PRELIMINARY
STORMWATER REPORT
(HYDROLOGY STUDY & WATER QUALITY MANAGEMENT PLAN)

FOR

QUICK QUACK STORE #33-059

632 East Lake Ave
Watsonville, CA 95076

Prepared for:

Quick Quack Car Wash
6020 W Oaks Blvd #300
Rocklin, CA 95765
Greg Farr, Construction Manager
916-955-5186 | GFarr@dontdrivedirty.com

Prepared by:

TAIT & ASSOCIATES, INC.
11280 Trade Center Dr
Rancho Cordova, CA 95742
Jon Romaguera, PE, QSD
916-669-1817 | jromaguera@tait.COM
Jacob Cain, PE
916-669-1827 | jcain@tait.com

TAIT Project Number:
QQ0076

5/17/2024

I. INTRODUCTION

This document is a combination of both the Preliminary Water Quality Management Plan and the Preliminary Hydrology Study. The exact figures, locations, and quantities of the stormwater system are expected to change as the project reaches a more detailed design.

Site address:	632 East Lake Ave Watsonville, CA 95076
Site coordinates:	36.923267, -121.745980
Overall Project Area:	±1.2 acres (100% disturbed)

This preliminary report was developed using the following document(s):

- RESOLUTION NO. 4-14 (CM)
  A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF WATSONVILLE INCORPORATING STORMWATER POST-CONSTRUCTION STANDARDS TO THE CITY OF WATSONVILLE PUBLIC IMPROVEMENT STANDARDS dated 1/15/2014 ("Stormwater Construction Standards")

II. EXISTING SITE CONDITIONS

The subject site of this report is located 632 East Lake Ave, Watsonville, CA 95076, see attached **Vicinity Map**. The site is approximately 275' north of Tuttle Ave. The approximately 1.2 acre site is an undeveloped parcel, consisting of a minimally maintained vegetation.

Stormwater from the existing site generally sheet flows west to Lake Ave, where it is collected in the city storm drain system at the intersection of East Lake Ave and Tuttle Ave. The storm drain system will discharge to Salsipudes Creek, which flows to the Pajaro River, which discharges to the Pacific Ocean approximately 6.5 miles downstream.

The existing site is effectively 100% pervious. Hydrologic soil types were determined from the USDA Web Soil Survey. The soil types underlaying the project site pre-development are Group A soils. Krazan & Associates prepared a Geotechnical Engineering Investigation Report, dated 9/22/2023 (Project Number 042-23020). Testing found the on-site infiltration rate to be 6 inches per hour. This is consistent with Group A soils.

Groundwater was encountered at 31 feet below ground surface during testing. Per the Geotechnical report:

> **GROUNDWATER**
>
> Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Groundwater was encountered at a depth of approximately 31 feet below existing site grade. Groundwater rose to an elevation of 9 feet after 24 hours. Historic high groundwater was estimated to be 32 feet based on information obtained from 2 wells located within 1 mile of the site.
>
> It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

III. PROPOSED SITE CONDITIONS

The project consists of developing the site a carwash structure and associated plumbing, vehicle vacuuming facility parking stalls, parking stalls and driveways, and stormwater facilities.

Project grading will occur on approximately 1.2± acres which comprises 100% of the total site area. The project will significantly increase the impervious area of the site. The post-development surface conditions are as follows:

Table 1 - Proposed Site Surfaces

Surface type	Area (sqft)	Area (ac)	% of site
Pervious	15996	0.37	31%
Impervious	35514	0.81	69%
Total	51510	1.18	-

Stormwater runoff from the project site is directed towards a single underground vault for water quality treatment and hydromodification requirements. Stormwater is directed by drainage inlets. There are several Drainage Management Areas, as depicted in the attached **Preliminary Water Quality Management Plan**.

IV. UNDERGROUND RETENTION VAULT

The project proposes an underground storage vault to serve a dual purpose of detention and treatment, meeting the requirements as set forth by the Stormwater Construction Standards. The treatment and retention volume was determined by using the method in Attachment 3 of the Stormwater Construction Standards.

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$
Where "i" is the fraction of the tributary area that is impervious[7]

d) Compute Retention Volume:

Retention Volume for 95th Percentile 24-hr Rainfall Depth = C x Rainfall Depth$_{95th}$ x Retention Tributary Area

or,

Retention Volume for 85th Percentile 24-hr Rainfall Depth = C x Rainfall Depth$_{85th}$ x Retention Tributary Area

From Page PCR-25 of the Stormwater Construction Standards.

Stormwater treatment will be accomplished through infiltration through the bottom of the underground storage vault. See Table 2 below.

Table 2 - Basin Sizing Calculations	
Existing Site C (Runoff Coeffect)	0.04
Proposed Site C (Runoff Coeffect)	0.48
Measured infiltration rate [in/hr]	6
Required Drawdown Time [hr]	48
85th Percentile 24-hr Rainfall Depth [in]	0.8
95th Percentile 24-hr Rainfall Depth [in]	1.3
85th Percentile 24-hr Retention (Treatment Volume) [cuft]	1662
Existing Site 95th Percentile 24-hr Retention (Retention Volume) [cuft]	223
Proposed Site 95th Percentile 24-hr Retention (Retention Volume) [cuft]	2701
Required Retention Volume [cuft]	2478

The project proposes using ADS Stormtech SC-740 chambers, with 30 chambers in 2 rows of 15. See Table 3 below.

Table 3 – Infiltration Chamber Sizing						
Model	Chambers	Rows	Gravel Depth [ft]	Gravel Footprint [sqft]	Design Volume [cuft]	Design Drawdown Time [hr]
SC-740	30	2	0.5	1,163	2,691	3.9

The project proposes using two ADS Barracuda S3 water quality pretreatment structures in order to separate trash and larger sediments, preventing them from entering the underground infiltration vault.

V. FLOW CONTROL

The project proposes to use an outlet control manhole “downstream” of the underground infiltration vault to restrict outflow during small storms, while allowing an overflow in the case of large storms. The outlet control manhole will reduce outflow to pre-project flows up to the 10-year storm event. The outlet control manhole will use an internal wall such that large flows being able to overtop the internal weir. The weir will include a 1.029 inch diameter orifice, which is the same diameter of a 1-inch Schedule 40 PVC pipe.

Infiltration through the bottom of retention vault (0.154 CFS) will actually exceed the calculated existing 10-year storm flow (0.140 CFS). This, in addition to the large storage volume, will fulfill Peak Flow requirements.

Site storm flow was calculated using the Rational Method (Q=cia), with rainfall intensity values being taken from NOAA data, see attached **NOAA Storm Estimates**. See Table 4 below.

Table 4 – Flow Control Sizing	
2-year 5-minute Rainfall Intensity (in/hr)	2.1
10-year 5-minute Rainfall Intensity (in/hr)	2.95
Existing 2-year Storm peak flow (cfs)	0.099
Existing 10-year Storm peak flow (cfs)	0.140
Proposed unmitigated 2-year Storm peak flow (cfs)	1.202
Proposed unmitigated 10-year Storm peak flow (cfs)	1.689
Orifice Diameter (in)	1.029
Mitigated Orifice Flow (cfs)	0.057

VI. NPDES COMPLIANCE

The project is in compliance with the NPDES Permit, the BMP Design Manual, and the California Stormwater Quality Association (CASQA) BMP Handbooks. The Notice of Intent (NOI) and Stormwater Pollution Prevention Plan (SWPPP) will be prepared and submitted to the State Water Resource Control Board (SWRCB) prior to issuance of the building permits.

VII. BMP MAINTENANCE

Ongoing BMP maintenance of the storm drain facilities will be assured with a covenant maintenance agreement that will be recorded with the city prior to issuance of building permits.

VIII. CONCLUSION

The hydrology and water quality calculations demonstrate that the proposed site is designed to meet performance requirements as follows:

Performance Requirement No. 1: Site Design and Runoff Reduction:

- minimizing impervious surfaces and
- directing runoff to safe areas

Performance Requirement No. 2: Water Quality Treatment

- Stormwater retention chambers have been sized to retain a volume greater than the 85th percentile 24-hour storm event.

Performance Requirement No. 3: Runoff Retention

- Retaining a volume greater than the 95th percentile 24-hour rainfall event

Performance Requirement No. 4: Peak Management

- Stormwater discharge from the site to the public storm drain system will not exceed the pre-project flow of the 10-year storm event. The retention chambers can in theory infiltrate 100% of the 10-year 5-minute peak flow of the existing site without discharging to the public system.

The existing site will be improved upon with the addition of a car wash structure, and associated improvements. The site improvements include the construction of a storm drain system designed to manage the required storm event. The project proposed to meet stormwater quality treatment requirements and hydrologic storage requirements in the form of an underground storage vault.

IX. ATTACHMENTS

Attached are following documents and exhibits to support the statements and calculations in the above document:

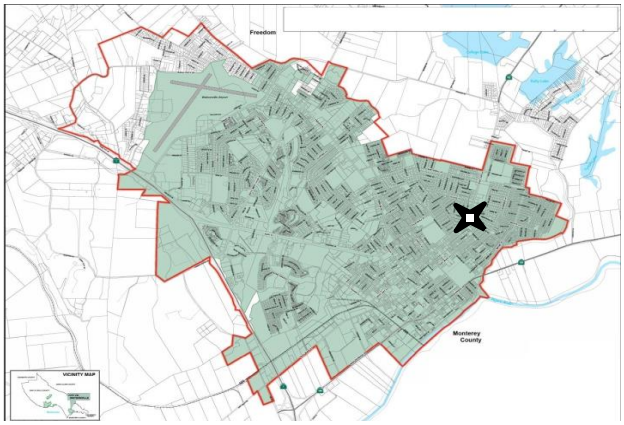
1. Vicinity Maps
2. Downstream Waterbody Map
3. Preliminary Civil Plans
    - Preliminary Horizontal Control
    - Preliminary Grading & Utility Plan
    - Preliminary Water Quality Management Plan
4. ADS Stormtech Chamber Details
5. Central Coast Region Rainfall Depth Maps
6. NOAA Storm Estimates
7. Soil data
    - Geotechnical Report (infiltration pages only)
    - USDA Web Soil Survey
8. Calculations

