APPENDIX H

AZUSA
LIGHT & WATER
For Quality of Life

City of Azusa

December 19, 2022

Chad Brown
8951 Research Drive, #100
Irvine, CA 92618

Attention: Chad Brown

Subject: 1000 N. Azusa Avenue & 845 W. Cypress Street, Covina, CA 91722
APN 8421-001-016 & 8421-001-061 – Mix use project with a 3 retail building and 97 dwelling units.

This is to advise you that the above-referenced project site is situated within the service boundaries of Azusa Light & Water (ALW). ALW is the incumbent water purveyor for this project site. The water produced by Azusa Light & Water currently meets all State and Federal Standards relating to domestic water quality.

Following a review of the information you submitted regarding your project water requirements, we have determined that your proposed project can be served by ALW with adequate water supply for normally anticipated domestic demand from a similar development compared to yours. Your development, of course, is subject to all the current and future rules and regulations of ALW. In addition, the water service from ALW is contingent upon project developer's satisfactory fulfillment of the following requirements which includes but not limited to:

1) Compliance to all the governing agencies' Conditions of Approval imposed on the proposed project.
2) Payment of the necessary fees to ALW which includes Water Capacity fees, inspection fees and any applicable water usage rates.
3) Design, furnish and install the required water facilities as per approved Water Standards of Azusa Light & Water including compliance with applicable water conservation requirements contained in the City of Azusa Municipal Code.
4) The attached Conditions of Approval.

In order to obtain a water service the service applicant shall determine the meter size(s) required for the proposed project and water improvement plans shall be submitted to ALW for review and approval. Please contact ALW Water Division for further details on specification and requirements for installation.

ALW looks forward to working with you in providing water service to this proposed project. If you have any questions or require additional information, please feel free to contact me at (626) 812-5063 or via email at jsabbaghi@azusaca.gov

Sincerely,

Jonathan B. Sabbaghi

Jonathan B. Sabbaghi
Assistant Water Utility Engineer

AZUSA
LIGHT & WATER

CITY OF AZUSA
WATER DIVISION
CONDITIONS OF APPROVAL

Project Address: 1000 N. Azusa Avenue & 845 W. Cypress Street, Covina, CA 91722

Assessor Parcel Number(s): 8421-001-016 & 8421-001-061

Project Description: Mix-use project with 3 retail buildings (8,046 SF total) and a 122,256 SF retail site area. The residential portion includes 97 dwelling units (DU) with a 222,530 SF residential site area.

W-194, B59V, B56V, C042V, C010V, D079, ALW 96, ALW 105, AVW 28, AVW 40, AVW 41

Review Date: 12/21/2022

All requirements of the Water Division shall be met, including but not limited to the following:

☒ 1. Applicant shall apply for water services & meters and pay applicable associated installation deposit and inspection fees.

☒ 2. The owner/applicant is required to install new water services and meters per ALW Standards. Owner is required to size their own meters to meet their proposed needs. Each commercial unit requires a new water meter, service, and backflow. An irrigation service, meter, and backflow is also required for a total of 7 minimum (1 residential, 2 irrigation, 4 commercial) services, meters, and backflows per ALW Standards W-1 through W-4. If the proposed retail areas are divided into multiple commercial units, each unit shall have its own service, meter, and backflow device in addition to the minimum provided above.

☒ 3. Will require approved backflow devices on all services (residential, commercial, irrigation, fire) per ALW standard W-15 with cages installed. Backflow device shall be field verified with ALW Water Inspector prior to placement (5) working days prior to start of work. The backflow shall be installed on private property directly behind the property line by owner/applicant, tested by LA County Certified backflow tester at owner's expense. The reports shall be filed with ALW immediately after the devices are in place and required prior to certificate of occupancy. Required to install backflow cages.

☒ 4. All easements shall be identified on the water plans and on the Tract Map. The existing water main(s) shall be identified on improvement plans including any/all easements. All quit-claimed easements shall be recorded on the Tract Map.

☒ 5. Plan check required. Required to submit a Water Plan & Tract Map for review and approval by Azusa Light & Water (ALW) using ALW latest title block. The plan approval is valid for one year from the date the plans are signed by ALW.

☒ 6. The owner or project applicant shall take sole responsibility for cost incurred due to any modification, relocation or alteration of existing water facilities cause by this project to the satisfaction of Light and Water Department.

☒ 7. This project is subject to Ordinance No. 96-08 City of Azusa Municipal Code Section 78-471 through 477 of Article VI, Division 5 entitled "Water System Development Fee" if there is any change in floor footage. Fees must be paid to the Light and Water Department prior to the final plan approval by Building Department.

☒ 8. This project is subject to the Water Conservation requirements under the ALW Rules & Regulations – Water Utility Rule No. 21. This also includes the installation of water saving devices, such as ultra low-flow toilets (1.28 gallons per flush), and drip irrigation.

☒ 9. The owner/applicant is required to remove any unused water facilities, including services, meters, fire services, irrigation meters, water vaults, etc. within project vicinity, abandon and completely severe from water main per ALW standards & shall be inspected & approved by ALW Water Inspector.

CITY OF AZUSA
WATER DIVISION
CONDITIONS OF APPROVAL

☒ 10. No public water facilities, including water mains, fire hydrants, or water meters are allowed on private property or private sidewalks. All proposed water meters, public fire hydrants, and public water mains shall be within the public right-of-way or within the street.

☒ 11. If a fire service line is required for this project by the Fire Department it shall be placed on the ALW Water Plan. The Fire Department Connection(s) (FDC)(s) shall not be installed on the riser of the backflow device. ALW is required to inspect the backflow devices. FDC(s) and fire backflow devices shall be painted red.

☒ 12. The onsite private water system shall be labeled private and owned and maintained by the property owner.

☒ 13. The Water System Development fees are required to be paid in full for this development prior to the Water Plan approval.

☒ 14. The owner shall pay all current applicable fees and deposits required for this project. ALW staff shall be consulted for current and applicable fees.

☒ 15. Currently in Phase III of the Drought, recommend drought tolerant landscaping.

☒ 16. Will require installation of a new water main. Public water mains shall be ductile iron class 350 with a minimum size of 8-inches in diameter, sized & designed for project needs. The public water mains shall be inspected & approved by ALW Water Inspector prior to certificate of occupancy including: trenching, bedding, shading, placing of pipe, valves, fittings, thrust blocks, other underground utilities in place, vertical & horizontal crossing separations, leakage testing, flushing, disinfection, bacteriological, valve boxes raised to grade and lines flushed, final inspection, etc.

☒ 17. Contact Water Division for details on Specifications and Requirements.

☒ 18. The developer shall submit a water system and hydraulic analysis for proposed plan with proposed water demands for development including average day demand, max day demand, and peak hour demand.

☒ 19. Requires installation of new class 350 ductile iron public water main on Azusa Avenue from northern property line to Cypress Avenue and on Cypress Avenue from Azusa Avenue to the eastern property line, including the entire intersection of Azusa Avenue and Cypress Avenue. All new water main shall be sized to meet the development's proposed needs. All new and existing services, valves, tie-ins, and fire hydrants shall be re-connected to the new public water main.

☒ 20. All existing public water main on private property shall be severed and abandoned completely per ALW requirements.

The following estimated Water System Development Fee is based on Resolution No. 17-C2 and will be changed to reflect the actual rate as of the day fees are paid. (Actual fees will be determined once additional information is provided and the plans have been approved by ALW)

☒ Residential	**$2,187/dwelling unit**	$
☒ Commercial	**$1.00/square feet**	$
☐ Industrial	**$0.43/square feet**	$
☐ School	**$7,927 fee**	$
☐ Park	**$3,628 fee**	$
	TOTAL	$

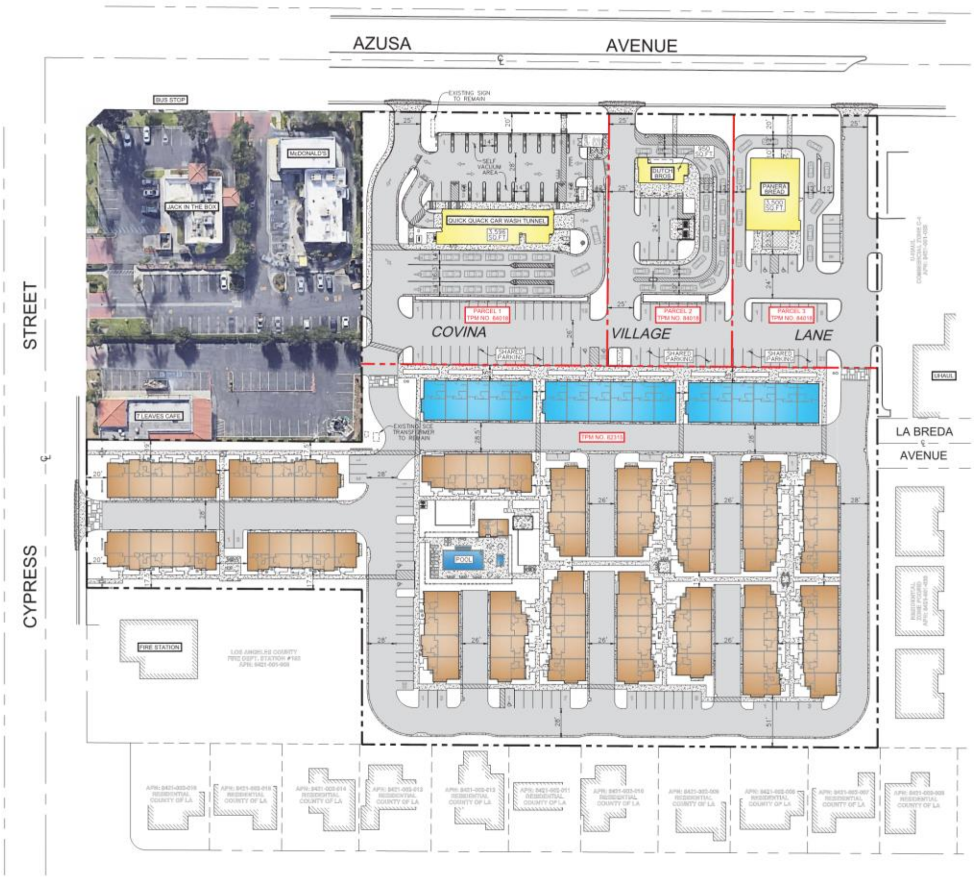
Reviewed By: Jonathan B. Sabbaghi **Date:** 12-21-2022

Jonathan B. Sabbaghi jsabbaghi@azusaca.gov 626.812.5063

APPENDIX I

SEWER AREA STUDY

for Parcel Map No. 84018 and Tract No. 82315 – Covina



LOCATION: 1000 N. Azusa Avenue

Revised March 2023

PREPARED FOR:

MELIA HOMES

8951 Research Drive
Irvine, CA 92618
(949) 759-4367

PREPARED BY:

Land Development Consultants
forward thinking, forward planning

1520 Brookhollow Drive, Suite 33
Santa Ana, CA 92705
(714) 557-7700

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SEWER CAPACITY STUDY

for Parcel Map No. 84018 and Tract Map No. 82315 – Covina

1.0 Executive Summary

At the request of Melia Homes Inc., and the City of Covina, Land Development Consultants (LDC) has prepared a Sewer Capacity Study comparing the existing and proposed sewage generation for APNs 8421-001-016 and 8421-001-061, 1000 N. Azusa Avenue, in the City of Covina (hereinafter referred to as “Property”). The Property is located towards the northeast corner of Cypress Avenue and Azusa Avenue intersection, and is approximately 7.9 acres. See *Appendix A* for an existing aerial of the Property. *Appendix B* shows the proposed Site Plan for the Property, consisting of three commercial parcels (Parcel Map No. 84018, *Appendix C*) and townhome units with live/work townhome units within Tract Map No. 82315, *Appendix C*. The commercial component consists of approximately 2.8 acres, while the residential component is approximately 5.1 acres. The Property is presently designated General Commercial (GC) by the City’s General Plan and zoned C-4 by the City’s Zoning Code.

The Property is currently improved with one (1) building, which served as a grocery store. The site is now vacant with the building now abandoned. The Property currently connects to sewer towards the north of the Property, along Azusa Avenue. The existing line is an 8” V.C.P., and runs westerly through Azusa Avenue to a service road and easement, then southerly down Homerest Avenue, eventually connecting to Sanitation District lines. Please see *Appendix D*, As-Built Plan and Profile of Sanitary Sewer in Azusa Avenue Service Road, Sheets 1 and 2, and *Appendix E*, Sewer Index Sheet E-2257. *Appendix E* will show Property In Question (PIQ) in red. As seen in the following calculations, and based on the findings of this report, mitigation will not be warranted as the proposed development will produce a decrease in sewage generation. This study will also demonstrate that the proposed development will not exceed the existing capacity, based on zoning coefficients and calculations.

2.0 Introduction

The purpose of this Sewer Capacity Study is to calculate the existing and proposed sewage generated from the Property. Calculations will show that the proposed development will not exceed the allowable capacity of the existing sewer main. The wastewater flow from the proposed site is calculated per County of Los Angeles Department of Public Works' Estimated Average Daily Sewage Flows for Various Occupancies as found in *Appendix F*.

2.1 Project Description

The proposed development per Parcel Map No. 84018 and Tract Map No. 82315 is located on the northeast corner of Cypress Avenue and Azusa Avenue, in the City of Covina, County of Los Angeles, State of California. Development of the proposed project site will consist of a residential and commercial component. Tract Map No. 82315 will consist of a stand-alone residential community, with entry from Cypress Avenue, and includes 80 townhomes and 17 live/work residential units, open space, amenities, garage and visitor parking, private yards, and two- and three-story elevation options. Parcels within the Parcel Map will front along Azusa Avenue, and will be the retail/fast-food component of this project. Currently proposed are three small retail/fast-food buildings with potential drive-thrus.

3.0 Sewage Generation

The equation for the tributary sewer discharge is as follows:

$$Q = ZA$$

Where Q = Sewer discharge (cfs)

Z = Zoning coefficient (cfs/acre)

A = Area (acres)

The corresponding zoning coefficients were obtained from the County of Los

Angeles Department of Public Works. This equation is common-practice in sewage generation, and utilizes zoning and acreage information to determine generation factors. The wastewater flow from the proposed site is calculated per County of Los Angeles Department of Public Works' Estimated Average Daily Sewage Flows for Various Occupancies as found in *Appendix F*.

3.1 Sewage Generation Factors for Existing Land Use

The generation factor for commercial (C-1 through C-4) is 0.021 cfs per acre based on the City of Covina's Sewer Master Plan. The Property is 7.99 acres.

Calculation for sewage flow for existing Property:

0.021 cfs/acre * 7.99 acres = 0.1678 cfs

Peak factor = 2.5 (based on LADPW)

0.1678 cfs x 2.5 = 0.4195 cfs

1 cfs = 448.83 GPM

0.4195 cfs * 448.83 = 188.28 GPM

The existing sewage generation including peak factor is:

0.4195 cfs or 188.28 GPM.

3.2 Sewage Generation Factors for Proposed Development

The Property will be subdivided into the following: 5.11 acres residential (0.92 acres live/work; 4.18 multi-family), with a total of 97 units; and 2.80 acres commercial. (0.078 acres will be street dedication)

Residential Component Calculation

The generation factor for residential, assuming condominiums for all units, is 0.001 cfs/unit, based on the LADPW Sanitary Sewer Procedural Manual, Estimated Average Daily Sewage Flows for Various Occupancies.

Calculation for sewage flow for proposed residential component:

0.001 cfs * 97 units = 0.097 cfs

Peak factor = 2.5 (based on LADPW)

0.097 cfs x 2.5 = 0.2425 cfs

1 cfs = 448.83 GPM

0.2425 cfs * 448.83 = 108.84 GPM

The proposed sewage generation for the residential component, including peak factor, is:

0.2425 cfs or 108.84 GPM

Commercial Component Calculation

The generation factor for commercial (C-1 through C-4) is 0.021 cfs per acre based on the LADPW Sanitary Sewer Procedural Manual, Estimated Average Daily Sewage Flows for Various Occupancies. The commercial component is 2.80 acres.

Calculation for sewage flow for proposed commercial component:

0.021 cfs/acre * 2.80 acres = 0.059 cfs

Peak factor = 2.5 (based on LADPW)

0.059 cfs x 2.5 = 0.148 cfs

1 cfs = 448.83 GPM

0.148 cfs * 448.83 = 66.43 GPM

The proposed sewage generation for the commercial component, including peak factor, is:

0.148 cfs or 66.43 GPM

3.3 Existing and Proposed Sewage Generation Comparison

Based on the above calculations, the existing Property generates 0.4195 cfs or 188.28 GPM at its current zoning and land use. The proposed development will generate a total of 0.39 cfs (0.2425 [residential] + 0.148 [commercial]) and 175.27 GPM (108.84 GPM [residential] + 66.43 GPM [commercial]).

SEWAGE GENERATION SUMMARY		
	TOTAL CFS **(includes Peak Factor)**	**TOTAL GPM** **(includes Peak Factor)**
EXISTING PROPERTY (COMMERCIAL)	0.4195 CFS	188.28 GPM
PROPOSED DEVELOPMENT (RESIDENTIAL + COMMERCIAL)	0.39 CFS	175.27 GPM
DIFFERENCE/REDUCTION	**0.0295 CFS**	**13.01 GPM**

4.0 Conclusion

Based on the findings of this report, the proposed development will discharge a peak flow of 0.39 cfs or 175.27 GPM. There will be a **reduction** of sewage generation by 0.0295 CFS or 13.01 GPM from the existing allowable land use.

DUE TO THE REDUCTION IN SEWAGE GENERATION FOR THE PROPOSED DEVELOPMENT, MITIGATION IS NOT WARRANTED. CALCULATED RESULTS SHOW THE PROPOSED DEVELOPMENT WILL HAVE LESS IMPACT ON THE EXISTING SEWER SYSTEM THAN EXISTING ZONED CONDITIONS. THE PROPOSED DEVELOPMENT WILL GENERATE SIGNIFICANTLY LESS CFS AND GPM THAN THE EXISTING ALLOWABLE LAND USE.

5.0 Appendices

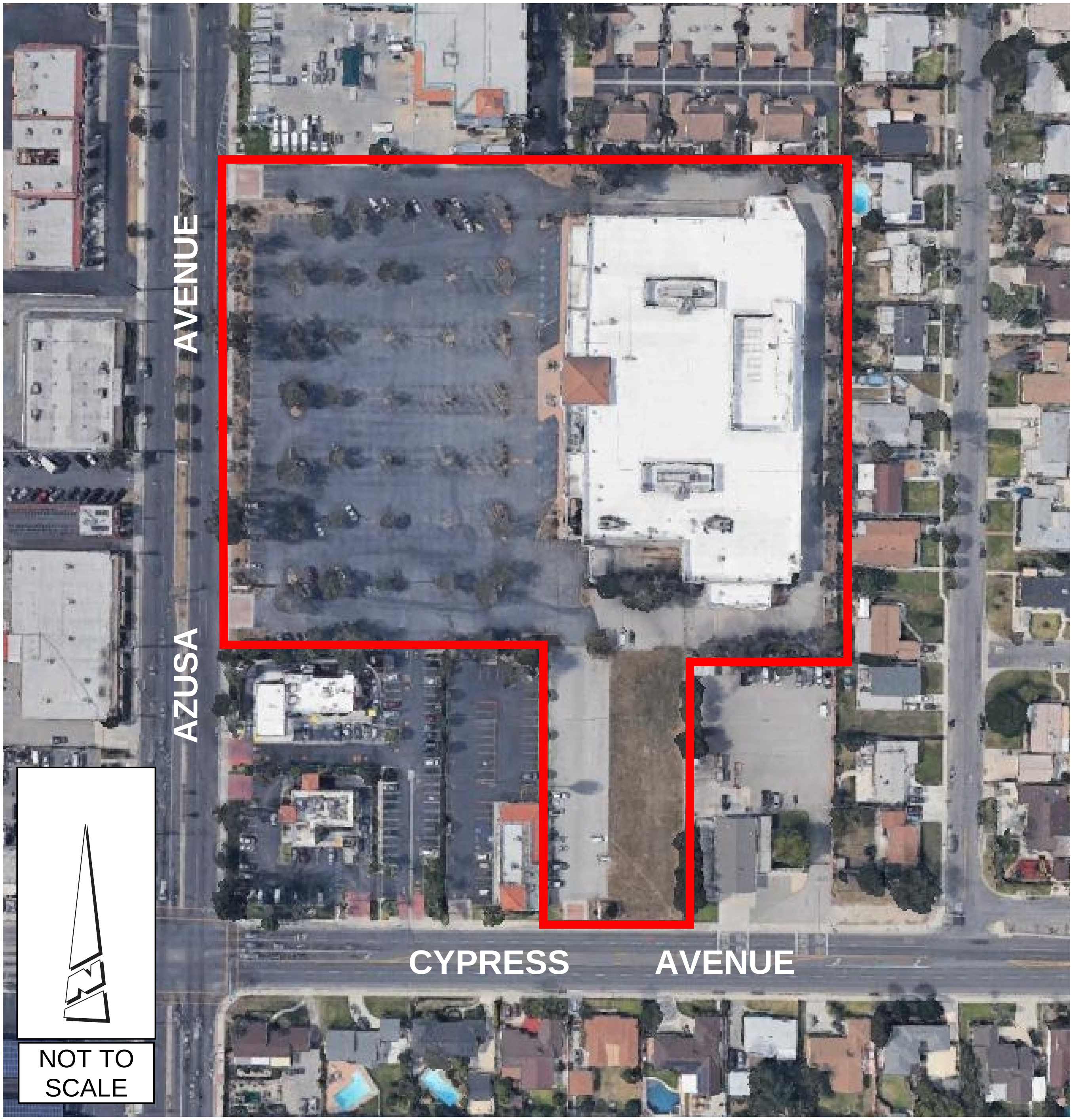
Please see attached for the following supplemental information related to this Sewer Area Study.

- **Appendix A** – Existing Aerial of the Property
- **Appendix B** – Site Plan for Parcel Map No. 84018 and Tract Map No. 82315
- **Appendix C** – Tentative Parcel Map No. 84018 and Tentative Tract No. 82315
- **Appendix D** – As-Built Plan and Profile in Azusa Avenue Service Road, Sheets 1 and 2
- **Appendix E** – Sewer Index Sheet E-2257
- **Appendix F** – Estimated Average Daily Sewage Flows for Various Occupancies
- **Appendix G** – Flow Diagram for the Design of Circular Sanitary Sewer, Standard S-C4

APPENDIX A

Existing Aerial

EXISTING AERIAL AND SITE CONDITIONS
1000 N. AZUSA AVENUE, COVINA, CA



LEGEND:

🟥 - PROPERTY
BOUNDARY

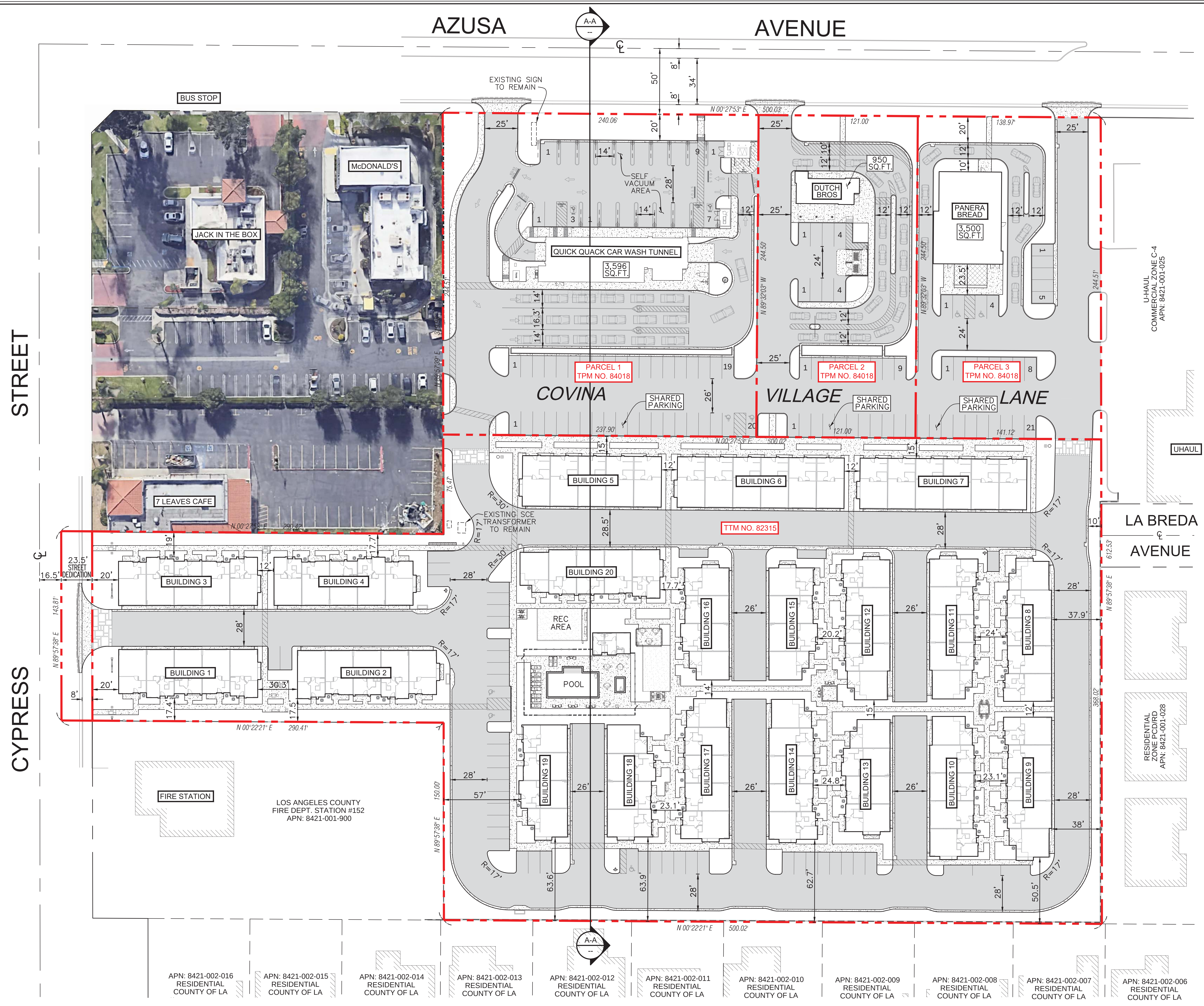
APPENDIX B

Site Plan

SITE PLAN

COVINA VILLAGE

RETAIL / COMMERCIAL + LIVE WORK + TOWNHOMES
TENTATIVE TRACT MAP NO. 82315 & TENTATIVE PARCEL MAP NO. 84018
845 WEST CYPRESS STREET & 1000 NORTH AZUSA AVENUE
IN THE CITY OF COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA



PROJECT SUMMARY:

OWNER (TTM NO. 82315):	MELIA HOMES 8951 RESEARCH DRIVE, SUITE 100 IRVINE, CA 92618
OWNER (TPM NO. 84018):	PKL INVESTMENTS, LLC 2863 MARICOPA STREET TORRANCE, CA 90503
ENGINEER:	LAND DEVELOPMENT CONSULTANTS 1520 BROOKHOLLOW DRIVE, SUITE 33 SANTA ANA, CA 92705
ARCHITECT:	SUMMA ARCHITECTURE 5256 S. MISSION ROAD, SUITE 404 BONSALL, CA 92003
SOILS ENGINEER:	GEOTEK, INC. 1548 N. MAPLE STREET CORONA, CA 92878
PROJECT LOCATION:	1000 NORTH AZUSA AVENUE 845 WEST CYPRESS STREET COVINA, CA 91722
APNs:	8421–001–016 & 8421–001–061
FLOOD ZONE:	ZONE "X" (FLOOD INSURANCE RATE MAP) COMMUNITY PANEL No. 06037C1700F
EXISTING GENERAL PLAN:	GENERAL COMMERCIAL
PROPOSED GENERAL PLAN:	COVINA VILLAGE SPECIFIC PLAN
EXISTING ZONING:	COMMERCIAL ZONE (HIGHWAY) (C–4)
PROPOSED ZONING:	SPECIFIC PLAN

PROJECT SITE AREA:	348,165 SF = 7.993 ACRES
STREET DEDICATION:	3,379 SF = 0.078 ACRES
NET SITE AREA:	344,786 SF = 7.915 ACRES

TTM NO. 82315 (RESIDENTIAL): 222,530 SF = 5.109 ACRES
97 UNITS

3 STORY ROW TOWN/LIVE–WORK

13 – PLAN 1	1,337 SF	2 BD + DEN
21 – PLAN 2	1,531 SF	2 BD + DEN
25 – PLAN 3	1,654 SF	3 BD + DEN
21 – PLAN 4	1,800 SF	4 BD
8 – PLAN 5	1,976 SF	3 BD + WORKSPACE
9 – PLAN 6	1,982 SF	3 BD + WORKSPACE

PARKING SUMMARY

GARAGE STALLS PROVIDED	194 STALLS
ON–SITE OPEN STALLS	49 STALLS
SHARED LIVE/WORK OPEN STALLS	41 STALLS
TOTAL PARKING PROVIDED	284 STALLS
(2.93 STALLS/UNIT)	

COMMON OPEN SPACE	45,874 SF (472.9 SF/UNIT) 15' DIM
PRIVATE OPEN SPACE	6,638 SF (68.4 SF/UNIT)
TOTAL OPEN SPACE	52,512 SF (541.3 SF/UNIT)

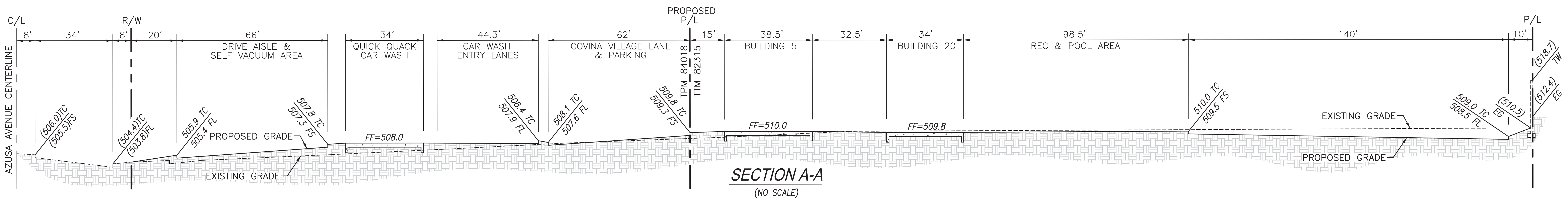
TPM NO. 84018 (COMMERCIAL):	122,256 SF = 2.806 ACRES
PARCEL 1: (QUICK QUACK CAR WASH)	58,430 SF = 1.341 ACRES
PARCEL 2: (DUTCH BROS)	29,584 SF = 0.679 ACRES
PARCEL 3: (PANERA BREAD)	34,242 SF = 0.786 ACRES

PARCEL 1 BUILDING (QUICK QUACK):	3,596 SF
PARCEL 2 BUILDING (DUTCH BROS):	950 SF
PARCEL 3 BUILDING (PANERA BREAD):	3,500 SF

PARKING SUMMARY:

VACUUM:	16 SPACES (14' X 19')
NON–STANDARD:	4 SPACES (14' X 19')
STANDARD:	53 SPACES (9' X 18')
SHARED LIVE/WORK:	41 SPACES (9' X 18')
TOTAL:	114 SPACES

40' 0 40' 80' 120'
SCALE: 1"=40'



SECTION A-A
(NO SCALE)

DATE PREPARED: NOVEMBER 28, 2022

APPENDIX C

Tentative Parcel Map No. 84018 and Tentative Tract Map No. 82315

TENTATIVE PARCEL MAP NO. 84018

COMMERCIAL & RETAIL
845 WEST CYPRESS STREET
IN THE CITY OF COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

LEGAL DESCRIPTION:

REAL PROPERTY IN THE CITY OF COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

TENTATIVE PARCEL MAP NO. 84018, BEING A DIVISION OF THE FOLLOWING:

THOSE PORTIONS OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, TOWNSHIP 1 SOUTH, RANGE 10 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF WEST COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND FILED IN THE DISTRICT LAND OFFICE ON APRIL 21, 1877, DESCRIBED AS FOLLOWS:

THE SOUTHERLY 150 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, LYING NORTHERLY OF THE NORTHERLY LINE OF SOUTHERLY 506.90 FEET OF SAID LAND;

TOGETHER WITH THE SOUTH 200 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, LYING NORTHERLY OF THE NORTHERLY LINE OF THE SOUTHERLY 306.90 FEET OF SAID LAND;

TOGETHER WITH THE NORTHERLY 150 FEET OF THE SOUTHERLY 300 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, LYING NORTHERLY OF THE NORTHERLY LINE OF SOUTHERLY 506.90 FEET OF SAID LAND.

EXCEPTING THEREFROM THOSE PORTIONS LYING EAST OF THE FOLLOWING DESCRIBED LINE:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF AZUSA AVENUE, 50.00 FOOT HALF WIDTH, AS SHOWN THE MAP OF TRACT NO. 34224, FILED IN BOOK 895, PAGES 56 THROUGH 58 OF MAPS, RECORDS OF SAID COUNTY, WITH THE NORTH LINE OF THE SOUTHERLY 306.90 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11; THENCE ALONG SAID NORTH LINE, NORTH 89°57'39" EAST 244.51 FEET TO THE POINT OF BEGINNING; THENCE LEAVING SAID NORTH LINE, PARALLEL WITH SAID EAST LINE OF AZUSA AVENUE, NORTH 00°27'53" EAST 500.02 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHERLY 806.90 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, SAID NORTH LINE ALSO BEING THE SOUTH LINE OF LOT 3 OF TRACT 23421, AS SHOWN ON A MAP FILED IN BOOK 780, PAGE 18 OF MAPS, RECORDS OF SAID COUNTY, SAID POINT BEING THE TERMINUS POINT OF THIS DESCRIPTION.

EXCEPT ALL OIL, MINERAL, GAS AND OTHER HYDROCARBON SUBSTANCES BELOW A DEPTH OF 500 FEET UNDER THE REAL PROPERTY HEREINABOVE DESCRIBED WITHOUT THE RIGHT OF SURFACE ENTRY, AS RESERVED BY A.S.D., A CALIFORNIA LIMITED PARTNERSHIP, IN THE DEED RECORDED JULY 19, 1985 AS INSTRUMENT NO. 85–828960 OF OFFICIAL RECORDS.

NOTE: THE ABOVE LEGAL DESCRIPTION IS FOR THE SOLE PURPOSE OF THIS REPORT AND MAY NOT BE CONSIDERED FOR USE IN ANY POLICY OF TITLE INSURANCE TO BE ISSUED BY THIS COMPANY AND IS SUBJECT TO CHANGE AT ANY TIME.

APN: PORTIONS OF 8421–001–016 AND 8421–001–061

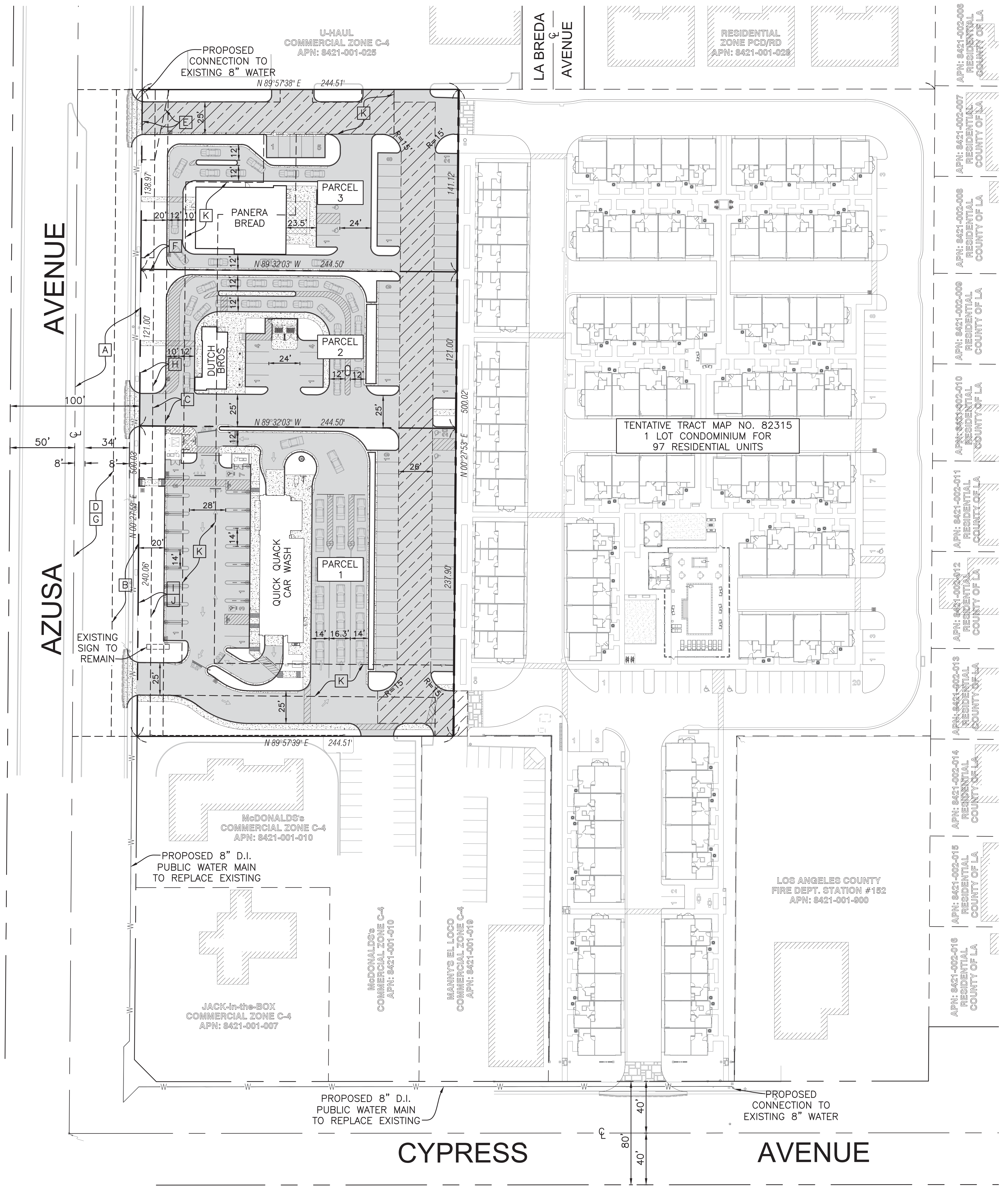
EXISTING EASEMENTS:

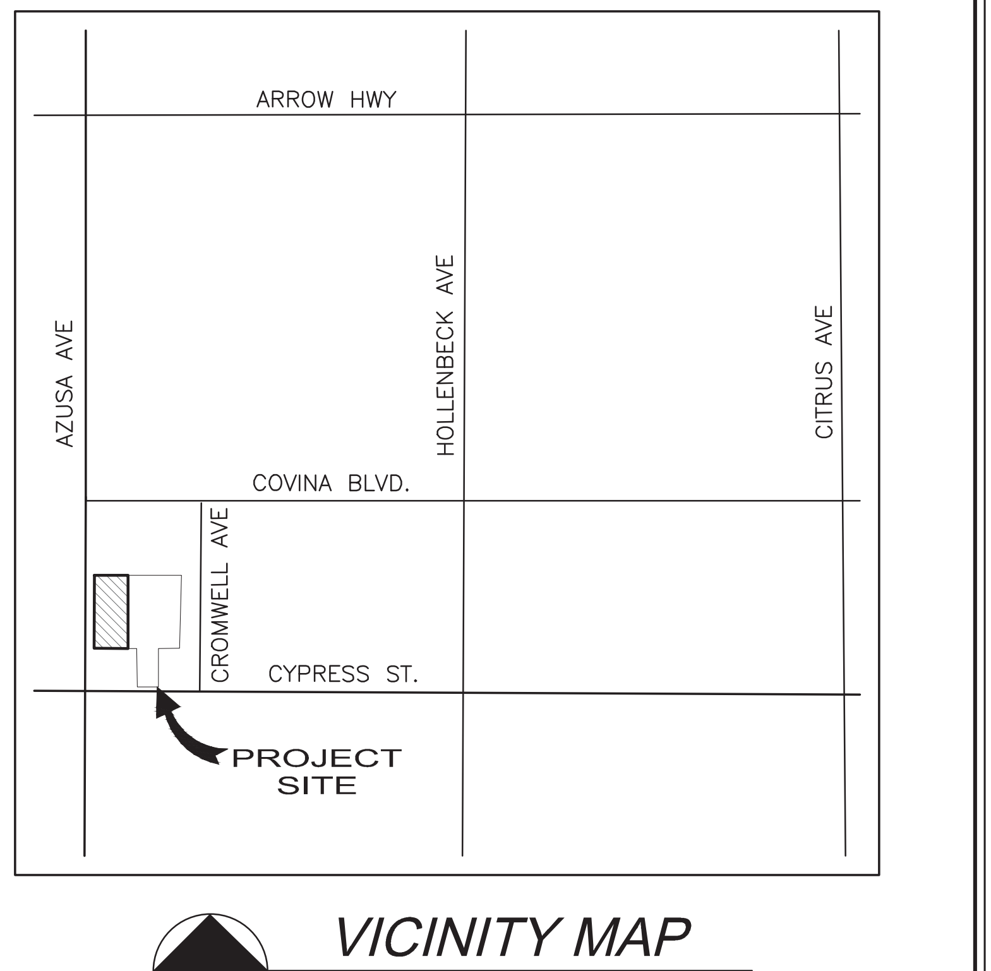
PER FIRST AMERICAN TITLE INSURANCE COMPANY ORDER NUMBER NCS–1154512–ONT1 DATED OCTOBER 28, 2022.

SYMBOL ON MAP	ITEM PER REPORT	DESCRIPTION
--	3	AN EASEMENT FOR HIGHWAY AND INCIDENTAL PURPOSES TO COUNTY OF LOS ANGELES, AS RECORDED IN BOOK 63, PAGE 3 AND IN BOOK 63, PAGE 70, BOTH OF DEEDS. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
--	4	THE INTEREST IN THE WEST 30 FEET OF SAID LAND, AS CONVEYED TO THE COUNTY OF LOS ANGELES, FOR ROAD PURPOSES, BY DEED RECORDED IN BOOK 739, PAGE 190 OF DEEDS. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
--	5	THE EFFECT OF THE RESERVATION OF THE WEST 30 FEET OF SAID LAND FOR ROAD PURPOSES, AS DISCLOSED BY PROCEEDINGS FOR ORIGINAL REGISTRATION HAD UNDER CASE NO. LR 182. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
A	6	AN EASEMENT FOR ROADWAYS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED MARCH 24, 1941 IN BK 18284, PG 195 OF O.R. (AFFECTS PORTION OF PARCELS 1, 3, AND 4) SAID INSTRUMENT ALSO PROVIDES FOR THE CONSTRUCTION AND MAINTENANCE BY THE STATE OF CALIFORNIA OF 1 TO 1 EXCAVATION SLOPES 1.5 TO 1 EMBANKMENT SLOPES AND THE RIGHT TO EXTEND DRAINAGE STRUCTURES BEYOND THE LIMIT OF THE ABOVE DESCRIBED STRIP OF LAND, WHERE REQUIRED FOR THE CONSTRUCTION AND MAINTENANCE OF 100 FT WIDTH OF ROADBED.
B	7	AN EASEMENT FOR PUBLIC STREET, ROAD/HIGHWAY AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED MARCH 26, 1941 AS INSTRUMENT NO. 6270–J OF O.R. SAID INSTRUMENT ALSO WAIVES AND CLAIMS FOR DAMAGES TO THE LAND DESCRIBED HEREIN BY REASON OF THE LOCATIONS, CONSTRUCTION, LANDSCAPING OR MAINTENANCE OF A HIGHWAY CONTIGUOUS THERETO.
C	8	AN EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JULY 11, 1941 AS INSTRUMENT NO. 12922–J OF O.R.
D	9	AN EASEMENT FOR PUBLIC ROADS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED NOVEMBER 24, 1950 AS CERTIFICATE NO. YN–97550 OF TORRENS.
--	10	AN EASEMENT FOR RIGHT OF WAY FOR STORM WATERS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED NOVEMBER 24, 1950 AS CERTIFICATE NO. YN–97550 OF TORRENS.
E	11	AN EASEMENT FOR SLOPE AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED OCTOBER 29, 1958 AS IN BOOK D–259, PAGE 713 OF O.R.
F	12	AN EASEMENT FOR SANITARY SEWER AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED FEBRUARY 9, 1962 IN BOOK D–1508, PAGE 495 OF O.R.
G	13	AN EASEMENT FOR SANITARY SEWERS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED AS IN BOOK D–2190, PAGE 408 OF O.R.
H	14	AN EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED AUGUST 10, 1964 AS INSTRUMENT NO. 631 IN BOOK D2583, PAGE 82 OF O.R.
I	15	AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JANUARY 14, 1965 AS INSTRUMENT NO. 3300 IN BOOK D–2764, PAGE 541 OF O.R.
J	16	AN EASEMENT FOR SANITARY SEWERS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JANUARY 29, 1965 AS INSTRUMENT NO. 69 IN BOOK D–2780, PAGE 880 OF O.R.
K	17	THE TERMS, PROVISIONS AND EASEMENT(S) CONTAINED IN THE DOCUMENT ENTITLED "DECLARATION OF EASEMENTS" RECORDED JULY 11, 1991 AS INSTRUMENT NO. 91–1059452 OF O.R.

PROPOSED EASEMENT:

▨ AN EASEMENT FOR VEHICULAR AND PEDESTRIAN INGRESS AND EGRESS AND INCIDENTAL PURPOSES TO REPLACE EXISTING EASEMENT RECORDED JULY 11, 1991 AS INSTRUMENT NO. 91–1059452 OF OFFICIAL RECORDS.





VICINITY MAP

(NO SCALE)

PROJECT SUMMARY:

OWNER:	PKL INVESTMENTS, LLC 2863 MARICOPA STREET TORRANCE, CA 90503
ENGINEER:	LAND DEVELOPMENT CONSULTANTS 1520 BROOKHOLLOW DRIVE, SUITE 33 SANTA ANA, CA 92705
SOILS ENGINEER:	GEOTEK, INC. 1548 N. MAPLE STREET CORONA, CA 92878
PROJECT LOCATION:	1000 NORTH AZUSA AVENUE 845 WEST CYPRESS STREET COVINA, CA 91722
APNs:	8421–001–016 & 8421–001–061
FLOOD ZONE:	ZONE "X" (FLOOD INSURANCE RATE MAP) COMMUNITY PANEL No. 06037C1700F
EXISTING GENERAL PLAN:	GENERAL COMMERCIAL
PROPOSED GENERAL PLAN:	COVINA VILLAGE SPECIFIC PLAN
EXISTING ZONING:	COMMERCIAL ZONE (HIGHWAY) (C–4)
PROPOSED ZONING:	SPECIFIC PLAN

PROJECT SITE AREA:	122,256 SF = 2.806 ACRES
PARCEL 1: (QUICK QUACK CAR WASH)	58,430 SF = 1.341 ACRES
PARCEL 2: (DUTCH BROS)	29,584 SF = 0.679 ACRES
PARCEL 3: (PANERA BREAD)	34,242 SF = 0.786 ACRES

EXISTING IMPERVIOUS AREA:	109,906 SF = 2.523 ACRES (89.9%)
EXISTING PERVIOUS AREA:	12,350 SF = 0.283 ACRES (10.1%)
PROPOSED IMPERVIOUS AREA:	99,356 SF = 2.280 ACRES (81.3%)
PROPOSED PERVIOUS AREA:	22,900 SF = 0.526 ACRES (18.7%)

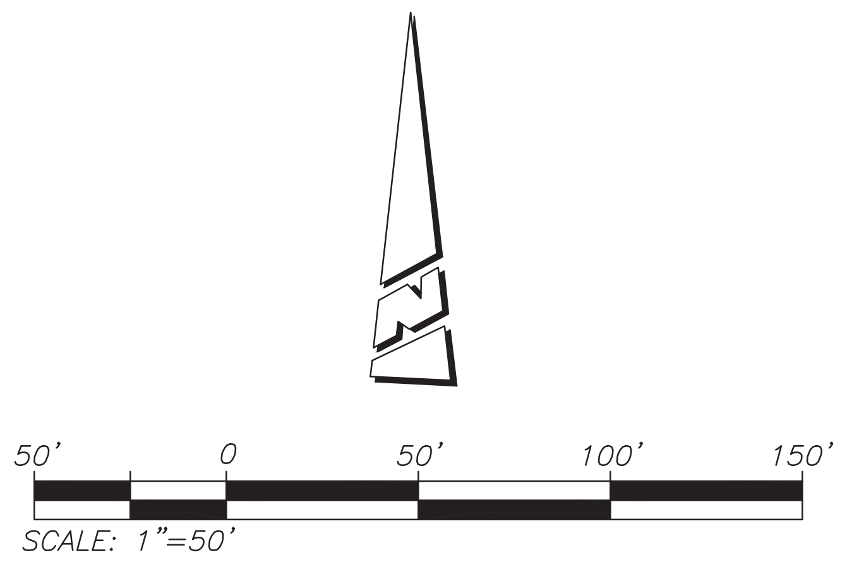
PARCEL 1 BUILDING (QUICK QUACK):	3,596 SF
PARCEL 2 BUILDING (DUTCH BROS):	950 SF
PARCEL 3 BUILDING (PANERA BREAD):	3,500 SF

PARKING SUMMARY:

VACUUM:	16 SPACES (14' X 19')
NON–STANDARD:	4 SPACES (14' X 19')
STANDARD:	53 SPACES (9' X 18')
SHARED LIVE/WORK:	41 SPACES (9' X 18')
TOTAL:	114 SPACES

UTILITY:

ELECTRIC:	SO. CALIFORNIA EDISON (800) 655–4555
WATER:	AZUSA LIGHT & WATER (626) 812–5063
GAS:	THE GAS COMPANY (800) 427–2200
CABLE:	TIME WARNER (626) 384–5400
TELEPHONE:	VERIZON (800) 483–4000



SCALE: 1"=50'

SHEET INDEX:

C1.0	TENTATIVE PARCEL MAP
C2.0	SITE PLAN

BENCHMARK:

LOS ANGELES COUNTY BENCHMARK G 4444 –RDBM TAG IN WEST CATCH BASIN 1 FT N. OF BCR AT THE N–W CORNER OF ARROW HWY AND AZUSA AVE.

ELEVATION = 519.766 FEET

BASIS OF BEARINGS:

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF AZUSA AVE AS SHOWN ON TRACT NO. 34224 M.B. 895/56–59 RECORDS OF LOS ANGELES COUNTY SAID BEARING BEING N 0°27'53" E.

REVISIONS

NO.	DESCRIPTION	BY	DATE	APPROVED

PREPARED FOR:

PKL Investments, LLC
2863 MARICOPA STREET
TORRANCE, CA 90503

REGISTERED PROFESSIONAL ENGINEER
HERSEL MOUSSA-ZAHAB
No. 44560
Exp. 3-31-2024
CIVIL
STATE OF CALIFORNIA

LAND
DEVELOPMENT
CONSULTANTS

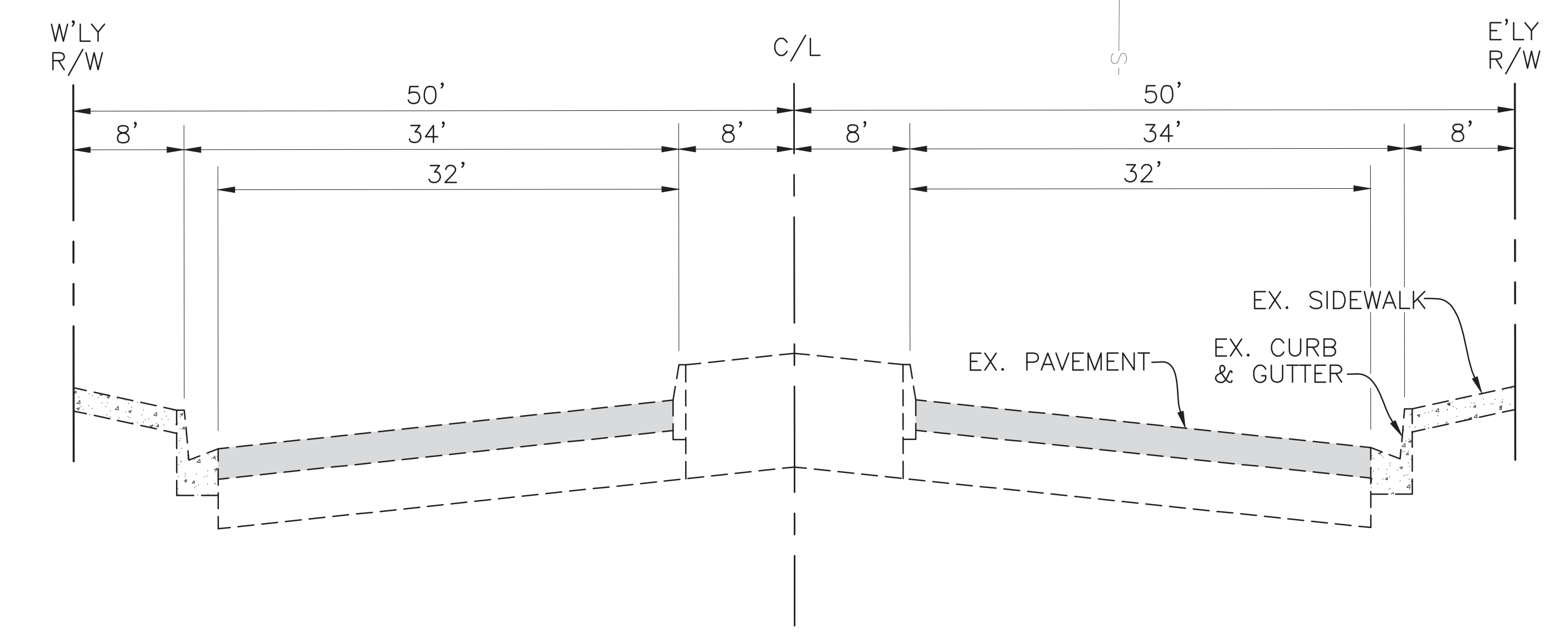
LAND PLANNERS
SURVEYORS
CIVIL ENGINEERS

1520 BROOKHOLLOW DRIVE, SUITE 33
SANTA ANA, CALIFORNIA, 92705
(714) 557–7700 (714) 557–7707 FAX

DATE: 11–28–22
DESIGNED: SZ
DRAFTED: SZ
CHECKED: HZ

TENTATIVE PARCEL MAP NO. 84018
COMMERCIAL & RETAIL
845 W. CYPRESS STREET
CITY OF COVINA, CALIFORNIA

C1.0
SHEET 1 OF 2
JOB NO. 503



AZUSA AVENUE TYPICAL SECTION

(NO SCALE)

UTILITY NOTES:

① INSTALL 1" IRRIGATION WATER SERVICE & METER PER ALW STD. DWG. W-1.

② INSTALL 1" IRRIGATION BACKFLOW DEVICE PER ALW STD. DWG. W-15.

③ INSTALL 1-1/2" COMMERCIAL WATER SERVICE & MASTER METER PER ALW STD. DWG. W-2.

④ INSTALL 1-1/2" COMMERCIAL BACKFLOW DEVICE PER ALW STD. DWG. W-15.

⑤ RECONNECT EXISTING FIRE HYDRANT TO NEW DUCTILE IRON PUBLIC WATER MAIN.

EXISTING EASEMENTS:

PER FIRST AMERICAN TITLE INSURANCE COMPANY ORDER NUMBER NCS-1154512-ONT1 DATED OCTOBER 28, 2022.

SYMBOL ON MAP	ITEM PER REPORT	DESCRIPTION
--	3	AN EASEMENT FOR HIGHWAY AND INCIDENTAL PURPOSES TO COUNTY OF LOS ANGELES, AS RECORDED IN BOOK 63, PAGE 3 AND IN BOOK 63, PAGE 70, BOTH OF DEEDS. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
--	4	THE INTEREST IN THE WEST 30 FEET OF SAID LAND, AS CONVEYED TO THE COUNTY OF LOS ANGELES, FOR ROAD PURPOSES, BY DEED RECORDED IN BOOK 739, PAGE 190 OF DEEDS. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
--	5	THE EFFECT OF THE RESERVATION OF THE WEST 30 FEET OF SAID LAND FOR ROAD PURPOSES, AS DISCLOSED BY PROCEEDINGS FOR ORIGINAL REGISTRATION HAD UNDER CASE NO. LR 182. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
A	6	AN EASEMENT FOR ROADWAYS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED MARCH 24, 1941 IN BK 18284, PG 195 OF O.R. (AFFECTS PORTION OF PARCELS 1, 3, AND 4) SAID INSTRUMENT ALSO PROVIDES FOR THE CONSTRUCTION AND MAINTENANCE BY THE STATE OF CALIFORNIA OF 1 TO 1 EXCAVATION SLOPES 1.5 TO 1 EMBANKMENT SLOPES AND THE RIGHT TO EXTEND DRAINAGE STRUCTURES BEYOND THE LIMIT OF THE ABOVE DESCRIBED STRIP OF LAND, WHERE REQUIRED FOR THE CONSTRUCTION AND MAINTENANCE OF 100 FT WIDTH OF ROADBED.
B	7	AN EASEMENT FOR PUBLIC STREET, ROAD/HIGHWAY AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED MARCH 26, 1941 AS INSTRUMENT NO. 6270-J OF O.R. SAID INSTRUMENT ALSO WAIVES AND CLAIMS FOR DAMAGES TO THE LAND DESCRIBED HEREIN BY REASON OF THE LOCATIONS, CONSTRUCTION, LANDSCAPING OR MAINTENANCE OF A HIGHWAY CONTIGUOUS THERETO.

SYMBOL ON MAP	ITEM PER REPORT	DESCRIPTION
C	8	AN EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JULY 11, 1941 AS INSTRUMENT NO. 12922-J OF O.R.
D	9	AN EASEMENT FOR PUBLIC ROADS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED NOVEMBER 24, 1950 AS CERTIFICATE NO. YN-97550 OF TORRENS.
--	10	AN EASEMENT FOR RIGHT OF WAY FOR STORM WATERS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED NOVEMBER 24, 1950 AS CERTIFICATE NO. YN-97550 OF TORRENS.
E	11	AN EASEMENT FOR SLOPE AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED OCTOBER 29, 1958 AS IN BOOK D-259, PAGE 713 OF O.R.
F	12	AN EASEMENT FOR SANITARY SEWER AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED FEBRUARY 9, 1962 IN BOOK D-1508, PAGE 495 OF O.R.
G	13	AN EASEMENT FOR SANITARY SEWERS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED AS IN BOOK D-2190, PAGE 408 OF O.R.
H	14	AN EASEMENT FOR PIPE LINES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED AUGUST 10, 1964 AS INSTRUMENT NO. 631 IN BOOK D2583, PAGE 82 OF O.R.
I	15	AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JANUARY 14, 1965 AS INSTRUMENT NO. 3300 IN BOOK D-2764, PAGE 541 OF O.R.
J	16	AN EASEMENT FOR SANITARY SEWERS AND INCIDENTAL PURPOSES IN THE DOCUMENT RECORDED JANUARY 29, 1965 AS INSTRUMENT NO. 69 IN BOOK D-2780, PAGE 880 OF O.R.
K	17	THE TERMS, PROVISIONS AND EASEMENT(S) CONTAINED IN THE DOCUMENT ENTITLED "DECLARATION OF EASEMENTS" RECORDED JULY 11, 1991 AS INSTRUMENT NO. 91-1059452 OF O.R.

BENCHMARK:

LOS ANGELES COUNTY BENCHMARK G 4444 -RDBM TAG IN WEST CATCH BASIN 1 FT N. OF BCR AT THE N-W CORNER OF ARROW HWY AND AZUSA AVE.

ELEVATION = 519.766 FEET

BASIS OF BEARINGS:

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF AZUSA AVE AS SHOWN ON TRACT NO. 34224 M.B. 895/56-59 RECORDS OF LOS ANGELES COUNTY SAID BEARING BEING N 0°27'53" E.

REVISIONS

NO.	DESCRIPTION	BY	DATE	APPROVED

PREPARED FOR:

PKL Investments, LLC
2863 MARICOPA STREET
TORRANCE, CA 90503

HERSEL MOUSSA-ZAHAB
No. 44560
Exp. 3-31-2024

LAND DEVELOPMENT CONSULTANTS
LAND PLANNERS
SURVEYORS
CIVIL ENGINEERS
1520 BROOKHOLLOW DRIVE, SUITE 33
SANTA ANA, CALIFORNIA, 92705
(714) 557-7700 (714) 557-7707 FAX

DATE: 11-28-22
DESIGNED: SZ
DRAFTED: SZ
CHECKED: HZ

SITE PLAN
TPM NO. 84018
COMMERCIAL & RETAIL
845 W. CYPRESS STREET
CITY OF COVINA, CALIFORNIA

C2.0
SHEET 2 OF 2
JOB NO. 503

TENTATIVE TRACT MAP NO. 82315

1 LOT CONDOMINIUM FOR 97 RESIDENTIAL UNITS
1000 N. AZUSA AVENUE
IN THE CITY OF COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

LEGAL DESCRIPTION:

REAL PROPERTY IN THE CITY OF COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

THOSE PORTIONS OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, TOWNSHIP 1 SOUTH, RANGE 10 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF WEST COVINA, COUNTY OF LOS ANGELES, STA TE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND FILED IN THE DISTRICT LAND OFFICE ON APRIL 21, 1877, DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE NORTHERLY LINE OF THE SOUTHERLY 16.5 FEET OF SAID WEST HALF WITH A LINE WHICH IS PARALLEL WITH AND 150.00 FEET WESTERLY, MEASURED AT RIGHT ANGLES FROM THE WESTERLY LINE OF TRACT NO. 18938, AS PER MAP RECORDED IN BOOK 496, PAGES 21 AND 22 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE ALONG SAID PARALLEL LINE NORTH 00° 21' 56" EAST 290.41 FEET TO A LINE WHICH IS PARALLEL WITH AND 290.4 FEET NORTHERLY, MEASURED AT RIGHT ANGLES FROM SAID NORTHERLY LINE; THENCE ALONG LAST DESCRIBED PARALLEL LINE SOUTH 89. 57' 39" WEST 243.32 FEET TO A
LINE WHICH IS PARALLEL WITH AND 220.00 FEET EASTERLY, MEASURED AT RIGHT ANGLES FROM THE EASTERLY LINE OF AZUSA AVENUE, 100 FEET WIDE; THENCE PARALLEL WITH SAID EASTERLY LINE, SOUTH 00° 27' 53" WEST 290.41 FEET TO SAID NORTHERLY LINE; THENCE ALONG SAID NORTHERLY LINE NORTH 89° 57' 39" EAST 243. 79 FEET TO THE POINT OF BEGINNING; EXCEPT THEREFROM THE WESTERLY 100 FEET THEREOF;

TOGETHER WITH THE SOUTHERLY 150 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, LYING NORTHERLY OF THE NORTHERLY LINE OF SOUTHERLY 506.90 FEET OF SAID LAND;

TOGETHER WITH THE SOUTH 200 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, LYING NORTHERLY OF THE NORTHERLY LINE OF SOUTHERLY 306.90 FEET OF SAID LAND; TOGETHER WITH THE NORTHERLY 150 FEET OF THE SOUTHERLY 300 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, LYING NORTHERLY OF THE NORTHERLY LINE OF SOUTHERLY 506.90 FEET OF SAID LAND.

EXCEPTING THEREFROM THOSE PORTIONS LYING WEST OF THE FOLLOWING DESCRIBED LINE:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF AZUSA AVENUE, 50.00 FOOT HALF WIDTH, AS SHOWN THE MAP OF TRACT NO. 34224, FILED IN BOOK 895, PAGES 56 THROUGH 58 OF MAPS, RECORDS OF SAID COUNTY, WITH THE NORTH LINE OF THE SOUTHERLY 306.90 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11; THENCE ALONG SAID NORTH LINE, NORTH 89° 57' 39" EAST 244.51 FEET TO THE POINT OF BEGINNING: THENCE LEAVING SAID NORTH LINE, PARALLEL WITH SAID EAST LINE OF AZUSA AVENUE, NORTH 00° 27'53" EAST 500.02 FEET TO A POINT ON THE NORTH LINE OF THE SOUTHERLY 806.90 FEET OF SAID PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, SAID NORTH LINE ALSO BEING THE SOUTH LINE OF LOT 3 OF TRACT NO. 23421, AS SHOWN ON A MAP FILED IN BOOK 780, PAGE 18 OF MAPS, RECORDS OF SAID COUNTY, SAID POINT BEING THE TERMINUS POINT OF THIS DESCRIPTION.

ALSO EXCEPTING ALL OIL, MINERAL, GAS AND OTHER HYDROCARBON SUBSTANCES BELOW A DEPTH OF 500 FEET UNDER THE REAL PROPERTY HEREIN ABOVE DESCRIBED WITHOUT THE RIGHT OF SURFACE ENTRY, AS RESERVED BY A.S.D., A CALIFORNIA LIMITED PARTNERSHIP, IN THE DEED RECORDED JULY 19, 1985 AS INSTRUMENT NO. 85-828960.

APN: PORTIONS OF 8421-001-061 AND 8421-001-016

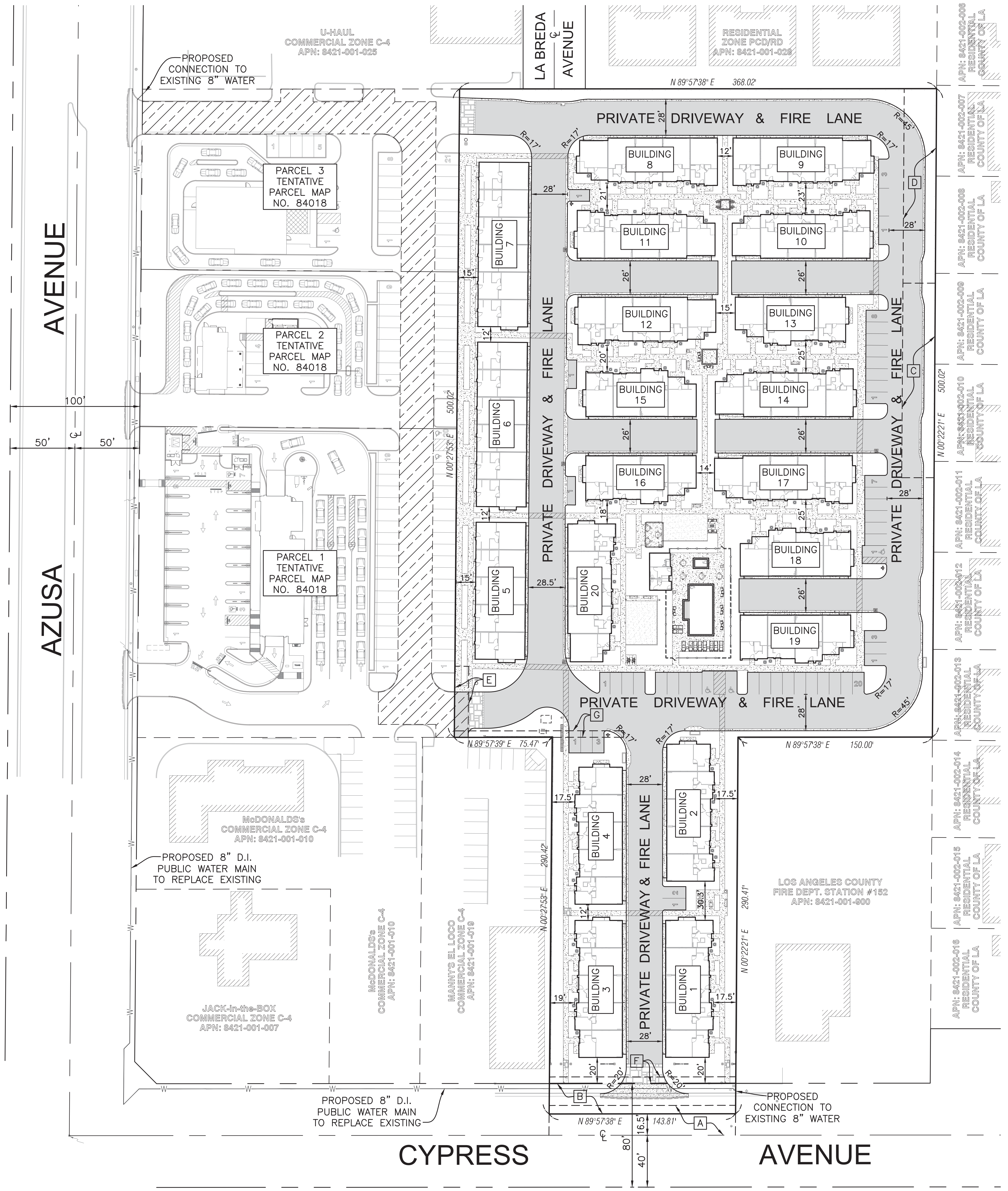
EXISTING EASEMENTS:

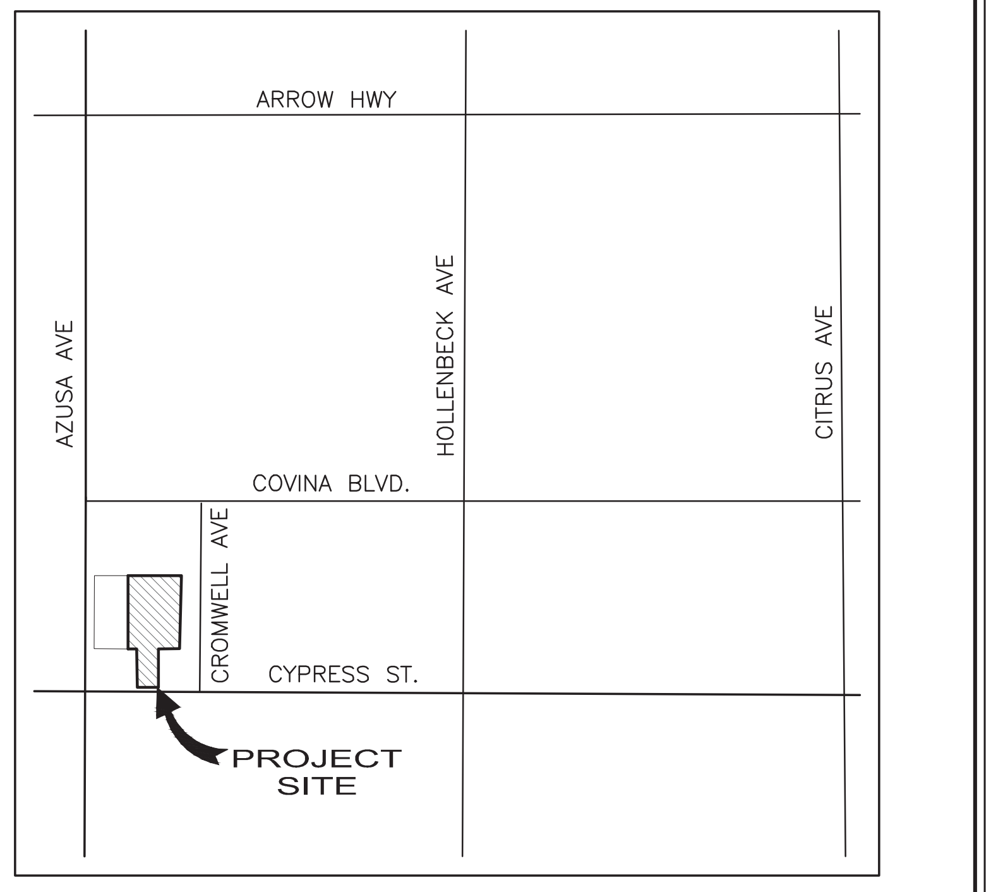
PER FIRST AMERICAN TITLE INSURANCE COMPANY ORDER NUMBER NHSC-5837139 (jd) DATED OCTOBER 28, 2022.

SYMBOL ON MAP	ITEM PER REPORT	DESCRIPTION
--	4	AN EASEMENT FOR HIGHWAY AND INCIDENTAL PURPOSES TO COUNTY OF LOS ANGELES, AS RECORDED IN BOOK 63, PAGE 3 AND IN BOOK 63, PAGE 70, BOTH OF DEEDS. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
A	7	AN EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES TO AZUSA IRRIGATING COMPANY, AS RECORDED MARCH 23, 1928 IN BOOK 8465, PAGE 148 OF OFFICIAL RECORDS.
B	13	AN EASEMENT FOR PUBLIC STREET, ROAD OR HIGHWAY INCIDENTAL PURPOSES TO COUNTY OF LOS ANGELES, AS RECORDED JUNE 24, 1958 AS INSTRUMENT NO. 3657 IN BOOK D136, PAGE 597 OF OFFICIAL RECORDS.
C	20	AN EASEMENT FOR INGRESS, EGRESS AND PUBLIC UTILITIES AND INCIDENTAL PURPOSES, AS RECORDED MARCH 18, 1966 AS INSTRUMENT NO. 763 OF OFFICIAL RECORDS.
D	21	AN EASEMENT FOR INGRESS, EGRESS AND PUBLIC UTILITIES AND INCIDENTAL PURPOSES, AS RECORDED JUNE 2, 1966 AS INSTRUMENT NO. 1603 OF OFFICIAL RECORDS.
E	22	AN EASEMENT FOR VEHICULAR AND PEDESTRIAN INGRESS AND EGRESS AND INCIDENTIAL PURPOSES AS RECORDED JULY 11, 1991 AS INSTRUMENT NO. 91-1059452 OF OFFICIAL RECORDS.
F	25	AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES TO GTE CALIFORNIA INCORPORATED, AS RECORDED AUGUST 19, 1992 AS INSTRUMENT NO. 92-1546379 OF OFFICIAL RECORDS.
G	26	AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES TO GTE CALIFORNIA INCORPORATED, AS RECORDED JULY 23, 1997 AS INSTRUMENT NO. 97-1111840 OF OFFICIAL RECORDS.

PROPOSED EASEMENT:

▨ AN EASEMENT FOR VEHICULAR AND PEDESTRIAN INGRESS AND EGRESS AND INCIDENTIAL PURPOSES TO REPLACE EXISTING EASEMENT RECORDED JULY 11, 1991 AS INSTRUMENT NO. 91-1059452 OF OFFICIAL RECORDS.





VICINITY MAP
(NO SCALE)

PROJECT SUMMARY:

OWNER:	MELIA HOMES 8951 RESEARCH DRIVE, SUITE 100 IRVINE, CA 92618
ENGINEER:	LAND DEVELOPMENT CONSULTANTS 1520 BROOKHOLLOW DRIVE, SUITE 33 SANTA ANA, CA 92705
ARCHITECT:	SUMMA ARCHITECTURE 5256 S. MISSION ROAD, SUITE 404 BONSALL, CA 92003
SOILS ENGINEER:	GEOTEK, INC. 1548 N. MAPLE STREET CORONA, CA 92878
PROJECT LOCATION:	1000 NORTH AZUSA AVENUE 845 WEST CYPRESS STREET COVINA, CA 91722
APNs:	8421-001-016 & 8421-001-061
FLOOD ZONE:	ZONE "X" (FLOOD INSURANCE RATE MAP) COMMUNITY PANEL No. 06037C1700F
EXISTING GENERAL PLAN:	GENERAL COMMERCIAL
PROPOSED GENERAL PLAN:	COVINA VILLAGE SPECIFIC PLAN
EXISTING ZONING:	COMMERCIAL ZONE (HIGHWAY) (C-4)
PROPOSED ZONING:	SPECIFIC PLAN

PROJECT SITE AREA:	225,909 SF = 5.187 ACRES
STREET DEDICATION:	3,379 SF = 0.078 ACRES
NET SITE AREA:	222,530 SF = 5.109 ACRES
EXISTING IMPERVIOUS AREA:	171,380 SF = 3.935 ACRES (77.0%)
EXISTING PERVIOUS AREA:	51,150 SF = 1.174 ACRES (23.0%)
PROPOSED IMPERVIOUS AREA:	173,130 SF = 3.975 ACRES (77.8%)
PROPOSED PERVIOUS AREA:	49,400 SF = 1.134 ACRES (22.2%)

97 UNITS

3 STORY ROW TOWN/LIVE-WORK

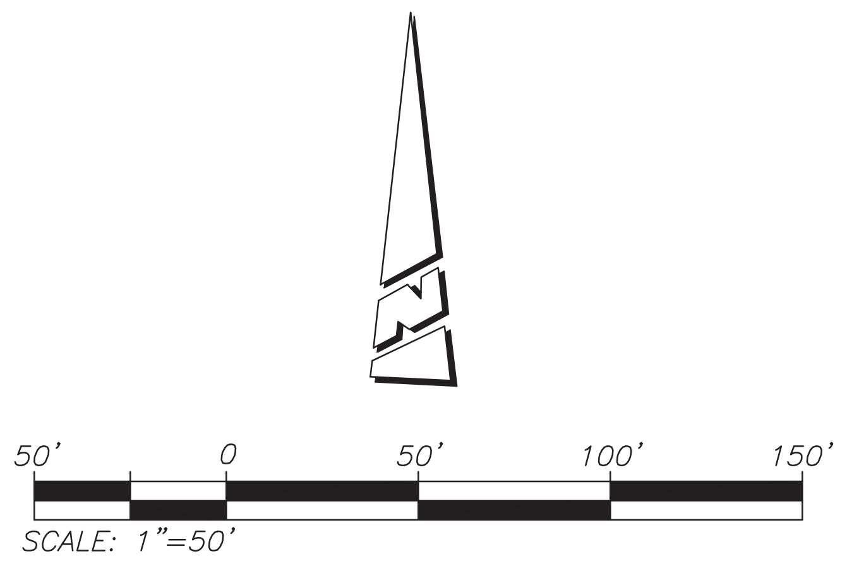
13 - PLAN 1	1,337 SF	2 BD + DEN
21 - PLAN 2	1,531 SF	2 BD + DEN
25 - PLAN 3	1,654 SF	3 BD + DEN
21 - PLAN 4	1,800 SF	4 BD
8 - PLAN 5	1,976 SF	3 BD + WORKSPACE
9 - PLAN 6	1,982 SF	3 BD + WORKSPACE

PARKING SUMMARY

GARAGE STALLS PROVIDED	194 STALLS
ON-SITE OPEN STALLS	49 STALLS
SHARED LIVE/WORK OPEN STALLS	41 STALLS
TOTAL PARKING PROVIDED	284 STALLS

(2.93 STALLS/UNIT)

COMMON OPEN SPACE	45,874 SF (472.9 SF/UNIT) 15' DIM
PRIVATE OPEN SPACE	6,638 SF (68.4 SF/UNIT)
TOTAL OPEN SPACE	52,512 SF (541.3 SF/UNIT)



SCALE: 1"=50'

UTILITY:

ELECTRIC:	SO. CALIFORNIA EDISON (800) 655-4555
WATER:	AZUSA LIGHT & WATER (626) 812-5063
GAS:	THE GAS COMPANY (800) 427-2200
CABLE:	TIME WARNER (626) 384-5400
TELEPHONE:	VERIZON (800) 483-4000

SHEET INDEX:

C1.0	TENTATIVE TRACT MAP
C2.0	SITE PLAN

BENCHMARK:

LOS ANGELES COUNTY BENCHMARK G 4444 -RDBM TAG IN WEST CATCH BASIN 1 FT N. OF BCR AT THE N-W CORNER OF ARROW HWY AND AZUSA AVE.

ELEVATION = 519.766 FEET

BASIS OF BEARINGS:

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF AZUSA AVE AS SHOWN ON TRACT NO. 34224 M.B. 895/56-59 RECORDS OF LOS ANGELES COUNTY SAID BEARING BEING N 0°27'53" E.

REVISIONS

NO.	DESCRIPTION	BY	DATE	APPROVED

PREPARED FOR:

MELIA HOMES
8951 RESEARCH DRIVE, SUITE 100
IRVINE, CA 92618
(949) 759-4367

HERSEL MOUSSA-ZAHAB
No. 44560
Exp. 3-31-2024

LAND
DEVELOPMENT
CONSULTANTS

LAND PLANNERS
SURVEYORS
CIVIL ENGINEERS

1520 BROOKHOLLOW DRIVE, SUITE 33
SANTA ANA, CALIFORNIA, 92705
(714) 557-7700 (714) 557-7707 FAX

DATE: 11-28-22
DESIGNED: SZ
DRAFTED: SZ
CHECKED: HZ

TENTATIVE TRACT
MAP NO. 82315
1000 N. AZUSA AVENUE
1 LOT CONDOMINIUM
CITY OF COVINA, CALIFORNIA

C1.0

SHEET 1 OF 2

JOB NO. 503

UTILITY NOTES:

① INSTALL 1" IRRIGATION WATER SERVICE & METER PER ALW STD. DWG. W-1.

② INSTALL 1" IRRIGATION BACKFLOW DEVICE PER ALW STD. DWG. W-15.

③ INSTALL 8" DOMESTIC WATER SERVICE & MASTER METER PER ALW STD. DWG. W-4.

④ INSTALL 8" DOMESTIC BACKFLOW DEVICE PER ALW STD. DWG. W-15.

⑤ INSTALL 8" FIRE BACKFLOW DEVICE PER ALW STD. DWG. W-15.

⑥ RECONNECT EXISTING FIRE HYDRANT TO NEW DUCTILE IRON PUBLIC WATER MAIN.

LEGEND:

CB – CATCH BASIN
FH – FIRE HYDRANT
GW – GUY WIRE
MH – MANHOLE
PB – PULLBOX
PP – POWER POLE
SD – STORM DRAIN
SL – STREET LIGHT
SMH – SEWER MANHOLE
TRANS – TRANSFORMER
WM – WATER METER
WV – WATER VALVE

▨ – HARDSCAPE
▦ – ENHANCED PAVING
■ – ASPHALT PAVING
▪▪▪▪▪ – ADA PATH OF TRAVEL
—S— – PROPOSED SEWER
—W— – PROPOSED WATER
—SD— – PROPOSED STORM DRAIN
━━━ – 6' HIGH PRECISION CMU WALL
- - - - – 6' HIGH SPLIT-FACE CMU WALL
—··— – 3'-6" HIGH CMU WALL
—·—·— – 5'-6" TUBE STEEL FENCE

EXISTING EASEMENTS:

PER FIRST AMERICAN TITLE INSURANCE COMPANY ORDER NUMBER NHSC-5837139 (jd) DATED OCTOBER 28, 2022.

SYMBOL ON MAP	ITEM PER REPORT	DESCRIPTION
--	2	AN EASEMENT FOR HIGHWAY AND INCIDENTAL PURPOSES TO COUNTY OF LOS ANGELES, AS RECORDED IN BOOK 63, PAGE 3 AND IN BOOK 63, PAGE 70, BOTH OF DEEDS. THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION.
A	3	AN EASEMENT FOR PIPELINES AND INCIDENTAL PURPOSES TO AZUSA IRRIGATING COMPANY, AS RECORDED MARCH 23, 1928 IN BOOK 8465, PAGE 148 OF OFFICIAL RECORDS.
B	4	AN EASEMENT FOR PUBLIC STREET, ROAD OR HIGHWAY INCIDENTAL PURPOSES TO COUNTY OF LOS ANGELES, AS RECORDED JUNE 24, 1958 AS INSTRUMENT NO. 3657 IN BOOK D136, PAGE 597 OF OFFICIAL RECORDS.

SYMBOL ON MAP	ITEM PER REPORT	DESCRIPTION
C	5	AN EASEMENT FOR INGRESS, EGRESS AND PUBLIC UTILITIES AND INCIDENTAL PURPOSES, AS RECORDED MARCH 18, 1966 AS INSTRUMENT NO. 763 OF OFFICIAL RECORDS.
D	6	AN EASEMENT FOR INGRESS, EGRESS AND PUBLIC UTILITIES AND INCIDENTAL PURPOSES, AS RECORDED JUNE 2, 1966 AS INSTRUMENT NO. 1603 OF OFFICIAL RECORDS.
E	7	AN EASEMENT FOR VEHICULAR AND PEDESTRIAN INGRESS AND EGRESS AND INCIDENTIAL PURPOSES AS RECORDED JULY 11, 1991 AS INSTRUMENT NO. 91-1059452 OF OFFICIAL RECORDS.

SYMBOL ON MAP	ITEM PER REPORT	DESCRIPTION
F	8	AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES TO GTE CALIFORNIA INCORPORATED, AS RECORDED AUGUST 19, 1992 AS INSTRUMENT NO. 92-1546379 OF OFFICIAL RECORDS.
G	9	AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES TO GTE CALIFORNIA INCORPORATED, AS RECORDED JULY 23, 1997 AS INSTRUMENT NO. 97-1111840 OF OFFICIAL RECORDS.

BENCHMARK:

LOS ANGELES COUNTY BENCHMARK G 4444 -RDBM TAG IN WEST CATCH BASIN 1 FT N. OF BCR AT THE N-W CORNER OF ARROW HWY AND AZUSA AVE.

ELEVATION = 519.766 FEET

BASIS OF BEARINGS:

BASIS OF BEARINGS FOR THIS MAP IS THE CENTERLINE OF AZUSA AVE AS SHOWN ON TRACT NO. 34224 M.B. 895/56-59 RECORDS OF LOS ANGELES COUNTY SAID BEARING BEING N 0°27'53" E.

REVISIONS

NO.	DESCRIPTION	BY	DATE	APPROVED

PREPARED FOR:

MELIA HOMES
8951 RESEARCH DRIVE, SUITE 100
IRVINE, CA 92618
(949) 759-4367

HERSEL MOUSSA-ZAHAB
No. 44560
Exp. 3-31-2024

LDC
LAND
DEVELOPMENT
CONSULTANTS

LAND PLANNERS
SURVEYORS
CIVIL ENGINEERS

1520 BROOKHOLLOW DRIVE, SUITE 33
SANTA ANA, CALIFORNIA, 92705
(714) 557-7700 (714) 557-7707 FAX

DATE: 11-28-22
DESIGNED: SZ
DRAFTED: SZ
CHECKED: HZ

SITE PLAN
TTM NO. 82315

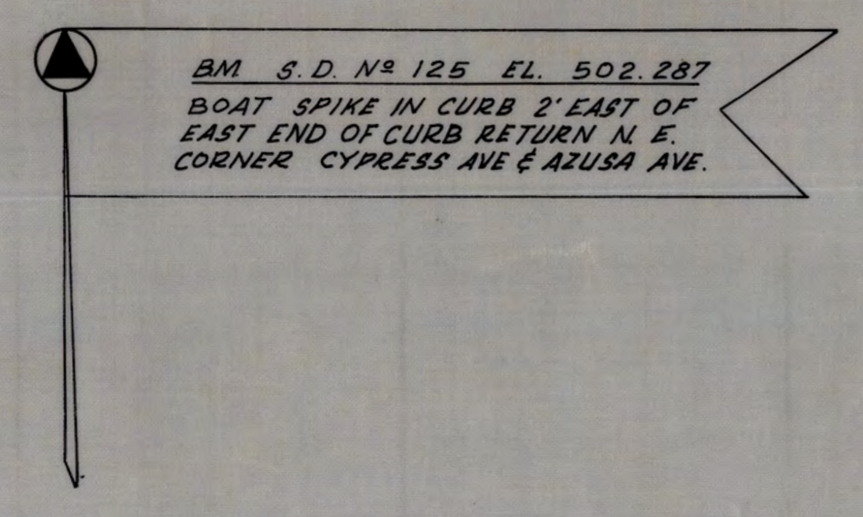
1000 N. AZUSA AVENUE
1 LOT CONDOMINIUM
CITY OF COVINA, CALIFORNIA

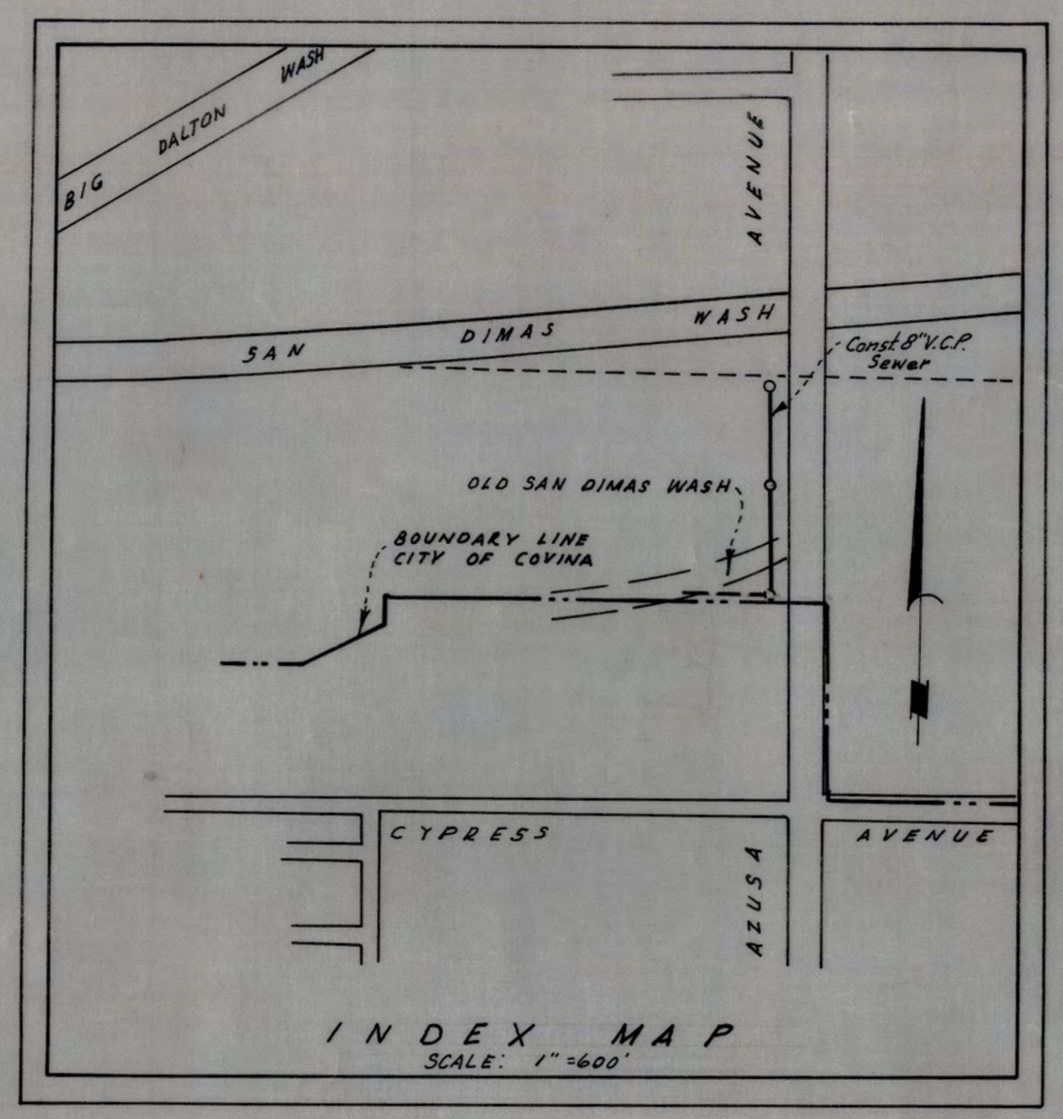
C2.0
SHEET 2 OF 2
JOB NO. 503

APPENDIX D

As-Built Plan

PAGE



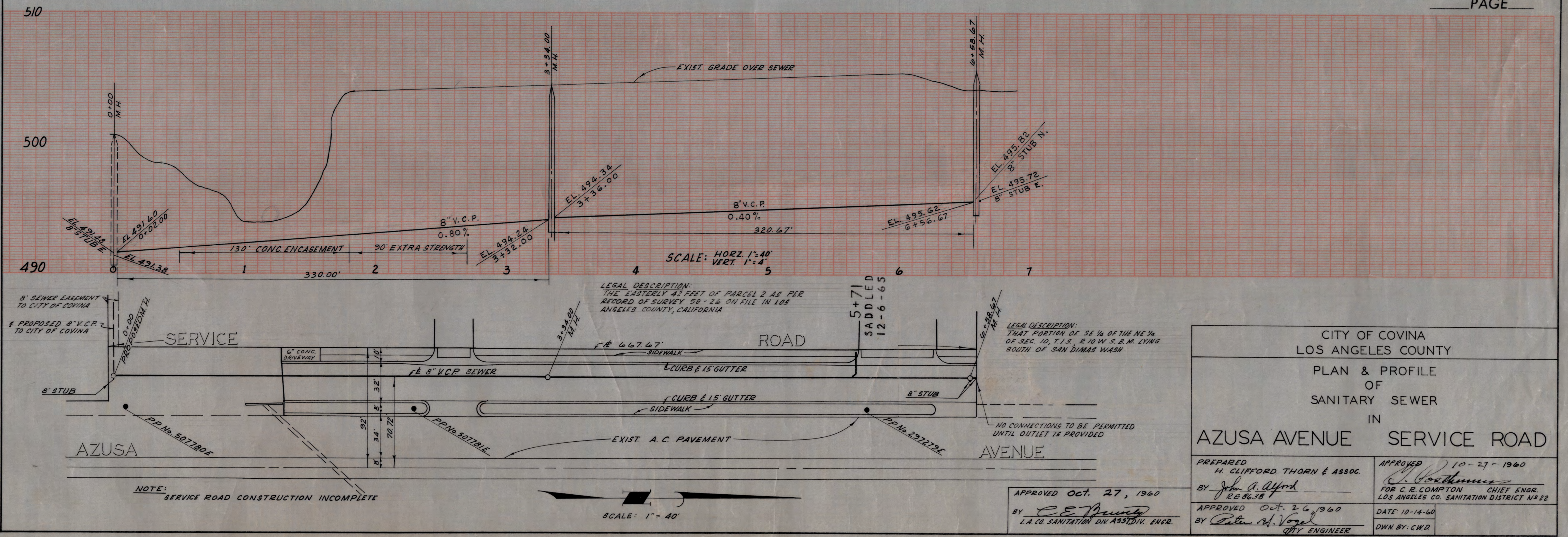


INDEX MAP
SCALE: 1" =600'

NOTES

1. NO REVISIONS WILL BE MADE IN THESE PLANS WITHOUT THE APPROVAL OF THE CITY ENGINEER.
2. ALL WORK SHALL BE CONSTRUCTED ACCORDING TO SPECIFICATIONS ON FILE IN THE OFFICE OF THE CITY ENGINEER & SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE CITY ENGINEER (SPEC. ARE DATED 1-1-60)
3. GRADES TO WHICH THIS IMPROVEMENT IS TO BE CONSTRUCTED ARE SHOWN ON PLANS AND PROFILES. GRADE POINTS FOR THE TOPS OF CURBS ARE SHOWN BY CIRCLES ON PROFILE. AT ALL POINTS BETWEEN DESIGNATED POINTS THE GRADE SHALL BE ESTABLISHED SO AS TO CONFORM TO A STRAIGHT LINE DRAWN BETWEEN DESIGNATED POINTS.
4. ELEVATIONS ARE IN FEET ABOVE U. S. C. & G. S. SEA LEVEL DATUM OF 1929
5. THIS DRAWING AND THE DATUM HEREON ARE MADE A PART OF THE SPECIFICATIONS
6. APPROVAL OF THIS PLAN BY THE CITY OF COVINA DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OF THE LOCATION OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE EXISTENCE OR NON-EXISTENCE OF ANY SUCH SUBSTRUCTURES AND SHALL BE RESPONSIBLE FOR ANY DAMAGE, DISTURBANCE OR DISCONNECTION OF SAME.
7. BEFORE BREAKING INTO ANY EXISTING STRUCTURES AND BEFORE FINAL ACCEPTANCE OF THIS WORK COUNTY SANITATION DISTRICT SHOULD BE NOTIFIED IN ORDER THAT THE REQUIRED INSPECTION MAY BE MADE
8. ALL VITRIFIED CLAY PIPE JOINTS SHALL BE MADE IN ACCORDANCE WITH SEC. 45 OF SAID SPECIFICATIONS.
9. RESURFACE ALL TRENCH WITHIN PAVED AREA TO MEET CITY OF COVINA REQUIREMENTS IN ACCORDANCE WITH PERMITS.
10. FOR ALLOWABLE LEAKAGE TEST, USE FORMULA Nº 1 OF SECTION 54 OF SPECIFICATIONS.
11. LOCATION OF HOUSE LATERALS ARE TENTATIVE ONLY. EXACT LOCATIONS WILL BE DETERMINED IN THE FIELD BY THE ENGINEER

PAGE



LEGAL DESCRIPTION:
THE EASTERLY 42 FEET OF PARCEL 2 AS PER RECORD OF SURVEY 58-26 ON FILE IN LOS ANGELES COUNTY, CALIFORNIA

LEGAL DESCRIPTION:
THAT PORTION OF SE 1/4 OF THE NE 1/4 OF SEC. 10, T.1S., R10W S.B.M. LYING SOUTH OF SAN DIMAS WASH

NOTE:
SERVICE ROAD CONSTRUCTION INCOMPLETE

APPROVED Oct. 27, 1960
BY C E Bunty
L.A. CO. SANITATION DIV. ASST. DIV. ENGR.

