Geologic and Geotechnical Review of Storm Drain Plans
Parcel Map No. 062646, MTD No1843
Santa Clarita, California

for

TMC Properties

September 14, 2011 W.O. 6457

MDN 13556

GeoSoils Consultants Inc.

GSC GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

September 14, 2011
W.O. 6457

TMC PROPERTIES
P.O. Box 800970
Santa Clarita, California 91380-0970

Attention: Mr. Mark Sullivan

Subject: Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California

Reference: GeoSoils Consultants, Inc. dated September 13, 2011, "Geologic and Geotechnical Engineering Study, Parcel No. 062646, Santa Clarita, California"

INTRODUCTION

As requested, GeoSoils Consultants, Inc. (GSC) has reviewed the storm drain plans for Parcel Map No. 062646 in the City of Santa Clarita. The plans were prepared by Sikand Engineering, and pertinent sheets are included as Plates 1A through 1I. The storm drain will consist of five storm drain lines labeled Line A through Line E.

Line A runs along the eastern edge of the tract, turns westward, and then runs along the northern edge of the tract outletting into the Santa Clara River channel. Lines B and C run in a south-north orientation along proposed Springbrook Avenue and tie into Line A to the north. Line D runs in a south-north direction from the end of a proposed cul de sac, "A" street, and ties into Line A on the north. Line E connects the proposed basin located in the northeast portion of the development to Line A to the west. An index map is presented on Plate 1.

MDN 13556

A comprehensive geotechnical engineering report containing subsurface exploration data, laboratory test results and engineering analyses was prepared for the subject tract (see Reference). A copy of our referenced report is being included for your review (see enclosed disk). Information presented in the referenced report has been utilized to prepare this report. Subsurface exploration and laboratory results are presented in Appendix A of this report.

The site is underlain by minor amounts of artificial fill, alluvium, and older alluvium. We recommend removing and recompacting the top five feet of material under the subject site. During grading, all existing fill and the top five feet of alluvium will be removed to competent native material prior to fill placement. It is anticipated the storm drain will be founded on alluvium, older alluvium, and/or certified compacted fill.

Rubber gaskets are recommended in cut/fill transition areas. The anticipated depths of removal and recompaction of the unsuitable materials are shown on the storm drain plans (Plates 1A through 1H). Cut/fill transition areas are also shown on these plans. Transition points may vary slightly during grading due to actual removal requirements. Actual cut/fill transition points will be verified in the field by the Geotechnical Engineer. Field inspection at the time of storm drain installation may alter the location of rubber gaskets along the alignment. Per County standards, rubber gaskets should be provided for a minimum distance of three pipe lengths on each side of the cut/fill transition (i.e. 24 feet).

As previously stated, all existing fill and unsuitable alluvial material will be removed during grading. Therefore, the anticipated settlement, both uniform and differential, is expected to be negligible. Rubber gasket joints will be utilized in areas of cut/fill transitions. It is our understanding that rubber gasket joints are capable of withstanding one degree of rotation over one pipe length (1.6 inches in 96 inches). Therefore, the joint flexures should be within acceptable limits.

The western portion of Line A will transverse below existing railroad tracks and Railroad Avenue in order to discharge into the Santa Clara River channel. When detailed plans for this area become available, they should be forwarded to this office for review.

The on-site material is considered suitable for use as fill/backfill material, provided it does not contain any debris or organic materials and does not contain rock fragments larger than six inches in diameter. All fill/backfill should be compacted to a minimum 90 percent relative compaction per ASTM Test Designation D-1557-09. Additional grading guidelines are presented in the referenced report.

Temporary Excavation

Where necessary space is available, temporary unsurcharged embankments may be sloped back without shoring. The slope should not be cut steeper than the following gradient:

Height	Temporary Gradient (Horizontal:Vertical)
0-4'	Near Vertical
Above 4'	1:1

In areas where soils with little or no binder are encountered, shoring or flatter excavation slopes shall be made.

These recommended temporary excavation slopes do not preclude local raveling or sloughing. During the rainy season, temporary cut slopes should be protected by covering the slopes with Visqueen, and preventing runoff over the slopes.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act, and the Construction Safety Act should be met.

Where sloped embankments are used, the top of the slope should be barricaded to prevent equipment and heavy storage loads within five feet of the top of the slope. If the temporary construction embankments are to be maintained for long periods, berms should be constructed along the top of the slope to prevent runoff water from eroding the slope faces.

If temporary shoring is required, heavy duty prefabricated storm drain trench supports referred to as "shields" may be used. All temporary excavations should be observed by our personnel to insure that adverse geologic conditions are not exposed in the excavations, and that modifications of the excavations can be made, if warranted.

Chemical Testing

Selective chemical testing of representative on-site materials were performed. The purpose of such testing was to determine whether or not construction materials will be at risk from chemicals within the near-surface materials. The results are presented in Appendix B.

"111" STATEMENT

Provided that the recommendations in this report and all relevant reports referenced herein, are implemented, it is GSC's opinion that the proposed MTD 1843 will be safe from the hazards of landslide, settlement or slippage. Furthermore, the completed development will not adversely affect the stability of the adjacent properties nor be adversely affected by adjacent properties.

We hope this satisfies your requirements at this time. If we can be of any further assistance, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

KAREN L. MILLER
GE 2257

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/12
GEOTECHNICAL
STATE OF CALIFORNIA

LANCE R. PUTNAM
CEG 2469

PROFESSIONAL GEOLOGIST
Lance R. Putnam
No. 2469
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

KLM.LRP.W:Geol & Geot Review

Encl: Plates 1A through 1I, Storm Drain Plans
Plate 2, Geologic Cross-Sections
Appendix A, Field Exploration Procedures (from referenced report)
Plates A-1 through A-11
Appendix B, Laboratory Test Procedures and Results
Plates SH-1 and SH-2, Shear Test Diagrams
Plates C-1 through C-6, Consolidation Diagrams
Chemical Series Results

cc: (2) Addressee
(5) Sikand Engineering

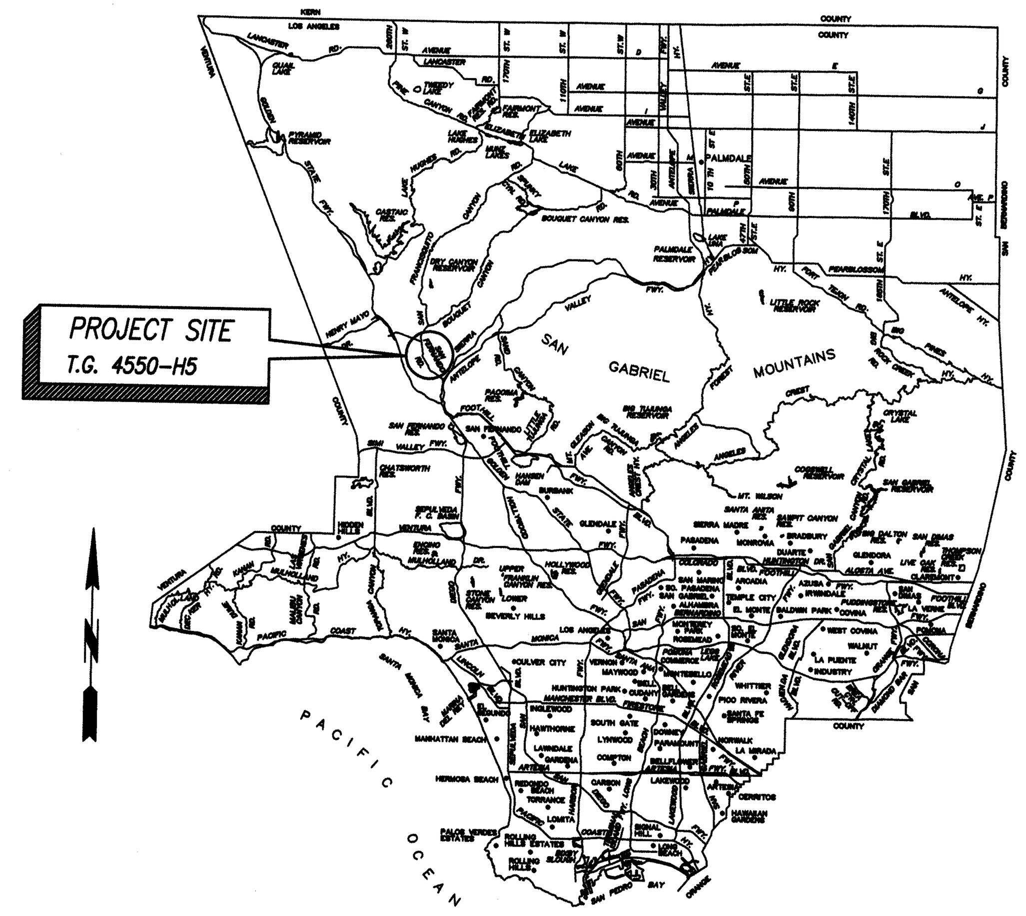
CITY OF SANTA CLARITA
MISCELLANEOUS TRANSFER DRAIN NO. 1843
PARCEL MAP NO. 062646

M.T.D. NO. 1843

BENCH MARK: L.A.C.D.P.W. L 5259

DPW BM TAG IN W CB 43FT W/O C/L SAN FERNANDO RD & 0.35MI N/O CIRCLE J RANCH RD (8FT E/O PP # 4235226E)

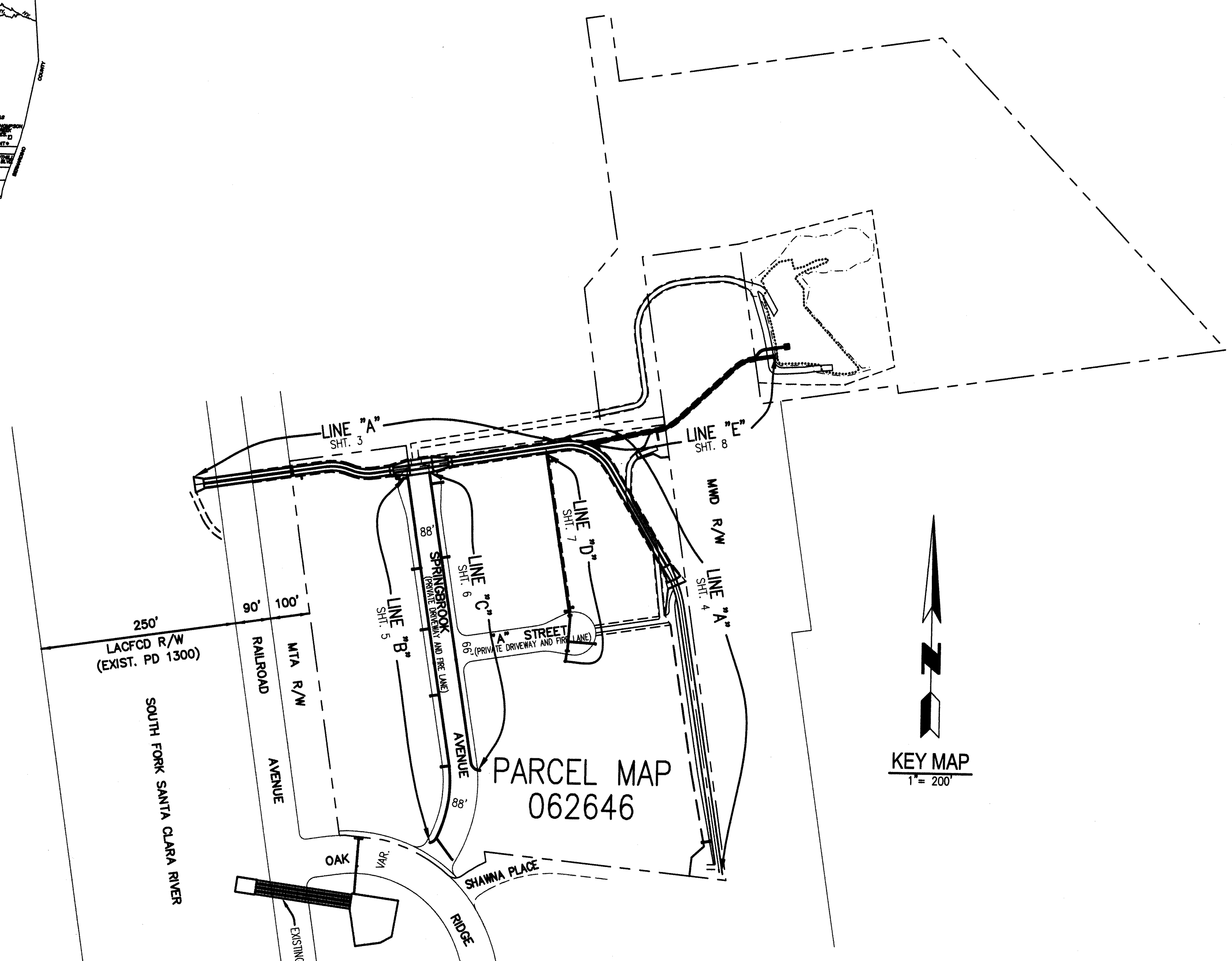
NEWHALL QUAD (1993) ELEV. 1175.593



LOCATION MAP
NOT TO SCALE

LIST OF STANDARDS

		L.A.C.D.P.W.	S.P.P.W.C.
1	PIPE ANCHORS AND BACKFILL STABILIZERS		221-2
2	SUPPORTS FOR CONDUITS ACCESS TRENCHES		224-2
3	BLANKET PROTECTIONFOR PIPES		225-2
4	CURB OPENING CATCH BASIN		300-3
5	MONOLITHIC CATCH BASIN CONNECTION		308-2
6	CATCH BASIN REINFORCEMENT		309-2
7	C.B. FACE PLATE ASSEMBLY AND PROTECTION BAR		310-3
8	CATCH BASIN MANHOLE FRAME AND COVER		312-3
9	LOCAL DEPRESSIONS AT CATCH BASINS		313-3
10	MANHOLE - PIPE TO PIPE (MAINLINE ID >= 36")		320-2
11	MANHOLE - PIPE TO PIPE (MAINLINE ID <= 33")		321-2
12	MANHOLE - PIPE TO PIPE (LARGE SIDE INLET)		322-2
13	MANHOLE - CONCRETE BOX STORM DRAIN		323-2
14	MANHOLE SHAFT WITH ECCENTRIC REDUCER		324-2
15	JUNCTION STRUCTURE PIPE TO PIPE (INLET I.D. >=24" OR O.D. > 1/2 MAINLINE I.D.)		331-3
16	JUNCTION STRUCTUE - PIPE TO PIPE (ID <= 24")		332-2
17	JUNCTION STRUCTUE - PIPE TO RCB INLET (ID <= 30")		334-2
18	TRANSITION STRUCTURE - PIPE TO PIPE		340-2
19	TRANSITION STRUCTURE (RC BOX TO PIPE)		342-2
20	TRANSITION STRUCTURE (DOUBLE RC BOX TO DOUBLE RC BOX)		344-2
21	TRANSITION STRUCTURE (DOUBLE RC BOX TO TRIPLE RC BOX)		345-2
22	SLOPED PROTECTION BARRIER		360-2
23	TRASH RACK (INCLINED)		361-2
24	CONCRETE COLLAR		380-4
25	WINDOW DETAILS FOR MULTIPLE R.C. BOX STRUCTURE		382-2
26	CHAIN LINK FENCE AND GATES		600-3
27	24" MANHOLE FRAME AND COVER		630-3
28	STEEL STEP		635-3
29	REINFORCED CONCRETE STAIRWAY		640-3
30	PIPE BEDDING	380-3 CASE 3	
31	SAFETY REQUIREMENTS	6008-1	
	CITY OF LOS ANGELES DWP STD. PLAN	A 3615	



KEY MAP
1" = 200'

INDEX TO PROJECT DRAWINGS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	GENERAL NOTES, WATER QUALITY NOTES, STRUCTURAL NOTES & HYDRAULIC ELEMENT TABLE
3	PLAN – LINE "A" PROFILE – LINE "A"
4	PLAN – LINE "A" PROFILE – LINE "A"
5	PLAN – LINE "B" PROFILE – LINE "B"
6	PLAN – LINE "C" PROFILE – LINE "C"
7	PLAN – LINE "D" PROFILE – LINE "D"
8	PLAN – LINE "E", LAT."E-2", "E-3" PROFILE – LINE "E", LAT."E-2", "E-3"
9	LINE E ELEVATED INLET DETAILS
10	PROFILES – LAT."A-1", "A-2", "B-1", "B-2" "B-3", "B-4", "B-5", "B-6" OUTLET STRUCTURE DETAILS
11	ELEVATED INLET STRUCTURAL DETAILS
12	DOUBLE/SINGLE RC BOX STRUCTURAL DETAILS
13	EASEMENT EXHIBIT
14	INLET STRUCTURE DETAILS FACING SLAB AND ACCESS ROAD DETAIL

PRIOR TO ORDERING PIPES, CONTACT GEOTECHNICAL AND MATERIALS ENGINEERING AT (626)458-1707 TO SCHEDULE A D-LOAD INSPECTION. INSPECTION FEES PAYABLE AT THE LAND DEVELOPMENT DIVISION PUBLIC COUNTER WILL BE REQUIRED.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED CIVIL ENGINEER No. 49041 ________ DATE

REVEIWED BY: ________ DATE

APPROVED FOR CONSTRUCTION BY: ________ DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No. 49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

PARCEL MAP NO. 062646 SHEET 1 OF 14

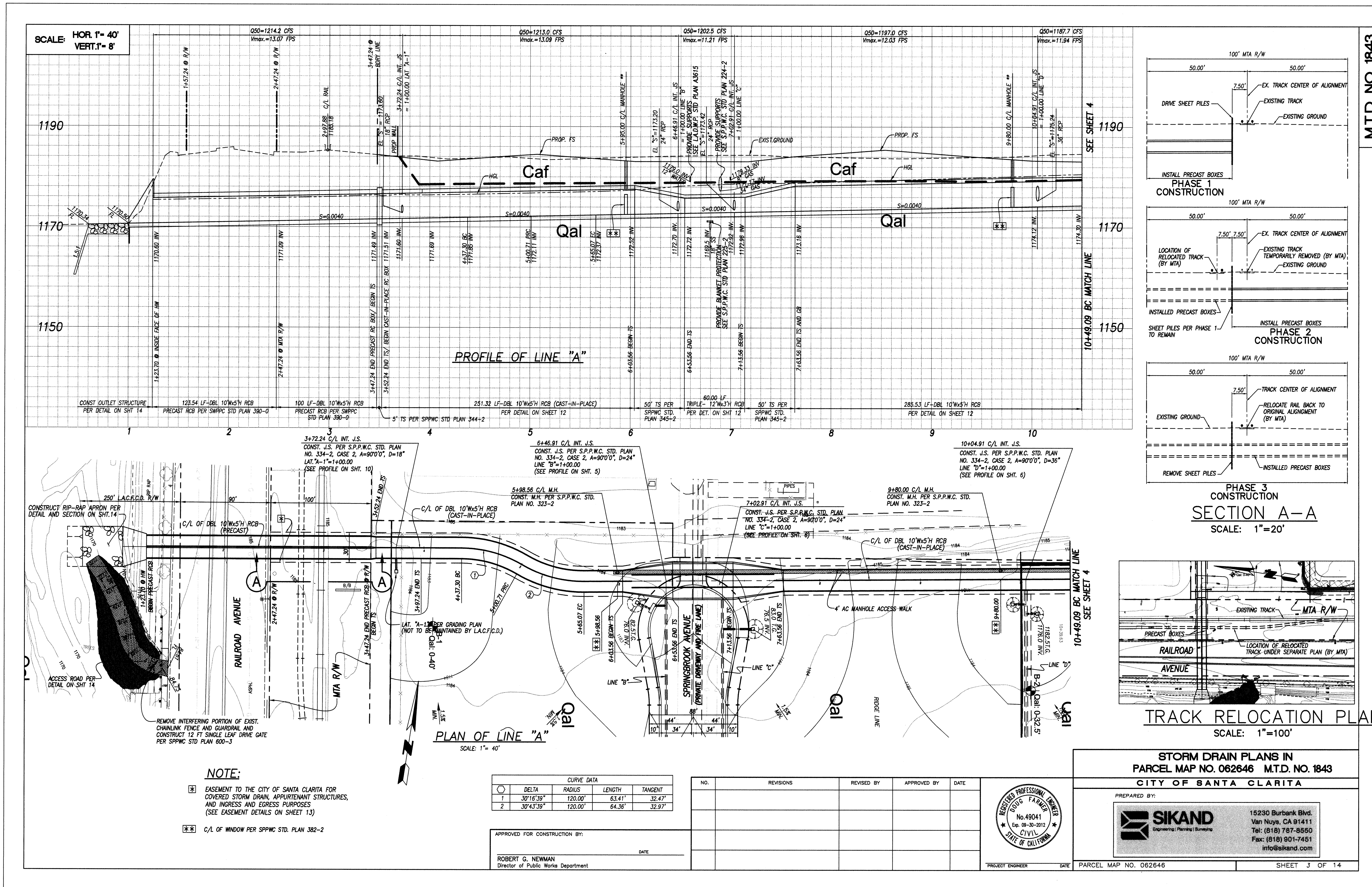
GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED ____

PLATE 1A



EXPLANATION

af	ARTIFICIAL FILL
Qal	ALLUVIUM
Qog	OLDER ALLUVIUM, PRIMARILY SAND AND GRAVEL

APPROXIMATE GEOLOGIC CONTACT

B-6 APPROXIMATE LOCATION OF BORING

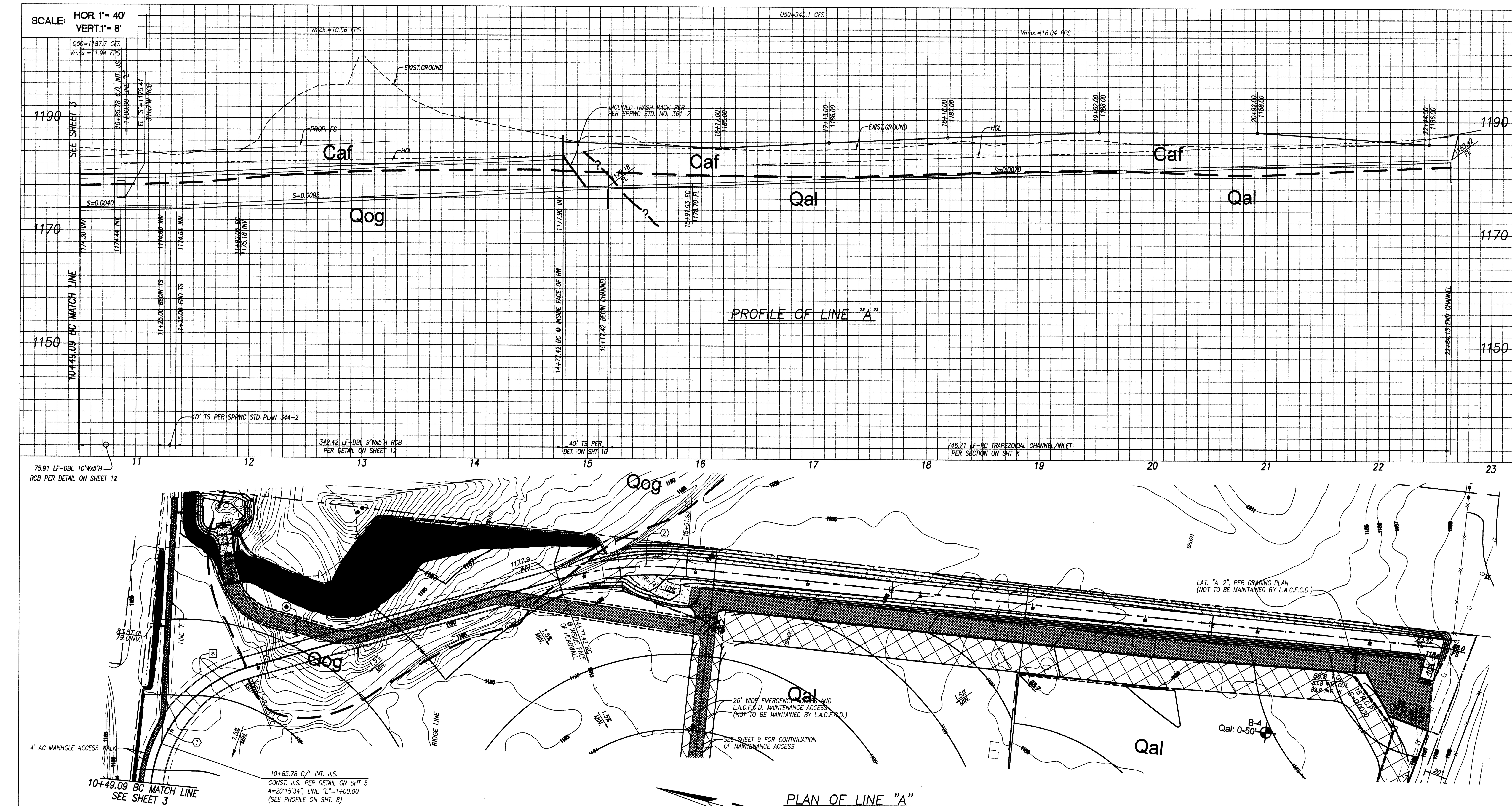
GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED

PLATE 1B



CURVE DATA				
	DELTA	RADIUS	LENGTH	TANGENT
1	68°15'31"	120.00'	142.96'	81.34'
2	21°52'08"	300.00'	114.51'	57.96'

NOTE:

EASEMENT TO THE CITY OF SANTA CLARITA FOR COVERED STORM DRAIN, APPURTENANT STRUCTURES, AND INGRESS AND EGRESS PURPOSES (SEE EASEMENT DETAILS ON SHEET 13)

CONSTRUCT 16 FT DOUBLE DRIVE GATE 8 FT EACH LEAF PER SPPWC STD PLAN 600-3

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No. 49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843
CITY OF SANTA CLARITA

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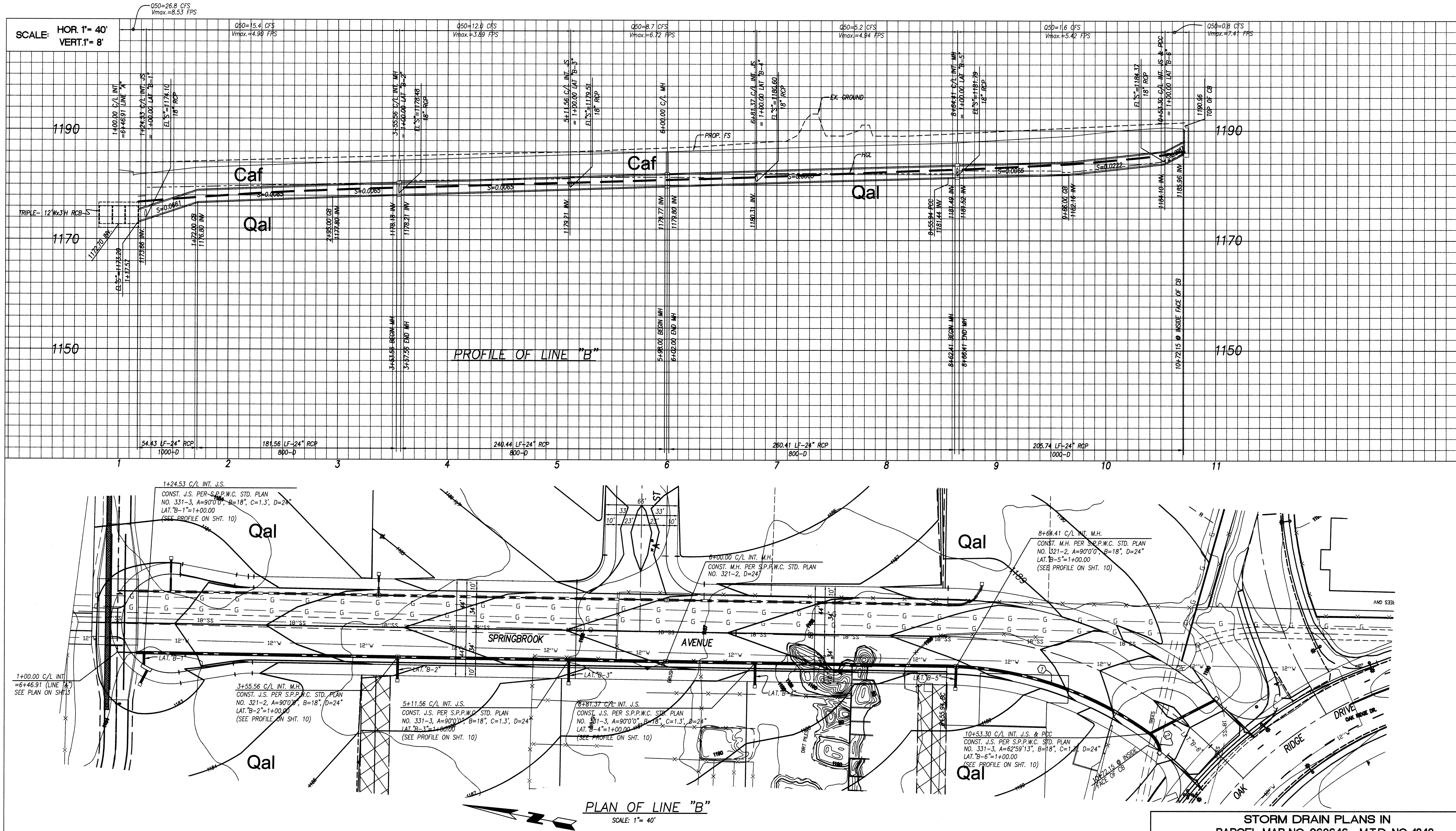
PARCEL MAP NO. 062646 SHEET 4 OF 14

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

SEE PLATE 1B FOR EXPLANATION

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'
REVISED	PLATE 1C	



CURVE DATA				
⬡	DELTA	RADIUS	LENGTH	TANGENT
1	35°00'35"	323.00'	197.36'	101.87'
2	47°59'36"	22.50'	18.85'	10.02'

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

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PARCEL MAP NO. 062646

SHEET 5 OF 14

M.T.D. NO. 1843

GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

SEE PLATE 1B FOR EXPLANATION

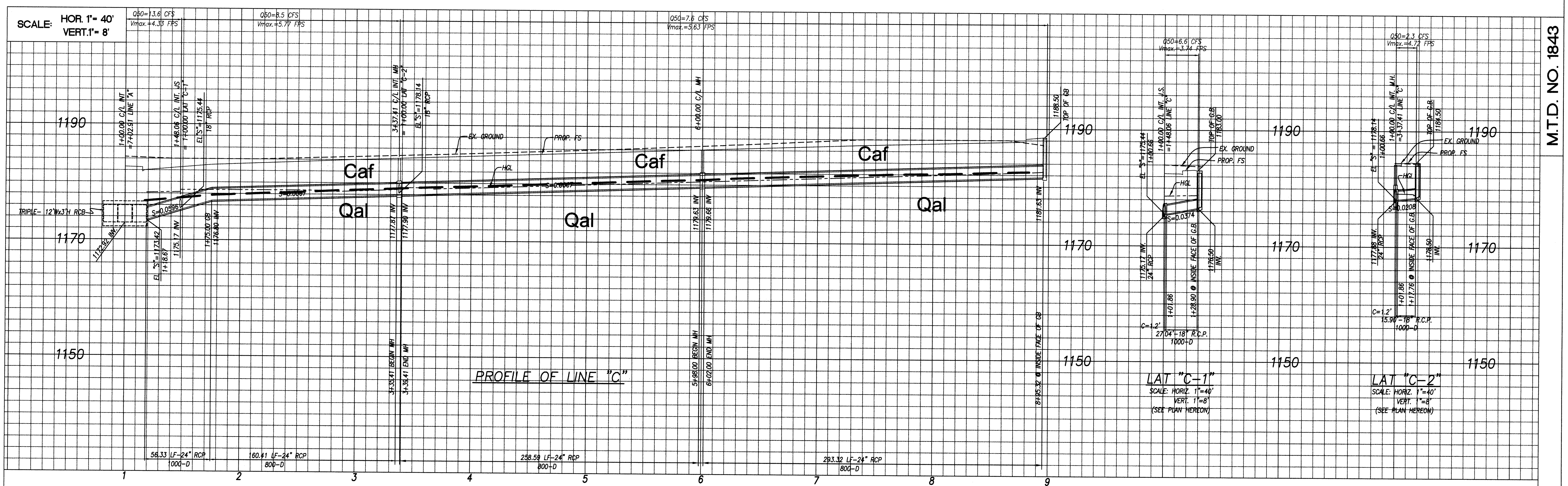
GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

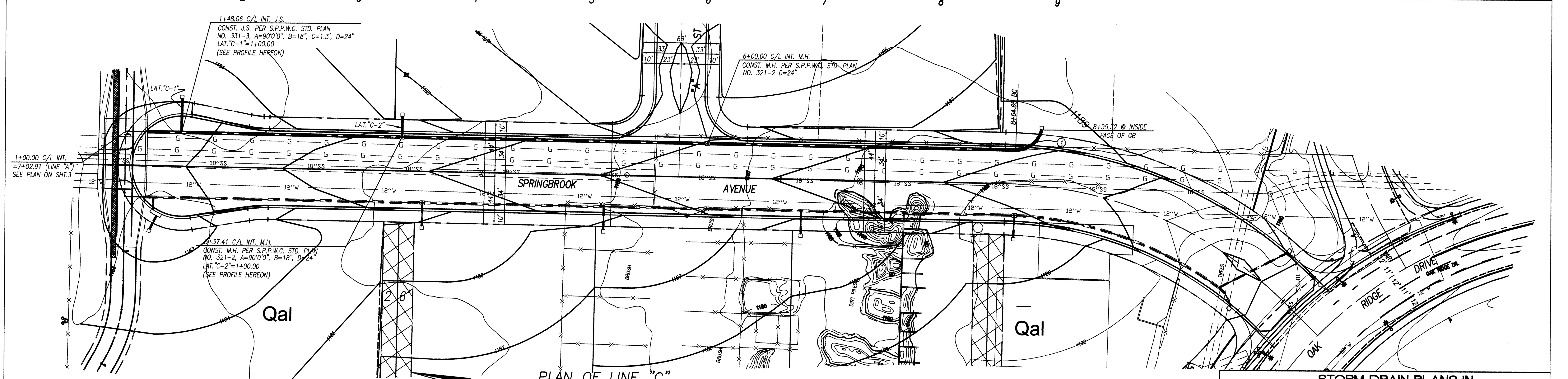
WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED

PLATE 1D

X:\2001 w.o\gsc-cad\6457\Incoming 8-23-11\STORM DRAIN PLANS IN PARCEL MAP NO. 062646 M.T.D. NO. 1843\sd_SM_05.dwg, 9/14/2011 1:03:29 PM, Custom 1: 38 x 30 in.





PLAN OF LINE "C"
SCALE: 1"= 40'

CURVE DATA				
⬡	DELTA	RADIUS	LENGTH	TANGENT
1	77°16'18"	22.50'	30.67'	17.98'

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

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STATE OF CALIFORNIA

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STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

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PARCEL MAP NO. 062646

SHEET 6 OF 14

SEE PLATE 1B FOR EXPLANATION

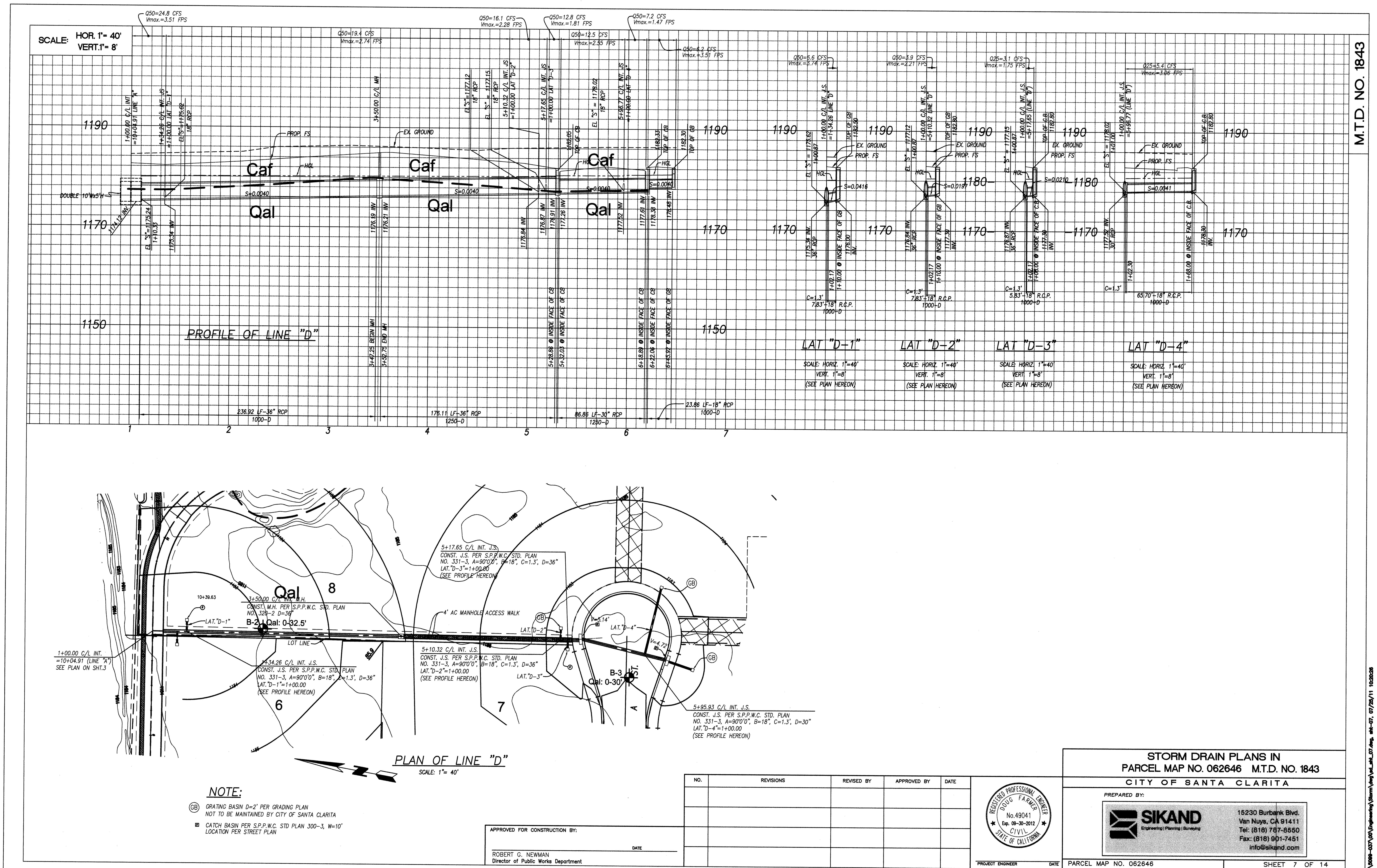
GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED

PLATE 1E

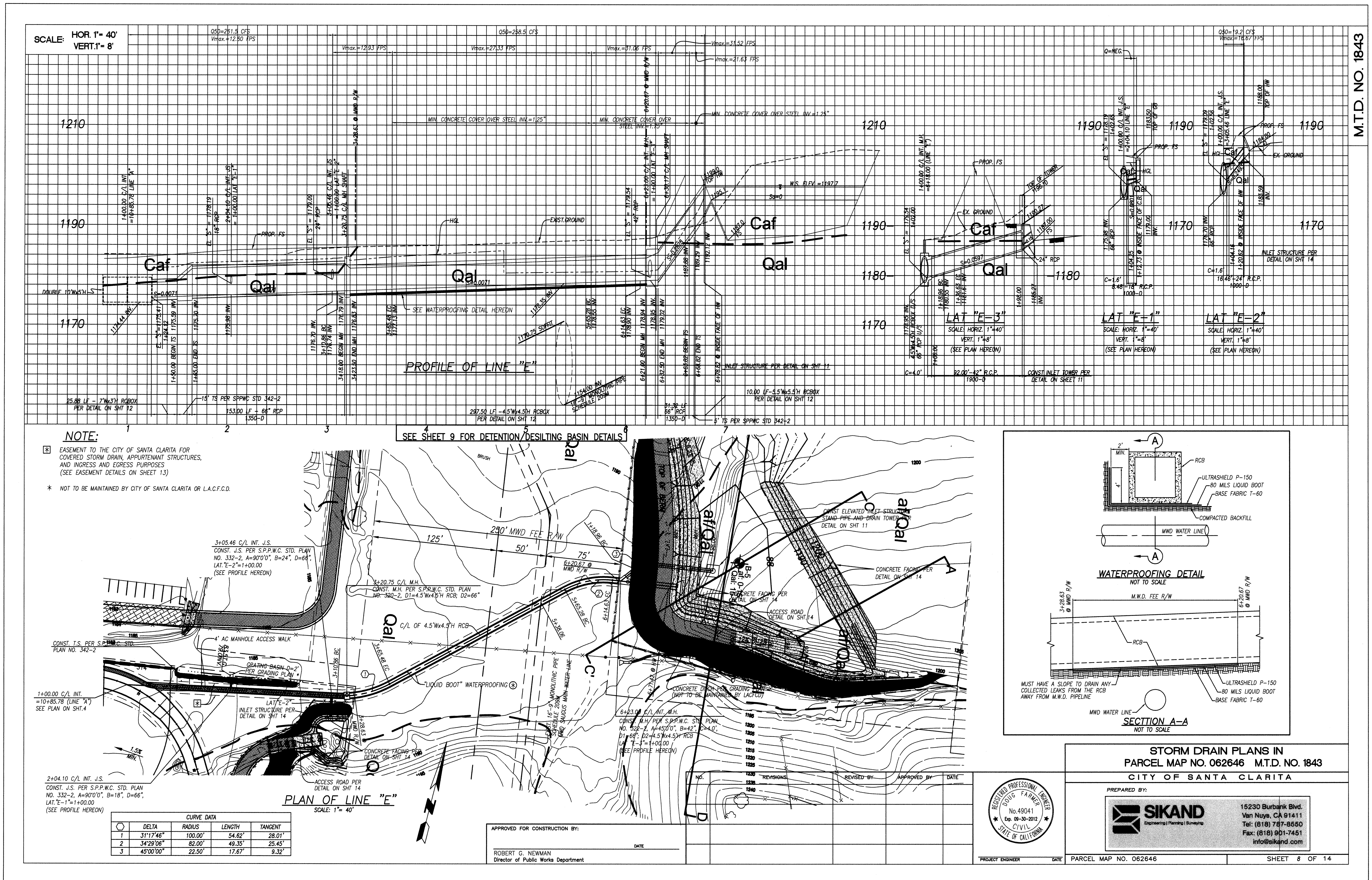


SEE PLATE 1B FOR EXPLANATION

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'
REVISED	PLATE 1F	



SEE PLATE 1B FOR EXPLANATION

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

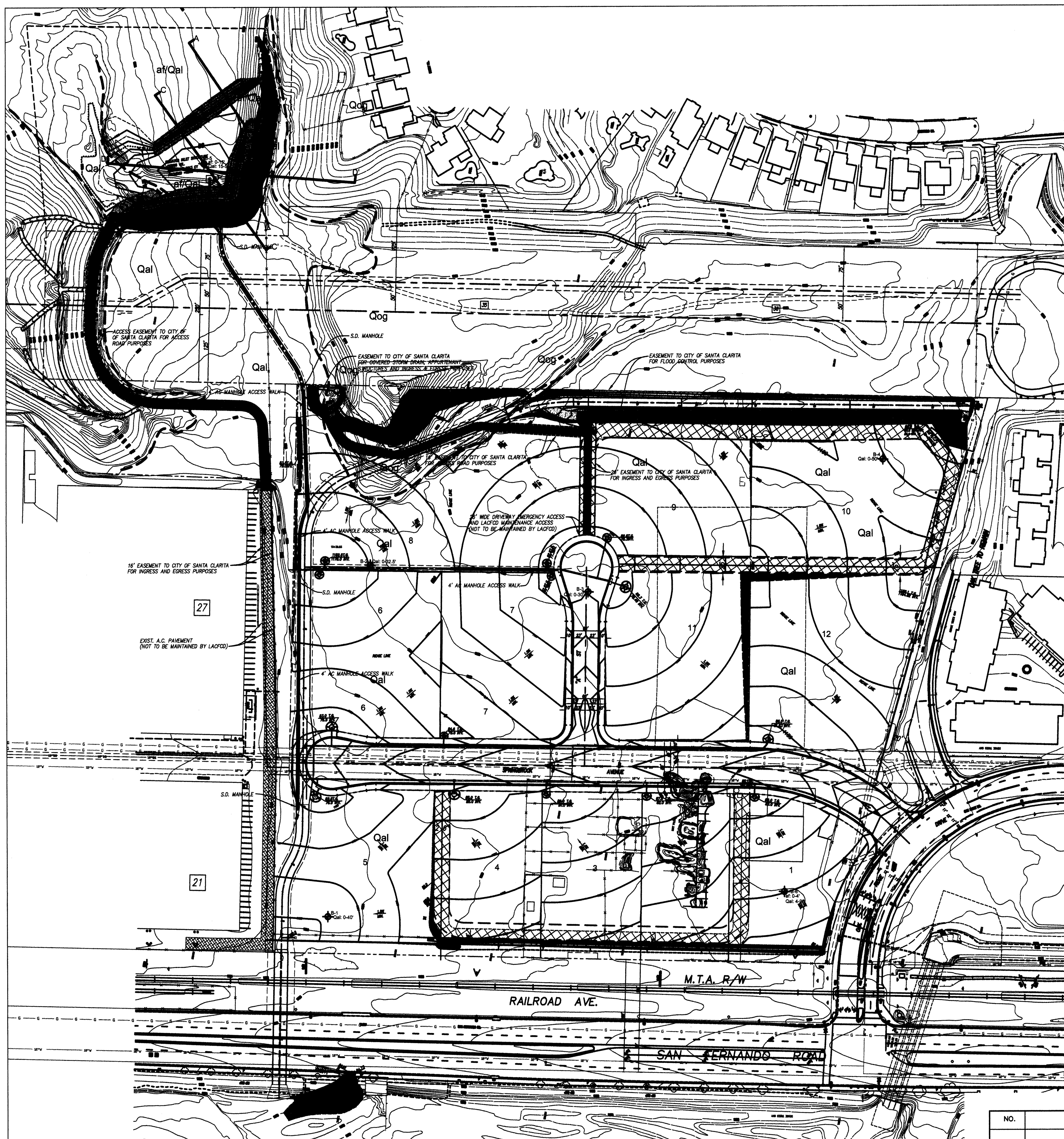
GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

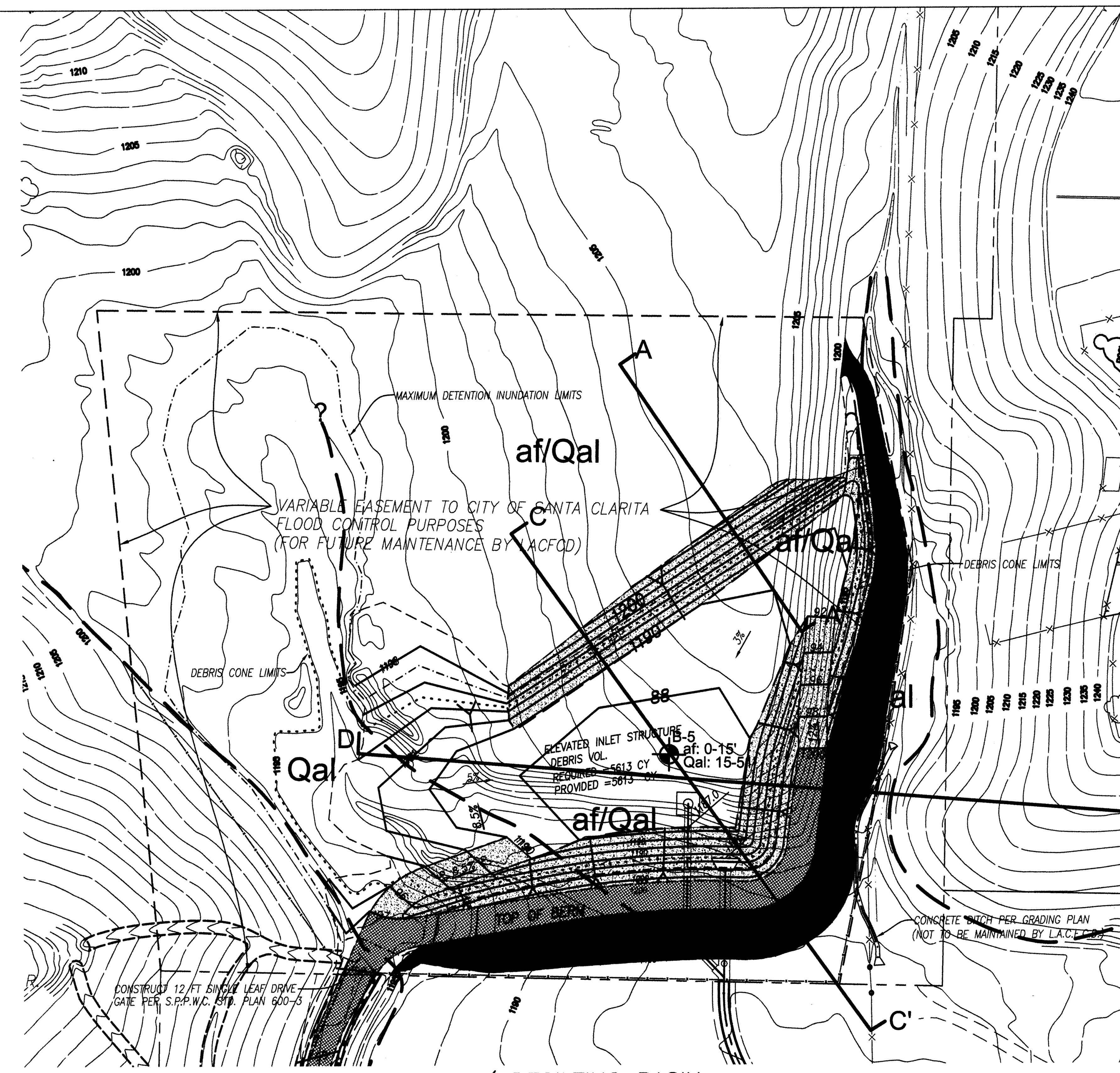
REVISED

PLATE 1G

M.T.D. NO. 1843



ACCESS ROAD OVERVIEW
SCALE: 1"= 100'



DETENTION/ DESILTING BASIN
SCALE: 1"= 40'

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT C. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

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PARCEL MAP NO. 062646 | SHEET 9 OF 14

SEE PLATE 1B FOR EXPLANATION

GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN

REVISED

PLATE 1H

M.T.D. NO. 1843

CURVE DATA				
⬡	DELTA	RADIUS	LENGTH	TANGENT
1	34°29'06"	88.00'	52.97'	27.31'
2	34°29'06"	76.00'	45.74'	23.59'
3	31°17'46"	94.00'	51.34'	26.33'
4	31°17'46"	106.00'	57.90'	29.69'
5	68°15'31"	105.50'	125.69'	71.51'
6	25°25'12"	134.50'	59.67'	30.34'
7	33°24'40"	134.50'	78.43'	40.37'
8	30°16'39"	105.50'	55.75'	28.54'
9	30°16'39"	134.50'	71.08'	36.39'
10	30°43'39"	105.50'	56.58'	28.99'
11	30°43'39"	134.50'	72.13'	36.96'
12	116°40'21"	55.00'	112.00'	89.18'
13	10°28'32"	55.00'	10.06'	5.04'
14	9°24'01"	106.00'	17.39'	8.72'
15	52°49'21"	61.00'	56.24'	30.30'
16	47°24'59"	45.00'	37.24'	19.76'

LINE TABLE		
LINE	BEARING	DISTANCE
D1	N08°38'26"W	46.00'
D2	N65°45'35"E	48.90'
D3	N81°06'03"E	6.01'
D4	N81°06'03"E	6.07'
D5	N46°36'57"E	199.80'
D6	N46°36'57"E	199.80'
D7	N77°54'43"E	188.93'
D8	N77°54'43"E	170.37'
D9	N17°48'25"W	49.05'
D10	N09°11'00"W	407.28'
D11	N71°22'30"E	42.98'
D12	N89°57'26"W	51.01'
D13	N89°56'07"E	24.97'
D14	N70°29'11"E	51.16'
D15	N71°31'50"E	51.10'
D16	N89°17'59"W	50.99'
D17	N39°12'19"W	58.66'
D18	N81°06'18"E	100.00'
D19	N81°06'18"E	100.00'
D20	N81°06'18"E	39.68'
D21	N81°06'18"E	39.77'
D22	N31°05'10"W	285.37'
D23	N31°05'10"W	289.87'
D24	N80°39'18"E	38.17'
D25	N80°39'18"E	38.14'
D26	N80°39'18"E	285.21'
D27	N80°39'18"E	235.99'
D28	N80°39'18"E	39.22'
D29	N09°11'00"W	408.17'
D30	N08°38'11"W	12.00'
D31	N81°20'02"E	60.00'
D32	N08°38'26"W	46.00'
D33	N69°03'14"E	133.40'
D34	N09°13'41"W	402.02'
D35	N74°43'36"E	347.40'
D36	N88°33'06"W	120.53'
D37	N88°50'03"E	101.08'
D38	N08°38'11"W	356.04'
D39	N05°16'41"E	68.02'
D40	N30°38'48"W	27.94'
D41	N77°54'43"E	23.85'
D42	N21°56'13"E	32.66'
D43	N51°47'39"E	28.75'
D44	N71°17'56"E	41.03'
D45	N65°01'08"W	21.49'
D46	N83°55'42"E	20.57'
D47	N00°36'38"E	29.72'
D48	N00°36'38"E	55.63'
D49	N05°44'44"E	47.47'
D50	N47°19'34"E	42.52'
D51	N10°52'17"W	188.00'
D52	N08°58'13"W	382.00'
D53	N31°05'10"W	30.45'
D54	N84°18'16"W	94.13'
D55	N08°41'33"W	68.16'
D56	N08°41'33"W	768.01'

FC EASEMENT TO THE CITY OF SANTA CLARITA FOR FLOOD CONTROL PURPOSES

SD EASEMENT TO THE CITY OF SANTA CLARITA FOR COVERED STORM DRAIN, APPURTENANT STRUCTURES, AND INGRESS AND EGRESS PURPOSES

IE EASEMENT TO THE CITY OF SANTA CLARITA FOR INGRESS AND EGRESS PURPOSES

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2012 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

SIKAND Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

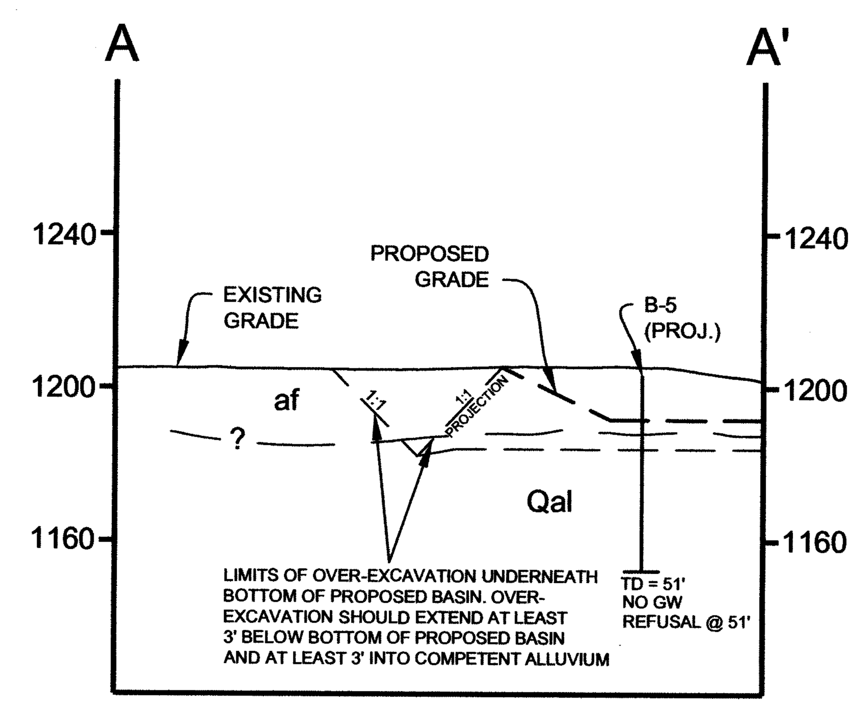
PARCEL MAP NO. 062646 SHEET 13 OF 14

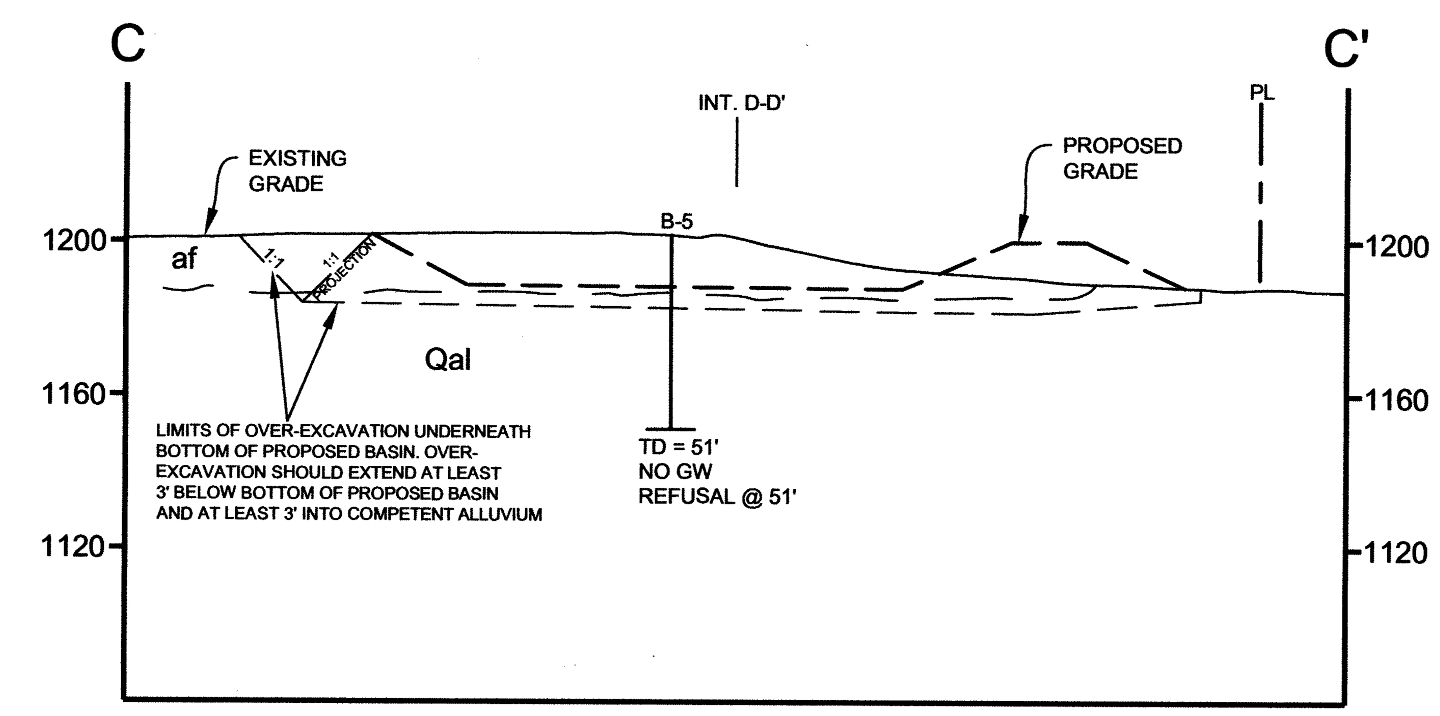
SEE PLATE 1B FOR EXPLANATION

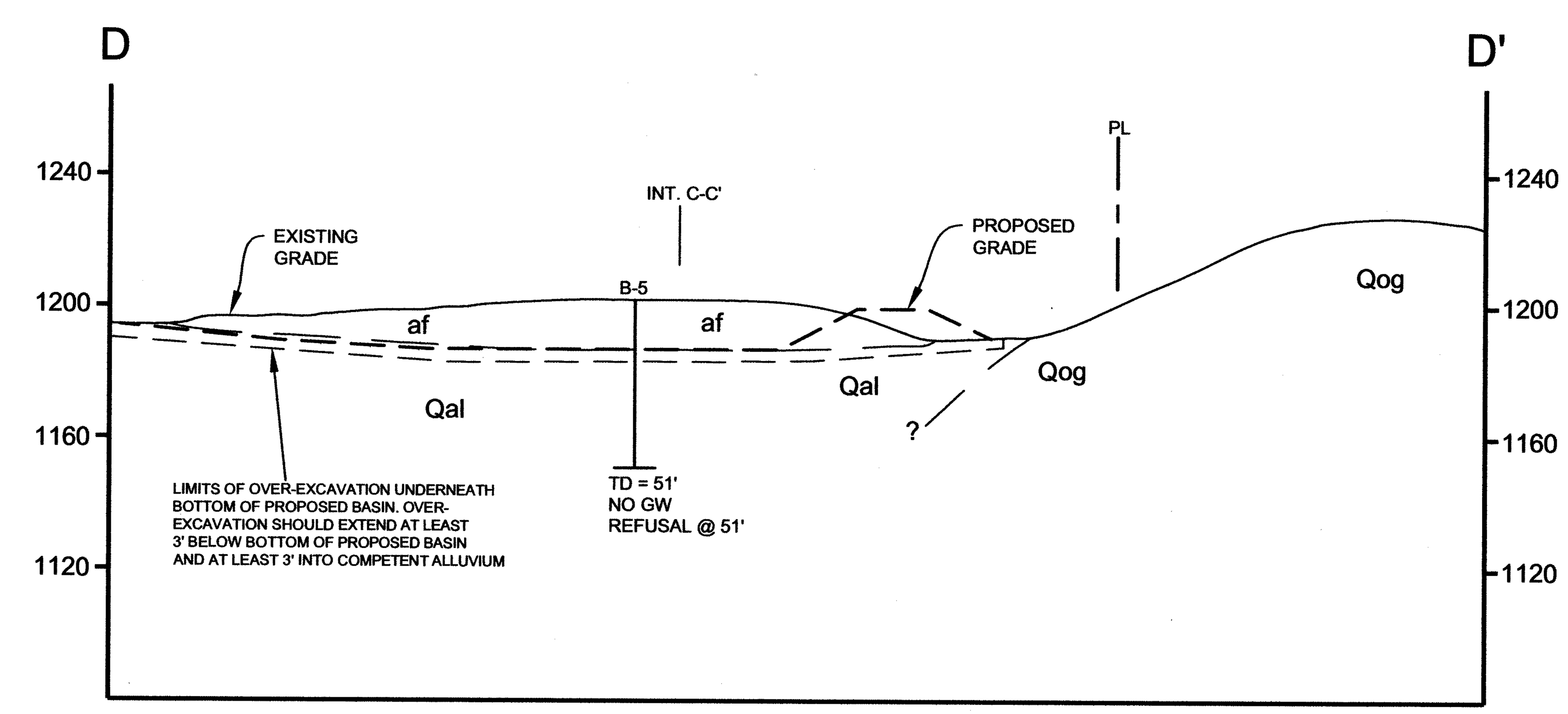
GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'
REVISED	PLATE 1I	







GSC GeoSoils Consultants Inc.
GEOTECHNICAL/GEOLOGIC/ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC CROSS-SECTIONS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED

PLATE 2

September 14, 2011
W.O. 6457

APPENDIX A

FIELD EXPLORATION PROCEDURES

(FROM REFERENCED REPORT)

September 14, 2011
W.O. 6457

APPENDIX A

FIELD EXPLORATION PROCEDURES

Hollow-Stem Auger Soil Borings

Our exploratory borings were drilled with a truck-mounted drill rig operated by an independent drilling company working under subcontract to GSC. A total of six (6) hollow-stem auger borings were drilled in July 2011 (designated B-1through B-6) using eight-inch diameter hollow-stem augers. Samples were obtained via an SPT split spoon sampler and the California ring sampler.

A representative from our firm continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to our laboratory for further visual examination and testing, as deemed necessary. After the boring was completed, the borehole was backfilled with soil cuttings.

The SPT split spoon samples were obtained at approximate 5-foot depth intervals by means of the Standard Penetration Test (SPT) per ASTM: D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "SPT blow count." If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

Appendix A

The California ring samples were obtained at 5-foot depth intervals by means of the latest ASTM standard. The California ring sampling procedure consists of driving a standard 3-inch-diameter steel sampler with eighteen 1-inch wide rings, 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded.

The enclosed *Boring Logs* describes the vertical sequence of soils and materials encountered in each boring, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our log indicates the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our log also graphically indicates the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log.

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-1
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	Bulk Sample		**0-40', ALLUVIUM**			
5	California Ring	4/5	@ 5', Brown, silty CLAY, moist, moderately stiff	16.8	104.7	
10	California Ring	3/5	@ 10', Medium brown, slightly sandy SILT, moist, moderately stiff	21.1	93.3	
15	Bulk Sample; California Ring	5/8	@ 15', Orange-brown, silty, very fine SAND to brown, silty, very fine to medium SAND, most, moderately dense	14.7	102.8	
20	California Ring	10/18	@ 20', Orange-brown, fine to coarse SNAD, slightly moist, dense	4.2	107.9	
25	California Ring	14/27	@ 25', Orange-brown, very fine to fine SAND with gravel, slighlty moist, dense	5.2	112.1	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-1

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
DRILLING COMPANY Choice
TYPE OF DRILL RIG Auto Hammer
DRILLING METHOD Hollow Stem
DIAMETER OF HOLE 8
BORING LOCATION:

DATE STARTED: 7-26-11
LOGGED BY RA
HAMMER WEIGHT (LBS) 140
DROP (IN) 30

W.O. NO. 6457
BORING NO. B-1
SHEET 2 OF 2
GROUND ELEVATION (FT)
GW ELEVATION

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	14/28	@ 30', Medium brown, very fine to coarse SAND with gravel, slighlty moist, dense	5.3	111.6	
35	California Ring	11/7	@ 35', Medium brown, slightly silty, very fine to coarse SAND to brown, sandy SILT (in tip), slightly moist, dense	3.3	103.6	
40	California Ring	18/33	@ 40', Orange-brown, fine to coarse SAND with gravel, slightly moist, dense	6.5	110.3	
			T.D. @ 40' No groundwater			
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE:	GRAIN SIZE ANALYSIS
MAX:	MAXIMUM DRY DENSITY
DS:	DIRECT SHEAR
CONS:	CONSOLIDATION
HYDR:	HYDROMETER ANALYSIS
EXPAN:	EXPANSION INDEX
CHEM:	CHEMICAL TESTS

PLATE A-2

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-2
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-32.5', ALLUVIUM			
	California Ring	4/7	@ 2.5', Brown, sandy SILT, moist, moderately stiff	9.4	105.3	
5						
	California Ring	5/5	@ 7.5', Brown, silty, very fine to fine SAND, moist, moderately dense	6.4	103.6	
10	Bulk Sample (10-15)					
	California Ring	5/9	@ 12.5', Orange-brown, silty, very fineto fine SAND, moist, moderately dense	8.5	102.9	
15						
	California Ring	8/12	@ 17.5', Orange-brown, slightly silty, very fine to fine SAND, moist, dense	16.0	98.5	
20						
	California Ring	7/16	@ 22.5', Orange-brown, sandy SILT, moist, stiff	21.4	93.5	
25						
	California Ring	16/26	@ 27.5', Brown, silty, very fine to fine SAND to brown, very silty, very fine SAND, moist, dense	14.9	102.2	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-3

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC — W.O. NO. 6457
DRILLING COMPANY Choice — DATE STARTED: 7-26-11 — BORING NO. B-2
TYPE OF DRILL RIG Auto Hammer — LOGGED BY RA — SHEET 2 OF 2
DRILLING METHOD Hollow Stem — HAMMER WEIGHT (LBS) 140 — GROUND ELEVATION (FT)
DIAMETER OF HOLE 8 — DROP (IN) 30 — GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	15/29	@ 32.5', Brown, slightly silty, very fine to fine SAND to brown, very silty, very fine SAND, moist, dense	5.0	105.5	
35			T.D. @ 32.5' No groundwater			
40						
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-4

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-3
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
0	Bulk Sample		**0-30', ALLUVIUM**			
5	California Ring	5/5	@ 5', Light brown, very silty, very fine to fine SAND, dry, moderately dense to brown, slighlty clayey SILT	10.5	104.4	
10	California Ring	5/5	@ 10', Medium brown, sandy SILT, slightly moist, moderately stiff	4.5	101.6	
15	California Ring	5/8	@ 15', Brown, sandy SILT, moist, moderately stiff	13.9	104.9	
20	California Ring	8/17	@ 20', Medium brown, slightly silty, very fine to fine SAND, slightly moist, dense	6.3	105.2	
25	California Ring	17/23	@ 25', Medium brown, very fine to fine SAND, slightly moist, dense	5.7	108.0	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-5

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC | W.O. NO. 6457
DRILLING COMPANY Choice | DATE STARTED: 7-26-11 | BORING NO. B-3
TYPE OF DRILL RIG Auto Hammer | LOGGED BY RA | SHEET 2 OF 2
DRILLING METHOD Hollow Stem | HAMMER WEIGHT (LBS) 140 | GROUND ELEVATION (FT)
DIAMETER OF HOLE 8 | DROP (IN) 30 | GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	17/29	@ 30', Medium brown, very fine to coarse SAND with gravel, slightly moist, dense	6.4	109.0	
			T.D. @ 30' No groundwater			
35						
40						
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-6

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-4
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-50', ALLUVIUM			
	California Ring	5/9	@ 2.5', Medium brown, silty, very fine to fine SAND, slighty moist, moderately dense	4.6	103.5	
5	California Ring	5/7	@ 5', Brown, clayey SILT, moist, moderately stiff	7.5	97.4	
	California Ring	4/8	@ 7.5-12.5', Brown, slighlty sandy SILT, moist, moderately stiff	10.6	99.8	
10	California Ring	5/8		11.5	94.5	
	California Ring	6/12		22.5	98.7	
15	California Ring	6/9	@ 15', Brown, silty CLAY, very moist, moderately stiff	17.4	90.3	
	California Ring	8/13	@ 17.5', Orange-brown, sandy SILT, moist, stiff	12.9	97.7	
20	Bulk Sample; California Ring	8/11	@ 20', Brown, silty CLAY, very moist, moderately stiff	17.6	95.9	
	Bulk Sample; Standard Penetration Test	2/2/3	@ 22.5', Brown, sandy SILT, moist, moderately stiff	14.5	-----	
25	California Ring	8/13	@ 25-27.5', Brown, clayey SILT, moist, moderately stiff	17.1	107.3	
	Standard Penetration Test	2/3/3		15.1	-----	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-7

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-4
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 2 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	9/17	@ 30', Brown, clayey SILT to orange-brown, silty, very fine to fine SAND, moist, stiff	9.8	115.9	
	Standard Penetration Test	2/3/5	@ 32.5', Orange-brown, slightly sandy SILT, moist, stiff	12.2	-----	
35	California Ring	12/13	@ 35', Medium brown, silty, very fine SAND, moist, dense	7.0	93.2	
	Standard Penetration Test	4/5/8	@ 37.5', Brown, silty CLAY to clayey SILT, moist, stiff	36.8	-----	
40	California Ring	9/19	@ 40', Brown, clayey SILT, moist, stiff	16.7	104.1	
	Standard Penetration Test	7/9/15	@ 42.5-45', Brown, sandy SILT with clay, moist, stiff	13.6	-----	
45	California Ring	9/17		10.9	102.0	
	Standard Penetration Test	8/11/14	@ 47.5-50', Brown, clayey SILT, moist, stiff	24.2	-----	
50	California Ring	9/22	T.D. @ 50' No groundwater	25.6	106.3	
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-8

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC		W.O. NO. 6457
DRILLING COMPANY Choice	DATE STARTED: 7-27-11	BORING NO. B-5
TYPE OF DRILL RIG Auto Hammer	LOGGED BY RA	SHEET 1 OF 2
DRILLING METHOD Hollow Stem	HAMMER WEIGHT (LBS) 140	GROUND ELEVATION (FT)
DIAMETER OF HOLE 8	DROP (IN) 30	GW ELEVATION
BORING LOCATION:		

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-15', FILL			
5	Bulk Sample, California Ring	10/14	@ 5', Orange-brown, slightly sandy, clayey SILT, moist, stiff	23.0	106.3	
10	California Ring	11/16	@ 10', Orange-brown to dark brown, sity, very fine to medium SAND with gravel, moist, dense	10.0	119.9	
	Bulk Sample, California Ring	12/12	@ 12.5', Dark gray-black, silty, very fine to medium SAND with gravel (strong petroleum odor), moist, dense	12.0	121.9	
15	California Ring	11/11	**15-51', ALLUVIUM (Qal)** @ 15', Brown, silty, very fine to fine SAND, moist, dense	8.7	126.1	
	California Ring	6/7	@ 17.5', Brown, sandy, silty CLAY, moist, stiff	7.4	116.0	
20	Bulk Sample, California Ring	6/13	@ 20-25', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	5.8	119.2	
	Bulk Sample, California Ring	9/13		5.9	118.0	
25	Standard Penetration Test	3/3/3		6.4	-----	
	California Ring	9/14	@ 27.5', Orange-brown, silty, very fine to medium SAND with gravel, moist, dense	6.6	113.5	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE:	GRAIN SIZE ANALYSIS
MAX:	MAXIMUM DRY DENSITY
DS:	DIRECT SHEAR
CONS:	CONSOLIDATION
HYDR:	HYDROMETER ANALYSIS
EXPAN:	EXPANSION INDEX
CHEM:	CHEMICAL TESTS

PLATE A-9

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME: TMC
W.O. NO.: 6457
DRILLING COMPANY: Choice
DATE STARTED: 7-27-11
BORING NO.: B-5
TYPE OF DRILL RIG: Auto Hammer
LOGGED BY: RA
SHEET 2 OF 2
DRILLING METHOD: Hollow Stem
HAMMER WEIGHT (LBS): 140
GROUND ELEVATION (FT):
DIAMETER OF HOLE: 8
DROP (IN): 30
GW ELEVATION:
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	Standard Penetration Test	2/3/3	@ 30', Orange-brown, silty, very fine to fine SAND, moist, dense	9.1	-----	
	California Ring	7/13	@ 32.5', Brown, silty, very fine to coarse SAND, moist, dense	7.2	124.5	
35	Standard Penetration Test	3/4/5	@ 35-42.5', Brown, silty, very fine to coarse SAND with gravel, moist, dense	7.6	-----	
	California Ring	18/33		7.9	128.5	
40	Standard Penetration Test	9/10/11		6.0	-----	
	California Ring	18/40		7.0	126.2	
45	Standard Penetration Test	7/10/10	@ 45', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	5.8	-----	
	California Ring	19/34	@ 47.5-51', Brown, silty, very fine to coarse SAND with gravel, moist, dense	7.4	126.3	
50	Standard Penetration Test	10/9/9		10.1	-----	
			T.D. @ 51' No groundwater Refusal @ 51'			
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-10

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-27-11
BORING NO. B-6
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 1
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-2.5', AC @ 0-4', orange-brown, gravelly, very fine to coarse SAND (fill)			
			2.5-4', FILL			
			4-20', ALLUVIUM			
5	California Ring	4/5	@ 5', Brown, slightly sandy, silty CLAY, moist, medium stiff	4.9	100.7	
10	California Ring	7/9	@ 10', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	6.8	110.1	
15	California Ring	7/9	@ 15', Orange-brown, silty, very fine to fine SAND to sandy SILT, moist, dense	4.6	102.7	
20	California Ring	6/10	@ 20', Orange-brown, silty, very fine to fine SAND, moist, dense	8.3	99.0	
			T.D. @ 20' No groundwater			
25						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-11

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APPENDIX B

LABORATORY TEST PROCEDURES AND RESULTS

APPENDIX B

LABORATORY TESTING PROCEDURES AND RESULTS

Moisture-Density

The field moisture content and dry unit weights were determined for each undisturbed ring sample obtained from our subsurface exploration. Once the dry unit weights had been determined, in-place densities of underlying soil profile were estimated. In those cases where ring samples were obtained, the moisture content and dry unit weights of selected samples are presented on the enclosed *Boring Logs* (Plates A-1 through A-11).