1. Vicinity Maps

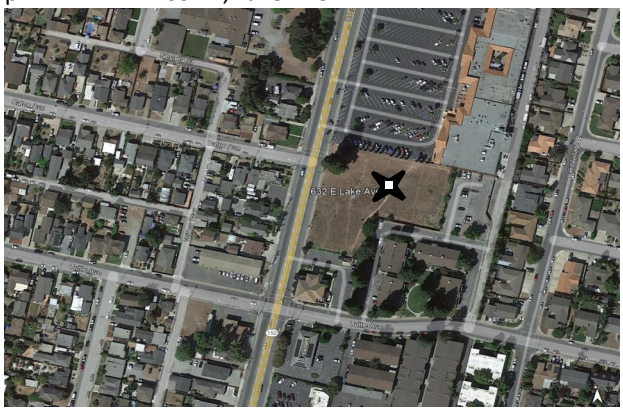
III. Location Maps

A. State Map: State

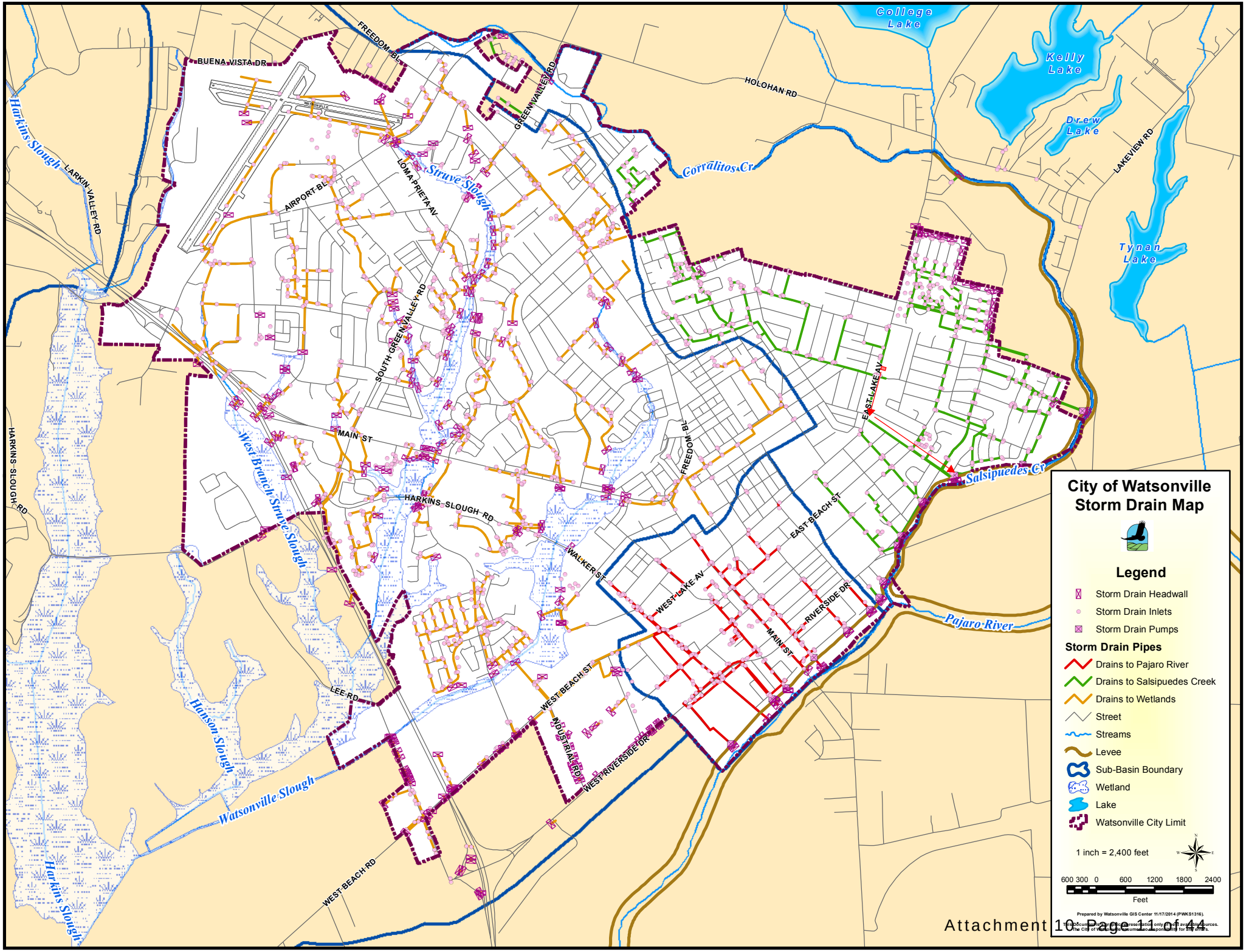
B. City Map: City



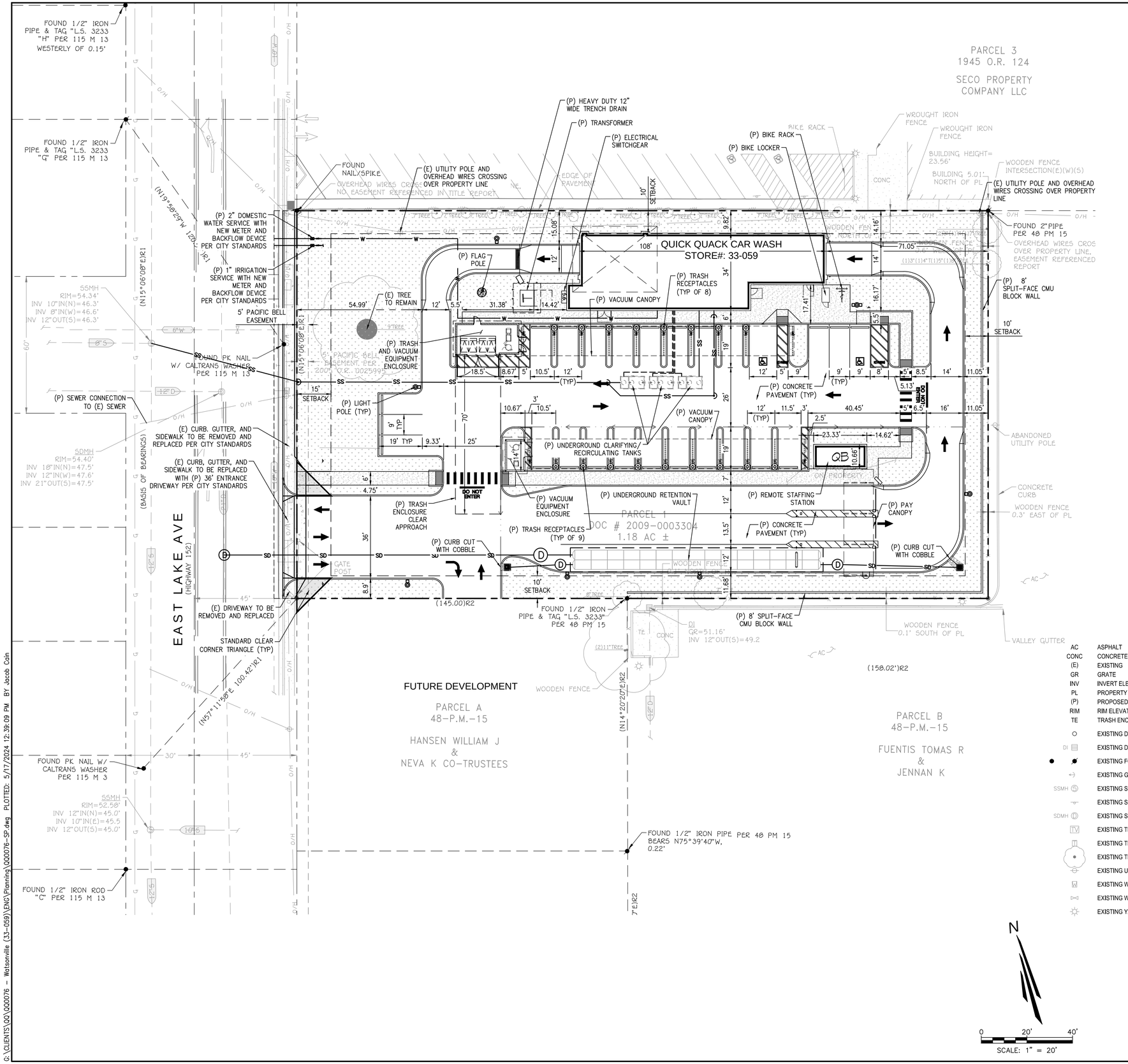
C. Vicinity Map: 632 E, Lake Ave



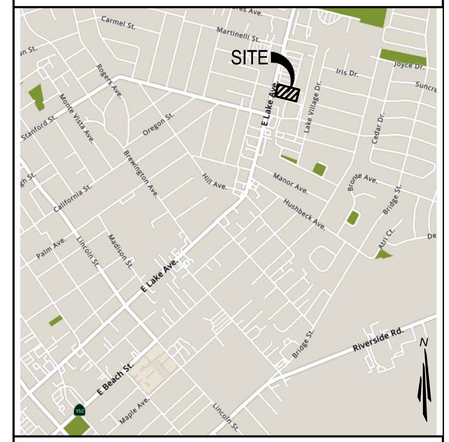
2. Downstream Waterbody Map


College Lake
Kelly Lake
Drew Lake
Tynan Lake
Harkins Slough
Larkin Valley Rd
Buena Vista Dr
Freedom Blvd
Green Valley Rd
Holohan Rd
Lakeview Rd
Airport Blvd
Loma Prieta Av
Struve Slough
Corralitos Cr
South Green Valley Rd
Main St
West Branch Struve Slough
Harkins Slough Rd
Freedom Blvd
East Lake Av
Salsipuedes Cr
East Beach St
Walker St
West Lake Av
Riverside Dr
Main St
Pajaro River
Lee Rd
West Beach St
Industrial Rd
West Riverside Dr
Hanson Slough
Watsonville Slough
West Beach Rd
Harkins Slough
Harkins Slough Rd
City of Watsonville
Storm Drain Map
Legend
Storm Drain Headwall
Storm Drain Inlets
Storm Drain Pumps
Storm Drain Pipes
Drains to Pajaro River
Drains to Salsipuedes Creek
Drains to Wetlands
Street
Streams
Levee
Sub-Basin Boundary
Wetland
Lake
Watsonville City Limit
1 inch = 2,400 feet
600 300 0 600 1200 1800 2400
Feet
Prepared by Watsonville GIS Center 11/17/2014 (PWKS1316).
This document is for reference purposes only and is derived from various sources.
The City of Watsonville assumes no responsibility for its errors.

3. Preliminary Civil Plans



VICINITY MAP



SITE DATA

PROJECT INFORMATION:	
ASSESSOR'S PARCEL NUMBER:	017-321-02
PARCEL SIZE:	±51,509 SF (±1.18 ACRES)
ADDRESS:	632 E. LAKE AVENUE WATSONVILLE, CA 95076
PROJECT DESCRIPTION:	NEW CONSTRUCTION
EXISTING ZONING:	CNS: NEIGHBORHOOD SHOPPING CENTER
EXISTING LAND USE:	VACANT LOT
SETBACKS:	
FRONT (STREET SIDE):	15'
SIDE-(ABUTTING COMMERCIAL):	NONE
SIDE-(ABUTTING "R" ZONE):	10'
REAR-(ABUTTING "R" ZONE):	10'
MINIMUM FRONTAGE	50'
FLOODPLAIN:	ZONE X - AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN MAP No. 06087C0411E EFFECTIVE DATE: MAY 16, 2012
PARKING REQUIREMENTS:	WATSONVILLE MUNICIPLE CODE SECTION 14-17.1001: AUTOMOTIVE REPAIR, SERVICES, AND GARAGES: 5 SPACES, PLUS 1 SPACE FOR EACH 800 SF FLOOR AREA IN EXCESS OF 3,000 SF
PARKING REQUIRED:	5 SPACES
PARKING PROVIDED:	
VACUUM STALLS:	17 SPACES
PARKING STALLS:	5 SPACES
ADA STALLS:	2 SPACES