CITY OF COVINA
LOS ANGELES COUNTY

PLAN & PROFILE
OF
SANITARY SEWER
IN

AZUSA AVENUE SERVICE ROAD

PREPARED
H. CLIFFORD THORN & ASSOC.
BY John A. Alford
RE 8638

APPROVED Oct. 26, 1960
BY Peter H. Vogel
CITY ENGINEER

APPROVED 10-27-1960
FOR C. R. COMPTON CHIEF ENGR.
LOS ANGELES CO. SANITATION DISTRICT Nº 22

DATE: 10-14-60
DWN. BY: C.W.D.

AS BUILT

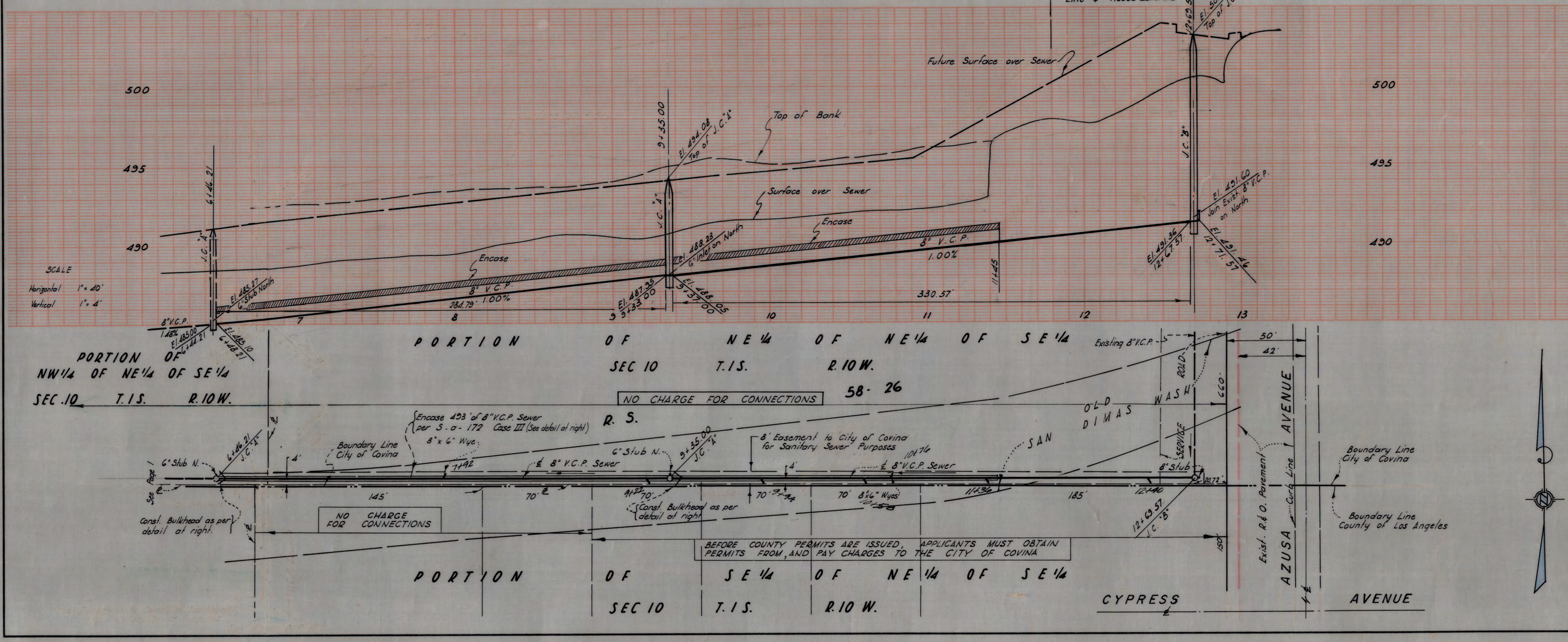
SHEET 1 OF 2 SHEETS

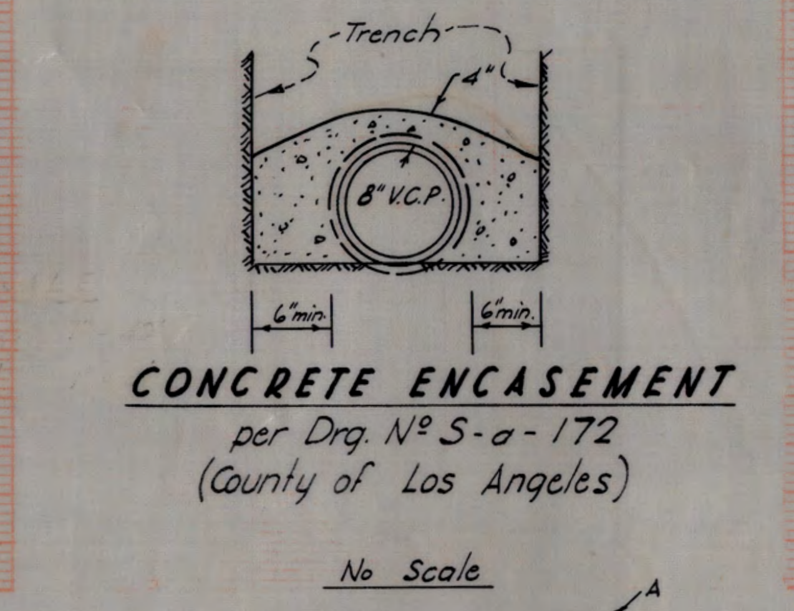
C.R. DUNNING 1083 14:A 1021

K. & E. 198 SO. CAL. BLUE PRINT SHEET NO. 2

PAGE 2

COLLECT CHARGES AS INDICATED



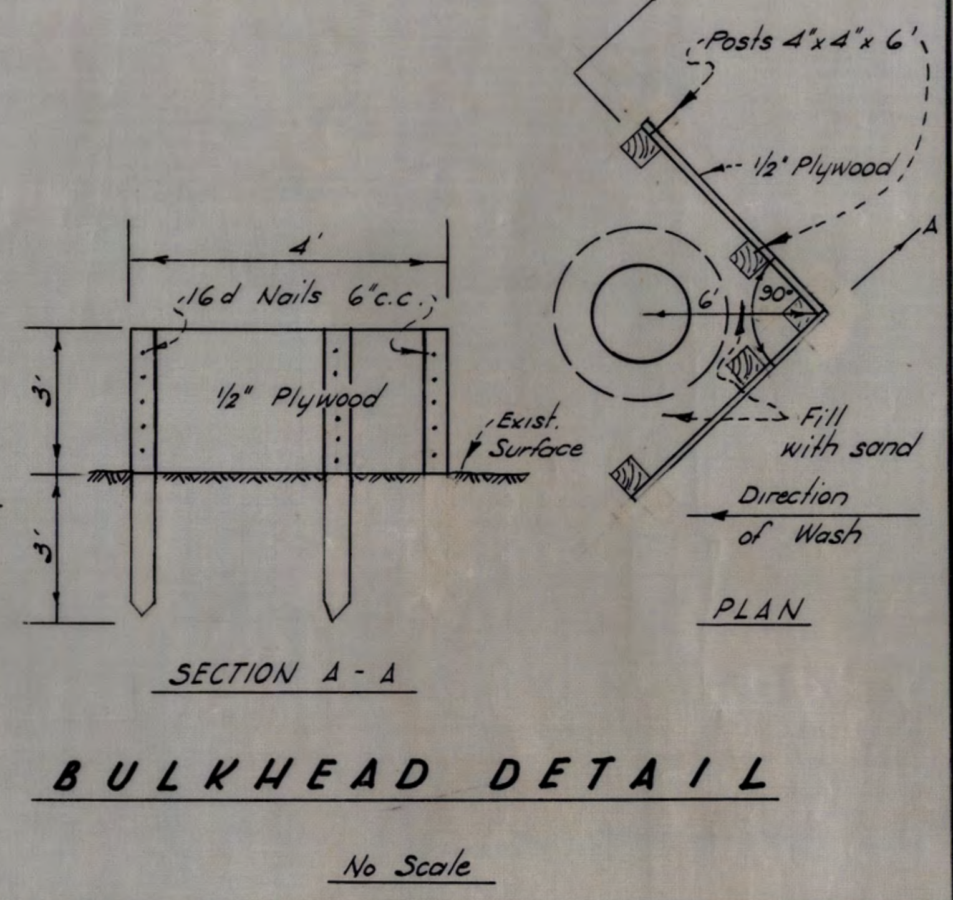


CONCRETE ENCASEMENT

per Drg. Nº S-a-172

(County of Los Angeles)

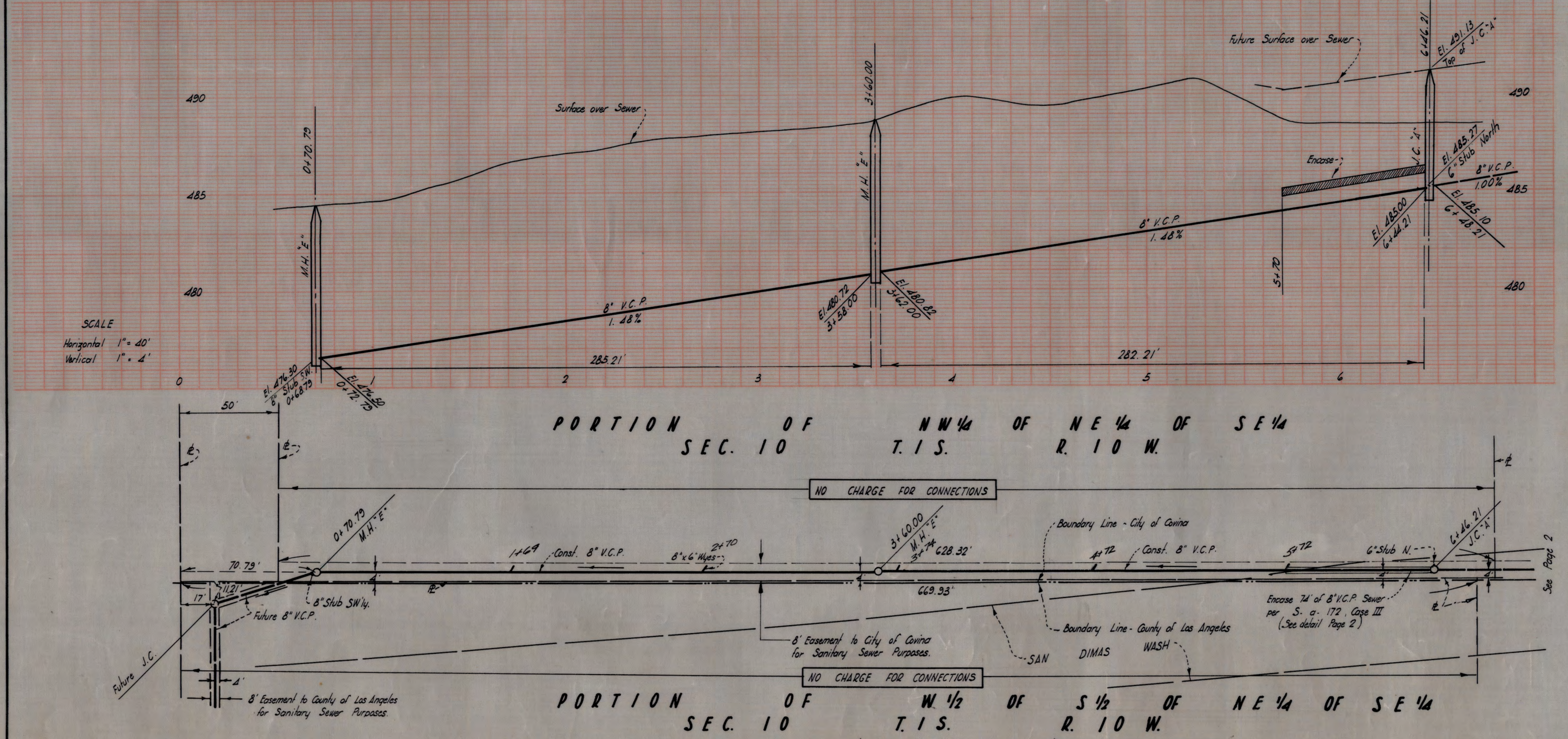
No Scale

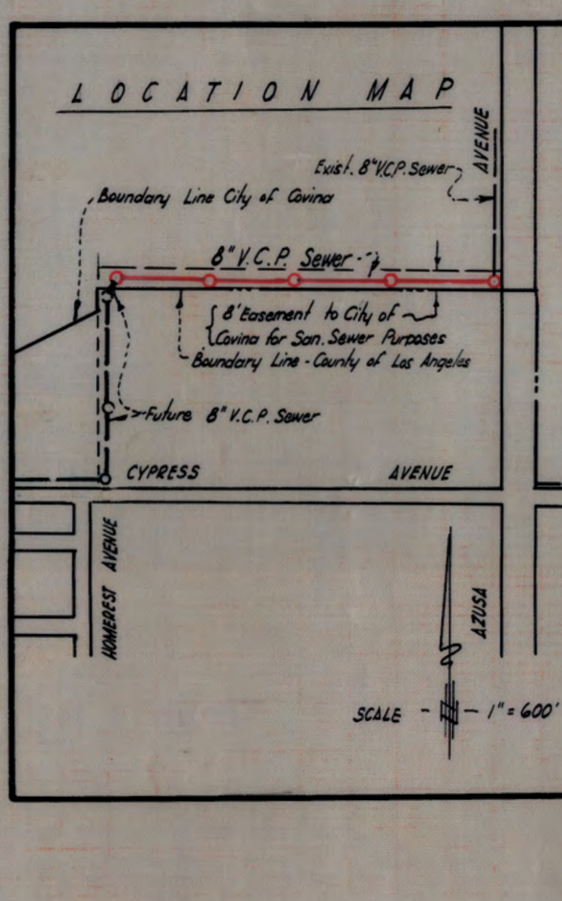


BULKHEAD DETAIL

No Scale

PAGE 1





NOTES

1. All work to be done in accordance with Standards and Specifications of the City of Covina
2. Utilities;- It shall be the responsibility of the contractor to locate all utilities of every nature, whether shown hereon or not and to protect them from damage. The contractor shall bear the total expence of repair or replacement of said utilities damaged by operations in connection with prosecution of the work.
3. Manholes shall be type "E", per sheet 3.1 of City of Covina Standards.
4. Junction Chambers shall be type "A" & "B" per sheets 3.2 & 3.3 of City of Covina Standards.
5. Use L.A. County M.H. Frame and Cover per sheet SA-117 modified for use by the City of Covina.
6. Before breaking into any existing structures and before final acceptance of this work, the County Sanitation District shall be notified in order that the required inspection be made.

BENCH MARK:- S.D. 122 Boat spike in south curb 10 ft. E/O west end curb 495'± W/O Homerest Avenue.
Elevation 476.184' F.B. 2505 page 18

December 18, 1965

CITY OF COVINA
LOS ANGELES COUNTY

PLAN AND PROFILE
of
SANITARY SEWER
in
RIGHT OF WAY

PREPARED IN THE OFFICE OF
WALSH-FORKERT CIVIL ENGINEERS, INC.
BY Leo m. Walsh 11/15/60
R.E. 6371

APPROVED November 17 1960
BY Peter H Vogel
CITY ENGINEER

APPROVED Nov. 18 1960
for E.P. Bennett
C.R. COMPTON CHIEF ENGINEER
LOS ANGELES COUNTY SANITATION DISTRICT NO. 22

APPROVED JOHN A. LAMBIE
LOS ANGELES COUNTY ENGINEER
C.E. Burnely 11-18-60
ASST. SANITATION ENGINEER DATE

K. & E. 155 SO. CAL. BLUE PRINT SHEET NO. 2

SHEET 2 OF 2 SHEETS 14A-1031

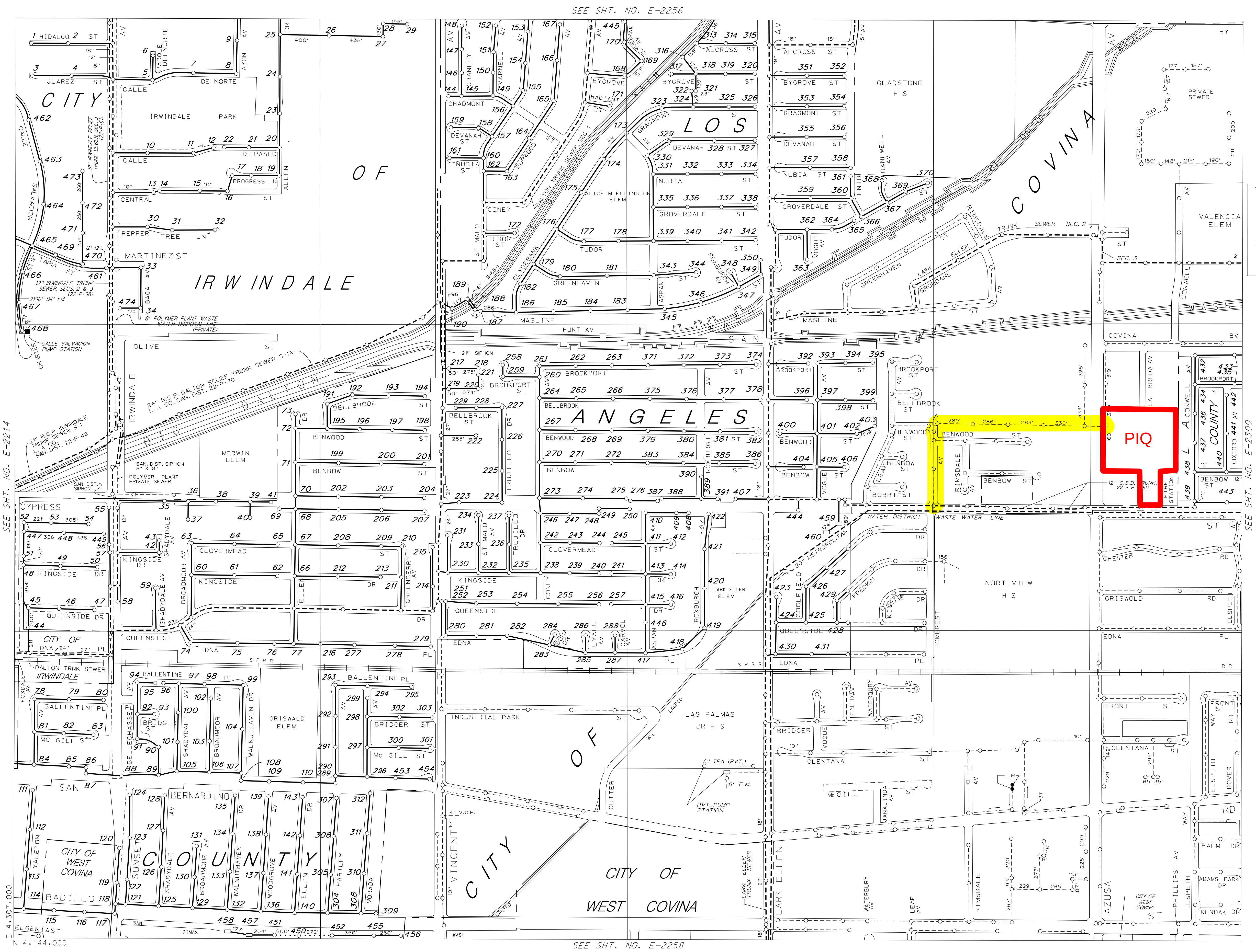
AS BUILT

J 100

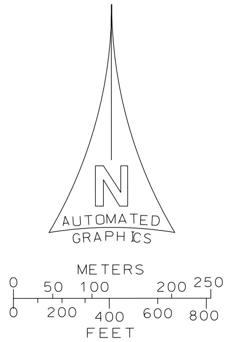
APPENDIX E

Sewer Index Sheet

U-64
U-65
U-70
U-71



THIS MAP IS INTENDED FOR USE ONLY AS OPERATIONS MAP BY LOS ANGELES COUNTY SEWER MAINTENANCE DISTRICTS. LOS ANGELES COUNTY EXPRESSLY DISCLAIMS ANY LIABILITY FOR ANY INACCURACIES WHICH MAY BE PRESENT IN THIS MAP.



LEGEND

—○——○—	CLAY SEWERS MAINTAINED BY SMD. 8" UNLESS OTHERWISE NOTED
···○·····○···	PLASTIC SEWERS
•—○—•—○—•	CONCRETE SEWERS
—○—//—○—	CLAY SEWERS, LINED
ıııı○ıııııı○ıııı	CEMENT SEWERS, LINED
———	FORCE MAINS
- -○- - -○- -	SEWERS NOT MAINTAINED BY SMD
▪ -○- -○- ▪	TRUNK SEWERS
— - - —	CITY BOUNDARY
○	STANDARD MANHOLE
△	DROP MANHOLE
▭	SHALLOW MANHOLE
◇	TRAP MANHOLE
W ○	WEIR MANHOLE
C.O.→●	CLEANOUT
L.H.→●	LAMP HOLE
■	PUMP STATION

TOTAL MH'S THIS MAP: 474

MAP REV
12-06-11

DATA BASE REV
02-23-89

E-2257

CONSOLIDATED S.M.D.

T:598:G4

1427.1429.2257

APPENDIX F

Estimated Average Daily Sewage Flows for Various Occupancies

Estimated Average Daily Sewage Flows for Various Occupancies

Occupancy	Abbreviation	*Average daily flow
Apartment Buildings:		
Bachelor or Single dwelling units	Apt	100 gal/D.U. → 150
1 bedroom dwelling units	Apt	150 gal/D.U. → 200
2 bedroom dwelling units	Apt	200 gal/D.U. → 250
3 bedroom or more dwelling units	Apt	250 gal/D.U. → use 300 GPD per SMF
Auditoriums, churches, etc.	Aud	5 gal/seat
Automobile parking	P	25 gal/1000 sq ft gross floor area
Bars, cocktails lounges, etc.	Bar	20 gal/seat
Commercial Shops & Stores	CS	100 gal/1000 sq ft gross floor area
Hospitals (surgical)	HS	500 gal/bed
Hospitals (convalescent)	HC	85 gal/bed
Hotels	H	150 gal/room
Medical Buildings	MB	300 gal/1000 sq ft gross floor area
Motels	M	150 gal/unit
Office Buildings	Off	200 gal/1000 sq ft gross floor area
Restaurants, cafeterias, etc.	R	50 gal/seat
Schools:		
Elementary or Jr. High	S	10 gal/student
High Schools	HS	15 gal/student
Universities or Colleges	U	20 gal/student
College Dormitories	CD	85 gal/student

*Multiply the average daily flow by 2.5 to obtain the peak flow

Zoning Coefficients

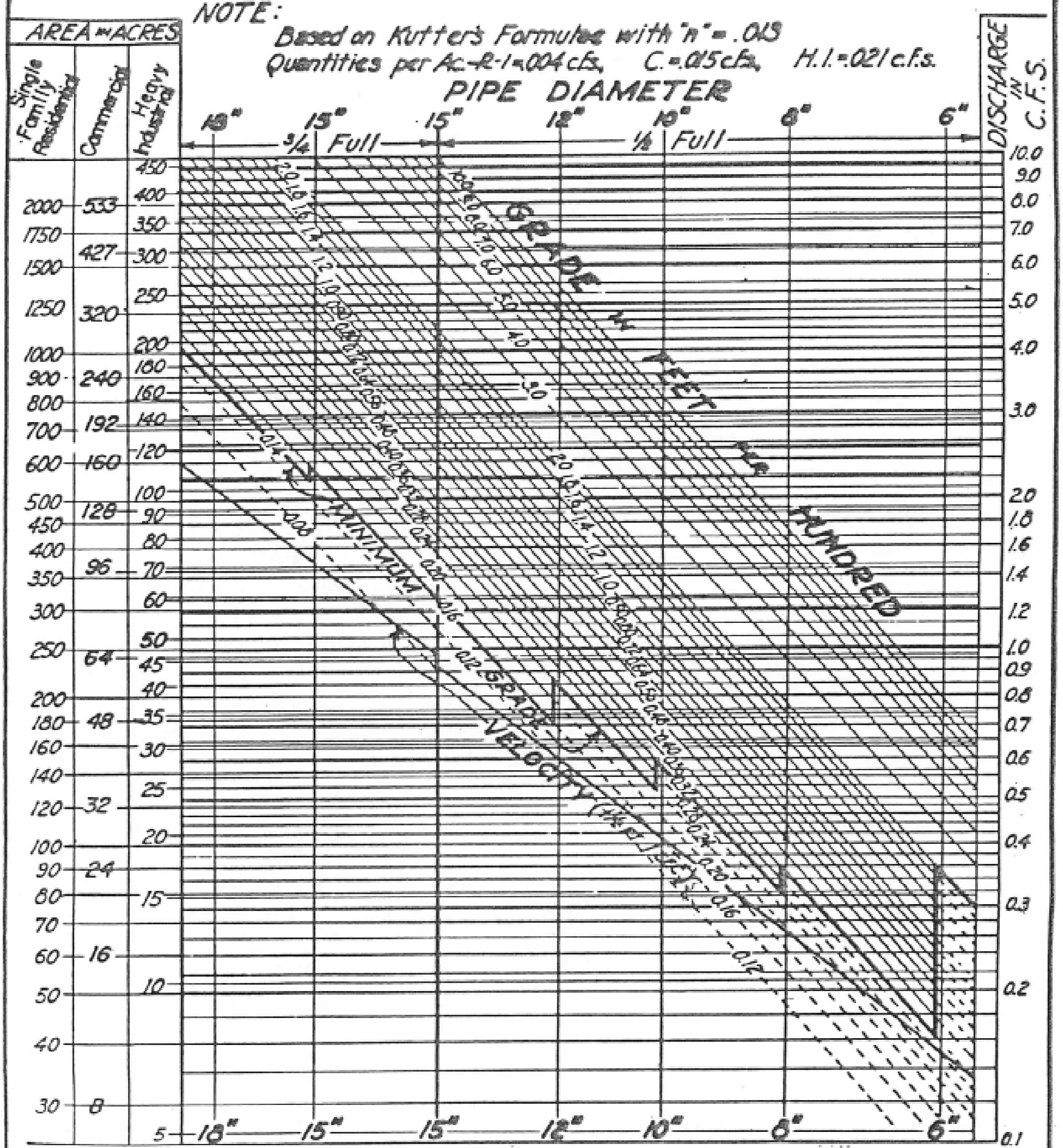
Zone	Coefficient (cfs/Acre)
Agriculture	0.001
Residential⁺:	
R-1	0.004
R-2	0.008
R-3	0.012
R-4	0.016*
Commercial:	
C-1 through C-4	0.015*
Heavy Industrial:	
M1 through M-4	0.021*

*Individual building, commercial or industrial plant capacities shall be the determining factor when they exceed the coefficients shown

+ Use 0.001 (cfs/unit) for condominiums only

APPENDIX G

Flow Diagram for the Design of Circular Sanitary Sewer, Standard S-C4



NOTE:
Based on Kutter's Formulae with "n" = .013
Quantities per Ac.-R-1 = .004 c.f.s. C. = .015 c.f.s. H.I. = .021 c.f.s.

NOTE: USE 15"- 1/2 FULL FOR COMPUTING DESIGN CAPACITY OF A NEW SEWER SYSTEM. USE 15"- 3/4" FULL FOR CHECKING CAPACITY OF EXIST. SEWER SYSTEM.

FLOW DIAGRAM FOR THE DESIGN OF CIRCULAR SANITARY SEWERS

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS

COUNTY ENGINEER
STANDARD
S-C4

DATE: 3/80

DESIGN RCE 10443

ASSISTANT DEPUTY

COUNTY ENGINEER

APPENDIX J

HYDROLOGY & HYDRAULIC STUDY FOR TRACT MAP NO. 83215 & PARCEL MAP 84018

CITY OF COVINA
CALIFORNIA

PREPARED FOR:

LAND DEVELOPMENT CONSULTANTS
1520 BROOKHOLLOW DRIVE, SUITE 33
SANTA ANA, CA 92705
(714) 557-7700

PREPARED BY:

JLC Engineering & Consulting, Inc.

41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552
FAX 951.304.3568

JANUARY 17, 2019
REVISED OCTOBER 9, 2019
REVISED NOVEMBER 25, 2019
REVISED DECEMBER 15, 2022
REVISED FEBRUARY 21, 2023

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

JOSEPH L. CASTANEDA
NO. 59835
EXP. 12/31/23
CIVIL

Joseph L Castaneda

2/21/2023

Joseph L. Castaneda RCE 59835 Date Seal
Registered Civil Engineer

TABLE OF CONTENTS

FIGURES

APPENDICES

EXHIBITS

I. PURPOSE AND SCOPE

The purpose of this study is to determine the necessary drainage improvements and increased runoff mitigation improvements required for Tract Map No. 82315 and Parcel Map 84018, referred to as "The Project". The Project is a proposed commercial site and high density development that lies on approximately 8 acres within a developed area of Covina. See Figure 1 Vicinity Map.

The scope of the study includes the following:

1. Determination of points of flow concentration and watershed subareas for onsite tributary areas.
2. Determination of 25-year storm event flow rates to catch basins and inlets proposed within the project area utilizing the Modified Rational Method as outlined in the Los Angeles County Department of Public Works (LACDPW) Hydrology Manual.
3. Determination of the peak storm flows and hydrographs for the post-project conditions for the area tributary to the proposed subsurface increase runoff basin for the 25-year storm event. The LACDPW has indicated that the allowable flow rate can not exceed 0.77 ft^3/s per acre.
4. Determine the limits of storm drain required to flood protect the project site and meet the LACDPW requirements for the 25-year storm events and perform hydraulic calculations in support of the proposed design.
5. Perform basin calculations in support of the basin design to ensure the design will mitigate runoff to be less than the allowable flow rate identified by LACDPW as 0.77 ft^3/s per acre.
6. Preparation of a hydrology and hydraulics report, which consist of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE AREA OVERVIEW

The Project is a proposed commercial and multi-family residential development that proposes to construct a commercial building for a car wash, two drive-through food service buildings, 80 multi-family townhomes, 17 live/work units, two subsurface basins, and subsurface storm drains, and internal streets. The approximately 8 acre project is located within the City of Covina and is bounded by Covina Boulevard to the north, Cypress Street to the south, Azusa Avenue to the west, and Conwell Avenue to the east.

The existing project site is currently a supermarket center that is no longer operational. The project is surrounded by residential homes to the north and west and commercial property to the south. Figure 4 shows the existing condition commercial center and the existing topographic mapping indicates that 5.64 acres flows towards Azusa Avenue and 2.19 acres flows to Cypress Street.

The project site will collect the onsite flows via curb and gutters, catch basins and subsurface storm drain. The onsite flows will be conveyed to two proposed subsurface basins within the project site. The subsurface systems have been designed to retain the water quality volume for the proposed commercial center. The subsurface system within the high density residential area will flow to two subsurface basins in order to store the required volume necessary to mitigate for increased runoff associated with the 25-year storm event to be equal to the allowable flow rate provided by LACDPW and to mitigate increased runoff. Figure 5 provides an overview of the proposed drainage areas. The proposed condition will reduce flooding to Azusa Avenue since the project will reduce the drainage area from 5.64 acres to 2.91 acres. Moreover, the project will use the existing two parkway drains to outlet a total of 4.2 ft^3/s at each parkway drain.

The two onsite basins have been designed to allow water quality volume to infiltrate. The subsurface systems, within the high density residential area, will allow the volume in excess of the water quality volume to be metered through an orifice plate to restrict the flows not to exceed 0.77 ft^3/s per acre.

Figure 6 has been prepared to show the existing drainage boundaries adjacent to the project. Figure 6 used a 1 meter Digital Elevation Model (DEM) produced by the USGS to establish contours. Based on the topography and site visits, it has been concluded that offsite flows from adjacent project will not enter the project site. The residential development to the north currently drains into Covina Boulevard and the adjacent U-Haul Site drains into an existing parkway drain.

III. HYDROLOGY

The LACDPW Hydrology Manual (Reference 1), was used to develop the hydrological parameters for the hydrology analyses. The modified rational method was used for the analyses and the computations were performed using the HydroCalc 3.1 software developed by LACDPW.

The rainfall and soil parameters for the project were obtained from the LACDPW Hydrology Manual, see Exhibit C. The hydrology parameters for the modified rational method calculations are as follows:

- 50 Year, 24 Hour Rainfall – 7.2 inches
- Soil Classification – 006
- Storm Drain Design Frequency – 25 Year Event
- Commercial Impervious Area 96% per LACDPW Hydrology Manual Appendix D
- High Density Residential Impervious Area 67% which is based on the LID Study.

The hydrology analyses performed for the project site was developed in the following manner:

1. Identify areas tributary to the proposed catch basin and inlet structures. The areas tributary to the proposed catch basins and inlets are shown on Exhibit A, Catch Basin & Inlet Hydrology. The flow rates tributary to the proposed catch basins and inlets will be used to

size the proposed storm drain systems. The project was broken into two watershed areas defined as Area A and B.

2. The subarea boundary tributary to each catch basin have been identified. Calculations were performed to determine the peak flow rate for each catch basin and inlet.
3. Additionally, the total area for watersheds A and B were used to perform a hydrology analyses to establish a peak flow rate and hydrograph. The hydrographs were used to size the proposed subsurface basins to mitigate the increase runoff to a level that is equal or less than the allowable flow rate.

Catch Basin and Inlet Hydrology

Exhibit A identifies the total area tributary to each catch basin and inlet structure proposed for the project. There are a total of 9 catch basins/grate inlets to intercept the onsite runoff and convey the flows to one of the two subsurface basins. The 9 drainage areas are analyzed with the following impervious areas:

Subarea	Area (ac)	Impervious Fraction
1A	0.27	0.96
2A	0.54	0.96
3A	0.82	0.96
4A	0.72	0.96
5A	0.56	0.96
1B	0.38	0.78
2B	1.22	0.78
3B	1.59	0.78
4B	1.76	0.78

The impervious percentages were obtained from the LACDPW Hydrology Manual. However, the LID Study defined an impervious percentage of 78% for the residential area 82% for the commercial area. The value of 96% was used for the commercial area as recommended by the LACDPW Hydrology Manual. This repot utilized the highest impervious percentage resulting from the LACDPW Hydrology Manual and the LID Study.

The LACDPW Hydrology Manual requires projects that are within developed areas and not covered by the Capital Flood Protection Conditions, identified in LACDPW Hydrology Manual Section 4.2, to provide protection per the Urban Flood Protection Condition discussed in LACDPW Hydrology Manual Section 4.3. The Urban Flood is defined as runoff associated with a 25-year storm event. The design of the proposed catch basins and inlets are designed to intercept the 25-year peak flow rate at all proposed catch basins/inlets. The following table provides the 25-year rates:

Table 1 – Peak Flow Rates for Catch Basins & Inlets

Subarea	Drainage Area (acres)	Catch Basin/Inlet Designation	25-Year Flow Rate (ft^3/s)
1A	0.27	1A	0.92
2A	0.54	2A	1.83
3A	0.82	3A	2.78
4A	0.72	4A	2.44
5A	0.56	5A	1.90
AREA A	2.91	SUBSURFACE BASIN	8.41
1B	0.38	1B	1.28
2B	1.22	2B	3.76
3B	1.59	3B	4.54
4B	1.76	4B	5.93
AREA B	4.95	SUBSURFACE BASIN	11.84

The hydrology calculations for the areas tributary to the catch basins have been included in Appendix A.

Subsurface Basin Hydrology

Exhibit B identifies the total area tributary to the Basin A and Basin B, which are proposed 96" CMP subsurface basins that are designed to retain the water quality volume and mitigate increased runoff for the project. The project site will mitigate flows for increased runoff and ensure that flows discharging from the project site are less than the 0.77 ft^3/s allowable flow rate provided by LACDPW for the subsurface systems within the high density residential area. The allowable flow rate data is included in Appendix F. The subsurface system within the commercial area, as shown on Exhibit B is solely for the water quality volume. The proposed commercial site will not impact Azusa Avenue since the drainage area for the post-project condition decreased from 5.64 acres to 2.91 acres. This will result in a lower runoff rate allowed to flow within Azusa Avenue since the land uses and impervious area are identical. In order to determine the post-project flow rates, hydrology calculations were performed for the 25-year storm event for the entire area tributary to each subsurface system, which are defined as Areas 1B, 2B, 3B and 4B. The table below provides the peak flow rate and allowable flow rate for Basin B.

Table 2 – Peak Flow Rate for Basins (96" CMP Subsurface Basin)

Subsurface Basin	Subareas	Drainage Area (acres)	25-Year Flow Rate (ft^3/s)	Allowable Flow Rate (ft^3/s)
B	**1B, 2B, 3B, 4B**	4.95	11.9	3.81

The hydrology calculations for Basin B have been included in Appendix B. In order to meet the requirements provided by LACDPW and to discharge into the existing 69-inch storm drain located within Cypress Street, the project cannot exceed the allowable flow rate provided in Table 2. There are no calculations for the Basin A since this system is solely for water quality volume. This analysis is part of the LID Study.

IV. BASIN SIZING CALUCLATIONS

The subsurface system will be designed to store the volume associated with the water quality volume and the volume required to mitigate for increased runoff. The allowable flow rate provided in Table 2 and the hydrograph table provided in Appendix B will be used to size the subsurface basin system. Prior to commencing the subsurface basin sizing the water quality volume for each subsurface basin were calculated in the Standard Urban Stormwater Mitigation Plan prepared by Land Development Consultants and the results are shown in Table 3.

Table 3 – Water Quality Volume for Basins (96" CMP Subsurface Basin)

Subsurface Basin	Subareas	Drainage Area (acres)	Water Quality Volume (ft^3)
A	**1A & 2A**	2.91	7,656.1
B	**1B, 2B, 3B & 4B**	4.95	13,419.7

The subsurface basin systems are designed to allow the water quality flow rates and volume to infiltrate into the in-situ soils, since the geotechnical reports indicate that the project has infiltration rates as follows; Basin A 3.3 inches /hour and Basin B 10.3 inches /hour. The report for the infiltration rates have been included in Appendix G. Moreover, the geotechnical report recommends a safety factor of 5 to be applied to the infiltration rate. As a result, the design infiltration rate for the project will be as follows, Basin A 0.66 inches /hour and Basin B 2.06 inches /hour The lower half of the subsurface basin systems will be used solely to impound the water quality volume and promote groundwater infiltration.

In order to accurately size Basin B subsurface system, the unit hydrograph (included in Appendix B) for the post-project condition was utilized (in 5 minute increments) to find the location of the allowable flow rate, based on Table 2, on the rising and recess limbs of the hydrograph to assess the required storage volume. Table 4 provides the required storage volume for each subsurface basin based on the designed outflow which is less than the allowable flow rate:

Table 4 – Water Quality Volume for Basins (96" CMP Subsurface Basin)

Subsurface Basin	Subareas	Allowable Flow Rate (ft^3/s)	Designed Outflow Flow Rate (ft^3/s)	Increased Runoff Volume (ft^3)
B	**1B, 2B, 3B & 4B**	3.81	3.8	11,983.2

The increased runoff volume shown on Table 4 was calculated by locating the difference in volume using the unit hydrograph table in Appendix B. The subsurface basin must store the volume between flow rates that are less than the allowable flow rates. The design outflow shown on Table 4 was selected from the hydrograph table shown on the table in Appendix B.

The design outflow was selected to be a value less than the allowable flow rate. During final engineering a more detailed basin routing analyses will be performed.

Moreover, the subsurface basin must store the "Required Volume", which equals to the sum of the "Water Quality Volume" and "Increased Runoff Volume". Table 5 provides the "Required Volume" and the proposed "Design Volume" which is based on the preliminary design of the subsurface basins. Figure 2 and Figure 3 are typical section of a Double CMP Subsurface System and a Single CMP Subsurface System, respectively. Basin B is a Double CMP Subsurface Systems that can store 148.3 cubic feet per foot of system. Moreover, Basin A is a Single CMP Subsurface System that can store 74.2 cubic feet per foot of system. The subsurface basins systems are perforated CMP pipe with a gravel bed that allows flows to infiltrate into the in-situ soil. The tables In Appendix C provide the storage volume calculations for each subsurface system.

Table 5 – Required Volume and Preliminary Design Volume for Subsurface Basins (96" CMP Subsurface Basin)

Subsurface Basin	Subareas	Drainage Area (acres)	Required Volume (ft^3)	Design Volume (ft^3)
A	**1A 2A, 3A, 4A & 5A**	2.91	7,580	7,580
B	**1B, 2B, 3B & 4B**	4.95	17,294.7	17,502

The preliminary subsurface basins Design Volume has provided sufficient storage to mitigate the water quality runoff and increased runoff volumes to prevent downstream impacts. Table 6 provides the length, area and volume of the subsurface basins:

Table 6 – Subsurface Basins (96" CMP Subsurface Basin)

Subsurface Basin	Length	Bottom Area (ft^2)	Storage Volume (ft^3)	Design Volume (ft^3)
A	**105 ft**	1,260	7,791	7,580
B	**173 ft**	2,076	25,655.9	17,502

Please note that Subsurface Basin B was sized for additional storage volume above the water quality volume of 13,419.7 ft^3 to mitigate flows to the allowable discharge flow rate of 0.77 ft^3/s per acre.

V. STORM DRAIN SYSTEMS

The Project is proposed to discharge into the LACDPW Line A Storm Drain system located within Cypress Street. The LACDPW has provided documentation that indicate that the project is allowed to discharge 0.77 ft^3/s per acre, see Appendix F. Table 2 provides the peak allowable flow rate which will be released by the subsurface basins. The Line A Storm Drain is shown on Exhibit B, Drainage Facilities Map. Based on the total project area of 4.95 acres the is tributary to the Line A system, the proposed project must discharge less than 3.81 ft^3/s into the Line A System.

Line B onsite storm drain that has been designed to collect the outflow discharge that is metered by the two subsurface basins within the high density residential area. The Lateral A Storm Drain will extend from Cypress Avenue to Subsurface Basin B as illustrated in Exhibit B. The Lateral A Storm Drain system will be the main trunk line that collects the flows from the onsite storm drain systems. Table 7 provides the controlled flow rate that will be discharged by the subsurface basins and into Lateral A:

Table 7 – Peak Flow Rate for Basin B Outflows into Line B

Subsurface Basin	Subareas	Drainage Area (acres)	Allowable Flow Rate (ft^3/s)	Designed Outflow Flow Rate (ft^3/s)
B	**1B, 2B, & 3B**	4.95	3.81	3.8

Based on Table 6, the flow rate for Line B will be 3.8 which will be conveyed by an 18-inch storm drain system. The maximum flow rate of 3.8 ft^3/s is less than the allowable flow rate of 3.8 ft^3/s, which meets the requirements provided by LACDPW.

The remaining storm drain shown on Exhibit B provided a horizontal layout to illustrate how proposed catch basins and inlet structures will convey flows to the two proposed subsurface basins. Appendix D provides the calculations for the proposed storm drain based on a full flow rate capacity for an 18-inch and 24-inch storm drain system that uses either HDPE or RCP pipe. Additionally, Appendix E provides calculations for each inlet shown on Exhibit B.

VI. FINDINGS

The hydrology and hydraulic analyses evaluated the proposed development to determine the necessary drainage improvements required to treat for water quality purposes, mitigate flows for increased runoff, and flood protect the project site. It has been concluded that:

1. The proposed drainage facilities will adequately convey the 25-year flows and provide flood protection to the project site.
2. Basin A and B have sufficient volume to store the water quality volume and allow the treatment of the water quality volume through infiltration, the preferred Best Management Practice measure.
3. Basin B has been designed to store volume that meter the discharge rate to the allowable flow rate of 0.77 ft^3/s per acre which meets the criteria provided by LACDPW.
4. The post project condition area that flows towards Azusa Avenue is 2.91 acres compared to the 5.64 acres that currently drains to the existing street. The proposed project condition will reduce the drainage area into Azusa Avenue by 2.73 acres which equates to a flow rate reduction.
5. Based on the improvement in this report the project will provide the storm drain infrastructure to address water quality and flooding issues for the project site.

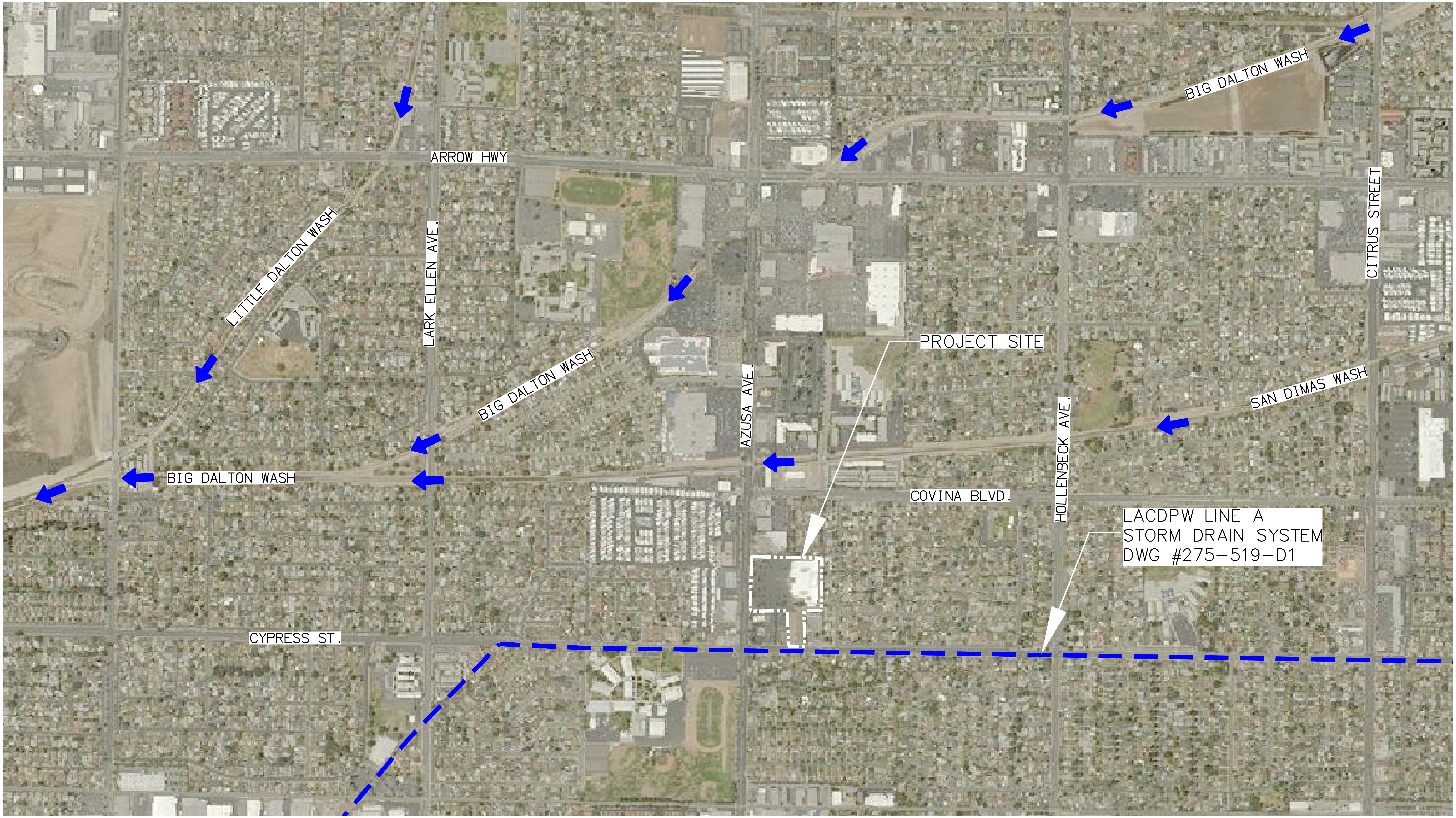
6. The areas discharging into Azusa Avenue decreased from 5.64 acres to 2.91 acres. Based on commercial area land use for the 5.64 acres and a flow rate yield of 2.89 ft^3/s per acre obtained from the 2.91 acre hydrology analyses, the flow rate currently discharging into Azusa is 16.3 ft^3/s. The post-project condition will reduce this to 8.4 ft^3/s which is a 50% reduction. Based on normal depth calculations, a 5' wide parkway drain at 2% slope and a flow rate of 4.2 ft^3/s will have a depth of 0.2 ft. Please note that the 4.2 ft^3/s was used since the project discharge flow rate will be equally distributed to the two existing parkway drains.

VII. REFERENCES

1. Los Angeles County Department of Public Works Manual, January 2006.
2. Los Angeles County Flood Control Design Manual, March 1982

FIGURES

FIGURE 1: VICINITY MAP



TENTAIVE TRACT MAP 82315 VICINITY MAP

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FIGURE 1

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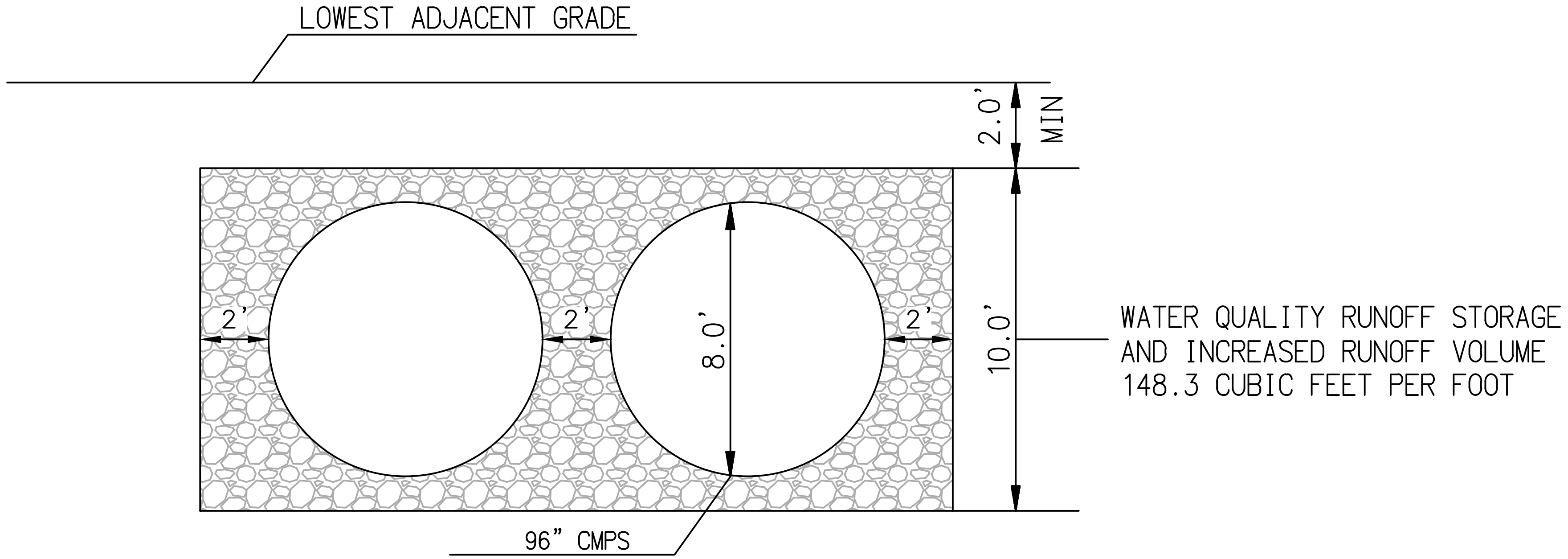
Last Opened: Jan 16, 2019 - 3:52pm by joe

FIGURE 2: DOUBLE 96-INCH SUBSURFACE BASIN TYPICAL SECTION

TRACT MAPNO 82315

IN THE CITY OF COVINA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DOUBLE 96-INCH SUBSURFACE BASIN



DOUBLE SUBSURFACE BASIN - 96" CMP SYSTEM TYPICAL CROSS SECTION

VOLUME CALCULATION

AREA 96" CMP = 50.26 ft^2 * 2 = 100.52 ft^2
AREA OF GRAVEL$^{(1)}$ =119.47 ft^2 * 0.40 = 47.79 ft^2
TOTAL AREA = 148.31 ft^2
VOLUME PER FOOT = 148.3 ft^3/ft

(1) ASSUME 40% VOID RATIO FOR GRAVEL

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FIGURE 2

TRACT MAP NO 82315

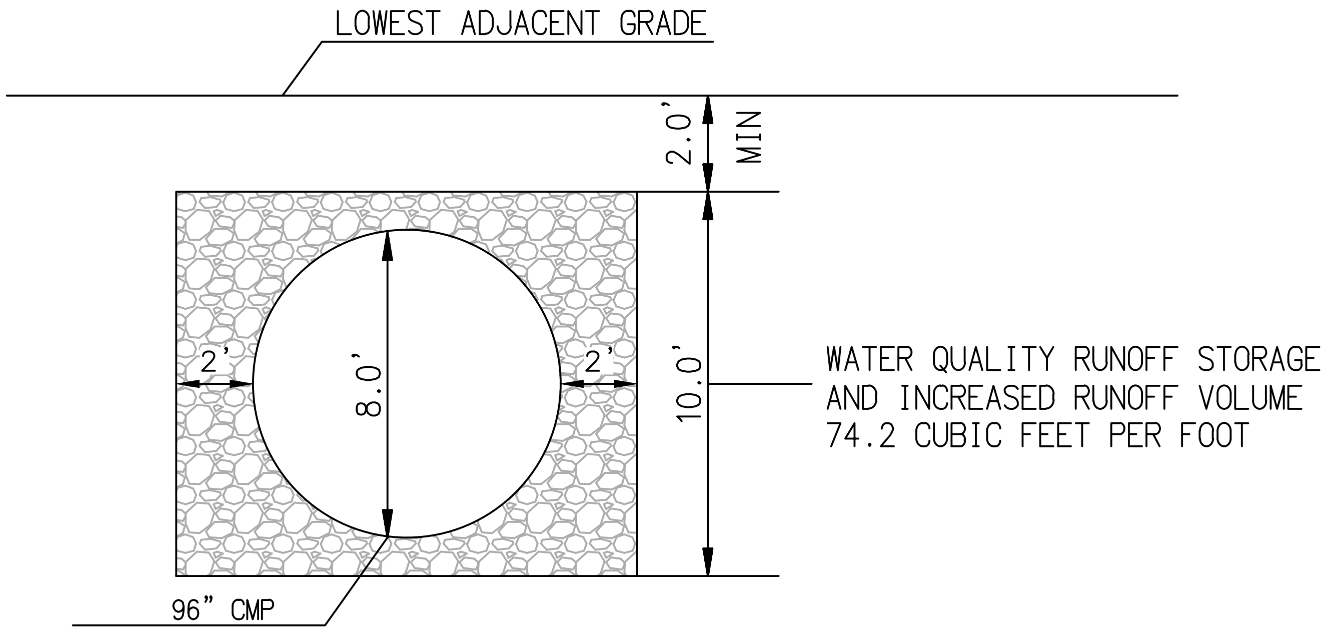
DOUBLE 96-INCH SUBSURFACE BASIN TYPICAL SECTION

FIGURE 3: SINGLE 96-INCH SUBSURFACE BASIN TYPICAL SECTION

TRACT MAPNO 82315

IN THE CITY OF COVINA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

SINGLE 96-INCH SUBSURFACE BASIN



SINGLE SUBSURFACE BASIN - 96" CMP SYSTEM TYPICAL CROSS SECTION

VOLUME CALCULATION

AREA 96" CMP = 50.26 ft^2 = 50.26 ft^2
AREA OF GRAVEL$^{(1)}$ = 69.74 ft^2 * 0.40 = 27.90 ft^2
TOTAL AREA = 78.16 ft^2
VOLUME PER FOOT = 78.2 ft^3/ft

(1) ASSUME 40% VOID RATIO FOR GRAVEL

FIGURE 3

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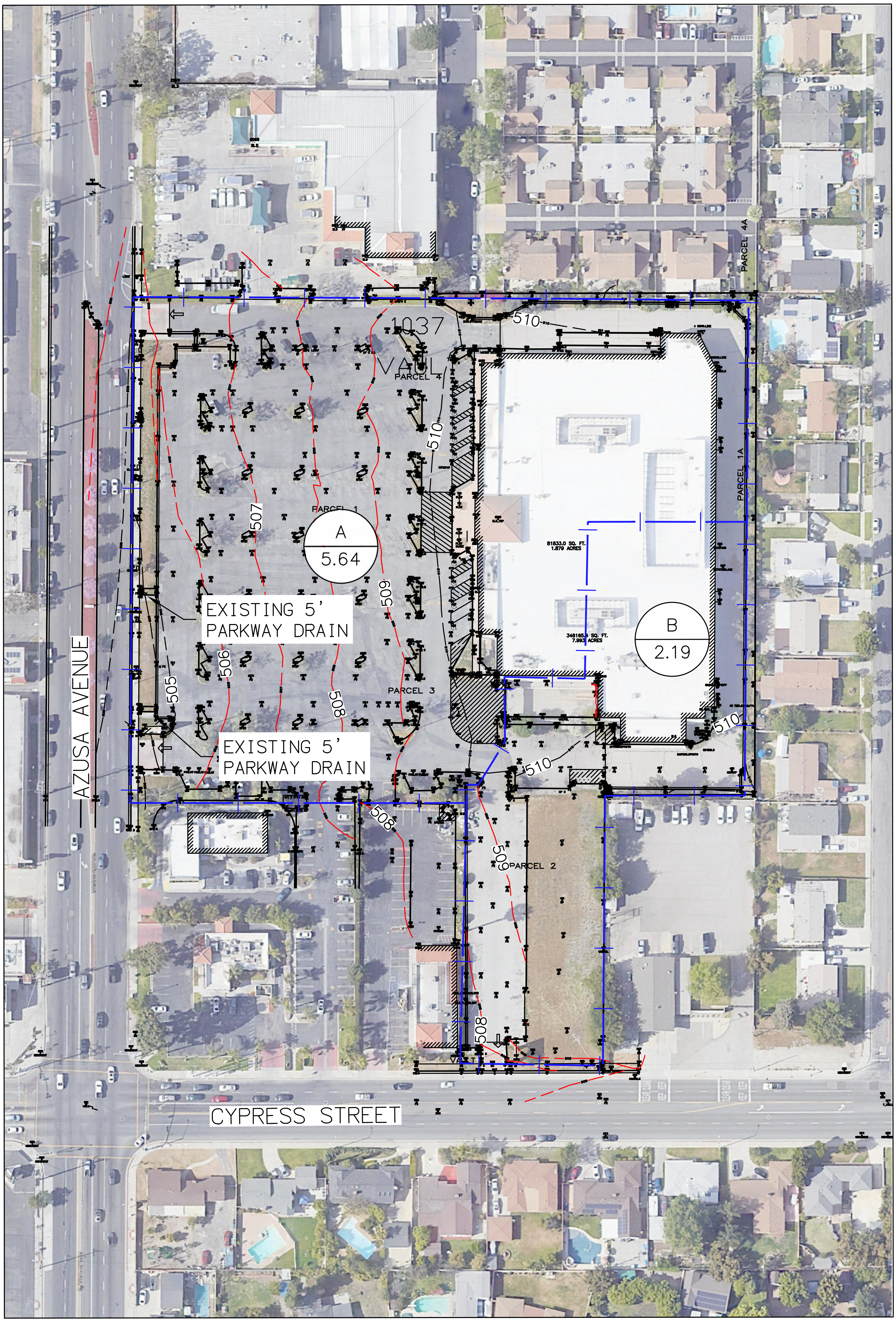
TRACT MAP NO 82315

SINGLE 96-INCH
SUBSURFACE BASIN
TYPICAL SECTION

FIGURE 4: EXISTING CONDITION DRAINAGE MAP

TENTAIVE TRACT MAP 82315
EXISTING DRAINAGE MAP



GRAPHIC SCALE
100' 0 50' 100' 200'
1" = 100'

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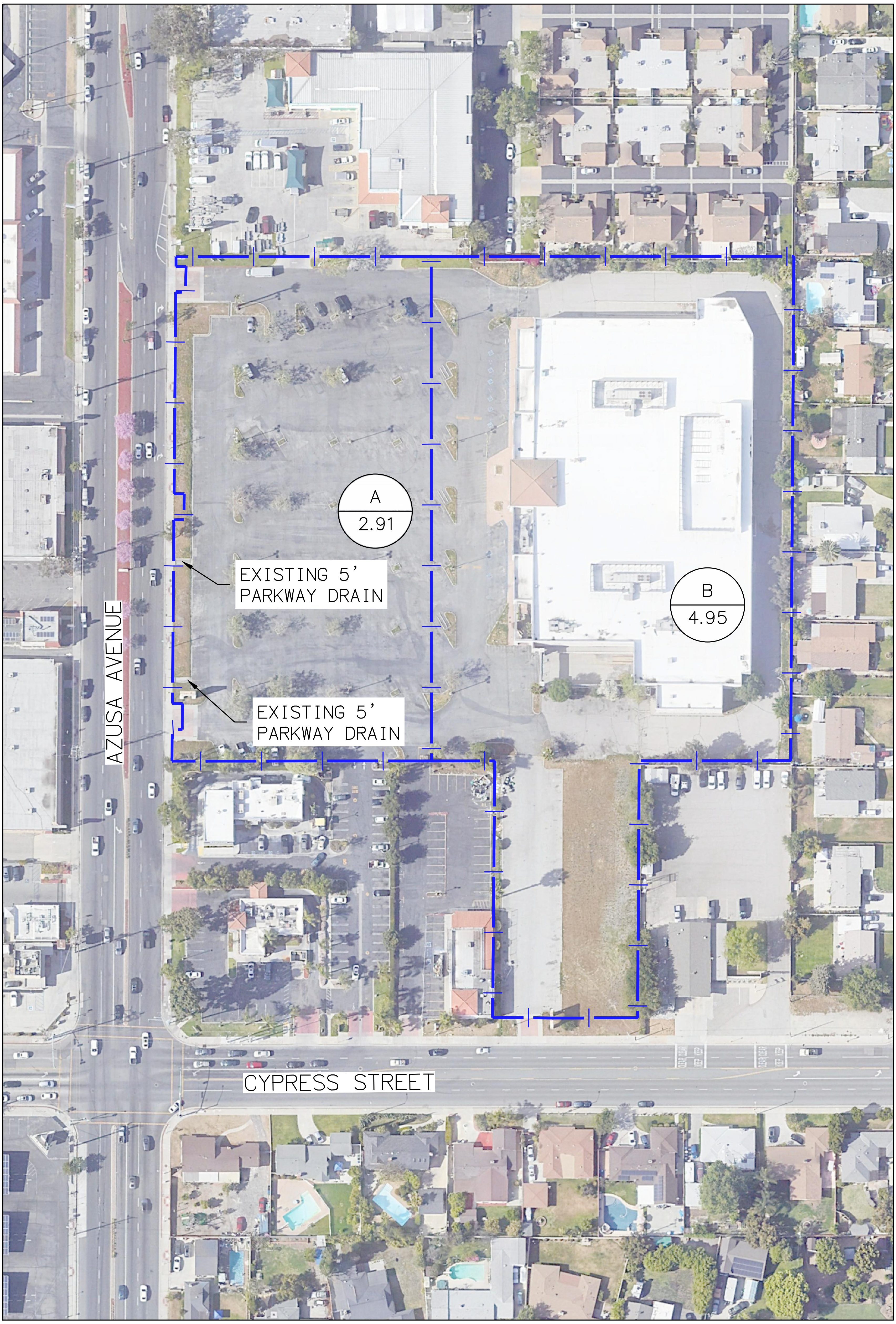
FIGURE 4

Drawing Name: O:\205.17.18\Engineering\Hydrology_Plan\Exhibits\Figure\Figure 3-Existing Drainage Area Map.dwg
Last Opened: Feb 17, 2023 - 1:20pm by joe

FIGURE 5: PROPOSED CONDITION DRAINAGE MAP

TENTAIVE TRACT MAP 82315
PROPOSED DRAINAGE MAP



GRAPHIC SCALE
100' 0 50' 100' 200'
1" = 100'

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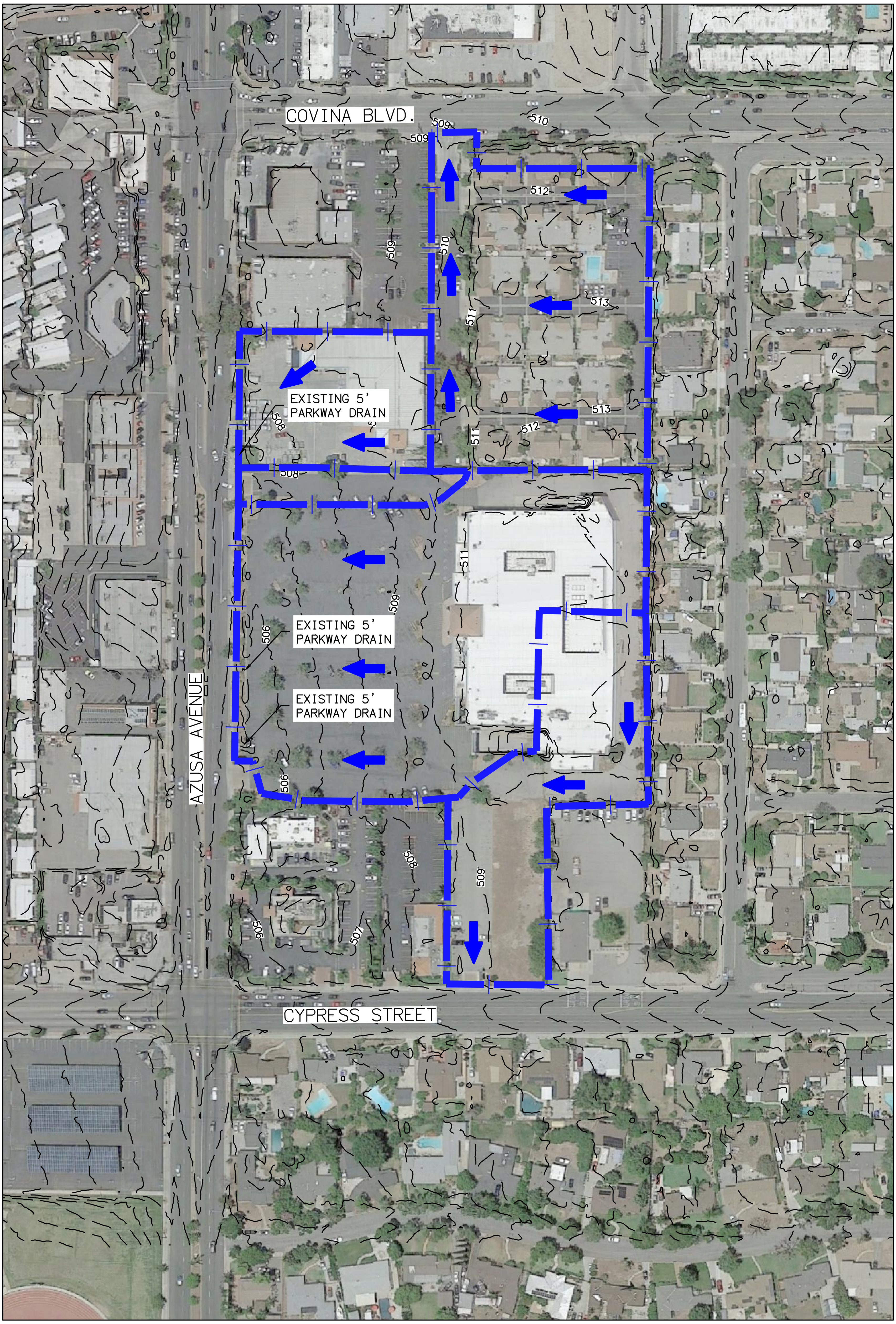
FIGURE 5

Drawing Name: O:\205.17.18\Engineering\Hydrology_Plan\Exhibits\Figure\Figure 5-Proposed Drainage Area Map.dwg
Last Opened: Feb 17, 2023 - 1:39pm by joe

FIGURE 6: USGS 1 METER DEM TOPOGRAPHIC MAP

TENTAIVE TRACT MAP 82315
USGS 1 METER DEM TOPOGRAPHIC MAP



GRAPHIC SCALE

150' 0 75' 150' 300'

1" = 150'

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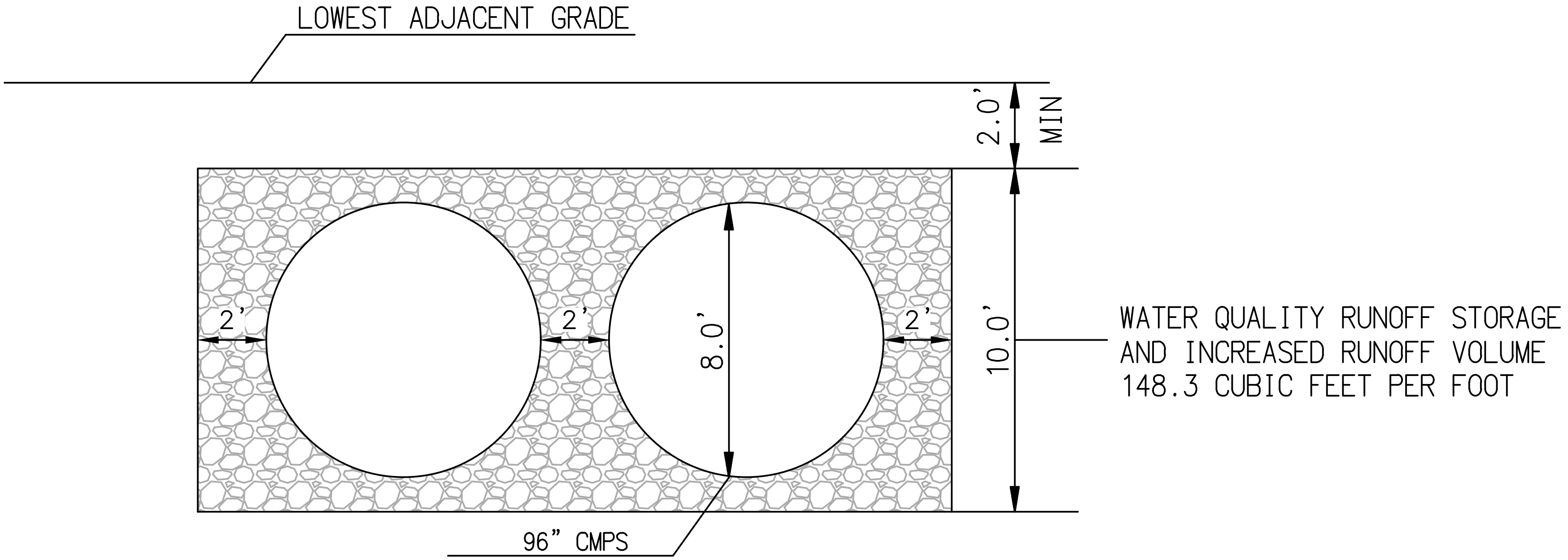
FIGURE 6

Drawing Name: O:\205.17.18\Engineering\Hydrology_Plan\Exhibits\Figure\Figure 6-USGS_1m DEM_TOPO Map.dwg
Last Opened: Feb 18, 2023 - 4:37pm by joe

TRACT MAPNO 82315
IN THE CITY OF COVINA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
DOUBLE 96-INCH SUBSURFACE BASIN



DOUBLE SUBSURFACE BASIN - 96" CMP SYSTEM TYPICAL CROSS SECTION

VOLUME CALCULATION

AREA 96" CMP = 50.26 ft^2 * 2 = 100.52 ft^2
AREA OF GRAVEL(1) =119.47 ft^2 * 0.40 = 47.79 ft^2
TOTAL AREA = 148.31 ft^2
VOLUME PER FOOT = 148.3 ft^3/ft

(1) ASSUME 40% VOID RATIO FOR GRAVEL

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FIGURE 2

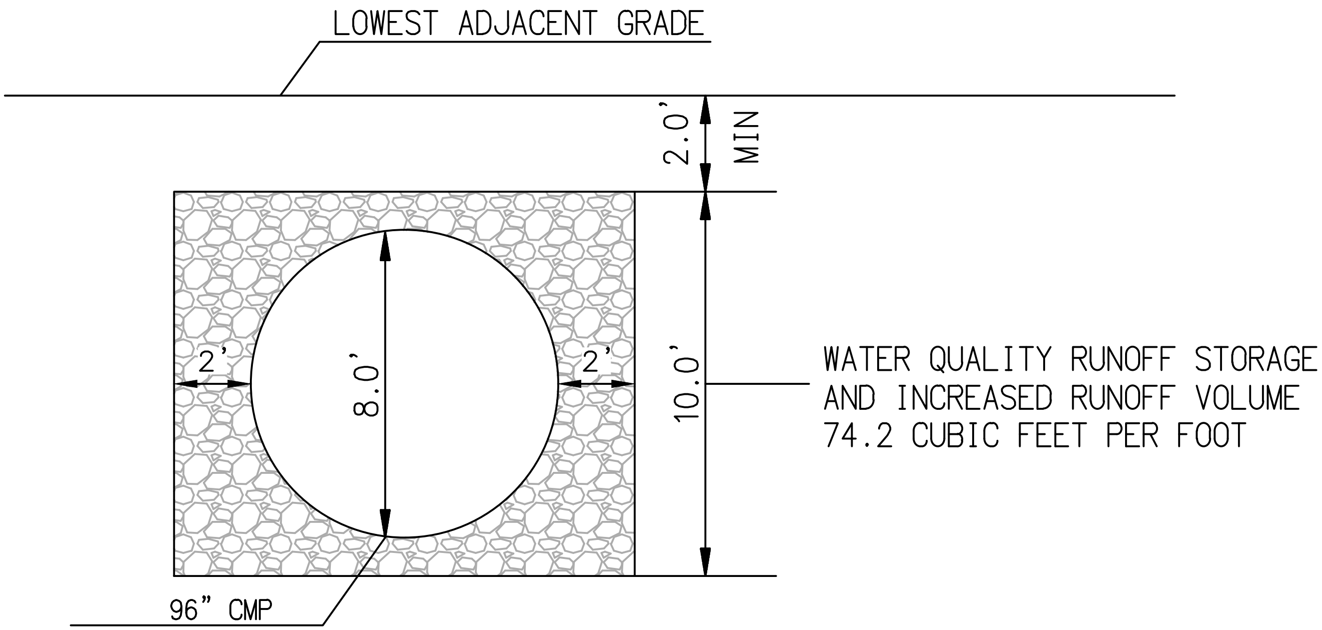
TRACT MAP NO 82315

DOUBLE 96-INCH
SUBSURFACE BASIN
TYPICAL SECTION

TRACT MAPNO 82315

IN THE CITY OF COVINA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

SINGLE 96-INCH SUBSURFACE BASIN



SINGLE SUBSURFACE BASIN - 96" CMP SYSTEM TYPICAL CROSS SECTION

VOLUME CALCULATION

AREA 96" CMP = 50.26 ft^2 = 50.26 ft^2
AREA OF GRAVEL$^{(1)}$ = 69.74 ft^2 * 0.40 = 27.90 ft^2
TOTAL AREA = 78.16 ft^2
VOLUME PER FOOT = 78.2 ft^3/ft

(1) ASSUME 40% VOID RATIO FOR GRAVEL

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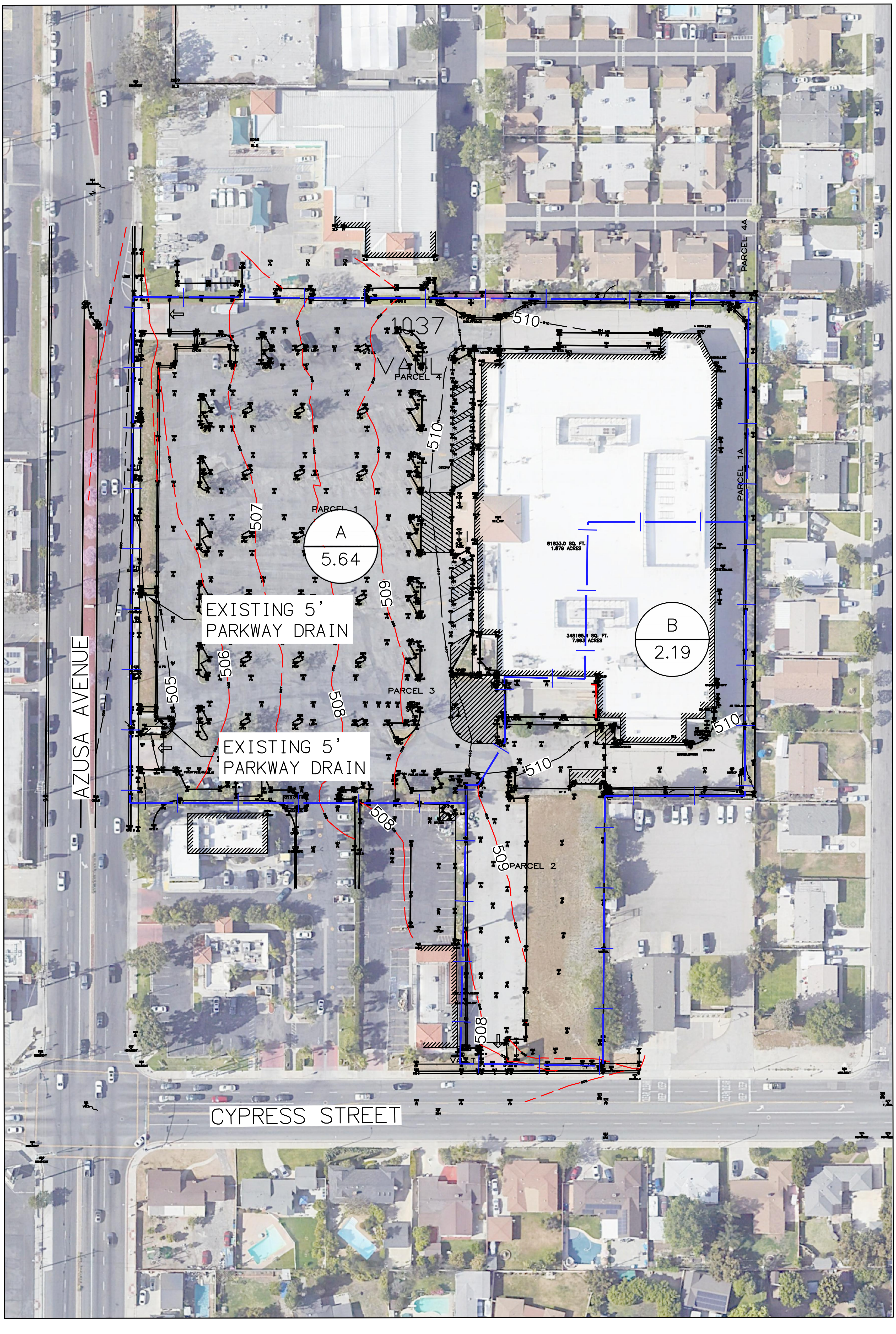
FIGURE 3

TRACT MAP NO 82315

SINGLE 96-INCH
SUBSURFACE BASIN
TYPICAL SECTION

TENTAIVE TRACT MAP 82315
EXISTING DRAINAGE MAP



GRAPHIC SCALE
100' 0 50' 100' 200'
1" = 100'

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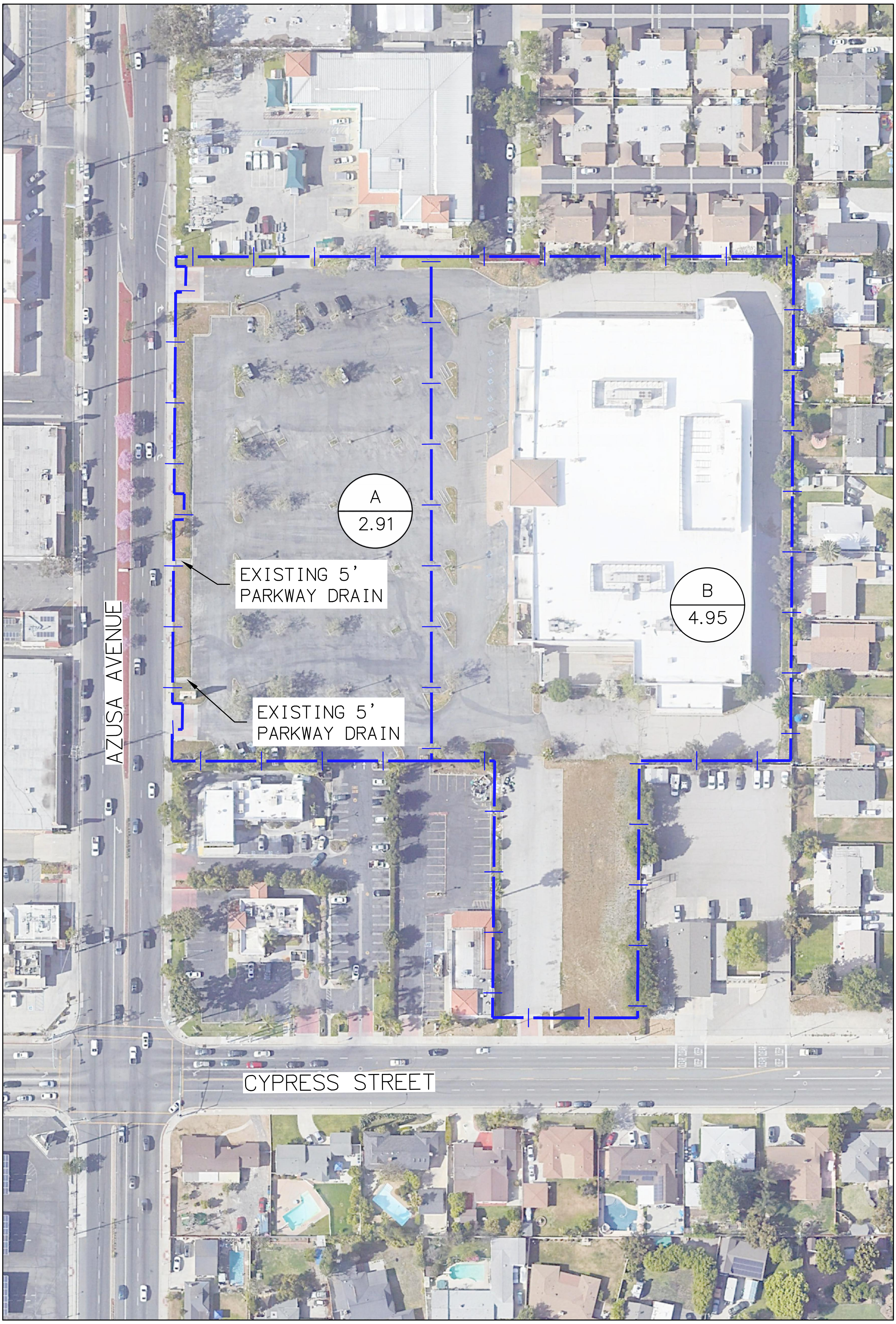
FIGURE 4

Drawing Name: O:\205.17.18\Engineering\Hydrology_Plan\Exhibits\Figure\Figure 3-Existing Drainage Area Map.dwg
Last Opened: Feb 17, 2023 - 1:20pm by joe

TENTAIVE TRACT MAP 82315
PROPOSED DRAINAGE MAP



GRAPHIC SCALE
100' 0 50' 100' 200'
1" = 100'

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FIGURE 5

Drawing Name: O:\205.17.18\Engineering\Hydrology_Plan\Exhibits\Figure\Figure 5-Proposed Drainage Area Map.dwg
Last Opened: Feb 17, 2023 - 1:39pm by joe

APPENDICES

APPENDIX A: CATCH BASINS/INLETS HYDROLOGY

APPENDIX A.1: RATIONAL METHOD ANALYSIS, AREA "1A"

Peak Flow Hydrologic Analysis

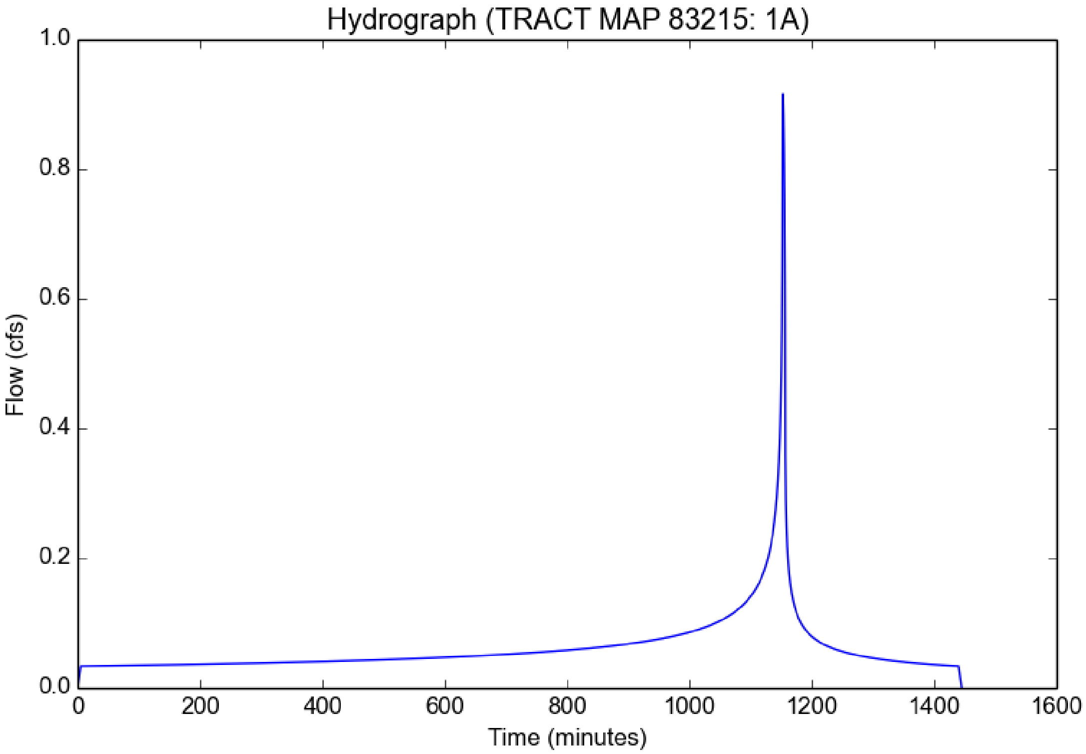
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	1A
Area (ac)	0.27
Flow Path Length (ft)	221.5
Flow Path Slope (vft/hft)	0.023476298
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.98
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.7716
Undeveloped Runoff Coefficient (Cu)	0.8678
Developed Runoff Coefficient (Cd)	0.8994
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.9159
Burned Peak Flow Rate (cfs)	0.9159
24-Hr Clear Runoff Volume (ac-ft)	0.125
24-Hr Clear Runoff Volume (cu-ft)	5447.0417



