, tan to light brown, moist, dense to very dense, fine- to coarse-grained sand, subrounded gravel up to 2-inch size	239	5		40				
GP/GC	SANDY GRAVEL with CLAY to CLAYEY GRAVEL with SAND, tan to light brown with medium brown mottling, moist, very dense, fine- to coarse-grained sand, subrounded gravel up to 2-inch size	234	10		52				
	at 15 feet, moist to very moist, medium dense to dense	229	15		28				
		224	20						

BORING NUMBER: B2

PROJECT NAME: Hecker Pass Residential Development
PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
PROJECT NUMBER: G369.01
CLIENT: Mana Hanalei, LLC
DATE DRILLED: 08/30/2023
GROUND ELEVATION: 244 feet MSL
DRILLING CONTRACTOR: Exploration Geoservices
GROUNDWATER ELEVATION: 222 feet MSL
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
SAMPLER TYPE:
LOGGED BY: KR
Standard Penetration Test
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
GP/ GC	SANDY GRAVEL with CLAY to CLAYEY GRAVEL with SAND, tan to light brown with medium brown mottling, moist, medium dense to dense, fine- to coarse- grained sand, subrounded gravel up to 2-inch size	224	20						
GP	SANDY GRAVEL, tan to medium brown, very moist to wet, very dense, fine- to coarse-grained sand, subrounded gravel up to 2-inch size	219	25						
					50/6”				
		214	30						
		209	35						
SS	SANDSTONE, highly weathered, tan and orange-brown with gray and white mottling, slightly moist, very dense, fine- to medium-grained sand [Temblor Sandstone]				50/3”				
		204	40						

BORING NUMBER: B2

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 244 feet MSL
GROUNDWATER ELEVATION: 222 feet MSL
SAMPLER TYPE:
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
		202	40						
SS	SANDSTONE, highly weathered, tan and orange-brown with gray and white mottling, slightly moist, very dense, fine- to medium-grained sand								
SS	SANDSTONE, highly weathered, light tan with white mottling, slightly moist, very dense, fine- to coarse-grained sand				50/5”				
	Bottom of Boring at 43½ feet bgs. Groundwater encountered at 22 feet bgs.	197	45						
		192	50						
		187	55						
		182	60						

BORING NUMBER: B3

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 239 feet MSL
GROUNDWATER ELEVATION: Not Encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
CL/ ML	SANDY CLAY with SILT to SANDY SILT with CLAY, tan to medium brown with mottled dark brown, slightly moist to moist, stiff, fine- to coarse-grained sand rootlets present (Sample consolidated 0.4% with a 1,500 psf load and an additional 8.2% upon saturation, sample likely disturbed)	239	0		12	80	10.5		
SM	SILTY SAND, tan to medium brown with orange mottling, moist, medium dense, fine- to coarse-grained sand	234	5		15				
SM/ GP	SILTY SAND with GRAVEL to SANDY GRAVEL, tan with gray mottling, moist, medium dense, fine- to coarse grained sand, subrounded gravel up to 2-inch size	229	10		18				
	Bottom of Boring at 10 feet bgs. Groundwater was not encountered.	224	15						
		219	20						

BORING NUMBER: B4

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 239 feet MSL
GROUNDWATER ELEVATION: Not Encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
CL	SANDY CLAY with SILT, medium to dark brown, slightly moist to moist, stiff, fine- to coarse-grained sand	239	0						
	below 2-feet moist								
	(Sample consolidated 0.4% with a 1,500 psf load and an additional 6.9% upon saturation, sample likely disturbed)				10	92	5.9		
	(ϕ = 27 degrees and c = 25 psf peak, 5 psf residual)					98	11.9		
		234	5		9				
CL	SILTY CLAY with SAND, medium to dark brown with gray and orange mottling, very moist, medium stiff				7				
	Bottom of Boring at 9 feet bgs. Groundwater was not encountered.	229	10						
		224	15						
		219	20						

BORING NUMBER: B5

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 239 feet MSL
GROUNDWATER ELEVATION: Not Encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
CL	SANDY CLAY with SILT, medium to dark brown, slightly moist to moist, stiff, fine- to coarse-grained sand	239	0						
	below 2-feet moist								
	(Sample consolidated 0.6% with a 1,500 psf load and an additional 0.2% upon saturation)				10	95	20.5		
CL	SILTY CLAY with SAND, medium to dark brown with gray and orange mottling, stiff, very moist	234	5		14				
		229	10		11				
	Bottom of Boring at 10 feet bgs. Groundwater was not encountered.	224	15						
		219	20						

BORING NUMBER: B6

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 245 feet MSL
GROUNDWATER ELEVATION: Not encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
CL	SILTY SANDY CLAY with GRAVEL, dark brown with white mottling, slightly moist to moist, stiff to hard, fine- to coarse-grained sand, subrounded gravel 2-inch size	245	0						
	(Sample consolidated 0.4% with a 1,500 psf load and an additional 3.6% upon saturation)	240	5		17	95	12.1		
					40				
GC	CLAYEY GRAVEL, medium to dark brown, slightly moist, hard, subrounded gravel up to 2-inch size	235	10		50/2”				
SS	SANDSTONE, highly weathered, mottled tan and gray, slightly moist, very dense, fine- to medium-grained sand [Temblor Sandstone]	230	15		50/3”				
		225	20						

BORING NUMBER: B6

PROJECT NAME: Hecker Pass Residential Development
PROJECT NUMBER: G369.01
DATE DRILLED: 08/30/2023
DRILLING CONTRACTOR: Exploration Geoservices
DRILLING METHOD: Mobile Drill B61 with Hollow Stem Auger
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 245 feet MSL
GROUNDWATER ELEVATION: Not encountered
SAMPLER TYPE:
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
		225	20						
SS	SANDSTONE, highly weathered, mottled tan and gray, slightly moist, very dense, fine- to medium-grained sand								
	below 20 feet, odor present								
SS	SANDSTONE, highly weathered, gray and silver, slightly moist, very dense, fine- to medium-grained sand	220	25		50/6"				
	Bottom of Boring at 25½ feet bgs. Groundwater was not encountered.	215	30						
		210	35						
		205	40						

APPENDIX B

Test Pit Logs

TEST PIT NUMBER: TP1

PROJECT NAME: Hecker Pass Residential Development
PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
PROJECT NUMBER: G369.01
CLIENT: Mana Hanalei, LLC
DATE EXCAVATED: 08/30/2023
GROUND ELEVATION: 242 feet above mean sea level (MSL)
EXCAVATION CONTRACTOR: Lion River Construction
GROUNDWATER: Groundwater not encountered
EXCAVATION METHOD: CAT 303.5E2
SAMPLER TYPE:
LOGGED BY: KR
Bulk Sample
Modified California Sampler
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SC/CL	CLAYEY SAND with GRAVEL to SANDY CLAY with GRAVEL, medium brown with mottled light brown, medium dense to stiff, slightly moist, with cobbles up to 12-inch size [FILL]	242	0						
SC/CL	CLAYEY SAND with GRAVEL to SANDY CLAY with GRAVEL, tan to medium brown, medium dense to stiff, slightly moist, rounded gravel up to 1 to 2-inch size								
SM	SILTY SAND with GRAVEL, tan to medium brown, moist, medium dense, fine- to coarse grained sand, rounded gravel and cobbles up to 4-inch size	237	5						
	Bottom of Test Pit at 5 feet below the ground surface (bgs). Groundwater was not encountered.	232	10						
		227	15						

TEST PIT NUMBER: TP2

PROJECT NAME: Hecker Pass Residential
PROJECT NUMBER: G369.01
DATE EXCAVATED: 08/30/2023
EXCAVATION CONTRACTOR: Lion River Construction
EXCAVATION METHOD: CAT 303.5E2
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 244 feet MSL
GROUNDWATER: Groundwater not encountered
SAMPLER TYPE:
Bulk Sample
Modified California Sampler

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SC/GC	CLAYEY SAND with GRAVEL to CLAYEY GRAVEL with SAND, tan to medium brown with light brown mottling, medium dense to stiff, slightly moist, rounded gravel up to 2-inch size [FILL?]	244	0						
SC/CL	CLAYEY SAND with GRAVEL to SANDY CLAY with GRAVEL, tan to medium brown, medium dense to stiff, moist, rounded gravel up to 2-inch size								
SM/GP	SILTY SAND with GRAVEL to SANDY GRAVEL, tan to medium brown, moist, medium dense, fine- to coarse-grained sand, rounded gravel and cobbles up to 4-inch size	239	5						
	Bottom of Test Pit at 7 feet bgs. Groundwater was not encountered.	234	10						
		229	15						

TEST PIT NUMBER: TP3

PROJECT NAME: Hecker Pass Residential
PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
PROJECT NUMBER: G369.01
CLIENT: Mana Hanalei, LLC
DATE EXCAVATED: 08/30/2023
GROUND ELEVATION: 242 feet MSL
EXCAVATION CONTRACTOR: Lion River Construction
GROUNDWATER: Groundwater not encountered
EXCAVATION METHOD: CAT 303.5E2
SAMPLER TYPE:
LOGGED BY: KR
Bulk Sample
Modified California Sampler
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SM	SILTY SAND, tan to medium brown with mottled light brown, dry to moist, medium dense, fine- to medium-grained sand, with minor gravel, with rootlets	242	0						
	below 1-foot, moist								
	(1% gravel, 68% sand, 31% silt and clay fines) (LL = 0, PI = NP) (R-Value = 23)							NP	31
		237	5						
	Bottom of Test Pit at 5 feet bgs. Groundwater was not encountered.								
		232	10						
		227	15						

TEST PIT NUMBER: TP4

PROJECT NAME: Hecker Pass Residential
PROJECT NUMBER: G369.01
DATE EXCAVATED: 08/30/2023
EXCAVATION CONTRACTOR: Lion River Construction
EXCAVATION METHOD: CAT 303.5E2
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 238 feet MSL
GROUNDWATER: Groundwater not encountered
SAMPLER TYPE:
Bulk Sample
Modified California Sampler

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SC/ CL	CLAYEY SAND to SANDY CLAY , tan to medium brown, medium dense to stiff, slightly moist to moist, fine- to medium-grained sand below 1-foot, moist	238	0						
		233	5						
SM/ GP	SILTY SAND with GRAVEL to SANDY GRAVEL, tan to medium brown, moist, medium dense, fine- to coarse grained sand, rounded gravel and cobbles to 4-inch size								
	Bottom of Test Pit at 6 feet bgs. Groundwater was not encountered.	228	10						
		223	15						

TEST PIT NUMBER: TP5

PROJECT NAME: Hecker Pass Residential
PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
PROJECT NUMBER: G369.01
CLIENT: Mana Hanalei, LLC
DATE EXCAVATED: 08/30/2023
GROUND ELEVATION: 241 feet MSL
EXCAVATION CONTRACTOR: Lion River Construction
GROUNDWATER: Groundwater not encountered
EXCAVATION METHOD: CAT 303.5E2
SAMPLER TYPE:
LOGGED BY: KR
Bulk Sample
Modified California Sampler
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
		241	0						
CL	SILTY SANDY CLAY with GRAVEL, dark brown with white mottling, slightly moist to moist, stiff to hard, fine- to coarse-grained sand, subrounded gravel to 2-inch size								
CL	SILTY CLAY, medium brown, moist, medium stiff (2% gravel, 35% sand, 63% silt and clay fines) (LL = 30, PI = 14) (R-Value < 5)							14	63
		236	5						
	Bottom of Test Pit at 7 feet bgs. Groundwater was not encountered.								
		231	10						
		226	15						

TEST PIT NUMBER: TP6

PROJECT NAME: Hecker Pass Residential
PROJECT NUMBER: G369.01
DATE EXCAVATED: 08/30/2023
EXCAVATION CONTRACTOR: Lion River Construction
EXCAVATION METHOD: CAT 303.5E2
LOGGED BY: KR
NOTES: Elevation from MH Engineering Topo Exhibit 7/27/23

PROJECT LOCATION: Hecker Pass Road at Plum Street, Gilroy
CLIENT: Mana Hanalei, LLC
GROUND ELEVATION: 238 feet MSL
GROUNDWATER: Groundwater not encountered
SAMPLER TYPE:
Bulk Sample
Modified California Sampler

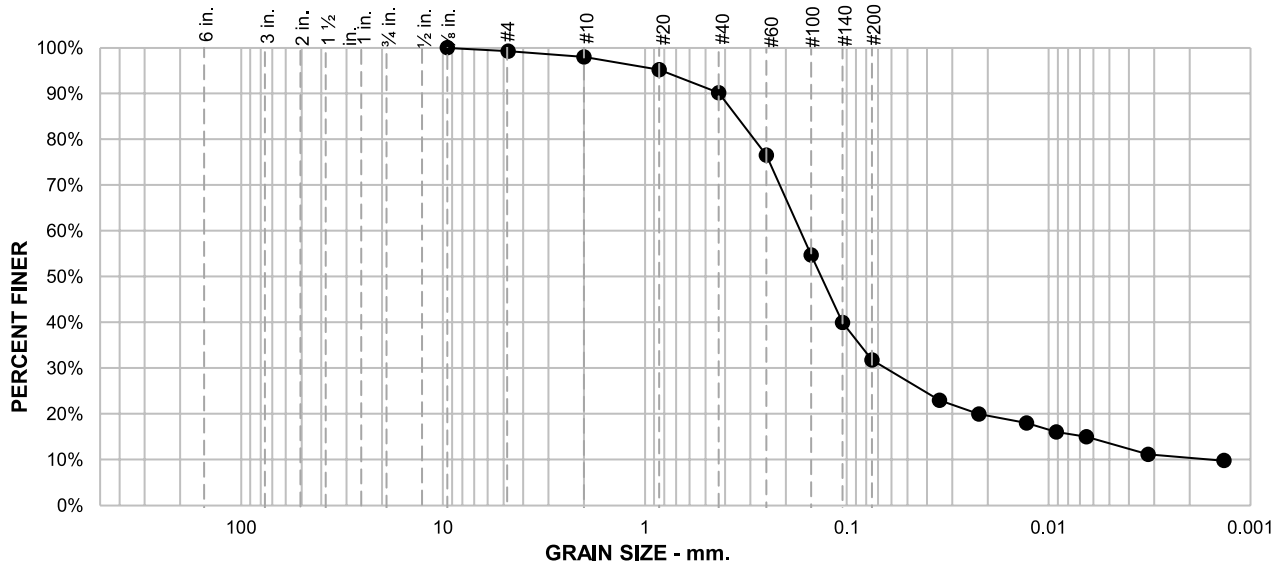
USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
CL	SILTY CLAY, medium brown, slightly moist to moist, medium stiff	238	0						
	below 1 foot, moist	233	5						
	Bottom of Test Pit at 5 feet bgs. Groundwater was not encountered.	228	10						
		223	15						

APPENDIX C

Laboratory Test Results - Geotechnical

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D422



SAMPLE ID: TP3@1-5'

DEPTH (ft): 1-5'

LOCATION: N/A

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		0.7	1.3	7.9	58.3	21.4	10.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
⅜ in.	100.0		
#4	99.3		
#10	98.0		
#20	95.2		
#40	90.1		
#60	76.5		
#100	54.7		
#140	40.0		
#200	31.8		
0.0347 mm.	22.9		
0.0222 mm.	20.0		
0.0129 mm.	18.0		
0.0092 mm.	16.0		
0.0065 mm.	15.0		
0.0032 mm.	11.2		
0.0014 mm.	9.8		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = NP LL = NV PI = NP

COEFFICIENTS

D_{90} = 0.4283 mm D_{85} = 0.3509 mm D_{60} = 0.1698 mm

D_{50} = 0.1338 mm D_{30} = 0.0642 mm D_{15} = 0.0065 mm

D_{10} = 0.0015 mm C_u = 110.72 C_c = 15.82

CLASSIFICATION

USCS = SM

REMARKS

Silt/clay division of 0.002mm used
PI: ASTM D4318, Wet Method
USCS: ASTM D2487

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group., Inc.

PROJECT NAME: G369.01 Hecker Pass Homes

PROJECT NO: 14368.000.220 PHLAB

PROJECT LOCATION: Gilroy, CA

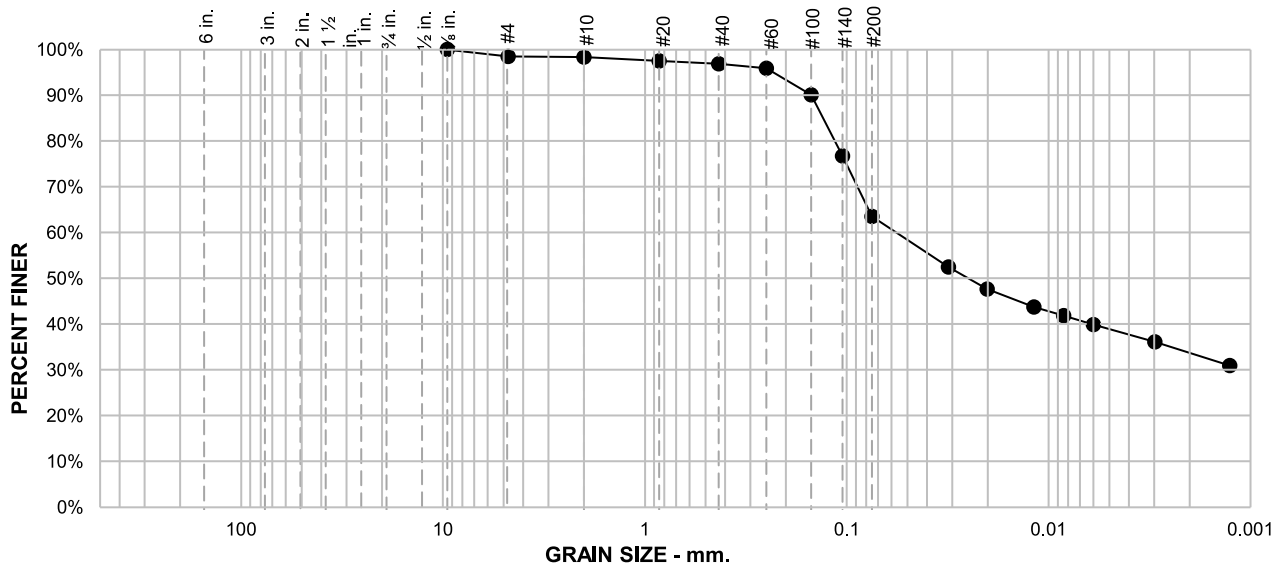
REPORT DATE: 9/14/2023

TESTED BY: K. Nguyen

REVIEWED BY: J. Moriarty

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D422



SAMPLE ID: TP5@1-5'

DEPTH (ft): 1-5'

LOCATION: N/A

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		1.5	0.2	1.4	33.4	29.8	33.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
⅜ in.	100.0		
#4	98.5		
#10	98.3		
#20	97.5		
#40	96.9		
#60	95.9		
#100	90.1		
#140	76.7		
#200	63.5		
0.0314 mm.	52.5		
0.0202 mm.	47.7		
0.0118 mm.	43.8		
0.0084 mm.	41.8		
0.0060 mm.	39.9		
0.0030 mm.	36.1		
0.0013 mm.	30.9		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = 16 LL = 30 PI = 14

COEFFICIENTS

D_{90} = 0.1496 mm D_{85} = 0.1310 mm D_{60} = 0.0568 mm

D_{50} = 0.0249 mm D_{30} = D_{15} =

D_{10} = C_u = C_c =

CLASSIFICATION

USCS = CL

REMARKS

Silt/clay division of 0.002mm used
PI: ASTM D4318, Wet Method
USCS: ASTM D2487

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group., Inc.