Consolidation Tests

Six (6) consolidation tests were performed on selected ring samples. The samples were inundated at an approximate load of one ton per square foot to monitor the hydroconsolidation. Loads were applied to the samples in several increments in geometric progression and resulting deformations were recorded at selected time intervals. Results of the consolidation tests are presented on Plates C-1 through C-6.

Direct Shear Tests

Two shear test were performed in a strain-control type Direct Shear Machine. The samples were sheared under varying confining loads in order to determine the Coulomb shear strength parameters: cohesion (c), and angle of internal friction (ϕ) for peak and residual strength conditions. Samples that were tested in order to obtain shear strengths for compacted fill parameters were remodeled to 90 percent of maximum. All samples were tested in an artificially-saturated condition. The results are plotted and a linear approximation is drawn of the failure curve. Results are shown on the Shear Test Diagram included with this appendix, as Plates SH-1 and SH-2.

Appendix B

Compaction Tests

Compaction tests were performed to determine to moisture density relationships of the typical soils encountered on the site. The laboratory standard used was in accordance with ASTM Test Designation D-1557-09. A summary of the compaction test results is shown in the following Table:

COMPACTION TEST RESULTS				
Boring No. and Sample Depth	Description	Maximum Dry Density (psf)	Optimum Moisture (%)	Expansion Index
B-3 @ 0-5'	Orange-brown, silty, very fine to fine SAND	123.5	11.5	Low

Read
W.O.: 6096

Date of Test: 1/08

Sample: **B-1 @ 0 - 5.0'**

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PLATE SH-1

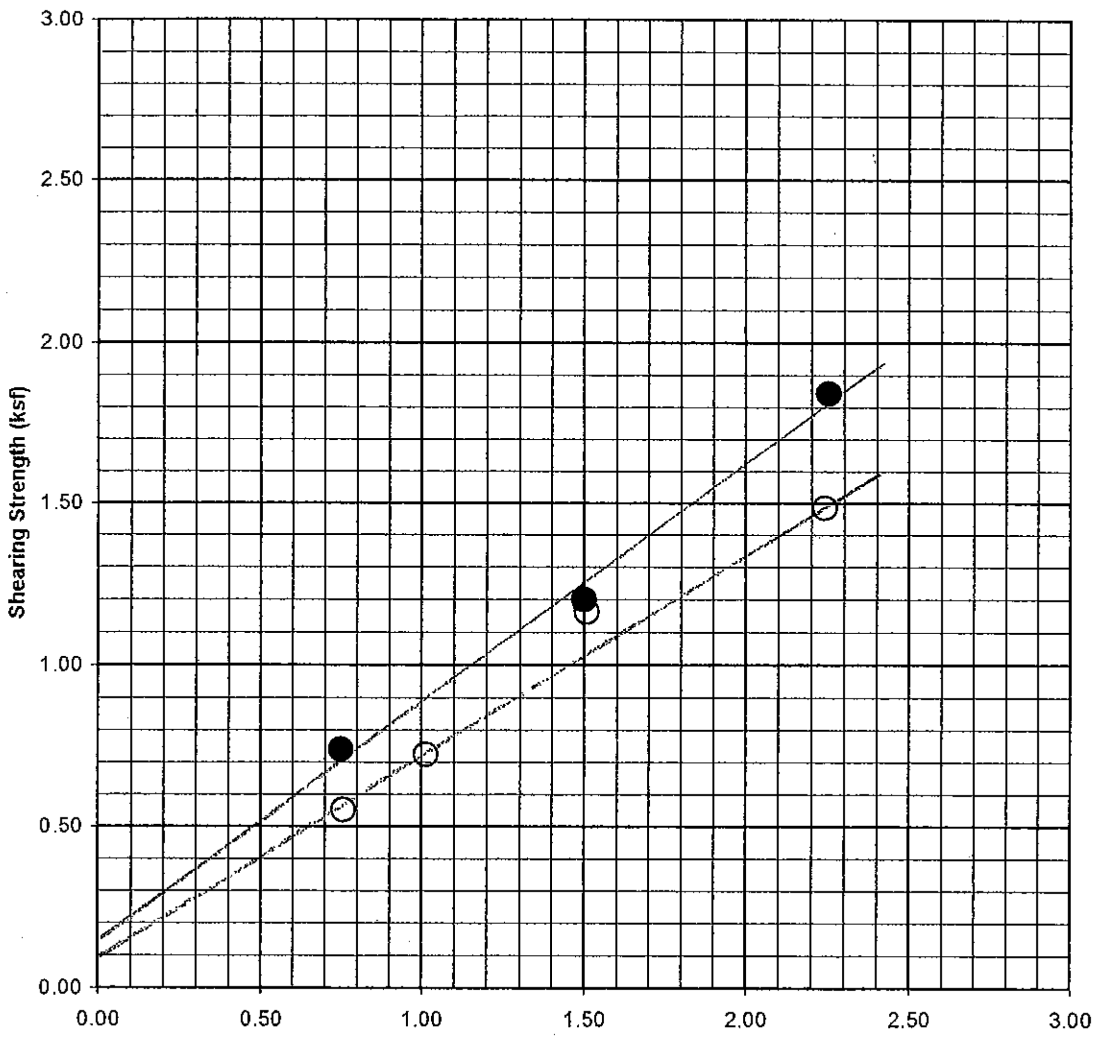
Shear Test Diagram

Peak

C(psf): **160** Phi (degrees): **36.0**

Reshear

C(psf): **100** Phi (degrees): **31.5**



Direct Shear, Peak / Reshear Speed: .005 in./min.

● Peak Values ○ Reshear Values

Sample **Remolded** to 90% Relative Density, saturated.
Remolded Dry Density = 97.1 PCF

Orange-brown, silty, fine SAND.

MAX: 105.5 PCF: 16.0%

15.7% Saturated Moisture Content
6457.2

TMC
W.O.: 6457

GeoSoils Consultants, Inc.

PLATE SH-2

Date of Test: 8/11

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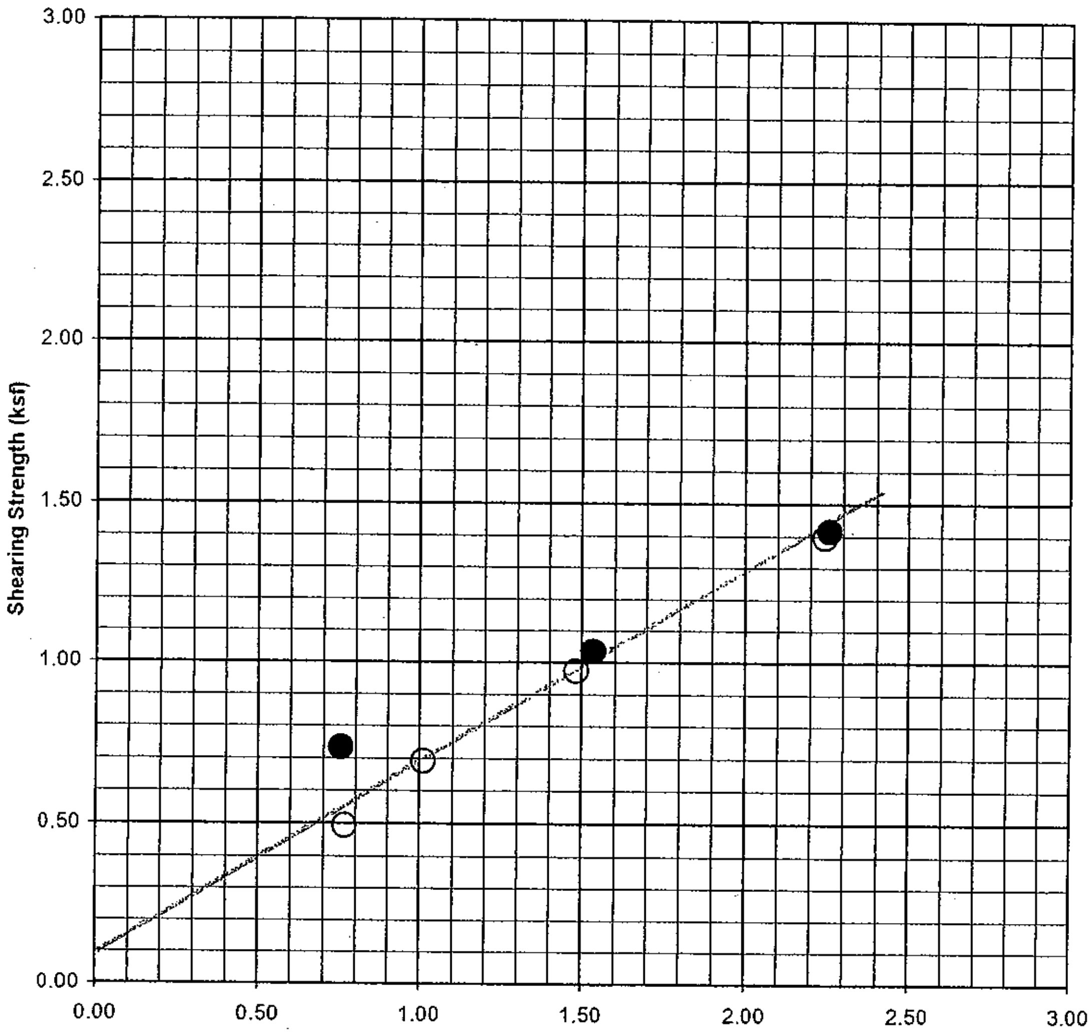
Sample: **B-1 @ 10.0'**

Shear Test Diagram
Peak
C(psf): 100 Phi (degrees): 30.0

Reshear
C(psf): 100 Phi (degrees): 30.0



Direct Shear, Peak / Reshear Speed: .001 in./min.

● Peak Values ○ Reshear Values

Undisturbed **Natural** Shear-Saturated

Brown, silty CLAY.

21.9% Saturated Moisture Content

TMC
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Date of Test: 8/11

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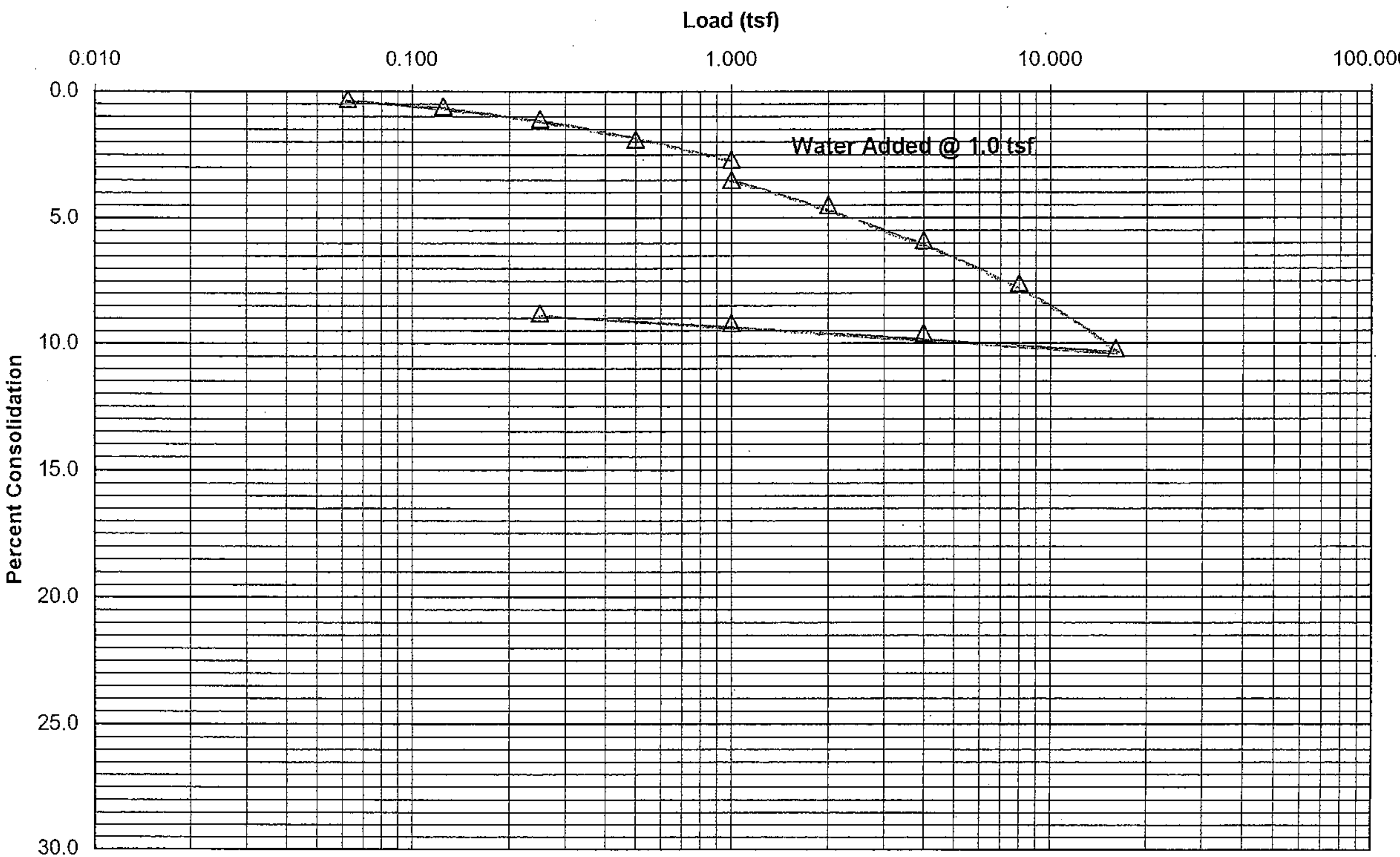
Moisture(%)
Before: 4.2 After: 18.5

Sample(in.)
Height: 1.00 Diameter: 2.36



B-1 @ 20.0'
Orange-brown, very fine to coarse SAND.

Consolidation Diagram

C6457.1

Plate C-1

TMC
W.O.: 6457

Date of Test: 8/11

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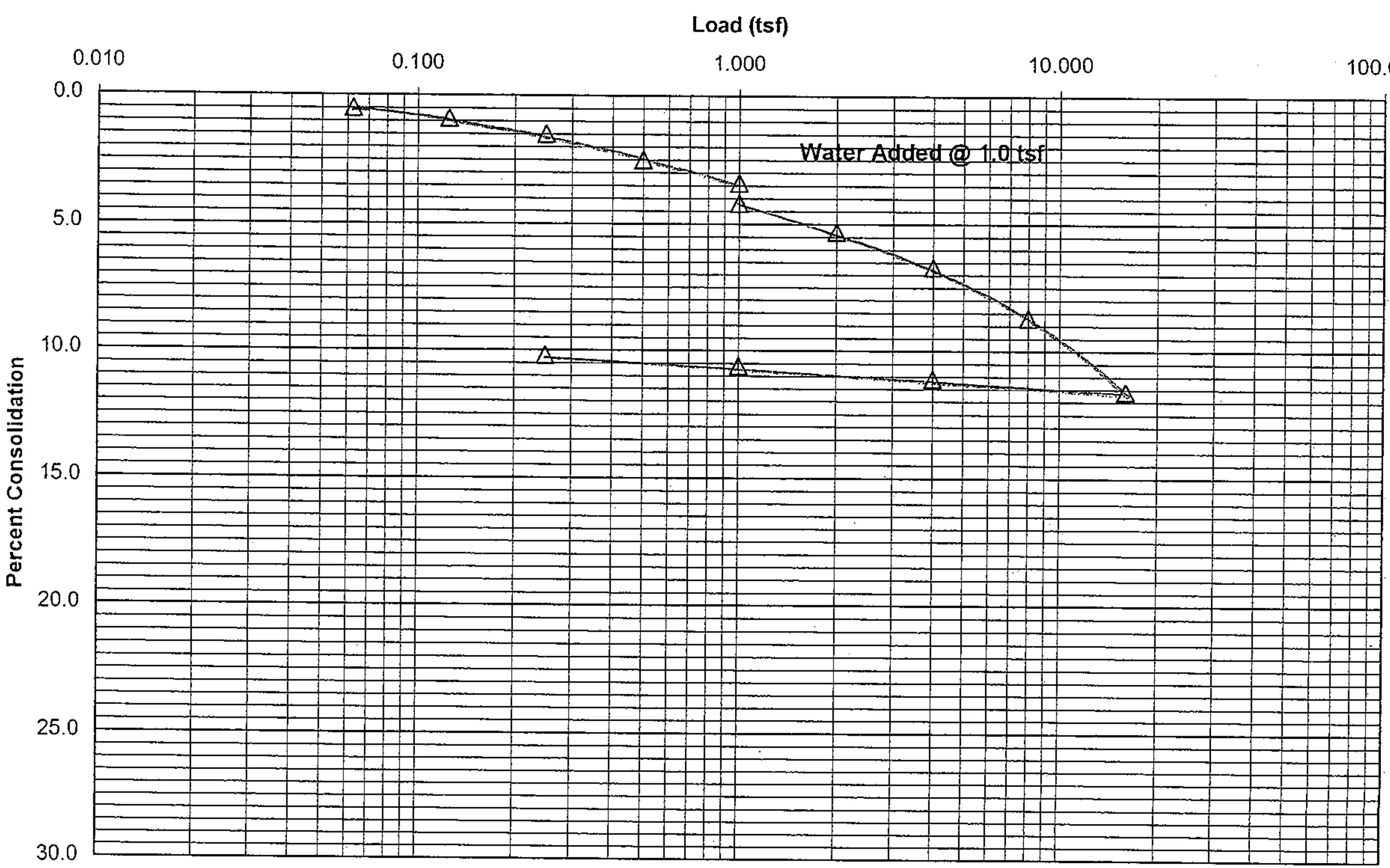
Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 3.3 After: 15.2

Sample(in.)
Height: 1.00 Diameter: 2.36



B-1 @ 35.0'
Medium-brown, fine to coarse SAND w/ gravel.

Consolidation Diagram

C6457.2

Plate C-2

TMC
W.O.: 6457

Date of Test: 8/11

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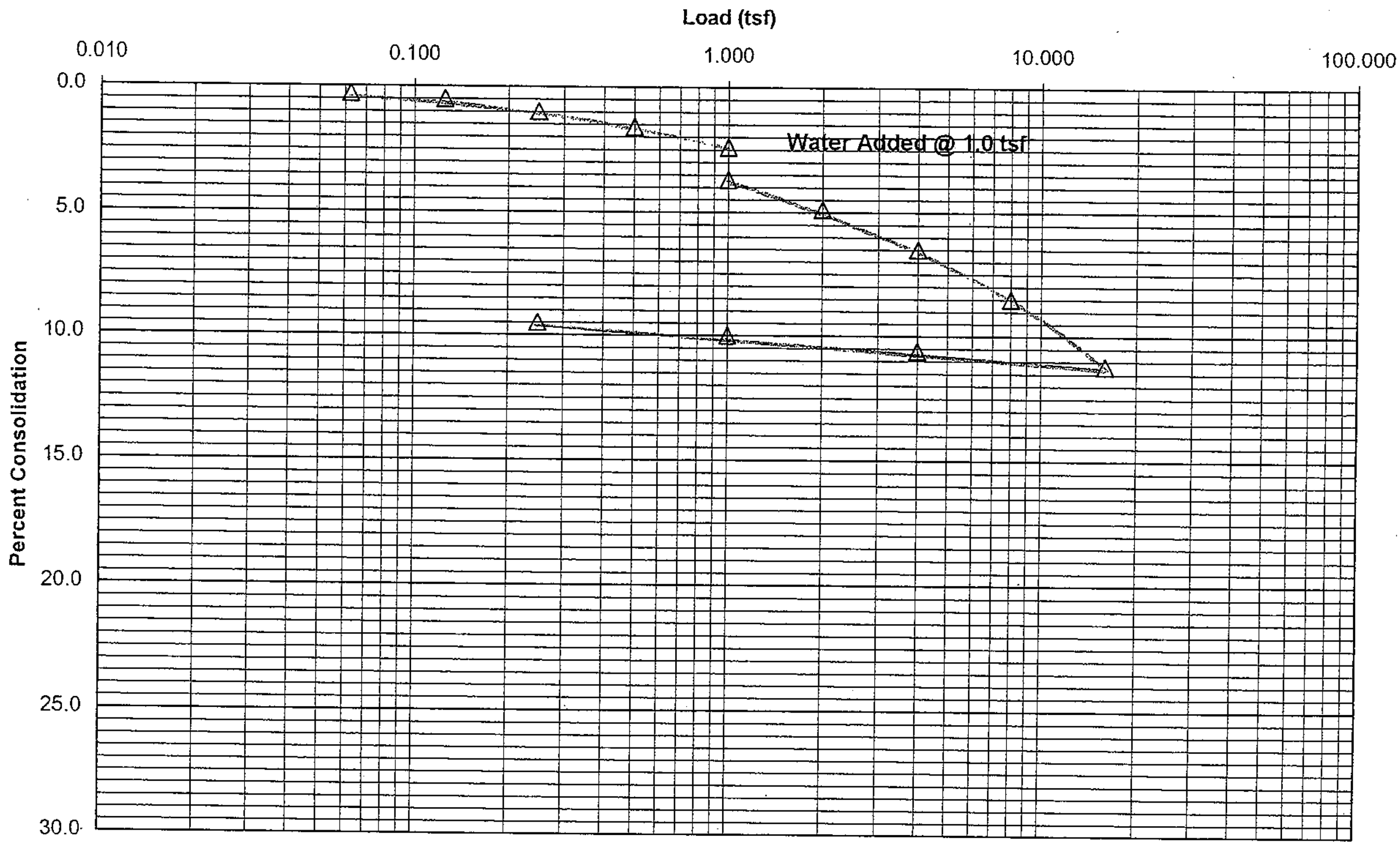
Moisture(%)
Before: 6.4 After: 16.8

Sample(in.)
Height: 1.00 Diameter: 2.36



B-2 @ 7.5'
Orange-brown, silty, very fine to fine SAND w/ some coarse sand.

Consolidation Diagram

C6457.3

Plate C-3

TMC
W.O.: 6457

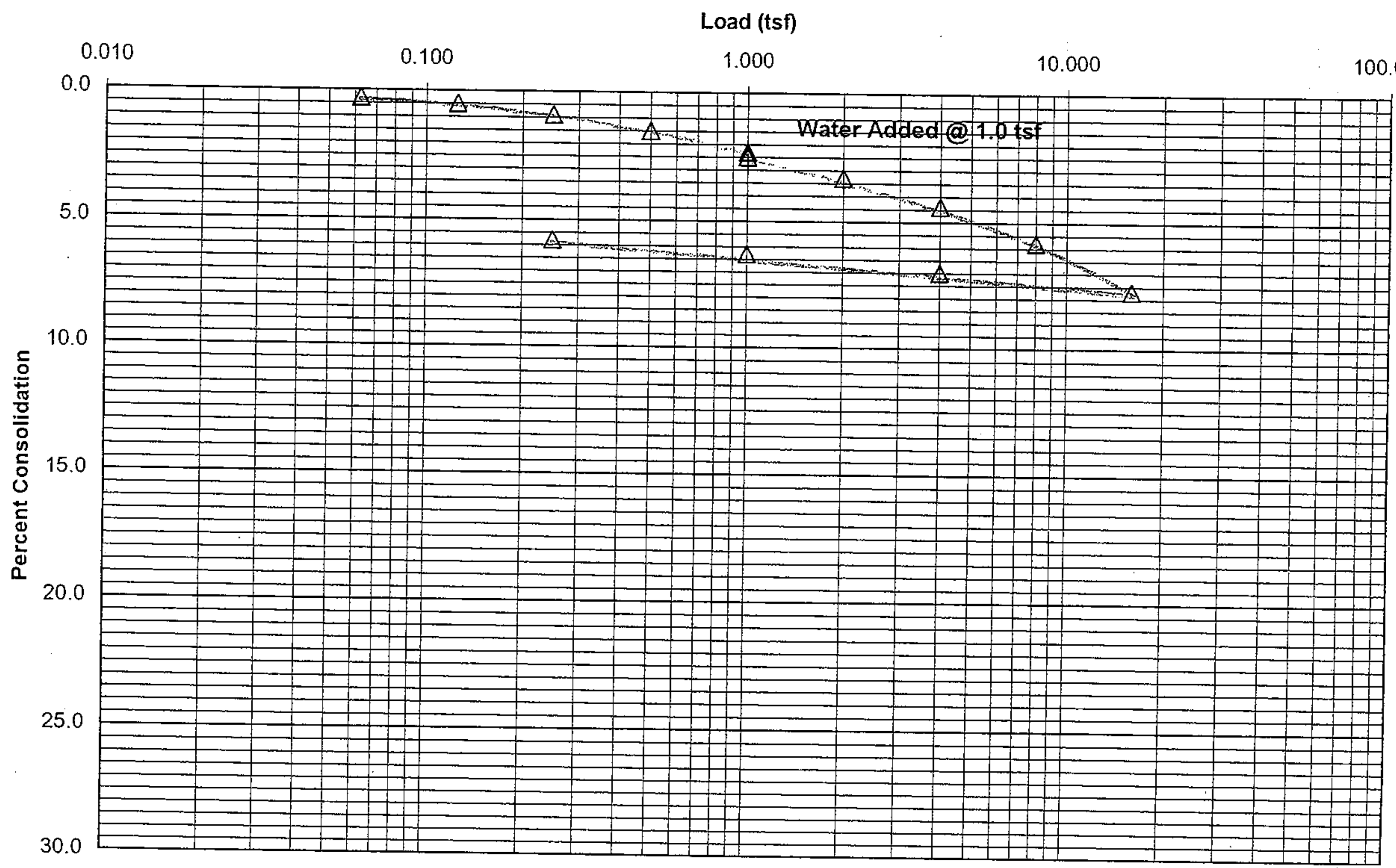
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 16.0 After: 18.2

Sample(in.)
Height: 1.00 Diameter: 2.36



B-2 @ 17.5'
Brown, very silty, very fine to fine SAND w/ sandy silt.

Consolidation Diagram

C6457.4

Plate C-4

TMC
W.O.: 6457

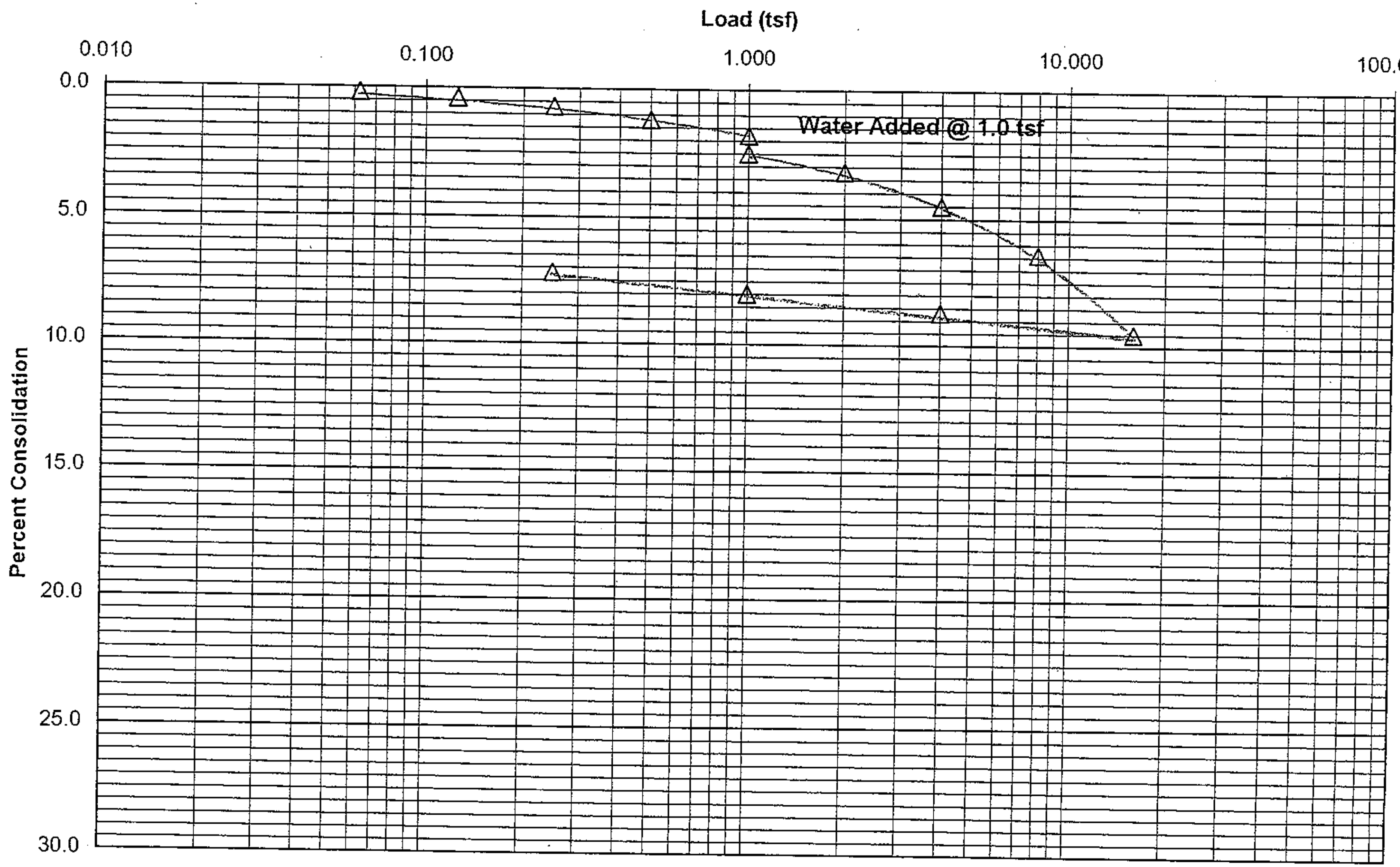
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 4.5 After: 17.9

Sample(in.)
Height: 1.00 Diameter: 2.36



B-3 @ 10.0'
Brown, sandy SILT, w/ silty very fine sand and clayey silt.

Consolidation Diagram

C6457.5

Plate C-5

TMC
W.O.: 6457

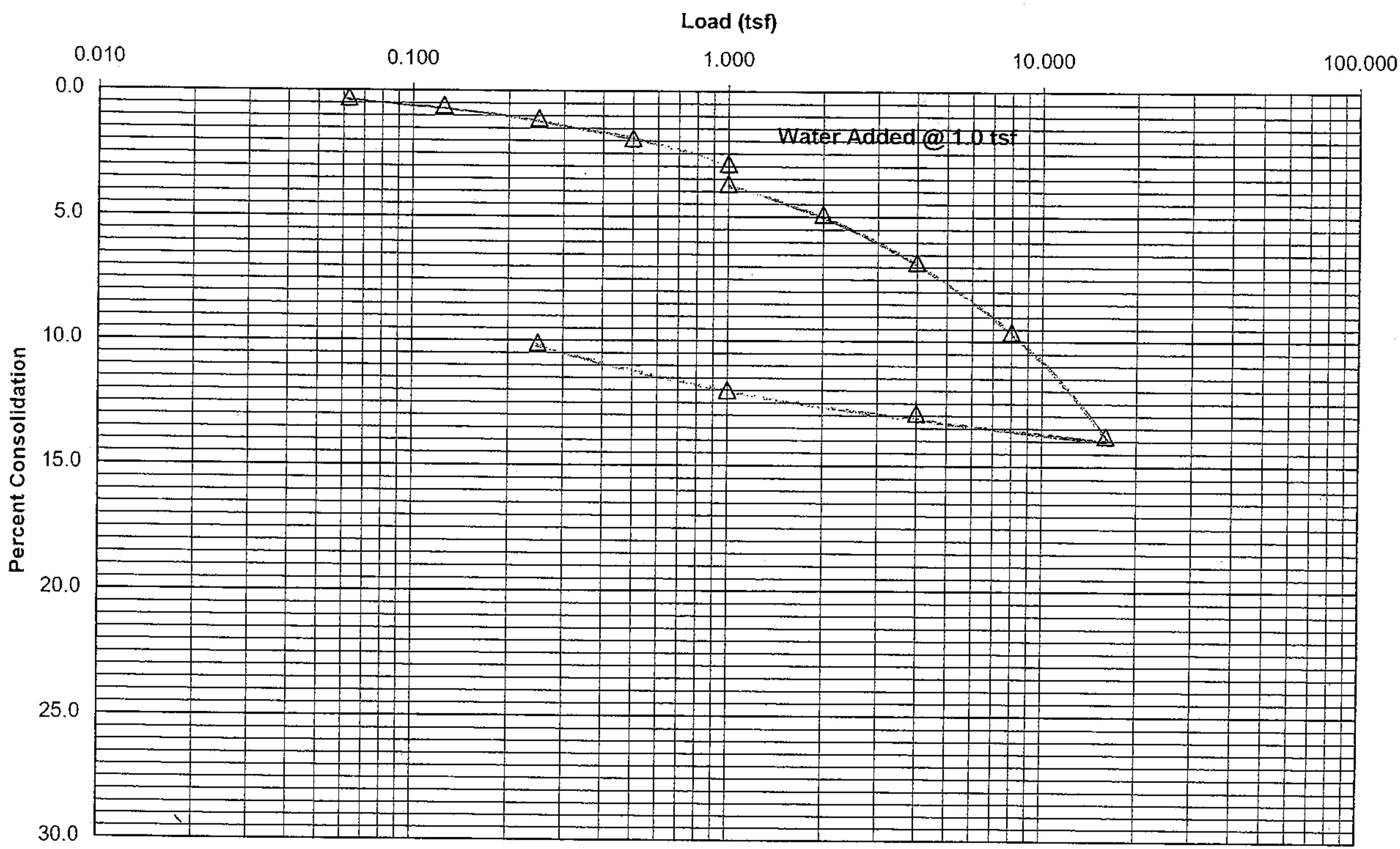
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 4.9 After: 26.0

Sample(in.)
Height: 1.00 Diameter: 2.36



B-6 @ 5.0'
Brown, sandy SILT.

Consolidation Diagram

C6457.6

Plate C-6

Table 1 - Laboratory Tests on Soil Samples

GeoSoils Consultants, Inc.
TMC
Your #6457, HDR|Schiff #11-0754LAB
1-Aug-11

Sample ID			B-3 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	92,000
minimum		ohm-cm	5,520
pH			8.0
Electrical Conductivity		mS/cm	0.08
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	65
magnesium	Mg^{2+}	mg/kg	10
sodium	Na^{1+}	mg/kg	14
potassium	K^{1+}	mg/kg	29
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	192
fluoride	F^{1-}	mg/kg	3.5
chloride	Cl^{1-}	mg/kg	3.2
sulfate	SO_4^{2-}	mg/kg	13
phosphate	PO_4^{3-}	mg/kg	5.2
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	11
sulfide	S^{2-}	qual	na
Redox		mV	na

Minimum resistivity per CTM 643, Chlorides per CTM 422, Sulfates per CTM 417
Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

HDR | SCHIFF

www.hdrinc.com
Corrosion Control and Condition Assessment (C3A) Department

Table 1 - Laboratory Tests on Soil Samples

GeoSoils Consultants, Inc.
TMC
Your #6457, HDR|Schiff #11-0771LAB
3-Aug-11

Sample ID			B-5 @ 4-9'
Resistivity		**Units**	
as-received		ohm-cm	12,400
minimum		ohm-cm	2,240
pH			8.0
Electrical Conductivity		mS/cm	0.13
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	44
magnesium	Mg^{2+}	mg/kg	17
sodium	Na^{1+}	mg/kg	86
potassium	K^{1+}	mg/kg	11
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	232
fluoride	F^{1-}	mg/kg	3.8
chloride	Cl^{1-}	mg/kg	11
sulfate	SO_4^{2-}	mg/kg	69
phosphate	PO_4^{3-}	mg/kg	8.8
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	36
sulfide	S^{2-}	qual	na
Redox		mV	na

Minimum resistivity per CTM 643, Chlorides per CTM 422, Sulfates per CTM 417
Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

GEOLOGIC AND GEOTECHNICAL ENGINEERING STUDY,
Parcel Map No. 062646,
Santa Clarita, California

for

TMC Properties, LLC

September 13, 2011 W.O. 6457

(Revised February 2, 2012)

MDN 13525A

GeoSoils Consultants Inc.

GSC GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

September 13, 2011
W.O. 6457
(Revised February 2, 2012)

TMC PROPERTIES, LLC
P.O. Box 800970
Santa Clarita, California 91380-0970

Attention: Mr. Mark Sullivan

Subject: Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California

Dear Mr. Sullivan:

As requested, GeoSoils Consultants, Inc. (GSC) has prepared a geologic and geotechnical engineering study for Parcel Map No. 062646, Santa Clarita, California. The purpose of our study was to determine the geologic conditions on the property and their effect on proposed development. The base topographic map, prepared by Sikand Engineering is utilized for our geologic map (Plates 1A through 1D).

This study included review of regional geologic maps, geologic mapping, subsurface exploration, laboratory testing, engineering analyses, and preparation of this report. This report has been prepared for the exclusive use of TMC Properties, LLC and their consultants, for specific application to this project, in accordance with generally accepted geotechnical engineering practice. The conclusions and recommendations contained in this report are based on our understanding of the currently proposed utilization of the project site, as derived from written and verbal information supplied to us. Environmental issues were not in our scope of services and are not addressed herein.

MDN 13525A

SITE DESCRIPTION

The subject site is located in the City of Santa Clarita (see Figure 1). The site is bound by Railroad Avenue on the west, Oak Ridge Drive and existing development to the south, an existing industrial park to the north, and Metropolitan Water District property to the east.

Previous Development

The site is essentially flat with a small raised older alluvium outcrop in the northeast portion of the property

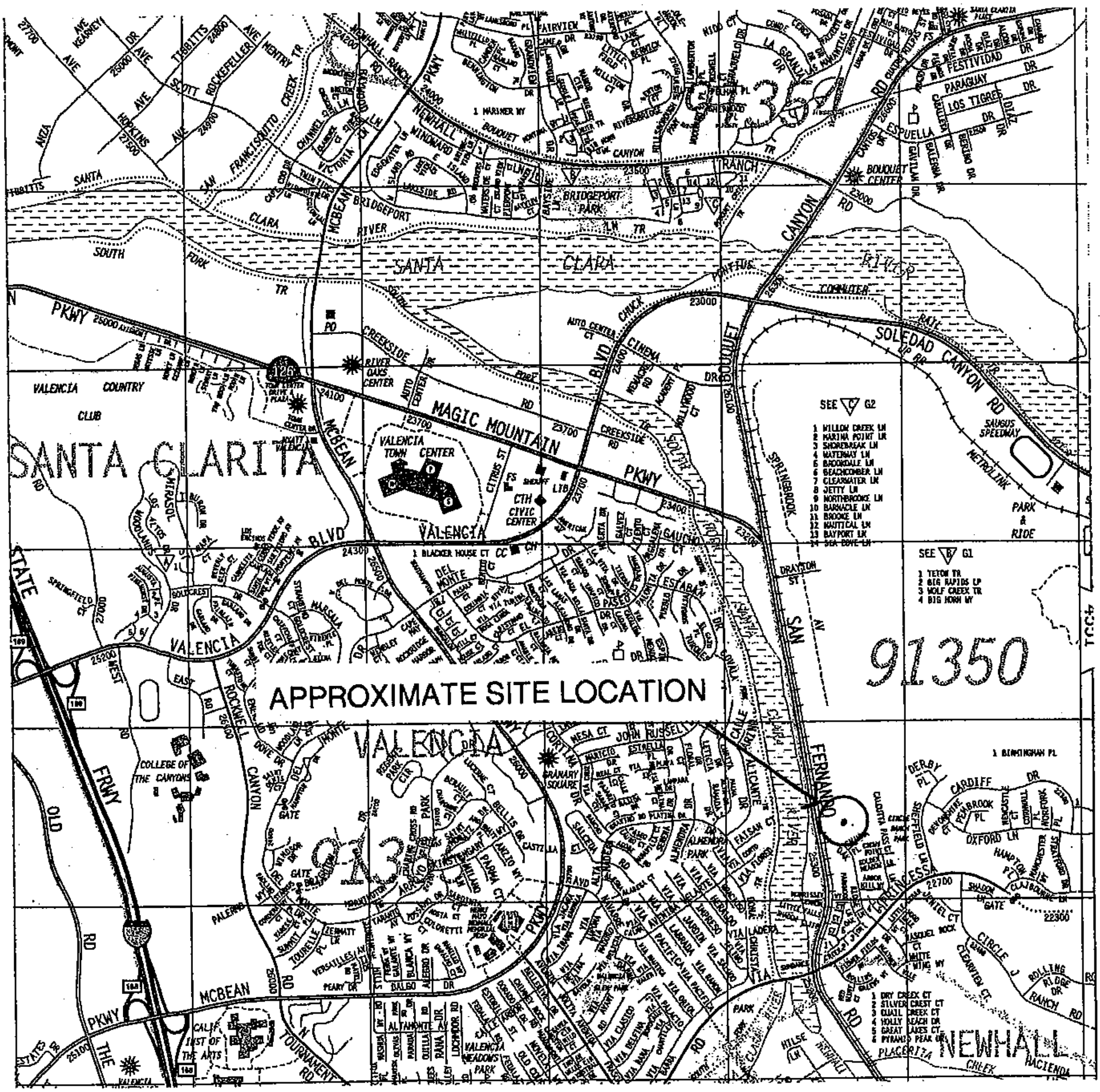
Previous development on site consists of a construction supply yard and buildings in the southwest portion of the property that were abandoned at the time of our exploration. The northern portion of the site currently is being used as a storage yard for RV's, etc.

PROJECT DESCRIPTION

Proposed development of the site will consist of grading to create 12 lots zoned for industrial usage, debris basin, and associated improvements (see Plates 1A through 1D). The primary access to the site will be from Oak Ridge Drive (see Plate 1A).

Most of the development is proposed in the main portion of the site, east of Railroad Avenue and west of the Metropolitan Water District land and pipeline. Oakridge Drive and an existing development are at the southern end of the property. Two detention basins are proposed northeast of and in the northeastern portion of the site, one onsite and the other offsite in an easement and is the only part of this development proposed east of the Metropolitan Water District property and pipeline (see Plate 1D).

The highest proposed fill slope is located in the basin area and is approximately 12 feet high (see Section C-C'). The highest proposed cut slope is located in the northeast portion of the site and is approximately 30 feet high (see Section E-E').



SCALE: 1" = 2400'

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SITE LOCATION MAP
PARCEL 062646, SANTA CLARITA
TMC

DATE 9/2011

W.O. NO. 6457

Geotechnical• Geologic• Environmental

FIGURE 1

FIELD EXPLORATION AND LABORATORY TESTING

We explored surface and subsurface conditions at the project site in July 2011. Our exploration and testing program consisted of the following elements:

- A visual surface reconnaissance of the site;
- 6 hollow-stem auger borings (designated B-1 through B-6) drilled at strategic locations across the site;
- Laboratory analyses performed on selected soil samples obtained from strategic locations beneath the site; and
- A review of published geologic and seismologic maps and literature.

The approximate relative locations of the explorations are depicted on Plates 1A through 1D. Appendix A of this report describes our field exploration procedures and includes descriptive boring logs of our subsurface explorations. A description of our laboratory testing procedures and graphic results of our laboratory tests are enclosed within Appendix B of this report. Stability analysis, including a rapid drawdown analysis for the before mentioned proposed debris basin, can be found in Appendix C of this report. A liquefaction analysis can be found in Appendix D.

The specific number, locations, and depths of our explorations were selected in relation to the existing and proposed site features, under the constraints of surface access, underground utility conflicts, and budget considerations. The locations depicted on Plates 1A through 1D should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods.

It should be realized that the explorations performed and utilized for this evaluation reveal subsurface conditions only at discrete locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions. The recommendations presented herein are based on the data available at the time this study was performed.

SITE CONDITIONS

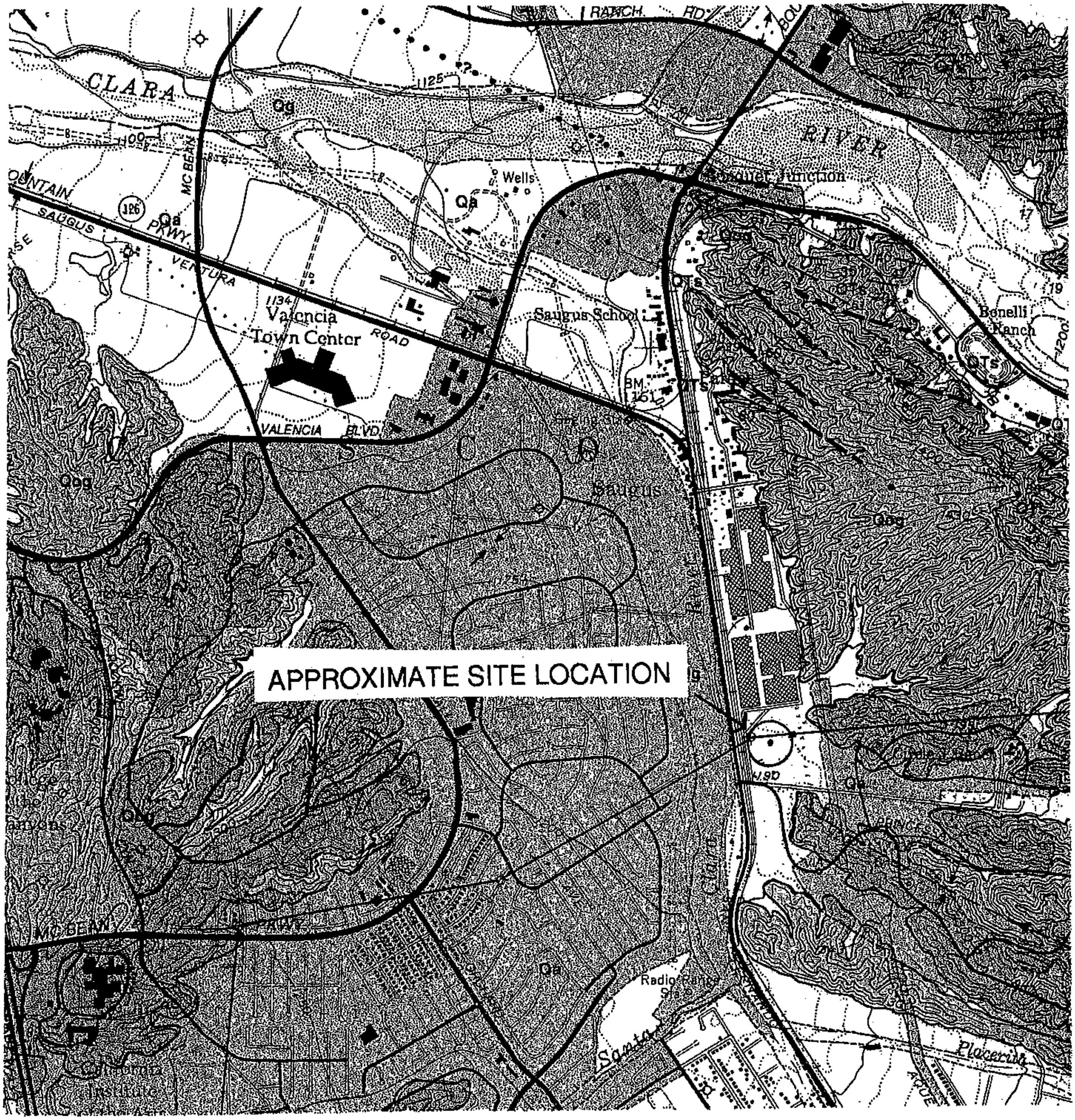
The following sections of text present our observations, measurements, findings, and interpretations regarding regional and local geologic environment, geologic structure, mass wasting, earth materials, and surface and subsurface water at the project site.

Regional Geologic Environment

The subject property is located within the Transverse Ranges geomorphic province of California (see Figure 2). The Transverse Ranges consist of generally east-west trending mountains and valleys, which are in contrast to the north-northwest regional trend elsewhere in the state. The structure of the Transverse Ranges is controlled by the effects of north-south compressive deformation (crustal shortening), which is attributed to convergence between the big bend of the San Andreas fault north of the San Gabriel Mountains and the motion of the Pacific Plate (Yerkes 1987). The valleys and mountains of the Transverse Ranges are typically bounded by a series of east-west trending, generally north dipping reverse faults with left-lateral oblique movement. The closest such fault to the site is the San Gabriel Fault zone. The property is located within the southeastern portion of the Newhall USGS 7.5-minute quadrangle.

Local Geologic Setting

The subject property is located just east of the Santa Clara River and Railroad Avenue in the City of Santa Clarita, California. Quaternary alluvium underlies a majority of the site with the surrounding slopes being comprised of older alluvium deposits that are generally massive in nature.



SCALE: 1" = 2000'

REGIONAL GEOLOGIC MAP PARCEL 062646, SANTA CLARITA TMC	
DATE 9/2011	W.O. NO. 6457

GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL

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FIGURE 2

Subsurface Soil Conditions

Artificial fill (af): Artificial fill was observed in the southwest portion of the site (associated with Pueblo Construction Supplies). The limits of fill are not known and, therefore, not shown on Plate 1A.The fill was measured to be approximately four feet deep in the southwest corner of the site (see B-6 in Appendix A) and approximately 15 feet in the proposed basin area (see B-5 in Appendix A). The existing fill generally consists of orange brown, silty sands and sandy silts. Existing artificial fill onsite is not considered suitable for structural support. All existing fill will be removed and recompacted within the development area.

Alluvium (Qal): Alluvium underlies the majority of the site. The alluvium consists of light brown sands, gravels, and clays and is moist to slightly moist, and moderately dense to dense. In areas where buildings are proposed, the top five feet of alluvium is not considered suitable for support of structural fills and should be removed and reocmpacted during grading. In the basin area (see Plate 1D and Sections A-A', C-C', and D-D' on Plate 2), the upper three feet of alluvium beneath the bottom of the proposed basin should be removed and recompacted during grading.

Older Alluvium Deposits (Qog): A small outcrop of older alluvium is located in the northeast portion of the site. This material is located on the elevated portion of the site above the main pad grade. Non-compressible, dense older alluvium deposits are suitable for structural support and are stable when exposed in cut slopes. The top 5 feet of older alluvium should be removed and recompacted to provide a 5 foot fill cap on building pads.

The enclosed boring logs in Appendix A provide a detailed description of the soil strata encountered in our subsurface explorations.

Surface and Subsurface Groundwater Conditions

Surface water consists of sheetflow from precipitation falling directly on the site. The natural drainage course on-site generally flows to the west into the Santa Clara River channel.

Over the course of our subsurface exploration for the proposed development (July 2011), groundwater was not encountered. It should be noted that our subsurface exploration reached a maximum depth of 51 feet below existing grade (see B-5 in Appendix A). Historical high groundwater information for this area, obtained from the Seismic Hazard Zone Report for the Newhall 7.5 Minute Quadrangle, indicates groundwater levels at 45 to 50 feet below existing grade.

FAULTING AND SEISMICITY

The proposed site is not within an Alquist-Priolo Earthquake Fault Zone, and there are no active faults on the property. However, the San Gabriel Fault, which is zoned as an active fault by the California Geological Survey, is mapped approximately 3500 feet to the north of the site. Although the site is not located in an AP Fault zone, this site has experienced earthquake-induced ground shaking in the past and can be expected to experience further shaking in the future. There are faults in close enough proximity to the site to cause moderate to intense ground shaking during the lifetime of the proposed development.

IBC seismic design criteria are provided below.

Seismic Design Criteria

Based upon the 2010 IBC (International Building Code), the following table provides design parameters for the subject site.

2007 CBC Section 1613, Earthquake Loads	
Site Class Definition (Table 1613.5.2)	D
Mapped Spectral Response Acceleration Parameter, S_s (Figure 1613.5(3) for 0.2 second)	2.030
Mapped Spectral Response Acceleration Parameter, S_1 (Figure 1613.5(4) for 1.0 second)	0.786
Site Coefficient, F_a (Table 1613.5.3(1) short period)	1.0
Site Coefficient, F_v (Table 1613.5.3(2) 1-second period)	1.5
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter S_{MS} (Eq. 16-37)	2.030
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter S_{M1} (Eq. 16-38)	1.179
Design Spectral Response Acceleration Parameter, S_{DS} (Eq. 16-39)	1.353
Design Spectral Response Acceleration Parameter, S_{D1} (Eq. 16-40)	0.786
Notes: 1. Site location: latitude = 34.4024, longitude = -118.5367 2. Site Class Designation: Class D is recommended based on subsurface condition 3. Ss, SMs, and SDs are spectral response accelerations for the period of 0.2 second. 4. S1, SM1, and SD1 are spectral response accelerations for the period of 1.0 second	

Conformance to the above criteria for seismic excitation does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid all damage, since such design may be economically prohibitive. Following a major earthquake, a properly designed building may be damaged beyond repair, yet not collapse.

Secondary Earthquake Effects

Ground shaking produced during an earthquake can result in a number of potentially damaging phenomena classified as secondary earthquake effects. These secondary effects include ground rupture, landslides, seiches and tsunamis, lurching, liquefaction, and seismically-induced settlement. Descriptions of each of these phenomenon and an assessment of each, as it affects the proposed site, are described below:

Ground Rupture

Ground surface rupture results when the movement along a fault is sufficient to cause a gap or rupture along the upper edge of the fault zone on the surface. The site is not located within an Alquist-Priolo Special Study Zone. Since there are no known active faults that cross the site, the potential for ground rupture is considered remote.

Landsliding

Landslides are slope failures that occur where the horizontal seismic forces act to induce soil and/or bedrock failures. The most common affect is reactivation or movement on a pre-existing landslide. Existing slides that are stable under static conditions (i.e., factor-of-safety above one) become unstable and move during strong ground shaking. As no landslides, overly steep slopes, or unfavorable bedding conditions exist onsite or nearby, landsliding is not considered a hazard to the site. Slope stability analyses (see Appendix C) performed by our office exhibit that the slope depicted in section B-B' (see Plate 2, Geologic Cross Sections) is both statically and seismically stable.

Seiches and Tsunamis

Seiches are an oscillation of the surface of an inland body of water that varies in period from a few minutes to several hours. Seismic excitations can induce such oscillations. Tsunamis are large sea waves produced by submarine earthquakes or volcanic eruptions. Due to the proximity of the site relative to the ocean and/or any large bodies of water, these phenomena are not considered a hazard to the site.

Liquefaction

Liquefaction describes a phenomenon where cyclic stresses, which are produced by earthquake-induced ground motions, creates excess pore pressures in cohesionless soils. As a result, the soils may acquire a high degree of mobility, which can lead to lateral spreading, consolidation and settlement of loose sediments, ground oscillation, flow failure, loss of bearing strength, ground fissuring, and sand boils, and other damaging deformations. This phenomenon occurs only below the water table, but after liquefaction has developed, it can propagate upward into overlying, non-saturated soil as excess pore water escapes. Descriptions of each of the phenomena associated with liquefaction is described below:

<u>Lateral Spreading</u>: Lateral spreading is the lateral movement of stiff, surficial blocks of sediments as a result of a subsurface layer liquefying. The lateral movements can cause ground fissures or extensional, open cracks at the surface as the blocks move toward a slope face, such as a stream bank or in the direction of a gentle slope. When the shaking stops, these isolated blocks of sediments come to rest in a place different from their original location and may be tilted.

<u>Ground Oscillation</u>: Occurs when liquefaction occurs at depth but the slopes are too gentle to permit lateral displacement. In this case, individual blocks may separate and oscillate on a liquefied layer. Sand boils and fissures are often associated with this phenomenon.

<u>Flow Failure</u>: A more catastrophic mode of ground failure than either lateral spreading or ground oscillation, involves large masses of liquefied sediment or blocks of intact material riding on a liquefied layer moving at high speeds over large distances. Generally flow failures are associated with ground slopes steeper than those associated with either lateral spreading or ground oscillation.

<u>Bearing Strength Loss</u>: Bearing strength decreases with a decrease in effective stress. Loss of bearing strength occurs when the effective stresses are reduced due to the cyclic loading caused by an earthquake. Even if the soil does not liquefy, the bearing of the soil may be reduced below its value either prior to or after the earthquake. If the bearing strength is sufficiently reduced, structures supported on the sediments can settle, tilt, or even float upward in the case of lightly loaded structures such as gas pipelines.

Ground Fissuring and Sand Boils: Ground fissuring and sand boils are surface manifestations associated with liquefaction and lateral spreading, ground oscillation, and flow failure. As apparent from the above descriptions, the likelihood of ground fissures developing is high when lateral spreading, ground oscillations, and flow failure occurs. Sand boils occur when the high pore water pressures are relieved by drainage to the surface along weak spots that may have been created by fissuring. As the water flows to the surface, it can carry sediments, and if the pore water pressures are high enough create a gusher (sand boils) at the point of exit.

Assessment of Liquefaction Potential: Research has shown that saturated, loose sands with a silt content less than about 25 percent are most susceptible to liquefaction, whereas other soil types are generally considered to have a low susceptibility. According to the SCEC (1999) publication *Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction in California*, any material having more than 15 percent finer than 0.005 millimeters (clay) was considered not subject to liquefaction. Liquefaction susceptibility is related to numerous factors, and the following conditions must exist for liquefaction to occur:

- Sediments must be relatively young in age and must not have developed large amounts of cementation;
- Sediments must consist mainly of cohesionless sands and silts;
- The sediment must not have a high relative density;
- Free groundwater must exist in the sediment; and
- The site must be exposed to seismic events of a magnitude large enough to induce straining of soil particles.

A complete discussion of criteria used to determine liquefaction potential is contained in SCEC (1999).

According to the Official State of California Seismic Hazard Zones Map – Newhall Quadrangle, a portion of the site is located within a "Zone of Required Investigation for Liquefaction". A complete liquefaction analysis can be found in Appendix D.

Settlement Due to Seismic Shaking

The potential for seismically-induced settlement was evaluated for this site. The seismic parameters used in the liquefaction analysis, as outlined in the **Liquefaction** section above, were also used for the seismically induced settlement calculations.

Our seismically-induced settlement analyses were based on the procedures of Tokimatsu and Seed (1987), as recommended in the SCEC (1999) publication *Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction in California*, which provide separate methodologies for soils above groundwater (Unsaturated method) and for soils at or below the static groundwater elevation (Saturated method).

Based on subsurface exploration of the site, groundwater was not encountered. However, as discussed in Appendix C, we used a groundwater level of 45 feet as indicated in the State Hazard Report for this area.

The seismically induced settlement analyses were performed to a maximum depth of 50 feet (maximum) below existing ground surface, and utilized information and laboratory data from Boring B-5. The computed seismically induced settlement was 0.78-inch in the unsaturated materials and 0.95 inch in the saturated materials. Therefore, the total seismically induced settlement was determined to be 1.72 inches across the entire site. A detailed description of the seismically induced settlement methodology is discussed in Appendix E.

CONCLUSIONS AND RECOMMENDATIONS

Based on our field explorations, research, and analyses, the proposed development appears feasible from a geologic and geotechnical standpoint, provided that the recommendations contained in this report are incorporated into the final design and construction phase of the proposed structures.

Considerations

The upper five feet of alluvium in the building pad areas, as well as proposed roads, is not suitable for structural support and should be removed and recompacted during grading operations. These structural fill area removals should extend horizontally beyond the footprints of the proposed structures for a distance equal to the depth of fill placement. If any deeper unsuitable soil is encountered during site grading, it must be completely removed within any proposed structural fill areas. Existing artificial fill is not suitable for structural support and should be removed during grading.

Debris Basin

In the area of the proposed basin, which is depicted on Plate 1D, existing artificial fill was encountered to a depth of approximately 15 feet (see B-5). It is the recommendation of this office that the entire debris basin be constructed completely with certified artificial fill. To accomplish this, the area underneath the proposed debris basin should be overexcavated at least 3 feet beneath the bottom of the proposed basin and at least 3 feet into competent alluvium. Removals should extend horizontally beyond the basin for a distance equal to the depth of fill placement. Cross sections drawn through this area (see Sections A-A', C-C', and D-D' on Plate 2) depict the limits of the recommended overexcavation.

In the area of the proposed fill slope and access road on the west side of Railroad Drive (see Plate 1A), the upper 3 feet of alluvium should not be considered suitable for fill placement. Therefore, the area to receive fill should be overexcavated at least 3 feet below the existing ground surface and at least three feet into competent natural alluvium. Removals should extend horizontally for a distance equal to the depth of fill placement. Cross Section F-F', shown on Plate 2, depicts the limits of the recommended overexcavation.

Grading

Removals should consist of reprocessing the upper five feet of natural alluvium in the building pad and roadway areas. Overexcavation in the basin area should extend at least three feet below the bottom of the proposed basin and at least three feet into competent natural alluvium. Overexcavation in the area of the fill slope located to the west of Railroad Avenue should extend at least three feet below the existing ground surface and at least three feet into competent natural alluvium. We offer the following recommendations and construction considerations concerning earthwork grading at the site.

General

Monitoring

We recommend that all earthwork (i.e., clearing, site preparation, fill placement, etc.) should be conducted with engineering control under observation and testing by the Geotechnical Engineer and in accordance with the requirements within the *Grading* section of this report.

Job Site Safety

At all times, safety should have precedence over production work. If an unsafe job condition is observed, it should be brought to the attention of the grading contractor or the developer's representative. Once this condition is noted, it should be corrected as soon as possible, or work related to the unsafe condition should be terminated.

The contractor for the project should realize that services provided by GSC do not include supervision or direction of the actual work performed by the contractor, his employees, or agents. GSC will use accepted geotechnical engineering and testing procedures; however, our testing and observations will not relieve the contractor of his primary responsibility to produce a completed project conforming to the project plans and specifications. Furthermore, our firm will not be responsible for job or site safety on this project, as this is the responsibility of the contractor.

Site Preparation

Existing Structure Location

The General Contractor should remove all surface and subsurface structures on the site or on the approved grading plan, prior to preparing the ground surface.

Existing Structure Removal

Any underground structures (e.g., wells, pipelines, foundations, utilities, etc.) that have not been located prior to grading, should be removed or treated in a manner recommended by the Geotechnical Engineer. If a septic tank is encountered during removals, it should be entirely removed. If an old cesspool should be encountered, it must be pumped dry and filled with crushed rock to five feet below the proposed finish grade, then backfilled with compacted fill.

Clearing and Stripping

The construction areas should be cleared and stripped of all vegetation, old foundations, debris, asphalt, concrete and other deleterious material prior to fill placement.

Reprocessing – Building/Roadway Areas

The surficial underlying material at the site is currently not suitable for support of foundations and slab-on-grade floors. Therefore, the upper five feet of alluvial material within the building areas should be overexcavated to expose competent, native underlying alluvium. Actual overexcavation depths will be based on the field conditions encountered during grading. For more specific building area removal recommendations, see the "Removals" section presented previously in this report. The overexcavated soils may be reused as compacted fill provided they are placed in accordance with the *Fill Placement* and *Compaction* sections of this report. Prior to fill placement, the overexcavation subgrade should be prepared in accordance with the *Subgrade Preparation* section of this report.

Reprocessing – Structural Limits

The overexcavation limits should be wide enough to contain a 1:1 (Horizontal:Vertical) slope extending from one foot outside each edge of the footing or structural element down to the bottom of the overexcavation. Building area and roadway removals should extend a minimum of five feet beyond the building location. The basin and fill slope/access road removals should extend a minimum of three feet beyond the limits of the basin and fill slope/access road.

Bottom Processing

We recommend that the bottoms of all removal areas, and for those areas receiving any additional fill be prepared by scarifying the upper 12 inches and moisture conditioning, as required to obtain at least optimum moisture, but not greater than 120 percent of optimum. The scarified areas shall be compacted to at least 90 percent of the maximum laboratory density, as determined by ASTM D-1557-09 compaction method. All areas to receive fill should be observed by the Geotechnical Engineer prior to fill placement.

Subgrade Inspection

Prior to placing fill, the ground surface to receive fill should be observed, tested, and approved by the Geotechnical Engineer.

Fill Placement

Laboratory Testing

Representative samples of materials to be utilized as compacted fill should be analyzed in a laboratory to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material should be conducted.

On-Site Material

The on-site soils, in our opinion, are adequate for re-use in controlled fills provided the soils do not contain any organic matter, debris, nor any individual particles greater than six inches in diameter. Based on the results of our laboratory tests, the surficial soils have a low expansion potential. However, additional testing will be performed following grading.

Import Fill Material

All imported fill shall not contain any organic matter, debris, nor any individual particles greater than six inches in diameter. The imported fill shall consist of a granular material with a non-expansive or a low expansive potential (plasticity index less than 15 percent). All imported fill materials shall be approved by the Geotechnical Engineer prior to use in controlled areas.

Rock Fragments

Rock, concrete, or asphalt fragments less than six inches in diameter may be utilized in the fill, provided they are not placed in concentrated pockets, surrounded with fine grained material, and the distribution of the rocks is supervised by the Geotechnical Engineer. Rocks greater than six inches in diameter should be taken off-site, placed in fill areas designated as suitable for rock disposal, or placed in accordance with the recommendations of the Geotechnical Engineer.

Subgrade Verification and Compaction Testing

Regardless of material or location, all fill material should be placed over properly compacted subgrades in accordance with the *Site Preparation* section of this report. The condition of all subgrades shall be verified by the Geotechnical Engineer before fill placement or earthwork grading begins. Earthwork monitoring and field density testing shall be performed during grading to provide a basis for opinions concerning the degree of soil compaction attained.

Fill Placement

Approved on-site or imported fill material shall be evenly placed, watered, processed, and compacted in controlled horizontal layers not exceeding eight inches in loose thickness, and each layer should be thoroughly compacted with approved equipment. All fill material should be moisture conditioned, as required to obtain at least optimum moisture, but not greater than 120 percent of optimum moisture content. The fill should be placed and compacted in horizontal layers, unless otherwise recommended by the Geotechnical Engineer.

Compaction Criteria

Each layer of fill should be compacted to at least 90 percent of the maximum laboratory density for material used as determined by ASTM D-1557-09. The field density shall be determined by the ASTM D-1556-07 method or equivalent. Where moisture content of the fill or density testing yields compaction results less than 90 percent, additional compaction effort and/or moisture conditioning, as necessary, shall be performed until the fill material is in accordance with the compaction requirements.

Fill Material - Moisture Content

All fill material placed must be moisture conditioned, as required to obtain at least optimum moisture, but not greater than 120 percent. If excessive moisture in the fill results in failing results or an unacceptable "pumping" condition, then the fill should be allowed to dry until the moisture content is within the necessary range to meet the compaction requirements or reworked until acceptable conditions are obtained.

Grading Control

Grading Inspection

Earthwork monitoring and field density testing shall be performed by the Geotechnical Engineer during grading to provide a basis for opinions concerning the degree of soil compaction attained. The Contractor should receive a copy of the Geotechnical Engineer's *Daily Field Engineering Report* which will indicate the results of field density tests for that day. Where failing tests occur or other field problems arise, the Contractor shall be notified of such conditions by written communication from the Geotechnical Engineer in the form of a conference memorandum, to avoid any misunderstanding arising from oral communication.

Subgrade Inspection

All processed ground to receive fill and overexcavations should be inspected and approved by the Geotechnical Engineer prior to placing any fill. The Contractor should be responsible for notifying the Geotechnical Engineer when such areas are ready for inspection. Inspection of the subgrade may also be required by the controlling governmental agency within the respective jurisdictions.

Subgrade Testing

Density tests should also be made on the prepared subgrade to receive fill, as required by the Geotechnical Engineer.

Density Testing Intervals

In general, density tests should be conducted at minimum intervals of two feet of fill height. Due to the variability that can occur in fill placement and different fill material characteristics, a higher number of density tests may be warranted to verify that the required compaction is being achieved.

Utility Trenching and Backfill

Utility Trenching

Open excavations and excavations that are shored shall conform to all applicable Federal, State and local regulations.

Backfill Placement

Approved on-site or imported fill material shall be evenly placed, watered, processed, and compacted in controlled horizontal layers not exceeding eight inches in loose thickness, and each layer should be thoroughly compacted with approved equipment. All fill material should be moisture conditioned, as required to obtain at least optimum moisture, but not greater than 120 percent of optimum moisture content. The fill should be placed and compacted on a horizontal plane, unless otherwise recommended by the Geotechnical Engineer.