APPENDIX A.2: RATIONAL METHOD ANALYSIS, AREA "2A"

Peak Flow Hydrologic Analysis

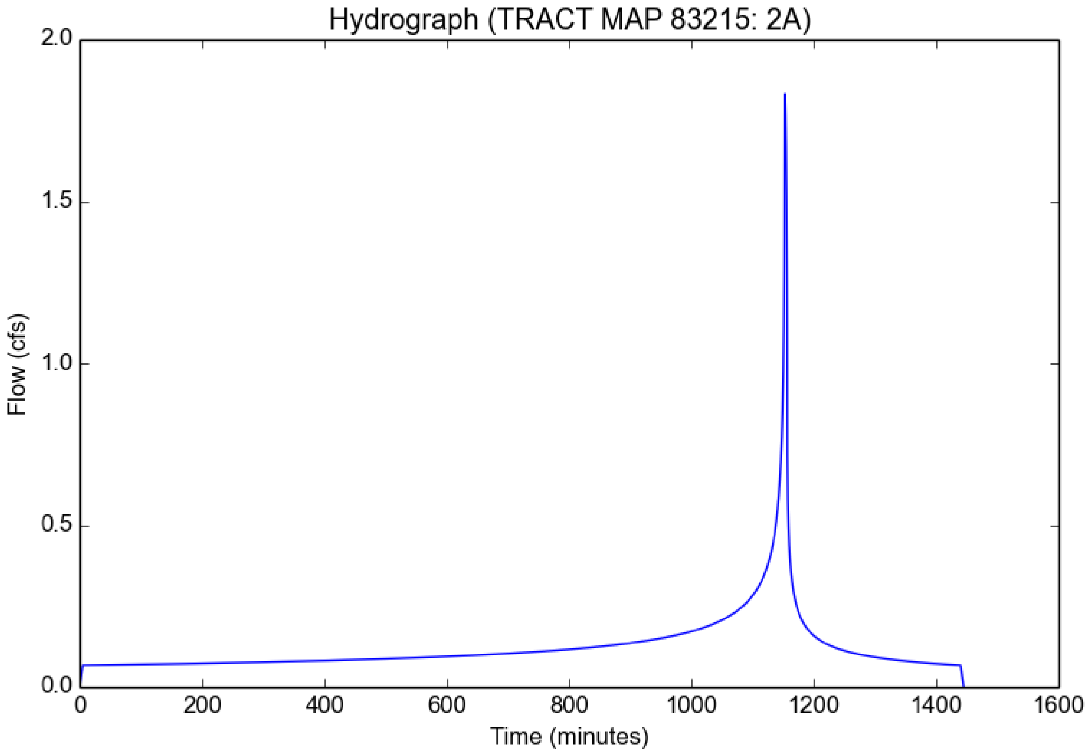
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	2A
Area (ac)	0.54
Flow Path Length (ft)	268.8
Flow Path Slope (vft/hft)	0.016369048
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.98
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.7716
Undeveloped Runoff Coefficient (Cu)	0.8678
Developed Runoff Coefficient (Cd)	0.8994
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.8317
Burned Peak Flow Rate (cfs)	1.8317
24-Hr Clear Runoff Volume (ac-ft)	0.2501
24-Hr Clear Runoff Volume (cu-ft)	10894.0835



APPENDIX A.3: RATIONAL METHOD ANALYSIS, AREA “3A”

Peak Flow Hydrologic Analysis

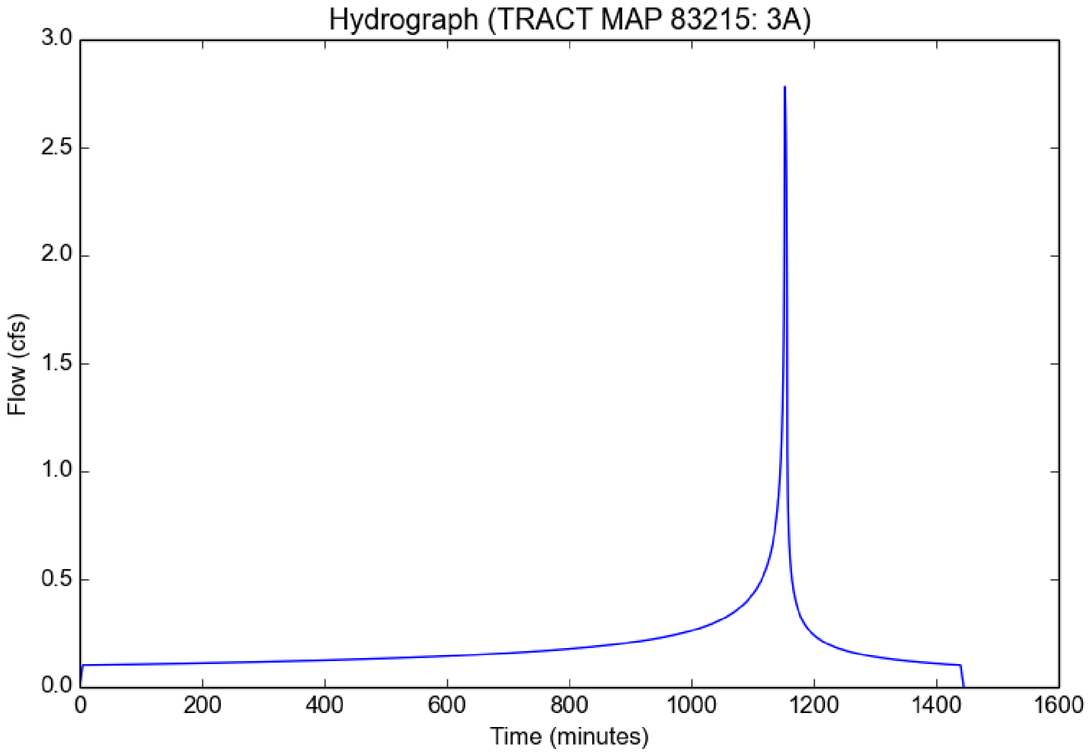
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	3A
Area (ac)	0.82
Flow Path Length (ft)	348.6
Flow Path Slope (vft/hft)	0.016351119
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.98
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.7716
Undeveloped Runoff Coefficient (Cu)	0.8678
Developed Runoff Coefficient (Cd)	0.8994
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.7815
Burned Peak Flow Rate (cfs)	2.7815
24-Hr Clear Runoff Volume (ac-ft)	0.3798
24-Hr Clear Runoff Volume (cu-ft)	16542.8675



APPENDIX A.4: RATIONAL METHOD ANALYSIS, AREA “4A”

Peak Flow Hydrologic Analysis

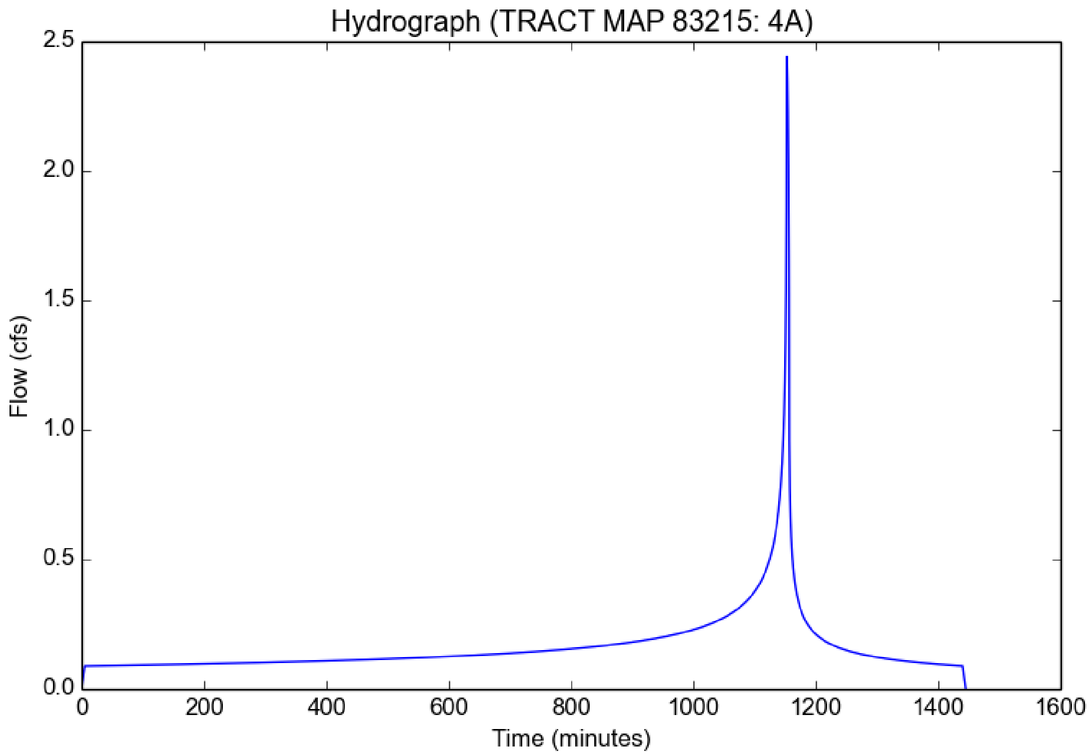
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	4A
Area (ac)	0.72
Flow Path Length (ft)	291.1
Flow Path Slope (vft/hft)	0.014771556
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.98
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.7716
Undeveloped Runoff Coefficient (Cu)	0.8678
Developed Runoff Coefficient (Cd)	0.8994
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.4423
Burned Peak Flow Rate (cfs)	2.4423
24-Hr Clear Runoff Volume (ac-ft)	0.3335
24-Hr Clear Runoff Volume (cu-ft)	14525.4446



APPENDIX A.5: RATIONAL METHOD ANALYSIS, AREA "5A"

Peak Flow Hydrologic Analysis

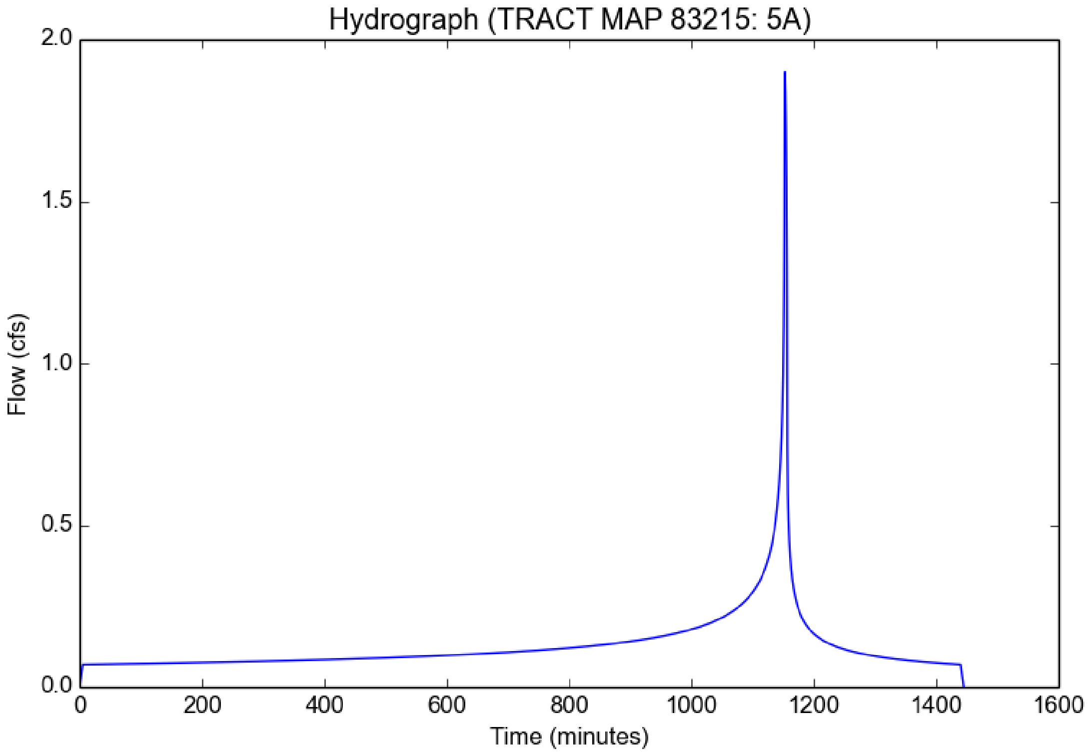
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	5A
Area (ac)	0.56
Flow Path Length (ft)	137.2
Flow Path Slope (vft/hft)	0.017492711
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.98
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.7716
Undeveloped Runoff Coefficient (Cu)	0.8678
Developed Runoff Coefficient (Cd)	0.8994
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.8995
Burned Peak Flow Rate (cfs)	1.8995
24-Hr Clear Runoff Volume (ac-ft)	0.2594
24-Hr Clear Runoff Volume (cu-ft)	11297.568



APPENDIX A.6: RATIONAL METHOD ANALYSIS, AREA “1B”

Peak Flow Hydrologic Analysis

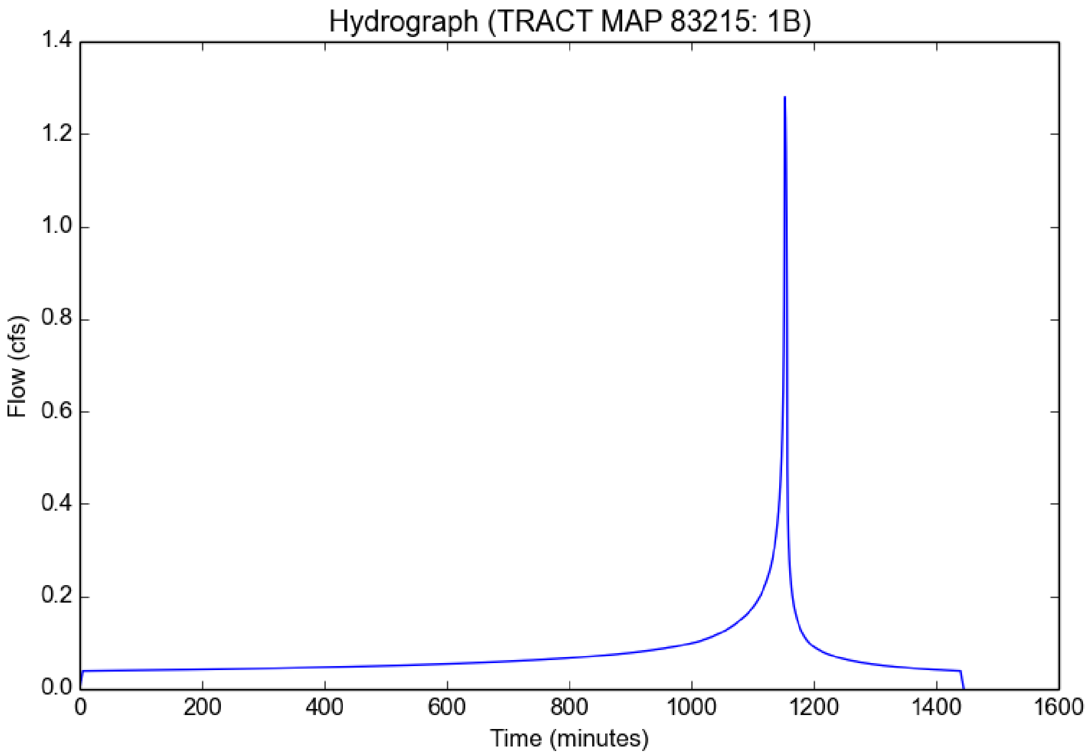
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	1B
Area (ac)	0.38
Flow Path Length (ft)	256.8
Flow Path Slope (vft/hft)	0.005841121
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.78
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.7716
Undeveloped Runoff Coefficient (Cu)	0.8678
Developed Runoff Coefficient (Cd)	0.8929
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2797
Burned Peak Flow Rate (cfs)	1.2797
24-Hr Clear Runoff Volume (ac-ft)	0.1491
24-Hr Clear Runoff Volume (cu-ft)	6496.7122



APPENDIX A.7: RATIONAL METHOD ANALYSIS, AREA “2B”

Peak Flow Hydrologic Analysis

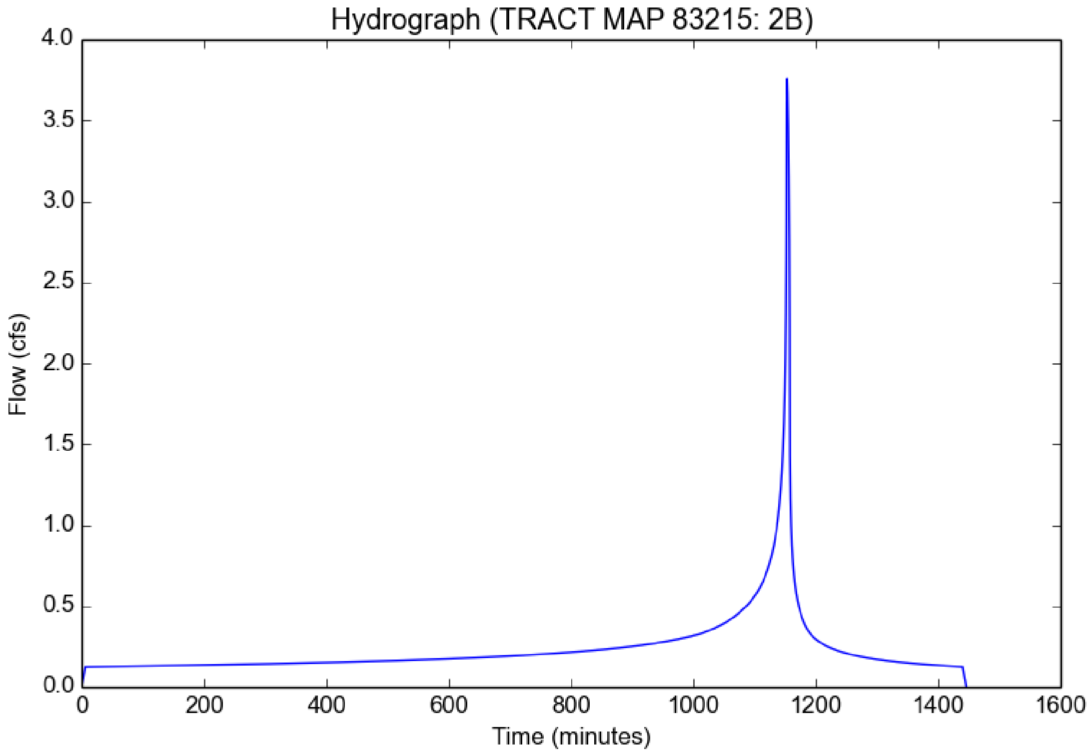
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	2B
Area (ac)	1.22
Flow Path Length (ft)	335.0
Flow Path Slope (vft/hft)	0.005970149
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.78
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.4619
Undeveloped Runoff Coefficient (Cu)	0.8547
Developed Runoff Coefficient (Cd)	0.89
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	3.7591
Burned Peak Flow Rate (cfs)	3.7591
24-Hr Clear Runoff Volume (ac-ft)	0.4788
24-Hr Clear Runoff Volume (cu-ft)	20856.3655



APPENDIX A.8: RATIONAL METHOD ANALYSIS, AREA "3B"

Peak Flow Hydrologic Analysis

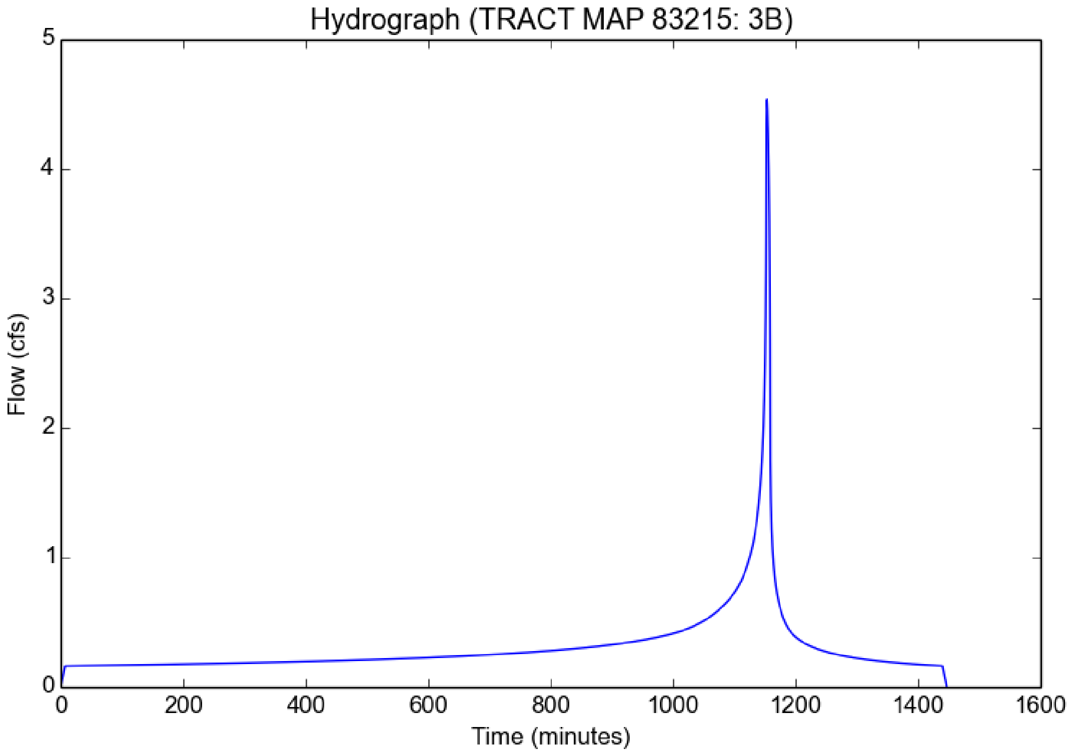
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	3B
Area (ac)	1.59
Flow Path Length (ft)	443.0
Flow Path Slope (vft/hft)	0.007223476
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.78
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.22
Undeveloped Runoff Coefficient (Cu)	0.8377
Developed Runoff Coefficient (Cd)	0.8863
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	4.5376
Burned Peak Flow Rate (cfs)	4.5376
24-Hr Clear Runoff Volume (ac-ft)	0.6239
24-Hr Clear Runoff Volume (cu-ft)	27179.0858



APPENDIX A.9: RATIONAL METHOD ANALYSIS, AREA “4B”

Peak Flow Hydrologic Analysis

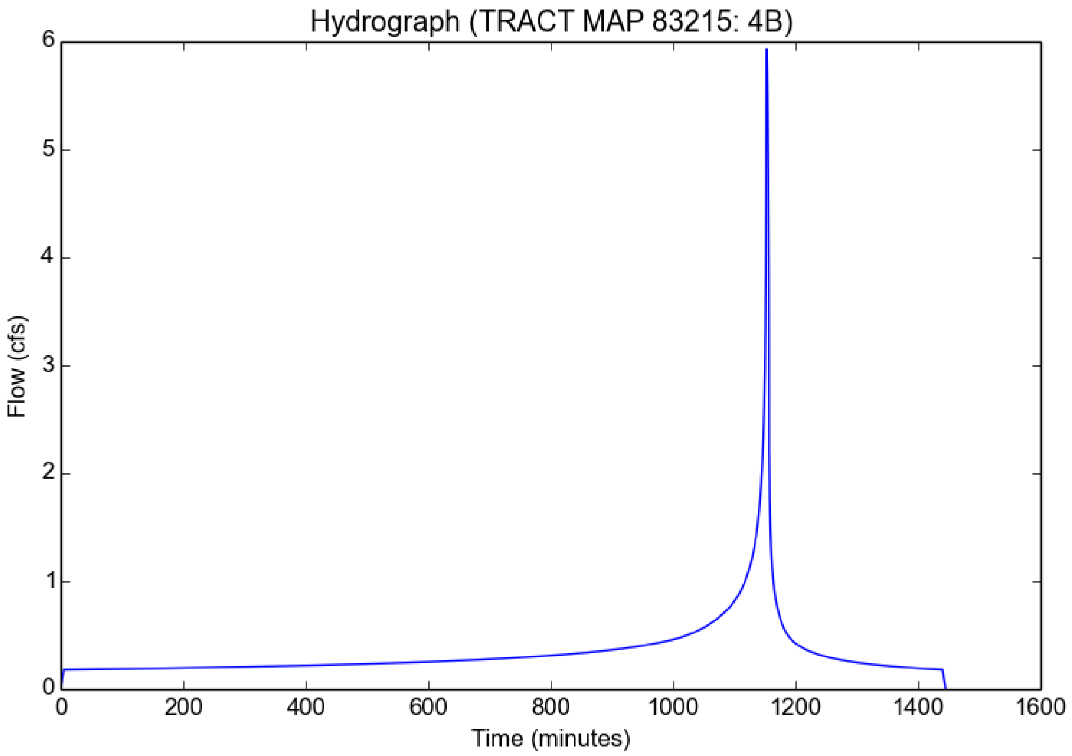
File location: O:/205.17.18/Engineering/Hydrology_Plan/Calcs/HydroCalc-Jacob-12_13_22/TRACT MAP 83215 Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TRACT MAP 83215
Subarea ID	4B
Area (ac)	1.76
Flow Path Length (ft)	256.6
Flow Path Slope (vft/hft)	0.007404521
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.78
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	3.7716
Undeveloped Runoff Coefficient (Cu)	0.8678
Developed Runoff Coefficient (Cd)	0.8929
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	5.9272
Burned Peak Flow Rate (cfs)	5.9272
24-Hr Clear Runoff Volume (ac-ft)	0.6908
24-Hr Clear Runoff Volume (cu-ft)	30090.0353



APPENDIX A.10: RATIONAL METHOD ANALYSIS, AREA "B"

Peak Flow Hydrologic Analysis

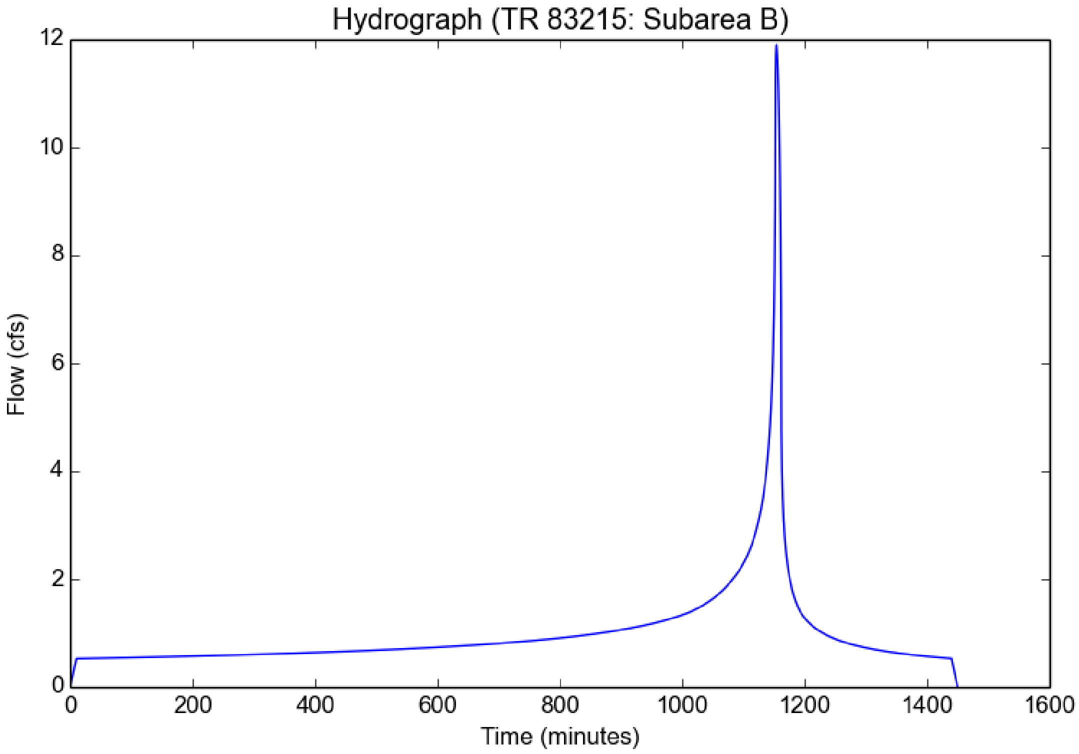
File location: P:/205-Land Development Consultants/205.17.18/Reports/Hydrology & Hydraulics/PDF-221213/Appendices/Appendix B/TRACT MAP 8321
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TR 83215
Subarea ID	Subarea B
Area (ac)	4.95
Flow Path Length (ft)	782.0
Flow Path Slope (vft/hft)	0.005
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.82
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	2.723
Undeveloped Runoff Coefficient (Cu)	0.8028
Developed Runoff Coefficient (Cd)	0.8825
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	11.8952
Burned Peak Flow Rate (cfs)	11.8952
24-Hr Clear Runoff Volume (ac-ft)	2.0122
24-Hr Clear Runoff Volume (cu-ft)	87649.3205



APPENDIX B: SUBSURFACE BASIN HYDROLOGY

Peak Flow Hydrologic Analysis

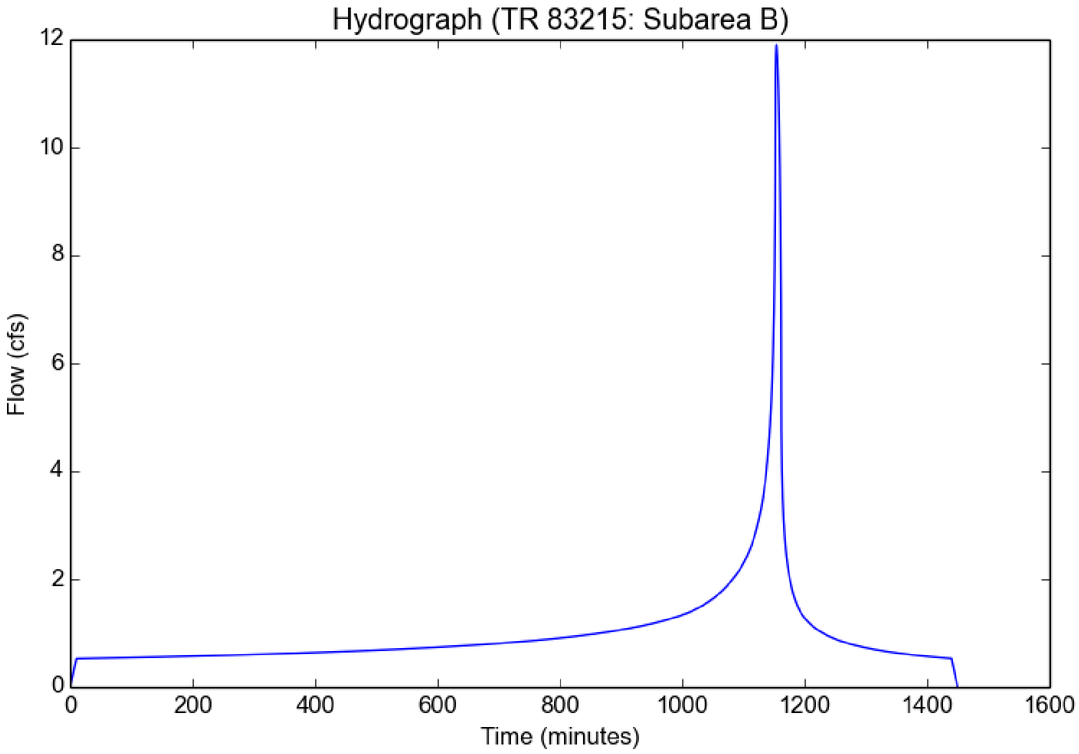
File location: P:/205-Land Development Consultants/205.17.18/Reports/Hydrology & Hydraulics/PDF-221213/Appendices/Appendix B/TRACT MAP 8321
Version: HydroCalc 1.0.3

Input Parameters

Project Name	TR 83215
Subarea ID	Subarea B
Area (ac)	4.95
Flow Path Length (ft)	782.0
Flow Path Slope (vft/hft)	0.005
50-yr Rainfall Depth (in)	7.2
Percent Impervious	0.82
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	6.3216
Peak Intensity (in/hr)	2.723
Undeveloped Runoff Coefficient (Cu)	0.8028
Developed Runoff Coefficient (Cd)	0.8825
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	11.8952
Burned Peak Flow Rate (cfs)	11.8952
24-Hr Clear Runoff Volume (ac-ft)	2.0122
24-Hr Clear Runoff Volume (cu-ft)	87649.3205



TRACT MAP 83215 INCREASE RUNOFF MITIGATION (PROJECT MUST RELEASE LESS THAN 3.8 CFS)

Subarea ID	Area (ac)	Flow Path Length (ft)	Flow Path Slope (vft/hft)	50-yr Rainfall Depth (in)	Percent Impervious	Soil Type	Design Storm Frequency	Fire Factor
Subarea B	4.95	782	0.005	7.2	0.82	6	25-yr	0

Outputs: TR83215

Area (ac)	Modeled (25-yr) Rainfall Depth (in)	Time of Concentration (min)	Clear Peak Flow Rate (cfs)	24-Hr Clear Runoff Volume (ac-ft)	Burned Peak Flow Rate (cfs)	Peak Intensity (in/hr)	Undeveloped Runoff Coefficient	Developed Runoff Coefficient (Cd)
Subarea B	6.3216	10	11.8951672	2.012151528	11.8951672	2.722990599	0.802828536	0.882509136

graph: TR83215 - Subarea B

Time (min)	Incremental Masscurve	Incremental Design Storm Depth (in)	Intensity (in/hr)	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)	Clear Peak Flow Rate (cfs)	Incremental Volume (cu-ft)	Cumulative Volume (cu-ft)
0	0	0	0	0	0	0	0	0
15	0.005537835	0.035007979	0.140175526	0.1	0.756	0.524564854	6.294519216	314.2545424
30	0.011110116	0.070233708	0.141049337	0.1	0.756	0.527834829	6.333753829	787.829634
45	0.016717521	0.10568148	0.141940414	0.1	0.756	0.531169416	6.373763617	1264.376619
60	0.022360752	0.141355732	0.142849337	0.1	0.756	0.534570789	6.414574667	1743.954619
75	0.028040536	0.177261053	0.143776716	0.1	0.756	0.538041228	6.456214313	2226.62476
90	0.033757623	0.21340219	0.14472319	0.1	0.756	0.541583121	6.498711219	2712.450267
105	0.03951279	0.249784054	0.145689428	0.1	0.756	0.545198976	6.542095462	3201.496568
120	0.045306842	0.286411733	0.146676133	0.1	0.756	0.548891426	6.586398622	3693.831403
135	0.051140613	0.323290499	0.147684046	0.1	0.756	0.552663236	6.631653883	4189.524943
150	0.057014967	0.360425813	0.148713942	0.1	0.756	0.556517316	6.677896135	4688.64991
165	0.062930799	0.397823342	0.149766641	0.1	0.756	0.560456725	6.725162092	5191.281711
180	0.068889042	0.435488965	0.150843003	0.1	0.756	0.564484686	6.773490417	5697.498581
195	0.074890659	0.473428787	0.151943936	0.1	0.756	0.568604598	6.822921856	6207.381732
210	0.080936654	0.511649149	0.153070397	0.1	0.756	0.572820041	6.873499385	6721.015517
225	0.087028069	0.550156644	0.154223397	0.1	0.756	0.577134798	6.925268369	7238.4876
240	0.093165991	0.588958127	0.155404004	0.1	0.756	0.581552864	6.978276737	7759.889146
255	0.099351546	0.628060735	0.156613346	0.1	0.756	0.586078465	7.032575173	8285.315016
270	0.105585912	0.6674719	0.157852619	0.1	0.756	0.590716073	7.08821732	8814.863985
285	0.111870312	0.707199367	0.159123089	0.1	0.756	0.595470425	7.14526001	9348.63897
300	0.118206026	0.747251215	0.160426098	0.1	0.756	0.600346545	7.203763511	9886.74728
315	0.124594387	0.787635874	0.161763072	0.1	0.756	0.605349768	7.263791796	10429.30088
330	0.131036787	0.82836215	0.163135525	0.1	0.756	0.61048576	7.325412849	10976.41669
345	0.137534682	0.869439247	0.164545067	0.1	0.756	0.615760551	7.388698988	11528.21689
360	0.144089597	0.910876794	0.165993416	0.1	0.756	0.621180562	7.453727231	12084.82925
375	0.150703124	0.952684871	0.1674824	0.1	0.756	0.626752638	7.520579697	12646.38752
390	0.157376937	0.994874044	0.169013973	0.1	0.756	0.632484088	7.589344049	13213.03181
405	0.164112787	1.037455393	0.170590221	0.1	0.756	0.638382724	7.660113985	13784.90903
420	0.170912514	1.08044055	0.172213379	0.1	0.756	0.644456907	7.732989785	14362.17338
435	0.177778053	1.123841739	0.173885841	0.1	0.756	0.650715595	7.808078921	14944.98682
450	0.184711437	1.16767182	0.175610178	0.1	0.756	0.657168407	7.885496729	15533.51968
465	0.191714809	1.211944334	0.17738915	0.1	0.756	0.663825676	7.965367174	16127.95128
480	0.198790426	1.256673558	0.17922573	0.1	0.756	0.670698528	8.047823696	16728.47057
495	0.205940673	1.301874558	0.181123125	0.1	0.756	0.677798959	8.133010163	17335.2769
510	0.213168068	1.347563256	0.183084796	0.1	0.756	0.685139923	8.221081948	17948.58085
525	0.220475275	1.393756497	0.185114487	0.1	0.756	0.692735435	8.312207141	18568.60512
540	0.227865118	1.440472129	0.187216259	0.1	0.756	0.700600684	8.406567919	19195.58555

555	0.235340592	1.487729086	0.189394518	0.1	0.756	0.708752166	8.504362112	19829.77222
570	0.242904879	1.535547483	0.191654061	0.1	0.756	0.717207827	8.605804972	20471.4307
585	0.250561365	1.583948727	0.194000118	0.1	0.756	0.72598724	8.711131204	21120.84342
600	0.25831366	1.63295563	0.196438402	0.1	0.756	0.73511179	8.820597292	21778.31126
615	0.266165614	1.682592547	0.198975176	0.1	0.756	0.744604902	8.934484177	22444.1552
630	0.27412135	1.732885524	0.201617311	0.1	0.756	0.754492301	9.053100336	23118.71835
645	0.282185281	1.78386247	0.204372376	0.1	0.756	0.764802304	9.176785372	23802.36811
660	0.290362147	1.835553348	0.207248724	0.1	0.756	0.775566173	9.305914175	24495.49864
675	0.298657048	1.887990394	0.210255604	0.1	0.756	0.78681852	9.440901791	25198.53373
690	0.307075482	1.941208369	0.213403287	0.1	0.756	0.79859778	9.582209142	25911.93002
705	0.315623393	1.995244844	0.216703218	0.1	0.756	0.810946783	9.730349772	26636.18063
720	0.324307221	2.050140528	0.220168193	0.1	0.756	0.82391341	9.885897853	27371.81947
735	0.333133962	2.105939656	0.22381257	0.1	0.756	0.8375514	10.04949773	28119.42612
750	0.342111242	2.162690426	0.22765253	0.1	0.756	0.851921297	10.22187536	28879.6315
765	0.351247393	2.22044552	0.231706379	0.1	0.756	0.867091612	10.40385216	29653.12451
780	0.360551556	2.279262715	0.235994927	0.1	0.756	0.883140217	10.5963618	30440.65981
795	0.370033789	2.339205602	0.240541945	0.1	0.756	0.900156067	10.80047079	31243.06697
810	0.379705207	2.400344438	0.245374731	0.1	0.756	0.918241318	11.01740382	32061.26142
825	0.389578142	2.462757183	0.250524815	0.1	0.756	0.937513962	11.24857542	32896.2574
840	0.399666339	2.52653073	0.256028844	0.1	0.756	0.958111139	11.49562959	33749.18371
855	0.409985197	2.59176242	0.261929704	0.1	0.756	0.980193337	11.76049013	34621.30271
870	0.420552059	2.658561897	0.268277959	0.1	0.756	1.003949779	12.04542515	35514.03368
885	0.431386581	2.727053408	0.275133721	0.1	0.756	1.029605409	12.3531308	36428.98168
900	0.442511184	2.7973787	0.2825691	0.1	0.756	1.057430087	12.68684136	37367.97362
915	0.453951639	2.869700682	0.290671489	0.1	0.756	1.087750845	13.05047606	38333.10399
930	0.465737814	2.944208163	0.299547997	0.1	0.756	1.120968513	13.44883816	39326.79334
945	0.477904649	3.02112203	0.30933159	0.1	0.756	1.157580676	13.88788981	40351.86448
960	0.490493464	3.100703484	0.320189733	0.1	0.756	1.198214018	14.37513927	41411.64328
975	0.50355372	3.183265199	0.332336856	0.1	0.756	1.243670984	14.92019948	42510.09452
990	0.517145475	3.269186835	0.346052832	0.1	0.756	1.294998907	15.53561528	43652.00906
1005	0.531342876	3.358937128	0.361711198	0.1	0.756	1.353595644	16.23812737	44843.26834
1020	0.546239304	3.453106385	0.379823895	0.116879078	0.759038234	1.427089249	17.11829023	46092.54462
1035	0.56195521	3.552456059	0.401115307	0.153461248	0.765623025	1.520160417	18.23376269	47417.51215
1050	0.578650643	3.657997907	0.426651442	0.197336556	0.77352058	1.633617171	19.5933307	48834.91971
1065	0.596546401	3.771127728	0.4580806	0.251337052	0.783240669	1.775997411	21.29911592	50366.64534
1080	0.61596247	3.89386835	0.498121011	0.320133107	0.795623959	1.961769206	23.52407957	52044.6198
1095	0.637395018	4.029356348	0.551666027	0.359849848	0.802772973	2.192169752	26.2843382	53908.48521
1110	0.661693594	4.182962222	0.628719126	0.414267401	0.812568132	2.528841774	30.31269538	56022.04527
1125	0.690568345	4.365496849	0.754372673	0.501411795	0.828254123	3.092820769	37.05586914	58526.57672
1135.6	0.715979084	4.526133377	0.914675047	0.556096221	0.83809732	3.794604191	45.42637895	60693.34638
1135.8	0.716523712	4.529576295	0.918834767	0.557515239	0.838352743	3.813022852	45.64576226	60738.99214
1136	0.717071509	4.53303925	0.923055406	0.558955038	0.838611907	3.831722007	45.86846915	60784.86061
1136.2	0.717622534	4.53652261	0.927338508	0.560416146	0.838874906	3.850708968	46.09458585	60830.9552
1136.4	0.718176847	4.540026757	0.931685673	0.561899107	0.839141839	3.869991327	46.32420177	60877.2794
1136.6	0.718734511	4.543552082	0.936098562	0.563404489	0.839412808	3.889576958	46.55740971	60923.83681
1136.8	0.719295589	4.547098993	0.940578897	0.564932879	0.839687918	3.909474042	46.794306	60970.63111
1137	0.719860147	4.550667907	0.945128464	0.566484886	0.83996728	3.929691074	47.0349907	61017.66611
1137.2	0.720428255	4.554259257	0.94974912	0.568061145	0.840251006	3.950236885	47.27956776	61064.94567
1137.4	0.720999983	4.55787349	0.954442793	0.569662311	0.840539216	3.971120657	47.52814525	61112.47382
1137.6	0.721575403	4.56151107	0.959211488	0.57128907	0.840832033	3.992351939	47.78083557	61160.25465
1137.8	0.722154593	4.565172473	0.964057288	0.572942133	0.841129584	4.013940673	48.03775567	61208.29241
1138	0.722737629	4.568858195	0.968982362	0.574622238	0.841432003	4.035897208	48.29902728	61256.59144
1138.2	0.723324593	4.572568748	0.973988965	0.576330155	0.841739428	4.058232327	48.56477721	61305.15621
1138.4	0.723915569	4.576304664	0.97907945	0.578066687	0.842052004	4.080957271	48.83513759	61353.99135

1138.6	0.724510645	4.580066492	0.984256263	0.579832669	0.84236988	4.104083762	49.1102462	61403.1016
1138.8	0.725109909	4.583854803	0.989521959	0.581628971	0.842693215	4.12762403	49.39024675	61452.49184
1139	0.725713457	4.587670188	0.994879199	0.583456503	0.843022171	4.151590848	49.67528927	61502.16713
1139.2	0.726321384	4.591513264	1.000330764	0.585264376	0.843347588	4.175951355	49.96525322	61552.13239
1139.4	0.726933793	4.595384667	1.005879555	0.586287674	0.843531781	4.200032295	50.2559019	61602.38829
1139.6	0.727550788	4.599285061	1.011528606	0.587329462	0.843719303	4.224558741	50.54754621	61652.93583
1139.8	0.728172478	4.603215137	1.017281087	0.588390325	0.843910258	4.249545026	50.8446226	61703.78046
1140	0.728798977	4.607175613	1.023140316	0.589470874	0.844104757	4.27500616	51.14730712	61754.92776
1140.2	0.729430403	4.611167236	1.029109767	0.590571749	0.844302915	4.300957861	51.45578412	61806.38355
1140.4	0.73006688	4.615190785	1.035193079	0.591693623	0.844504852	4.327416612	51.77024684	61858.1538
1140.6	0.730708535	4.619247074	1.041394067	0.592837199	0.844710696	4.3543997	52.09089787	61910.24469
1140.8	0.731355503	4.62333695	1.047716735	0.594003214	0.844920579	4.381925277	52.41794986	61962.66264
1141	0.732007925	4.627461298	1.054165285	0.595192444	0.84513464	4.410012412	52.75162613	62015.41427
1141.2	0.732665946	4.631621044	1.060744133	0.596405704	0.845353027	4.438681156	53.0921614	62068.50643
1141.4	0.73332972	4.635817155	1.067457926	0.59764385	0.845575893	4.467952608	53.43980258	62121.94623
1141.6	0.733999406	4.640050646	1.07431155	0.598907783	0.845803401	4.497848994	53.79480961	62175.74104
1141.8	0.734675174	4.644322578	1.081310155	0.600198454	0.846035722	4.528393738	54.15745639	62229.8985
1142	0.735357198	4.648634063	1.088459173	0.601516863	0.846273035	4.559611558	54.52803177	62284.42653
1142.2	0.736045664	4.652986271	1.095764332	0.602864068	0.846515532	4.591528558	54.90684069	62339.33337
1142.4	0.736740766	4.657380428	1.103231687	0.604241185	0.846763413	4.624172334	55.29420535	62394.62758
1142.6	0.737442709	4.661817828	1.11086764	0.605649394	0.847016891	4.657572088	55.69046654	62450.31804
1142.8	0.738151706	4.666299827	1.118678965	0.607089945	0.84727619	4.691758756	56.09598507	62506.41403
1143	0.738867986	4.670827861	1.126672846	0.608564162	0.847541549	4.726765144	56.5111434	62562.92517
1143.2	0.739591787	4.67540344	1.1348569	0.610073451	0.847813221	4.762626084	56.93634737	62619.86152
1143.4	0.740323361	4.680028162	1.143239219	0.611619304	0.848091475	4.799378605	57.37202813	62677.23355
1143.6	0.741062977	4.684703716	1.151828411	0.613203307	0.848376595	4.837062114	57.81864431	62735.05219
1143.8	0.741810917	4.689431892	1.160633639	0.614827152	0.848668887	4.875718614	58.27668437	62793.32888
1144	0.742567481	4.694214587	1.169664678	0.616492641	0.848968675	4.915392927	58.74666925	62852.07555
1144.2	0.743332988	4.699053818	1.178931962	0.618201697	0.849276305	4.956132956	59.2291553	62911.3047
1144.4	0.744107778	4.703951728	1.188446652	0.61995638	0.849592148	4.997989976	59.72473759	62971.02944
1144.6	0.744892211	4.708910603	1.198220704	0.621758893	0.849916601	5.041018953	60.23405357	63031.26349
1144.8	0.745686674	4.71393288	1.208266941	0.623611603	0.850250088	5.085278913	60.7577872	63092.02128
1145	0.746491579	4.719021167	1.218599149	0.62551705	0.850593069	5.130833351	61.29667359	63153.31795
1145.2	0.747307367	4.724178254	1.229232169	0.627477973	0.850946035	5.177750693	61.85150426	63215.16946
1145.4	0.748134513	4.729407138	1.240182014	0.629497325	0.851309518	5.226104827	62.42313312	63277.59259
1145.6	0.748973526	4.734711042	1.251465991	0.631578296	0.851684093	5.275975703	63.01248318	63340.60507
1145.8	0.749824955	4.740093437	1.263102851	0.633724345	0.852070382	5.327450018	63.62055433	63404.22563
1146	0.750689394	4.745558076	1.275112956	0.635939228	0.852469061	5.380622003	64.24843212	63468.47406
1146.2	0.751567486	4.751109022	1.287518468	0.638227031	0.852880866	5.435594336	64.89729803	63533.37136
1146.4	0.752459929	4.756750686	1.300343578	0.640592215	0.853306599	5.492479189	65.56844115	63598.9398
1146.6	0.753367482	4.762487875	1.313614755	0.643039663	0.853747139	5.551399454	66.26327186	63665.20307
1146.8	0.754290976	4.768325836	1.327361059	0.645574732	0.854203452	5.612490174	66.98333777	63732.18641
1147	0.755231321	4.774270322	1.341614491	0.648203325	0.854676598	5.675900222	67.73034237	63799.91675
1147.2	0.756189518	4.780327659	1.356410411	0.650931963	0.855167753	5.741794294	68.5061671	63868.42292
1147.4	0.757166672	4.786504831	1.371788041	0.653767878	0.855678218	5.810355278	69.31289743	63937.73582
1147.6	0.758164006	4.792809581	1.387791066	0.656719128	0.856209443	5.881787087	70.15285419	64007.88867
1147.8	0.759182886	4.799250531	1.404468346	0.659794723	0.85676305	5.956318093	71.02863108	64078.9173
1148	0.760224837	4.805837329	1.421874807	0.663004792	0.857340863	6.034205297	71.94314034	64150.86044
1148.2	0.761291577	4.812580833	1.440072506	0.66636078	0.85794494	6.115739455	72.89966851	64223.76011
1148.4	0.762385049	4.819493327	1.459131978	0.669875695	0.858577625	6.201251438	73.90194536	64297.66206
1148.6	0.763507468	4.826588809	1.479133903	0.673564415	0.859241595	6.291120198	74.95422981	64372.61629
1148.8	0.764661374	4.833883341	1.50017123	0.677431298	0.859937634	6.385765803	76.06131601	64448.6776
1149	0.765849707	4.841395506	1.522351905	0.679865828	0.860375849	6.483484322	77.21550075	64525.8931
1149.2	0.767075899	4.849147001	1.545802424	0.682439734	0.860839152	6.586901879	78.42231721	64604.31542

MITIGATION VOLUME REQUIRED TO
RESTRICT FLOW TO LESS THAN 3.8 CFS
EQUALS 11983.2 ft^3

1149.4	0.768343999	4.857163426	1.570672553	0.685169455	0.861330502	6.696697485	79.70159618	64684.01702
1149.6	0.769658843	4.865475345	1.5971417	0.688074683	0.861853443	6.813685264	81.06229649	64765.07931
1149.8	0.771026284	4.874119759	1.625427729	0.691179331	0.86241228	6.938854725	82.51523993	64847.59455
1150	0.772453523	4.883142188	1.65579945	0.694512902	0.863012322	7.073427878	84.07369562	64931.66825
1150.2	0.773949588	4.892599714	1.688594867	0.698112495	0.863660249	7.218942703	85.75422349	65017.42247
1150.4	0.775526067	4.902565586	1.724248804	0.702025837	0.864364651	7.37737959	87.57793376	65105.0004
1150.6	0.777198258	4.913136506	1.763336593	0.706316075	0.865136893	7.551361333	89.57244554	65194.57285
1150.8	0.778987088	4.924444778	1.80664697	0.71106978	0.86599256	7.744487035	91.77509021	65286.34794
1151	0.780922557	4.936680034	1.855312417	0.716411253	0.866954025	7.961929315	94.2384981	65380.58644
1151.2	0.783050462	4.9501318	1.911064539	0.722530552	0.868055499	8.211604911	97.04120536	65477.62764
1151.4	0.785447409	4.965284338	1.976803096	0.729745953	0.869354271	8.506783968	100.3103333	65577.93798
1151.6	0.788261517	4.983074007	2.058140165	0.738673431	0.870961218	8.873173308	104.2797437	65682.21772
1151.8	0.791870458	5.005888288	2.169394264	0.750884574	0.873159223	9.376421723	109.4975702	65791.71529
1152	0.8	5.05728	2.451875623	0.781889456	0.878740102	10.6650791	120.249005	65911.9643
1152.2	0.804237385	5.08406705	2.586484676	0.79324395	0.880783911	11.27676374	131.6510571	66043.61535
1152.4	0.806118483	5.095958603	2.631469051	0.796402469	0.881352444	11.48029582	136.5423573	66180.15771
1152.6	0.807585289	5.105231164	2.660480018	0.798439436	0.881719099	11.61169041	138.5519174	66318.70963
1152.8	0.808834657	5.113129165	2.680976024	0.799878537	0.881978137	11.70458308	139.8976409	66458.60727
1153	0.809943791	5.120140668	2.69587684	0.800924778	0.88216646	11.77215004	140.8603987	66599.46767
1153.2	0.81095262	5.126518085	2.706687872	0.801683861	0.882303095	11.82118948	141.5600371	66741.0277
1153.4	0.811885018	5.132412328	2.714305	0.802218688	0.882399364	11.85574997	142.0616367	66883.08934
1153.6	0.812756619	5.13792224	2.719311142	0.802570187	0.882462634	11.87846784	142.4053069	67025.49465
1153.8	0.813578331	5.14311678	2.72210933	0.802766658	0.882497999	11.89116738	142.6178113	67168.11246
1154	0.81435813	5.148046353	2.722990599	0.802828536	0.882509136	11.8951672	142.7180075	67310.83047
1154.2	0.815102053	5.15274914	2.722171934	0.802771054	0.88249879	11.89145152	142.7197123	67453.55018
1154.4	0.815814808	5.157254893	2.719818989	0.802605845	0.882469052	11.88077262	142.6333448	67596.18352
1154.6	0.816500148	5.161587338	2.716060413	0.802341942	0.882421549	11.86371568	142.4669298	67738.65045
1154.8	0.817161124	5.165765763	2.710997294	0.801986441	0.882357559	11.84074133	142.2267421	67880.8772
1155	0.817800256	5.169806097	2.70470958	0.801544958	0.882278092	11.81221474	141.9177365	68022.79493
1155.2	0.818419654	5.173721684	2.697260581	0.801021936	0.882183948	11.77842595	141.5438441	68164.33878
1155.4	0.819021108	5.177523834	2.688700174	0.800420878	0.882075758	11.73960436	141.1081818	68305.44696
1155.6	0.819606149	5.181222233	2.679067145	0.799744507	0.881954011	11.69592937	140.6132024	68446.06016
1155.8	0.820176103	5.184825252	2.668390889	0.798994888	0.88181908	11.64753809	140.0608048	68586.12097
1156	0.820732123	5.188340187	2.656692669	0.798173513	0.881671232	11.59453102	139.4524147	68725.57338
1156.2	0.821275222	5.191773444	2.643986532	0.797281368	0.881510646	11.53697627	138.7890437	68864.36242
1156.4	0.821806296	5.195130678	2.630279954	0.796318978	0.881337416	11.47491248	138.0713325	69002.43376
1156.6	0.822326139	5.198416921	2.615574281	0.795286439	0.881151559	11.40835091	137.2995803	69139.73334
1156.8	0.822835464	5.201636667	2.599864985	0.794183431	0.880953018	11.33727657	136.4737649	69276.2071
1157	0.823334907	5.20479395	2.583141769	0.793009232	0.880741662	11.26164884	135.5935525	69411.80065
1157.2	0.823825046	5.207892411	2.565388517	0.791762711	0.880517288	11.18140125	134.6583005	69546.45895
1157.4	0.824306402	5.210935349	2.546583108	0.790442313	0.880279616	11.09644075	133.667052	69680.12601
1157.6	0.824779448	5.21392576	2.526697076	0.789046041	0.880028287	11.00664626	132.618522	69812.74453
1157.8	0.825244619	5.216866381	2.505695102	0.787571415	0.879762855	10.91186651	131.5110766	69944.2556
1158	0.825702309	5.219759716	2.483534322	0.785364284	0.879365571	10.81047616	130.334056	70074.58966
1158.2	0.826152883	5.222608066	2.460163399	0.782799114	0.878903841	10.70312295	129.0815946	70203.67126
1158.4	0.826596676	5.225413547	2.435521323	0.780094423	0.878416996	10.59004646	127.7590164	70331.43027
1158.6	0.827033997	5.228178116	2.409535843	0.777242282	0.877903611	10.47093408	126.3658832	70457.79616
1158.8	0.827465133	5.230903583	2.38212145	0.774233305	0.877361995	10.34541499	124.8980944	70582.69425
1159	0.827890348	5.233591626	2.353176721	0.771056359	0.876790145	10.21304868	123.3507821	70706.04503
1159.2	0.828309891	5.236243808	2.322580843	0.767698185	0.876185673	10.0733097	121.7181503	70827.76318
1159.4	0.828723991	5.238861584	2.290188952	0.764142882	0.875545719	9.925567403	119.9932626	70947.75644
1159.6	0.829132864	5.241446313	2.255825809	0.760371217	0.874866819	9.76905839	118.1677548	71065.9242
1159.8	0.82953671	5.243999265	2.219277035	0.756359659	0.874144739	9.602848252	116.2314399	71182.15564
1160	0.829935717	5.246521631	2.180276658	0.752079015	0.873374223	9.425777285	114.1717532	71296.32739

1160.2	0.830330063	5.249014529	2.138488892	0.74749243	0.872548637	9.236381066	111.9729501	71408.30034
1160.4	0.830719914	5.25147901	2.093480542	0.742552357	0.871659424	9.032770115	109.6149071	71517.91525
1160.6	0.831105426	5.253916062	2.044677336	0.737195764	0.870695237	8.812439553	107.071258	71624.98651
1160.8	0.831486747	5.256326619	1.991291048	0.731336136	0.869640505	8.571951389	104.3063457	71729.29285
1161	0.831864016	5.258711562	1.932189165	0.724849171	0.868472851	8.306366471	101.2699072	71830.56276
1161.2	0.832237364	5.261071722	1.865639527	0.717544746	0.867158054	8.008131496	97.8869878	71928.44975
1161.4	0.832606917	5.263407887	1.788741294	0.70910447	0.865638805	7.664599186	94.0363841	72022.48613
1161.6	0.832972793	5.265720806	1.695880791	0.698912191	0.863804194	7.251299257	89.49539066	72111.98152
1161.8	0.833335103	5.268011185	1.572737381	0.685396089	0.861371296	6.70581864	83.74270738	72195.72423
1162	0.833693954	5.270279699	1.277998193	0.636471318	0.852564837	5.393402793	72.59532859	72268.31956
1162.2	0.834049447	5.272526987	1.130759621	0.609317838	0.847677211	4.744669851	60.82843586	72329.14799
1162.4	0.83440168	5.274753658	1.072770327	0.598623554	0.84575224	4.491124636	55.41476692	72384.56276
1162.6	0.834750742	5.276960292	1.030374772	0.590805039	0.844344907	4.306458871	52.78550104	72437.34826
1162.8	0.835096723	5.279147444	0.996109675	0.583876259	0.843097727	4.15709812	50.78134195	72488.1296
1163	0.835439705	5.28131564	0.967049835	0.573962989	0.841313338	4.027280029	49.10626889	72537.23587
1163.2	0.835779769	5.283465386	0.941683804	0.565309799	0.839755764	3.914382791	47.64997692	72584.88585
1163.4	0.83611699	5.285597164	0.919109011	0.557608793	0.838369583	3.81423754	46.37172199	72631.25757
1163.6	0.836451442	5.287711435	0.898735171	0.550658604	0.837118549	3.724122015	45.23015733	72676.48773
1170	0.846009383	5.348132913	0.609667689	0.40081262	0.810146272	2.444904026	29.46628138	73806.20272
1185	0.863440174	5.458323404	0.419040223	0.184259222	0.77116666	1.599591755	19.23356487	75555.07091
1200	0.877376634	5.546424129	0.34178698	0.1	0.756	1.279035238	15.36536993	76829.5135
1215	0.889372204	5.622255325	0.296734218	0.1	0.756	1.11043879	13.33613079	77899.17909
1230	0.900083415	5.689967317	0.266243726	0.1	0.756	0.996337271	11.96377837	78844.32423
1245	0.909862111	5.751784321	0.243815264	0.1	0.756	0.912405482	10.95473258	79701.52517
1260	0.918923195	5.809064868	0.226407371	0.1	0.756	0.847261666	10.17179138	80492.24317
1275	0.927409463	5.862711663	0.212378924	0.1	0.756	0.794764408	9.540979691	81230.36712
1290	0.935421585	5.913361093	0.200755085	0.1	0.756	0.751265677	9.018379686	81925.50629
1305	0.943033721	5.961481968	0.190915067	0.1	0.756	0.714442365	8.576035218	82584.64079
1320	0.950302393	6.00743161	0.182442077	0.1	0.756	0.68273474	8.195182455	83213.03285
1335	0.957271871	6.051489863	0.175044383	0.1	0.756	0.65505109	7.862691154	83814.76769
1350	0.963977601	6.093880802	0.168510802	0.1	0.756	0.630601125	7.569058302	84393.09303
1365	0.970448493	6.134787196	0.162684151	0.1	0.756	0.608796631	7.307211981	84950.64205
1380	0.976708502	6.174360468	0.157444672	0.1	0.756	0.589189453	7.07176493	85489.58523
1395	0.98277774	6.212727759	0.152699289	0.1	0.756	0.571431279	6.85853063	86011.73709
1410	0.988673289	6.249997067	0.148374408	0.1	0.756	0.55524671	6.664199259	86518.63312
1425	0.994409812	6.286261067	0.144410963	0.1	0.756	0.540414707	6.486114597	87011.58657
1440	1	6.3216	0.14076092	0.1	0.756	0.526755515	6.322116678	87491.73115

APPENDIX C.1: STORAGE VOLUME CALCULATION BASIN A

SUBSURFACE BASIN "A" STORAGE VOLUME

TRACT MAP 83215
SUBSURFACE BASIN A STORAGE, LENGTH =105 FEET

BOTTOM ELEVATION	TOP ELEVATION	96" CMP AREA (ft^2)	GRAVEL AREA (ft^2)	96" CMP VOLUME (ft^3)[1, 2]	GRAVEL VOLUME (ft^3)	TOTAL VOLUME (ft^3)
493.5	494.5	0	11	0	462.00	462.00
494.5	495.5	3.626	7.374	380.73	309.71	1,152.44
495.5	496.5	6.2	4.805	651.00	201.81	2,005.25
496.5	497.5	7.39	3.62	775.95	152.04	2,933.24
497.5	498.5	7.916	3.072	831.18	129.02	3,893.44
498.5	499.5	7.916	3.072	831.18	129.02	4,853.65
499.5	500.5	7.39	3.62	775.95	152.04	5,781.64
500.5	501.5	6.2	4.805	651.00	201.81	6,634.45
501.5	502.5	3.626	7.374	380.73	309.71	7,324.88
502.5	503.5	0.00	11	0.00	462.00	7,786.88

1 - 96" Volume Represents the 96" CMP Area multiplied by the total linear feet of the system.

APPENDIX C.2: STORAGE VOLUME CALCULATION BASIN B

SUBSURFACE BASIN "B" STORAGE VOLUME

TRACT MAP 83215
SUBSURFACE BASIN B STORAGE, LENGTH =346 FEET

BOTTOM ELEVATION	TOP ELEVATION	96" CMP AREA (ft^2)	GRAVEL AREA (ft^2)	96" CMP VOLUME (ft^3)$^{1, 2}$	GRAVEL VOLUME (ft^3)	TOTAL VOLUME (ft^3)
496	497	0	11	0	1522.40	1,522.40
497	498	3.626	7.374	1254.60	1020.56	3,797.56
498	499	6.2	4.805	2145.20	665.01	6,607.77
499	500	7.39	3.62	2556.94	501.01	9,665.72
500	501	7.916	3.072	2738.94	425.16	12,829.82
501	502	7.916	3.072	2738.94	425.16	15,993.92
502	503	7.39	3.62	2556.94	501.01	19,051.87
503	504	6.2	4.805	2145.20	665.01	21,862.08
504	505	3.626	7.374	1254.60	1020.56	24,137.24
505	506	0.00	11	0.00	1522.40	25,659.64

1 - 96" Volume Represents the 96" CMP Area multiplied by the total linear feet of the system.

APPENDIX D: STORM DRAIN NORMAL DEPTH CALCULATIONS

STORM DRAIN SIZING USING MANNING'S EQUATION AND FLOW CONDITION AT APPROX. 75% OF DIAMETER

STORM DRAIN SYSTEM	Q_{25} (ft^3/s)	STORM DRAIN DIAMETER (IN)	ASSUME MINIMUM PIPE SLOPE
LINE 1A (R1)	0.92	12	0.003
LINE 1A (R2)	2.75	15	0.003
LINE 1A (R3)	5.53	24	0.003
LINE 4A	2.44	15	0.003
LINE 5A	1.90	15	0.003
LINE B	3.8	18	0.003
LATERAL 1B (R1)	1.28	12	0.003
LATERAL 1B (R2)	5.04	18	0.003
LATERAL 3B (R1)	4.54	18	0.003
LATERAL 4B	5.93	24	0.003

DESIGN NOTES: STORM DRAIN SIZING IS BASED ON MANNING'S EQUATION WITH A MANNING'S n VALUE OF 0.013 TO ACCOUNT FOR THE USE OF RCP. THE CALCULATIONS IS BASED ON A DEPTH TO BE APPROXIMATELY 75% OF THE DIAMETER AND A MINIMUM SLOPE OF 0.3%.

Existing 5 Ft Parkway Drains

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.02000	ft/ft
Bottom Width	5.00	ft
Discharge	4.20	ft³/s

Results

Normal Depth	0.19	ft
Flow Area	0.95	ft²
Wetted Perimeter	5.38	ft
Hydraulic Radius	0.18	ft
Top Width	5.00	ft
Critical Depth	0.28	ft
Critical Slope	0.00577	ft/ft
Velocity	4.41	ft/s
Velocity Head	0.30	ft
Specific Energy	0.49	ft
Froude Number	1.78	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.19	ft
Critical Depth	0.28	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00577	ft/ft

APPENDIX E: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS "ALLOWABLE FLOW RATE"

Office Use Only
☐ Sent Initials: ____________
☐ Fax ☐ Email ☐ Other: ____________
Date: ____________ Time: ____________

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION – HYDRAULIC ANALYSIS UNIT

INFORMATION REQUEST SUMMARY

INFORMATION REQUESTED BY

*Requester's Name: Jennifer Lange Colicchio
Company: Land Development Consultants
*Phone Number: 714-557-7700 Fax Number: ____________
*Email: jlange@ldc-ce.com

Method of Contact: ☐ Walk-in ☐ Phone ☐ Fax ☒ Email ☐ Prelim. Mtg. Date: 10/24/18

Intended Use: Need allowable Q for proposed development

Proposed Project Type: Mixed-Use Acreage Involved: 5 AC

*Will information be used in any litigation? ☐ YES ☒ NO
Case Info. Name: ____________ No: ____________ Location: ____________

INFORMATION REQUESTED (Attach Assessor Map)
LACFCD Facility: Name: Badillo Avenue Line A
Unit: No.275-519-D1.11 Line: A Station: 149+00.00
City: Covina
*Street/Cross-street: NEC of Cypress and Azusa
*Thomas Guide: Page: 598 Grid: J4 ☒ Site Map/Plans Submitted
Info. Requested: Allowable Q, Hydraulic Calculation, As Built Drawing.

***Required Information. See Page 2 of 2 for Instructions.**

BELOW SECTION TO BE COMPLETED BY THE HYDRAULIC ANALYSIS UNIT

INFORMATION PROVIDED:
Hydrology Data, Drainage Map, Hydraulic Calculation Sheet, and As Built Plan And Profile.

REFERENCES SEARCHED:
Project No. 519 Line "A" Files Drawing No. 275-519-D1.11

COMMENTS, ETC:
Sub Area 25 Allowable Q=(19.00/17.50)x(407.70/576.00)=0.77CFS/Acre.

COUNTY [illegible]
DEPARTMENT [illegible]
DE[illegible]
Hy[illegible]

GKA
11/8/2018

INFORMATION PROVIDED BY: George K Aintablian Date: 11/8/2018
INFORMATION REVIEWED BY: Date:

Print Save a Copy

* Drainage Sub Area 25
Allowable Q = 19/17.5 × 407.70/576 = 0.77 cfs/acre

2

—— LOS ANGELES COUNTY FLOOD CONTROL DISTRICT ——

Sht. 2 of ___

Hydrology Calculation Sheet

PROJECT 423 & 519
FREQUENCY 10-YR
ISOHYETAL ZONE L

CALCULATED BY R.E.P. & G.J.P.
CHECKED BY ______
DATE 10/30/59

DRAINAGE AREA	Soil & Development	A Acres	I in/hr.	C	ΔQ CFS	ΣQ CFS	SLOPE	SECTION	V FPS	L FT.	T MIN.	ΣT MIN.	REMARKS
						132.5	.004	57" Ø	8.3	250	.5	23.4	Cont'd from p.1
Part (18)	Hf sf	9.5	1.79	.758	12.9	145.4	Q₀	Line	B (519)			23.9	In Citrus @ Cypress Jct. (423)
264.2 +	1.58 145.4	=	393.2	@ 31.9									
	1-78					393.2	.0142	66" Ø	18	1500	1.4	31.9	
(19) (26), Part (27)	Hf sf	53.9	1.54	.733	60.8	454.0	✓	69" Ø	19.1	450	.4	33.3	In Cypress @ North Ford
(Go) (21)	✓ ✓	26.8	1.53	.732	30	484	✓	72" Ø	19	550	.5	33.7	✓ @ Firecroft
												34.2	✓ @ Hollenbeck
													End (423) Start (519)
													Pick up Area (22)
						484						34.2	CYPRESS @ HOLLENB
22	Hf - S.F.	13.4	1.53	.73	15	499	.0085	78" RCP	16.4	350	0.4	34.6	✓ @ LARKIN
23		10.3	1.51	.73	11	510	✓	81" ✓	15.3	1580	1.7	36.3	✓ @ CONWELL
24		44.3	1.48	.72	47	557	.0157	75" ✓	20	800	0.7	37.1	✓ @ AZUSA
* 25		17.5	1.47	.72	19	576	.016	✓	21	1930	1.5	38.6	✓ @ SAN DIMAS WASH
28-31		71.3	1.45	.72	74	650	.005	96" ✓	13.8	850	1.0	39.6	IN SAN DIMAS WASH @ PICKUP PT.
32		13.8	1.44	.72	14	664	.005	✓	14.2	170	0.2	39.8	✓ @ ✓
33-36		68.7	1.43	.71	70	734	.004	105" ✓	13	850	1.1	40.9	✓ @ P.E. R.R.
37-38		20.2	1.41	.71	20	754	.008	93" ✓	17	1020	1	41.9	✓ @ SCHOOL D
40, ½(41)		55.1	1.40	.71	55	809	.019	90" ✓	19.5	460	0.4	42.3	✓ @ SAN BERNARDINO
39, ½(41)		51.2	1.39	.71	51	860	.005	108" ✓	14.4	1250	1.5	43.8	✓ @ BADILLO
42-86	Hs - S.F.	566.9	1.37	.66	513	1373	.0167	102" ✓	23.8	340	0.2	44.0	BADILLO @ VINCENT
87-91	Hf - S.F.	113.2	1.36	.70	108	1481	.001	[illegible]	10.7	650	1.0	45.0	✓ @ [illegible]
92, 93		16.7	1.35	.70	16	1497	.008	[illegible]	18.1	300	0.3	45.3	✓ @ [illegible]

Ref. No. 423

Ref. No. 519

DA-2

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
RECORD COPY
Issued By: GKA
Date: 11/8/2018

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Sht. 2 of __

Hydraulic Calculation Sheet

PROJECT No. 519-A

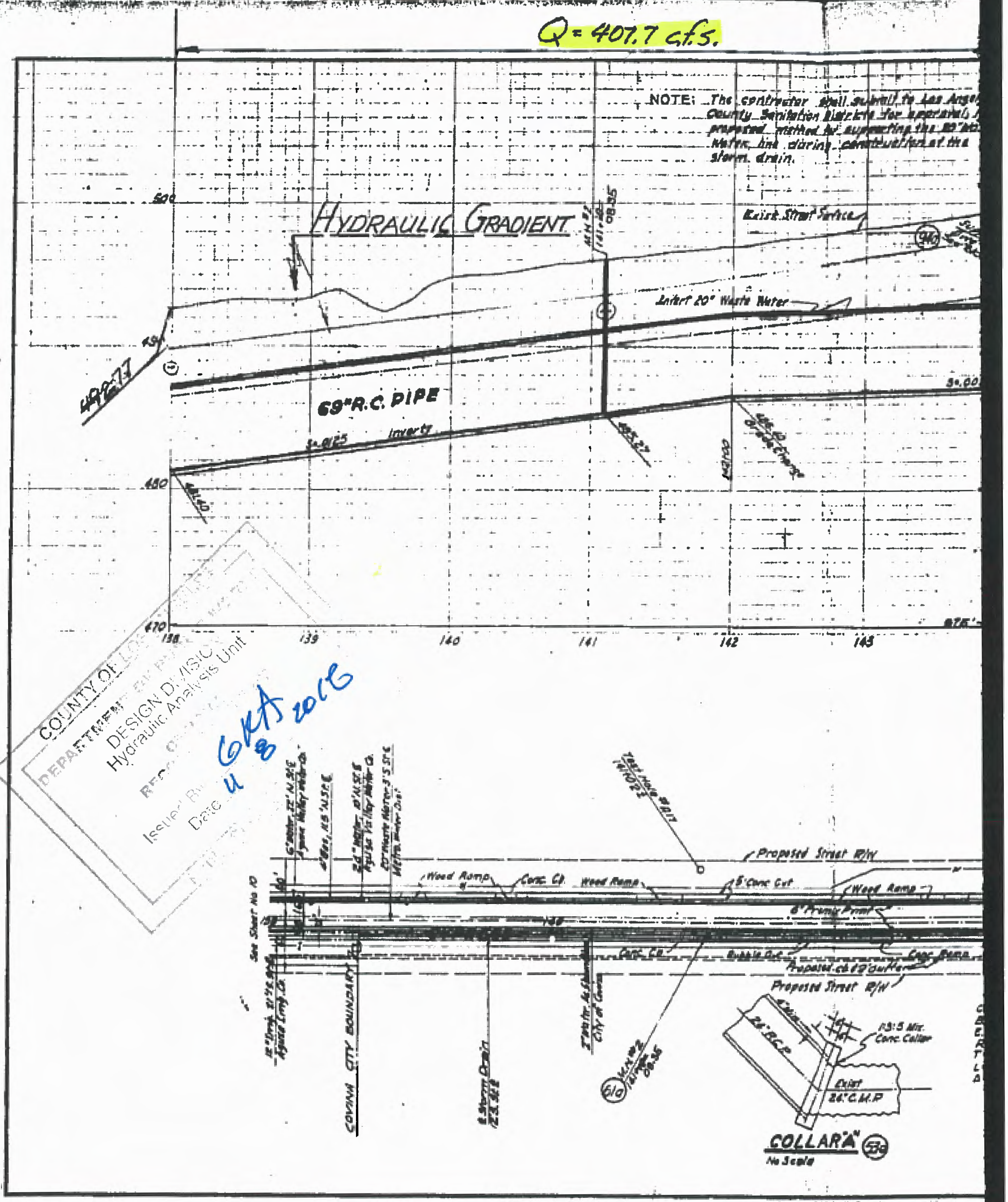
CALCULATED BY ______

DATE ______

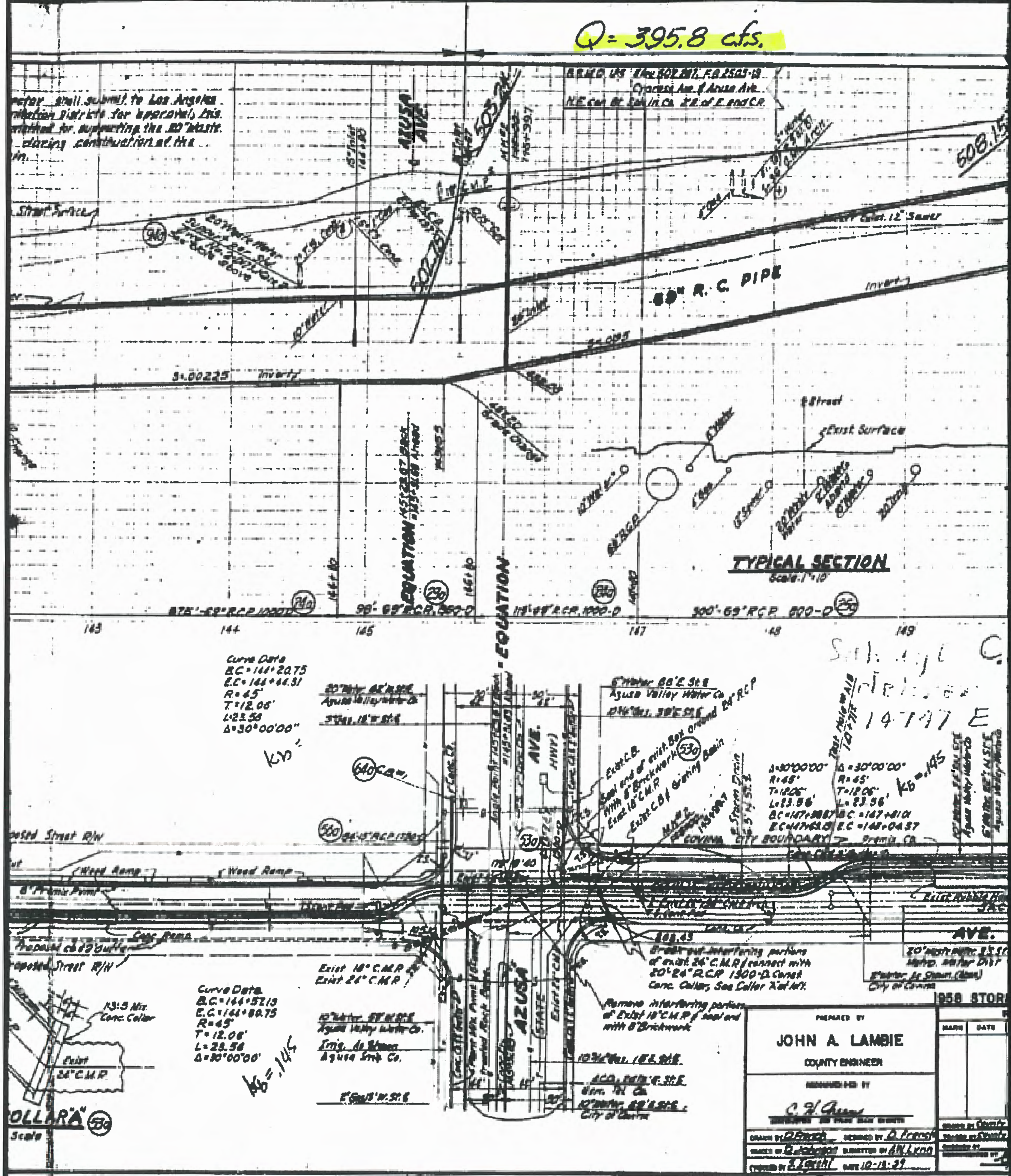
STA.	ELEV. INV.	D	ELEV. W.S.	SECTION	A	K	Q	V	$\frac{v^2}{2g}$	E.G.	S_f	Av. S_f	L	h_f	h_b	h_j	h_t	E.G.
116+43.2		459.66	459.48	81"⌀	35.79	5796	514.2	14.38	3.20	46[illegible].68	.00787							462.86
"		459.71	[illegible]	72"⌀	28.27	4236	459	16.22	4.[illegible]	46[illegible].63	.001178	–	–	1.92	–	.95		463.81
118+12		461.69	[illegible].23	|	|	|	|	[illegible]	[illegible]	462.83	|	.00117	168.5	.20				465.79
"		462.03	[illegible].03	|	|	|	450	16.59	4.22	462.45	.00113	–	–	.77	⌀	17 .12		465.96
121+46		466.01	[illegible]	|	|	|	|	|	|	46[illegible]	|	[illegible]	334	.38		MH .21		469.94
125+00		470.01	[illegible]	|	|	|	|	|	|	[illegible].71	|	|	354	4.00				473.94
126+70		472.58	[illegible].94	|	|	|	|	|	|	[illegible].63	|	|	170	1.92	.6[illegible]			476.51
"		472.52	[illegible]	66"⌀	23.76	3358	407.7	17.18	4.58	475.24	.01474	–	–	–	–	.59		477.10
130+00		477.39	47[illegible]	|	|	|	|	|	|	48[illegible]	|	.01474	330	4.87				481.97
131+30		477.54	[illegible]	|	|	|	|	|	|	482.94	|	|	130	1.92	⌀		MH .23	484.12
132+36		481.10	[illegible]	|	|	|	|	|	|	48[illegible].50	|	|	106	.56				485.68
136+30		487.14	[illegible]	|	|	|	|	|	|	49[illegible]	|	|	394	5.81			MH .23	491.72
"		487.95	[illegible]	69"⌀	25.97	3780	|	15.[illegible]	3.59	49[illegible]	.01160	–	-	–	–	–	.07	491.79
138+00		489.92	[illegible]	|	|	|	|	|	|	49[illegible]	.0161	.01160	170	1.92				493.76
141+08		493.68	[illegible]	|	|	|	|	|	|	49[illegible]	.0151	|	308	3.57			MH .19	497.52
144+44		498.14	[illegible]	|	|	|	|	|	|	5[illegible]	|	|	336	3.90	.56			501.48
144+80		499.12	[illegible]	|	|	|	|	|	|	50[illegible]	|	|	36	.42	.56			502.46
145+67		500.13	[illegible]	|	|	|	|	|	|	5[illegible]	|	.	87	1.01				503.97
"		500.59	[illegible]	|	|	|	345.8	15.25	3.61	50[illegible]	.001093	–	–	–	–	.23		504.2
146+00	5[illegible]	500.[illegible]	[illegible]	|	|	|	|	|	|	50[illegible]	|	.001093	33	.04	[illegible]		MH .16	514.7[illegible]
147+63	50[illegible]	501.51	50[illegible]	|	|	|	|	|	|	50[illegible]	|	|	163	.18	.52	.1		5[illegible]
148+04	5[illegible]	502.97	50[illegible]	|	|	|	|	|	|	5[illegible]	|	|	41	.04	.52			5[illegible]
150+00	5[illegible]	502.2[illegible]	502.13	|	|	|	|	|	|	50[illegible]	|	|	196	.21				51[illegible].17
			502.26	|	[illegible]			–	|	505.8[illegible]	|	|	–					
150+82			502.52	|	|	|	|	|	|	50[illegible].16	|	.	82	.04			5[illegible]	
							[illegible]											

DB-3

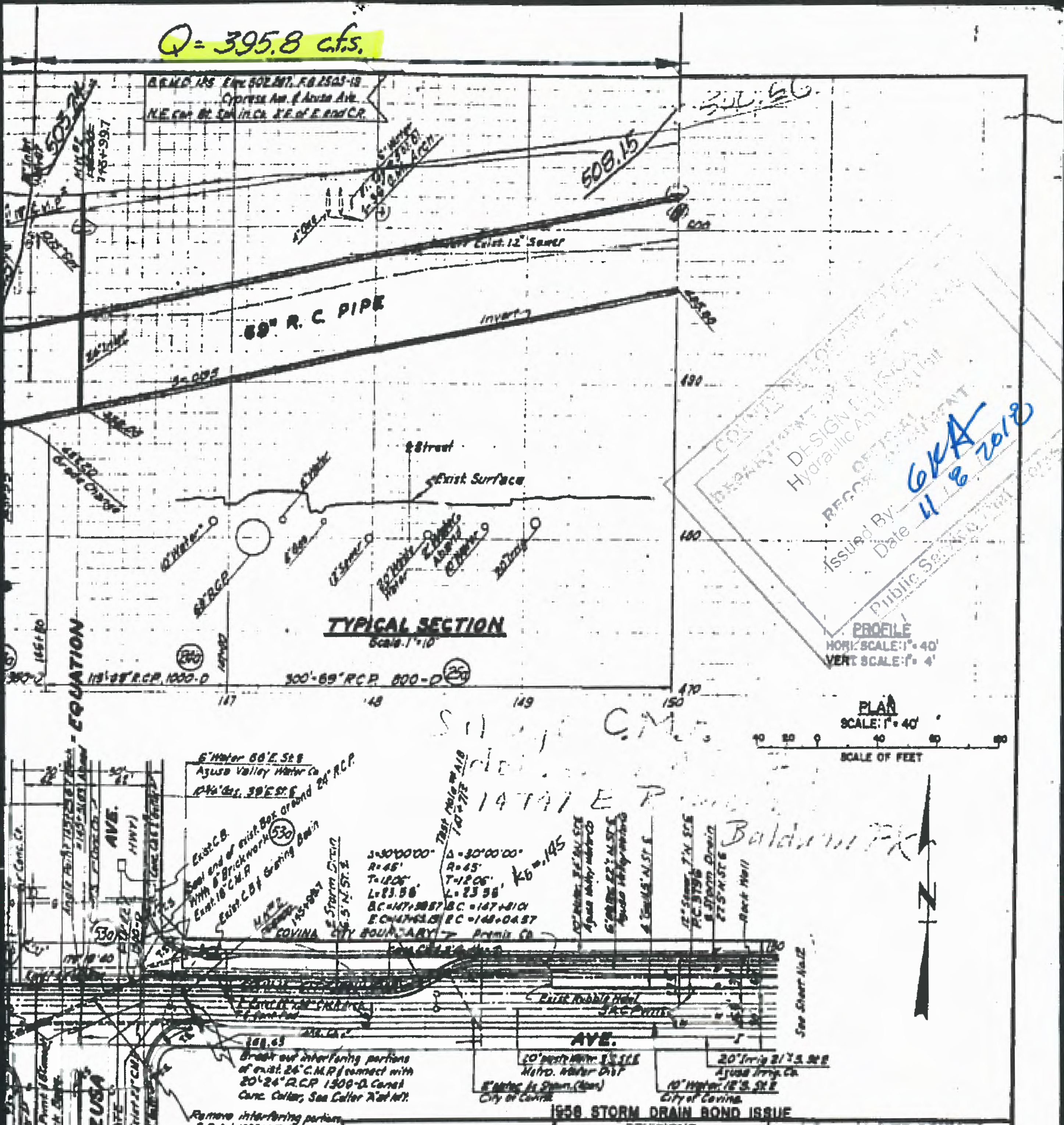
Q = 407.7 c.f.s.


NOTE: The contractor shall submit to Los Ange
County Sanitation Districts for approval, a
proposed method for supporting the 20" Wa
Water line during construction of the
storm drain.
HYDRAULIC GRADIENT
Exist. Street Surface
Invert 20" Waste Water
69" R.C. PIPE
S=.0125
Inverts
500
490
480
470
490.77
481.40
485.27
486.10 Grade Change
M.H. #2 141+22 08.35
142+00
138
139
140
141
142
143
See Sheet No 10
COVINA CITY BOUNDARY
Storm Drain
Proposed Street R/W
Wood Ramp
Conc. Cb
Wood Ramp
5' Conc Cut
Wood Ramp
6" Prunus Privet
Conc. Cb
Bubble Pole
Proposed cb & gutter
Conc. Ramp
Proposed Street R/W
M.H. #2
24" R.C.P.
13:5 Mix. Conc. Collar
Exist 24" C.M.P.
COLLAR "A"
No Scale
City of Covina

Q= 395.8 cfs.


BENCH MARK US Elev 502.887 F.B. 2503-13
Cypress Ave & Azusa Ave.
N.E. cor. Br Culv in Co ... of E and CR
...ctor shall submit to Los Angeles ... District for approval his method for supporting the 30" Waste ... during construction of the ... line.
Street Surface
AZUSA AVE.
503.20
508.15
507.75
Exist. 12" Sewer
69" R. C. PIPE
Invert
S=.00225
Invert
S=.0095
E Street
Exist. Surface
TYPICAL SECTION
Scale 1"=10'
EQUATION 145+... Back = 145+... Ahead
EQUATION
875'-69" RCP 1000-D
98'-69" RCP 850-D
115'-69" RCP 1000-D
300'-69" RCP 800-D
143
144
145
147
148
149
Curve Data
B.C.=144+20.75
E.C.=144+44.31
R=45'
T=12.06'
L=23.56
Δ=30°00'00"
Curve Data
B.C.=144+52.19
E.C.=144+80.75
R=45'
T=12.06'
L=23.56
Δ=30°00'00"
Δ=30°00'00"
R=45'
T=12.06'
L=23.56'
B.C.=147+38.87
E.C.=147+62.13
Δ=30°00'00"
R=45'
T=12.06'
L=23.56'
B.C.=147+81.01
E.C.=148+04.57
kb=.145
kb=.145
kb=
6" Water 66' E St. ... Azusa Valley Water Co.
Exist. C.B.
Seal end of exist. Box around 24" RCP with 8" Brickwork
Exist. 18" C.M.P.
Exist. C.B. & Grating Basin
Storm Drain
COVINA CITY BOUNDARY
Proposed Street R/W
Weed Ramp
Exist. 18" C.M.P.
Exist. 24" C.M.P.
Break out interfering portions of exist. 24" C.M.P. & connect with 20'-24" R.C.P. 1500-D Const. Conc. Collar, See Collar Xsec
Remove interfering portions of Exist. 18" C.M.P. & seal end with 8" Brickwork
1:3:5 Mix Conc. Collar
Exist. 24" C.M.P.
AZUSA
STATE
AVE.
20" Waste Water ... Metro. Water Dist.
City of Covina
COLLAR "A"
Scale
Schedule C
14747 E
PREPARED BY
JOHN A. LAMBIE
COUNTY ENGINEER
RECOMMENDED BY
C. H. ...
DRAWN BY D. French
DESIGNED BY D. French
TRACED BY B. Johnson
SUBMITTED BY Al Lynn
CHECKED BY ...
DATE 10-15-59
1958 STORM
MARK
DATE

Q= 395.8 c.f.s.



1958 STORM DRAIN BOND ISSUE

PREPARED BY

JOHN A. LAMBIE

COUNTY ENGINEER

RECOMMENDED BY

C. H. Gram

REVISIONS		
MARK	DATE	DESCRIPTION

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

PROJECT NO. 59

BADILLO AVE.