NOTE:
ALL UTILITIES FOR THE PROPOSED PROJECT SHALL BE PLACED UNDERGROUND

LEGEND

AC	ASPHALT
CONC	CONCRETE
(E)	EXISTING
GR	GRATE
INV	INVERT ELEVATION
PL	PROPERTY LINE
(P)	PROPOSED
RIM	RIM ELEVATION
TE	TRASH ENCLOSURE
	EXISTING DIMENSION POINT
DI	EXISTING DRAIN INLET
	EXISTING FOUND MONUMENT
	EXISTING GUY WIRE
SSMH	EXISTING SEWER MANHOLE
	EXISTING SIGN
SDMH	EXISTING STORM DRAIN MANHOLE
TV	EXISTING TELEPHONE VAULT
	EXISTING TRAFFIC SIGNAL PULLBOX
	EXISTING TREE
	EXISTING UTILITY POLE
W	EXISTING WATER METER
	EXISTING WATER VALVE
	EXISTING YARD LIGHT
	PROPOSED BACKFLOW PREVENTER
	PROPOSED CATCH BASIN
	PROPOSED LIGHT POLE
C	PROPOSED SANITARY SEWER CLEANOUT
S	PROPOSED SANITARY SEWER MANHOLE
D	PROPOSED STORM DRAIN MANHOLE
	PROPOSED WATER METER
	CENTER LINE
	EASEMENT LINE
	PROPERTY LINE
	EXISTING EDGE OF PAVEMENT
X	EXISTING FENCE
G	EXISTING GAS LINE
O/H	EXISTING OVERHEAD LINE
S	EXISTING SANITARY SEWER LINE
D	EXISTING STORM DRAIN LINE
T	EXISTING TELEPHONE LINE
W	EXISTING WATER LINE
S S S	PROPOSED SWALE
SS	PROPOSED SANITARY SEWER LINE
SD	PROPOSED STORM DRAIN LINE
W	PROPOSED WATER LINE
	CONCRETE PAVING
	LANDSCAPE AREA

QuickQuack CAR WASH

6020 WEST OAKS BLVD., SUITE 300, ROCKLIN, CA 95765

QUICK QUACK
STORE #: 33-059
632 E. LAKE AVENUE
WATSONVILLE, CA 95076

REVISIONS

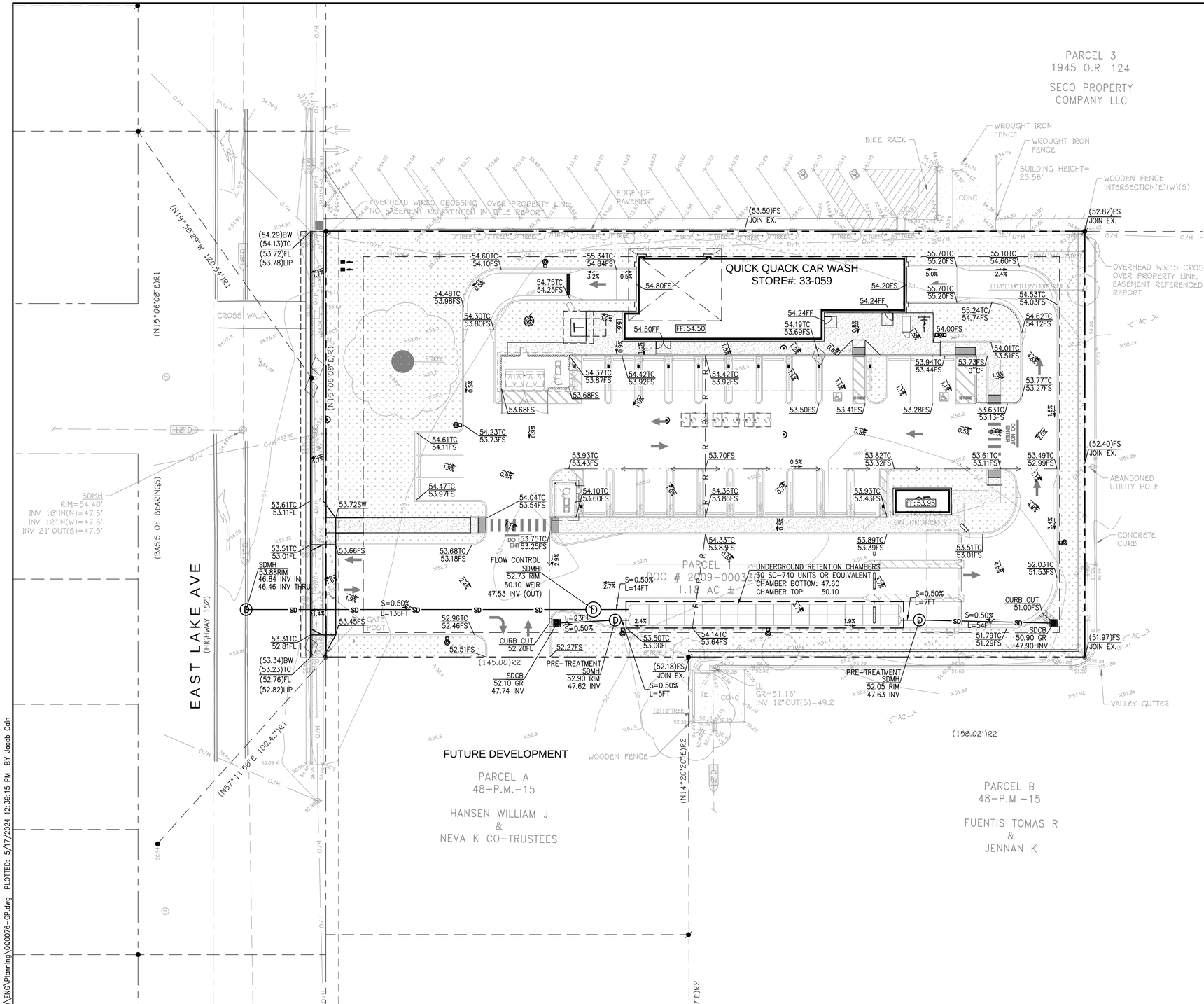
#	DATE	DESCRIPTION
1	-	-
2		
3		
4		
5		
6		

TAIT
SINCE 1964
11280 TRADE CENTER DR.
RANCHO CORDOVA, CA 95742
P: (916) 635-2444
www.tait.com

DATE: 5/17/2024
TAIT JOB #: QQ0076

PLANNING PACKAGE

PRELIMINARY SITE PLAN



LEGEND

AC	ASPHALT
BW	BACK OF WALK
CONC	CONCRETE
(E)	EXISTING
FS	FINISH SURFACE
FF	FINISH FLOOR
FL	FLOW LINE
GR	GRATE
INV	INVERT ELEVATION
PL	PROPERTY LINE
(P)	PROPOSED
RIM	RIM ELEVATION
TC	TOP OF CURB
TOG	TOP OF GRATE
TE	TRASH ENCLOSURE
	EXISTING DIMENSION POINT
DI	EXISTING DRAIN INLET
	EXISTING FOUND MONUMENT
	EXISTING GUY WIRE
SSMH	EXISTING SEWER MANHOLE
	EXISTING SIGN
SDMH	EXISTING STORM DRAIN MANHOLE
TV	EXISTING TELEPHONE VAULT
	EXISTING TRAFFIC SIGNAL PULLBOX
	EXISTING TREE
	EXISTING UTILITY POLE
	EXISTING WATER METER
	EXISTING WATER VALVE
	EXISTING YARD LIGHT
	PROPOSED BACKFLOW PREVENTER
	PROPOSED CATCH BASIN
	PROPOSED LIGHT POLE
	PROPOSED SANITARY SEWER CLEANOUT
S	PROPOSED SANITARY SEWER MANHOLE
D	PROPOSED STORM DRAIN MANHOLE
	PROPOSED WATER METER
× 00.0	EXISTING ELEVATION (00.00)XX (00.00)XX JOIN EX.
	PROPOSED ELEVATION 00.00XX 00.00XX
	DRAINAGE ARROWS
	CENTER LINE
	EASEMENT LINE
	PROPERTY LINE
00	EXISTING CONTOUR LINE
	EXISTING EDGE OF PAVEMENT
X	EXISTING FENCE
O/H	EXISTING OVERHEAD LINE
D	EXISTING STORM DRAIN LINE
00	PROPOSED CONTOUR LINE
R R R	PROPOSED RIDGE
S S S	PROPOSED SWALE
SD	PROPOSED STORM DRAIN LINE
	CONCRETE PAVING
	LANDSCAPE AREA

QuickQuack CAR WASH
6020 WEST OAKS BLVD., SUITE 300, ROCKLIN, CA 95765

QUICK QUACK
STORE #: 33-059
632 E. LAKE AVENUE
WATSONVILLE, CA 95076

REVISIONS

#	DATE	DESCRIPTION
1	-	-
2		
3		
4		
5		
6		

TAIT
SINCE 1964
11280 TRADE CENTER DR.
RANCHO CORDOVA, CA
95742
P: (916) 635-2444
www.tait.com