PROJECT NAME: G369.01 Hecker Pass Homes

PROJECT NO: 14368.000.220 PHLAB

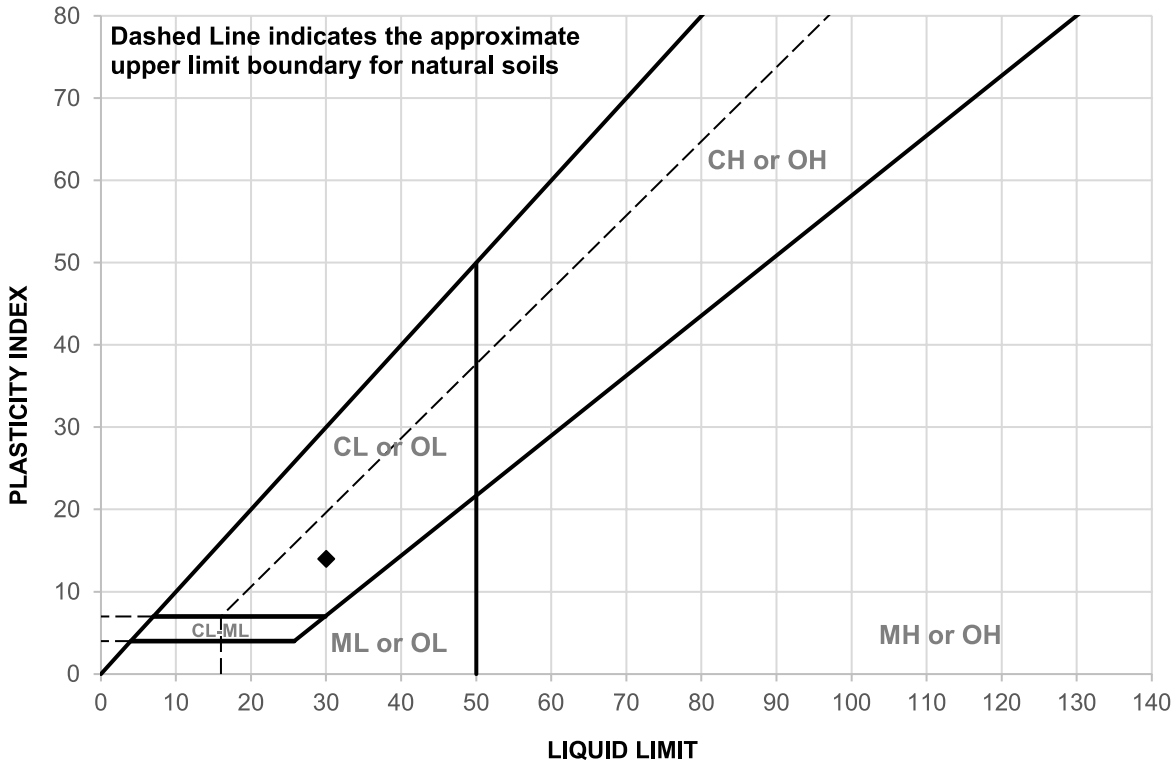
PROJECT LOCATION: Gilroy, CA

REPORT DATE: 9/14/2023

TESTED BY: K. Nguyen

REVIEWED BY: J. Moriarty

LIQUID AND PLASTIC LIMITS TEST REPORT
ASTM D4318



	SAMPLE ID	DEPTH (ft)	MATERIAL DESCRIPTION	LL	PL	PI
▲	TP3	1-5'	See exploration logs	NV	NP	NP
◆	TP5	1-5'	See exploration logs	30	16	14

*NV = No Value, NP = Non-Plastic

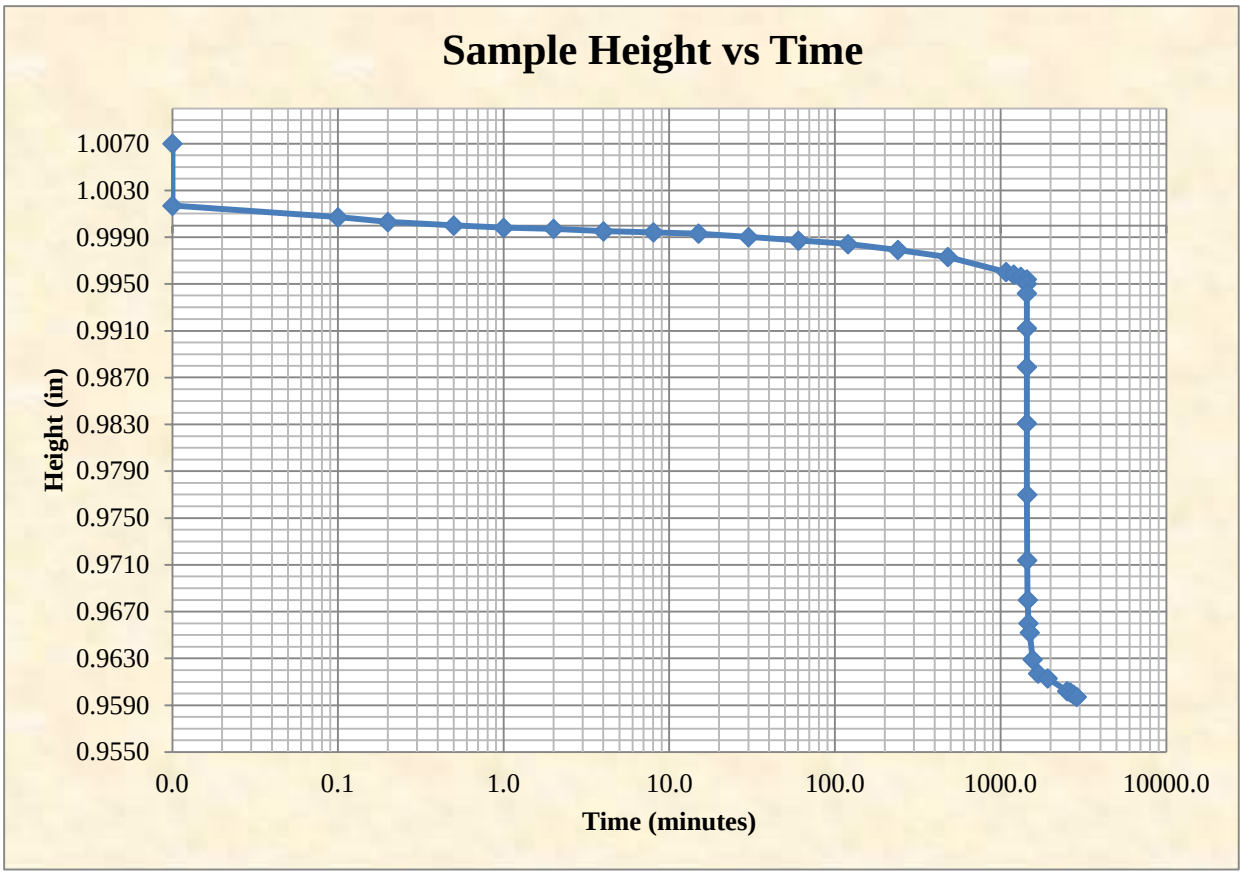
	SAMPLE ID	TEST METHOD	REMARKS
▲	TP3	PI: ASTM D4318, Wet Method	
◆	TP5	PI: ASTM D4318, Wet Method	

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group., Inc.
PROJECT NAME: G369.01 Hecker Pass Homes
PROJECT NO: 14368.000.220 PHLAB
PROJECT LOCATION: Gilroy, CA
REPORT DATE: 9/14/2023
TESTED BY: K. Nguyen
REVIEWED BY: J. Moriarty

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID:	**B1@2.5-3**	**IN-SITU LOAD (psf):**	**400**
SAMPLE DESCRIPTION:	**See exploration logs**	**DESIGN LOAD (psf):**	**2500**
TYPE OF WATER USED:	**Distilled**	**USCS: n/a**	**SOURCE OF WATER: Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**	**SAMPLING DATE:**	**n/a**
STORAGE ENVIRONMENT:	**Controlled**	**TEST START DATE:**	**09/06/23**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**29.89**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**99.98**
Specific Gravity, <#4 (Measured):	**2.782**	**Initial water content:**	**9.54**
Initial sample height (in):	**1.0070**	**Final water content:**	**28.69**
Dry in-situ load height (in):	**1.0017**	**Post-test dry density (pcf):**	**96.50**
Dry design load height (in):	**0.9954**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.53*
Wet design load height (in):	**0.9597**	*Dry design load % SWELL/COLLAPSE:*	*-0.63*
Initial sample mass (g):	**117.18**	*Wet design load % SWELL/COLLAPSE:*	*-3.55*
Final saturated sample mass (g):	**137.66**	***Overall % SWELL/COLLAPSE:***	***-4.70***
Initial-test dry density (pcf):	**91.97**		

Testing remarks: As requested by client, an in-situ load was added and then a design load was added prior to saturation. Note, gravels larger #4 were removed and replaced with trimmings.

PROJECT NAME:	**G369.01 - Hecker Pass Homes, Gilroy, CA**
PROJECT NUMBER:	**14368.000.220 PHLAB**
CLIENT:	**Baez Geotechnical Group, Inc.**
PHASE NUMBER:	**LAB**
REPORT DATE:	**09/11/23**

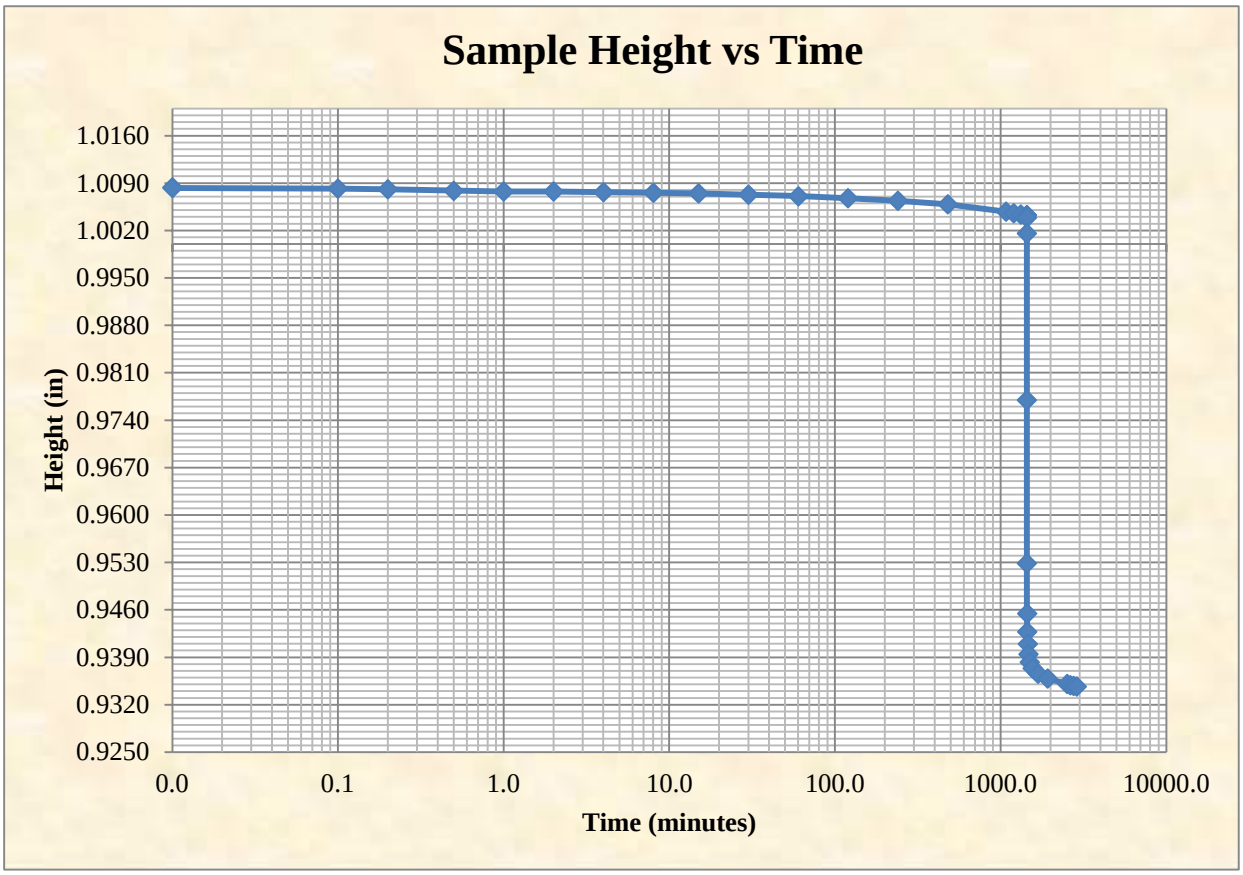
ENGEO
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Tested by: K. Lecce

Reviewed by: J. Moriarty

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID: B4@2.5-3
SAMPLE DESCRIPTION: See exploration logs
TYPE OF WATER USED: Distilled
TRANSPORTATION METHOD: Insulated bucket
STORAGE ENVIRONMENT: Controlled

Remolded? (Y/N): N
Number of lifts, if remolded: n/a
Specific Gravity, <#4 (Measured): 2.677
Initial sample height (in): 1.0084
Dry in-situ load height (in): 1.0083
Dry design load height (in): 1.0043
Wet design load height (in): 0.9347
Initial sample mass (g): 113.02
Final saturated sample mass (g): 134.15
Initial-test dry density (pcf): 91.78

USCS: n/a

IN-SITU LOAD (psf): 300
DESIGN LOAD (psf): 1500
SOURCE OF WATER: Distilled
SAMPLING DATE: n/a
TEST START DATE: 09/06/23

Initial % Saturation: 19.09
Final % Saturation: 99.98
Initial water content: 5.85
Final water content: 25.64
Post-test dry density (pcf): 99.01

Dry In-situ load % SWELL/COLLAPSE: *-0.01*
Dry design load % SWELL/COLLAPSE: *-0.40*
Wet design load % SWELL/COLLAPSE: *-6.90*
Overall % SWELL/COLLAPSE: ***-7.31***

Testing remarks: As requested by client, an in-situ load was added and then a design load was added prior to saturation. Note, gravels larger #4 were removed and replaced with trimmings.

PROJECT NAME: G369.01 - Hecker Pass Homes, Gilroy, CA
PROJECT NUMBER: 14368.000.220 PHLAB
CLIENT: Baez Geotechnical Group, Inc.
PHASE NUMBER: LAB

REPORT DATE: 09/11/23

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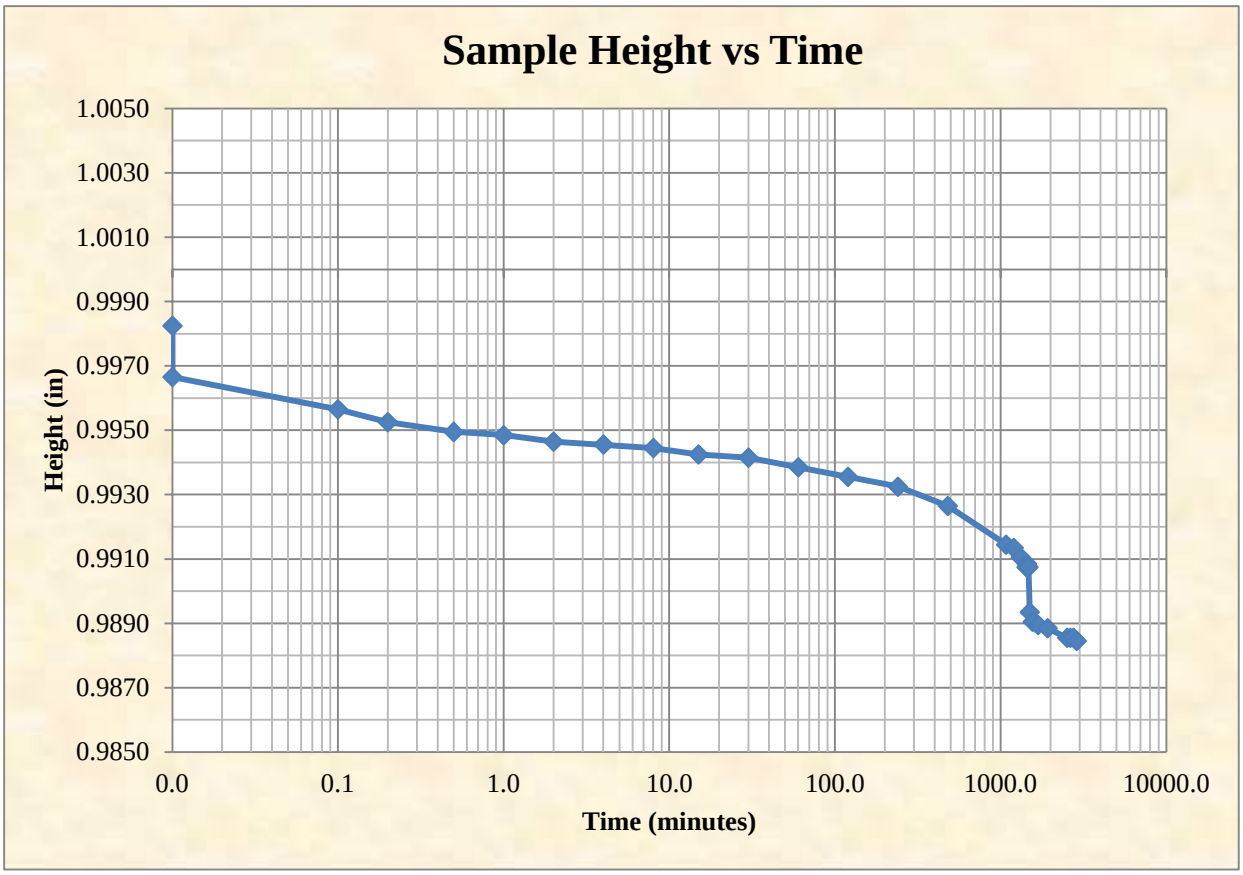
Tested by: K. Lecce

Reviewed by: J. Moriarty

Lab Address: 17278 Golden Valley Parkway, Lathrop, CA 95330. Phone No. (209) 835-0610.

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID:	**B5@3-3.5**	**IN-SITU LOAD (psf):**	**400**
SAMPLE DESCRIPTION:	**See exploration logs**	**DESIGN LOAD (psf):**	**1500**
TYPE OF WATER USED:	**Distilled**	**USCS: n/a**	**SOURCE OF WATER: Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**	**SAMPLING DATE:**	**n/a**
STORAGE ENVIRONMENT:	**Controlled**	**TEST START DATE:**	**09/11/23**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**71.74**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**99.99**
Specific Gravity, <#4 (Measured):	**2.671**	**Initial water content:**	**20.49**
Initial sample height (in):	**0.9983**	**Final water content:**	**27.86**
Dry in-situ load height (in):	**0.9967**	**Post-test dry density (pcf):**	**95.52**
Dry design load height (in):	**0.9909**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.16*
Wet design load height (in):	**0.9885**	*Dry design load % SWELL/COLLAPSE:*	*-0.58*
Initial sample mass (g):	**131.40**	*Wet design load % SWELL/COLLAPSE:*	*-0.24*
Final saturated sample mass (g):	**139.44**	***Overall % SWELL/COLLAPSE:***	***-0.98***
Initial-test dry density (pcf):	**94.59**		

Testing remarks: As requested by client, an in-situ load was added and then a design load was added prior to saturation. Note, gravels larger #4 were removed and replaced with trimmings.

PROJECT NAME:	**G369.01 - Hecker Pass Homes, Gilroy, CA**	**REPORT DATE:**	**09/18/23**
PROJECT NUMBER:	**14368.000.220 PHLAB**		
CLIENT:	**Baez Geotechnical Group, Inc.**		
PHASE NUMBER:	**LAB**		

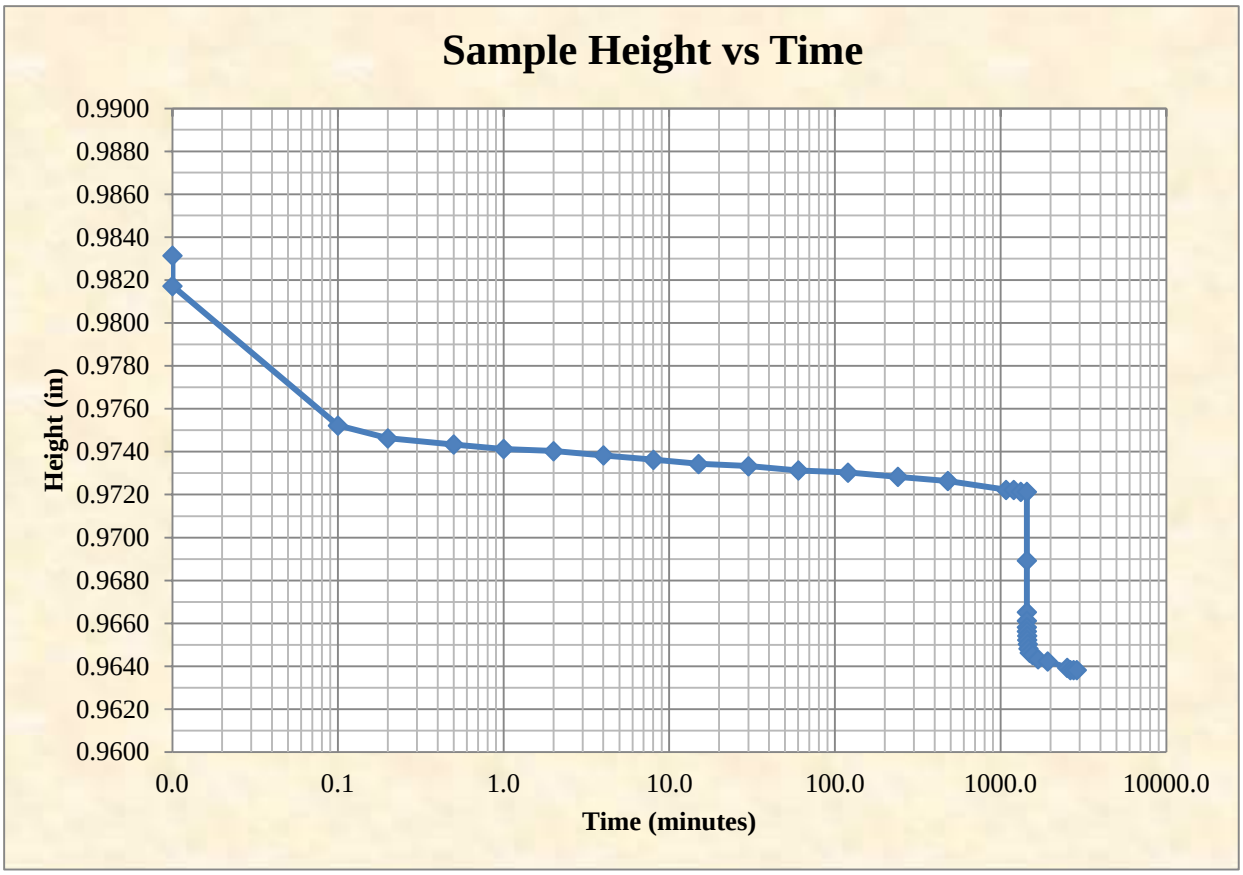
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Tested by: K. Lecce

Reviewed by: J. Moriarty

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID:	**B2@3.5-4**	**IN-SITU LOAD (psf):**	**400**
SAMPLE DESCRIPTION:	**See exploration logs**	**DESIGN LOAD (psf):**	**2500**
TYPE OF WATER USED:	**Distilled**	**USCS: n/a**	**SOURCE OF WATER: Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**	**SAMPLING DATE:**	**n/a**
STORAGE ENVIRONMENT:	**Controlled**	**TEST START DATE:**	**09/06/23**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**17.99**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**99.99**
Specific Gravity, <#4 (Measured):	**2.819**	**Initial water content:**	**3.36**
Initial sample height (in):	**0.9831**	**Final water content:**	**17.56**
Dry in-situ load height (in):	**0.9817**	**Post-test dry density (pcf):**	**117.61**
Dry design load height (in):	**0.9721**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.14*
Wet design load height (in):	**0.9638**	*Dry design load % SWELL/COLLAPSE:*	*-0.98*
Initial sample mass (g):	**135.76**	*Wet design load % SWELL/COLLAPSE:*	*-0.84*
Final saturated sample mass (g):	**154.42**	***Overall % SWELL/COLLAPSE:***	***-1.96***
Initial-test dry density (pcf):	**115.31**		

Testing remarks: As requested by client, an in-situ load was added and then a design load was added prior to saturation. Note, gravels larger #4 were removed and replaced with trimmings.