LINE A

CONCRETE CONDUIT

STA. 138+00 to STA. 150+00

PLAN AND PROFILE

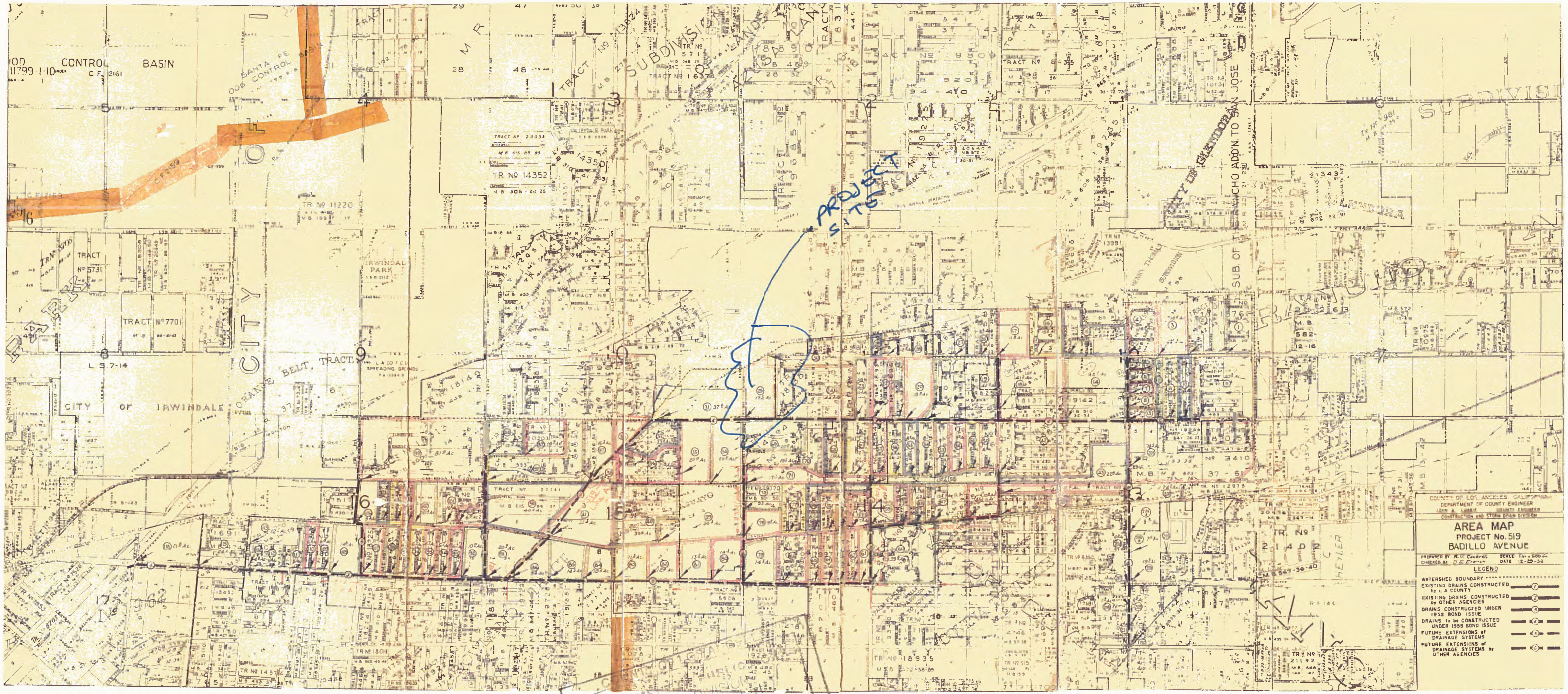
DRAWN BY C. French   DESIGNED BY D. French

TRACED BY D. Johnson   SUBMITTED BY A.W. Lynn

CHECKED BY S. Gorell   DATE 10-13-59

SCALE	DATE	NO. 275-51P-DU1
AS SHOWN	OCT. 1959	SHEET 11 OF 25

DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL
Issued By: GKA
Date 11 8 2018



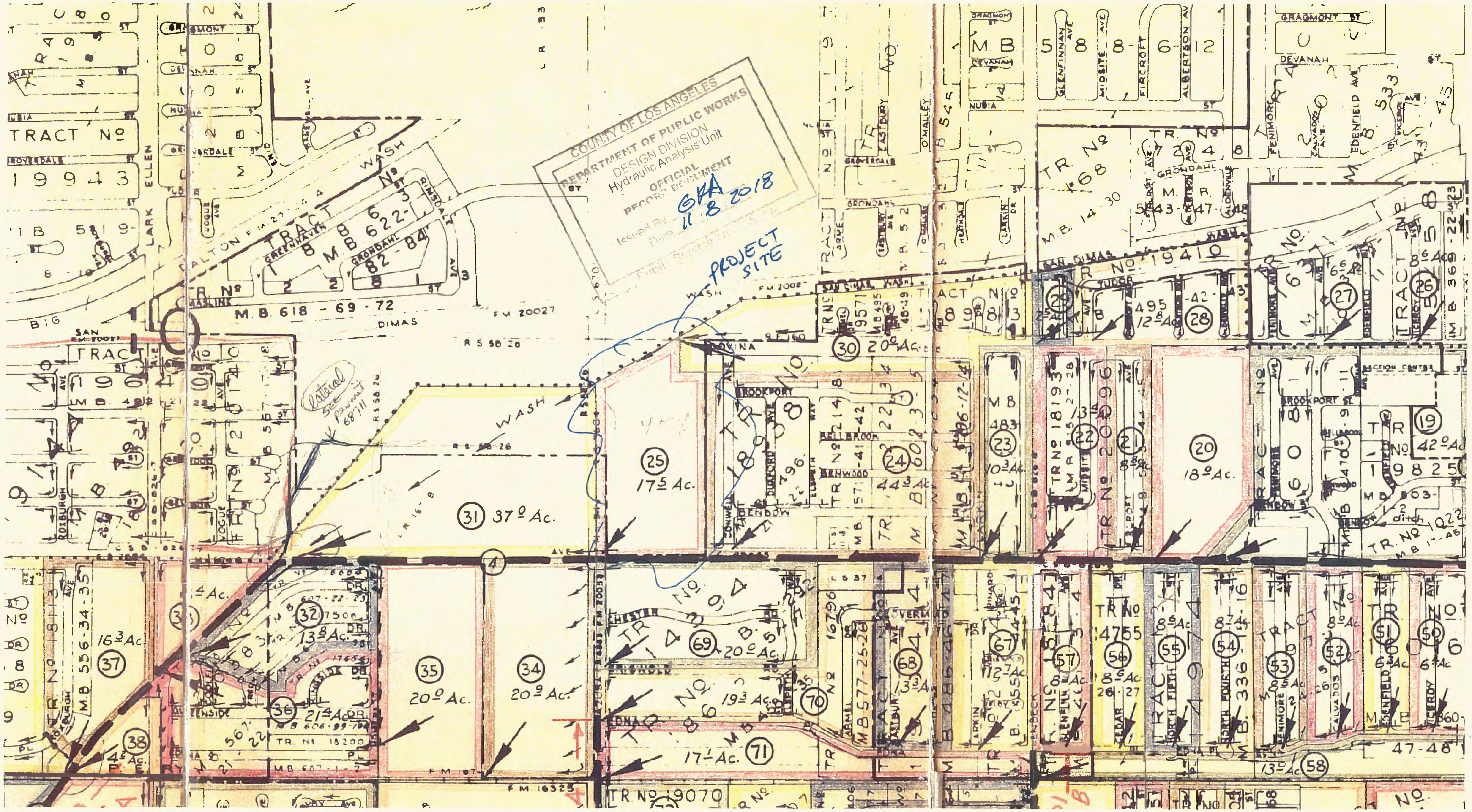
COUNTY OF LOS ANGELES, CALIFORNIA
DEPARTMENT OF COUNTY ENGINEER
JOHN A. LAMBIE COUNTY ENGINEER
CONSTRUCTION AND STORM DRAIN DIVISION

AREA MAP
PROJECT No. 519
BADILLO AVENUE

PREPARED BY R.V. Caceres
CHECKED BY D.E. French
SCALE 1in = 600 ft
DATE 12-29-58

LEGEND

WATERSHED BOUNDARY	- - - - - - - -
EXISTING DRAINS CONSTRUCTED by L A COUNTY	①
EXISTING DRAINS CONSTRUCTED by OTHER AGENCIES	②
DRAINS CONSTRUCTED UNDER 1952 BOND ISSUE	③
DRAINS to be CONSTRUCTED UNDER 1958 BOND ISSUE	④
FUTURE EXTENSIONS of DRAINAGE SYSTEMS	⑤
FUTURE EXTENSIONS of DRAINAGE SYSTEMS by OTHER AGENCIES	⑥


TRACT No 19943
M B 519
LARK ELLEN
BIG DALTON WASH
TRACT No 18862
M B 622-82-84
GREENHAVEN
GRONDAHL
RIMSDALE
TR No
HASLINK
M B 618-69-72
SAN DIMAS
FM 20027
R S 58-26
Lateral See permit 68711
WASH
31 37.0 Ac.
PROJECT SITE
SAN DIMAS WASH
FM 20027
COVINA
25 17.5 Ac.
TR No 18908
BROOKPORT
BELLBROOK
BENWOOD
BENBOW
24 44.3 Ac.
30 20.0 Ac.
TRACT No 18983
TRACT No 19410
TUDOR
28 12.5 Ac.
27
26
23 10.3 Ac.
22
21
20 18.0 Ac.
19 42.0 Ac.
TR No 19825
SECTION CENTER
GRAGMONT ST
DEVANAH
NUBIA
GROVERDALE
GLENFINNAN AVE
MIDSITE AVE
FIRCROFT
ALBERTSON AV
FENIMORE
CALVADOS
EDENFIELD AVE
VICEROY
TR No 17244
M B 443-47-48
4
37 16.3 Ac.
38
36 21.4 Ac.
32 13.5 Ac.
33
35 20.0 Ac.
34 20.9 Ac.
69 20.0 Ac.
TR No 14094
CHESTER
GRISWOLD
TR No 18618
70
71 17.1 Ac.
EDNA
KINGSIDE DR
OVERMAN
68 13.3 Ac.
67 12.7 Ac.
57 8.2 Ac.
56 8.5 Ac.
TR No 14755
55 8.5 Ac.
TRACT 14974
NORTH FIFTH
54 8.7 Ac.
NORTH FOURTH
M B 336
53
52 8.0 Ac.
51 6.4 Ac.
50 6.4 Ac.
TRACT 16076
58 13.0 Ac.
EDNA PL
47-48
TR No 19070
FM 16325
FM 16744
M B 556-34-35
M B 577-25-26
M B 486-46-47
TR No 15200
M B 607-1-2

APPENDIX F: INFILTRATION TEST BY GEO CONCEPTS

UPDATED GEOTECHNICAL AND INFILTRATION EVALUATION
FOR
PROPOSED MIXED-USE DEVELOPMENT PROJECT
1000 NORTH AZUSA AVENUE
CITY OF COVINA, LOS ANGELES COUNTY, CALIFORNIA

PREPARED FOR

MELIA HOMES
8951 RESEARCH DRIVE
IRVINE, CALIFORNIA 92618

PREPARED BY

GEOTEK, INC.
1548 NORTH MAPLE STREET
CORONA, CALIFORNIA 92878

PROJECT NO. 3260-CR JULY 28, 2022

GEOTEK

GEOTEK

GeoTek, Inc.
1548 North Maple Street, Corona, California 92878
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

July 28, 2022
Project No. 3260-CR

Melia Homes
8951 Research Drive
Irvine, California 92618

Attention: Mr. Chad Brown

Subject: Updated Geotechnical and Infiltration Evaluation
Proposed Mixed-Use Development Project
1000 North Azusa Avenue
City of Covina, Los Angeles County, California

Dear Mr. Brown:

We are pleased to provide herein the results of our updated geotechnical and infiltration evaluation for the subject property located in the city of Covina, Los Angeles County, California. This report presents a discussion of our evaluation and provides preliminary geotechnical recommendations for earthwork, foundation design, and construction. In our opinion, site development is feasible from a geotechnical viewpoint provided that the recommendations included herein are incorporated into the design and construction phases of site development.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

EDWARD H. LaMONT
No. 1892
Exp.

Gaby Bogdanoff

GABY M. BOGDANOFF
NO. 3133

Edward H. LaMont
CEG 1892, Exp. 07/31/24
Principal Geologist

Gaby M. Bogdanoff
GE 3133, Exp. 06/30/24
Project Engineer

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1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to complete an evaluation of the existing geotechnical conditions of the project site with respect to currently anticipated site development. Services provided for this study included the following:

- Research and review of available geologic and geotechnical data, and general information pertinent to the site,
- Review of past studies available for the property,
- Site reconnaissance,
- Site exploration consisting of the excavation, logging, and sampling of five exploratory hollow-stem auger borings and logging and percolation testing of two hollow-stem auger borings,
- Collection of relatively undisturbed and bulk soil samples of the onsite materials,
- Laboratory testing of the soil samples obtained from the site,
- Review and evaluation of site seismicity,
- Engineering analyses, and
- Compilation of this updated geotechnical and infiltration report which presents our findings, conclusions, and recommendations for site development.

The intent of this report is to aid in the assessment of the site for future proposed development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report may need to be updated based upon our review of the final site development plans. These plans should be provided to GeoTek, Inc. (GeoTek) for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The subject site is located at 1000 North Azusa Avenue in the city of Covina, Los Angeles County, California. The site is also identified with Los Angeles County Assessor's Parcel Numbers (APNs)

8421-001-016 and -061. The irregular-shaped property consists of approximately eight acres and is currently occupied by a large single-story building and associated parking and drive areas. The southern-most portion of APN 8421-001-061 contains a driveway and an emptied lot which was occupied by various structures between 1964 and 1977 which were later demolished.

The site has a generally flat topography with a gentle fall of about five to six feet to the west-southwest. Surface drainage is to the west-southwest.

The site is bounded by commercial buildings and an apartment complex on the north, single-family dwellings on the east, Cypress Street on the south, and North Azusa Avenue on the west. The general location of the site is shown in Figure 1. The current site conditions are shown on Figure 2a.

2.2 PROPOSED DEVELOPMENT

According to the Site Plan prepared by Land Development Consultants, Inc. and dated May 2, 2022, the three-acre region immediately adjacent to North Azusa Avenue is planned to be developed commercially with the remainder of the property to be developed residentially (townhomes and live-work units). It is our understanding that Melia will mass grade the entire property. However, Melia will only build the five-acre residential part of the project. The proposed residential buildings are anticipated to be three stories in height, of wood-frame construction, and to be supported on either conventional shallow foundations or post-tensioned slabs. Cuts and fills are estimated to be minimal. In addition, we anticipate that stormwater at the site may be managed via chamber systems. Specific percolation test locations and depths for design of these systems were provided by the project civil engineer.

If site development differs from the assumptions made herein, the recommendations included in this report should be subject to further review and evaluation. Final site development plans should be reviewed by GeoTek when they become available. Additional geotechnical field exploration, analyses and recommendations may be necessary upon review of site development plans.

3. REVIEW OF PAST REPORTS

On December 7, 2015, GeoConcepts, Inc. (GeoConcepts) issued a *Preliminary Geotechnical Engineering Investigation* for the subject site. The investigation included drilling of five borings across the property to depths ranging from 28.5 to 31 feet below grade. GeoConcepts reportedly encountered localized undocumented fill overlying alluvial deposits. The undocumented fill was encountered in the vicinity of the existing building and extended to about 1.5 feet below grade. The fill reportedly consists of silty sand with some clay and rock and glass fragments. The alluvium consists of moderately dense to dense silty sand to poorly graded sand. Groundwater was not encountered in any of the borings. GeoConcepts noted that liquefaction and seismic settlement potentials were very low due to the great depth to groundwater and dense condition of the alluvium.

The study indicated that the expansion index of the site soils was “very low” or negligible. In addition, results of sulfate testing showed negligible concentrations.

GeoConcepts recommended that all existing undocumented fill and loose alluvium be removed from future building areas. Removals were recommended to extend to at least five feet from existing grades or three feet below the base of foundations, whichever is deeper. Removals were suggested to extend at least five feet beyond the building perimeters or to an extent equal to the depth of fill below the foundations. GeoConcepts provided recommendations for conventional reinforced shallow foundations for building support.

On December 20, 2018, GeoConcepts completed an *Infiltration Test Report* for the project. The report indicated that two test pits were excavated to a depth of ten feet within the south-central portion of the site which was the general area of the proposed infiltration systems. The test pits reportedly encountered undocumented fill overlying alluvium. The undocumented fill had a reported thickness of 3.5 feet and consisted of silty sand. The alluvium encountered also consisted of silty sand. GeoConcepts stated that testing was performed in accordance with County standards yielding design infiltration rates of 1.3 (at ITP-2) and 3.3 (at ITP-1) at the two test locations. GeoConcepts noted that the cited design rates were based on measured infiltration rates after corrections. However, GeoConcepts did not mention if the rates include a factor of safety as required by the *Guidelines for Low Impact Development Stormwater Infiltration* by Los Angeles County.

Appendix A includes copies of the logs of excavations and laboratory test results reported by GeoConcepts. The locations of the excavations are shown on Figures 2a-b, Exploration Location Maps.

4. FIELD EXPLORATION, LABORATORY TESTING, AND PERCOLATION TESTING

4.1 FIELD EXPLORATION

The soils underlying the site were explored on June 24, 2022 by means of excavating five exploratory borings to depths between 19 and 51.5 feet. In addition, two percolation test borings approximately 15 feet deep were drilled at the locations selected by the project civil engineer. All borings were drilled with a truck-mounted hollow-stem auger drill rig. An engineer from our firm kept detailed logs of the borings and collected relatively undisturbed and disturbed soil samples at selected boring depths. The approximate locations of our site explorations and explorations by GeoConcepts (2015) are shown on the Exploration Location Maps, Figures 2a-b. Logs of the borings are provided in Appendices A and B.

4.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively undisturbed and bulk soil samples collected during the field exploration. The purpose of the laboratory testing was to confirm the field classification of the soil materials encountered and to evaluate the soils physical properties for use in the engineering design and analysis. Results of the laboratory testing program along with a brief description and relevant information regarding testing procedures are included in Appendix C.

4.3 PERCOLATION TESTING

Testing was performed in general accordance with the *Guidelines for Low Impact Development Stormwater Infiltration* by Los Angeles County (2021) using the Small Diameter Boring Infiltration Test Procedure.

The locations of the infiltration test borings (Borings I-1 and I-2) are shown in Figure 2. Both borings were drilled to about 15 feet below existing grade and were approximately eight inches in diameter. A three-inch diameter perforated PVC pipe encapsulated in filter sock was inserted into each of the test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel to prevent caving within the borings. Water was placed in the borings to presoak the holes, and testing was conducted soon after. Testing after presoaking indicated that a falling head test using a time interval between readings of about 10 minutes was suitable for the site conditions. Testing achieved stabilized rates which are summarized as follows:

SUMMARY OF TEST RESULTS		
Boring	Test Depth (ft)	Measured Infiltration Rate* (inches per hour)
I-1	15	10.3
I-2	15	3.3

*Estimated as flow rate divided by the surface area of test section per GS200.1

As required, reduction factors should be applied to the measured rates to account for the test method reliability (RFt), site variability (RFv), and long-term siltation (RFs). As noted in Los Angeles County Manual, a RFt of 2.0 should be utilized for the small diameter boring method. RFv and RFs should vary between 1.0 and 3.0. A RFv of 2.0 is preliminarily considered suitable, and the value to be selected for RFs should be based on the level of pre-treatment and maintenance for the proposed BMPs.

Assuming RFs of 1.0 and RFv and RFt values of 2.0, we recommend a Total Reduction Factor of 5.0 be applied to the measured rates obtained. Detailed infiltration test data is included in Appendix D.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed on-site soils. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soils and relative density. Infiltration rates may be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors. GeoTek assumes no responsibility or liability for the ultimate design or performance of the storm water facility.

5. GEOLOGIC AND SOILS CONDITIONS

5.1 REGIONAL SETTING

The subject property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. Basically, it extends roughly 975 miles from the north and extends from the Transverse Ranges geomorphic province to the tip of Baja California, from north to south. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto

Fault zone trend northwest-southeast and are found in the near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province.

More specific to the subject property, Dibblee, T.W., and Ehrenspeck, H.E. (1999) map the site to be underlain by Quaternary age alluvium. Additionally, the nearest known active fault to the site is the Sierra Madre fault located approximately 2.2 miles to the north.

5.2 GENERAL SOIL/GEOLOGIC CONDITIONS

A brief description of the earth materials encountered in our explorations and explorations by GeoConcept (2015 and 2018) is presented in the following sections.

5.2.1 Undocumented Fill

Our borings found that the site is covered by shallow fill associated with the current use of the site. The fill is generally composed of loose to medium dense silty sand and sandy silt and extends to about two feet below the existing ground surface at the explored locations. Similarly, much of GeoConcept's excavations encountered fill ranging from 1.5 to 3.5 feet in thickness. However, we anticipate that the fill could extend to greater depths in the vicinity of the current building and improvements as well as within the emptied lot within the southern-most portion the site.

5.2.2 Alluvial Deposits

Alluvial deposits were encountered in our borings below the fill and extended to the maximum depth explored of about 51.5 feet. The alluvial deposits mostly consist of silty sand with some units of sandy silt, poorly graded sand, and clayey sand. The alluvium was brown in color, slightly moist to moist, and loose/soft to dense/stiff to the total depth explored, based on our field observations, blow counts, and in-place density determinations. Collapse tests conducted on the most unfavorable units of the alluvium (selected based on blow counts) indicated negligible to slight potential for collapse upon application of water. The near surface site soils were found to have "very low" expansion potential when tested and classified in accordance with ASTM D 4829.

5.3 SURFACE WATER AND GROUNDWATER

5.3.1 Surface Water

If encountered during the earthwork construction, surface water on this site is the result of precipitation or surface run-off from surrounding sites. Overall drainage in the area is variable, and most commonly directed toward the west-southwest. Provisions for surface drainage will need to be accounted for by the project civil engineer.

5.3.2 Groundwater

Groundwater was not encountered in the deepest exploratory boring, Boring B-2, excavated to a maximum depth of 51.5 feet. The California Water Data Library shows several groundwater wells in the site vicinity with a depth to groundwater in excess of 200 feet.

Perched groundwater or localized seepage can occur due to variations in rainfall, irrigation practices, and other factors not evident at the time of this investigation.

5.4 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007; CGS, 1986). The subject property is not located within a State of California Seismic Hazard Zone for earthquake induced liquefaction (CGS, 1997). The subject property is not located within a State of California Seismic Hazard Zone for earthquake induced landsliding. Additionally, the nearest known active fault to the site is the Sierra Madre fault located approximately 2.2 miles to the north.

5.4.1 Seismic Design Parameters

The site is located at approximately 34.0972^0 Latitude and -117.9066^0 Longitude. Based on the conditions observed in the site excavations and review of regional geologic maps, a Site Class "D" appears to be the appropriate category for the property. Site spectral accelerations (Sa and S1), for 0.2 and 1.0 second periods for a Class "D" site, were determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. As noted using the ASCE 7-16 option on the SEAOC/OSHPD website, the values for SM1 and SD1 are reported as "null-See Section 11.4.8 (of ASCE 7-16)". As noted in ASCE 7-16, Section 11.4.8, a site-specific ground motion procedure is recommended for Site Class D when the value S1 exceeds 0.2. The value S1 for the subject site exceeds 0.2.

For a Site Class D, an exception to performing a site-specific ground motion analysis is allowed in ASCE 7-16 where S1 exceeds 0.2 provided the value of the seismic response coefficient, Cs, is conservatively calculated by Eq 12.8-2 of ASCE 7-16 for values of T≤1.5Ts and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for TL≥T>1.5Ts or Eq. 12.8-4 for T>TL.

Assuming that the Cs value calculated by and used by the structural engineer allows for the exclusion per ASCE 7-16, noted above, then a site-specific ground motion analysis is not required. For this assumption and condition, the following seismic design parameters, based on the 2015 National Earthquake Hazards Reduction Program (NEHRP)/ASCE 7-16, are presented on the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_s	1.643g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.604g
Site Coefficient for Site Class "D," F_a	1.0
Site Coefficient for Site Class "D," F_v	1.7
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.643g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	1.026g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.096g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.684g
Site Modified Peak Ground Acceleration, PGA_M	0.766g
Seismic Design Category	D

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

5.5 LIQUEFACTION AND SEISMICALLY INDUCED SETTLEMENT

The project site is not located within an area mapped by the State of California for liquefaction potential. Due to the presence of dense/stiff alluvium and the lack of shallow groundwater, the liquefaction hazard at the site is nil.

Loose to medium dense sands tend to densify during strong ground shaking. Based on the blow counts recorded in boring B-2 and utilizing a peak ground acceleration of 0.76g and an magnitude (Mw) seismic event of 7.72, we estimate that the seismically induced settlement of the onsite sandy units would be about three inches total settlement and about 1.5 inches differential settlement over a 30-foot span. Results of these analyses are presented in Appendix E.

5.6 OTHER SEISMIC HAZARDS

Evidence of ancient landslides or slope instabilities at this site was not observed during our investigation. Thus, the potential for landslides is considered negligible.

The potential for secondary seismic hazards such as a seiche or tsunami is considered negligible due to site elevation and distance to an open body of water.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL

Development of the site appears feasible from a geotechnical viewpoint. The following recommendations should be incorporated into the design and construction phases of development.

6.2 EARTHWORK CONSIDERATIONS

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Covina, the 2019 California Building Code (CBC), and recommendations contained in this report. Site grading plans should be reviewed by this office when they become available. Additional recommendations will likely be offered subsequent to review of these plans.

6.2.1 Site Clearing and Preparation

Site preparation should start with demolition/razing of existing site improvements and removal of deleterious materials, and vegetation. Demolition should include removal of all pavements, floor slabs, foundations, and any other below-grade construction. These materials should be properly disposed of off-site. Voids resulting from site clearing (such as removals of underground utilities, foundations, etc.) should be replaced with engineered fill materials.

6.2.2 Removals

Based on our boring data and the field observations, the upper three to four feet from existing grade or two feet below footing base, whichever is deeper. should be removed in order to provide a homogeneous, dense fill mat for structural support. Deeper removals may be required in some areas to eliminate all previously existing undocumented fill and unsuitable alluvium. The bottom of removals should expose competent native alluvial soils which are defined as relatively homogeneous, no visibly porous materials with an in-place density of at least 85 percent of the soil's maximum dry density as determined per ASTM D 1557. As a minimum, removals should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth, or a minimum of five feet laterally.

The upper two feet of soil or one foot below pavement subgrade, whichever is deeper, should be removed below asphaltic concrete pavement and Portland cement concrete hardscape areas. The horizontal extent of removals should extend at least two feet beyond the edge of the improvements. Where existing shallow utilities are located, removals should be limited to two feet above these improvements.

The bottom of all removals should be scarified to a minimum depth of 12 inches, brought to slightly above the optimum moisture content, and then recompacted to at least 90 percent of the soil's maximum dry density (ASTM D 1557). The bottoms of removals should be observed by a GeoTek representative prior to scarification.

6.2.3 Engineered Fill

The onsite soils are considered suitable for reuse as engineered fill provided they are free from vegetation, roots, and rock/concrete or hard lumps greater than six inches in maximum dimension.

Concrete generated from the demolition of existing site improvements may be incorporated into site fills provided the following guidelines are implemented: 1) concrete should be free of rebar or other deleterious materials and should be broken down to a maximum dimension of six inches; 2) concrete should not be placed within three feet of finish grade in the building pad areas or within one foot of subgrade elevations in the street/drive areas; 3) concrete should be distributed in the fill and should not be "nested" or placed in concentrated pockets.

The undercut areas should be brought to final pad elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Fill materials should be placed at or above optimum moisture content and should be compacted to a minimum relative compaction of 90 percent as determined by ASTM Test Method D 1557.

6.2.4 Excavation Characteristics

Excavation in the onsite soil materials is expected to be easy using heavy-duty grading equipment in good operating conditions.

All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with local and Cal-OSHA guidelines. Temporary excavations within the onsite materials should be stable at 1:1 (h:v) inclinations for cuts less than ten feet in height.

6.2.5 Shrinkage and Subsidence

Several factors will impact earthwork balancing on the site, including shrinkage, subsidence, trench spoil from utilities and footing excavations, as well as the accuracy of topography.

Shrinkage, bulking, and subsidence are primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of 5 to 10 percent for both the existing fills and upper alluvium may be considered. Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of site earthwork construction. Subsidence on the order of up to 0.1-foot could occur.

6.2.6 Trench Excavations and Backfill

Temporary excavations within the onsite materials should be stable at 1:1 (h:v) inclinations for short durations during construction, and where cuts do not exceed ten feet in height. Temporary cuts to a maximum height of four feet can be excavated vertically, but local sloughing and/or failure could occur due to the granular nature of some of the onsite units. Increased caution should be applied when working near or within any excavations at this site.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined per ASTM D 1557). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. Much of the onsite materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than six ± inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.3 DESIGN RECOMMENDATIONS

6.3.1 Foundation Design Criteria

The site soils were found to generally have "very low" expansion potential in accordance with ASTM D 4829. Additional testing of the soils should be performed during construction to evaluate the as-graded conditions. Additional recommendations may be necessary based on the as-graded soils conditions.

The foundation elements for the proposed structures should bear entirely in engineered fill soils and should be designed in accordance with the 2019 CBC.

Because of the potential for seismically induced ground settlement at the property, it is our recommendation that post-tensioned foundation systems be used to support the proposed buildings. For foundations designed in accordance with the recommendations presented in this report, we would anticipate a total static settlement of less than 1-inch and a differential static settlement of less than 0.5-inch in a 30-foot span. As noted previously, seismically induced ground settlement of up to 3 inches total and 1.5 inches differential settlement over a 30-foot span are also estimated.

The slab designer may choose the post-tension design methodology. Since the CBC indicated Post Tensioning Institute (PTI) design methodology is intended for expansive soils conditions which do not apply, no e_m or y_m parameters as used in the PTI methodology are provided. However, the slab design should consider the estimated static and seismically induced settlement as noted above.

MINIMUM DESIGN REQUIREMENTS FOR POST-TENSIONED FOUNDATIONS	
Design Parameter	"Very Low" Expansion Potential
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	One- or Two-Story – 12 Three-Story – 18
Minimum Foundation Width	One- or Two-Story – 12 Three-Story – 15
Minimum Slab Thickness (actual)	4 inches
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum 100% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete

It should be noted that the above recommendations are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

An allowable bearing capacity of 1,800 psf may be used for design of post-tensioned slab foundations. An increase of one third may be applied when considering short-term live loads (e.g. seismic and wind loads)

The passive earth pressure may be computed as an equivalent fluid having a density of 250 psf per foot of depth, to a maximum earth pressure of 2,500 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. The upper one foot of soil below the adjacent grade should not be used in calculating passive pressure unless the ground is covered by concrete or pavement. Passive pressure and frictional resistance could be combined without reduction.

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these systems are provided in the 2019 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2019 CBC Section 1907.1, ACI 360R-10, and ACI 302.2R-06.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as the result of construction related punctures (e.g. stake penetrations, tears, punctures from walking on the aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. It is GeoTek's opinion that a minimum ten mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and atmospheric conditions.

Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e. thickness, composition, strength, and permeance) to achieve the desired performance level. Consideration should be given to consulting with an individual possessing specific expertise in this area for additional evaluation.

6.3.2 Miscellaneous Foundation Recommendations

- To minimize moisture penetration beneath the slab on grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.
- Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

- Under-slab utility trenches should be compacted to project specifications. Compaction should be achieved with a mechanical compaction device. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.3.3 Foundation Set Backs

Foundations should comply with the following setbacks. Improvements not conforming to these setbacks are subject to the increased likelihood of excessive lateral movements and/or differential settlements. If large enough, these movements can compromise the integrity of the improvements. The following recommendations are presented:

- The outside bottom edge of all footings should be set back a minimum of H/2 (where H is the slope height) from the face of any ascending slope. The setback should be at least five feet and need not to exceed 15 feet. Where a retaining wall is constructed at the toe of the slope, the height of the slope should be measured from top of the wall to the top of the slope.
- The outside bottom edge of all footings should be set back a minimum of H/3 from the face of any descending slope. The setback should be at least 7 feet and need not exceed 40 feet.
- The bottom of all footings for structures near retaining walls should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom inside edge of the wall foundation.
- The bottom of any future foundations for structures should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom of the nearest excavation.

6.3.4 Retaining Wall Design and Construction

6.3.4.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete walls retaining up to six feet of soils. Additional review and recommendations should be requested for higher walls. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Wall foundations should be embedded a minimum of 12 inches below the lowest adjacent grade and should rest entirely on at least 24 inches of compacted fill placed on competent native soil. Wall footings should be designed using an allowable bearing capacity of 2,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads). The passive earth pressure may be computed as an equivalent fluid having a density of 250 psf per foot of depth, to a maximum earth pressure of 2,500 psf. Unless the ground is covered by asphalt or concrete, the passive pressure should be neglected in the upper 1 foot. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third. For wall footings entirely placed on engineered fill, a minimum footing reinforcement of about two No. 4 rebars (one placed near the top and one near the bottom of footing) should be provided. These are tentative recommendations. Final reinforcement recommendations should be provided by the project structural/wall engineer.

All earth retention structure plans, as applicable, should be reviewed by this office prior to finalization. The seismic design parameters as discussed in this report remain applicable to all proposed earth retention structures at this site and should be properly incorporated into the design and construction of the structures.

Earthwork considerations, site clearing and remedial earthwork for all earth retention structures should meet the requirements of this report, unless specifically provided otherwise, or more stringent requirements or recommendations are made by the designer. The backfill material placement for all earth retention structures should meet the requirement of Section 6.3.4.4 in this report.

In general, cantilever earth retention structures, which are designed to yield at least 0.001H, where H is equal to the height of the earth retention structure to the base of its footing, may be designed using the active condition. Rigid earth retention structures (including but not limited to rigid walls, and walls braced at top, such as typical basement walls) should be designed using the at-rest condition.

In addition to the design lateral forces due to retained earth, surcharges due to improvements, such as an adjacent building or traffic loading, should be considered in the design of the earth retention structures. Loads applied within a 1:1 (h:v) projection from the surcharge on the stem and footing of the earth retention structure should be considered in the design.

Final selection of the appropriate design parameters should be made by the designer of the earth retention structures.

6.3.4.2 Cantilevered Walls

The recommendations presented below are for cantilevered walls retaining up to six feet of soils. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions such as traffic, structures, or adverse geologic conditions.

ACTIVE EARTH PRESSURES		
Surface Slope of Retained Materials (h:v)	Equivalent Fluid Pressure (pcf) Native Backfill*	Equivalent Fluid Pressure (pcf) Import Granular Backfill**
Level	41	36
2:1	67	53

*The design pressures assume the native backfill material has an expansion index less than or equal to 20 and a friction angle of about 30 degrees. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.
**The design pressures assume that import granular backfill material has an expansion index less than or equal to 20 and a friction angle of at least 34 degrees. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

6.3.4.3 Restrained Retaining Walls

Retaining walls that will be restrained prior to placing and compacting backfill material, or that have reentrant or male corners, should be designed for an at-rest equivalent fluid pressure of 62 pcf, plus any applicable surcharge loading, for native backfill and level back slope condition. For imported granular backfill, an at-rest equivalent fluid pressure of 57 pcf should be utilized. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner, or a distance otherwise determined by the project structural engineer.

6.3.4.4 Retaining Wall Backfill and Drainage

Retaining wall backfill should be free of deleterious and/or oversized materials and should have properties indicated in Section 6.3.4.2. Retaining walls should be provided with an adequate pipe and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one-cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Retaining wall backfill should be placed in lifts no greater than eight inches in thickness and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D 1557. The wall backfill should also include a minimum one-foot wide section of ¾- to

1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The rock should be separated from the earth with filter fabric. The upper 24 inches should consist of compacted on-site soil.

As an alternative to the drain rock and fabric, Miradrain 2000, or approved equivalent, may be used behind the retaining wall. The Miradrain 2000 should extend from the base of the wall to within two feet of the ground surface. The subdrain should be placed at the base of the wall in direct contact with the Miradrain 2000.

The presence of other materials might necessitate revision to the parameters provided and modification of the wall designs. Proper surface drainage needs to be provided and maintained.

6.3.4.5 Other Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.
- The retaining wall footing excavations, backcuts, and backfill materials should be approved the project geotechnical engineer or their authorized representative.

6.3.5 Pool Construction

The proposed swimming pool should derive support entirely from engineered fill. A minimum 12 inches of fill compacted to at least 90 percent of the soil's maximum dry density per ASTM D 1557 should be provided below the pool shell.

The pool walls be designed for at-rest soil conditions using an equivalent fluid pressure of 62 pcf. Pool walls surcharged by adjacent structures should be designed for additional pressures. Alternatively, the pool walls may be designed as freestanding walls using the active soil state conditions provided that some lateral movement of the pool walls would be acceptable. If the active state is to be used, an equivalent fluid pressure of 41 pcf is considered suitable. These recommended pressures assume that native soil is used as wall backfill with a level backslope and in a drained condition. If a drain system adjacent/beneath the pool is not provided, the pool walls should then be designed for an equivalent fluid pressure of 100 pcf for the at-rest condition and 87 pcf for the active condition.

As noted above, the use of the lower (drained condition) at-rest or active soil pressures will require a subdrain system beneath/adjacent to the pool. A typical subdrain system includes a series of four-inch diameter perforated drain pipes encapsulated with at least one cubic foot of free-draining material per linear foot of pipe. The free-draining material should be encapsulated within a geotextile to prevent migration of fines into the drainage medium. The drain pipes should be routed to an acceptable discharge location, as determined by the civil engineer/pool designed. If desired, GeoTek can review the subdrain system once designed to determine if additional measures are warranted.

Pool decking supported on grade should be separated from the pool bond beam by a full-depth, mastic construction joint. If it is desired to extend the pool deck over the bond beam, consideration should be given to designing the deck as a structural slab supported by the pool shell. This will reduce the possibility of deck cracking occurring along the outer edge of the bond beam. we also recommend that the pool decking subgrade be “pre-saturated” prior to concrete placement. The subgrade soils should be moisture conditioned to at least 100 percent of the soil’s optimum moisture content to a depth of 12 inches, prior to concrete placement. Testing by the geotechnical engineer is recommended to confirm that the soils have been adequately moisture treated.

Pool decking may consist of five-inch-thick concrete and the use of reinforcement is suggested. A minimum of No. 4 rebars spaced 24 inches each way or equivalent should be placed at mid-height of the concrete slab. Control joints should be placed in two directions and located a distance apart approximately equal to 24 to 36 times the slab thickness. The pool designer should provide final design recommendations.

While the site soils are anticipated to have a negligible sulfate content (see Section 6.3.8), it is our recommendation that Type V cement be used for the pool construction due to the chemicals associated with the pool water.

6.3.6 Pavement Design Considerations

Pavement design for proposed on-site parking and drive areas was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements and the Portland Cement Association for rigid pavements. Based on an assumed design R-value of 30 and for Traffic Indexes (TIs) of 5.0 for car parking areas and 6.0 for drive areas for light traffic with occasional truck traffic, the following preliminary sections were calculated:

GEOTECHNICAL RECOMMENDATION FOR MINIMUM PAVEMENT SECTION		
Traffic Index	Thickness of Flexible Pavement Section	Thickness of Rigid Pavement Section
5.0	3" AC/6" AB/Compacted Subgrade or 6" AC/Compacted Subgrade	--
6.0	4" AC/7" AB/compacted Subgrade or 7.5" AC/Compacted Subgrade	6.5" PCC/4" AB/Compacted Subgrade

*AC = Asphalt Concrete, AB = Aggregate Base, PCC = Portland Cement Concrete with a f'c > 3,500 psi.

The TIs used in our pavement design are considered reasonable values for the proposed pavement areas and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

No structural reinforcement of the concrete pavements is required. However, temperature and shrinkage control reinforcement should be provided. This reinforcement should consist of No. 4 rebars on 24-inch centers, each way, or equivalent. The reinforcement should be placed at mid-height to the concrete pavement. Also, the concrete pavement should be provided with proper joints to help control cracking. All materials and methods of construction should also conform to the requirements of the City of Covina. These pavement sections should be considered preliminary until reviewed and approved by the City.

The recommended pavement sections provided are intended as a minimum guideline and final selection of pavement cross section parameters should be made by the project civil engineer, based upon the local laws and ordinates, expected subgrade and pavement response, and desired level of conservatism. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. Final pavement design should be checked by testing of soils exposed at subgrade (the upper one foot) after final grading has been completed.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2 and 200-2.4 of the Green Book, respectively. Pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density (modified proctor).

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of Covina specifications, and under the observation and testing of GeoTek and a City Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

Deleterious material, excessive wet or dry pockets, oversized rock fragments, and other unsuitable yielding materials encountered during grading should be removed. Once existing compacted fill are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform and unyielding surface. The upper 12 inches of pavement subgrade soils should be scarified, moisture conditioned at or near optimum moisture content, and recompacted to at least 95 percent of the laboratory maximum dry density (ASTM D1557). If loose or yielding materials are encountered during construction, additional evaluation of these areas should be carried out by GeoTek. All pavement section changes should be properly transitioned.

6.3.7 Soil Corrosivity

The soil resistivity was tested in the laboratory on two samples collected during our field exploration. The results of the testing (6,231 and 6,700 ohm-cm) indicate that the soil samples are "moderately corrosive" to buried ferrous metals, based on the guidelines provided in *Corrosion Basics: An Introduction* (Roberge, 2005). Consideration should be given to consulting with a corrosion engineer.

6.3.8 Soil Sulfate Content

The sulfate content was determined in the laboratory for two soil samples obtained during our field exploration. The results (0.0072 and 0.0012 percent) indicate that the water-soluble sulfate range is less than 0.1 percent by weight which is considered "not applicable" (i.e. negligible) as per Table 4.2.1 of ACI 318. Based upon the test results, no special concrete mix design is required by Code for sulfate attack resistance. Additional testing of soils collected near finish grade should be performed subsequent to site grading.

6.3.9 Import Soils

Import soils should have an expansion index similar to the on-site soils. GeoTek also recommends that, as a minimum, proposed import soils be tested for soluble sulfate content and expansion index. GeoTek should be notified a minimum of 72 hours of potential import sources so that appropriate sampling and laboratory testing can be performed.

6.3.10 Concrete Flatwork

6.3.10.1 Exterior Concrete Slabs, Sidewalks, and Driveways

Exterior concrete slabs, sidewalks, and driveways should be designed using a four-inch minimum thickness. No specific reinforcement is required due to the non-structural nature. However, the use of some reinforcement should be considered. Some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in residential construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented herein.

Subgrade soils, classified as having "very low" expansion potential, should be pre-moistened prior to placing concrete. The subgrade soils below exterior concrete flatwork should be pre-saturated to a minimum of 100 percent of optimum moisture content to a depth of 12 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Covina specifications, and under the observation and testing of GeoTek and a City Inspector, if necessary.

6.3.10.2 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 1/8 inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete can also undergo chemical processes that are dependent on a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is also subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two directions and located a distance apart roughly equal to 24 to 36 times the slab thickness.

Exterior concrete flatwork (patios, walkways, driveways, etc.) is often some of the most visible aspects of site development. They are typically given the least level of quality control, being considered "non-structural" components. We suggest that the same standards of care be applied to these features as to the structure itself.

6.4 POST CONSTRUCTION CONSIDERATIONS

6.4.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. The soils should be maintained in a solid to semi-solid state as defined by the materials Atterberg Limits. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundation. This type of landscaping should be avoided. If used, then extreme care should be exercised with regard to the irrigation and drainage in these areas.

6.4.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground. Pad drainage should be directed toward approved area(s) and not be blocked by other improvements.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

6.5 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that site grading plans, pool plans, retaining wall plans, foundation plans, and relevant project specifications be reviewed by this office prior to construction to check for conformance with the recommendations of this report. We also recommend that GeoTek representatives be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. The owner/developer should verify that GeoTek representatives perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of onsite and import materials for fill placement and collect soil samples for laboratory testing where necessary.
- Observe the fill for uniformity during placement, including utility trenches.
- Perform field density testing of the fill materials.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. We recommend that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

7. INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of our evaluation is limited to the boundaries of the subject site. This review does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to us by the client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our fee estimate (P-0509622-CR) dated May 25, 2022 and geotechnical engineering standards normally used on similar projects in this region.

8. LIMITATIONS

The materials observed on the project site appear to be representative of the area; however, soil materials vary in character between excavations or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusion and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

9. SELECTED REFERENCES

ASCE, 2017, "Minimum Design Loads for Buildings and Other Structures, ASCE Standard ASCE/SEI 7-16".

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Dibblee, T.W. and Ehrenspeck, H.E., 1999, "Geologic Map of the El Monte and Baldwin Park Quadrangles, Los Angeles County, California," Dibblee Geological Foundation, Dibblee Foundation Map DF-69, 1:24,000.

GeoConcepts, Inc., 2015, "Preliminary Geotechnical Engineering Investigation, Proposed Residential and Commercial Developments, 1000 North Azusa Avenue, Covina, California," dated December 7.

________, 2018, "Infiltration Test Report, 1000 North Azusa Avenue, Covina, California," dated December 20.

Land Development Consultants, Inc., 2022, "Site Plan – Covina Village, 1000 North Azusa Avenue, Covina, California," dated May 2.

Seismic Design Values for Buildings (http://earthquake.usgs.gov/research/hazmaps/design).

Melia Homes
Proposed Mixed-Use Development
1000 Azusa Avenue
Covina, Los Angeles County, California

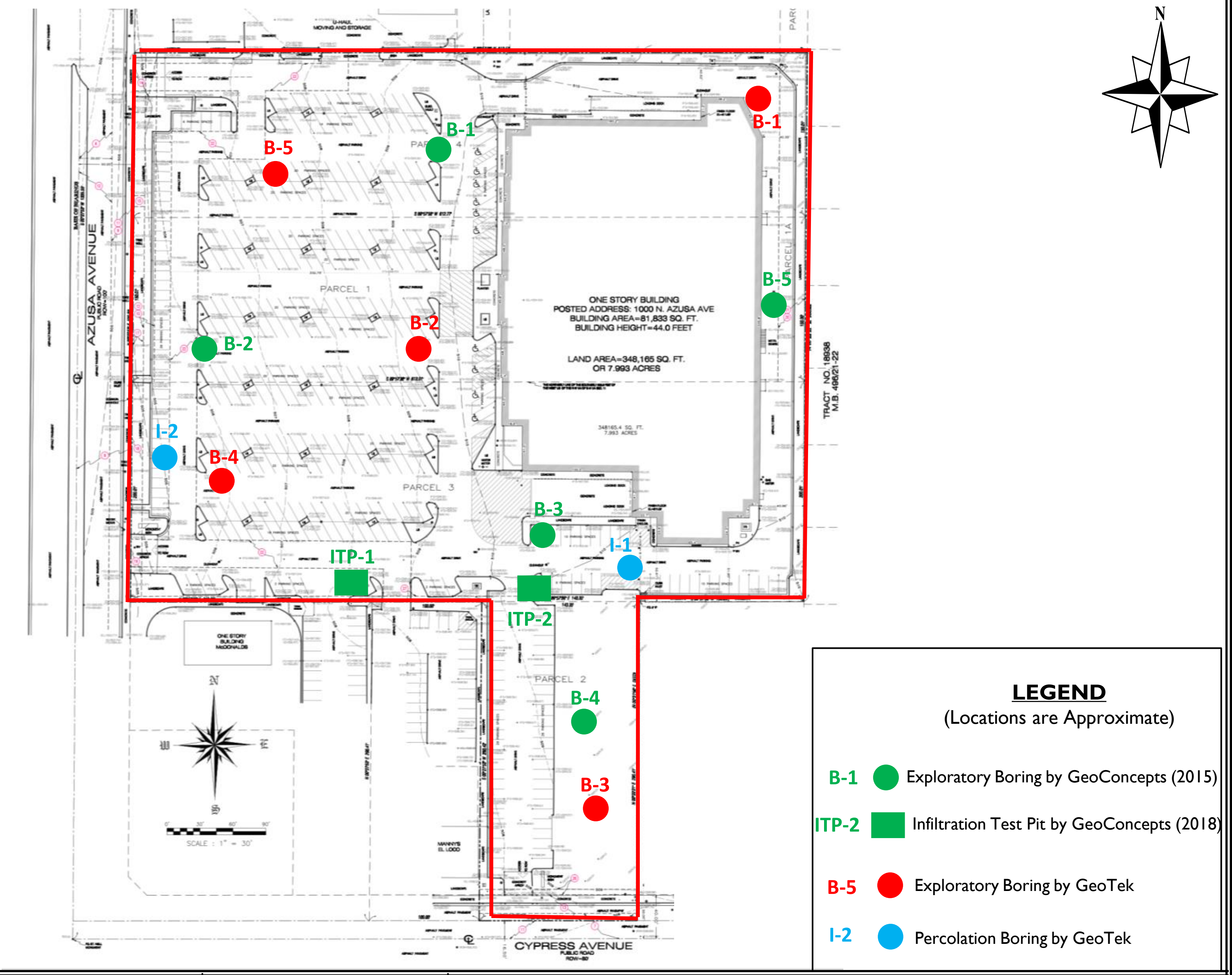
Project No. 3260-CR

Scale:
As Shown

Figure 1

Site Location Map

GEOTEK



Melia Homes
Mixed-Use Development
1000 North Azusa Avenue
Covina, Los Angeles County, California

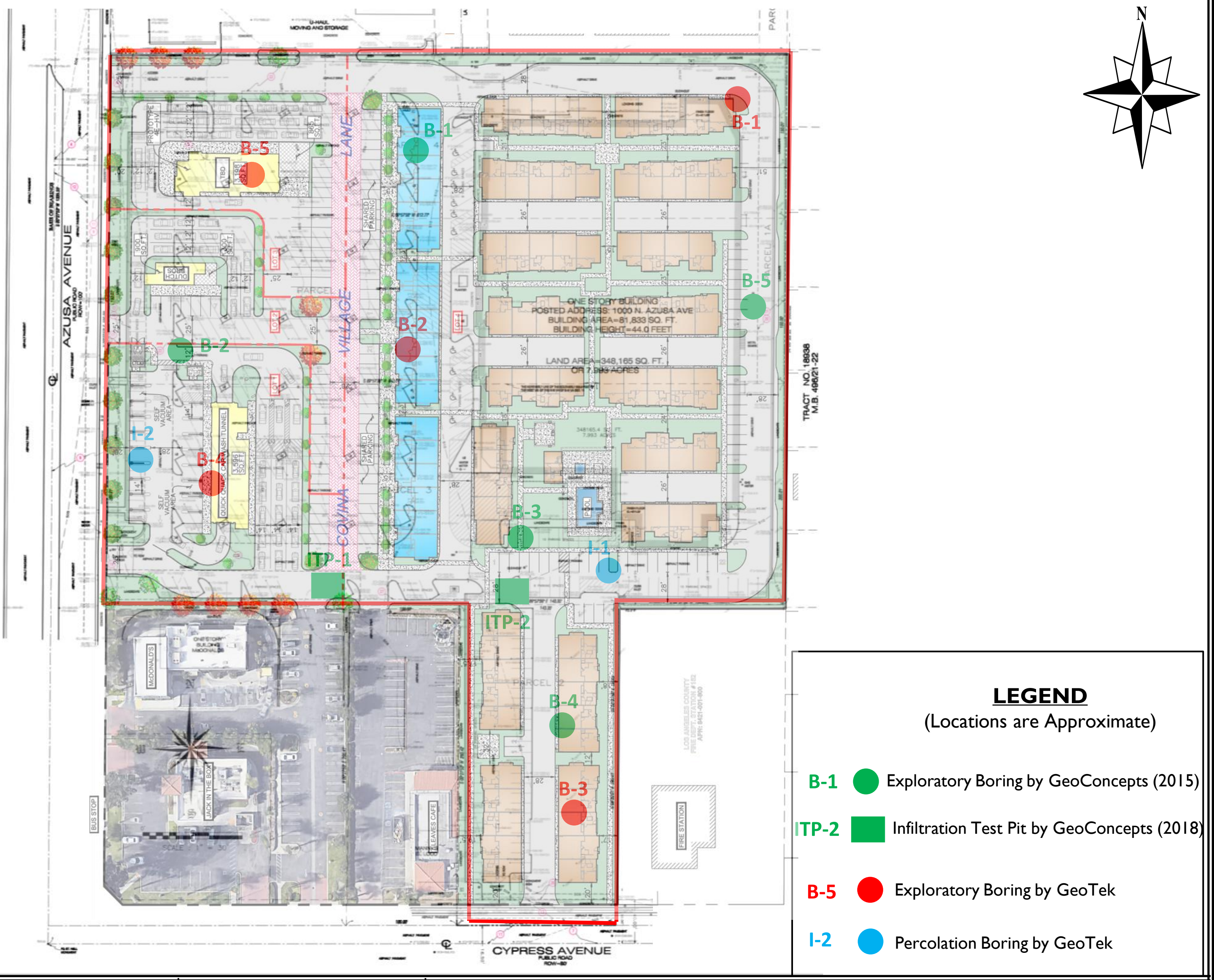
Project No. 3260-CR

Scale:
0 150 ft

Figure 2a

Exploration Location Map

GEOTEK



LEGEND

(Locations are Approximate)

- **B-1** ● Exploratory Boring by GeoConcepts (2015)
- **ITP-2** 🟩 Infiltration Test Pit by GeoConcepts (2018)
- **B-5** ● Exploratory Boring by GeoTek
- **I-2** ● Percolation Boring by GeoTek

Melia Homes
Mixed-Use Development
1000 North Azusa Avenue
Covina, Los Angeles County, California

Project No. 3260-CR

Scale:

0 150 ft

Figure 2b

Exploration Location Map

GEOTEK

APPENDIX A

LOGS OF EXCAVATIONS AND LABORATORY TEST RESULTS BY GEOCONCEPTS, INC. (2015)

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GEOTEK

BORING: B-1

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 2.0" **ASPHALT**
							ARTIFICIAL FILL; Af, silty sand with clay binder, medium reddish brown, slightly moist, fine to medium grained, glass and rock fragments up to 0.5" in length
							1.5' - 31.0' **ALLUVIUM; Qal,**
	5	116	69		5		@5.0' sand with silt and clay binder, medium brown, slightly moist, fine to coarse grained, ~3% coarse grained
	4	113	38		10		@10.0' silty sand, reddish brown, slightly moist, fine to medium grained, ~5% fine gravels
	2	115	33		15		@15.0' silty sand with gravels, tan to light brown, slightly moist, fine to medium grained sand, ~15% fine gravels
	3	112	50		20		@20.0' silty sand with gravels, light brown, slightly moist, fine to medium grained sand, ~15% fine gravels, 50 blows for 6 inches
			35		25		@25.0' silty sand with gravels, light brown, slightly moist, fine to medium grained sand, ~15% fine gravels
	4	121	50		30		@30.0' silty sand with gravels, light brown, slightly moist, fine to medium grained sand, ~15% fine gravels, 50 blows for 3 inches
							Total Depth - 31.0 Feet No Groundwater 8 Inch Hollow Stem Auger with Autohammer

BORING: B-2

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 2.0" **ASPHALT**
	4	114	41				**ARTIFICIAL FILL; Af,** silty sand with clay binder, medium reddish brown, slightly moist, fine to medium grained, glass and rock fragments up to 0.5" in length
							1.5' - 31.0' **ALLUVIUM; Qal,**
					5		@2.5' silty sand to sandy silt, olive brown, slightly moist, fine to medium grained
	3	106	30		10		@7.5' sand with silt, reddish brown, slightly moist, fine to medium grained
	5	109	26		15		@12.5' sand with silt, tan to light brown, slightly moist, fine to coarse grained
	1	116	42		20		@17.5' sand with silt, light reddish brown, slightly moist, fine to coarse grained with ~5% coarse grains, ~15% fine gravels
	1	116	62		25		@22.5' sand with silt, light reddish brown, slightly moist, fine to coarse grained with ~5% coarse grains, ~10% fine gravels
	2	118	50				@27.5' sand with minor silt, reddish brown, slightly moist to moist, fine to medium grained, ~15% fine to medium grained gravels, 50 blows for 4 inches
	2	118	50		30		@30.0' sand with minor silt, reddish brown, slightly moist to moist, fine to medium grained, ~15% fine to medium grained gravels, 50 blows for 3 inches

Total Depth - 31.0 Feet
No Groundwater
8 Inch Hollow Stem Auger with Autohammer

BORING: B-3

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 28.5' **ALLUVIUM; Qal,**
	7	121	50				@2.5' silty sand, medium brown, slightly moist, fine grained, 50 blows for 6 inches
					5		
	4	110	28				@7.5' silty sand to sandy silt, medium brown, slightly moist, fine grained
					10		
	5	113	25				@12.5' sandy silt, medium brown, slightly moist, fine grained
					15		
	0	120	37				@17.5' sand with silt, white to tan, slightly moist, fine to coarse grained sand, ~15% fine to medium sized gravels
					20		
	2	123	50				@22.5' gravelly sand, reddish brown, slightly moist, fine to coarse grained sand, ~25% fine to medium sized gravels, 50 blows for 3 inches
					25		
	3	121	48				@27.5' gravelly sand, reddish brown, slightly moist, fine to coarse grained sand, ~25% fine to medium sized gravels
					30		Total Depth - 28.5 Feet No Groundwater 8 Inch Hollow Stem Auger with Autohammer

BORING: B-4

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 31.0' **ALLUVIUM; Qal,**
	6	106	32	⧗	5		@5.0' silty sand, medium brown, slightly moist, fine to medium grained
	9	105	29	⧗	10		@10.0' silty sand to sandy silt, reddish brown, slightly moist to moist, fine grained
	7	111	33	⧗	15		@15.0' silty sand to sandy silt, reddish brown, slightly moist to moist, fine grained
			50	⧗	20		@20.0' No Recovery
	9	112	48	⧗	25		@25.0' silty sand to sandy silt, yellowish brown, slightly moist, fine to medium grained
	6	115	49	⧗	30		@30.0' silty sand to sandy silt, yellowish brown, slightly moist, fine to medium grained
							Total Depth - 31.0 Feet No Groundwater 8" Hollow Stem Auger with Autohammer

BORING: B-5

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 2.0" **ASPHALT**
							2.0" - 31.0' **ALLUVIUM; Qal,**
	3	109	27		5		@5.0' silty sand to sandy silt, light reddish brown, slightly moist, fine to medium grained
	3	107	22		10		@10.0' silty sand, light reddish brown, slightly moist, fine to medium grained
			26		15		@15.0' No Recovery
	3	113	50		20		@20.0' gravelly silty sand, light reddish brown, slightly moist, fine to medium grained sand, ~25% fine to coarse sized gravels, 50 blows for 5 inches
	5	112	45		25		@25.0' silty sand to sandy silt, light reddish brown, slightly moist to moist, fine to medium grained
	5	112	82		30		@30.0' sandy silt, reddish brown, slightly moist to moist, fine grained
							Total Depth - 31 Feet No Groundwater 8" Hollow Stem Auger with Autohammer

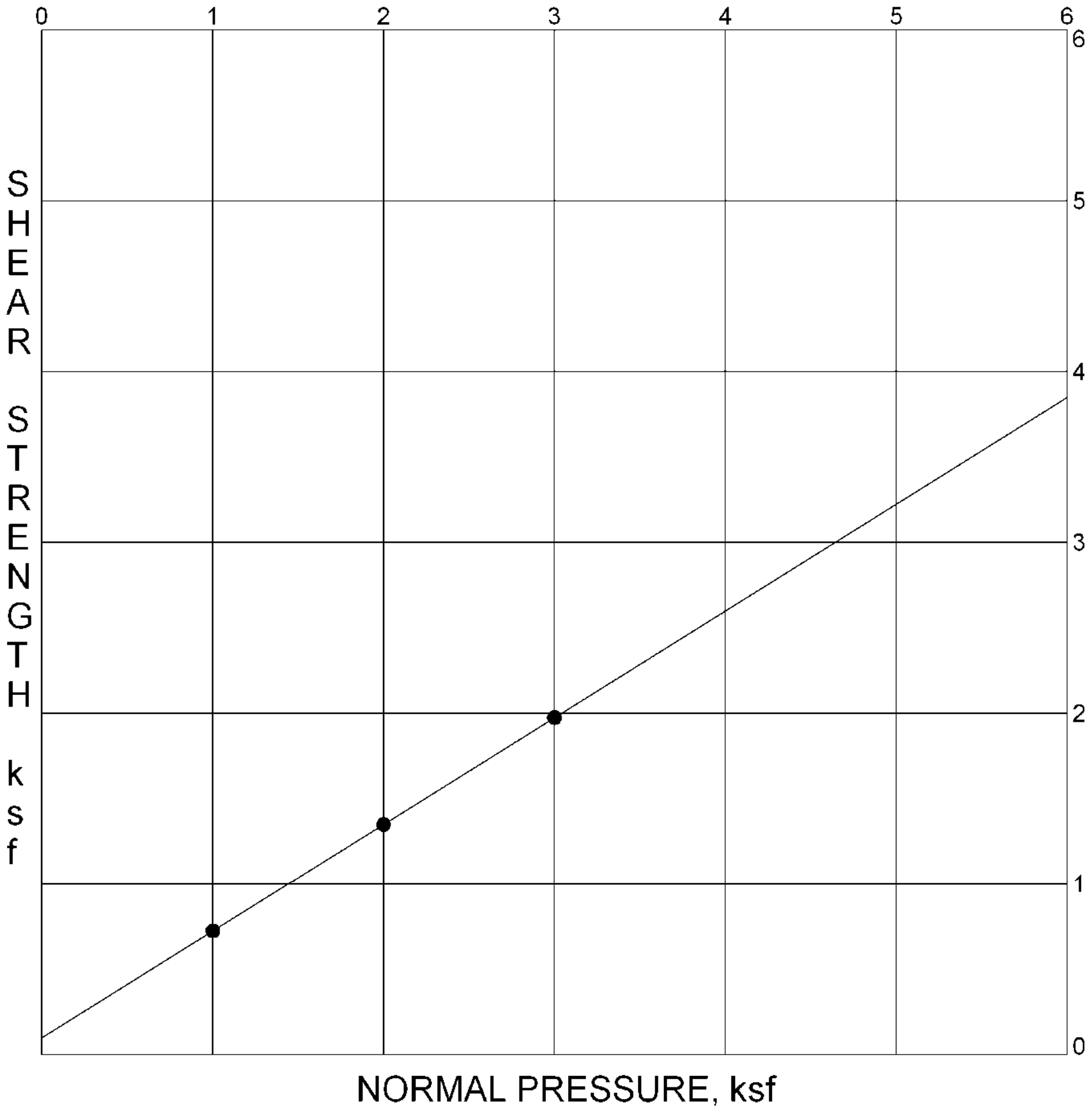
LABORATORY RECAPITULATION 1
PROJECT: 1000 North Azusa Avenue
PROJECT NO.: 5071

Exploration	Depth (ft)	Material	Dry Density In Situ (P.C.F.)	Moisture Content (%)	Cohesion (K.S.F)	Friction Angle (degree)
B-1	5	Qal	116.1	5.1	0.1	32
B-1	10	Qal	113	4.4		
B-1	15	Qal	115	1.9		
B-1	20	Qal	112.1	2.5		
B-1	25	Qal				
B-1	30	Qal	121	3.8		
B-2	2.5	Qal	114	4.4		
B-2	7.5	Qal	105.7	3.2		
B-2	12.5	Qal	109.5	4.9		
B-2	17.5	Qal	116.1	1.1		
B-2	22.5	Qal	116.1	1		
B-2	27.5	Qal	118.4	1.6		
B-2	30	Qal	117.6	1.5		
B-3	2.5	Qal	121.2	6.9	0.05	32
B-3	7.5	Qal	109.7	4.1	0.05	30
B-3	12.5	Qal	113.3	5.2		
B-3	17.5	Qal	120.5	0.5		
B-3	22.5	Qal	123.1	1.9		
B-3	27.5	Qal	120.5	2.7		
B-4	5	Qal	106	6.2		
B-4	10	Qal	105	9		
B-4	15	Qal	111.1	7		
B-4	25	Qal	112	9.5		
B-4	30	Qal	115	5.9		
B-5	5	Qal	109	3.2	0.15	27
B-5	10	Qal	107.2	2.7	0.05	30
B-5	20	Qal	113.5	3.2		
B-5	25	Qal	112	5.1		
B-5	30	Qal	112.2	4.9		

LABORATORY RECAPITULATION 2
PROJECT: 1000 North Azusa Avenue
PROJECT NO.: 5071

Exploration	Depth (ft)	pH	As-Is Soil Resistivity (ohm-cm)	Minimum Soil Resistivity (ohm-cm)	Chloride (%)	Sulphate (%)
B-3	12.5	7.11	29000	6000	0.001	0.00042

PROJECT LOCATION: 1000 North Azusa Avenue	PROJECT NO.: 5071
SAMPLE LOCATION: B-1 @ 5.0	DESCRIPTION: Qal



Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 5.1	Dry Density: 116.1	Phi (deg): 32.0
Saturated: 16.7		Cohesion (ksf): 0.100

SHEAR TEST DIAGRAM

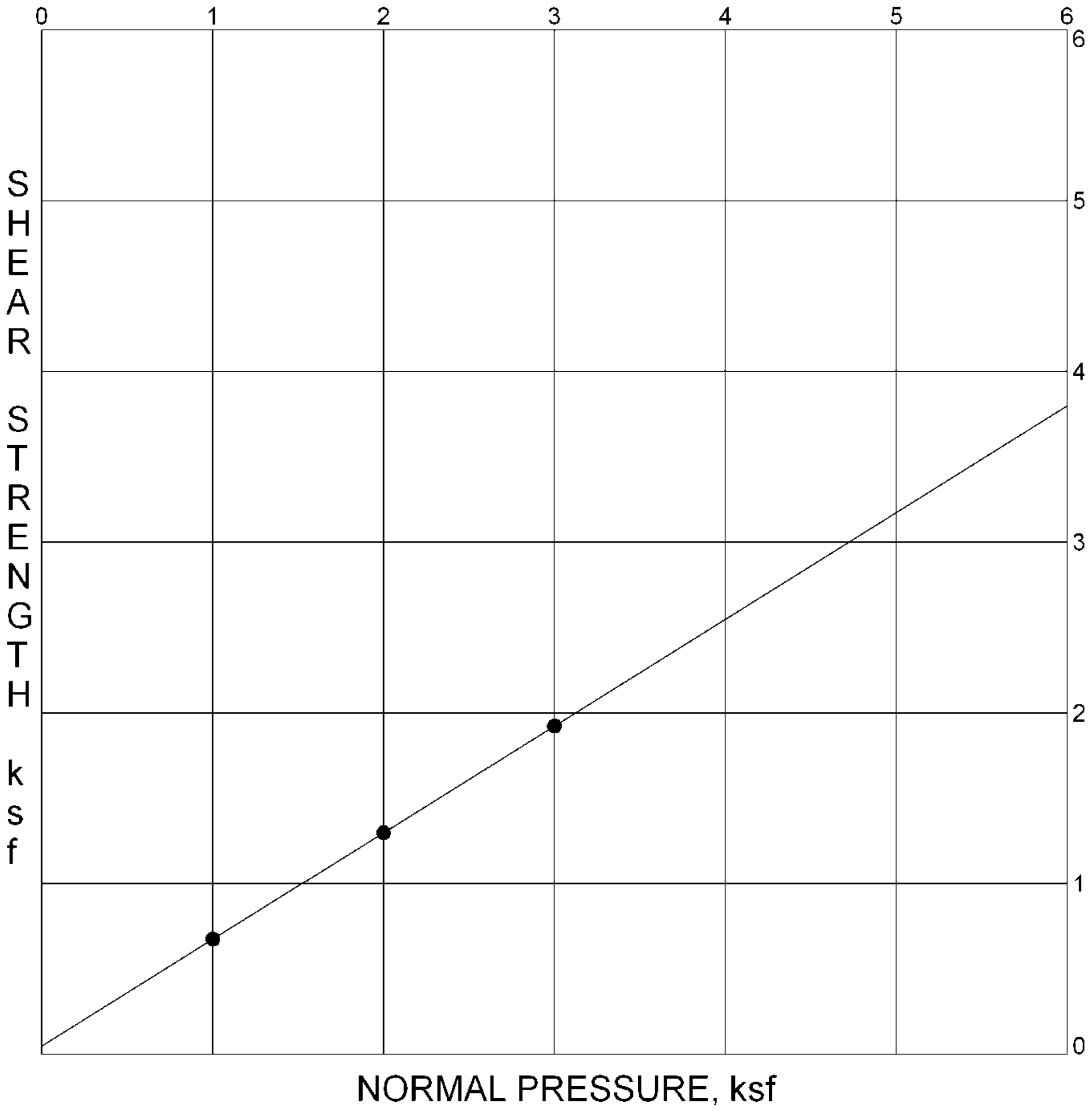
Figure S.1

PROJECT LOCATION: 1000 North Azusa Avenue

PROJECT NO.: 5071

SAMPLE LOCATION: B-3 @ 2.5

DESCRIPTION: Qal



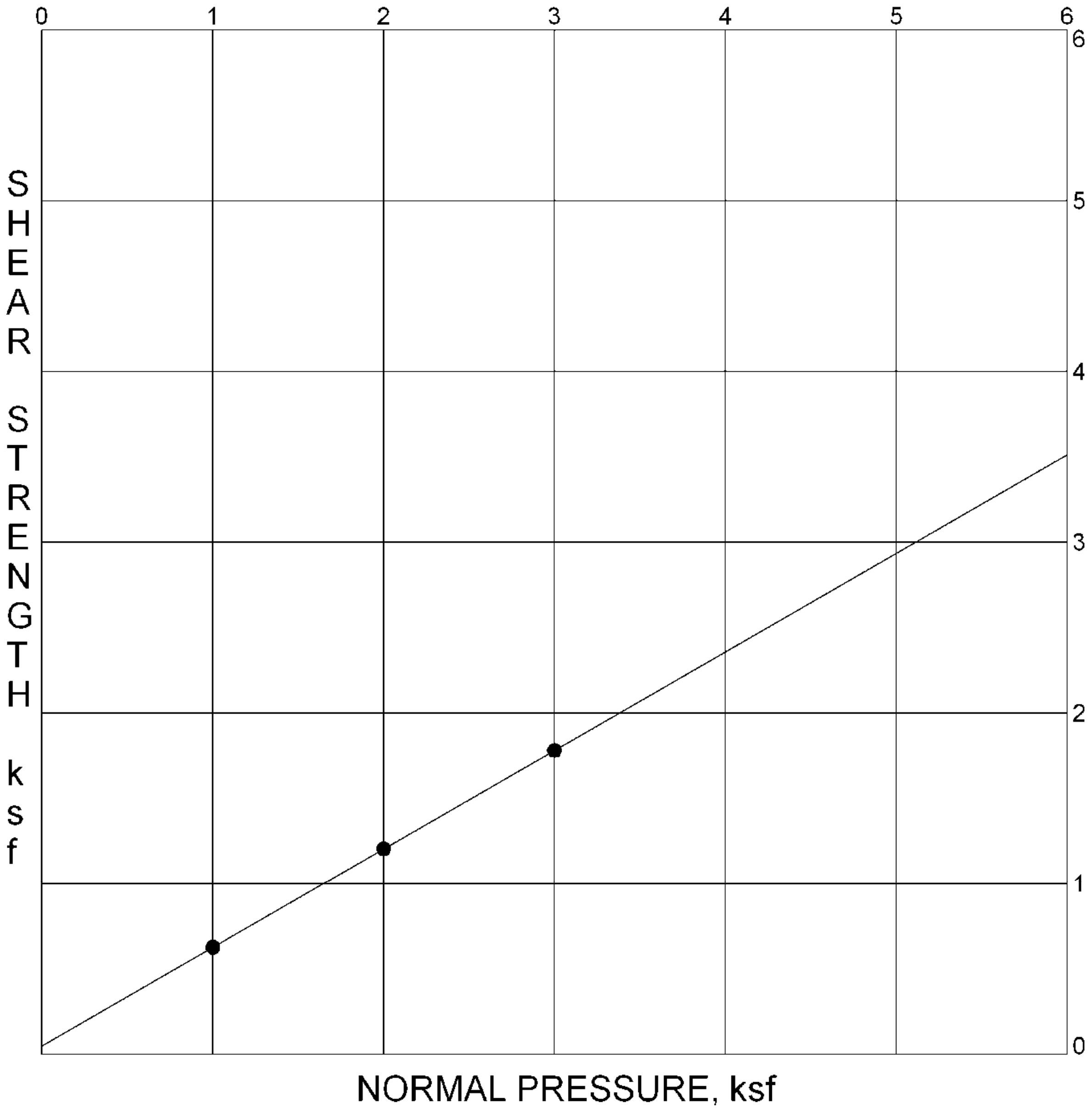
Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 6.9	Dry Density: 121.2	Phi (deg): 32.0
Saturated: 14.5		Cohesion (ksf): 0.050

SHEAR TEST DIAGRAM

Figure S.2

PROJECT LOCATION: 1000 North Azusa Avenue
PROJECT NO.: 5071
SAMPLE LOCATION: B-3 @ 7.5
DESCRIPTION: Qal



Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 4.1	Dry Density: 109.7	Phi (deg): 30.0
Saturated: 19.9		Cohesion (ksf): 0.050

SHEAR TEST DIAGRAM

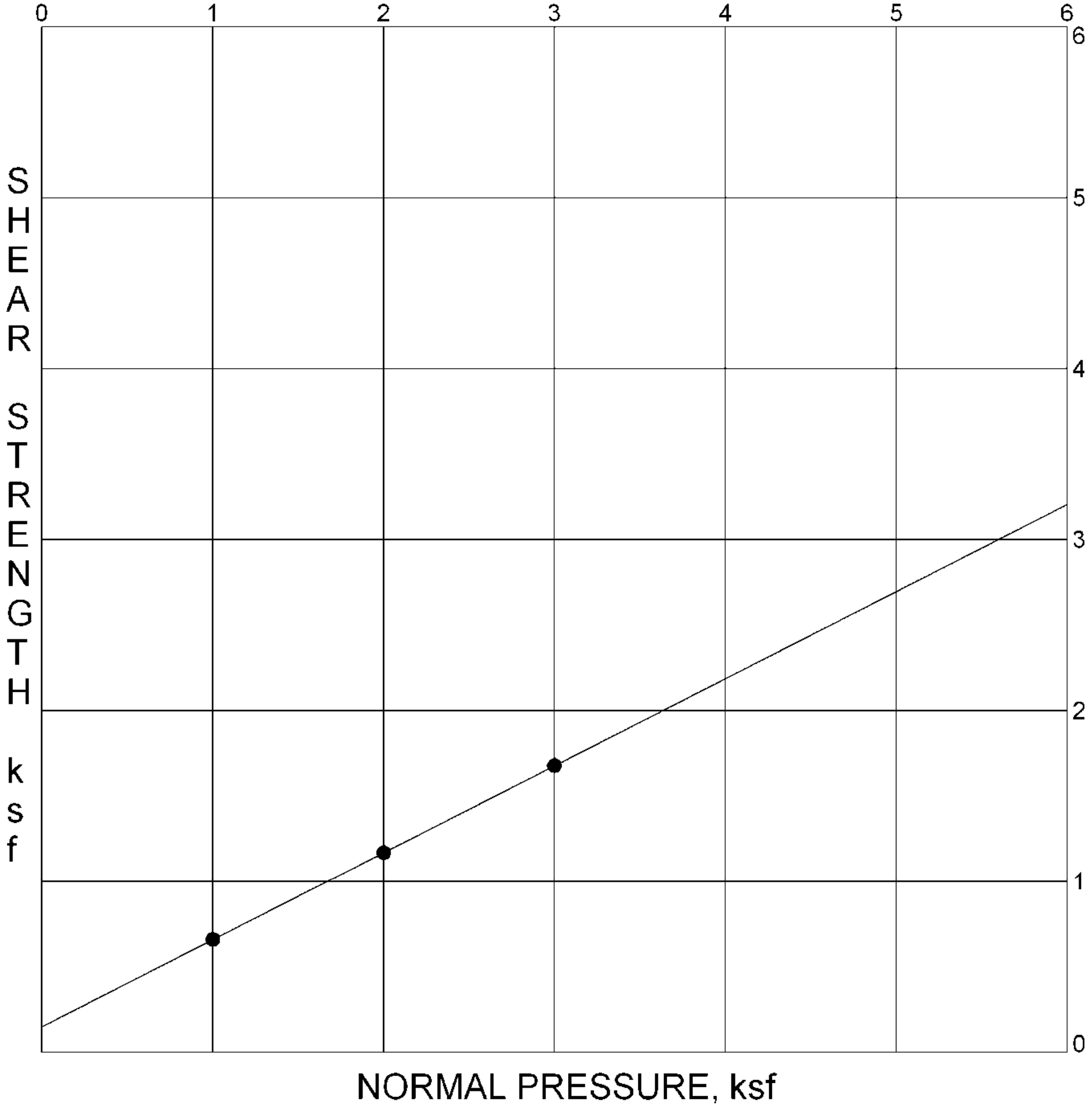
Figure S.3

PROJECT LOCATION: 1000 North Azusa Avenue

PROJECT NO.: 5071

SAMPLE LOCATION: B-5 @ 5.0

DESCRIPTION: Qal



Test Results

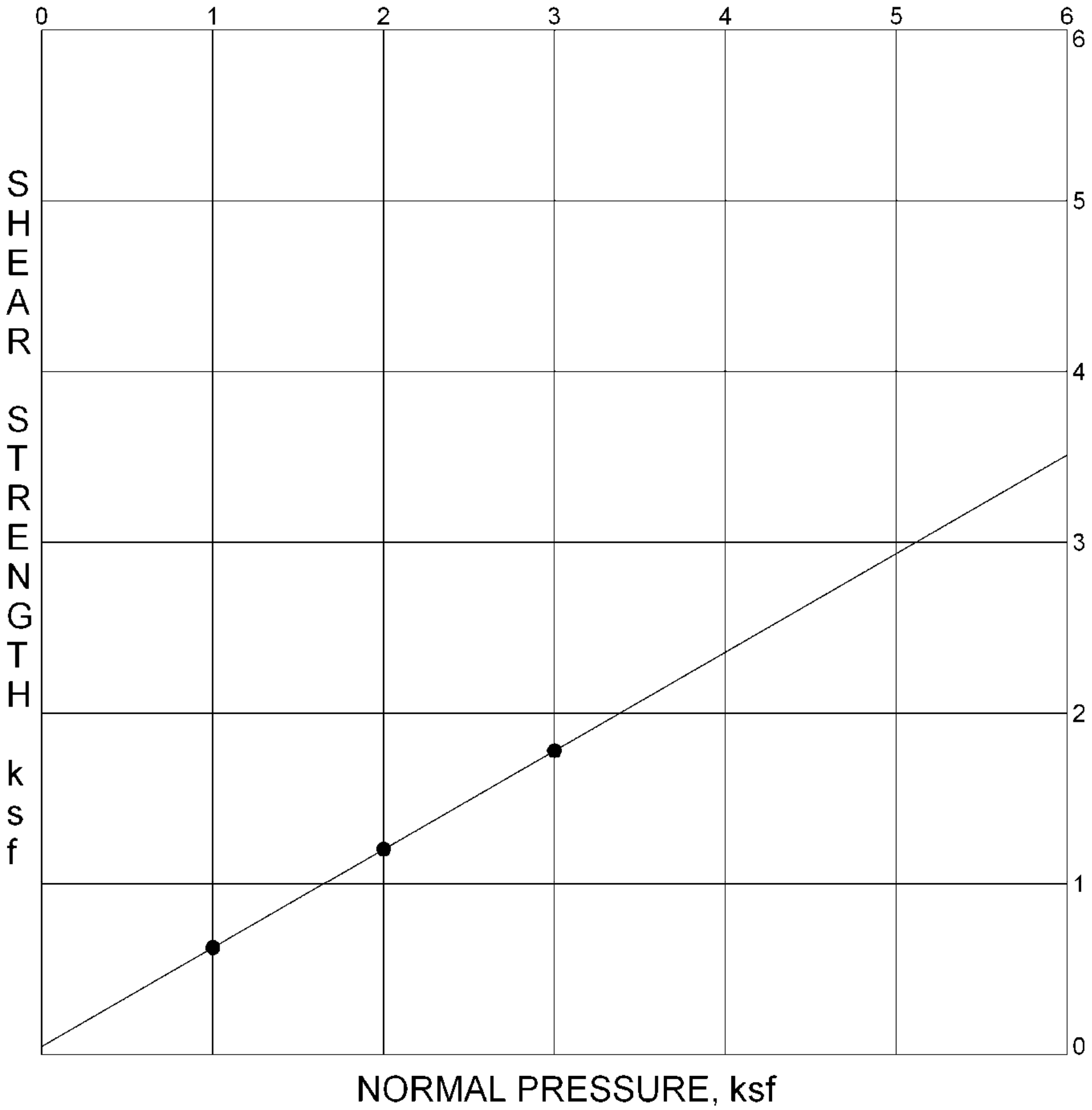
Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 3.2 Saturated: 20.2	Dry Density: 109.0	Phi (deg): 27.0 Cohesion (ksf): 0.150

SHEAR TEST DIAGRAM

Figure S.4

PROJECT LOCATION: 1000 North Azusa Avenue
SAMPLE LOCATION: B-5 @ 10.0

PROJECT NO.: 5071
DESCRIPTION: Qal



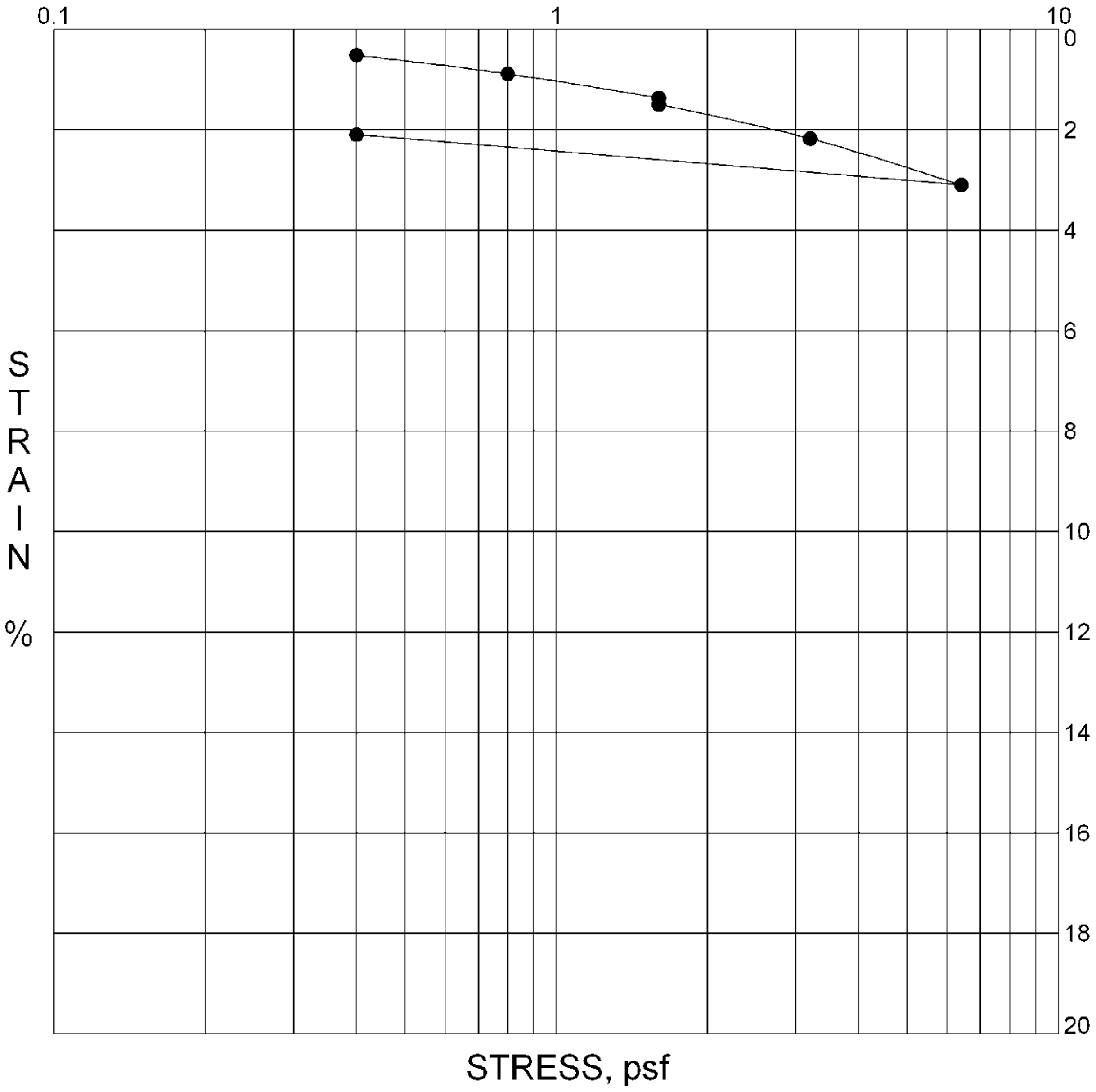
Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 2.7 Saturated: 21.1	Dry Density: 107.2	Phi (deg): 30.0 Cohesion (ksf): 0.050

SHEAR TEST DIAGRAM

Figure S.5

PROJECT LOCATION:	1000 North Azusa Avenue	PROJECT NO.:	5071
SAMPLE LOCATION:	B-1 @ 5.0	DESCRIPTION:	Qal



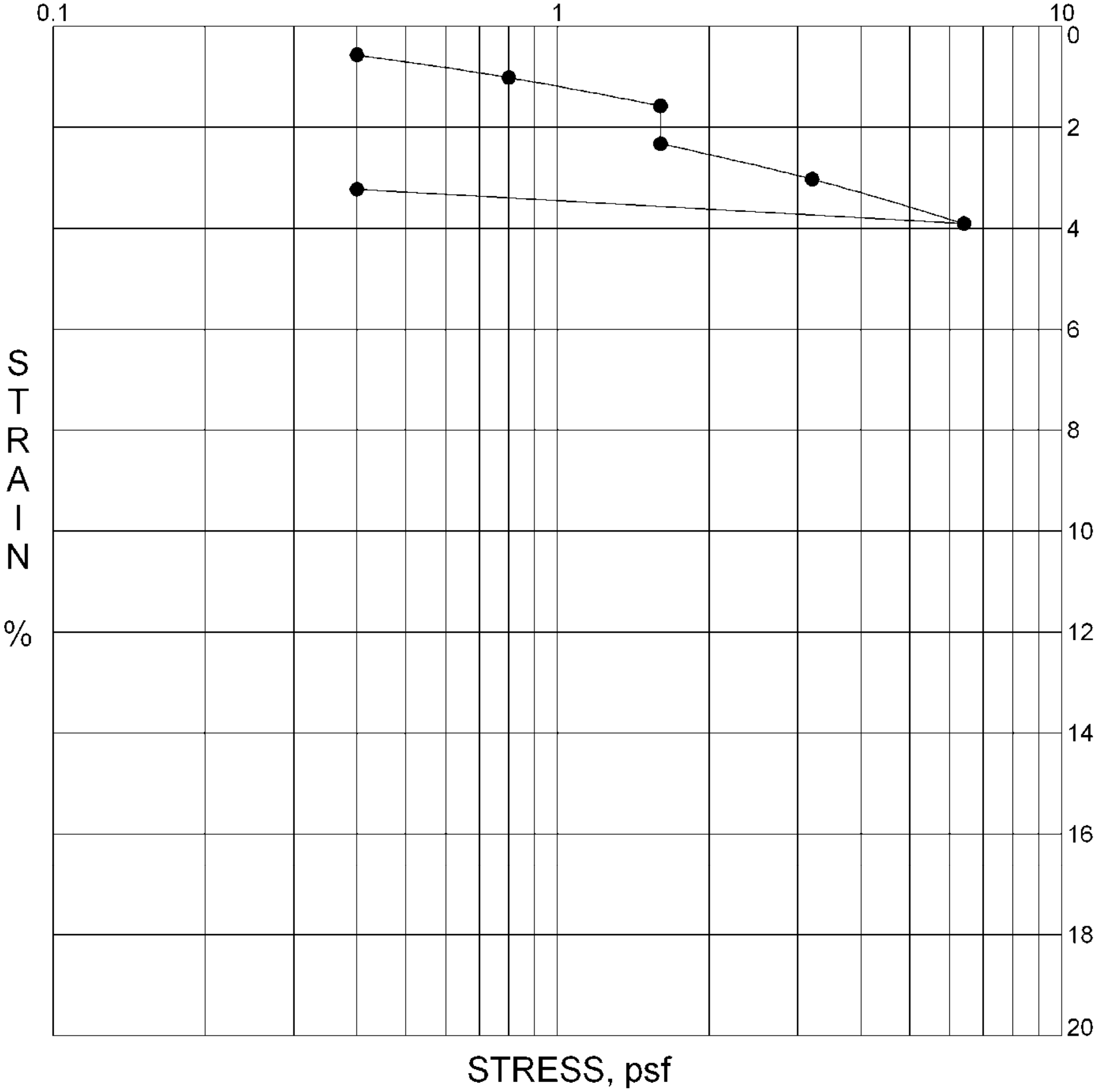
Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 5.1	Dry Density: 116.1	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.1

PROJECT LOCATION: 1000 North Azusa Avenue	PROJECT NO.: 5071
SAMPLE LOCATION: B-2 @ 7.5	DESCRIPTION: Qal



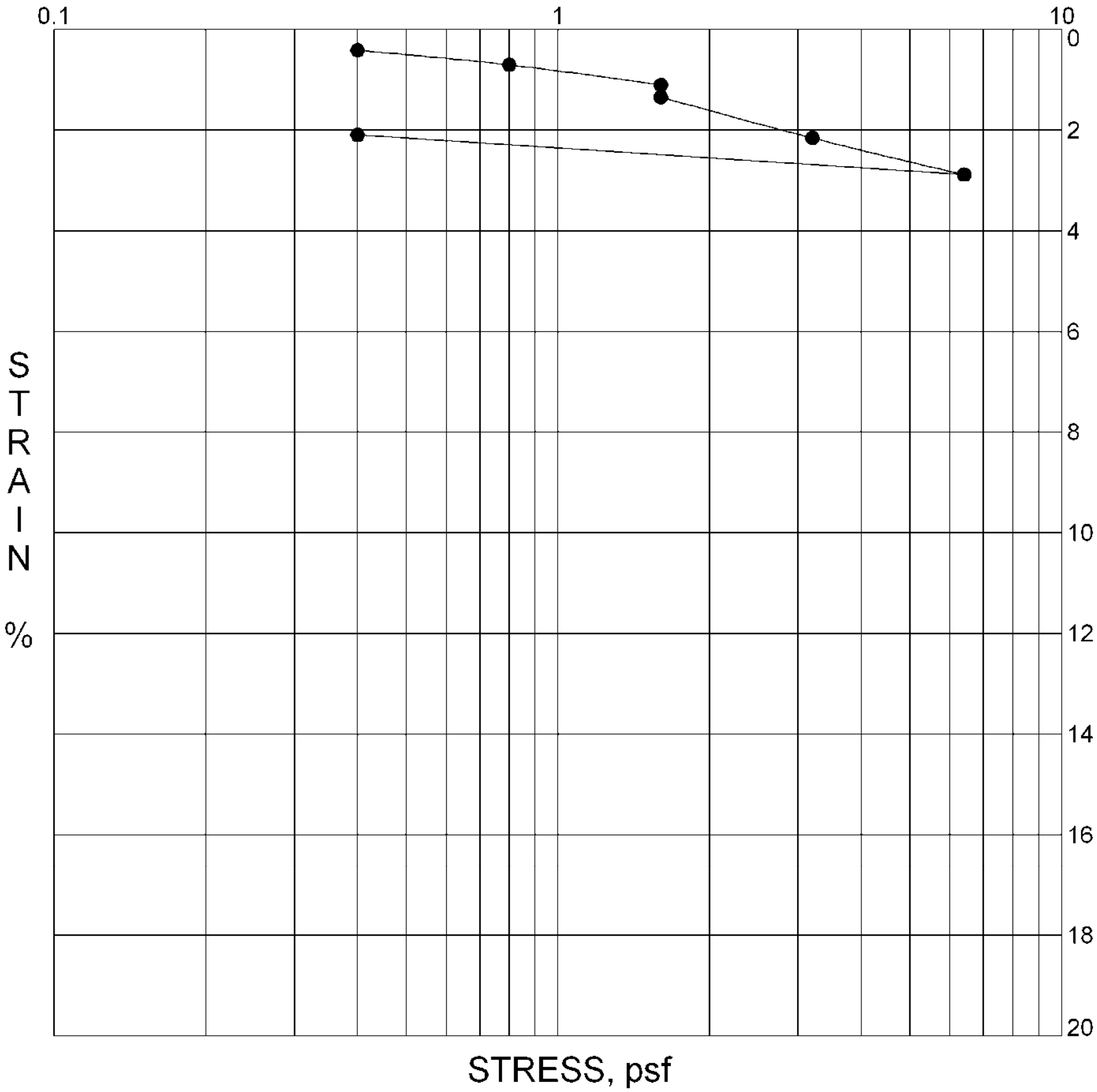
Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 3.2	Dry Density: 105.7	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.2