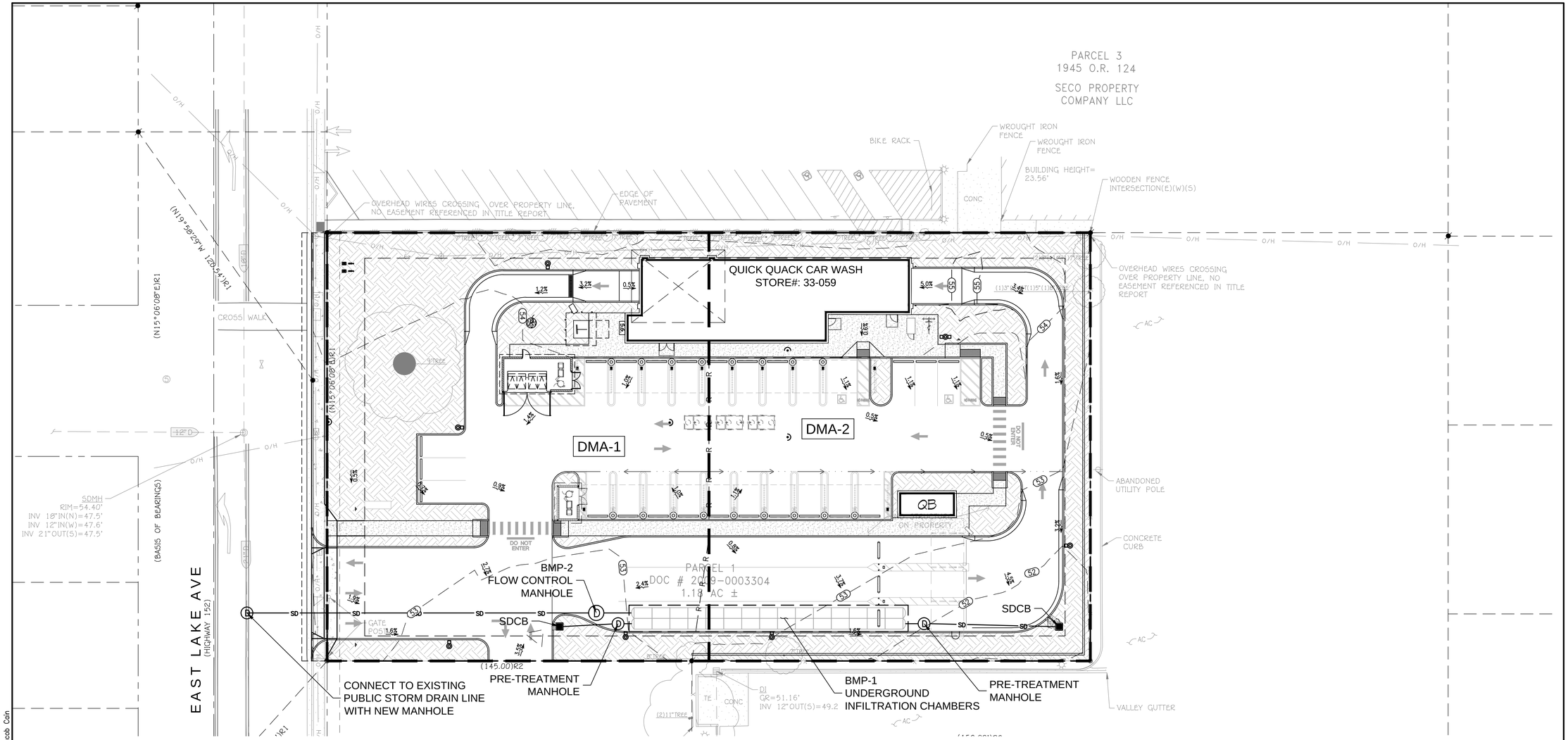
DATE: 5/17/2024
TAIT JOB #: QQ0076

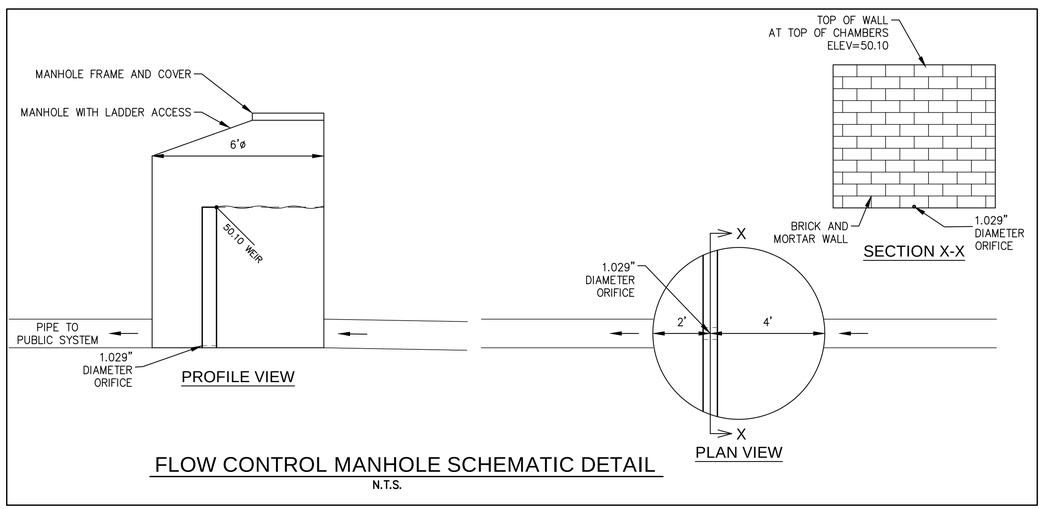
PLANNING PACKAGE

PRELIMINARY GRADING PLAN

SHEET 2 OF 3

G:\CLIENTS\QQ\QQ0076 - Watsonville (33-059)\ENG\Planning\QQ0076-GP.dwg PLOTTED: 5/17/2024 12:39:15 PM BY Jacob Cain





FLOW CONTROL MANHOLE SCHEMATIC DETAIL

N.T.S.

N

0 20' 40'

SCALE: 1" = 20'

STORM WATER QUALITY MANAGEMENT TABLE

PROPOSED SITE AREAS

DMA–#	AREA (SQFT)	AREA (AC)	PERVIOUS AREA (SQFT)	IMPERVIOUS AREA (SQFT)	IMPERVIOUS FRACTION	DRAINS TO
DMA–1	25769	0.592	9420	16349	0.63	BMP–1
DMA–2	25741	0.591	6577	19165	0.74	BMP–1
TOTAL	51510	1.183	15996	35514	0.69	–

BMP–1 (WATER QUALITY TREATMENT & RUNOFF RETENTION)

TYPE	MODEL	TOTAL CHAMBERS	GRAVEL FOOTPRINT (SQFT)	DESIGN VOLUME (CUFT)	MINIMUM TREATMENT VOLUME (CUFT)	MINIMUM STORAGE VOLUME (CUFT)
UNDERGROUND INFILTRATION CHAMBER	ADS STORMTECH SC–740	30	1163	2691	1662	2478

BMP–2 (PEAK FLOW MANAGEMENT)

TYPE	MODEL	OVERFLOW WEIR ELEVATION	ORIFICE DIAMETER (IN)	ORIFICE FLOW/ MITIGATED DISCHARGE (CFS)
FLOW CONTROL MANHOLE	N/A– CUSTOMIZED ON SITE	50.10 (TOP OF CHAMBERS)	1.029 (1" SCH 40 PVC)	0.059
EXISTING SITE 2–YR/ 5–MIN STORM FLOW (CFS)	EXISTING SITE 10–YR/ 5–MIN STORM FLOW (CFS)	PROPOSED UNMITIGATED SITE 2–YR/ 5–MIN STORM FLOW (CFS)	PROPOSED UNMITIGATED SITE 10–YR/ 5–MIN STORM FLOW (CFS)	DESIGN DRAWDOWN TIME (HRS)
0.099	0.140	1.202	1.689	3.9

ASSUMPTIONS

MEASURED INFILTRATION RATE (IN/HR)	EXISTING SITE RUNOFF COEFFICIENT	PROPOSED SITE RUNOFF COEFFICIENT	85%/24–HR STORM DEPTH (IN)	95%/24–HR STORM DEPTH (IN)	2–YR/ 5–MIN STORM INTENSITY (IN/HR)	10–YR/ 5–MIN STORM INTENSITY (IN/HR)
6	0.04	0.48	0.80	1.30	2.10	2.950

QuickQuack CAR WASH

6020 WEST OAKS BLVD., SUITE 300, ROCKLIN, CA 95765

QUICK QUACK
STORE #: 33-059
632 E. LAKE AVENUE
WATSONVILLE, CA 95076

REVISIONS

#	DATE	DESCRIPTION
1	-	-
2		
3		
4		
5		
6		

TAIT
SINCE 1964
11280 TRADE CENTER DR.
RANCHO CORDOVA, CA
95742
P: (916) 635-2444
www.tait.com

DATE: 5/17/2024
TAIT JOB #: QQ0076

PLANNING PACKAGE

PRELIMINARY WATER QUALITY MANAGEMENT PLAN

4. ADS Stormtech Chamber Details

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

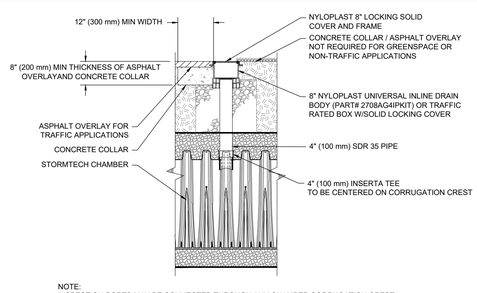
NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

3 SC-740 ISOLATOR ROW PLUS DETAIL



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4 4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER)

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

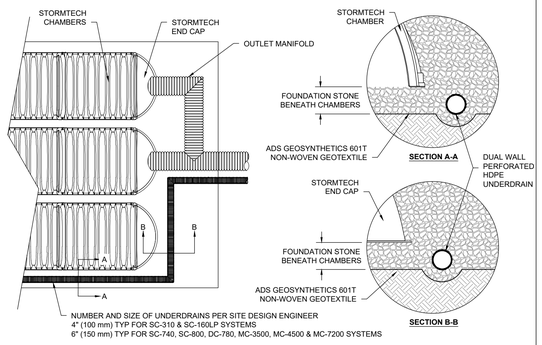
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

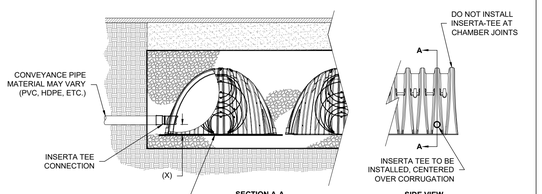
STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



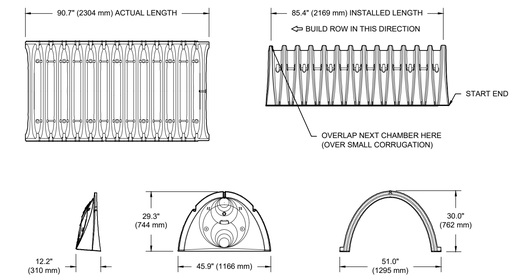
5 UNDERDRAIN DETAIL



NOTES:
- PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.
- CONTACT ADS ENGINEERING SERVICES IF INSERTA TEE INLET MUST BE RAISED AS NOT ALL INVERTS ARE POSSIBLE.

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
SC-800	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
MC-7200	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

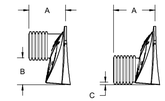
6 INSERTA-TEE SIDE INLET DETAIL



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.8 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

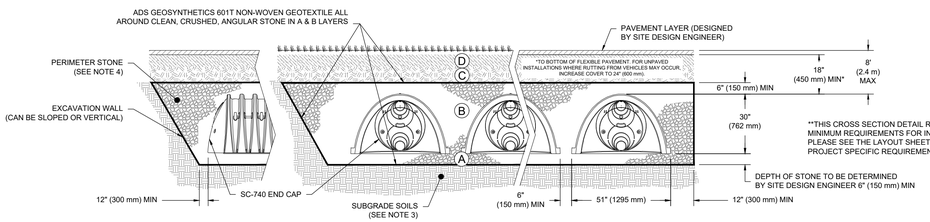
NOTE: ALL DIMENSIONS ARE NOMINAL

2 SC-740 TECHNICAL SPECIFICATIONS

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 SC-740 CROSS SECTION DETAIL

DRAWN: JL | DATE: 01/10/24
REVIEWED: JLM | PROJECT NO:
REV: | NOT TO SCALE

SC-740 STANDARD DETAILS

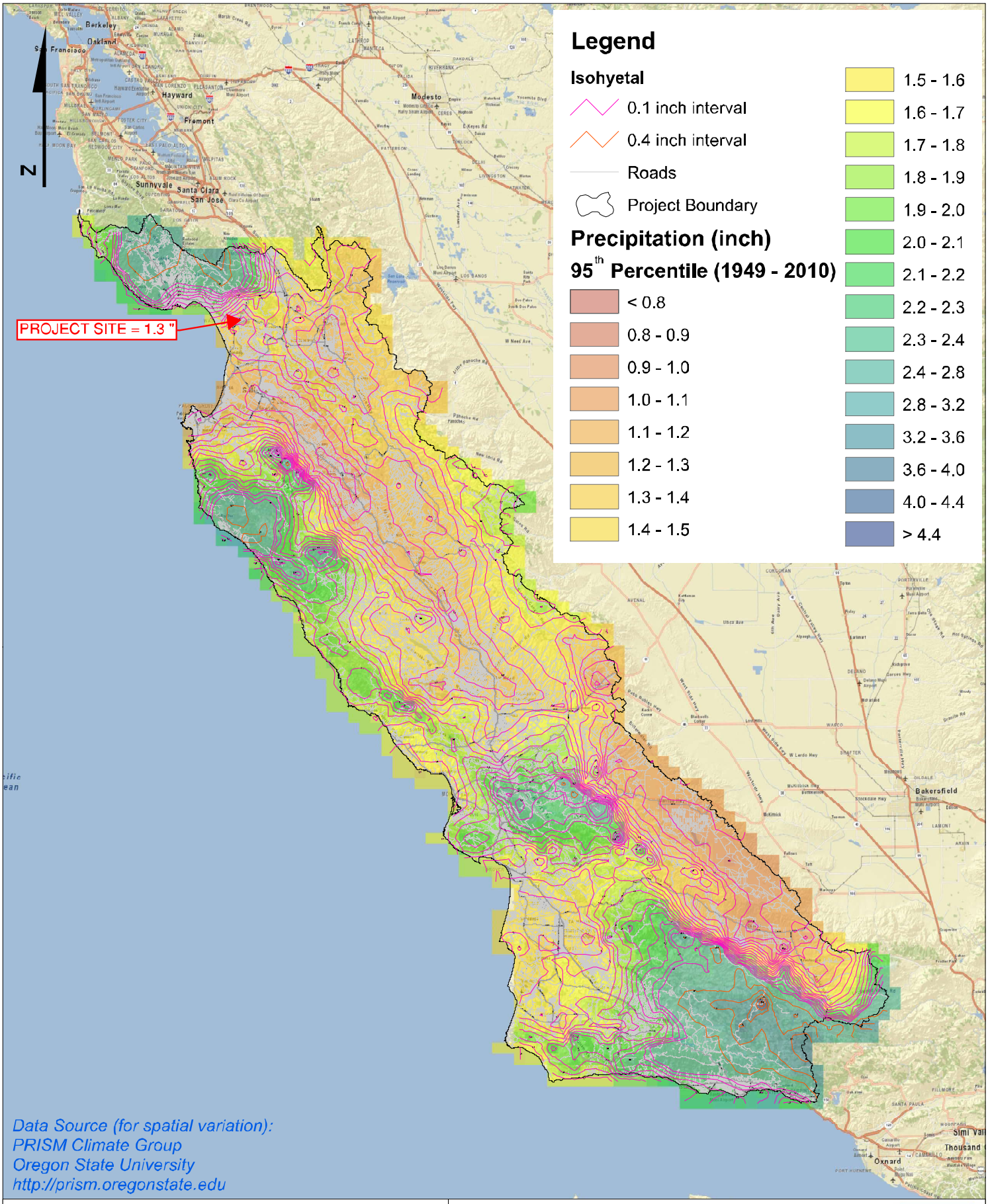
StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026

Advanced Drainage Systems, Inc.