Backfill Compaction Criteria

Each layer of utility trench backfill shall be compacted to at least 90 percent of the maximum laboratory density determined by ASTM D-1557-09. The field density shall be determined by the ASTM D-1556-07 method or equivalent. Where moisture content of the fill or density testing yields compaction results less than 90 percent, additional compaction effort and/or moisture conditioning, as necessary, shall be performed until the compaction criteria is reached.

Exterior Trenches Adjacent to Footings

Exterior trenches, paralleling a footing and extending below a 1H:1V plane projected from the outside bottom edge of the footing, should be compacted to 90 percent of the laboratory standard. Sand backfill, unless it is similar to the in-place fill, should not be allowed in these trench backfill areas. Density testing, along with probing, should be accomplished to verify the desired results.

Pipe Bedding

We recommend that a minimum of six inches of bedding material should be placed in the bottom of the utility trench. All bedding materials shall extend at least four inches above the top of utilities which require protection during subsequent trench backfilling. All trenches shall be wide enough to allow for compaction around the haunches of the pipe or materials, such as pea gravel, or controlled density fill (CDF) shall be used below the spring line of the pipes to eliminate the need for mechanical compaction in this portion of the trenches.

Construction Considerations

Erosion Control

Erosion control measures, when necessary, should be provided by the Contractor during grading and prior to the completion and construction of permanent drainage controls.

Compaction Equipment

It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the project site to handle the amount of fill being placed and the type of fill material to be compacted. If necessary, excavation equipment should be shut down to permit completion of compaction in accordance with the recommendations contained herein. Sufficient watering devices/equipment should also be provided by the Contractor to achieve optimum moisture content in the fill material.

Final Grading Considerations

Care should be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of a permanent nature on or adjacent to the property.

Total and Differential Settlement

Based upon the anticipated building loads and consolidation test results, it is estimated total static settlement should be on the order of 1.0 inch, while differential settlement should be on the order of 0.5-inch. Seismic settlement was determined to be on the order of 1.72 inches. Therefore, total settlement is estimated to be approximately 2.72 inches, while differential settlement should be around 1.36 inches.

FOUNDATION DESIGN RECOMMENDATIONS

We offer the following recommendations and comments for post-tensioned slab foundation, mat foundation, conventional spread footings, and conventional slab-on-grade floors.

Post-Tensioned Slab Foundation

Anticipated surficial differential movement across the building pad areas included in this report in the form of settlement or heave could be in the order of 1.5 inch. These post-tensioned slabs should be designed in accordance with the recommendations of either the California Foundation Slab Method or Post-Tensioning Institute. The slabs should be designed for at least one inch of surficial differential movement (i.e., at least 1.5 inch in a 30-foot span) for low expansion index (EI) soil.

Based on review of laboratory data for the on-site materials, the average soil modulus of subgrade reaction, K, to be used for design is 100 pounds per cubic inch. Specific recommendations for the design of *California Foundation Slab* and *Post Tension Institute* methods are presented below.

A surface bearing value of 1,000 pounds per square foot can also be used in design.

1. **California Foundation Slab (Spanability) Method**

   It is recommended that slabs be designed for a free span of 15 feet regardless of the expansion index of the soil. From a soil expansion/shrinkage standpoint, a common contributing factor to distress of structures using post-tensioned slabs is fluctuation of moisture in soils underlying the perimeter of the slab, compared to the center, causing a "dishing" or "arching" of the slabs. To mitigate this possibility, a combination of soil presaturation and construction of a perimeter "cut off" wall should be employed.

   All slab foundation areas should be moisture conditioned to at least optimum moisture, but no more than 5 percent above optimum moisture for a depth of at least 12 inches below subgrade low EI soil. A continuous perimeter curtain wall should extend to a depth of at least 12 inches below exterior grade for low EI soil to preserve this moisture. The cut-off walls may be integrated into the slab design or independent of the slab and should be a minimum of 6 (six) inches wide.

2. **Post-Tensioning Institute Method**

Post-tensioned slabs should have sufficient stiffness to resist excessive bending due to non-uniform swell and shrinkage of subgrade soils. The differential movement can occur at the corner, edge, or center of slab. The potential for differential uplift can be evaluated using design specifications of the Post-Tensioning Institute. The following table presents suggested minimum coefficients to be used in the Post-Tensioning Institute design method.

Suggested Coefficients	
Thornthwaite Moisture Index	-20 in/yr
Depth to Constant Soil Suction	9 (feet)
Constant Soil Suction: (pf)	3.8

The coefficients are considered minimums and may not be adequate to represent worst case conditions such as adverse drainage, excess watering, and/or improper landscaping and maintenance. The above parameters are applicable provided structures have gutters and downspouts, yard drains, and positive drainage is maintained away from structure perimeters. Also, the values may not be adequate if the soils below the foundation become saturated or dry such that shrinkage occurs. The parameters are provided with the expectation that subgrade soils below the foundations are maintained in a relatively uniform moisture condition. Responsible irrigation of landscaping adjacent to the foundation must be practiced since over-irrigation of landscaping can cause problems. Therefore, it is important that information regarding drainage, site maintenance, settlements and affects of expansive soils be passed on to future homeowners.

Based on the above parameters, the following values were obtained from the Post Tensioning Institute Design manual. If a stiffer slab is desired, higher values of y_m may be warranted.

Expansion Index of Soil Subgrade	Low EI
e_m center lift	9.0 feet
e_m edge lift	4.7 feet
Y_m center lift	0.34 inch
Y_m edge lift	0.48 inch

Deepened footings/edges around the slab perimeter must be used as indicated above to minimize non-uniform surface moisture migration (from an outside source) beneath the slab. An edge depth of at least 12 inches should be considered for low EI soil. The bottom of the deepened footing/edge should be designed to resist tension, using cable or reinforcement per the Structural Engineer.

Mat Foundation

Mat foundation could either be designed as a beam on an elastic foundation or using the method of static equilibrium. The static equilibrium method assumes the mat moves as a rigid body when the loads are applied and that the reaction pressures are distributed linearly across the bottom of the mat. For mat foundation, the criteria under post-tensioned slab may be used for design.

The aforementioned parameters are applicable provided that the recommendations in the *Drainage* section of this report are followed.

Conventional Spread Footings

We offer the following alternate foundation recommendations and comments for purposes of footing design and construction.

Bearing Subgrades

All footings should be constructed on firm, unyielding certified compacted fill. All compacted fill should be compacted to at least 90 percent of the Modified Proctor maximum laboratory density, as determined by ASTM D-1557-09 compaction method.

Subgrade Preparation

Pre-moistening of all areas to receive concrete is recommended. The moisture content of the subgrade soils should be equal to or greater than optimum moisture, and verified by the Geotechnical Engineer to a depth of 12 inches below adjacent grade within 24 hours of concrete placement. Footings subgrades shall be prepared in accordance with the *Grading* section of this report.

Subgrade Verification

All footing subgrades should consist of firm, unyielding certified compacted fill. Under no circumstances should footings be cast atop loose/soft soil, slough, debris, existing artificial fill, unprocessed alluvium, or surfaces covered by standing water. We recommend that the condition of all subgrades be verified by the Geotechnical Engineer before any concrete is placed.

Footing Depth and Width

Footings should be continuous and be founded at a minimum depth of 24 inches below the lowest adjacent ground surface for one- and two-story structures and should have a minimum width of 12 inches. Footings should be reinforced according to structural design.

Bearing Pressures

The allowable bearing capacity values shown in Table 3, include dead and live loads, and may be used for design of footings and foundations. All foundations should be founded in firm, unyielding compacted fill and should be reinforced according to structural design. The bearing values may be increased by one-third when considering short duration loading conditions, such as seismic or wind loads.

TABLE 3 BEARING CAPACITY VALUES					
Bearing Subgrade	Minimum Embedment Depth (inches)	Allowable Bearing Capacity (psf)	Bearing Capacity Increase per Foot Deeper (%)	Bearing Capacity Increase per Foot Wider (%)	Maximum Allowable Bearing Capacity (psf)
Compacted Fill	24	1,500	20	10	3,000

Lateral Capacity

To resist lateral loads, the allowable passive earth pressures shown in Table 4, expressed as an equivalent fluid pressure, may be used on that portion of shallow foundations which have a minimum embedment as previously recommended. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

TABLE 4 LATERAL BEARING PRESSURE VALUES			
Soil Type	Allowable Passive Pressure (pcf)	Maximum Allowable Passive Pressure (psf)	Coefficient of Friction (Concrete/Soil)
Compacted Fill	250	2,500	0.4

Conventional Slab-On-Grade Floor

We offer the following alternate floor slab recommendations and comments for purposes of slab-on-grade floor design and construction:

Reinforcement

Concrete slabs should be reinforced with a minimum No. 4 rebar at 16 inches on-center in both directions. All slab reinforcement should be properly positioned at mid-height in the slab during placement of concrete.

Thickness

The design engineer should determine the actual thickness of the slabs based on proposed loadings and use. However, minimum slab thickness of four inches is recommended.

Moisture Barrier

Concrete slabs should be underlain with a minimum 6 mil polyvinyl chloride membrane vapor barrier with a minimum overlap of 12 inches in all directions. This membrane should be sandwiched between two, one-inch layers of sand.

Slab Sectioning

To minimize transgression of shrinkage cracks, slabs must not exceed 20-foot sections. Sectioning can be performed by expansion joints, plastic joints, saw cutting, or proper tooling during concrete placement. It is suggested that slabs not be tied structurally to heavily loaded walls or columns, until most of the dead loads are in place to permit minor differential settlement.

Subgrade Preparation

All areas to receive concrete should be presaturated to a depth of 12 inches, such that the soil within this zone is approximately at optimum moisture to not more than 6 percent above optimum moisture content. The Geotechnical Engineer should verify all subgrades that are pre-soaked within 24 hours of concrete placement.

Retaining Wall Recommendations

Should retaining walls be used onsite, the following recommendations should be followed for retaining wall design and construction. Wall footings should have a minimum width of 18 inches and a minimum embedment depth of 24 inches into compacted fill.

For perimeter walls where a full removal can not be performed, walls should be designed for an allowable bearing capacity of 1,000 psf with a minimum depth of 18 inches into competent material.

The equivalent fluid pressures recommended are based on the assumption of a uniform backfill and no build-up of hydrostatic pressure behind the wall. To prevent the build-up of lateral soil pressures in excess of the recommended design pressures, overcompaction of the fill behind the wall should be avoided. This can be accomplished by placement of the backfill above a 45-degree plane projected upward from the base of the wall, in horizontal lifts not exceeding 8 inches in loose depth, and compacted with hand-operated or small self propelled vibrating plates. (Note: Placement of free-draining material in this zone could also prevent the build-up of lateral soils pressures). All walls must conform to International Building Code setback requirements.

1. Conventional (Yielding) Retaining Walls

All recommendations for active lateral earth pressures contained herein assume that the anticipated retaining structures are in tight contact with the fill or soil that they are supposed to support.

The earth support system must be sufficient stiff to hold horizontal movements in the soil to less than one percent of the height of the vertical face, but should be free-standing to the point that they yield at the top at least 0.1 percent of the height of the wall.

2. **Earth Pressures on Conventional (Yielding) Walls**

The earth pressures on walls retaining self-draining, granular materials, compacted fill or undisturbed native soil shall be assumed equal to that exerted by an equivalent fluid having a density not less than that shown in the following table:

Backfill Slope (Horizontal:Vertical)	Equivalent Fluid Density
Level	30 pcf
2:1	43 pcf

3. **Restrained (Non-Yielding) Walls**

Earth pressures will be greater on walls where yielding at the top of the wall is limited to less than one-thousandth the height of the wall either by stiffness (i.e., return walls, etc.) or structural floor network prior to backfilling. Utilizing the recommended backfill compaction of 90 percent Modified Proctor Density per ASTM D-1557-09, we recommend the following equivalent fluid density for non-yielding walls:

Backfill Slope (Horizontal:Vertical)	Equivalent Fluid Density
Level	45 pcf
2:1	65 pcf

4. **General**

a. If water is allowed to saturate the backfill, the lateral pressure would exceed the active pressure provided. Clayey or expansive soils should not be used for backfilling behind retaining walls.

b. Any anticipated, superimposed loading (i.e., upper retaining walls, other structures, etc.) within a 45-degree (1:1) projection upward from the wall bottom, except retained earth, shall be considered as surcharge and provided for in the design.

c. A vertical component equal to one-third of the horizontal force so obtained may be assumed at the plane of application of force.

d. Walls higher than three feet should be constructed with weepholes near the bottom on five-foot centers or with perforated drainpipe in a gravel envelope at the bottom and behind the wall. A one-foot thick zone of clean, granular, free-draining material should be placed behind the wall to within three feet of the surface. On-site soil should be used for the remainder of the backfill and should be compacted to 90 percent relative compaction as determined by ASTM Test Designation D-1557-09. All proposed subterranean walls should be waterproofed and backdrained.

e. A concrete-lined swale is recommended to be placed behind retaining walls that can intercept surface runoff from upslope areas. This surface runoff shall be transferred to an approved drainage channel via non-erosive drainage devices.

Temporary and Permanent Slopes and Excavations

We offer the following recommendations and construction considerations for temporary and permanent slopes and excavations.

Safety: Temporary excavation slope stability is a function of many factors including soil type, density, cut inclination, depth, the presence of groundwater, and the length of time that the cut is to remain open. As the cut is deepened, or as the length of time an excavation is open, the likelihood of bank failure increases. For this reason, maintenance of safe slopes and worker safety should remain the responsibility of the contractor, who is present at the site, able to observe changes in the soil conditions, and monitor the performance of the excavation.

Maintenance: If seepage or surface runoff is not controlled, flatter temporary slopes would be necessary. Larger cobbles and boulders should be scaled from the excavation sidewalls prior to worker entry to prevent injury to workmen from falling rocks. In all cases, cut slopes and any excavation shoring should conform to applicable Federal, State and/or local safety guidelines.

Cut/Fill Slopes: We tentatively recommend that temporary and permanent cut and fill slopes in natural soil and compacted fill soils not exceed the inclinations shown in Table 5.

TABLE 5
MAXIMUM SLOPE INCLINATIONS

Soil Type	Maximum Inclination (Horizontal:Vertical)	
	Temporary	Permanent
Compacted Fill/Older Alluvium (Qog)/Native Soils	1H:1V	2H:1V

Excavations: Shallow excavations used for construction that are less than five feet in depth and are made in properly engineered fill or firm native soils should stand with vertical sides. Excavations deeper than four feet should be sloped at angles provided in Table 5 or shored. All open excavations and excavations that are shored shall conform to all applicable Federal, State and Local regulations.

Surcharge: Surcharge loads should be setback from the top of temporary excavations a minimum horizontal distance of ten feet.

Excavation Inspection: The soils exposed in temporary excavation slopes should be observed by the Geotechnical Engineer so that modifications of the slopes can be made if variations in soil conditions occur.

On-Site Drainage

Seasonal precipitation and/or landscape water should not be allowed to pond within the site, especially next to foundations of any structures. Surface runoff should be collected and disposed of in such a manner as to prevent concentrated erosion. Roof gutters, downspouts, and yard drains should be provided in accordance with the City of Santa Clarita requirements. All pad drainage should be directed toward the street or an approved water course area swale via non-erosive channel, pipe and/or dispersions devices. We recommend that all planters proposed adjacent to structures be self-contained, provided with a subdrain system, and/or allowed to have positive drainage away from structure to drain excess landscape water.

We recommend that lot drainage be verified after house construction and that notices be posted cautioning homeowners not to modify drainage in any way without approval by the City of Santa Clarita. At no time should drainage be directed toward any descending slope or allowed to pond. All slope or fill backdrains should continue to remain unobstructed and be allowed to drain freely.

Leakage from any of the appurtenant plumbing will create an artificial groundwater condition which could likely render settlement problems; therefore, it is imperative that all underground plumbing fixtures be *absolutely* leak-free.

LIMITATIONS

The findings and recommendations of this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice for the City of Santa Clarita at this time. We make no other warranty, either express or implied. The conclusions and recommendations contained in this report are based on site conditions disclosed in our subsurface investigation. However, soil conditions can vary significantly between borings; therefore, further refinements of our recommendations contained herein may be necessary due to changes in the building plans or what is encountered during site grading.

The recommendations provided in this report are applicable for preliminary development planning provided that surface water will be kept from infiltrating into the subgrade adjacent to the structure foundation system. This may include, but not be limited to rain water, roof water, landscape water and/or leaky plumbing. The lots are to be fine graded at the completion of construction to include positive drainage away from the structure and roof water will be collected via gutters, downspouts, and transported to the street in buried drain pipes. Lot buyers should be cautioned against constructing open draining planters adjacent to the structures, or obstructing the yard drainage in any way.

Since our investigation was based on the site conditions observed, selective laboratory testing, and engineering analysis, the conclusions and recommendations contained herein are professional opinions. Further, these opinions have been derived in accordance with standard engineering practices, and no warranty is expressed or implied.

If the conditions encountered during grading are not consistent with the findings presented in this report, or if proposed construction is moved from the location investigated, this office shall be notified immediately so that the condition or change can be evaluated and appropriate action taken.

"111" STATEMENT

Based on site observations and field exploration, it is our opinion, provided that our recommendations are followed, that the proposed development will be safe from the hazards of landslide, settlement, or slippage and will not adversely affect the stability of property outside the subject development.

CLOSURE

We appreciate this opportunity to be of continued service to you. If you have any questions regarding the content of this report or any other aspects of the project, please do not hesitate to contact us.

Very truly yours,
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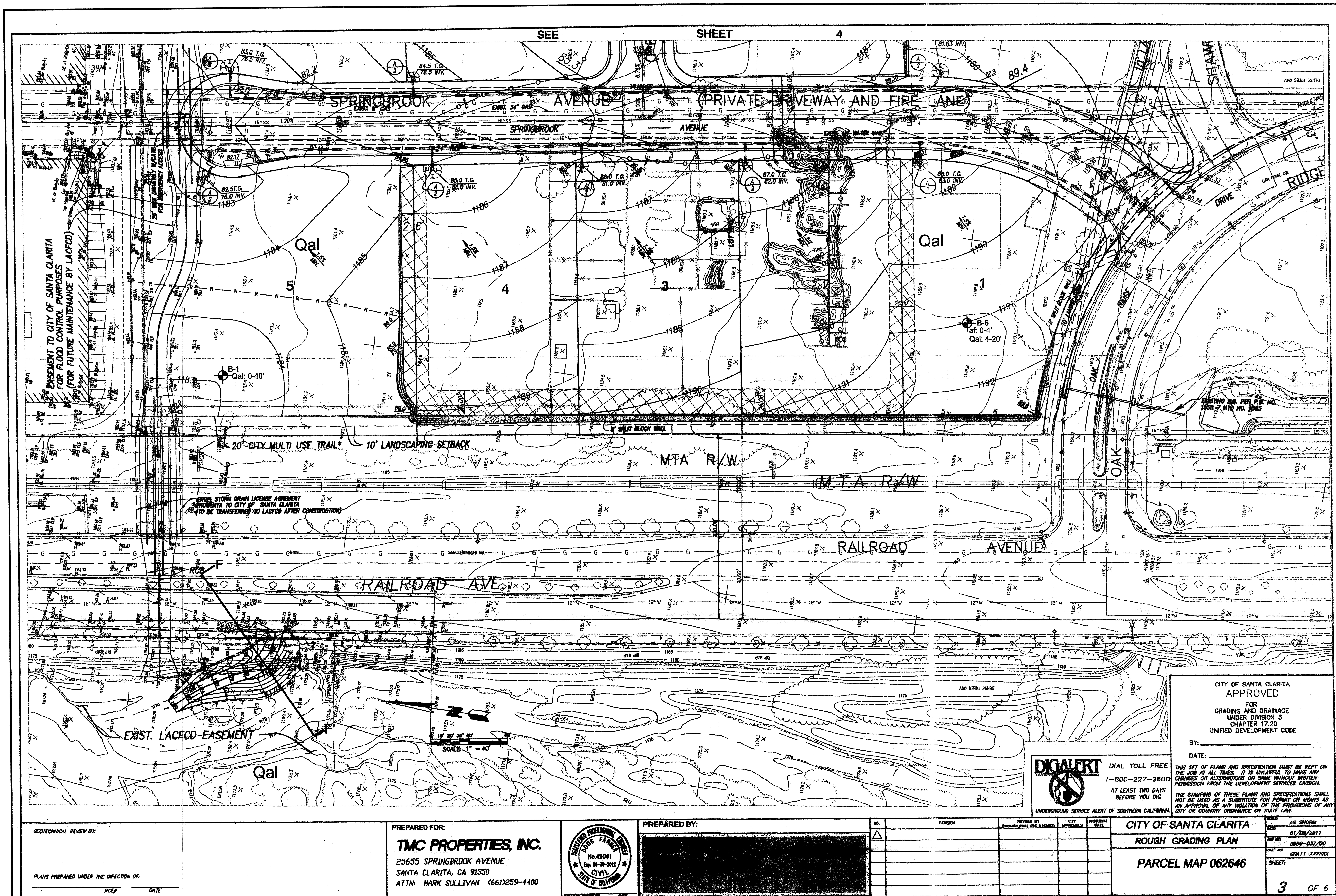
Encl: Plates 1A through 1D, Geologic Maps
Plate 2, Geologic Cross-Sections
Appendix A, Field Exploration Procedures
Plates A-1 through A-11, Boring Logs
Appendix B, Laboratory Test Procedures and Results
Plates SH-1 and SH-2, Shear Test Diagrams
Plates C-1 through C-6, Consolidation Diagrams
Plates G-1 through G-3, Grain Size Analyses
Chemical Series Results
Appendix C, Engineering Analyses
Appendix D, Liquefaction Analyses
Appendix E, Seismically Induced Settlement Analyses

cc: (2) Addressee
(5) Sikand Engineering
Attention: Mari Prutz

MDN 13525A



EXPLANATION

af	ARTIFICIAL FILL
Qal	ALLUVIUM
Qog	OLDER ALLUVIUM, PRIMARILY SAND AND GRAVEL

APPROXIMATE GEOLOGIC CONTACT

F F' LINE OF GEOLOGIC SECTION

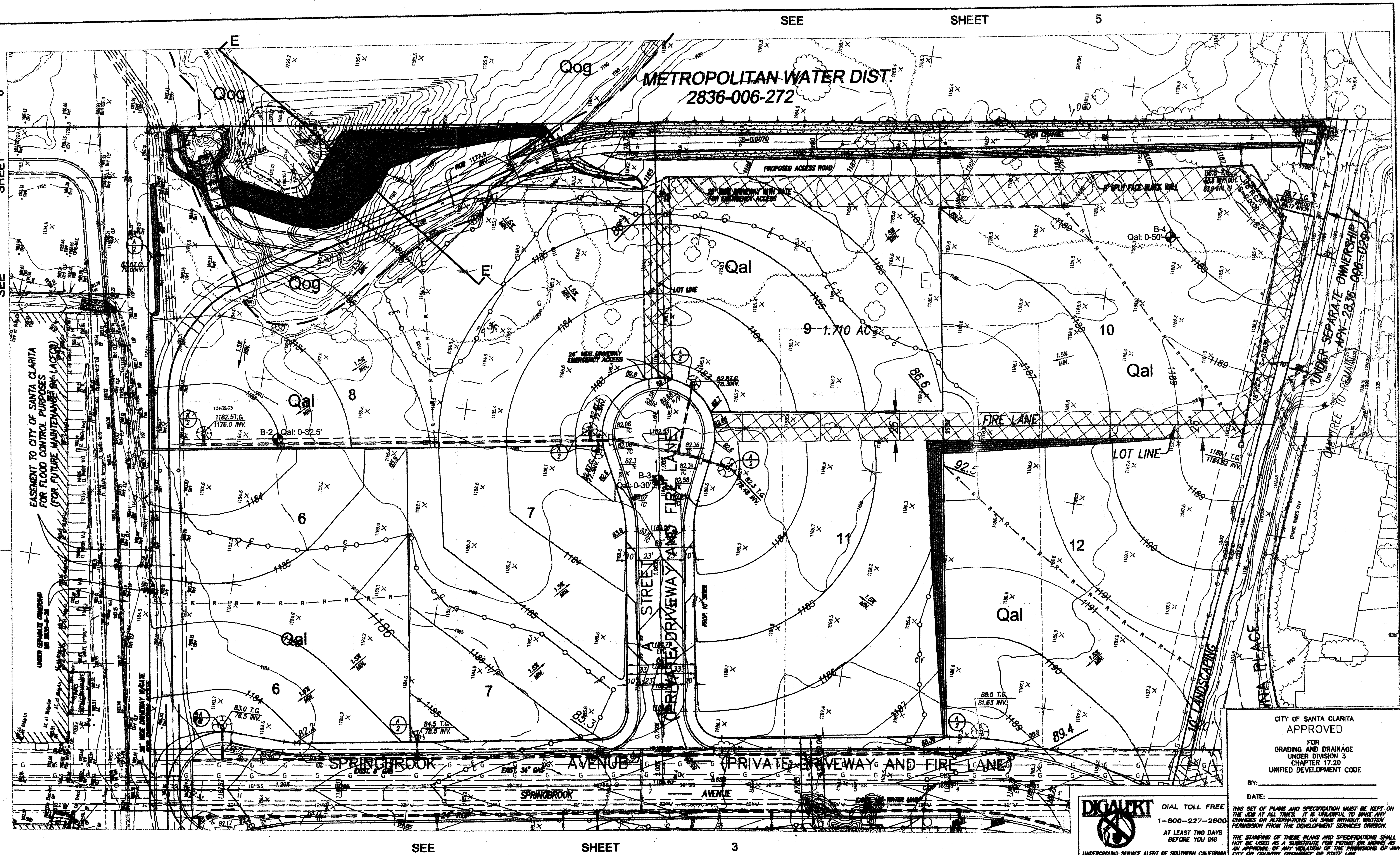
B-6 APPROXIMATE LOCATION OF BORING

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'
REVISED	PLATE 1A	

MON 13525



CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
UNDER DIVISION 3
CHAPTER 17.20
UNIFIED DEVELOPMENT CODE

BY: ______

DATE: ______

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AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

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PLANS PREPARED UNDER THE DIRECTION OF:

RCE# ______ DATE ______

PREPARED FOR:
TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

REGISTERED PROFESSIONAL ENGINEER
DOUG FARGER
No.49041
Exp. 06-30-2012
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
[redacted]

NO.	REVISION	REVISED BY	CITY APPROVALS	APPROVAL DATE

CITY OF SANTA CLARITA
ROUGH GRADING PLAN

SCALE: AS SHOWN
DATE: 01/05/2011
JOB NO.: 5099-037/00
DWG NO.: GRA11-XXXXXX
SHEET: 4 OF 6

GRA11-XXXXX

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

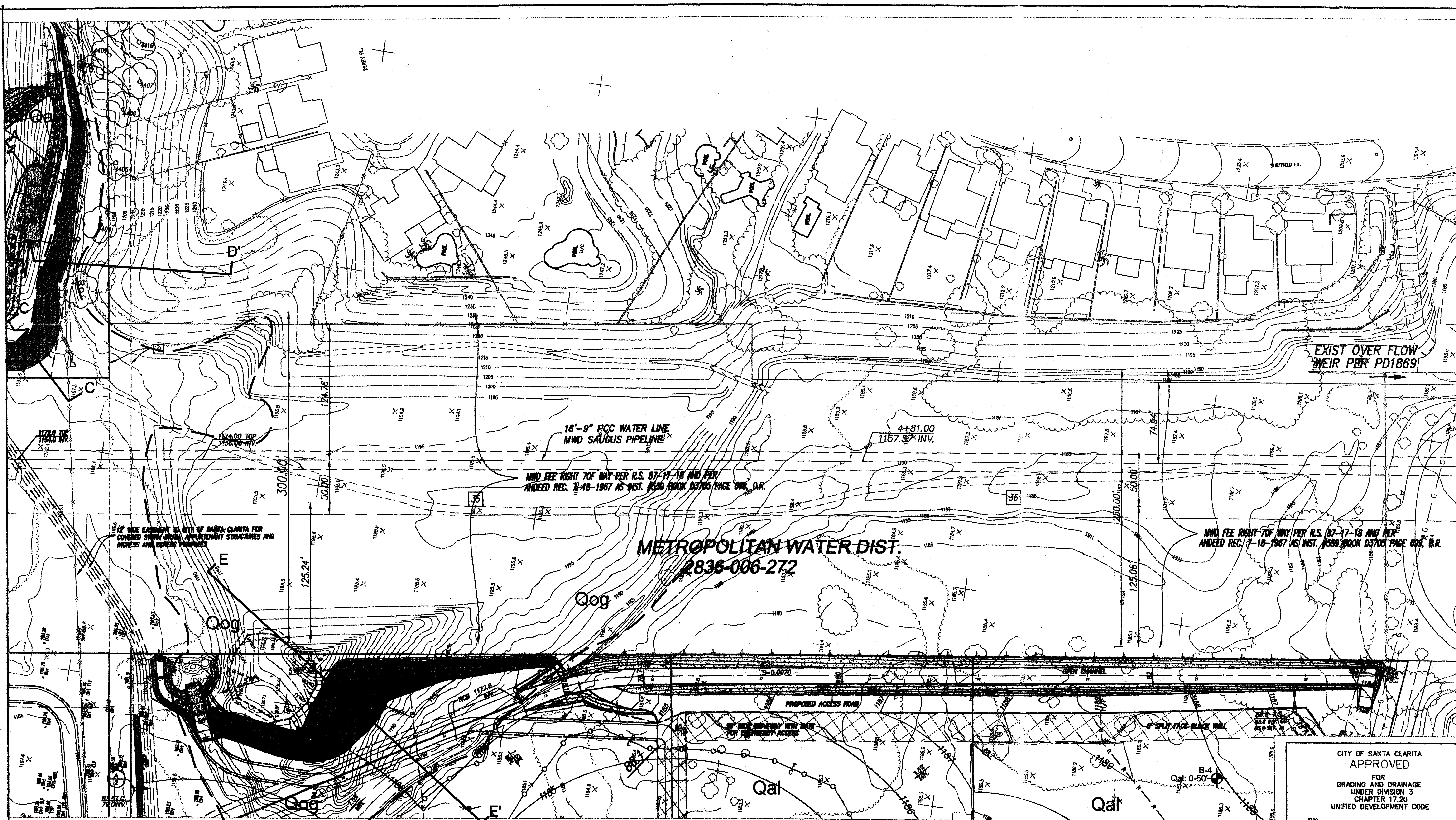
SEE PLATE 1A FOR EXPLANATION

GEOLOGIC MAP
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED ______ PLATE 1B

MON 13525



CITY OF SANTA CLARITA
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UNDER DIVISION 3
CHAPTER 17.20
UNIFIED DEVELOPMENT CODE

BY:

DATE:

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UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

GEOTECHNICAL REVIEW BY:

PLANS PREPARED UNDER THE DIRECTION OF:

RCE# DATE

PREPARED FOR:

TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2012 CIVIL STATE OF CALIFORNIA

PREPARED BY:

[redacted]

CITY OF SANTA CLARITA
ROUGH GRADING PLAN

SCALE: AS SHOWN
DATE: 01/05/2011
JOB NO. 5099-037/00
CASE NO. GRA11-XXXXXX
SHEET: 5 OF 6

GRA11-XXXXX

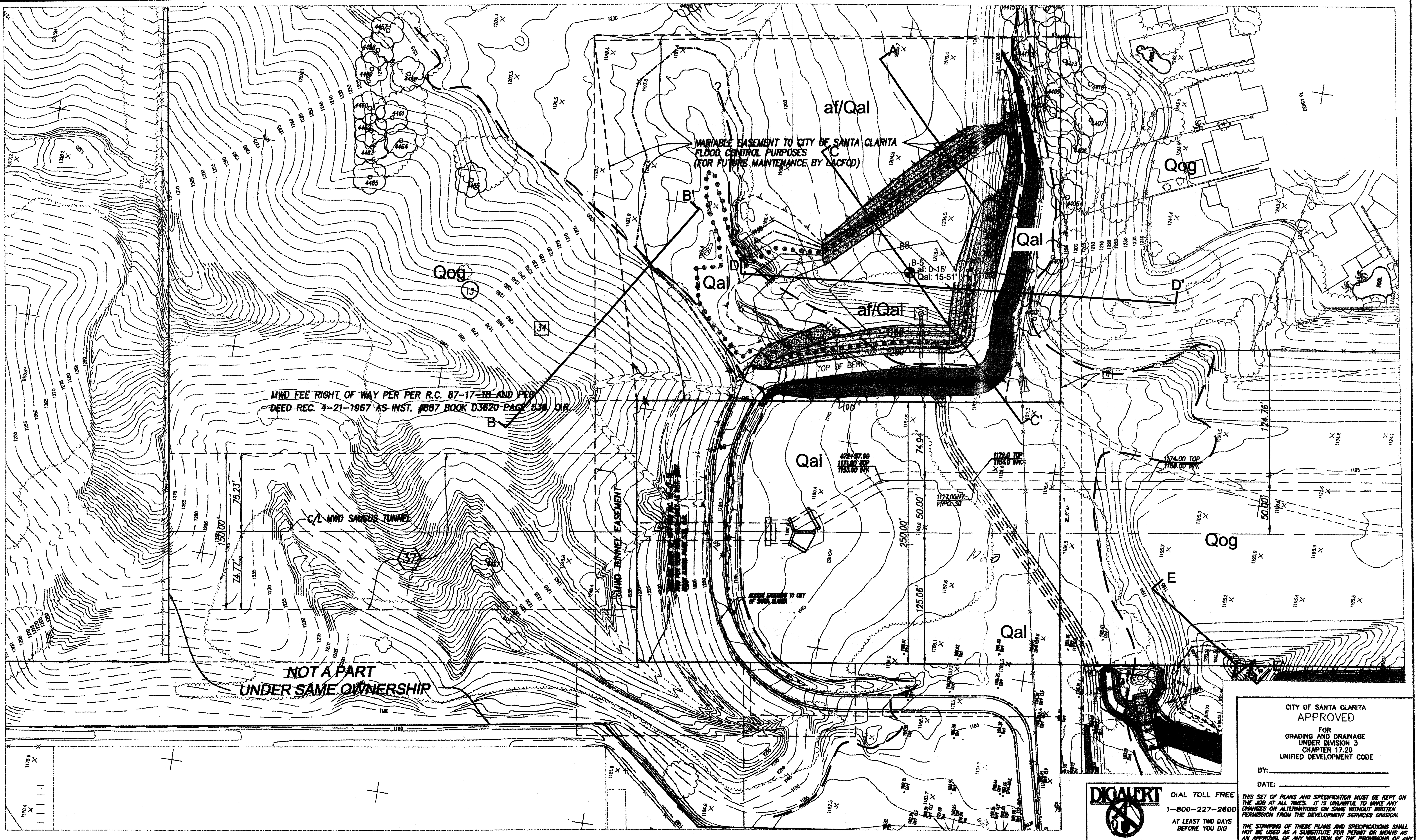
GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

SEE PLATE 1A FOR EXPLANATION

GEOLOGIC MAP
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'
REVISED	PLATE 1C	

MDN 13525



CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
UNDER DIVISION 3
CHAPTER 17.20
UNIFIED DEVELOPMENT CODE

BY: ____________

DATE: ____________

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UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

THIS SET OF PLANS AND SPECIFICATION MUST BE KEPT ON THE JOB AT ALL TIMES. IT IS UNLAWFUL TO MAKE ANY CHANGES OR ALTERNATIONS ON SAME WITHOUT WRITTEN PERMISSION FROM THE DEVELOPMENT SERVICES DIVISION.

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GEOTECHNICAL REVIEW BY:

PLANS PREPARED UNDER THE DIRECTION OF:

RCE# DATE

PREPARED FOR:

TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No. 49041
Exp. 03-30-2012
CIVIL
STATE OF CALIFORNIA

PREPARED BY:

[redacted]

NO.	REVISION	REVISED BY	CITY APPROVALS	APPROVAL DATE
△				

CITY OF SANTA CLARITA
ROUGH GRADING PLAN

SCALE: AS SHOWN
DATE: 01/05/2011
JOB NO.: 5089-037/00
DWG NO.: GRA11-XXXXXX
SHEET: 6 OF 6

GRA11-XXXXX

GSC GeoSoils Consultants Inc.
GEOTECHNICAL/GEOLOGIC/ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

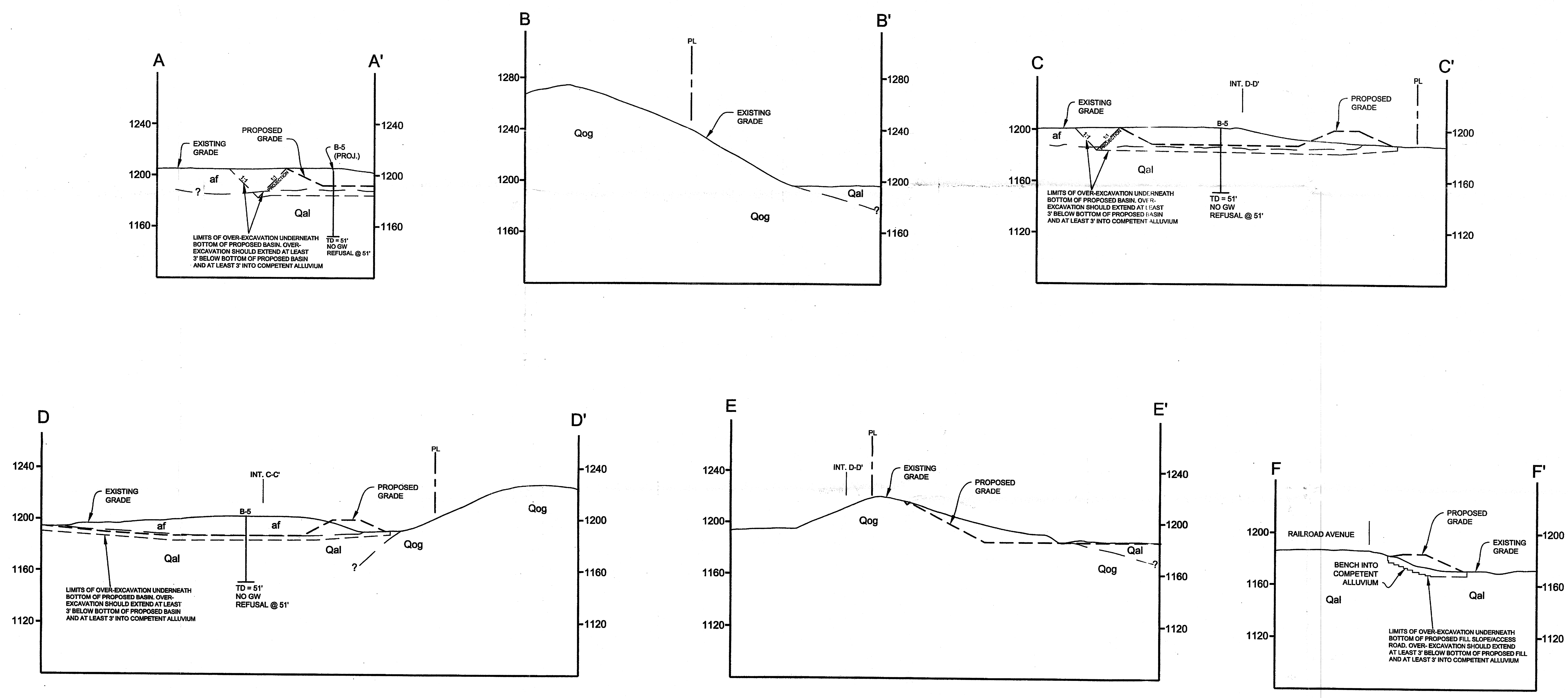
SEE PLATE 1A FOR EXPLANATION

GEOLOGIC MAP
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED ____ PLATE 1D

HDN 13525



GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC CROSS-SECTIONS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED

PLATE 2

September 13, 2011
W.O. 6457
(Revised February 2, 2012)

APPENDIX A

FIELD EXPLORATION PROCEDURES

APPENDIX A

FIELD EXPLORATION PROCEDURES

Hollow-Stem Auger Soil Borings

Our exploratory borings were drilled with a truck-mounted drill rig operated by an independent drilling company working under subcontract to GSC. A total of six (6) hollow-stem auger borings were drilled in July 2011 (designated B-1through B-6) using eight-inch diameter hollow-stem augers. Samples were obtained via an SPT split spoon sampler and the California ring sampler.

A representative from our firm continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to our laboratory for further visual examination and testing, as deemed necessary. After the boring was completed, the borehole was backfilled with soil cuttings.

The SPT split spoon samples were obtained at approximate 5-foot depth intervals by means of the Standard Penetration Test (SPT) per ASTM: D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "SPT blow count." If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

Appendix A

The California ring samples were obtained at 5-foot depth intervals by means of the latest ASTM standard. The California ring sampling procedure consists of driving a standard 3-inch-diameter steel sampler with eighteen 1-inch wide rings, 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded.

The enclosed *Boring Logs* describes the vertical sequence of soils and materials encountered in each boring, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our log indicates the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our log also graphically indicates the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log.

GEOTECHNICAL BORING LOG

PROJECT NAME: TMC
W.O. NO.: 6457
DRILLING COMPANY: Choice
DATE STARTED: 7-26-11
BORING NO.: B-1
TYPE OF DRILL RIG: Auto Hammer
LOGGED BY: RA
SHEET 1 OF 2
DRILLING METHOD: Hollow Stem
HAMMER WEIGHT (LBS): 140
GROUND ELEVATION (FT):
DIAMETER OF HOLE: 8
DROP (IN): 30
GW ELEVATION:
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	Bulk Sample		0-40', ALLUVIUM			
5	California Ring	4/5	@ 5', Brown, silty CLAY, moist, moderately stiff	16.8	104.7	
10	California Ring	3/5	@ 10', Medium brown, slightly sandy SILT, moist, moderately stiff	21.1	93.3	
15	Bulk Sample; California Ring	5/8	@ 15', Orange-brown, silty, very fine SAND to brown, silty, very fine to medium SAND, most, moderately dense	14.7	102.8	
20	California Ring	10/18	@ 20', Orange-brown, fine to coarse SAND, slightly moist, dense	4.2	107.9	
25	California Ring	14/27	@ 25', Orange-brown, very fine to fine SAND with gravel, slighlty moist, dense	5.2	112.1	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-1

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC W.O. NO. 6457
DRILLING COMPANY Choice DATE STARTED: 7-26-11 BORING NO. B-1
TYPE OF DRILL RIG Auto Hammer LOGGED BY RA SHEET 2 OF 2
DRILLING METHOD Hollow Stem HAMMER WEIGHT (LBS) 140 GROUND ELEVATION (FT)
DIAMETER OF HOLE 8 DROP (IN) 30 GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	14/28	@ 30', Medium brown, very fine to coarse SAND with gravel, slighlty moist, dense	5.3	111.6	
35	California Ring	11/7	@ 35', Medium brown, slightly silty, very fine to coarse SAND to brown, sandy SILT (in tip), slightly moist, dense	3.3	103.6	
40	California Ring	18/33	@ 40', Orange-brown, fine to coarse SAND with gravel, slightly moist, dense	6.5	110.3	
			T.D. @ 40' No groundwater			
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-2

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-2
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-32.5', ALLUVIUM			
2.5	California Ring	4/7	@ 2.5', Brown, sandy SILT, moist, moderately stiff	9.4	105.3	
7.5	California Ring	5/5	@ 7.5', Brown, silty, very fine to fine SAND, moist, moderately dense	6.4	103.6	
10-15	Bulk Sample					
12.5	California Ring	5/9	@ 12.5', Orange-brown, silty, very fineto fine SAND, moist, moderately dense	8.5	102.9	
17.5	California Ring	8/12	@ 17.5', Orange-brown, slightly silty, very fine to fine SAND, moist, dense	16.0	98.5	
22.5	California Ring	7/16	@ 22.5', Orange-brown, sandy SILT, moist, stiff	21.4	93.5	
27.5	California Ring	16/26	@ 27.5', Brown, silty, very fine to fine SAND to brown, very silty, very fine SAND, moist, dense	14.9	102.2	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-3

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME: TMC | W.O. NO. 6457
DRILLING COMPANY: Choice | DATE STARTED: 7-26-11 | BORING NO. B-2
TYPE OF DRILL RIG: Auto Hammer | LOGGED BY: RA | SHEET 2 OF 2
DRILLING METHOD: Hollow Stem | HAMMER WEIGHT (LBS): 140 | GROUND ELEVATION (FT):
DIAMETER OF HOLE: 8 | DROP (IN): 30 | GW ELEVATION:
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	15/29	@ 32.5', Brown, slightly silty, very fine to fine SAND to brown, very silty, very fine SAND, moist, dense	5.0	105.5	
35			T.D. @ 32.5' No groundwater			
40						
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-4

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-3
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	Bulk Sample		**0-30', ALLUVIUM**			
5	California Ring	5/5	@ 5', Light brown, very silty, very fine to fine SAND, dry, moderately dense to brown, slighlty clayey SILT	10.5	104.4	
10	California Ring	5/5	@ 10', Medium brown, sandy SILT, slightly moist, moderately stiff	4.5	101.6	
15	California Ring	5/8	@ 15', Brown, sandy SILT, moist, moderately stiff	13.9	104.9	
20	California Ring	8/17	@ 20', Medium brown, slightly silty, very fine to fine SAND, slightly moist, dense	6.3	105.2	
25	California Ring	17/23	@ 25', Medium brown, very fine to fine SAND, slightly moist, dense	5.7	108.0	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-5

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-3
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 2 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	17/29	@ 30', Medium brown, very fine to coarse SAND with gravel, slightly moist, dense	6.4	109.0	
			T.D. @ 30' No groundwater			
35						
40						
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-6

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME: TMC
W.O. NO. 6457
DRILLING COMPANY: Choice
DATE STARTED: 7-26-11
BORING NO. B-4
TYPE OF DRILL RIG: Auto Hammer
LOGGED BY: RA
SHEET 1 OF 2
DRILLING METHOD: Hollow Stem
HAMMER WEIGHT (LBS): 140
GROUND ELEVATION (FT):
DIAMETER OF HOLE: 8
DROP (IN): 30
GW ELEVATION:
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-50', ALLUVIUM			
		5/9	@ 2.5', Medium brown, silty, very fine to fine SAND, slighty moist, moderately dense	4.6	103.5	
5		5/7	@ 5', Brown, clayey SILT, moist, moderately stiff	7.5	97.4	
		4/8	@ 7.5-12.5', Brown, slighlty sandy SILT, moist, moderately stiff	10.6	99.8	
10		5/8		11.5	94.5	
		6/12		22.5	98.7	
15		6/9	@ 15', Brown, silty CLAY, very moist, moderately stiff	17.4	90.3	
		8/13	@ 17.5', Orange-brown, sandy SILT, moist, stiff	12.9	97.7	
20		8/11	@ 20', Brown, silty CLAY, very moist, moderately stiff	17.6	95.9	
		2/2/3	@ 22.5', Brown, sandy SILT, moist, moderately stiff	14.5	-----	
25		8/13	@ 25-27.5', Brown, clayey SILT, moist, moderately stiff	17.1	107.3	
		2/3/3		15.1	-----	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-7

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
DRILLING COMPANY Choice
TYPE OF DRILL RIG Auto Hammer
DRILLING METHOD Hollow Stem
DIAMETER OF HOLE 8
BORING LOCATION:

DATE STARTED: 7-26-11
LOGGED BY RA
HAMMER WEIGHT (LBS) 140
DROP (IN) 30

W.O. NO. 6457
BORING NO. B-4

GROUND ELEVATION (FT)
GW ELEVATION

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
		9/17	@ 30', Brown, clayey SILT to orange-brown, silty, very fine to fine SAND, moist, stiff	9.8	115.9	
		2/3/5	@ 32.5', Orange-brown, slightly sandy SILT, moist, stiff	12.2	-----	
35		12/13	@ 35', Medium brown, silty, very fine SAND, moist, dense	7.0	93.2	
		4/5/8	@ 37.5', Brown, silty CLAY to clayey SILT, moist, stiff	36.8	-----	
40		9/19	@ 40', Brown, clayey SILT, moist, stiff	16.7	104.1	
		7/9/15	@ 42.5-45', Brown, sandy SILT with clay, moist, stiff	13.6	-----	
45		9/17		10.9	102.0	
		8/11/14	@ 47.5-50', Brown, clayey SILT, moist, stiff	24.2	-----	
50		9/22	T.D. @ 50' No groundwater	25.6	106.3	
55						

LEGEND

Standard Penetration Test
California Ring
Rock Core
Bulk Sample
Shelby Tube
Water Seepage
Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-8

GeoSoils Consultants, Inc.
GEOTECHNICAL ★ GEOLOGIC ★ ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-27-11
BORING NO. B-5
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			<u>0-15', FILL</u>			
5		10/14	@ 5', Orange-brown, slightly sandy, clayey SILT, moist, stiff	23.0	106.3	
10		11/16	@ 10', Orange-brown to dark brown, sity, very fine to medium SAND with gravel, moist, dense	10.0	119.9	
		12/12	@ 12.5', Dark gray-black, silty, very fine to medium SAND with gravel (strong petroleum odor), moist, dense	12.0	121.9	
15		11/11	<u>15-51', ALLUVIUM (Qal)</u> @ 15', Brown, silty, very fine to fine SAND, moist, dense	8.7	126.1	
		6/7	@ 17.5', Brown, sandy, silty CLAY, moist, stiff	7.4	116.0	
20		6/13	@ 20-25', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	5.8	119.2	
		9/13		5.9	118.0	
25		3/3/3		6.4	-----	
		9/14	@ 27.5', Orange-brown, silty, very fine to medium SAND with gravel, moist, dense	6.6	113.5	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-9

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME: TMC
W.O. NO.: 6457
DRILLING COMPANY: Choice
DATE STARTED: 7-27-11
BORING NO.: B-5
TYPE OF DRILL RIG: Auto Hammer
LOGGED BY: RA
SHEET 2 OF 2
DRILLING METHOD: Hollow Stem
HAMMER WEIGHT (LBS): 140
GROUND ELEVATION (FT):
DIAMETER OF HOLE: 8
DROP (IN): 30
GW ELEVATION:
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	Standard Penetration Test	2/3/3	@ 30', Orange-brown, silty, very fine to fine SAND, moist, dense	9.1	-----	
	California Ring	7/13	@ 32.5', Brown, silty, very fine to coarse SAND, moist, dense	7.2	124.5	
35	Standard Penetration Test	3/4/5	@ 35-42.5', Brown, silty, very fine to coarse SAND with gravel, moist, dense	7.6	-----	
	California Ring	18/33		7.9	128.5	
40	Standard Penetration Test	9/10/11		6.0	-----	
	California Ring	18/40		7.0	126.2	
45	Standard Penetration Test	7/10/10	@ 45', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	5.8	-----	
	California Ring	19/34	@ 47.5-51', Brown, silty, very fine to coarse SAND with gravel, moist, dense	7.4	126.3	
50	Standard Penetration Test	10/9/9		10.1	-----	
			T.D. @ 51' No groundwater Refusal @ 51'			
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-10

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-27-11
BORING NO. B-6
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 1
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-2.5', AC @ 0-4', orange-brown, gravelly, very fine to coarse SAND (fill)			
			2.5-4', FILL			
			4-20', ALLUVIUM			
5	California Ring	4/5	@ 5', Brown, slightly sandy, silty CLAY, moist, medium stiff	4.9	100.7	
10	California Ring	7/9	@ 10', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	6.8	110.1	
15	California Ring	7/9	@ 15', Orange-brown, silty, very fine to fine SAND to sandy SILT, moist, dense	4.6	102.7	
20	California Ring	6/10	@ 20', Orange-brown, silty, very fine to fine SAND, moist, dense	8.3	99.0	
			T.D. @ 20' No groundwater			
25						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-11

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

September 13, 2011
W.O. 6457
(Revised February 2, 2012)

APPENDIX B

LABORATORY TESTING PROCEDURES AND RESULTS

APPENDIX B

LABORATORY TESTING PROCEDURES AND RESULTS

Moisture-Density

The field moisture content and dry unit weights were determined for each undisturbed ring sample obtained from our subsurface exploration. Once the dry unit weights had been determined, in-place densities of underlying soil profile were estimated. In those cases where ring samples were obtained, the moisture content and dry unit weights of selected samples are presented on the enclosed *Boring Logs* (Plates A-1 through A-11).

Consolidation Tests

Six (6) consolidation tests were performed on selected ring samples. The samples were inundated at an approximate load of one ton per square foot to monitor the hydroconsolidation. Loads were applied to the samples in several increments in geometric progression and resulting deformations were recorded at selected time intervals. Results of the consolidation tests are presented on Plates C-1 through C-6.

Direct Shear Tests

Two shear test were performed in a strain-control type Direct Shear Machine. The samples were sheared under varying confining loads in order to determine the Coulomb shear strength parameters: cohesion (c), and angle of internal friction (ϕ) for peak and residual strength conditions. Samples that were tested in order to obtain shear strengths for compacted fill parameters were remodeled to 90 percent of maximum. All samples were tested in an artificially-saturated condition. The results are plotted and a linear approximation is drawn of the failure curve. Results are shown on the Shear Test Diagram included with this appendix, as Plates SH-1 and SH-2.

Appendix B

Compaction Tests

Compaction tests were performed to determine to moisture density relationships of the typical soils encountered on the site. The laboratory standard used was in accordance with ASTM Test Designation D-1557-09. A summary of the compaction test results is shown in the following Table:

COMPACTION TEST RESULTS				
Boring No. and Sample Depth	Description	Maximum Dry Density (psf)	Optimum Moisture (%)	Expansion Index
B-3 @ 0-5'	Orange-brown, silty, very fine to fine SAND	123.5	11.5	Low

Grain-Size Analysis

Washed sieve analyses of selected representative samples were performed for grain-size determination in accordance with California Test 202. A graphical grain size distribution curve is shown on Plates G-1 through G-3.

Read
W.O.: 6096

Date of Test: 1/08

Sample: B-1 @ 0 - 5.0'

GeoSoils Consultants, Inc.

PLATE SH-1

Geotechnical Engineering * Engineering Geology

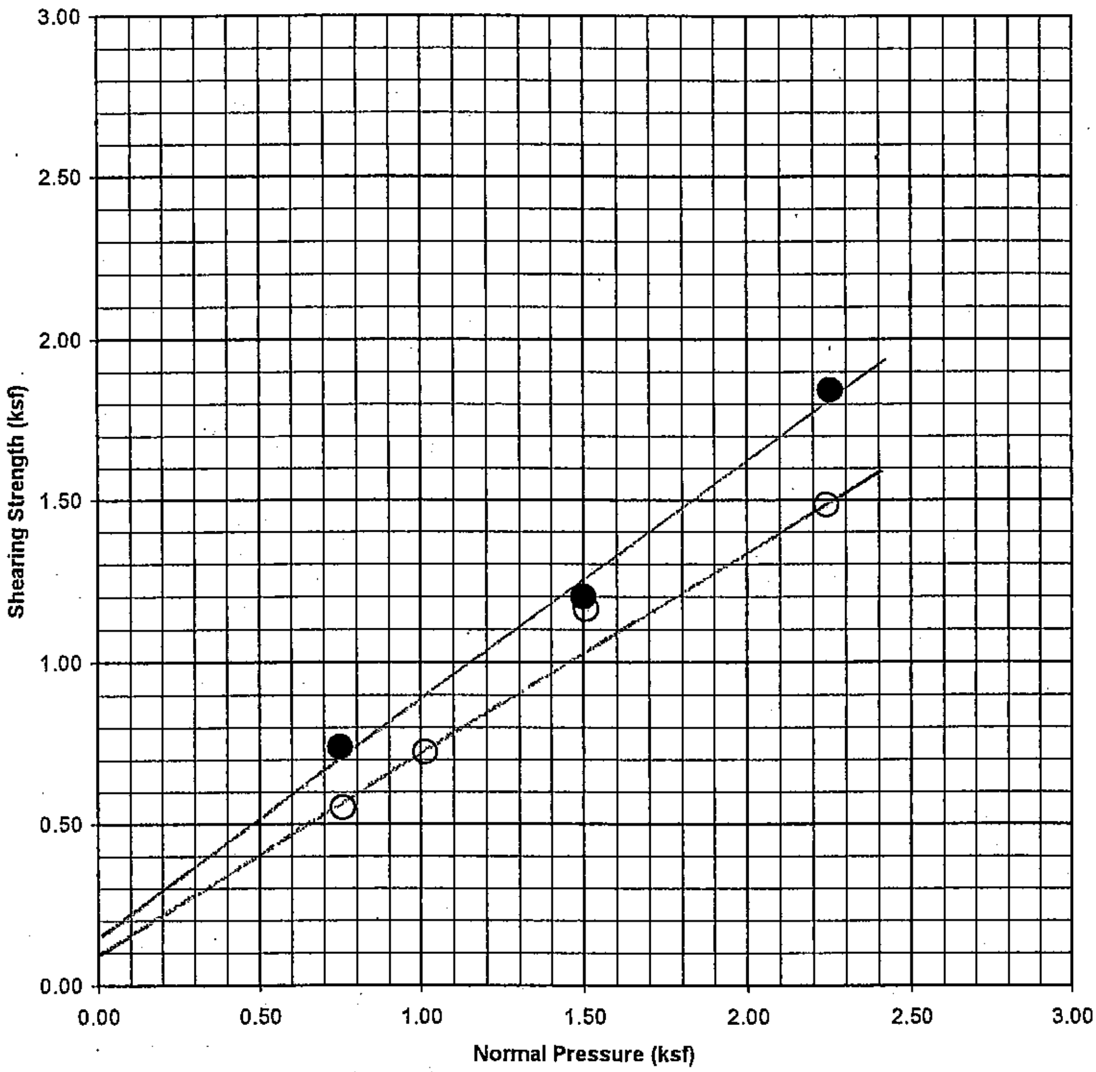
Shear Test Diagram

Peak

C(psf): **160** Phi (degrees): **36.0**

Reshear

C(psf): **100** Phi (degrees): **31.5**



Direct Shear, Peak / Reshear Speed: .005 in./min.

● Peak Values ○ Reshear Values

Sample Remolded to 90% Relative Density, saturated.
Remolded Dry Density = 97.1 PCF

Orange-brown, silty, fine SAND.

MAX: 105.5 PCF: 16.0%

15.7% Saturated Moisture Content
6457.2

TMC
W.O.: 6457

GeoSoils Consultants, Inc.

PLATE SH-2

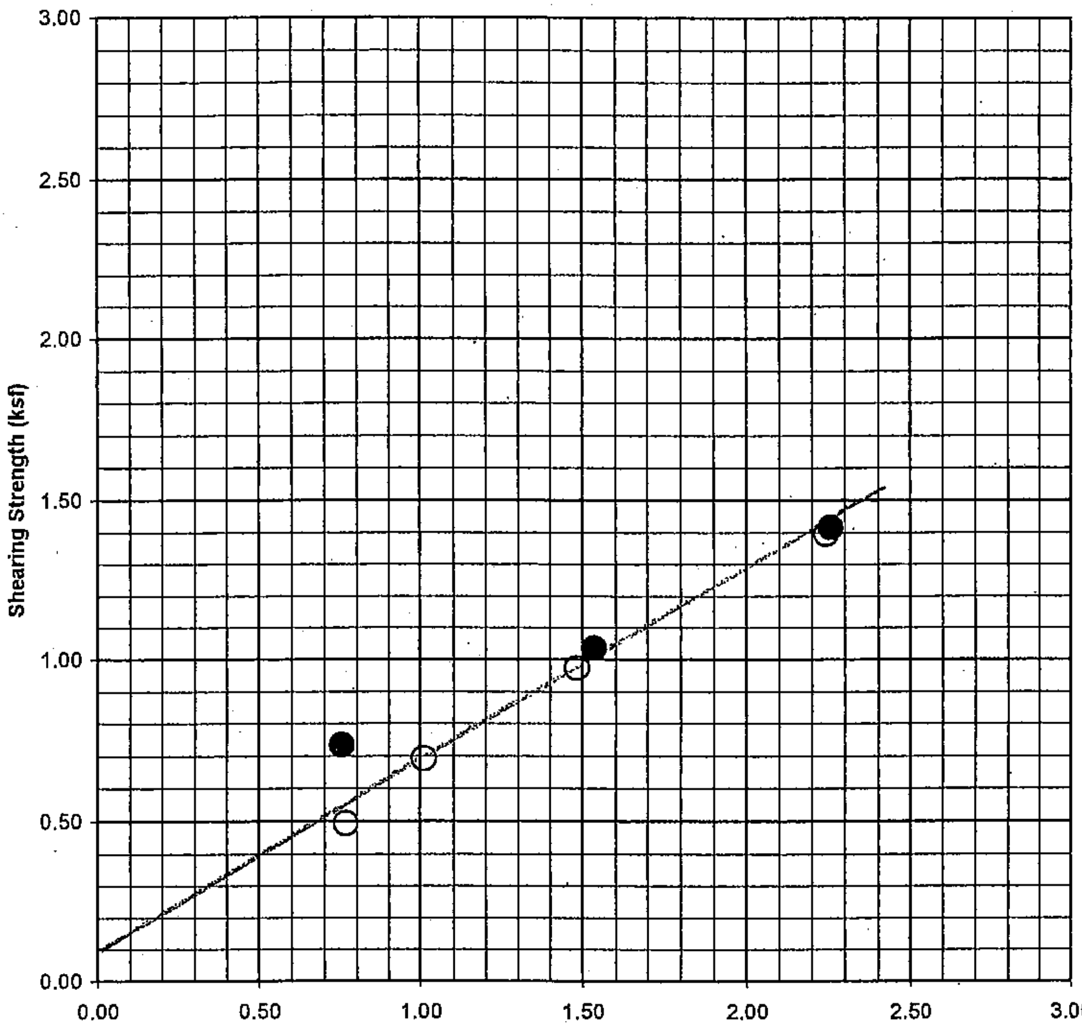
Date of Test: 8/11

Geotechnical Engineering * Engineering Geology

Sample: B-1 @ 10.0'

Shear Test Diagram
Peak
C(psf): 100 Phi (degrees): 30.0

Reshear
C(psf): 100 Phi (degrees): 30.0



Normal Pressure (ksf)
Direct Shear, Peak / Reshear Speed: .001 in./min.

● Peak Values ○ Reshear Values

Undisturbed **Natural** Shear-Saturated

Brown, silty CLAY.

21.9% Saturated Moisture Content

6457.1

TMC
W.O.: 6457

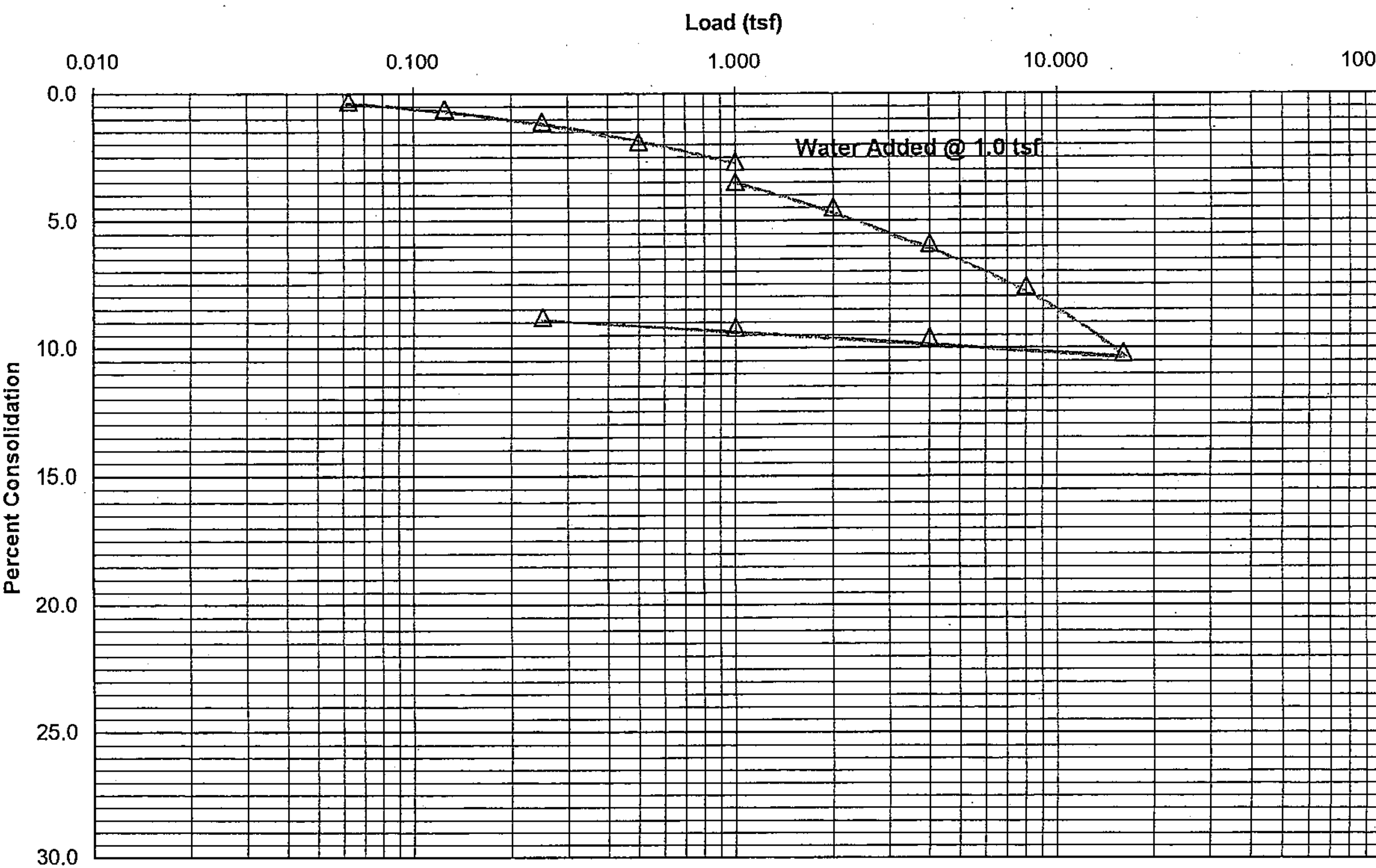
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 4.2 After: 18.5

Sample(in.)
Height: 1.00 Diameter: 2.36



B-1 @ 20.0'
Orange-brown, very fine to coarse SAND.

Consolidation Diagram

C6457.1

Plate C-1

TMC
W.O.: 6457

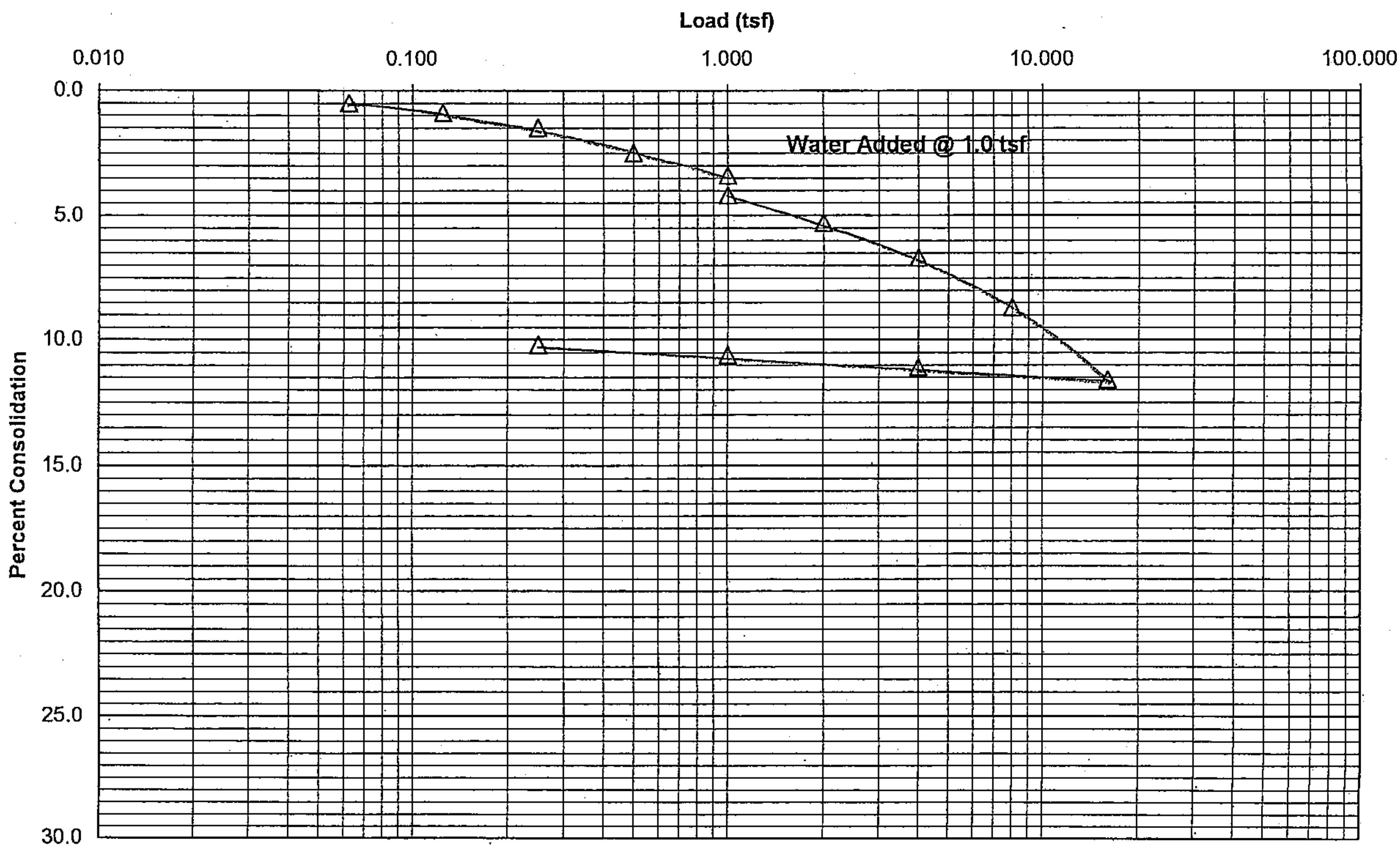
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 3.3 After: 15.2

Sample(in.)
Height: 1.00 Diamêter: 2.36



B-1 @ 35.0'
Medium-brown, fine to coarse SAND w/ gravel.