PROJECT LOCATION:	1000 North Azusa Avenue	PROJECT NO.:	5071
SAMPLE LOCATION:	B-3 @ 2.5	DESCRIPTION:	Qal



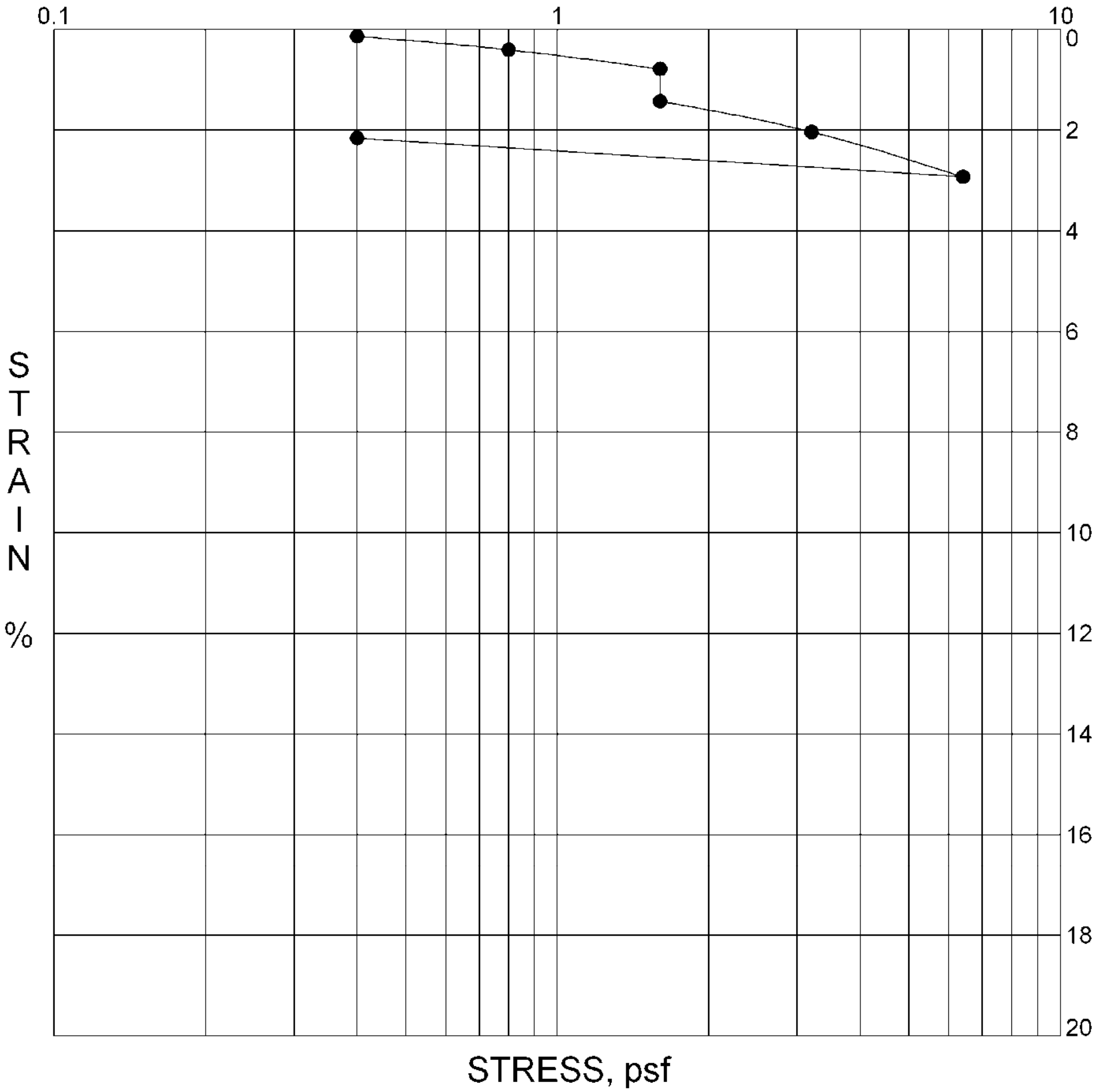
Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 6.9	Dry Density: 121.2	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.3

PROJECT LOCATION:	1000 North Azusa Avenue	PROJECT NO.:	5071
SAMPLE LOCATION:	B-3 @ 7.5	DESCRIPTION:	Qal



Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 4.1	Dry Density: 109.7	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

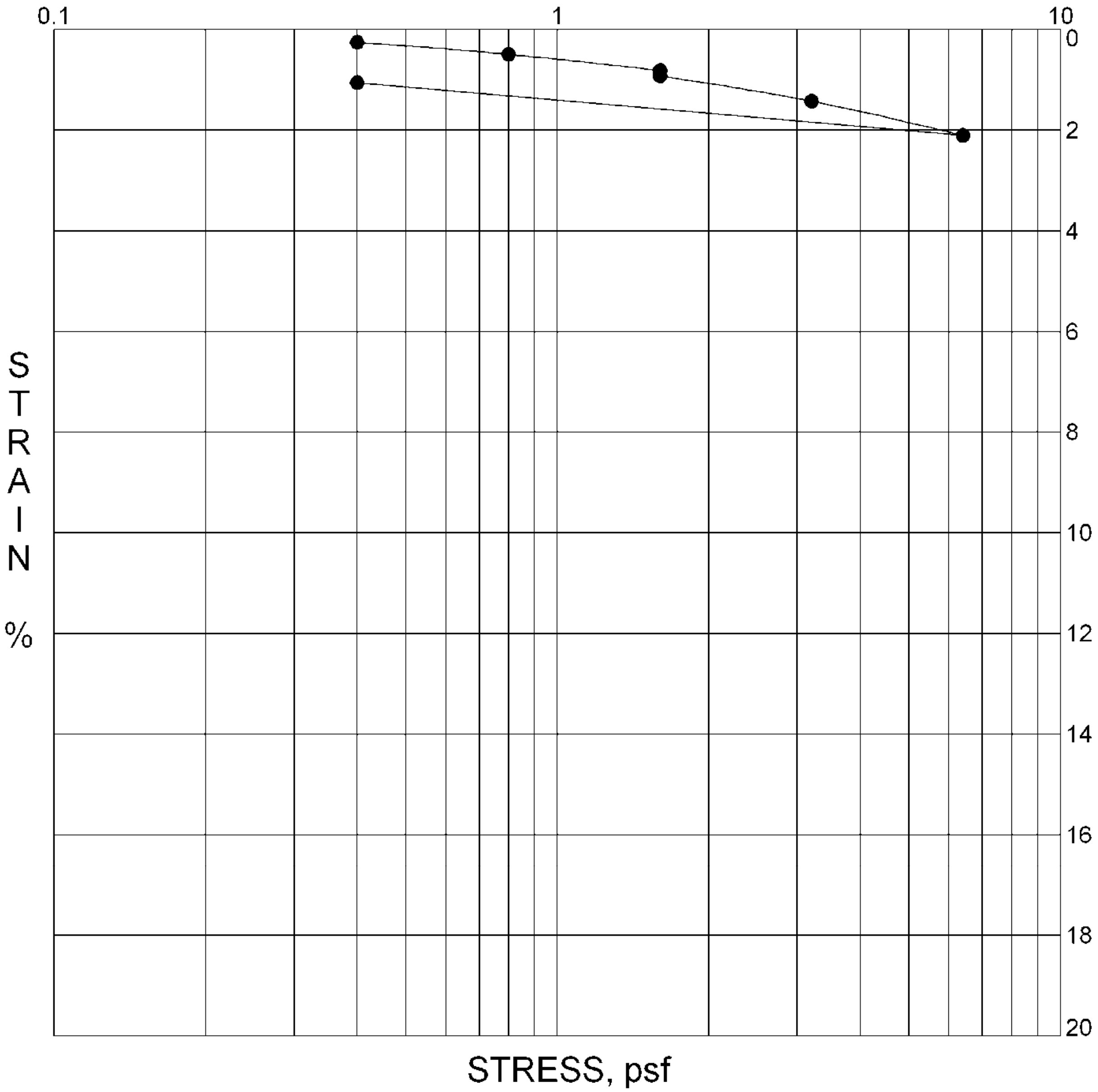
Figure C.4

PROJECT LOCATION: 1000 North Azusa Avenue

PROJECT NO.: 5071

SAMPLE LOCATION: B-4 @ 10.0

DESCRIPTION: Qal



Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 9.0	Dry Density: 105.0	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

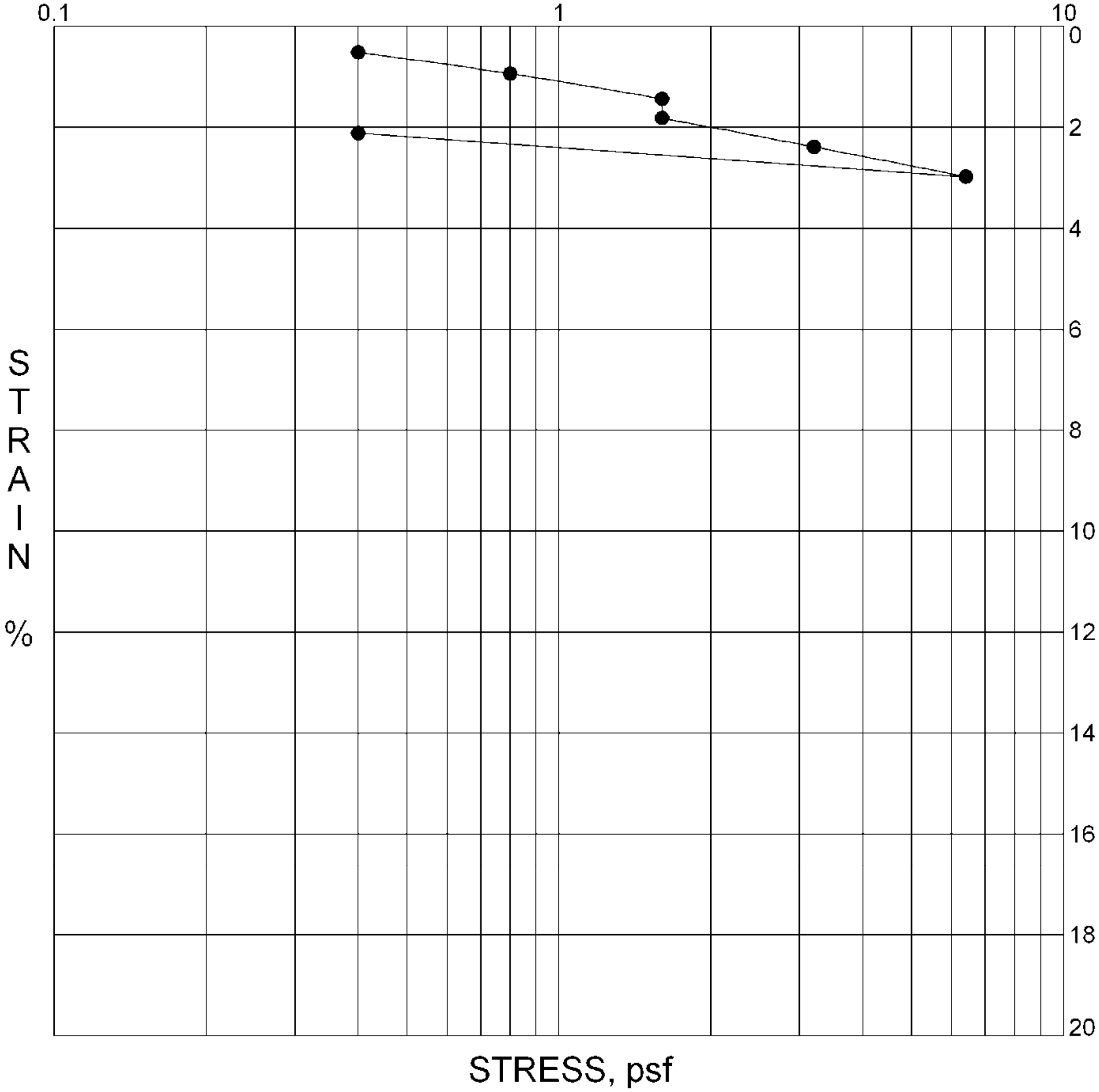
Figure C.5

PROJECT LOCATION: 1000 North Azusa Avenue

PROJECT NO.: 5071

SAMPLE LOCATION: B-5 @ 10.0

DESCRIPTION: Qal



Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 2.7	Dry Density: 107.2	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.6

APPENDIX B

EXPLORATORY BORING LOGS BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

The Modified Split-Barrel Sampler (Ring)

The ring sampler is driven into the ground in accordance with ASTM Test Method D 3550. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler is typically driven into the ground 12 or 18 inches with a 140-pound hammer free falling from a height of 30 inches. Blow counts are recorded for every 6 inches of penetration as indicated on the logs of borings. The samples are removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

Bulk Samples (Large)

These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)

These are plastic bag samples which are normally airtight and contain less than five pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B – BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of borings:

SOILS	
USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium
GEOLOGIC	
B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
………..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
━━━	Thick solid line denotes end of boring

(Additional denotations and symbols are provided on the logs of borings)

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
PROJECT NAME: 1000 N Azusa Ave, Covina
PROJECT NO.: 3260-CR
LOCATION: See Exploration Location Map
DRILLER: 2R Drilling Inc.
DRILL METHOD: Hollow Stem Auger
HAMMER: 140lbs/30in.
LOGGED BY: KIG
OPERATOR: Jorge
RIG TYPE: CME 75
DATE: 6/24/2022

BORING NO.: B-1

Depth (ft)	SAMPLES			USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 3" Base			
				SM/ML	**Undocumented Fill:** silty f SAND to f sandy SILT, brown, slightly moist to moist			
	☒				**Alluvium:**			MD, EI, SH, SR
	☒ ▨	16 30 35	R1	SM	silty f-m SAND, brown, slightly moist, dense	3.7	121.4	
5	▨	16 17 21	R2		becomes olive-brown, slightly moist, medium dense	2.2	119.6	
	▨	15 22 28	R3		silty f-m SAND, brown, slightly moist, dense	2.4	114.4	
10	▨	20 26 24	R4		silty f-c SAND, brown, slightly moist, dense, few fine gravel	2.3	131.6	
	▨	50/6"	R5		contains some fine to coarse gravel			
15								
	▨	50/6"	R6					
20								
	▪	32 31 35	S1		silty f-c SAND, olive-brown, slightly moist, dense, grey-white rock pieces towards bottom of sampler			
25								
30	▪	39 50/3"	S2		same as above			

BORING TERMINATED AT 30.0 FEET
No groundwater encountered
Boring backfilled with soil cuttings

LEGEND

Sample type: ▨ ---Ring ▪ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk □ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	Melia Homes	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	KIG
PROJECT NAME:	1000 N Azusa Ave, Covina	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jorge
PROJECT NO.:	3260-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	6/24/2022

BORING NO.: B-2 SHEET 1 OF 2

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 5" Base			
				SM/ML	**Undocumented Fill:** silty f SAND to f sandy SILT, brown, slightly moist to moist, few clay, glass fragments			
	☒				**Alluvium:**			EI, SR, SA
	■	11 19 25	S3	SM	silty SAND, brown, moist, medium dense	11.6	126.5	
5	■	13 13 13	R2		Same as above	7.7	115.0	HC, SA
	■	6 39 30	R3		silty f-m SAND, light brown, slightly moist, fine to coarse gravels and cobble in sampler tip, sample disturbed	3.6		SA
10	■	7 10 14	R4	SP	gravelly f-c SAND, brown, moist, medium dense, few cobbles	8.4	108.7	
15	■	2 1 2	R5	SM	silty f-c SAND, brown, moist, loose	10.3	107.2	HC, SA
20	■	50/6"	R6	SP	gravelly f-c SAND, brown, slightly moist to moist, very dense.			
25	▪	32 31 35	S1		SAND, olive-brown, slightly moist to moist, very dense, some fine gravel			SA
30	▪	35 39 50/5"	S2		Same as above			

LEGEND

Sample type: ■ ---Ring ▪ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Melia Homes	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	KIG
PROJECT NAME:	1000 N Azusa Ave, Covina	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jorge
PROJECT NO.:	3260-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	6/24/2022

BORING NO.: B-2 SHEET 2 OF 2

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
35	▮	23 25 26	S3		Same as above			
40	▮	7 11 9	S4	SM	silty SAND, brown, slightly moist to moist, some fine gravel, transitions to clayey f-sandy SILT at sampler tip			SA
45	▮	20 13 10	S5	SM	silty f-m SAND, olive-brown, slightly moist to moist, medium dense, some coarse grained sand, trace fine gravel			
50	▮	7 8 9	S6	SM/ML	silty f SAND to f sandy SILT, brown, slightly moist to moist, stiff to medium dense			

BORING TERMINATED AT 51.5 FEET

No groundwater encountered
Boring backfilled with soil cuttings

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ◩ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Melia Homes	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	KIG
PROJECT NAME:	1000 N Azusa Ave, Covina	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jorge
PROJECT NO.:	3260-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	6/24/2022

BORING NO.: B-3 SHEET 1 OF 2

Depth (ft)	SAMPLES Sample Type	SAMPLES Blows/ 6 in	SAMPLES Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				SM/ML	**Undocumented Fill:** silty f-m SAND to f-m sandy SILT, grey-brown, slightly moist to moist, rootlets			
	■	28 50/6"	R1	SM	**Alluvium:** silty f-m SAND, brown, slightly moist to moist, dense	6.5	127	
5	⧄	37 50/5"	R2		Same as above, fragmented rock at sampler tip.			
	■	6 8 11	R3	SM/ML	silty f-m SAND to f-m sandy SILT, brown, moist, medium dense to stiff	8.2	113.7	
10	■	13 25 29	R4	SM	silty f-c SAND, light brown, slightly moist, dense, few fine to coarse gravel present	2.1	114.9	
	■	36 39 50	R5		silty f-c SAND, light grey-brown, slightly moist, very dense, some fine to coarse gravel			
15								
	▪	5 5 6	S1		silty f-c SAND, brown, slightly moist, loose, trace clay towards sampler tip.			
20								
25	▪	3 5 5	S2		silty f-m SAND, brown, slightly moist, loose, trace clay			

LEGEND

Sample type: ■ ---Ring ▪ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Melia Homes	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	KIG
PROJECT NAME:	1000 N Azusa Ave, Covina	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jorge
PROJECT NO.:	3260-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	6/24/2022

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**BORING NO.: B-3 SHEET 2 OF 2** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
30	■	4 5 7	S3	SM/CL	clayey silty f SAND, brown, slightly moist, loose			
					BORING TERMINATED AT 31.5 FEET No groundwater encountered Boring backfilled with soil cuttings			
35								
40								
45								
50								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
DRILLER: 2R Drilling Inc.
LOGGED BY: KIG
PROJECT NAME: 1000 N Azusa Ave, Covina
DRILL METHOD: Hollow Stem Auger
OPERATOR: Jorge
PROJECT NO.: 3260-CR
HAMMER: 140lbs/30in.
RIG TYPE: CME 75
LOCATION: See Exploration Location Map
DATE: 6/24/2022

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	**BORING NO.: B-4** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
					3" Asphaltic Concrete over 3" Base			
				SM/ML	**Undocumented Fill:** silty f SAND to f sandy SILT, olive brown, slightly moist to moist, some clay			
	▨	16 30 35	R1	SM	**Alluvium:** silty f-m SAND, reddish-brown, moist, dense	11.7	114	
5								
	▨	16 17 21	R2		Same as above, medium dense	11.3	113.8	
10	▨	20 26 24	R3		Same as above, trace coarse sand	10.4	118.7	
	▨	5 13 13	R4		silty f-c SAND, reddish-brown, slightly moist, medium dense, trace fine gravel in sampler tip	4.2	127.4	
15								
	▨	5 13 13	R5		gravelly silty f-c SAND, light grey-brown, slightly moist, medium dense, minor silt			
	▨	50/6"	R6		silty f-c SAND, olive brown, slightly moist, very dense, some fine gravel			
20					**BORING TERMINATED AT 19.0 FEET** No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ▱ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
DRILLER: 2R Drilling Inc.
LOGGED BY: KIG
PROJECT NAME: 1000 N Azusa Ave, Covina
DRILL METHOD: Hollow Stem Auger
OPERATOR: Jorge
PROJECT NO.: 3260-CR
HAMMER: 140lbs/30in.
RIG TYPE: CME 75
LOCATION: See Exploration Location Map
DATE: 6/24/2022

BORING NO.: B-5

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
					3" Asphaltic Concrete over 3" Base			
				SM/ML	**Undocumented Fill:** silty f-c SAND to f-c sandy SILT, olive brown, slightly moist to moist, some clay.			
	☒				**Alluvium:**			
5	☒ ■	12 25 37	R1	SM	silty f-m SAND, dark reddish-brown, moist, dense	7.1	120	
	■	15 19 30	R2	ML/SM	f-c sandy SILT to silty f-c SAND, dark brown, moist, dense, trace fine to coarse gravels and cobbles	8.0	130.3	
	■	20 27 38	R3		Same as above, fine to medium grained sand with trace coarse sand	8.2	131.2	
10								
	■	12 17 17	R4		Same as above, trace coarse sand and fine gravel	10.3	123.5	
15	■	9 10 9	R5		Same as above, trace coarse sand	10.7	120.5	
20	■	50/6"	R6	SP	gravelly f-c SAND, whitish-grey, slightly moist, very dense, large rock pieces			
					BORING TERMINATED AT 20.5 FEET No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ▱---Small Bulk ☒---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
PROJECT NAME: 1000 N Azusa Ave, Covina
PROJECT NO.: 3260-CR
LOCATION: See Exploration Location Map
DRILLER: 2R Drilling Inc.
DRILL METHOD: Hollow Stem Auger
HAMMER: 140lbs/30in.
LOGGED BY: KIG
OPERATOR: Jorge
RIG TYPE: CME 75
DATE: 6/24/2022

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	**BORING NO.: I-1** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
					3" Asphaltic Concrete over 6" Base			
				SM	**Undocumented Fill:** silty f-c SAND, dark brown, slightly moist			
				SM	**Alluvium:** silty f-m SAND, reddish-brown, slightly moist			
5					silty f-c SAND, brown, slightly moist, trace coarse sand			
10					Same as above, trace fine gravel			
	▮	12 18 20	S1		silty f-m SAND, whitish-brown, slightly moist			
15					**BORING TERMINATED AT 15.0 FEET** No groundwater encountered Boring set with pipe, sock, and gravel in annular space			
20								
25								
30								

LEGEND

Sample type: ▮ ---Ring ▮ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Melia Homes	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	KIG
PROJECT NAME:	1000 N Azusa Ave, Covina	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jorge
PROJECT NO.:	3260-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	6/24/2022

Depth (ft)	SAMPLES			USCS Symbol	**BORING NO.: I-2**	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number		**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 3" Base			
				SM/CL	**Undocumented Fill:** silty SAND to sandy CLAY, olive brown slightly moist to moist			
				SM/ML	**Alluvium:** silty f-m SAND to f-m sandy SILT, reddish-brown, slightly moist			
5					Same as above, darker color			
10					Same as above			
	▮	12 18 20	S1	SM	silty f-m SAND, light brown, slightly moist, some coarse sand, 10-15% f. gravel			
15					**BORING TERMINATED AT 15.0 FEET** No groundwater encountered Boring set with pipe, sock, and gravel in annular space			
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

APPENDIX C

LABORATORY TEST RESULTS BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

Classification

Soils were classified visually in general accordance to the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the logs of exploratory borings in Appendix A.

Collapse

Several collapse tests were conducted in accordance with ASTM D4546. The results of these tests are presented herewith.

Direct Shear

Direct shear testing was performed on remolded samples of the surficial soils according to ASTM Test Method D 3080. The results of these tests are presented herewith.

Expansion Index

The expansion potential of the soils was determined by performing expansion index tests on two representative soil samples from the site in general accordance with ASTM D 4829. The results of these tests are presented herewith.

In Situ Moisture Content and Unit Weight

The field moisture content was measured in the laboratory on selected samples collected during the field investigation. The field moisture content is determined as a percentage of the dry unit weight. The dry density was measured in the laboratory on selected ring samples. The results are shown on the logs of exploratory borings in Appendix A.

Moisture-Density Relationship

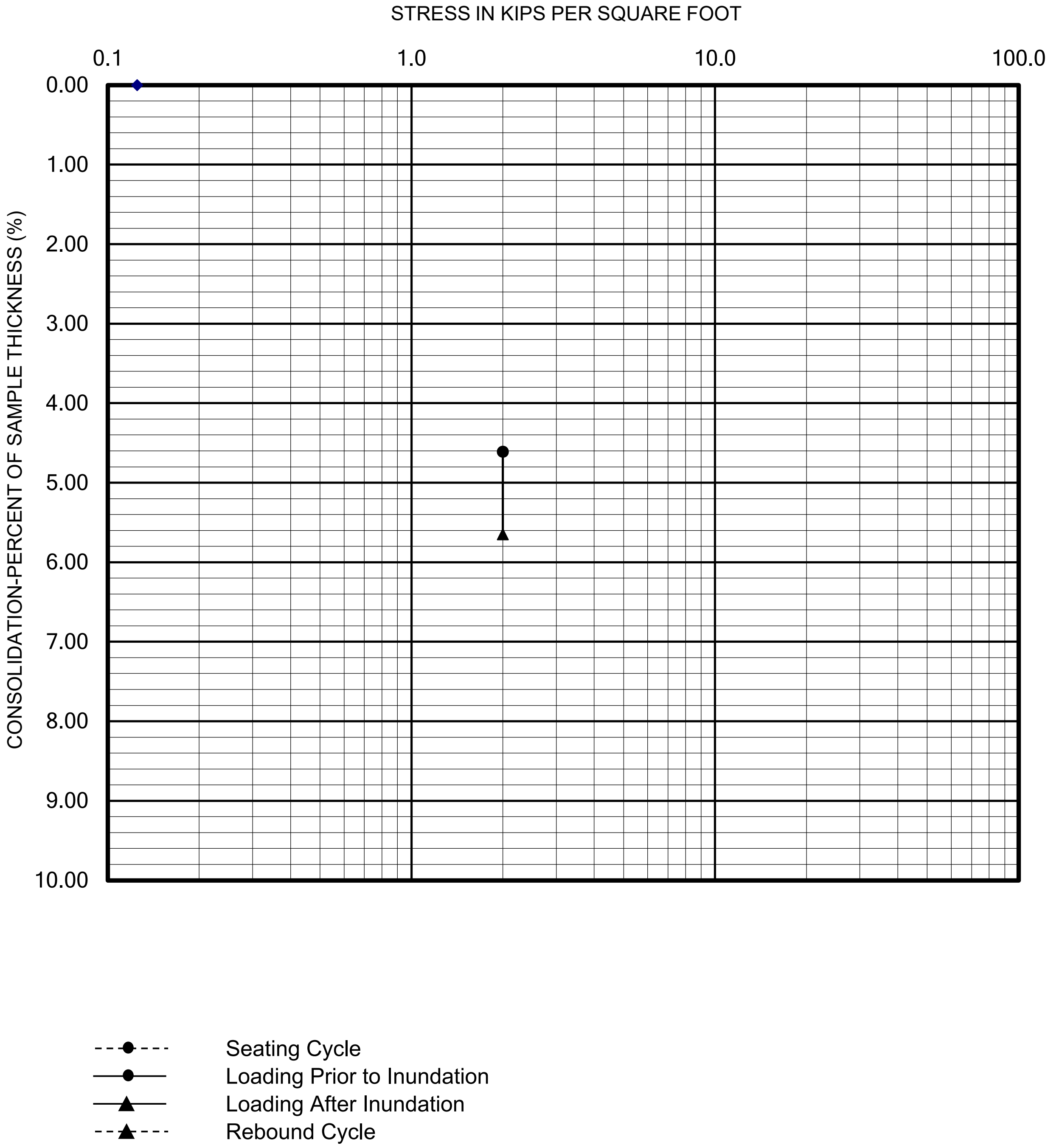
Laboratory testing was performed on a representative soil sample collected during the subsurface exploration. The laboratory maximum dry density and optimum moisture content for the soil type was determined in general accordance with test method ASTM Test Procedure D 1557. The results are presented herewith.

Percent Passing No. 200 Sieve

Several samples were tested to estimate the amount of soil finer than No. 200 sieve. Tests were conducted in general accordance with ASTM D 1140. The results are presented herewith.

Sulfate Content, Resistivity and Chloride Content

Testing to determine the water-soluble sulfate content, minimum resistivity, and chloride concentration in selected soil samples was performed by others. The results are included herewith.



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

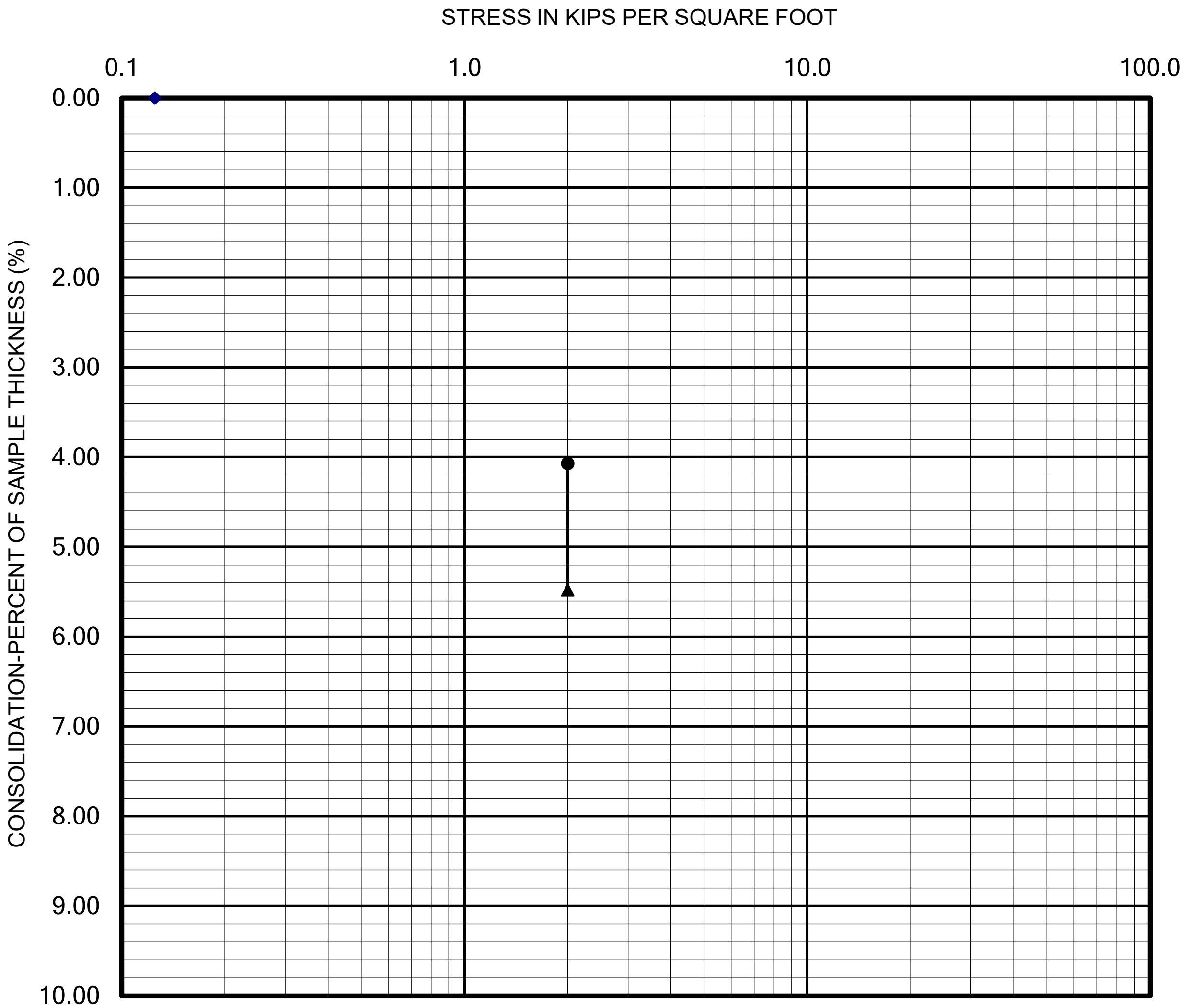
GEOTEK

CHECKED BY: DA | Lab: Corona

PROJECT NO.: 3260-CR | Date: 7/13/2022

COLLAPSE REPORT

Sample: B-2 @ 5 feet



- - ● - - - Seating Cycle
—●— Loading Prior to Inundation
—▲— Loading After Inundation
- - ▲ - - - Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

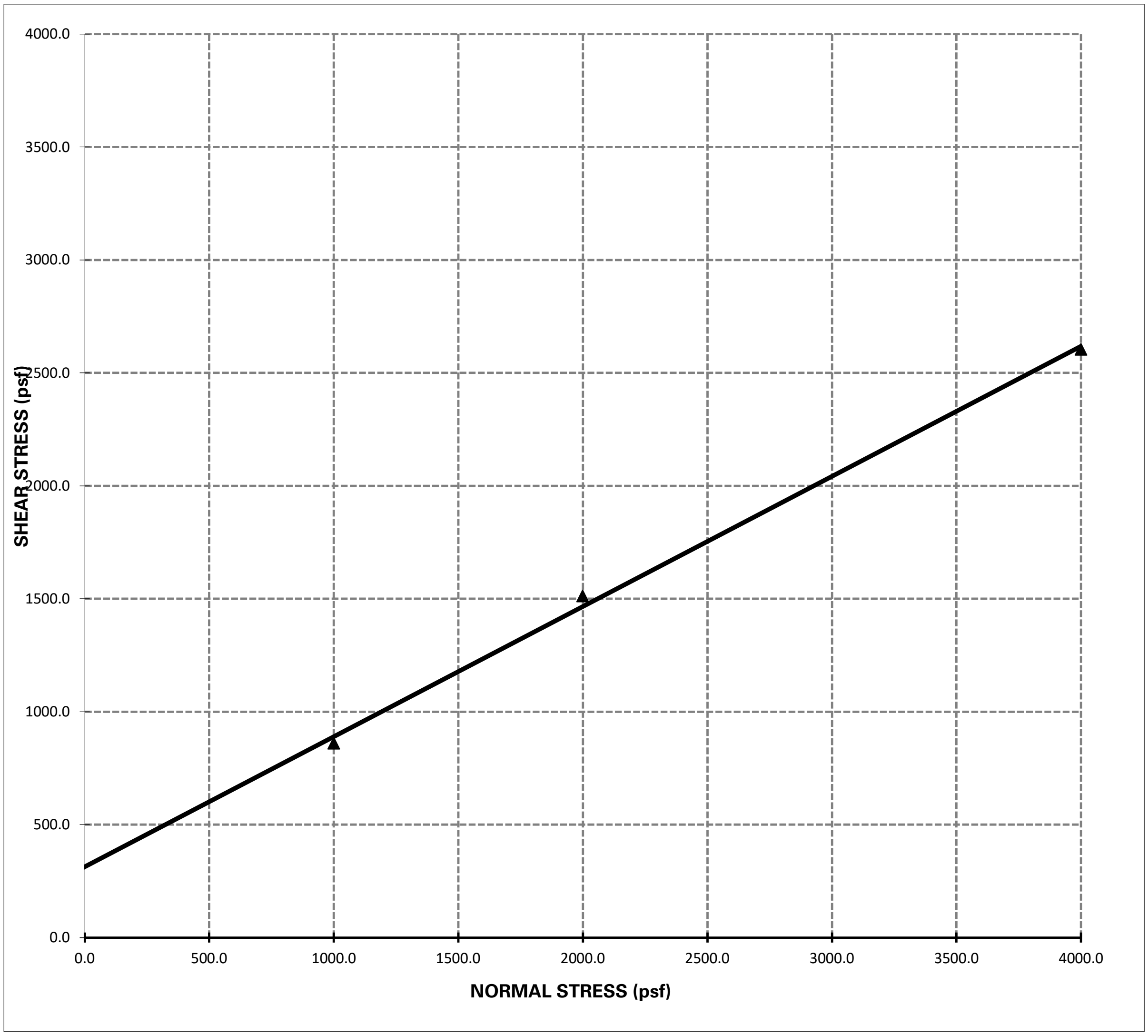
COLLAPSE REPORT

Sample: B-2 @ 15 feet

CHECKED BY: DA	Lab: Corona
PROJECT NO.: 3260-CR	Date: 7/13/2022

DIRECT SHEAR TEST

Project Name: 1000 North Azusa Avenue, Covina
Project Number: 3260-CR
Sample Location: B-1 @ 2-5 feet
Date Tested: 7/11/2022



Shear Strength: Φ = 30 °, C = 314 psf

Notes:

1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client: Melia Homes
Project Number: 3260-CR
Project Location: 1000 N Azusa Avenue, Covina

Tested/ Checked By: MP Lab No Corona
Date Tested: 7/14/2022
Sample Source: B-1 @ 2-5 feet
Sample Description:

Ring #: Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

Weight of compacted sample & ring (gm)	781.0
Weight of ring (gm)	370.3
Net weight of sample (gm)	**410.7**
Wet Density, lb / ft3 (C*0.3016)	**123.9**
Dry Density, lb / ft3 (D/1.F)	**114.1**

SATURATION DETERMINATION

Moisture Content, %	8.6
Specific Gravity, assumed	**2.70**
Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
% Saturation	**48.7**

READINGS			
DATE	TIME	READING	
7/14/2022		0.3510	Initial
7/14/2022		0.3490	10 min/Dry
7/15/2022		0.3490	Final

FINAL MOISTURE	
Final Weight of wet sample & tare	% Moisture
800.8	**13.4**

EXPANSION INDEX = 0

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client: Melia Homes
Project Number: 3260-CR
Project Location: 1000 N Azusa Avenue, Covina

Tested/ Checked By: MP Lab No Corona
Date Tested: 7/14/2022
Sample Source: B-2 @ 2-5 feet
Sample Description:

Ring #:______ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

Weight of compacted sample & ring (gm)	771.9
Weight of ring (gm)	368.2
Net weight of sample (gm)	**403.7**
Wet Density, lb / ft3 (C*0.3016)	**121.8**
Dry Density, lb / ft3 (D/1.F)	**111.2**

SATURATION DETERMINATION

Moisture Content, %	9.5
Specific Gravity, assumed	**2.70**
Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
% Saturation	**49.8**

READINGS			
DATE	TIME	READING	
7/14/2022		0.3580	Initial
7/14/2022		0.3570	10 min/Dry
7/15/2022		0.3650	Final

FINAL MOISTURE	
Final Weight of wet sample & tare	% Moisture
791.4	**14.3**

EXPANSION INDEX = **8**

GEOTEK

MOISTURE/DENSITY RELATIONSHIP

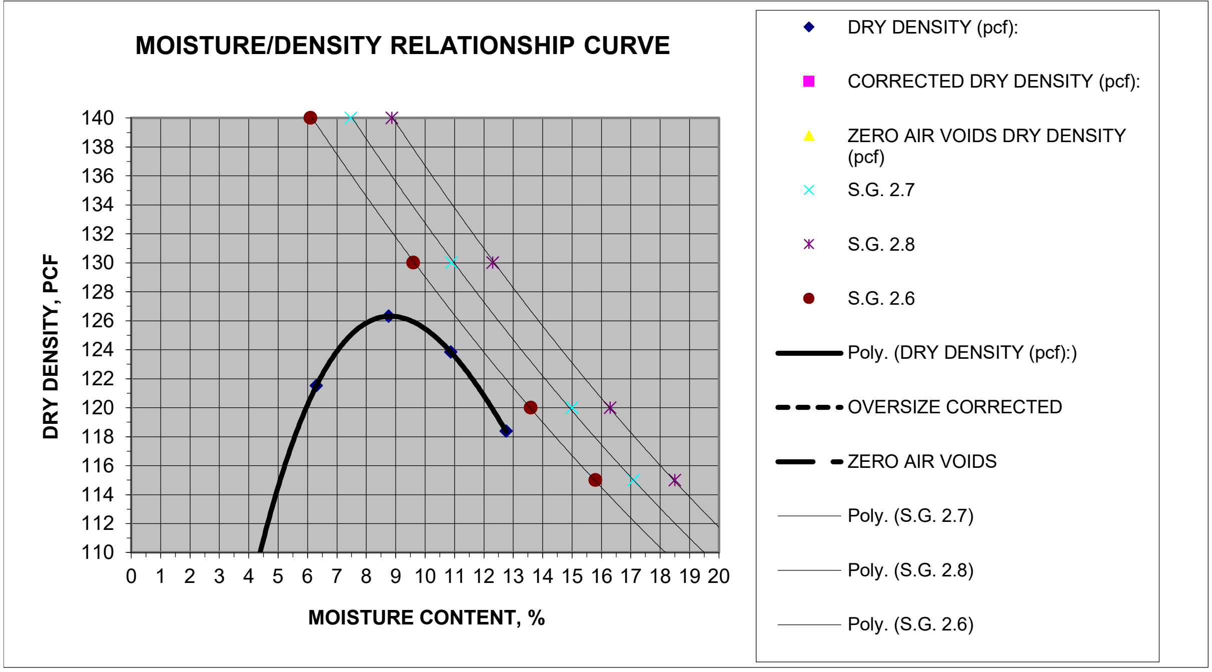
Client: Melia Homes
Project: 1000 North Azusa Ave
Location: Covina
Material Type: Brown silty f-m sand
Material Supplier: -
Material Source: -
Sample Location: B1 @ 2-5 feet
-

Job No.: 3260-CR
Lab No.: Corona

Sampled By: KIG
Received By: MJP
Tested By: MJP
Reviewed By: DA

Date Sampled: 6/29/2022
Date Received: 6/29/2022
Date Tested: 7/7/2022
Date Reviewed: 7/20/2022

Test Procedure: ASTM D1557 **Method:** A
Oversized Material (%): 10.5 **Correction Required:** ☒ **yes** ☐ **no**



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 126.5 **@ Optimum Moisture, %** 9.0
Corrected Maximum Dry Density, pcf **@ Optimum Moisture, %**

MATERIAL DESCRIPTION

Grain Size Distribution:

% Gravel (retained on No. 4)
% Sand (Passing No. 4, Retained on No. 200)
% Silt and Clay (Passing No. 200)

Atterberg Limits:

Liquid Limit, %
Plastic Limit, %
Plasticity Index, %

Classification:

Unified Soils Classification:
AASHTO Soils Classification:

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-1

Client: Melia Homes depth 25 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	297	63.4	17.6%	

Dry Weight 360.4

Soak Time 1440 Minutes

-200 WASH

Date: 7/7/2022
W.O.: 3260-CR sample ID B-2
Client: Melia Homes depth 2-5 feet
Project: 1000 North Azusa Avenue, Covina

Sieve Size	**Particle Diameter**		**Wt. Retained**	**Wt. Passing**	**% Passing**	**Specs**
	in.	**mm.**				
#200	0.0029	0.074	252.5	168.7	40.1%	

Dry Weight 421.2

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 5 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	196.1	96.2	32.9%	

Dry Weight 292.3

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 7 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	224.2	67.3	23.1%	

Dry Weight 291.5

Soak Time 1440 Minutes

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 15 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	164.4	74.8	31.3%	

Dry Weight 239.2

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 25 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	416.8	23.2	5.3%	

Dry Weight 440

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 40 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	199.3	116.3	36.9%	

Dry Weight 315.6

Soak Time 1440 Minutes

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: 1000 North Azusa, Covina
Client Job Number: 3260-CR Melia Homes
Project X Job Number: S220708D
July 12, 2022

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity**		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^{--}	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	As Rec'd (Ohm-cm)	Minimum (Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B1	2-5'	127.2	0.0127	57.2	0.0057	17,420	6,700	8.2	187	0.57	12.4	4.4	ND	55.8	6.6	23.0	31.2	1.1	1.1
B2	2-5'	71.9	0.0072	25.5	0.0026	12,730	6,231	7.8	146	0.90	11.8	4.2	ND	39.5	12.6	21.1	31.6	2.1	6.6

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

APPENDIX D

INFILTRATION TEST DATA BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GeoTek, Inc.

INFILTRATION TESTING

Depth of Hole (D_T) in.	180		**Test No. I-1**
Boring Radius, in.	4		**3260-CR**

Trial No.	**Time Interval (ΔT) Min.**	**Initial Depth (D_0) in.**	**Final Depth (D_f) in.**	**Change In Level (ΔD) in.**	**Flow Rate (in3/hr)**	**Surface Area of Test Section (in2)**	**Field Infiltration Rate (in/hr)**
10 min test	10	156.00	170.00	14.00			
1	10	156.00	170.00	14.00	4222.30	301.59	14.00
2	10	156.00	169.13	13.13	3958.40	323.58	12.23
3	10	156.00	174.38	18.38	5541.76	191.64	28.92
4	10	156.00	170.38	14.38	4335.39	292.17	14.84
5	10	156.00	171.13	15.13	4561.59	273.32	16.69
6	10	156.00	168.75	12.75	3845.31	333.01	11.55
7	10	156.00	168.00	12.00	3619.11	351.86	10.29
8	10	156.00	168.50	12.50	3769.91	339.29	11.11
9	10	156.00	169.50	13.50	4071.50	314.16	12.96
10	10	156.00	168.25	12.25	3694.51	345.57	10.69
11	10	156.00	168.00	12.00	3619.11	351.86	10.29
12	10	156.00	168.13	12.13	3656.81	348.72	10.49

GeoTek, Inc.

INFILTRATION TESTING

Depth of Hole (D_T) in. 180

Boring Radius, in. 4

Test No. I-2

3260-CR

Trial No.	**Time Interval (ΔT) Min.**	**Initial Depth (D_0) in.**	**Final Depth (D_f) in.**	**Change In Level (ΔD) in.**	**Flow Rate (in3/hr)**	**Surface Area of Test Section (in2)**	**Field Infiltration Rate (in/hr)**
10 min test	10	156.00	170.00	14.00			
1	10	156.00	170.50	14.50	4373.09	289.03	15.13
2	10	156.00	164.00	8.00	2412.74	452.39	5.33
3	10	156.00	164.75	8.75	2638.94	433.54	6.09
4	10	156.00	164.38	8.38	2525.84	442.96	5.70
5	10	156.00	162.38	6.38	1922.65	493.23	3.90
6	10	156.00	162.13	6.13	1847.25	499.51	3.70
7	10	156.00	161.75	5.75	1734.16	508.94	3.41
8	10	156.00	161.88	5.88	1771.86	505.80	3.50
9	10	156.00	162.00	6.00	1809.56	502.65	3.60
10	10	156.00	161.75	5.75	1734.16	508.94	3.41
11	10	156.00	161.75	5.75	1734.16	508.94	3.41
12	10	156.00	161.63	5.63	1696.46	512.08	3.31

APPENDIX E

RESULTS OF SEISMIC SETTLEMENT ANALYSIS

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

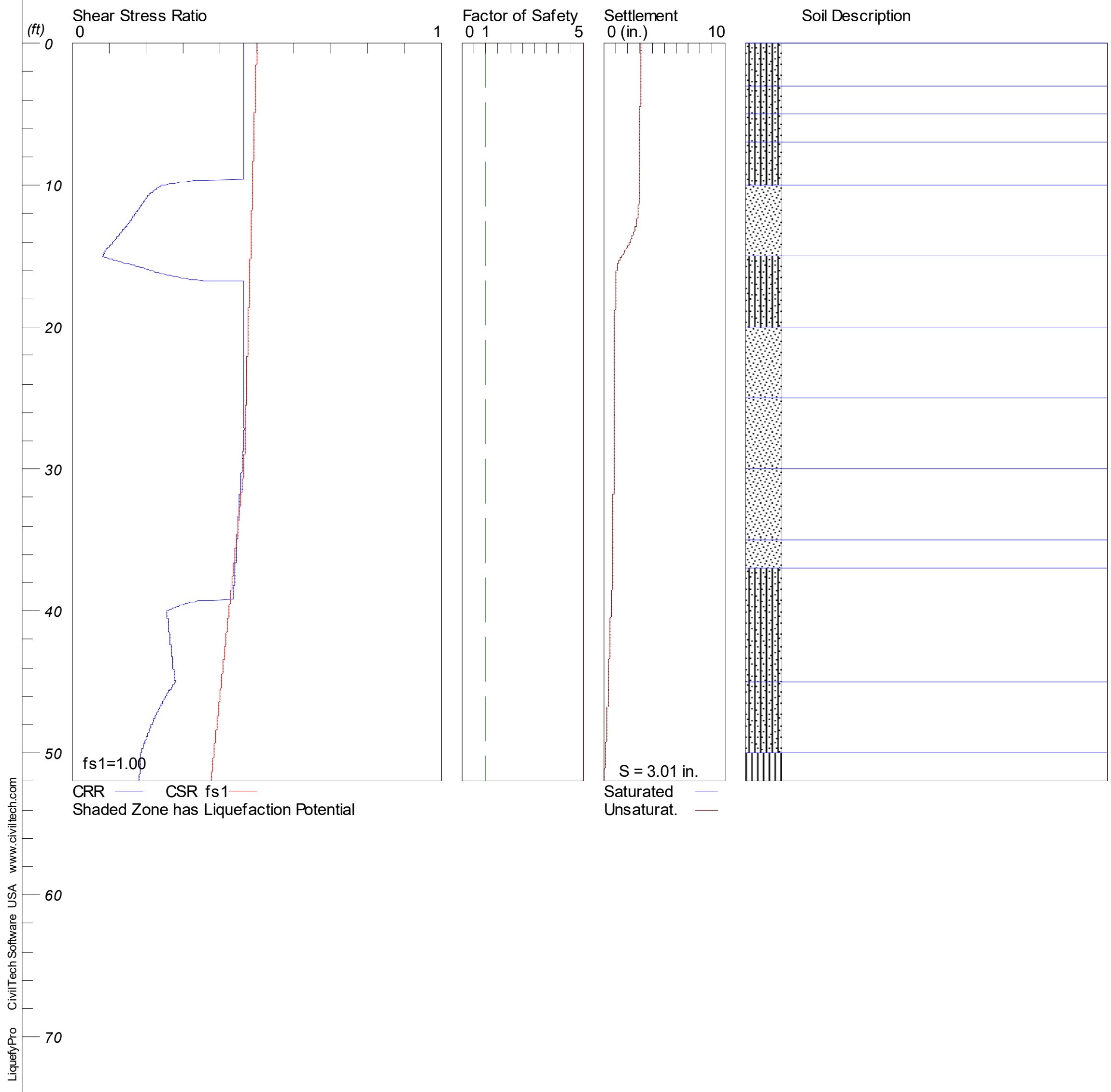
GEOTEK

LIQUEFACTION ANALYSIS

1000 N. Azusa Avenue, Covina

Hole No.=B-2   Water Depth=200 ft

Magnitude=7.72
Acceleration=0.77g



GeoTek, Inc.

APPENDIX F

GENERAL EARTHWORK AND GRADING GUIDELINES

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor’s overall level of efforts during grading. The contractor’s personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor’s responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.

6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.
7. Procedures for testing of fill slopes are as follows:
    a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
    b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).

2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
    a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
    b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
    a) They are not placed in concentrated pockets;
    b) There is a sufficient percentage of fine-grained material to surround the rocks;
    c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractors responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractors procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractors attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

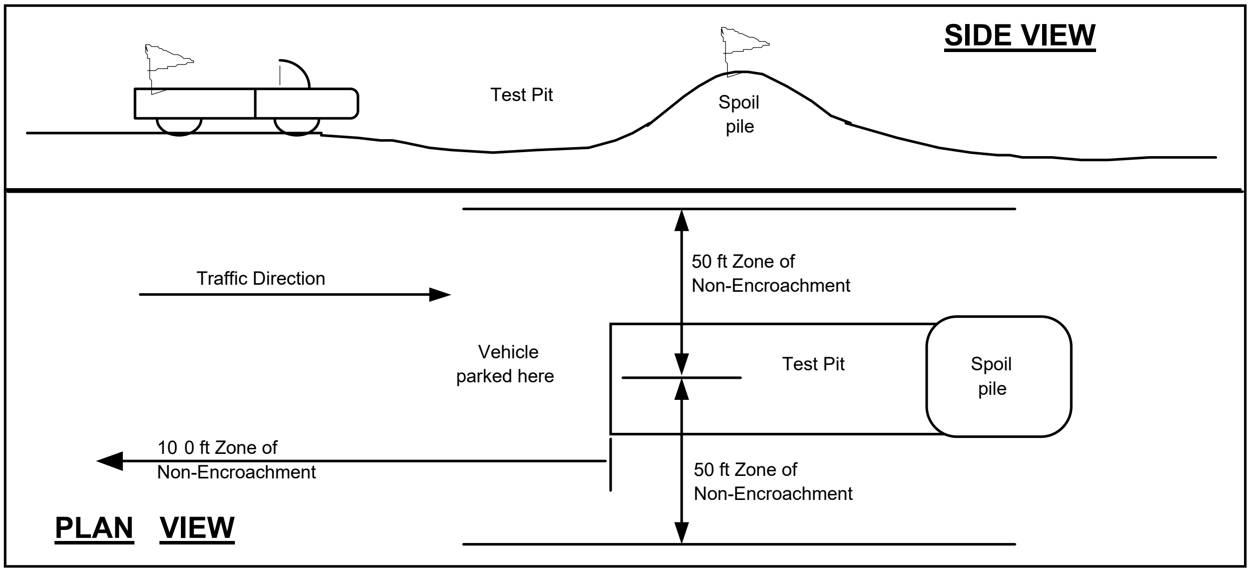
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;
1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

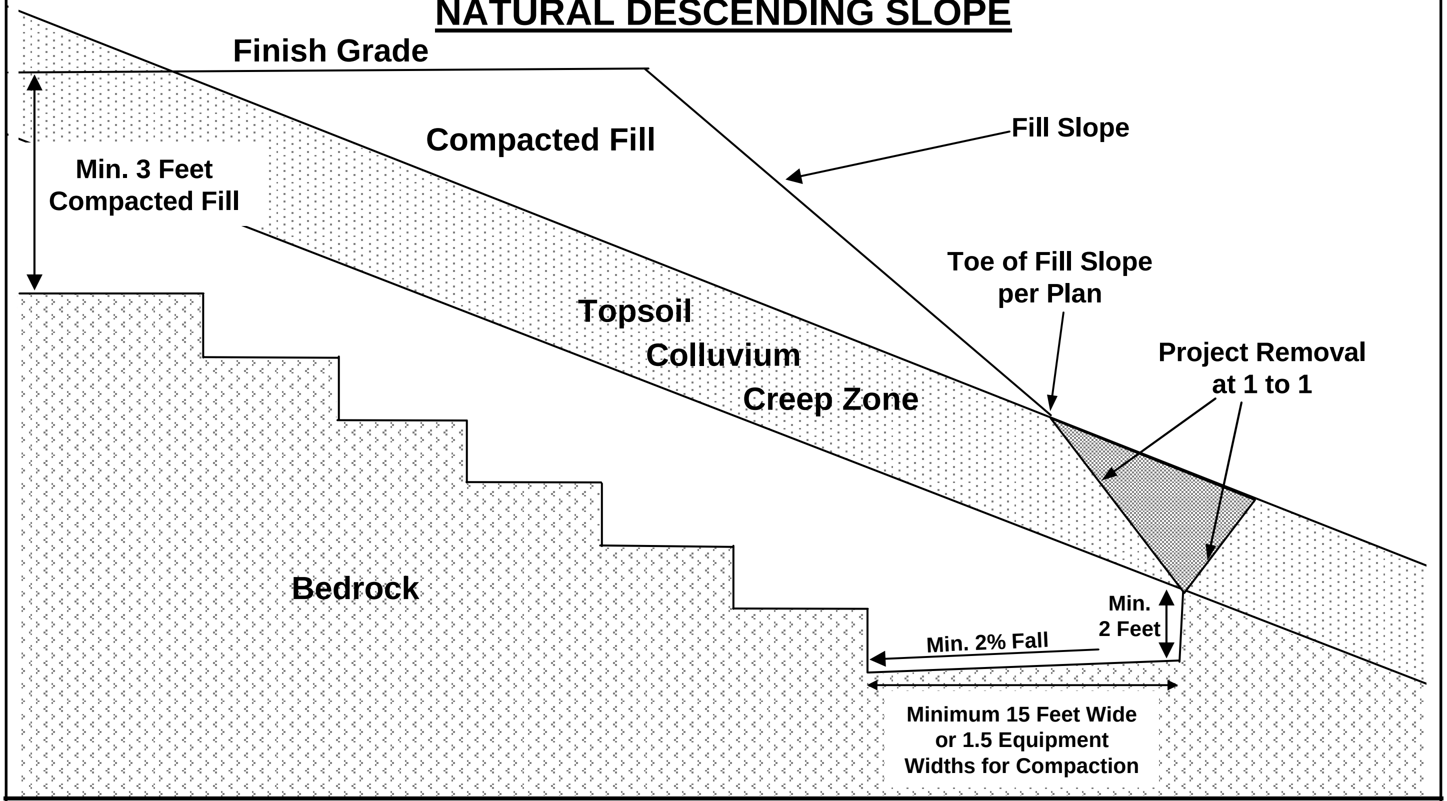
In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor’s representative will then be contacted in an effort to effect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technicians attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

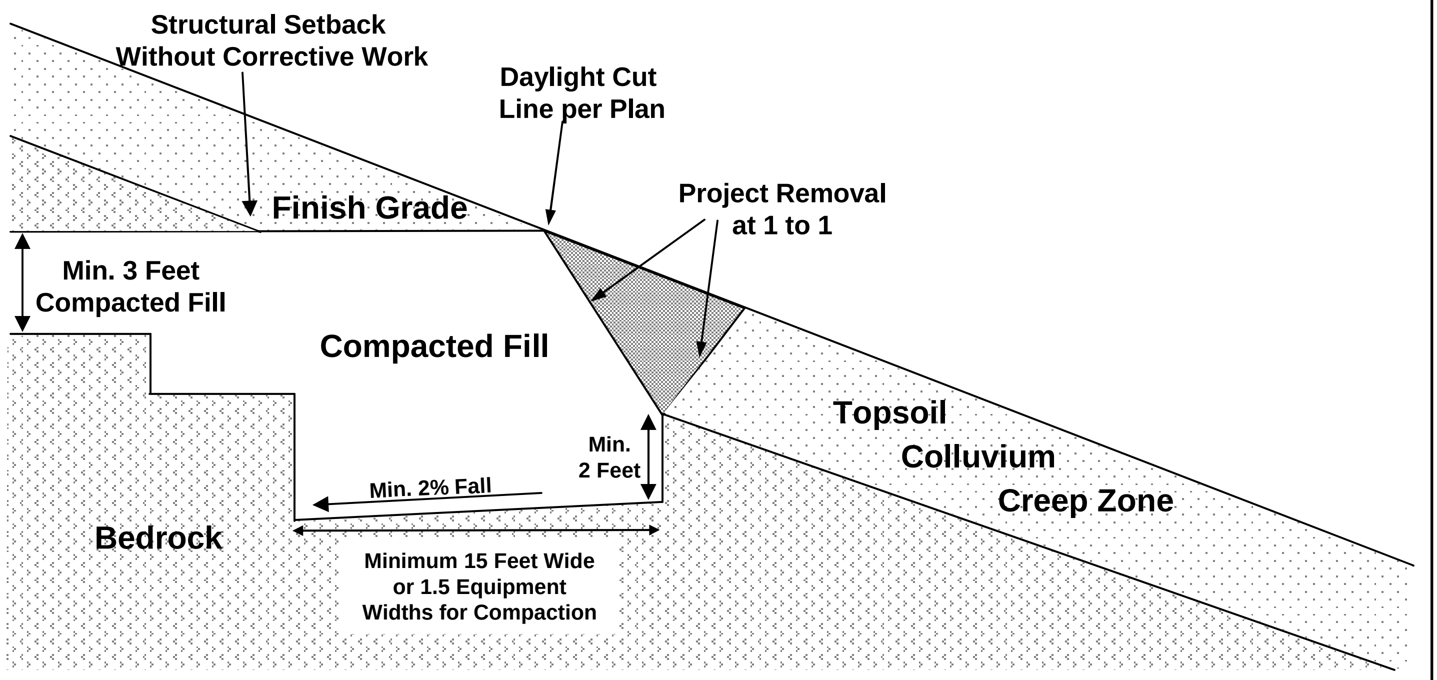
The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE



DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



GEOTEK

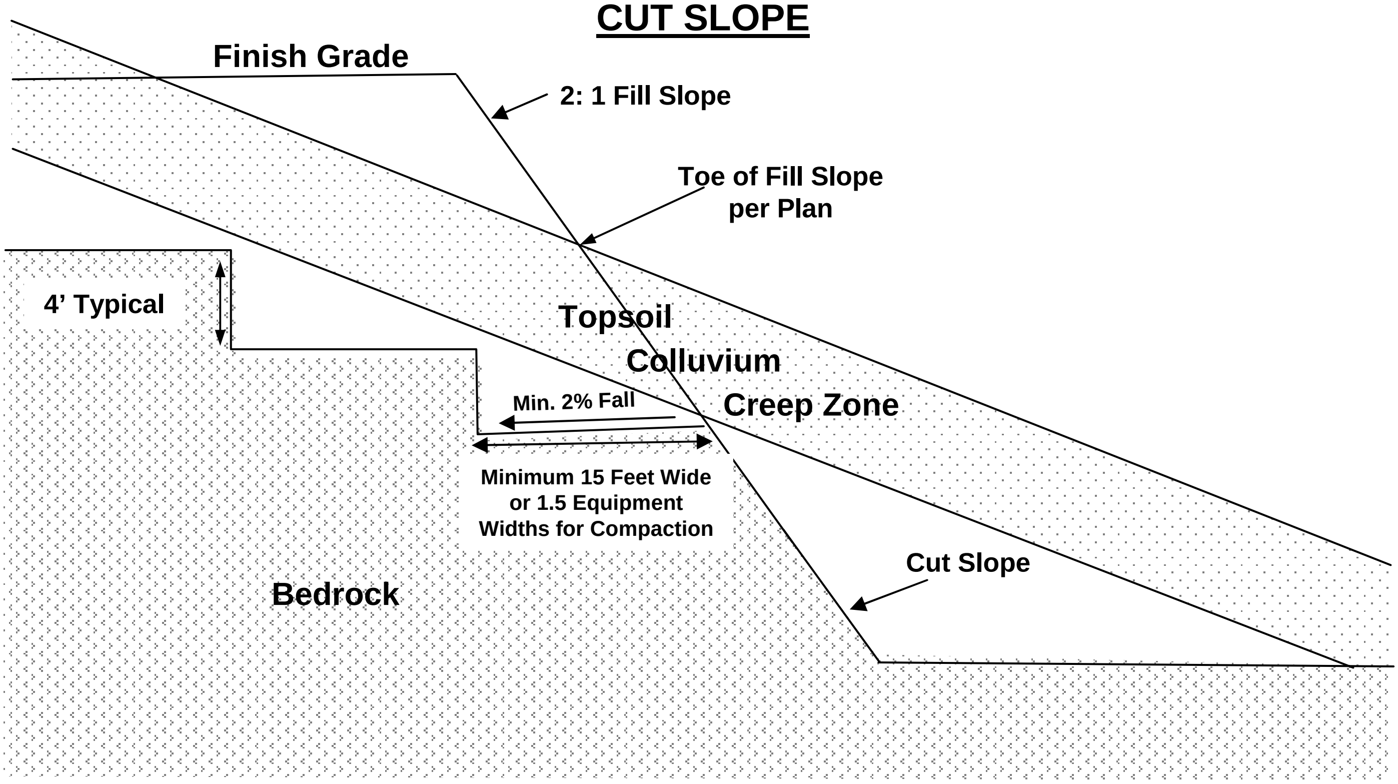
1548 North Maple Street
Corona, California 92878

TREATMENT ABOVE
NATURAL SLOPES

STANDARD GRADING
GUIDELINES

PLATE F-1

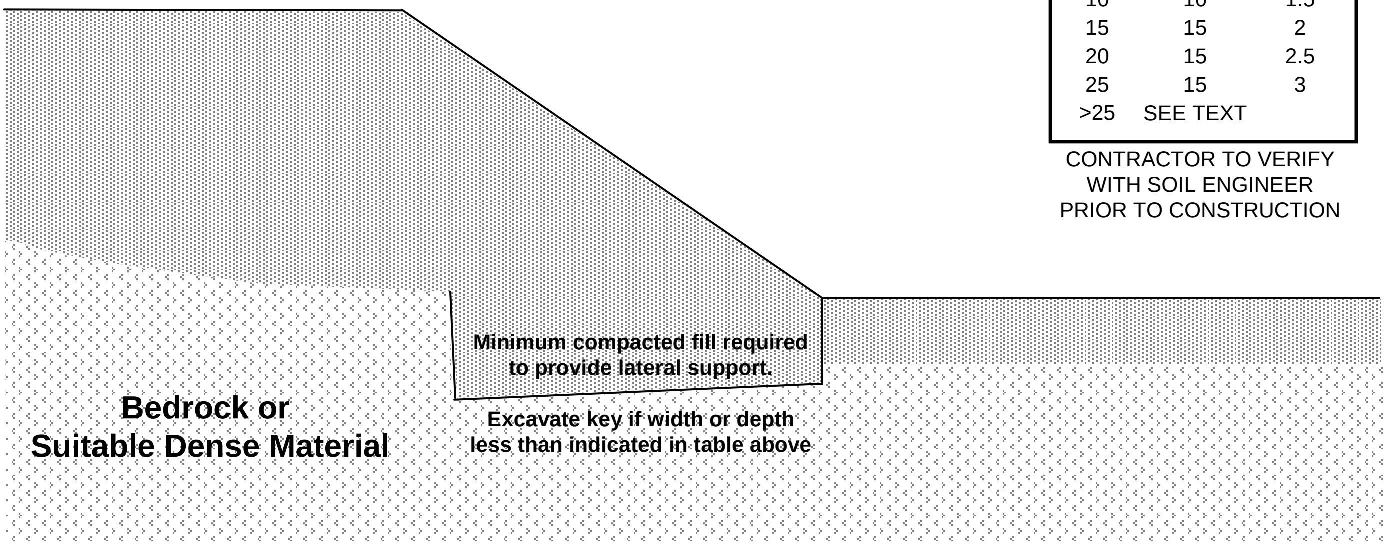
TYPICAL FILL SLOPE OVER CUT SLOPE



TYPICAL FILL SLOPE

SLOPE HEIGHT	MIN. KEY WIDTH	MIN. KEY DEPTH
5	7	1
10	10	1.5
15	15	2
20	15	2.5
25	15	3
>25	SEE TEXT	

CONTRACTOR TO VERIFY
WITH SOIL ENGINEER
PRIOR TO CONSTRUCTION



GEOTEK

1548 North Maple Street
Corona, California 92878

COMMON FILL
SLOPE KEYS

STANDARD GRADING
GUIDELINES

PLATE F-2

EXHIBITS

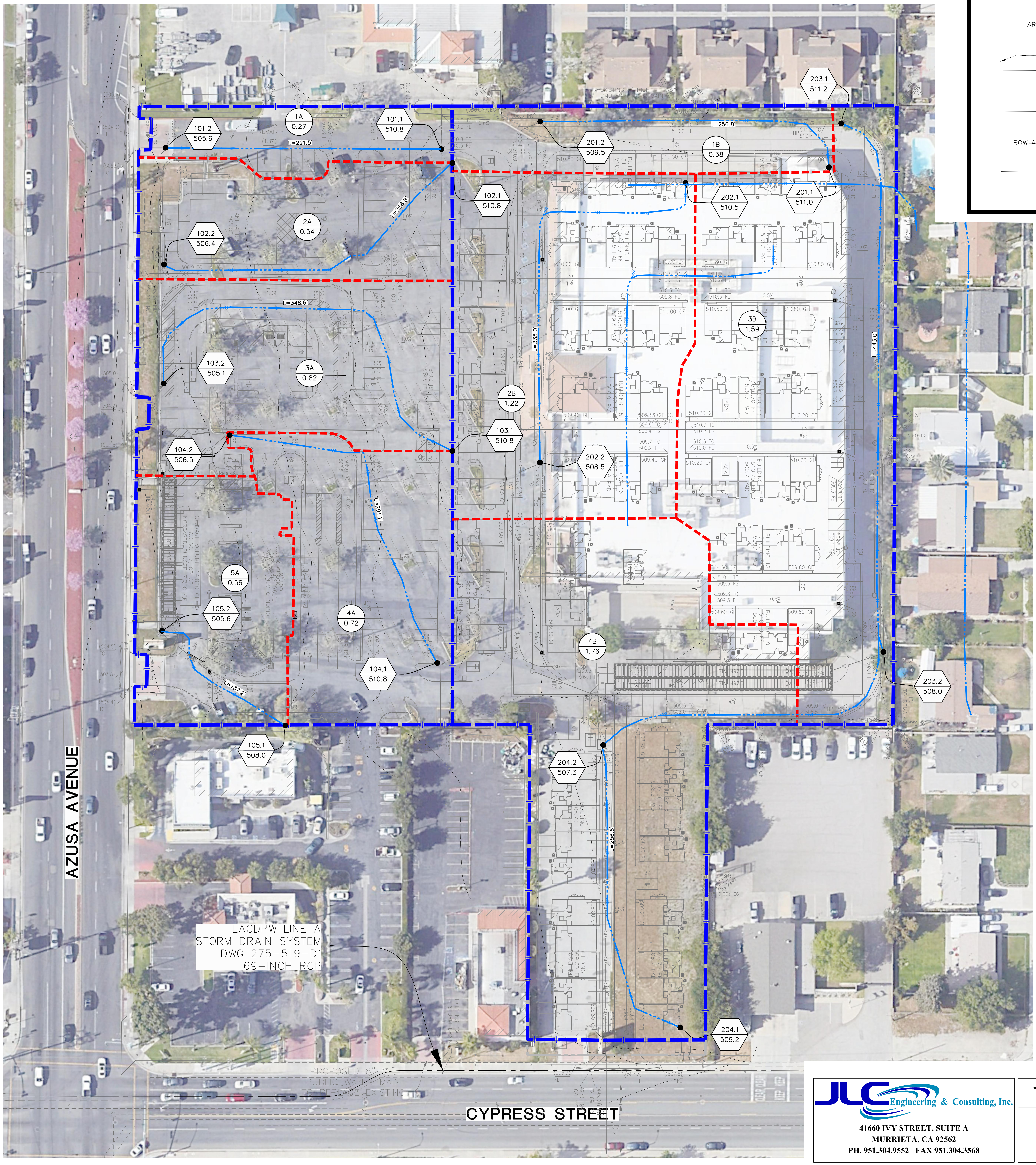
EXHIBIT A: CATCH BASIN & INLET HYDROLOGY MAP

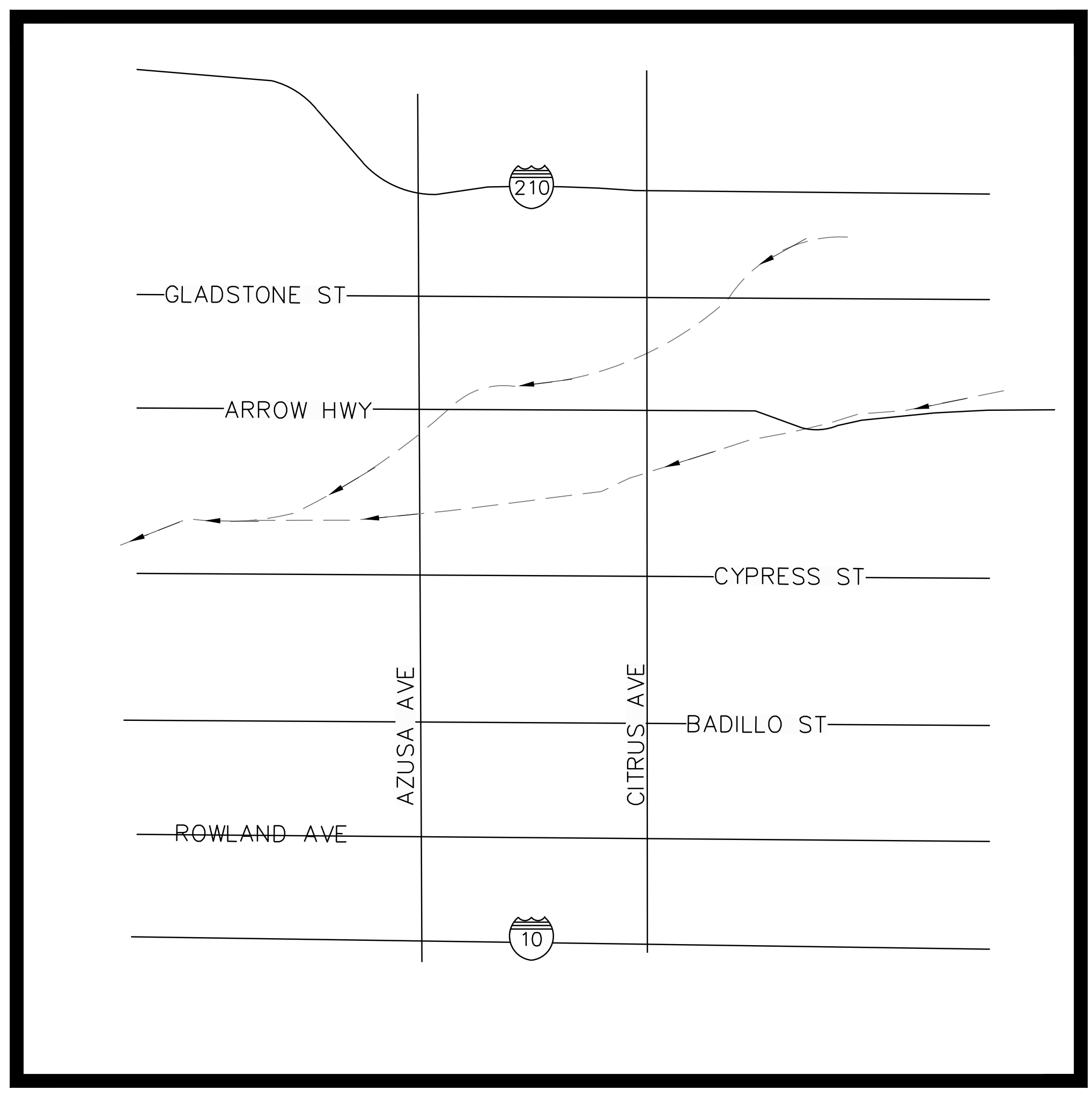
SHEET 1 OF 1

TENTATIVE TRACT MAP NO. 83215

IN THE CITY OF COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

POST-PROJECT INLET HYDROLOGY MAP





HYDROLOGY DESIGN NOTES:

1. BASIN SIZING IS BASED ON CALCULATIONS FOR ENTIRE DRAINAGE AREA A (2.91) AND DRAINAGE AREA B (4.95 AC).
2. DRAINAGE AREA A CONSIST OF AREA 1A, 2A, 3A, 4A & 5A. FLOW LENGTH IS EQUAL TO 499'. SLOPE OF AREA A IS EQUAL TO ±0.9%.
3. DRAINAGE AREA B CONSIST OF AREA 1B, 2B, 3B, & 4B.FLOW LENGTH IS EQUAL TO 782'. SLOPE OF AREA A IS EQUAL TO ±0.5%.
4. AREA A USED AN IMPERVIOUS PERCENTAGE OF 96%
5. AREA B USED AN IMPERVIOUS PERCENTAGE OF 78%

25 YEAR POST PROJECT FLOW RATES

SUBAREA	PEAK FLOW (ft^3/s)
1A	0.92
2A	1.83
3A	2.78
4A	2.44
5A	1.90
TOTAL AREA A	8.410
1B	1.28
2B	3.76
3B	4.54
4B	5.93
TOTAL AREA B	11.84

LEGEND:

⬡ X.X / X.X	NODE/CONCENTRATION POINT FLOWLINE ELEVATION
◯ XXX / X.X	SUB AREA ACRES
─ · · ─	FLOW PATH
─ · ─	WATERSHED BOUNDARY
- - -	WATERSHED SUB-AREAS

HYDROLOGY DATA

SOIL TYPE: 006

50 YR RAINFALL: 7.2 INCHES

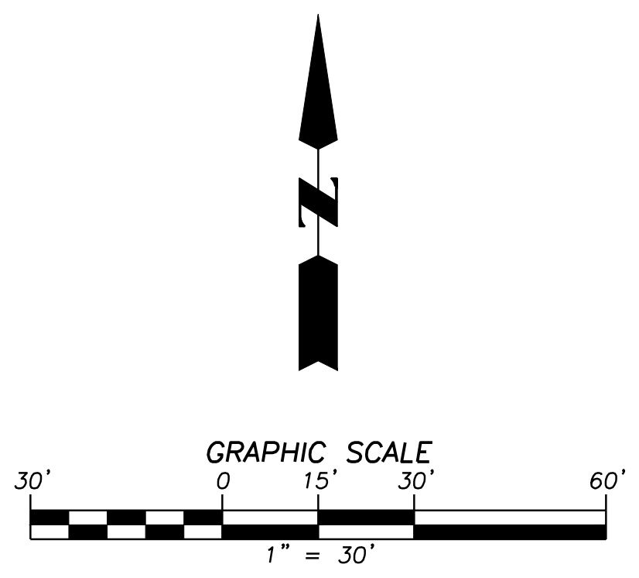


EXHIBIT "A"

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

TENTATIVE TRACT MAP 83215

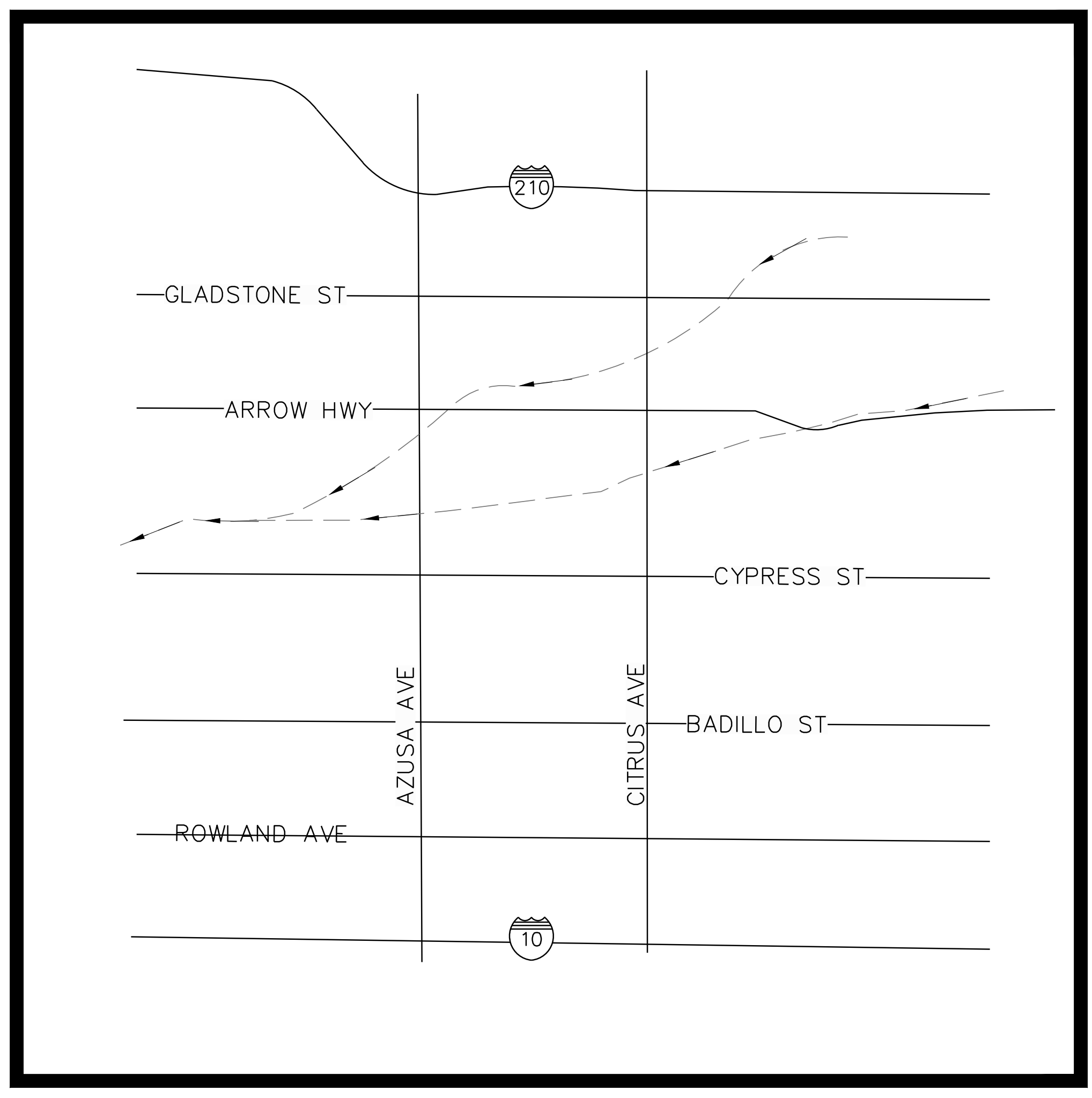
POST-PROJECT
INLET HYDROLOGY MAP

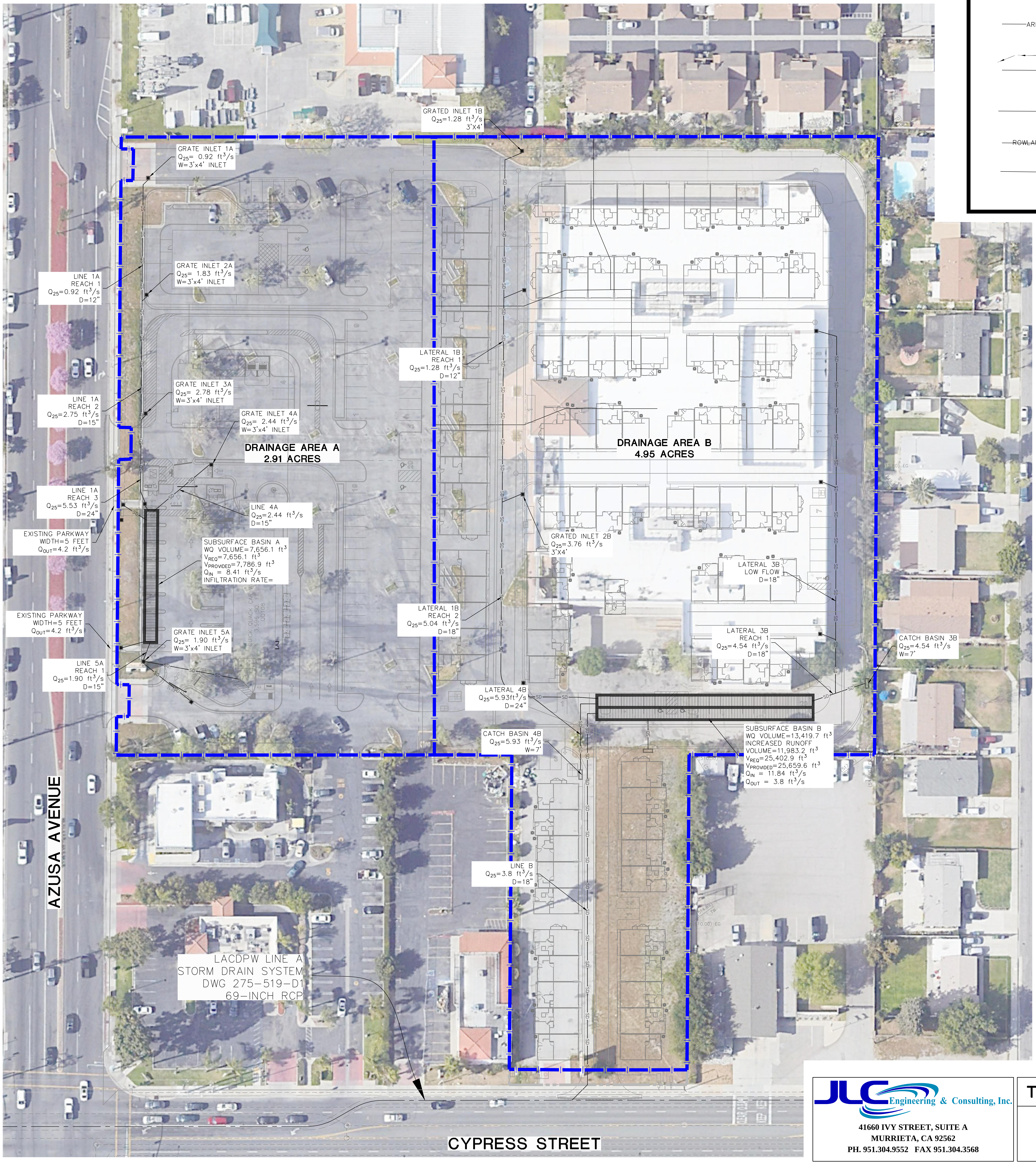
Drawing Name: O:\205.17.18\Engineering\Hydrology_Plan\Exhibits\Exhibit A Inlet Hydrology Map.dwg
Last Opened: Dec 14, 2022 - 11:57am by BWILTZEN

EXHIBIT B: DRAINAGE FACILITIES MAP

SHEET 1 OF 1

TENTATIVE TRACT MAP NO. 83215
IN THE CITY OF COVINA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA
DRAINAGE FACILITIES MAP





25 YEAR INLET
FLOW RATES

SUBAREA	PEAK FLOW (ft^3/s)
1A	0.92
2A	1.83
3A	2.780
4A	2.44
5A	1.90
TOTAL AREA A	8.41
1B	1.28
2B	3.76
3B	4.54
4B	5.93
TOTAL AREA B	11.84

LEGEND:

— · — · —	WATERSHED BOUNDARY

HYDROLOGY DATA

SOIL TYPE: 006

50 YR RAINFALL: 7.2 INCHES

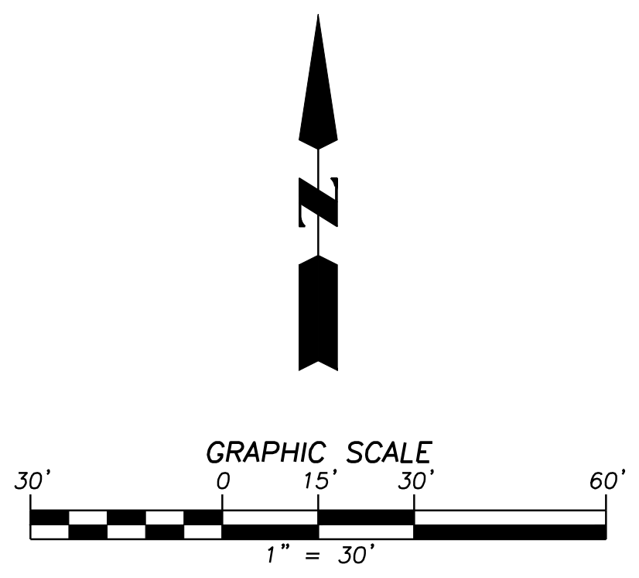


EXHIBIT "B"

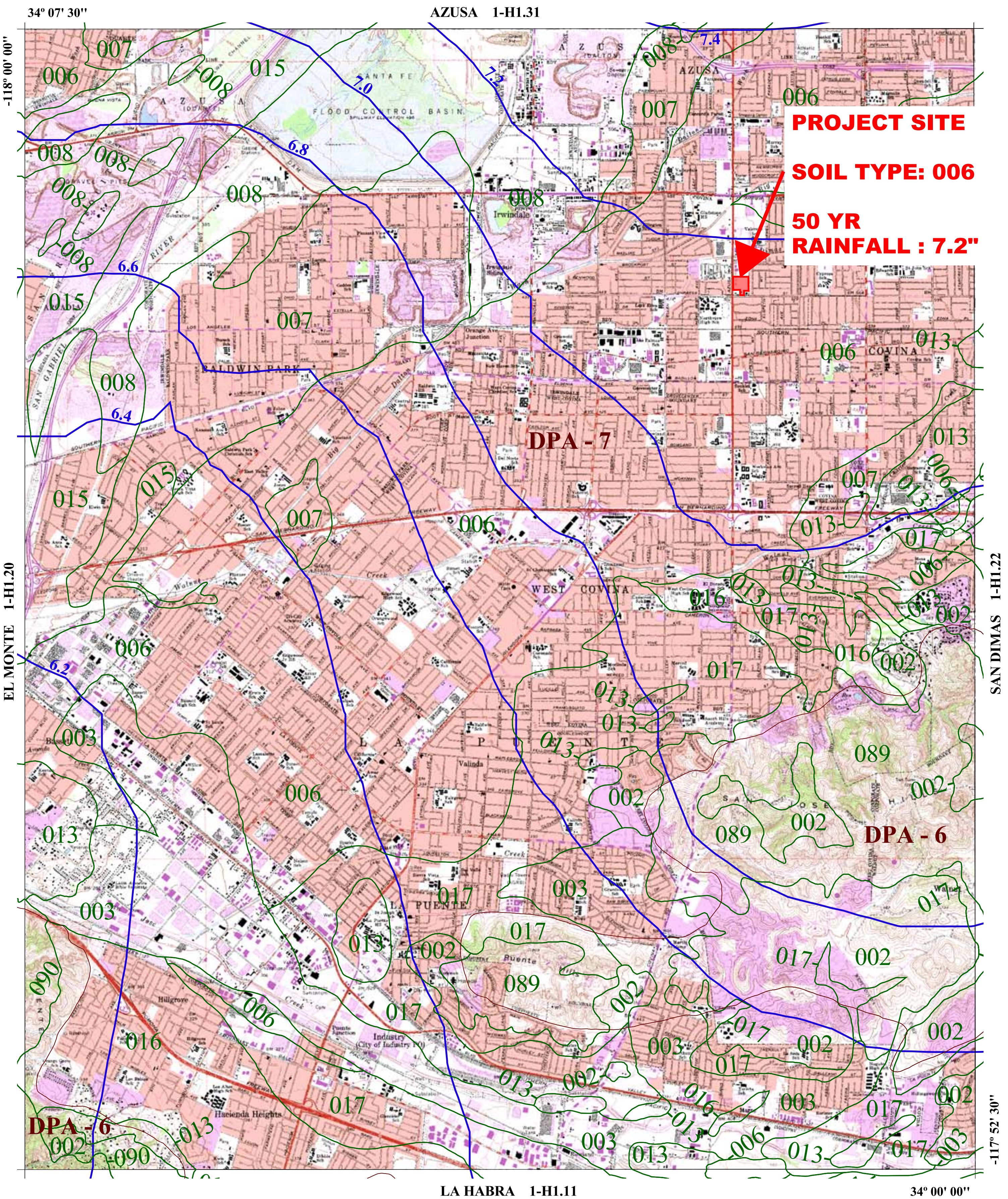
JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

TENTATIVE PARCEL MAP 83215

DRAINAGE
FACILITIES MAP

Drawing Name: O:\205.17.18\Engineering\Hydrology_Plan\Exhibits\Exhibit B Drainage Facilities Map.dwg
Last Opened: Feb 20, 2023 - 10:40am by joe

EXHIBIT C: RAINFALL & SOIL DATA MAP



016	SOIL CLASSIFICATION AREA
7.2	INCHES OF RAINFALL
DPA - 6	DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

BALDWIN PARK
50-YEAR 24-HOUR ISOHYET

1-H1.21

APPENDIX K

Low Impact Development Plan (LID Plan)

Project Name:

Covina Village

Tentative Tract Map No. 82315 & Tentative Parcel Map No. 84018

845 WEST CYPRESS STREET & 1000 NORTH AZUSA AVENUE

Covina, CA 91722

Prepared for:

PKL Investments, LLC

2863 Maricopa Street

Torrance, CA 90503

(714) 738-0828

Prepared by:

Land Development Consultants

1520 Brookhollow Drive, Suite 33

Santa Ana, CA 92705

(714) 557-7700

HERSEL MOUSSA-ZAHAB
C 44560
3/31/24

PE Stamp & Sign Here

Date Prepared – 2/20/23

Project Owner's Certification

I certify under penalty of law that this document and all attachments were prepared under my jurisdiction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathered the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner's Name:			
Owner's Title:			
Company:	PKL Investments, LLC		
Address:	2863 Torrance, CA 90503		
Email:			
Telephone No:	(714) 738-0828		
Signature:		Date:	

Preparer (Engineer) Certification

Engineer's Name:	Hersel Moussa-Zahab
Engineer's Title:	Principal
Company:	Land Development Consultants
Address:	1520 Brookhollow Drive, Suite 33
Email:	hzahab@ldc-ce.com
Telephone No:	(714) 557-7700

I hereby certify that this Low Impact Development Plan is in compliance with, and meets the requirements set forth in, Order No. R4-2012-0175, of the Los Angeles Regional Water Quality Control Board.