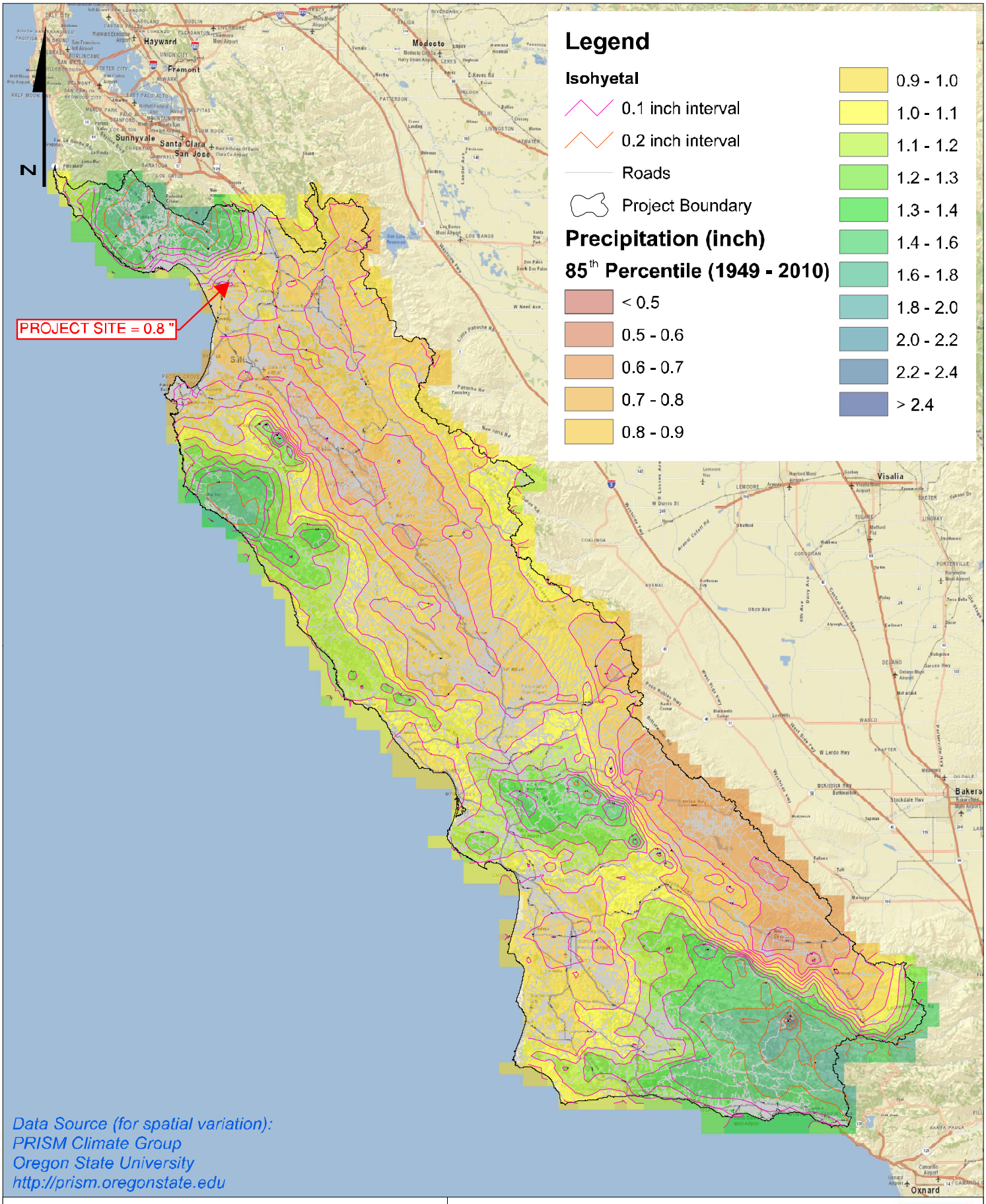
SHEET 1

5. Central Coast Region Rainfall Depth Maps



Central Coast Region
95th Percentile 24-hour Rainfall Depth
NAD 1983 California Teale Albers

0 20 40 80 Kilometers
0 20 40 80 Miles



Data Source (for spatial variation):
PRISM Climate Group
Oregon State University
http://prism.oregonstate.edu

Central Coast Region
85th Percentile 24-hour Rainfall Depth
NAD 1983 California Teale Albers

0 20 40 80 Kilometers
0 15 30 60 Miles

6. NOAA Storm Estimates

NOAA Atlas 14, Volume 6, Version 2
Location name: Watsonville, California, USA*
Latitude: 36.9233°, Longitude: -121.7461°
Elevation: 54 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.78** (1.54-2.09)	**2.10** (1.81-2.47)	**2.56** (2.20-3.01)	**2.95** (2.51-3.52)	**3.53** (2.87-4.38)	**4.00** (3.17-5.09)	**4.50** (3.46-5.90)	**5.04** (3.76-6.85)	**5.83** (4.13-8.34)	**6.49** (4.40-9.67)
10-min	**1.27** (1.10-1.49)	**1.51** (1.30-1.77)	**1.84** (1.57-2.16)	**2.12** (1.79-2.52)	**2.53** (2.06-3.14)	**2.86** (2.27-3.65)	**3.22** (2.48-4.23)	**3.62** (2.69-4.91)	**4.18** (2.96-5.98)	**4.66** (3.16-6.94)
15-min	**1.03** (0.884-1.20)	**1.22** (1.04-1.43)	**1.48** (1.27-1.74)	**1.71** (1.45-2.03)	**2.04** (1.66-2.53)	**2.31** (1.83-2.94)	**2.60** (2.00-3.41)	**2.92** (2.17-3.96)	**3.37** (2.38-4.82)	**3.75** (2.54-5.59)
30-min	**0.710** (0.612-0.832)	**0.840** (0.722-0.986)	**1.02** (0.876-1.20)	**1.18** (1.00-1.40)	**1.41** (1.14-1.75)	**1.59** (1.26-2.03)	**1.79** (1.38-2.36)	**2.01** (1.50-2.74)	**2.33** (1.65-3.33)	**2.59** (1.76-3.86)
60-min	**0.490** (0.422-0.574)	**0.579** (0.498-0.680)	**0.705** (0.604-0.831)	**0.813** (0.690-0.968)	**0.971** (0.790-1.20)	**1.10** (0.872-1.40)	**1.24** (0.953-1.63)	**1.39** (1.03-1.89)	**1.61** (1.14-2.30)	**1.79** (1.21-2.66)
2-hr	**0.355** (0.306-0.416)	**0.424** (0.365-0.498)	**0.519** (0.445-0.611)	**0.599** (0.509-0.714)	**0.714** (0.581-0.886)	**0.806** (0.639-1.03)	**0.904** (0.695-1.19)	**1.01** (0.750-1.37)	**1.16** (0.817-1.65)	**1.28** (0.866-1.90)
3-hr	**0.294** (0.253-0.345)	**0.354** (0.304-0.415)	**0.435** (0.372-0.512)	**0.503** (0.427-0.599)	**0.600** (0.488-0.744)	**0.676** (0.536-0.862)	**0.757** (0.583-0.995)	**0.843** (0.627-1.15)	**0.964** (0.681-1.38)	**1.06** (0.719-1.58)
6-hr	**0.203** (0.175-0.238)	**0.247** (0.212-0.290)	**0.307** (0.263-0.362)	**0.357** (0.303-0.426)	**0.428** (0.348-0.531)	**0.483** (0.383-0.615)	**0.541** (0.416-0.710)	**0.602** (0.447-0.817)	**0.686** (0.485-0.981)	**0.754** (0.511-1.12)
12-hr	**0.130** (0.112-0.153)	**0.162** (0.140-0.191)	**0.206** (0.177-0.243)	**0.243** (0.206-0.289)	**0.294** (0.239-0.365)	**0.335** (0.265-0.427)	**0.377** (0.290-0.496)	**0.423** (0.314-0.574)	**0.486** (0.343-0.694)	**0.536** (0.363-0.799)
24-hr	**0.087** (0.079-0.097)	**0.110** (0.100-0.124)	**0.142** (0.129-0.160)	**0.168** (0.151-0.191)	**0.205** (0.180-0.239)	**0.234** (0.201-0.277)	**0.264** (0.222-0.319)	**0.295** (0.243-0.366)	**0.339** (0.270-0.435)	**0.374** (0.288-0.493)
2-day	**0.055** (0.050-0.062)	**0.070** (0.063-0.078)	**0.089** (0.081-0.101)	**0.105** (0.095-0.119)	**0.127** (0.111-0.148)	**0.143** (0.123-0.169)	**0.159** (0.134-0.193)	**0.176** (0.145-0.218)	**0.199** (0.158-0.255)	**0.216** (0.167-0.286)
3-day	**0.041** (0.038-0.046)	**0.053** (0.048-0.059)	**0.067** (0.061-0.075)	**0.078** (0.071-0.089)	**0.094** (0.082-0.109)	**0.105** (0.090-0.125)	**0.116** (0.098-0.141)	**0.128** (0.105-0.158)	**0.143** (0.114-0.183)	**0.154** (0.119-0.204)
4-day	**0.034** (0.031-0.038)	**0.043** (0.039-0.049)	**0.055** (0.050-0.062)	**0.065** (0.058-0.073)	**0.077** (0.067-0.089)	**0.086** (0.074-0.102)	**0.095** (0.080-0.115)	**0.103** (0.085-0.128)	**0.115** (0.091-0.148)	**0.124** (0.096-0.164)
7-day	**0.024** (0.022-0.027)	**0.030** (0.028-0.034)	**0.038** (0.035-0.043)	**0.045** (0.040-0.051)	**0.053** (0.046-0.061)	**0.059** (0.050-0.069)	**0.064** (0.054-0.078)	**0.070** (0.057-0.087)	**0.077** (0.061-0.099)	**0.082** (0.063-0.109)
10-day	**0.019** (0.017-0.021)	**0.024** (0.021-0.027)	**0.030** (0.027-0.034)	**0.035** (0.031-0.039)	**0.041** (0.036-0.048)	**0.045** (0.039-0.054)	**0.049** (0.042-0.060)	**0.054** (0.044-0.066)	**0.059** (0.047-0.076)	**0.063** (0.048-0.083)
20-day	**0.012** (0.011-0.013)	**0.015** (0.014-0.017)	**0.020** (0.018-0.022)	**0.023** (0.020-0.026)	**0.027** (0.023-0.031)	**0.029** (0.025-0.035)	**0.032** (0.027-0.039)	**0.034** (0.028-0.043)	**0.038** (0.030-0.048)	**0.040** (0.031-0.053)
30-day	**0.010** (0.009-0.011)	**0.013** (0.011-0.014)	**0.016** (0.014-0.018)	**0.019** (0.017-0.021)	**0.022** (0.019-0.025)	**0.024** (0.021-0.028)	**0.026** (0.022-0.032)	**0.028** (0.023-0.035)	**0.031** (0.024-0.039)	**0.032** (0.025-0.043)
45-day	**0.008** (0.007-0.009)	**0.010** (0.009-0.011)	**0.013** (0.012-0.015)	**0.015** (0.014-0.017)	**0.018** (0.015-0.021)	**0.019** (0.017-0.023)	**0.021** (0.018-0.026)	**0.023** (0.019-0.028)	**0.025** (0.020-0.032)	**0.026** (0.020-0.035)
60-day	**0.007** (0.006-0.008)	**0.009** (0.008-0.010)	**0.011** (0.010-0.013)	**0.013** (0.012-0.015)	**0.015** (0.013-0.018)	**0.017** (0.015-0.020)	**0.018** (0.015-0.022)	**0.020** (0.016-0.025)	**0.021** (0.017-0.028)	**0.023** (0.017-0.030)