PROJECT NAME:	**G369.01 - Hecker Pass Homes, Gilroy, CA**
PROJECT NUMBER:	**14368.000.220 PHLAB**
CLIENT:	**Baez Geotechnical Group, Inc.**
PHASE NUMBER:	**LAB**
REPORT DATE:	**09/11/23**

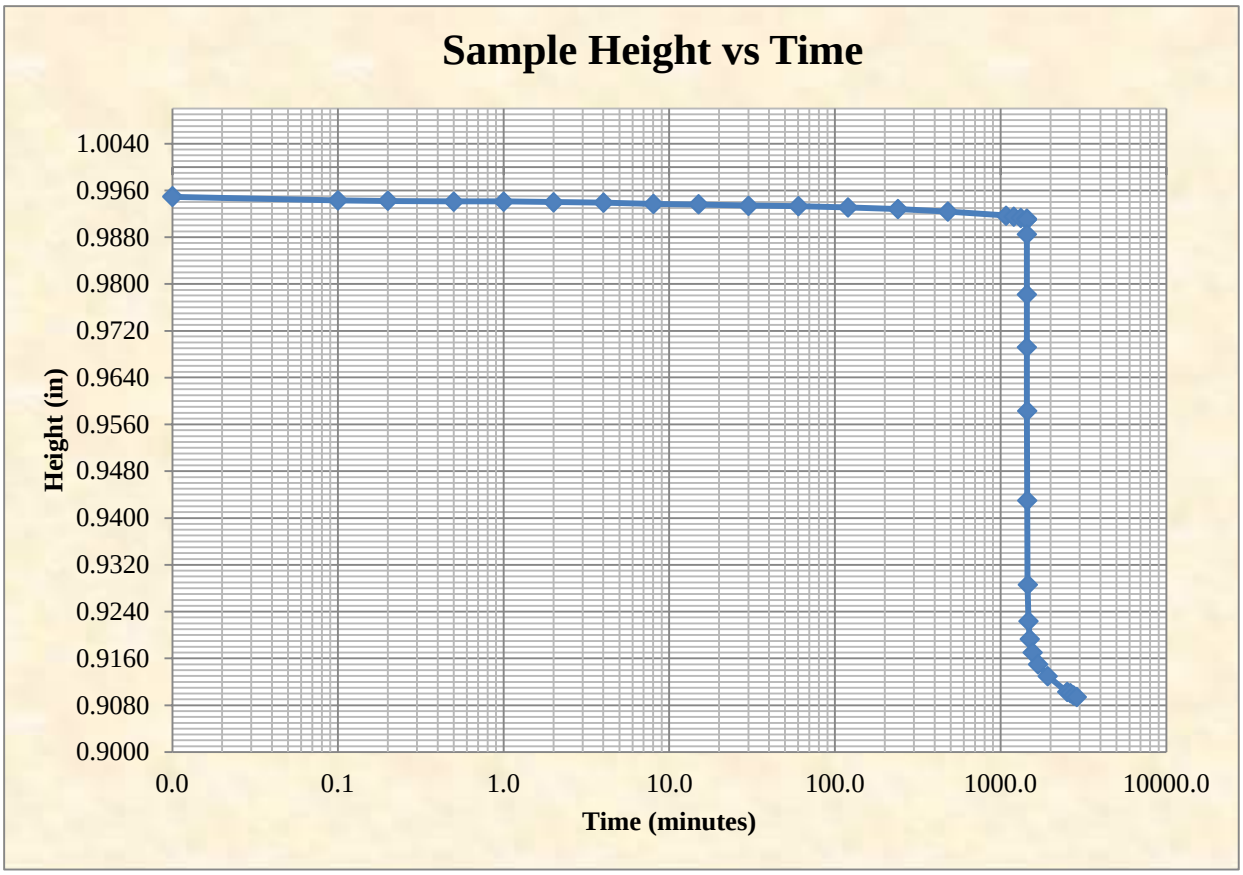
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Tested by: K. Lecce

Reviewed by: J. Moriarty

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID:	**B3@3.5-4**	**IN-SITU LOAD (psf):**	**400**
SAMPLE DESCRIPTION:	**See exploration logs**	**DESIGN LOAD (psf):**	**1500**
TYPE OF WATER USED:	**Distilled**	**USCS: n/a**	**SOURCE OF WATER: Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**	**SAMPLING DATE:**	**n/a**
STORAGE ENVIRONMENT:	**Controlled**	**TEST START DATE:**	**09/06/23**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**25.51**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**99.99**
Specific Gravity, <#4 (Measured):	**2.704**	**Initial water content:**	**10.46**
Initial sample height (in):	**0.9950**	**Final water content:**	**34.24**
Dry in-situ load height (in):	**0.9949**	**Post-test dry density (pcf):**	**87.58**
Dry design load height (in):	**0.9912**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.01*
Wet design load height (in):	**0.9094**	*Dry design load % SWELL/COLLAPSE:*	*-0.37*
Initial sample mass (g):	**102.33**	*Wet design load % SWELL/COLLAPSE:*	*-8.22*
Final saturated sample mass (g):	**124.36**	***Overall % SWELL/COLLAPSE:***	***-8.60***
Initial-test dry density (pcf):	**80.05**		

Testing remarks: As requested by client, an in-situ load was added and then a design load was added prior to saturation. Note, gravels larger #4 were removed and replaced with trimmings.

PROJECT NAME:	**G369.01 - Hecker Pass Homes, Gilroy, CA**
PROJECT NUMBER:	**14368.000.220 PHLAB**
CLIENT:	**Baez Geotechnical Group, Inc.**
PHASE NUMBER:	**LAB**
REPORT DATE:	**09/11/23**

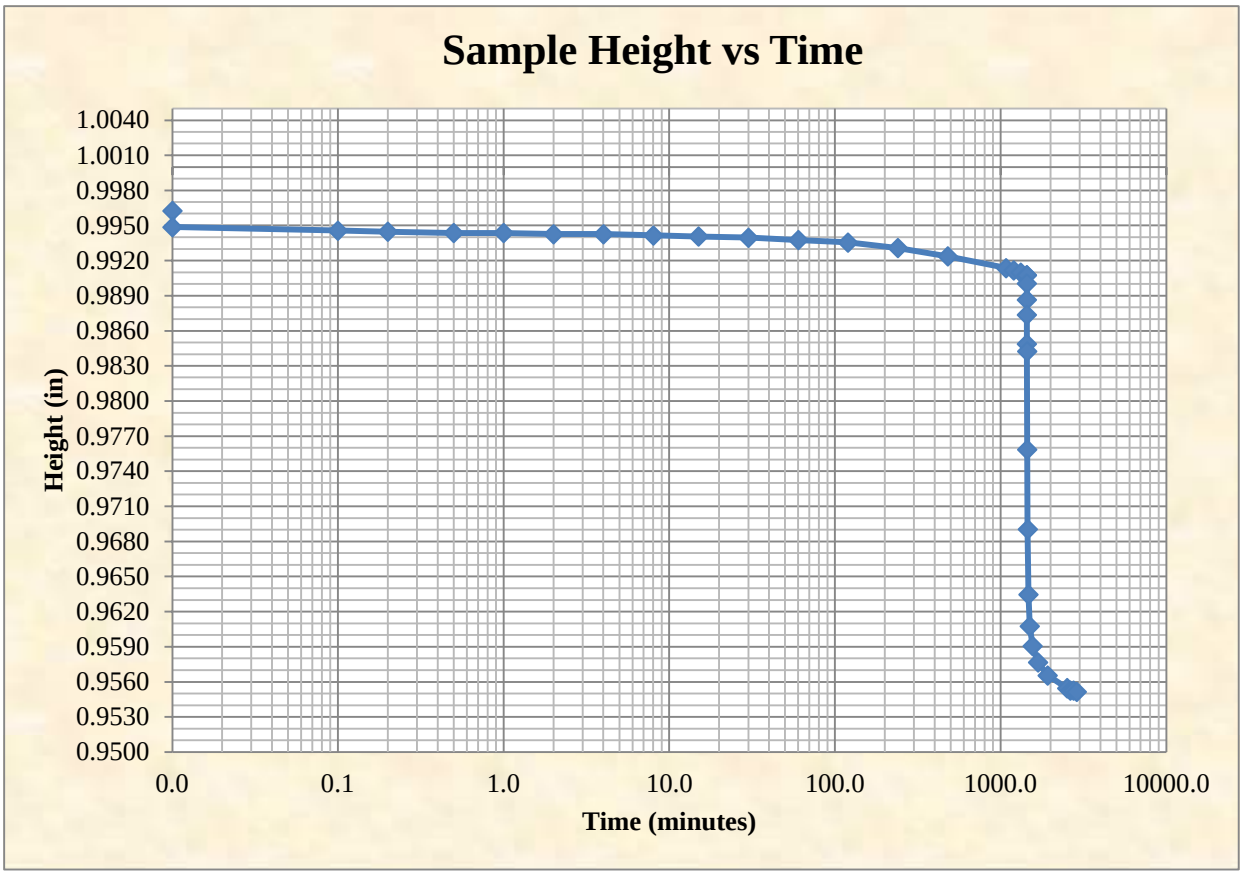
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Tested by: K. Lecce

Reviewed by: J. Moriarty

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID:	**B6@4-4.5**	**IN-SITU LOAD (psf):**	**500**
SAMPLE DESCRIPTION:	**See exploration logs**	**DESIGN LOAD (psf):**	**1500**
TYPE OF WATER USED:	**Distilled**	**USCS: n/a**	**SOURCE OF WATER: Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**	**SAMPLING DATE:**	**n/a**
STORAGE ENVIRONMENT:	**Controlled**	**TEST START DATE:**	**09/11/23**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**41.98**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**99.98**
Specific Gravity, <#4 (Measured):	**2.703**	**Initial water content:**	**12.12**
Initial sample height (in):	**0.9963**	**Final water content:**	**26.11**
Dry in-situ load height (in):	**0.9949**	**Post-test dry density (pcf):**	**98.85**
Dry design load height (in):	**0.9908**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.14*
Wet design load height (in):	**0.9552**	*Dry design load % SWELL/COLLAPSE:*	*-0.41*
Initial sample mass (g):	**122.66**	*Wet design load % SWELL/COLLAPSE:*	*-3.57*
Final saturated sample mass (g):	**137.96**	***Overall % SWELL/COLLAPSE:***	***-4.13***
Initial-test dry density (pcf):	**94.77**		

Testing remarks: As requested by client, an in-situ load was added and then a design load was added prior to saturation. Note, gravels larger #4 were removed and replaced with trimmings.

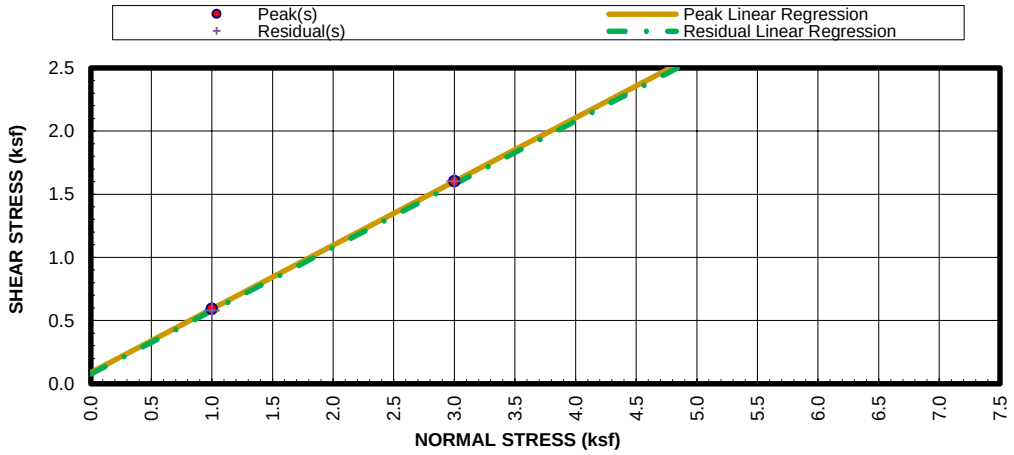
PROJECT NAME:	**G369.01 - Hecker Pass Homes, Gilroy, CA**
PROJECT NUMBER:	**14368.000.220 PHLAB**
CLIENT:	**Baez Geotechnical Group, Inc.**
PHASE NUMBER:	**LAB**
REPORT DATE:	**09/18/23**

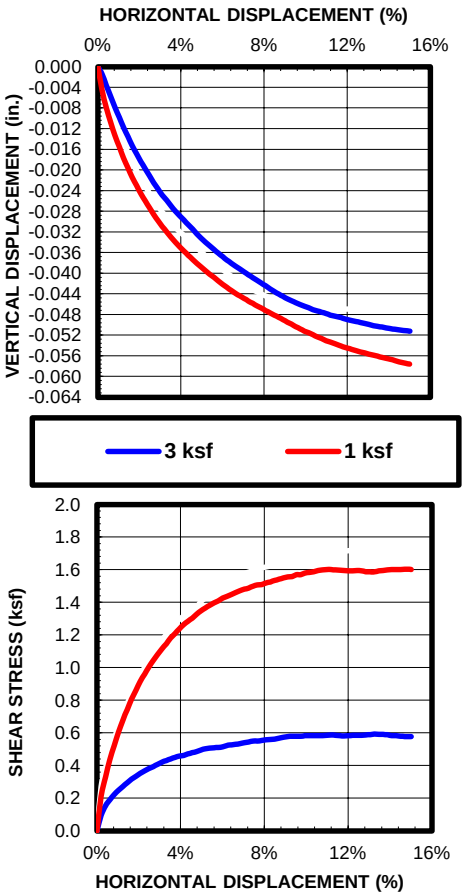
ENGEO
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Tested by: K. Lecce

Reviewed by: J. Moriarty

CONSOLIDATED DRAINED DIRECT SHEAR
ASTM D3080





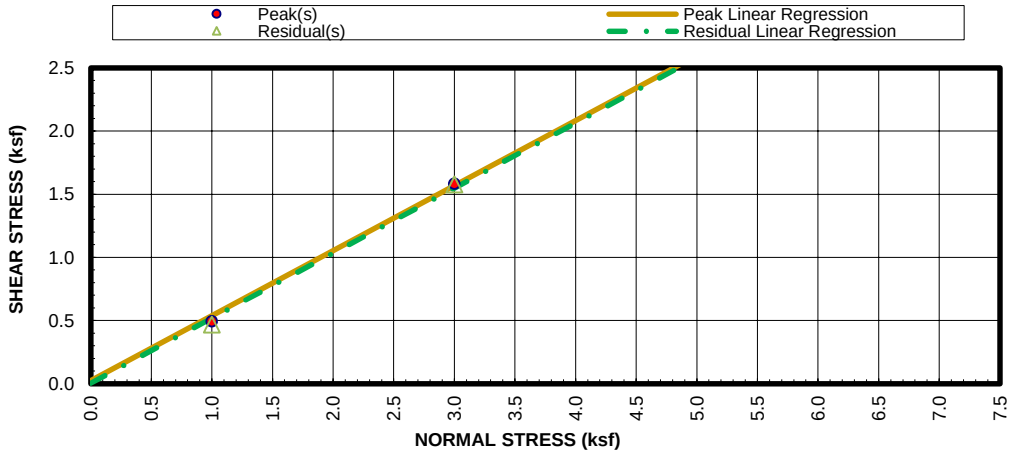
		SPECIMEN		
INITIAL PARAMETERS		**3 ksf**	**1 ksf**	
MOISTURE (%)		10.66	11.41	
DRY DENSITY (PCF)		76.78	78.78	
VOID RATIO		1.212	1.156	
SATURATION (%)		23.94	26.87	
DIAMETER (IN.)		2.415	2.415	
HEIGHT (IN.)		0.987	0.993	
DIAMETER-TO-HEIGHT RATIO		2.446	2.433	
SPECIFIC GRAVITY (ASTM D854)		2.720	2.720	
FINAL PARAMETERS		**3 ksf**	**1 ksf**	
MOISTURE (%)		37.39	31.56	
DRY DENSITY (PCF)		84.19	91.36	
VOID RATIO		1.017	0.859	
SATURATION (%)		100.00	100.00	
DIAMETER (IN.)		2.415	2.415	
HEIGHT (IN.)		0.907	0.862	
NORMAL STRESS (ksf)		1.00	3.00	
PEAK STRESS (ksf)		0.59	1.60	
PEAK STRAIN (%)		13.25	14.70	
RESIDUAL STRESS (ksf)		0.58	1.60	
RESIDUAL STRAIN (%)		15.00	15.00	
RATE (IN/MIN)		0.00181	0.00181	
DIAMETER-TO-HEIGHT RATIO		2.664	2.801	

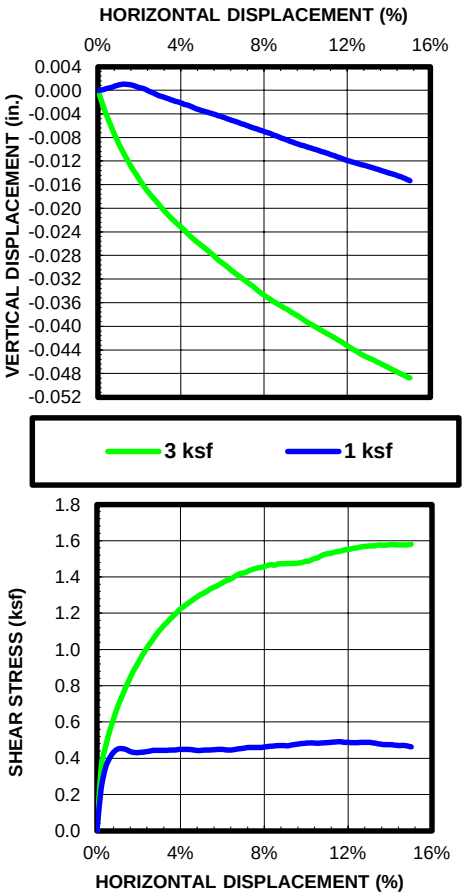
SPECIMEN INFORMATION		**STRENGTH PARAMETERS**	**ϕ°**	**C(psf)**
SAMPLE ID:	B1@3-3.5			
DEPTH (ft):	3-3.5 ft	PEAK:	26.8	88.2
SAMPLE TYPE:	In-situ	RESIDUAL:	26.6	77.4
DESCRIPTION:	See exploration logs	**ASTM D4318**		
		LIQUID LIMIT	n/a	
		PLASTIC LIMIT:	n/a	
REMARKS:	Consolidation data inconclusive. Default minimum shear rates used per ASTM D3080			

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.
PROJECT NAME: G369.01 - Hecker Pass Homes
PROJECT NO: 14368.000.220 PHLAB
PROJECT LOCATION: Gilroy, CA
REPORT DATE: 9/18/2023
TESTED BY: K. Lecce
REVIEWED BY: J. Moriarty

CONSOLIDATED DRAINED DIRECT SHEAR
ASTM D3080





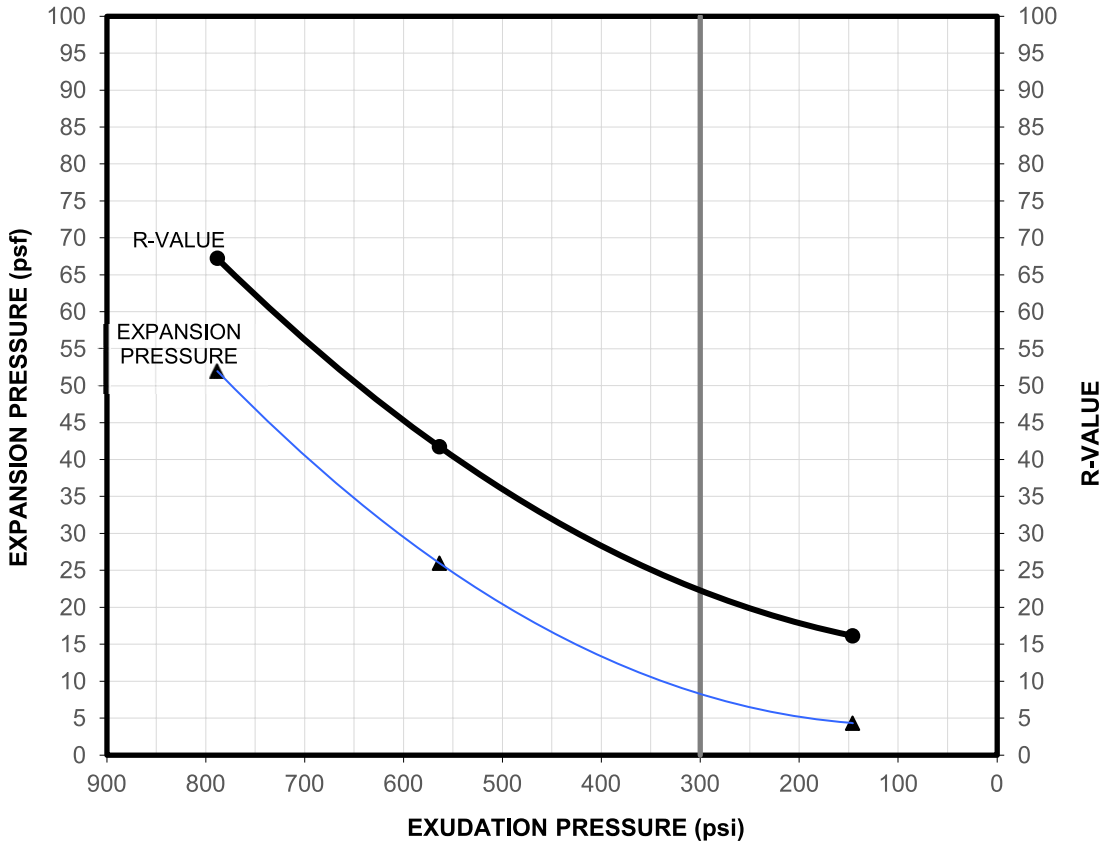
	SPECIMEN			
INITIAL PARAMETERS	**3 ksf**	**1 ksf**		
MOISTURE (%)	12.25	11.62		
DRY DENSITY (PCF)	95.78	100.34		
VOID RATIO	0.788	0.707		
SATURATION (%)	42.66	45.13		
DIAMETER (IN.)	2.415	2.415		
HEIGHT (IN.)	0.989	0.985		
DIAMETER-TO-HEIGHT RATIO	2.442	2.452		
SPECIFIC GRAVITY (ASTM D854)	2.743	2.743		
FINAL PARAMETERS	**3 ksf**	**1 ksf**		
MOISTURE (%)	25.37	27.09		
DRY DENSITY (PCF)	100.97	98.25		
VOID RATIO	0.696	0.743		
SATURATION (%)	100.00	100.00		
DIAMETER (IN.)	2.415	2.415		
HEIGHT (IN.)	0.937	0.977		
NORMAL STRESS (ksf)	3.00	1.00		
PEAK STRESS (ksf)	1.58	0.49		
PEAK STRAIN (%)	15.00	11.59		
RESIDUAL STRESS (ksf)	1.58	0.47		
RESIDUAL STRAIN (%)	15.00	15.00		
RATE (IN/MIN)	0.00181	0.00181		
DIAMETER-TO-HEIGHT RATIO	2.577	2.473		