Consolidation Diagram

C6457.2

Plate C-2

TMC
W.O.: 6457

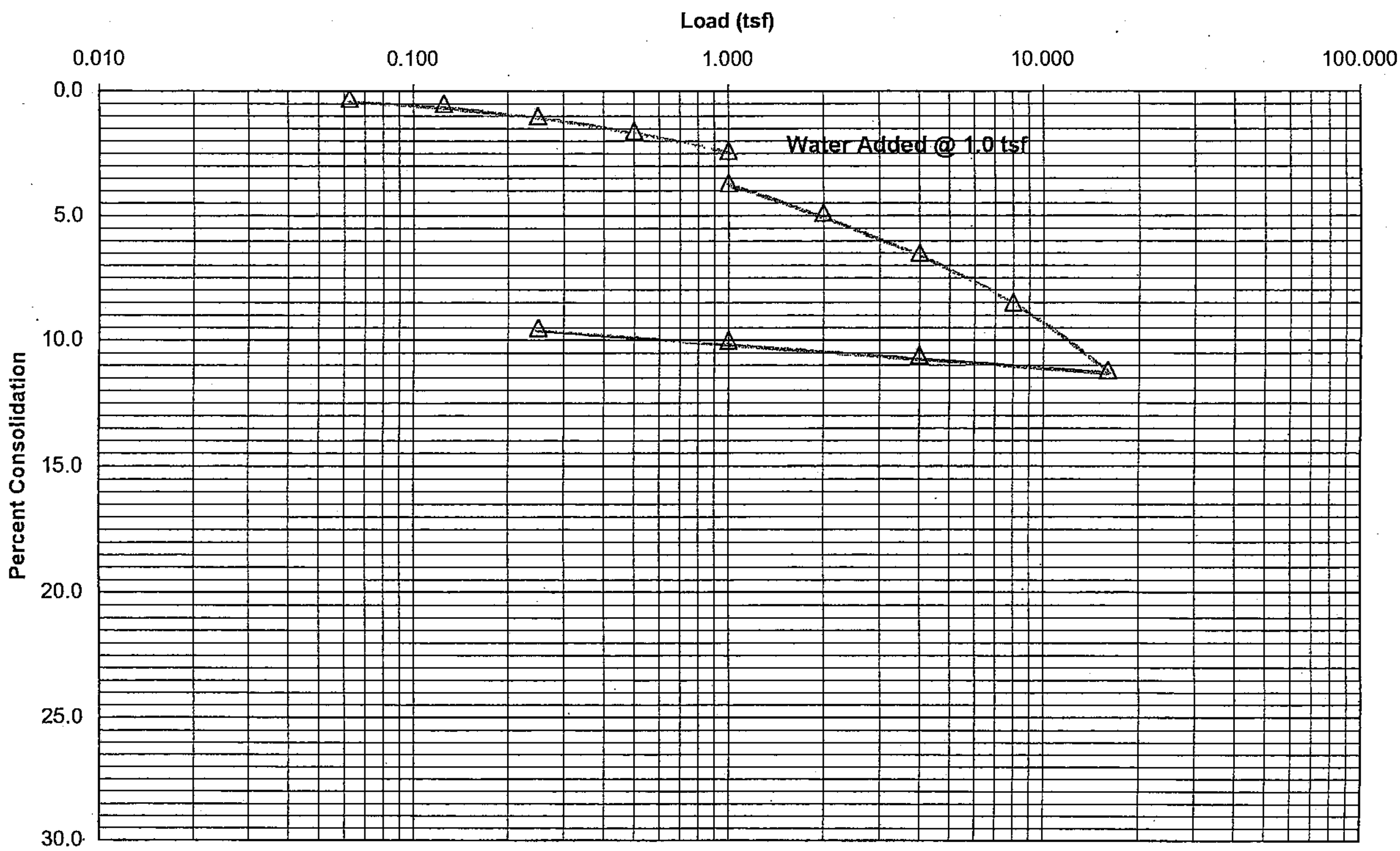
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 6.4 After: 16.8

Sample(in.)
Height: 1.00 Diameter: 2.36



B-2 @ 7.5'
Orange-brown, silty, very fine to fine SAND w/ some coarse sand.

Consolidation Diagram

C6457.3

Plate C-3

TMC
W.O.: 6457

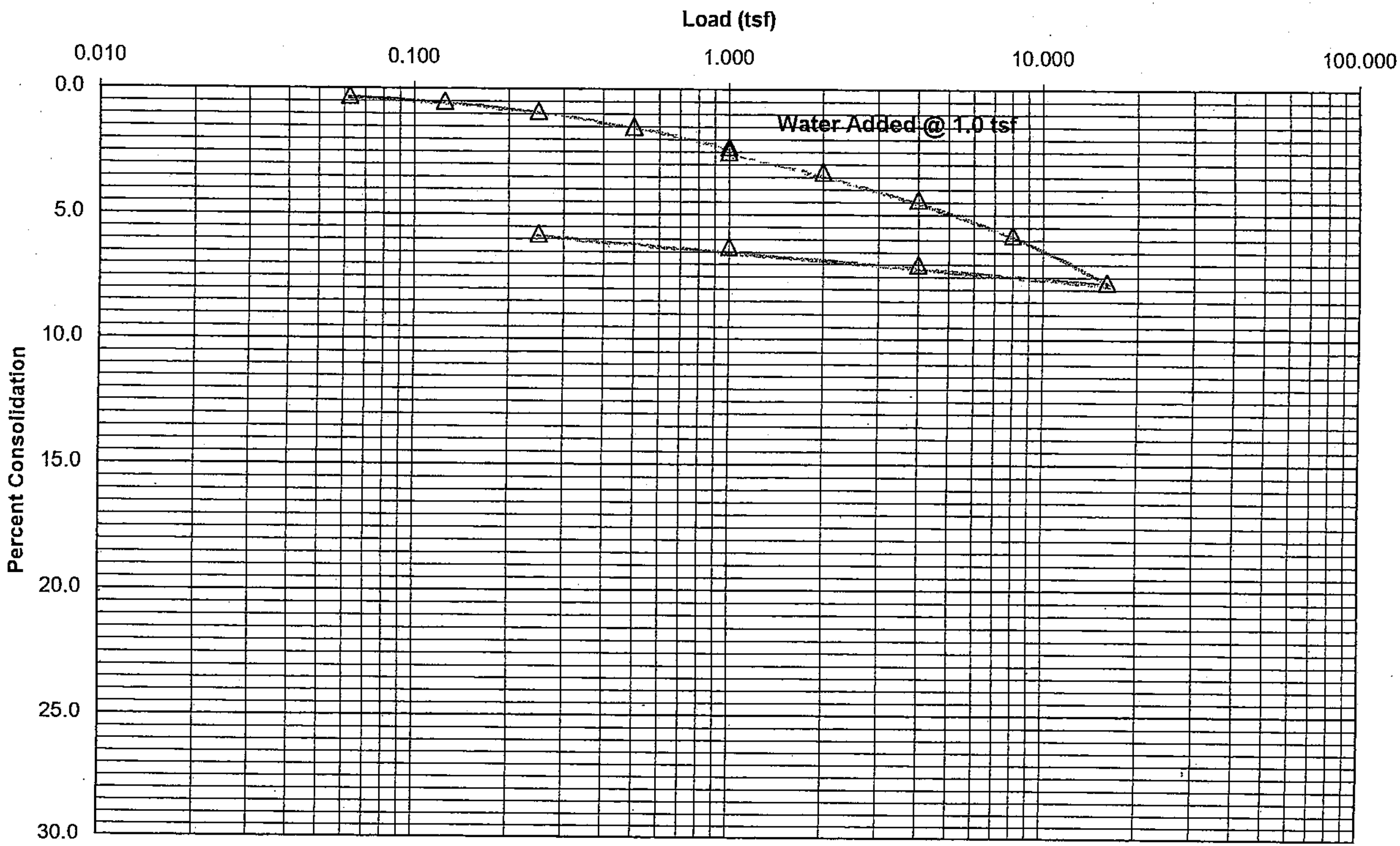
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 16.0 After: 18.2

Sample(in.)
Height: 1.00 Diameter: 2.36



B-2 @ 17.5'
Brown, very silty, very fine to fine SAND w/ sandy silt.

Consolidation Diagram

C6457.4

Plate C-4

TMC
W.O.: 6457

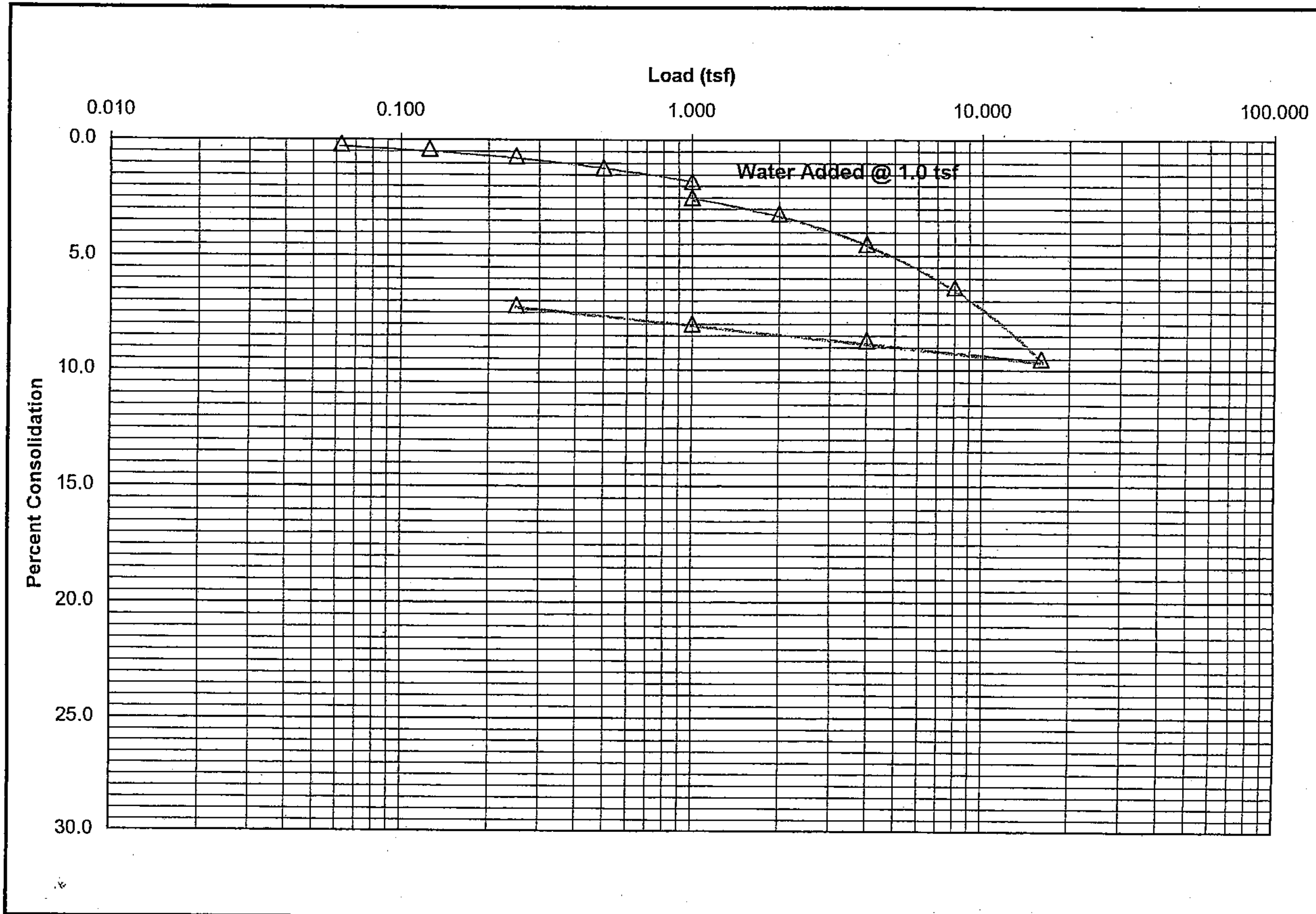
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 4.5 After: 17.9

Sample(in.)
Height: 1.00 Diameter: 2.36



B-3 @ 10.0'
Brown, sandy SILT, w/ silty very fine sand and clayey silt.

Consolidation Diagram

C6457.5

Plate C-5

TMC
W.O.: 6457

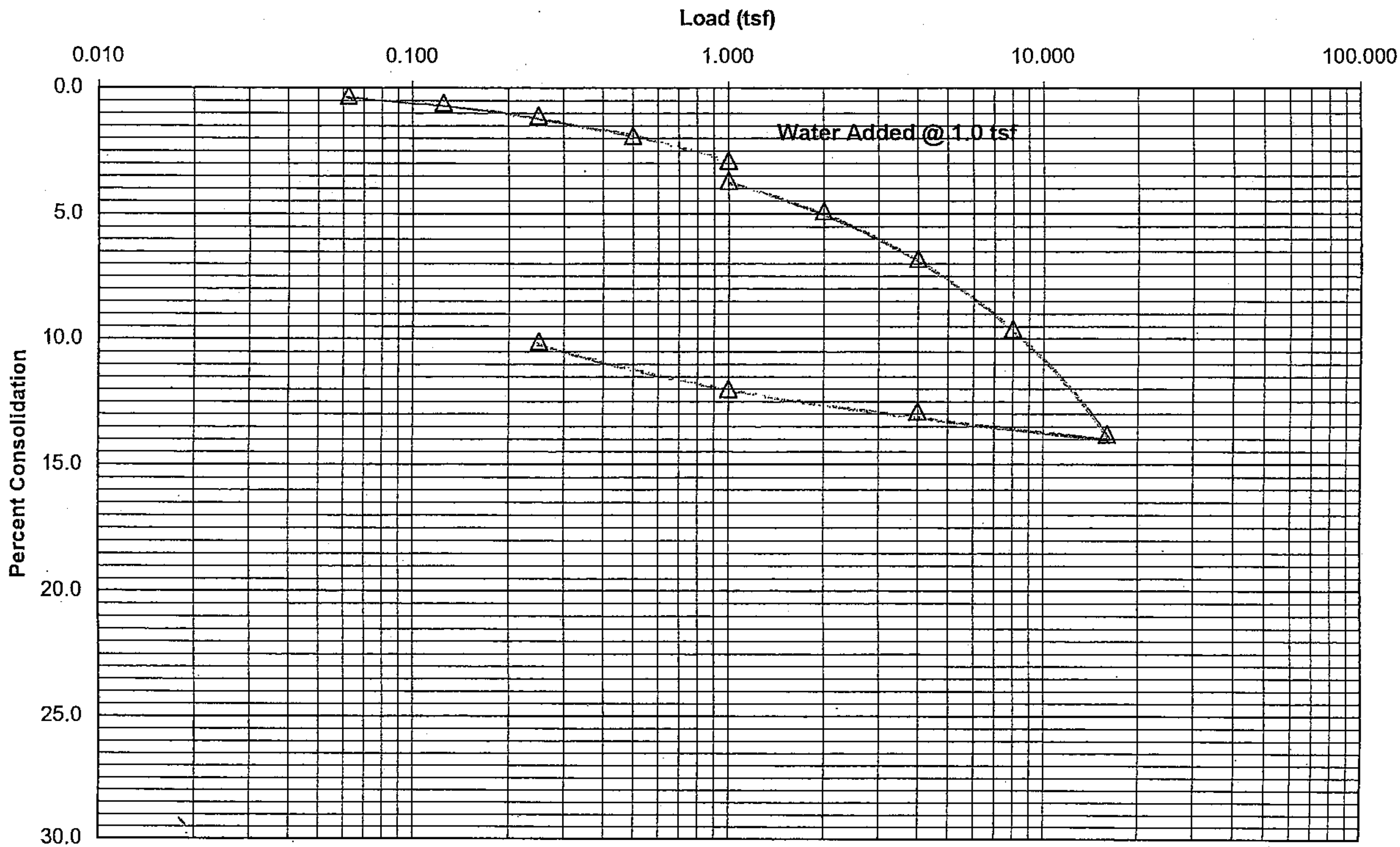
Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture(%)
Before: 4.9 After: 26.0

Sample(in.)
Height: 1.00 Diameter: 2.36



B-6 @ 5.0'
Brown, sandy SILT.

Consolidation Diagram

C6457.6

Plate C-6

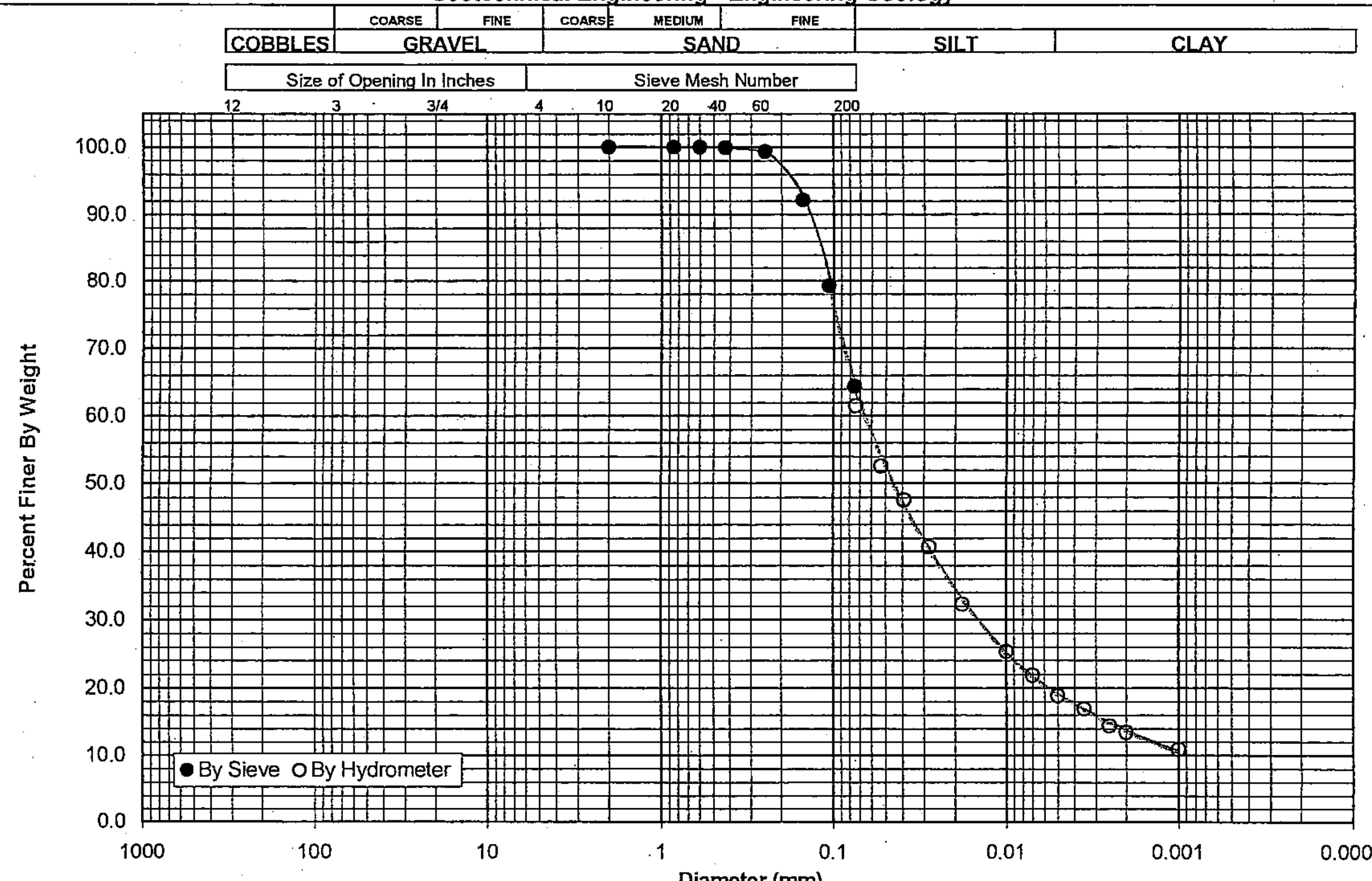
TMC
W.O. 6457

Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture (%): 13.6
Liquid Limit (%):
Plastic Limit (%):
Plasticity Index :



Grain Size Analysis

B-4 @ 42.5'
Brown, fine sandy SILT, w/ clay.

SH6457.1

Plate G-1

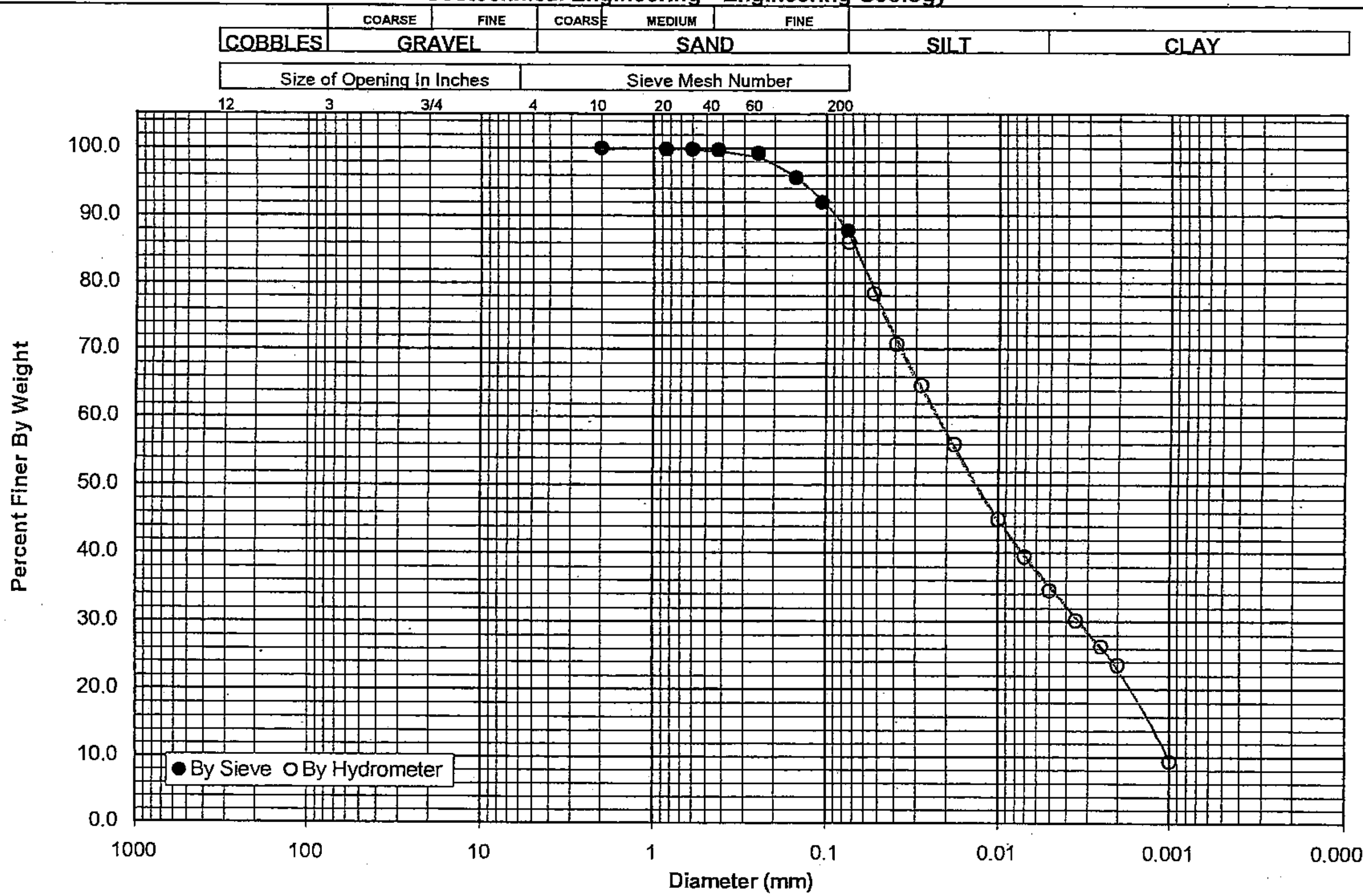
TMC
W.O. 6457

Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture (%): 24.2
Liquid Limit (%):
Plastic Limit (%):
Plasticity Index :



Grain Size Analysis

B-4 @ 47.5'
Brown, clayey SILT, w/ fine sand.

SH6457.2

Plate G-2

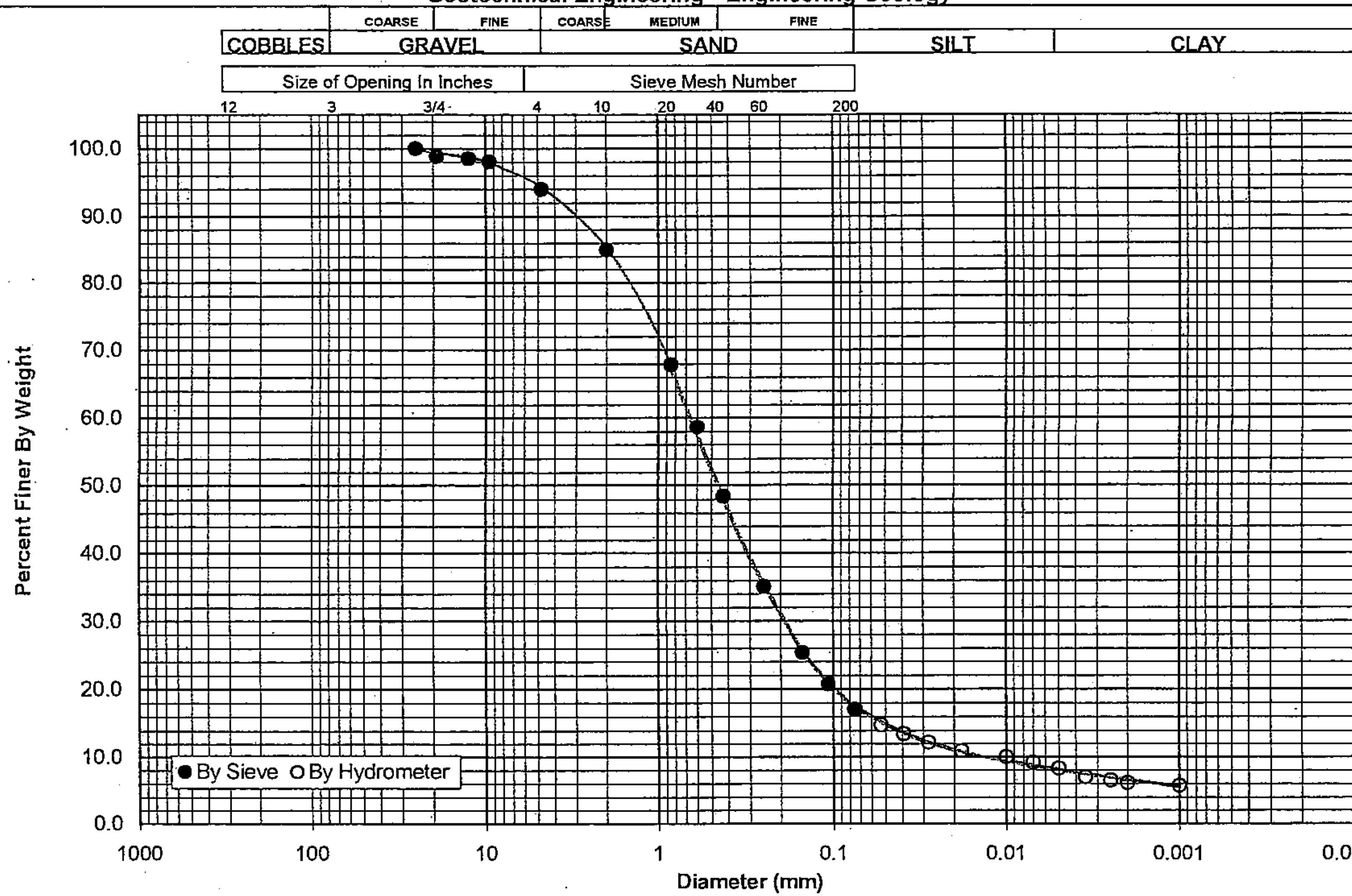
TMC
W.O. 6457

Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture (%): 13.6
Liquid Limit (%):
Plastic Limit (%):
Plasticity Index :



Grain Size Analysis

B-5 @ 45.0'
Orange-brown, silty, fine to coarse SAND.

SH6457.3

Plate G-3

Table 1 - Laboratory Tests on Soil Samples

GeoSoils Consultants, Inc.
TMC
Your #6457, HDR|Schiff #11-0754LAB
1-Aug-11

Sample ID			B-3 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	92,000
minimum		ohm-cm	5,520
pH			8.0
Electrical Conductivity		mS/cm	0.08
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	65
magnesium	Mg^{2+}	mg/kg	10
sodium	Na^{1+}	mg/kg	14
potassium	K^{1+}	mg/kg	29
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	192
fluoride	F^{1-}	mg/kg	3.5
chloride	Cl^{1-}	mg/kg	3.2
sulfate	SO_4^{2-}	mg/kg	13
phosphate	PO_4^{3-}	mg/kg	5.2
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	11
sulfide	S^{2-}	qual	na
Redox		mV	na

Minimum resistivity per CTM 643, Chlorides per CTM 422, Sulfates per CTM 417
Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Table 1 - Laboratory Tests on Soil Samples

GeoSoils Consultants, Inc.
TMC
Your #6457, HDR|Schiff #11-0771LAB
3-Aug-11

Sample ID			B-5 @ 4-9'
Resistivity		**Units**	
as-received		ohm-cm	12,400
minimum		ohm-cm	2,240
pH			8.0
Electrical Conductivity		mS/cm	0.13
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	44
magnesium	Mg^{2+}	mg/kg	17
sodium	Na^{1+}	mg/kg	86
potassium	K^{1+}	mg/kg	11
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	232
fluoride	F^{1-}	mg/kg	3.8
chloride	Cl^{1-}	mg/kg	11
sulfate	SO_4^{2-}	mg/kg	69
phosphate	PO_4^{3-}	mg/kg	8.8
Other Tests			
ammonium	NH_4^{1+}	mg/kg	ND
nitrate	NO_3^{1-}	mg/kg	36
sulfide	S^{2-}	qual	na
Redox		mV	na

Minimum resistivity per CTM 643, Chlorides per CTM 422, Sulfates per CTM 417
Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

September 13, 2011
W.O. 6457
(Revised February 2, 2012)

APPENDIX C

ENGINEERING ANALYSES

APPENDIX C

ENGINEERING ANALYSES

1.0 Introduction

XSTABL is a fully integrated slope stability analysis program. It permits the Engineer to develop the slope geometry interactively and perform the slope analysis from within a single program. The slope analysis portion of XSTABL uses a modified version of the popular STABL program, originally developed at Purdue University.

XSTABL performs a two dimensional limit equilibrium analysis to compute the factor-of-safety for a layered slope using the modified Bishop or Janbu methods. The program can be used to search for the most critical surface or the factor-of-safety may be determined for specific surfaces. XSTABL, Version 5.20 is programmed to handle:

1. heterogenous soil systems;
2. anisotropic soil strength properties;
3. reinforced slopes;
4. non-linear Mohr-Coulomb strength envelope;
5. pore water pressures for effective stress analysis using:
    a) Phreatic and piezometric surfaces
    b) pore pressure grid
    c) R_u factor
    d) constant pore water pressure
6. pseudo-static earthquake loading;
7. surcharge boundary loads;
8. automatic generation and analysis of an unlimited number of circular, non-circular and block-shaped failure surfaces;
9. analysis of right-facing slopes;
10. both SI and Imperial units.

Appendix C

2.0 General Information

If the reviewer wishes to obtain more information concerning slope stability analysis, the following publications may be consulted:

1. The Stability of Slopes, by E.N. Bromhead, Surrey University Press, Chapman and Hall, NY, 374 pages, ISBN 0 412 01061 5 (1985).

2. Rock Slope Engineering, by E. Hoek and J.W. Bray, Inst. of Mining and Metrallurgy, London, England, Third Edition, 358 pages, ISBN 0900488 573 (1981).

3. Landslides: Analysis and Control, by R.L. Schuster and R.J. Krizek (editors), Special Report 176, Transportation Research Board, National Academy of Sciences, 234 pages, ISBN 0 309 02804 3 (1978).

3.0 XSTABL Features

The present version of XSTABL contains the following features:

1. Allows the user to calculate factors-of-safety for static stability and dynamic stability situations.
2. Allows user to analyze stability situations for different failure modes.
3. Allows user to edit input for slope geometry and calculate corresponding factor-of-safety.
4. Allows user to readily review on-screen the input slope geometry.
5. Allows user to automatically generate and analyze an unlimited number of circular, non-circular and block-shaped failure surfaces (i.e., bedding plane, slide plane, etc.).

Appendix C

4.0 Input Data

Input data includes the following items:

1. Unit weight, cohesion, friction angle of bedrock material, alluvium and fill.
2. Slope geometry, surcharge boundary loads and water surface elevations.
3. Water level conditions for full basin and rapid draw down conditions.
4. Pseudo-static earthquake loading.

5.0 Output Information

Output information includes:

1. All input data.
2. Factors-of-safety for the ten most critical surfaces.
3. High quality plots can be generated. The plots include the slope geometry, the critical surfaces and the factor-of-safety.

6.0 Stability Analysis

GeoSoils Consultants, Inc. has performed slope stability analyses for the proposed development as depicted on the following Geologic-Sections:

- Geologic Cross-Section A-A': Mode 1 – Circular Failure Analysis
- Geologic Cross Section A-A': Mode 2 - Circular Failure Analysis, Water in Basin
- Geologic Cross Section A-A': Mode 3 - Circular Failure Analysis, Rapid Drawdown
- Geologic Cross Section B-B', Mode 1- Circular Failure Analysis

Appendix C

Soil Parameters: Soil properties used in our slope stability analyses, which include cohesion, friction angle, and unit weight, are shown on Table C-1.

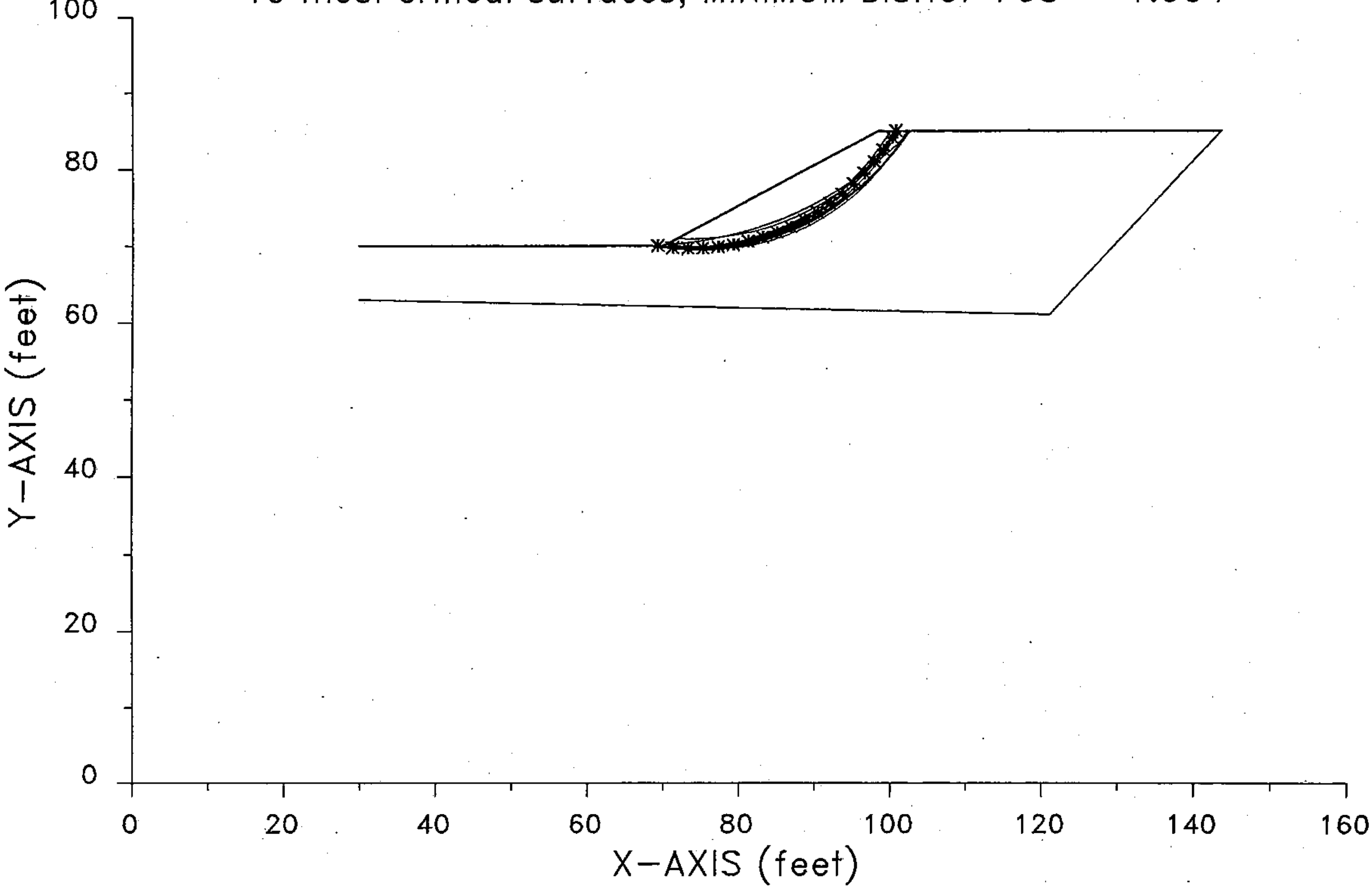
TABLE C-1 SHEAR TEST DATA SUMMARY					
Soil Description	Peak Values		Resheared Values		Unit Weight (pcf)
	c (psf)	ϕ (degrees)	c (psf)	ϕ (degrees)	
Alluvium (Qal)	100	30	100	30	130
Certified Artificial Fill (Caf)	100	31.5	160	36	137.7
Older Alluvium (Qog, obtained from Seismic Hazard Report by California Geological Survey, Newhall Quadrangle)	300	31	300	31	130

Results: The results of the analyses are presented in Table C-2. Detailed outputs of the results of our analyses are included at the end of this appendix.

TABLE C-2 RESULTS OF ANALYSES				
Cross-Section	Mode	Description	Factor-of-Safety	
			Static	Seismic
A-A'	1	Circular Failure Analysis	1.90	1.80
A-A'	2	Circular Failure Analysis, Water in Basin	1.82	-----
A-A'	3	Circular Failure Analysis, Rapid Drawdown	1.52	-----
B-B'	1	Circular Failure Analysis	1.75	1.27

ASTAT1 9-06-** 14:31

6457, Section A, Static, No Water
10 most critical surfaces, MINIMUM BISHOP FOS = 1.904



XSTABL File: ASTAT1   9-06-**   14:31

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******************************************
*              X S T A B L               *
*                                        *
*       Slope Stability Analysis         *
*             using the                  *
*          Method of Slices              *
*                                        *
*        Copyright (C) 1992 Ä 96         *
*   Interactive Software Designs, Inc.   *
*       Moscow, ID 83843, U.S.A.         *
*                                        *
*          All Rights Reserved           *
*                                        *
*  Ver. 5.200                96 Ä 1288   *
******************************************
```

Problem Description : 6457, Section A, Static, No Water

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	98.5	85.0	1
3	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

---

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	137.7	100.0	31.50	.000	.0	0
2	130.0	130.0	100.0	30.00	.000	.0	0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 60.0 ft and x = 75.0 ft

Each surface terminates between x = 95.0 ft and x = 106.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	69.31	70.00
2	71.30	69.77
3	73.29	69.67
4	75.29	69.69
5	77.29	69.84
6	79.27	70.12
7	81.23	70.53
8	83.16	71.06
9	85.05	71.71
10	86.89	72.48
11	88.68	73.37
12	90.41	74.37
13	92.08	75.48
14	93.67	76.69
15	95.18	78.01
16	96.60	79.42
17	97.93	80.91
18	99.16	82.49
19	100.28	84.14
20	100.79	85.00

**** Simplified BISHOP FOS = 1.904 ****

The following is a summary of the TEN most critical surfaces

Problem Description : 6457, Section A, Static, No Water

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.904	73.91	100.91	31.25	69.31	100.79	4.612E+05
2.	1.905	73.97	104.41	34.66	69.83	102.68	5.591E+05
3.	1.910	74.86	99.77	30.19	69.83	101.17	4.739E+05
4.	1.912	73.29	100.68	31.01	68.79	100.02	4.283E+05
5.	1.914	74.79	103.00	33.12	70.34	102.57	5.337E+05
6.	1.915	72.39	103.54	33.85	67.76	100.71	4.757E+05
7.	1.919	67.94	118.22	48.10	70.34	102.71	5.991E+05
8.	1.920	73.87	105.13	34.19	71.90	101.50	4.231E+05
9.	1.924	74.31	102.58	33.13	68.28	102.38	5.620E+05
10.	1.928	75.61	100.09	30.64	69.83	102.27	5.313E+05

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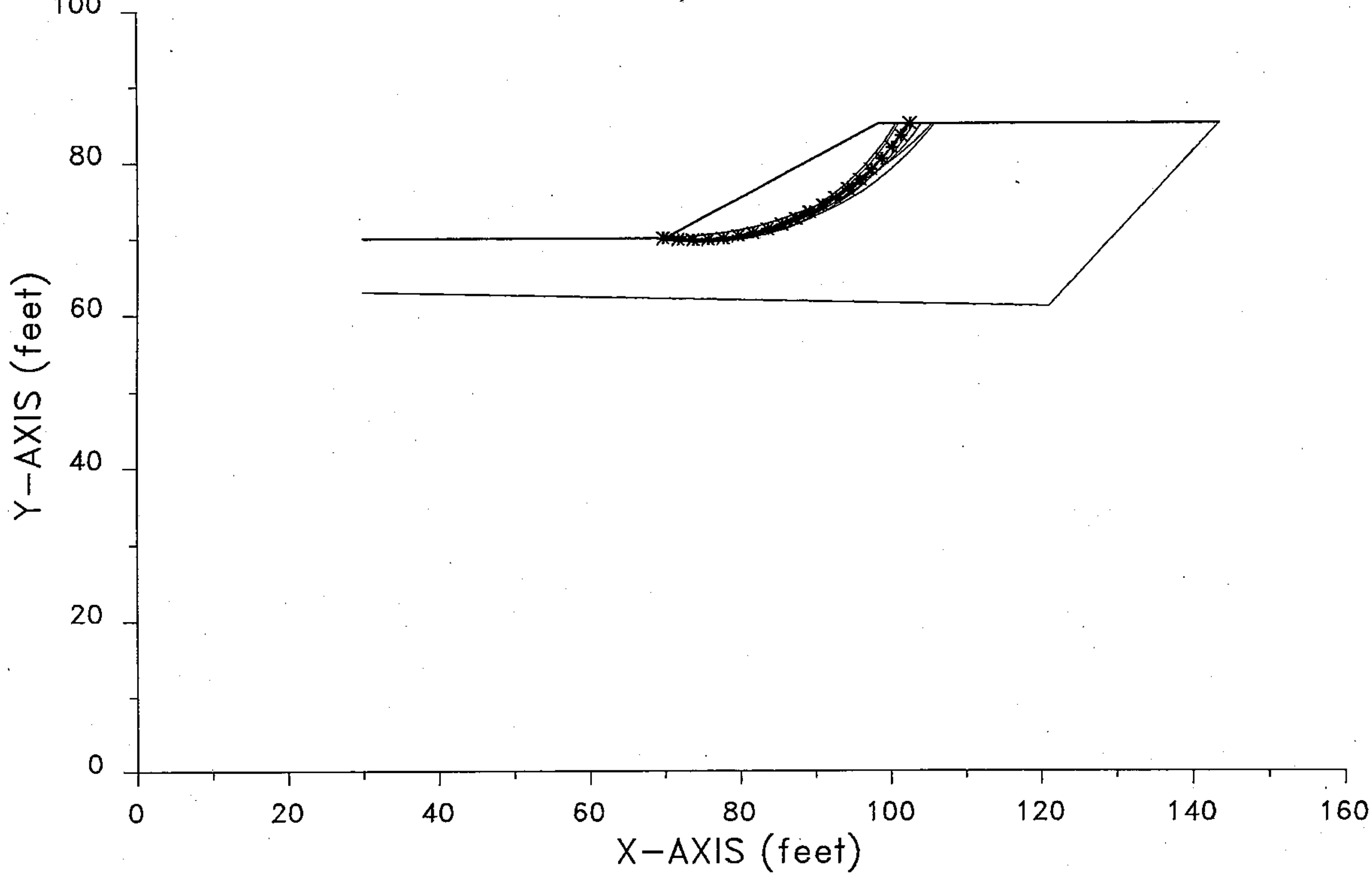
ASEIS1 9-06-** 14:33

6457, Section A, Seismic, No Water
10 most critical surfaces, MINIMUM BISHOP FOS = 1.800



XSTABL File: ASEIS1   9-06-**   14:33

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```

Problem Description : 6457, Section A, Seismic, No Water

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	98.5	85.0	1
3	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

---

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	137.7	160.0	36.00	.000	.0	0
2	130.0	130.0	100.0	30.00	.000	.0	0

A horizontal earthquake loading coefficient
of .150 has been assigned

A vertical earthquake loading coefficient
of .000 has been assigned

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced
along the ground surface between x = 60.0 ft
and x = 75.0 ft

Each surface terminates between x = 95.0 ft
and x = 106.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	69.83	70.00
2	71.82	69.82
3	73.82	69.75
4	75.82	69.80
5	77.81	69.97
6	79.79	70.24
7	81.75	70.64
8	83.69	71.14
9	85.59	71.76
10	87.45	72.48
11	89.27	73.31
12	91.04	74.25
13	92.75	75.28
14	94.40	76.42
15	95.98	77.64
16	97.49	78.96
17	98.92	80.35
18	100.27	81.83
19	101.52	83.39
20	102.68	85.00

**** Simplified BISHOP FOS = 1.800 ****

The following is a summary of the TEN most critical surfaces

Problem Description : 6457, Section A, Seismic, No Water

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.800	73.97	104.41	34.66	69.83	102.68	6.880E+05
2.	1.808	74.79	103.00	33.12	70.34	102.57	6.562E+05
3.	1.818	74.86	99.77	30.19	69.83	101.17	5.832E+05
4.	1.819	73.83	107.35	37.76	68.28	104.25	8.367E+05
5.	1.819	74.67	109.37	39.67	69.83	105.95	9.450E+05
6.	1.820	75.61	100.09	30.64	69.83	102.27	6.511E+05
7.	1.822	74.31	102.58	33.13	68.28	102.38	6.921E+05
8.	1.823	70.83	118.69	48.52	70.34	105.72	9.743E+05
9.	1.823	73.91	100.91	31.25	69.31	100.79	5.702E+05
10.	1.826	76.26	100.95	31.33	70.34	103.21	6.910E+05

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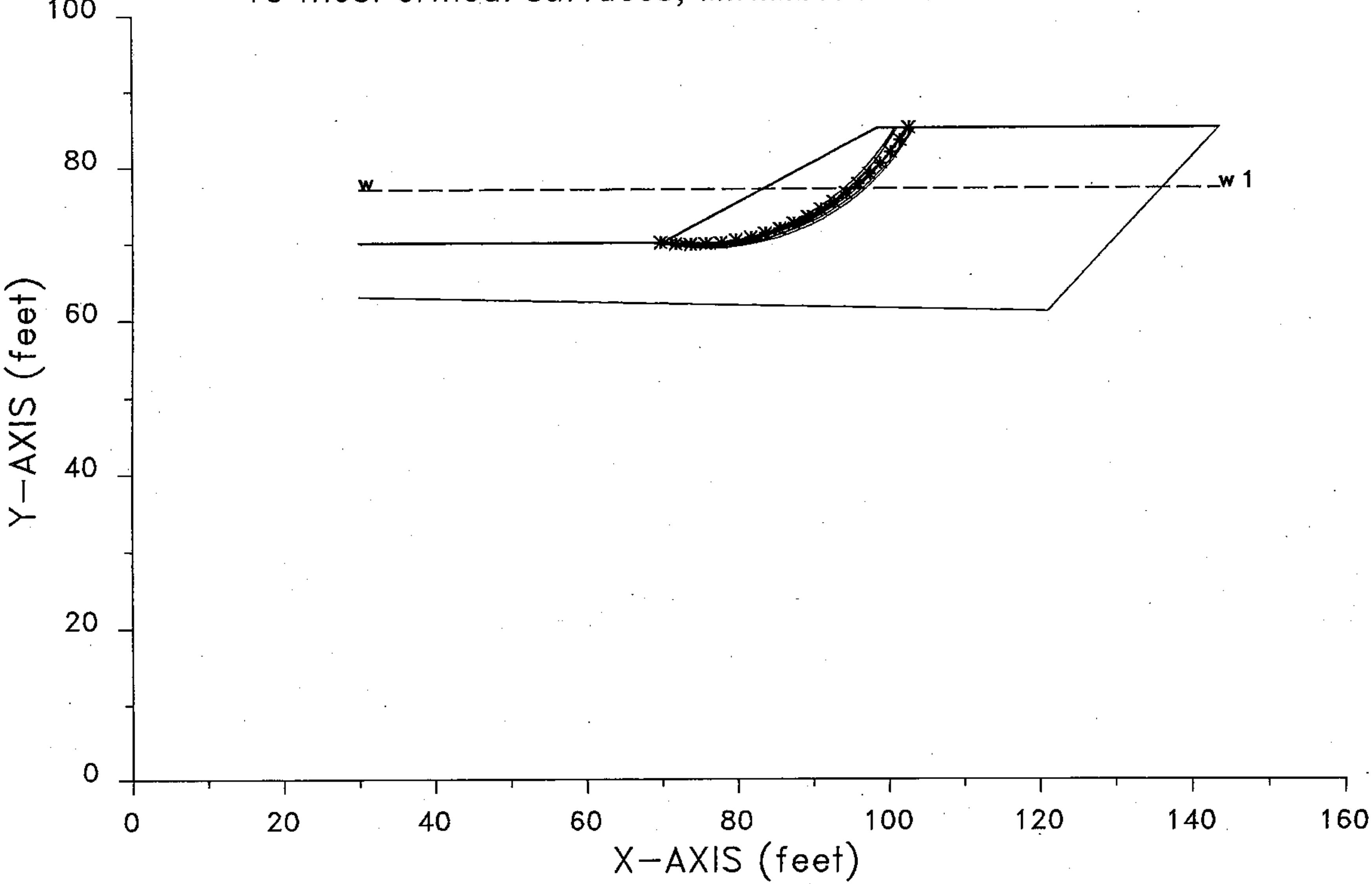
ASTAT2 9-06-** 14:56

6457, Section A, Static, Water
10 most critical surfaces, MINIMUM BISHOP FOS = 1.822



XSTABL File: ASTAT2   9-06-**   14:56

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```

Problem Description : 6457, Section A, Static, Water

SEGMENT BOUNDARY COORDINATES

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	98.5	85.0	1
3	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	143.7	100.0	31.50	.000	.0	1
2	130.0	135.0	100.0	30.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	30.00	77.00
2	143.50	77.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 60.0 ft
and x = 75.0 ft

Each surface terminates between x = 95.0 ft
and x = 106.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	69.83	70.00
2	71.82	69.82
3	73.82	69.75
4	75.82	69.80
5	77.81	69.97
6	79.79	70.24
7	81.75	70.64
8	83.69	71.14
9	85.59	71.76
10	87.45	72.48
11	89.27	73.31
12	91.04	74.25
13	92.75	75.28
14	94.40	76.42
15	95.98	77.64
16	97.49	78.96
17	98.92	80.35
18	100.27	81.83
19	101.52	83.39
20	102.68	85.00

**** Simplified BISHOP FOS = 1.822 ****

The following is a summary of the TEN most critical surfaces

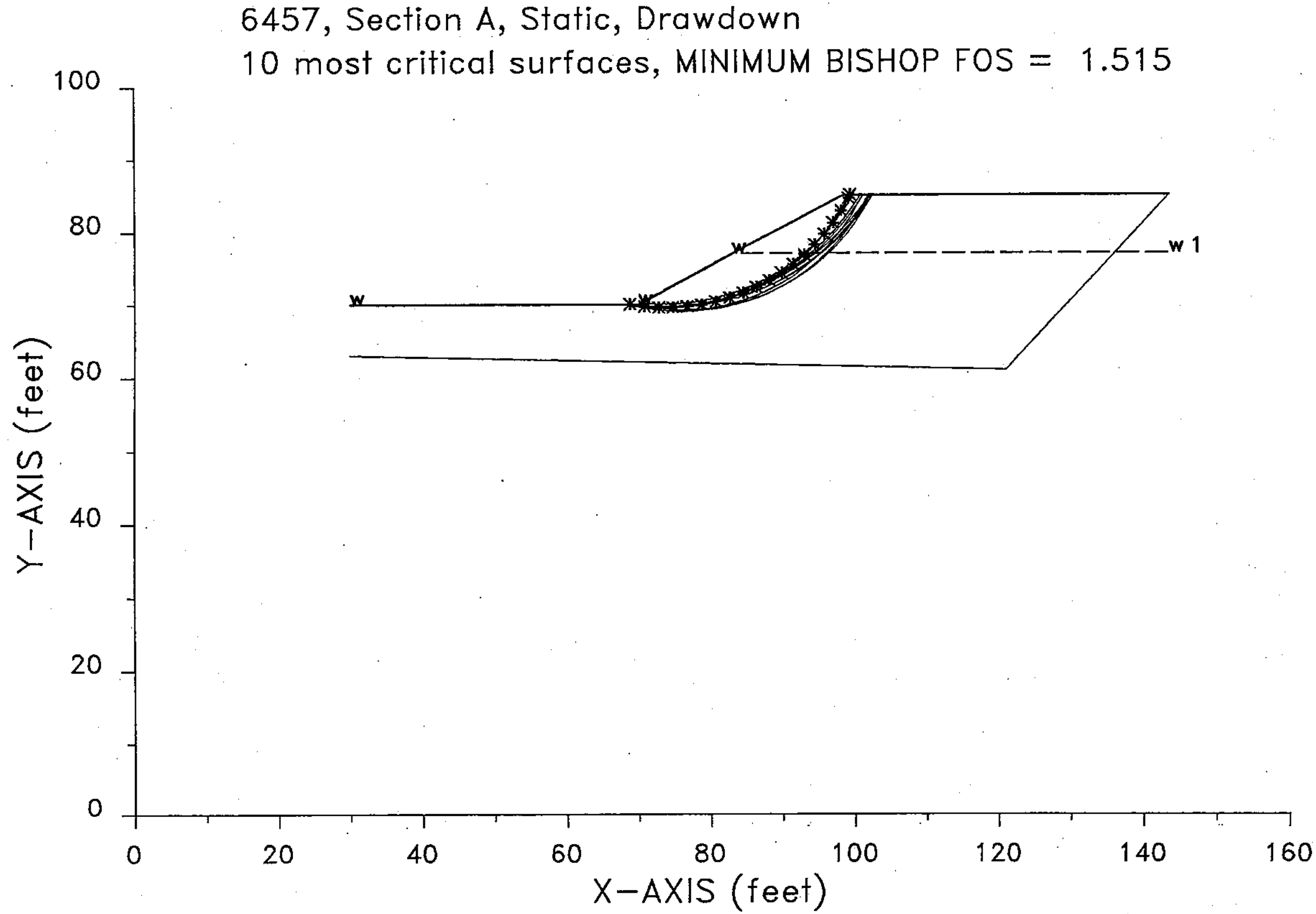
Problem Description : 6457, Section A, Static, Water

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.822	73.97	104.41	34.66	69.83	102.68	4.560E+05

2.	1.822	75.61	100.09	30.64	69.83	102.27	4.261E+05
3.	1.823	74.79	103.00	33.12	70.34	102.57	4.349E+05
4.	1.823	74.86	99.77	30.19	69.83	101.17	3.808E+05
5.	1.831	76.31	100.33	30.37	70.86	102.51	4.089E+05
6.	1.831	76.26	100.95	31.33	70.34	103.21	4.555E+05
7.	1.834	76.41	100.41	31.11	69.83	103.42	4.769E+05
8.	1.835	73.91	100.91	31.25	69.31	100.79	3.728E+05
9.	1.837	74.31	102.58	33.13	68.28	102.38	4.544E+05
10.	1.839	75.76	97.18	27.93	69.31	100.89	3.717E+05

* * * END OF FILE * * *

ASTAT3 9-06-** 15:22



XSTABL File: ASTAT3   9-06-**   15:22

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*                                       *
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```

Problem Description : 6457, Section A, Static, Drawdown

SEGMENT BOUNDARY COORDINATES

---

4 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	83.0	77.0	1
3	83.0	77.0	98.5	85.0	1
4	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

---

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	143.7	100.0	31.50	.000	.0	1
2	130.0	135.0	100.0	30.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	30.00	70.00
2	70.00	70.00
3	83.00	77.00
4	143.50	77.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 60.0 ft
and x = 75.0 ft

Each surface terminates between x = 95.0 ft
and x = 110.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	68.79	70.00
2	70.77	69.71
3	72.77	69.56
4	74.77	69.55
5	76.76	69.68
6	78.74	69.95
7	80.70	70.35
8	82.63	70.89
9	84.51	71.56
10	86.35	72.37
11	88.12	73.29
12	89.82	74.34
13	91.45	75.50
14	92.99	76.78
15	94.44	78.16
16	95.79	79.63
17	97.04	81.20
18	98.17	82.84
19	99.18	84.57
20	99.40	85.00

**** Simplified BISHOP FOS = 1.515 ****

The following is a summary of the TEN most critical surfaces

Problem Description : 6457, Section A, Static, Drawdown

FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)

1.	1.515	73.91	98.30	28.76	68.79	99.40	3.243E+05
2.	1.517	73.92	101.64	31.98	69.31	101.21	3.961E+05
3.	1.521	73.47	100.81	30.78	70.34	99.87	3.262E+05
4.	1.523	75.52	97.59	28.52	68.28	101.09	3.984E+05
5.	1.523	73.41	101.68	32.09	68.28	100.83	3.901E+05
6.	1.526	74.59	102.30	32.65	69.83	102.28	4.375E+05
7.	1.530	74.61	102.73	33.07	69.83	102.53	4.496E+05
8.	1.534	76.30	97.52	28.53	68.79	101.91	4.266E+05
9.	1.538	76.53	98.42	29.19	69.83	102.44	4.363E+05
10.	1.539	73.06	104.93	35.26	68.28	102.13	4.546E+05

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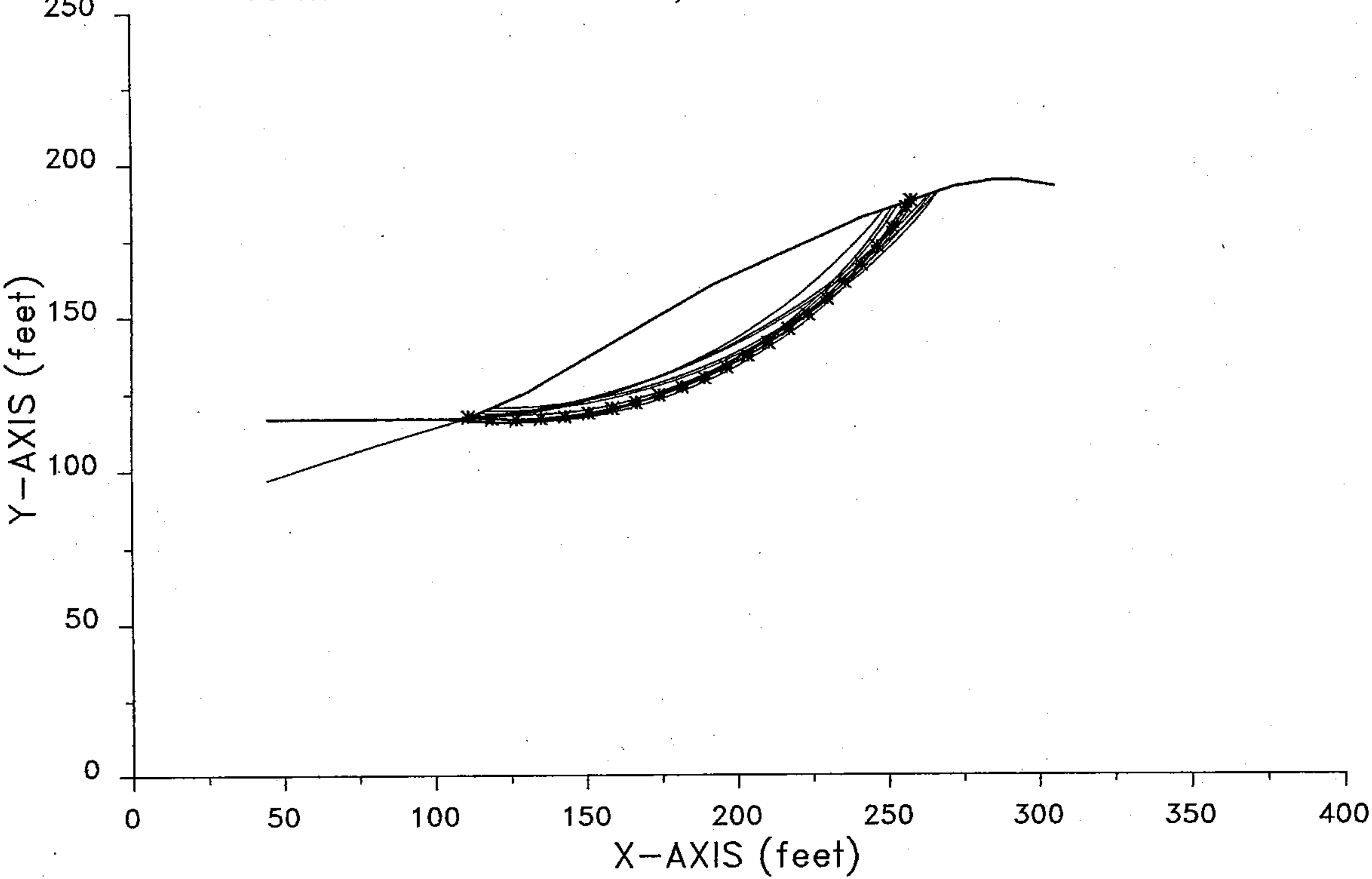
BSTAT 9-07-** 9:30

6457, Section B, Static, Circular

10 most critical surfaces, MINIMUM BISHOP FOS = 1.746



XSTABL File: BSTAT 9-07-** 9:30

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****************************************
```

Problem Description : 6457, Section B, Static, Circular

SEGMENT BOUNDARY COORDINATES

---

8 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	45.0	117.0	110.0	117.0	1
2	110.0	117.0	130.0	125.0	2
3	130.0	125.0	192.0	160.0	2
4	192.0	160.0	241.0	182.0	2
5	241.0	182.0	272.0	192.0	2
6	272.0	192.0	285.0	194.0	2
7	285.0	194.0	293.0	194.0	2
8	293.0	194.0	305.0	192.0	2

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	45.0	97.0	80.0	108.0	2
2	80.0	108.0	110.0	117.0	2

ISOTROPIC Soil Parameters

---

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	130.0	130.0	100.0	30.00	.000	.0	0
2	130.0	130.0	300.0	31.00	.000	.0	0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 100.0 ft
and x = 125.0 ft

Each surface terminates between x = 240.0 ft
and x = 293.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface

is specified by 23 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	111.21	117.48
2	119.18	116.89
3	127.18	116.71
4	135.18	116.93
5	143.15	117.56
6	151.09	118.60
7	158.96	120.04
8	166.74	121.88
9	174.42	124.12
10	181.98	126.75
11	189.39	129.76
12	196.64	133.14
13	203.71	136.89
14	210.57	140.99
15	217.22	145.44
16	223.63	150.23
17	229.79	155.33
18	235.68	160.75
19	241.29	166.45
20	246.60	172.44
21	251.59	178.69
22	256.26	185.18
23	257.68	187.38

**** Simplified BISHOP FOS = 1.746 ****

The following is a summary of the TEN most critical surfaces

Problem Description : 6457, Section B, Static, Circular

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.746	126.80	273.33	156.62	111.21	257.68	3.957E+07
2.	1.746	124.21	267.18	151.28	106.03	251.41	3.591E+07
3.	1.747	121.10	305.08	185.59	116.38	266.94	4.462E+07
4.	1.748	106.01	302.23	185.14	110.34	248.92	3.392E+07
5.	1.749	123.68	270.16	154.60	102.59	253.33	3.800E+07
6.	1.749	128.71	271.14	152.93	114.66	256.31	3.639E+07
7.	1.750	122.59	300.78	180.23	118.97	264.37	4.077E+07
8.	1.750	100.00	344.34	226.84	112.07	266.38	4.868E+07
9.	1.751	128.07	271.07	155.29	108.62	259.18	4.178E+07
10.	1.751	96.53	345.49	228.77	110.34	263.66	4.747E+07

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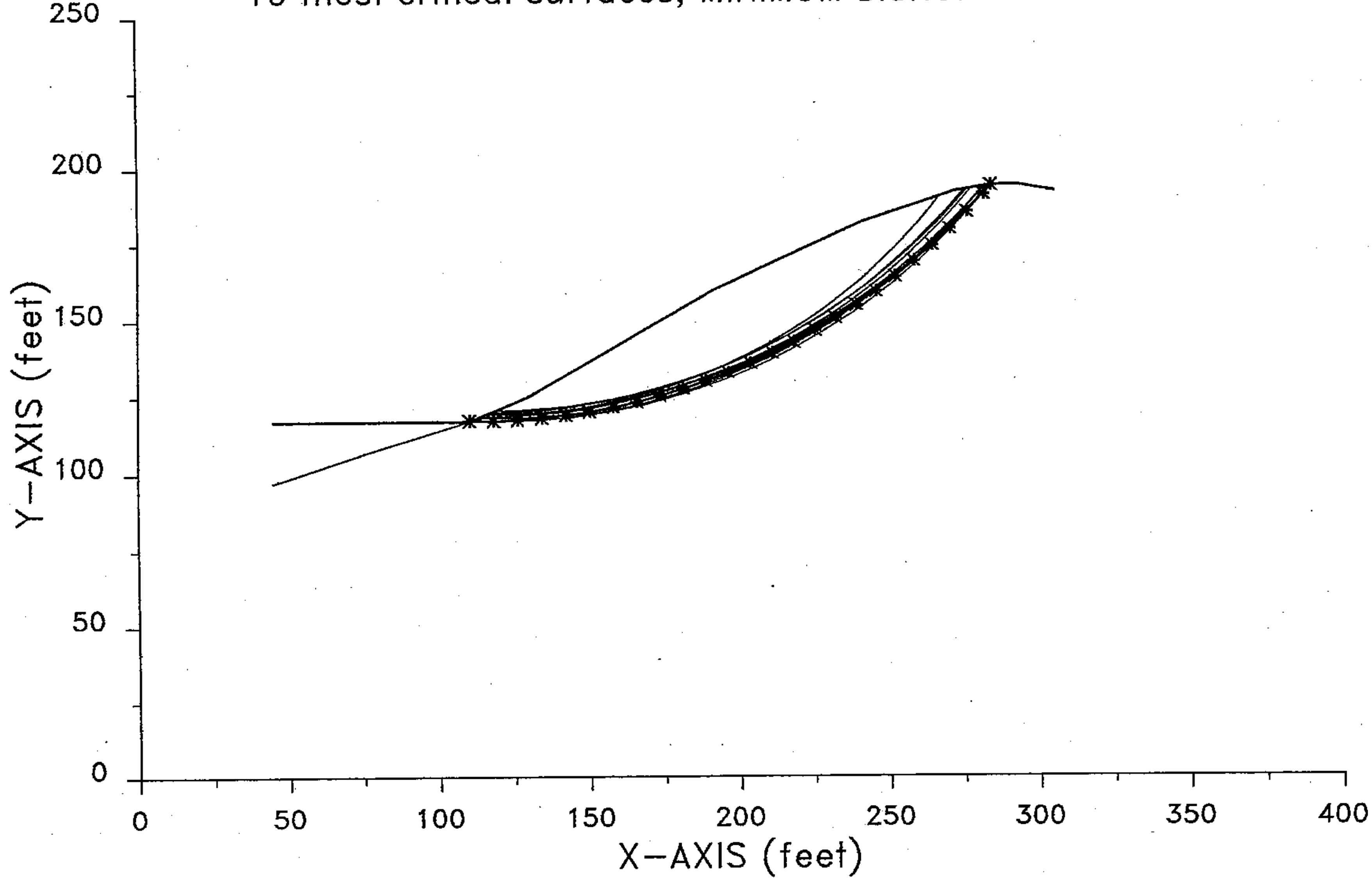
BSEIS 9-07-** 9:33

6457, Section B, Seismic, Circular
10 most critical surfaces, MINIMUM BISHOP FOS = 1.267



XSTABL File: BSEIS 9-07-** 9:33

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****************************************
```

Problem Description : 6457, Section B, Seismic, Circular

SEGMENT BOUNDARY COORDINATES

8 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	45.0	117.0	110.0	117.0	1
2	110.0	117.0	130.0	125.0	2
3	130.0	125.0	192.0	160.0	2
4	192.0	160.0	241.0	182.0	2
5	241.0	182.0	272.0	192.0	2
6	272.0	192.0	285.0	194.0	2
7	285.0	194.0	293.0	194.0	2
8	293.0	194.0	305.0	192.0	2

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	45.0	97.0	80.0	108.0	2
2	80.0	108.0	110.0	117.0	2

ISOTROPIC Soil Parameters

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Constant (psf)	Water Surface No.
1	130.0	130.0	100.0	30.00	.000	.0	0
2	130.0	130.0	300.0	31.00	.000	.0	0

A horizontal earthquake loading coefficient
of .150 has been assigned

A vertical earthquake loading coefficient
of .000 has been assigned

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced
along the ground surface between x = 100.0 ft
and x = 125.0 ft

Each surface terminates between x = 240.0 ft
and x = 293.0 ft

Unless further limitations were imposed, the minimum elevation
at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined
within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *

The most critical circular failure surface
is specified by 26 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	110.34	117.14
2	118.34	117.15
3	126.34	117.45
4	134.32	118.03
5	142.27	118.89
6	150.19	120.03
7	158.06	121.45
8	165.88	123.14
9	173.64	125.11
10	181.31	127.36
11	188.91	129.87
12	196.41	132.65
13	203.81	135.69
14	211.10	138.99
15	218.26	142.55
16	225.30	146.35
17	232.20	150.41
18	238.95	154.70
19	245.54	159.23
20	251.97	163.99
21	258.23	168.97
22	264.31	174.17
23	270.20	179.59
24	275.90	185.20
25	281.39	191.02
26	283.87	193.83

****   Simplified BISHOP FOS =   1.267   ****

The following is a summary of the TEN most critical surfaces

Problem Description : 6457, Section B, Seismic, Circular

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.267	113.94	343.77	226.66	110.34	283.87	6.568E+07
2.	1.268	119.50	326.28	209.35	110.34	281.24	6.164E+07
3.	1.271	115.90	342.36	223.86	113.79	283.28	6.217E+07

4.	1.271	120.44	327.84	209.80	112.93	281.55	6.003E+07
5.	1.271	120.42	322.95	203.80	115.52	277.26	5.320E+07
6.	1.272	117.85	337.02	217.83	115.52	281.65	5.876E+07
7.	1.272	116.99	330.22	210.33	117.24	276.01	5.116E+07
8.	1.273	122.66	324.41	207.25	111.21	283.50	6.350E+07
9.	1.273	121.10	305.08	185.59	116.38	266.94	4.246E+07
10.	1.275	120.81	321.93	201.36	118.97	274.99	4.856E+07

* * * END OF FILE * * *

September 13, 2011
W.O. 6457
(Revised February 2, 2012)

APPENDIX D

LIQUEFACTION ANALYSES

APPENDIX D

LIQUEFACTION ANALYSES

General: Liquefaction describes a phenomenon where cyclic stresses, which are produced by earthquake-induced ground motions, creates excess pore pressures in predominately cohesionless soils. As a result, the soils may acquire a high degree of mobility, which can lead to lateral spreading, consolidation and settlement of loose sediments, ground oscillation, flow failure, loss of bearing strength, ground fissuring, sand boils, and other damaging deformations. This phenomenon occurs only below the water table, but after liquefaction has developed, it can propagate upward into overlying, non-saturated soil.

Research has shown that saturated, loose sands with a silt content less than about 25 percent are most susceptible to liquefaction, whereas other soil types are generally considered to have a low susceptibility. According to the SCEC (1999) publication *Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction in California*, any material having more than 15 percent finer than 0.005 millimeters (clay) was considered not subject to liquefaction.

Procedure: The method of liquefaction assessment utilized in this report is based on the "Simplified Procedure" originally developed by *Seed and Idriss (1971, 1982)*, with subsequent refinements by *Seed et. Al. (1983)*, *Seed et al. (1985)*, *Seed and De Alba (1986)*, and *Seed and Harder (1990)*. As generally defined by the DMG Special Publication, the procedure essentially compares the cyclic resistance ratio (CRR) with the earthquake-induced cyclic stress ratio (CSR) at that depth from a specified design earthquake. The CRR is the cyclic stress ratio required to induce liquefaction for a cohesionless soil stratum at a given depth and is essentially the capacity of the soil to resist liquefaction. The CSR is defined generally as the seismic demand placed on a soil layer or the peak ground surface acceleration and an associated earthquake moment magnitude. The equation for CSR is defined below.

Appendix D

$$CSR = \left(\frac{\tau_{av}}{\sigma'_{vo}}\right) = 0.65\left(\frac{a_{max}}{g}\right)\left(\frac{\sigma_{vo}}{\sigma'_{vo}}\right)r_d$$

Values of CRR were established that were empirically correlated using extensive databases for sites that did or did not liquefy during previous earthquakes, where values of $(N_1)_{60}$ could be correlated with the liquefied soil zones. The 1997 version of the baseline chart defines values of CRR as a function of $(N_1)_{60}$ for moment magnitude 7.5 earthquake, CSR, and the percent fines. The factor of safety against liquefaction is obtained by calculating the ratio of CRR and CSR.

The "Simplified Procedure" was modified by Robertson and Wride *(Youd and Idriss, 1977)* for determining liquefaction strengths for clean sands from CPT probing data. Material behavior classification interpretation is based on Robertson and Campanella (1984). The correlation developed by Robertson and Wride correlates the CSR and the corrected and the normalized CPT resistance, q_{C1N}. Robertson and Wride developed a graph similar to the graph, by Youd and Idriss (1997), that determines the CRR from the corrected CPT tip resistance q_{C1N}, CSR, and the cyclic shear strain potential, $\square_e$. The curve essentially separates regions of the plot with data indicative of liquefaction from regions indicative of non-liquefaction. The factor of safety against liquefaction is then determined by calculating the ratio of CRR and CSR. The liquefaction procedure assesses the potential for liquefaction as "very low", "moderate", or "high" according to the chronological criteria below.

<u>"Very Low" Potential for Liquefaction</u>

- Soil layer above groundwater level
- Soil layer has been reprocessed
- Clay content within soil layer >= 15% (Based on laboratory testing)
- Liquid limit within soil layer >= 35% (Based on laboratory testing)

Appendix D

- CPT soil classification, Ic > 2.6, which is considered a clay-rich soil (Based on CPT data and liquefaction analyses).
- Corrected tip resistance, (qC1N)cs, > 160 (Based on CPT data and liquefaction analyses).
- Corrected blow count, (N1)60cs > 30 (Based on Boring Log data, if available)
- Factor-of-safety against liquefaction > 1.25 (Based on CPT and/or boring data and liquefaction analyses).

"Moderate" Potential for Liquefaction

- 1.0 < Factor-of-safety against liquefaction < 1.25 (Based on CPT and/or boring data and liquefaction analyses).

"High" Potential for Liquefaction

- Factor-of-safety against liquefaction < 1.0 (Based on CPT and/or boring data and liquefaction analyses).

Analyses Parameters: The following parameters were utilized in the assessment of liquefaction potential of the subsurface soils underlying the subject site:

Exploration Data: The assessment of liquefaction potential for the proposed development was evaluated using the subsurface information and laboratory data from one GSC boring (B-5).

Groundwater: At the time of exploration (July 2011), groundwater was not encountered. However, according to the Division of Mines and Geology Seismic Hazard Evaluation of the Newhall 7.5 minute Quadrangle, the historical high groundwater table is at approximately 45 to 50 feet below grade. Therefore, groundwater was considered at 45 feet below existing ground surface in our analyses.

Appendix D

Seismic Parameters: As there are numerous faults that can cause ground-shaking at the site, ground accelerations could vary. Therefore, as obtained from the Seismic Hazard Report for Newhall Quadrangle, an acceleration of 0.57g and M_w=6.6 were considered in the analyses

Analysis: It should be noted that soils classified as clay, silty clay, and clayey silt were not considered in our liquefaction analyses.

Liquefaction Results: The results of our liquefaction analysis indicated that the potential for liquefaction within the area of study exists. However, only one layer of potentially liquefiable material was encountered in the boring that was drilled. This layer was encountered at approximately 45 feet below existing ground and was approximately 5 feet thick.

Although the potential for liquefaction exists in the study area, due to the fact that only one layer of potentially liquefiable material was encountered and based on the depth of that layer as well as the high blow counts (greater than 15), we believe that neither liquefaction nor any related phenomena will pose a significant risk to site development.

The LIQUEFY 2 program was used to evaluate the liquefaction potential at the site. The output for the liquefaction analysis performed for the boring is enclosed at the end of this appendix.