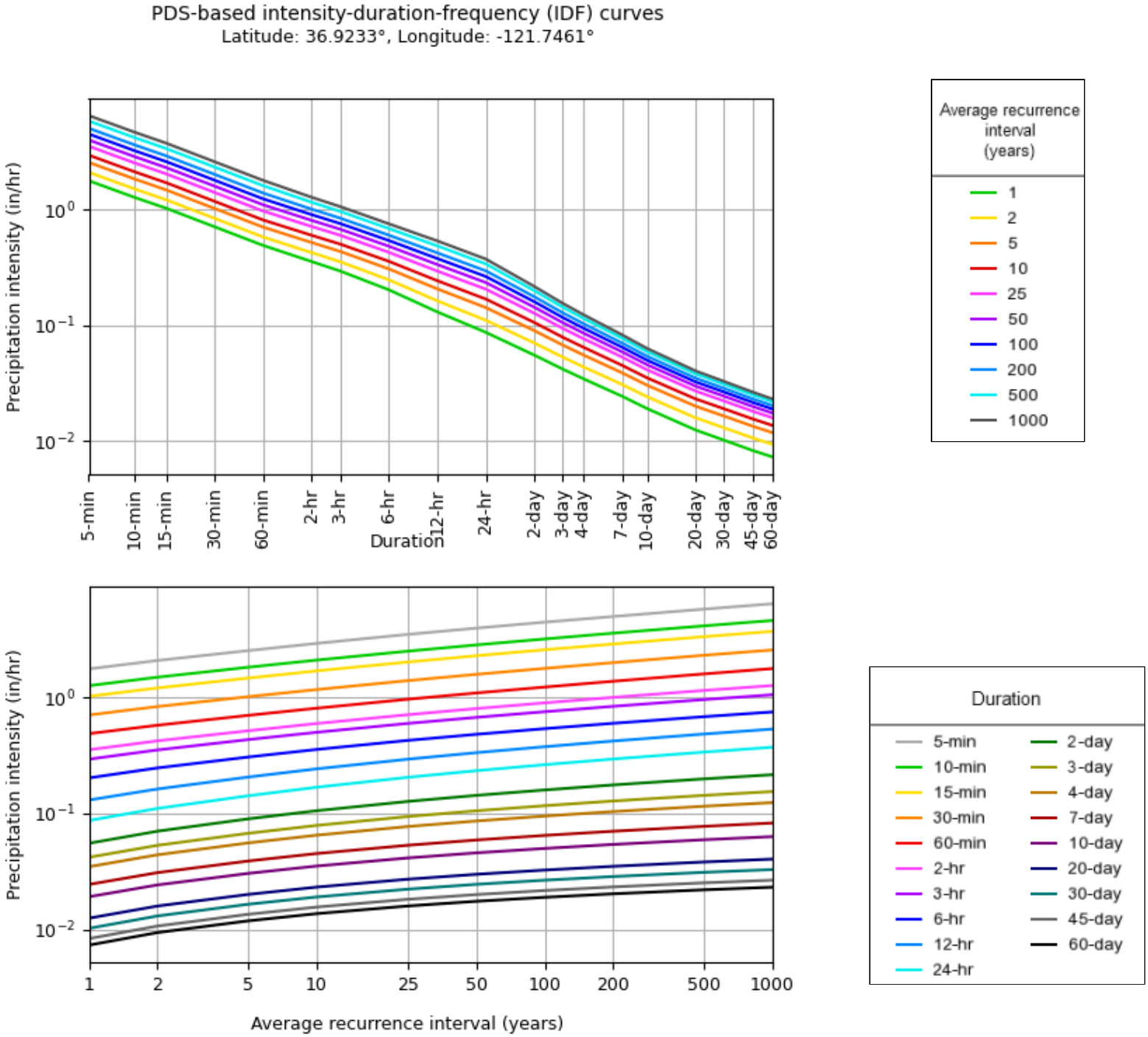
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



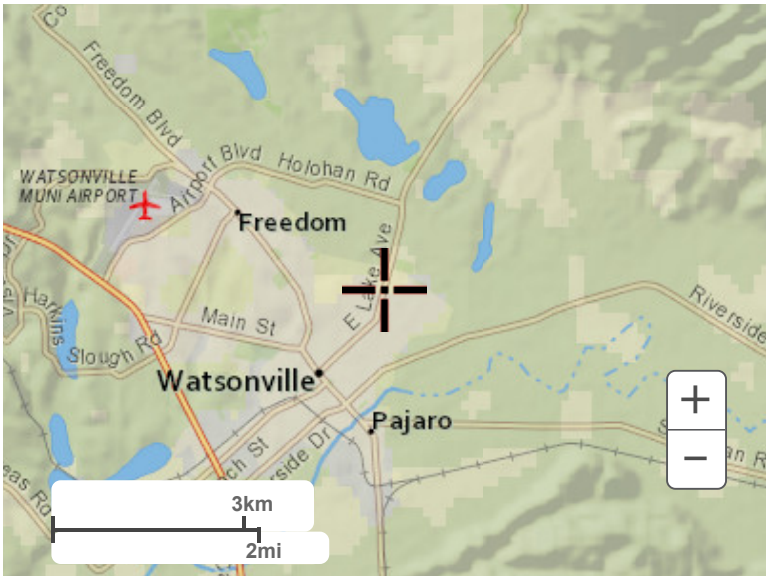
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Aug 9 22:56:14 2023

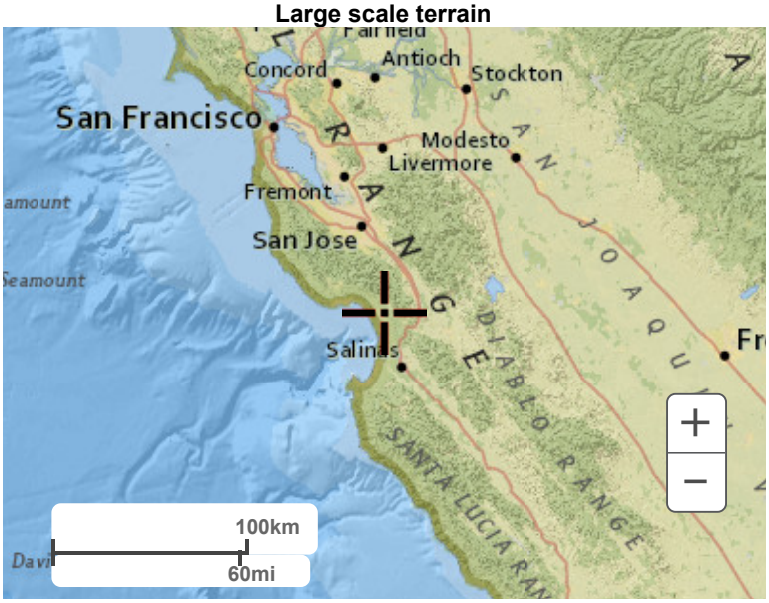
Back to Top

Maps & aerials

Small scale terrain

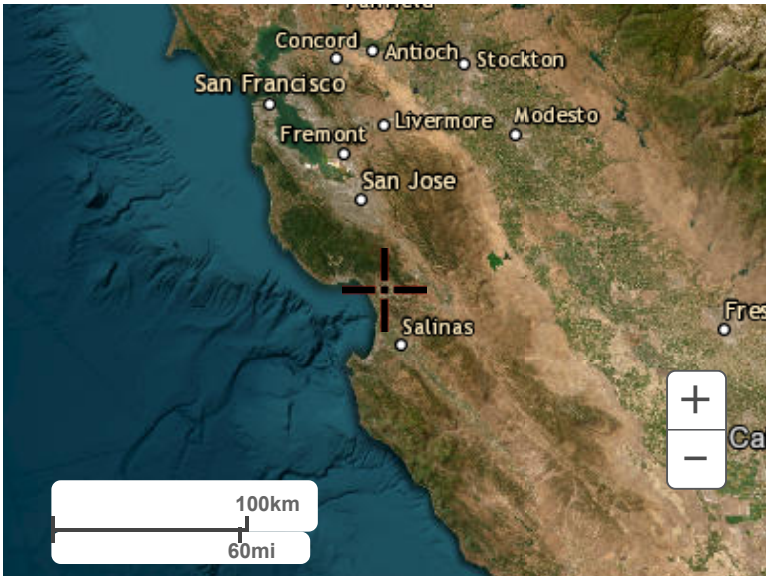


Large scale terrain



Large scale map

Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

7. Soil data

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED QUICK QUACK CAR WASH
832 EAST LAKE AVENUE
WATSONVILLE, CALIFORNIA

PROJECT NO. 042-23020
SEPTEMBER 22, 2023

Prepared for:

MS. SUSIE BURKART-SMITH
QUICK QUACK CAR WASH
1380 LEAD HILL BOULEVARD, SUITE 260
ROSEVILLE, CALIFORNIA 95661

Prepared by:

KRAZAN & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING DIVISION
1061 SERPENTINE LANE, SUITE F
PLEASANTON, CALIFORNIA 94566
(925) 307-1160

properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. A more detailed description of the field investigation is presented in Appendix A.

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory-testing program was formulated with emphasis on the evaluation of natural moisture, density, gradation, consolidation potential, plasticity, R-value and moisture-density relationships of the materials encountered. In addition, chemical tests were performed to evaluate the soil cement reactivity. Details of the laboratory test program and results of the laboratory tests are summarized in Appendix A. This information, along with the field observations, was used to prepare the final boring logs in Appendix A.

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the upper soils consisted of approximately 6 to 12 inches of very loose silty sand or sandy silt. These soils are disturbed, have low strength characteristics and are highly compressible when saturated.

Below the loose surface soils, approximately 2 to 3 feet of loose to medium dense silty sand, sandy silt and gravelly sand were encountered. Field and laboratory tests suggest that these soils are moderately strong and moderately compressible. Penetration resistance ranged from 5 to 24 blows per foot. Dry densities ranged from 96 to 101 pcf. A representative soil sample consolidated approximately 3½ percent under a 2 ksf load when saturated. A representative soil sample had an angle of internal friction of 42 degrees.