SPECIMEN INFORMATION		**STRENGTH PARAMETERS**	**ϕ°**	**C(psf)**
SAMPLE ID:	B4@3-3.5			
DEPTH (ft):	3-3.5 ft	PEAK:	27.2	25.0
SAMPLE TYPE:	In-situ	RESIDUAL:	27.2	5.0
DESCRIPTION:	See exploration logs	**ASTM D4318**		
		LIQUID LIMIT	n/a	
		PLASTIC LIMIT:	n/a	
REMARKS:	Consolidation data inconclusive. Default minimum shear rates used per ASTM D3080			

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.
PROJECT NAME: G369.01 - Hecker Pass Homes
PROJECT NO: 14368.000.220 PHLAB
PROJECT LOCATION: Gilroy, CA
REPORT DATE: 9/18/2023
TESTED BY: K. Lecce
REVIEWED BY: J. Moriarty

R-VALUE TEST REPORT
CTM 301



SAMPLE ID	MATERIAL DESCRIPTION	SAMPLE LOCATION
TP-3 @ 1-5'	See exploration logs	TP-3@1-5'

SPECIMENS	1	2	3
EXUDATION PRESSURE (psi)	788	564	146
EXPANSION PRESSURE (psf)	52	26	4
R-VALUE	67	42	16
MOISTURE CONTENT (%)	15.2	16.1	17.0
DRY DENSITY (pcf)	107.4	106.3	105.9
EXPANSION PRESSURE (psf) AT EXUDATION PRESSURE OF 300 psi		8	

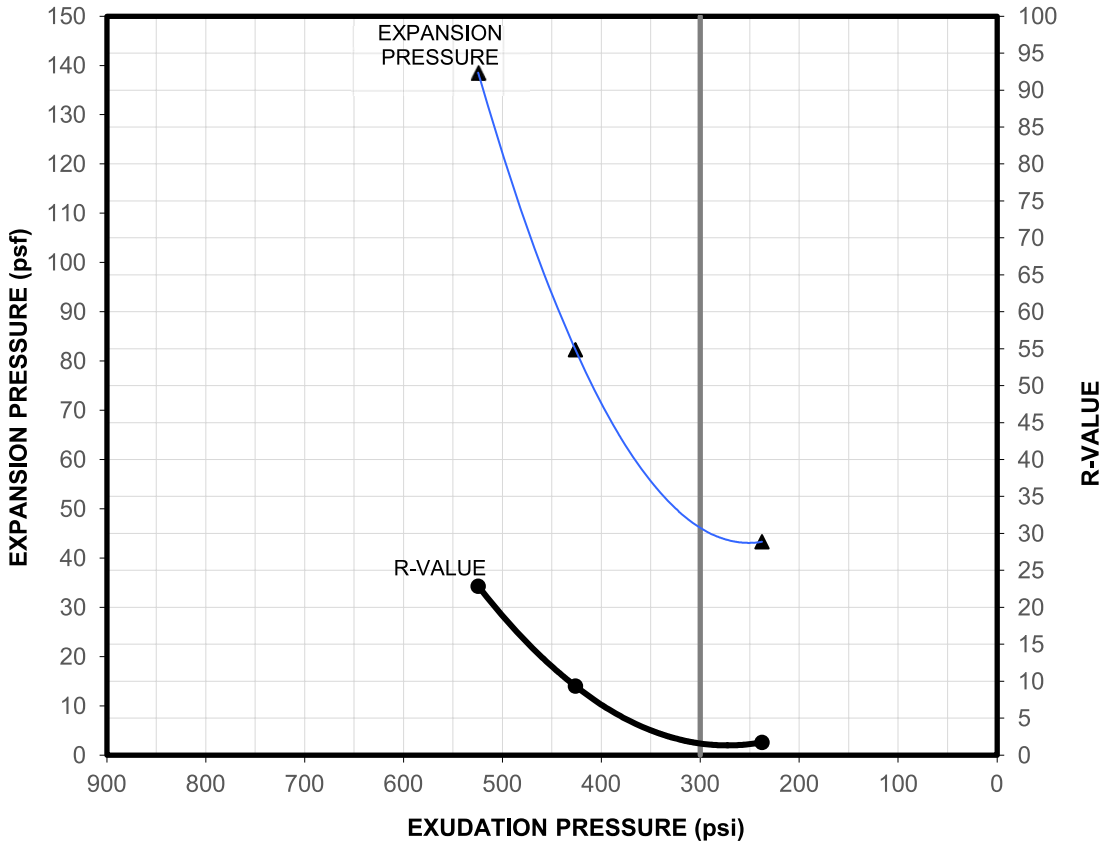
R-VALUE AT EXUDATION PRESSURE OF 300 psi	TEST RESULT
	23

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group., Inc.
PROJECT NAME: G369.01 Hecker Pass Homes
PROJECT NO: 14368.000.220 PHLAB
PROJECT LOCATION: Gilroy, CA
REPORT DATE: 9/14/2023
TESTED BY: O. Espinoza
REVIEWED BY: J. Moriarty

R-VALUE TEST REPORT

CTM 301



SAMPLE ID	MATERIAL DESCRIPTION	SAMPLE LOCATION
TP-5 @ 1-5'	See exploration logs	TP-5 @ 1-5'

SPECIMENS	1	2	3
EXUDATION PRESSURE (psi)	525	426	238
EXPANSION PRESSURE (psf)	139	82	43
R-VALUE	23	9	2
MOISTURE CONTENT (%)	16.3	18.6	24.2
DRY DENSITY (pcf)	116.5	110.4	96.7
EXPANSION PRESSURE (psf) AT EXUDATION PRESSURE OF 300 psi		46	

R-VALUE AT EXUDATION PRESSURE OF 300 psi	TEST RESULT
	Less than 5

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group., Inc.
PROJECT NAME: G369.01 Hecker Pass Homes
PROJECT NO: 14368.000.220 PHLAB
PROJECT LOCATION: Gilroy,CA
REPORT DATE: 9/14/2023
TESTED BY: O. Espinoza
REVIEWED BY: J. Moriarty

APPENDIX D

Laboratory Test Results – CERCO Analytical

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

11 September, 2023

Job No. 2309012
Cust. No. 13042

Ms. Stefanie Parman
Baez Geotechnical Group, Inc.
P.O. Box 296
Oakdale, CA 95361

Subject: Project No.: G369.01
Project Name: Hecker Pass Residential - Gilroy, CA
Corrosivity Analysis – ASTM Methods

Dear Ms. Parman:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on September 07, 2023. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, Sample No.002 is classified as "moderately corrosive" and Sample No.001 is classified as "mildly corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations reflect none detected with a reporting limit of 15 mg/kg.

The sulfate ion concentrations reflect none detected with a reporting limit of 15 mg/kg.

The sulfide ion concentrations reflect none detected with a reporting limit of 50 mg/kg.

The pH of the soils are 7.38 and 7.44, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential for both samples is 110-mV. Both samples are indicative of potentially "moderately corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Baez Geotechnical Group
Client's Project No.: G369.01
Client's Project Name: Hecker Pass Residential - Gilroy, CA
Date Sampled: 30-Aug-23
Date Received: 7-Sep-23
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 11-Sep-2023

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2309012-001	TP3 @ 1-5'	110	7.44	-	13,000	N.D.	N.D.	N.D.
2309012-002	TP6 @ 1-5'	110	7.38	-	3,900	N.D.	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	7-Sep-2023	8-Sep-2023	-	7-Sep-2023	7-Sep-2023	8-Sep-2023	8-Sep-2023

* Results Reported on "As Received" Basis

N.D. - None Detected

Julia Clauson
Chemist

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

Chain of Custody

2309012 2309012

Page 1 of 1

Concord, CA 94520-1006
925 462 2771
Fax: 925 462 2775
CERCO analytical

Job No.	CU#	Client Project I.D.	Schedule	Date Sampled	Date Due
G369.01	13044	Hecker Pass Residential	Analyte	8/30/2023	Standard

Full Name Stefanie Parman, smp@baezgeotechnicalgroup.com **Phone** Office (209) 602-6569

Company and/or Mailing Address Baez Geotechncial Group, PO Box 296, Oakdale, CA 95361 **Cell** (209) 602-6569

Sample Source
G369.01 - Hecker Pass Residential- Gilroy, CA

Lab No.	Sample I.D.	Date	Time	Matrix	Contain.	Size	Preserv.	Qtv.	Redox Potential	pH	Sulfate	Chloride	Resistivity-100% Saturated	Sulfides		Brief Evaluation						
	TP3 @ 1-5'	8/30/23		S	Baggy			1	X	X	X	X	X	X		X						
	TP6 @ 1-5'	8/30/23		S	Baggy			1	X	X	X	X	X	X		X						

ANALYSIS — ASTM

MATRIX: DW - Drinking Water; GW - Ground Water; SW - Surface Water; WW - Waste Water Water; SL - Sludge; S - Soil; Product

ABBREVIATIONS: HB - Hosebib; PV - Petcock Valve; PT - Pressure Tank; PH - Pump House; RR - Restroom; GL - Glass; PL - Plastic; ST - Sterile

SAMPLE RECEIPT: Total No. of Containers; Rec'd Good Cond/Cold; Conforms to Record; Temp. a t Lab -°C; Sampler

Comments:

THERE IS AN ADDITIONAL CHARGE FOR EXTRUDING SOIL FROM METAL TUBES

Email Address smp@baezgeotechnicalgroup.com

Relinquished By:		Date 9/7/23	Time 8:05 AM
Received By:	Nicole Griep	Date 9/7/23	Time 9:26 AM
Relinquished By:		Date	Time
Received By:		Date	Time
Relinquished By:		Date	Time
Received By:		Date	Time

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

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment D:
Retention Volume Calculations

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

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

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	73,308	66,072	52,658
2	7,793	0	0	0	0	0	69,836	57,110	65,740

Pervious vs Impervious Areas									
		Pre-Development		Post-Development					
					Impervious			i	C
DMA	Total Area	Pervious	Impervious	Pervious	Replaced	New	Total		
1	339,642	339,642	0	147,604	0	192,038	192,038	0.57	0.38
2	355,881	348,087	7,793	163,195	0	192,686	192,686	0.54	0.37
Total	695,522	687,729	7,793	310,798	0	384,724	384,724	0.55	0.37

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	339,642	0	0	0	339,642
2	355,881	0	0	0	355,881
Total	695,522	0	0	0	695,522

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 Hollister,

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

0.98 = D_{85} = 85th Percentile Rainfall Depth
1.58 = D_{95} = 95th Percentile Rainfall Depth

c.) compute the runoff coefficient

DMA	DMA Area	Impervious Area	i	C
1	339,642	192,038	0.57	0.38
2	355,881	192,686	0.54	0.37
Total	695,522	384,724	0.55	0.37

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$
i = fraction of the tributary area that is impervious = $A_{impervious}$ / $A_{project}$

d.) Project Type

Residential

e.) Compute Retention Volume required

DMA	DMA Area	$A_{retention}$	i	C	D_{85}	V_{85}	D_{95}	V_{95}
1	339,642	339,642	0.57	0.38	0.98 in.	10,633 CF	1.58 in.	17,144 CF
2	355,881	355,881	0.54	0.37	0.98 in.	10,655 CF	1.58 in.	17,178 CF
Total	**695,522**	**695,522**	0.55	0.37	0.98 in.	21,283 CF	1.58 in.	34,313 CF

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$
i = fraction of the tributary area that is impervious = $A_{impervious}$ / $A_{project}$
V_{85} = Required Quality Treatement Retention Volume = $A_{retention}$ x C x (D_{85}/12)
V_{95} = Required Retention Volume = $A_{retention}$ x C x (D_{95}/12)

3.) Retention Volume Provided

DMA 1

SCM 1 Volume	
Elevation (ft.)	Storage (CF)
231.99	0
232.00	34
232.10	376
232.20	718
232.30	1,026
232.40	1,368
232.50	1,710
232.60	2,052
232.70	2,394
232.80	2,736
232.90	3,078
232.99	3,420
233.00	3,420
233.10	4,138
233.20	4,853
233.30	5,565
233.40	6,275
233.50	6,982

SCM 1 Volume cont.	
Elevation (ft.)	Storage (CF)
233.60	7,686
233.70	8,387
233.80	9,086
233.90	9,782
234.00	10,476
234.10	11,167
234.20	11,855
234.30	12,540
234.40	13,223
234.50	13,903
234.60	14,580
234.70	15,254
234.80	15,925
234.90	16,591
234.98	17,186

Note: Volume Table povided for the NDS SC-44 Stormchambers exported from HydroCAD to provide calculation from the bottom of the provided chambers to the outlet elevation. See Attachment F for detailed volume tables and storage chart.

Total Retention Volume Provided = 17,186 CF

17,186CF ≥ 10,633; therefore in compliance with PR-2
17,186CF ≥ 17,144; therefore in compliance with PR-3

DMA 2

SCM 2 Volume	
Elevation (ft.)	Storage (CF)
226.52	13
226.60	314
226.70	691
226.80	1,031
226.90	1,408
227.00	1,785
227.10	2,162
227.20	2,539
227.30	2,916
227.40	3,293
227.50	3,670
227.52	3,783
227.60	4,337
227.70	5,126
227.80	5,912

SCM 2 Volume cont.	
Elevation (ft.)	Storage (CF)
227.90	6,695
228.00	7,475
228.10	8,252
228.20	9,026
228.30	9,798
228.40	10,566
228.50	11,331
228.60	12,093
228.70	12,853
228.80	13,609
228.90	14,363
229.00	15,113
229.10	15,861
229.20	16,605
229.27	17,197

Note: Volume Table povided for the NDS SC-44 Stormchambers exported from HydroCAD to provide calculation from the bottom of the provided chambers to the outlet elevation. See Attachment F for detailed volume tables and storage chart.

Total Retention Volume Provided = 17,197 CF

17,197CF ≥ 10,655; therefore in compliance with PR-2
17,197CF ≥ 17,178; therefore in compliance with PR-3

4.) Drawdown Time

DMA 1

Infiltration Rates	
P1	5.76 in/hr
P2	5.14 in/hr
P5	7.85 in/hr
P6	6.86 in/hr
P7	6.35 in/hr

Average Infiltration Rate: 6.39 in/hr
Factor of Safety: 2
Design Infiltration Rate: 3.20 in/hr

Retention Volume = V_{ret-1} = 17,186 CF
Infiltration Area = $A_{infiltration}$ = 8,636 SF
Design Infiltration Rate = I_{design} = 3.20 in/hr

Infiltration Flow Rate = $A_{infiltration}$ x I_{design} x (1 ft./12 in.) = 2,300 CF/hr = 0.64 CFS

Drawdown Time = Storage Volume/Infiltration Flow Rate = 7 hours

DMA 2

Infiltration Rates	
P8	3.32 in/hr
P9	1.79 in/hr
P10	4.55 in/hr
P11	3.54 in/hr

Average Infiltration Rate: 3.30 in/hr
Factor of Safety: 2
Design Infiltration Rate: 1.65 in/hr

Retention Volume = V_{ret-1} = 17,197 CF
Infiltration Area = $A_{infiltration}$ = 9,536 SF
Design Infiltration Rate = I_{design} = 1.65 in/hr

Infiltration Flow Rate = $A_{infiltration}$ x I_{design} x (1 ft./12 in.) = 1,311 CF/hr = 0.36 CFS

Drawdown Time = Storage Volume/Infiltration Flow Rate = 13 hours

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

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment E:
Rainfall Data

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

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Rainfall Data

2) Use map:



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	**0.136** (0.121-0.155)	**0.169** (0.150-0.193)	**0.216** (0.190-0.247)	**0.255** (0.223-0.296)	**0.314** (0.261-0.381)	**0.362** (0.292-0.452)	**0.414** (0.323-0.536)	**0.471** (0.353-0.634)	**0.555** (0.394-0.791)	**0.626** (0.424-0.934)
10-min	**0.195** (0.173-0.222)	**0.243** (0.215-0.277)	**0.309** (0.273-0.354)	**0.366** (0.319-0.424)	**0.450** (0.374-0.546)	**0.518** (0.419-0.648)	**0.593** (0.463-0.768)	**0.675** (0.507-0.909)	**0.796** (0.564-1.13)	**0.897** (0.607-1.34)
15-min	**0.236** (0.210-0.269)	**0.294** (0.260-0.335)	**0.374** (0.330-0.428)	**0.443** (0.386-0.513)	**0.544** (0.452-0.660)	**0.627** (0.506-0.784)	**0.717** (0.559-0.928)	**0.816** (0.613-1.10)	**0.962** (0.682-1.37)	**1.08** (0.734-1.62)
30-min	**0.327** (0.290-0.372)	**0.406** (0.360-0.463)	**0.517** (0.456-0.591)	**0.612** (0.534-0.709)	**0.752** (0.625-0.913)	**0.867** (0.700-1.08)	**0.992** (0.774-1.28)	**1.13** (0.847-1.52)	**1.33** (0.943-1.90)	**1.50** (1.02-2.24)
60-min	**0.462** (0.411-0.526)	**0.575** (0.509-0.655)	**0.731** (0.645-0.837)	**0.867** (0.756-1.00)	**1.06** (0.885-1.29)	**1.23** (0.991-1.54)	**1.40** (1.10-1.82)	**1.60** (1.20-2.15)	**1.88** (1.34-2.68)	**2.12** (1.44-3.17)
2-hr	**0.696** (0.618-0.792)	**0.867** (0.769-0.988)	**1.11** (0.977-1.27)	**1.31** (1.15-1.52)	**1.62** (1.34-1.96)	**1.87** (1.51-2.33)	**2.14** (1.67-2.76)	**2.43** (1.83-3.27)	**2.87** (2.03-4.08)	**3.23** (2.19-4.82)
3-hr	**0.873** (0.775-0.993)	**1.09** (0.967-1.24)	**1.40** (1.23-1.60)	**1.66** (1.45-1.92)	**2.05** (1.70-2.48)	**2.36** (1.91-2.96)	**2.70** (2.11-3.50)	**3.08** (2.31-4.14)	**3.63** (2.57-5.17)	**4.08** (2.76-6.09)
6-hr	**1.20** (1.07-1.37)	**1.52** (1.35-1.74)	**1.97** (1.74-2.26)	**2.35** (2.05-2.73)	**2.90** (2.42-3.53)	**3.36** (2.71-4.20)	**3.84** (2.99-4.97)	**4.36** (3.27-5.87)	**5.11** (3.63-7.28)	**5.74** (3.88-8.57)
12-hr	**1.58** (1.40-1.80)	**2.07** (1.83-2.36)	**2.72** (2.41-3.12)	**3.28** (2.86-3.80)	**4.06** (3.38-4.93)	**4.68** (3.78-5.86)	**5.34** (4.17-6.92)	**6.05** (4.54-8.14)	**7.05** (5.00-10.0)	**7.86** (5.32-11.7)
24-hr	**2.05** (1.87-2.28)	**2.76** (2.52-3.08)	**3.70** (3.38-4.15)	**4.48** (4.06-5.06)	**5.56** (4.88-6.47)	**6.41** (5.51-7.60)	**7.28** (6.12-8.84)	**8.21** (6.72-10.2)	**9.49** (7.48-12.3)	**10.5** (8.02-14.1)
2-day	**2.63** (2.41-2.94)	**3.57** (3.26-3.98)	**4.80** (4.37-5.37)	**5.80** (5.25-6.54)	**7.18** (6.30-8.35)	**8.25** (7.10-9.78)	**9.34** (7.86-11.3)	**10.5** (8.59-13.1)	**12.0** (9.49-15.6)	**13.3** (10.1-17.8)

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

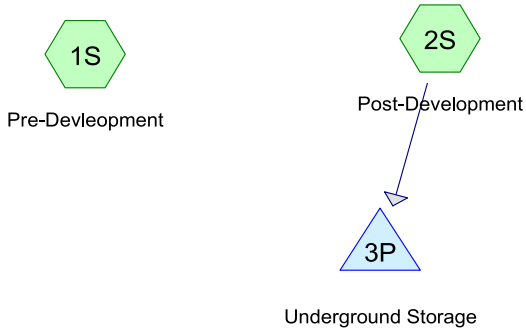
Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment F:
HydroCAD Modeling Output