```
*****************************
*                           *
*     L I Q U E F Y 2       *
*                           *
*      Version 1.50         *
*                           *
*****************************
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EMPIRICAL PREDICTION OF
EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 6457 DATE: 09-09-2011

JOB NAME: TMC

SOIL-PROFILE NAME: 6457.LDW

BORING GROUNDWATER DEPTH: 45.00 ft

CALCULATION GROUNDWATER DEPTH: 45.00 ft

DESIGN EARTHQUAKE MAGNITUDE: 6.60 Mw

SITE PEAK GROUND ACCELERATION: 0.570 g

BOREHOLE DIAMETER CORRECTION FACTOR: 1.00

SAMPLER SIZE CORRECTION FACTOR: 1.00

N60 HAMMER CORRECTION FACTOR: 1.00

MAGNITUDE SCALING FACTOR METHOD: Idriss (1997, in press)

Magnitude Scaling Factor: 1.387

rd-CORRECTION METHOD: Seed (1985)

FIELD SPT N-VALUES ARE CORRECTED FOR THE LENGTH OF THE DRIVE RODS.

Rod Stick-Up Above Ground: 3.0 ft

CN NORMALIZATION FACTOR: 1.044 tsf

MINIMUM CN VALUE: 0.6

NCEER [1997] Method

LIQUEFACTION ANALYSIS SUMMARY

File Name: 6457.OUT

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.017	0.017	20	0.45	*	*	*	*	*	**
1	0.75	0.051	0.051	20	0.45	*	*	*	*	*	**
1	1.25	0.085	0.085	20	0.45	*	*	*	*	*	**
1	1.75	0.119	0.119	20	0.45	*	*	*	*	*	**
1	2.25	0.153	0.153	20	0.45	*	*	*	*	*	**
1	2.75	0.187	0.187	20	0.45	*	*	*	*	*	**
1	3.25	0.221	0.221	20	0.45	*	*	*	*	*	**
1	3.75	0.255	0.255	20	0.45	*	*	*	*	*	**
1	4.25	0.289	0.289	20	0.45	*	*	*	*	*	**
1	4.75	0.323	0.323	20	0.45	*	*	*	*	*	**
1	5.25	0.357	0.357	20	0.45	*	*	*	*	*	**
1	5.75	0.391	0.391	20	0.45	*	*	*	*	*	**
1	6.25	0.425	0.425	20	0.45	*	*	*	*	*	**
1	6.75	0.459	0.459	20	0.45	*	*	*	*	*	**
1	7.25	0.493	0.493	20	0.45	*	*	*	*	*	**
1	7.75	0.527	0.527	20	0.45	*	*	*	*	*	**
1	8.25	0.561	0.561	20	0.45	*	*	*	*	*	**
1	8.75	0.595	0.595	20	0.45	*	*	*	*	*	**
1	9.25	0.629	0.629	20	0.45	*	*	*	*	*	**
1	9.75	0.663	0.663	20	0.45	*	*	*	*	*	**
1	10.25	0.697	0.697	20	0.45	*	*	*	*	*	**
1	10.75	0.731	0.731	20	0.45	*	*	*	*	*	**
1	11.25	0.765	0.765	20	0.45	*	*	*	*	*	**
1	11.75	0.799	0.799	20	0.45	*	*	*	*	*	**
1	12.25	0.833	0.833	20	0.45	*	*	*	*	*	**
1	12.75	0.867	0.867	20	0.45	*	*	*	*	*	**
1	13.25	0.901	0.901	20	0.45	*	*	*	*	*	**
1	13.75	0.935	0.935	20	0.45	*	*	*	*	*	**
1	14.25	0.969	0.969	20	0.45	*	*	*	*	*	**
1	14.75	1.003	1.003	20	0.45	*	*	*	*	*	**
1	15.25	1.037	1.037	20	0.45	*	*	*	*	*	**
1	15.75	1.071	1.071	20	0.45	*	*	*	*	*	**
1	16.25	1.105	1.105	20	0.45	*	*	*	*	*	**
1	16.75	1.139	1.139	20	0.45	*	*	*	*	*	**
1	17.25	1.173	1.173	20	0.45	*	*	*	*	*	**
1	17.75	1.207	1.207	20	0.45	*	*	*	*	*	**
1	18.25	1.241	1.241	20	0.45	*	*	*	*	*	**
1	18.75	1.275	1.275	20	0.45	*	*	*	*	*	**
1	19.25	1.309	1.309	20	0.45	*	*	*	*	*	**
1	19.75	1.343	1.343	20	0.45	*	*	*	*	*	**
1	20.25	1.377	1.377	20	0.45	*	*	*	*	*	**
1	20.75	1.411	1.411	20	0.45	*	*	*	*	*	**
1	21.25	1.445	1.445	20	0.45	*	*	*	*	*	**

File Name: 6457.OUT

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	21.75	1.479	1.479	20	0.45	*	*	*	*	*	**
1	22.25	1.513	1.513	20	0.45	*	*	*	*	*	**
1	22.75	1.547	1.547	20	0.45	*	*	*	*	*	**
1	23.25	1.581	1.581	20	0.45	*	*	*	*	*	**
1	23.75	1.615	1.615	20	0.45	*	*	*	*	*	**
1	24.25	1.649	1.649	20	0.45	*	*	*	*	*	**
1	24.75	1.683	1.683	20	0.45	*	*	*	*	*	**
1	25.25	1.717	1.717	20	0.45	*	*	*	*	*	**
1	25.75	1.751	1.751	20	0.45	*	*	*	*	*	**
1	26.25	1.785	1.785	20	0.45	*	*	*	*	*	**
1	26.75	1.819	1.819	20	0.45	*	*	*	*	*	**
1	27.25	1.853	1.853	20	0.45	*	*	*	*	*	**
1	27.75	1.887	1.887	20	0.45	*	*	*	*	*	**
1	28.25	1.921	1.921	20	0.45	*	*	*	*	*	**
1	28.75	1.955	1.955	20	0.45	*	*	*	*	*	**
1	29.25	1.989	1.989	20	0.45	*	*	*	*	*	**
1	29.75	2.023	2.023	20	0.45	*	*	*	*	*	**
1	30.25	2.057	2.057	20	0.45	*	*	*	*	*	**
1	30.75	2.091	2.091	20	0.45	*	*	*	*	*	**
1	31.25	2.125	2.125	20	0.45	*	*	*	*	*	**
1	31.75	2.159	2.159	20	0.45	*	*	*	*	*	**
1	32.25	2.193	2.193	20	0.45	*	*	*	*	*	**
1	32.75	2.227	2.227	20	0.45	*	*	*	*	*	**
1	33.25	2.261	2.261	20	0.45	*	*	*	*	*	**
1	33.75	2.295	2.295	20	0.45	*	*	*	*	*	**
1	34.25	2.329	2.329	20	0.45	*	*	*	*	*	**
1	34.75	2.363	2.363	20	0.45	*	*	*	*	*	**
1	35.25	2.397	2.397	20	0.45	*	*	*	*	*	**
1	35.75	2.431	2.431	20	0.45	*	*	*	*	*	**
1	36.25	2.465	2.465	20	0.45	*	*	*	*	*	**
1	36.75	2.499	2.499	20	0.45	*	*	*	*	*	**
1	37.25	2.533	2.533	20	0.45	*	*	*	*	*	**
1	37.75	2.567	2.567	20	0.45	*	*	*	*	*	**
1	38.25	2.601	2.601	20	0.45	*	*	*	*	*	**
1	38.75	2.635	2.635	20	0.45	*	*	*	*	*	**
1	39.25	2.669	2.669	20	0.45	*	*	*	*	*	**
1	39.75	2.703	2.703	20	0.45	*	*	*	*	*	**
1	40.25	2.737	2.737	20	0.45	*	*	*	*	*	**
1	40.75	2.771	2.771	20	0.45	*	*	*	*	*	**
1	41.25	2.805	2.805	20	0.45	*	*	*	*	*	**
1	41.75	2.839	2.839	20	0.45	*	*	*	*	*	**
1	42.25	2.873	2.873	20	0.45	*	*	*	*	*	**
1	42.75	2.907	2.907	20	0.45	*	*	*	*	*	**

1	43.25	2.941	2.941	20	0.45	*	*	*	*	*	**

NCEER [1997] Method   LIQUEFACTION ANALYSIS SUMMARY   PAGE 3

File Name: 6457.OUT

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	43.75	2.975	2.975	20	0.45	*	*	*	*	*	**
1	44.25	3.009	3.009	20	0.45	*	*	*	*	*	**
1	44.75	3.043	3.043	20	0.45	*	*	*	*	*	**
2	45.25	3.076	3.068	18	0.43	0.600	11.2	0.112	0.802	0.298	0.52
2	45.75	3.108	3.085	18	0.43	0.600	11.2	0.112	0.797	0.297	0.52
2	46.25	3.141	3.102	18	0.43	0.600	11.2	0.112	0.792	0.297	0.52
2	46.75	3.173	3.118	18	0.43	0.600	11.2	0.112	0.787	0.297	0.52
2	47.25	3.205	3.135	18	0.43	0.600	11.2	0.112	0.782	0.296	0.53
2	47.75	3.237	3.152	18	0.43	0.600	11.2	0.112	0.776	0.295	0.53
2	48.25	3.270	3.168	18	0.43	0.600	11.2	0.112	0.771	0.295	0.53
2	48.75	3.302	3.185	18	0.43	0.600	11.2	0.112	0.766	0.294	0.53
2	49.25	3.334	3.202	18	0.43	0.600	11.2	0.112	0.761	0.294	0.53
2	49.75	3.366	3.218	18	0.43	0.600	11.2	0.112	0.756	0.293	0.53

September 13, 2011
W.O. 6457
(Revised February 2, 2012)

APPENDIX E

SEISMICALLY INDUCED SETTLEMENT ANALYSES

APPENDIX E

SEISMICALLY INDUCED SETTLEMENT ANALYSES

General: Seismically-induced settlement in unsaturated (dry) and saturated soils generally occur due to the dissipation of pore pressure in a liquefiable soil layer. As previously define, liquefaction occurs when cyclic stresses, which are produced by earthquake-induced ground motions, create excess pore pressures in predominately cohesionless soils. The controlling factors affecting settlement in saturated sands consist of the pore pressure drainage path, magnitude and duration of the seismic event, cyclic stresses, maximum shear strains, and the SPT $(N_1)_{60}$ of the soil layers. Seismically-induced settlement in partially saturated or dry sands is controlled predominately by the magnitude and duration of the seismic event, cyclic strains, and the SPT $(N_1)_{60}$ of the soil layers.

The potential for seismically-induced settlement is greatest in loose granular soils (i.e., sands, silty sands, sandy silts), whereas cohesive soils (i.e., clays and silts) are generally not prone to settlement. It should be realized that granular soils are susceptible to settlement during a seismic event whether the soils liquefy or not. Soils underlying the site generally consist of alternating layers of silts and clays with interbeds of sand, silty sand and sandy silt. Based on the exploration results, the granular layers, which are most likely less than two feet thick, are confined by less permeable soils which would prevent the migration of excess pore pressures and thus the movement of water and potential settlement.

Procedure: The methodology used in these analyses consists of estimating probable seismically-induced settlement in unsaturated and saturated soil deposits based on the procedures suggested by *DMG Special Publication 117* and *Tokimatsu and Seed (1987).* The method suggests that the primary factors controlling settlement due to seismic events include the following:

Appendix E

- The cyclic stress ratio;
- Maximum shear strains (saturated sands);
- Cyclic strains (dry or partially saturated sands);
- SPT $(N_1)_{60CS}$ values; and
- Earthquake magnitude

Values of $(N_1)_{60CS}$ were derived using empirical equations outlined in the *1997 NCEER Workshop Proceedings*, as described in the Liquefaction Analyses, Appendix D. The actual seismically-induced settlement analyses were based on the procedures of *DMG Special Publication 117* and *Tokimatsu and Seed (1987)*.

Parameters: The parameters utilized in the assessment of seismically-induced settlement are the same as those used in the liquefaction analysis presented in Appendix C. It should be noted that settlement for non-granular soils classified as clay, silty clay, and clayey silt were not considered in our settlement analyses.

Results: The seismically induced settlement analyses were performed to a depth of 50 feet below existing grade and were based on information from drilled Boring B-5. The computed seismically-induced settlement was 0.78-inch in the unsaturated materials and 0.95-inch in the saturated materials. The results of our analyses are shown in the following table

SUMMARY OF SEISMICALLY-INDUCED SETTLEMENT			
Boring No.	Unsaturated Settlement Calculations (inch)	Saturated Settlement Calculations (inch)	Total Settlement (inch)
B-5	0.78	0.95	1.72

In our opinion, the seismically-induced settlement will not pose a significant risk to site development.

N Field to N1 60 Conversion

8/12/2011 11:13 AM 6457

PROJECT INFORMATION	
Project Name:	TMC
Project No.:	6457
Date:	############
	11-Sep

SITE INFORMATION AND PARAMETERS	
Based on Boring No:	b-5
Source of Blow Counts (N_{SPT} = 1 or N_{RING} = 0)	1
Groundwater Depth (feet):	45.0

LAYER No.	DEPTH TO LAYER BOTTOM (feet)	LAYER THICKNESS (feet)	IN-SITU WET DENSITY (pcf)	FINES CONTENT (%)	φ (degrees)	SETTLEMENT CALCULATIONS σ'_o @ LAYER MIDDLE (psf)	u_o @ LAYER MIDDLE (psf)	σ_o @ LAYER MIDDLE (psf)	FOR $(N_1)_{60}$ CALCULATIONS σ'_o @ LAYER BOTTOM (tsf)	u_o @ LAYER BOTTOM (tsf)	σ_o @ LAYER BOTTOM (tsf)	N_{RING} FIELD to N_{SPT} CONVERSION: N_{RING} FIELD	N_{SPT}	N_{SPT} FIELD	C_N	$(N_1)_{60}$	$\Delta(N_1)_{60}$	$(N_1)_{60CS}$	K_σ	σ_o (psf)	STRESS REDUCTION FACTOR r_d
1	25.0	25.0	125	[illegible]	[illegible]	1563	0	1563	1.563	0.000	1.563	28	N/A	8	0.82	8	0	8	1.00	1563	0.899
2	30.0	5.0	125	[illegible]	[illegible]	3438	0	3438	1.875	0.000	1.875	25	N/A	8	0.75	8	0	8	1.00	3438	0.873
3	35.0	5.0	125	[illegible]	[illegible]	4063	0	4063	2.188	0.000	2.188	22	N/A	9	0.69	11	0	11	1.00	4063	0.847
4	40.0	5.0	125	[illegible]	[illegible]	4688	0	4688	2.500	0.000	2.500	34	N/A	21	0.65	23	0	23	1.00	4688	0.822
5	45.0	5.0	125	[illegible]	[illegible]	5313	0	5313	2.813	0.000	2.813	25	N/A	20	0.61	21	0	21	1.00	5313	0.799
6	50.0	5.0	125	[illegible]	[illegible]	5938	0	5938	3.125	0.000	3.125	25	N/A	18	0.58	18	0	18	1.00	5938	0.777
7																					
8																					
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25																					

Notes

1. $(K_2)_{max}$: see refernce No. 021
2. G_{max}: see reference No. 021
3. G_{eff}: from graph on reference No. 021
4. $(N_1)_{60}$: see reference No. 065
5. Cyclic Shear Strain g_{eff}: see reference 021 and graph Fig. 11
6. Get e_C in % from reference 021, grapg Fig 13
7. N_{ring} to N_{spt}: see reference No. __ (SPT folder)
8. Rd see reference 065
9. Liquefaction will not occur in soils with clay content >15% or silt content >35%
10. Magnitude scaling factor for saturated sands (see Table 4, Reference 21)
11. Magnitude scaling factor for unsaturated sands (see Table 1, Reference 21)

N Field to N1 60 Conversion

8/12/2011 11:13 AM 6457

PROJECT INFORMATION	
Project Name:	TMC
Project No.:	6457
Date:	11-Sep

SITE INFORMATION AND PARAMETERS	
Based on Boring No:	B-5
Source of Blow Counts (N_{SPT} = 1 or N_{RING} = 0)	1
Groundwater Depth (feet):	45.0

DRY SETTLEMENT CALCULATIONS											
POTENTIAL FOR SEISMIC SETTLEMENT (YES/NO)	$(K_2)_{max}$	G_{max} (psf)	$\gamma_{eff}(G_{eff}/G_{max})$	σ_m (tsf)	CYCLIC SHEAR STRAIN γ_{eff}	CYCLIC SHEAR STRAIN (%)	$(N_1)_{60CS}$	VOLUMETRIC STRAIN (%)	[illegible]	[illegible]	SETTLEMENT (in)
YES	40.06	1.58E+06	0.00026	0.78	0.00050	0.05000	8	[illegible]	0.083	0.166	0.499
YES	39.53	2.32E+06	0.00038	1.72	0.00070	0.07000	8	[illegible]	0.075	0.150	0.090
YES	44.11	2.81E+06	0.00036	2.03	0.00080	0.08000	11	0.0800	0.075	0.150	0.090
yes	57.21	3.92E+06	0.00029	2.34	0.00050	0.05000	23	0.0500	0.042	0.083	0.050
yes	55.20	4.02E+06	0.00031	2.66	0.00050	0.05000	21	0.0500	0.042	0.083	0.050
no	52.36	4.03E+06	0.00033	2.97	0.00050	N/A	18	0.0500	N/A	N/A	N/A
								TOTAL SETTLEMENT (IN)			0.779

SATURATED SETTLEMENT CALCULATIONS					
POTENTIAL FOR SEISMIC SETTLEMENT (YES/NO)	$(N_1)_{60}$	SHEAR STRESS RATIO	VOLUMETRIC STRAIN M=7.5 (%)	VOLUMETRIC STRAIN M=X (%)	SETTLEMENT (in)
no	8	0.26	[illegible]	N/A	N/A
no	8	0.26	[illegible]	N/A	N/A
no	11	0.25	[illegible]	N/A	N/A
no	23	0.24	[illegible]	N/A	N/A
no	21	0.23	[illegible]	N/A	N/A
yes	18	0.23	1.40	1.58	0.95
			TOTAL SETTLEMENT (IN)		0.95

SUMMARY OF SEISMICALLY INDUCED SETTLEMENT		
UNSATURATED IN-SITU SOILS (Above Groundwater):	0.78	Inch
SATURATED IN-SITU SOILS (Below Groundwater):	0.95	Inch
TOTAL SETTLEMENT	1.72	Inch

RESPONSE TO COUNTY OF LOS ANGELES SOILS ENGINEERING AND GEOLOGIC REVIEW SHEETS DATED NOVEMBER 18, 2011 AND SEPTEMBER 28, 2011,
Parcel Map No. 062646, MTD No. 1843,
Santa Clarita, California

for

TMC Properties

May 23, 2012 W.O. 6457

MDN 13790

GeoSoils Consultants Inc.

GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

May 23, 2012
W.O. 6457

TMC PROPERTIES
P.O. Box 800970
Santa Clarita, California 91380-0970

Attention: Mr. Mark Sullivan

Subject: Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California

INTRODUCTION

As requested, GeoSoils Consultants, Inc. (GSC) has prepared this report to respond to the County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011 regarding the Miscellaneous Transfer Drain No. 1843.

Copies of the review sheets are included herein. The items are addressed below, followed by our responses.

SOILS ENGINEERING REVIEW SHEET DATED NOVEMBER 18, 2011

Item 1

No storm drain plans were submitted to the Soils Section for review. Submit two sets of storm drain plans to the Soils Section for verification of compliance with County codes and policies.

6634 Valjean Avenue Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 785-1548

Response to Item 1

Acknowledged. Two sets will be provided to the Soils Section for verification of compliance with the County Codes and policies. An additional set has been included with this response as Geologic Maps, Plates 1A through 1L.

Item 2

Address potential liquefaction for the location of the proposed storm drain. Provide data and analyses to determine liquefaction potential of the on-site soils. Also, evaluate the potential for seismically induced settlement (dry and saturated soils), lateral spreading, surface manifestation, etc. The analyses must be performed for soils within the upper 50 feet, as a minimum, for shallow foundation, or greater depth where deep foundation and/or subterranean structure is proposed. The historic-high water table shall be used in the analyses, unless other information is provided which indicates a higher or lower level is appropriate. Recommended mitigation as necessary. The liquefaction data and analyses must conform to the State of California Division of Mines and Geology "Special Publication 117A", dated 2008 and "Recommended Procedure For Implementation of DMG Special Publication 117", dated March 1999.

Response to Item 2

A liquefaction analysis has been performed and was included in our referenced report originally dated September 13, 2011 (revised February 2, 2012, see references). For convenience, the liquefaction analysis has been included with this response in Appendix D. Seismically induced settlement analyses is included in Appendix E. Boring logs describing the subsurface conditions at the site are included in Appendix A. Laboratory test results used in the analysis (e.g. gradation analyses) are included in Appendix B. For a more detailed discussion of the liquefaction and settlement analyses and associated phenomena, please refer to our report dated February 2, 2012.

Item 3

Provide slope stability analyses considering rapid drawdown condition from full capacity for debris basins with slopes steeper than 3:1 gradient and designed with outlet structures. Submitted report indicates debris basin along Cross Section C-C'. Recommend mitigation if factors of safety is below the minimum standard.

Response to Item 3

Slope stability analyses considering rapid drawdown conditions for the proposed debris basin were performed and presented in our previously submitted report originally dated September 13, 2011 (revised February 2, 2012, see references). For convenience, the analyses have been included in Appendix C of this response. The stability analyses were performed on the highest proposed slope contained within the debris basin (approximately 15 feet in height). The corresponding cross section (Geologic Cross Section A-A') has been included on Plate 2. The location of the cross section can be found on Plate 1H. Stability analysis results indicate acceptable factors of safety. Direct shear test results used in the analyses can be found in Appendix B.

Item 4

CD with PDF copy of report and references were not provided in the submittal to the Soils Section. Provide CD with referenced reports and current report as requested by the Geology Section.

Response to Item 4

Acknowledged. A CD with PDF copies of this report and all referenced reports has been included with this submittal.

Item 5

Show the following on the storm drain plans:

a. Show/Add/Note the locations of the proposed rubber-gasketed joints
b. Approximate limits and depth of removal and recompaction of unsuitable soils.
c. All recommended mitigation measures.

Response to Item 5

Acknowledged. Remark 5a has been forwarded to the Project Civil Engineer. The requests from remarks 5b and 5c have been included on the storm drain plans (see Plates 1A through 1L included with this response).

Where a transition is present below storm drain pipes, the rubber gasket locations are shown on the plans (Plate 1E). A transition is also located below the box culvert on Plate 1D. Due to the gradual transition and similar characteristics of the proposed fill and existing alluvium, below the box culvert, differential settlement is considered negligible and therefore, it is our opinion that the box culvert can be constructed as planned.

Item 6

Add the following notes on the storm drain plans:
The Soils Engineer of record shall inspect and approve the foundation excavations before steel or concrete is placed.

Response to Item 6

Acknowledged. The requested notes have been included on the storm drain plans.

Item 7

The Soils Engineer of record must review the storm drain plans and sign and stamp the plans in verification of his recommendations. Original manual signature and wet stamp are required.

Response to Item 7

Acknowledged. The storm drain plans have been signed and stamped by this office.

Item 8

Submit two sets of storm drain plans to the Soils Section for verification of compliance with County code and policies.

Response to Item 8

Acknowledged. Two sets of storm drain plans have been submitted to the Soils Section for verification of compliance with County codes and policies.

Item 9

Requirements of the Geology Section are attached.

Response to Item 9

Acknowledged. Responses to comments from the Geology Section can be found below.

Item 10

Include a copy of this review sheet with your response.

Response to Item 10

Acknowledged. A copy of this review sheet is enclosed at the end of this response.

GEOLOGIC REVIEW SHEET DATED SEPTEMBER 28, 2011

Item 1

Required plans not submitted. To initiate review, submit plans (2 sets).

Response to Item 1

Acknowledged. Two storm drain plan sets have been provided.

Item 2

All recommendations of the consulting geologist must be incorporated into the design or shown as notes on the plans.

Response to Item 2

Acknowledged. All geologic recommendations have been incorporated into the design and are shown as notes on the plans.

Item 3

The plan must be specifically approved by the consultant geologist by manual, original signature and date on each sheet prior to approval by the Geology Section. Submit two (2) sets for review.

Response to Item 3

Acknowledged. Two sets of storm drain plans have been wet signed by this office.

Item 4

Based on the State of California Seismic Hazard Maps, the subject site is located in an area with a potential for liquefaction and may be subject to secondary effects of seismic shaking. In accordance with California Public Resources Code of Regulations 3724, prior to the approval of a project in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard must be submitted for review and approval. The report must address the potential for liquefaction and ground failure, and must comply with provisions of the "Manual for Preparation of Geotechnical Reports" prepared by the County of Los Angeles, Department of Public Works, (available on the internet at http://dpw.lacounty.gov/gmed/Manual.pdf), and DMG Special Publication 117. Provide this office with two (2) original copies of the report for review and distribution to the State of California.

All parameters and data utilized in the liquefaction analysis must comply with the requirements of the Geotechnical and Materials Engineering Division's Administrative Manual memo G045.0.

Response to Item 4

Liquefaction analyses have been performed and were included in our submitted report originally dated September 13, 2011 (revised February 2, 2012, see references). For convenience, the liquefaction analyses have been included with this response in Appendix C. Boring logs describing the subsurface conditions at the site are included in Appendix A. Laboratory test results used in the analyses (e.g. gradation analyses) are included in Appendix B.

Item 5

Effective August 1, 2006, all geotechnical reports submitted for review must include an electronic copy of the report on a CD in Adobe Portable Document Format (PDF). The electronic version shall include an electronically generated representation of the licensee's seal, signature, and date of sealing or signing. This project cannot be approved until this requirement has been met. The submittal in response to this review must include a CD containing an electronic version of the original report and the supplemental report in response to the review.

Response to Item 5

Acknowledged. A CD with PDF copies of this report and all referenced reports has been included with this submittal.

Item 6

The Soils Engineering review dated 11/18/11 is attached.

Response to Item 6

Acknowledged. The comments from the Soils Section have been addressed in this submittal and can be found above.

We appreciate the opportunity to be of service. If we can be of any further assistance, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

KAREN L. MILLER
GE 2257

LANCE R. PUTNAM
CEG 2469

KLM.LRP.W:Rsp to LA County Rev dtd 11-18-11 & 9-28-11

Encl: References
County of Los Angeles Review Letters dated September 28, 2011 and November 18, 2011
Plates 1A through 1L, Storm Drain Plans
Appendix A, Field Exploration Procedures (from referenced report)
Plates A-1 through A-11, Boring Logs
Appendix B, Laboratory Test Procedures and Results
Plates SH-1 and SH-2, Shear Test Diagrams
Plates G-1 through G-3, Grain Size Analysis
Appendix C, Slope Stability Analyses
Appendix D, Liquefaction Analyses
Appendix E, Seismically Induced Settlement Analyses

cc: (2) Addressee
(5) Sikand Engineering

REFERENCES

1. GeoSoils Consultants, Inc., dated September 14, 2011, "Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No 1843, Santa Clarita, California"

2. GeoSoils Consultants, Inc., dated September 13, 2011 (revised February 2, 2012), "Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California"

RECEIVED

NOV 3 0 2011

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION

SOILS ENGINEERING REVIEW SHEET

Address: 900 S. Fremont Ave., Alhambra, CA 91803
Telephone: (626) 458-4925
Fax: (626) 458-4913

District Office N/A
Job Number LMTPWCHK / A304
Sheet 1 of 1

DISTRIBUTION:
___ Drainage
___ Grading
___ Geo/Soils Central File
___ District Engineer
___ Geologist
___ Soils Engineer
___ Engineer/Architect

Miscellaneous Transfer Drain 1843
Parcel Map 62646
Location Valencia / Newhall
Developer/Owner City of Santa Clarita
Engineer/Architect Sikand
Soils Engineer GeoSoils Consultants, Inc. (W.O. 6457)
Geologist GeoSoils Consultants, Inc.

Miscellaneous Transfer Drain No. 1843

Review of:
Soils Engineering and Geology Report Dated 9/14/11

ACTION:
Plan is not recommended for approval.

REMARKS:

1. No storm drain plans were submitted to the Soils Section for review. Submit two sets of storm drain plans to the Soils Section for verification of compliance with County codes and policies.

2. Address potential liquefaction for the location of the proposed storm drain. Provide data and analyses to determine liquefaction potential of the on-site soils. Also, evaluate the potential for seismically induced settlement (dry and saturated soils), lateral spreading, surface manifestation, etc. The analyses must be performed for soils within the upper 50 feet, as a minimum, for shallow foundation, or greater depth where deep foundation and/or subterranean structure is proposed. The historic-high water table shall be used in the analyses, unless other information is provided which indicates a higher or lower level is appropriate. Recommend mitigation as necessary. The liquefaction data and analyses must conform to the State of California Division of Mines and Geology "Special Publication 117A", dated 2008 and "Recommended Procedure For Implementation of DMG Special Publication 117", dated March 1999.

3. Provide slope stability analyses considering rapid drawdown condition from full capacity for debris basins with slopes steeper than 3:1 gradient and designed with outlet structures. Submitted report indicates debris basin along Cross Section C-C'. Recommend mitigation if factors of safety is below the minimum standard.

4. CD with PDF copy of report and references were not provided in the submittal to the Soils Section. Provide CD with referenced reports and current report as requested by the Geology Section.

5. Show the following on the storm drain plans:
   a. Show/Add/Note the locations of the proposed rubber-gasketed joints.
   b. Approximate limits and depth of removal and recompaction of unsuitable soils.
   c. All recommended mitigation measures.

6. Add the following notes on the storm drain plans:
   The Soils Engineer of record shall inspect and approve the foundation excavations before steel or concrete is placed.

7. The Soils Engineer of record must review the storm drain plans and sign and stamp the plans in verification of his recommendations. Original manual signature and wet stamp are required.

8. Submit two sets of storm drain plans to the Soils Section for verification of compliance with County codes and policies.

9. Requirements of the Geology Section are attached.

10. Include a copy of this review sheet with your response.

NOTE(S) TO THE PLAN CHECKER/BUILDING AND SAFETY ENG[illegible]
A. PER SOILS ENGINEER, RUBBER GASKET JOINTS SHALL [illegible] ALLED [illegible] CUT/FILL TRANSITION AREAS.
B. ON-SITE SOILS ARE MODERATELY CORROSIVE TO FER[illegible] METALS.

REGISTERED PROFESSIONAL ENGINEER YOSHIYA MORISAKU No. 67567 Exp. 6/30/13 CIVIL STATE OF CALIFORNIA

Reviewed by Yoshiya Morisaku Date 11/18/11
Yoshiya Morisaku

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsur[illegible]

NOTICE: Public safety, relative to geotechnical subsurface exploration, shall be provided in accordance with current codes for excavations, inclusive of the Los Angeles County Code, Chapter 11.48, and the State of California, Title 8, Construction Safety Orders.

P:\Yosh\MTD 1843, NA_1

Dist. Office NA

LMTPWCHK

County of Los Angeles Department of Public Works
GEOTECHNICAL AND MATERIALS ENGINEERING DIVISION
GEOLOGIC REVIEW SHEET
900 So. Fremont Ave., Alhambra, CA 91803
TEL. (626) 458-4925

DISTRIBUTION
___ Dist. Office
1 Geologist
___ Soils Engineer
1 GMED File
1 LDD - Drainage

Parcel Map	62646	**Lot(s)**	
Parent Tract		**Location**	Valencia/Newhall
Site Address		**APN**	
Geologist	GeoSoils Consultants, Inc.	**Developer/Owner**	City of Santa Clarita
Soils Engineer	GeoSoils Consultants, Inc.	**Engineer/Arch.**	Sikand

Grading P.C. No. ________ For: MTD 1843
Soils Engineering Report(s) Dated ________
Geology and Soils Engineering Report(s) Dated 9/14/11 (W.O. 6457)
Additional Reports Reviewed ________

Action: Plan is not recommended for approval for reasons below.

Remarks/Conditions:

1. Required plans not submitted. To initiate review, submit plans (2 sets).

2. All recommendations of the consulting geologist must be incorporated into the design or shown as notes on the plans.

3. The plan must be specifically approved by the consultant geologist by manual, original signature and date on each sheet prior to approval by the Geology Section. Submit two (2) sets for review.

4. Based on the State of California Seismic Hazard Maps, the subject site is located in an area with a potential for liquefaction and may be subject to secondary effects of seismic shaking. In accordance with California Public Resources Code § 2697 and California Code of Regulations § 3724, prior to the approval of a project in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard must be submitted for review and approval. The report must address the potential for liquefaction and ground failure, and must comply with the provisions of the "Manual for Preparation of Geotechnical Reports" prepared by the County of Los Angeles, Department of Public Works, (available on the internet at http://dpw.lacounty.gov/gmed/Manual.pdf), and DMG Special Publication 117. Provide this office with two (2) original copies of the report for review and distribution to the State of California.

   All parameters and data utilized in the liquefaction analysis must comply with the requirements of the Geotechnical and Materials Engineering Division's Administrative Manual memo G045.0.

5. Effective August 1, 2006, all geotechnical reports submitted for review must include an electronic copy of the report on a CD in Adobe® Portable Document Format (PDF). The electronic version shall include an electronically generated representation of the licensee's seal, signature, and date of sealing or signing. This project cannot be approved until this requirement has been met. The submittal in response to this review must include a CD containing an electronic version of the original report and the supplemental report in response to this review.

6. The Soils Engineering review dated 11/18/11 is attached.

Prepared by ________ Reviewed by ________ Date 9/28/11
Geir Mathisen

Please complete a Customer Service Survey at http://dpw.lacounty.gov/go/gmedsurvey

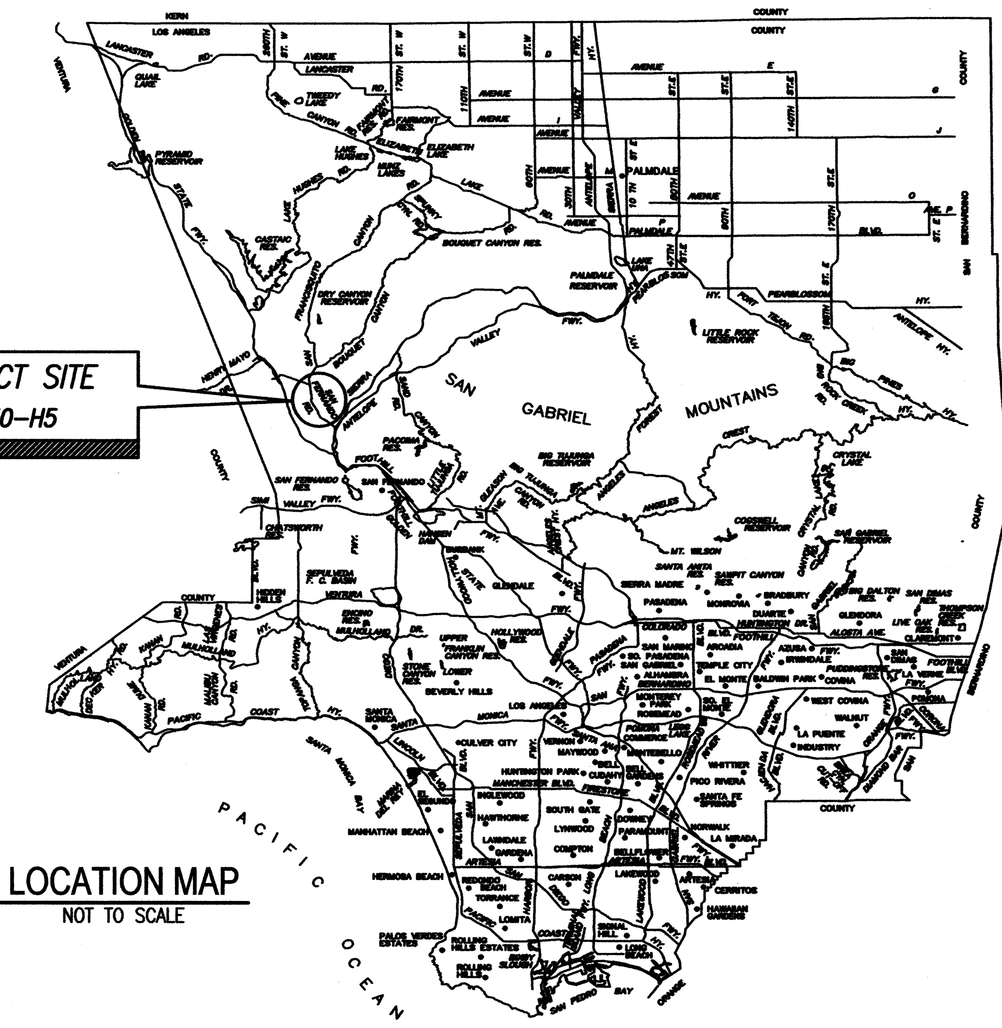
CITY OF SANTA CLARITA
MISCELLANEOUS TRANSFER DRAIN NO.1843
PARCEL MAP NO. 062646

M.T.D. NO. 1843

BENCH MARK: L.A.C.D.P.W. L 5259

DPW BM TAG IN W CB 43FT W/O C/L SAN FERNANDO RD & 0.35MI N/O CIRCLE J RANCH RD (8FT E/O PP # 4235226E)

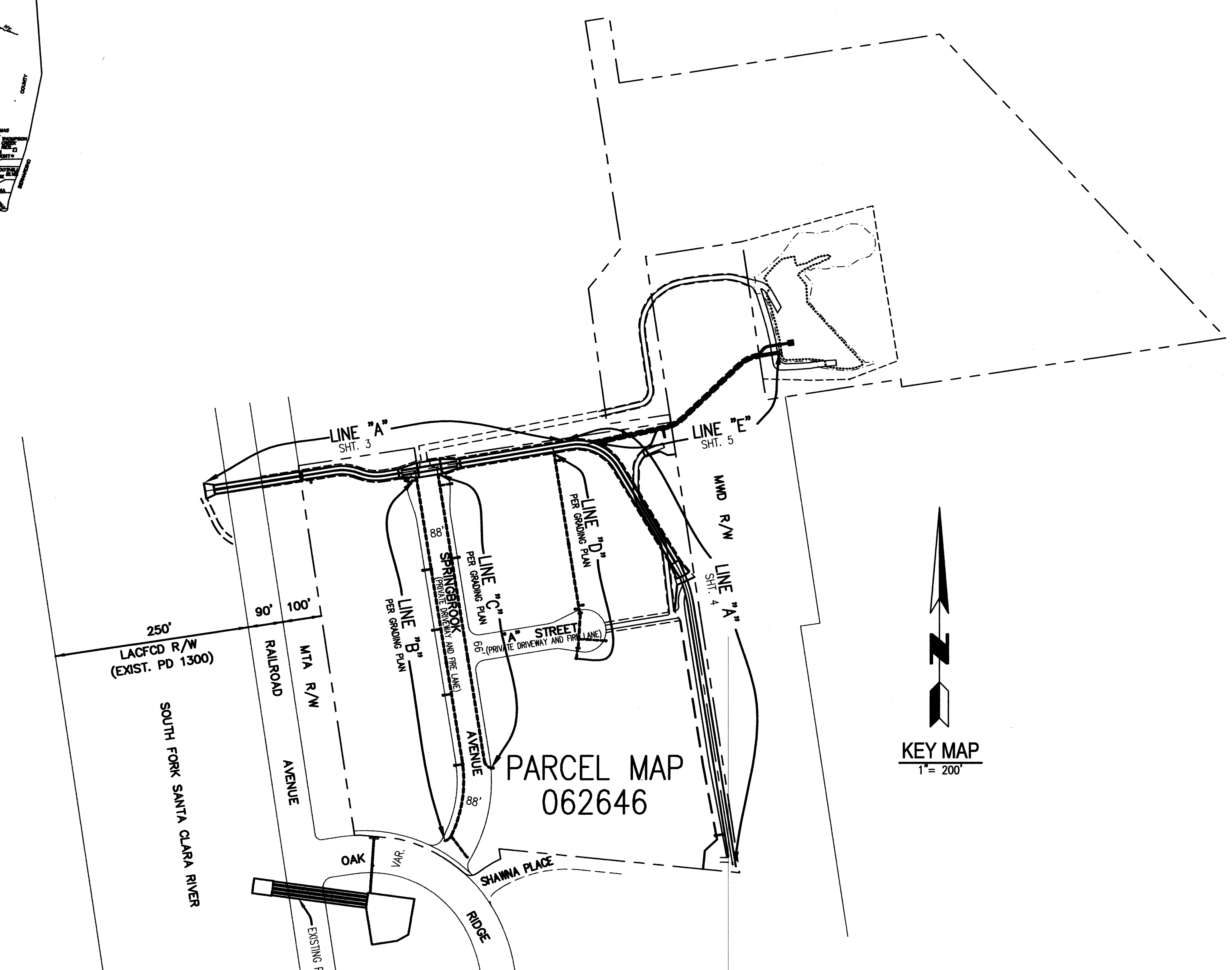
NEWHALL QUAD (1993) ELEV. 1175.593



LOCATION MAP
NOT TO SCALE

INDEX TO PROJECT DRAWINGS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	GENERAL NOTES, WATER QUALITY NOTES, STRUCTURAL NOTES & HYDRAULIC ELEMENT TABLE
3	PLAN – LINE "A" PROFILE – LINE "A"
4	PLAN – LINE "A" PROFILE – LINE "A"
5	PLAN – LINE "E", LAT."E-1", "E-2" & "E-3" PROFILE – LINE "E", LAT."E-1", "E-2" & "E-3"
6	DETENTION/DESILTING BASIN, ACCESS ROAD OVERVIEW
7	PROFILES – LAT."A-1" & "A-2" OUTLET STRUCTURE DETAILS
8	ELEVATED INLET STRUCTURAL DETAILS
9	DOUBLE/SINGLE RC BOX STRUCTURAL DETAILS
10	INLET STRUCTURE DETAILS FACING SLAB AND ACCESS ROAD DETAIL
11	EASEMENT EXHIBIT
12	STRUCTURAL DETAILS



PRIOR TO ORDERING PIPES, CONTACT GEOTECHNICAL AND MATERIALS ENGINEERING AT (626)458-1707 TO SCHEDULE A D-LOAD INSPECTION. INSPECTION FEES PAYABLE AT THE LAND DEVELOPMENT DIVISION PUBLIC COUNTER WILL BE REQUIRED.

LIST OF STANDARD PLANS

		L.A.C.D.P.W.	S.P.P.W.C.
1	PIPE ANCHORS AND BACKFILL STABILIZERS		221-2
2	SUPPORTS FOR CONDUITS ACCESS TRENCHES		224-2
3	BLANKET PROTECTIONFOR PIPES		225-2
4	CURB OPENING CATCH BASIN		300-3
5	MONOLITHIC CATCH BASIN CONNECTION		308-2
6	CATCH BASIN REINFORCEMENT		309-2
7	C.B. FACE PLATE ASSEMBLY AND PROTECTION BAR		310-3
8	CATCH BASIN MANHOLE FRAME AND COVER		312-3
9	LOCAL DEPRESSIONS AT CATCH BASINS		313-3
10	MANHOLE - PIPE TO PIPE (MAINLINE ID >= 36")		320-2
11	MANHOLE - PIPE TO PIPE (MAINLINE ID <= 33")		321-2
12	MANHOLE - PIPE TO PIPE (LARGE SIDE INLET)		322-2
13	MANHOLE - CONCRETE BOX STORM DRAIN		323-2
14	MANHOLE SHAFT WITH ECCENTRIC REDUCER		324-2
15	JUNCTION STRUCTURE PIPE TO PIPE (INLET I.D. >=24" OR O.D. > 1/2 MAINLINE I.D.)		331-3
16	JUNCTION STRUCTURE PIPE TO PIPE (INLET I.D. < 24")		332-2
17	JUNCTION STRUCTUE - PIPE TO RCB		333-2
18	JUNCTION STRUCTUE - PIPE TO RCB INLET (ID <= 30")		334-2
19	TRANSITION STRUCTURE - PIPE TO PIPE		340-2
20	TRANSITION STRUCTURE (RC BOX TO PIPE)		342-2
21	TRANSITION STRUCTURE (DOUBLE RC BOX TO DOUBLE RC BOX)		344-2
22	TRANSITION STRUCTURE (DOUBLE RC BOX TO TRIPLE RC BOX)		345-2
23	SLOPED PROTECTION BARRIER		360-2
24	TRASH RACK (INCLINED)		361-2
25	CONCRETE COLLAR		380-4
26	WINDOW DETAILS FOR MULTIPLE R.C. BOX STRUCTURE		382-2
27	CHAIN LINK FENCE AND GATES		600-3
28	24" MANHOLE FRAME AND COVER		630-3
29	STEEL STEP		635-3
30	REINFORCED CONCRETE STAIRWAY		640-3
31	PIPE BEDDING	3080-3 CASE 3	
32	SAFETY REQUIREMENTS	6008-1	
33	DEBRIS DAMS AND BASINS OUTLET WORKS	3097-0	
	CITY OF LOS ANGELES DWP STD. PLAN	A 3615	

SCRRA NOTE:

1. SCRRA is not a member of DIGALERT. The Contractor shall call SCRRA's Signal Department at (909) 859-4100 a minimum of five days prior to beginning construction to mark signal and communication cables and conduits. To assure cables and conduits have been marked, no work may proceed until you have been provided with an SCRRA dig number . In case of signal emergencies or grade crossing problems, the contractor shall call SCRRA's 24-hour signal emergency number 1-888-446-9721.
2. Contact SCRRA's consultant/contractor at (714) 920-9037 to arrange for flagging services. Flagging service is dependent on the Employee-In-Charge (EIC) availability and may require a minimum of fifteen working days prior to beginning work. Prior notification of flagging services does not guarantee the availability of the EIC for the proposed date of work.
3. Contact SCRRA's consultant/contractor at (877) 452-0205 to arrange for third party safety training. Allow 24 to 72 hours from the request for safety training to arrange the training.
4. Contractor is to complete SCRRA's Temporary Right of Entry Agreement, Form 6. Real estate license through the approriate member agency will be needed. If so, Form 6 will not be issued until the license agreement has been issued.
5. The applicant and/or the contractor shall follow SCRRA's "Right-of-Way Encroachment Approval Procedures" (SCRRA Form 36)".
6. The applicant and/or the contractor shall follow SCRRA rules and regulations, addressed in "Rules and Requirements for Construction on Railway Property" (SCRRA Form 37)".

PRIVATE ENGINEERS NOTICE TO CONTRACTORS:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED CIVIL ENGINEER No. 49041 DATE

REVEIWED BY: DATE

APPROVED FOR CONSTRUCTION BY: DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

PARCEL MAP NO. 062646 SHEET 1 OF 12

GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED 5/12

PLATE 1A

MDN-13790

X:\2001 w.o\gsc-cad\6457\Storm Drain Plans - PM 062646 - MTD 1843\sd sht 01.dwg 5/16/2012 ...
HP DesignJet 1050C by HP HPGL2.pc3, Custom 1: 36 x 30 in. (landscape)

M.T.D. NO. 1843

GENERAL NOTES

1. A permit shall be obtained and all fees and deposits for construction inspection shall be paid to the Department of Public Works at the Permit Counter, 900 South Fremont Avenue, 8th Floor, prior to starting work under this contract. Also, all other required permits, such as Road Excavation Permits, must be obtained prior to starting work.
2. The contractor shall contact the District Office listed on the "Application for Storm Drain Construction Inspection Form I" to arrange for an acceptable construction start date.
3. Approval of this plan by the County of Los Angeles does not constitute a representation to the accuracy of the location, or the existence or nonexistence of any underground utility, pipe or structure within the limits of this project. This note applies to all sheets.
4. All work shall be in accordance with the latest adopted edition of the "Standard Specifications for Public Works Construction," including supplements, and shall be prosecuted only in the presence of the Director of Public Works.
5. The contractor's attention is directed to Section 7–10.4.1 of the Standard Specifications for Public Works Construction in regard to safety orders, and shall conform to the "Minimum Public Safety Requirements" as shown on Los Angeles County Department of Public Works Standard Plan 6008–1.
6. Elevations are in feet above N.A.V.D. 1988 unless otherwise indicated.
7. No concrete shall be placed until the forms and reinforcing steel have been placed, inspected and approved.
8. All structural concrete shall be Portland cement concrete with an ultimate 28 day compressive strength of 4000 psi unless otherwise noted.
9. Transverse reinforcement and transverse joints shall be placed at right angles (or radial) to the conduit centerline except as otherwise shown on the drawings.
10. All steel adjacent to face of concrete shall have a 2–inch clearance unless otherwise specified.
11. Reinforcement shall be deformed bars of intermediate grade steel, per ASTM A–615–Grade 60.
12. All bar bends and hooks shall conform to the American Concrete Institute "Manual of Standard practice."
13. Dimensions from face of concrete to steel are to centerline of steel unless otherwise noted.
14. All steel that is to be continuous shall have a minimum lap of 30 bar diameters or 18 inches, whichever is greater.
15. All construction joints in the footing or slabs and walls shall be in the same plane. No staggering of joints will be permitted.
16. All exposed edges shall be finished with a 3/4–inch chamfer.
17. Unless otherwise shown, concrete dimensions shall be measured vertically or horizontally and parallel or at right angles (or radial) to the center line of construction.
18. Concrete backfill is required when the pipe has less than one foot of cover. The concrete backfill shall consist of 1:3:5 mix, Portland cement concrete poured from wall to wall of trench and from bottom of trench to a minimum of 4 inches over the top of the pipe.
19. All pipes shall be placed in trench in natural ground and/or compacted fill. The ground level before the trenching shall be at least 3 feet above the top of the pipe elevation, or at finish surface elevation, whichever is less.
20. All backfill and fills outside of street right of way shall be compacted to a minimum relative compaction of 90 percent of maximum dry density as determined by ASTM Soil Test D 1557–91 Method "D" unless otherwise specified. This shall be certified by a soils engineer. This certification shall be submitted to the City prior to acceptance of the work by the County.
21. All backfill and fills within street rights of way shall be compacted in accordance with City requirements unless otherwise noted and inspected by the City. The soil compaction shall be certified by a geotechnical engineer.
22. Pipe bedding shall be:

    According to Standard Plan No. 3080 Case III, except bell and spigot pipe which shall be Case II bedding, unless otherwise shown. "W" values shall be as specified on Standard Plan No. 3080 for Case III bedding, Notes 3 (a), 3 (b), and 3 (c). If the "W": value at the tip of the pipe is exceeded, the bedding shall be modified, and/or pipe of additional strength shall be provided. The proposed modification shall be approved by the Public Works.
23. Pipe shall be embedded 5 inches into all structures including inlet and head walls, unless otherwise specified.
24. The minimum concrete cover for reinforcement in precast concrete pipe shall be 1 inch in pipe having a thickness of 2 1/2 inches or greater and 3/4 inch in pipe having a wall thickness of less than 2 1/2 inches.
25. All catch basins within the dedicated street right of way shall be constructed per Street Plans.
26. The contractor shall provide to the satisfaction of the Director of Public Works a drainage system for contributory flows to be operable at all times until this storm drain system is accepted for maintenance . The design of the drainage system must be prepared under the direction of a Civil Engineer.
27. All references on this plan to the County Engineer, Road Department, or Flood Control District shall apply to the appropriate elements of the Department of Public Works.
28. Existing utilities shall be maintained in place by the contractor, unless otherwise noted.
29. Where the utilities are indicated on the Drawings to be supported, said supports shall be in accordance with Standard Plans for Public Works Construction No. 224 unless otherwise indicated.
30. All openings resulting from the cutting or partial removal of existing culverts, pipes or similar structures shall be sealed with 8 inches of Brick and Mortar or 6 inches of concrete, unless otherwise shown.
31. Manholes shall use the Standard Plans for Public Works Construction No 630 for the "Frame and Cover" and No. 635 for the "Standard Drop Step."
32. This storm drain will not be field accepted until the streets have been paved, manholes brought to grade, and the system cleaned to the satisfaction of the Director of Public Works.
33. A NPDES Permit from the Regional Water Quality Control Board is required before any discharge of non–storm water into the storm drain is allowed.
34. The latest revised standard plan or drawing shall be used unless otherwise noted.
35. The soil engineer of record shall inspect and approve the foundation excavation before steel or concrete is placed.
36. Storm drain manhole covers constructed per S.P.P.W.C. standard plans 630, 631, 632 and 633 shall be cast with the letters "L.A.C.F.C.D.". The letters shall be 1 inch in height and placed below the letter "D" in the center of the cover.
37. Catch basin manhole covers constructed per S.P.P.W.C. standard plan 312 shall be cast with the letters "L.A.C.F.C.D.". The letters shall be 1 inch in height and placed below the letter "D" in the center of the cover.

STORMWATER POLLUTION CONTROL REQUIREMENTS FOR STORM DRAIN CONSTRUCTION

1. Eroded sediments and other pollutants must be retained on site and may not be transported from the site via sheetflow, swales, area drains, natural drainage courses or wind.
2. Stockpiles of earth and other construction related materials must be protected from being transported from the site by the forces of wind or water.
3. Fuels, oils, solvents and other toxic materials must be stored in accordance with their listing and are not to contaminate the soil and surface waters. All approved storage containers are to be protectedfrom the weather. Spills must be cleaned up immediately and disposed of in a proper manner. Spills may not be washed into the drainage system.
4. Excess or waste concrete may not be washed into the public way or any other drainage system. Provisions shall be made to retain concrete wastes on site until they can be disposed of as solid waste.
5. Trash and construction related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.
6. Sediments and other materials may not be tracked from the site by vehicle traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public way. Accidental depositions must be swept up immediately and may not be washed down by rain or other means.
7. Any slopes with disturbed soils or denuded of vegetation must be stabilized so as to inhibit erosion by wind and water.
8. The following BMP's as outlined in, but not limited to, the "BEST MANAGEMENT PRACTICE HANDBOOK, CALIFORNIA STORM QUALITY TASK FORCE, SACRAMENTO, CALIFORNIA 2003". or the latest revised edition, may apply during the construction of this project (additional measures may be required if deemed appropriate by county inspectors:

TEMPORARY SOIL STABILIZATION

SS1 – Scheduling
SS2 – Preservation of Existing Vegetation
SS3 – Hydraulic Mulch
SS4 – Hydroseeding
SS5 – Soil Binders
SS6 – Straw Mulch
SS7 – Geotextiles, Plastic Covers & Erosion Control Blankets/ Mats
SS8 – Wood Mulching
SS9 – Earth Dikes/ Drainage Swales & Lined Ditches
SS10 – Outlet Protection/ Velocity Dissipation Devices
SS11 – Slope Drains
SS12 – Streambank Stabilization

NON–STORMWATER MANAGEMENT

NS1 – Water Conservation Practices
NS2 – Dewatering Operations
NS3 – Paving and Grinding Operations
NS4 – Temporary Stream Crossing
NS5 – Clear Water Diversion
NS6 – Illicit Connection/ Illegal Discharge Detection & Reporting
NS7 – Potable Water/Irrigation
NS8 – Vehicle and Equipment Cleaning
NS9 – Vehicle and Equipment Fueling
NS10 – Vehicle & Equipment Maintenance
NS11 – Pile Driving Operations
NS12 – Concrete Curing
NS13 – Material and Equipment Use Over Water
NS14 – Concrete Finishing
NS15 – Structure Demolition / Removal Or Adjacent To Water

WASTE MANAGEMENT & MATERIAL POLUTION CONTROL

WM1 – Material Delivery and Storage
WM2 – Material Use
WM3 – Stockpile Management
WM4 – Spill Prevention and Control
WM5 – Solid Waste Management
WM6 – Hazardous Waste Management
WM7 – Contaminated Soil Management
WM8 – Concrete Waste Management
WM9 – Sanitary/Septic Waste Management
WM10 – Liquid Waste Management

TEMPORARY SEDIMENT CONTROL

SC1 – Silt Fence
SC2 – Sediment/ Desilting Basin
SC3 – Sediment Trap
SC4 – Check Dams
SC5 – Fiber Rolls
SC6 – Gravel Bag Berm
SC7 – Street Sweeping and Vacuuming
SC8 – Sandbag Barrier
SE9 – Straw Bale Barrier
SC10 – Storm Drain Inlet Protection

WIND EROSION CONTROL

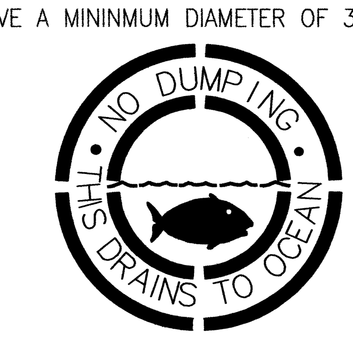
WE1 – Wind Erosion Control

EQUIPMENT TRACKING CONTROL

TC1 – Stabilized Construction Entrance/Exit
TC2 – Stabilized Construction Roadway
TC3 – Entrance/ Outlet Tire Wash

CATCH BASIN DETAIL

ALL CATCH BASINS AND INLETS THAT DISCHARGE INTO AN EXISTING OR PROPOSED STORM DRAIN MUST BE STENCILED TO DISCOURAGE ILLEGAL DUMPING OF POLLUTANTS. THIS STENCIL SHALL HAVE A MININMUM DIAMETER OF 30 INCHES.



HYDRAULIC ELEMENTS

50 YR. FREQUENCY

LINE NAME	REACH STA FROM	REACH STA TO	Q (cfs)	CONDUIT SIZE (in)	S.F.	MAXIMUM VELOCITY (fps)	MAXIMUM DEPTH OF FLOW (ft)	COMMENTS
LINE A	1+22.86	3+47.23	1214.2	QTPL 6'Wx3.5'H RCB	0.0093	11.70	6.22	
	3+47.23	3+82.10	1214.2	TS	0.0056	11.70	7.54	
	3+82.10	3+87.23	1213.0	TS	0.0019	7.90	7.55	
	3+87.23	6+22.06	1213.0	DBL 14'Wx5.5'H RCB	0.0019	7.90	7.54	
	6+22.06	6+23.55	1213.0	DBL 14'Wx5.5'H RCB	0.0038	7.83	7.32	
	6+23.55	6+53.55	1202.5	TS	0.0038	10.48	7.30	
	6+53.55	6+75.79	1202.5	TPL 11'Wx3.5'H RCB	0.0058	10.48	6.74	
	6+75.79	7+13.55	1197.0	TPL 11'Wx3.5'H RCB	0.0058	10.43	6.84	
	7+13.55	7+43.55	1197.0	TS	0.0038	10.43	7.65	
	7+43.55	9+44.55	1197.0	DBL 14'Wx5.5'H RCB	0.0019	7.80	7.65	
	9+44.55	9+84.55	1197.0	TS	0.0056	12.03	7.22	
	9+84.55	10+85.78	1187.7	DBL 10'Wx5'H RCB	0.0056	11.94	6.59	
	10+85.79	11+25.00	945.1	DBL 10'Wx5'H RCB	0.0035	9.50	7.49	
	11+25.00	11+30.00	945.1	TS	0.0035	9.59	7.49	
	11+30.00	14+77.42	945.1	DBL 9'Wx5.5'H RCB	0.0035	9.59	7.59	
	14+77.42	15+17.42	945.1	TS	0.0020	9.59	7.46	
	15+17.42	22+64.00	945.1	TRAP. CHANNEL	0.0066	16.12	6.28	
LINE E	1+24.12	1+50.00	261.5	S 7'Wx3'H RCB	0.0116	12.60	6.49	
	1+50.00	1+65.00	261.5	TS	0.0088	12.60	7.16	
	1+65.00	3+05.46	261.5	66" RCP	0.0061	11.01	7.16	
	3+05.46	3+10.86	258.5	66" RCP	0.0059	10.88	7.09	
	3+10.86	3+16.36	258.5	66" RCP	0.0059	10.88	7.25	
	3+16.36	3+21.36	258.5	TS	0.0085	12.93	7.25	
	3+21.36	3+65.48	258.5	S 4.5'Wx4.5'H RCB	0.0111	12.93	7.09	
	3+65.48	5+65.28	258.5	S 4.5'Wx4.5'H RCB	0.0529	27.48*	7.72	
	5+65.28	6+14.63	258.5	S 4.5'Wx4.5'H RCB	0.0653	30.63**	2.06	
	6+14.63	6+21.00	258.5	TS	0.0653	30.82**	2.11	
	6+21.00	6+32.50	258.5	66" RCP	0.0612	30.95**	2.11	
	6+32.50	6+63.82	258.5	66" RCP	0.0612	31.52**	2.76	
	6+63.82	6+68.82	258.5	TS	0.0236	21.63*	2.76	
	6+68.82	6+78.82	258.5	S 5.5'Wx5.5'H RCB	0.0236	20.49*	4.10	
LAT–E2	1+02.96	1+20.62	19.2	24" RCP	0.0389	13.90	4.81	
LAT–E3	1+02.00	1+98.00	150.0	42" RCP	0.0368	22.49*	3.39	

* ADDITIONAL CONCRETE COVER OVER STEEL IN INVERT = 0.5" (30 > V > 20 fps)

** ADDITIONAL CONCRETE COVER OVER STEEL IN INVERT = 1.0" (40 > V > 30 fps)

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

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info@sikand.com

PARCEL MAP NO. 062646 SHEET 2 OF 12

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GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

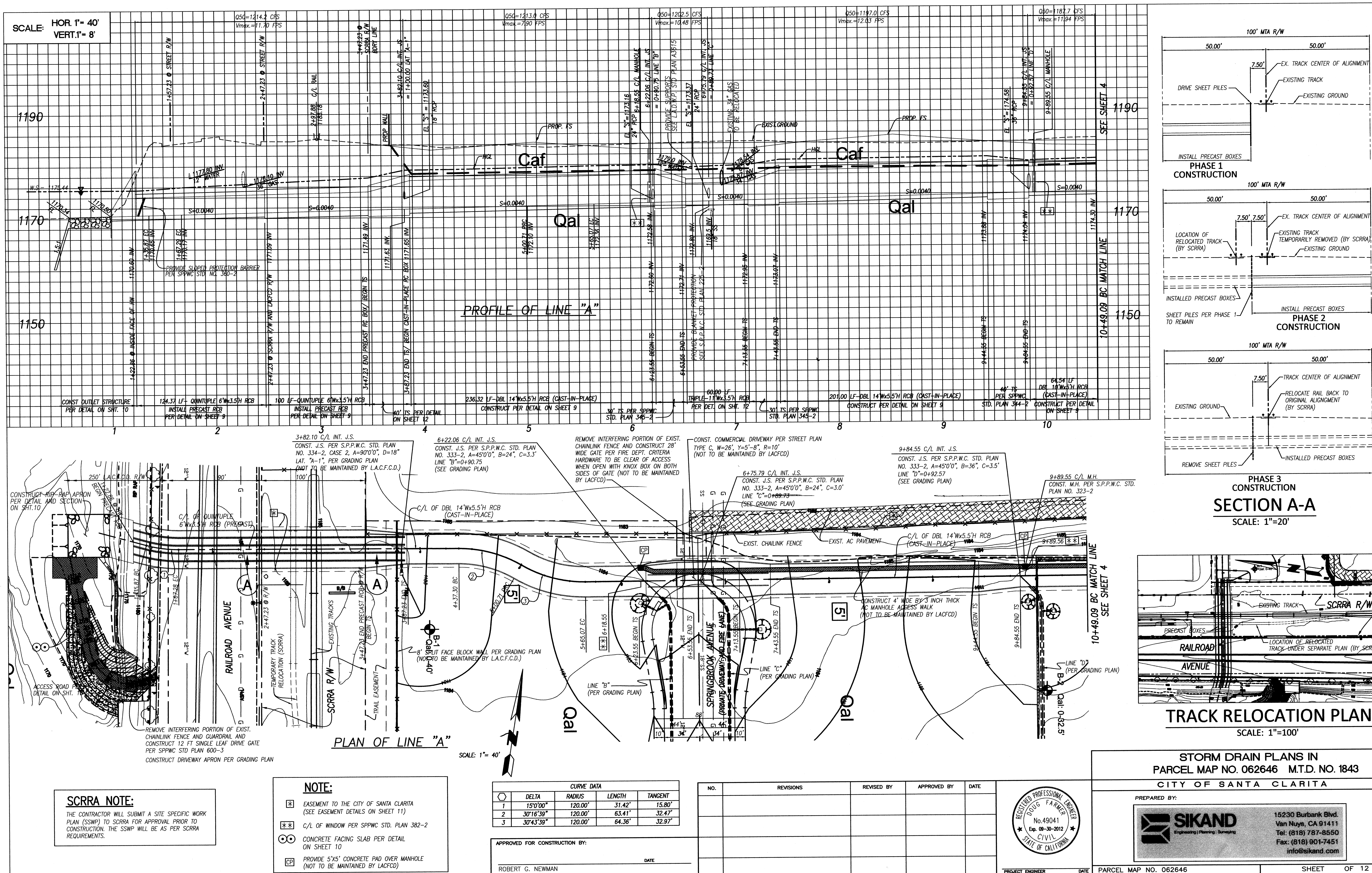
WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED 5/12

PLATE 1B

MWN 13790

X:\2001 w.o.\gsc-cad\6457\Storm Drain Plans - PM 062646 - MTD 1843\sd_sht_02.dwg, 5/16/2012 2:37:52 PM, PThomson,
HP DesignJet 1050C by HP HPGL2.pc3, Custom 1: 36 x 30 in. (landscape)



	DELTA	RADIUS	LENGTH	TANGENT
1	15°00'00"	120.00'	31.42'	15.80'
2	30°16'39"	120.00'	63.41'	32.47'
3	30°43'39"	120.00'	64.36'	32.97'

EXPLANATION

af	ARTIFICIAL FILL
Qal	ALLUVIUM
Qog	OLDER ALLUVIUM, PRIMARILY SAND AND GRAVEL

APPROXIMATE GEOLOGIC CONTACT

B-6 APPROXIMATE LOCATION OF BORING

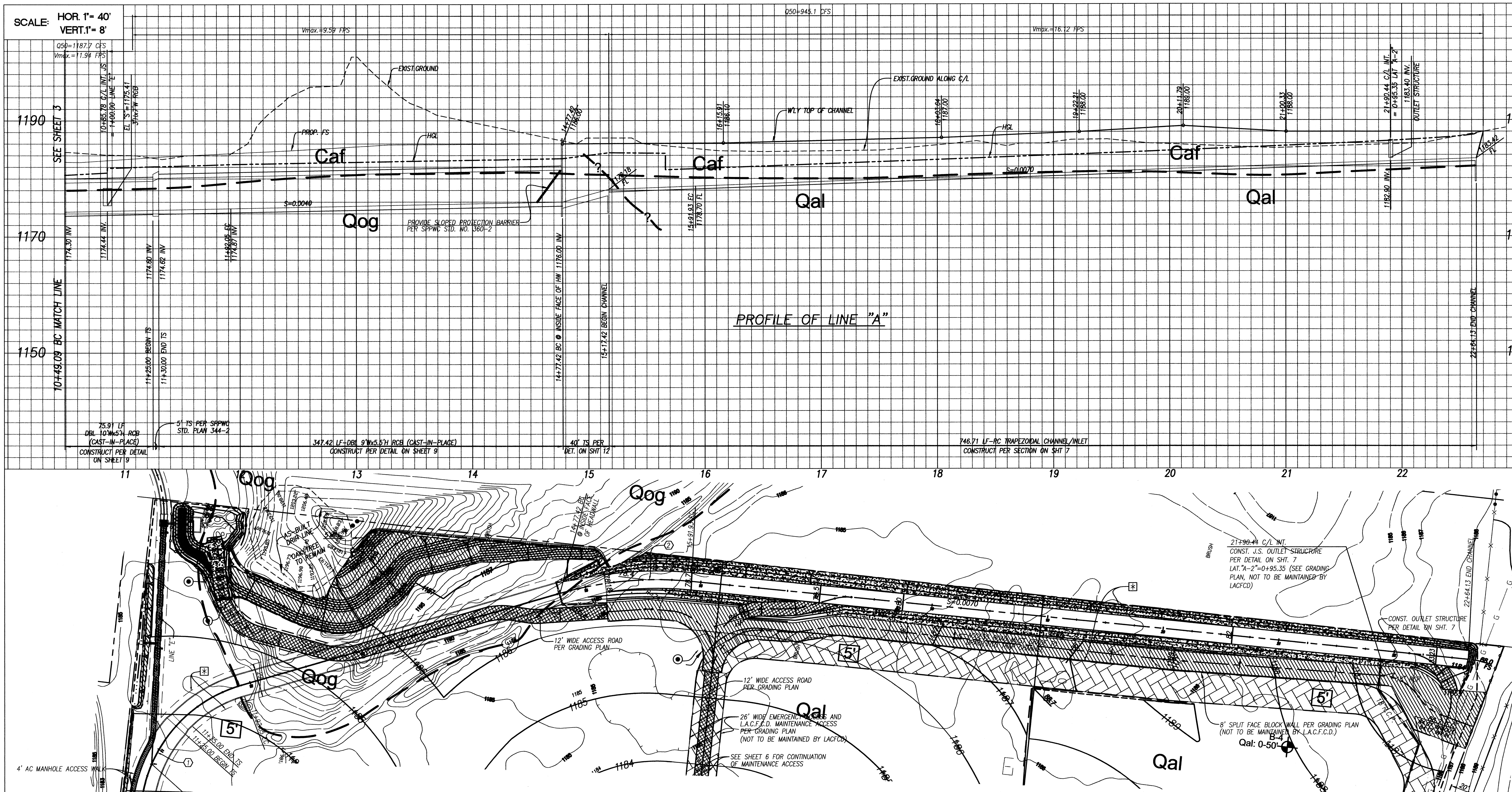
5' APPROXIMATE DEPTH OF REMOVAL AND RECOMPACTION

GSC GeoSoils Consultants Inc. 6634 Valjean Avenue Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'
REVISED 5/12	PLATE 1C	