Engineer's Signature		Date	2/21/23
Place Stamp Here	REGISTERED PROFESSIONAL ENGINEER HERSEL MOUSSA-ZAHAB C 44560 3/31/24 CIVIL STATE OF CALIFORNIA		

Table of Contents

Attachments

1. PROJECT DESCRIPTION

1.1. PROJECT CATEGORY

Category	YES	NO
1. Development [a] of a new project equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious area [b]	☒	☐
2. Development [a] of a new industrial park with 10,000 square feet or more of surface area [c]	☐	☐
3. Development [a] of a new commercial mall with 10,000 square feet or more surface area [c]	☐	☐
4. Development [a] of a new retail gasoline outlet with 5,000 square feet or more of surface area [c]	☐	☐
5. Development [a] of a new restaurant (SIC 5812) with 5,000 square feet or more of surface area [c]	☐	☐
6. Development [a] of a new parking lot with either 5,000 ft^2 or more of impervious area [b] or with 25 or more parking spaces	☐	☐
7. Development [a] of a new automotive service facility (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area [c]	☐	☐
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA),[d] where the development will: a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and b. Create 2,500 square feet or more of impervious area [b]	☐	☐
9. Redevelopment [e] of 5,000 square feet or more in one of the categories listed above **If yes, list redevelopment category here:**	☐	☐
10. Redevelopment [e] of 10,000 square feet or more to a Single Family Home, without a change in landuse.	☐	☐

[a] Development includes any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance.

[b] Surfaces that do not allow stormwater runoff to percolate into the ground. Typical impervious surfaces include: concrete, asphalt, roofing materials, etc.

[c] The surface area is the total footprint of an area. Not to include the cumulative area above or below the ground surface.

[d] An area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and would be disturbed or degraded by human activities and developments. Also, an area designated by the City as approved by the Regional Water Quality Control Board.

[e] Land-disturbing activities that result in the creation, addition, or replacement of a certain amount of impervious surface area on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of facility, nor does it include modifications to existing single family structures, or emergency construction activities required to immediately protect public health and safety.

1.2. PROJECT DESCRIPTION

Total Project Area (ft^2): 344,786

Total Project Area (Ac): 7.91

EXISTING CONDITIONS

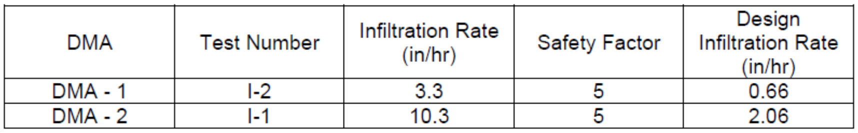
Condition	Area (ft^2)	Percentage (%)
Pervious Area:	51,160	14.8
Impervious Area:	293,626	85.2

PROPOSED CONDITIONS

Condition	Area (ft^2)	Percentage (%)
Pervious Area:	72,300	21.0
Impervious Area:	272,486	79.0

SITE CHARACTERISTICS

DRAINAGE PATTERNS/CONNECTIONS	Existing: Existing project site is currently a supermarket center that is no longer operational. The project is surrounded by residential homes to the north and west and commercial property to the south. 5.7 acres sheet flows towards Azusa Avenue and 2.2 acres flows to Cypress Street.
	Proposed: The project site will collect the onsite flows via curb and gutters, catch basins and subsurface storm drain. Pretreatment to be provided for identified pollutants of concern associated with proposed land use type via Stormexx Clean Catch Basin Inserts at inlets upstream of basins. The onsite flows will be conveyed to two proposed subsurface basins within the project site. The subsurface systems have been designed to allow the DCV to infiltrate into the in-situ soils via perforated aluminized steel type 2 CMPs. The project for DMA 1 and DMA 2 will use the recommended values provided by the geotechnical report. The table below provides the infiltration rate and recommended safety factor per the Geotechnical Report. The subsurface system has been sized using the values below.



DMA	Test Number	Infiltration Rate (in/hr)	Safety Factor	Design Infiltration Rate (in/hr)
DMA - 1	I-2	3.3	5	0.66
DMA - 2	I-1	10.3	5	2.06

DMA – 1 has been designed to collect all runoff through the use of grate inlets. The subsurface system will implement the use of overflow pipes that will connect to existing proposed parkway drains to allow volume in excess of the 85th percentile storm to flow into Azusa Avenue. The parkway drains will allow flows from grate inlets to overflow.

DMA – 2 has been designed to collect all runoff through the use of catch basins and grate inlets. Several storm drains have been designed to convey flows to the subsurface system. The subsurface system will allow the 85th Percentile to infiltrate. Additionally, a manhole with a orifice plate will be designed to restrict the flow from the project to about 3.8 cfs to ensure project complies with the LACDPW Allowable Flow Rate Criteria.

NARRATIVE PROJECT DESCRIPTION:	Tract Map (5.109 ac) for condominium purposes to create 80 multifamily townhomes and 17 Live/Work units with drive aisles, parking, landscaping and recreation area. Parcel Map (2.806 ac) for drive-thru commercial uses including a self-service car wash.

OFFSITE RUNON	No offsite runon. Refer to project drainage report Figure 6 for USGS 1 Meter Dem Topographic Map. The U-Haul drains into a parkway drain and then to Azusa. The housing tract to the north drains to Covina Blvd.
UTILITY AND INFRASTRUCTURE INFORMATION	There are no known existing onsite utility and/or infrastructure that will conflict with proposed stormwater facilities. The proposed sewer, water and dry utility improvements designed to not conflict with proposed subsurface infiltration systems.
SIGNIFICANT ECOLOGICAL AREAS (SEAs)	There are no known SEAs.
RECEIVING WATERS	Receiving waterbodies that follow are Walnut Creek Wash, San Gabriel River Reach 3, San Gabriel River Reach 2, San Gabriel River Reach 1 and the San Gabriel River Estuary. The above mentioned receiving waterbodies are listed for water quality

	impairment on the most recent 303(d)-list for: * Benthic-Macroinvertebrate Bioassessments * Indicator Bacteria * pH * Coliform Bacteria * Cyanide * Lead * Copper * Dioxin * Nickel * Oxygen, Dissolved

Hydromodification Analysis

DOES THE PROPOSED PROJECT FALL INTO ONE OF THE FOLLOWING CATEGORIES? CHECK YES/NO.	YES	NO
1. *Project is a redevelopment that decreases the effective impervious area compared to the pre-project conditions.*	☒	☐
Describe: Project will decrease impervious surface area from 85.2% to 79.0%.		
2. *Project is a redevelopment that increases the infiltration capacity of pervious areas compared to the pre-project conditions.*	☒	☐
Describe: Project will collect onsite flows and convey to subsurface infiltration chambers.		
3. *Project discharges directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q_{100}) of 25,000 cfs or more.*	☐	☒
Describe: Project does not discharge to a receiving water with these conditions.		
4. *Project discharges directly or via a storm drain into concrete or otherwise engineered (not natural) channels (e.g., channelized or armored with rip rap, shotcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to hydromodification impacts.*	☒	☐
Describe: Subsurface basin has been designed to store volume that meter the discharge rate to the allowable flow rate of 0.77 ft3/s per acre which meets the criteria provided by LACDPW for connection to existing 69-inch RCP in Cypress St.		

HYDROMODIFICATION ANALYSIS

The project is exempt from Hydromodification Control Measures.

1.3. PROPERTY OWNERSHIP/MANAGEMENT

- Project to be developed with a fully operational Home Owner’s Association for ownership, management and maintenance purposes of stormwater devices.

OWNER:

PKL Investments, LLC
2863 Maricopa Street
Torrance, CA 90503
(714) 738-0828

2. Best Management Practices (BMPs)

2.1. Site Design

85th Percentile, 24-Hour Storm Depth

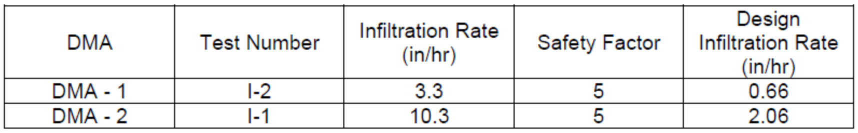
1.01 inch

Refer to Attachment “A” for 85th percentile Isohyetal map.

Site Design

The project site will collect the onsite flows via curb and gutters, catch basins and subsurface storm drain. Pretreatment to be provided for identified pollutants of concern associated with proposed land use type via Stormexx Clean Catch Basin Inserts at inlets upstream of basins. The onsite flows will be conveyed to two proposed subsurface basins within the project site. The subsurface systems have been designed to allow the DCV to infiltrate into the in-situ soils via perforated aluminized steel type 2 CMPs.

The project for DMA 1 and DMA 2 will use the recommended values provided by the geotechnical report. The table below provides the infiltration rate and recommended safety factor per the Geotechnical Report. The subsurface system has been sized using the values below.



DMA	Test Number	Infiltration Rate (in/hr)	Safety Factor	Design Infiltration Rate (in/hr)
DMA - 1	I-2	3.3	5	0.66
DMA - 2	I-1	10.3	5	2.06

Site design principles outlined in County of Los Angeles LID Standards Manual were applied where applicable. Site planning included all design criteria identified in the manual. Site planning considerations for Protection/Restoration of Natural Areas and Minimization of Land Disturbance were not applicable. Project will also decrease impervious surface area when compared to existing conditions.

BMP List

DMA Designation	Square Footage (SF)	Acreage (Ac)	Storm Water Quality Design Volume (SWQDv, CF)	Storm Water Quality Design Flowrate (SWQDq, CFS)	BMP Type	Minimum BMP Size	BMP Size Provided
1	122,256	2.806	7,656	0.6464	(Four) 48” CMPs Infiltration Subsurface Basin	Length of 48” CMP =109’	Four CMP Basins

2	222,530	5.109	13,420	0.9735	(Two) 96” CMPs Infiltration Subsurface Basin	Length of 96” CMP = 172’	Double CMP Basins

2.2. BMP SELECTION

2.2.1. INFILTRATION BMPS

NAME	INCLUDED
Bioretention without underdrains	☐
Infiltration Trench	☐
Infiltration Basin	☐
Drywell	☐
Proprietary Subsurface Infiltration Gallery	☒
Permeable Pavement (concrete, asphalt, pavers)	☐
Other:	☐
Other:	☐

<table>
<tr><td>DESCRIPTION</td><td>The proposed perforated CMPs that make up the subsurface infiltration basin BMP systems are feasible from a geotechnical viewpoint as tested infiltration rates exceed the required minimum 0.3 inch/hour for onsite soils. The project for DMA 1 and DMA 2 will use the recommended values provided by the geotechnical report. The table below provides the infiltration rate and recommended safety factor per the Geotechnical Report. The subsurface system has been sized using the values below.
<table>
<tr><th>DMA</th><th>Test Number</th><th>Infiltration Rate (in/hr)</th><th>Safety Factor</th><th>Design Infiltration Rate (in/hr)</th></tr>
<tr><td>DMA - 1</td><td>I-2</td><td>3.3</td><td>5</td><td>0.66</td></tr>
<tr><td>DMA - 2</td><td>I-1</td><td>10.3</td><td>5</td><td>2.06</td></tr>
</table>
Refer to Attachment B for Infiltration Test Report</td></tr>
<tr><td>CALCULATIONS</td><td>Attachment A – “Peak Flow Hydrologic Analysis”
Attachment B – “Infiltration Test Report”
*Refer to Hydrology & Hydraulic Study</td></tr>
</table>

BMP POLLUTANT REMOVAL EFFECTIVENESS

BMP Pollutant Removal Effectiveness(1)

Pollutant of Concern	Harvest and Use (9)	Infiltration BMPs(3)	Bioretention	Biofiltration with Partial Infiltration	Biofiltration with No Infiltration	Extended Detention Basins (2)	Sand Filter Basin(8)
Sediment	H	H	H	H	H	M	H
Nutrients	H	H	H	H/M(5)	M/L(6)	M/L(4)	M
Trash	H	H	H	H	H	H	H
Metals	H	H	H	H	H	M	M(7)
Bacteria	H	H	H	H	M	L	M
Oil & Grease	H	H	H	H	H	M	H
Organic Compounds	H	H	H	M	M	L	H
Pesticides and Herbicides	H	H	H	M	M	L	M

Abbreviations:

L: Low removal efficiency M: Medium removal efficiency H: High removal efficiency U: Unknown

Notes:

(1) Periodic performance assessment and updating of this table has occurred based on updated information from studies from the District, CASQA, Caltrans, the International BMP Database, and others. These effectiveness ratings are bases on the specific BMP designs incorporated into this manual. Effectiveness ratings assume operation of a given BMP in isolation. If BMPs are used in series the overall pollutant removal effectiveness may be increased. Where direct data are not available to describe the performance rating of a certain BMP/pollutant combination, professional judgement was applied based on evaluation of unit operations and processes of BMPs and the associated unit operations and processes that are effective for pollutant removal.

(2) Effectiveness based upon total 72-hour drawdown time.

(3) Includes infiltration basins, infiltration trenches, and permeable pavements without underdrains.

(4) Medium for Phosphorous, Low for Nitrogen.

(5) Nutrient removal is High if Bioretention Soil Media is formulated according to requirements in Fact Sheet 3.8 Bioretention Soil Media. Otherwise nutrient removal efficiency is Medium.

(6) Nutrient removal efficiency is Medium if Bioretention Soil Media is formulated according to requirements in Fact Sheet 3.8 Bioretention Soil Media. Otherwise nutrient removal efficiency is Low. Medium if the standard Bioretention Soil Media is used. If a nutrient sensitive Bioretention Soil Media is used, removal efficiency is High.

(7) High if specialized media targeting metals is used.

(8) Considered to be a Treatment Control BMP. See the WQMP to determine if this BMP can be used.

(9) Cisterns, when associated with an adequate and reliable (year-round) demand for non-potable use of captured storm water (see the applicable WQMP for any specific requirements), have a High effectiveness at removing all pollutants from stormwater runoff. If there is inadequate demand to reliably drain the cistern through non-potable use throughout the year, pollutant removal effectiveness will be low.

References:

Technical Guidance Document (TGD) for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs) in South Orange County. (2017)

International Stormwater Best Management Practices (BMP) Database 2014 Performance Summaries. http://www.bmpdatabase.org/Docs/2014%20Water%20Quality%20Analysis%20Addendum/BMP%20Database%20Categorical_StatisticalSummaryReport_December2014.pdf

International Stormwater Best Management Practices (BMP) Database 2016 Performance Summaries. http://www.bmpdatabase.org/Docs/03-SW-1COh%20BMP%20Database%202016%20Summary%20Stats.pdf

Strecker, E.W., W.C Huber, J.P. Heaney, D. Bodine, J.J. Sansalone, M.M. Quigley, D. Pankani, M. Leisenring, and P. Thayumanavan, "Critical Assessment of Stormwater Treatment and Control Selection Issues." Water Environment Research Federation, Report No. 02-SW-1. ISBN 1-84339-741-2. 290pp

Oil and grease, Organics, and Trash and Debris based on review of unit operations and processes; comprehensive dataset not generally available. BMP must include design elements to address pollutants of concern.

2.2.2. RAINWATER HARVEST AND USE BMPS

NAME	INCLUDED
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

DESCRIPTION	Project able to fully infiltrate/retain the Stormwater Quality Design Volume onsite via subsurface basins.
CALCULATIONS	n/a

2.2.3. ALTERNATIVE COMPLIANCE BMPS

BIOFILTRATION BMPS

(If Infiltration BMPs and Rainwater Harvest and Use BMPs are Infeasible)

NAME	INCLUDED
Bioretention with underdrains (i.e. planter box, rain garden, etc.)	☐
Constructed Wetland	☐
Vegetated Swale	☐
Vegetated Filter Strip	☐
Tree-Well Filter	☐
Other:	☐
Other:	☐

DESCRIPTION	n/a
CALCULATIONS	n/a

OFFSITE BMPS

(If Infiltration BMPs, Rainwater Harvest and Use BMPs, and Biofiltration BMPs are Infeasible)

NAME	INCLUDED
Offsite Infiltration	☐
Ground Water Replenishment Projects	☐
Offsite Project - Retrofit Existing Development	☐
Regional Storm Water Mitigation Program	☐
Other:	☐
Other:	☐

DESCRIPTION	n/a
CALCULATIONS	n/a

2.2.4. TREATMENT CONTROL BMPS

NAME	INCLUDED
Media Filter	☐
Filter Insert	☒
CDS Unit	☐
Other:	☐
Other:	☐

DESCRIPTION	Stormexx Clean Catch Basin Filter Inserts to be installed at all roadway/parking catch basins as indicated on LID Site Plan. The inserts should be inspected during each season before and after rain events to ensure that the insert filter assembly is ready to accept and treat stormwater run-off. Keep the grate and area within 6’ of the grate clean and free of leaves, grass clippings, sediment and debris to minimize these contaminants from entering the unit housing. Periodic visual inspections involve looking through the grate to see if any standing water exists. Replace filter cartridge if standing water is in the housing. Maintenance schedules will vary with rainfall and pollutant concentration levels. Typical post-construction installations will require cartridge change-outs once or twice per year. If sediment reaches a height of 6” to 8” above bottom of the 24” housing, the sediment should be dumped and the filter cartridge inspected and replaced if necessary. Refer to Attachement “G” for BMP Technical Information Sheets.

2.2.5. HYDROMODIFICATION CONTROL BMPS

NAME	INCLUDED
Infiltration System	☐
Above-ground Cistern	☐
Above-ground Basin	☐
Underground Detention	☐
Other:	☐
Other:	☐

DESCRIPTION	The project is exempt from Hydromodification Control Measures, see Section 1.3
CALCULATIONS	n/a

2.2.6. NON-STRUCTURAL SOURCE CONTROL BMPS

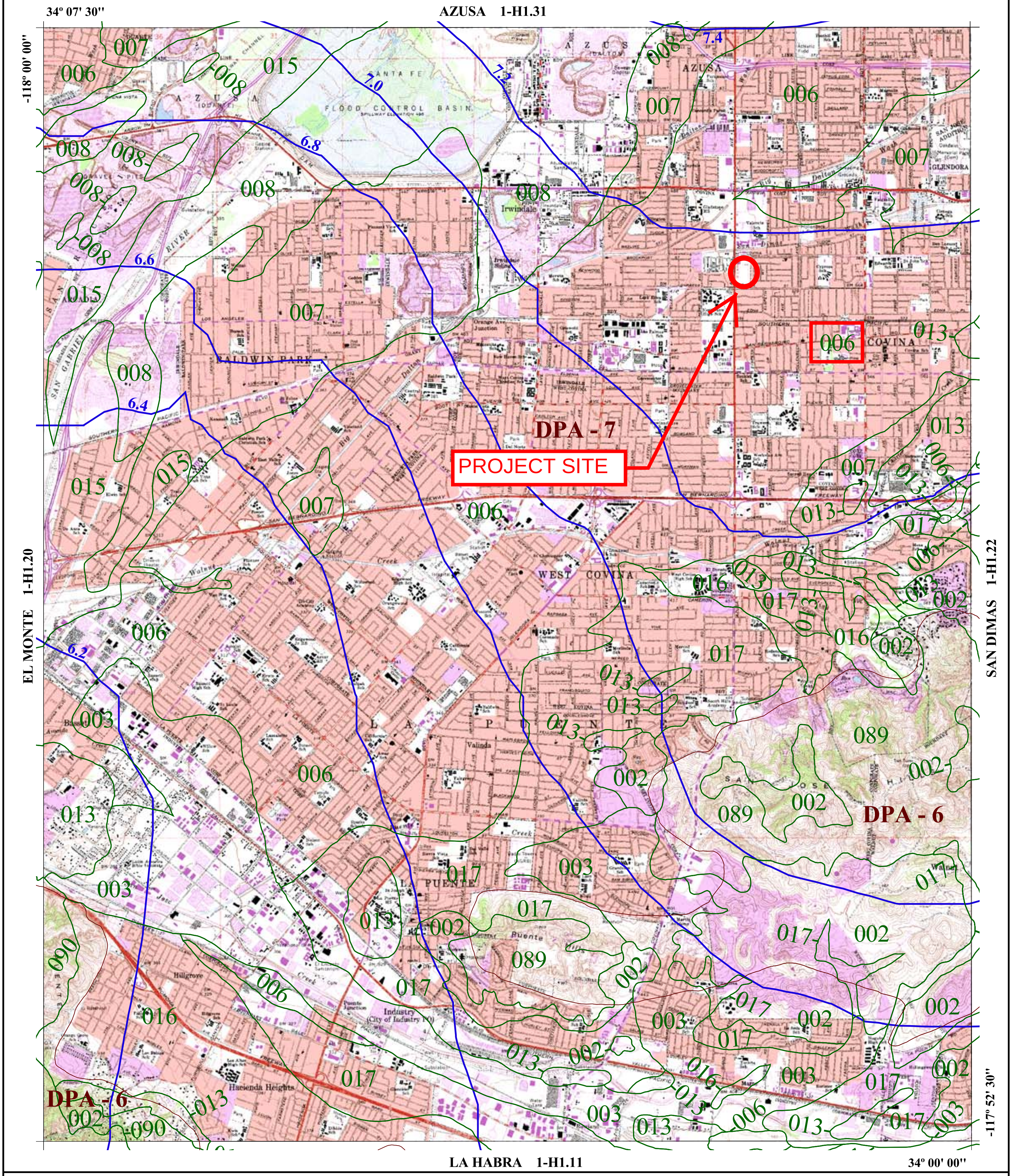
NAME	CHECK ONE	
	Included	**Not Applicable**
Education for Property Owners, Tenants and Occupants	☒	☐
Activity Restrictions	☒	☐
Common Area Landscape Management	☒	☐
Common Area Litter Control	☒	☐
Housekeeping of Loading Docks	☐	☒
Common Area Catch Basin Inspection	☒	☐
Street Sweeping Private Streets and Parking Lots	☒	☐

2.2.7. STRUCTURAL SOURCE CONTROL BMPS

NAME	CHECK ONE	
	Included	**Not Applicable**
(S-1) Storm Drain Message and Signage	☒	☐
(S-2) Outdoor Material Storage Area	☐	☒
(S-3) Outdoor Trash Storage & Waste Handling Area	☒	☐
(S-4) Outdoor Loading/Unloading Dock Area	☐	☒
(S-5) Outdoor Vehicle/Equipment Repair/Maintenance Area	☐	☒
(S-6) Outdoor Vehicle/Equipment/Accessory Washing Area	☒	☐
(S-7) Fuel and Maintenance Area	☐	☒
(S-8) Landscape Irrigation Practices	☒	☐
(S-9) Building Materials Selection	☒	☐
(S-10) Animal Care and Handling Facilities	☐	☒
(S-11) Outdoor Horticulture Areas	☐	☒

Attachment A

Calculations



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N S W E

1 0 1 2 Miles

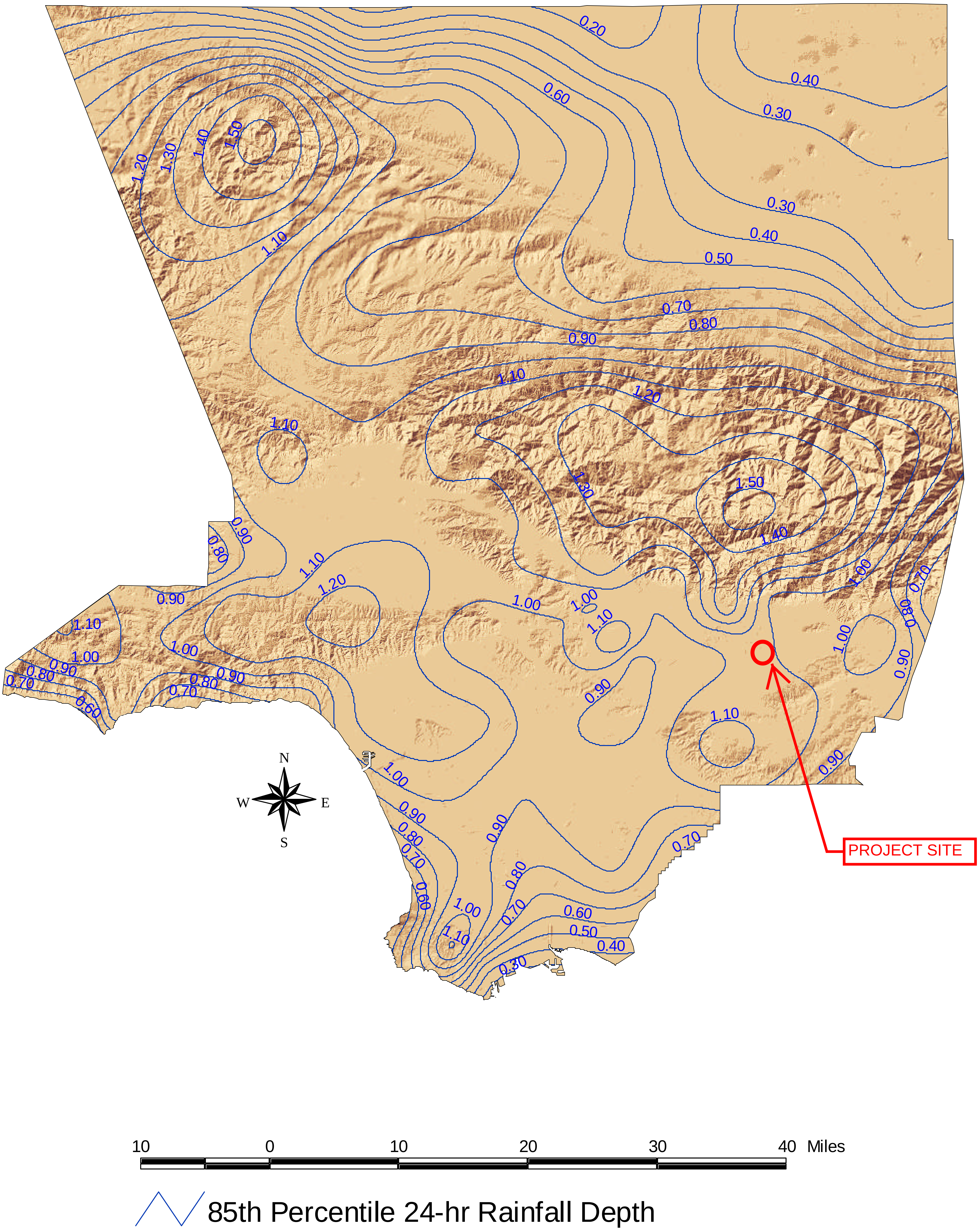
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

BALDWIN PARK
50-YEAR 24-HOUR ISOHYET

1-H1.21

LOS ANGELES COUNTY
PUBLIC WORKS
Public Service That Works

85th Percentile 24-hr Rainfall Isohyetal Map



Peak Flow Hydrologic Analysis

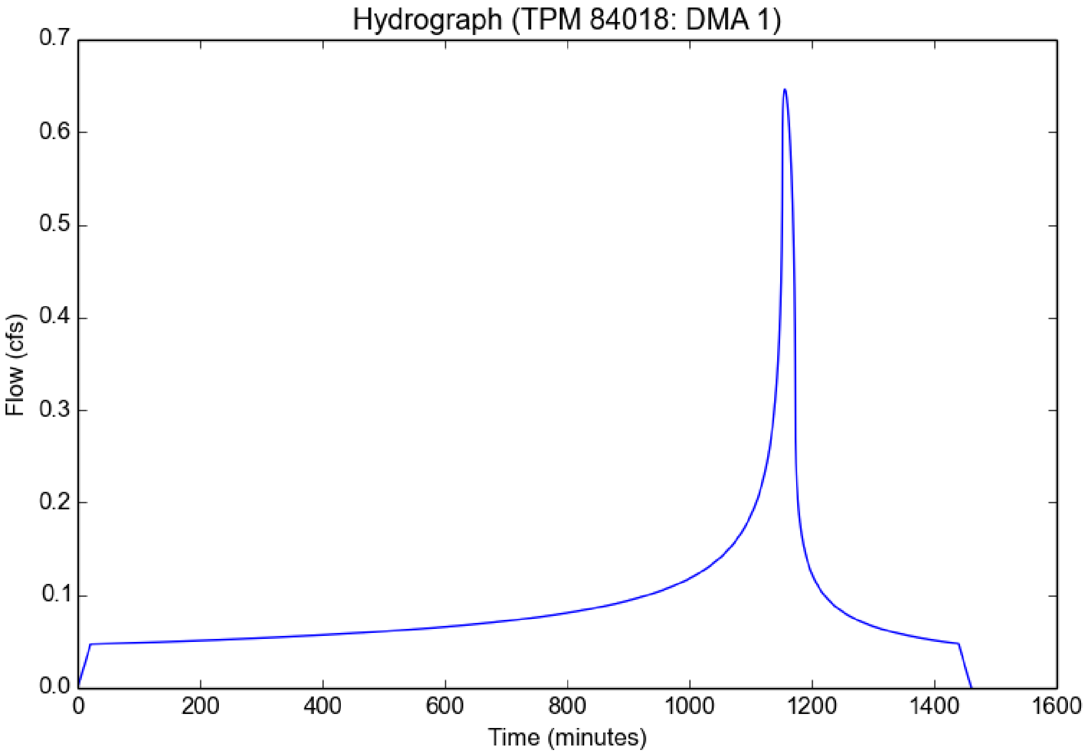
File location: N:/JN503 - Covina/LID - covina village/NEW - DMA 1.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	TPM 84018
Subarea ID	DMA 1
Area (ac)	2.806
Flow Path Length (ft)	340.0
Flow Path Slope (vft/hft)	0.008
85th Percentile Rainfall Depth (in)	1.01
Percent Impervious	0.813
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.01
Peak Intensity (in/hr)	0.307
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7504
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	0.6464
Burned Peak Flow Rate (cfs)	0.6464
24-Hr Clear Runoff Volume (ac-ft)	0.1758
24-Hr Clear Runoff Volume (cu-ft)	7656.0859



Peak Flow Hydrologic Analysis

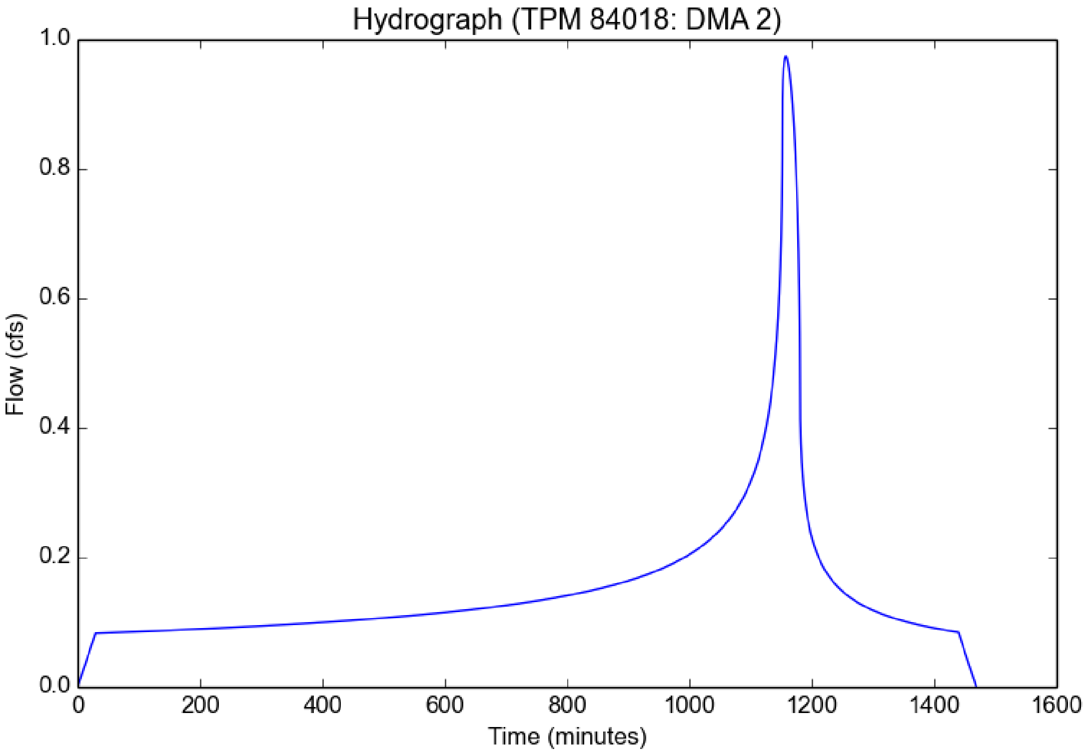
File location: N:/JN503 - Covina/LID - covina village/NEW - DMA 2.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	TPM 84018
Subarea ID	DMA 2
Area (ac)	5.109
Flow Path Length (ft)	455.0
Flow Path Slope (vft/hft)	0.005
85th Percentile Rainfall Depth (in)	1.01
Percent Impervious	0.778
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

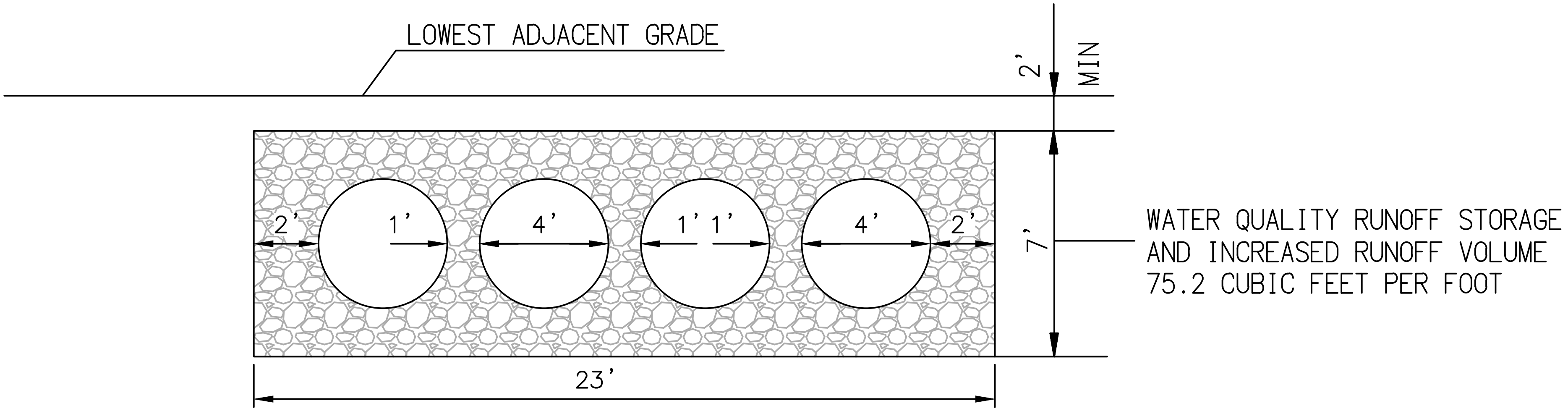
Modeled (85th percentile storm) Rainfall Depth (in)	1.01
Peak Intensity (in/hr)	0.2638
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7224
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	0.9735
Burned Peak Flow Rate (cfs)	0.9735
24-Hr Clear Runoff Volume (ac-ft)	0.3081
24-Hr Clear Runoff Volume (cu-ft)	13419.6803



TRACT MAPNO 82315

IN THE CITY OF COVINA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

4 BARREL 48-INCH SUBSURFACE BASIN



4 BARREL 48" CMP SUBSURFACE SYSTEM TYPICAL CROSS SECTION

VOLUME CALCULATION

AREA 48" CMP = 12.57 ft^2, 3–48" CMP=50.28 ft^2
AREA OF GRAVEL$^{(1)}$ = 110.72 ft^2 * 0.40 = 44.29 ft^2
TOTAL AREA = 94.57 ft^2
VOLUME PER FOOT = 94.57 ft^3/ft

(1) ASSUME 40% VOID RATIO FOR GRAVEL

FIGURE 3

Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

TRACT MAP NO 82315

5 BARREL 36-INCH
SUBSURFACE BASIN
TYPICAL SECTION

SUBSURFACE BASIN "A" STORAGE VOLUME

TRACT MAP 83215
SUBSURFACE BASIN A STORAGE, LENGTH =105 FEET

BOTTOM ELEVATION	TOP ELEVATION	4-48" CMP AREA (ft^2)	GRAVEL AREA (ft^2)	48" CMP VOLUME (ft^3)$^{1, 2}$	GRAVEL VOLUME (ft^3)	TOTAL VOLUME (ft^3)
491.5	492.5	0	0	0	0.00	0.0
492	493	0	11.5	0.00	483.00	483.0
492.5	493.5	0	11.5	0.00	483.00	966.0
493	494	0	11.5	0.00	483.00	1,449.0
493.5	494.5	3.628	7.87	380.94	330.54	2,160.5
494	495	6.2	5.3	651.00	222.60	3,034.1
494.5	495.5	7.388	4.11	775.74	172.62	3,982.4
495	496	7.916	3.58	831.18	150.36	4,964.0
495.5	496.5	7.916	3.58	831.18	150.36	5,945.5
496	497	7.388	4.11	775.74	172.62	6,893.9
496.5	497.5	6.20	5.3	651.00	222.60	7,767.5
497	498	3.63	7.87	380.94	330.54	8,479.0
497.5	498.5	0.00	11.5	0.00	483.00	8,962.0
498	499	0.00	11.5	0.00	483.00	9,445.0
498.5	499.5	0.00	11.5	0.00	483.00	9,928.0

1 - 48" Volume Represents the 48" CMP Area multiplied by the total linear feet of the system.

DRAWDOWN ANALYSIS FOR SUBSURFACE BASIN A

WATER QUALITY VOLUME FT^3	STORAGE VOLUME FT^3	INFILTRATON RATE IN/HR	REDUCTION FACTOR	DESIGN INFILTRATION RATE IN/HR	SUBSURFACE BASIN BOTTOM AREA $^{(1)}$ FT^2	DRAWDOWN TIME $^{(2)}$ HR	MAXIMUM ALLOWABLE DRAWDOWN TIME HR
7656	9928	3.3	5	0.66	2415	74.7	96

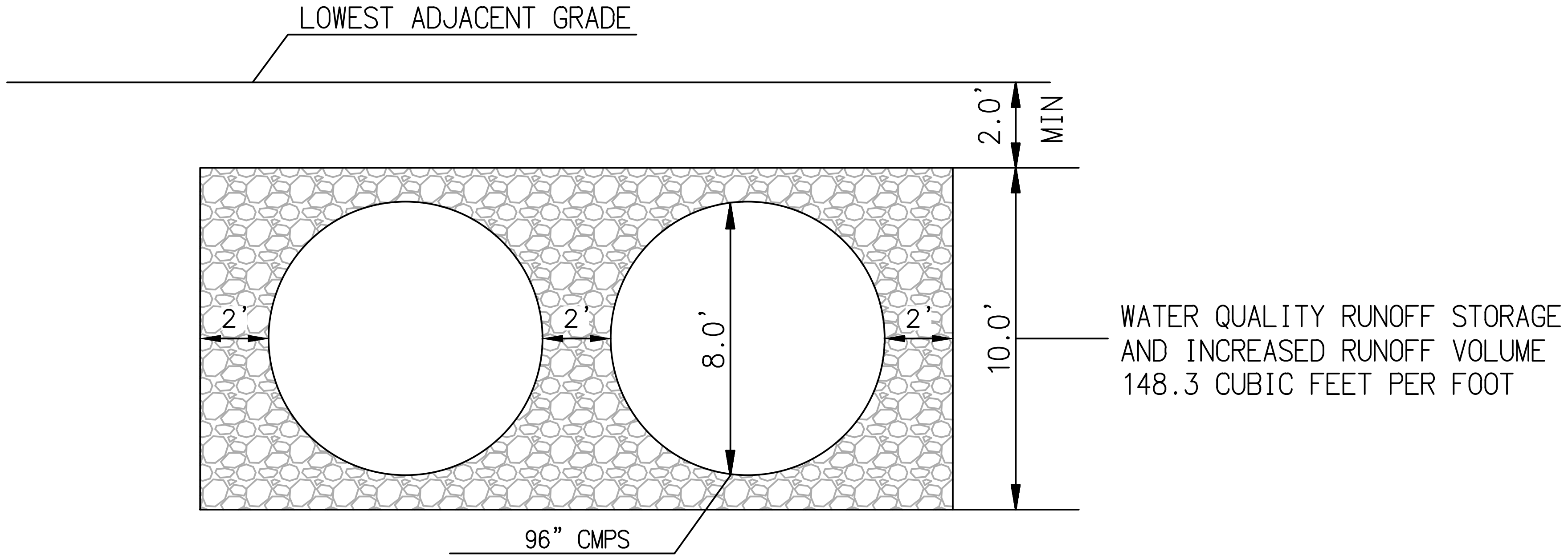
(1) BOTTOM AREA IS THE PRODUCT OF THE LENGTH OF SUBSURFACE AREA AND THE WIDTH. THE WIDTH IS 10 FT.

(2) DRAWDWON TIME BASED ON STORAGE VOLUME

TRACT MAPNO 82315

IN THE CITY OF COVINA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DOUBLE 96-INCH SUBSURFACE BASIN



DOUBLE SUBSURFACE BASIN - 96" CMP SYSTEM TYPICAL CROSS SECTION

VOLUME CALCULATION

AREA 96" CMP = 50.26 ft^2 * 2 = 100.52 ft^2
AREA OF GRAVEL$^{(1)}$ =119.47 ft^2 * 0.40 = 47.79 ft^2
TOTAL AREA = 148.31 ft^2
VOLUME PER FOOT = 148.3 ft^3/ft

(1) ASSUME 40% VOID RATIO FOR GRAVEL

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE 2

TRACT MAP NO 82315

DOUBLE 96-INCH SUBSURFACE BASIN TYPICAL SECTION

SUBSURFACE BASIN "B" STORAGE VOLUME

TRACT MAP 83215
SUBSURFACE BASIN B STORAGE, LENGTH =346 FEET

BOTTOM ELEVATION	TOP ELEVATION	96" CMP AREA (ft^{2})	GRAVEL AREA (ft^{2})	96" CMP VOLUME (ft^{3})$^{1, 2}$	GRAVEL VOLUME (ft^{3})	TOTAL VOLUME (ft^{3})
496	497	0	11	0	1522.40	1,522.40
497	498	3.626	7.374	1254.60	1020.56	3,797.56
498	499	6.2	4.805	2145.20	665.01	6,607.77
499	500	7.39	3.62	2556.94	501.01	9,665.72
500	501	7.916	3.072	2738.94	425.16	12,829.82
501	502	7.916	3.072	2738.94	425.16	15,993.92
502	503	7.39	3.62	2556.94	501.01	19,051.87
503	504	6.2	4.805	2145.20	665.01	21,862.08
504	505	3.626	7.374	1254.60	1020.56	24,137.24
505	506	0.00	11	0.00	1522.40	25,659.64

1 - 96" Volume Represents the 96" CMP Area multiplied by the total linear feet of the system.

WATER QUALITY VOLUME FT^{3}	STORAGE VOLUME FT^{3}	INFILTRATON RATE IN/HR	REDUCTION FACTOR	DESIGN INFILTRATION RATE IN/HR	SUBSURFACE BASIN BOTTOM AREA $^{(1)}$ FT^{2}	DRAWDOWN TIME $^{(2)}$ HR	MAXIMUM ALLOWABLE DRAWDOWN TIME HR
13420	25659.6	10.3	5	2.06	7612	19.6	96

(1) BOTTOM AREA IS THE PRODUCT OF THE LENGTH OF SUBSURFACE AREA AND THE WIDTH. THE WIDTH IS 22 FT.

(2) DRAWDWON TIME BASED ON STORAGE VOLUME

Attachment B

Geotechnical Investigation

UPDATED GEOTECHNICAL AND INFILTRATION EVALUATION
FOR
PROPOSED MIXED-USE DEVELOPMENT PROJECT
1000 NORTH AZUSA AVENUE
CITY OF COVINA, LOS ANGELES COUNTY, CALIFORNIA

PREPARED FOR

MELIA HOMES
8951 RESEARCH DRIVE
IRVINE, CALIFORNIA 92618

PREPARED BY

GEOTEK, INC.
1548 NORTH MAPLE STREET
CORONA, CALIFORNIA 92878

PROJECT NO. 3260-CR **JULY 28, 2022**

GEOTEK

GeoTek, Inc.
1548 North Maple Street, Corona, California 92878
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

July 28, 2022
Project No. 3260-CR

Melia Homes
8951 Research Drive
Irvine, California 92618

Attention: Mr. Chad Brown

Subject: Updated Geotechnical and Infiltration Evaluation
Proposed Mixed-Use Development Project
1000 North Azusa Avenue
City of Covina, Los Angeles County, California

Dear Mr. Brown:

We are pleased to provide herein the results of our updated geotechnical and infiltration evaluation for the subject property located in the city of Covina, Los Angeles County, California. This report presents a discussion of our evaluation and provides preliminary geotechnical recommendations for earthwork, foundation design, and construction. In our opinion, site development is feasible from a geotechnical viewpoint provided that the recommendations included herein are incorporated into the design and construction phases of site development.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

EDWARD H. LaMONT
No. 1892
Exp.

Edward H. LaMont
CEG 1892, Exp. 07/31/24
Principal Geologist

Gaby Bogdanoff

GABY M. BOGDANOFF
NO. 3133

Gaby M. Bogdanoff
GE 3133, Exp. 06/30/24
Project Engineer

Distribution: (1) pdf file sent via email to addressee

G:\Projects\3252 to 3302\3260CR Melia Homes 1000 North Azusa Avenue Covina\Geotechnical & Infiltration Investigation\3260 -CR Geotechnical and Infiltration Evaluation 1000 North Azusa Avenue Covina.docx

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Appendix B – Exploratory Boring Logs by GeoTek
Appendix C – Laboratory Test Results by GeoTek
Appendix D – Infiltration Test Data by GeoTek
Appendix E – Results of Seismic Settlement Analysis
Appendix F – General Earthwork and Grading Guidelines

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to complete an evaluation of the existing geotechnical conditions of the project site with respect to currently anticipated site development. Services provided for this study included the following:

- Research and review of available geologic and geotechnical data, and general information pertinent to the site,
- Review of past studies available for the property,
- Site reconnaissance,
- Site exploration consisting of the excavation, logging, and sampling of five exploratory hollow-stem auger borings and logging and percolation testing of two hollow-stem auger borings,
- Collection of relatively undisturbed and bulk soil samples of the onsite materials,
- Laboratory testing of the soil samples obtained from the site,
- Review and evaluation of site seismicity,
- Engineering analyses, and
- Compilation of this updated geotechnical and infiltration report which presents our findings, conclusions, and recommendations for site development.

The intent of this report is to aid in the assessment of the site for future proposed development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report may need to be updated based upon our review of the final site development plans. These plans should be provided to GeoTek, Inc. (GeoTek) for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The subject site is located at 1000 North Azusa Avenue in the city of Covina, Los Angeles County, California. The site is also identified with Los Angeles County Assessor's Parcel Numbers (APNs)

8421-001-016 and -061. The irregular-shaped property consists of approximately eight acres and is currently occupied by a large single-story building and associated parking and drive areas. The southern-most portion of APN 8421-001-061 contains a driveway and an emptied lot which was occupied by various structures between 1964 and 1977 which were later demolished.

The site has a generally flat topography with a gentle fall of about five to six feet to the west-southwest. Surface drainage is to the west-southwest.

The site is bounded by commercial buildings and an apartment complex on the north, single-family dwellings on the east, Cypress Street on the south, and North Azusa Avenue on the west. The general location of the site is shown in Figure 1. The current site conditions are shown on Figure 2a.

2.2 PROPOSED DEVELOPMENT

According to the Site Plan prepared by Land Development Consultants, Inc. and dated May 2, 2022, the three-acre region immediately adjacent to North Azusa Avenue is planned to be developed commercially with the remainder of the property to be developed residentially (townhomes and live-work units). It is our understanding that Melia will mass grade the entire property. However, Melia will only build the five-acre residential part of the project. The proposed residential buildings are anticipated to be three stories in height, of wood-frame construction, and to be supported on either conventional shallow foundations or post-tensioned slabs. Cuts and fills are estimated to be minimal. In addition, we anticipate that stormwater at the site may be managed via chamber systems. Specific percolation test locations and depths for design of these systems were provided by the project civil engineer.

If site development differs from the assumptions made herein, the recommendations included in this report should be subject to further review and evaluation. Final site development plans should be reviewed by GeoTek when they become available. Additional geotechnical field exploration, analyses and recommendations may be necessary upon review of site development plans.

3. REVIEW OF PAST REPORTS

On December 7, 2015, GeoConcepts, Inc. (GeoConcepts) issued a *Preliminary Geotechnical Engineering Investigation* for the subject site. The investigation included drilling of five borings across the property to depths ranging from 28.5 to 31 feet below grade. GeoConcepts reportedly encountered localized undocumented fill overlying alluvial deposits. The undocumented fill was encountered in the vicinity of the existing building and extended to about 1.5 feet below grade. The fill reportedly consists of silty sand with some clay and rock and glass fragments. The alluvium consists of moderately dense to dense silty sand to poorly graded sand. Groundwater was not encountered in any of the borings. GeoConcepts noted that liquefaction and seismic settlement potentials were very low due to the great depth to groundwater and dense condition of the alluvium.

The study indicated that the expansion index of the site soils was “very low” or negligible. In addition, results of sulfate testing showed negligible concentrations.

GeoConcepts recommended that all existing undocumented fill and loose alluvium be removed from future building areas. Removals were recommended to extend to at least five feet from existing grades or three feet below the base of foundations, whichever is deeper. Removals were suggested to extend at least five feet beyond the building perimeters or to an extent equal to the depth of fill below the foundations. GeoConcepts provided recommendations for conventional reinforced shallow foundations for building support.

On December 20, 2018, GeoConcepts completed an *Infiltration Test Report* for the project. The report indicated that two test pits were excavated to a depth of ten feet within the south-central portion of the site which was the general area of the proposed infiltration systems. The test pits reportedly encountered undocumented fill overlying alluvium. The undocumented fill had a reported thickness of 3.5 feet and consisted of silty sand. The alluvium encountered also consisted of silty sand. GeoConcepts stated that testing was performed in accordance with County standards yielding design infiltration rates of 1.3 (at ITP-2) and 3.3 (at ITP-1) at the two test locations. GeoConcepts noted that the cited design rates were based on measured infiltration rates after corrections. However, GeoConcepts did not mention if the rates include a factor of safety as required by the *Guidelines for Low Impact Development Stormwater Infiltration* by Los Angeles County.

Appendix A includes copies of the logs of excavations and laboratory test results reported by GeoConcepts. The locations of the excavations are shown on Figures 2a-b, Exploration Location Maps.

4. FIELD EXPLORATION, LABORATORY TESTING, AND PERCOLATION TESTING

4.1 FIELD EXPLORATION

The soils underlying the site were explored on June 24, 2022 by means of excavating five exploratory borings to depths between 19 and 51.5 feet. In addition, two percolation test borings approximately 15 feet deep were drilled at the locations selected by the project civil engineer. All borings were drilled with a truck-mounted hollow-stem auger drill rig. An engineer from our firm kept detailed logs of the borings and collected relatively undisturbed and disturbed soil samples at selected boring depths. The approximate locations of our site explorations and explorations by GeoConcepts (2015) are shown on the Exploration Location Maps, Figures 2a-b. Logs of the borings are provided in Appendices A and B.

4.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively undisturbed and bulk soil samples collected during the field exploration. The purpose of the laboratory testing was to confirm the field classification of the soil materials encountered and to evaluate the soils physical properties for use in the engineering design and analysis. Results of the laboratory testing program along with a brief description and relevant information regarding testing procedures are included in Appendix C.

4.3 PERCOLATION TESTING

Testing was performed in general accordance with the *Guidelines for Low Impact Development Stormwater Infiltration* by Los Angeles County (2021) using the Small Diameter Boring Infiltration Test Procedure.

The locations of the infiltration test borings (Borings I-1 and I-2) are shown in Figure 2. Both borings were drilled to about 15 feet below existing grade and were approximately eight inches in diameter. A three-inch diameter perforated PVC pipe encapsulated in filter sock was inserted into each of the test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel to prevent caving within the borings. Water was placed in the borings to presoak the holes, and testing was conducted soon after. Testing after presoaking indicated that a falling head test using a time interval between readings of about 10 minutes was suitable for the site conditions. Testing achieved stabilized rates which are summarized as follows:

SUMMARY OF TEST RESULTS		
Boring	Test Depth (ft)	Measured Infiltration Rate* (inches per hour)
I-1	15	10.3
I-2	15	3.3

*Estimated as flow rate divided by the surface area of test section per GS200.1

As required, reduction factors should be applied to the measured rates to account for the test method reliability (RFt), site variability (RFv), and long-term siltation (RFs). As noted in Los Angeles County Manual, a RFt of 2.0 should be utilized for the small diameter boring method. RFv and RFs should vary between 1.0 and 3.0. A RFv of 2.0 is preliminarily considered suitable, and the value to be selected for RFs should be based on the level of pre-treatment and maintenance for the proposed BMPs.

Assuming RFs of 1.0 and RFv and RFt values of 2.0, we recommend a Total Reduction Factor of 5.0 be applied to the measured rates obtained. Detailed infiltration test data is included in Appendix D.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed on-site soils. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soils and relative density. Infiltration rates may be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors. GeoTek assumes no responsibility or liability for the ultimate design or performance of the storm water facility.

5. GEOLOGIC AND SOILS CONDITIONS

5.1 REGIONAL SETTING

The subject property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. Basically, it extends roughly 975 miles from the north and extends from the Transverse Ranges geomorphic province to the tip of Baja California, from north to south. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto

Fault zone trend northwest-southeast and are found in the near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province.

More specific to the subject property, Dibblee, T.W., and Ehrenspeck, H.E. (1999) map the site to be underlain by Quaternary age alluvium. Additionally, the nearest known active fault to the site is the Sierra Madre fault located approximately 2.2 miles to the north.

5.2 GENERAL SOIL/GEOLOGIC CONDITIONS

A brief description of the earth materials encountered in our explorations and explorations by GeoConcept (2015 and 2018) is presented in the following sections.

5.2.1 Undocumented Fill

Our borings found that the site is covered by shallow fill associated with the current use of the site. The fill is generally composed of loose to medium dense silty sand and sandy silt and extends to about two feet below the existing ground surface at the explored locations. Similarly, much of GeoConcept's excavations encountered fill ranging from 1.5 to 3.5 feet in thickness. However, we anticipate that the fill could extend to greater depths in the vicinity of the current building and improvements as well as within the emptied lot within the southern-most portion the site.

5.2.2 Alluvial Deposits

Alluvial deposits were encountered in our borings below the fill and extended to the maximum depth explored of about 51.5 feet. The alluvial deposits mostly consist of silty sand with some units of sandy silt, poorly graded sand, and clayey sand. The alluvium was brown in color, slightly moist to moist, and loose/soft to dense/stiff to the total depth explored, based on our field observations, blow counts, and in-place density determinations. Collapse tests conducted on the most unfavorable units of the alluvium (selected based on blow counts) indicated negligible to slight potential for collapse upon application of water. The near surface site soils were found to have "very low" expansion potential when tested and classified in accordance with ASTM D 4829.

5.3 SURFACE WATER AND GROUNDWATER

5.3.1 Surface Water

If encountered during the earthwork construction, surface water on this site is the result of precipitation or surface run-off from surrounding sites. Overall drainage in the area is variable, and most commonly directed toward the west-southwest. Provisions for surface drainage will need to be accounted for by the project civil engineer.

5.3.2 Groundwater

Groundwater was not encountered in the deepest exploratory boring, Boring B-2, excavated to a maximum depth of 51.5 feet. The California Water Data Library shows several groundwater wells in the site vicinity with a depth to groundwater in excess of 200 feet.

Perched groundwater or localized seepage can occur due to variations in rainfall, irrigation practices, and other factors not evident at the time of this investigation.

5.4 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007; CGS, 1986). The subject property is not located within a State of California Seismic Hazard Zone for earthquake induced liquefaction (CGS, 1997). The subject property is not located within a State of California Seismic Hazard Zone for earthquake induced landsliding. Additionally, the nearest known active fault to the site is the Sierra Madre fault located approximately 2.2 miles to the north.

5.4.1 Seismic Design Parameters

The site is located at approximately 34.0972^0 Latitude and -117.9066^0 Longitude. Based on the conditions observed in the site excavations and review of regional geologic maps, a Site Class "D" appears to be the appropriate category for the property. Site spectral accelerations (Sa and S1), for 0.2 and 1.0 second periods for a Class "D" site, were determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. As noted using the ASCE 7-16 option on the SEAOC/OSHPD website, the values for SM1 and SD1 are reported as "null-See Section 11.4.8 (of ASCE 7-16)". As noted in ASCE 7-16, Section 11.4.8, a site-specific ground motion procedure is recommended for Site Class D when the value S1 exceeds 0.2. The value S1 for the subject site exceeds 0.2.

For a Site Class D, an exception to performing a site-specific ground motion analysis is allowed in ASCE 7-16 where S1 exceeds 0.2 provided the value of the seismic response coefficient, Cs, is conservatively calculated by Eq 12.8-2 of ASCE 7-16 for values of T≤1.5Ts and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for TL≥T>1.5Ts or Eq. 12.8-4 for T>TL.

Assuming that the Cs value calculated by and used by the structural engineer allows for the exclusion per ASCE 7-16, noted above, then a site-specific ground motion analysis is not required. For this assumption and condition, the following seismic design parameters, based on the 2015 National Earthquake Hazards Reduction Program (NEHRP)/ASCE 7-16, are presented on the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_s	1.643g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.604g
Site Coefficient for Site Class "D," F_a	1.0
Site Coefficient for Site Class "D," F_v	1.7
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.643g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	1.026g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.096g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.684g
Site Modified Peak Ground Acceleration, PGA_M	0.766g
Seismic Design Category	D

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

5.5 LIQUEFACTION AND SEISMICALLY INDUCED SETTLEMENT

The project site is not located within an area mapped by the State of California for liquefaction potential. Due to the presence of dense/stiff alluvium and the lack of shallow groundwater, the liquefaction hazard at the site is nil.

Loose to medium dense sands tend to densify during strong ground shaking. Based on the blow counts recorded in boring B-2 and utilizing a peak ground acceleration of 0.76g and an magnitude (Mw) seismic event of 7.72, we estimate that the seismically induced settlement of the onsite sandy units would be about three inches total settlement and about 1.5 inches differential settlement over a 30-foot span. Results of these analyses are presented in Appendix E.

5.6 OTHER SEISMIC HAZARDS

Evidence of ancient landslides or slope instabilities at this site was not observed during our investigation. Thus, the potential for landslides is considered negligible.

The potential for secondary seismic hazards such as a seiche or tsunami is considered negligible due to site elevation and distance to an open body of water.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL

Development of the site appears feasible from a geotechnical viewpoint. The following recommendations should be incorporated into the design and construction phases of development.

6.2 EARTHWORK CONSIDERATIONS

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Covina, the 2019 California Building Code (CBC), and recommendations contained in this report. Site grading plans should be reviewed by this office when they become available. Additional recommendations will likely be offered subsequent to review of these plans.

6.2.1 Site Clearing and Preparation

Site preparation should start with demolition/razing of existing site improvements and removal of deleterious materials, and vegetation. Demolition should include removal of all pavements, floor slabs, foundations, and any other below-grade construction. These materials should be properly disposed of off-site. Voids resulting from site clearing (such as removals of underground utilities, foundations, etc.) should be replaced with engineered fill materials.

6.2.2 Removals

Based on our boring data and the field observations, the upper three to four feet from existing grade or two feet below footing base, whichever is deeper. should be removed in order to provide a homogeneous, dense fill mat for structural support. Deeper removals may be required in some areas to eliminate all previously existing undocumented fill and unsuitable alluvium. The bottom of removals should expose competent native alluvial soils which are defined as relatively homogeneous, no visibly porous materials with an in-place density of at least 85 percent of the soil's maximum dry density as determined per ASTM D 1557. As a minimum, removals should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth, or a minimum of five feet laterally.

The upper two feet of soil or one foot below pavement subgrade, whichever is deeper, should be removed below asphaltic concrete pavement and Portland cement concrete hardscape areas. The horizontal extent of removals should extend at least two feet beyond the edge of the improvements. Where existing shallow utilities are located, removals should be limited to two feet above these improvements.

The bottom of all removals should be scarified to a minimum depth of 12 inches, brought to slightly above the optimum moisture content, and then recompacted to at least 90 percent of the soil's maximum dry density (ASTM D 1557). The bottoms of removals should be observed by a GeoTek representative prior to scarification.

6.2.3 Engineered Fill

The onsite soils are considered suitable for reuse as engineered fill provided they are free from vegetation, roots, and rock/concrete or hard lumps greater than six inches in maximum dimension.

Concrete generated from the demolition of existing site improvements may be incorporated into site fills provided the following guidelines are implemented: 1) concrete should be free of rebar or other deleterious materials and should be broken down to a maximum dimension of six inches; 2) concrete should not be placed within three feet of finish grade in the building pad areas or within one foot of subgrade elevations in the street/drive areas; 3) concrete should be distributed in the fill and should not be "nested" or placed in concentrated pockets.

The undercut areas should be brought to final pad elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Fill materials should be placed at or above optimum moisture content and should be compacted to a minimum relative compaction of 90 percent as determined by ASTM Test Method D 1557.

6.2.4 Excavation Characteristics

Excavation in the onsite soil materials is expected to be easy using heavy-duty grading equipment in good operating conditions.

All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with local and Cal-OSHA guidelines. Temporary excavations within the onsite materials should be stable at 1:1 (h:v) inclinations for cuts less than ten feet in height.

6.2.5 Shrinkage and Subsidence

Several factors will impact earthwork balancing on the site, including shrinkage, subsidence, trench spoil from utilities and footing excavations, as well as the accuracy of topography.

Shrinkage, bulking, and subsidence are primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of 5 to 10 percent for both the existing fills and upper alluvium may be considered. Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of site earthwork construction. Subsidence on the order of up to 0.1-foot could occur.

6.2.6 Trench Excavations and Backfill

Temporary excavations within the onsite materials should be stable at 1:1 (h:v) inclinations for short durations during construction, and where cuts do not exceed ten feet in height. Temporary cuts to a maximum height of four feet can be excavated vertically, but local sloughing and/or failure could occur due to the granular nature of some of the onsite units. Increased caution should be applied when working near or within any excavations at this site.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined per ASTM D 1557). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. Much of the onsite materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than six ± inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.3 DESIGN RECOMMENDATIONS

6.3.1 Foundation Design Criteria

The site soils were found to generally have "very low" expansion potential in accordance with ASTM D 4829. Additional testing of the soils should be performed during construction to evaluate the as-graded conditions. Additional recommendations may be necessary based on the as-graded soils conditions.

The foundation elements for the proposed structures should bear entirely in engineered fill soils and should be designed in accordance with the 2019 CBC.

Because of the potential for seismically induced ground settlement at the property, it is our recommendation that post-tensioned foundation systems be used to support the proposed buildings. For foundations designed in accordance with the recommendations presented in this report, we would anticipate a total static settlement of less than 1-inch and a differential static settlement of less than 0.5-inch in a 30-foot span. As noted previously, seismically induced ground settlement of up to 3 inches total and 1.5 inches differential settlement over a 30-foot span are also estimated.

The slab designer may choose the post-tension design methodology. Since the CBC indicated Post Tensioning Institute (PTI) design methodology is intended for expansive soils conditions which do not apply, no e_m or y_m parameters as used in the PTI methodology are provided. However, the slab design should consider the estimated static and seismically induced settlement as noted above.

MINIMUM DESIGN REQUIREMENTS FOR POST-TENSIONED FOUNDATIONS	
Design Parameter	"Very Low" Expansion Potential
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	One- or Two-Story – 12 Three-Story – 18
Minimum Foundation Width	One- or Two-Story – 12 Three-Story – 15
Minimum Slab Thickness (actual)	4 inches
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum 100% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete

It should be noted that the above recommendations are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

An allowable bearing capacity of 1,800 psf may be used for design of post-tensioned slab foundations. An increase of one third may be applied when considering short-term live loads (e.g. seismic and wind loads)

The passive earth pressure may be computed as an equivalent fluid having a density of 250 psf per foot of depth, to a maximum earth pressure of 2,500 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. The upper one foot of soil below the adjacent grade should not be used in calculating passive pressure unless the ground is covered by concrete or pavement. Passive pressure and frictional resistance could be combined without reduction.

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these systems are provided in the 2019 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2019 CBC Section 1907.1, ACI 360R-10, and ACI 302.2R-06.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as the result of construction related punctures (e.g. stake penetrations, tears, punctures from walking on the aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. It is GeoTek's opinion that a minimum ten mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and atmospheric conditions.

Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e. thickness, composition, strength, and permeance) to achieve the desired performance level. Consideration should be given to consulting with an individual possessing specific expertise in this area for additional evaluation.

6.3.2 Miscellaneous Foundation Recommendations

- To minimize moisture penetration beneath the slab on grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.
- Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

- Under-slab utility trenches should be compacted to project specifications. Compaction should be achieved with a mechanical compaction device. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.3.3 Foundation Set Backs

Foundations should comply with the following setbacks. Improvements not conforming to these setbacks are subject to the increased likelihood of excessive lateral movements and/or differential settlements. If large enough, these movements can compromise the integrity of the improvements. The following recommendations are presented:

- The outside bottom edge of all footings should be set back a minimum of H/2 (where H is the slope height) from the face of any ascending slope. The setback should be at least five feet and need not to exceed 15 feet. Where a retaining wall is constructed at the toe of the slope, the height of the slope should be measured from top of the wall to the top of the slope.
- The outside bottom edge of all footings should be set back a minimum of H/3 from the face of any descending slope. The setback should be at least 7 feet and need not exceed 40 feet.
- The bottom of all footings for structures near retaining walls should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom inside edge of the wall foundation.
- The bottom of any future foundations for structures should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom of the nearest excavation.

6.3.4 Retaining Wall Design and Construction

6.3.4.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete walls retaining up to six feet of soils. Additional review and recommendations should be requested for higher walls. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Wall foundations should be embedded a minimum of 12 inches below the lowest adjacent grade and should rest entirely on at least 24 inches of compacted fill placed on competent native soil. Wall footings should be designed using an allowable bearing capacity of 2,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads). The passive earth pressure may be computed as an equivalent fluid having a density of 250 psf per foot of depth, to a maximum earth pressure of 2,500 psf. Unless the ground is covered by asphalt or concrete, the passive pressure should be neglected in the upper 1 foot. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third. For wall footings entirely placed on engineered fill, a minimum footing reinforcement of about two No. 4 rebars (one placed near the top and one near the bottom of footing) should be provided. These are tentative recommendations. Final reinforcement recommendations should be provided by the project structural/wall engineer.

All earth retention structure plans, as applicable, should be reviewed by this office prior to finalization. The seismic design parameters as discussed in this report remain applicable to all proposed earth retention structures at this site and should be properly incorporated into the design and construction of the structures.

Earthwork considerations, site clearing and remedial earthwork for all earth retention structures should meet the requirements of this report, unless specifically provided otherwise, or more stringent requirements or recommendations are made by the designer. The backfill material placement for all earth retention structures should meet the requirement of Section 6.3.4.4 in this report.

In general, cantilever earth retention structures, which are designed to yield at least 0.001H, where H is equal to the height of the earth retention structure to the base of its footing, may be designed using the active condition. Rigid earth retention structures (including but not limited to rigid walls, and walls braced at top, such as typical basement walls) should be designed using the at-rest condition.

In addition to the design lateral forces due to retained earth, surcharges due to improvements, such as an adjacent building or traffic loading, should be considered in the design of the earth retention structures. Loads applied within a 1:1 (h:v) projection from the surcharge on the stem and footing of the earth retention structure should be considered in the design.

Final selection of the appropriate design parameters should be made by the designer of the earth retention structures.

6.3.4.2 Cantilevered Walls

The recommendations presented below are for cantilevered walls retaining up to six feet of soils. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions such as traffic, structures, or adverse geologic conditions.

ACTIVE EARTH PRESSURES

Surface Slope of Retained Materials (h:v)	Equivalent Fluid Pressure (pcf) Native Backfill*	Equivalent Fluid Pressure (pcf) Import Granular Backfill**
Level	41	36
2:1	67	53

*The design pressures assume the native backfill material has an expansion index less than or equal to 20 and a friction angle of about 30 degrees. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

**The design pressures assume that import granular backfill material has an expansion index less than or equal to 20 and a friction angle of at least 34 degrees. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

6.3.4.3 Restrained Retaining Walls

Retaining walls that will be restrained prior to placing and compacting backfill material, or that have reentrant or male corners, should be designed for an at-rest equivalent fluid pressure of 62 pcf, plus any applicable surcharge loading, for native backfill and level back slope condition. For imported granular backfill, an at-rest equivalent fluid pressure of 57 pcf should be utilized. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner, or a distance otherwise determined by the project structural engineer.

6.3.4.4 Retaining Wall Backfill and Drainage

Retaining wall backfill should be free of deleterious and/or oversized materials and should have properties indicated in Section 6.3.4.2. Retaining walls should be provided with an adequate pipe and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one-cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Retaining wall backfill should be placed in lifts no greater than eight inches in thickness and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D 1557. The wall backfill should also include a minimum one-foot wide section of ¾- to

1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The rock should be separated from the earth with filter fabric. The upper 24 inches should consist of compacted on-site soil.

As an alternative to the drain rock and fabric, Miradrain 2000, or approved equivalent, may be used behind the retaining wall. The Miradrain 2000 should extend from the base of the wall to within two feet of the ground surface. The subdrain should be placed at the base of the wall in direct contact with the Miradrain 2000.

The presence of other materials might necessitate revision to the parameters provided and modification of the wall designs. Proper surface drainage needs to be provided and maintained.

6.3.4.5 Other Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.
- The retaining wall footing excavations, backcuts, and backfill materials should be approved the project geotechnical engineer or their authorized representative.

6.3.5 Pool Construction

The proposed swimming pool should derive support entirely from engineered fill. A minimum 12 inches of fill compacted to at least 90 percent of the soil's maximum dry density per ASTM D 1557 should be provided below the pool shell.

The pool walls be designed for at-rest soil conditions using an equivalent fluid pressure of 62 pcf. Pool walls surcharged by adjacent structures should be designed for additional pressures. Alternatively, the pool walls may be designed as freestanding walls using the active soil state conditions provided that some lateral movement of the pool walls would be acceptable. If the active state is to be used, an equivalent fluid pressure of 41 pcf is considered suitable. These recommended pressures assume that native soil is used as wall backfill with a level backslope and in a drained condition. If a drain system adjacent/beneath the pool is not provided, the pool walls should then be designed for an equivalent fluid pressure of 100 pcf for the at-rest condition and 87 pcf for the active condition.

As noted above, the use of the lower (drained condition) at-rest or active soil pressures will require a subdrain system beneath/adjacent to the pool. A typical subdrain system includes a series of four-inch diameter perforated drain pipes encapsulated with at least one cubic foot of free-draining material per linear foot of pipe. The free-draining material should be encapsulated within a geotextile to prevent migration of fines into the drainage medium. The drain pipes should be routed to an acceptable discharge location, as determined by the civil engineer/pool designed. If desired, GeoTek can review the subdrain system once designed to determine if additional measures are warranted.

Pool decking supported on grade should be separated from the pool bond beam by a full-depth, mastic construction joint. If it is desired to extend the pool deck over the bond beam, consideration should be given to designing the deck as a structural slab supported by the pool shell. This will reduce the possibility of deck cracking occurring along the outer edge of the bond beam. we also recommend that the pool decking subgrade be “pre-saturated” prior to concrete placement. The subgrade soils should be moisture conditioned to at least 100 percent of the soil’s optimum moisture content to a depth of 12 inches, prior to concrete placement. Testing by the geotechnical engineer is recommended to confirm that the soils have been adequately moisture treated.

Pool decking may consist of five-inch-thick concrete and the use of reinforcement is suggested. A minimum of No. 4 rebars spaced 24 inches each way or equivalent should be placed at mid-height of the concrete slab. Control joints should be placed in two directions and located a distance apart approximately equal to 24 to 36 times the slab thickness. The pool designer should provide final design recommendations.

While the site soils are anticipated to have a negligible sulfate content (see Section 6.3.8), it is our recommendation that Type V cement be used for the pool construction due to the chemicals associated with the pool water.

6.3.6 Pavement Design Considerations

Pavement design for proposed on-site parking and drive areas was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements and the Portland Cement Association for rigid pavements. Based on an assumed design R-value of 30 and for Traffic Indexes (TIs) of 5.0 for car parking areas and 6.0 for drive areas for light traffic with occasional truck traffic, the following preliminary sections were calculated:

GEOTECHNICAL RECOMMENDATION FOR MINIMUM PAVEMENT SECTION		
Traffic Index	Thickness of Flexible Pavement Section	Thickness of Rigid Pavement Section
5.0	3" AC/6" AB/Compacted Subgrade or 6" AC/Compacted Subgrade	--
6.0	4" AC/7" AB/compacted Subgrade or 7.5" AC/Compacted Subgrade	6.5" PCC/4" AB/Compacted Subgrade

*AC = Asphalt Concrete, AB = Aggregate Base, PCC = Portland Cement Concrete with a f'c > 3,500 psi.

The TIs used in our pavement design are considered reasonable values for the proposed pavement areas and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

No structural reinforcement of the concrete pavements is required. However, temperature and shrinkage control reinforcement should be provided. This reinforcement should consist of No. 4 rebars on 24-inch centers, each way, or equivalent. The reinforcement should be placed at mid-height to the concrete pavement. Also, the concrete pavement should be provided with proper joints to help control cracking. All materials and methods of construction should also conform to the requirements of the City of Covina. These pavement sections should be considered preliminary until reviewed and approved by the City.

The recommended pavement sections provided are intended as a minimum guideline and final selection of pavement cross section parameters should be made by the project civil engineer, based upon the local laws and ordinates, expected subgrade and pavement response, and desired level of conservatism. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. Final pavement design should be checked by testing of soils exposed at subgrade (the upper one foot) after final grading has been completed.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2 and 200-2.4 of the Green Book, respectively. Pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density (modified proctor).

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of Covina specifications, and under the observation and testing of GeoTek and a City Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

Deleterious material, excessive wet or dry pockets, oversized rock fragments, and other unsuitable yielding materials encountered during grading should be removed. Once existing compacted fill are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform and unyielding surface. The upper 12 inches of pavement subgrade soils should be scarified, moisture conditioned at or near optimum moisture content, and recompacted to at least 95 percent of the laboratory maximum dry density (ASTM D1557). If loose or yielding materials are encountered during construction, additional evaluation of these areas should be carried out by GeoTek. All pavement section changes should be properly transitioned.

6.3.7 Soil Corrosivity

The soil resistivity was tested in the laboratory on two samples collected during our field exploration. The results of the testing (6,231 and 6,700 ohm-cm) indicate that the soil samples are "moderately corrosive" to buried ferrous metals, based on the guidelines provided in *Corrosion Basics: An Introduction* (Roberge, 2005). Consideration should be given to consulting with a corrosion engineer.

6.3.8 Soil Sulfate Content

The sulfate content was determined in the laboratory for two soil samples obtained during our field exploration. The results (0.0072 and 0.0012 percent) indicate that the water-soluble sulfate range is less than 0.1 percent by weight which is considered "not applicable" (i.e. negligible) as per Table 4.2.1 of ACI 318. Based upon the test results, no special concrete mix design is required by Code for sulfate attack resistance. Additional testing of soils collected near finish grade should be performed subsequent to site grading.

6.3.9 Import Soils

Import soils should have an expansion index similar to the on-site soils. GeoTek also recommends that, as a minimum, proposed import soils be tested for soluble sulfate content and expansion index. GeoTek should be notified a minimum of 72 hours of potential import sources so that appropriate sampling and laboratory testing can be performed.

6.3.10 Concrete Flatwork

6.3.10.1 Exterior Concrete Slabs, Sidewalks, and Driveways

Exterior concrete slabs, sidewalks, and driveways should be designed using a four-inch minimum thickness. No specific reinforcement is required due to the non-structural nature. However, the use of some reinforcement should be considered. Some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in residential construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented herein.

Subgrade soils, classified as having "very low" expansion potential, should be pre-moistened prior to placing concrete. The subgrade soils below exterior concrete flatwork should be pre-saturated to a minimum of 100 percent of optimum moisture content to a depth of 12 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Covina specifications, and under the observation and testing of GeoTek and a City Inspector, if necessary.

6.3.10.2 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 1/8 inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete can also undergo chemical processes that are dependent on a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is also subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two directions and located a distance apart roughly equal to 24 to 36 times the slab thickness.

Exterior concrete flatwork (patios, walkways, driveways, etc.) is often some of the most visible aspects of site development. They are typically given the least level of quality control, being considered "non-structural" components. We suggest that the same standards of care be applied to these features as to the structure itself.

6.4 POST CONSTRUCTION CONSIDERATIONS

6.4.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. The soils should be maintained in a solid to semi-solid state as defined by the materials Atterberg Limits. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundation. This type of landscaping should be avoided. If used, then extreme care should be exercised with regard to the irrigation and drainage in these areas.

6.4.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground. Pad drainage should be directed toward approved area(s) and not be blocked by other improvements.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

6.5 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that site grading plans, pool plans, retaining wall plans, foundation plans, and relevant project specifications be reviewed by this office prior to construction to check for conformance with the recommendations of this report. We also recommend that GeoTek representatives be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. The owner/developer should verify that GeoTek representatives perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of onsite and import materials for fill placement and collect soil samples for laboratory testing where necessary.
- Observe the fill for uniformity during placement, including utility trenches.
- Perform field density testing of the fill materials.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. We recommend that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

7. INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of our evaluation is limited to the boundaries of the subject site. This review does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to us by the client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our fee estimate (P-0509622-CR) dated May 25, 2022 and geotechnical engineering standards normally used on similar projects in this region.

8. LIMITATIONS

The materials observed on the project site appear to be representative of the area; however, soil materials vary in character between excavations or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusion and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

9. SELECTED REFERENCES

ASCE, 2017, "Minimum Design Loads for Buildings and Other Structures, ASCE Standard ASCE/SEI 7-16".

ASTM, 2011, "Soil and Rock: American Society for Testing and Materials", vol. 4.08 and 4.09.

Bryant, W.A., and Hart, E.W., 2007, "Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps", California Geological Survey: Special Publication 42.

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Dibblee, T.W. and Ehrenspeck, H.E., 1999, "Geologic Map of the El Monte and Baldwin Park Quadrangles, Los Angeles County, California," Dibblee Geological Foundation, Dibblee Foundation Map DF-69, 1:24,000.

GeoConcepts, Inc., 2015, "Preliminary Geotechnical Engineering Investigation, Proposed Residential and Commercial Developments, 1000 North Azusa Avenue, Covina, California," dated December 7.

________, 2018, "Infiltration Test Report, 1000 North Azusa Avenue, Covina, California," dated December 20.

Land Development Consultants, Inc., 2022, "Site Plan – Covina Village, 1000 North Azusa Avenue, Covina, California," dated May 2.

Seismic Design Values for Buildings (http://earthquake.usgs.gov/research/hazmaps/design).