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

SCS Routing DMA 1

Event Summary



Events for Subcatchment 1S: Pre-Devleopment

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95%	1.50	0.12	0.046	0.07
1 year	2.05	0.43	0.153	0.23
2 year	2.76	0.94	0.354	0.55
5 year	3.70	1.73	0.699	1.08
10 year	4.48	2.44	1.032	1.59
25 year	5.56	3.48	1.542	2.37
50 year	6.41	4.32	1.973	3.04
100 year	**7.28**	**5.19**	**2.433**	**3.74**

Events for Subcatchment 2S: Post-Development

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95%	1.50	0.72	0.294	0.45
1 year	2.05	1.24	0.541	0.83
2 year	2.76	1.94	0.902	1.39
5 year	3.70	2.89	1.424	2.19
10 year	4.48	3.69	1.878	2.89
25 year	5.56	4.78	2.527	3.89
50 year	6.41	5.64	3.048	4.69
100 year	**7.28**	**6.51**	**3.587**	**5.52**

Events for Pond 3P: Underground Storage

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Tertiary (cfs)	Elevation (feet)	Storage (cubic-feet)
95%	0.72	0.62	0.62	0.00	**0.00**	232.29	1,011
1 year	1.24	0.63	**0.63**	0.00	0.00	232.89	3,085
2 year	1.94	0.63	0.63	0.00	0.00	233.81	9,260
5 year	2.89	1.11	0.63	0.48	0.00	235.28	19,117
10 year	3.69	2.74	0.63	2.11	0.00	235.95	23,187
25 year	4.78	3.80	0.63	3.17	0.00	236.57	26,339
50 year	5.64	4.50	0.63	3.86	0.00	237.13	28,290
100 year	**6.51**	**5.76**	0.63	**5.13**	0.00	**237.54**	**29,672**

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 into the City Storm Drain in Lone Oak Drive
Tertiary = Bubble-Up out of lowest catch basin

Pre-Development

Summary for Subcatchment 1S: Pre-Devleopment

Runoff = 5.19 cfs @ 18.14 hrs, Volume= 2.433 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
SCVWD 1956 Storm 100 year Rainfall=7.28"

	Area (sf)	CN	Description
	339,642	69	50-75% Grass cover, Fair, HSG B
*	0	98	existing impervious areas
	339,642	69	Weighted Average
	339,642		100.00% Pervious Area

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

Post-Development

Summary for Subcatchment 2S: Post-Development

Runoff = 6.51 cfs @ 18.13 hrs, Volume= 3.587 af, Depth= 5.52"
Routed to Pond 3P : Underground Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
SCVWD 1956 Storm 100 year Rainfall=7.28"

	Area (sf)	CN	Description
*	52,658	98	AC Pavement
*	73,308	98	Buildings
*	66,072	98	PCC Walkways, Patios, etc.
	147,604	69	50-75% Grass cover, Fair, HSG B
	339,642	85	Weighted Average
	147,604		43.46% Pervious Area
	192,038		56.54% Impervious Area

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

Post-Development Routed Through Storm Water Control

Summary for Pond 3P: Underground Storage

Inflow Area = 7.797 ac, 56.54% Impervious, Inflow Depth = 5.52" for 100 year event
Inflow = 6.51 cfs @ 18.13 hrs, Volume= 3.587 af
Outflow = 5.76 cfs @ 18.39 hrs, Volume= 3.587 af, Atten= 12%, Lag= 15.2 min
Discarded = 0.63 cfs @ 5.06 hrs, Volume= 1.487 af
Primary = 5.13 cfs @ 18.39 hrs, Volume= 2.100 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= 0.02 hrs / 3
Peak Elev= 237.54' @ 18.39 hrs Surf.Area= 8,519 sf Storage= 29,672 cf

Plug-Flow detention time= 164.5 min calculated for 3.587 af (100% of inflow)
Center-of-Mass det. time= 164.4 min (1,108.6 - 944.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	231.99'	4,737 cf	**15.75'W x 208.42'L x 5.67'H Drain Rock 1a**
			18,601 cf Overall - 6,758 cf Embedded = 11,843 cf x 40.0% Voids
#2A	232.99'	6,758 cf	**NDS StormChamber v2 SC-44** x 64 Inside #1
			Effective Size= 69.2"W x 44.0"H => 16.37 sf x 6.42'L = 105.0 cf
			Overall Size= 78.0"W x 44.0"H x 7.50'L with 1.08' Overlap
			Row Length Adjustment= +1.08' x 16.37 sf x 2 rows
#3B	231.99'	7,436 cf	**23.00'W x 227.67'L x 5.67'H Drain Rock 1b**
			29,673 cf Overall - 11,082 cf Embedded = 18,590 cf x 40.0% Void
#4B	232.99'	11,082 cf	**NDS StormChamber v2 SC-44** x 105 Inside #3
			Effective Size= 69.2"W x 44.0"H => 16.37 sf x 6.42'L = 105.0 cf
			Overall Size= 78.0"W x 44.0"H x 7.50'L with 1.08' Overlap
			Row Length Adjustment= +1.08' x 16.37 sf x 3 rows
#5	231.99'	188 cf	**4.00'D x 15.00'H Vertical Cone/Cylinder** -Impervious
		30,202 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

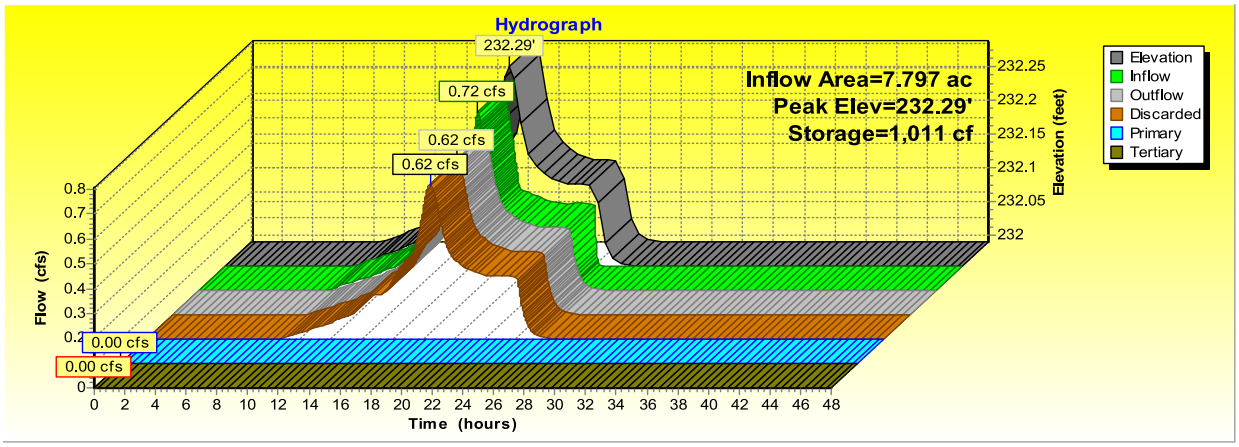
Device	Routing	Invert	Outlet Devices
#0	Tertiary	246.99'	**Automatic Storage Overflow** (Discharged without head)
#1	Primary	234.33'	**18.0" Round Culvert**
			L= 150.0' RCP, rounded edge headwall, Ke= 0.100
			Inlet / Outlet Invert= 234.33' / 233.71' S= 0.0041 '/' Cc= 0.900
			n= 0.011, Flow Area= 1.77 sf
#2	Device 1	234.98'	**11.0" W x 4.0" H Vert. Orifice/Grate**
			X 2 rows with 6.0" cc spacing C= 0.600
			Limited to weir flow at low heads
#3	Device 1	237.16'	**120.0 deg x 0.5' long x 1.00' rise Weir** Cv= 2.48 (C= 3.10)
#4	Discarded	231.99'	**3.200 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.63 cfs @ 5.06 hrs HW=232.29' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.63 cfs)

Primary OutFlow Max=5.02 cfs @ 18.39 hrs HW=237.54' (Free Discharge)
└**1=Culvert** (Passes 5.02 cfs of 12.35 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 4.30 cfs @ 7.03 fps)
  └**3=Weir** (Weir Controls 0.73 cfs @ 1.69 fps)

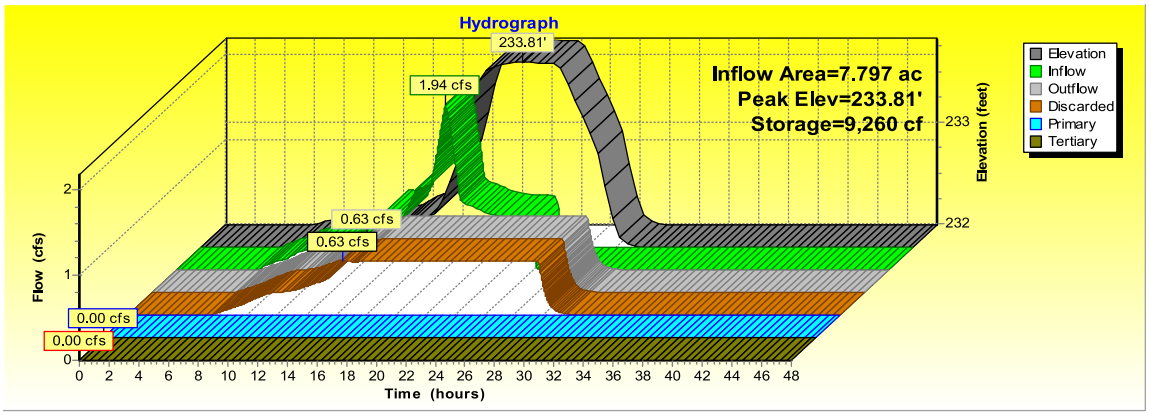
Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=231.99' (Free Discharge)

95th% Event



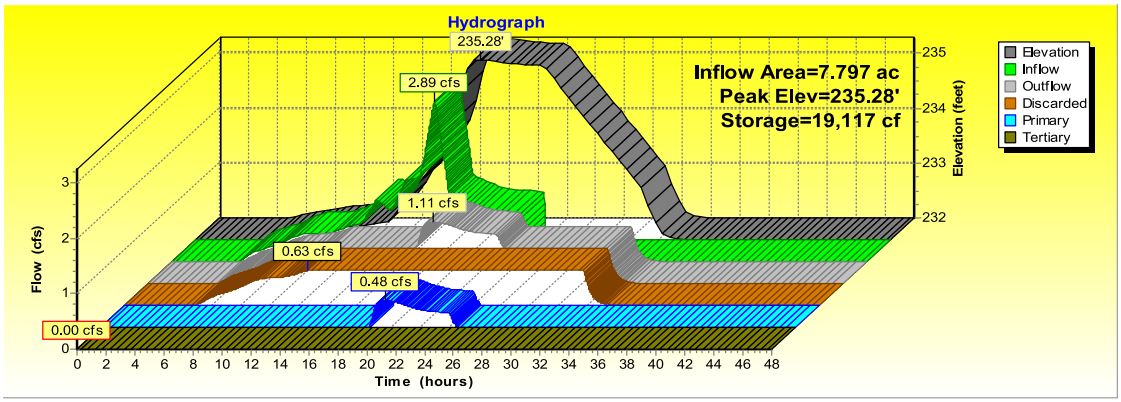
Note: 0cfs discharge from Primary Outlet for 95th% event
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via City Storm Drain in Lone Oak Drive
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 35 of the model, 11 hours after the end of the 100-year storm

2-year Event



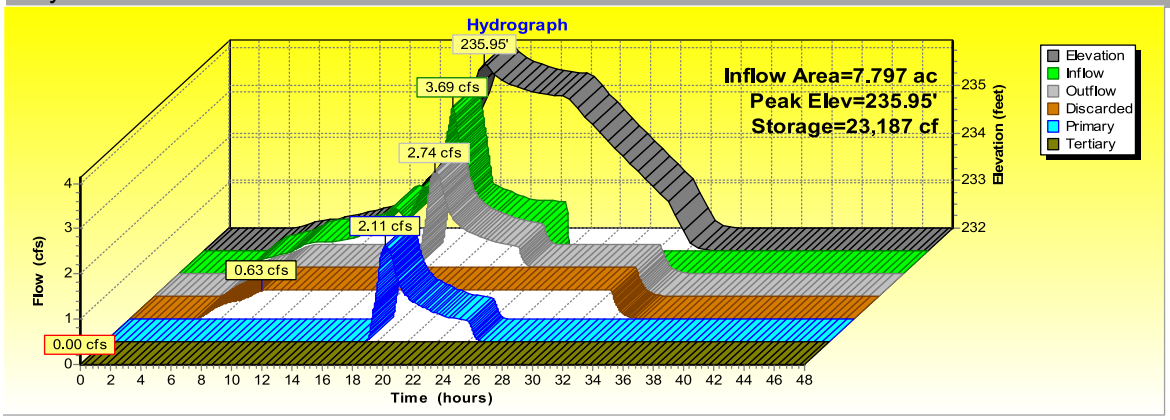
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via City Storm Drain in Lone Oak Drive
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 35 of the model, 11 hours after the end of the 100-year storm

5-year Event



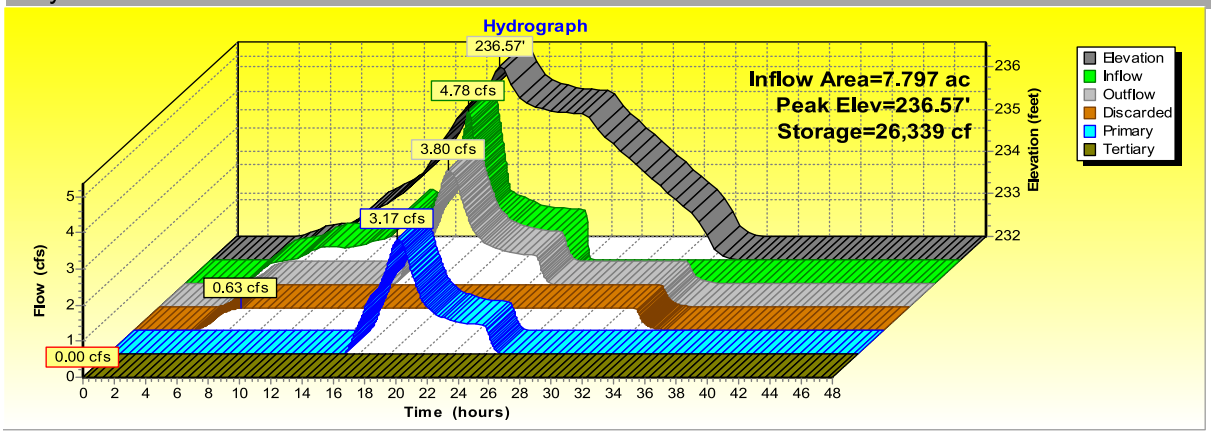
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via City Storm Drain in Lone Oak Drive
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 35 of the model, 11 hours after the end of the 100-year storm

10-year Event



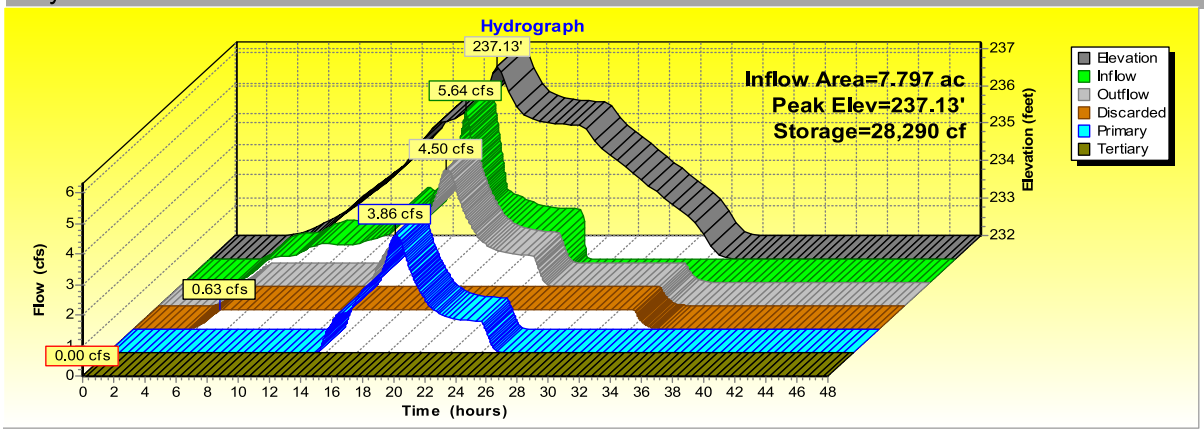
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via City Storm Drain in Lone Oak Drive
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 35 of the model, 11 hours after the end of the 100-year storm

25-year Event



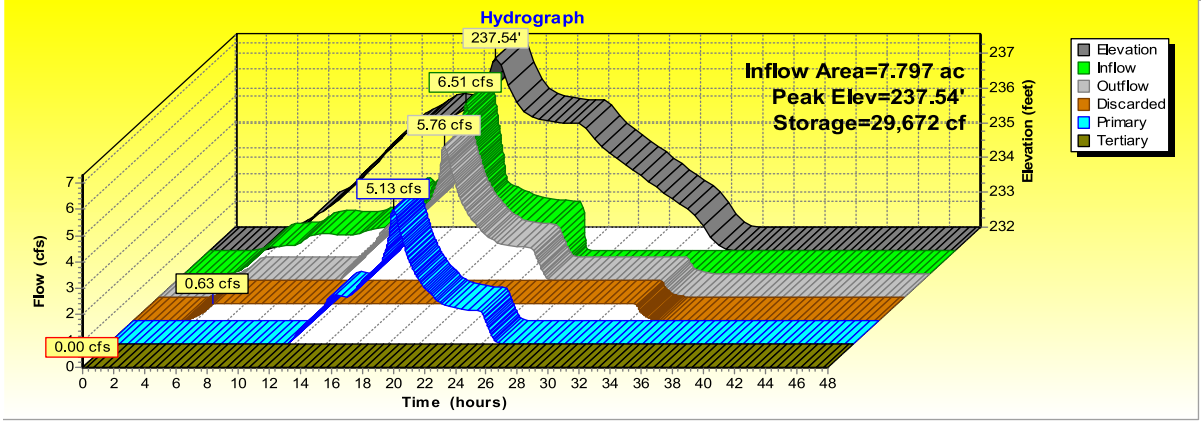
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via City Storm Drain in Lone Oak Drive
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 35 of the model, 11 hours after the end of the 100-year storm

50-year 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 via City Storm Drain in Lone Oak Drive
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 35 of the model, 11 hours after the end of the 100-year storm

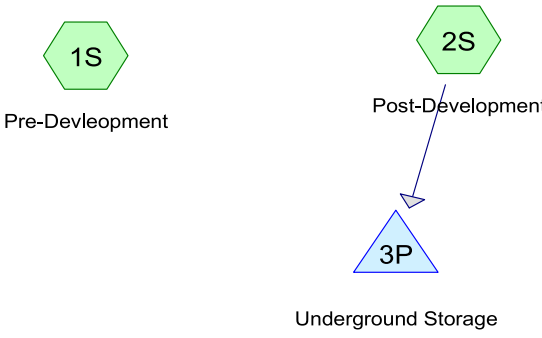
100-year Event



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 via City Storm Drain in Lone Oak Drive
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 35 of the model, 11 hours after the end of the 100-year storm

SCS Routing DMA 2

Event Summary



Events for Subcatchment 1S: Pre-Devleopment

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95%	1.50	0.15	0.057	0.08
1 year	2.05	0.49	0.177	0.26
2 year	2.76	1.04	0.398	0.59
5 year	3.70	1.88	0.772	1.13
10 year	4.48	2.64	1.130	1.66
25 year	5.56	3.74	1.675	2.46
50 year	6.41	4.63	2.134	3.13
100 year	**7.28**	**5.55**	**2.623**	**3.85**

Events for Subcatchment 2S: Post-Development

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
95%	1.50	0.75	0.308	0.45
1 year	2.05	1.29	0.566	0.83
2 year	2.76	2.03	0.946	1.39
5 year	3.70	3.03	1.492	2.19
10 year	4.48	3.86	1.968	2.89
25 year	5.56	5.01	2.648	3.89
50 year	6.41	5.91	3.193	4.69
100 year	**7.28**	**6.82**	**3.759**	**5.52**

Events for Pond 3P: Underground Storage

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Tertiary (cfs)	Elevation (feet)	Storage (cubic-feet)
95%	0.75	0.36	**0.36**	0.00	**0.00**	226.91	1,465
1 year	1.29	0.36	0.36	0.00	0.00	228.01	7,626
2 year	2.03	0.63	0.36	0.27	0.00	229.41	18,259
5 year	3.03	2.12	0.36	1.76	0.00	229.98	22,277
10 year	3.86	2.78	0.36	2.42	0.00	230.45	25,418
25 year	5.01	3.70	0.36	3.34	0.00	231.15	29,278
50 year	5.91	4.93	0.36	4.57	0.00	231.63	31,074
100 year	**6.82**	**5.74**	0.36	**5.39**	0.00	**232.11**	**32,882**

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 into the Storm Drain Pipe Outflow from existing Detention Pond.
Tertiary = Bubble-Up out of lowest catch basin

Pre-Development

Summary for Subcatchment 1S: Pre-Devleopment

Runoff = 5.55 cfs @ 18.14 hrs, Volume= 2.623 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
SCVWD 1956 Storm 100 year Rainfall=7.28"

	Area (sf)	CN	Description
	348,087	69	50-75% Grass cover, Fair, HSG B
*	7,793	98	existing impervious areas
	355,880	70	Weighted Average
	348,087		97.81% Pervious Area
	7,793		2.19% Impervious Area

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

Post-Development

Summary for Subcatchment 2S: Post-Development

Runoff = 6.82 cfs @ 18.14 hrs, Volume= 3.759 af, Depth= 5.52"
Routed to Pond 3P : Underground Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
SCVWD 1956 Storm 100 year Rainfall=7.28"