WDN 13790



NOTE:

- [*] EASEMENT TO THE CITY OF SANTA CLARITA FOR (SEE EASEMENT DETAILS ON SHEET 11)
- (●) CONSTRUCT 5' HIGH WROUGHT IRON FENCE AND 15' WIDE DOUBLE DRIVE GATES, TO BE MAINTAINED BY H.O.A. WROUGHT IRON FENCE AND GATES WILL BE REPLACED WITH CHAINLINK FENCE IF NOT SATIFACTORILY MAINTAINED.
- * CONSTRUCT 12' ACCESS ROAD PER DETAIL ON SHEET 10

CURVE DATA				
⬡	DELTA	RADIUS	LENGTH	TANGENT
1	68°15'31"	120.00'	142.96'	81.34'
2	21°52'08"	300.00'	114.51'	57.96'

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2012 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

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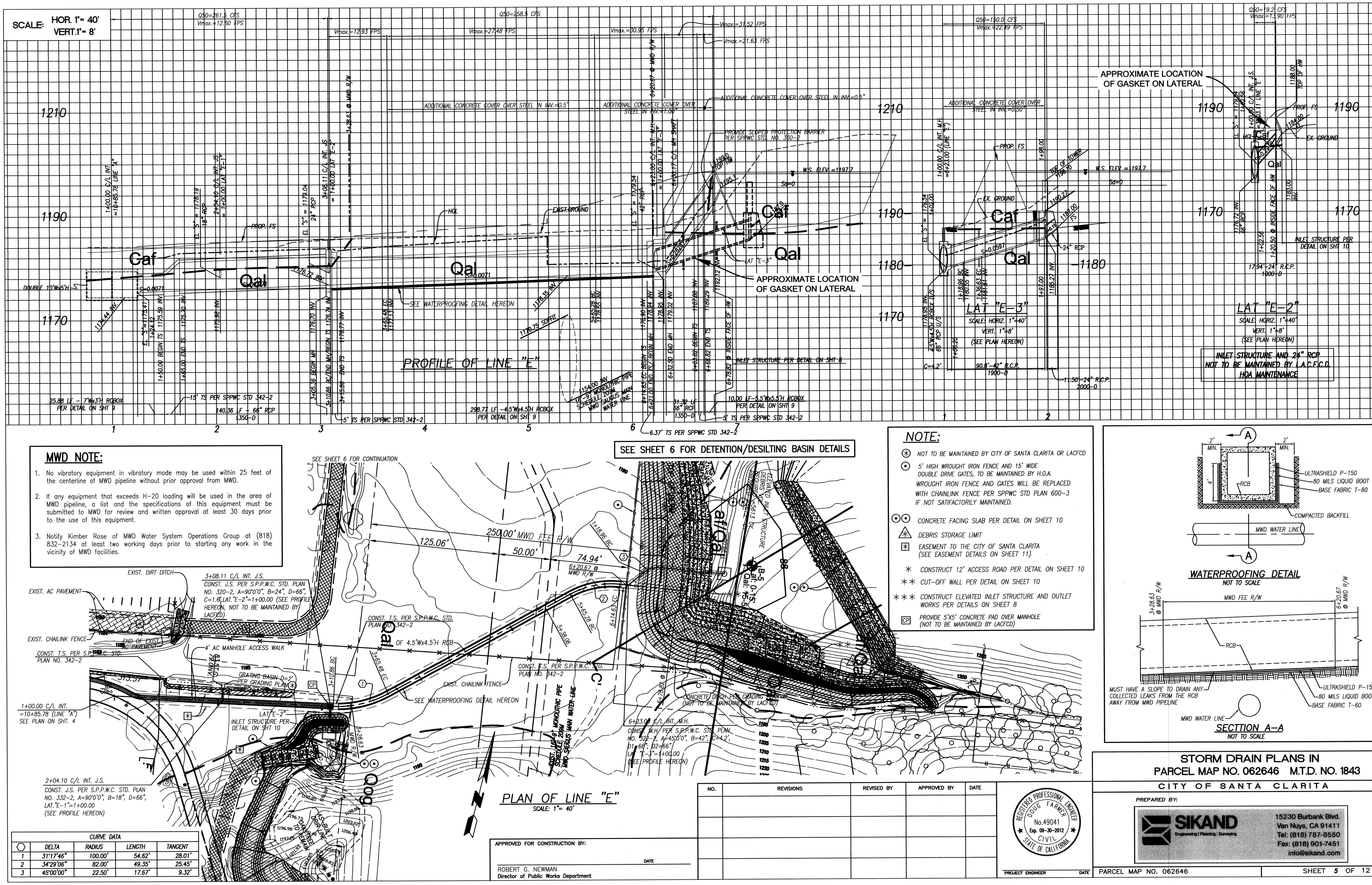
PARCEL MAP NO. 062646 SHEET 4 OF 12

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'
REVISED 5/12	PLATE 1D	

SEE PLATE 1C FOR EXPLANATION



GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

SEE PLATE 1C FOR EXPLANATION

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

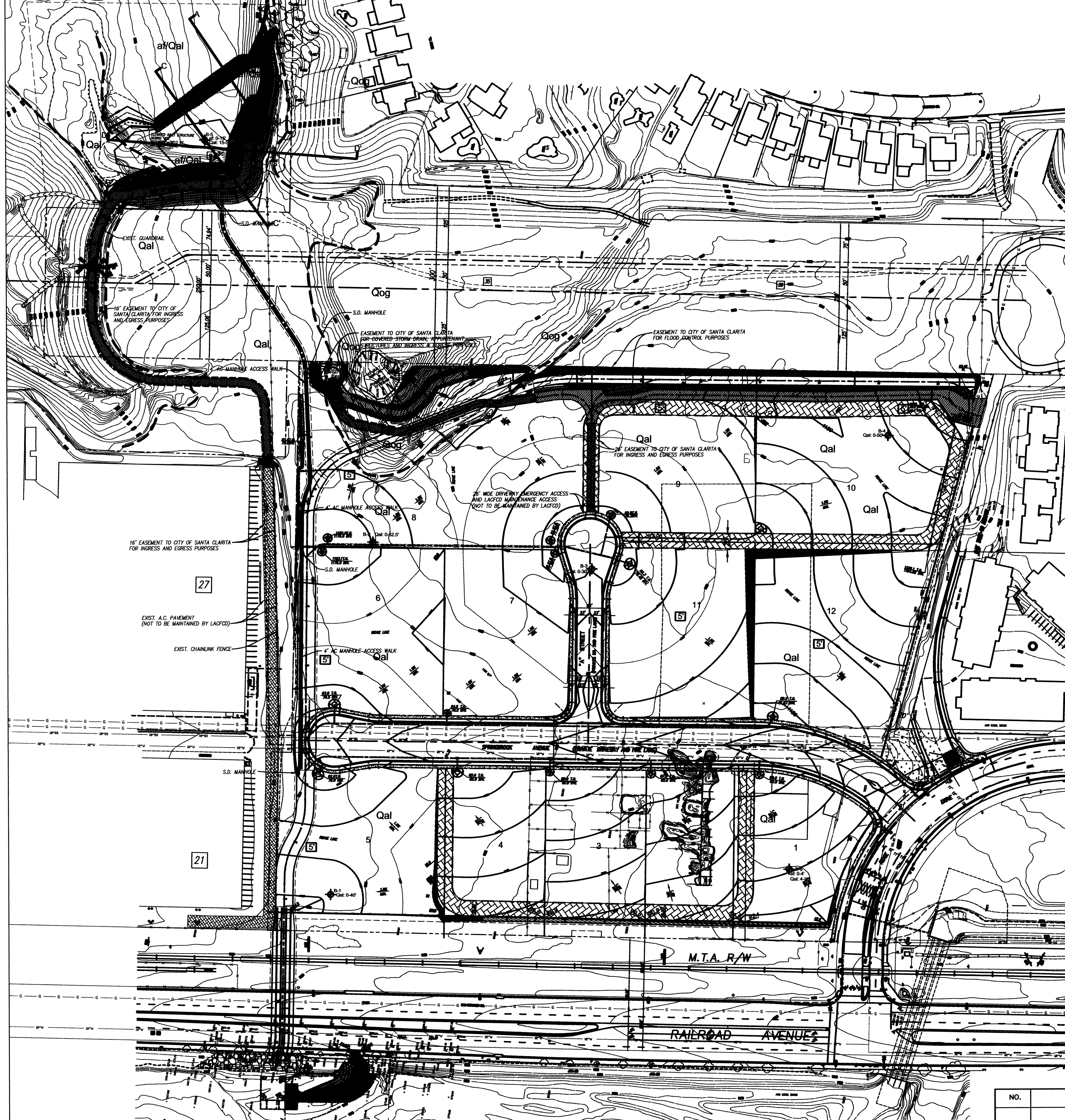
WORK ORDER	DATE	SCALE
6457	9/2011	1" = 40'

REVISED 5/12

PLATE 1E

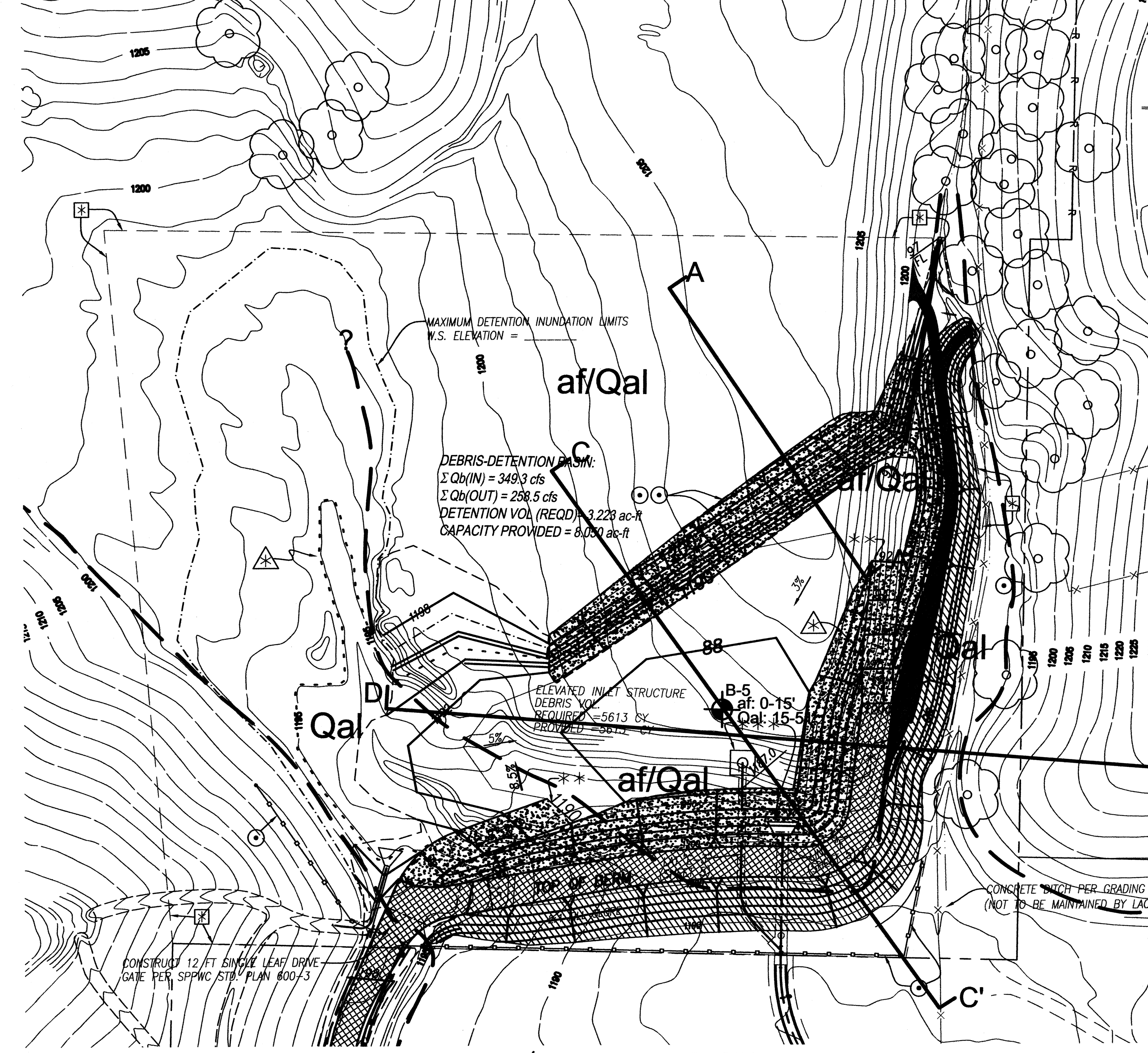
MON 13790

M.T.D. NO. 1843



ACCESS ROAD OVERVIEW

SCALE: 1"= 100'



DETENTION/ DESILTING BASIN

SCALE: 1"= 40'

NOTE:

- (*) NOT TO BE MAINTAINED BY CITY OF SANTA CLARITA OR LACFCD
- (•) 5' HIGH WROUGHT IRON FENCE AND 15' WIDE DOUBLE DRIVE GATES, TO BE MAINTAINED BY H.O.A. WROUGHT IRON FENCE AND GATES WILL BE REPLACED WITH CHAINLINK FENCE IF NOT SATIFACTORILY MAINTAINED.
- (•)(•) CONCRETE FACING SLAB PER DETAIL ON SHEET 10
- DEBRIS STORAGE LIMIT, ELEVATION = _______
- [*] EASEMENT TO THE CITY OF SANTA CLARITA FOR COVERED STORM DRAIN, APPURTENANT STRUCTURES, AND INGRESS AND EGRESS PURPOSES (SEE EASEMENT DETAILS ON SHEET 11)
- * 12' ACCESS ROAD PER DETAIL ON SHEET 10
- ** CUT-OFF WALL PER DETAIL ON SHEET 10
- *** CONSTRUCT ELEVATED INLET STRUCTURE AND OUTLET WORKS DETAIL ON SHEET 8

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

PREPARED BY:

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PARCEL MAP NO. 062646 SHEET 6 OF 12

SEE PLATE 1C FOR EXPLANATION

GSC GeoSoils Consultants Inc.
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6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN

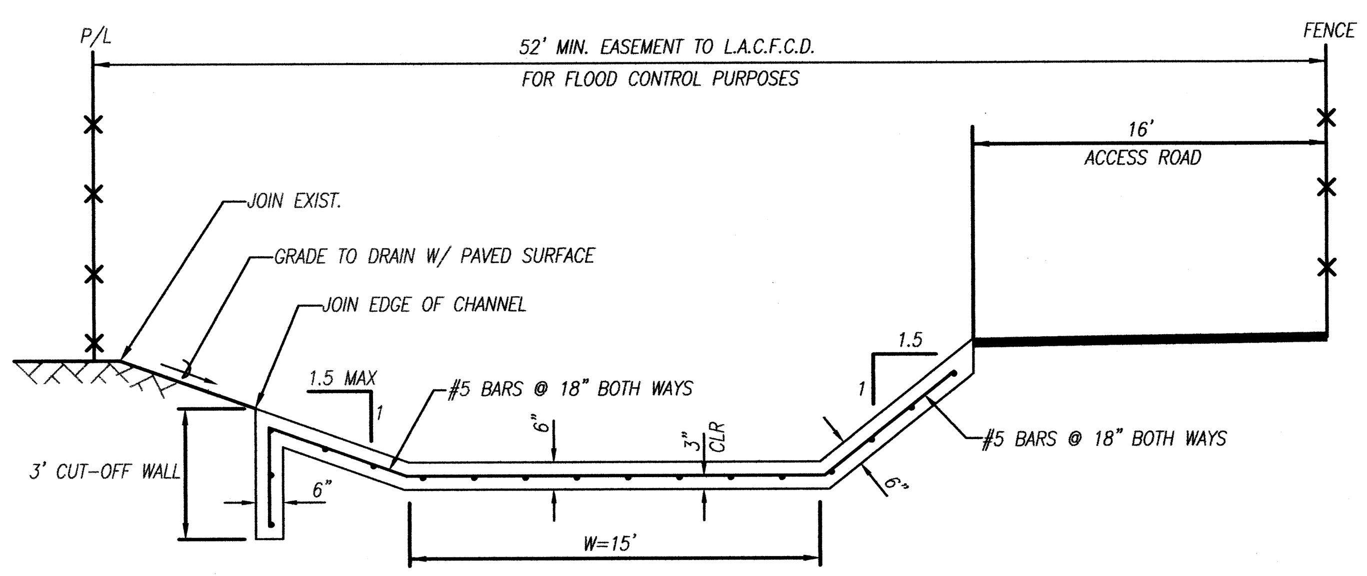
REVISED 5/12

PLATE 1F

MDN 13790

SCALE: HOR. 1"= 40'
VERT. 1"= 8'

M.T.D. NO. 1843



REINFORCED CONCRETE TRAPEZOIDAL CHANNEL/INLET

NOT TO SCALE

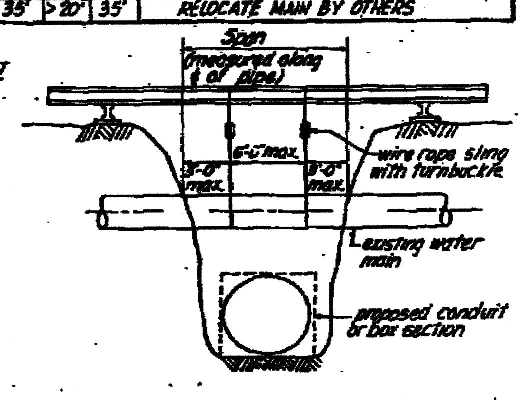
REINFORCED CONCRETE TRAPEZOIDAL CHANNEL

1. Transverse construction joints shall not be placed within 30 inches of inlets.
2. Transverse joints shall be placed at the junction of trapezoidal open channel sections with closed conduit sections. The joint shall not be keyed and shall have a three–eights inch layer of expansion joint material in walls and invert.
3. All trapezoidal open channel walls shall be fenced in accordance with S.P.P.W.C. Standard Drawing 600–3 except as otherwise shown on the drawings.
4. Unless otherwise shown on the drawings, in curved sections, the maximum spacing of bars shall not exceed that shown on the typical sections. Steel shall be placed radially from the maximum spacing.
5. At the beginning and ending of all pours, a complete curtain of reinforcement composed of B1, B4, and B7 bars shall be placed three inches from the transverse construction joint.
6. Longitudinal steel shall terminate two inches from transverse construction joints.

TEMPORARY AND PERMANENT SUPPORT AND OTHER REQUIREMENTS

TYPE OF PIPE	SIZE OF PIPE	SPAN: TEMPORARY SUPPORTS MIN.	SPAN: TEMPORARY SUPPORTS MAX.	SPAN: PERMANENT SUPPORTS MIN.	SPAN: PERMANENT SUPPORTS MAX.	REQUIREMENTS WHEN SPAN EXCEEDS MAXIMUM
ASBESTOS CEMENT	4" to 6"	> 6'	11'	> 4'	11'	REPLACE WITH STEEL PIPE BY OTHERS
	8" to 16"	> 6'	11'	> 6'	11'	
CAST IRON	4" to 6"	> 8'	16'	> 8'	16'	
	8" to 16"	> 8'	16'	> 10'	16'	
STEEL	4" to 16"	> 20'	35'	> 20'	35'	RELOCATE MAIN BY OTHERS

TEMPORARY SUPPORT



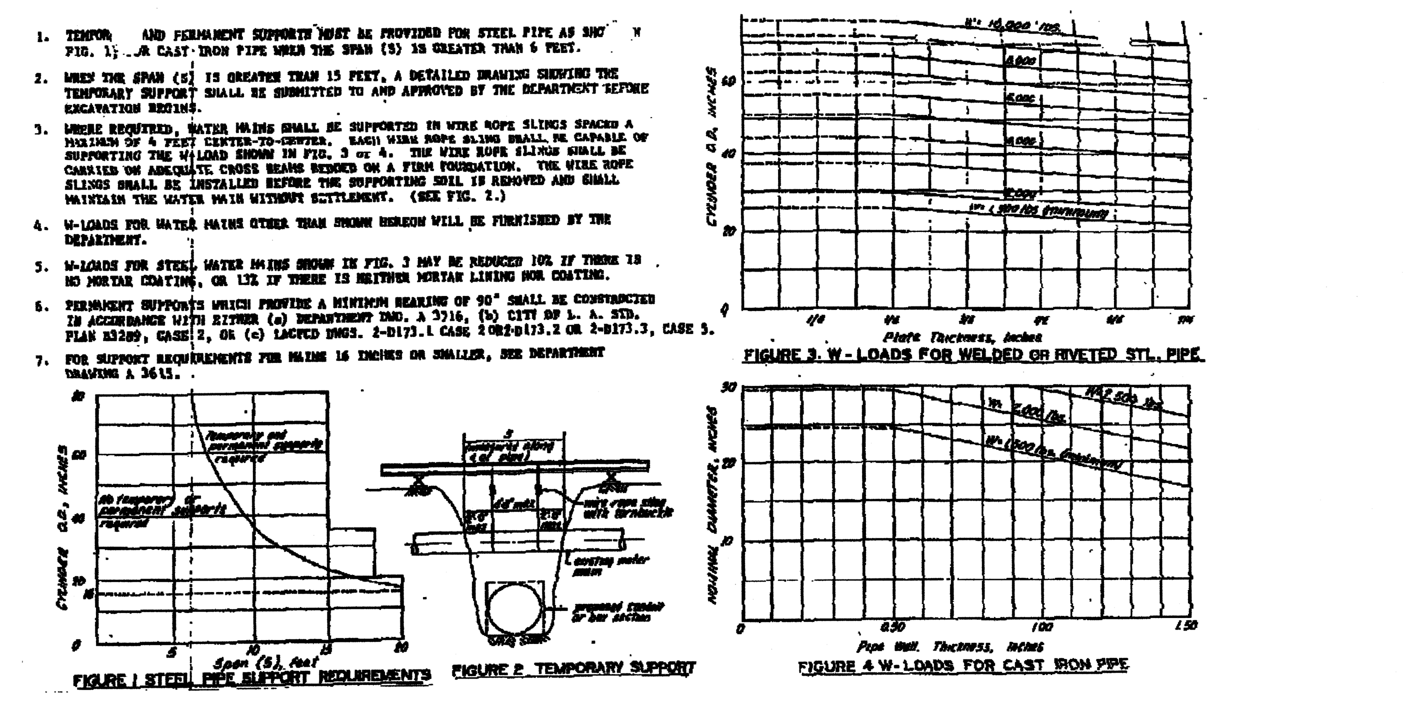
NOTES:

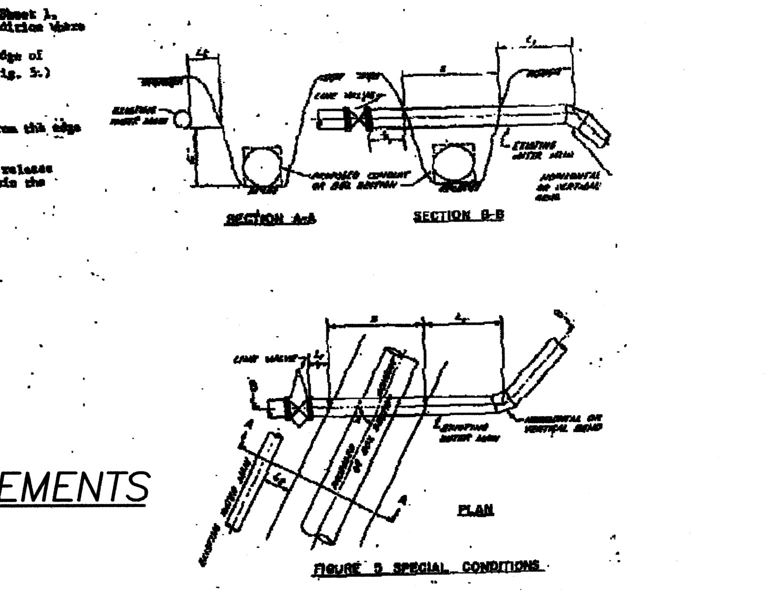
1. TEMPORARY SUPPORTS, WHERE REQUIRED, SHALL MAINTAIN THE WATER MAIN WITHOUT SETTLEMENT BY MEANS OF WIRE ROPE SLINGS INSTALLED BEFORE THE SUPPORTING SOIL IS REMOVED. THE WIRE ROPE SLINGS SHALL BE CARRIED ON ADEQUATE CROSS BEAMS BEDDED ON A FIRM FOUNDATION. THE MAXIMUM ALLOWED SPACING OF THE SLINGS IS 6 FEET CENTER-TO-CENTER AND EACH SLING SHALL BE CAPABLE OF SUPPORTING A LOAD OF 1500 POUNDS.
2. PERMANENT SUPPORTS WHERE REQUIRED WILL PROVIDE A MINIMUM BEARING OF 90° AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH EITHER (a) DEPARTMENT DWG. A-3716 OR A-3718, (b) CITY OF L. A. STD. PLAN B-3289, CASE 2, OR (c) LACFCD DWGS. 2-D173.1, CASE 2, OR 2-D173.2, OR 2-D173.3, CASE 5.
3. FOR SUPPORT REQUIREMENTS FOR MAINS LARGER THAN 16", SEE DEPARTMENT DWG. B-1453-1A.

WATER SYSTEM SUPPORT REQUIREMENTS

FOR MAINS 16" AND SMALLER

NOT TO SCALE

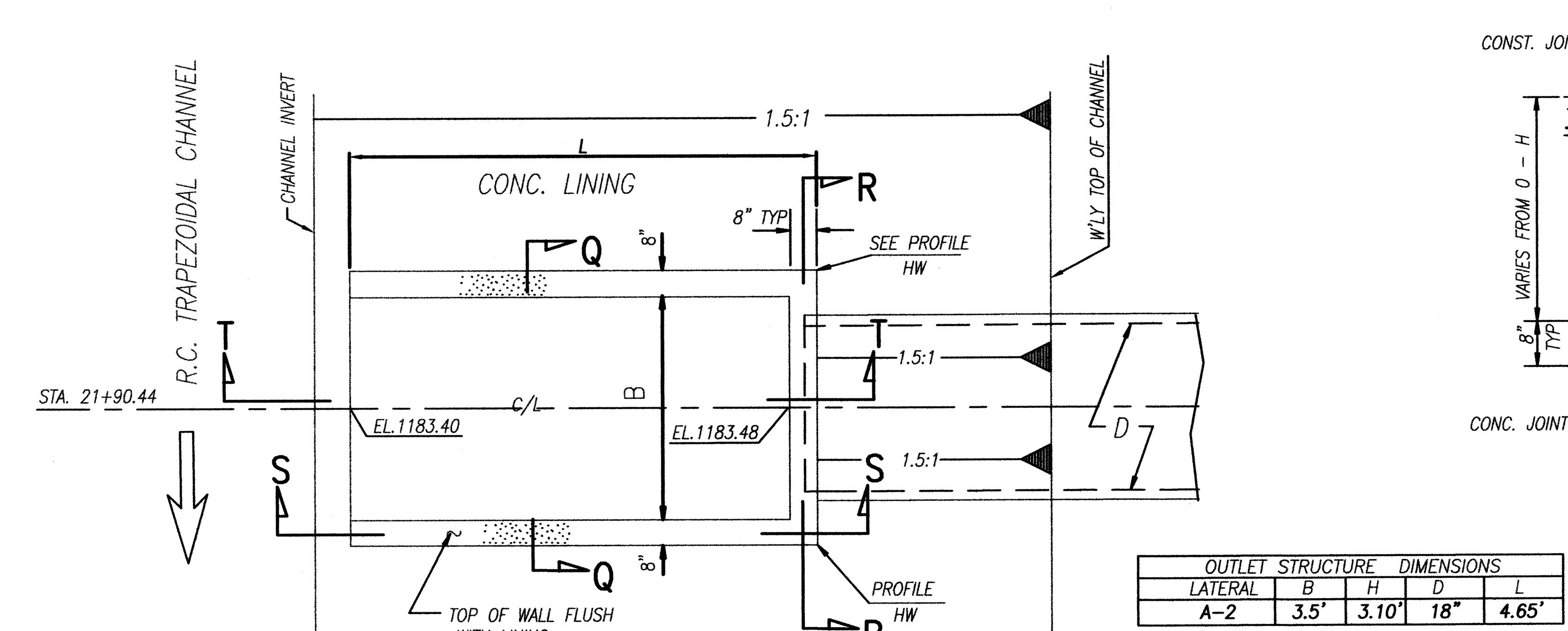




WATER SYSTEM SUPPORT REQUIREMENTS

FOR MAINS LARGER THAN 16"

NOT TO SCALE

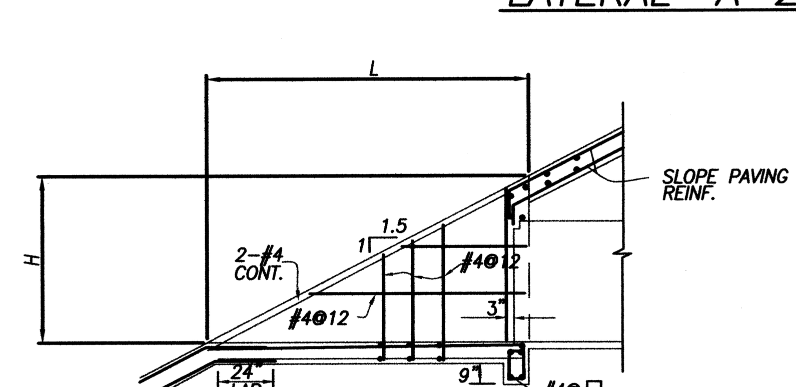


PLAN

NOT TO SCALE

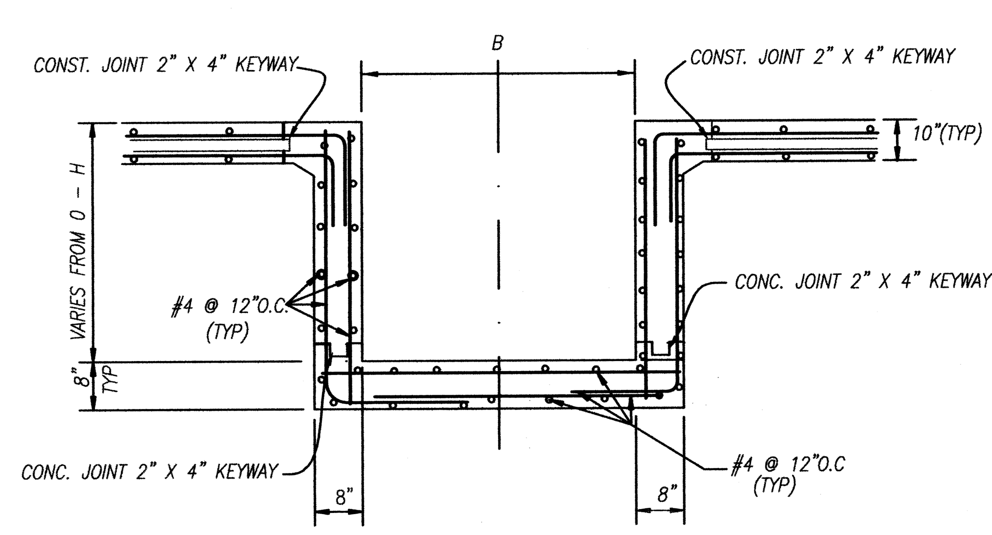
OUTLET STRUCTURE DIMENSIONS				
LATERAL	B	H	D	L
A–2	3.5'	3.10'	18"	4.65'

LATERAL "A–2" OUTLET STRUCTURE



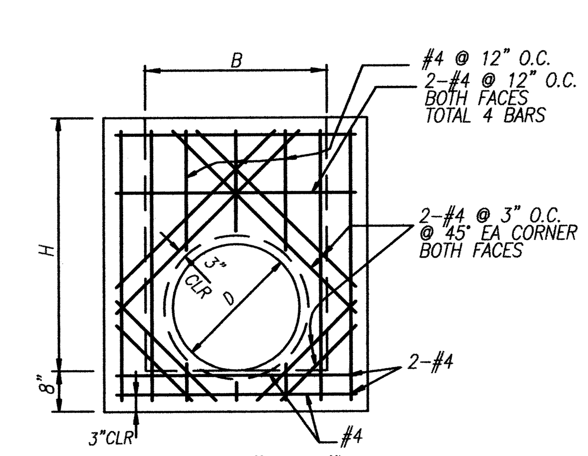
SECTION "S–S"

NOT TO SCALE



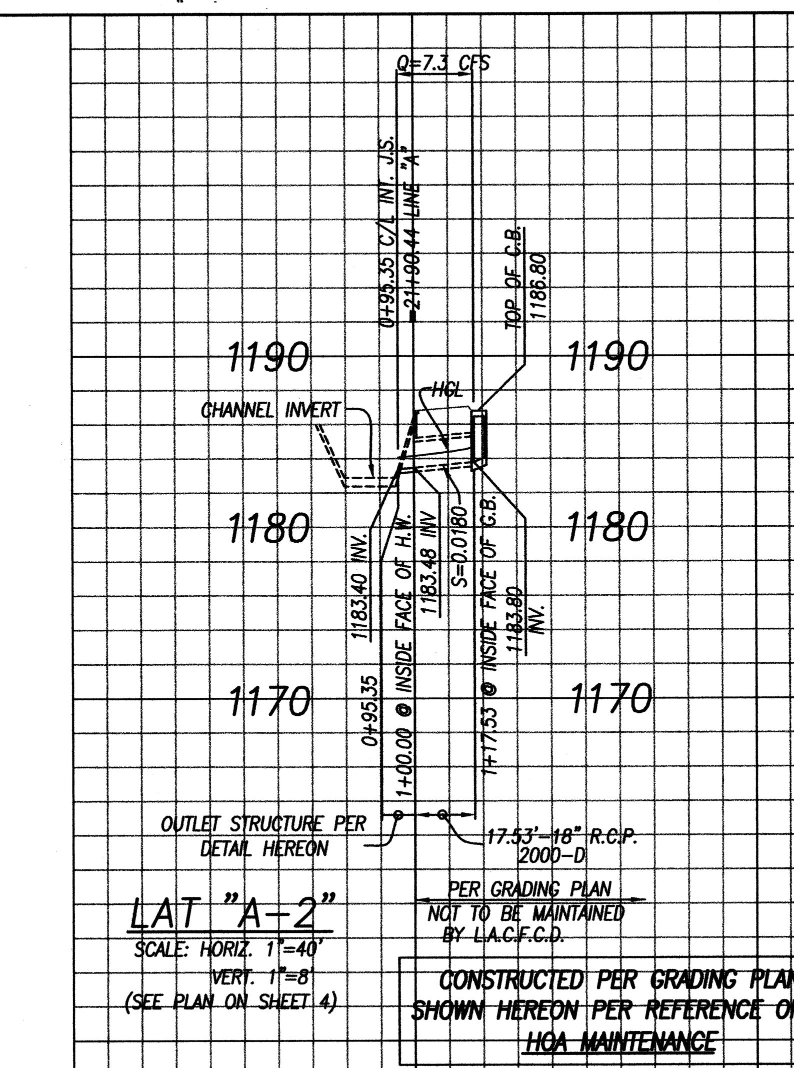
SECTION "Q–Q"

NOT TO SCALE



SECTION "R–R"

NOT TO SCALE



LAT "A–2"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE PLAN ON SHEET 4)

CONSTRUCTED PER GRADING PLAN SHOWN HEREON PER REFERENCE ONLY
HOA MAINTENANCE

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

APPROVED FOR CONSTRUCTION BY:
DATE
ROBERT G. NEWMAN
Director of Public Works Department

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No. 49041
Exp. 09–30–2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
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PARCEL MAP NO. 062646 SHEET 7 OF 12

GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN

REVISED 5/12

PLATE 1G

MDN 13790

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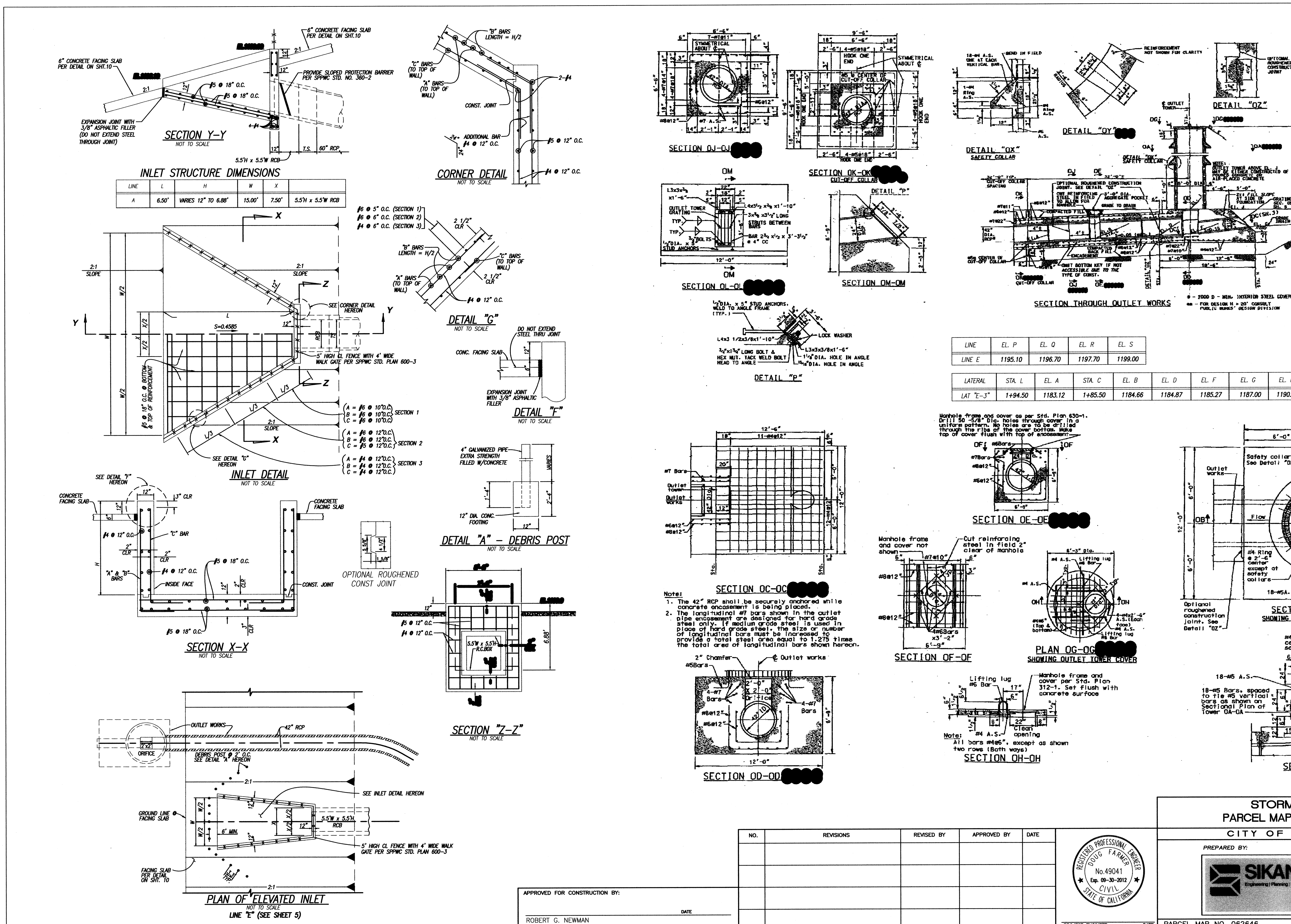

INLET STRUCTURE DIMENSIONS

LINE	L	H	W	X	
A	6.50'	VARIES 12" TO 6.88'	15.00'	7.50'	5.5'H x 5.5'W RCB

NOTE FOR INLET TOWER

1. PAINT TOWER WHITE BETWEEN ELEVATIONS WHERE BASIN CAPACITIES ARE 5% TO 25%.
2. LABEL THE ELEVATIONS AND PERCENTAGES ON THE TOWER.

5% BASIN CAPACITY: EL. 1996.0
25% BASIN CAPACITY: EL. 1997.0

M.T.D. NO. 1843

LINE	EL. P	EL. Q	EL. R	EL. S
LINE E	1195.10	1196.70	1197.70	1199.00

LATERAL	STA. L	EL. A	STA. C	EL. B	EL. D	EL. F	EL. G	EL. I	EL. J	EL. K	STA. E	STA. H
LAT "E-3"	1+94.50	1183.12	1+85.50	1184.66	1184.87	1185.27	1187.00	1190.27	1190.18	1196.10	1+88.50	2+07.00

Notes:
1. The 42" RCP shall be securely anchored while concrete encasement is being placed.
2. The longitudinal #7 bars shown in the outlet pipe encasement are designed for hard grade steel only. If medium grade steel is used in place of hard grade steel, the size or number of longitudinal bars must be increased to provide a total steel area equal to 1.275 times the total area of longitudinal bars shown hereon.

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843
CITY OF SANTA CLARITA

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REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No. 49041
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APPROVED FOR CONSTRUCTION BY:
DATE
ROBERT G. NEWMAN
Director of Public Works Department

PROJECT ENGINEER DATE
PARCEL MAP NO. 062646 SHEET 8 OF 12

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

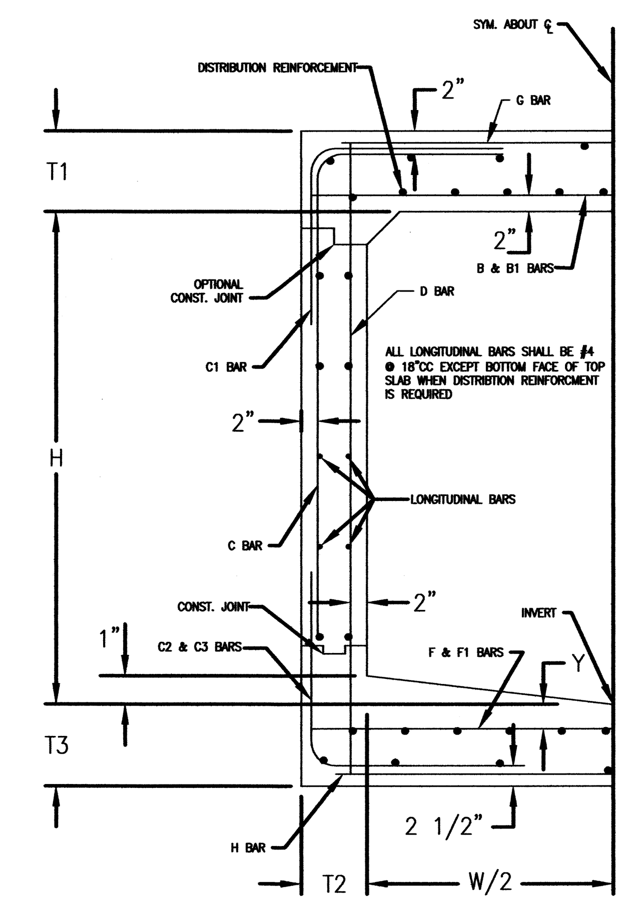
WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN

REVISED 5/12 PLATE 1H

STRUCTURAL NOTES FOR R.C.BOX

GENERAL

1. Dimensions from face of concrete to steel are to center of bar and shall be two inches unless otherwise shown.
2. Concrete dimensions shall be measured horizontally or vertically on the profile, and parallel to or at right angles (or radially) to centerline of conduit on the plan except as otherwise shown.
3. All bar bends and hooks shall conform to the American Concrete Institute's "Building Code Requirements for Reinforced Concrete", latest edition.
4. Placing of reinforcement shall conform to the American Concrete Institute's "Building Code Requirements for Reinforced Concrete", latest edition.
5. Transverse construction joints shall not be placed within 30 inches of manhole or junction structure opening.
6. Transverse construction joints in walls and slabs shall be in the same plane. No staggering of joints will be permitted. Transverse construction joints shall be normal or radial to the centerline of construction.
7. The transverse reinforcing steel shall terminate one and one-half inches from the concrete surfaces unless otherwise shown on the structural details.
8. Exposed edges of concrete members shall be rounded or bevelled.
9. No splices in transverse steel reinforcement will be permitted other than shown on the drawing without approval of the engineer. No more than two splices will be permitted in any longitudinal bar between transverse joints. Splices shall be staggered.
10. Longitudinal steel shall be lapped 20 bar diameters at splices. Transverse steel shall be lapped 30 bar diamaeters at splices.
11. Longitudinal steel shall be continous and extend through all construction joints.
12. Unless otherwise shown on the drawings, transverse joint keyways (in slabs and walls), as detailed for longitudinal keyways at the base of the walls, shall be placed at the end of each pour, but the spacing thereof shall not exceed 50 feet or be less than 10 feet. All construction joints in bottom slab, top slab, and side walls shall be in the same plane. No staggering of joints will be permitted.
13. Unless otherwise shown on the details, in curved sections, transverse bars shall be placed radially. straight transverse bars in top and bottom slabs shall be spaced as shown on the typical sections.; spacing shall be at the centerline of the barrel on the outside of the curve for double barrel boxes. Straight bars and I-bars in walls shall be spaced as shown for the typical sections, with the spacing measured between the vertical legs of bars.
14. At the beginning and ending of all pours, a curtain of reinforcement composed of B. C. C2, D, CW, F, G, and H bars shall be placed three inches from the transverse construction joint.
15. The vertical wall steel in interior walls and in the interior face of exterior walls may be spliced at the construction joint at the base of the wall. The splices shall be 20 bar diameters in length.
16. In all sections lap C and C2 bars. The vertical length of C and C2 bars has been calculated for a four inch starter wall. If the height of the starter wall is varied, the vertical length of the C and C2 bars shall be varied correspondingly so as to maintain a 30 diameter lap between the two bars. The laps shall be based on the smaller bars.
17. Concrete quantities are based on a six-by-six inch fillet and the steel quantities do not include any optional splices.
18. If wall thickness is six inches place reinforcement at the centerline of the wall.
19. The design of box sections identified by a numerical value is based on a width of trench equal to the outside width of the conduit plus three feet. When the cover is equal to 10 feet or less the trench width is unrestricted.



TYPICAL SINGLE R. C. BOX SECTION

NOT TO SCALE

PRECAST SINGLE R.C. BOX (LINE "A")

BOX SECTION			FROM 1+22.86 TO 2+47.23	FROM 2+47.23 TO 3+47.23
Installation Condition			Trench	Trench
Design Cover			10.0'	10.5'
Width		W	6'	6'
Height		H	3.5'	3.5'
Live Load			32 Kips	80 Kips
Top Slab Thickness		T1	8.75"	12.25"
Side Wall Thickness		T2	8"	8"
Bottom Slab Thickness		T3	9.5"	12.50"
Concrete Cover (3" min.)		Y	3.5"	3.5"
B Bars	Bar No. & Spacing		#6@19"	#7@16"
	Length		7'-1.5"	7'-1.5"
B1 Bars	Bar No. & Spacing		#5@19"	#4@16"
	Length		5'-0"	5'-2"
C Bars	Bar No. & Spacing		#4@11"	#4@11"
	Hor. Length		3'-2.5"	3'-2.5"
	Vert. Length		3'-8"	3'-11.5"
C1 Bars	Bar No. & Spacing		–	–
	Hor. Length		–	–
	Vert. Length		–	–
C2 Bars	Bar No. & Spacing		#5@11"	#5@11"
	Hor. Length		3'-6"	3'-6"
	Vert. Length		2'-2"	2'-5"
C3 Bars	Bar No. & Spacing		–	–
	Hor. Length		–	–
	Vert. Length		–	–
D Bars	Bar No. & Spacing		#4@18"	#4@18"
	Length		4'-9"	5'-3"
F Bars	Bar No. & Spacing		#6@14"	#8@18"
	Length		7'-1.5"	7'-1.5"
F1 Bars	Bar No. & Spacing		#4@14"	#5@12"
	Length		4'-11"	4'-18"
G Bars	Bar No. & Spacing		#4@11"	#4@11"
	Length		3'-0"	3'-0"
H Bars	Bar No. & Spacing		#5@11"	#5@11"
	Length		3'-0"	3'-0"
NUMBER OF LONGITUDINAL REINFORCEMENT #4 BARS				
Top Slab (includes distr. reinf.)			12	12
Bottom Slab			12	12
Side Walls			8	8
TOTAL			32	32
QUANTITIES				
Concrete Cu. Yds/Lin. Ft.			0.60	0.75
Steel Lbs/Lin. Ft.			76.1	83.9

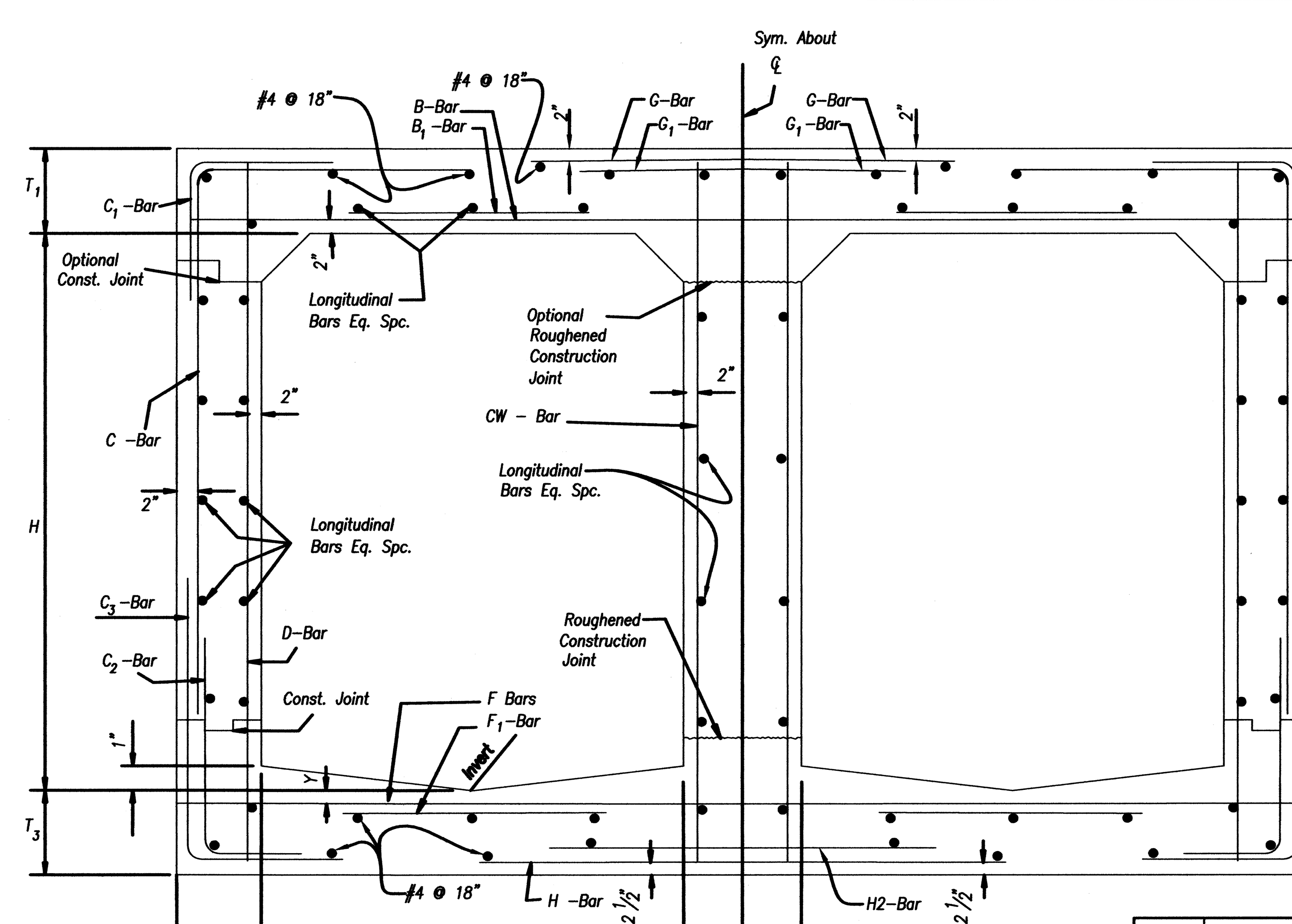
SINGLE R.C. BOX (LINE "E")

BOX SECTION			FROM 1+24.15 TO 1+50.00	FROM 3+15.86 TO 6+14.63	FROM 6+68.82 TO 6+78.82
Installation Condition			Trench	Trench	Pos. Proj.
Design Cover			5'	3'	4.5'
Width		W	7'	4.5'	5.5'
Height		H	3'	4.5'	5.5'
Live Load			32 Kips	32 Kips	32 Kips
Top Slab Thickness		T1	6.5"	6.5"	6.5"
Side Wall Thickness		T2	8"	8"	8"
Bottom Slab Thickness		T3	7"	7"	7"
Concrete Cover (3" min.)		Y	3.5"	3.5"	3.5"
B Bars	Bar No. & Spacing		#4@11"	#4@20"	#4@18"
	Length		8'-1"	5'-7.5"	6'-7.5"
B1 Bars	Bar No. & Spacing		#4@11"	#4@20"	#5@18"
	Length		5'-0"	3'-10"	4'-10.5"
C Bars	Bar No. & Spacing		#4@13"	#4@14"	#4@12"
	Hor. Length		3'-5.5"	2'-0.5"	2'-9"
	Vert. Length		2'-11.5"	4'-5.5"	5'-5.5"
C1 Bars	Bar No. & Spacing		#4@13"	–	–
	Hor. Length		1'-4.5"	–	–
	Vert. Length		2'-11.5"	–	–
C2 Bars	Bar No. & Spacing		#4@13"	#4@14"	#4@12"
	Hor. Length		3'-5.5"	1'-8.5"	2'-0.5"
	Vert. Length		2'-0"	2'-0"	2'-0"
C3 Bars	Bar No. & Spacing		#4@13"	–	–
	Hor. Length		1'-4"	–	–
	Vert. Length		2'-0"	–	–
D Bars	Bar No. & Spacing		#4@18"	#4@18"	#4@18"
	Vert. Length		3'-10.5"	5'-4.5"	6'-4.5"
F Bars	Bar No. & Spacing		#6@20"	#4@20"	#4@13"
	Length		8'-1"	5'-7.5"	6'-7.5"
F1 Bars	Bar No. & Spacing		#5@20"	#4@20"	#4@13"
	Length		4'-11"	4'-2.5"	4'-10.5"
G Bars	Bar No. & Spacing		#4@13"	–	–
	Length		3'-6'	–	–
H Bars	Bar No. & Spacing		#4@13"	–	–
	Length		3'-6"	–	–
NUMBER OF LONGITUDINAL REINFORCEMENT #4 BARS					
Top Slab (includes distr. reinf.)			13	11	11
Bottom Slab			13	11	11
Side Walls			8	12	12
TOTAL			34	34	34
QUANTITIES					
Concrete Cu. Yds/Lin. Ft.			0.52	0.48	0.57
Steel Lbs/Lin. Ft.			74.4	46.9	58.1

DOUBLE R.C. BOX (LINE "A)

BOX SECTION			FROM 3+87.23 TO 9+44.55	FROM 9+84.55 TO 11+25.00	FROM 11+30.00 TO 14+77.42
Installation Condition			Neg. Proj.	Trench	Trench
Design Cover			6'	4'	4.5'
Width		W	14'	10'	9'
Height		H	5.5'	5'	5.5'
Live Load			32 Kips	32 Kips	32 Kips
Top Slab Thickness		T1	12"	7.50"	7.25"
Side Wall Thickness		T2	8"	8"	8"
Bottom Slab Thickness		T3	12.25"	8"	7.5"
Concrete Cover (3" Min.)		Y	3.5"	3.5"	3.5"
B Bars	Bar No. & Spacing		#4@16"	#4@20"	#4@17"
	Length		29'-9"	21'-9"	19'-9"
B_1 Bars	Bar No. & Spacing		#9@16"	#8@20"	#7@17"
	Length		29'-9"	21'-9"	19'-9"
C Bars	Bar No. & Spacing		#4@14"	#4@14"	#5@14"
	Horiz. Length		5'-2.5"	4'-2.5"	4'-3"
	Vert. Length		5'-11"	5'-0.5"	5'-6.5"
C_1 Bars	Bar No. & Spacing		#5@14"	#5@14"	#4@14"
	Horiz. Length		1'-10"	1'-9"	1'-4.5"
	Vert. Length		5'-11"	5'-0.5"	2'-4"
C_2 Bars	Bar No. & Spacing		#4@14"	#4@14"	#4@14"
	Horiz. Length		5'-2.5"	4'-2.5"	3'-11.5"
	Vert. Length		2'-5.5"	2'-1"	2'-0.5"
C_3 Bars	Bar No. & Spacing		#4@14"	#4@14"	#4@14"
	Horiz. Length		1'-8"	1'-7.5"	1'-6.5"
	Vert. Length		2'-5.5"	2'-1"	2'-0.5"
D Bars	Bar No. & Spacing		#4@18"	#4@18"	#4@18"
	Vert. Length		7'-3.5"	6'-0.5"	6'-5.5"
F Bars	Bar No. & Spacing		#4@16"	#4@17"	#4@18"
	Length		29'-9"	21'-9"	19'-9"
F_1 Bars	Bar No. & Spacing		#9@16"	#7@17"	#7@18"
	Length		29'-9"	21'-9"	19'-9"
G Bars	Bar No. & Spacing		#6@10"	#5@12"	#5@13"
	Length		21'-8"	15'-8.5"	14'-2.5"
G_1 Bars	Bar No. & Spacing		#8@10"	#7@12"	#7@13"
	Length		6'-2.5"	4'-8"	4'-2"
H Bars	Bar No. & Spacing		#6@10"	#5@12"	#5@13"
	Length		21'-8"	15'-8.5"	14'-2.5"
H_1 Bars	Bar No. & Spacing		#8@10"	#7@12"	#7@13'
	Length		6'-2.5"	4'-7.5"	4'-2"
Cw Bars	Bar No. & Spacing		#4@18"	#4@18"	#4@18"
	Vertical Length		7'-3.5"	6'-0.5"	6'-5.5"
NUMBER OF LONGITUDINAL REINFORCEMENT #4 BARS					
Top Slab (Includes distribution reinf.)			42	31	30
Bottom Slab			42	31	30
Side Walls			18	18	18
TOTAL			102	80	78
QUANTITIES					
Concrete Cu. Yds/Lin. Ft.			2.71	1.47	1.36
Steel Lbs/Lin. Ft.			419.9	235.3	212.9

M.T.D. NO. 1843



TYPICAL DOUBLE R. C. BOX SECTION

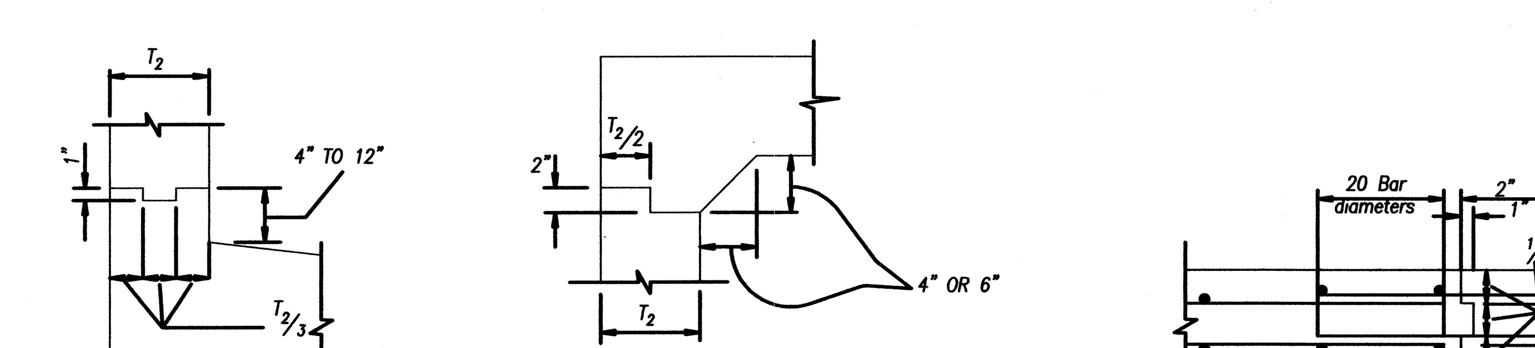
NOT TO SCALE

STRUCTURAL DESIGN CRITERIA
L.A.C.F.C.D. STRUCTURAL
DESIGN MANUAL
DATED APRIL 1982

LIVE LOAD
H20-S16-44 unless otherwise noted.

DEAD LOAD
Earth load per Marsten's formula: w = 110 pcf.
Ku = Ku' = 0.150.
Bd = Outside width of box plus 3 feet
Side earth 37 psf per foot of depth
Internal water pressure: 62.4 psf per foot of depth
Weight of concrete: 150 pcf

ALLOWABLE STRESSES
fc' = 4000psi at 28 days
fc = 1800 psi
fs - 24,000 psi
n = 8
Shear and bond stresses per A.C.I. 318-08



BASE OF WALL

TOP OF WALL

LONGITUDINAL JOINT

TRANSVERSE JOINT

CONSTRUCTION JOINT DETAILS

NOT TO SCALE

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

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PARCEL MAP NO. 062646 | SHEET 9 OF 12

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GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
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DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN
REVISED 5/12	PLATE 1I	

MON 13790

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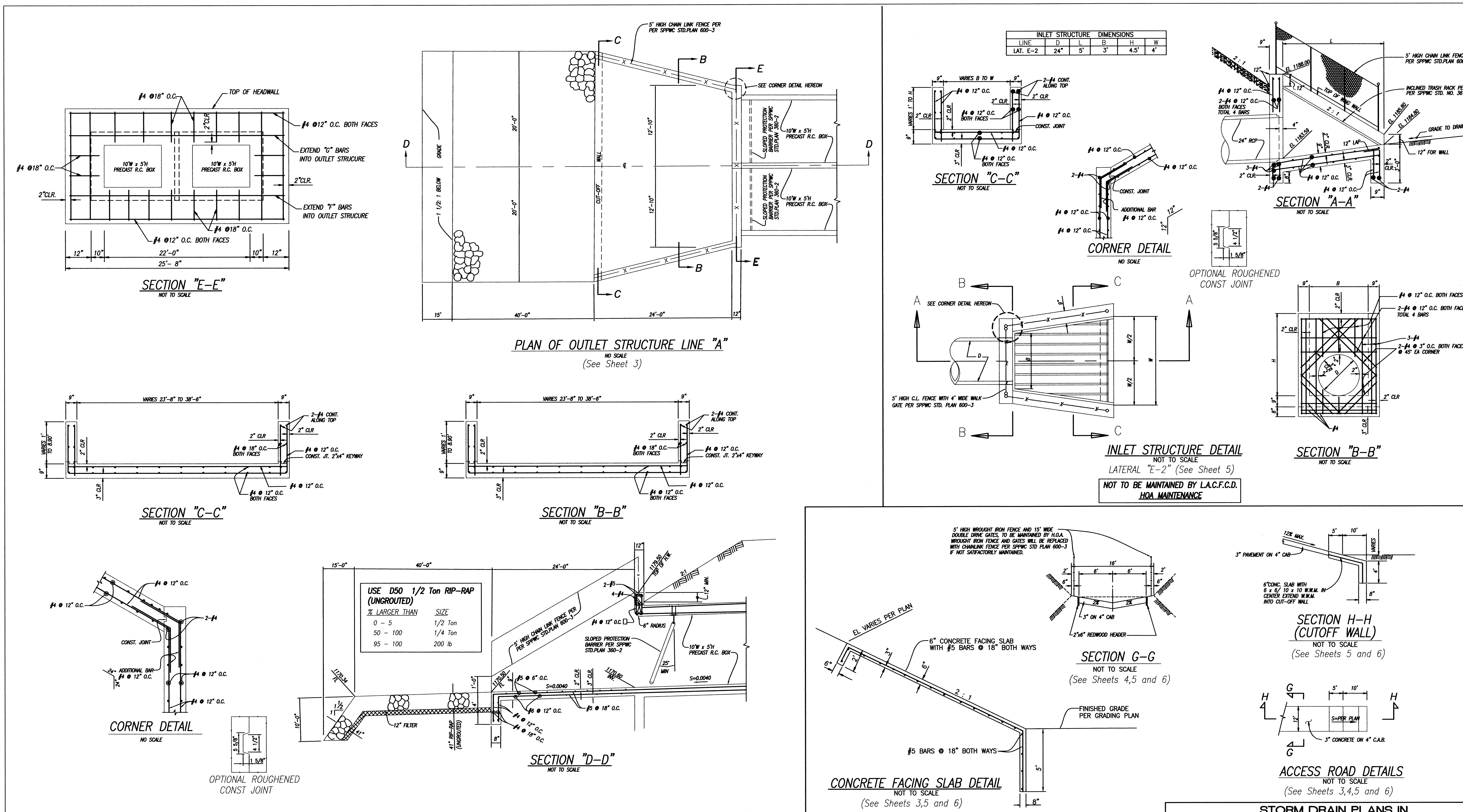


INLET STRUCTURE DIMENSIONS					
LINE	D	L	B	H	W
LAT. E-2	24"	5'	3'	4.5'	4'

RIPRAP NOTES

1. ROCKS FOR UNGROUTED RIPRAP SHALL BE GOOD QUALITY BROKEN CONCRETE AND/OR RIVER RUN ROCK. THE SMALLEST DIMENSIONS SHALL EXCEED 6 INCHES AND THE LARGEST DIMENSION SHALL NOT EXCEED 24 INCHES. THE LARGEST DIMENSION SHALL NOT EXCEED 4 TIMES THE SMALLEST DIMENSION.
2. THERE SHALL BE A GROUT BED OF AT LEAST 2 INCHES BENEATH THE FIRST LAYER OF ROCKS. ALL THE VOIDS BETWEEN THE ROCKS SHALL BE FILLED WITH GROUT. MAXIMUM SPACING BETWEEN ROCKS SHALL BE 2 INCHES.
3. SURFACE ROCKS SHALL BE IMBEDED FROM 1/2 TO 2/3 OF THEIR MAXIMUM DIMENSION.

NOTE: CONCRETE MAY BE SUBSTITUTED FOR GROUT.