Melia Homes
Proposed Mixed-Use Development
1000 Azusa Avenue
Covina, Los Angeles County, California

Project No. 3260-CR

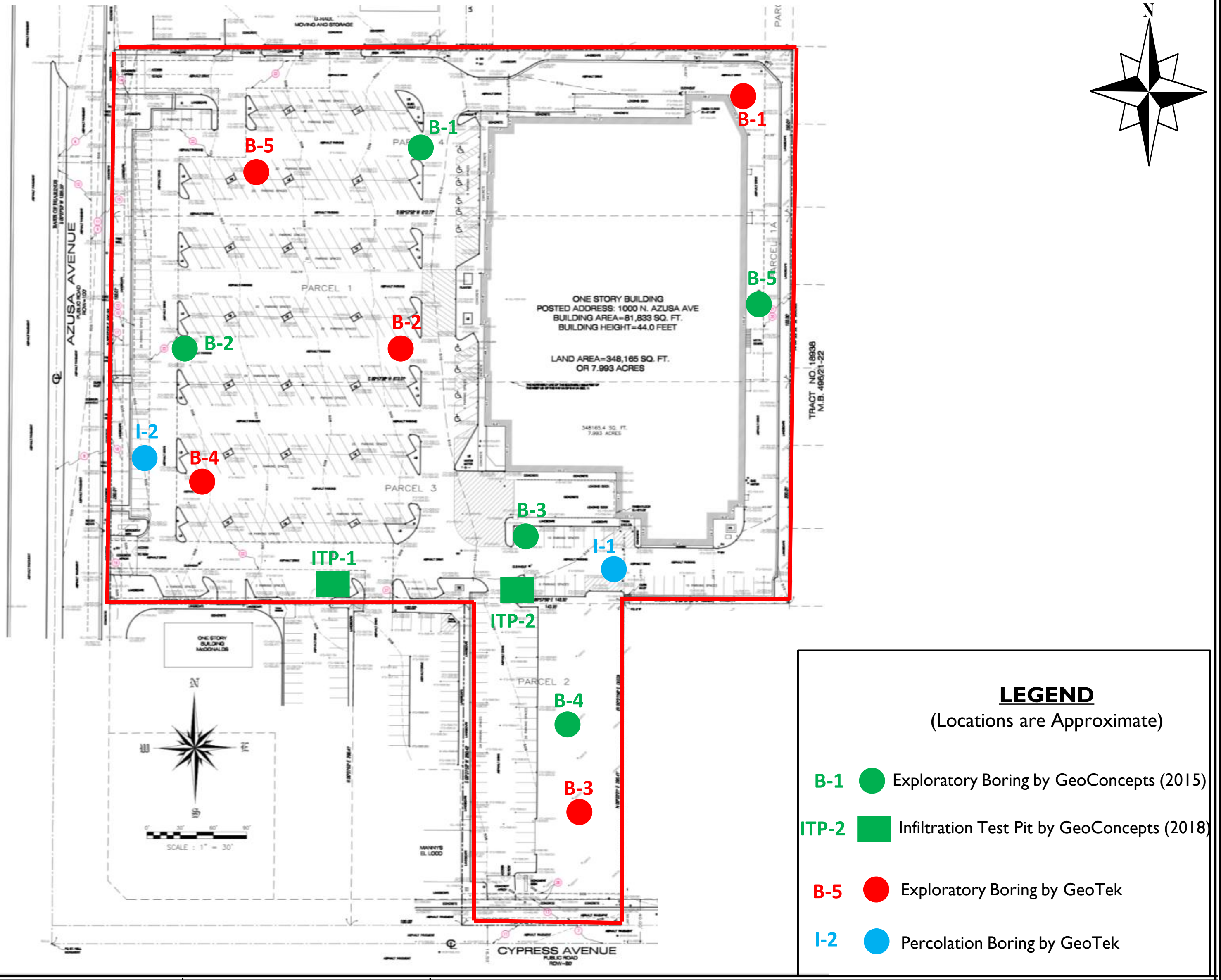
Scale:
As Shown

0 200 ft

Figure 1

Site Location Map

GEOTEK



LEGEND
(Locations are Approximate)

B-1	●	Exploratory Boring by GeoConcepts (2015)
ITP-2	🟩	Infiltration Test Pit by GeoConcepts (2018)
B-5	●	Exploratory Boring by GeoTek
I-2	●	Percolation Boring by GeoTek

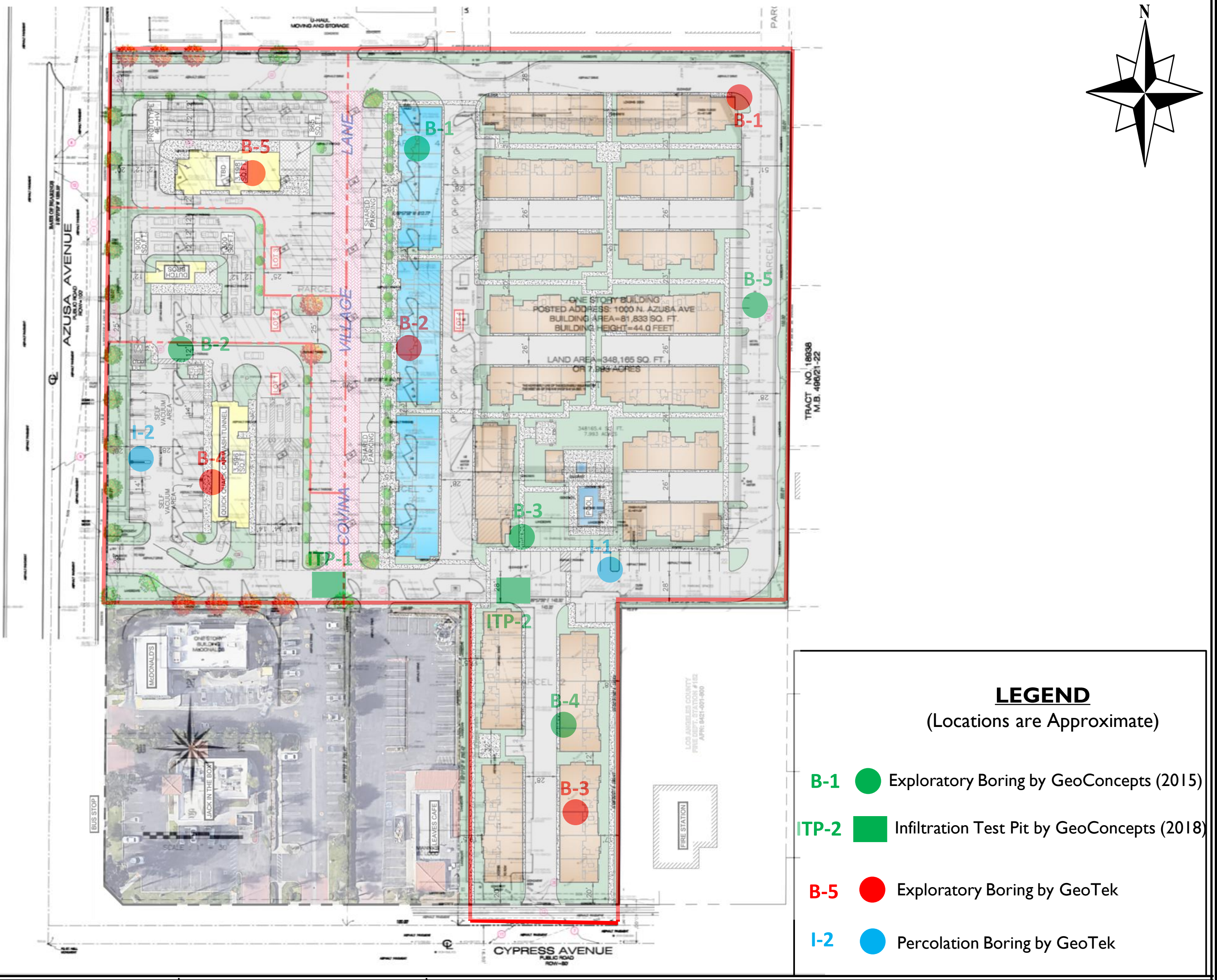
Melia Homes
Mixed-Use Development
1000 North Azusa Avenue
Covina, Los Angeles County, California

Project No. 3260-CR

Scale:
0 150 ft

Figure 2a

Exploration Location Map



Melia Homes
Mixed-Use Development
1000 North Azusa Avenue
Covina, Los Angeles County, California

Project No. 3260-CR

Scale:
0 150 ft

Figure 2b

Exploration Location Map

GEOTEK

APPENDIX A

LOGS OF EXCAVATIONS AND LABORATORY TEST RESULTS BY GEOCONCEPTS, INC. (2015)

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

BORING: B-1

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 2.0" **ASPHALT**
							ARTIFICIAL FILL; Af, silty sand with clay binder, medium reddish brown, slightly moist, fine to medium grained, glass and rock fragments up to 0.5" in length
							1.5' - 31.0' **ALLUVIUM; Qal,**
	5	116	69		5		@5.0' sand with silt and clay binder, medium brown, slightly moist, fine to coarse grained, ~3% coarse grained
	4	113	38		10		@10.0' silty sand, reddish brown, slightly moist, fine to medium grained, ~5% fine gravels
	2	115	33		15		@15.0' silty sand with gravels, tan to light brown, slightly moist, fine to medium grained sand, ~15% fine gravels
	3	112	50		20		@20.0' silty sand with gravels, light brown, slightly moist, fine to medium grained sand, ~15% fine gravels, 50 blows for 6 inches
			35		25		@25.0' silty sand with gravels, light brown, slightly moist, fine to medium grained sand, ~15% fine gravels
	4	121	50		30		@30.0' silty sand with gravels, light brown, slightly moist, fine to medium grained sand, ~15% fine gravels, 50 blows for 3 inches
							Total Depth - 31.0 Feet No Groundwater 8 Inch Hollow Stem Auger with Autohammer

BORING: B-2

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 2.0" **ASPHALT**
	4	114	41	⧗			**ARTIFICIAL FILL; Af,** silty sand with clay binder, medium reddish brown, slightly moist, fine to medium grained, glass and rock fragments up to 0.5" in length
							1.5' - 31.0' **ALLUVIUM; Qal,**
					5		@2.5' silty sand to sandy silt, olive brown, slightly moist, fine to medium grained
	3	106	30	⧗			@7.5' sand with silt, reddish brown, slightly moist, fine to medium grained
					10		
	5	109	26	⧗			@12.5' sand with silt, tan to light brown, slightly moist, fine to coarse grained
					15		
	1	116	42	⧗			@17.5' sand with silt, light reddish brown, slightly moist, fine to coarse grained with ~5% coarse grains, ~15% fine gravels
					20		
	1	116	62	⧗			@22.5' sand with silt, light reddish brown, slightly moist, fine to coarse grained with ~5% coarse grains, ~10% fine gravels
					25		
	2	118	50	⧗			@27.5' sand with minor silt, reddish brown, slightly moist to moist, fine to medium grained, ~15% fine to medium grained gravels, 50 blows for 4 inches
					30		
	2	118	50	⧗			@30.0' sand with minor silt, reddish brown, slightly moist to moist, fine to medium grained, ~15% fine to medium grained gravels, 50 blows for 3 inches
							Total Depth - 31.0 Feet No Groundwater 8 Inch Hollow Stem Auger with Autohammer

BORING: B-3

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 28.5' **ALLUVIUM; Qal,**
	7	121	50				@2.5' silty sand, medium brown, slightly moist, fine grained, 50 blows for 6 inches
					5		
	4	110	28				@7.5' silty sand to sandy silt, medium brown, slightly moist, fine grained
					10		
	5	113	25				@12.5' sandy silt, medium brown, slightly moist, fine grained
					15		
	0	120	37				@17.5' sand with silt, white to tan, slightly moist, fine to coarse grained sand, ~15% fine to medium sized gravels
					20		
	2	123	50				@22.5' gravelly sand, reddish brown, slightly moist, fine to coarse grained sand, ~25% fine to medium sized gravels, 50 blows for 3 inches
					25		
	3	121	48				@27.5' gravelly sand, reddish brown, slightly moist, fine to coarse grained sand, ~25% fine to medium sized gravels
					30		Total Depth - 28.5 Feet No Groundwater 8 Inch Hollow Stem Auger with Autohammer

BORING: B-4

ADDRESS: 1000 North Azusa Avenue
PROJECT NO.: 5071
DATE LOGGED: November 6, 2015
LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 31.0' **ALLUVIUM; Qal,**
	6	106	32	⧗	5		@5.0' silty sand, medium brown, slightly moist, fine to medium grained
	9	105	29	⧗	10		@10.0' silty sand to sandy silt, reddish brown, slightly moist to moist, fine grained
	7	111	33	⧗	15		@15.0' silty sand to sandy silt, reddish brown, slightly moist to moist, fine grained
			50	⧗	20		@20.0' No Recovery
	9	112	48	⧗	25		@25.0' silty sand to sandy silt, yellowish brown, slightly moist, fine to medium grained
	6	115	49	⧗	30		@30.0' silty sand to sandy silt, yellowish brown, slightly moist, fine to medium grained
							Total Depth - 31.0 Feet No Groundwater 8" Hollow Stem Auger with Autohammer

BORING: B-5

ADDRESS: 1000 North Azusa Avenue

PROJECT NO.: 5071

DATE LOGGED: November 6, 2015

LOGGED BY: RD

ATTITUDES b - bedding j - joint s - shear f - fault	WATER CONTENT, %	UNIT DRY WEIGHT, PCF	BLOWS/FOOT	SAMPLES	DEPTH, FT	GRAPHIC LOG	DESCRIPTION
							0.0' - 2.0" **ASPHALT**
							2.0" - 31.0' **ALLUVIUM; Qal,**
	3	109	27	⧗	5		@5.0' silty sand to sandy silt, light reddish brown, slightly moist, fine to medium grained
	3	107	22	⧗	10		@10.0' silty sand, light reddish brown, slightly moist, fine to medium grained
			26	⧗	15		@15.0' No Recovery
	3	113	50	⧗	20		@20.0' gravelly silty sand, light reddish brown, slightly moist, fine to medium grained sand, ~25% fine to coarse sized gravels, 50 blows for 5 inches
	5	112	45	⧗	25		@25.0' silty sand to sandy silt, light reddish brown, slightly moist to moist, fine to medium grained
	5	112	82	⧗	30		@30.0' sandy silt, reddish brown, slightly moist to moist, fine grained

Total Depth - 31 Feet
No Groundwater
8" Hollow Stem Auger with Autohammer

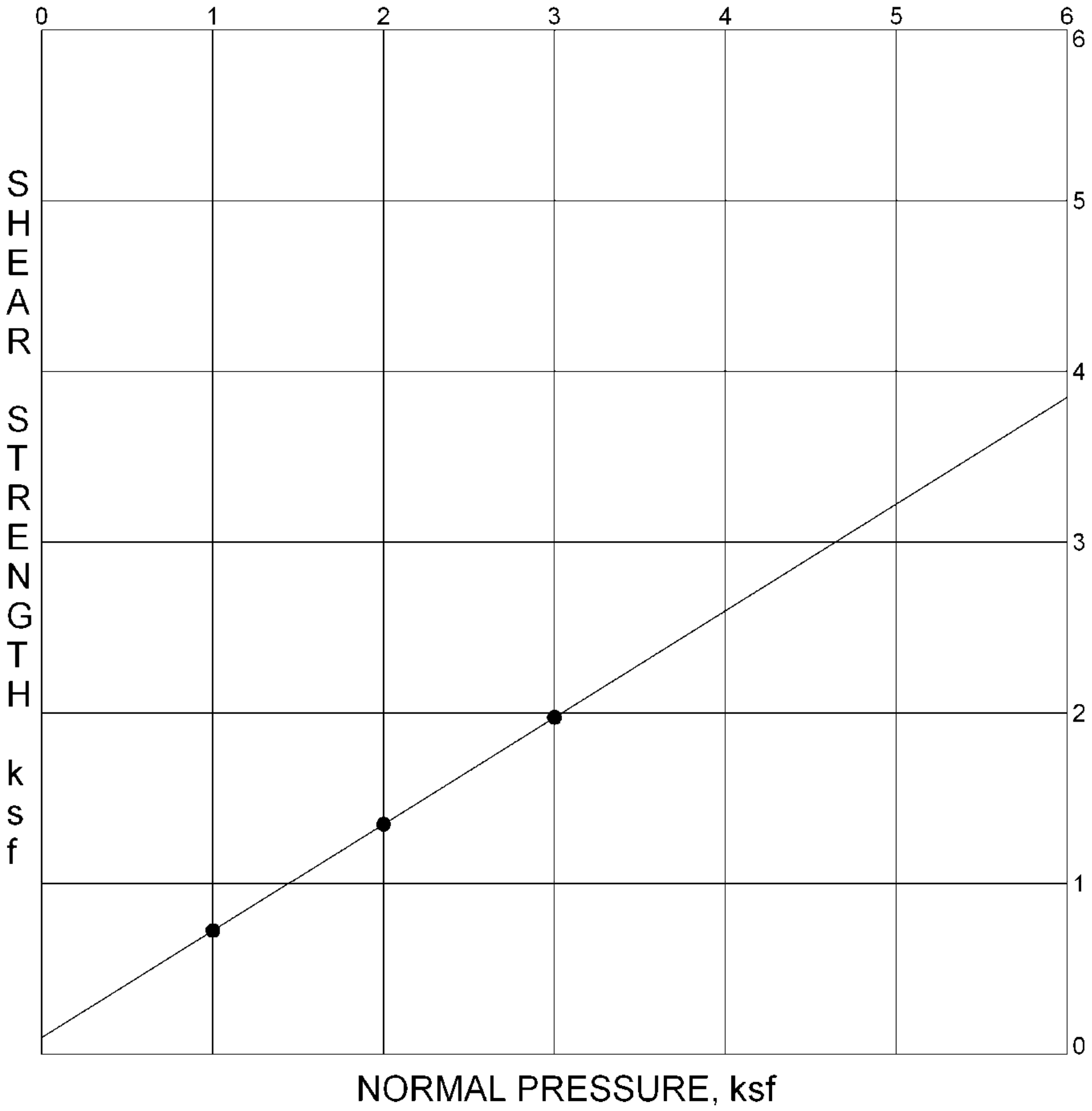
LABORATORY RECAPITULATION 1
PROJECT: 1000 North Azusa Avenue
PROJECT NO.: 5071

Exploration	Depth (ft)	Material	Dry Density In Situ (P.C.F.)	Moisture Content (%)	Cohesion (K.S.F)	Friction Angle (degree)
B-1	5	Qal	116.1	5.1	0.1	32
B-1	10	Qal	113	4.4		
B-1	15	Qal	115	1.9		
B-1	20	Qal	112.1	2.5		
B-1	25	Qal				
B-1	30	Qal	121	3.8		
B-2	2.5	Qal	114	4.4		
B-2	7.5	Qal	105.7	3.2		
B-2	12.5	Qal	109.5	4.9		
B-2	17.5	Qal	116.1	1.1		
B-2	22.5	Qal	116.1	1		
B-2	27.5	Qal	118.4	1.6		
B-2	30	Qal	117.6	1.5		
B-3	2.5	Qal	121.2	6.9	0.05	32
B-3	7.5	Qal	109.7	4.1	0.05	30
B-3	12.5	Qal	113.3	5.2		
B-3	17.5	Qal	120.5	0.5		
B-3	22.5	Qal	123.1	1.9		
B-3	27.5	Qal	120.5	2.7		
B-4	5	Qal	106	6.2		
B-4	10	Qal	105	9		
B-4	15	Qal	111.1	7		
B-4	25	Qal	112	9.5		
B-4	30	Qal	115	5.9		
B-5	5	Qal	109	3.2	0.15	27
B-5	10	Qal	107.2	2.7	0.05	30
B-5	20	Qal	113.5	3.2		
B-5	25	Qal	112	5.1		
B-5	30	Qal	112.2	4.9		

LABORATORY RECAPITULATION 2
PROJECT: 1000 North Azusa Avenue
PROJECT NO.: 5071

Exploration	Depth (ft)	pH	As-Is Soil Resistivity (ohm-cm)	Minimum Soil Resistivity (ohm-cm)	Chloride (%)	Sulphate (%)
B-3	12.5	7.11	29000	6000	0.001	0.00042

PROJECT LOCATION: 1000 North Azusa Avenue
PROJECT NO.: 5071
SAMPLE LOCATION: B-1 @ 5.0
DESCRIPTION: Qal



Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 5.1	Dry Density: 116.1	Phi (deg): 32.0
Saturated: 16.7		Cohesion (ksf): 0.100

SHEAR TEST DIAGRAM

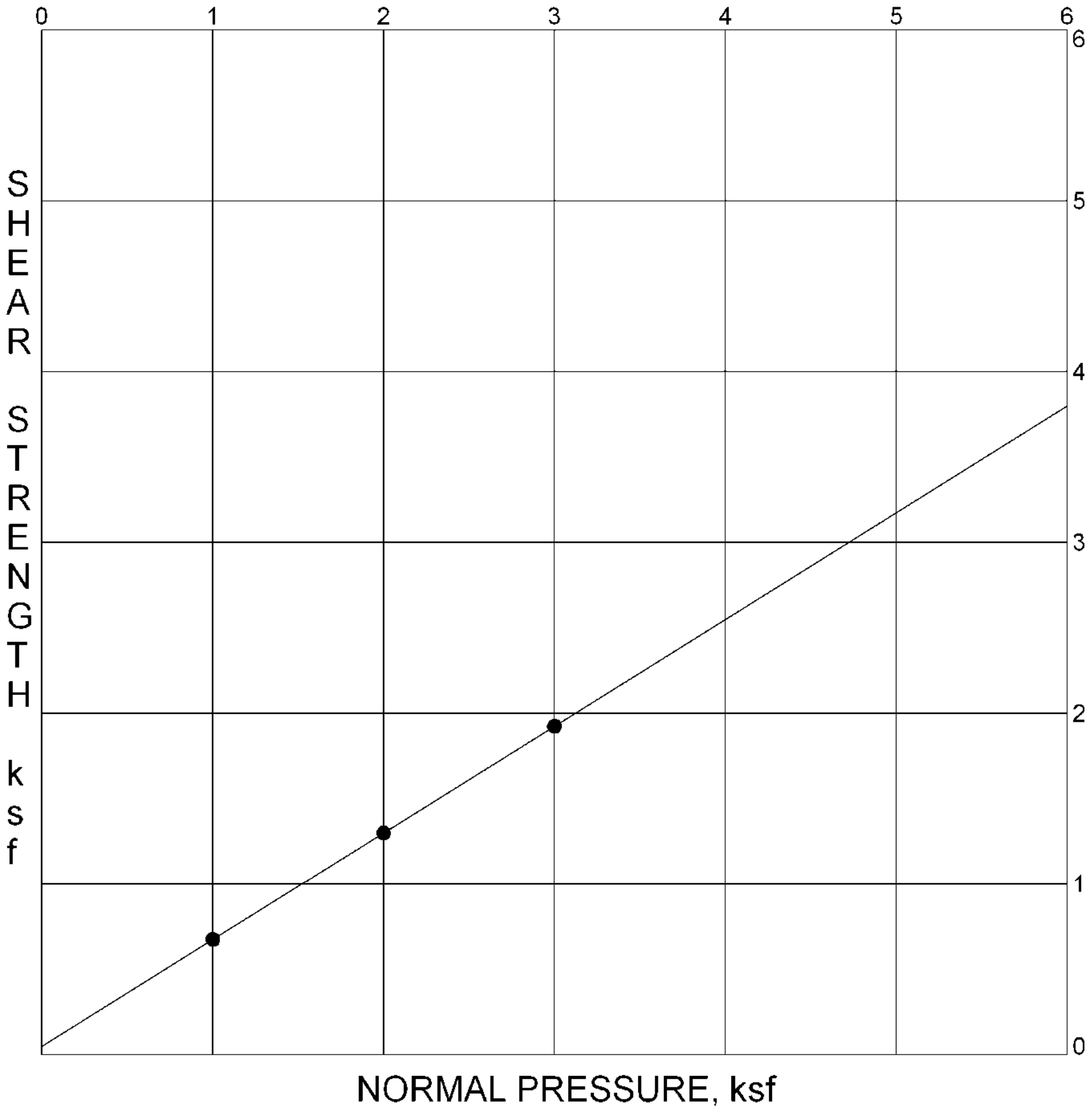
Figure S.1

PROJECT LOCATION: 1000 North Azusa Avenue

PROJECT NO.: 5071

SAMPLE LOCATION: B-3 @ 2.5

DESCRIPTION: Qal



Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 6.9	Dry Density: 121.2	Phi (deg): 32.0
Saturated: 14.5		Cohesion (ksf): 0.050

SHEAR TEST DIAGRAM

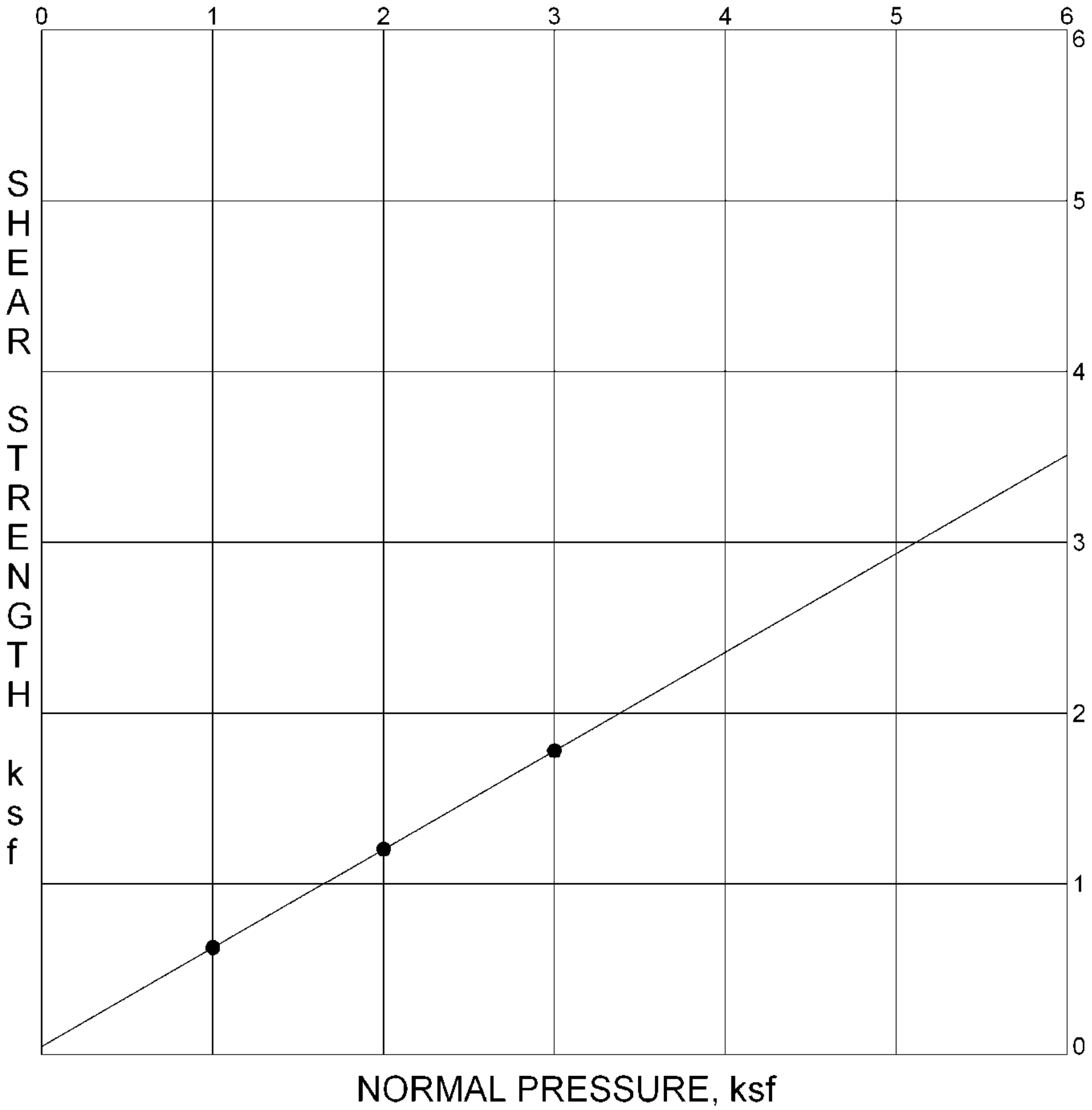
Figure S.2

PROJECT LOCATION: 1000 North Azusa Avenue

PROJECT NO.: 5071

SAMPLE LOCATION: B-3 @ 7.5

DESCRIPTION: Qal



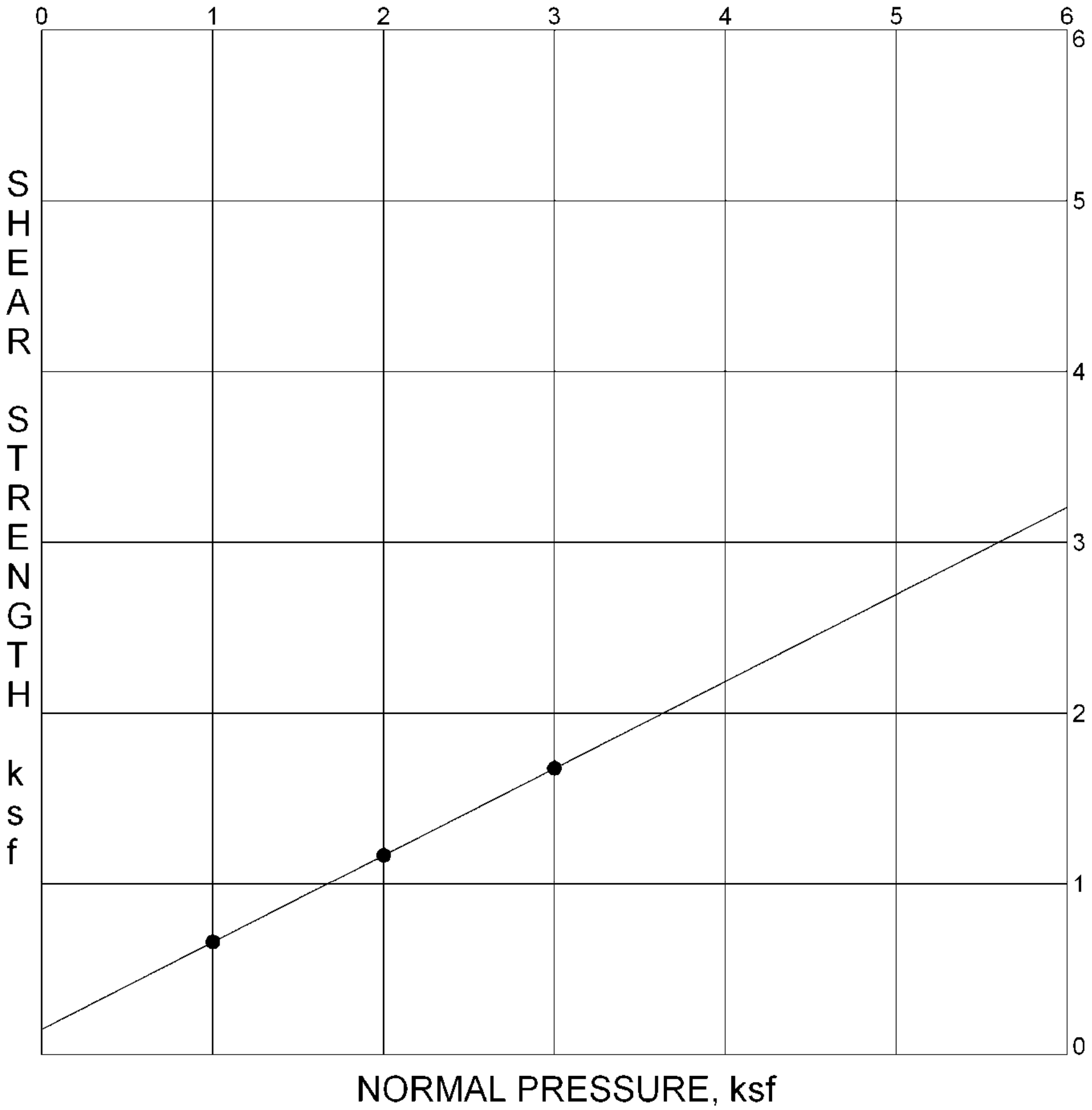
Test Results

Moisture Content (%)	**Density (pcf)**	**Ultimate Strength**
Insitu: 4.1	Dry Density: 109.7	Phi (deg): 30.0
Saturated: 19.9		Cohesion (ksf): 0.050

SHEAR TEST DIAGRAM

Figure S.3

PROJECT LOCATION:	1000 North Azusa Avenue	PROJECT NO.:	5071
SAMPLE LOCATION:	B-5 @ 5.0	DESCRIPTION:	Qal



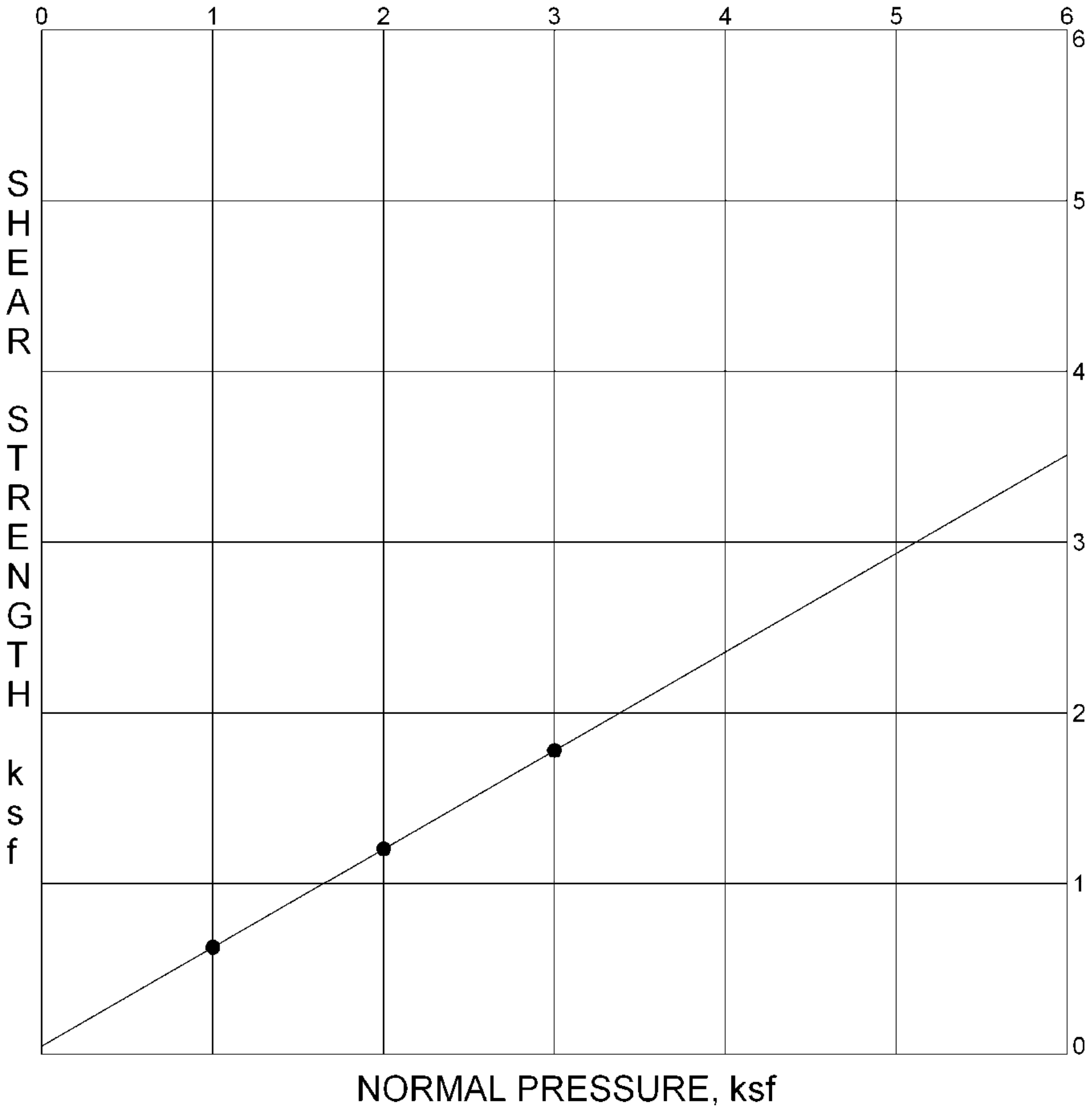
Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 3.2	Dry Density: 109.0	Phi (deg): 27.0
Saturated: 20.2		Cohesion (ksf): 0.150

SHEAR TEST DIAGRAM

Figure S.4

PROJECT LOCATION: 1000 North Azusa Avenue
PROJECT NO.: 5071
SAMPLE LOCATION: B-5 @ 10.0
DESCRIPTION: Qal



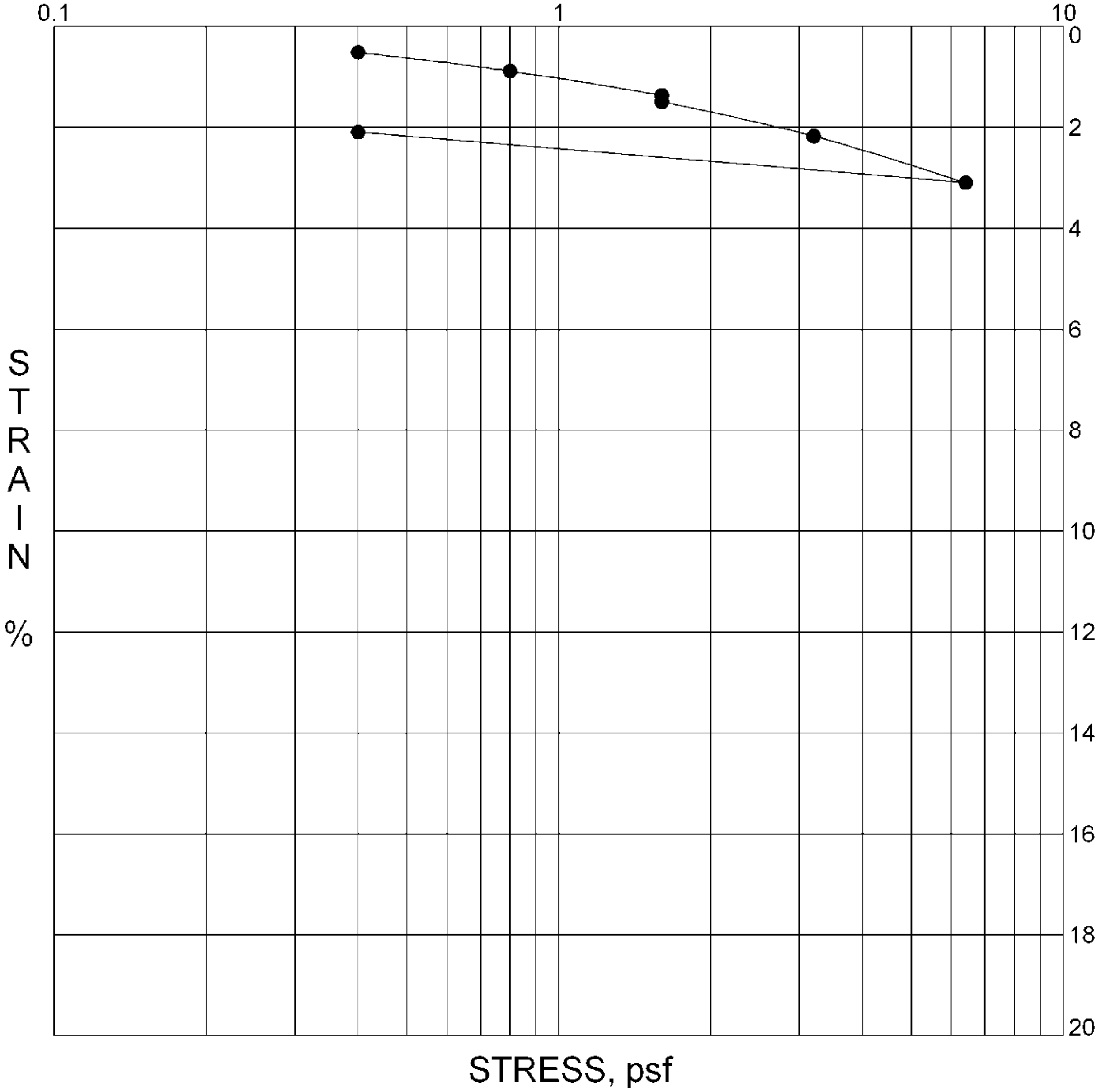
Test Results

Moisture Content (%)	Density (pcf)	Ultimate Strength
Insitu: 2.7	Dry Density: 107.2	Phi (deg): 30.0
Saturated: 21.1		Cohesion (ksf): 0.050

SHEAR TEST DIAGRAM

Figure S.5

PROJECT LOCATION:	1000 North Azusa Avenue	PROJECT NO.:	5071
SAMPLE LOCATION:	B-1 @ 5.0	DESCRIPTION:	Qal



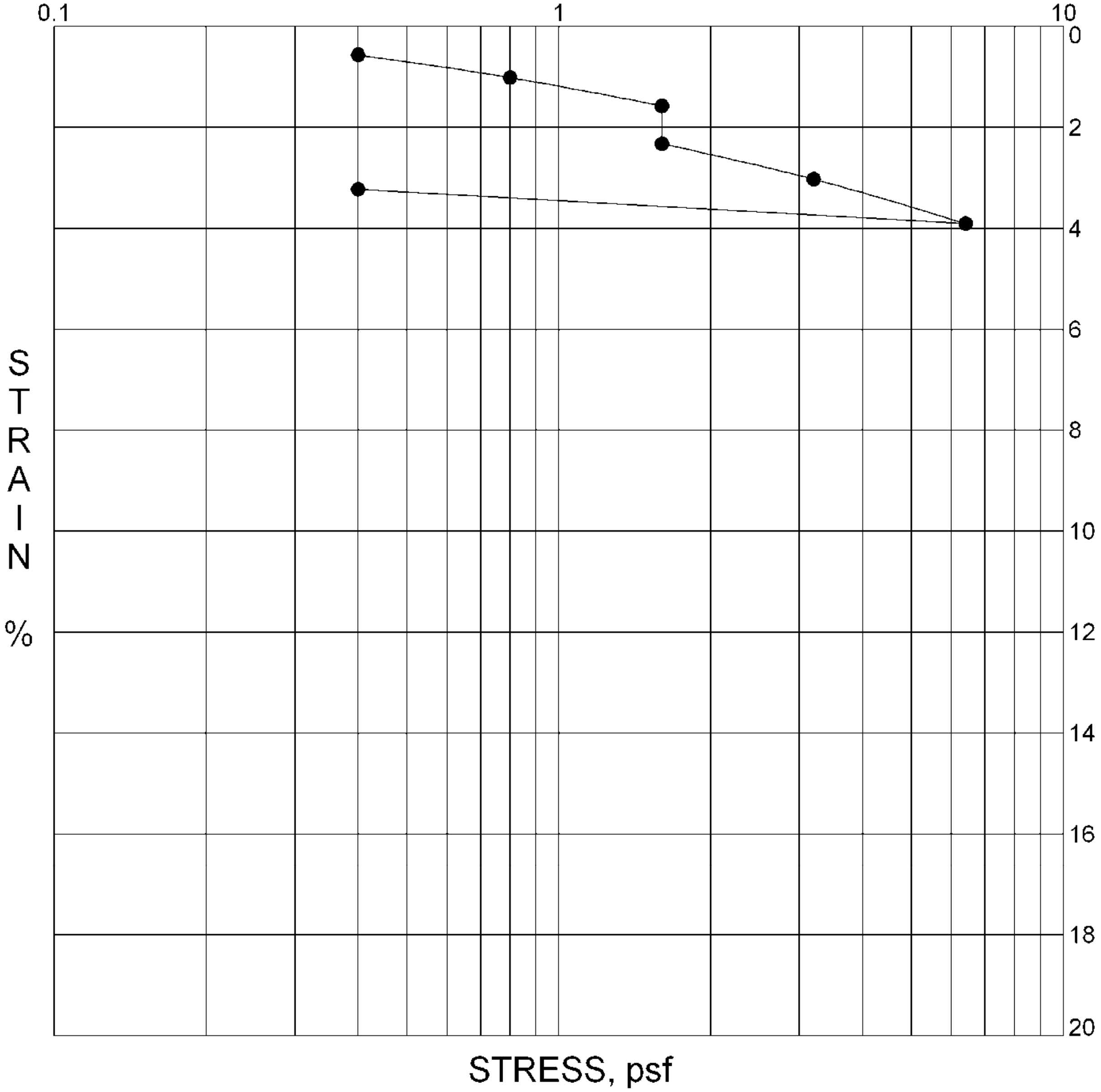
Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 5.1	Dry Density: 116.1	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.1

PROJECT LOCATION:	1000 North Azusa Avenue	PROJECT NO.:	5071
SAMPLE LOCATION:	B-2 @ 7.5	DESCRIPTION:	Qal



Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 3.2	Dry Density: 105.7	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

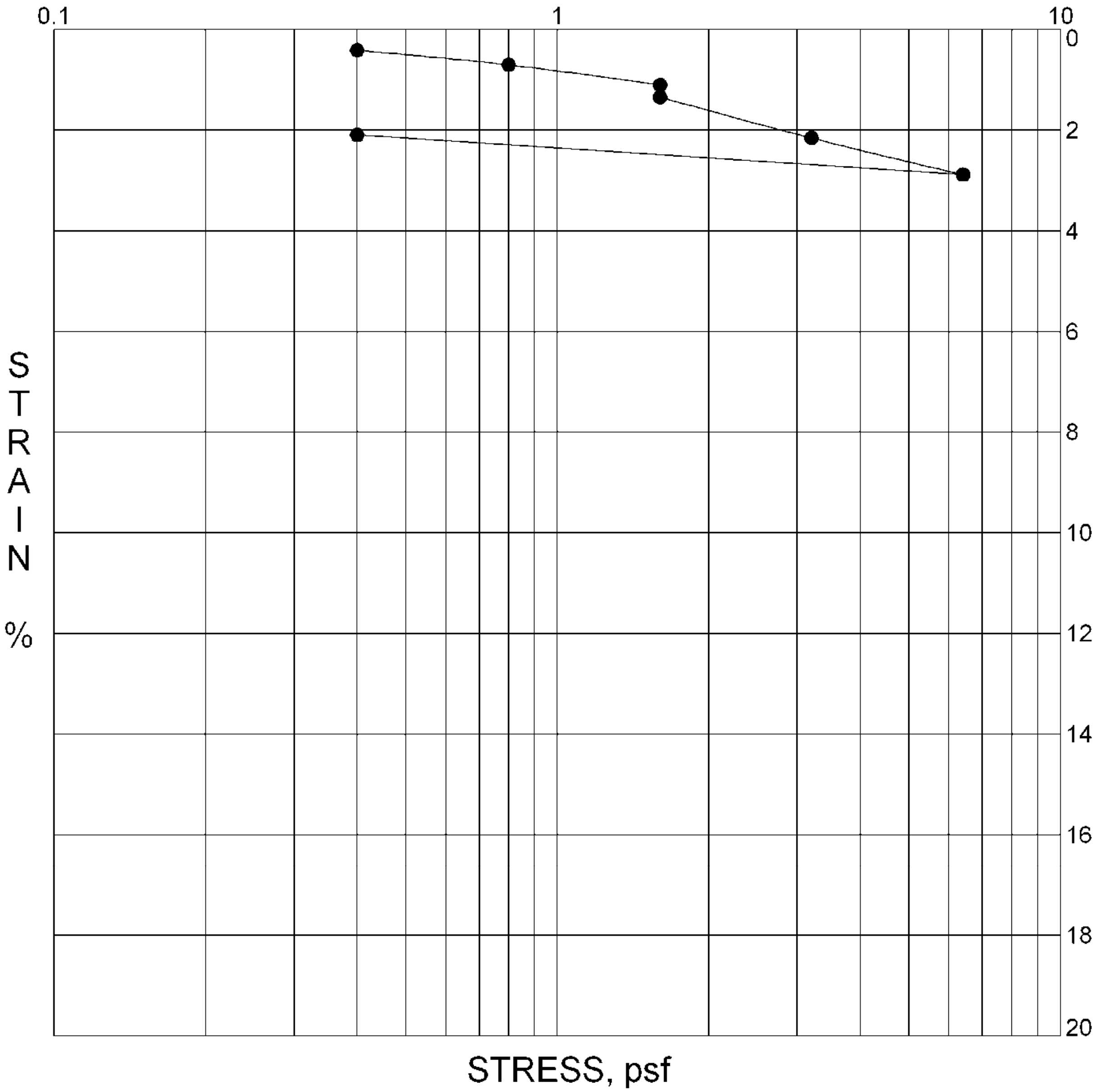
Figure C.2

PROJECT LOCATION: 1000 North Azusa Avenue

PROJECT NO.: 5071

SAMPLE LOCATION: B-3 @ 2.5

DESCRIPTION: Qal



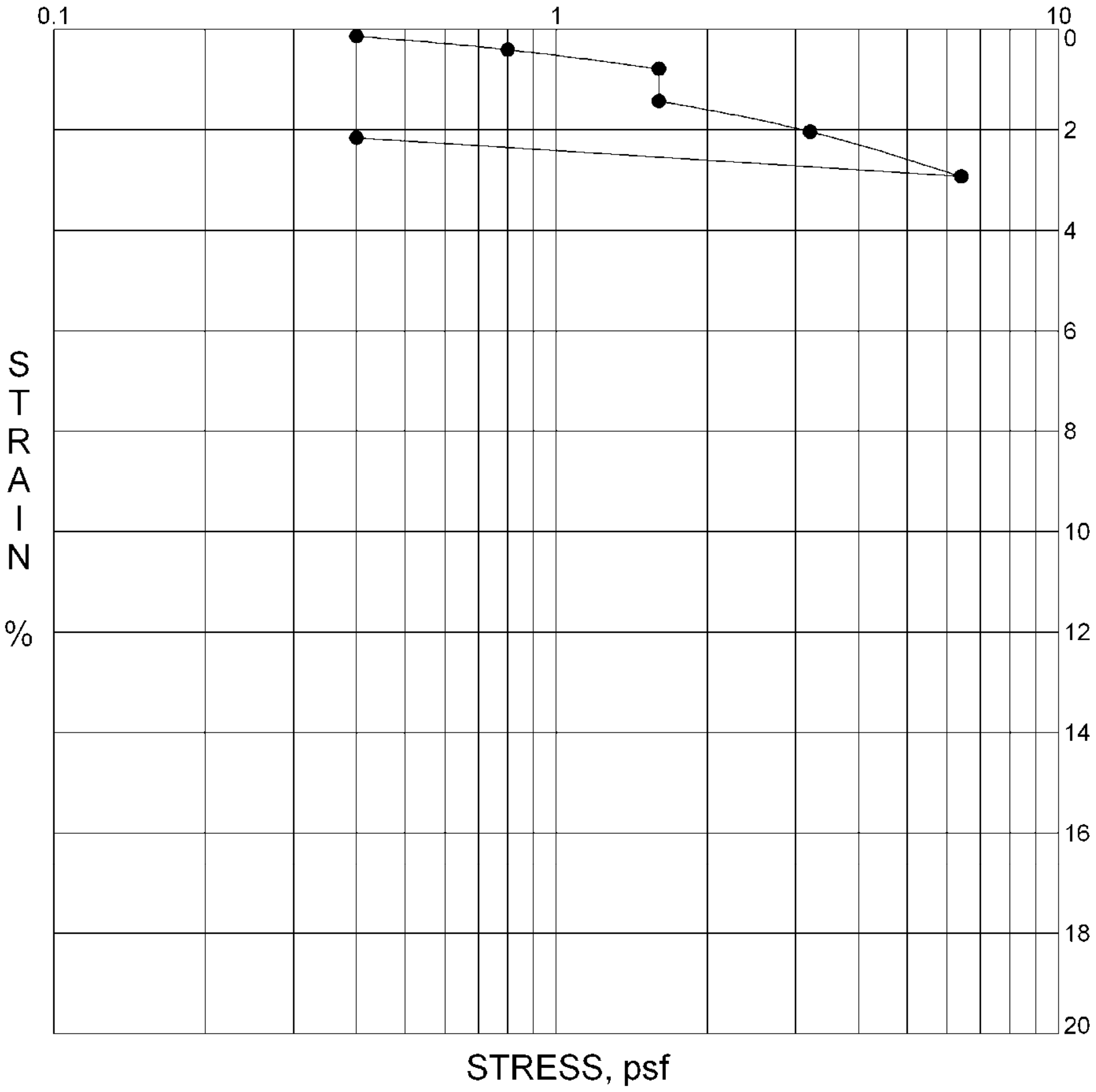
Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 6.9	Dry Density: 121.2	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.3

PROJECT LOCATION:	1000 North Azusa Avenue	PROJECT NO.:	5071
SAMPLE LOCATION:	B-3 @ 7.5	DESCRIPTION:	Qal



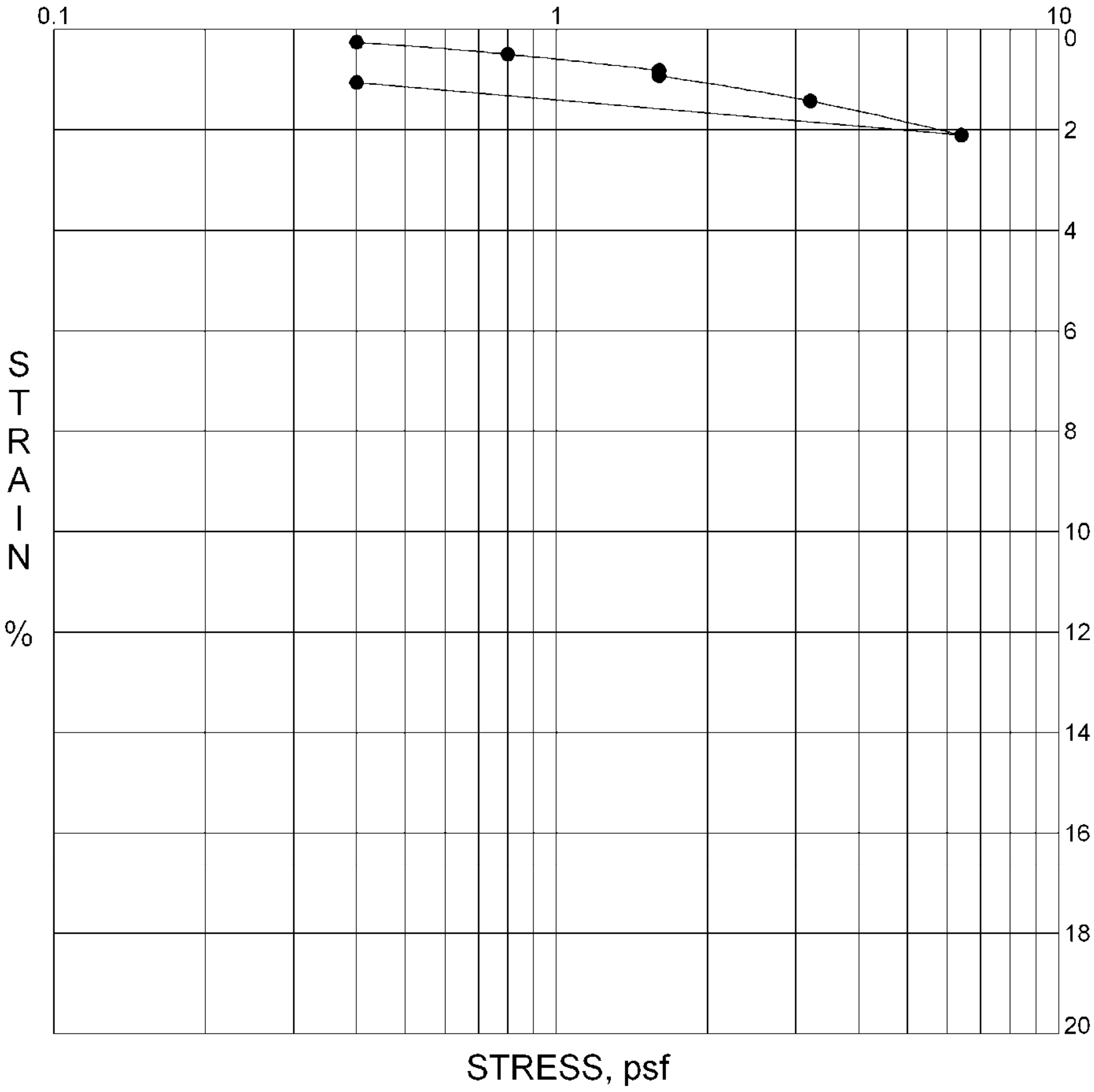
Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 4.1	Dry Density: 109.7	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.4

PROJECT LOCATION: 1000 North Azusa Avenue
PROJECT NO.: 5071
SAMPLE LOCATION: B-4 @ 10.0
DESCRIPTION: Qal



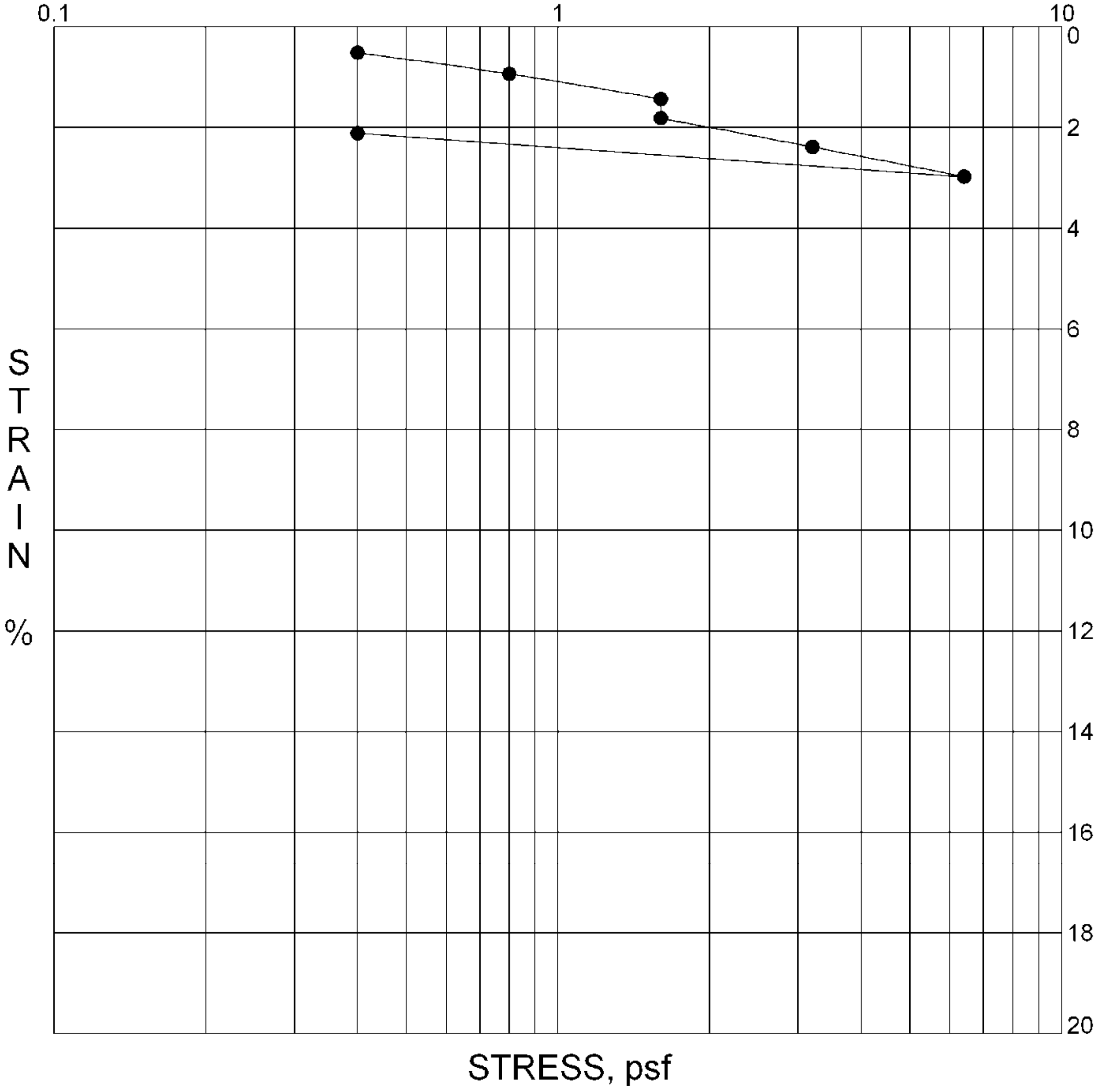
Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 9.0	Dry Density: 105.0	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.5

PROJECT LOCATION: 1000 North Azusa Avenue
PROJECT NO.: 5071
SAMPLE LOCATION: B-5 @ 10.0
DESCRIPTION: Qal



Test Results

Moisture Content (%)	Density (pcf)	Water Added At
Insitu: 2.7	Dry Density: 107.2	**1600 lbs.**

CONSOLIDATION TEST DIAGRAM

Figure C.6

APPENDIX B

EXPLORATORY BORING LOGS BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

The Modified Split-Barrel Sampler (Ring)

The ring sampler is driven into the ground in accordance with ASTM Test Method D 3550. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler is typically driven into the ground 12 or 18 inches with a 140-pound hammer free falling from a height of 30 inches. Blow counts are recorded for every 6 inches of penetration as indicated on the logs of borings. The samples are removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

Bulk Samples (Large)

These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)

These are plastic bag samples which are normally airtight and contain less than five pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B – BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of borings:

SOILS	
USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium
GEOLOGIC	
B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
………..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
———	Thick solid line denotes end of boring

(Additional denotations and symbols are provided on the logs of borings)

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
DRILLER: 2R Drilling Inc.
LOGGED BY: KIG
PROJECT NAME: 1000 N Azusa Ave, Covina
DRILL METHOD: Hollow Stem Auger
OPERATOR: Jorge
PROJECT NO.: 3260-CR
HAMMER: 140lbs/30in.
RIG TYPE: CME 75
LOCATION: See Exploration Location Map
DATE: 6/24/2022

BORING NO.: B-1

Depth (ft)	SAMPLES Sample Type	SAMPLES Blows/ 6 in	SAMPLES Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
					3" Asphaltic Concrete over 3" Base			
				SM/ML	**Undocumented Fill:** silty f SAND to f sandy SILT, brown, slightly moist to moist			
	☒				**Alluvium:**			MD, EI, SH, SR
	☒ ▨	16 30 35	R1	SM	silty f-m SAND, brown, slightly moist, dense	3.7	121.4	
5	▨	16 17 21	R2		becomes olive-brown, slightly moist, medium dense	2.2	119.6	
	▨	15 22 28	R3		silty f-m SAND, brown, slightly moist, dense	2.4	114.4	
10	▨	20 26 24	R4		silty f-c SAND, brown, slightly moist, dense, few fine gravel	2.3	131.6	
	▨	50/6"	R5		contains some fine to coarse gravel			
15								
	▨	50/6"	R6					
20								
	▪	32 31 35	S1		silty f-c SAND, olive-brown, slightly moist, dense, grey-white rock pieces towards bottom of sampler			
25								
30	▪	39 50/3"	S2		same as above			
					BORING TERMINATED AT 30.0 FEET No groundwater encountered Boring backfilled with soil cuttings			

LEGEND

Sample type: ▨ ---Ring ▪ ---SPT ◩ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Melia Homes	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	KIG
PROJECT NAME:	1000 N Azusa Ave, Covina	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jorge
PROJECT NO.:	3260-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	6/24/2022

BORING NO.: B-2 SHEET 1 OF 2

	SAMPLES					Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 5" Base			
				SM/ML	**Undocumented Fill:** silty f SAND to f sandy SILT, brown, slightly moist to moist, few clay, glass fragments			
	☒				**Alluvium:**			EI, SR, SA
	▨	11 19 25	S3	SM	silty SAND, brown, moist, medium dense	11.6	126.5	
5	▨	13 13 13	R2		Same as above	7.7	115.0	HC, SA
	▨	6 39 30	R3		silty f-m SAND, light brown, slightly moist, fine to coarse gravels and cobble in sampler tip, sample disturbed	3.6		SA
10	▨	7 10 14	R4	SP	gravelly f-c SAND, brown, moist, medium dense, few cobbles	8.4	108.7	
15	▨	2 1 2	R5	SM	silty f-c SAND, brown, moist, loose	10.3	107.2	HC, SA
20	▨	50/6"	R6	SP	gravelly f-c SAND, brown, slightly moist to moist, very dense.			
25	▪	32 31 35	S1		SAND, olive-brown, slightly moist to moist, very dense, some fine gravel			SA
30	▪	35 39 50/5"	S2		Same as above			

LEGEND

Sample type: ▨ ---Ring ▪ ---SPT ◺ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
PROJECT NAME: 1000 N Azusa Ave, Covina
PROJECT NO.: 3260-CR
LOCATION: See Exploration Location Map
DRILLER: 2R Drilling Inc.
DRILL METHOD: Hollow Stem Auger
HAMMER: 140lbs/30in.
LOGGED BY: KIG
OPERATOR: Jorge
RIG TYPE: CME 75
DATE: 6/24/2022

BORING NO.: B-2 SHEET 2 OF 2

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
35	■	23 25 26	S3		Same as above			
40	■	7 11 9	S4	SM	silty SAND, brown, slightly moist to moist, some fine gravel, transitions to clayey f-sandy SILT at sampler tip			SA
45	■	20 13 10	S5	SM	silty f-m SAND, olive-brown, slightly moist to moist, medium dense, some coarse grained sand, trace fine gravel			
50	■	7 8 9	S6	SM/ML	silty f SAND to f sandy SILT, brown, slightly moist to moist, stiff to medium dense			

BORING TERMINATED AT 51.5 FEET

No groundwater encountered
Boring backfilled with soil cuttings

LEGEND

Sample type: ■ ---Ring ■ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
PROJECT NAME: 1000 N Azusa Ave, Covina
PROJECT NO.: 3260-CR
LOCATION: See Exploration Location Map
DRILLER: 2R Drilling Inc.
DRILL METHOD: Hollow Stem Auger
HAMMER: 140lbs/30in.
LOGGED BY: KIG
OPERATOR: Jorge
RIG TYPE: CME 75
DATE: 6/24/2022

BORING NO.: B-3 SHEET 1 OF 2

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
				SM/ML	**Undocumented Fill:** silty f-m SAND to f-m sandy SILT, grey-brown, slightly moist to moist, rootlets			
	■	28 50/6"	R1	SM	**Alluvium:** silty f-m SAND, brown, slightly moist to moist, dense	6.5	127	
5	⧄ ■	37 50/5"	R2		Same as above, fragmented rock at sampler tip.			
	■	6 8 11	R3	SM/ML	silty f-m SAND to f-m sandy SILT, brown, moist, medium dense to stiff	8.2	113.7	
10	■	13 25 29	R4	SM	silty f-c SAND, light brown, slightly moist, dense, few fine to coarse gravel present	2.1	114.9	
	■	36 39 50	R5		silty f-c SAND, light grey-brown, slightly moist, very dense, some fine to coarse gravel			
15								
	▮	5 5 6	S1		silty f-c SAND, brown, slightly moist, loose, trace clay towards sampler tip.			
20								
25	▮	3 5 5	S2		silty f-m SAND, brown, slightly moist, loose, trace clay			

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
DRILLER: 2R Drilling Inc.
LOGGED BY: KIG
PROJECT NAME: 1000 N Azusa Ave, Covina
DRILL METHOD: Hollow Stem Auger
OPERATOR: Jorge
PROJECT NO.: 3260-CR
HAMMER: 140lbs/30in.
RIG TYPE: CME 75
LOCATION: See Exploration Location Map
DATE: 6/24/2022

BORING NO.: B-3 SHEET 2 OF 2

Depth (ft)	SAMPLES			USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number			Water Content (%)	Dry Density (pcf)	Others
30	▨	4 5 7	S3	SM/CL	clayey silty f SAND, brown, slightly moist, loose			
					BORING TERMINATED AT 31.5 FEET No groundwater encountered Boring backfilled with soil cuttings			
35								
40								
45								
50								

LEGEND

Sample type: ▬ ---Ring ▨ ---SPT ◩ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
PROJECT NAME: 1000 N Azusa Ave, Covina
PROJECT NO.: 3260-CR
LOCATION: See Exploration Location Map
DRILLER: 2R Drilling Inc.
DRILL METHOD: Hollow Stem Auger
HAMMER: 140lbs/30in.
LOGGED BY: KIG
OPERATOR: Jorge
RIG TYPE: CME 75
DATE: 6/24/2022

BORING NO.: B-4

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 3" Base			
				SM/ML	**Undocumented Fill:** silty f SAND to f sandy SILT, olive brown, slightly moist to moist, some clay			
					Alluvium:			
	▨	16 30 35	R1	SM	silty f-m SAND, reddish-brown, moist, dense	11.7	114	
5								
	▨	16 17 21	R2		Same as above, medium dense	11.3	113.8	
10	▨	20 26 24	R3		Same as above, trace coarse sand	10.4	118.7	
	▨	5 13 13	R4		silty f-c SAND, reddish-brown, slightly moist, medium dense, trace fine gravel in sampler tip	4.2	127.4	
15								
	▨	5 13 13	R5		gravelly silty f-c SAND, light grey-brown, slightly moist, medium dense, minor silt			
	▨	50/6"	R6		silty f-c SAND, olive brown, slightly moist, very dense, some fine gravel			
20					**BORING TERMINATED AT 19.0 FEET** No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▪ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
PROJECT NAME: 1000 N Azusa Ave, Covina
PROJECT NO.: 3260-CR
LOCATION: See Exploration Location Map
DRILLER: 2R Drilling Inc.
DRILL METHOD: Hollow Stem Auger
HAMMER: 140lbs/30in.
LOGGED BY: KIG
OPERATOR: Jorge
RIG TYPE: CME 75
DATE: 6/24/2022

BORING NO.: B-5

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 3" Base			
				SM/ML	**Undocumented Fill:** silty f-c SAND to f-c sandy SILT, olive brown, slightly moist to moist, some clay.			
	☒				**Alluvium:**			
5	▨	12 25 37	R1	SM	silty f-m SAND, dark reddish-brown, moist, dense	7.1	120	
	▨	15 19 30	R2	ML/SM	f-c sandy SILT to silty f-c SAND, dark brown, moist, dense, trace fine to coarse gravels and cobbles	8.0	130.3	
	▨	20 27 38	R3		Same as above, fine to medium grained sand with trace coarse sand	8.2	131.2	
10								
	▨	12 17 17	R4		Same as above, trace coarse sand and fine gravel	10.3	123.5	
15	▨	9 10 9	R5		Same as above, trace coarse sand	10.7	120.5	
20	▨	50/6"	R6	SP	gravelly f-c SAND, whitish-grey, slightly moist, very dense, large rock pieces			
					BORING TERMINATED AT 20.5 FEET No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	Melia Homes	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	KIG
PROJECT NAME:	1000 N Azusa Ave, Covina	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jorge
PROJECT NO.:	3260-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	6/24/2022

Depth (ft)	SAMPLES			USCS Symbol	**BORING NO.: I-1**	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number		**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 6" Base			
				SM	**Undocumented Fill:** silty f-c SAND, dark brown, slightly moist			
				SM	**Alluvium:** silty f-m SAND, reddish-brown, slightly moist			
5					silty f-c SAND, brown, slightly moist, trace coarse sand			
10					Same as above, trace fine gravel			
	■	12 18 20	S1		silty f-m SAND, whitish-brown, slightly moist			
15					**BORING TERMINATED AT 15.0 FEET** No groundwater encountered Boring set with pipe, sock, and gravel in annular space			
20								
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ◩ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: Melia Homes
PROJECT NAME: 1000 N Azusa Ave, Covina
PROJECT NO.: 3260-CR
LOCATION: See Exploration Location Map
DRILLER: 2R Drilling Inc.
DRILL METHOD: Hollow Stem Auger
HAMMER: 140lbs/30in.
LOGGED BY: KIG
OPERATOR: Jorge
RIG TYPE: CME 75
DATE: 6/24/2022

BORING NO.: I-2

Depth (ft)	SAMPLES			USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					3" Asphaltic Concrete over 3" Base			
				SM/CL	**Undocumented Fill:** silty SAND to sandy CLAY, olive brown slightly moist to moist			
				SM/ML	**Alluvium:** silty f-m SAND to f-m sandy SILT, reddish-brown, slightly moist			
5					Same as above, darker color			
10					Same as above			
	▨	12 18 20	S1	SM	silty f-m SAND, light brown, slightly moist, some coarse sand, 10-15% f. gravel			
15					**BORING TERMINATED AT 15.0 FEET** No groundwater encountered Boring set with pipe, sock, and gravel in annular space			
20								
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ◸ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

APPENDIX C

LABORATORY TEST RESULTS BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

SUMMARY OF LABORATORY TESTING

Classification

Soils were classified visually in general accordance to the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the logs of exploratory borings in Appendix A.

Collapse

Several collapse tests were conducted in accordance with ASTM D4546. The results of these tests are presented herewith.

Direct Shear

Direct shear testing was performed on remolded samples of the surficial soils according to ASTM Test Method D 3080. The results of these tests are presented herewith.

Expansion Index

The expansion potential of the soils was determined by performing expansion index tests on two representative soil samples from the site in general accordance with ASTM D 4829. The results of these tests are presented herewith.

In Situ Moisture Content and Unit Weight

The field moisture content was measured in the laboratory on selected samples collected during the field investigation. The field moisture content is determined as a percentage of the dry unit weight. The dry density was measured in the laboratory on selected ring samples. The results are shown on the logs of exploratory borings in Appendix A.

Moisture-Density Relationship

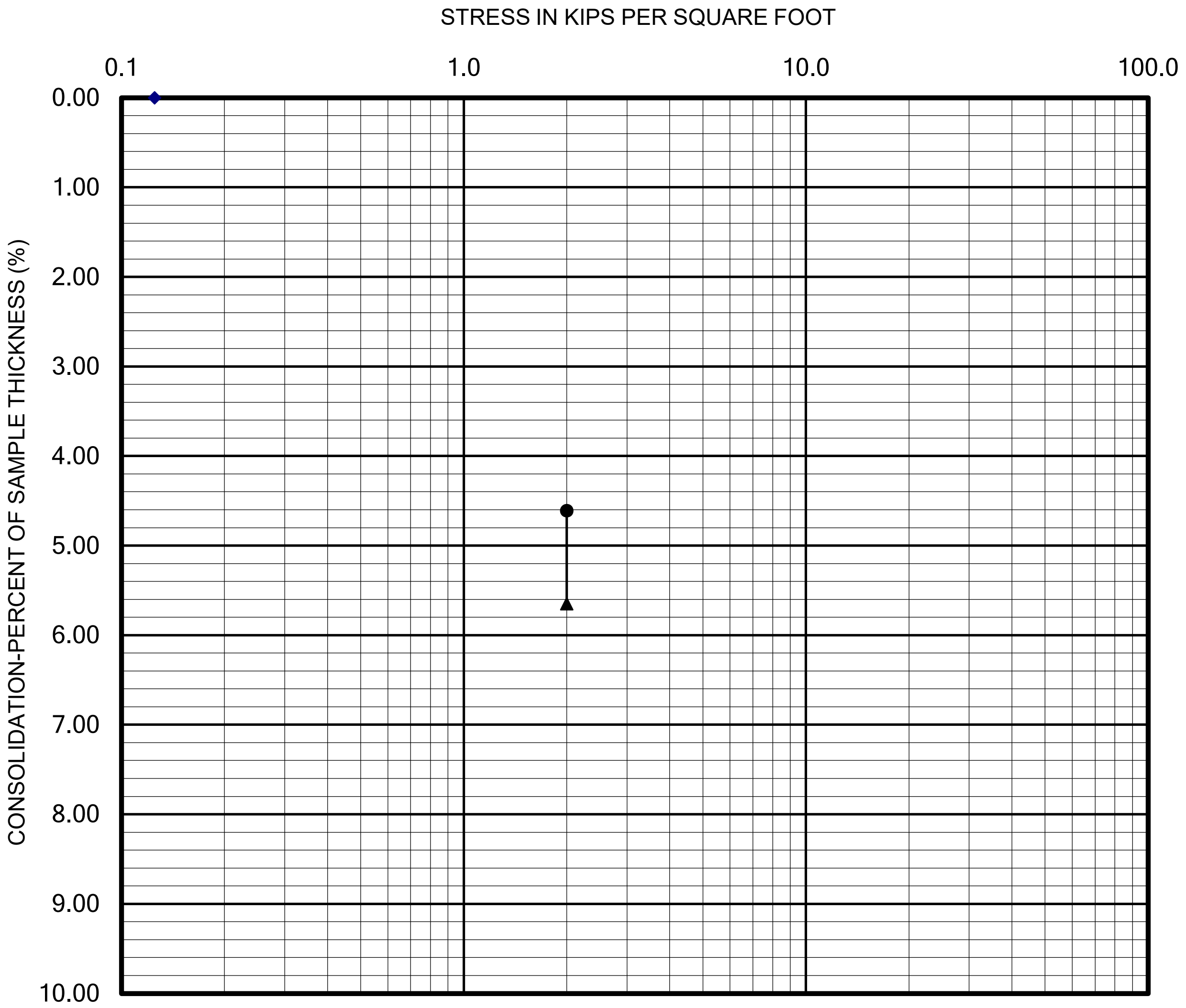
Laboratory testing was performed on a representative soil sample collected during the subsurface exploration. The laboratory maximum dry density and optimum moisture content for the soil type was determined in general accordance with test method ASTM Test Procedure D 1557. The results are presented herewith.

Percent Passing No. 200 Sieve

Several samples were tested to estimate the amount of soil finer than No. 200 sieve. Tests were conducted in general accordance with ASTM D 1140. The results are presented herewith.

Sulfate Content, Resistivity and Chloride Content

Testing to determine the water-soluble sulfate content, minimum resistivity, and chloride concentration in selected soil samples was performed by others. The results are included herewith.



- - -●- - - Seating Cycle
—●— Loading Prior to Inundation
—▲— Loading After Inundation
- - -▲- - - Rebound Cycle

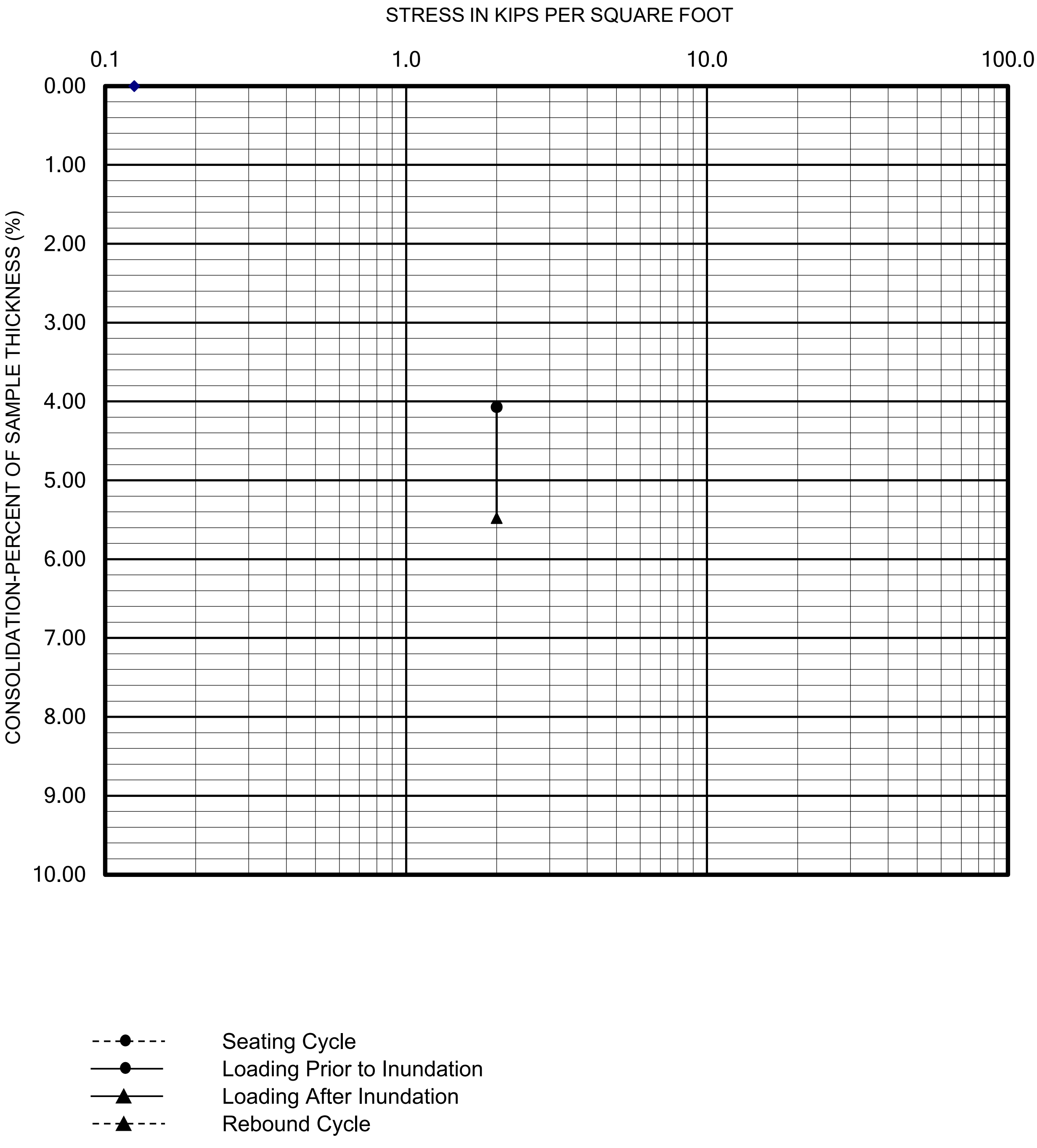
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

Sample: B-2 @ 5 feet

CHECKED BY: DA	Lab: Corona
PROJECT NO.: 3260-CR	Date: 7/13/2022



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

Sample: B-2 @ 15 feet

CHECKED BY: DA	Lab: Corona
PROJECT NO.: 3260-CR	Date: 7/13/2022

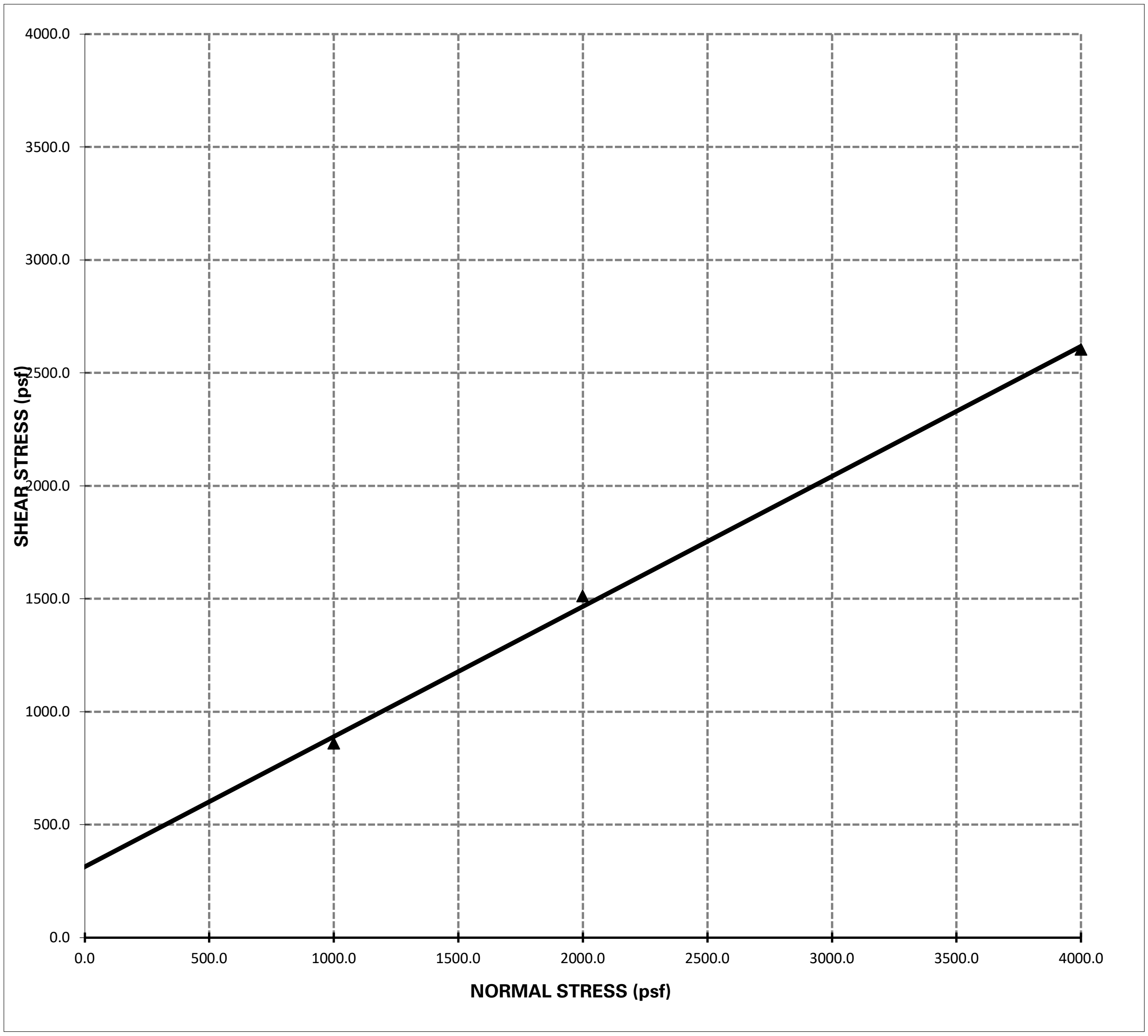
DIRECT SHEAR TEST

Project Name: 1000 North Azusa Avenue, Covina

Sample Location: B-1 @ 2-5 feet

Project Number: 3260-CR

Date Tested: 7/11/2022



Shear Strength: $\Phi =$ **30 °** ; **C = 314 psf**

Notes:

1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client: Melia Homes

Project Number: 3260-CR

Project Location: 1000 N Azusa Avenue, Covina

Tested/ Checked By: MP Lab No Corona

Date Tested: 7/14/2022

Sample Source: B-1 @ 2-5 feet

Sample Description:

Ring #:______ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

Weight of compacted sample & ring (gm)	781.0
Weight of ring (gm)	370.3
Net weight of sample (gm)	**410.7**
Wet Density, lb / ft3 (C*0.3016)	**123.9**
Dry Density, lb / ft3 (D/1.F)	**114.1**

SATURATION DETERMINATION

Moisture Content, %	8.6
Specific Gravity, assumed	**2.70**
Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
% Saturation	**48.7**

READINGS

DATE	TIME	READING	
7/14/2022		0.3510	Initial
7/14/2022		0.3490	10 min/Dry
7/15/2022		0.3490	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
800.8	**13.4**

EXPANSION INDEX = 0

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client: Melia Homes
Project Number: 3260-CR
Project Location: 1000 N Azusa Avenue, Covina

Tested/ Checked By: MP Lab No Corona
Date Tested: 7/14/2022
Sample Source: B-2 @ 2-5 feet
Sample Description:

Ring #:______ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

Weight of compacted sample & ring (gm)	771.9
Weight of ring (gm)	368.2
Net weight of sample (gm)	**403.7**
Wet Density, lb / ft3 (C*0.3016)	**121.8**
Dry Density, lb / ft3 (D/1.F)	**111.2**

SATURATION DETERMINATION

Moisture Content, %	9.5
Specific Gravity, assumed	**2.70**
Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
% Saturation	**49.8**

READINGS

DATE	TIME	READING	
7/14/2022		0.3580	Initial
7/14/2022		0.3570	10 min/Dry
7/15/2022		0.3650	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
791.4	**14.3**

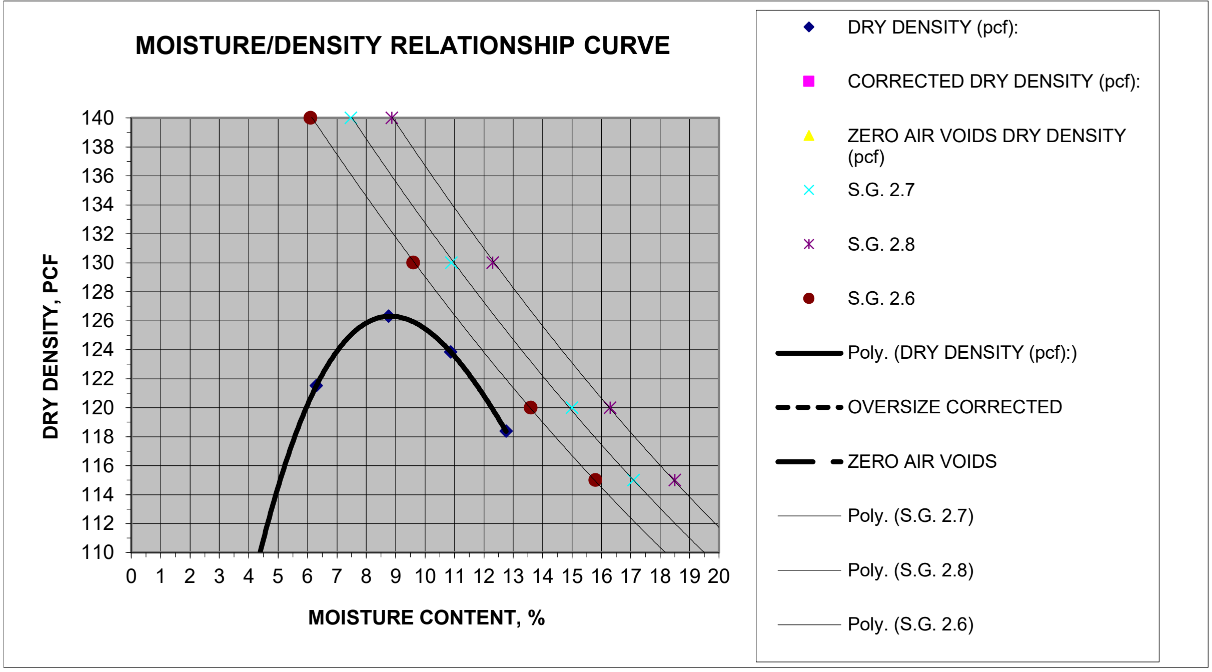
EXPANSION INDEX = **8**

GEOTEK

MOISTURE/DENSITY RELATIONSHIP

Client: Melia Homes
Job No.: 3260-CR
Project: 1000 North Azusa Ave
Lab No.: Corona
Location: Covina
Material Type: Brown silty f-m sand
Material Supplier: -
Material Source: -
Sample Location: B1 @ 2-5 feet
-
Sampled By: KIG
Date Sampled: 6/29/2022
Received By: MJP
Date Received: 6/29/2022
Tested By: MJP
Date Tested: 7/7/2022
Reviewed By: DA
Date Reviewed: 7/20/2022

Test Procedure: ASTM D1557
Method: A
Oversized Material (%): 10.5
Correction Required: ☒ **yes** ☐ **no**



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 126.5 **@ Optimum Moisture, %** 9.0
Corrected Maximum Dry Density, pcf **@ Optimum Moisture, %**

MATERIAL DESCRIPTION

Grain Size Distribution:
% Gravel (retained on No. 4)
% Sand (Passing No. 4, Retained on No. 200)
% Silt and Clay (Passing No. 200)

Atterberg Limits:
Liquid Limit, %
Plastic Limit, %
Plasticity Index, %

Classification:
Unified Soils Classification:
AASHTO Soils Classification:

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-1

Client: Melia Homes depth 25 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	297	63.4	17.6%	

Dry Weight 360.4

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 2-5 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	252.5	168.7	40.1%	

Dry Weight 421.2

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 5 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	**Particle Diameter**		**Wt. Retained**	**Wt. Passing**	**% Passing**	**Specs**
	in.	**mm.**				
#200	0.0029	0.074	196.1	96.2	32.9%	

Dry Weight 292.3

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 7 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	224.2	67.3	23.1%	

Dry Weight 291.5

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR sample ID B-2

Client: Melia Homes depth 15 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	164.4	74.8	31.3%	

Dry Weight 239.2

Soak Time 1440 Minutes

GEOTEK

-200 WASH

Date: 7/7/2022

W.O.: 3260-CR   sample ID B-2

Client: Melia Homes   depth 25 feet

Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	416.8	23.2	5.3%	

Dry Weight 440

Soak Time 1440 Minutes

-200 WASH

Date: 7/7/2022
W.O.: 3260-CR sample ID B-2
Client: Melia Homes depth 40 feet
Project: 1000 North Azusa Avenue, Covina

Sieve Size	Particle Diameter		Wt. Retained	Wt. Passing	% Passing	Specs
	in.	mm.				
#200	0.0029	0.074	199.3	116.3	36.9%	

Dry Weight 315.6

Soak Time 1440 Minutes

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: 1000 North Azusa, Covina
Client Job Number: 3260-CR Melia Homes
Project X Job Number: S220708D
July 12, 2022

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates**		**Chlorides**		**Resistivity**		**pH**	**Redox**	**Sulfide**	**Nitrate**	**Ammonium**	**Lithium**	**Sodium**	**Potassium**	**Magnesium**	**Calcium**	**Fluoride**	**Phosphate**
		SO_4^{2-}		Cl^-		As Rec'd	Minimum			S^{2-}	NO_3^-	NH_4^+	Li^+	Na^+	K^+	Mg^{2+}	Ca^{2+}	F_2^{--}	PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B1	2-5'	127.2	0.0127	57.2	0.0057	17,420	6,700	8.2	187	0.57	12.4	4.4	ND	55.8	6.6	23.0	31.2	1.1	1.1
B2	2-5'	71.9	0.0072	25.5	0.0026	12,730	6,231	7.8	146	0.90	11.8	4.2	ND	39.5	12.6	21.1	31.6	2.1	6.6

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

APPENDIX D

INFILTRATION TEST DATA BY GEOTEK

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GeoTek, Inc.

INFILTRATION TESTING

Depth of Hole (D_T) in. 180

Boring Radius, in. 4

Test No. I-1

3260-CR

Trial No.	**Time Interval (ΔT) Min.**	**Initial Depth (D_0) in.**	**Final Depth (D_f) in.**	**Change In Level (ΔD) in.**	**Flow Rate (in3/hr)**	**Surface Area of Test Section (in2)**	**Field Infiltration Rate (in/hr)**
10 min test	10	156.00	170.00	14.00			
1	10	156.00	170.00	14.00	4222.30	301.59	14.00
2	10	156.00	169.13	13.13	3958.40	323.58	12.23
3	10	156.00	174.38	18.38	5541.76	191.64	28.92
4	10	156.00	170.38	14.38	4335.39	292.17	14.84
5	10	156.00	171.13	15.13	4561.59	273.32	16.69
6	10	156.00	168.75	12.75	3845.31	333.01	11.55
7	10	156.00	168.00	12.00	3619.11	351.86	10.29
8	10	156.00	168.50	12.50	3769.91	339.29	11.11
9	10	156.00	169.50	13.50	4071.50	314.16	12.96
10	10	156.00	168.25	12.25	3694.51	345.57	10.69
11	10	156.00	168.00	12.00	3619.11	351.86	10.29
12	10	156.00	168.13	12.13	3656.81	348.72	10.49

GeoTek, Inc.

INFILTRATION TESTING

Depth of Hole (D_T) in.	180	**Test No. I-2**
Boring Radius, in.	4	**3260-CR**

Trial No.	**Time Interval (ΔT) Min.**	**Initial Depth (D_0) in.**	**Final Depth (D_f) in.**	**Change In Level (ΔD) in.**	**Flow Rate (in3/hr)**	**Surface Area of Test Section (in2)**	**Field Infiltration Rate (in/hr)**
10 min test	10	156.00	170.00	14.00			
1	10	156.00	170.50	14.50	4373.09	289.03	15.13
2	10	156.00	164.00	8.00	2412.74	452.39	5.33
3	10	156.00	164.75	8.75	2638.94	433.54	6.09
4	10	156.00	164.38	8.38	2525.84	442.96	5.70
5	10	156.00	162.38	6.38	1922.65	493.23	3.90
6	10	156.00	162.13	6.13	1847.25	499.51	3.70
7	10	156.00	161.75	5.75	1734.16	508.94	3.41
8	10	156.00	161.88	5.88	1771.86	505.80	3.50
9	10	156.00	162.00	6.00	1809.56	502.65	3.60
10	10	156.00	161.75	5.75	1734.16	508.94	3.41
11	10	156.00	161.75	5.75	1734.16	508.94	3.41
12	10	156.00	161.63	5.63	1696.46	512.08	3.31

APPENDIX E

RESULTS OF SEISMIC SETTLEMENT ANALYSIS

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

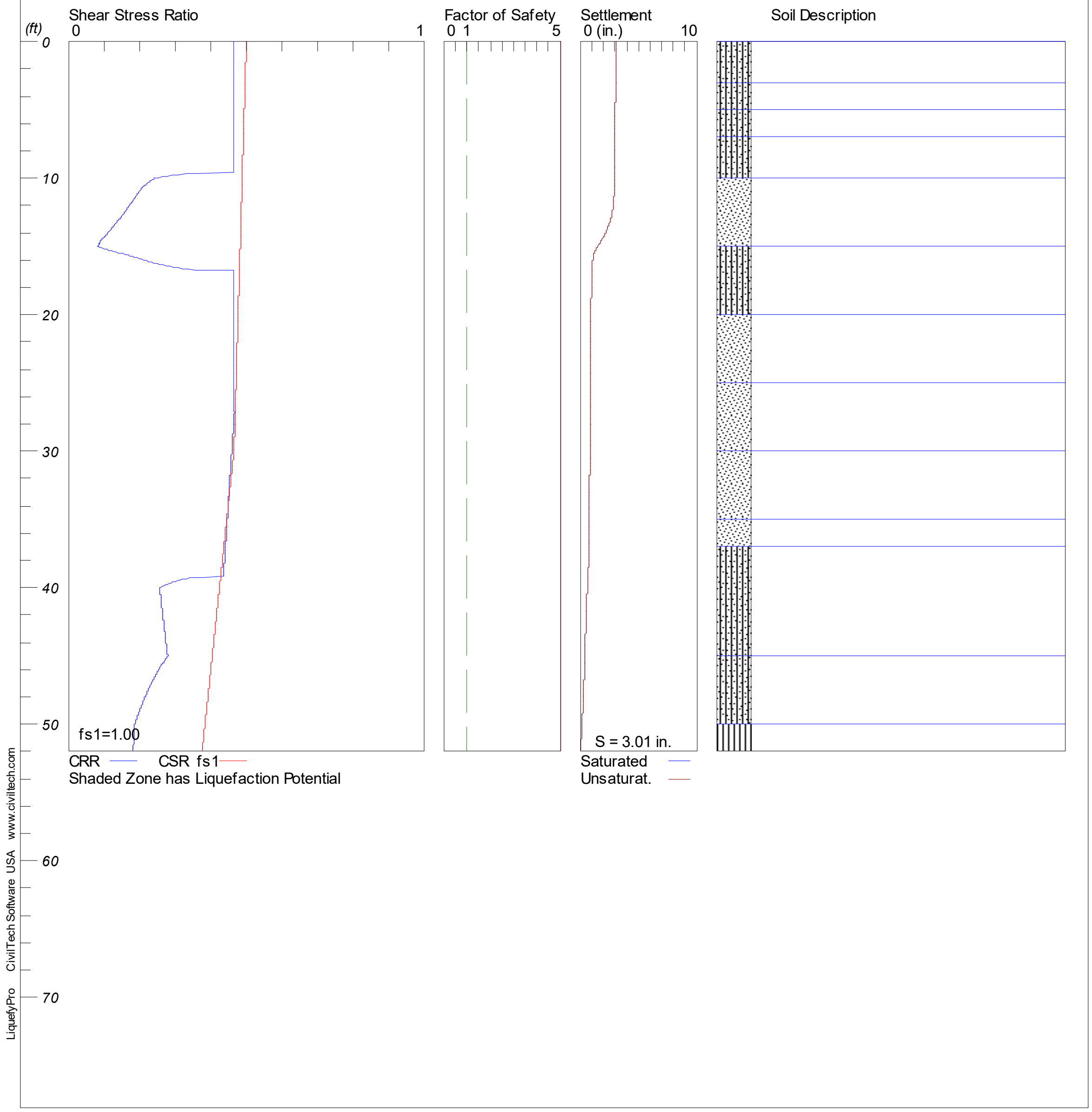
GEOTEK

LIQUEFACTION ANALYSIS

1000 N. Azusa Avenue, Covina

Hole No.=B-2   Water Depth=200 ft

Magnitude=7.72
Acceleration=0.77g



APPENDIX F

GENERAL EARTHWORK AND GRADING GUIDELINES

Updated Geotechnical and Infiltration Evaluation
1000 North Azusa Avenue, Covina, California
Project No. 3260-CR

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor’s overall level of efforts during grading. The contractor’s personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor’s responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.

6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.
7. Procedures for testing of fill slopes are as follows:
    a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
    b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).