	Area (sf)	CN	Description
*	65,740	98	AC Pavement
*	69,836	98	Buildings
*	57,110	98	PCC Walkways, Patios, etc.
	163,195	69	50-75% Grass cover, Fair, HSG B
	355,881	85	Weighted Average
	163,195		45.86% Pervious Area
	192,686		54.14% Impervious Area

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

Post-Development Routed Through Storm Water Control

Summary for Pond 3P: Underground Storage

Inflow Area = 8.170 ac, 54.14% Impervious, Inflow Depth = 5.52" for 100 year event
Inflow = 6.82 cfs @ 18.14 hrs, Volume= 3.759 af
Outflow = 5.74 cfs @ 18.46 hrs, Volume= 3.758 af, Atten= 16%, Lag= 19.1 min
Discarded = 0.36 cfs @ 4.09 hrs, Volume= 1.047 af
Primary = 5.39 cfs @ 18.46 hrs, Volume= 2.712 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 / 3

Peak Elev= 232.11' @ 18.46 hrs Surf.Area= 9,395 sf Storage= 32,882 cf

Plug-Flow detention time= 193.4 min calculated for 3.758 af (100% of inflow)
Center-of-Mass det. time= 193.5 min (1,137.8 - 944.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	226.52'	8,508 cf	**15.75'W x 375.25'L x 5.67'H Drain Rock 2a** 33,491 cf Overall - 12,220 cf Embedded = 21,271 cf x 40.0% Void
#2A	227.52'	12,220 cf	**NDS StormChamber v2 SC-44** x 116 Inside #1 Effective Size= 69.2"W x 44.0"H => 16.37 sf x 6.42'L = 105.0 cf Overall Size= 78.0"W x 44.0"H x 7.50'L with 1.08' Overlap Row Length Adjustment= +1.08' x 16.37 sf x 2 rows
#3B	226.52'	4,921 cf	**37.50'W x 92.92'L x 5.67'H Drain Rock 2b** 19,745 cf Overall - 7,441 cf Embedded = 12,303 cf x 40.0% Voids
#4B	227.52'	7,441 cf	**NDS StormChamber v2 SC-44** x 70 Inside #3 Effective Size= 69.2"W x 44.0"H => 16.37 sf x 6.42'L = 105.0 cf Overall Size= 78.0"W x 44.0"H x 7.50'L with 1.08' Overlap Row Length Adjustment= +1.08' x 16.37 sf x 5 rows
#5	225.52'	148 cf	**4.00'D x 11.80'H Vertical Cone/Cylinder** -Impervious
		33,240 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

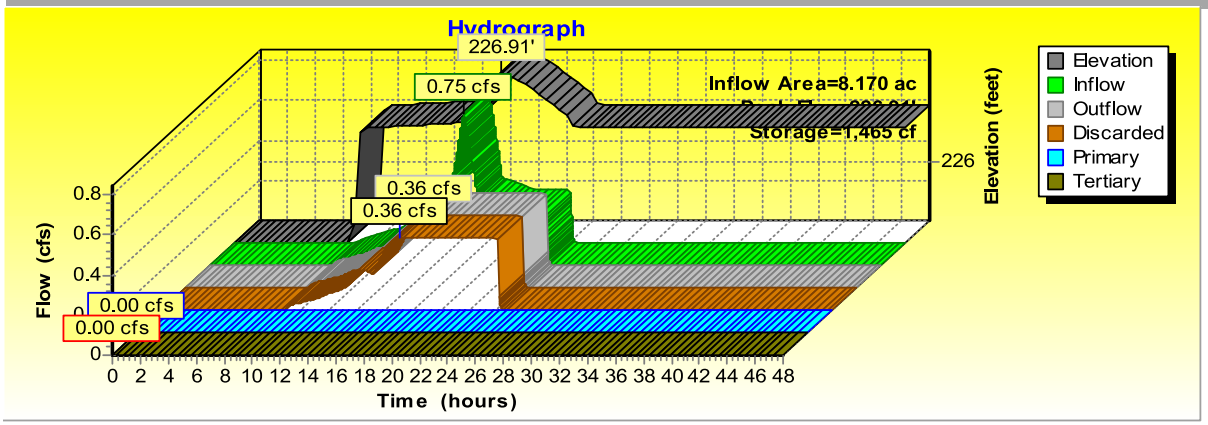
Device	Routing	Invert	Outlet Devices
#0	Tertiary	237.32'	**Automatic Storage Overflow** (Discharged without head)
#1	Primary	228.50'	**18.0" Round Culvert** L= 20.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 228.50' / 2.40' S= 11.3050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	229.27'	**18.0" W x 4.0" H Vert. 18"x4" Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	231.00'	**11.2" W x 4.0" H Vert. 11.25"x4" Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	233.50'	**90.0 deg x 2.0' long x 0.50' rise Overflow Weir** Cv= 2.50 (C= 3.13)
#5	Discarded	226.52'	**1.650 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.36 cfs @ 4.09 hrs HW=226.52' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=5.39 cfs @ 18.46 hrs HW=232.11' (Free Discharge)
└**1=Culvert** (Passes 5.39 cfs of 19.62 cfs potential flow)
  ├**2=18"x4" Orifice** (Orifice Controls 3.93 cfs @ 7.87 fps)
  ├**3=11.25"x4" Orifice** (Orifice Controls 1.45 cfs @ 4.67 fps)
  └**4=Overflow Weir** (Controls 0.00 cfs)

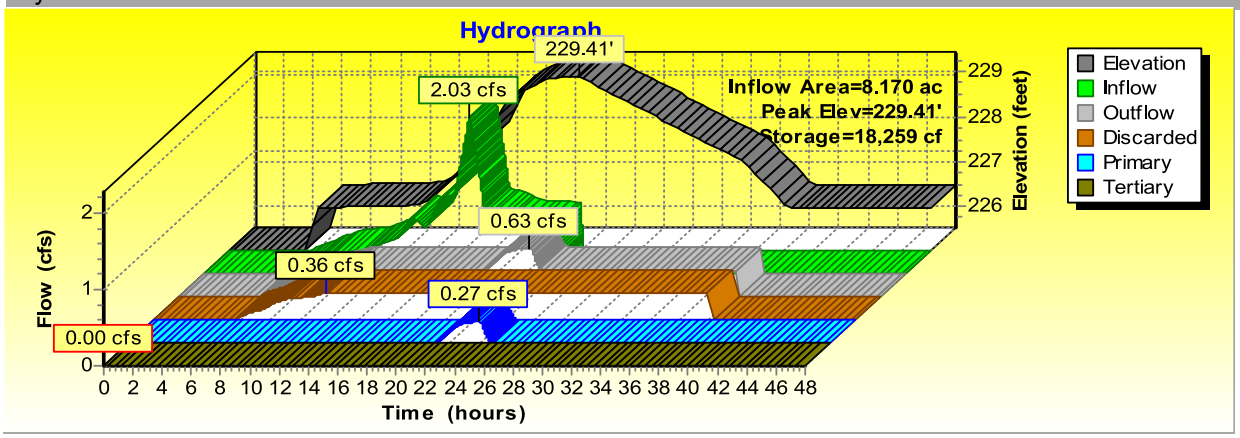
Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=225.52' (Free Discharge)

95th% Event



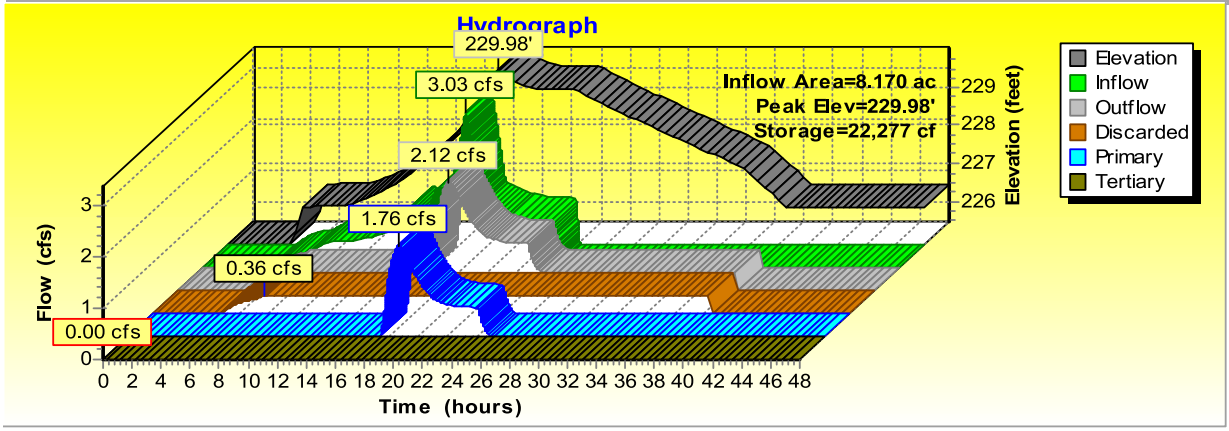
Note: 0cfs discharge from Primary Outlet for 95th% event
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via storm drain outlet from existing detention pond
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 39 of the model, 15 hours after the end of the 100-year storm

2-year Event



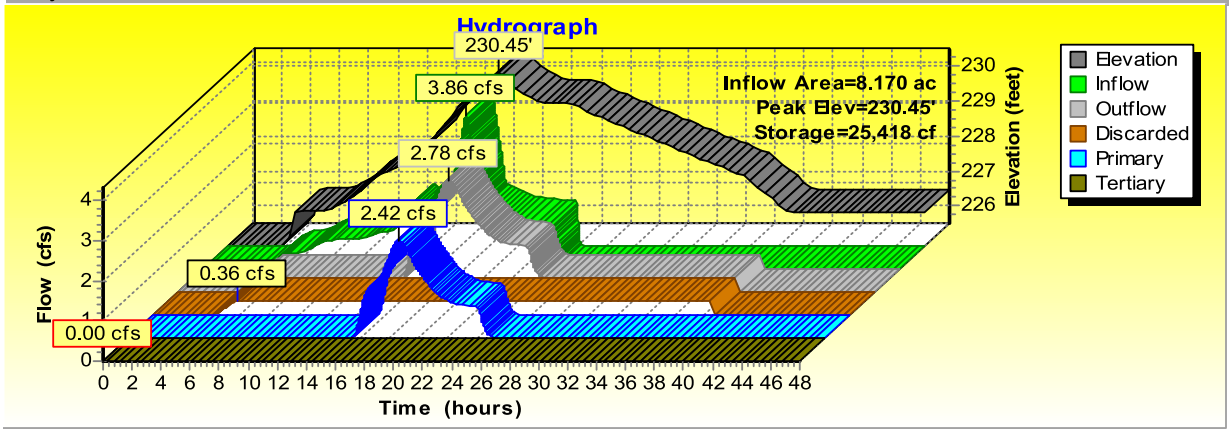
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via storm drain outlet from existing detention pond
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 39 of the model, 15 hours after the end of the 100-year storm

5-year Event



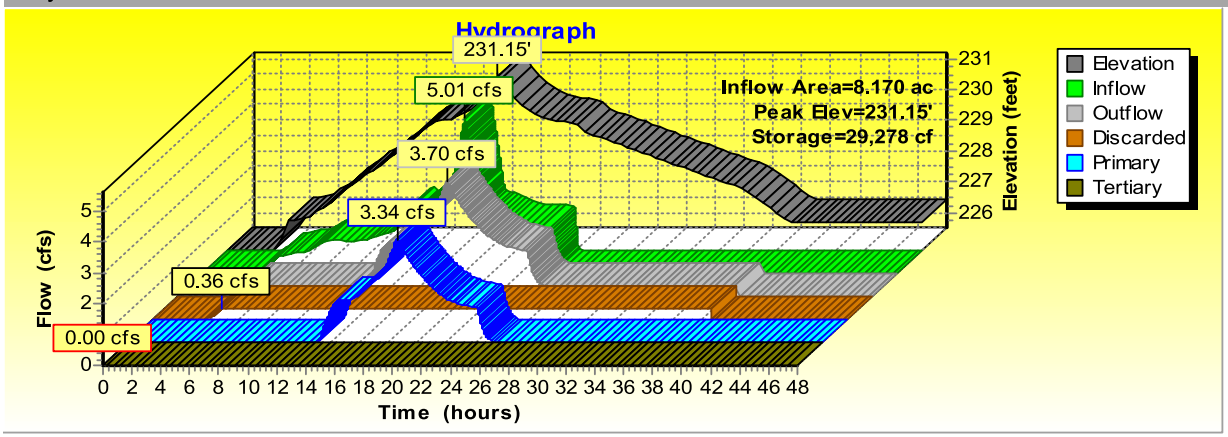
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via storm drain outlet from existing detention pond
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 39 of the model, 15 hours after the end of the 100-year storm

10-year Event



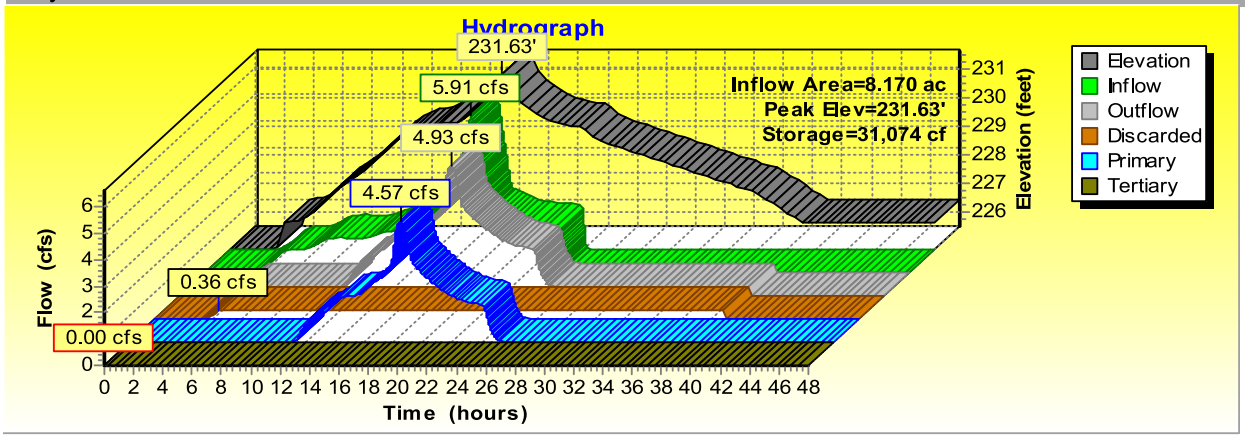
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via storm drain outlet from existing detention pond
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 39 of the model, 15 hours after the end of the 100-year storm

25-year Event



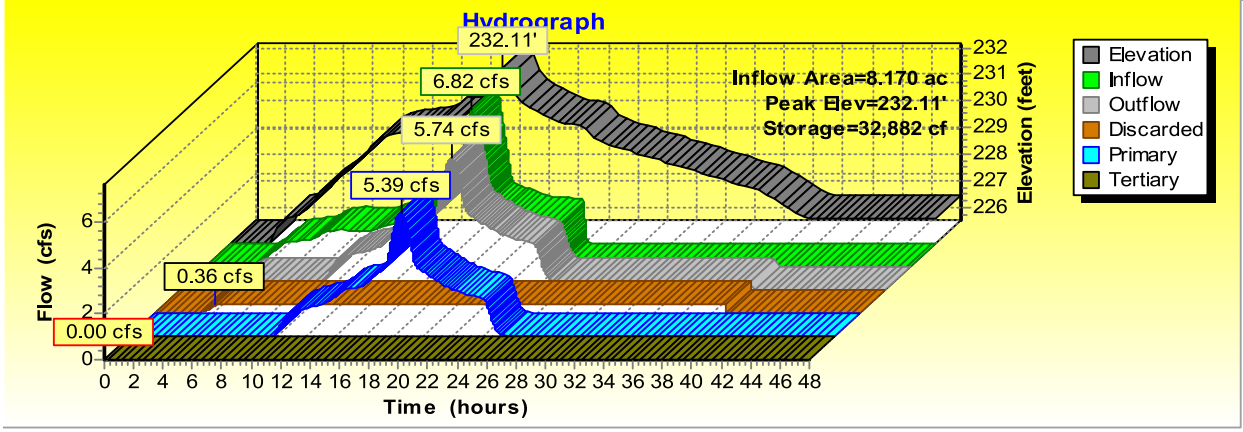
Elevation = water surface elevation
Inflow = all inflow into the storm water control
Outflow = sum of all outflow (discarded+primary+tertiary)
Discarded = flow out via infiltration
Primary = flow out via storm drain outlet from existing detention pond
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 39 of the model, 15 hours after the end of the 100-year storm

50-year 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 via storm drain outlet from existing detention pond
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 39 of the model, 15 hours after the end of the 100-year storm

100-year 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 via storm drain outlet from existing detention pond
Tertiary = Bubble Up out of Lowest Catch Basin
Note: full dewatering of subsurface retention occurs at hour 39 of the model, 15 hours after the end of the 100-year storm

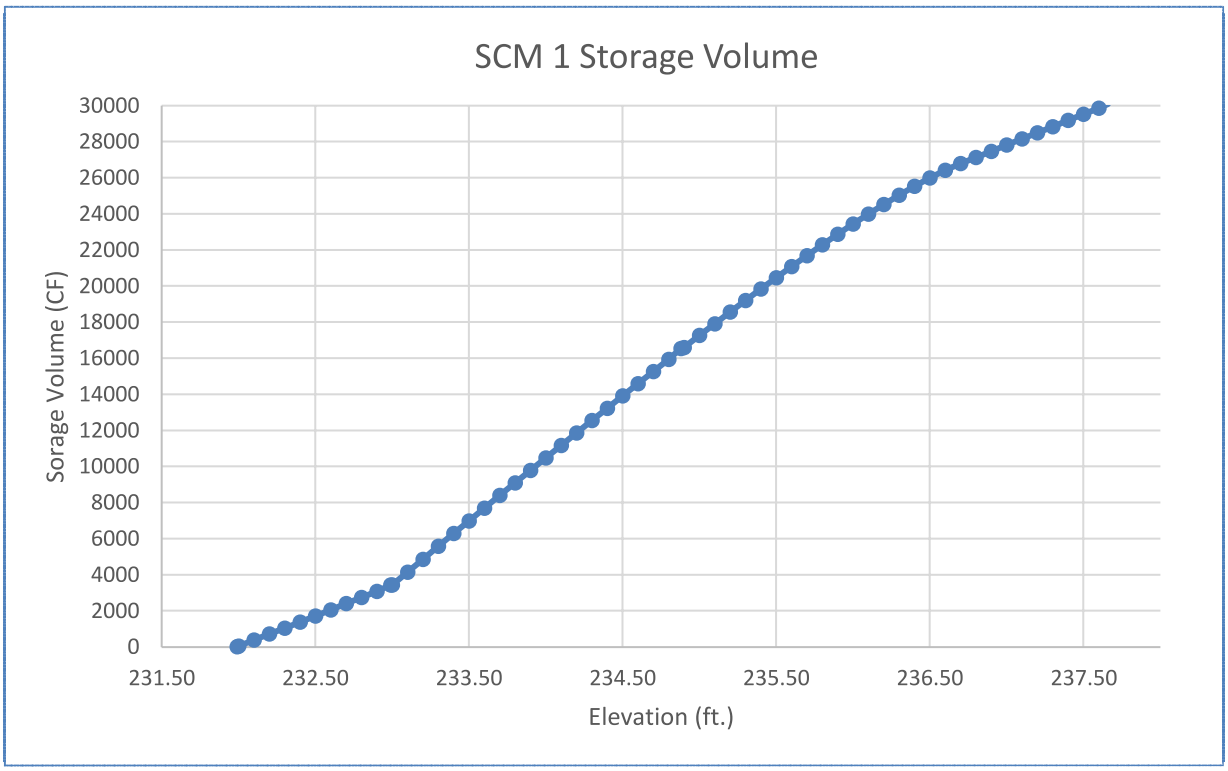
MH engineering Co.
16075 Vineyard Blvd., Morgan Hill, CA 95037 - (408) 779-7381

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment G:
HydroCAD Storage Curves