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2012 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

PARCEL MAP NO. 062646 SHEET 10 OF 12

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

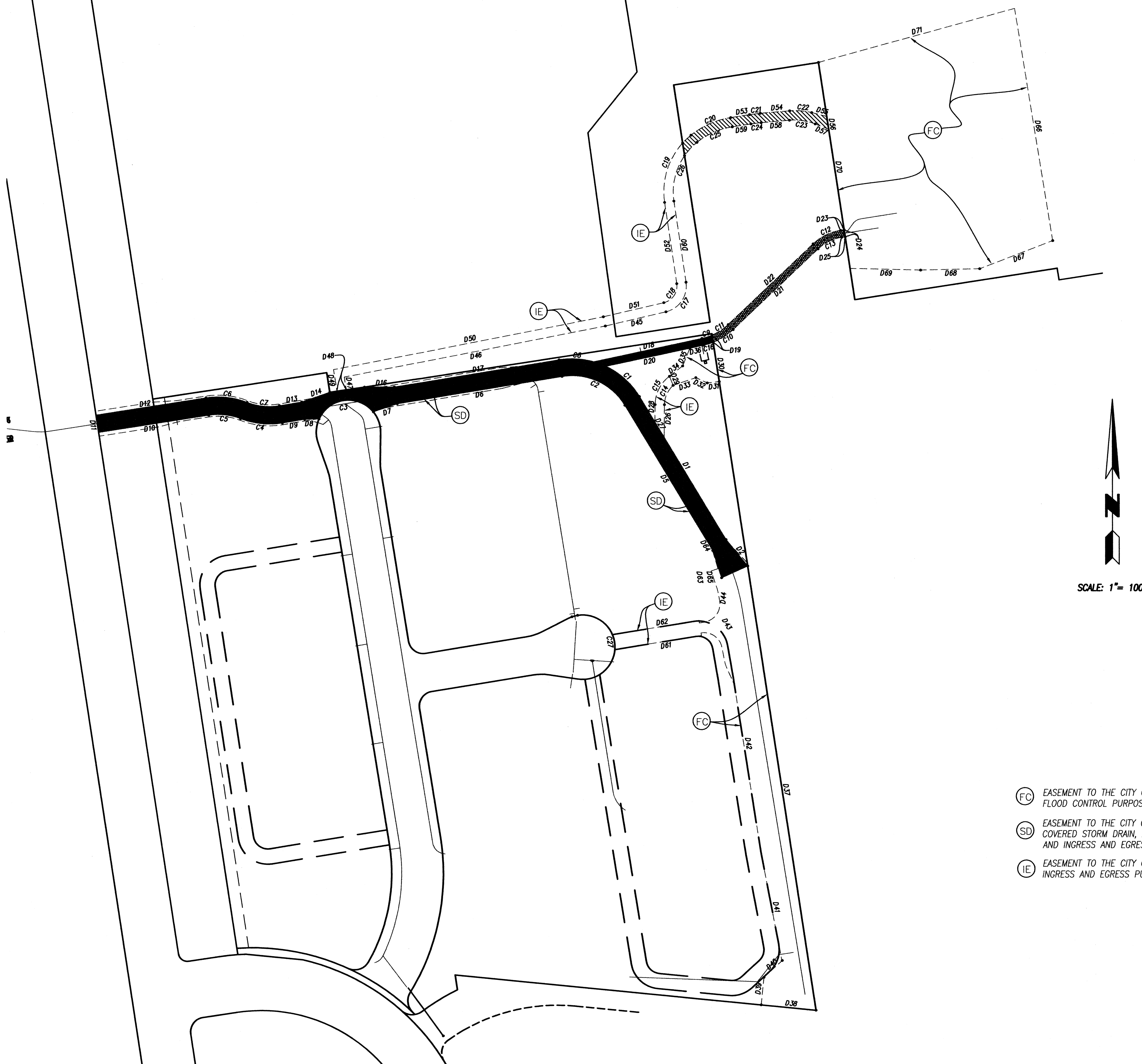
DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN

REVISED 5/12 PLATE 1J

MON 13790

M.T.D. NO. 1843



CURVE DATA				
⬡	DELTA	RADIUS	LENGTH	TANGENT
1	33°24'40"	134.50'	78.43'	40.37'
2	68°15'31"	105.50'	125.69'	71.51'
3	116°36'33"	55.00'	111.94'	89.07'
4	30°43'39"	135.00'	72.40'	37.09'
5	30°16'39"	105.00'	55.49'	28.41'
6	30°16'39"	135.00'	71.34'	36.52'
7	30°43'39"	105.00'	56.31'	28.85'
8	25°25'12"	134.50'	59.67'	30.34'
9	11°4'02"	94.00'	18.16'	9.11'
10	21°53'45"	106.00'	40.51'	20.50'
11	20°13'44"	94.00'	33.19'	16.77'
12	34°29'06"	88.00'	52.97'	27.31'
13	34°29'06"	76.00'	45.74'	23.59'
14	47°24'59"	45.00'	37.24'	19.76'
15	52°49'21"	61.00'	56.24'	30.30'
16	9°24'01"	106.00'	17.39'	8.72'
17	85°23'57"	45.00'	67.07'	41.52'
18	85°23'57"	29.00'	43.22'	26.76'
19	59°48'24"	124.00'	129.43'	71.31'
20	29°51'32"	144.00'	75.04'	38.39'
21	4°1'23"	264.00'	18.54'	9.27'
22	19°1'51"	114.00'	37.87'	19.11'
23	26°12'19"	98.00'	44.82'	22.81'
24	4°1'23"	248.00'	17.41'	8.71'
25	29°51'32"	128.00'	66.71'	34.13'
26	59°48'25"	108.00'	112.73'	62.11'
27	27°20'39"	55.00'	26.25'	13.38'

LINE TABLE		
LINE	BEARING	DISTANCE
D1	N31°05'10"W	285.37'
D2	N39°12'19"W	58.66'
D3	N65°45'35"E	48.90'
D4	N17°48'25"W	49.05'
D5	N31°05'10"W	289.87'
D6	N80°39'18"E	285.21'
D7	N71°22'30"E	42.98'
D8	N88°46'42"E	24.60'
D9	N80°39'18"E	38.49'
D10	N81°06'18"E	190.13'
D11	N08°38'26"W	30.00'
D12	N81°06'18"E	189.99'
D13	N80°39'18"E	38.49'
D14	N70°58'18"E	50.72'
D15	N81°20'02"E	60.00'
D16	N89°57'26"W	51.01'
D17	N80°39'18"E	285.21'
D18	N77°54'43"E	188.93'
D19	N08°41'33"W	12.35'
D20	N77°54'43"E	170.37'
D21	N46°36'57"E	199.80'
D22	N46°36'57"E	199.80'
D23	N81°06'03"E	6.07'
D24	N08°38'11"W	12.00'
D25	N81°06'03"E	6.01'
D26	N00°36'38"E	55.63'
D27	N31°05'10"W	30.45'
D28	N00°36'38"E	29.72'
D29	N21°54'07"W	16.75'
D30	N08°41'33"W	68.16'
D31	N83°55'42"E	20.57'
D32	N65°01'08"W	21.49'
D33	N71°17'56"E	41.03'
D34	N51°47'39"E	28.75'
D35	N21°56'13"E	32.66'
D36	N77°54'43"E	23.85'
D37	N08°41'33"W	768.01'
D38	N84°18'16"W	94.13'
D39	N05°44'44"E	47.47'
D40	N47°19'34"E	42.52'
D41	N10°52'17"W	188.00'
D42	N08°58'13"W	382.00'
D43	N30°38'48"W	27.94'
D44	N05°16'41"E	68.02'
D45	N76°57'16"E	106.16'
D46	N78°58'33"E	454.56'
D47	N09°11'00"W	22.05'
D48	N81°20'02"E	16.00'
D49	N09°11'00"W	37.40'
D50	N78°58'33"E	469.77'
D51	N76°57'16"E	105.88'
D52	N08°26'41"W	140.15'
D53	N81°13'15"E	32.43'
D54	N85°14'38"E	50.26'
D55	N75°43'31"W	26.46'
D56	N08°38'11"W	22.13'
D57	N68°33'03"W	24.60'
D58	N85°14'38"E	48.59'
D59	N81°13'15"E	32.43'
D60	N08°26'41"W	140.15'
D61	N80°49'00"E	192.70'
D62	N80°49'00"E	166.43'
D63	N06°18'59"W	158.63'
D64	N31°05'10"W	38.19'
D65	N06°18'59"W	123.15'
D66	N09°13'41"W	402.02'
D67	N69°03'14"E	133.40'
D68	N88°50'03"E	101.08'
D69	N88°33'06"W	120.53'
D70	N08°38'11"W	356.04'
D71	N74°43'36"E	347.40'

FC EASEMENT TO THE CITY OF SANTA CLARITA FOR FLOOD CONTROL PURPOSES

SD EASEMENT TO THE CITY OF SANTA CLARITA FOR COVERED STORM DRAIN, APPURTENANT STRUCTURES, AND INGRESS AND EGRESS PURPOSES

IE EASEMENT TO THE CITY OF SANTA CLARITA FOR INGRESS AND EGRESS PURPOSES

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER DATE

STORM DRAIN PLANS IN PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

PARCEL MAP NO. 062646

SHEET 11 OF 12

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GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN

REVISED 5/12

PLATE 1K

MDN 13790

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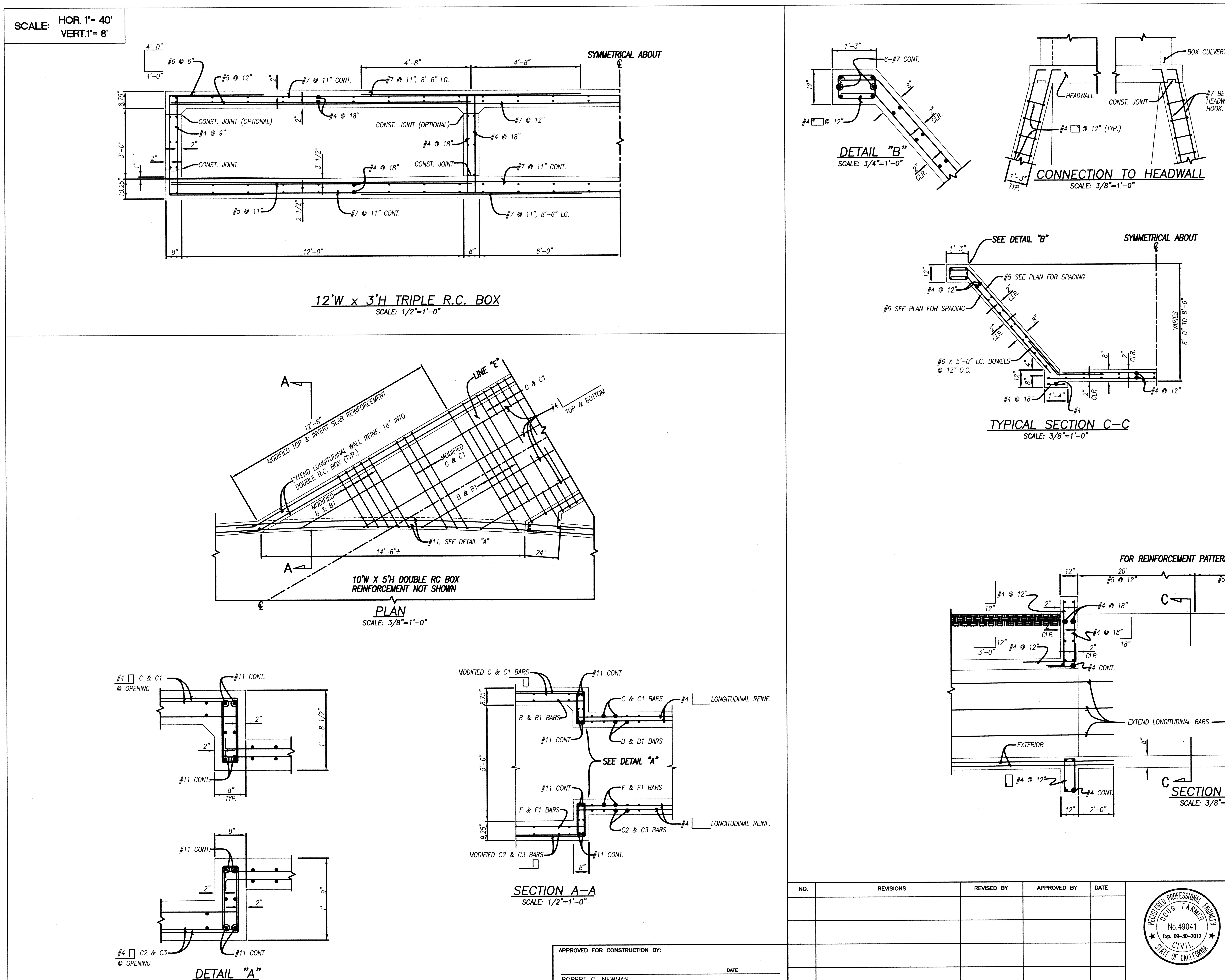

M.T.D. NO. 1843

APPROVED FOR CONSTRUCTION BY:

DATE

ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE

REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No. 49041
Exp. 09-30-2012
CIVIL
STATE OF CALIFORNIA

PROJECT ENGINEER   DATE

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

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Engineering | Planning | Surveying
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PARCEL MAP NO. 062646   SHEET 12 OF 12

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

DETAIL SHEET
STORM DRAIN PLANS
PARCEL MAP 062646
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2011	AS SHOWN

REVISED 5/12   PLATE 1L

MUN 13790

APPENDIX A

FIELD EXPLORATION PROCEDURES

APPENDIX A

FIELD EXPLORATION PROCEDURES

Hollow-Stem Auger Soil Borings

Our exploratory borings were drilled with a truck-mounted drill rig operated by an independent drilling company working under subcontract to GSC. A total of six (6) hollow-stem auger borings were drilled in July 2011 (designated B-1through B-6) using eight-inch diameter hollow-stem augers. Samples were obtained via an SPT split spoon sampler and the California ring sampler.

A representative from our firm continuously observed the borings, logged the subsurface conditions, and collected representative soil samples. All samples were stored in watertight containers and later transported to our laboratory for further visual examination and testing, as deemed necessary. After the boring was completed, the borehole was backfilled with soil cuttings.

The SPT split spoon samples were obtained at approximate 5-foot depth intervals by means of the Standard Penetration Test (SPT) per ASTM: D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "SPT blow count." If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

Appendix A

The California ring samples were obtained at 5-foot depth intervals by means of the latest ASTM standard. The California ring sampling procedure consists of driving a standard 3-inch-diameter steel sampler with eighteen 1-inch wide rings, 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded.

The enclosed *Boring Logs* describes the vertical sequence of soils and materials encountered in each boring, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our log indicates the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our log also graphically indicates the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in a borehole, the approximate groundwater depth is depicted on the boring log.

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-1
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	Bulk Sample		0-40', ALLUVIUM			
5	California Ring	4/5	@ 5', Brown, silty CLAY, moist, moderately stiff	16.8	104.7	
10	California Ring	3/5	@ 10', Medium brown, slightly sandy SILT, moist, moderately stiff	21.1	93.3	
15	Bulk Sample; California Ring	5/8	@ 15', Orange-brown, silty, very fine SAND to brown, silty, very fine to medium SAND, most, moderately dense	14.7	102.8	
20	California Ring	10/18	@ 20', Orange-brown, fine to coarse SAND, slightly moist, dense	4.2	107.9	
25	California Ring	14/27	@ 25', Orange-brown, very fine to fine SAND with gravel, slighlty moist, dense	5.2	112.1	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-1

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-1
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 2 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	14/28	@ 30', Medium brown, very fine to coarse SAND with gravel, slightly moist, dense	5.3	111.6	
35	California Ring	11/7	@ 35', Medium brown, slightly silty, very fine to coarse SAND to brown, sandy SILT (in tip), slightly moist, dense	3.3	103.6	
40	California Ring	18/33	@ 40', Orange-brown, fine to coarse SAND with gravel, slightly moist, dense	6.5	110.3	
			T.D. @ 40' No groundwater			
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-2

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
DRILLING COMPANY Choice DATE STARTED: 7-26-11
TYPE OF DRILL RIG Auto Hammer LOGGED BY RA
DRILLING METHOD Hollow Stem HAMMER WEIGHT (LBS) 140
DIAMETER OF HOLE 8 DROP (IN) 30
BORING LOCATION:

W.O. NO. 6457
BORING NO. B-2
SHEET 1 OF 2
GROUND ELEVATION (FT)
GW ELEVATION

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-32.5', ALLUVIUM			
	California Ring	4/7	@ 2.5', Brown, sandy SILT, moist, moderately stiff	9.4	105.3	
5						
	California Ring	5/5	@ 7.5', Brown, silty, very fine to fine SAND, moist, moderately dense	6.4	103.6	
10	Bulk Sample (10-15)					
	California Ring	5/9	@ 12.5', Orange-brown, silty, very fineto fine SAND, moist, moderately dense	8.5	102.9	
15						
	California Ring	8/12	@ 17.5', Orange-brown, slightly silty, very fine to fine SAND, moist, dense	16.0	98.5	
20						
	California Ring	7/16	@ 22.5', Orange-brown, sandy SILT, moist, stiff	21.4	93.5	
25						
	California Ring	16/26	@ 27.5', Brown, silty, very fine to fine SAND to brown, very silty, very fine SAND, moist, dense	14.9	102.2	

LEGEND

Standard Penetration Test
California Ring
Rock Core
Bulk Sample
Shelby Tube
Water Seepage
Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-3

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-2
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 2 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	15/29	@ 32.5', Brown, slightly silty, very fine to fine SAND to brown, very silty, very fine SAND, moist, dense	5.0	105.5	
35			T.D. @ 32.5' No groundwater			
40						
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-4

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-3
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
0–5	Bulk Sample		0-30', ALLUVIUM			
5	California Ring	5/5	@ 5', Light brown, very silty, very fine to fine SAND, dry, moderately dense to brown, slighlty clayey SILT	10.5	104.4	
10	California Ring	5/5	@ 10', Medium brown, sandy SILT, slightly moist, moderately stiff	4.5	101.6	
15	California Ring	5/8	@ 15', Brown, sandy SILT, moist, moderately stiff	13.9	104.9	
20	California Ring	8/17	@ 20', Medium brown, slightly silty, very fine to fine SAND, slightly moist, dense	6.3	105.2	
25	California Ring	17/23	@ 25', Medium brown, very fine to fine SAND, slightly moist, dense	5.7	108.0	

LEGEND

Standard Penetration Test
California Ring
Rock Core
Bulk Sample
Shelby Tube
Water Seepage
Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-5

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
DRILLING COMPANY Choice DATE STARTED: 7-26-11
TYPE OF DRILL RIG Auto Hammer LOGGED BY RA
DRILLING METHOD Hollow Stem HAMMER WEIGHT (LBS) 140
DIAMETER OF HOLE 8 DROP (IN) 30
BORING LOCATION:

W.O. NO. 6457
BORING NO. B-3
SHEET 2 OF 2
GROUND ELEVATION (FT)
GW ELEVATION

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	17/29	@ 30', Medium brown, very fine to coarse SAND with gravel, slightly moist, dense	6.4	109.0	
			T.D. @ 30' No groundwater			
35						
40						
45						
50						
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-6

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-26-11
BORING NO. B-4
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-50', ALLUVIUM			
		5/9	@ 2.5', Medium brown, silty, very fine to fine SAND, slighty moist, moderately dense	4.6	103.5	
5		5/7	@ 5', Brown, clayey SILT, moist, moderately stiff	7.5	97.4	
		4/8	@ 7.5-12.5', Brown, slighlty sandy SILT, moist, moderately stiff	10.6	99.8	
10		5/8		11.5	94.5	
		6/12		22.5	98.7	
15		6/9	@ 15', Brown, silty CLAY, very moist, moderately stiff	17.4	90.3	
		8/13	@ 17.5', Orange-brown, sandy SILT, moist, stiff	12.9	97.7	
20		8/11	@ 20', Brown, silty CLAY, very moist, moderately stiff	17.6	95.9	
		2/2/3	@ 22.5', Brown, sandy SILT, moist, moderately stiff	14.5	-----	
25		8/13	@ 25-27.5', Brown, clayey SILT, moist, moderately stiff	17.1	107.3	
		2/3/3		15.1	-----	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-7

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC | W.O. NO. 6457
DRILLING COMPANY Choice | DATE STARTED: 7-26-11 | BORING NO. B-4
TYPE OF DRILL RIG Auto Hammer | LOGGED BY RA | SHEET 2 OF 2
DRILLING METHOD Hollow Stem | HAMMER WEIGHT (LBS) 140 | GROUND ELEVATION (FT)
DIAMETER OF HOLE 8 | DROP (IN) 30 | GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	California Ring	9/17	@ 30', Brown, clayey SILT to orange-brown, silty, very fine to fine SAND, moist, stiff	9.8	115.9	
	Standard Penetration Test	2/3/5	@ 32.5', Orange-brown, slightly sandy SILT, moist, stiff	12.2	-----	
35	California Ring	12/13	@ 35', Medium brown, silty, very fine SAND, moist, dense	7.0	93.2	
	Standard Penetration Test	4/5/8	@ 37.5', Brown, silty CLAY to clayey SILT, moist, stiff	36.8	-----	
40	California Ring	9/19	@ 40', Brown, clayey SILT, moist, stiff	16.7	104.1	
	Standard Penetration Test	7/9/15	@ 42.5-45', Brown, sandy SILT with clay, moist, stiff	13.6	-----	
45	California Ring	9/17		10.9	102.0	
	Standard Penetration Test	8/11/14	@ 47.5-50', Brown, clayey SILT, moist, stiff	24.2	-----	
50	California Ring	9/22	T.D. @ 50' No groundwater	25.6	106.3	
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-8

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
DRILLING COMPANY Choice — DATE STARTED: 7-27-11
TYPE OF DRILL RIG Auto Hammer — LOGGED BY RA
DRILLING METHOD Hollow Stem — HAMMER WEIGHT (LBS) 140
DIAMETER OF HOLE 8 — DROP (IN) 30
BORING LOCATION:

W.O. NO. 6457
BORING NO. B-5
SHEET 1 OF 2
GROUND ELEVATION (FT)
GW ELEVATION

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-15', FILL			
5		10/14	@ 5', Orange-brown, slightly sandy, clayey SILT, moist, stiff	23.0	106.3	
10		11/16	@ 10', Orange-brown to dark brown, sity, very fine to medium SAND with gravel, moist, dense	10.0	119.9	
		12/12	@ 12.5', Dark gray-black, silty, very fine to medium SAND with gravel (strong petroleum odor), moist, dense	12.0	121.9	
15		11/11	15-51', ALLUVIUM (Qal) @ 15', Brown, silty, very fine to fine SAND, moist, dense	8.7	126.1	
		6/7	@ 17.5', Brown, sandy, silty CLAY, moist, stiff	7.4	116.0	
20		6/13	@ 20-25', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	5.8	119.2	
		9/13		5.9	118.0	
25		3/3/3		6.4	----	
		9/14	@ 27.5', Orange-brown, silty, very fine to medium SAND with gravel, moist, dense	6.6	113.5	

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-9

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-27-11
BORING NO. B-5
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 2 OF 2
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
	Standard Penetration Test	2/3/3	@ 30', Orange-brown, silty, very fine to fine SAND, moist, dense	9.1	-----	
	California Ring	7/13	@ 32.5', Brown, silty, very fine to coarse SAND, moist, dense	7.2	124.5	
35	Standard Penetration Test	3/4/5	@ 35-42.5', Brown, silty, very fine to coarse SAND with gravel, moist, dense	7.6	-----	
	California Ring	18/33		7.9	128.5	
40	Standard Penetration Test	9/10/11		6.0	-----	
	California Ring	18/40		7.0	126.2	
45	Standard Penetration Test	7/10/10	@ 45', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	5.8	-----	
	California Ring	19/34	@ 47.5-51', Brown, silty, very fine to coarse SAND with gravel, moist, dense	7.4	126.3	
50	Standard Penetration Test	10/9/9		10.1	-----	
			T.D. @ 51' No groundwater Refusal @ 51'			
55						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-10

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

GEOTECHNICAL BORING LOG

PROJECT NAME TMC
W.O. NO. 6457
DRILLING COMPANY Choice
DATE STARTED: 7-27-11
BORING NO. B-6
TYPE OF DRILL RIG Auto Hammer
LOGGED BY RA
SHEET 1 OF 1
DRILLING METHOD Hollow Stem
HAMMER WEIGHT (LBS) 140
GROUND ELEVATION (FT)
DIAMETER OF HOLE 8
DROP (IN) 30
GW ELEVATION
BORING LOCATION:

DEPTH (FT)	SAMPLE TYPE	BLOWS/ 6 IN.	GEOTECHNICAL DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	OTHER TESTS
			0-2.5', AC @ 0-4', orange-brown, gravelly, very fine to coarse SAND (fill)			
			2.5-4', FILL			
			4-20', ALLUVIUM			
5	California Ring	4/5	@ 5', Brown, slightly sandy, silty CLAY, moist, medium stiff	4.9	100.7	
10	California Ring	7/9	@ 10', Orange-brown, slightly silty, very fine to coarse SAND with gravel, slightly moist, dense	6.8	110.1	
15	California Ring	7/9	@ 15', Orange-brown, silty, very fine to fine SAND to sandy SILT, moist, dense	4.6	102.7	
20	California Ring	6/10	@ 20', Orange-brown, silty, very fine to fine SAND, moist, dense	8.3	99.0	
			T.D. @ 20' No groundwater			
25						

LEGEND

- Standard Penetration Test
- California Ring
- Rock Core
- Bulk Sample
- Shelby Tube
- Water Seepage
- Groundwater

SIEVE: GRAIN SIZE ANALYSIS
MAX: MAXIMUM DRY DENSITY
DS: DIRECT SHEAR
CONS: CONSOLIDATION
HYDR: HYDROMETER ANALYSIS
EXPAN: EXPANSION INDEX
CHEM: CHEMICAL TESTS

PLATE A-11

GeoSoils Consultants, Inc.
GEOTECHNICAL * GEOLOGIC * ENVIRONMENTAL

APPENDIX B

LABORATORY TESTING PROCEDURES AND RESULTS

APPENDIX B

LABORATORY TESTING PROCEDURES AND RESULTS

Moisture-Density

The field moisture content and dry unit weights were determined for each undisturbed ring sample obtained from our subsurface exploration. Once the dry unit weights had been determined, in-place densities of underlying soil profile were estimated. In those cases where ring samples were obtained, the moisture content and dry unit weights of selected samples are presented on the enclosed *Boring Logs* (Plates A-1 through A-11).

Direct Shear Tests

Two shear test were performed in a strain-control type Direct Shear Machine. The samples were sheared under varying confining loads in order to determine the Coulomb shear strength parameters: cohesion (c), and angle of internal friction (ϕ) for peak and residual strength conditions. Samples that were tested in order to obtain shear strengths for compacted fill parameters were remodeled to 90 percent of maximum. All samples were tested in an artificially-saturated condition. The results are plotted and a linear approximation is drawn of the failure curve. Results are shown on the Shear Test Diagram included with this appendix, as Plates SH-1 and SH-2.

Grain-Size Analysis

Washed sieve analyses of selected representative samples were performed for grain-size determination in accordance with California Test 202. A graphical grain size distribution curve is shown on Plates G-1 through G-3.

Read
W.O.: 6096

PLATE SH-1

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Date of Test: 1/08

Sample: B-1 @ 0 - 5.0'

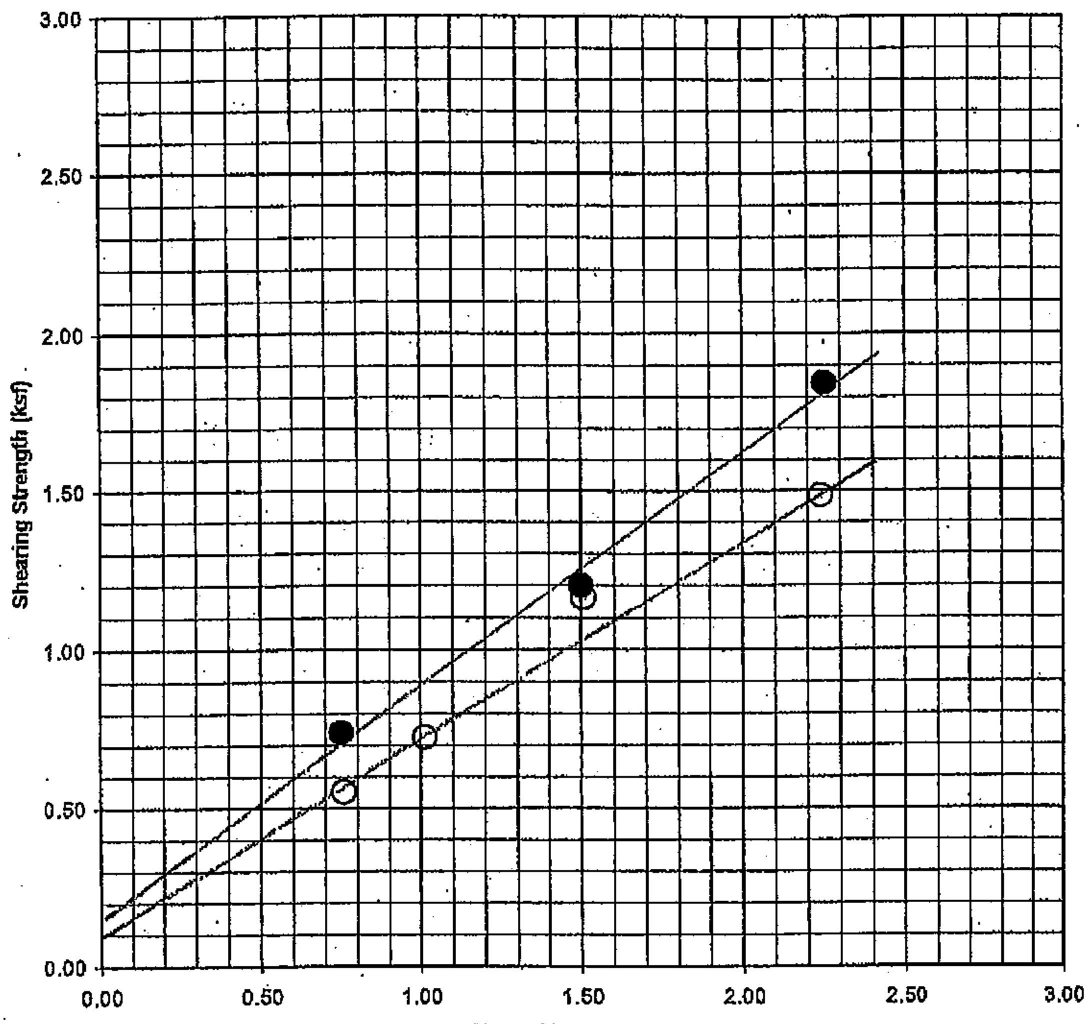
Shear Test Diagram

Peak

C(psf): **160** Phi (degrees): **36.0**

Reshear

C(psf): **100** Phi (degrees): **31.5**



Direct Shear, Peak / Reshear Speed: .005 in./min.

● Peak Values ○ Reshear Values

Sample Remolded to 90% Relative Density, saturated.
Remolded Dry Density = 97.1 PCF

Orange-brown, silty, fine SAND.

MAX: 105.5 PCF: 16.0%

15.7% Saturated Moisture Content
6457.2

TMC
W.O.: 6457

Date of Test: 8/11

Sample: B-1 @ 10.0'

GeoSoils Consultants, Inc.

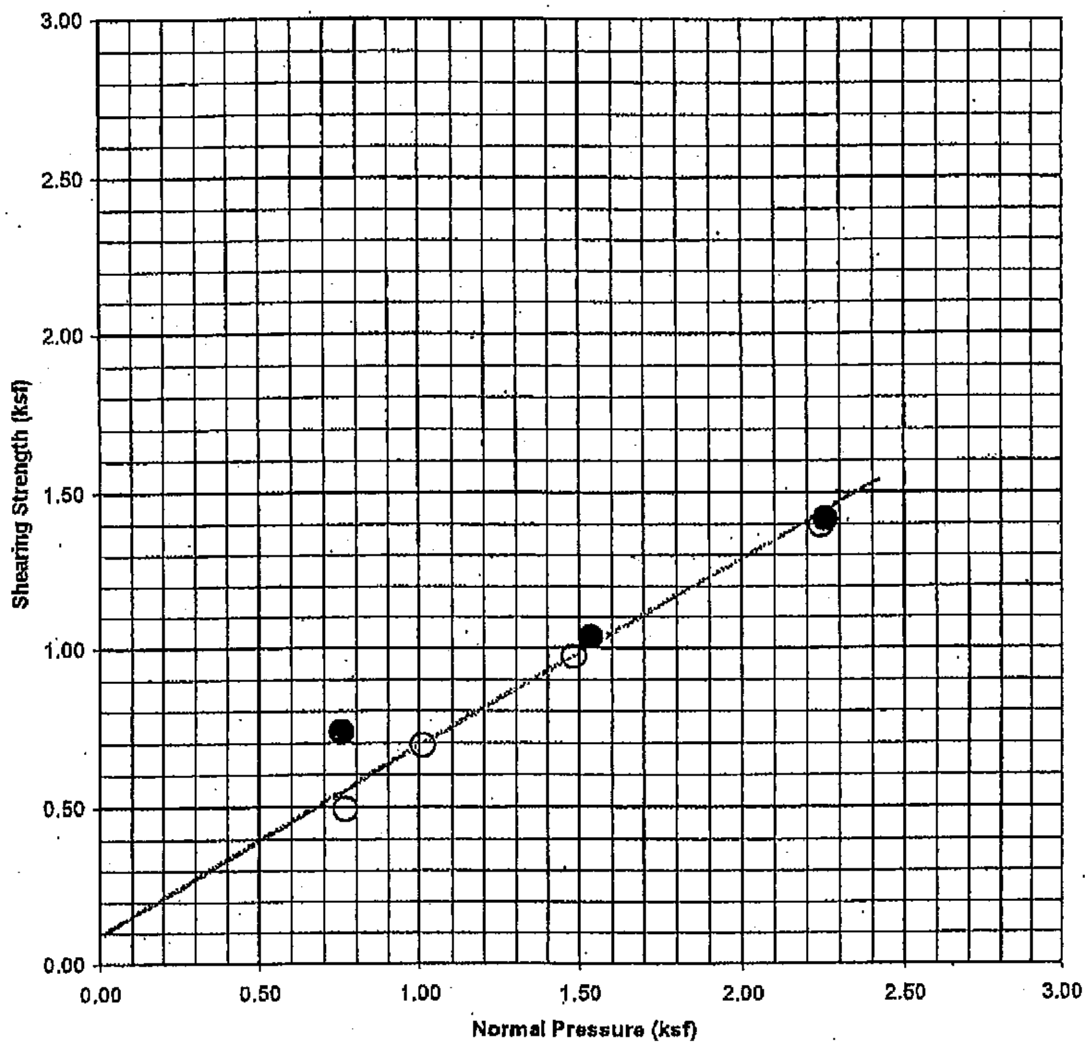
Geotechnical Engineering * Engineering Geology

PLATE SH-2

Shear Test Diagram

Peak
C(psf): 100 Phi (degrees): 30.0

Reshear
C(psf): 100 Phi (degrees): 30.0



Direct Shear, Peak / Reshear Speed: .001 in./min.

● Peak Values ○ Reshear Values

Undisturbed Natural Shear-Saturated

Brown, silty CLAY.

21.9% Saturated Moisture Content

6457.1

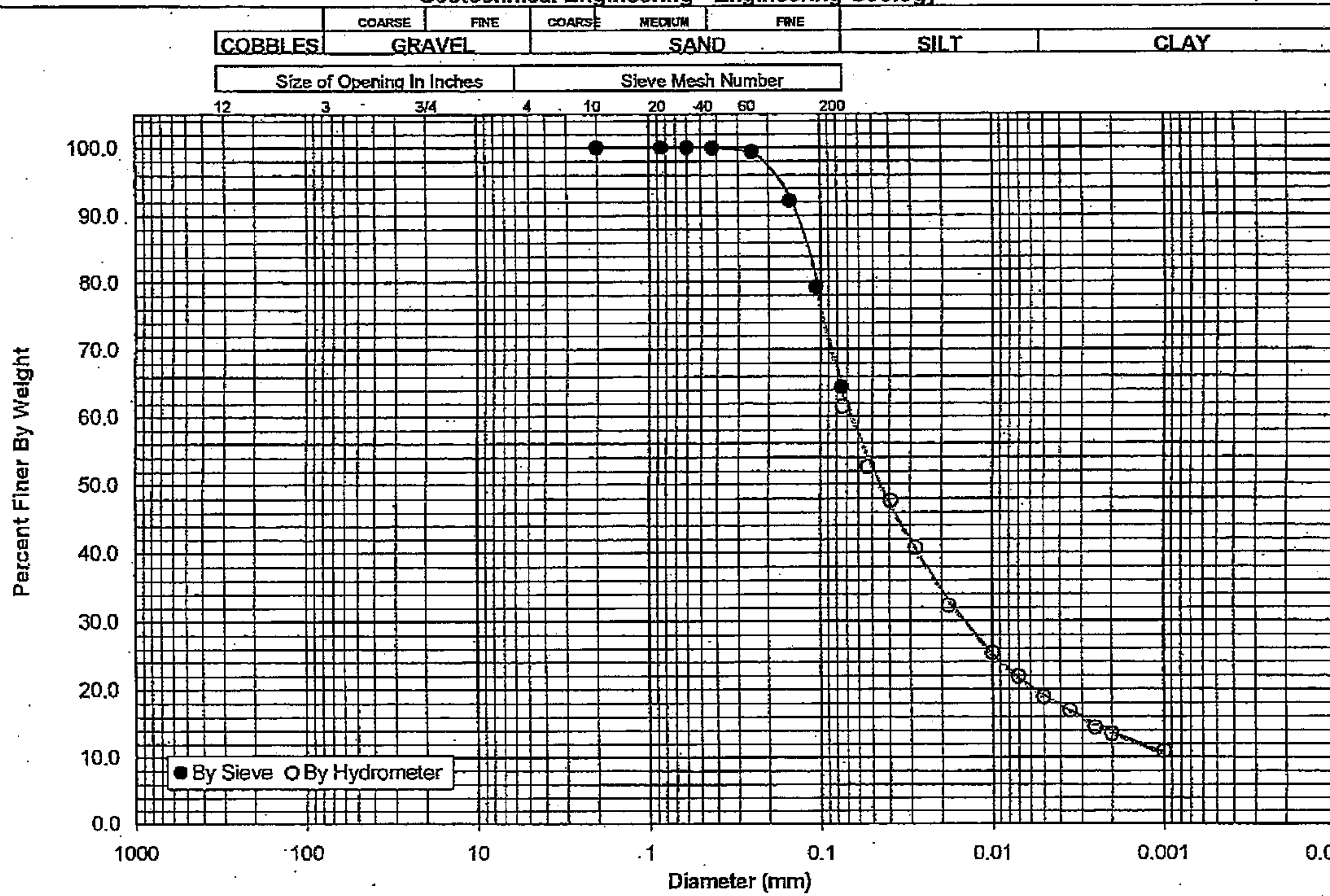
TMC
W.O. 6457

Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture (%): 13.6
Liquid Limit (%):
Plastic Limit (%):
Plasticity Index :



Grain Size Analysis

B-4 @ 42.5'
Brown, fine sandy SILT, w/ clay.

SH6457.1

Plate G-1

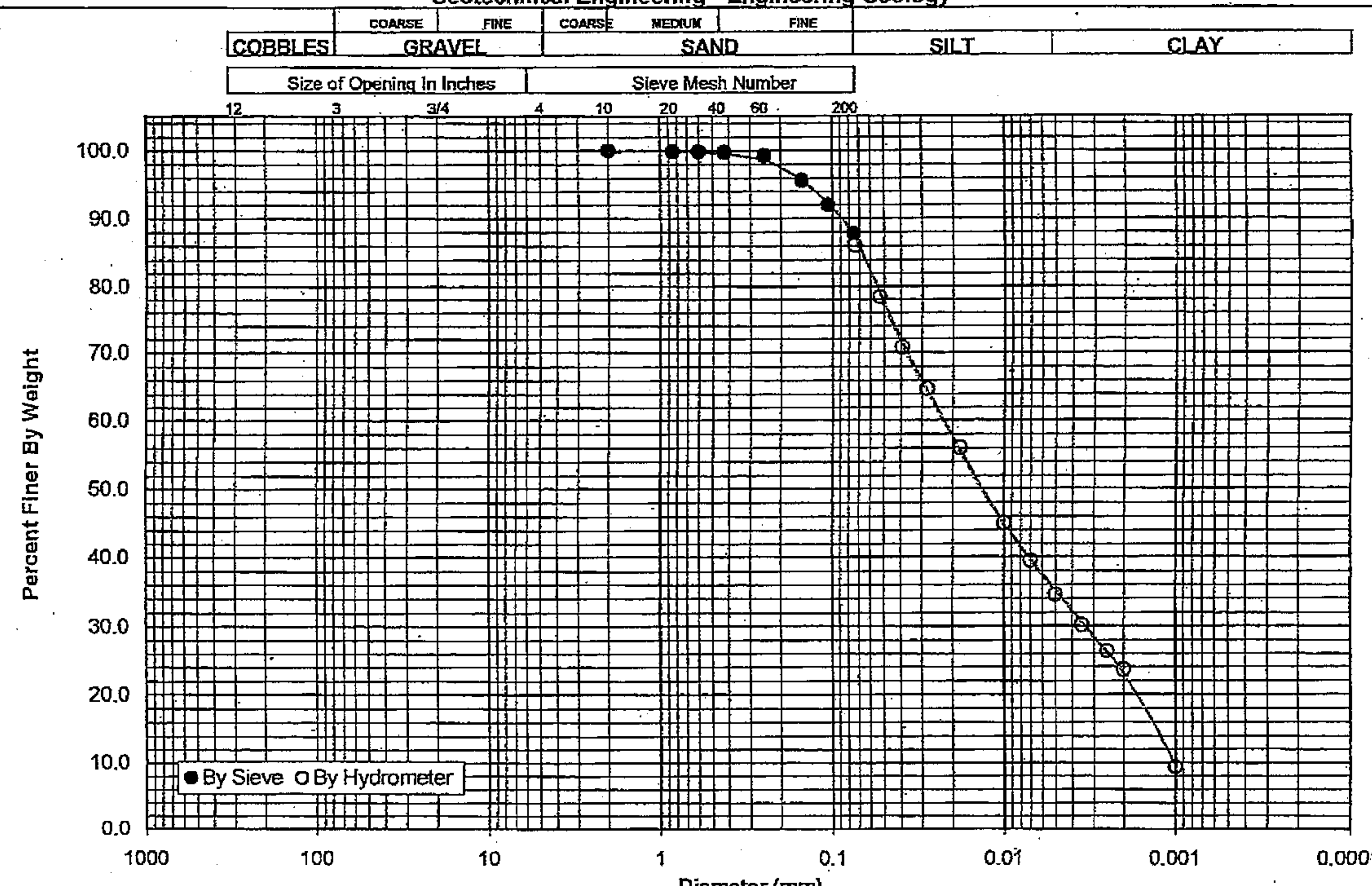
TMC
W.O. 6457

Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture (%): 24.2
Liquid Limit (%):
Plastic Limit (%):
Plasticity Index :



Grain Size Analysis

B-4 @ 47.5'
Brown, clayey SILT, w/ fine sand.

SH6457.2

Plate G-2

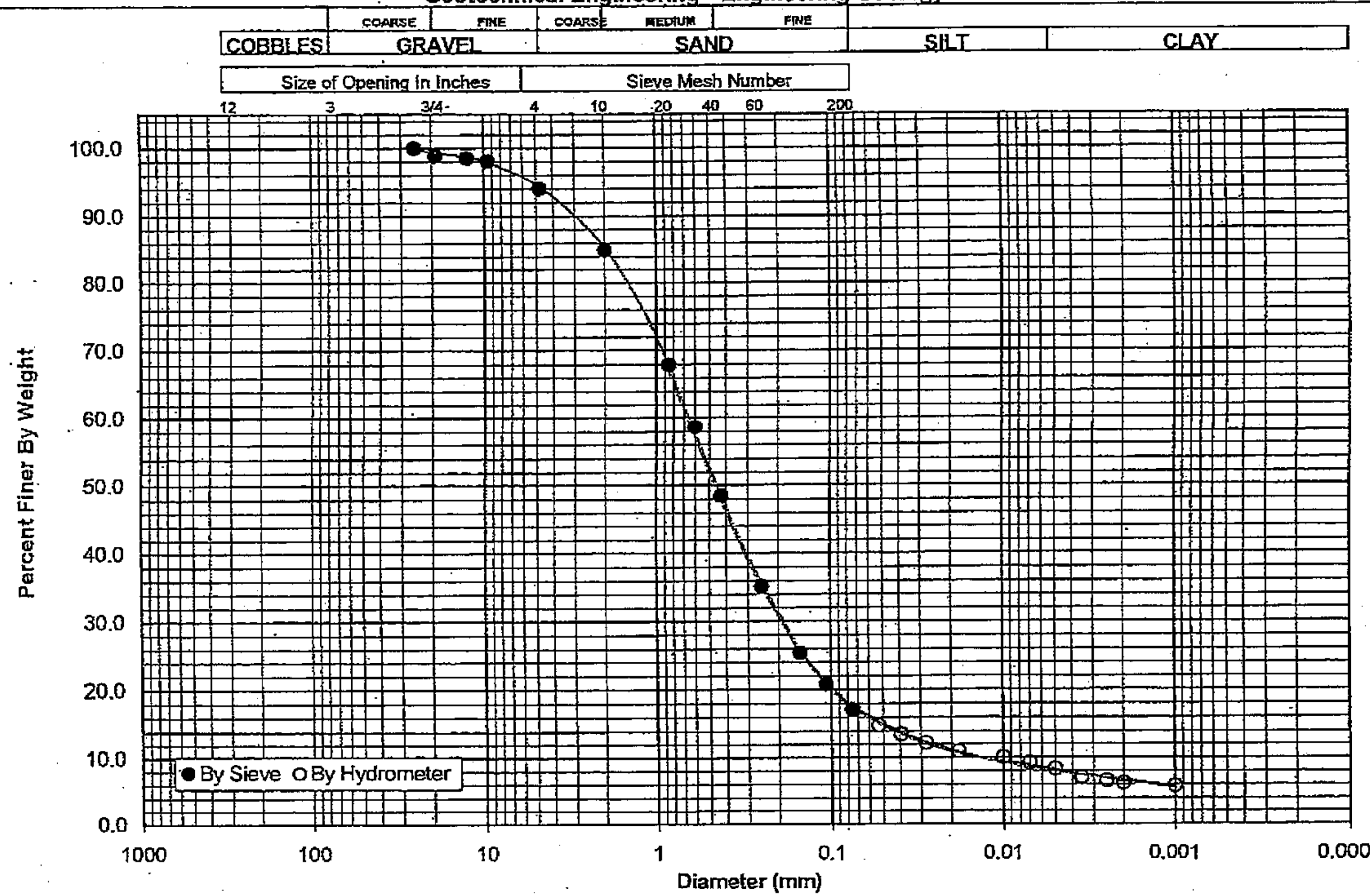
TMC
W.O. 6457

Date of Test: 8/11

GeoSoils Consultants, Inc.

Geotechnical Engineering * Engineering Geology

Moisture (%): 13.6
Liquid Limit (%):
Plastic Limit (%):
Plasticity Index :



Grain Size Analysis

B-5 @ 45.0'
Orange-brown, silty, fine to coarse SAND.

SH6457.3

Plate G-3

May 23, 2012
W.O. 6457

APPENDIX C

SLOPE STABILITY ANALYSES

May 23, 2012
W.O. 6457

APPENDIX C

SLOPE STABILITY ANALYSES

1.0 Introduction

XSTABL is a fully integrated slope stability analysis program. It permits the Engineer to develop the slope geometry interactively and perform the slope analysis from within a single program. The slope analysis portion of XSTABL uses a modified version of the popular STABL program, originally developed at Purdue University.

XSTABL performs a two dimensional limit equilibrium analysis to compute the factor-of-safety for a layered slope using the modified Bishop or Janbu methods. The program can be used to search for the most critical surface or the factor-of-safety may be determined for specific surfaces. XSTABL, Version 5.20 is programmed to handle:

1. heterogenous soil systems;
2. anisotropic soil strength properties;
3. reinforced slopes;
4. non-linear Mohr-Coulomb strength envelope;
5. pore water pressures for effective stress analysis using:
   a) Phreatic and piezometric surfaces
   b) pore pressure grid
   c) R_u factor
   d) constant pore water pressure
6. pseudo-static earthquake loading;
7. surcharge boundary loads;
8. automatic generation and analysis of an unlimited number of circular, non-circular and block-shaped failure surfaces;
9. analysis of right-facing slopes;
10. both SI and Imperial units.

Appendix C

2.0 General Information

If the reviewer wishes to obtain more information concerning slope stability analysis, the following publications may be consulted:

1. The Stability of Slopes, by E.N. Bromhead, Surrey University Press, Chapman and Hall, NY, 374 pages, ISBN 0 412 01061 5 (1985).

2. Rock Slope Engineering, by E. Hoek and J.W. Bray, Inst. of Mining and Metrallurgy, London, England, Third Edition, 358 pages, ISBN 0900488 573 (1981).

3. Landslides: Analysis and Control, by R.L. Schuster and R.J. Krizek (editors), Special Report 176, Transportation Research Board, National Academy of Sciences, 234 pages, ISBN 0 309 02804 3 (1978).

3.0 XSTABL Features

The present version of XSTABL contains the following features:

1. Allows the user to calculate factors-of-safety for static stability and dynamic stability situations.

2. Allows user to analyze stability situations for different failure modes.

3. Allows user to edit input for slope geometry and calculate corresponding factor-of-safety.

4. Allows user to readily review on-screen the input slope geometry.

5. Allows user to automatically generate and analyze an unlimited number of circular, non-circular and block-shaped failure surfaces (i.e., bedding plane, slide plane, etc.).

Appendix C

4.0 Input Data

Input data includes the following items:

1. Unit weight, cohesion, friction angle of bedrock material, alluvium and fill.
2. Slope geometry, surcharge boundary loads and water surface elevations.
3. Water level conditions for full basin and rapid draw down conditions.
4. Pseudo-static earthquake loading.

5.0 Output Information

Output information includes:

1. All input data.
2. Factors-of-safety for the ten most critical surfaces.
3. High quality plots can be generated. The plots include the slope geometry, the critical surfaces and the factor-of-safety.

6.0 Stability Analysis

GeoSoils Consultants, Inc. has performed slope stability analyses for the proposed development as depicted on the following Geologic-Sections:

- Geologic Cross-Section A-A': Mode 1 – Circular Failure Analysis
- Geologic Cross Section A-A': Mode 2 - Circular Failure Analysis, Water in Basin
- Geologic Cross Section A-A': Mode 3 - Circular Failure Analysis, Rapid Drawdown

Appendix C

Soil Parameters: Soil properties used in our slope stability analyses, which include cohesion, friction angle, and unit weight, are shown on Table C-1.

TABLE C-1
SHEAR TEST DATA SUMMARY

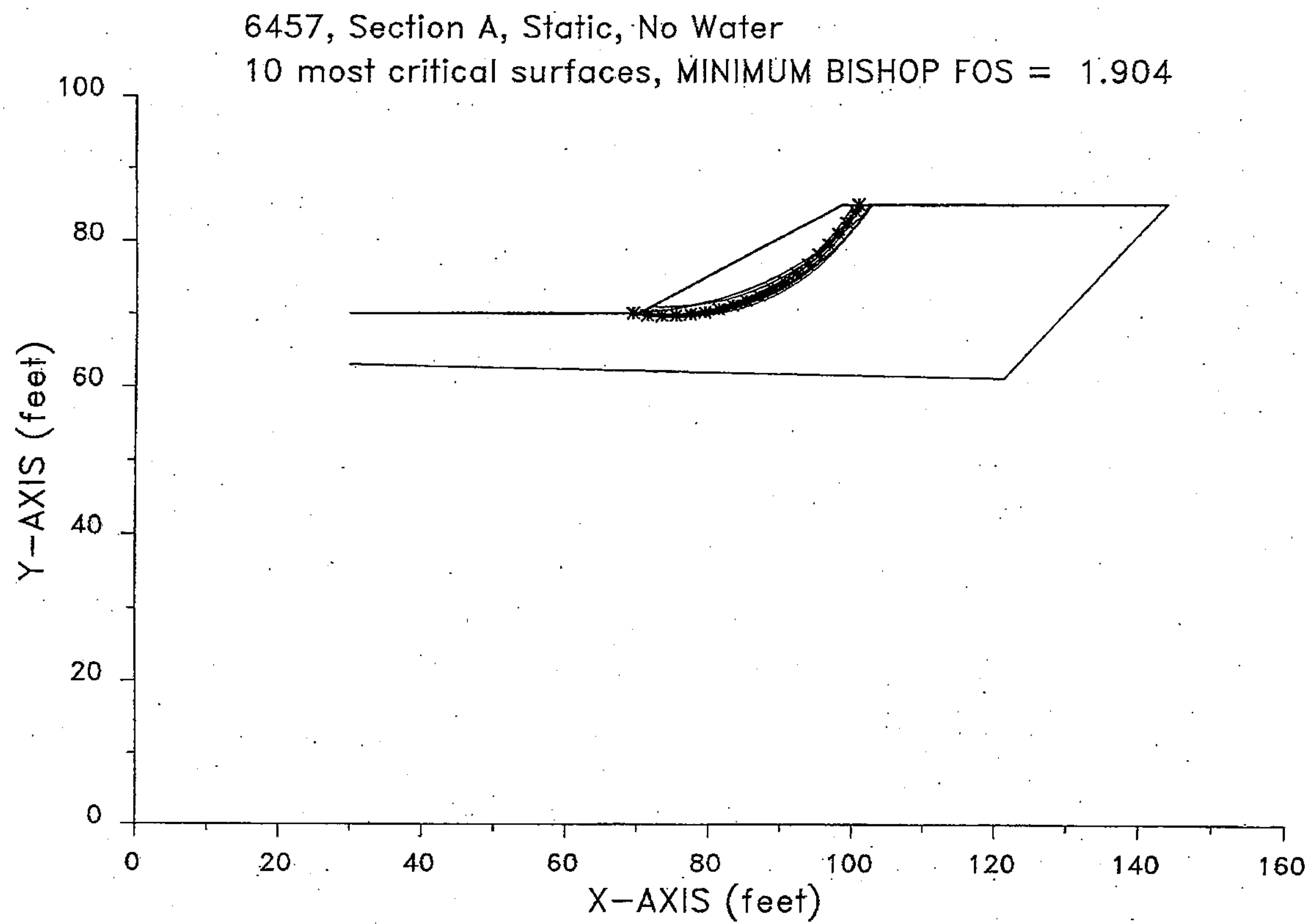
Soil Description	Peak Values		Resheared Values		Unit Weight (pcf)
	c (psf)	ϕ (degrees)	c (psf)	ϕ (degrees)	
Alluvium (Qal)	100	30	100	30	130
Certified Artificial Fill (Caf)	160	36	100	31.5	137.7

Results: The results of the analyses are presented in Table C-2. Detailed outputs of the results of our analyses are included at the end of this appendix.

TABLE C-2
RESULTS OF ANALYSES

Cross-Section	Mode	Description	Factor-of-Safety	
			Static	Seismic
A-A'	1	Circular Failure Analysis	1.90	1.80
A-A'	2	Circular Failure Analysis, Water in Basin	1.82	-----
A-A'	3	Circular Failure Analysis, Rapid Drawdown	1.52	-----

ASTAT1 9-06-** 14:31



XSTABL File: ASTAT1   9-06-**   14:31

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*              X S T A B L              *
*                                       *
*      Slope Stability Analysis         *
*            using the                  *
*         Method of Slices              *
*                                       *
*      Copyright (C) 1992 Ä 96          *
*   Interactive Software Designs, Inc.  *
*      Moscow, ID 83843, U.S.A.         *
*                                       *
*         All Rights Reserved           *
*                                       *
*  Ver. 5.200                96 Ä 1288  *
*****************************************
```

Problem Description : 6457, Section A, Static, No Water

SEGMENT BOUNDARY COORDINATES

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	98.5	85.0	1
3	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	137.7	100.0	31.50	.000	.0	0
2	130.0	130.0	100.0	30.00	.000	.0	0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 60.0 ft
and x = 75.0 ft

Each surface terminates between x = 95.0 ft
and x = 106.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	69.31	70.00
2	71.30	69.77
3	73.29	69.67
4	75.29	69.69
5	77.29	69.84
6	79.27	70.12
7	81.23	70.53
8	83.16	71.06
9	85.05	71.71
10	86.89	72.48
11	88.68	73.37
12	90.41	74.37
13	92.08	75.48
14	93.67	76.69
15	95.18	78.01
16	96.60	79.42
17	97.93	80.91
18	99.16	82.49
19	100.28	84.14
20	100.79	85.00

**** Simplified BISHOP FOS = 1.904 ****

The following is a summary of the TEN most critical surfaces

Problem Description : 6457, Section A, Static, No Water

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.904	73.91	100.91	31.25	69.31	100.79	4.612E+05
2.	1.905	73.97	104.41	34.66	69.83	102.68	5.591E+05
3.	1.910	74.86	99.77	30.19	69.83	101.17	4.739E+05
4.	1.912	73.29	100.68	31.01	68.79	100.02	4.283E+05
5.	1.914	74.79	103.00	33.12	70.34	102.57	5.337E+05
6.	1.915	72.39	103.54	33.85	67.76	100.71	4.757E+05
7.	1.919	67.94	118.22	48.10	70.34	102.71	5.991E+05
8.	1.920	73.87	105.13	34.19	71.90	101.50	4.231E+05
9.	1.924	74.31	102.58	33.13	68.28	102.38	5.620E+05
10.	1.928	75.61	100.09	30.64	69.83	102.27	5.313E+05

* * * END OF FILE * * *

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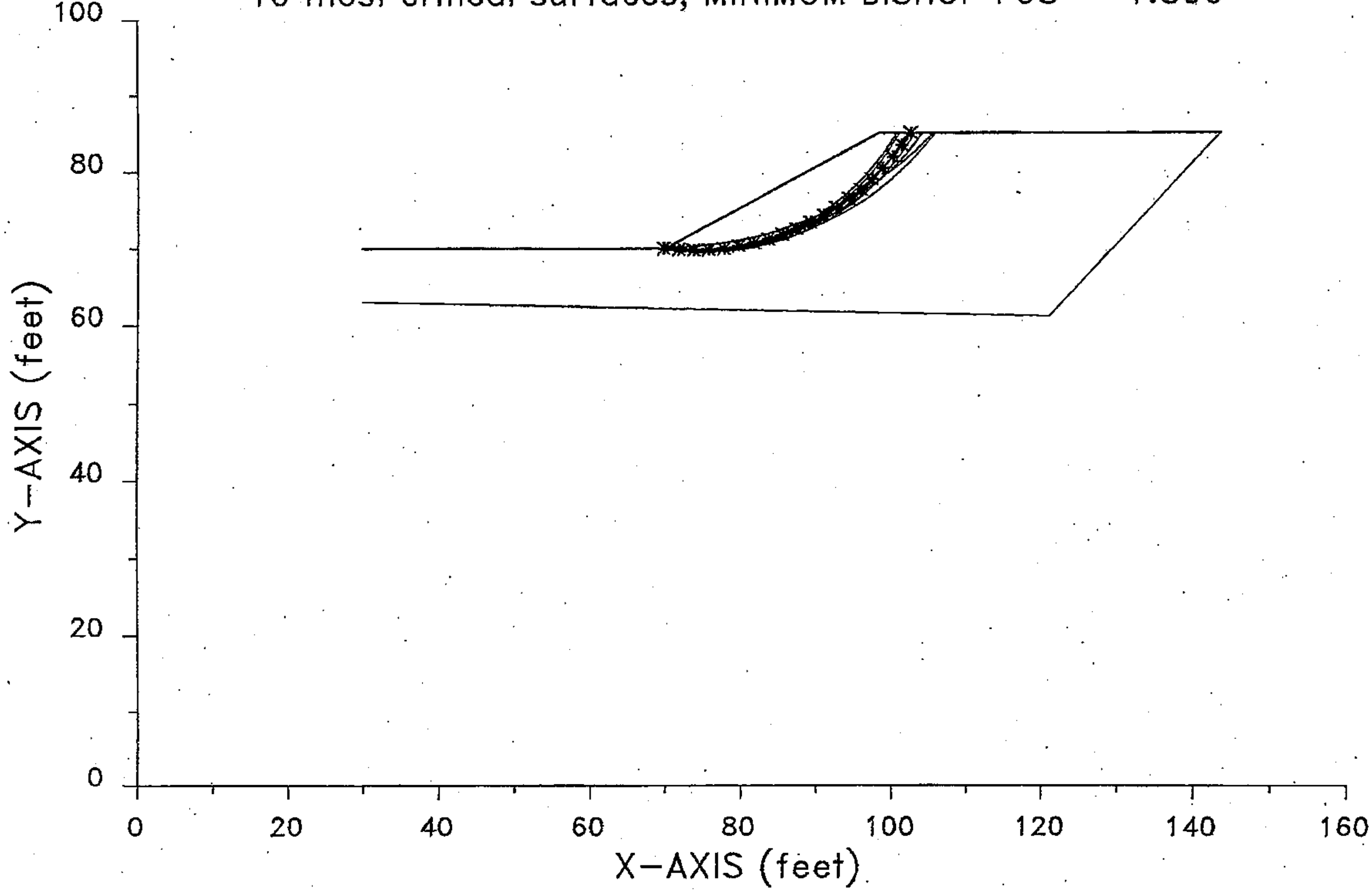
6457, Section A, Seismic, No Water
10 most critical surfaces, MINIMUM BISHOP FOS = 1.800



XSTABL File: ASEIS1   9-06-**   14:33

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*              X S T A B L              *
*                                       *
*       Slope Stability Analysis        *
*              using the                *
*           Method of Slices            *
*                                       *
*        Copyright (C) 1992 Ä 96        *
*   Interactive Software Designs, Inc.  *
*       Moscow, ID 83843, U.S.A.        *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.200                96 Ä 1288  *
*****************************************
```

Problem Description : 6457, Section A, Seismic, No Water

SEGMENT BOUNDARY COORDINATES

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	98.5	85.0	1
3	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	137.7	160.0	36.00	.000	.0	0
2	130.0	130.0	100.0	30.00	.000	.0	0

A horizontal earthquake loading coefficient
of .150 has been assigned

A vertical earthquake loading coefficient
of .000 has been assigned

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 60.0 ft
and x = 75.0 ft

Each surface terminates between x = 95.0 ft
and x = 106.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	69.83	70.00
2	71.82	69.82
3	73.82	69.75
4	75.82	69.80
5	77.81	69.97
6	79.79	70.24
7	81.75	70.64
8	83.69	71.14
9	85.59	71.76
10	87.45	72.48
11	89.27	73.31
12	91.04	74.25
13	92.75	75.28
14	94.40	76.42
15	95.98	77.64
16	97.49	78.96
17	98.92	80.35
18	100.27	81.83
19	101.52	83.39
20	102.68	85.00

**** Simplified BISHOP FOS = 1.800 ****

The following is a summary of the TEN most critical surfaces

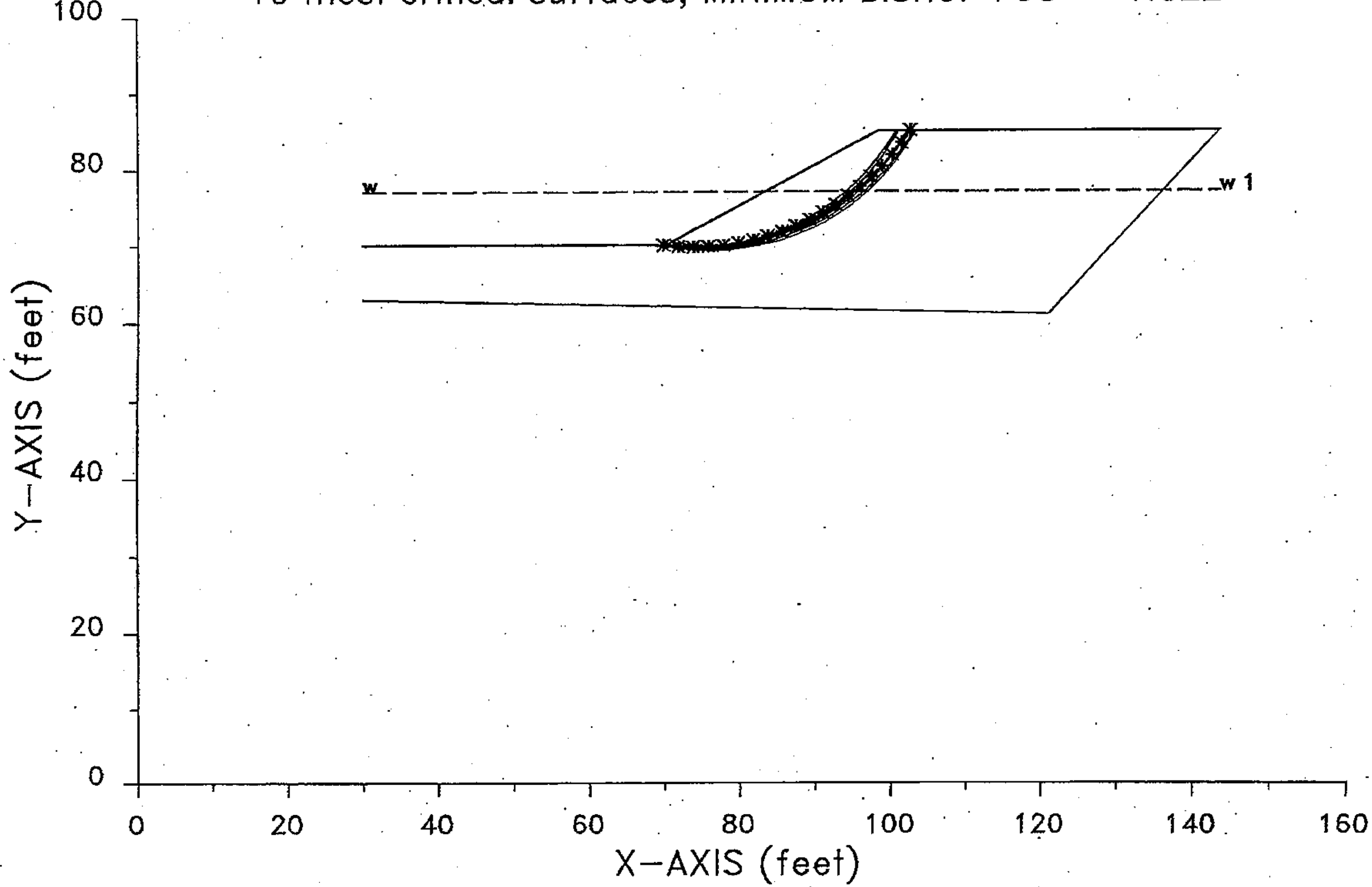
Problem Description : 6457, Section A, Seismic, No Water

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.800	73.97	104.41	34.66	69.83	102.68	6.880E+05
2.	1.808	74.79	103.00	33.12	70.34	102.57	6.562E+05
3.	1.818	74.86	99.77	30.19	69.83	101.17	5.832E+05
4.	1.819	73.83	107.35	37.76	68.28	104.25	8.367E+05
5.	1.819	74.67	109.37	39.67	69.83	105.95	9.450E+05
6.	1.820	75.61	100.09	30.64	69.83	102.27	6.511E+05
7.	1.822	74.31	102.58	33.13	68.28	102.38	6.921E+05
8.	1.823	70.83	118.69	48.52	70.34	105.72	9.743E+05
9.	1.823	73.91	100.91	31.25	69.31	100.79	5.702E+05
10.	1.826	76.26	100.95	31.33	70.34	103.21	6.910E+05

* * * END OF FILE * * *

ASTAT2 9-06-** 14:56

6457, Section A, Static, Water
10 most critical surfaces, MINIMUM BISHOP FOS = 1.822



XSTABL File: ASTAT2   9-06-**   14:56

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*****************************************
*              X S T A B L              *
*                                       *
*       Slope Stability Analysis        *
*              using the                *
*           Method of Slices            *
*                                       *
*        Copyright (C) 1992 Ä 96        *
*   Interactive Software Designs, Inc.  *
*       Moscow, ID 83843, U.S.A.        *
*                                       *
*          All Rights Reserved          *
*                                       *
* Ver. 5.200                 96 Ä 1288  *
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```

Problem Description : 6457, Section A, Static, Water

SEGMENT BOUNDARY COORDINATES

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	98.5	85.0	1
3	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	143.7	100.0	31.50	.000	.0	1
2	130.0	135.0	100.0	30.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 2 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	30.00	77.00
2	143.50	77.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 60.0 ft
and x = 75.0 ft

Each surface terminates between x = 95.0 ft
and x = 106.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	69.83	70.00
2	71.82	69.82
3	73.82	69.75
4	75.82	69.80
5	77.81	69.97
6	79.79	70.24
7	81.75	70.64
8	83.69	71.14
9	85.59	71.76
10	87.45	72.48
11	89.27	73.31
12	91.04	74.25
13	92.75	75.28
14	94.40	76.42
15	95.98	77.64
16	97.49	78.96
17	98.92	80.35
18	100.27	81.83
19	101.52	83.39
20	102.68	85.00

**** Simplified BISHOP FOS = 1.822 ****

The following is a summary of the TEN most critical surfaces

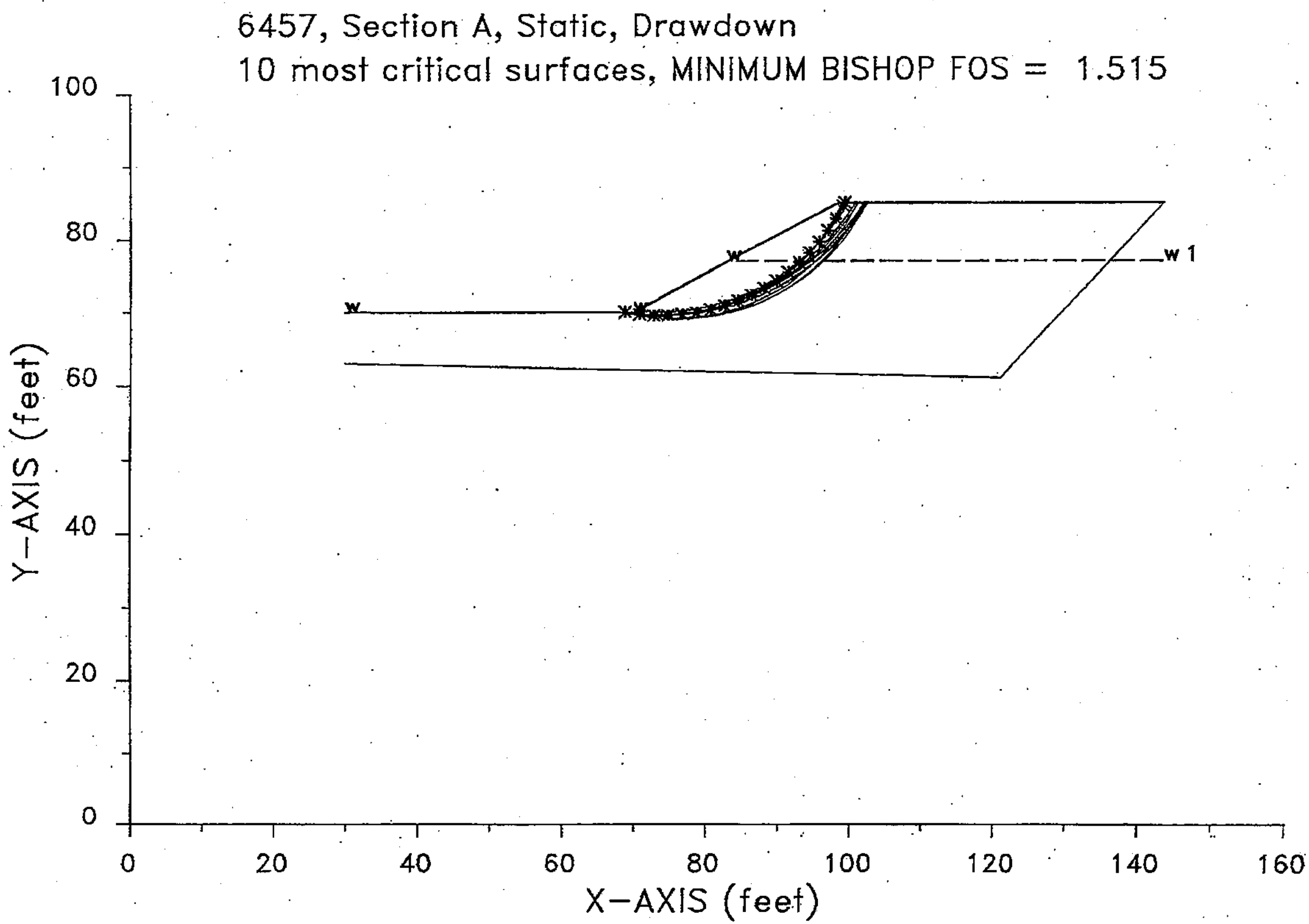
Problem Description : 6457, Section A, Static, Water

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.822	73.97	104.41	34.66	69.83	102.68	4.560E+05

2.	1.822	75.61	100.09	30.64	69.83	102.27	4.261E+05
3.	1.823	74.79	103.00	33.12	70.34	102.57	4.349E+05
4.	1.823	74.86	99.77	30.19	69.83	101.17	3.808E+05
5.	1.831	76.31	100.33	30.37	70.86	102.51	4.089E+05
6.	1.831	76.26	100.95	31.33	70.34	103.21	4.555E+05
7.	1.834	76.41	100.41	31.11	69.83	103.42	4.769E+05
8.	1.835	73.91	100.91	31.25	69.31	100.79	3.728E+05
9.	1.837	74.31	102.58	33.13	68.28	102.38	4.544E+05
10.	1.839	75.76	97.18	27.93	69.31	100.89	3.717E+05

* * * END OF FILE * * *

ASTAT3 9-06-** 15:22



XSTABL File: ASTAT3   9-06-**   15:22

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******************************************
*               X S T A B L              *
*                                        *
*      Slope Stability Analysis          *
*            using the                   *
*        Method of Slices                *
*                                        *
*       Copyright (C) 1992 Å 96          *
*   Interactive Software Designs, Inc.   *
*      Moscow, ID 83843, U.S.A.          *
*                                        *
*         All Rights Reserved            *
*                                        *
*  Ver: 5.200                96 Å 1288   *
******************************************
```

Problem Description : 6457, Section A, Static, Drawdown

SEGMENT BOUNDARY COORDINATES

4 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	70.0	70.0	70.0	1
2	70.0	70.0	83.0	77.0	1
3	83.0	77.0	98.5	85.0	1
4	98.5	85.0	143.5	85.0	1

2 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	30.0	63.0	121.0	61.0	2
2	121.0	61.0	143.5	85.0	2

ISOTROPIC Soil Parameters

2 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.

1	137.7	143.7	100.0	31.50	.000	.0	1
2	130.0	135.0	100.0	30.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	30.00	70.00
2	70.00	70.00
3	83.00	77.00
4	143.50	77.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 60.0 ft and x = 75.0 ft

Each surface terminates between x = 95.0 ft and x = 110.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 20 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	68.79	70.00
2	70.77	69.71
3	72.77	69.56
4	74.77	69.55
5	76.76	69.68
6	78.74	69.95
7	80.70	70.35
8	82.63	70.89
9	84.51	71.56
10	86.35	72.37
11	88.12	73.29
12	89.82	74.34
13	91.45	75.50
14	92.99	76.78
15	94.44	78.16
16	95.79	79.63
17	97.04	81.20
18	98.17	82.84
19	99.18	84.57
20	99.40	85.00

**** Simplified BISHOP FOS = 1.515 ****

The following is a summary of the TEN most critical surfaces

Problem Description : 6457, Section A, Static, Drawdown

FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)

1.	1.515	73.91	98.30	28.76	68.79	99.40	3.243E+05
2.	1.517	73.92	101.64	31.98	69.31	101.21	3.961E+05
3.	1.521	73.47	100.81	30.78	70.34	99.87	3.262E+05
4.	1.523	75.52	97.59	28.52	68.28	101.09	3.984E+05
5.	1.523	73.41	101.68	32.09	68.28	100.83	3.901E+05
6.	1.526	74.59	102.30	32.65	69.83	102.28	4.375E+05
7.	1.530	74.61	102.73	33.07	69.83	102.53	4.496E+05
8.	1.534	76.30	97.52	28.53	68.79	101.91	4.266E+05
9.	1.538	76.53	98.42	29.19	69.83	102.44	4.363E+05
10.	1.539	73.06	104.93	35.26	68.28	102.13	4.546E+05

* * * END OF FILE * * *

May 23, 2012
W.O. 6457

APPENDIX D

LIQUEFACTION ANALYSES

APPENDIX D

LIQUEFACTION ANALYSES

General: Liquefaction describes a phenomenon where cyclic stresses, which are produced by earthquake-induced ground motions, creates excess pore pressures in predominately cohesionless soils. As a result, the soils may acquire a high degree of mobility, which can lead to lateral spreading, consolidation and settlement of loose sediments, ground oscillation, flow failure, loss of bearing strength, ground fissuring, sand boils, and other damaging deformations. This phenomenon occurs only below the water table, but after liquefaction has developed, it can propagate upward into overlying, non-saturated soil.

Research has shown that saturated, loose sands with a silt content less than about 25 percent are most susceptible to liquefaction, whereas other soil types are generally considered to have a low susceptibility. According to the SCEC (1999) publication *Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction in California*, any material having more than 15 percent finer than 0.005 millimeters (clay) was considered not subject to liquefaction.

Procedure: The method of liquefaction assessment utilized in this report is based on the "Simplified Procedure" originally developed by *Seed and Idriss (1971, 1982)*, with subsequent refinements by *Seed et. Al. (1983)*, *Seed et al. (1985)*, *Seed and De Alba (1986)*, and *Seed and Harder (1990)*. As generally defined by the DMG Special Publication, the procedure essentially compares the cyclic resistance ratio (CRR) with the earthquake-induced cyclic stress ratio (CSR) at that depth from a specified design earthquake. The CRR is the cyclic stress ratio required to induce liquefaction for a cohesionless soil stratum at a given depth and is essentially the capacity of the soil to resist liquefaction. The CSR is defined generally as the seismic demand placed on a soil layer or the peak ground surface acceleration and an associated earthquake moment magnitude. The equation for CSR is defined below.

Appendix D

$$CSR = \left(\frac{\tau_{av}}{\sigma'_{vo}}\right) = 0.65\left(\frac{a_{max}}{g}\right)\left(\frac{\sigma_{vo}}{\sigma'_{vo}}\right) r_d$$

Values of CRR were established that were empirically correlated using extensive databases for sites that did or did not liquefy during previous earthquakes, where values of $(N_1)_{60}$ could be correlated with the liquefied soil zones. The 1997 version of the baseline chart defines values of CRR as a function of $(N_1)_{60}$ for moment magnitude 7.5 earthquake, CSR, and the percent fines. The factor of safety against liquefaction is obtained by calculating the ratio of CRR and CSR.

The "Simplified Procedure" was modified by Robertson and Wride *(Youd and Idriss, 1977)* for determining liquefaction strengths for clean sands from CPT probing data. Material behavior classification interpretation is based on Robertson and Campanella (1984). The correlation developed by Robertson and Wride correlates the CSR and the corrected and the normalized CPT resistance, q_{C1N}. Robertson and Wride developed a graph similar to the graph, by Youd and Idriss (1997), that determines the CRR from the corrected CPT tip resistance q_{C1N}, CSR, and the cyclic shear strain potential, $\square_e$. The curve essentially separates regions of the plot with data indicative of liquefaction from regions indicative of non-liquefaction. The factor of safety against liquefaction is then determined by calculating the ratio of CRR and CSR. The liquefaction procedure assesses the potential for liquefaction as "very low", "moderate", or "high" according to the chronological criteria below.

"Very Low" Potential for Liquefaction

- Soil layer above groundwater level
- Soil layer has been reprocessed
- Clay content within soil layer >= 15% (Based on laboratory testing)
- Liquid limit within soil layer >= 35% (Based on laboratory testing)

Appendix D

- CPT soil classification, Ic > 2.6, which is considered a clay-rich soil (Based on CPT data and liquefaction analyses).
- Corrected tip resistance, (qC1N)cs, > 160 (Based on CPT data and liquefaction analyses).
- Corrected blow count, (N1)60cs > 30 (Based on Boring Log data, if available)
- Factor-of-safety against liquefaction > 1.25 (Based on CPT and/or boring data and liquefaction analyses).

"Moderate" Potential for Liquefaction

- 1.0 < Factor-of-safety against liquefaction < 1.25 (Based on CPT and/or boring data and liquefaction analyses).

"High" Potential for Liquefaction

- Factor-of-safety against liquefaction < 1.0 (Based on CPT and/or boring data and liquefaction analyses).

Analyses Parameters: The following parameters were utilized in the assessment of liquefaction potential of the subsurface soils underlying the subject site:

Exploration Data: The assessment of liquefaction potential for the proposed development was evaluated using the subsurface information and laboratory data from one GSC boring (B-5).

Groundwater: At the time of exploration (July 2011), groundwater was not encountered. However, according to the Division of Mines and Geology Seismic Hazard Evaluation of the Newhall 7.5 minute Quadrangle, the historical high groundwater table is at approximately 45 to 50 feet below grade. Therefore, groundwater was considered at 45 feet below existing ground surface in our analyses.

Appendix D

Seismic Parameters: As there are numerous faults that can cause ground-shaking at the site, ground accelerations could vary. Therefore, as obtained from the Seismic Hazard Report for Newhall Quadrangle, an acceleration of 0.57g and M_w=6.6 were considered in the analyses

Analysis: It should be noted that soils classified as clay, silty clay, and clayey silt were not considered in our liquefaction analyses.

Liquefaction Results: The results of our liquefaction analysis indicated that the potential for liquefaction within the area of study exists. However, only one layer of potentially liquefiable material was encountered in the boring that was drilled. This layer was encountered at approximately 45 feet below existing ground and was approximately 5 feet thick.

Although the potential for liquefaction exists in the study area, due to the fact that only one layer of potentially liquefiable material was encountered and based on the depth of that layer as well as the high blow counts (greater than 15), we believe that neither liquefaction nor any related phenomena will pose a significant risk to site development.

The LIQUEFY 2 program was used to evaluate the liquefaction potential at the site. The output for the liquefaction analysis performed for the boring is enclosed at the end of this appendix.