Below approximately 3 to 4 feet, layers of predominately very loose to medium dense silty sand, sand, clayey silt and silty sand/sandy silt or soft to stiff silty clay and sandy clay were encountered. Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. Penetration resistance ranged from 2 to 17 blows per foot. Dry densities ranged from 77 to 111 pcf. Representative soil samples consolidated approximately 3 to 3¼ percent under a 2 ksf load when saturated. These soils had similar strength characteristics as the upper soils and extended to the termination depth of our borings.

For additional information about the soils encountered, please refer to the logs of borings in Appendix A.

PERCOLATION TESTING

One percolation test was performed on the site. The percolation test was performed at a depth of 5 feet. Results of the test are as follows:

Test No.	Depth (feet)	Percolation Rate (min/inch)	Soil Type
P1	5	10	Silty Sand (SM)

The percolation test indicates that the soils tested have moderate absorption characteristics. The percolation rates given are based on 1 inch of fall within a 6-inch diameter hole with a 6- to 12-inch head of water.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Groundwater was encountered at a depth of approximately 31 feet below existing site grade. Groundwater rose to an elevation of 9 feet after 24 hours. Historic high groundwater was estimated to be 32 feet based on information obtained from 2 wells located within 1 mile of the site.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

SOIL LIQUEFACTION

Soil liquefaction is a state of soil particle suspension, caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs in soils, such as sands, in which the strength is purely frictional. However, liquefaction has occurred in soils other than clean sands. Liquefaction usually occurs under vibratory conditions, such as those induced by seismic events.

To evaluate the liquefaction potential of the site, the following items were evaluated:

1) Soil type

2) Groundwater depth

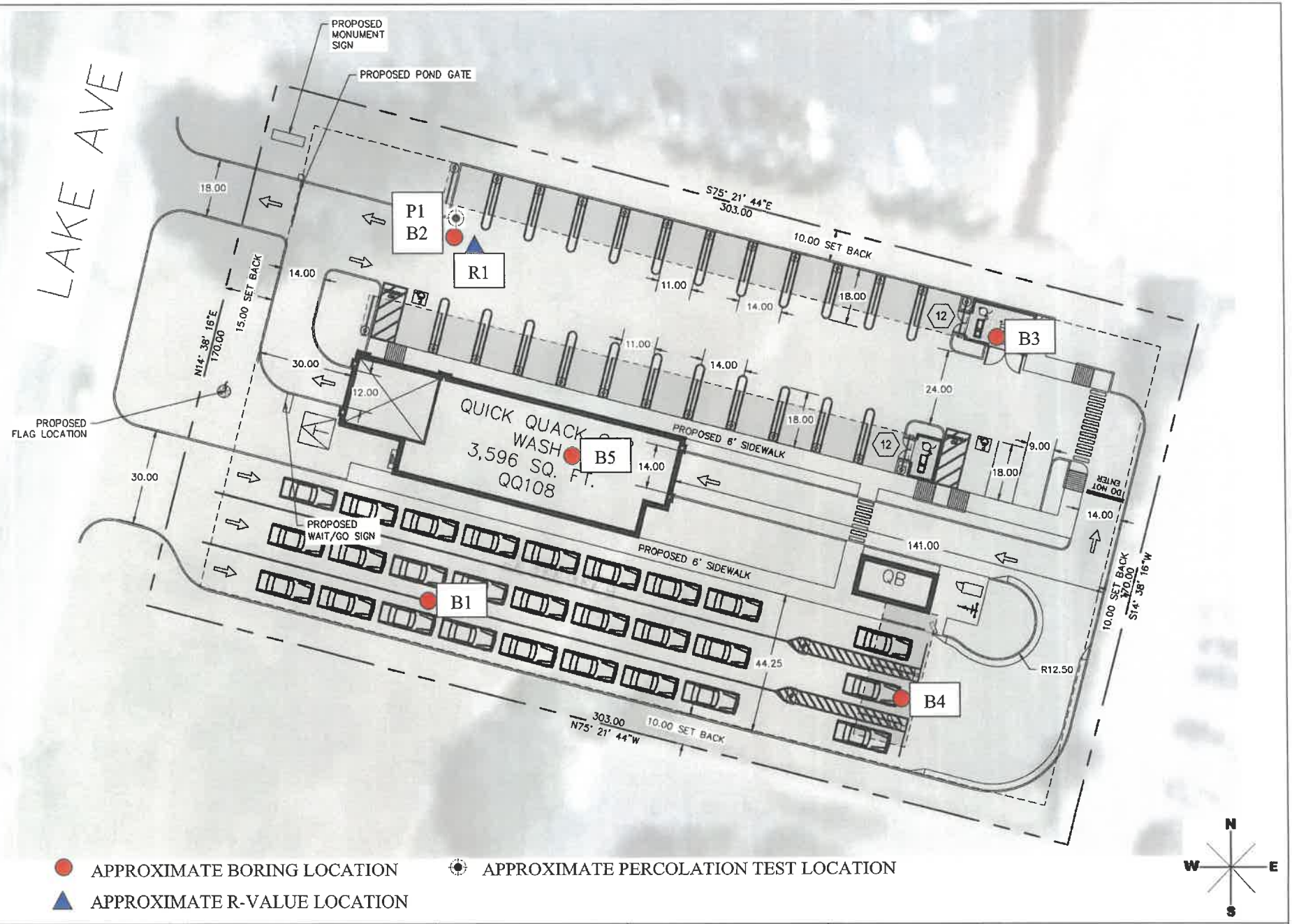
3) Relative density

4) Initial confining pressure

5) Intensity and duration of groundshaking

The predominant soils within the project site consist of alternating layers of silty sands, sandy silts, sandy clays, silty clays, clayey silts and sand. Groundwater was encountered at a depth of 31 feet below existing site grade during our exploratory drilling. The water elevation rose to a depth of 9 feet after 24 hours. Historically groundwater has been as shallow as 32 feet within the project site vicinity.

The potential for soil liquefaction during a seismic event was evaluated using the LIQUEFYPRO computer program (version 5.8h) developed by CivilTech Software. For the analysis, a maximum earthquake magnitude of 7.12 was used. A peak horizontal ground surface acceleration of 1.13g was considered conservative and appropriate for the liquefaction analysis. A high groundwater depth of 9 feet was used



APPROXIMATE BORING LOCATION

APPROXIMATE PERCOLATION TEST LOCATION

APPROXIMATE R-VALUE LOCATION

SITE MAP	**Scale:** NTS	**Date:** September 2023	Krazan GEOTECHNICAL ENGINEERING
Quick Quack Car Wash 33-059 **832 East Lake Avenue** **Watsonville, California**	**Drawn by:** HT	**Approved by:** DJ	
	Project No. 042-23020	**Figure No.** 1	

Log of Boring B5

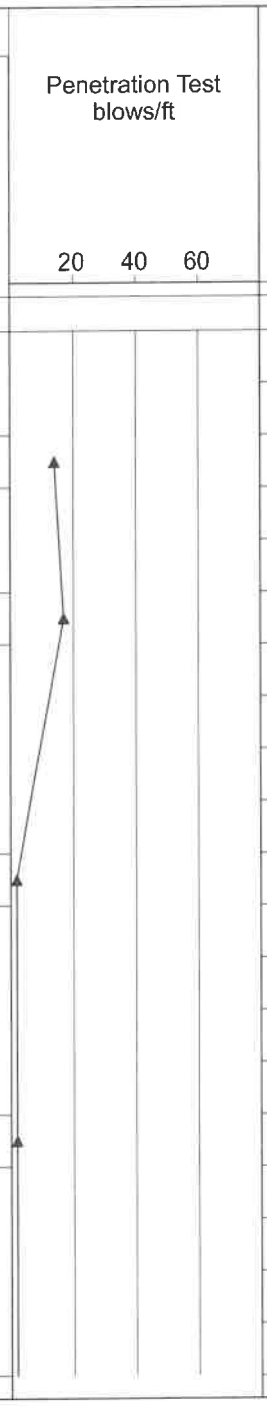
Project: Quick Quack Car Wash 33-059 | **Project No:** 042-23020

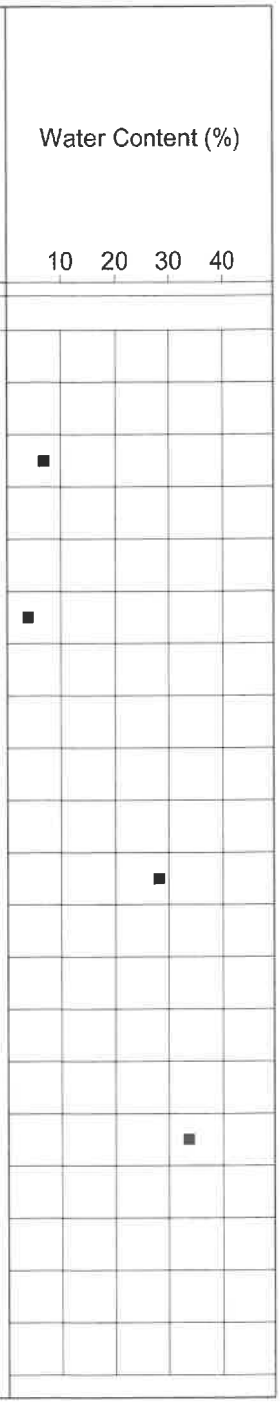
Client: Quick Quack Car Wash | **Figure No.:** A-5

Location: 832 East Lake Avenue, Watsonville, California | **Logged By:** Michael Rupright

Depth to Water> **Initial:** 31 Feet | **At Completion:** 9 Feet

Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0		Ground Surface				
0		***SANDY SILT (ML)*** Very loose, fine-grained; dark brown, moist, drills easily Loose below 12 inches				
2		***SILTY SAND (SM)*** Loose, fine-grained; brown, moist, drills easily		7.0		14
6		***SAND (SP)*** Medium dense, fine- to medium-grained with GRAVEL; gray-brown, damp, drills easily	102.3	3.9		17
10		***SAND (SP)*** Very loose, fine- to medium-grained with trace CLAY; brown, saturated, drills easily	83.7	28.2		2
12		***SANDY CLAY (CL)*** Soft, fine- to medium-grained; dark gray, saturated, drills easily				
16			87.7	33.7		2
18		***SILTY SAND (SM)*** Very loose, fine- to medium-grained with trace CLAY; brown, saturated, drills easily				
20						