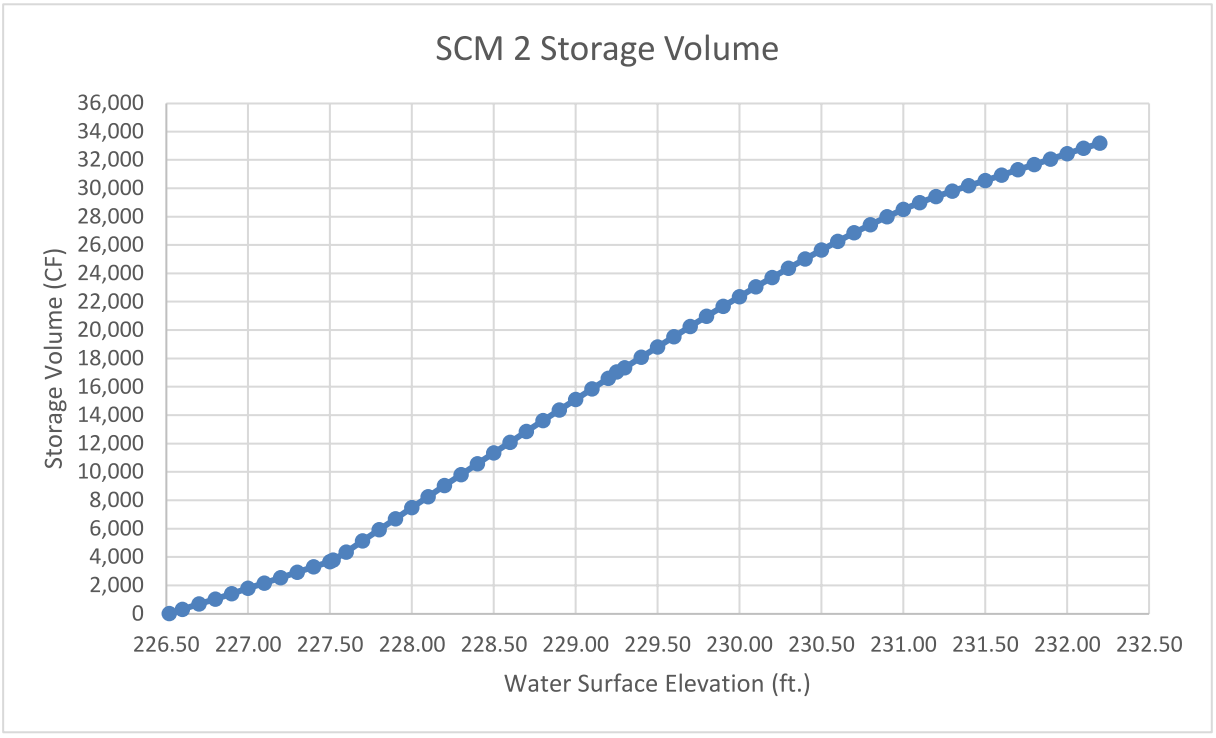
SCM 1 Elevation (feet)	Volume Storage (cubic-feet)
231.99	0
232.00	34
232.10	376
232.20	718
232.30	1026
232.40	1368
232.50	1710
232.60	2052
232.70	2394
232.80	2736
232.90	3078
232.99	3420
233.00	3420
233.10	4138
233.20	4853
233.30	5565
233.40	6275
233.50	6982
233.60	7686
233.70	8387
233.80	9086
233.90	9782
234.00	10476
234.10	11167
234.20	11855
234.30	12540
234.40	13223
234.50	13903
234.60	14580
234.70	15254
234.80	15925
234.88	16524
234.90	16591
235.00	17252
235.10	17907
235.20	18555
235.30	19197
235.40	19832
235.50	20458
235.60	21074
235.70	21679
235.80	22274
235.90	22857
236.00	23425
236.10	23978
236.20	24515
236.30	25030
236.40	25522
236.50	25987

236.60	26414
236.70	26779
236.80	27121
236.90	27463
237.00	27805
237.10	28147
237.20	28489
237.30	28831
237.40	29173
237.50	29515
237.60	29857
237.66	30085



SCM 2 Elevation (feet)	Volume Storage (cubic-feet)
226.52	13
226.60	314
226.70	691
226.80	1,031
226.90	1,408
227.00	1,785
227.10	2,162
227.20	2,539
227.30	2,916
227.40	3,293
227.50	3,670
227.52	3,783
227.60	4,337
227.70	5,126
227.80	5,912
227.90	6,695
228.00	7,475
228.10	8,252
228.20	9,026
228.30	9,798
228.40	10,566
228.50	11,331
228.60	12,093
228.70	12,853
228.80	13,609
228.90	14,363
229.00	15,113
229.10	15,861
229.20	16,605
229.25	17,049
229.30	17,345
229.40	18,081
229.50	18,811
229.60	19,535
229.70	20,252
229.80	20,962
229.90	21,664
230.00	22,357
230.10	23,039
230.20	23,710
230.30	24,369
230.40	25,016
230.50	25,647

230.60	26,262
230.70	26,859
230.80	27,435
230.90	27,986
231.00	28,507
231.10	28,992
231.20	29,417
231.30	29,794
231.40	30,171
231.50	30,548
231.60	30,925
231.70	31,302
231.80	31,679
231.90	32,057
232.00	32,434
232.10	32,811
232.20	33,175



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

Project: Lands of Murray
Project No.: 223026
Date: 2/16/2024

Attachment H:
Stormwater Control Plan Sheets

02/15/2024 12:16pm
FOR PLANCHECK ONLY

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

FOR PLANCHECK ONLY
signature shall be provided upon approval

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

Prelminary Grading Plan - West Side

Hecker Pass Specific Plan - Low Income Housing

DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: WA
CHECKED BY: WJM

JOB NO. 223026

SHEET C.13
OF 31

SCALE: 1"=40'
0 10 20 30 40 60 80 100

Match Line X=C.13
See Sheet C.14

135
6234627.49
1826879.36
245.84

Hecker Pass Highway

Walter Way

Autumn Drive

Walter Court

Lone Oak Ct.

Plum Street

Curb Inlet TC 243.66'

Curb Inlet TC 242.36'

24x36 Field Inlet TC 242.83'

Curb Inlet TC 243.70'

Curb Inlet TC 242.82'

Curb Inlet TC 241.26'

Curb Inlet TC 240.67'

Curb Inlet TC 239.83'

SDMH Rim 243.42

SDMH Rim 243.16

SDMH Rim 242.30

SDMH Rim 242.72

Cascade Separator SDMH Rim 243.63

Cascade Separator SDMH Rim 241.66

SDMH Rim 241.23

Outlet Structure 1 Rim 241.22

Conform 242.6 ±

Conform 241.4 ±

Lot 1 PAD: 245.95 FF: 246.78
Lot 2 PAD: 245.80 FF: 246.63
Lot 3 PAD: 245.80 FF: 246.63
Lot 4 PAD: 245.45 FF: 246.28
Lot 5 PAD: 245.30 FF: 246.13
Lot 6 PAD: 245.30 FF: 246.13
Lot 7 PAD: 244.95 FF: 245.78
Lot 8 PAD: 244.80 FF: 245.63
Lot 9 PAD: 244.60 FF: 245.43
Lot 10 PAD: 244.65 FF: 245.48
Lot 11 PAD: 244.30 FF: 245.13
Lot 12 PAD: 244.05 FF: 244.88
Lot 13 PAD: 244.00 FF: 244.83
Lot 14 PAD: 243.75 FF: 244.58
Lot 15 PAD: 243.65 FF: 244.48
Lot 16 PAD: 243.80 FF: 244.63
Lot 17 PAD: 243.90 FF: 244.73
Lot 18 PAD: 243.75 FF: 244.58
Lot 19 PAD: 243.55 FF: 244.38
Lot 20 PAD: 243.35 FF: 244.18
Lot 21 PAD: 243.15 FF: 243.98
Lot 22 PAD: 243.10 FF: 243.93
Lot 23 PAD: 242.90 FF: 243.73
Lot 24 PAD: 242.70 FF: 243.53
Lot 25 PAD: 242.25 FF: 243.08
Lot 26 PAD: 242.10 FF: 242.93
Lot 27 PAD: 242.10 FF: 242.93
Lot 28 PAD: 241.95 FF: 242.78
Lot 29 PAD: 242.40 FF: 243.23
Lot 30 PAD: 242.50 FF: 243.33
Lot 31 PAD: 242.70 FF: 243.53
Lot 32 PAD: 243.00 FF: 243.83
Lot 33 PAD: 243.30 FF: 244.13
Lot 34 PAD: 243.30 FF: 244.13
Lot 35 PAD: 243.55 FF: 244.38
Lot 36 PAD: 243.55 FF: 244.38
Lot 37 PAD: 243.80 FF: 244.63
Lot 38 PAD: 243.75 FF: 244.58
Lot 39 PAD: 243.95 FF: 244.78
Lot 40 PAD: 244.15 FF: 244.98
Lot 41 PAD: 244.30 FF: 245.13
Lot 42 PAD: 244.20 FF: 245.03
Lot 43 PAD: 244.35 FF: 245.18
Lot 44 PAD: 244.55 FF: 245.38
Lot 45 PAD: 244.85 FF: 245.68
Lot 46 PAD: 245.10 FF: 245.93
Lot 47 PAD: 245.50 FF: 246.33
Lot 48 PAD: 245.40 FF: 246.23
Lot 49 PAD: 245.25 FF: 246.08
Lot 50 PAD: 245.10 FF: 245.93
Lot 51 PAD: 244.95 FF: 245.78
Lot 52 PAD: 244.80 FF: 245.63
Lot 53 PAD: 244.65 FF: 245.48
Lot 54 PAD: 244.40 FF: 245.23
Lot 55 PAD: 244.25 FF: 245.08
Lot 56 PAD: 244.10 FF: 244.93
Lot 57 PAD: 243.85 FF: 244.68
Lot 58 PAD: 243.70 FF: 244.53
Lot 59 PAD: 243.55 FF: 244.38
Lot 60 PAD: 243.90 FF: 244.73
Lot 61 PAD: 243.80 FF: 244.63
Lot 62 PAD: 243.70 FF: 244.53
Lot 63 PAD: 243.45 FF: 244.28

HP TC 245.01
HP TC 242.89
HP TC 242.89
TC 244.81
TC 244.50
TC 244.00
TC 243.50
TC 243.36
TC 243.00
TC 242.89
TC 242.56
TC 242.50
TC 242.36
TC 242.20
TC 242.09
TC 242.00
TC 241.79
TC 241.50
TC 244.00
TC 243.50

FG 245.59
FG 245.16
FG 244.73
FG 244.41
FG 244.07
FG 243.82
FG 243.51
FG 243.26
FG 243.81
FG 243.35
FG 242.95
FG 240.81
FG 240.55
FG 243.89
FG 243.81
FG 243.42
FG 243.04
FG 242.65
FG 242.26
FG 241.96
FG 241.90

SW 243.09
SW 242.62
SW 242.57
SW 242.23
SW 242 09
SW 241.75
SW 240.91

0.41%
2.00%
2.00%
0.50%
0.70%
0.54%
0.60%
0-2% (typ)
4.7% (typ)
2.00%2.00%
2.00%2.00%
2.00%2.00%

Match Line X-C.13
See Sheet C.14

North

SCALE: 1"=40'

0 10 20 30 40 60 80 100

02/15/2024 12:16pm
FOR PLANCHECK ONLY

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

FOR PLANCHECK ONLY
signature shall be provided upon approval

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

Preliminary Grading Plan - East Side
Hecker Pass Specific Plan - Low Income Housing

DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: WA
CHECKED BY: WJM

JOB NO.
223026

SHEET
C.14
OF
31

Autumn Drive
Hoey Ct.
Hoey Place
Ranch Drive
Barn Drive
3rd St.
Plum Street
Apple Tree Way

383' - 8" Wall
Retains 0' - 4.03'

766' - 8" Wall
Retains 0' - 4.91'

232' - 8" Wall
Retains 0' - 3.46'

Lot 89 PAD: 242.05 FF: 242.88
Lot 90 PAD: 242.15 FF: 242.98
Lot 88 PAD: 241.70 FF: 242.53
Lot 87 PAD: 241.40 FF: 242.23
Lot 86 PAD: 241.40 FF: 242.23
Lot 85 PAD: 241.60 FF: 242.43
Lot 84 PAD: 242.00 FF: 242.83
Lot 83 PAD: 242.30 FF: 243.13
Lot 82 PAD: 242.60 FF: 243.43
Lot 81 PAD: 242.50 FF: 243.33
Lot 80 PAD: 242.40 FF: 243.23
Lot 79 PAD: 242.20 FF: 243.03
Lot 78 PAD: 242.00 FF: 242.83
Lot 77 PAD: 241.75 FF: 242.58
Lot 76 PAD: 241.95 FF: 242.78
Lot 75 PAD: 242.00 FF: 242.83
Lot 74 PAD: 242.35 FF: 243.18
Lot 73 PAD: 242.60 FF: 243.43
Lot 72 PAD: 242.80 FF: 243.63
Lot 71 PAD: 242.70 FF: 243.53
Lot 70 PAD: 242.55 FF: 243.38
Lot 69 PAD: 242.05 FF: 242.88
Lot 68 PAD: 242.05 FF: 242.88
Lot 67 PAD: 241.70 FF: 242.53
Lot 66 PAD: 241.45 FF: 242.28
Lot 65 PAD: 241.30 FF: 242.13
Lot 64 PAD: 241.20 FF: 242.03
Lot 91 PAD: 242.30 FF: 243.13
Lot 92 PAD: 242.10 FF: 242.93
Lot 93 PAD: 241.90 FF: 242.73
Lot 94 PAD: 242.00 FF: 242.83
Lot 95 PAD: 241.75 FF: 242.58
Lot 96 PAD: 241.75 FF: 242.58
Lot 97 PAD: 241.75 FF: 242.58
Lot 98 PAD: 242.10 FF: 242.93
Lot 99 PAD: 242.45 FF: 243.28
Lot 100 PAD: 242.50 FF: 243.33
Lot 101 PAD: 242.25 FF: 243.08
Lot 102 PAD: 242.00 FF: 242.83
Lot 103 PAD: 241.75 FF: 242.58
Lot 104 PAD: 241.75 FF: 242.58
Lot 105 PAD: 241.95 FF: 242.78
Lot 106 PAD: 242.55 FF: 243.38
Lot 107 PAD: 242.30 FF: 243.13
Lot 108 PAD: 241.80 FF: 242.63
Lot 109 PAD: 241.70 FF: 242.53
Lot 110 PAD: 241.40 FF: 242.23
Lot 111 PAD: 241.25 FF: 242.08
Lot 112 PAD: 240.70 FF: 241.53
Lot 113 PAD: 240.90 FF: 241.73
Lot 114 PAD: 241.15 FF: 241.98
Lot 115 PAD: 241.35 FF: 242.18
Lot 116 PAD: 241.65 FF: 242.48

FG 241.67 (eg 240.12)
FG 241.56 (eg 239.78)
FG 241.17 (eg 238.46)
FG 241.67 (eg 238.32)
FG 241.52 (eg 237.49)
FG 240.91 (eg 237.45)
FG 240.90 (eg 237.61)
FG 240.88 (eg 237.51)
FG 240.89 (eg 238.63)
FG 241.49 (eg 242.99)
FG 241.31 (eg 243.57)
FG 241.42 (eg 244.36)
FG 241.76 (eg 245.29)
FG 242.04 (eg 246.23)
FG 242.25 (eg 247.14)
FG 241.99 (eg 245.32)
FG 241.99 (eg 240.16)
FG 241.73 (eg 238.73)
FG 241.69 (eg 238.28)
FG 241.09 (eg 237.85)
FG 240.84 (eg 237.53)
FG 240.78 (eg 237.57)
FG 240.88 (eg 236.80)

TC 241.00
TC 240.50
TC 241.32'
TC 241.50
HP TC 241.83
TC 240.41'
TC 240.65'
TC 239.19'
TC 239.50
TC 240.00

SDMH Rim 238.32
SDMH Rim 237.75
SDMH Rim 241.64
SDMH Rim 241.19
SDMH Rim 240.52
SDMH Rim 241.11
SDMH Rim 240.68
SDMH Rim 240.72
SDMH Rim 239.65
SDMH Rim 239.30
SDMH Rim 226.70

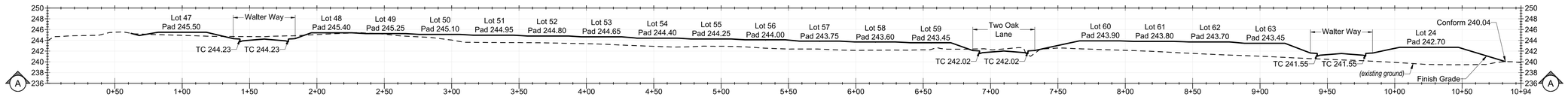
Curb Inlet TC 237.94'
Curb Inlet TC 232.82'
Curb Inlet TC 240.79'
Curb Inlet TC 240.81'
Curb Inlet TC 240.85'
Curb Inlet TC 239.20'
Curb Inlet TC 235.79'

Conform 237.9

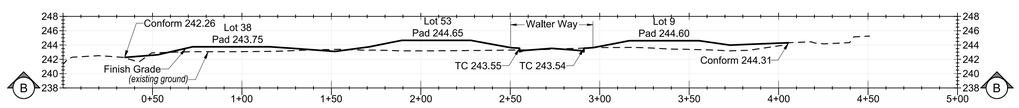
HP TC 241.27
1.51%
0.50%
0.67%
0.51%
2.00%
0.57%

Contech Cascade Separator
Rim 233.02
Outlet Structure 2
Rim 235.98

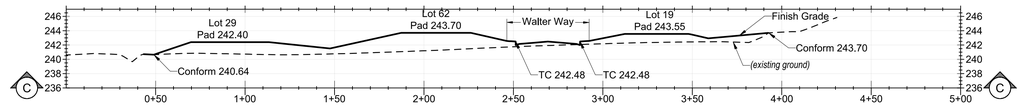
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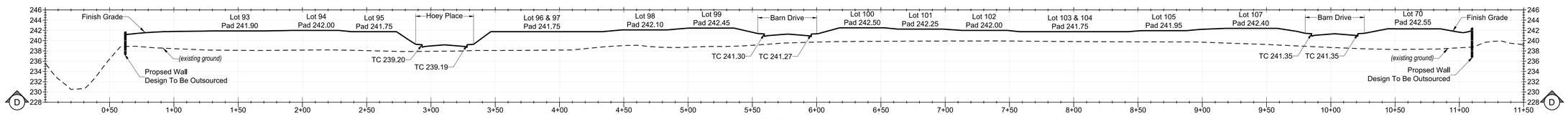
PROFILE: A
SCALE H: 1"=40' SCALE V: 1"=10'



PROFILE: B
SCALE H: 1"=40' SCALE V: 1"=10'



PROFILE: C
SCALE H: 1"=40' SCALE V: 1"=10'



PROFILE: D
SCALE H: 1"=40' SCALE V: 1"=10'

PROFILE: E
SCALE H: 1"=40' SCALE V: 1"=10'

PROFILE: F
SCALE H: 1"=40' SCALE V: 1"=10'

Grading Quantites			
	Cut (cy)	Fill (cy)	Net (cy)
Parcel 1	3,663 cy	10,846 cy	7,183 cy (fill)
Parcel 2	2,148 cy	23,102 cy	20,954 cy (fill)
Total	5,811 cy	33,948 cy	28,137 cy (fill)

02/15/2024 12:15pm
FOR PLANCHECK ONLY
REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA
FOR PLANCHECK ONLY
signature shall be provided upon approval

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

Preliminary Grading Sections

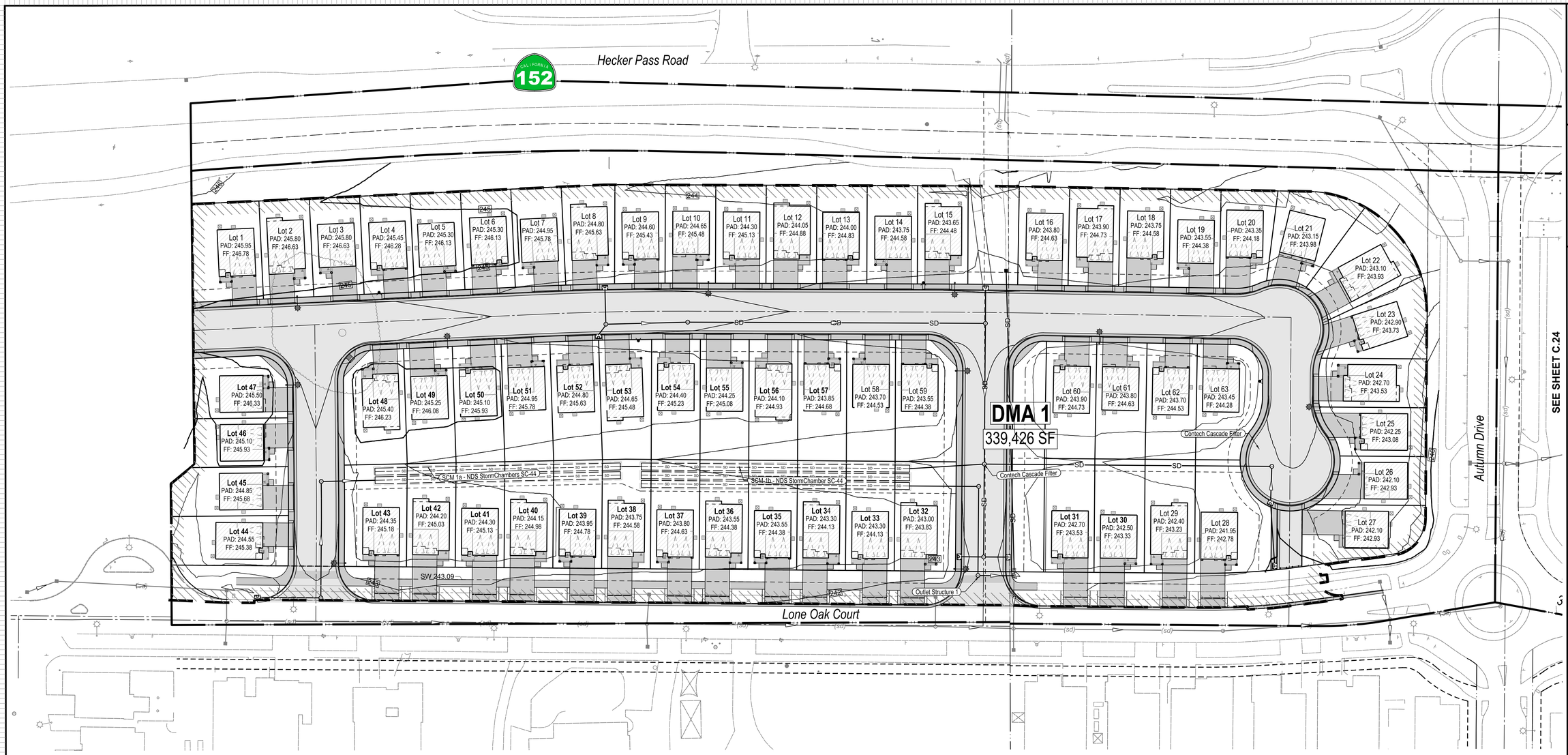
Hecker Pass Specific Plan - Low Income Housing

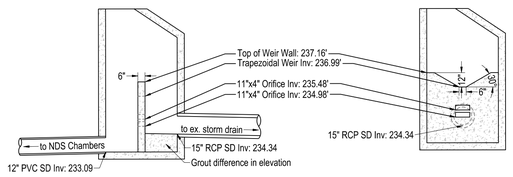
DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: WA
CHECKED BY: WJM

JOB NO. 223026

SHEET C.15
OF 31

Plotted: 15 FEB 2024 8:55AM By: Wendy Atkinson
File Name: J:\Projects\223026 Hecker Pass\Engineering\Preliminary Grading\Preliminary Grading Plan.dwg





Outlet Structure 1 Detail

Scale: none

LID Sizing Table

DMA	BMP	Total DMA Area	DMA Impervious Area	i	C	Required Retention Volume	Provided Retention Volume
1	SCM 1	339,642 SF	192,038 SF	0.57	0.38	17,144 CF	17,186 CF
2	SCM 2	355,881 SF	192,686 SF	0.54	0.37	17,178 CF	17,197 CF

SEE SHEET C.24

02/15/2024 12:21pm
FOR PLANCHECK ONLY

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
STATE OF CALIFORNIA

FOR PLANCHECK ONLY
signature shall be provided upon approval

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

Stormwater Control Plan - DMA 1

Hecker Pass Specific Plan - Low Income Housing

DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: KW
CHECKED BY: WJM

JOB NO. 223026

SHEET C.23
OF 31

Plotted: 2/15/2024 12:21 PM - Plotted By: Kevin Winebrenner
File Name: N:\2022\223026 Martha Hecker Phase 2\Working\Civil\C23 Stormwater Control Plan.dwg

SCALE: 1"=40'

0 10 20 30 40 60 80 100

Hecker Pass Highway

CALIFORNIA 152

SEE SHEET C.23

3rd St.