2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
    a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
    b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
    a) They are not placed in concentrated pockets;
    b) There is a sufficient percentage of fine-grained material to surround the rocks;
    c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractors responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractors procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractors attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

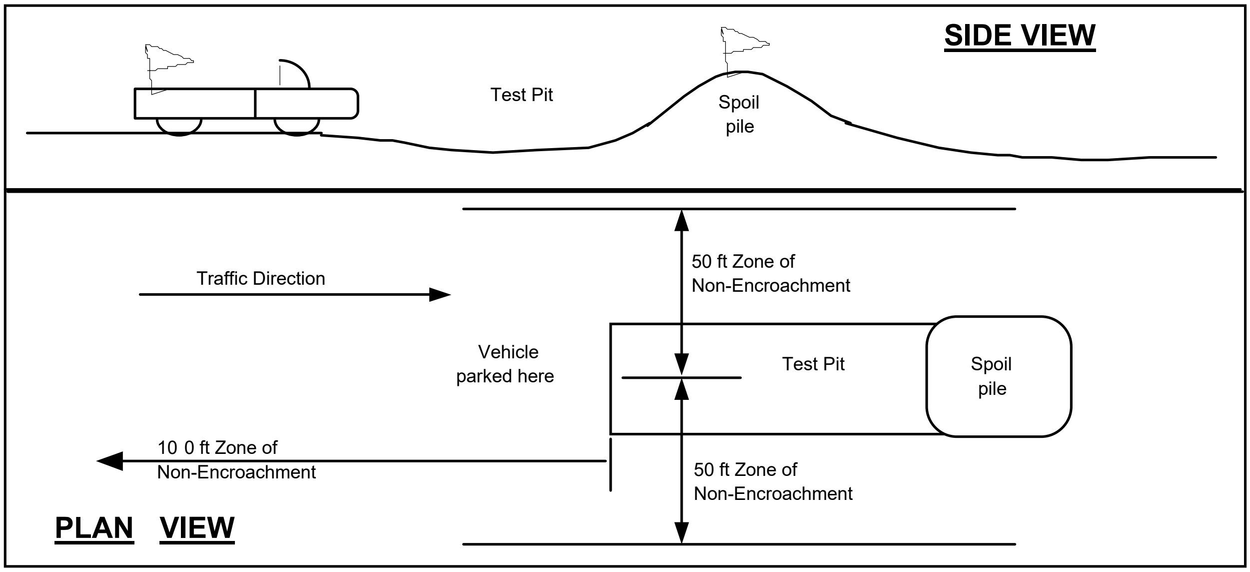
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

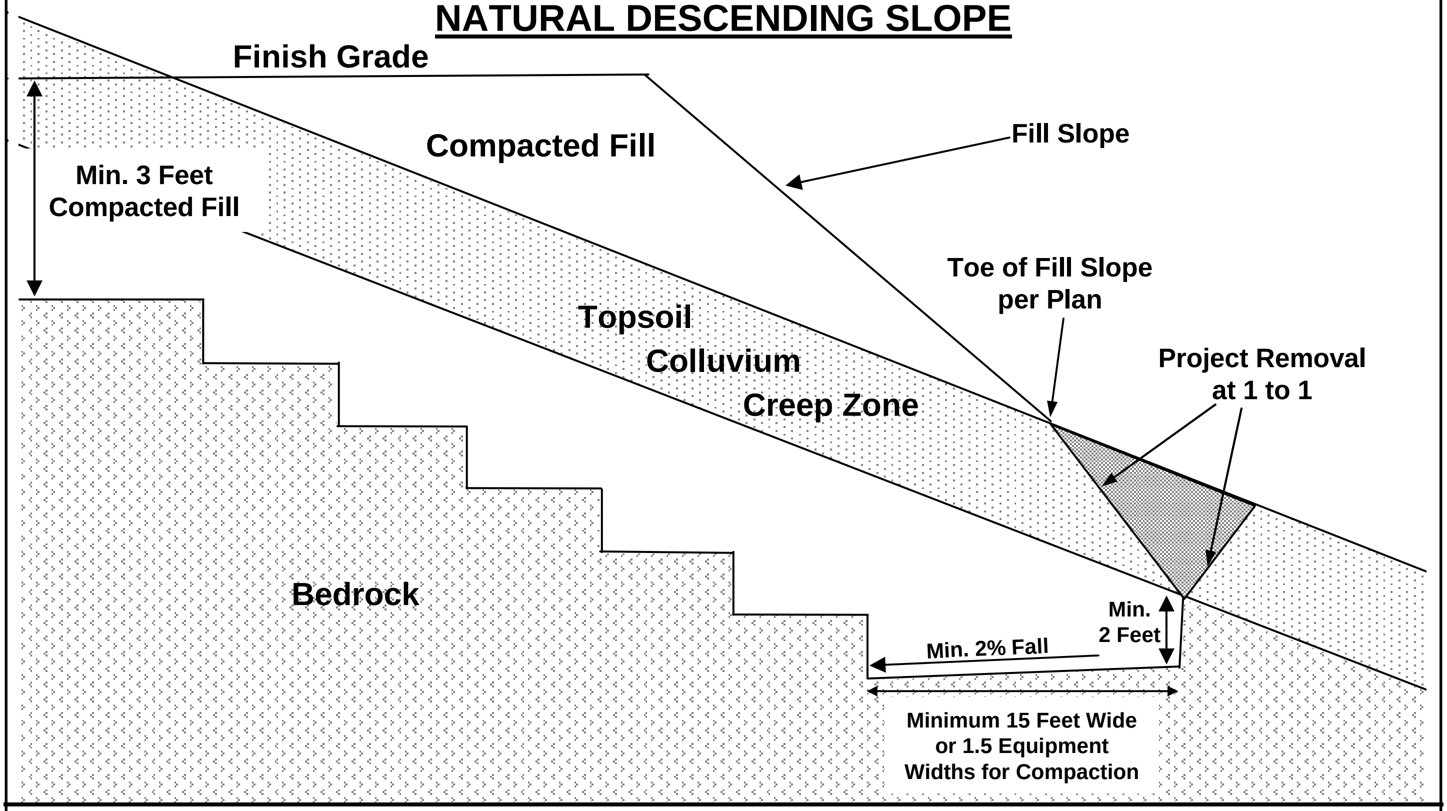
In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor’s representative will then be contacted in an effort to effect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technicians attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

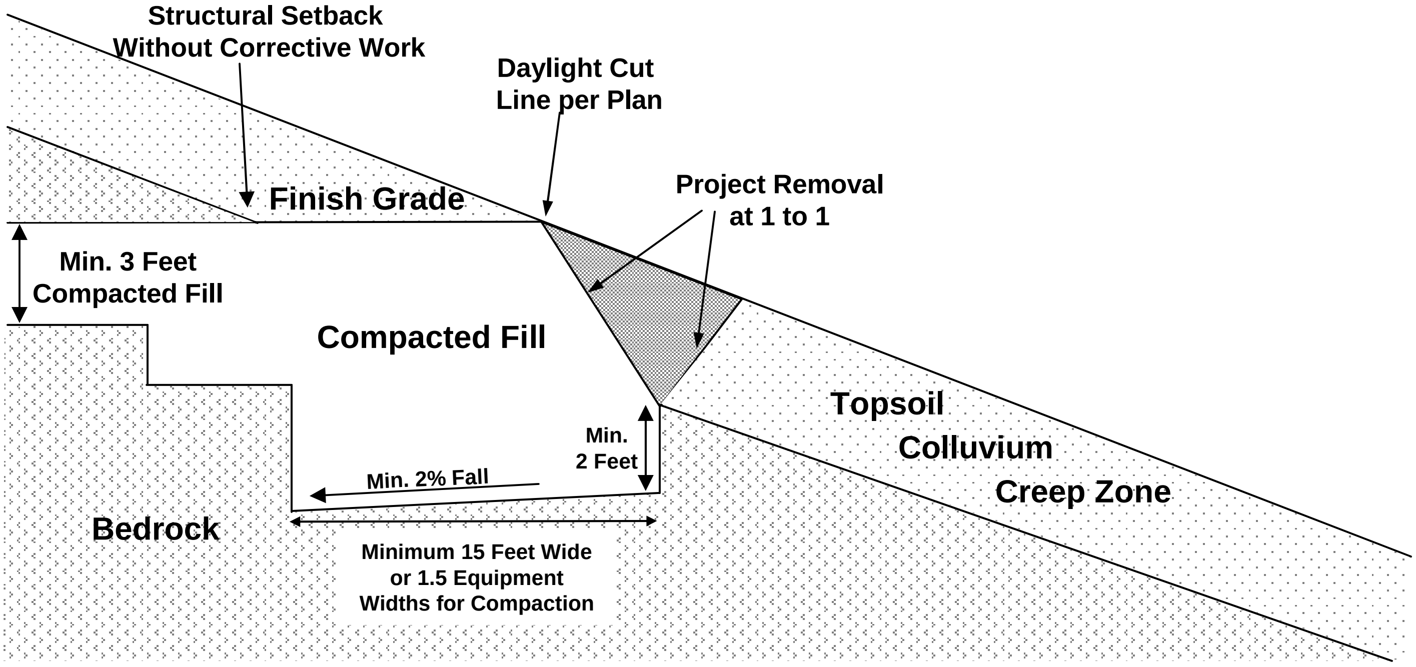
The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE

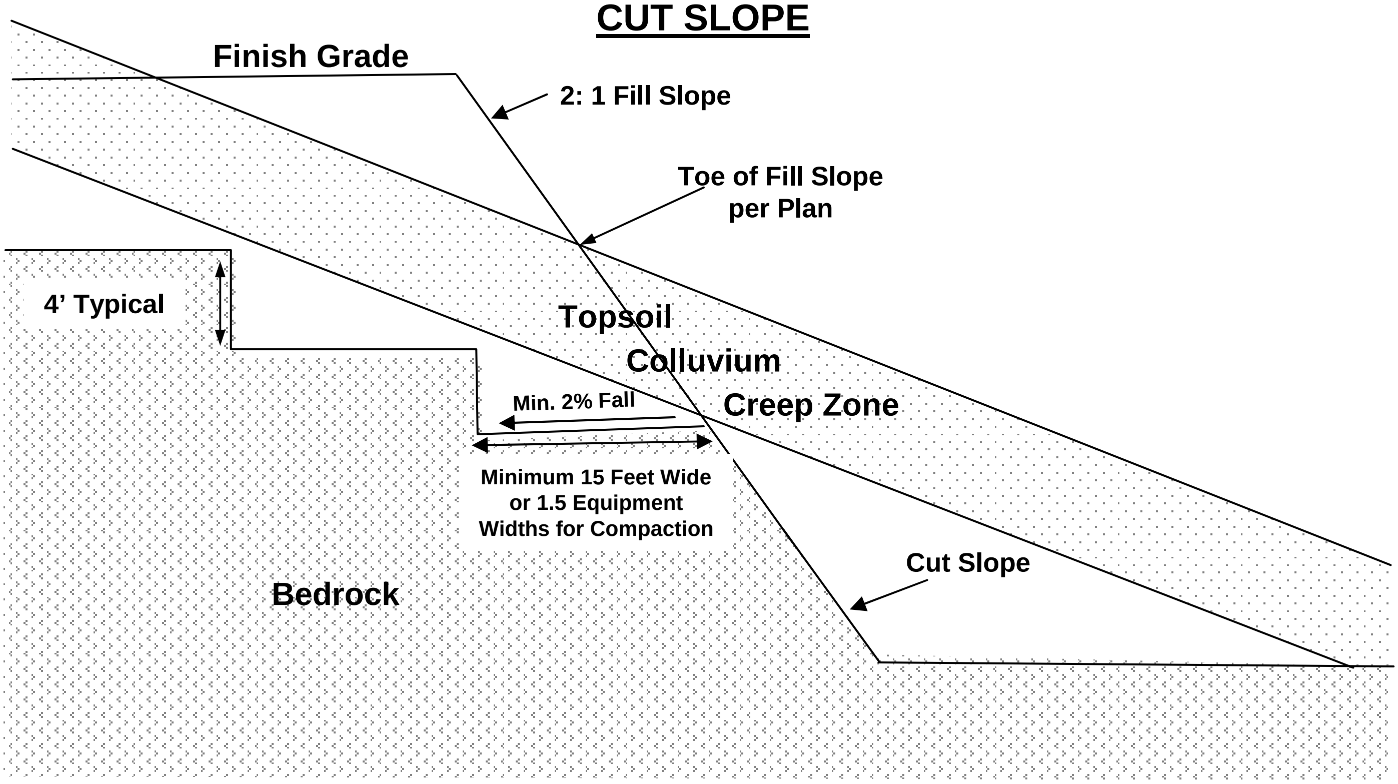


DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



F-1

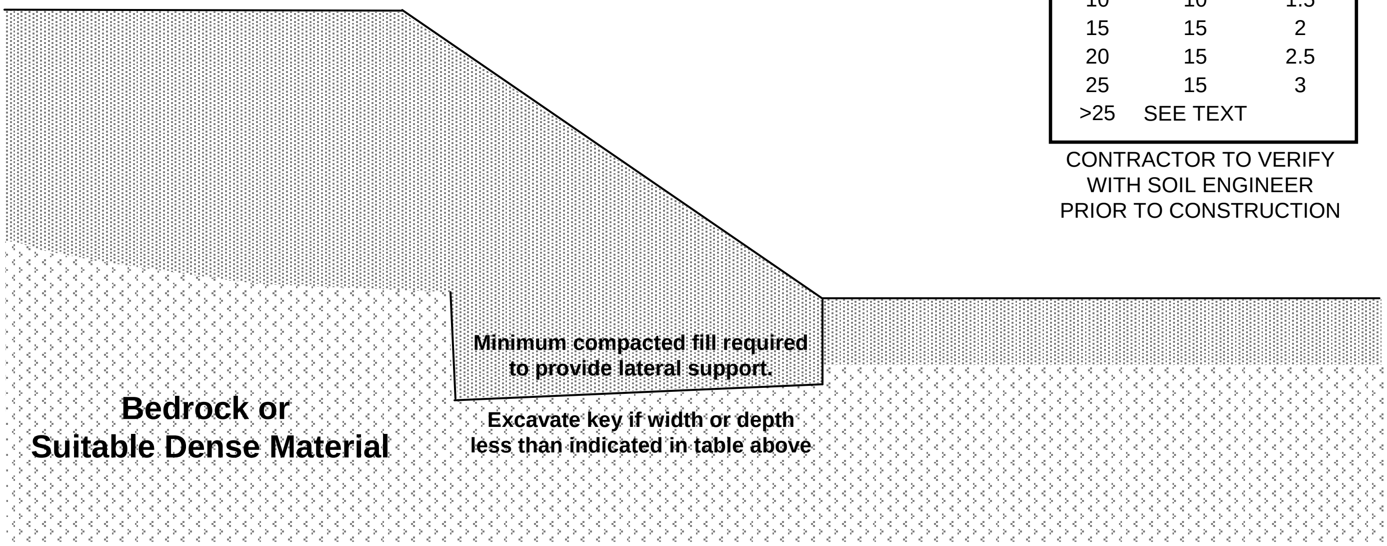
TYPICAL FILL SLOPE OVER CUT SLOPE



TYPICAL FILL SLOPE

SLOPE HEIGHT	MIN. KEY WIDTH	MIN. KEY DEPTH
5	7	1
10	10	1.5
15	15	2
20	15	2.5
25	15	3
>25	SEE TEXT	

CONTRACTOR TO VERIFY
WITH SOIL ENGINEER
PRIOR TO CONSTRUCTION



GEOTEK

F-2

Attachment C

City Forms

CITY OF COVINA
INC 1901
CALIFORNIA

OWNER'S CERTIFICATION
MINIMUM BMPS FOR ALL CONSTRUCTION SITES

PLAN CHECK #________________________

FORM
OC1

Project Name	______________________	BUILDING/GRADING PERMIT NUMBER	
Project Location	______________________		
Owner Name	______________________	Contractor Name	See owner info
Address	______________________	Address	______________________
Phone	______________________	Phone	______________________
FAX/Email	______________________	FAX/Email	______________________

The National Pollutant Discharge Elimination System (NPDES) is the portion of the Clean Water Act that applies to the protection of receiving waters. Under permits from the Los Angeles Regional Water Quality Control Board (RWQCB), certain activities are subject to RWQCB enforcement. To meet the requirements of the Los Angeles County Municipal Separate Storm Sewer System (MS4) Permit (R4-2012-0175), minimum requirements for sediment control, erosion control and construction activities must be implemented on each project site. Minimum requirements include:

- **EROSION:** Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs, such as the limiting of grading activities during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.
- **SEDIMENT CONTROL:** Eroded sediments from areas disturbed by construction and from stockpiles of soil shall be retained on site to minimize sediment transport from the site to streets, drainage facilities and/or adjacent properties via runoff, vehicle tracking or wind.
- **CONSTRUCTION MATERIALS CONTROL:** Construction related materials, wastes, spills or residues shall be retained on site to minimize transport from the site to streets, drainage facilities or adjoining properties by wind or runoff. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to remove sediment and pollutants.
- **NON-STORMWATER RUNOFF:** Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site.
- **EROSION AND SEDIMENT CONTROL PLAN (ESCP):** Required for projects one acre or more. The ESCP must be developed and certified by a Qualified SWPPP Developer (QSD).
- **HILLSIDE:** Construction upon slopes 25% or more requires the implementation of additional BMPs to protect slopes and prevent erosion and sediment runoff.

Minimum BMPs include: (1) Soil piles must be covered with tarps or plastic, (2) leaking equipment must be repaired immediately, (3) refueling must be conducted away from catch basins, (4) catch basins must be protected when working nearby, (5) vacuum all concrete saw cutting, (6) never wash concrete waste into the street, (7) keep the site clean, sweep the gutters at the end of each working day and keep a trash receptacle on site.

As the engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on stormwater quality. The project owner and contractor are aware that the selected BMPs shall be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity.

Engineer of Record Name
Engineer of Record Signature

Title
Date

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person(s) who manage the system or those person(s) directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/or inaccurate information, failing to update the BMPs or ESCP to reflect conditions, or failing to properly and/or adequately implement the BMPs may result in revocation of grading and/or other permits or other sanctions provided by law.

Landowner or Agent Name
Landowner or Agent Signature

Title
Date

STORMWATER PLANNING PROGRAM

PRIORITY DEVELOPMENT & REDEVELOPMENT PROJECTS

PLAN CHECK # ______________________

FORM
P1

Project Name ________________________________
Project Location ________________________________

Company Name ________________________________
Address ________________________________
Contact Name / Title ________________________________
Phone / FAX / Email ________________________________

GENERAL PROJECT CERTIFICATION

A completed original of this form must accompany all LID Plan submittals.

Best Management Practices (BMPs) have been incorporated into the design / maintenance / construction of this project to accomplish the following:

1. Minimize impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances.
2. Maximize the percentage of pervious surfaces to allow more percolation of stormwater into the ground.
3. Minimize the amount of stormwater directed to impermeable surfaces and to the MS4.
4. Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices.
5. Minimize breeding of Vectors
6. Reduce pollutant loads in stormwater from the development site.

I certify that this Low Impact Development Plan and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered/evaluated the information submitted.

Post Construction / Maintenance Certification

As the responsible party, I certify that the proposed BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner/lessee will be notified of the BMPs in use at this site and I will include written conditions in the sales or lease agreement, which requires the new owner (or lessee) to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

In consideration of the execution of City of Covina approval of the proposed Low Impact Development (LID) Plan including any proposed treatment system, the applicant hereby agrees to indemnify, save and keep the City of Covina, its officers, agents and employees free and harmless from and against any and all claims for injury, damage, loss, liability, cost and expense of any nature whatsoever, which the City of Covina, its officers, agents, or employees may suffer, sustain, incur, pay out as a result of any and all actions, suits, proceedings, claims and demands which may be brought, made, or filed against the City of Covina, its officers, agents or employees by reason of or arising out of, or in any manner connected with any and all operations permitted by this approval. This indemnification extends to further agree that the City of Covina is not responsible for any additional requirements or restrictions due to changes in regulations, policies or enforcement practices of the California Regional Water Quality Control Board, or any other applicable regulatory agencies.

____
Property Owner Name

____
Property Owner Signature

____
Applicant Title

____
Date

PLANNING BEST MANAGEMENT PRACTICES

BMP Type	✓ if to be used
Infiltration Trench	
Bioretention with no Underdrain	
Bioinfiltration	
Drywell	
Permeable Pavement (concrete, asphalt, and pavers)	
Underground Infiltration (Proprietary)	
Bioretention with Underdrains	
Vegetated Swale	
Vegetated Filter Strip	
Wet Detention Basin	
Constructed Wetland	
Dry Extended Detention Basin	
Proprietary Biotreatment	
Velocity Dissipation Device	
Inlet Trash Screen	
Media Filter	
Filter Insert	
Landscape Management	
Common Area Litter Control	
Common Area Catch Basin Inspection	
Street Sweeping Private Streets and Parking Lots	
Storm Drain System Stenciling and Signage	
Design and Construct Outdoor Material Storage Areas to Reduce Pollutant Introduction	
Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction	
Efficient Irrigation	
Maintenance Bays	
Vehicle and Equipment Cleaning	
Outdoor Loading/Unloading	
Protect Slopes and Channels	
Materials Management	
Vehicle and Equipment Fueling	
Other:	

CITY OF COVINA INC 1901 CALIFORNIA

STORMWATER TREATMENT CERTIFICATION

FORM P2

SITE NAME and ADDRESS

____

____

____

____

____

Plan Check #______________________

Planning #______________________

APPROXIMATE PROJECT CHARACTERISTICS

Roofed Area	________	ft^2
Roadway/Parking Area (exposed)	________	ft^2
Landscaped/Vegetation	________	ft^2
Other Ground Level Impervious Areas (Ex: Outdoor work or storage areas)	________	ft^2
Other: ______________	________	ft^2
TOTAL	________	ft^2

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary) or see back

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

By stamping this form, I acknowledge that each treatment BMP is provided with adequate bypass or overflow so as not to contribute to localized flooding or soil instability.

*Flow rates and volumes based on the 0.75 inch, 24-hour rain event or the 85th percentile, 24-hour rain event, whichever is greater.

I certify that I am a Professional Civil Engineer registered in the State of California, and that the treatment methods and capacities herein comply with the requirements established by the California Regional Water Quality Control Board, Los Angeles Region, and the State Water Resources Control Board for Low Impact Development (LID) Plans.

Affix Registered Engineer Wet Ink Stamp Here:

______________ ______________ ______________

Print Name **Signature** **Date**

Rev: 6/9/2015 4:58 PM

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary)

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

Attachment D

Master Covenant Agreement (MCA)

RECORDING REQUESTED BY AND MAIL TO:

CITY OF BALDWIN PARK
DEPARTMENT OF PUBLIC WORKS
14403 EAST PACIFIC AVENUE
BALDWIN PARK, CA 91706

Space above this line is for Recorder's use.

COVENANT AND AGREEMENT
REGARDING THE MAINTENANCE OF LOW IMPACT DEVELOPMENT (LID) & NATIONAL POLLUTANTS DISCHARGE ELIMINATION SYSTEM (NPDES) BMPs

The undersigned, ______________________________ ("Owner"), hereby certifies that it owns the real property described as follows ("Subject Property"), located in the County of Los Angeles, State of California:

LEGAL DESCRIPTION

ASSESSOR'S ID #: 8421-001-016
8421-001-061 TRACT NO.______________ LOT NO.__________
ADDRESS: 1000 N. Azusa Ave & 845 W. Cypress St., Covina, CA 91722
Tract No. 83215 & Parcel No.84018

Owner is aware of the requirements of g Standards Code, Title 31, Section 4.106.4 (LID), and National Pollutant Discharge Elimination System (NPDES) permit. The following post-construction BMP features have been installed on the Subject Property:

- ○ Porous pavement
- ○ Cistern/rain barrel
- ○ Infiltration trench/pit
- ○ Bio retention or bio filtration
- ○ Rain garden/planter box
- ○ Disconnect impervious surfaces
- ○ Dry Well
- ○ Storage containers
- ○ Landscaping and landscape irrigation
- ○ Green roof
- ☒ Other 96" Corrugated Metal Pipe (CMP) Subsurface Infiltration Basin "A" and "B" Stormexx Clean Catch Basin Filters

The location, including GPS x-y coordinates, and type of each post-construction BMP feature installed on the Subject Property is identified on the site diagram attached hereto as Exhibit 1.

Owner hereby covenants and agrees to maintain the above-described post-construction BMP features in a good and operable condition at all times, and in accordance with the LID/NPDES Maintenance Guidelines, attached hereto as Exhibit 2.

Owner further covenants and agrees that the above-described post-construction BMP features shall not be removed from the Subject Property unless and until they have been replaced with other post-construction BMP features in accordance with County of Los Angeles Green Building Standards Code, and NPDES permit.

Owner further covenants and agrees that if Owner hereafter sells the Subject Property, Owner shall provide printed educational materials to the buyer regarding the post-construction BMP features that are located on the Subject Property, including the type(s) and location(s) of all such features, and instructions for properly maintaining all such features.

Owner makes this Covenant and Agreement on behalf of itself and its successors and assigns. This Covenant and Agreement shall run with the Subject Property and shall be binding upon owner, future owners, and their heirs, successors and assignees, and shall continue in effect until the release of this Covenant and Agreement by the County of Los Angeles, in its sole discretion.

Owner(s):

By:__________________________ Date:__________________________

By:__________________________ Date:__________________________
(PLEASE ATTACH NOTARY)

REFERENCE

PLAN CHECK NO.: ____________________ DISTRICT OFFICE NO.:____________________

ATTACHMENTS

Exhibit 1

SITE BMP PLAN

Exhibit 2

LID/NPDES Maintenance Guidelines

CONTECH®
ENGINEERED SOLUTIONS

Contech® CMP Detention & Infiltration Maintenance Guide

CONTECH®
CMP DETENTION SYSTEMS

Contech® CMP Detention

Underground stormwater detention/infiltration and retention systems must be properly inspected and maintained at regular intervals for purposes of performance and longevity.

Inspection

Inspection is the key to effective maintenance and is easily performed. Contech recommends ongoing quarterly inspections. The rate at which the system collects pollutants will depend more heavily on site specific activities rather than the size or configuration of the system. Inspections should be performed more often in equipment washdown areas, in climates where sanding and/or salting operations take place, and in various other instances in which higher accumulations of sediment or abrasive / corrosive conditions may exist. Inspection and maintenance records should be maintained for the life of the system.

Maintenance

Systems should be cleaned when inspection reveals that accumulated sediment or trash is clogging the discharge orifice. Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities. Contech suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

If inspectors observe any salt or other corrosive substance concentrations or accumulations in the system, or if salt or other corrosive substance is used or prevalent near the system, it is recommended to rinse the system above the spring line annually between late spring and early summer as part of the maintenance program. This maintenance is required for infiltration systems. Excessive salting should be avoided and pavement should be sealed to reduce salt infiltration from the surface.

Maintaining an underground detention or retention system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

The foregoing inspection and maintenance efforts help ensure underground pipe systems used for stormwater storage continue to function as intended by identifying recommended regular inspection and maintenance practices. Inspection and maintenance related to the structural integrity of the pipe or the soundness of pipe joint connections is beyond the scope of this guide.

Inspection & Maintenance Log Sample Template

__________” Diameter System			Location: Anywhere, USA		
Date	**Depth of Sediment**	**Accumulated Trash**	**Maintenance Performed**	**Maintenance Personnel**	**Comments**
12/01/10	2”	None	Removed Sediment	B. Johnson	Installed
03/01/11	1”	Some	Removed Sediment and Trash	B. Johnson	Swept parking lot
06/01/11	0”	None	None		
09/01/11	0”	Heavy	Removed Trash	S. Riley	
12/01/11	1”	None	Removed Sediment	S. Riley	
04/01/12	0”	None	None	S. Riley	
04/15/01	2	Some	Removed Sediment and Trash	ACE Environmental Services	

CONTECH®
CMP DETENTION SYSTEMS

Support

Drawings and specifications are available at www.ContechES.com.
Site-specific support is available from our engineers.

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800.338.1122
www.ContechES.com

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treatment products. For information, visit www.ContechES.com or call 800.338.1122.

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

STORMEXX® CLEAN CATCH BASIN FILTER

FlexStorm has partnered with Filtrexx to offer the latest in compost filter technology. The StormExx Clean Catch Basin Filter utilizes an enhanced cartridge filter for the capture and removal of sediment, hydrocarbons, heavy metals, nutrients and bacteria from stormwater runoff. The filter insert sits below the grate and will fit any round or rectangular storm drain using FlexStorm engineered framing systems.

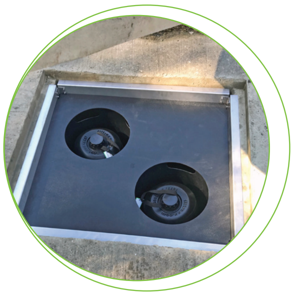
FEATURES & BENEFITS:

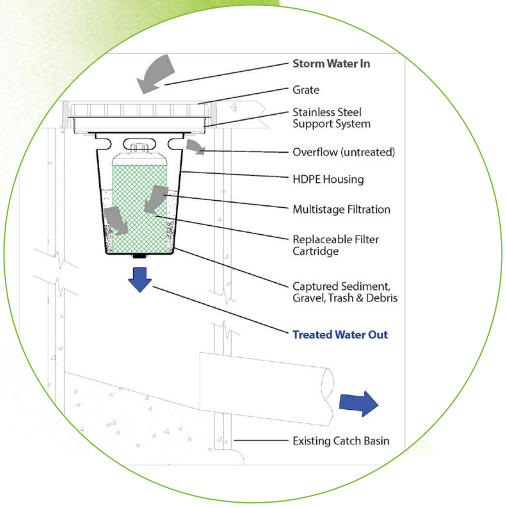
- Easy to install, maintain and replace
- Treats stormwater at the street/inlet level
- Patented multi-stage filtration system
- Option for double units
- Overflow bypass of 500+ gpm

REMOVAL RATES:

- TSS: 90%
- Total Phosphorous: 59%
- Soluble Phosphorous: 94%
- Ammonium Nitrate: 41%
- Chromium: 24%
- E. Coli: 93%
- pH (low) neutralized to 6.62
- Oil/Hydrocarbons: 99%
- Copper: 75%
- Zinc: 58%
- Cadmium: 99%
- Arsenic: 18%
- Total Coliform: 79%
- pH (high) neutralized to 8.31
- Turbidity: 76%
- Nickel: 58%
- TKN: 22%
- Lead: 60%
- Selenium: 25%
- Fecal Coliform: 71%

Values are total efficiency removal percentage of typical standard input stormwater concentrations over 10 run-off events. All pollutants are common stormwater pollutants and part of industrial and municipal stormwater permit effluent limit guideline regulations. For methodology, reference Filtrexx TechLink Research Summary #3338.





*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

FLEXSTORM® INLET FILTERS

POWERED BY filtrexx® TECHNOLOGY

ADS®

STORMEXX CLEAN CATCH BASIN FILTER

SUMMARY

StormExx inserts are for use at stormwater catch basins in roadways, parking lots and paved areas as indicated on the plans and specifications. The inserts remove sediment, hydrocarbons, heavy metals, nutrients and bacteria from stormwater run-off. Installer must provide size and type as required upon placing order. Inserts shall include all components required for a complete installation at each catch basin as indicated on drawings. Each insert shall include a stainless steel framing system and a replaceable filter/absorber cartridge with filter media having a combined total volume of approximately 1,200 cubic inches.

CATCH BASIN INSERT FEATURES AND CHARACTERISTICS

1. Filter Cartridge Size: Nominal 10" in diameter by 18" high with center perforated HDPE tube. Stormwater flows through media horizontally on a downward path through the filter/absorber cartridge before exiting the perforated tube. The cartridge shall slip over a perforated internal drain tube that exits through the bottom of the housing. The cartridge shall contain approximately 1,200 cubic inches of various absorbent material arranged primarily in layers. The outer surface of the cartridge shall be covered with a poly strainer fabric. Cartridge shall be easily removable for replacement. Drain tube with perforations may extend above filter/absorber portion to allow a minimum flow rate to deter standing water if unit becomes plugged or blinded.
2. Nominal Flow Rate: 15-40 gpm through clean filter/absorber cartridge. Unit features a large overflow opening area and space between housing, deflector and catch basin that allows for high overflow rates with minimum restriction during storm conditions. Overflow capable of passing several hundred gpm.
3. Nominal Flow Rate with Pre-Strainer: Where leaves and other surface material are anticipated, a pre-strainer can be used. Flow restriction can occur when pre-strainer is restricted or plugged.
4. Filter Housing: HDPE solid housing suitable for full height sediment containment and shall be nominal 15 gallons retention size. Smaller size capacity may be used on shallow catch basins. A perforated tube shall be incorporated within the housing to allow the filter/absorber cartridge to slip on for easy replacement. A locking screw-on-cap keeps cartridge in place during use. Use modified or shorter housing (with less storage, flow and filtration) where depth of catch basin is shallow or to suit basin.
5. Frame/Deflector: Each insert shall be fitted with a custom frame that directs incoming water from the grate inlet to the housing. Materials include HDPE or poly sheet and/or Type 304 SS sheet and frame.

OPERATION AND MAINTENANCE GUIDELINES

StormExx catch basin inserts are used to intercept stormwater as it passes through the grate. Heavy sediment items settle to the bottom of the housing and the collected water starts to rise and pass through the filter cartridge. As the rainfall rate increases, the water level may rise to the top of the cartridge. During high rainfall flow events excess untreated water will overflow the housing. **Note**: The most concentrated contaminants in stormwater generally occur at the beginning of each rain event. Stormwater treatment devices are frequently sized to treat this "first flush" event. Each site and installation may vary widely as to exposure to sediment, construction debris, landscaping and other pollutants.

With periodic site inspections, the proper care and maintenance frequency may be determined for a proper service schedule. The StormExx inserts should be inspected during each season before and after rain events to ensure that the insert filter assembly is ready to accept and treat stormwater run-off. Keep the grate and area within 6' of the grate clean and free of leaves, grass clippings, sediment and debris to minimize these contaminants from entering the unit housing. This is especially important during leaf fall season as decaying leaves on the filter cartridge can shorten filter life. Periodic visual inspections involve looking through the grate to see if any standing water exists. The collected water should drain through the filter cartridge that is designed for deep bed loading. As it becomes blinded or plugged with sediment, the flow rate capability will be reduced. Replace filter cartridge if standing water is in the housing. Maintenance schedules will vary with rainfall and pollutant concentration levels. Typical post-construction installations will require cartridge change-outs once or twice per year. If sediment reaches a height of 6" to 8" above bottom of the 24" housing, the sediment should be dumped and the filter cartridge inspected and replaced if necessary. Collected leaves, grass clippings, sediment, debris and spent filter cartridges that are not considered hazardous may be disposed of in on-site trash bins if approved by client. Cartridge disposal shall be in accordance with applicable rules and regulations.

*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS®*

Advanced Drainage Systems, Inc.
1-800-821-6710 www.ads-pipe.com

FLEXSTORM www.inletfilters.com

(OPERATION, MAINTENANCE AND MONITORING PLAN)

Stormwater Quality Control

96” Diameter Perforated Underground Retention System

Owner's Association to conduct ongoing annual inspections of 96" Corrugated Metal Pipe (CMP) Subsurface Infiltration Basin. System to be cleaned when inspection reveals that accumulated sediment or trash is clogging the discharge orifice or when any salt or other corrosive substance concentrations or accumulations are observed. Inspection, maintenance and records to be conducted according to recommendations contained in attached Contech CMP Detention & Infiltration Maintenance Guide.

Stormexx Clean Catch Basin Filters

Inserts to be installed at all roadway/parking catch basins as indicated on LID Site Plan. The inserts should be inspected during each season before and after rain events to ensure that the insert filter assembly is ready to accept and treat stormwater run-off. Keep the grate and area within 6’ of the grate clean and free of leaves, grass clippings, sediment and debris to minimize these contaminants from entering the unit housing. Periodic visual inspections involve looking through the grate to see if any standing water exists. Replace filter cartridge if standing water is in the housing. Maintenance schedules will vary with rainfall and pollutant concentration levels. Typical post-construction installations will require cartridge change-outs once or twice per year. If sediment reaches a height of 6” to 8” above bottom of the 24” housing, the sediment should be dumped and the filter cartridge inspected and replaced if necessary.

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
NON-STRUCTURAL SOURCE CONTROL BMPs			
Education for Property Owners, Tenants and Occupants	**Owner's Association will provide educational materials.**	**Continuous**	**Owner's Association**
Activity Restriction	**Owner's Association will provide materials outlining restricted activities.**	**Continuous**	**Owner's Association**
Common Area Landscape Management	**Construction Manager during construction. Owner's Association through its landscape maintenance firm.**	**Monthly during regular maintenance.**	**Owner's Association**
Common Area Litter Control	**Owner's Association and owners**	**Continuous**	**Owner's Association and owners**
Housekeeping of Loading Docks	**Owner's Association and owners**	**n/a**	**n/a**
Common Area Catch Basin Inspection	**Owner's Association and owners. Inspect, cleaned and maintained at 100% of the catch basins and inlets on an annual basis. Cleaning to take place in late summer/early fall.**	**Annually**	**Owner's Association and owners**
Street Sweeping Private Streets and Parking Lots	**Owner's Association to insure sweeping occurs and trash, sediment and debris is not located in gutters.**	**Weekly**	**Owner's Association**

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
STRUCTURAL SOURCE CONTROL BMPs			
(S-1) – Storm Drain Message & Signage	**The signs must be placed so they are easily visible to the public. Legibility and visibility of markers and signs should be maintained (e.g., signs should be repainted or replaced as necessary).**	**Continuous**	**Owner's Association**
(S-3) – Outdoor Trash Storage & Waste Handling Area	**Outdoor trash storage areas must be checked periodically to ensure containment of accumulated water and prevention of stormwater run-on. Contaminated accumulated water must be disposed of in accordance with applicable laws and regulations, and cannot be discharged directly to the storm drain or sanitary sewer system without appropriate permitting.**	**Continuous**	**Owner's Association**
(S-8) – Landscape Irrigation Practices	**Maintain irrigation areas to remove trash and debris and loose vegetation. Rehabilitate areas of bare soil. Inspect and maintain irrigation equipment and components to ensure proper functionality. Clean equipment as necessary to prevent algae growth and vector breeding.**	**Monthly during regular maintenance.**	**Owner's Association**
(S-9) – Building Materials Selection	**Design Considerations/Specifications of building materials to be added at design phase. The integrity of structural elements that are subject to damage (e.g., signs) must be maintained as required by local codes and ordinances.**	**Continuous**	**Owner's Association and individual owners**

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
STORMWATER QUALITY CONTROL BMPs			
(T-6) – Proprietary Treatment Control Measures	**Proprietary stormwater quality control measure vendors are constantly updating and expanding their product lines, so refer to the latest design guidance from the vendors.**	**See below.**	**Owner's Association**
Stormexx Clean Catch Basin Filter Inserts – *Advanced Drainage Systems*	**Inserts to be installed at all roadway/parking catch basins as indicated on LID Site Plan. Keep the grate and area within 6' of the grate clean and free of leaves, grass clippings, sediment and debris to minimize these contaminants from entering the unit housing. Periodic visual inspections involve looking through the grate to see if any standing water exists. Replace filter cartridge if standing water is in the housing. Maintenance schedules will vary with rainfall and pollutant concentration levels. Typical post-construction installations will require cartridge change-outs once or twice per year. If sediment reaches a height of 6" to 8" above bottom of the 24" housing, the sediment should be dumped and the filter cartridge inspected and replaced if necessary.**	**Continuous**	**Owner's Association**

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
96” Perforated Underground Retention System – *Contech Engineered Solutions*	**CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice.** **Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. Manhole covers should be securely seated following cleaning activities. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.** **Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.** **Inspect prior to and after the rainy season and 72 hours after large storm events (greater than 1-inch) to verify there is no standing water.**	**As needed**	**Owner’s Association**

Attachment E

Operations and Maintenance (O&M) Plan

Tract Map No. 82315 & Parcel Map No. 84018
845 W. Cypress St. & 1000 N. Azusa Ave.
Covina, CA 91722
Grading Permit No._____________, Building Permit No._____________

REQUIRED PERMITS

If no permits are required for implementation, operation or maintenance of the BMPs.

RECORDKEEPING

All records must be made available for review upon request.

RESPONSIBLE PARTY

The owner is aware of the maintenance responsibilities of the proposed BMPs. A funding mechanism is in place to maintain the BMPs at the frequency stated in the LID Plan. The contact information for the entity responsible is below:

Name:
Company: PKL Investments, LLC
Title: Landowner
Address 1: 2863 Maricopa Street
Address 2: Torrance, CA 90503
Phone Number: (714) 738-0828
Email:

(OPERATION, MAINTENANCE AND MONITORING PLAN)

Stormwater Quality Control

96” Diameter Perforated Underground Retention System

Owner's Association to conduct ongoing annual inspections of 96" Corrugated Metal Pipe (CMP) Subsurface Infiltration Basin. System to be cleaned when inspection reveals that accumulated sediment or trash is clogging the discharge orifice or when any salt or other corrosive substance concentrations or accumulations are observed. Inspection, maintenance and records to be conducted according to recommendations contained in attached Contech CMP Detention & Infiltration Maintenance Guide.

Stormexx Clean Catch Basin Filters

Inserts to be installed at all roadway/parking catch basins as indicated on LID Site Plan. The inserts should be inspected during each season before and after rain events to ensure that the insert filter assembly is ready to accept and treat stormwater run-off. Keep the grate and area within 6’ of the grate clean and free of leaves, grass clippings, sediment and debris to minimize these contaminants from entering the unit housing. Periodic visual inspections involve looking through the grate to see if any standing water exists. Replace filter cartridge if standing water is in the housing. Maintenance schedules will vary with rainfall and pollutant concentration levels. Typical post-construction installations will require cartridge change-outs once or twice per year. If sediment reaches a height of 6” to 8” above bottom of the 24” housing, the sediment should be dumped and the filter cartridge inspected and replaced if necessary.

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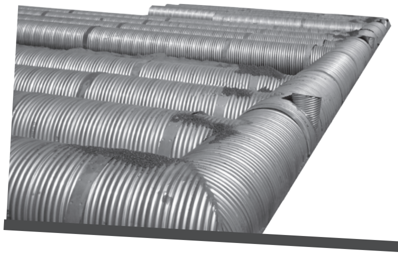

Contech® CMP Detention & Infiltration Maintenance Guide

CONTECH®
CMP DETENTION SYSTEMS

Contech® CMP Detention

Underground stormwater detention/infiltration and retention systems must be properly inspected and maintained at regular intervals for purposes of performance and longevity.

Inspection

Inspection is the key to effective maintenance and is easily performed. Contech recommends ongoing quarterly inspections. The rate at which the system collects pollutants will depend more heavily on site specific activities rather than the size or configuration of the system. Inspections should be performed more often in equipment washdown areas, in climates where sanding and/or salting operations take place, and in various other instances in which higher accumulations of sediment or abrasive / corrosive conditions may exist. Inspection and maintenance records should be maintained for the life of the system.

Maintenance

Systems should be cleaned when inspection reveals that accumulated sediment or trash is clogging the discharge orifice. Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities. Contech suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

If inspectors observe any salt or other corrosive substance concentrations or accumulations in the system, or if salt or other corrosive substance is used or prevalent near the system, it is recommended to rinse the system above the spring line annually between late spring and early summer as part of the maintenance program. This maintenance is required for infiltration systems. Excessive salting should be avoided and pavement should be sealed to reduce salt infiltration from the surface.

Maintaining an underground detention or retention system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

The foregoing inspection and maintenance efforts help ensure underground pipe systems used for stormwater storage continue to function as intended by identifying recommended regular inspection and maintenance practices. Inspection and maintenance related to the structural integrity of the pipe or the soundness of pipe joint connections is beyond the scope of this guide.

Inspection & Maintenance Log Sample Template

__________" Diameter System			Location: Anywhere, USA		
Date	**Depth of Sediment**	**Accumulated Trash**	**Maintenance Performed**	**Maintenance Personnel**	**Comments**
12/01/10	2"	None	Removed Sediment	B. Johnson	Installed
03/01/11	1"	Some	Removed Sediment and Trash	B. Johnson	Swept parking lot
06/01/11	0"	None	None		
09/01/11	0"	Heavy	Removed Trash	S. Riley	
12/01/11	1"	None	Removed Sediment	S. Riley	
04/01/12	0"	None	None	S. Riley	
04/15/01	2	Some	Removed Sediment and Trash	ACE Environmental Services	

CONTECH®
CMP DETENTION SYSTEMS

Support

Drawings and specifications are available at www.ContechES.com.
Site-specific support is available from our engineers.

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800.338.1122
www.ContechES.com

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treatment products. For information, visit www.ContechES.com or call 800.338.1122.

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

STORMEXX® CLEAN CATCH BASIN FILTER

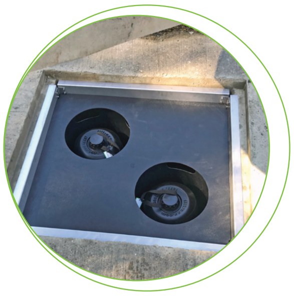
FlexStorm has partnered with Filtrexx to offer the latest in compost filter technology. The StormExx Clean Catch Basin Filter utilizes an enhanced cartridge filter for the capture and removal of sediment, hydrocarbons, heavy metals, nutrients and bacteria from stormwater runoff. The filter insert sits below the grate and will fit any round or rectangular storm drain using FlexStorm engineered framing systems.

FEATURES & BENEFITS:

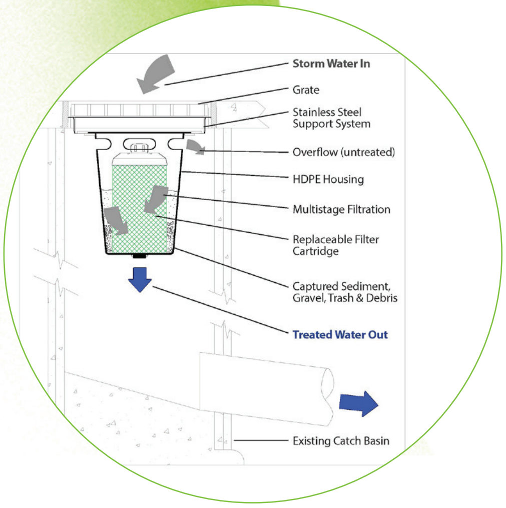
- Easy to install, maintain and replace
- Treats stormwater at the street/inlet level
- Patented multi-stage filtration system
- Option for double units
- Overflow bypass of 500+ gpm

REMOVAL RATES:

- TSS: 90%
- Total Phosphorous: 59%
- Soluble Phosphorous: 94%
- Ammonium Nitrate: 41%
- Chromium: 24%
- E. Coli: 93%
- pH (low) neutralized to 6.62
- Oil/Hydrocarbons: 99%
- Copper: 75%
- Zinc: 58%
- Cadmium: 99%
- Arsenic: 18%
- Total Coliform: 79%
- pH (high) neutralized to 8.31
- Turbidity: 76%
- Nickel: 58%
- TKN: 22%
- Lead: 60%
- Selenium: 25%
- Fecal Coliform: 71%



Values are total efficiency removal percentage of typical standard input stormwater concentrations over 10 run-off events. All pollutants are common stormwater pollutants and part of industrial and municipal stormwater permit effluent limit guideline regulations. For methodology, reference Filtrexx TechLink Research Summary #3338.



*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

STORMEXX CLEAN CATCH BASIN FILTER

SUMMARY

StormExx inserts are for use at stormwater catch basins in roadways, parking lots and paved areas as indicated on the plans and specifications. The inserts remove sediment, hydrocarbons, heavy metals, nutrients and bacteria from stormwater run-off. Installer must provide size and type as required upon placing order. Inserts shall include all components required for a complete installation at each catch basin as indicated on drawings. Each insert shall include a stainless steel framing system and a replaceable filter/absorber cartridge with filter media having a combined total volume of approximately 1,200 cubic inches.

CATCH BASIN INSERT FEATURES AND CHARACTERISTICS

1. Filter Cartridge Size: Nominal 10" in diameter by 18" high with center perforated HDPE tube. Stormwater flows through media horizontally on a downward path through the filter/absorber cartridge before exiting the perforated tube. The cartridge shall slip over a perforated internal drain tube that exits through the bottom of the housing. The cartridge shall contain approximately 1,200 cubic inches of various absorbent material arranged primarily in layers. The outer surface of the cartridge shall be covered with a poly strainer fabric. Cartridge shall be easily removable for replacement. Drain tube with perforations may extend above filter/absorber portion to allow a minimum flow rate to deter standing water if unit becomes plugged or blinded.
2. Nominal Flow Rate: 15-40 gpm through clean filter/absorber cartridge. Unit features a large overflow opening area and space between housing, deflector and catch basin that allows for high overflow rates with minimum restriction during storm conditions. Overflow capable of passing several hundred gpm.
3. Nominal Flow Rate with Pre-Strainer: Where leaves and other surface material are anticipated, a pre-strainer can be used. Flow restriction can occur when pre-strainer is restricted or plugged.
4. Filter Housing: HDPE solid housing suitable for full height sediment containment and shall be nominal 15 gallons retention size. Smaller size capacity may be used on shallow catch basins. A perforated tube shall be incorporated within the housing to allow the filter/absorber cartridge to slip on for easy replacement. A locking screw-on-cap keeps cartridge in place during use. Use modified or shorter housing (with less storage, flow and filtration) where depth of catch basin is shallow or to suit basin.
5. Frame/Deflector: Each insert shall be fitted with a custom frame that directs incoming water from the grate inlet to the housing. Materials include HDPE or poly sheet and/or Type 304 SS sheet and frame.

OPERATION AND MAINTENANCE GUIDELINES

StormExx catch basin inserts are used to intercept stormwater as it passes through the grate. Heavy sediment items settle to the bottom of the housing and the collected water starts to rise and pass through the filter cartridge. As the rainfall rate increases, the water level may rise to the top of the cartridge. During high rainfall flow events excess untreated water will overflow the housing. **Note**: The most concentrated contaminants in stormwater generally occur at the beginning of each rain event. Stormwater treatment devices are frequently sized to treat this "first flush" event. Each site and installation may vary widely as to exposure to sediment, construction debris, landscaping and other pollutants.

With periodic site inspections, the proper care and maintenance frequency may be determined for a proper service schedule. The StormExx inserts should be inspected during each season before and after rain events to ensure that the insert filter assembly is ready to accept and treat stormwater run-off. Keep the grate and area within 6' of the grate clean and free of leaves, grass clippings, sediment and debris to minimize these contaminants from entering the unit housing. This is especially important during leaf fall season as decaying leaves on the filter cartridge can shorten filter life. Periodic visual inspections involve looking through the grate to see if any standing water exists. The collected water should drain through the filter cartridge that is designed for deep bed loading. As it becomes blinded or plugged with sediment, the flow rate capability will be reduced. Replace filter cartridge if standing water is in the housing. Maintenance schedules will vary with rainfall and pollutant concentration levels. Typical post-construction installations will require cartridge change-outs once or twice per year. If sediment reaches a height of 6" to 8" above bottom of the 24" housing, the sediment should be dumped and the filter cartridge inspected and replaced if necessary. Collected leaves, grass clippings, sediment, debris and spent filter cartridges that are not considered hazardous may be disposed of in on-site trash bins if approved by client. Cartridge disposal shall be in accordance with applicable rules and regulations.

THE MOST ***ADVANCED*** *NAME IN WATER MANAGEMENT SOLUTIONS®*

Advanced Drainage Systems, Inc.
1-800-821-6710 www.ads-pipe.com

FLEXSTORM www.inletfilters.com

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
NON-STRUCTURAL SOURCE CONTROL BMPs			
Education for Property Owners, Tenants and Occupants	**Owner's Association will provide educational materials.**	**Continuous**	**Owner's Association**
Activity Restriction	**Owner's Association will provide materials outlining restricted activities.**	**Continuous**	**Owner's Association**
Common Area Landscape Management	**Construction Manager during construction. Owner's Association through its landscape maintenance firm.**	**Monthly during regular maintenance.**	**Owner's Association**
Common Area Litter Control	**Owner's Association and owners**	**Continuous**	**Owner's Association and owners**
Housekeeping of Loading Docks	**Owner's Association and owners**	**n/a**	**n/a**
Common Area Catch Basin Inspection	**Owner's Association and owners. Inspect, cleaned and maintained at 100% of the catch basins and inlets on an annual basis. Cleaning to take place in late summer/early fall.**	**Annually**	**Owner's Association and owners**
Street Sweeping Private Streets and Parking Lots	**Owner's Association to insure sweeping occurs and trash, sediment and debris is not located in gutters.**	**Weekly**	**Owner's Association**

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
STRUCTURAL SOURCE CONTROL BMPs			
(S-1) – Storm Drain Message & Signage	**The signs must be placed so they are easily visible to the public. Legibility and visibility of markers and signs should be maintained (e.g., signs should be repainted or replaced as necessary).**	**Continuous**	**Owner's Association**
(S-3) – Outdoor Trash Storage & Waste Handling Area	**Outdoor trash storage areas must be checked periodically to ensure containment of accumulated water and prevention of stormwater run-on. Contaminated accumulated water must be disposed of in accordance with applicable laws and regulations, and cannot be discharged directly to the storm drain or sanitary sewer system without appropriate permitting.**	**Continuous**	**Owner's Association**
(S-8) – Landscape Irrigation Practices	**Maintain irrigation areas to remove trash and debris and loose vegetation. Rehabilitate areas of bare soil. Inspect and maintain irrigation equipment and components to ensure proper functionality. Clean equipment as necessary to prevent algae growth and vector breeding.**	**Monthly during regular maintenance.**	**Owner's Association**
(S-9) – Building Materials Selection	**Design Considerations/Specifications of building materials to be added at design phase. The integrity of structural elements that are subject to damage (e.g., signs) must be maintained as required by local codes and ordinances.**	**Continuous**	**Owner's Association and individual owners**

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
STORMWATER QUALITY CONTROL BMPs			
(T-6) – Proprietary Treatment Control Measures	**Proprietary stormwater quality control measure vendors are constantly updating and expanding their product lines, so refer to the latest design guidance from the vendors.**	**See below.**	**Owner's Association**
Stormexx Clean Catch Basin Filter Inserts – *Advanced Drainage Systems*	**Inserts to be installed at all roadway/parking catch basins as indicated on LID Site Plan. Keep the grate and area within 6' of the grate clean and free of leaves, grass clippings, sediment and debris to minimize these contaminants from entering the unit housing. Periodic visual inspections involve looking through the grate to see if any standing water exists. Replace filter cartridge if standing water is in the housing. Maintenance schedules will vary with rainfall and pollutant concentration levels. Typical post-construction installations will require cartridge change-outs once or twice per year. If sediment reaches a height of 6" to 8" above bottom of the 24" housing, the sediment should be dumped and the filter cartridge inspected and replaced if necessary.**	**Continuous**	**Owner's Association**

BMP Name	BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
96” Perforated Underground Retention System – *Contech Engineered Solutions*	**CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice.** **Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. Manhole covers should be securely seated following cleaning activities. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.** **Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.** **Inspect prior to and after the rainy season and 72 hours after large storm events (greater than 1-inch) to verify there is no standing water.**	**As needed**	**Owner’s Association**

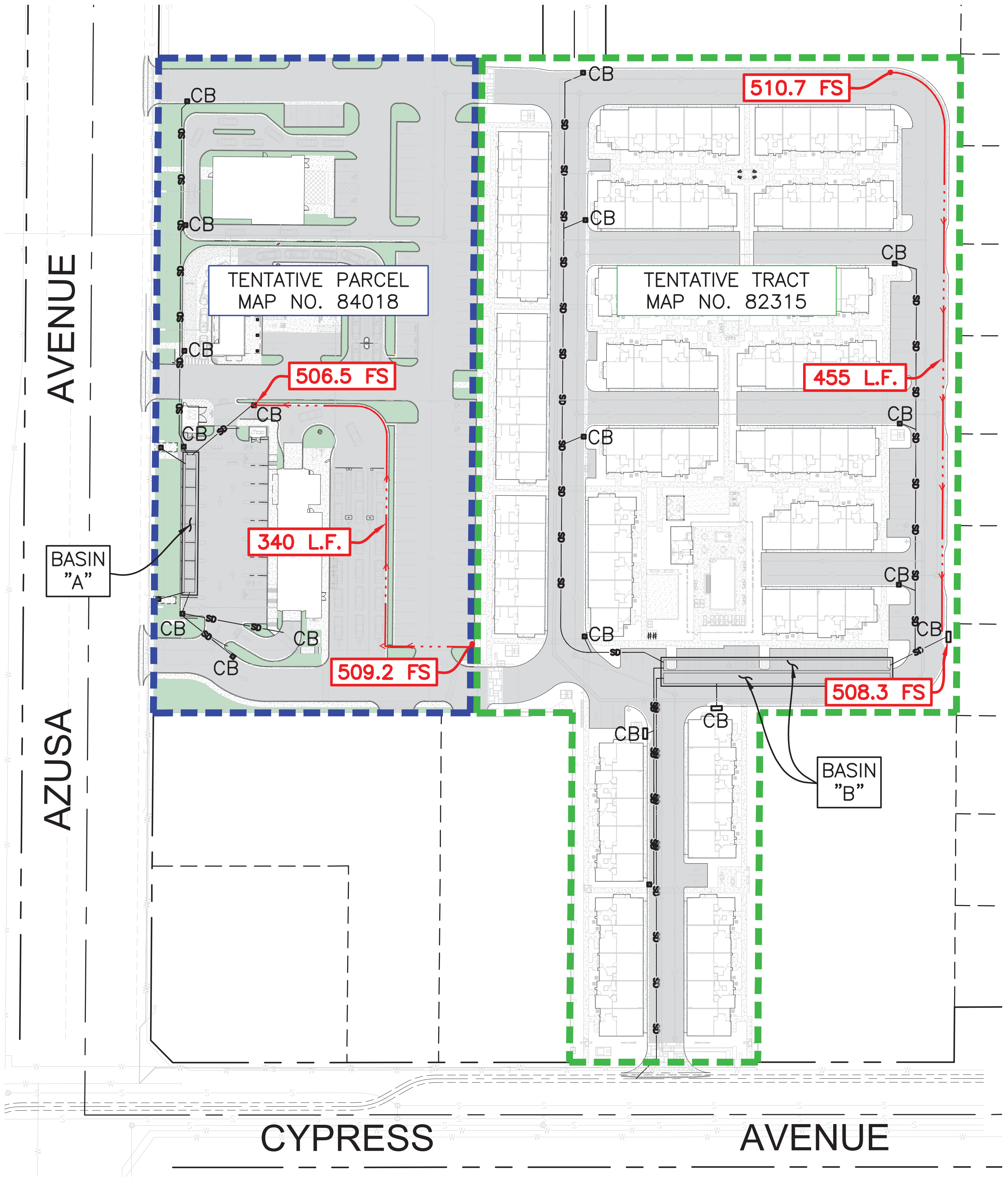
Attachment F

Plans

SHEET 1 OF 1

LID SITE PLAN

TENTATIVE TRACT MAP NO. 82315 &
TENTATIVE PARCEL MAP NO. 84018
COVINA, CA



DMA 1:

PERVIOUS AREA – 22,900 S.F.
IMPERVIOUS AREA – 99,356 S.F.
0.6464 CFS (1.01" RAINFALL)
VM = 7,656 FT^3

DMA 2:

PERVIOUS AREA – 49,400 S.F.
IMPERVIOUS AREA – 173,130 S.F.
0.9735 CFS (1.01" RAINFALL)
VM = 13,420 FT^3

CATCH BASIN NOTE:

FILTER INSERTS AND (S–1) STORM DRAIN MESSAGE & SIGNAGE TO BE INSTALLED AT EACH CATCH BASIN IDENTIFIED HEREON AND AS OUTLINED IN REPORT.

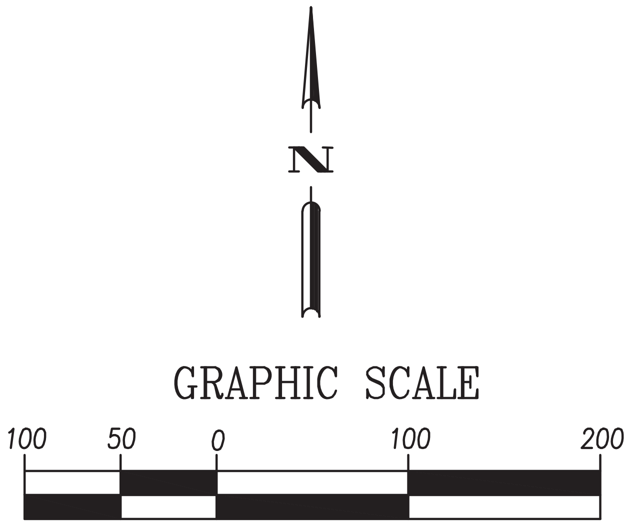
SOURCE CONTROL BMPs:

(S–1) – STORM DRAIN MESSAGE & SIGNAGE
(S–3) – OUTDOOR TRASH STORAGE AREA
(S–8) – LANDSCAPE IRRIGATION PRACTICES
(S–9) – BUILDING MATERIALS SELECTION

STORMWATER QUALITY CONTROL BMPs:

(T–6) – PROPRIETARY TREATMENT CONTROL MEASURES

* ADS STORMEXX CLEAN CATCH BASIN FILTER INSERTS
* 96" PERFORATED UNDERGROUND RETENTION SYSTEM



SCALE IN FEET
1 inch = 100 ft.

LDC *LAND DEVELOPMENT CONSULTANTS*
LAND PLANNERS
SURVEYORS
CIVIL ENGINEERS
1520 BROOKHOLLOW DRIVE, SUITE 33
SANTA ANA, CA 92705
(714) 557-7700 (714) 557-7707 FAX

LID SITE PLAN
TENTATIVE TRACT MAP NO. 82315 &
TENTATIVE PARCEL MAP NO. 84018
COVINA, CA

DATE: FEBRUARY 20, 2022

Attachment G

BMP Fact Sheets

S-1: Storm Drain Message and Signage

Purpose

Waste material dumped into storm drain inlets can adversely impact surface and ground waters. In fact, any material discharged into the storm drain system has the potential to significantly impact downstream receiving waters. Storm drain messages have become a popular method of alerting and reminding the public about the effects of and the prohibitions against waste disposal into the storm drain system. The signs are typically stenciled or affixed near the storm drain inlet or catch basin. The message simply informs the public that dumping of wastes into storm drain inlets is prohibited and/or that the drain ultimately discharges into receiving waters.

General Guidance

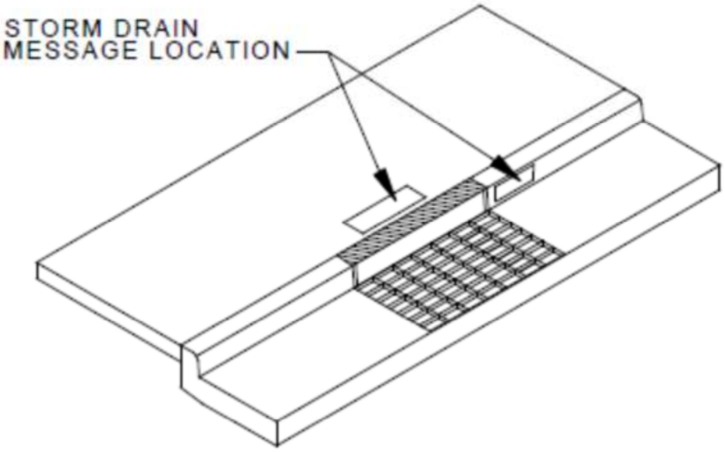
- The signs must be placed so they are easily visible to the public.
- Be aware that signs placed on sidewalk will be worn by foot traffic.

Design Specifications

- Signs with language and/or graphical icons that prohibit illegal dumping, must be posted at designated public access points along channels and streams within the project area. Consult with Los Angeles County Department of Public Works (LACDPW) staff to determine specific signage requirements for channels and streams.
- Storm drain message markers, placards, concrete stamps, or stenciled language/icons (e.g., “No Dumping – Drains to the Ocean”) are required at all storm drain inlets and catch basins within the project area to discourage illegal or inadvertent dumping. Signs should be placed in clear sight facing anyone approaching the storm drain inlet or catch basin from either side (see Figure D-1 and Figure D-2). LACDPW staff should be contacted to determine specific requirements for types of signs and methods of application. A stencil can be purchased for a nominal fee from LACDPW Building and Safety Office by calling (626) 458-3171. All storm drain inlet and catch basin locations must be identified on the project site map.

Maintenance Requirements

Legibility and visibility of markers and signs should be maintained (e.g., signs should be repainted or replaced as necessary). If required by LACDPW, the owner/operator or homeowner’s association shall enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards and signs.



NOTES:

1. STORM DRAIN MESSAGE SHALL BE APPLIED IN SUCH A WAY AS TO PROVIDE A CLEAR, LEGIBLE IMAGE.
2. STORM DRAIN MESSAGE SHALL BE PERMANENTLY APPLIED DURING THE CONSTRUCTION OF THE CURB AND GUTTER USING A METHOD APPROVED BY THE LOCAL AGENCY.

Figure D-1. Storm Drain Message Location – Curb Type Inlet

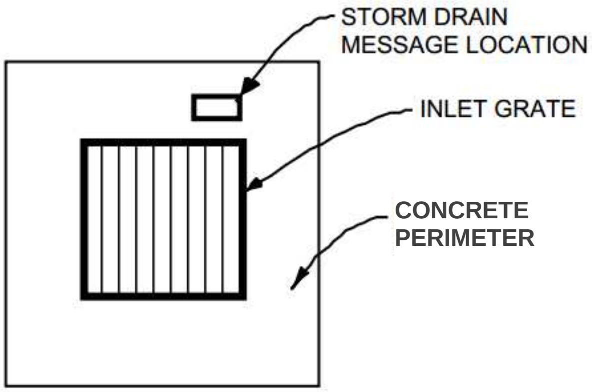


Figure D-2. Storm Drain Message Location – Catch Basin/Area Type Inlet

S-2: Outdoor Material Storage Area

Purpose

The County defines outdoor material storage areas as areas or facilities whose sole purpose is the storage of materials. Materials, including raw materials, by-products, finished products, and waste products, stored outdoors can become sources of pollutants in stormwater runoff if not handled or stored properly. The type of pollutants associated with the materials will vary depending on the type of commercial or industrial activity present.

Materials may be stored in a variety of ways, including bulk piles, containers, shelving, stacking, and tanks. Contamination of stormwater runoff may be prevented by eliminating the possibility of stormwater runoff contact with the material storage areas either through diversion, cover, or capture of the stormwater runoff. Design considerations may also include minimizing the storage area. The source control measures presented in this fact sheet must meet local permitting requirements.

Some materials, such as those containing heavy metals or toxic compounds, are of more concern than other materials. Toxic and hazardous materials must be prevented from coming in contact with stormwater runoff. Non-toxic or non-hazardous materials, such as debris and sediment, can also have significant impacts on receiving waters. Contact between non-toxic or non-hazardous materials and stormwater runoff should be limited, and such materials prevented from being discharged with stormwater runoff.

Materials are classified into three categories based on the potential risk of pollutant release associated with stormwater runoff contact – high risk, medium risk, and low risk. General types of materials under each category are presented in Table D-1. The categorization of the potential pollutant risk is used to determine the design specifications, which are presented in Table D-2, for design features at the project site.

Table D-1. Classification of Materials for Potential Pollutant Risk

High Risk Materials	Medium Risk Materials	Low Risk Materials
• Recycled materials with discharge potential • Corrosives • Food items • Chalk/gypsum products • Scrap or salvage goods • Feedstock/grain • Fertilizers • Pesticides • Compost • Asphalt • Lime/lye/soda ash • Animal/human wastes • Rubber and plastic pellets or other small pieces • Uncured concrete/cement • Lead and copper, and any metals with oil/grease coating	• Clean recycled materials without discharge potential • Metal (excluding lead and copper, and any metals with oil/grease coating) • Sawdust/bark chips • Sand/soil • Unwashed gravel/rock	• Washed gravel/rock • Finished lumber (non-pressure treated) • Rubber or plastic products (excluding small pieces) • Clean, precast concrete products • Glass products (new) • Inert products • Gaseous products • Products in containers that prevent contact with stormwater (fertilizers and pesticides excluded)

Design Specifications

Design specifications for material storage areas are regulated by local building and fire codes, ordinances, and zoning requirements. Source control measures presented in this fact sheet are intended to enhance and be consistent with local code and ordinance requirements while addressing stormwater runoff concerns. The design specifications, presented in Table D-2, must be incorporated into the design of outdoor material storage areas when stored materials could contribute pollutants to the storm drain system. The level of controls required varies relative to the risk category of the material stored.

As general guidance, downspouts and roofs should be directed away from outdoor materials storage areas, and such storage areas should slope towards a dead-end sump to collect stormwater runoff, non-stormwater runoff, and spills. Stormwater runoff, non-stormwater runoff, and spills must be disposed of in accordance with local, state, and federal laws. Locations of design features, including the features presented in Table D-2, must be included on site maps or plans. Additionally, site maps or plans must show all storage areas for chemicals and/or waste materials, with a tank/drum schedule indicating tank capacities, materials of construction, and contents.

Table D-2. Design Specifications for Outdoor Material Storage Areas

Design Feature	Design Specifications
Surfacing	• High-Risk Materials: o Construct/pave outdoor material storage areas with Portland cement concrete or an equivalent impervious surface. Ensure that the surfacing material is chemically-resistant to the materials being stored. • Medium-Risk Materials: o Construct/pave outdoor material storage areas with Portland cement concrete. • Low-Risk Materials: o There are no requirements for surfacing.
Enclosures and Covers	• High-Risk Materials: o Place materials in an enclosure such as a shed, cabinet, or other structure that prevents contact with stormwater runoff; or o Cover entire storage area with a permanent canopy, roof, or awning to prevent precipitation from making direct contact with and collecting within the storage area. Direct stormwater runoff from the cover away from the storage area to a stormwater runoff disposal point that meets all applicable code, ordinance, and LID Standards Manual requirements. For cover structures that do not include sidewalls, include a roof overhang that extends beyond the grade break. o Covers 10 feet high or less should extend a minimum of 3 feet beyond the perimeter of the hydraulically-isolated storage area. o Covers higher than 10 feet should extend a minimum of either 20 percent of the cover's height or 5 feet beyond the perimeter of the hydraulically-isolated storage area, whichever is greater. o LACDPW may grant waivers for covers on a case-by-case basis. • Medium-Risk Materials: o At a minimum, completely cover material with temporary plastic sheeting during storm events. • Low-Risk Materials: o There are no requirements for enclosures or covers.

Table D-2. Design Specifications for Outdoor Material Storage Areas (continued)

Hydraulic Isolation and Drainage	• High-Risk Materials: o Hydraulically-isolate storage area with grading, berms, drains, dikes, or curbs to prevent stormwater run-on from surrounding areas or roof drains. o Direct stormwater runoff from surrounding areas away from the hydraulically-isolated storage area to a stormwater runoff disposal point that meets all applicable LID Standards Manual requirements. o Drainage facilities are not required for the hydraulically-isolated storage area. However, if drainage facilities are provided, drainage from the hydraulically-isolated storage area must be directed to a stormwater runoff disposal point as determined by LACDPW. • Medium-Risk Materials: o Drainage from storage area may be allowed, on a case-by-case basis with approval from LACDPW, to a treatment control measure or standard storm drain(s). o For erodible material, provide grading and a structural containment barrier on at least three sides of each stockpile to prevent stormwater run-on from surrounding areas and migration of material due to wind erosion. • Low-Risk Materials: o Provide appropriate drainage from the storage area to minimize contact with materials.
Spill Containment	• All Materials: o Implement spill containment measures where materials are stored in tanks, drums, or similar containers and that may potentially enter the storm drain system, sanitary sewer system, or contaminate the soil. Spill containment must be designed for the volume of the largest tank/drum or 10 percent of the tank/drum total (whichever is greater). o Separate spill containment systems for all tanks containing incompatible materials such as acids, bases, reactive or flammable materials. o Clean, repair, and seal (using epoxy or equivalent sealant compatible with the stored materials) the interior wall and floors within all spill containment areas. Identify the areas to be sealed on the site maps. o Bond the contact joint for spill containment walls or dikes constructed on existing concrete, masonry or asphalt to the existing surface. Identify the areas to be bonded on the site maps. o Cover the spill containment areas with a roof or awning to minimize collection of stormwater runoff within. o Store materials collected in spill containment areas until its quality and an appropriate approved disposal method have been determined.

Accumulated Water

Stormwater runoff, non-stormwater runoff, and spills will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and regulations, and cannot be discharged directly to the storm drain or sanitary sewer system without appropriate permitting. Contact LACDPW (1-888-CLEAN-LA) for information regarding discharge of contaminated accumulated water.

Maintenance Requirements

The integrity of structural elements that are subject to damage (e.g., screens, covers, signs) must be maintained by the owner/operator as required by local codes and ordinances. Outdoor material storage areas must be checked periodically to ensure containment of accumulated water and prevention of stormwater run-on. Any enclosures and secondary/spill containment areas should be checked periodically to ensure spills are contained efficiently. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

S-3: Outdoor Trash Storage and Waste Handling Area

Purpose

Stormwater runoff from areas where trash is stored or handled can be polluted. Loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or receiving waters. Waste handling operations (i.e., dumpsters, litter control, waste piles) may be sources of stormwater pollution.

Design Specifications

Wastes from commercial and industrial sites are typically hauled away for disposal by either public or commercial carriers that may have design or access requirements for waste storage areas. Design specifications for waste handling areas are regulated by local building and fire codes and by current County ordinances and zoning requirements. The design specifications, listed below in Table D-3, are recommendations and are not intended to conflict with requirements established by the waste hauler. The design specifications are intended to enhance local codes and ordinances while addressing stormwater runoff concerns. The waste hauler should be contacted prior to the design of trash storage and collection areas to determine established and accepted guidelines for designing trash collection areas. All hazardous waste must be handled in accordance with the legal requirements established in Title 22 of the California Code of Regulations. Conflicts or issues should be discussed with LACDPW staff.

Table D-3. Design Specifications for Outdoor Trash Storage and Waste Handling Area

Design Feature	Design Specifications
Surfacing	• Construct/pave outdoor trash storage and waste handling area with Portland cement concrete or an equivalent impervious surface.
Screens/Covers	• Install a screen or wall around trash storage area to prevent off-site transport of loose trash. • Use lined bins or dumpsters to reduce leaking of liquid wastes. • Use waterproof lids on bins/dumpsters or provide a roof to cover storage area enclosure (LACDPW discretion) to prevent precipitation from entering containers.
Grading/Drainage	• Berm and/or grade waste handling area to prevent stormwater run-on. • Locate waste handling area at least 35 feet from storm drains. • Divert drainage from adjoining roofs and pavement away from adjacent trash storage areas.
Signs	• Post signs on all dumpsters and/or inside enclosures prohibiting disposal of liquids and hazardous materials in accordance with any waste disposal ordinance.

Accumulated Water

Stormwater runoff, non-stormwater runoff, and spills will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and regulations, and cannot be discharged directly to the storm drain or sanitary sewer system without appropriate permitting. Contact LACDPW (1-888-CLEAN-LA) for information regarding discharge of contaminated accumulated water.

Maintenance Requirements

The integrity of structural elements that are subject to damage (e.g., screens, covers, signs) must be maintained by the owner/operator as required by local codes and ordinances. Outdoor trash storage and waste handling areas must be checked periodically to ensure containment of accumulated water and prevention of stormwater run-on. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

S-8: Landscape Irrigation Practices

Purpose

Irrigation runoff provides a pathway for pollutants (i.e., nutrients, bacteria, organics, sediment) to enter the storm drain system. By effectively irrigating, less runoff is produced resulting in less potential for pollutants to enter the storm drain system.

General Guidance

- Do not allow irrigation runoff from the landscaped area to drain directly to storm drain system.
- Minimize use of fertilizer, pesticides, and herbicides on landscaped areas.
- Plan sites with sufficient landscaped area and dispersal capacity (e.g., ability to receive irrigation water without generating runoff).
- Consult a landscape professional regarding appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.

Design Specifications

- Choose plants that minimize the need for fertilizer and pesticides.
- Group plants with similar water requirements and water accordingly.
- Use mulch to minimize evaporation and erosion.
- Include a vegetative boundary around project site to act as a filter.
- Design the irrigation system to only water areas that need it.
- Install an approved subsurface drip, pop-up, or other irrigation system.[1] The irrigation system should employ effective energy dissipation and uniform flow spreading methods to prevent erosion and facilitate efficient dispersion.
- Install rain sensors to shut off the irrigation system during and after storm events.
- Include pressure sensors to shut off flow-through system in case of sudden pressure drop. A sudden pressure drop may indicate a broken irrigation head or water line.
- If the hydraulic conductivity in the soil is not sufficient for the necessary water application rate, implement soil amendments to avoid potential geotechnical hazards (i.e., liquefaction, landslide, collapsible soils, and expansive soils).

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[1] If alternative distribution systems (e.g., spray irrigation) are approved, the County will establish guidelines to implement these new systems.

- For sites located on or within 50 feet of a steep slope (15% or greater), do not irrigate landscape within three days of a storm event to avoid potential geotechnical instability.[2]
- Implement Integrated Pest Management practices.

For additional guidelines and requirements, refer to the Los Angeles County Department of Health Services.

Maintenance Requirements

Maintain irrigation areas to remove trash and debris and loose vegetation. Rehabilitate areas of bare soil. If a rain or pressure sensor is installed, it should be checked periodically to ensure proper function. Inspect and maintain irrigation equipment and components to ensure proper functionality. Clean equipment as necessary to prevent algae growth and vector breeding. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

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[2] As determined by the City of Los Angeles, Building and Safety Division

S-9: Building Materials Selection

Purpose

Building materials can potentially contribute pollutants of concern to stormwater runoff through leaching. For example, metal buildings, roofing, and fencing materials may be significant sources of metals in stormwater runoff, especially due to acidic precipitation. The use of alternative building materials can reduce pollutant sources in stormwater runoff by eliminating compounds that can leach into stormwater runoff. Alternative building materials may also reduce the need to perform maintenance activities (i.e., painting) that involve pollutants of concern, and may reduce the volume of stormwater runoff. Alternative materials are available to replace lumber and paving.

Design Specifications

Lumber

Decks and other house components constructed using pressure-treated wood that is typically treated using arsenate, copper, and chromium compounds are hazardous to the environment. Pressure-treated wood may be replaced with cement-fiber or vinyl.

Roofs, Fencing, and Metals

Minimizing the use of copper and galvanized (zinc-coated) metals on buildings and fencing can reduce leaching of these pollutants into stormwater runoff. The following building materials are conventionally made of galvanized metals:

- Metal roofs;
- Chain-link fencing and siding; and
- Metal downspouts, vents, flashing, and trim on roofs.

Architectural use of copper for roofs and gutters should be avoided. As an alternative to copper and galvanized materials, coated metal products are available for both roofing and gutter application. Vinyl-coated fencing is an alternative to traditional galvanized chain-link fences. These products eliminate contact of bare metal with precipitation or stormwater runoff, and reduce the potential for stormwater runoff contamination. Roofing materials are also made of recycled rubber and plastic.

Green roofs may be an option. Green roofs use vegetation such as grasses and other plants as an exterior surface. The plants reduce the velocity of stormwater runoff and absorb water to reduce the volume of stormwater runoff. One potential problem with using green roofs in the Los Angeles County area is the long, hot and dry summers, which may kill the plants if they are not watered. See the Green Roof Fact Sheet (RET-7) in Appendix E.

Pesticides

The use of pesticides around foundations can be reduced through the use of alternative barriers. Sand barriers can be applied around foundations to deter termites, as they cannot tunnel through sand. Metal shields also block termites from tunneling. Additionally, diatomaceous earth can be used to repel or kill a wide variety of other pests.

Maintenance Requirements

The integrity of structural elements that are subject to damage (e.g., signs) must be maintained by the owner/operator as required by local codes and ordinances. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

T-6: Proprietary Treatment Control Measures

Definition

The LID Standards Manual provided information for selecting and designing the more common treatment-based stormwater quality control measures for projects. The treatment-based stormwater quality control measures included in this appendix (T-1 to T-5) are non-proprietary (public domain) designs that have been reviewed and evaluated by LACDPW and determined generally acceptable.

Proprietary devices are commercial products that typically aim at providing stormwater treatment in space-limited applications, often using patented innovative technologies. The most commonly encountered classes of proprietary stormwater quality control measures include hydrodynamic separation, catch basin insert technologies, cartridge filter-type controls, and proprietary biotreatment devices.

Hydrodynamic separation devices (alternatively, swirl concentrators) are devices that remove trash, debris, and coarse sediment from incoming flows using screening, gravity settling, and centrifugal forces generated by forcing the influent into a circular motion. By having the water move in a circular fashion, rather than a straight line, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space as compared to wet vaults and other settling devices. Hydrodynamic devices were originally developed for combined sewer overflows, where they were used primarily to remove coarse inorganic solids. Hydrodynamic separation has been adapted for stormwater treatment by several manufacturers and is currently used to remove trash, debris, and other coarse solids down to sand-sized particles. Several types of hydrodynamic separation devices are also designed to remove floating oils and grease using sorbent media.

Catch basin inserts are manufactured filters or fabric placed in a drop inlet to remove sediment and debris and may include sorbent media to remove floating oils and grease. There are a multitude of inserts of various shapes and configurations, typically falling into one of three groups: socks, boxes, and trays. The sock-type filters are typically constructed of a fabric, usually polypropylene. The fabric may be attached to a frame or the grate of the inlet may hold the sock. Socks are meant for vertical (drop) inlets. Boxes are constructed of plastic or wire mesh. Typically a polypropylene “bag” is placed in the wire mesh box and the bag takes the form of the box. Most box products are one box; that is, settling and filtration through media occur in the same box. Other products consist of one or more trays or mesh grates. The trays may hold different types of media. Filtration media vary by manufacturer. Types include polypropylene, porous polymer, treated cellulose, and activated carbon. Inserts are an easy and inexpensive retrofitting option because drain inlets are already a component of most standard drainage systems. Inserts are usually only suitable for mitigating relatively small tributary areas (less than one acre) because they are limited by treatment capacity and influent flow rate.

Cartridge filter-type controls typically consist of a series of vertical filters contained in a vault or catch basin that provide treatment through filtration and sedimentation. The vault may be divided into multiple chambers where the first chamber acts as a pre-settling basin for removal of coarse sediment while another chamber acts as the filter bay and houses the filter cartridges. The performance and capacity of a cartridge filter installation depends on the properties of the media contained in the cartridges. Cartridge filter manufacturers often provide an array of media types each with varying properties, targeting various pollutants and a range of particle sizes. Commonly used media include media that target solids, such as perlite, and media that target both dissolved and non-dissolved constituents, such as compost leaf media, zeolite, and iron-infused polymers. Manufacturers try to distinguish their products through innovative designs that aim at providing self cleaning and draining, uniformly loaded, and clog resistant cartridges that functional properly over a wide range of hydraulic loadings and pollutant concentrations.

Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as wetlands by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or higher volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through natural media (mulch, compost, soil, plants, microbes, etc) and either infiltrated or collected by an underdrain and delivered to the storm system. Tributary areas for biotreatment devices tend to be limited to 0.5 to 1.0 acres.

The vendors of the various proprietary stormwater quality control measures provide detailed documentation for device selection, sizing, and maintenance requirements. Tributary area sizes are limited to the capacities of the largest available model. The latest manufacturer supplied documentation must be used for sizing and selection of all proprietary devices. Links to the websites of a number of vendors of proprietary devices are provided at www.BMPLA.org. All proprietary devices proposed for use by a project applicant must be approved by LACDPW.

General Design Specifications

Proprietary stormwater quality control measure vendors are constantly updating and expanding their product lines, so refer to the latest design guidance from the vendors. General guidelines on the performance, sizing, and operation and maintenance of proprietary devices are provided through LACDPW Watershed Division.

Expected Performance

For hydrodynamic devices, it has been stated with respect to combined sewer overflows that the practical lower limit of hydrodynamic separation is a particle with a settling velocity of 12 to 16.5 ft/hr (0.10 to 0.14 cm/s). As such, the focus for hydrodynamic separation in combined sewer overflows has been with settleable solids generally 200 μm and larger, given the presence of the lighter organic solids. For inorganic sediment, the above settling velocity range represents a particle diameter of 50 to 100 μm. Thus, hydrodynamic separation devices are effective for removal of course sediment, trash, and debris and useful for pretreatment in combination with other types of stormwater quality control measures that target smaller particle sizes.

Because there is a wide range of catch basin insert configurations, it is not possible to generalize the expected performance. Inserts should mainly be used for catching coarse sediments and floatable trash, and are effective for pretreatment in combination with other types of stormwater quality control measures. Trash and large objects can greatly reduce the effectiveness of catch basin inserts with respect to sediment and hydrocarbon capture. Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

Cartridge filters have been proven to provide efficient removals for both dissolved and non-dissolved pollutants. However, cartridge filters are less adept at handling high flow rates when compared to catch basin inserts and hydrodynamic devices due to the enhanced treatment provided through the filtration mechanism.

Because proprietary biotreatment devices are relatively new compared to the other types of proprietary treatment devices included in the LID Standards Manual, there are fewer third party studies on proprietary biotreatment devices. The available performance information is mostly vendor-supplied. According to the vendors, like their natural counterparts, proprietary biotreatment devices are highly efficient at mitigating dissolved metals, nutrients, and suspended solids.

Sizing

Hydrodynamic devices, catch basin inserts, and cartridge filters are flow-based stormwater quality control measures, but can be sized to capture and treat the mitigation volume of the SWQDv with additional facilities to manage stormwater runoff flow. Proprietary biotreatment devices on the other hand include both volume-based and flow-based stormwater quality control measures. Volume-based proprietary devices should be sized to capture and treat the mitigation volume of the SWQDv if used as a standalone stormwater quality control measure.

Auxiliary components of proprietary devices such as sorbent media, screens, baffles, and sumps are selected based on site-specific conditions such as the expected loading and the desired frequency of maintenance. Sizing of proprietary devices is reduced to a simple process whereby a model can simply be selected from a table or a chart based on a few known quantities (tributary area, location, design flow rate, design volume, etc). Some manufacturers either size the devices for potential clients or offer calculators on their websites that simplify the design process even further and lessens the possibility of using obsolete design information. For the latest sizing guidelines, refer to the manufacturer’s website.

Operation and Maintenance

Hydrodynamic Separation Devices

Hydrodynamic separators do not have moving parts and are not maintenance intensive. However, maintenance is important to ensure that the device operates as efficiently as possible. Proper maintenance involves frequent inspections throughout the first year of installation, especially after major storm events. The systems are considered full when the sediment level is within one foot from the top of the unit, at which point it must be cleaned out. Removal of sediment can be performed with a sump vacuum or vactor truck. Some hydrodynamic separator devices may contribute to mosquito breeding if they do not fully drain stormwater runoff between storm events. Refer to manufacturer's guidelines for inspection and maintenance activities.

Catch Basin Inserts

Catch basin inserts can be maintenance-intensive because of their susceptibility for accumulating trash and debris. Regular maintenance activities include the clean-up and removal of accumulated trash and sediment while major maintenance activities include replacing filter media (if used) and or repairing/replacing geomembrane fabrics. Refer to manufacturer's guidelines for inspection and maintenance activities.

Cartridge Filters

For cartridge filters, maintenance activities include periodically removing trash, debris, and sediment from the vault floor, typically twice per year depending on the accumulation rate, using a sump vacuum or vactor truck. The cartridges may need to be replaced when they become saturated, which will occur approximately every other year depending on the pollutant accumulation rate. The manufacturers of these devices typically provide contract operation and maintenance services.

All stormwater vaults that contain standing water can become a breeding area for vectors. Manufacturers have developed systems, such as a perforated pipe installed in the bottom of the vault that is encased in a filter sock to prevent clogging, to completely drain the vault.

Biotreatment Devices

Maintenance of biotreatment devices can be provided by the manufacturer and typically consists of routine inspection and hand removal of accumulated trash and debris. Vactor trucks or mechanical maintenance activities are not needed for biotreatment devices.

Attachment H

Pollutants of Concern

Table 7-3. Typical Pollutants of Concern by Land Use (1)

Land Use	**Pollutants of Concern (2)**								
	Suspended Solids	Total Phosphorus	Total Nitrogen	Total Kjeldahl Nitrogen	Cadmium, Total	Chromium, Total	Copper, Total	Lead, Total	Zinc, Total
High Density Single Family Residential	X	X			(4)	(4)	X	X	X
Multi-Family Residential	X				(4)	(4)	X		X
Mixed Residential	X	X	X		(4)	(4)	X	X	X
Commercial	X	X	X	X	(4)	(4)	X	X	X
Industrial	X	X	X	X	(4)	(4)	X	X	X
Critical Facilities (3)	X	(4)	(4)	(4)	(4)	(4)	X	X	X
Transportation (streets, roads)	X	X	X	X	(4)	(4)	X	X	X
Institutional (educational facilities)	X				(4)	(4)	X		X

(1) Adapted from Table A-3 of the *Technical Manual for Stormwater Best Management Practices in the County of Los Angeles* (February 2004) and the Southern California Coastal Water Research Project Land Use Specific Storm Water Monitoring Data. X = exceedance of "standard" by observed median/average concentration; blank = no exceedance of "standard" by observed median/average concentration.

(2) Derived from Table 11 of the 2012 Los Angeles County MS4 Permit (page 104).

(3) Critical facilities include automobile dismantling (SIC 50xx), automobile repair (SIC 75xx), metal fabrication (SIC 34xx), motor freight (SIC 42xx), automobile dealerships (SIC 55xx), chemical manufacturing (SIC 28xx), and machinery manufacturing (SIC 35xx).

(4) No available data to determine if these pollutants of concern originate from this land use. Pollutant is assumed to be produced by this land use unless otherwise proven by the project applicant.

NARRATIVE PROJECT DESCRIPTION:	Tract Map (5.109 ac) for condominium purposes to create 80 multifamily townhomes and 17 Live/Work units with drive aisles, parking, landscaping and recreation area. Parcel Map (2.806 ac) for drive-thru commercial uses including a self-service car wash.

OFFSITE RUNON	Offsite runon not anticipated.
UTILITY AND INFRASTRUCTURE INFORMATION	There are no known existing onsite utility and/or infrastructure that will conflict with proposed stormwater facilities. The proposed sewer, water and dry utility improvements designed to not conflict with proposed subsurface infiltration systems.
SIGNIFICANT ECOLOGICAL AREAS (SEAs)	There are no known SEAs.
RECEIVING WATERS	Receiving waterbodies that follow are Walnut Creek Wash, San Gabriel River Reach 3, San Gabriel River Reach 2, San Gabriel River Reach 1 and the San Gabriel River Estuary. The above mentioned receiving waterbodies are listed for water quality impairment on the most recent 303(d)-list for: * Benthic-Macroinvertebrate Bioassessments * Indicator Bacteria * pH * Coliform Bacteria * Cyanide * Lead * Copper * Dioxin * Nickel * Oxygen, Dissolved

MALIBU CREEK WATERSHED MANAGEMENT AREA

Parameter	Parameter
E. coli Bacteria	Total Dissolved Solids
Cyanide, Total Recoverable	
Mercury, Total Recoverable	
Selenium, Total Recoverable	
Sulfate	

SAN GABRIEL RIVER WATERSHED MANAGEMENT AREA

Parameter	Parameter
pH	Cyanide, Total Recoverable
E. coli Bacteria	Cadmium, Total Recoverable
Total Coliform Bacteria[1]	Copper, Total Recoverable
Fecal Coliform Bacteria[1]	Lead, Total Recoverable
Enterococcus Bacteria[1]	Mercury, Total Recoverable
Chloride	Nickel, Total Recoverable
Nitrate Nitrogen, Total (as N)	Selenium, Total Recoverable
Sulfate	Silver, Total Recoverable
Total Dissolved Solids	Zinc, Total Recoverable
Aluminum, Total Recoverable	

[1] Apply only to discharges to the estuary and the ocean

SANTA CLARA RIVER WATERSHED AREA (LA County portion only)

Parameter	Parameter
E. coli Bacteria	Aluminum, Total Recoverable
Chloride	Cyanide, Total Recoverable
Sulfate	Copper, Total Recoverable
Total Dissolved Solids	Mercury, Total Recoverable
Methylene Blue Active Substances	Selenium, Total Recoverable