Drill Method: Hollow Stem | **Drill Date:** 8-30-23

Drill Rig: CME 45B | **Hole Size:** 6½ Inches

Driller: Brent Snyder | **Elevation:** 50 Feet

Krazan and Associates

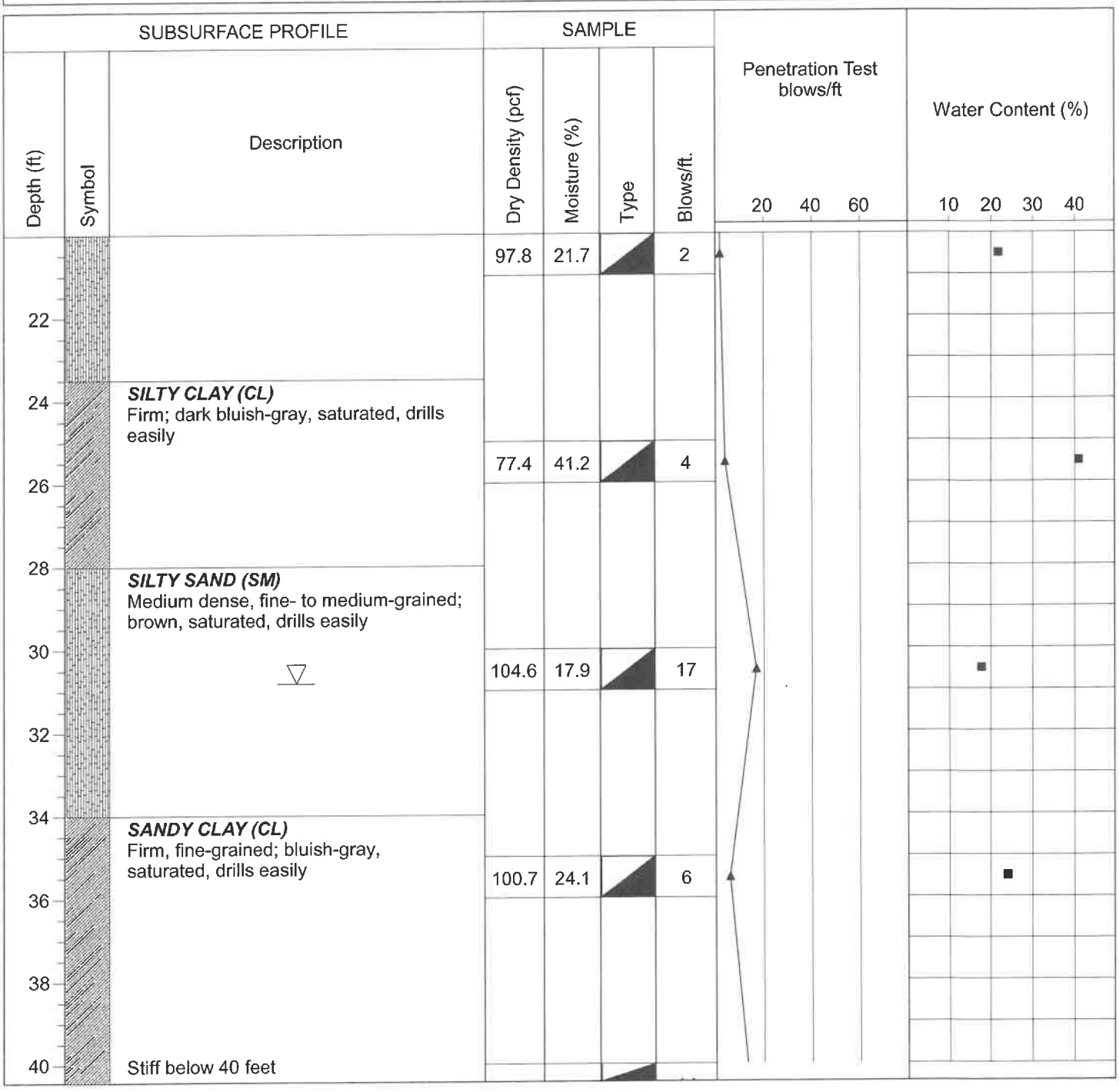
Log of Boring B5

Project: Quick Quack Car Wash 33-059 | **Project No:** 042-23020

Client: Quick Quack Car Wash | **Figure No.:** A-5

Location: 832 East Lake Avenue, Watsonville, California | **Logged By:** Michael Rupright

Depth to Water> **Initial:** 31 Feet | **At Completion:** 9 Feet



Drill Method: Hollow Stem | **Drill Date:** 8-30-23

Drill Rig: CME 45B | **Hole Size:** 6½ Inches

Driller: Brent Snyder | **Elevation:** 50 Feet

Krazan and Associates

Sheet 2 of 3

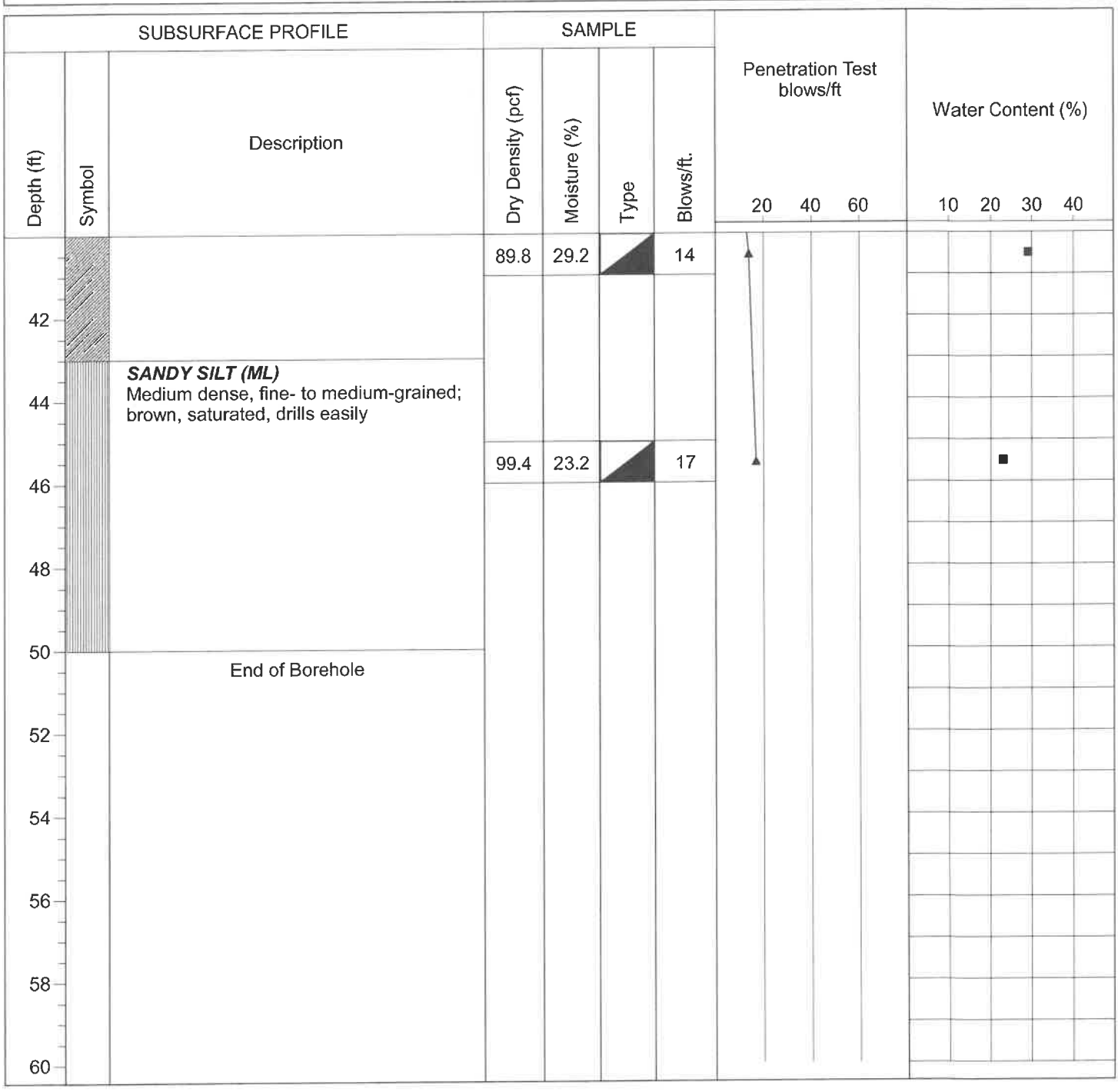
Log of Boring B5

Project: Quick Quack Car Wash 33-059 | **Project No:** 042-23020

Client: Quick Quack Car Wash | **Figure No.:** A-5

Location: 832 East Lake Avenue, Watsonville, California | **Logged By:** Michael Rupright

Depth to Water> **Initial:** 31 Feet | **At Completion:** 9 Feet



Drill Method: Hollow Stem | **Drill Date:** 8-30-23

Drill Rig: CME 45B | **Hole Size:** 6½ Inches

Driller: Brent Snyder | **Elevation:** 50 Feet

Krazan and Associates

Map Scale: 1:624 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

= 55.0000

Not rated or not available

Soil Rating Lines

= 55.0000

Not rated or not available

Soil Rating Points

= 55.0000

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Cruz County, California
Survey Area Data: Version 16, Sep 14, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 11, 2022—May 29, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
129	Elder sandy loam, 0 to 2 percent slopes, MLRA 14	55.0000 = 7.79 in/hr	1.2	100.0%
Totals for Area of Interest			**1.2**	**100.0%**

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Weighted Average

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Map Scale: 1:624 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Cruz County, California
Survey Area Data: Version 16, Sep 14, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 11, 2022—May 29, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
129	Elder sandy loam, 0 to 2 percent slopes, MLRA 14	A	1.2	100.0%
Totals for Area of Interest			**1.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

8. Calculations

Basin System - ADS Stormtech SC-740			
Underground Infiltration Basin Calculations			
Required Volume (CF)	2,478		
Infiltration (Stone) Area (SF)	1,163		
Measured Infiltration Rate (in/hr)	6		
Infiltration Outflow Rate (CFS)	0.1615		
Drawdown Time Allowed (Hrs)	48		
Expected Drawdown Time (Hrs)	4.26		
Number of End Caps	6	Stone Above	0.5
End Cap Storage Volume (CF)	0	Stone Below	0.5
Number of Sections	30	Stone Void %	40%
Section Storage Volume (CF)	74.9	System Area	1,109
Total Provide Storage (CF)	2,691		

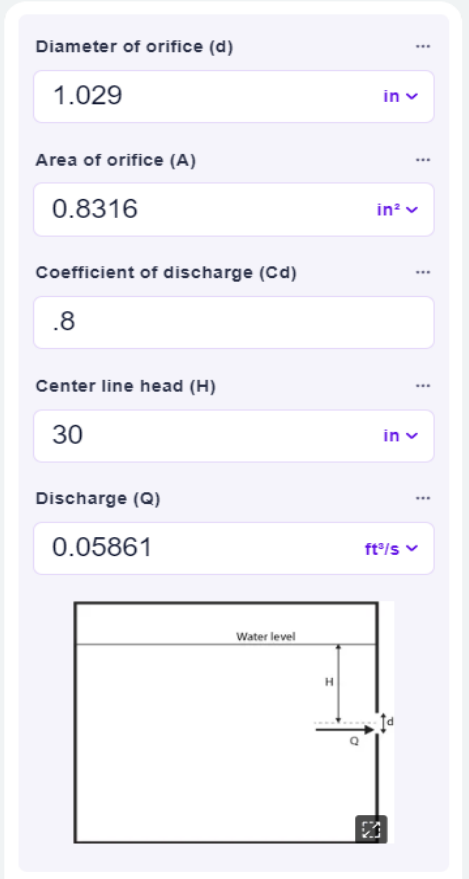
Chamber Drawdown Time Calculation	
Retention Chamber Volume (cuft)	2,691
Infiltration Rate (in/hr)	6
Chamber infiltration area (sqft)	1,163
Discharge due to infiltration (cfs)	0.162
Discharge via orifice when full (cfs)	0.0586
Assumed orifice discharge (1/2 of full) (cfs)	0.0293
Combined outflow rate (cfs)	0.191
Drawdown time (sec)	14100
Drawdown time (hrs)	3.9
Max Allowed Drawdown time (hrs)	48

Year Storm Flow Calculations

Existing i 0%	Existing Adjusted C 0.04
Proposed i 69%	Proposed Adjusted C 0.48

85th Percentile 24-hr Retention Volume (Treatment) (cuft) 1662

Existing 95th Percentile 24-hr Retention Volume (cuft) 223
Proposed 95th Percentile 24-hr Retention Volume (cuft) 2701
Requiered Storage Volume (cuft) 2478



Existing 2-year Storm flow (cfs)	0.099	I=2yr/5min 2.1
Proposed 2-year Storm flow (cfs)	1.202	I=10yr/5min 2.95
Existing 10-year Storm flow (cfs)	0.140	
Proposed 10-year Storm flow (cfs)	1.689	

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

Where "i" is the fraction of the tributary area that is impervious[7]