3rd St

Lot 89 PAD: 242.05 FF: 242.88
Lot 90 PAD: 242.15 FF: 242.98
Lot 88 PAD: 241.70 FF: 242.53
Lot 87 PAD: 241.40 FF: 242.23
Lot 86 PAD: 241.40 FF: 242.23
Lot 85 PAD: 241.60 FF: 242.43
Lot 84 PAD: 242.00 FF: 242.83
Lot 83 PAD: 242.30 FF: 243.13
Lot 82 PAD: 242.60 FF: 243.43
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Lot 80 PAD: 242.40 FF: 243.23
Lot 79 PAD: 242.20 FF: 243.03
Lot 78 PAD: 242.00 FF: 242.83
Lot 77 PAD: 241.75 FF: 242.58
Lot 76 PAD: 241.95 FF: 242.78
Lot 75 PAD: 242.00 FF: 242.83
Lot 74 PAD: 242.35 FF: 243.18
Lot 73 PAD: 242.60 FF: 243.43
Lot 72 PAD: 242.80 FF: 243.63
Lot 71 PAD: 242.70 FF: 243.53
Lot 70 PAD: 242.55 FF: 243.38
Lot 69 PAD: 242.05 FF: 242.88
Lot 68 PAD: 242.05 FF: 242.88
Lot 67 PAD: 241.70 FF: 242.53
Lot 66 PAD: 241.45 FF: 242.28
Lot 65 PAD: 241.30 FF: 242.13
Lot 64 PAD: 241.20 FF: 242.03
Lot 91 PAD: 242.30 FF: 243.13
Lot 92 PAD: 242.10 FF: 242.93
Lot 93 PAD: 241.90 FF: 242.73
Lot 94 PAD: 242.00 FF: 242.83
Lot 95 PAD: 241.75 FF: 242.58
Lot 96 PAD: 241.75 FF: 242.58
Lot 97 PAD: 241.75 FF: 242.58
Lot 98 PAD: 242.10 FF: 242.93
Lot 99 PAD: 242.45 FF: 243.28
Lot 100 PAD: 242.50 FF: 243.33
Lot 101 PAD: 242.25 FF: 243.08
Lot 102 PAD: 242.00 FF: 242.83
Lot 103 PAD: 241.75 FF: 242.58
Lot 104 PAD: 241.75 FF: 242.58
Lot 105 PAD: 241.95 FF: 242.78
Lot 106 PAD: 242.55 FF: 243.38
Lot 107 PAD: 242.30 FF: 243.13
Lot 108 PAD: 241.80 FF: 242.63
Lot 109 PAD: 241.70 FF: 242.53
Lot 110 PAD: 241.40 FF: 242.23
Lot 111 PAD: 241.25 FF: 242.08
Lot 112 PAD: 240.70 FF: 241.53
Lot 113 PAD: 240.90 FF: 241.73
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Lot 115 PAD: 241.35 FF: 242.18
Lot 116 PAD: 241.65 FF: 242.48

DMA 2
352,002 SF

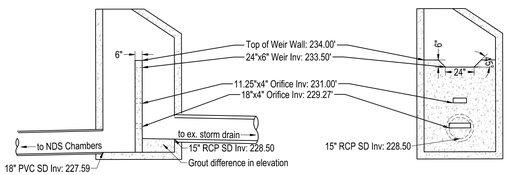
SCM-1a - NDS StormChambers SC-44

SCM-2a - NDS StormChambers SC-44

Outlet Structure 2

SCM-2b - NDS StormChamber SC-44

Contech Cascade Filter



Outlet Structure 2 Detail

Scale: none

LID Sizing Table

DMA	BMP	Total DMA Area	DMA Impervious Area	i	C	Required Retention Volume	Provided Retention Volume
1	SCM 1	339,642 SF	192,038 SF	0.57	0.38	17,144 CF	17,186 CF
2	SCM 2	355,881 SF	192,686 SF	0.54	0.37	17,178 CF	17,197 CF

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

Stormwater Control Plan - DMA 2

Hecker Pass Specific Plan - Low Income Housing

DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: KW
CHECKED BY: WJM

JOB NO. 223026

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OF 31

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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	73,308	66,072	52,658
2	7,793	0	0	0	0	0	69,836	57,110	65,740

Pervious vs Impervious Areas

DMA	Total Area	Pre-Development		Post-Development					
		Pervious	Impervious	Pervious	Impervious			i	C
					Replaced	New	Total		
1	339,642	339,642	0	147,604	0	192,038	192,038	0.57	0.38
2	355,881	348,087	7,793	163,195	0	192,686	192,686	0.54	0.37
Total	695,522	687,729	7,793	310,798	0	384,724	384,724	0.55	0.37

Atotal = drainage area (sf)
Arocfs = 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
Careaaf = Area runoff coefficient=C = 0.858i3 - 0.78i2 + 0.774i + 0.04

b.)adjustments for redevelopment project

DMA	DMA Area	APA	Aother	Areplaced	Aretention
1	339,642	0	0	0	339,642
2	355,881	0	0	0	355,881
Total	695,522	0	0	0	695,522

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 Hollister,

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

0.98 = D85 = 85th Percentile Rainfall Depth
1.58 = D95 = 95th Percentile Rainfall Depth

c.) compute the runoff coefficient

DMA	DMA Area	Impervious Area	i	C
1	339,642	192,038	0.57	0.38
2	355,881	192,686	0.54	0.37
Total	695,522	384,724	0.55	0.37

C = 0.858i3 - 0.78i2 + 0.774i + 0.04
i = fraction of the tributary area that is impervious = Aimpervious / Aproject

d.) Project Type

Residential

e.) Compute Retention Volume required

DMA	DMA Area	Aretention	i	C	D85	V85	D95	V95
1	339,642	339,642	0.57	0.38	0.98 in.	10,633 CF	1.58 in.	17,144 CF
2	355,881	355,881	0.54	0.37	0.98 in.	10,655 CF	1.58 in.	17,178 CF
Total	**695,522**	**695,522**	0.55	0.37	0.98 in.	21,283 CF	1.58 in.	34,313 CF

C = 0.858i3 - 0.78i2 + 0.774i + 0.04
i = fraction of the tributary area that is impervious = Aimpervious / Aproject
V85 = Required Quality Treatement Retention Volume = Aretention x C x (D85/12)
V95 = Required Retention Volume = Aretention x C x (D95/12)

3.) Retention Volume Provided

DMA 1

SCM 1 Volume			SCM 1 Volume cont.		
Elevation (ft.)	Storage (CF)		Elevation (ft.)	Storage (CF)	
231.99	0		233.60	7,686	
232.00	34		233.70	8,387	
232.10	376		233.80	9,086	
232.20	718		233.90	9,782	
232.30	1,026		234.00	10,476	
232.40	1,368		234.10	11,167	
232.50	1,710		234.20	11,855	
232.60	2,052		234.30	12,540	
232.70	2,394		234.40	13,223	
232.80	2,736		234.50	13,903	
232.90	3,078		234.60	14,580	
232.99	3,420		234.70	15,254	
233.00	3,420		234.80	15,925	
233.10	4,138		234.90	16,591	
233.20	4,853		234.98	17,186	
233.30	5,565				
233.40	6,275		**Total Retention Volume Provided =**		**17,186 CF**
233.50	6,982				

Note: Volume Table povided for the NDS SC-44 Stormchambers exported from HydroCAD to provide calculation from the bottom of the provided chambers to the outlet elevation. See Attachment F for detailed volume tables and storage chart.

0CF ≥ 10,633; therefore in compliance with PR-2
0CF ≥ 17,144; therefore in compliance with PR-3

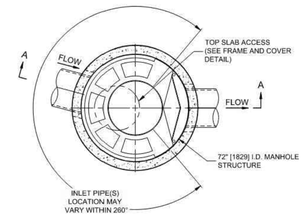
DMA 2

SCM 2 Volume			SCM 2 Volume cont.			
Elevation (ft.)	Storage (CF)		Elevation (ft.)	Storage (CF)		Note: Volume Table povided for the NDS SC-44 Stormchambers exported from HydroCAD to provide calculation from the bottom of the provided chambers to the outlet elevation. See Attachment F for detailed volume tables and storage chart.
226.52	13		227.90	6,695		
226.60	314		228.00	7,475		
226.70	691		228.10	8,252		
226.80	1,031		228.20	9,026		
226.90	1,408		228.30	9,798		
227.00	1,785		228.40	10,566		
227.10	2,162		228.50	11,331		
227.20	2,539		228.60	12,093		
227.30	2,916		228.70	12,853		
227.40	3,293		228.80	13,609		
227.50	3,670		228.90	14,363		
227.52	3,783		229.00	15,113		
227.60	4,337		229.10	15,861		
227.70	5,126		229.20	16,605		
227.80	5,912		229.27	17,197		
			Total Retention Volume Provided =			**17,197 CF**

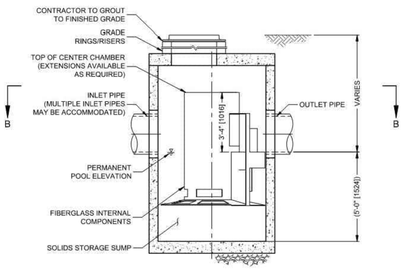
17,197CF ≥ 10,655; therefore in compliance with PR-2
17,197CF ≥ 17,178; therefore in compliance with PR-3

LID Sizing Table

DMA	BMP	Total DMA Area	DMA Impervious Area	i	C	Required Retention Volume	Provided Retention Volume
1	SCM 1	339,642 SF	192,038 SF	0.57	0.38	17,144 CF	17,186 CF
2	SCM 2	355,881 SF	192,686 SF	0.54	0.37	17,178 CF	17,197 CF



PLAN VIEW B-B
NOT TO SCALE



ELEVATION A-A
NOT TO SCALE

CASCADE separator™

CASCADE SEPARATOR DESIGN NOTES

THE STANDARD CS-6 CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES



FRAME AND COVER
(DIAMETER VARIES)
NOT TO SCALE

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (cfs [L/s])	
PEAK FLOW RATE (cfs [L/s])	
RETURN PERIOD OF PEAK FLOW (yrs)	
RIM ELEVATION	

PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			

NOTES / SPECIAL REQUIREMENTS:

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CASCADE SEPARATOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. CASCADE SEPARATOR STRUCTURE SHALL MEET AASHTO H520 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2' [610], AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. CASCADE SEPARATOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CASCADE SEPARATOR MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CS-6
CASCADE SEPARATOR
STANDARD DETAIL

02/15/2024 12:21pm
FOR PLANCHECK ONLY
REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. McCLINTOCK
No. 24893
EXP. 12-31-2023
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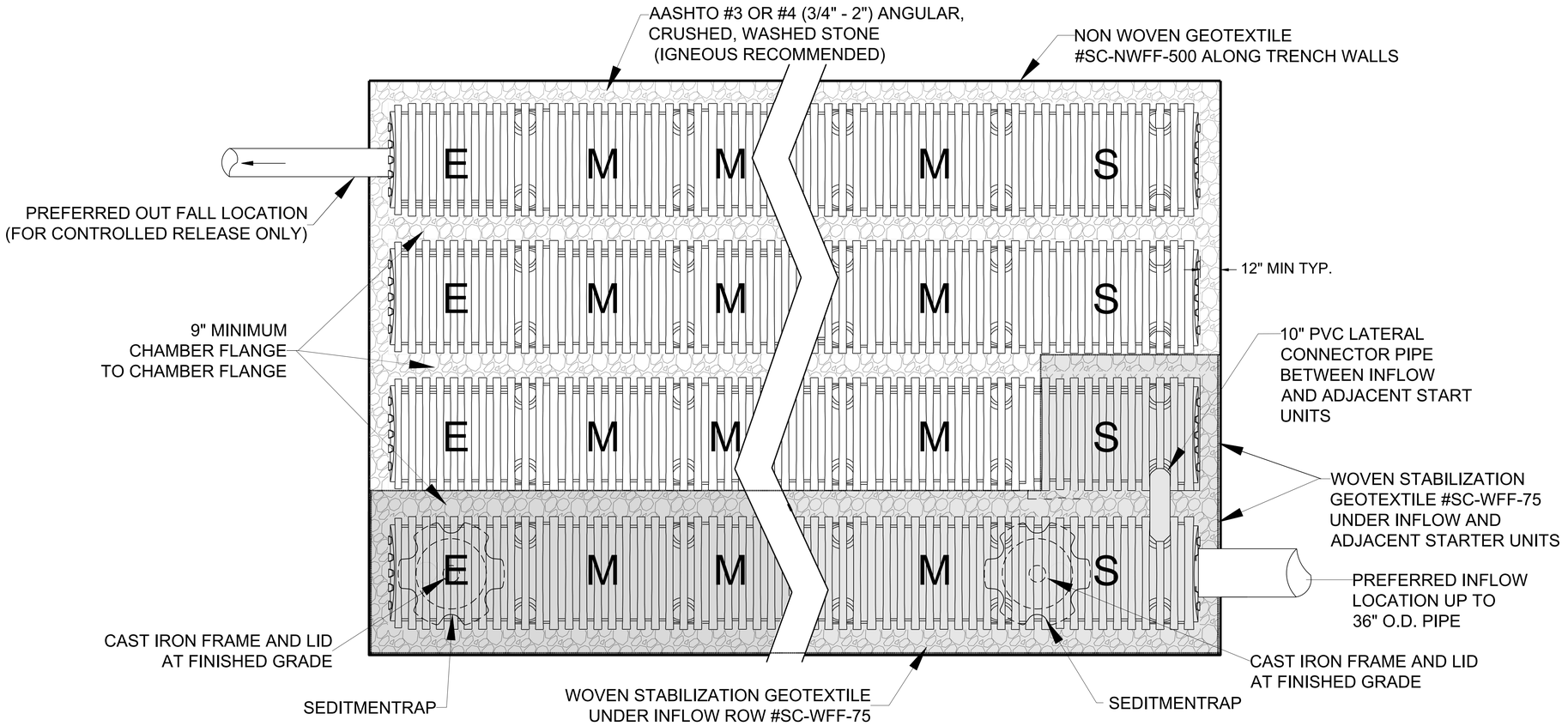
Stormwater Control Plan Details
Hecker Pass Specific Plan - Low Income Housing

DATE: 2/15/2024
SCALE: 1" = 40'
DRAWN BY: KW
CHECKED BY: WJM

JOB NO. 223026

SHEET C.25
OF 31

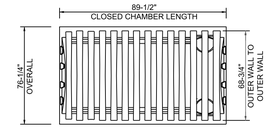
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Plotted: 15 FEB 2024 8:12:21 PM | By: Kevin Williamson
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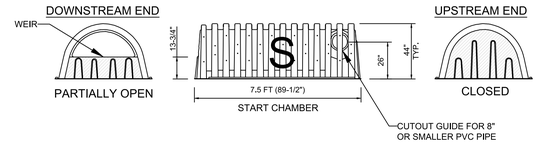
TYPICAL PLAN VIEW

SC-44105 DIMENSIONS

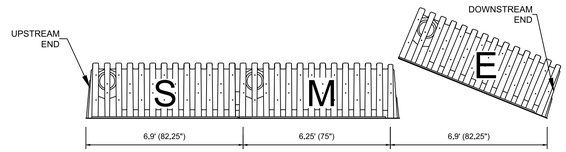
(DIMENSIONS MAY VARY SLIGHTLY)
WEIGHT: 120 LBS EA.



PLAN VIEW



DELIVERY LENGTHS
ELEVATION VIEW



CHAMBER:	172 CU-FT
CLOSED CHAMBER:	226 CU-FT
SEDIMENTRAP™:	46 CU-FT

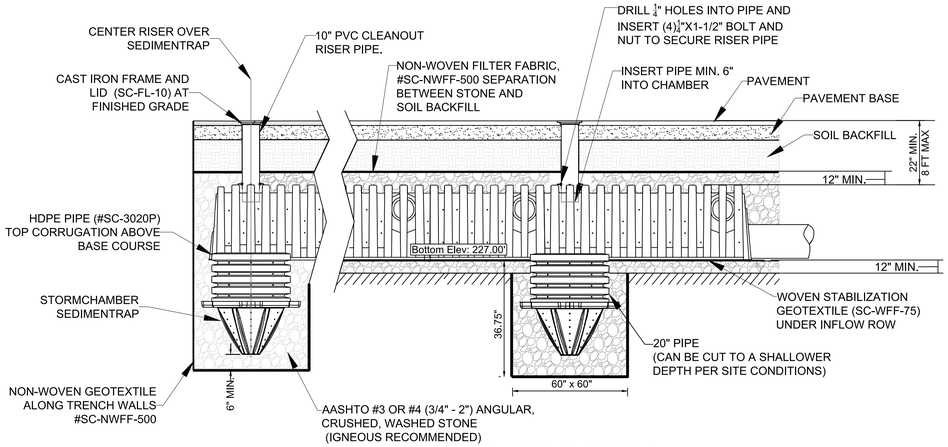
144 CU-FT	172 CU-FT

CHAMBER MINIMUM INSTALLED VOLUMES

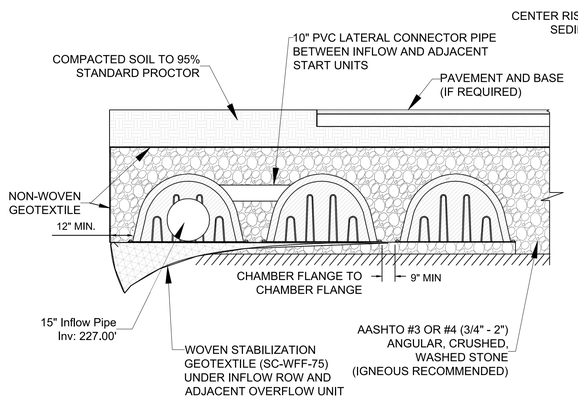
NOTES:

1. START CHAMBERS (CLOSED AT THE SIDE PORTAL END) ARE PLACED AT THE INFLOW END OF THE ROWS.
2. BEGIN PLACEMENTS WITH START CHAMBERS AND END ROWS WITH END CHAMBERS.
3. PLACE FIRST RIB OF THE NEXT CHAMBER IN THE ROW OVER THE LAST RIB OF THE PREVIOUS CHAMBER.

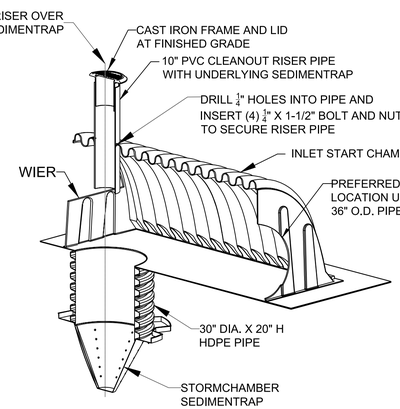
INSTALLED LENGTHS
ELEVATION VIEW



TYPICAL SIDE VIEW



TYPICAL FRONT VIEW



START CHAMBER CUTAWAY

MATERIAL LIST

DESCRIPTION	STOCK CODE	QTY	UNITS
CHAMBERS AND ACCESSORIES:			
START CHAMBER	SC-44105-S-O		EACH
MIDDLE CHAMBER	SC-44105-M-O		EACH
END CHAMBER	SC-44105-E-O		EACH
CLOSED CHAMBER	SC-44105-C-O		EACH
SEDIMENTRAP™	SC-ST		EACH
NON-WOVEN GEOTEXTILE	SC-NWFF-500		SQ FT
WOVEN STABILIZATION GEOTEXTILE	SC-WFF-75		SQ FT
30" X 20" HDPE PIPE FOR SEDIMENTRAP™	SC-3020P		EACH
10" CAST IRON FRAME AND LID	SC-FL-10		EACH
MATERIALS BY OTHERS:			
10" DIAMETER RISER / LATERAL PIPE	OTHERS		EACH
IN-PLACE EXCAVATION (NO BULKING FACTOR)	OTHERS		CU FT
STONE BACKFILL	OTHERS		CU FT
1/4" X 1-1/2" NUT AND BOLT	OTHERS		EACH
3" SCREWS	OTHERS		EACH

NDS StormChamber SC-44 Details
Hecker Pass Specific Plan - Low Income Housing

223026

DATE: 2/15/2024 | REVISION:

DRAWN BY: WA | Sheet: C.26 of 31

StormChamber® NDS Design Worx™

TYPICAL SC-44105 STORMCHAMBER LAYOUT

MEETS OR EXCEEDS ASTM F2922 & ASTM F2787

DRAWING# 44105-DT
REV. C | DATE 11-22-2019