```
*****************************
*                           *
*      L I Q U E F Y 2      *
*                           *
*       Version 1.50        *
*                           *
*****************************
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EMPIRICAL PREDICTION OF
EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 6457 DATE: 09-09-2011

JOB NAME: TMC

SOIL-PROFILE NAME: 6457.LDW

BORING GROUNDWATER DEPTH: 45.00 ft

CALCULATION GROUNDWATER DEPTH: 45.00 ft

DESIGN EARTHQUAKE MAGNITUDE: 6.60 Mw

SITE PEAK GROUND ACCELERATION: 0.570 g

BOREHOLE DIAMETER CORRECTION FACTOR: 1.00

SAMPLER SIZE CORRECTION FACTOR: 1.00

N60 HAMMER CORRECTION FACTOR: 1.00

MAGNITUDE SCALING FACTOR METHOD: Idriss (1997, in press)

Magnitude Scaling Factor: 1.387

rd-CORRECTION METHOD: Seed (1985)

FIELD SPT N-VALUES ARE CORRECTED FOR THE LENGTH OF THE DRIVE RODS.

Rod Stick-Up Above Ground: 3.0 ft

CN NORMALIZATION FACTOR: 1.044 tsf

MINIMUM CN VALUE: 0.6

File Name: 6457.OUT

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.017	0.017	20	0.45	*	*	*	*	*	**
1	0.75	0.051	0.051	20	0.45	*	*	*	*	*	**
1	1.25	0.085	0.085	20	0.45	*	*	*	*	*	**
1	1.75	0.119	0.119	20	0.45	*	*	*	*	*	**
1	2.25	0.153	0.153	20	0.45	*	*	*	*	*	**
1	2.75	0.187	0.187	20	0.45	*	*	*	*	*	**
1	3.25	0.221	0.221	20	0.45	*	*	*	*	*	**
1	3.75	0.255	0.255	20	0.45	*	*	*	*	*	**
1	4.25	0.289	0.289	20	0.45	*	*	*	*	*	**
1	4.75	0.323	0.323	20	0.45	*	*	*	*	*	**
1	5.25	0.357	0.357	20	0.45	*	*	*	*	*	**
1	5.75	0.391	0.391	20	0.45	*	*	*	*	*	**
1	6.25	0.425	0.425	20	0.45	*	*	*	*	*	**
1	6.75	0.459	0.459	20	0.45	*	*	*	*	*	**
1	7.25	0.493	0.493	20	0.45	*	*	*	*	*	**
1	7.75	0.527	0.527	20	0.45	*	*	*	*	*	**
1	8.25	0.561	0.561	20	0.45	*	*	*	*	*	**
1	8.75	0.595	0.595	20	0.45	*	*	*	*	*	**
1	9.25	0.629	0.629	20	0.45	*	*	*	*	*	**
1	9.75	0.663	0.663	20	0.45	*	*	*	*	*	**
1	10.25	0.697	0.697	20	0.45	*	*	*	*	*	**
1	10.75	0.731	0.731	20	0.45	*	*	*	*	*	**
1	11.25	0.765	0.765	20	0.45	*	*	*	*	*	**
1	11.75	0.799	0.799	20	0.45	*	*	*	*	*	**
1	12.25	0.833	0.833	20	0.45	*	*	*	*	*	**
1	12.75	0.867	0.867	20	0.45	*	*	*	*	*	**
1	13.25	0.901	0.901	20	0.45	*	*	*	*	*	**
1	13.75	0.935	0.935	20	0.45	*	*	*	*	*	**
1	14.25	0.969	0.969	20	0.45	*	*	*	*	*	**
1	14.75	1.003	1.003	20	0.45	*	*	*	*	*	**
1	15.25	1.037	1.037	20	0.45	*	*	*	*	*	**
1	15.75	1.071	1.071	20	0.45	*	*	*	*	*	**
1	16.25	1.105	1.105	20	0.45	*	*	*	*	*	**
1	16.75	1.139	1.139	20	0.45	*	*	*	*	*	**
1	17.25	1.173	1.173	20	0.45	*	*	*	*	*	**
1	17.75	1.207	1.207	20	0.45	*	*	*	*	*	**
1	18.25	1.241	1.241	20	0.45	*	*	*	*	*	**
1	18.75	1.275	1.275	20	0.45	*	*	*	*	*	**
1	19.25	1.309	1.309	20	0.45	*	*	*	*	*	**
1	19.75	1.343	1.343	20	0.45	*	*	*	*	*	**
1	20.25	1.377	1.377	20	0.45	*	*	*	*	*	**
1	20.75	1.411	1.411	20	0.45	*	*	*	*	*	**
1	21.25	1.445	1.445	20	0.45	*	*	*	*	*	**

File Name: 6457.OUT

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	21.75	1.479	1.479	20	0.45	*	*	*	*	*	**
1	22.25	1.513	1.513	20	0.45	*	*	*	*	*	**
1	22.75	1.547	1.547	20	0.45	*	*	*	*	*	**
1	23.25	1.581	1.581	20	0.45	*	*	*	*	*	**
1	23.75	1.615	1.615	20	0.45	*	*	*	*	*	**
1	24.25	1.649	1.649	20	0.45	*	*	*	*	*	**
1	24.75	1.683	1.683	20	0.45	*	*	*	*	*	**
1	25.25	1.717	1.717	20	0.45	*	*	*	*	*	**
1	25.75	1.751	1.751	20	0.45	*	*	*	*	*	**
1	26.25	1.785	1.785	20	0.45	*	*	*	*	*	**
1	26.75	1.819	1.819	20	0.45	*	*	*	*	*	**
1	27.25	1.853	1.853	20	0.45	*	*	*	*	*	**
1	27.75	1.887	1.887	20	0.45	*	*	*	*	*	**
1	28.25	1.921	1.921	20	0.45	*	*	*	*	*	**
1	28.75	1.955	1.955	20	0.45	*	*	*	*	*	**
1	29.25	1.989	1.989	20	0.45	*	*	*	*	*	**
1	29.75	2.023	2.023	20	0.45	*	*	*	*	*	**
1	30.25	2.057	2.057	20	0.45	*	*	*	*	*	**
1	30.75	2.091	2.091	20	0.45	*	*	*	*	*	**
1	31.25	2.125	2.125	20	0.45	*	*	*	*	*	**
1	31.75	2.159	2.159	20	0.45	*	*	*	*	*	**
1	32.25	2.193	2.193	20	0.45	*	*	*	*	*	**
1	32.75	2.227	2.227	20	0.45	*	*	*	*	*	**
1	33.25	2.261	2.261	20	0.45	*	*	*	*	*	**
1	33.75	2.295	2.295	20	0.45	*	*	*	*	*	**
1	34.25	2.329	2.329	20	0.45	*	*	*	*	*	**
1	34.75	2.363	2.363	20	0.45	*	*	*	*	*	**
1	35.25	2.397	2.397	20	0.45	*	*	*	*	*	**
1	35.75	2.431	2.431	20	0.45	*	*	*	*	*	**
1	36.25	2.465	2.465	20	0.45	*	*	*	*	*	**
1	36.75	2.499	2.499	20	0.45	*	*	*	*	*	**
1	37.25	2.533	2.533	20	0.45	*	*	*	*	*	**
1	37.75	2.567	2.567	20	0.45	*	*	*	*	*	**
1	38.25	2.601	2.601	20	0.45	*	*	*	*	*	**
1	38.75	2.635	2.635	20	0.45	*	*	*	*	*	**
1	39.25	2.669	2.669	20	0.45	*	*	*	*	*	**
1	39.75	2.703	2.703	20	0.45	*	*	*	*	*	**
1	40.25	2.737	2.737	20	0.45	*	*	*	*	*	**
1	40.75	2.771	2.771	20	0.45	*	*	*	*	*	**
1	41.25	2.805	2.805	20	0.45	*	*	*	*	*	**
1	41.75	2.839	2.839	20	0.45	*	*	*	*	*	**
1	42.25	2.873	2.873	20	0.45	*	*	*	*	*	**
1	42.75	2.907	2.907	20	0.45	*	*	*	*	*	**

1	43.25	2.941	2.941	20	0.45	*	*	*	*	*	**

File Name: 6457.OUT

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	43.75	2.975	2.975	20	0.45	*	*	*	*	*	**
1	44.25	3.009	3.009	20	0.45	*	*	*	*	*	**
1	44.75	3.043	3.043	20	0.45	*	*	*	*	*	**
2	45.25	3.076	3.068	18	0.43	0.600	11.2	0.112	0.802	0.298	0.52
2	45.75	3.108	3.085	18	0.43	0.600	11.2	0.112	0.797	0.297	0.52
2	46.25	3.141	3.102	18	0.43	0.600	11.2	0.112	0.792	0.297	0.52
2	46.75	3.173	3.118	18	0.43	0.600	11.2	0.112	0.787	0.297	0.52
2	47.25	3.205	3.135	18	0.43	0.600	11.2	0.112	0.782	0.296	0.53
2	47.75	3.237	3.152	18	0.43	0.600	11.2	0.112	0.776	0.295	0.53
2	48.25	3.270	3.168	18	0.43	0.600	11.2	0.112	0.771	0.295	0.53
2	48.75	3.302	3.185	18	0.43	0.600	11.2	0.112	0.766	0.294	0.53
2	49.25	3.334	3.202	18	0.43	0.600	11.2	0.112	0.761	0.294	0.53
2	49.75	3.366	3.218	18	0.43	0.600	11.2	0.112	0.756	0.293	0.53

May 23, 2012
W.O. 6457

APPENDIX E

SEISMICALLY INDUCED SETTLEMENT ANALYSES

APPENDIX E

SEISMICALLY INDUCED SETTLEMENT ANALYSES

General: Seismically-induced settlement in unsaturated (dry) and saturated soils generally occur due to the dissipation of pore pressure in a liquefiable soil layer. As previously define, liquefaction occurs when cyclic stresses, which are produced by earthquake-induced ground motions, create excess pore pressures in predominately cohesionless soils. The controlling factors affecting settlement in saturated sands consist of the pore pressure drainage path, magnitude and duration of the seismic event, cyclic stresses, maximum shear strains, and the SPT $(N_1)_{60}$ of the soil layers. Seismically-induced settlement in partially saturated or dry sands is controlled predominately by the magnitude and duration of the seismic event, cyclic strains, and the SPT $(N_1)_{60}$ of the soil layers.

The potential for seismically-induced settlement is greatest in loose granular soils (i.e., sands, silty sands, sandy silts), whereas cohesive soils (i.e., clays and silts) are generally not prone to settlement. It should be realized that granular soils are susceptible to settlement during a seismic event whether the soils liquefy or not. Soils underlying the site generally consist of alternating layers of silts and clays with interbeds of sand, silty sand and sandy silt. Based on the exploration results, the granular layers, which are most likely less than two feet thick, are confined by less permeable soils which would prevent the migration of excess pore pressures and thus the movement of water and potential settlement.

Procedure: The methodology used in these analyses consists of estimating probable seismically-induced settlement in unsaturated and saturated soil deposits based on the procedures suggested by *DMG Special Publication 117* and *Tokimatsu and Seed (1987).* The method suggests that the primary factors controlling settlement due to seismic events include the following:

Appendix E

- The cyclic stress ratio;
- Maximum shear strains (saturated sands);
- Cyclic strains (dry or partially saturated sands);
- SPT $(N_1)_{60CS}$ values; and
- Earthquake magnitude

Values of $(N_1)_{60CS}$ were derived using empirical equations outlined in the *1997 NCEER Workshop Proceedings*, as described in the Liquefaction Analyses, Appendix D. The actual seismically-induced settlement analyses were based on the procedures of *DMG Special Publication 117* and *Tokimatsu and Seed (1987)*.

Parameters: The parameters utilized in the assessment of seismically-induced settlement are the same as those used in the liquefaction analysis presented in Appendix C. It should be noted that settlement for non-granular soils classified as clay, silty clay, and clayey silt were not considered in our settlement analyses.

Results: The seismically induced settlement analyses were performed to a depth of 50 feet below existing grade and were based on information from drilled Boring B-5. The computed seismically-induced settlement was 0.78-inch in the unsaturated materials and 0.95-inch in the saturated materials. The results of our analyses are shown in the following table

SUMMARY OF SEISMICALLY-INDUCED SETTLEMENT			
Boring No.	**Unsaturated Settlement Calculations (inch)**	**Saturated Settlement Calculations (inch)**	**Total Settlement (inch)**
B-5	0.78	0.95	1.72

In our opinion, the seismically-induced settlement will not pose a significant risk to site development.

N Field to N1 60 Conversion

9/12/2011 11:13 AM 6457

PROJECT INFORMATION	
Project Name:	TMC
Project No.:	6457
Date:	############

11-Sep

SITE INFORMATION AND PARAMETERS	
Based on Boring No:	b-5
Source of Blow Counts (N_{SPT} = 1 or N_{RING} = 0)	1
Groundwater Depth (feet):	45.0

LAYER No.	DEPTH TO LAYER BOTTOM (feet)	LAYER THICKNESS (feet)	IN-SITU WET DENSITY (pcf)	FINES CONTENT (%)	(degrees)	SETTLEMENT CALCULATIONS: @ LAYER MIDDLE (psf)	@ LAYER MIDDLE (psf)	@ LAYER MIDDLE (psf)	FOR (N1)60 CALCULATIONS: @ LAYER BOTTOM (tsf)	@ LAYER BOTTOM (tsf)	@ LAYER BOTTOM (tsf)	FIELD TO N60 CONVERSION: FIELD	FIELD TO N60 CONVERSION: [illegible]	FIELD	[illegible]	$N_{1(60)}$	$\Delta N_{1(60)}$	$N_{1(60)cs}$	K_σ	(psf)	STRESS REDUCTION FACTOR
1	25.0	25.0	125	[illegible]	[illegible]	1563	0	1563	1.563	0.000	1.563	28	N/A	[illegible]	0.82	8	0	8	1.00	1563	0.899
2	30.0	5.0	125	[illegible]	[illegible]	3438	0	3438	1.875	0.000	1.875	25	N/A	[illegible]	0.75	8	0	8	1.00	3438	0.873
3	35.0	5.0	125	[illegible]	[illegible]	4063	0	4063	2.188	0.000	2.188	22	N/A	[illegible]	0.69	11	0	11	1.00	4063	0.847
4	40.0	5.0	125	[illegible]	[illegible]	4688	0	4688	2.500	0.000	2.500	[illegible]	N/A	[illegible]	0.65	23	0	23	1.00	4688	0.822
5	45.0	5.0	125	[illegible]	[illegible]	5313	0	5313	2.813	0.000	2.813	25	N/A	20	0.61	21	0	21	1.00	5313	0.799
6	50.0	5.0	125	[illegible]	[illegible]	5938	0	5938	3.125	0.000	3.125	28	N/A	18	0.58	18	0	18	1.00	5938	0.777
7																					
8																					
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Notes

1. $(K_2)_{max}$: see refernce No. 021
2. G_{max}: see reference No. 021.
3. G_{eff}: from graph on reference No. 021
4. $(N_1)_{60}$: see reference No. 065
5. Cyclic Shear Strain g_{av}: see reference 021 and graph Fig. 11
6. Get e_C in % from reference 021, grapg Fig 13
7. N_{ring} to N_{spt}: see reference No. __ (SPT folder)
8. Rd see reference 065
9. Liquefaction will not occur in soils with clay content >15% or silt content >35%
10. Magnitude scaling factor for saturated sands (see Table 4, Reference 21)
11. Magnitude scaling factor for unsaturated sands (see Table 1, Reference 21)

PROJECT INFORMATION	
Project Name:	TMC
Project No.:	6457
Date:	11-Sep

SITE INFORMATION AND PARAMETERS	
Based on Boring No:	B-5
Source of Blow Counts (N_{SPT} = 1 or N_{RING} = 0)	1
Groundwater Depth (feet):	45.0

DRY SETTLEMENT CALCULATIONS

POTENTIAL FOR SEISMIC SETTLEMENT (YES/NO)	$(K_2)_{max}$	[illegible] (psf)	$\gamma_{eff}(G_{eff}/G_{max})$	[illegible] (ft)	CYCLIC SHEAR STRAIN	CYCLIC SHEAR STRAIN (%)	$(N_1)_{60}$	VOLUMETRIC STRAIN (%)	[illegible]	[illegible]	SETTLEMENT (in)
YES	40.06	1.58E+06	0.00026	0.78	0.00050	0.05000	8	0.1000	0.083	0.166	0.499
YES	38.53	2.32E+06	0.00038	1.72	0.00070	0.07000	8	0.0900	0.075	0.150	0.090
YES	44.11	2.81E+06	0.00036	2.03	0.00060	0.06000	11	0.0900	0.075	0.150	0.090
YES	57.21	3.92E+06	0.00029	2.34	0.00050	0.05000	23	0.0500	0.042	0.083	0.050
[illegible]	55.20	4.02E+06	0.00031	2.66	0.00050	0.05000	21	0.0500	0.042	0.083	0.050
NO	52.36	4.03E+06	0.00033	2.97	0.00050	N/A	18	0.0500	N/A	N/A	N/A
									TOTAL SETTLEMENT (IN)		0.779

SATURATED SETTLEMENT CALCULATIONS

POTENTIAL FOR SEISMIC SETTLEMENT (YES/NO)	$(N_1)_{60}$	SHEAR STRESS RATIO	VOLUMETRIC STRAIN (%)	VOLUMETRIC STRAIN (%)	SETTLEMENT (in)
NO	8	0.26	[illegible]	N/A	N/A
NO	8	0.26	[illegible]	N/A	N/A
NO	11	0.25	[illegible]	N/A	N/A
[illegible]	23	0.24	[illegible]	N/A	N/A
NO	21	0.23	[illegible]	N/A	N/A
YES	18	0.23	[illegible]	1.68	0.95
			TOTAL SETTLEMENT (IN)		0.95

SUMMARY OF SEISMICALLY INDUCED SETTLEMENT		
UNSATURATED IN-SITU SOILS (Above Groundwater):	0.78	Inch
SATURATED IN-SITU SOILS (Below Groundwater):	0.95	Inch
TOTAL SETTLEMENT	1.72	Inch

GSC GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

May 14, 2015
W.O. 6457

TMC PROPERTIES
P.O. Box 800970
Santa Clarita, California 91380-0970

Attention: Mr. Mark Sullivan

Subject: Addendum Report, MTD No. 1843, Parcel Map No. 062646, Santa Clarita, California

Dear Mr. Sullivan:

As requested, GeoSoils Consultants, Inc. (GSC) has prepared this addendum report to address MTD No. 1843 which consists of a box culvert.

The box culvert will extend from the subject tract, continue below Railroad Avenue, and outlet to the Santa Clara River. The site was first investigated by GSC in 2011 (see References). It is anticipated the culvert will be founded on alluvium. Laboratory testing of the on-site materials, as presented in Reference 1, indicate the on site alluvium has a friction angle of 30 degrees and a cohesion of 100 psf. As presented on Plate 1, a bearing capacity of 1442 pounds per square foot (psf) is required for the culvert.

MDN 15996

6634 Valjean Avenue Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 785-1548

Calculations for the allowable bearing capacity have been calculated assuming the water table rises in the Santa Clara River. These calculations are presented on Plate 2. As indicated, the allowable bearing capacity exceeds the required bearing capacity.

In areas where it is anticipated the water table may rise above the culvert bottom, buoyancy forces should be considered by the structural engineer.

We appreciate the opportunity to be of service. If we can be of any further assistance, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 8/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

KAREN L. MILLER
GE 2257

LANCE R. PUTNAM
CEG 2469

KLM.LRP.W:Rsp to LA County Rev dtd 11-18-11 & 9-28-11

Encl: References
Plate 1, Required Bearing Capacity
Plate 2, Bearing Capacity Calculations

cc: (2) Addressee
(2) Sikand Engineering

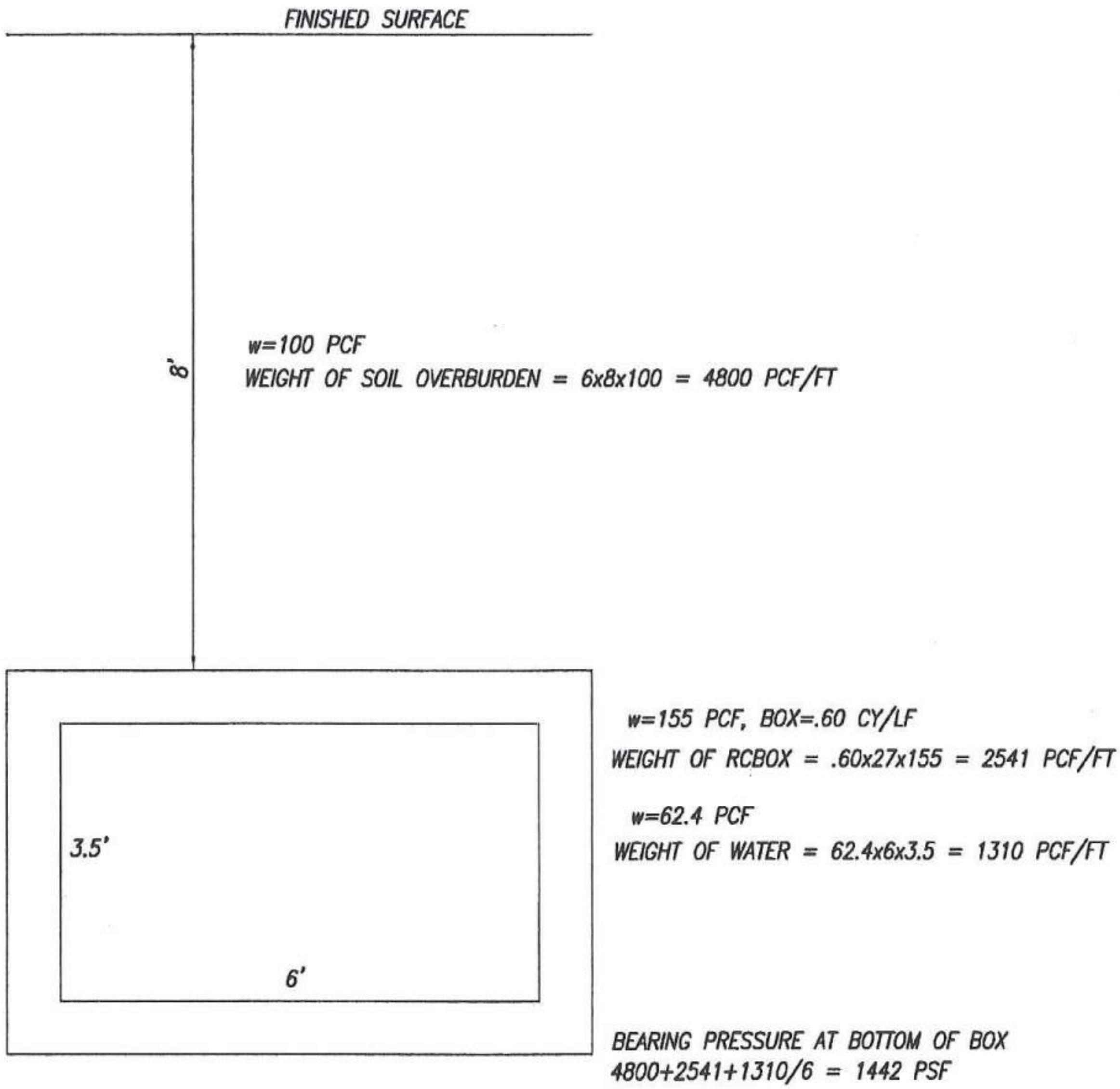
MDN 15996

REFERENCES

1. GeoSoils Consultants, Inc. dated May 23, 2012, "Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California"

2. GeoSoils Consultants, Inc. dated September 14, 2011, "Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No 1843, Santa Clarita, California"

3. GeoSoils Consultants, Inc. dated September 13, 2011 (revised February 2, 2012), "Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California"



REQUIRED BEARING CAPACITY

PLATE 1

From previous reports:

$c = 100$ psf $\Phi = 30^{o}$ $\gamma = 100$ pcf

From Navfac for a continuous foundation:

$$q_{ult} = CN_c + \gamma DN_q + \gamma B/2\ N\gamma$$

$$N_c = 30 \quad N\gamma = 18 \quad N_{\varepsilon} = 20$$

For water at the ground surface:

$$\gamma = 100 - 62.4 = 37.6 \text{ pcf}$$

$$q_{ult} = 30(100) + 37.6(3.5)20 + 37.6/2(6)18 = 3000 + 2632 + 2030 = 7662 \text{ psf}$$

$$q_{allow} = q_{ult}/3 = 7662/3 = 2554 \text{ psf} > 1442 \text{ psf}$$

GeoSoils Consultants Inc.
GEOTECHNICAL · GEOLOGIC · ENVIRONMENTAL

BEARING CAPACITY CALCULATIONS	
DATE 5/2015	W.O. NO. 6457

Geotechnical • Geologic • Environmental

PLATE 2

GSC GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

August 19, 2015
W.O. 6457
(Revised August 27, 2015)

TMC PROPERTIES, LLC
P.O. Box 800970
Santa Clarita, California 91380-0970

Subject: Proposal and Cost Estimate, Geologic and Geotechnical services for Partial Installation of MTD 1843, Parcel Map No. 062643, Tract 1801, Lots 21, 22, 28, and 29, Santa Clarita, California

As requested, GeoSoils Consultants, Inc. (GSC) has prepared a proposal and cost estimate to provide Geologic and Geotechnical services for the partial installation of MTD 1843. The portion of MTD 1843 that is proposed to constructed is located within a MTA easement. It is our understanding that the train schedule will be cancelled during this portion of MTD 1843 earthwork and construction. According to a construction schedule dated August 8, 2015, the work will be performed continually over the upcoming Labor Day weekend (September 4 to 7, 2015). This proposal is based primarily on information provided in the construction schedule. Overtime rates were applied, where required.

Our cost estimates are as follows:

ROUGH GRADING COST BREAKDOWN

1.	MTA Training	$ 1,005.00
2.	Test Pit and Soil Sampling (excavator provided by contractor)	$ 500.00
3.	Pre-Job Meeting	$ 500.00
4.	Senior Technician: (32 hrs)	$ 4,560.00
5.	Project Engineer/Geologist: (6 hrs)	$ 1,305.00

MDN 16175A

6.	Laboratory	$ 750.00
7.	Office Supervision/Dispatch	$ 125.00
8.	Mileage	$ 200.00

TOTAL .... $ 8,945.00

The estimated grand total for our services for the proposed partial installation of MTD 1843 included herein is $8,945.00. Our charges will be billed on an hourly basis in accordance with our current WAA-13 Fee Schedule.

LIMITATIONS

It should be noted that this estimate is based on specific assumptions, and the actual field time could vary due to factors such as an excess of retests due to poor performance by the contractor, change of job conditions, etc.

Communication and cooperation between the contractor, superintendent, and this office is essential for the success of this estimate. Our actual time will be billed on an hourly basis in accordance with the attached Schedule of Fees (WAA-13), and fees may be lower than or exceed the estimates presented herein.

CLOSING

We appreciate this opportunity to submit this proposal to your office. If you have any questions regarding this proposal or have any input that would result in an adjustment of the scope of work included herein, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

Lance R. Putnam

LANCE R. PUTNAM, CEG 2469
Project Geologist

PROFESSIONAL GEOLOGIST
Lance R. Putnam
No. 2469
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LRP.W/Proposals/TMC Properties (rev 8-27-15)

Encl: Work Authorization and Agreement Form (WAA-13)

cc: (1) Addressee

MDN 16175A

WORK AUTHORIZATION AND AGREEMENT
GEOTECHNICAL SERVICES

GeoSoils Consultants Inc.
GEOTECHNICAL · GEOLOGIC · ENVIRONMENTAL
6634 Valjean Avenue, Van Nuys, CA 91406 • (818) 785-2158 Fax (818) 785-1548

LRP

PROJECT INFORMATION

ESTIMATE EXPIRES: 10-27-15

PROPOSAL # ________

WORK ORDER # 6457

Identification of Services: Geologic and Geotechnical Services

Project Name: Partial Installation of MTD 1843

Project Location: Santa Clarita, California

Legal Description: Parcel Map No. 062646, Tract 1801, Lots 21, 22, 28, and 29

Assessor's Parcel # ________

Scope of Work: Please see attached GeoSoils Proposal No. ________, dated August 27, 2015

Fee Estimate: $ Hourly, estimated at $8,945.00 Retaining Fee in advance of work: $ ________

(Retainer will be applied to final invoice)

CLIENT INFORMATION

Name: TMC Properties, LLC

Attention: Lynn LaRoque Title: ________

Address: P.O. Box 800970
Santa Clarita, CA 91380-0970

Phone Number: (661) 253-0944 ext. ________ Fax Number: ( ) ________

Property Owner: ________

Invoices to be sent to: ________

SPECIAL INSTRUCTIONS

Report Distribution: Client ________ copies Other ________

Other Instructions: Email: saugusstation@gmail.com, randyw@spiritholding.com

PROPOSAL ACCEPTANCE

This proposal, including the Schedule of Fees on the reverse side of this page and the Terms and Conditions attached hereto, is:

Accepted this ________ day of, ________ 20____. Accepted this ________ day of, ________ 20____.

Signature of Authorized Agent of Client	Accepted by GeoSoils Consultants Inc.
Print or type name and title of authorized representative.	Print or type name and title of authorized representative.

GeoSoils Consultants Inc.
GEOTECHNICAL · GEOLOGIC · ENVIRONMENTAL

FEE SCHEDULE

GEOTECHNICAL SERVICES

HOURLY CHARGES FOR PROFESSIONAL PERSONNEL:

Principal Engineers/Geologists	$170.00/hr
Project Engineers/Geologists	$145.00/hr
*Staff Engineers/Geologists	$115.00/hr
*Field Engineers/Geologists	$97.00/hr
Supervisory Technicians	$95.00/hr
*Senior Field Technicians	$95.00/hr
*Deputy Grading Inspector	$100.00/hr
*Laboratory Technicians	$85.00/hr
Technical Illustrators	$80.00/hr
*Field Technicians	$85.00/hr
Office Services/Contract Administration	$52.00/hr
Expert Witness/Deposition (4 hr min)	$400.00/hr

OTHER FEES AND EXPENSES:

Word Processing	$12.00/page
Drawing Reproduction	Cost plus 15%
Report Reproduction	$0.40/page
Vehicle	$0.60/mile
Inclinometer	$30.00/hr
Seismic Timer	No Charge
Pneumatic Instrumentation	No Charge
Settlemonitor	No Charge
Nuclear Densometer	No Charge
Outside Service	Cost plus 15%

Billing will be at the above rates for actual time spent. Overtime for hourly personnel will be billed at the above rates times 1.50. Holiday work is above rates times 2.0. Minimum charge per site visit is 2 hours.
***If at any time this project is determined to be subject to Prevailing Wage, GSC has the right to recover increased costs per the Prevailing Wage guidelines. For Prevailing Wage jobs add $29.80 per hour. ***

TERMS AND CONDITIONS – GEOTECHNICAL SERVICES

SERVICES TO BE PROVIDED. GeoSoils Consultants and/or its subsidiaries, affiliates, branches, or divisions, as an independent consultant, agrees to provide Client for its sole benefit and exclusive use consulting services set forth in our Proposal.

DEFINITIONS. When used herein, the terms "GSC", "we", "us", or "our" refer to GeoSoils Consultants, its agents, staff, consultants, and contractors or subcontractors and the terms "you", "your", "he", "his", "it" and "its" refer to client and/or client's agent.

RIGHT OF ENTRY AND RIGHT TO PROCEED. Client grants the right of entry to GSC, for the purpose of performing and with the right to perform all acts, studies, and research including without limitation the making of tests and evaluations, pursuant to the agreed services. Client represents that he possesses all necessary authority, permits and licenses required for the continuation of its activities at the site.

BILLING AND PAYMENT. Unless otherwise specified, fee quotations are estimates only, GSC billings will be based on actual accrued time, test costs, and expenses. Client agrees to pay invoices upon receipt. If payment is not received within 30 days, the amount due shall accrue interest at a rate of 1½ percent per month or the maximum allowed by law, whichever is less. If Client disputes any invoice or part thereof, he shall advise GSC in writing stating reasons within 14 days of receipt of such invoice. Client agrees not to exercise any right of set-off it has under this Agreement, any continuing agreement with Consultant, or otherwise provided by law. No deduction shall be made from GSC's invoice on account of penalty, liquidated damages, or other sums withheld from payments to contractors or others. Payment of the invoice shall constitute final approval of all aspects of the work performed to date as well as the necessity thereof. If the project is terminated in whole or in part, GSC shall be paid for services performed prior to our receiving or issuing written notice of such termination, in addition to reimbursable expenses and any shut down costs incurred. Shut down costs may, at our sole discretion, include completion of analysis and records necessary to document our files and protect our professional reputation. Any and all change orders shall be deemed authorized, provided Client is orally informed and if confirmed in writing by either the client or GSC. Due to the need for rapid decisions, fax transmissions shall be deemed an acceptable mode of confirmation. Client shall be responsible for additional charges authorized or requested by Client. GSC shall be entitled to recover reasonable costs of collection, including attorney or other fees incurred.

INSURANCE. GSC maintains worker's compensation and public liability insurance policies for bodily injury and property damage. Certificates of insurance will be furnished upon request. With regard to property claims, GSC shall not be responsible for damage beyond those amounts paid under the policies. GSC shall not be responsible for any consequential, lost profits, business interruption damages claimed by Client.

DAMAGE AT SITE. GSC will not be liable for any property damage or bodily injury arising from damage to or interference with surface or subterranean structures (including, without limitation, pipes, tanks, telephone cables, etc.) which are not called to our attention in writing and correctly shown on the plans furnished by Client in connection with work performed under this Agreement. Client recognizes that the use of exploration and test equipment may unavoidably affect, alter, or damage the terrain and affect subsurface, vegetation, buildings, structures and equipment in, at, or upon the site. Client accepts the fact that this is inherent to our work and will not hold us liable or responsible for any such effect, alteration or damage.

It shall be the responsibility of the client to notify GSC of any environmentally sensitive or endangered species of plants or animals that exist onsite. In the event suit is filed against GSC for any cause other than covered by the above stated policies, the limit of GSC's liability is the fee collected for services performed hereunder. It is agreed that venue shall be laid in the Municipal Court of the County in which the work was performed.

STANDARD OF CARE AND WARRANTY. Professional services, findings and recommendations provided by GSC will be obtained and prepared in accordance with generally accepted current geologic and engineering practices. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED.

PERFORMANCE. State and local rules and regulations are subject to changing interpretations. All reports will be written by GSC so as to meet the requirements of local governmental agencies; however, it is understood that governmental agency approval is discretionary, and accordingly, GSC cannot and does not guarantee approval of its reports by these agencies. All additional work subsequent to submittal of the initial report by GSC will be in addition to our estimate and will be billed hourly.

PROFESSIONAL LIABILITY. Client acknowledges the risks and unknowns involved in construction and agrees to limit any liability, claim for damages to person or property, attorneys fees, expert fees or other costs of defense, or expenses (collectively "Claims") to be levied against GSC arising out of or relating to any design defect, error, omission, professional negligence or other promise of GSC (collectively "Liabilities") to the greater of $50,000 or the amount of GSC's fees paid under the contract. The fee charged Client for the services to be rendered pursuant to this agreement has been established with regard to the legal effect of this Limitation of Liability section.

(a) Client agrees to notify any other contractors or subcontractors who may perform work involved with or related to any design, report, or study prepared by GSC of such limitation of liability for Claims and to require a like limitation of liability on their part as against GSC. If Client fails to obtain a like limitation of liability for Claims provision, any liability of the Client and GSC to such contractor or subcontractor arising out of any Liabilities, shall be allocated so that the aggregate liability of GSC to all parties (including Client) shall not exceed the limits stated above.

(b) Client and GSC intend to allocate, release, liquidate, exclude or limit certain liability in accordance with and to the maximum extent permitted under California law.

(c) In the event any third party brings suit or claim against GSC, alleging damages as the direct or indirect result of services provided under this contract, during or after the services of this Agreement, then: Client agrees to defend GSC in any such suit or claim, and to pay all associated costs including attorney fees, expert fees, court costs and any judgements including interest thereon. Client will have the right to investigate, negotiate and settle, any such suit or claim, and we will cooperate in the defense of any such suit or claim. Selection of attorneys, experts and any settlement is subject to approval by GSC.

The CLIENT nor any of the CLIENT's contractors or subcontractors shall make any claim for professional negligence, either directly or in a third-party claim, against GEOSOILS CONSULTANTS INC., unless the CLIENT has first provided GEOSOILS CONSULTANTS INC. with a written certification, executed by an independent Geotechnical Consultant, currently practicing in the same discipline as GEOSOILS CONSULTANTS INC., who is principal of a bona fide firm, and licensed in the State of California. This certification shall: a) identify the name and license number of the certifier; b) specify each and every act or omission that the certifier contends is a violation of the standard of care expected of a Geotechnical Consultant performing professional services under similar circumstances; and c) state in complete detail the basis for the certifier's opinion that each such act or omission constitutes such a violation. This certificate shall be provided to GEOSOILS CONSULTANTS INC. not less than thirty (30) calendar days prior to the presentation of any claim or the institution of any arbitration or judicial proceeding.

UNFORESEEN OCCURRENCES. If, during the performance of services, any unforeseen hazardous substances or constituents or other unforeseen conditions or occurrences are encountered which, in our sole judgement significantly affect or may affect the services, the risk involved in providing the services, or the recommended scope of services, we will promptly notify Client thereof. Subsequent to that notification, GSC may:

(a) If practicable, complete the original Scope of Services in accordance with the procedures originally intended in the Proposal;
(b) Modify the Scope of Services and the estimate of fees to include study of the encountered conditions or occurrences, such revisions are to be in writing and signed by the parties and incorporated herein; or
(c) Terminate the services effective on the date specified by us in writing.

SAMPLING AND TESTING LOCATION. The fee estimate in our Proposal does not include costs of surveying the site and/or facility to determine accurate horizontal and vertical locations of tests. If surveying is required, surveying costs will be paid by Client. Field tests or boring locations described in our report or shown on sketches are based on specific information furnished by others or estimates made in the field by our personnel. Such dimensions, depths or elevations are approximations and should not be considered to reflect any specific level of accuracy.

SAMPLE HANDLING AND RETENTION. Generally, test samples or specimens (collectively samples) are consumed or substantially altered during conduct of test and GSC, at our sole discretion, will dispose (subject to the following) of any remaining residue immediately upon completion of tests.

A. NON-HAZARDOUS SAMPLES. At Client's written request, we will maintain preservable samples or the residue therefrom for 30 days after submission of our report free of storage charges. After 30 days and upon written request, we will retain samples for a mutually acceptable storage charge and period of time. Client agrees not to hold GSC responsible or liable for any loss of samples retained in storage.

B. HAZARDOUS OR POTENTIALLY HAZARDOUS SAMPLES. In the event that samples contain substances or constituents hazardous or detrimental to health, safety, or the environment as defined by federal, state or local statutes, regulations, or ordinances, GSC will, after completion of testing and at Client's expense, (i) return such samples to Client, or (ii) using a manifest signed by Client as generator, have such samples transportee(to a location selected by Client for final disposal. Client agrees to pay all costs associated with the storage, transport, and disposal of samples. Client recognizes and agrees that GSC is acting as a bailee and at no time assumes title to said waste.

HAZARDOUS SUBSTANCES AND CONSTITUENTS. Client agrees to advise GSC upon execution of this Agreement of any hazardous substances or any condition existing in, on, or near the site presenting a potential danger to human health, the environment, or equipment. Client agrees to provide any and all additional information as it comes available to Client in the future. By virtue of entering into this Agreement or of providing services hereunder, GSC does not assume control of, or responsibility for the site or the person in charge of the site, or undertake responsibility for reporting to any federal, state or local public agencies any conditions at the site that may present a potential danger to public health, safety or the environment. Client agrees to notify the appropriate federal, state or local public agencies as required by law, or otherwise to disclose, in a timely manner, any information that may be necessary to prevent any danger to health, safety, or the environment. In connection with hazardous waste, Client agrees to the maximum extent permitted by law to defend, hold harmless and indemnify Consultant from and against any and all claims and liabilities resulting from:

(a) Client's violation of any federal, state or local statute, regulation or ordinance relating to the disposal of hazardous substances or constituents;
(b) Client's undertaking of or arrangement for the handling, removal, treatment, storage, transportation or disposal of hazardous substances or constituents found or identified at the site;
(c) Changed conditions or hazardous substances or constituents introduced at the site by Client or third persons before or after the completion of services herein;
(d) Allegations that Consultant is a handler, generator, operator, treater, storer, transporter, or disposer under the Resource Conservation and Recovery Act of 1976 as amended or any other similar Federal, state or local regulation or law.

CONTAMINATED EQUIPMENT. All laboratory and field equipment contaminated in performing our services and which cannot be reasonably decontaminated shall become the property and responsibility of Client. All such equipment shall be delivered to client or disposed of in a manner similar to that indicated for hazardous samples. Client agrees to pay the fair market value of any such equipment which cannot reasonably be decontaminated.

DISPUTES. Any and all disputes arising out of the interpretation, performance or breach of this Agreement, at the request of either party, shall be submitted to binding arbitration before a single arbitrator administered by the American Arbitration Association in accordance with its commercial arbitration rules then in effect. The arbitrator shall apply California substantive law to the proceeding, and shall have the power to grant all legal and equitable remedies and award compensatory damages provided by California law, except for the power to award punitive damages. The parties shall be permitted to conduct discovery in accordance with the California Code of Civil Procedure. The arbitrator shall prepare in writing and provide to the parties an award including factual findings and the reasons on which the decision is based. The arbitrator shall not have the power to commit errors of law or legal reasoning, and the award may be vacated or corrected pursuant to California Code of Civil Procedure, Sections 1286.2 or 1286.6 for any such error. Except as provided in the preceding sentence, the award of the arbitrator shall be final and may be submitted to any court having jurisdiction for the purpose of confirmation and enforcement. As additional damages, the court, or the arbitrator, as the case may be, shall have the discretion to award costs and attorneys fees to the prevailing party.

DOCUMENTS. Client will furnish or cause to be furnished such reports, data, studies, plans, specifications, documents and other information deemed necessary by us for proper performance of our services. We may rely upon Client-provided documents in performing the services required under this Agreement: however, we assume no responsibility or liability for their accuracy. Client-provided documents will remain property of Client. All documents, including but not limited to, drawings, specifications, reports, boring logs, field notes, laboratory test data, calculations and estimates prepared by us as instruments of service pursuant to this Agreement, shall be our sole property. Client agrees that all documents of any nature furnished to Client or Client's agents or designees, if not paid for, will be returned upon demand and will not be used by Client for any purpose whatsoever. Client further agrees that under no circumstances shall any documents produced by us pursuant to this Agreement be used at any location or for any project not expressly provided for in this Agreement without our prior written permission. If Client uses all or any portion of our work on another project without our permission, Client shall to the maximum extent permitted by law save us harmless from any and all claims arising from such unauthorized reuse. Further, no part of any document we deliver to Client shall be reproduced or distributed, whether for advertising or any other purpose, without our prior written consent. Any such reproduction or distribution shall be at Client's sole risk and without liability or legal exposure to Consultant.

FIELD REPRESENTATIVE. The presence of GSC field personnel either full- or part-time will be for the purpose of providing observation and field testing of specific aspects of the project. Should a contractor be involved in the project, our work does not include supervision or direction of the actual work of the contractor, his employees or agents. The contractor should be so advised. The contractor should also be informed that neither the presence of our field representative nor observation and testing by us shall excuse contractor in any way for defects discovered in contractor's work. It is agreed that GSC will not be responsible for job or site safety and that we do not have the right to stop the contractor's work.

MISCELLANEOUS.

A. SEVERABILITY. In the event that any portions of this Agreement are held to be unenforceable or invalid by any court, the remaining portions, shall not be affected and shall be curtailed by the court, but only to the extent required for their validity under any law which may be applicable. As curtailed, the remaining provisions shall be enforceable.
B. SURVIVAL. All obligations arising prior to the termination of this Agreement and all provisions of this Agreement allocating responsibility or liability between Client and Consultant shall survive the completion of the services and the termination of this Agreement.
C. INTEGRATION. This Agreement and the documents attached hereto and which are incorporated herein constitute the entire Agreement between the parties and cannot be changed except by a written instrument signed by both parties.
D. GOVERNING LAW. This Agreement shall be governed in all respects by the laws of the State of California.

NOTICE:
Under the Mechanics' Lien Law (Calif. Code of Civil Procedure, Sec. 1181 et seq.) any contractor, subcontractor, laborer, supplier or other person who helps to improve your property but is not paid for his work or supplies, has a right to enforce a claim against your property. This means that after a court hearing, your property could be sold by a court officer and the proceeds of the sale used to satisfy the indebtedness. This can happen even if you have paid your contractor in full, if the subcontractor, laborer, or supplier remains unpaid.

PAYMENT SCHEDULE. CLIENT recognizes that prompt payment of CONSULTANT's invoices is an essential aspect of the overall consideration CONSULTANT requires for providing service to CLIENT. CLIENT agrees to pay all charges not in dispute within 30 days of receipt of CONSULTANT's invoice. CLIENT agrees that CONSULTANT has the right to suspend or terminate service if undisputed charges are not paid within 45 days of receipt of CONSULTANT's invoice, and CLIENT agrees to waive any claim against CONSULTANT, and to indemnify, defend, and hold CONSULTANT harmless from and against any claims arising from CONSULTANT's suspension or termination due to CLIENT's failure to provide timely payment. Any charges held to be in dispute shall be called to CONSULTANT's attention within ten days of receipt of CONSULTANT's invoice, **and CLIENT and CONSULTANT shall work together in good faith to resolve their differences. If CLIENT and CONSULTANT shall be unable to resolve their differences within 25 days, CONSULTANT shall have the right to suspend or terminate service.**

GSC GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

September 10, 2015
W.O. 6457

TMC
21070 Centre Pointe Parkway
Santa Clarita, California 91350

Attention: Mr. Randy Wrage

Subject: Storm Drain Backfill Compaction Report, Parcel Map #062646 M.T.D. #1843, Santa Clarita, California

INTRODUCTION

Submitted herein are the results of the storm drain trench backfill for Parcel Map 062646 for the partial installation of M.T.D. # 1843. The work was performed over the Labor Day weekend.

Field density test results are presented in Table I. The approximate locations of these tests consisted of the MTD section indicated on the approved plans beginning at Station 2+47.23 to 3+47.23. This area is located under the rail easement and the test locations are shown on the enclosed Compaction Map indicated on Plate 1. All bottoms were established in competent alluvium and approved by our registered geologist before backfill was placed.

The following ASTM Standards were used:

Laboratory Standards for Maximum Density	ASTM D-1557-12	
Field Density Test Method	ASTM D-1556-15	Sand Cone
	ASTM D-6938-15	Nuclear Densometer

MDN 16217

6634 Valjean Avenue Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 785-1548

The relationship between maximum dry density and optimum moisture content for the soil types used in the project were determined in the laboratory and the results are listed, as follows.

LABORATORY TEST DATA			
Soil Type	Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
A	Brown, fine, sandy SILT - SM	106.0	14.5
B	Crushed Aggregate Base -CAB	134.5	8.5

The subject trenches were backfilled utilizing on-site native material which were placed in lifts and mechanically compacted to a minimum of 90 percent relative compaction using a rubber tire skip loader and an excavator with a sheepsfoot attachment. The upper 6-inch section of subgrade and 6-inch base section below the ballast material and rails were compacted to a minimum of 95 percent relative compaction. Moisture conditioning was accomplished with a water truck. Field density tests were performed in the trench backfill to verify the compaction during the fill process. Field density tests were taken every two feet or 500 cubic yards of material placed.

"111" STATEMENT

It is our opinion that the proposed site development will be safe from the hazards of landslide, settlement, or slippage and will not adversely affect the stability of property outside of the subject development.

REGULATORY COMPLIANCE

Placement of fills and/or processing of materials under the purview of this report have been completed under the observation of, and with selective testing by, GeoSoils Consultants, Inc., and are found to be in compliance with the grading specifications of the MTA, the City of Santa Clarita and the County of Los Angeles. Our findings were made and recommendations prepared in conformance with generally accepted professional engineering practices, and no further warranty is implied or made.

We appreciate the opportunity to be of service. If you should have any questions regarding this report, or if we may be of further service to you, please do not hesitate to contact us.

Very truly yours,
GEOSOILS CONSULTANTS, INC.

KAREN L. MILLER
GE 2257

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

KLM.W.Storm Drain BF Comp Rpt

Encl: Engineer's Certificate of Compliance
Table I, Field Density Test Results
Plate 1, Compaction Map

cc: (3) Addressee

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY/LAND DEVELOPMENT DIVISION

ENGINEER GRADING

CONSULTANT STATEMENT

(To be filed at the local Office of Building and Safety prior to Rough and Final Inspection)

Job Address Or Tract No. PM 062646, MTD 1843 Locality Santa Clarita Permit No. ____________

Owner TMC Contractor ______________________________

☐ **ROUGH GRADING**

☐ **BY FIELD ENGINEER**

Based upon field observations, rough grading of the lots listed below has been completed in conformance with Section 7021 of the County of Los Angeles Building Code. The work includes, but is not limited to, the following: grading to approximate final elevations; staking of property lines; location and gradient of cut and fill slopes; location, cross-section, configuration and grade of required drainage devices.

Latest approved plan revision dated ______________________________

Lot No(s) ______________________________

Other Areas ______________________________

Remarks ______________________________

Engineer ____________________ Reg. No. ______________ Date: __________
(Signature)

☐ **BY SOIL ENGINEER**

Based upon tests and observations, the earth fills placed on the following lots were installed upon properly base material and compacted in compliance with requirements of Section 7021 of the County of Los Angeles Building Code. Fill slope surfaces have been compacted and buttress fills or similar stabilization measures have been installed in accordance with my recommendations as approved by the Building Official. Subdrains have been provided where required, and locations of said subdrains are shown on as-graded plans and/or rough grade reports dated __________

See field testing report dated 9-10-15 for compaction test data

Lot No(s): ______________________________

EXPANSIVE SOILS	(Yes)	(No)	Lot No(s) __________
BUTTRESS FILLS	(Yes)	(No)	Lot No(s) __________
REINFORCED EARTH WALLS	(Yes)	(No)	Lot No(s) __________
RESTRICTED USE AREAS	(Yes)	(No)	Lot No(s) __________

Remarks: ______________________________

Engineer [signature] Reg. No. GE 2257 Date: 9-10-15
(Signature)
KAREN L. MILLER

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

Tract ________________ W.O. 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Elevation (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
9/5/2015	1	Storm Drain	1174.0	14.9	98.4	93	SC	A
9/5/2015	2	Storm Drain	1176.0	15.3	99.7	94	N	A
9/5/2015	3	Storm Drain	1174.0	15.0	99.9	93	N	A
9/5/2015	4	Storm Drain	1176.0	14.6	97.9	92	N	A
9/5/2015	5	Storm Drain	1175.5	14.9	98.5	93	SC	A
9/5/2015	6	Storm Drain	1177.0	15.0	99.9	94	N	A
9/5/2015	7	Storm Drain	1179.0	14.7	97.1	92	N	A
9/5/2015	8	Storm Drain	1181.0	14.4	96.3	91	N	A
9/5/2015	9	Storm Drain	1178.0	14.8	99.9	94	N	A
9/5/2015	10	Storm Drain	1180.0	15.1	100.7	95	SC	A
9/5/2015	11	Storm Drain	1178.0	15.4	98.4	93	N	A
9/5/2015	12	Storm Drain	1178.0	15.7	99.6	94	N	A
9/6/2015	13	Storm Drain	1185.0	14.6	99.3	93	N	A
9/6/2015	14	Storm Drain	1180.0	14.4	99.9	94	SC	A
9/6/2015	15	Storm Drain	1182.0	14.5	100.9	95	SC	A
9/6/2015	16	Storm Drain	1180.0	14.6	97.3	92	N	A
9/6/2015	17	Storm Drain	1182.0	14.5	95.9	90	N	A
9/6/2015	18	Storm Drain	1183.5	14.9	101.5	96	N	A
9/6/2015	19	Storm Drain	1183.5	14.7	101.1	95	N	A
9/6/2015	20	Storm Drain	1178.0	14.4	96.4	91	N	A
9/6/2015	21	Storm Drain	1179.5	14.3	95.9	90	SC	A
9/6/2015	22	Storm Drain	1181.5	14.2	96.1	91	N	A
9/6/2015	23	Storm Drain	1183.5	14.7	101.9	96	N	A
9/6/2015	24	Storm Drain	1185.0	16.5	102.4	95	N	A

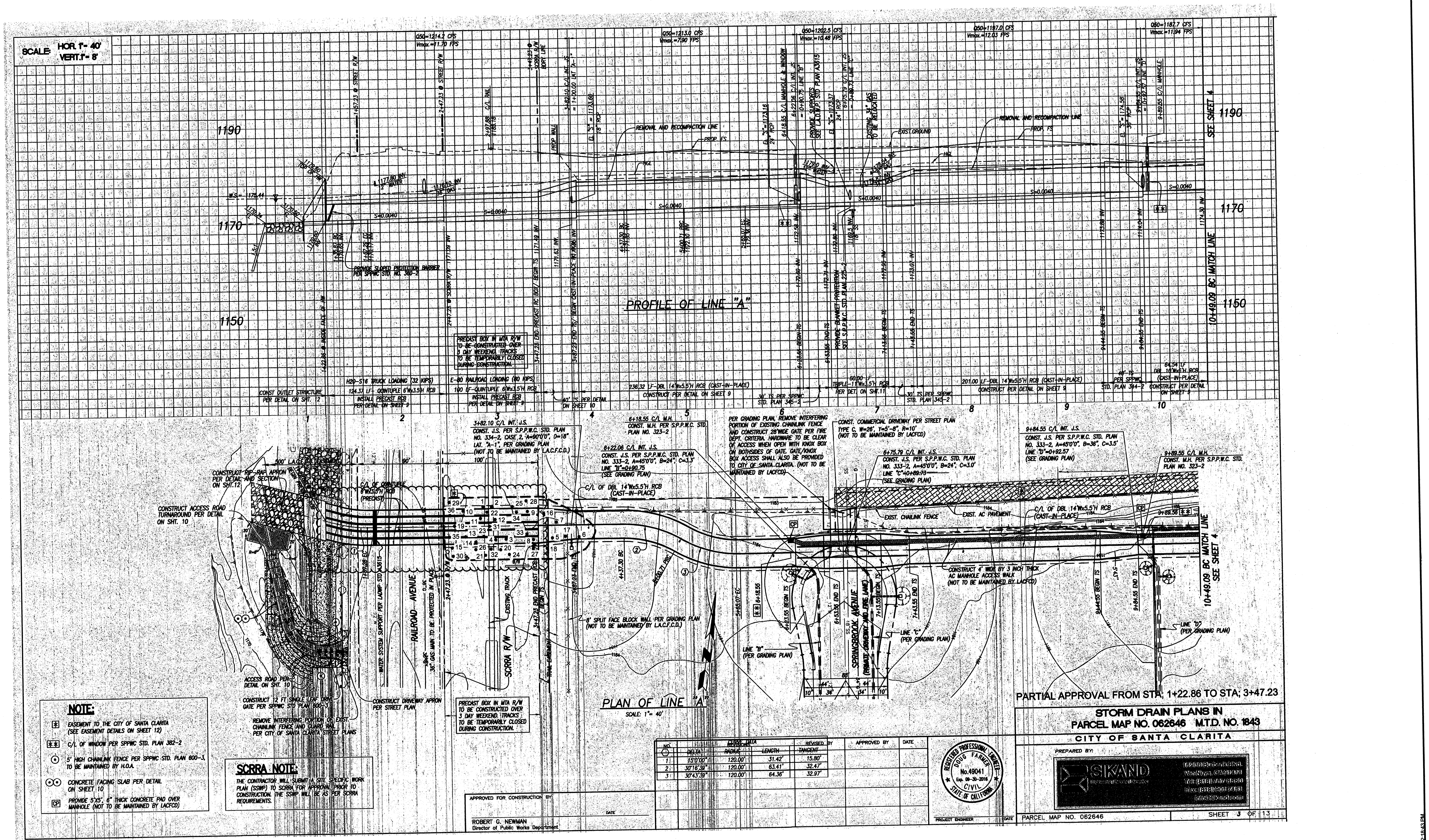
SC - indicates sand cone test
FG - indicates finished grade
N - indicates nuclear densometer test
SG - indicates subgrade
A-1 - indicates a retest of a failing test

Tract ______________ W.O. 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Elevation (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
9/5/2015	25	Storm Drain	1185.0	16.4	101.0	95	N	A
9/5/2015	26	Storm Drain	1185.0	16.6	101.8	96	N	A
9/5/2015	27	Storm Drain	1185.0	16.5	102.0	96	N	A
9/5/2015	28	Storm Drain	1185.0	16.6	102.6	97	SC	A
9/5/2015	29	Storm Drain	1185.0	16.3	102.4	97	N	A
9/5/2015	30	Storm Drain	1185.0	15.9	101.9	96	N	A
9/5/2015	31	Storm Drain	1185.18	9.9	128.8	96	N	B
9/5/2015	32	Storm Drain	1185.18	10.3	130.2	97	N	B
9/5/2015	33	Storm Drain	1185.0	16.1	101.8	96	SC	A
9/5/2015	34	Storm Drain	1185.0	16.4	102.6	97	N	A
9/5/2015	35	Storm Drain	1185.0	15.9	101.9	96	N	A
9/5/2015	36	Storm Drain	1185.0	16.3	102.1	96	N	A

SC - indicates sand cone test
FG - indicates finished grade
N - indicates nuclear densometer test
SG - indicates subgrade
A-1 - indicates a retest of a failing test



EXPLANATION

36● APPROXIMATE LOCATION OF FIELD DENSITY TEST

APPROXIMATE LIMITS OF COMPACTED FILL INCLUDED IN THIS REPORT

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

STORM DRAIN COMPACTION MAP
PARCEL MAP NO 062646, MTD NO 1843
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2015	1" = 40'
REVISED	PLATE 1	

GSC GeoSoils Consultants Inc.
GEOTECHNICAL · GEOLOGIC · ENVIRONMENTAL

December 15, 2015
W.O. 6457

TMC
21070 Centre Pointe Parkway
Santa Clarita, California 91350

Attention: Mr. Randy Wrage

Subject: Update Geologic and Geotechnical Engineering Report, Parcel Map No. 062646, Santa Clarita, California

INTRODUCTION

At your request, GeoSoils Consultants, Inc. (GSC) has prepared this update report on the subject property. This update report is a follow up to GSC's report dated September 13, 2011, revised February 2, 2012 (references). This report was submitted to the City of Santa Clarita, and approved in a Development Services Division Letter dated July 10, 2012. A copy of the approval letter is enclosed with this report.

The geologic conditions on site remain unchanged from conditions noted in the approved report. The development plan has not changed from the plan included in the approved report and recommendations contained in the referenced reports remain applicable.

MDN 16432

6634 Valjean Avenue Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 785-1548

We appreciate this opportunity to be of service to you. If you have any questions, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

PROFESSIONAL GEOLOGIST
Lance R. Putnam
No. 2469
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LANCE R. PUTNAM
CEG 2469

KAREN L. MILLER
GE 2257

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/16
GEOTECHNICAL
STATE OF CALIFORNIA

LRP.KLM.W/Update G&G Eng Rpt

Encl: References
City of Santa Clarita Approval Letter dated July 10, 2012

cc: (3) Addressee

MDN 16432

REFERENCES

1. GeoSoils Consultants, Inc. dated September 10, 2015, "Storm Drain Backfill Compaction Report, Parcel Map #062646, M.T.D. #1843, Santa Clarita, California"

2. GeoSoils Consultants, Inc. dated May 23, 2012, "Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California"

3. GeoSoils Consultants, Inc. dated September 14, 2011, "Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No 1843, Santa Clarita, California"

4. GeoSoils Consultants, Inc. dated September 13, 2011 (revised February 2, 2012), "Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California"

CITY OF SANTA CLARITA

DEVELOPMENT SERVICES DIVISION
23920 Valencia Boulevard, Suite 302
Santa Clarita, California 91355
(661) 255-4942
(661) 254-3538 FAX

Geotechnical Review Sheet

Review No. 2

City Case #: SOL11-00007 & GRA11-00005
Location: Oak Ridge Drive and Springbrook
Tract/PM No.: PM 62646
Owner/Developer: TMC Hollis
Geotechnical Engineer: GeoSoils Consultants Inc
Engineering Geologist: Lance Putnam/Karen Miller
Design Engineer/Architect: Sikand

Review of:

- Geologic and Geotechnical Engineering Study, Parcel (Map)No 062646, Santa Clarita, California

Action: Report is **accepted** as submitted subject to the following conditions.

CONDITIONS

A. SUBMIT A FINAL COMPACTION REPORT TO DEVELOPMENT SERVICES FOR VERIFICATION THAT THE COMPLETED WORK COMPLIES WITH CITY CODES AND POLICIES
B. THE ROUGH AND FINAL GRADING CERTIFICATION FORMS MUST BE COMPLETED BY THE SOILS ENGINEER AND THE PROJECT CIVIL ENGINEER AND BE SUBMITTED TO DEVELOPMENT SERVICES PRIOR TO GRADING APRPOVAL

COMMENTS

A. FOUNDATION SLAB IS RECOMMENDED TO BE POST TENSIONED.
B. SOILS ARE OF LOW EXPANSIVITY
C. SOILS ARE MILDLY CORROSIVE – NO SPECIAL REQUIREMENTS
D. SULPHATES ARE NEGLIGIBLE - NO SPECIAL REQUIREMENTS

Should you have any questions, please feel free to contact me at (661) 255-4375.

Prepared by: Gabrielle Koontz Dated: 7/10/12

S:\PW\DS\PROJECTS\ENG11-00005\SOL11-00007\Transmittal 1st review

February 8, 2018
W.O. 6457

TMC
21070 Centre Pointe Parkway
Santa Clarita, California 91350

Attention: Mr. Randy Wrage

Subject: Storm Drain Backfill and Access Road Compaction Report, Parcel Map 62646, M.T.D. 1843, Santa Clarita, California

INTRODUCTION

Submitted herein are the results of the storm drain trench backfill, access road, and base and asphalt testing within Railroad Avenue for Parcel Map 62646. This work was for the partial installation of M.T.D. 1843. The work was performed over approximately four months from September to December of 2017. Technicians observed excavations of Railroad Avenue to approximately 15 feet below existing grade, exposing competent alluvial material suitable for the precast stormdrain installation. Bottoms were scarified, pre-moistened, and compacted. All fill was compacted to a minimum relative compaction of 90 percent. All asphalt and base was compacted to a minimum relative compaction of 95 percent.

Excavations were also performed for an access road and associated rip-rap apron and cut-off wall adjacent the southbound lanes of Railroad Avenue. A five-foot over excavation was performed; bottoms were scarified, pre-moistened, and compacted to a minimum of 90 percent prior to placement of backfill.

Field density test results are presented in Table I. The approximate locations of these tests are shown on the enclosed Compaction Map indicated on Plate 1. All bottoms were

6634 Valjean Avenue, Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 785-1548

established in competent material and approved by our registered geologist before backfill was placed.

The following ASTM Standards were used:

Laboratory Standards for Maximum Density	ASTM D-1557-12	
Field Density Test Method	ASTM D-1556-15	Sand Cone
	ASTM-D-6938-15	Nuclear Densometer

The relationship between maximum dry density and optimum moisture content for the soil types used in the project were determined in the laboratory and the results are listed, as follows.

LABORATORY TEST DATA

Soil Type	Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
A	Brown, fine, sandy SILT	106.0	14.5
B	Brown, slightly clayey, sandy SILT	127.0	10.5
C	Light brown, sandy SILT	120.0	12.5
D	Gray brown, silty SAND with rock	132.5	11.5
E	Base	139.0	14.0
F	AC	153.0	-----

The subject trench and access road were backfilled utilizing on-site native materials which were placed in lifts and mechanically compacted to a minimum of 90 percent relative compaction. The compaction was achieved using a rubber tire skip loader, backhoe with compaction wheel, smooth drum vibratory compactor, and an excavator with a sheepsfoot attachment. The base and asphalt section were compacted to a minimum of 95 percent relative compaction. Moisture conditioning was accomplished with a water truck. Field density tests were performed in the backfill to verify the compaction during the fill process. Field density tests were taken at least every two feet or 500 cubic yards of material placed.

"111" STATEMENT

It is our opinion that the proposed site development will be safe from the hazards of landslide, settlement, or slippage and will not adversely affect the stability of property outside of the subject development.

REGULATORY COMPLIANCE

Placement of fills and/or processing of materials under the purview of this report have been completed under the observation of, and with selective testing by, GeoSoils Consultants, Inc., and are found to be in compliance with the grading specifications of the MTA, the City of Santa Clarita and the County of Los Angeles. Our findings were made and recommendations prepared in conformance with generally accepted professional engineering practices, and no further warranty is implied or made.

We appreciate the opportunity to be of service. If you should have any questions regarding this report, or if we may be of further service to you, please do not hesitate to contact us.

Very truly yours,
GEOSOILS CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/18
GEOTECHNICAL
STATE OF CALIFORNIA

KAREN L. MILLER
GE 2257

JONATHAN GURUNATHAN
Staff Engineer

KLM.JG.W:Stormdrain BF Comp Rpt

Encl: Engineer's Certificate of Compliance
Table 1, Field Density Test Results
Plate 1, Compaction Map

cc: (3) Addressee

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY/LAND DEVELOPMENT DIVISION

ENGINEER GRADING

CONSULTANT STATEMENT

(To be filed at the local Office of Building and Safety prior to Rough and Final Inspection)

Job Address
Or Tract No. Parcel Map 062646, MTD 1843 Locality Santa Clarita Permit No. ____________

Owner TMC ____________ Contractor ________________________________

☐ **ROUGH GRADING**

☐ **BY FIELD ENGINEER**

Based upon field observations, rough grading of the lots listed below has been completed in conformance with Section 7021 of the County of Los Angeles Building Code. The work includes, but is not limited to, the following: grading to approximate final elevations; staking of property lines; location and gradient of cut and fill slopes; location, cross-section, configuration and grade of required drainage devices.

Latest approved plan revision dated ________________________________

Lot No(s) ________________________________

Other Areas ________________________________

Remarks ________________________________

Engineer ____________ (Signature) Reg. No. ____________ Date: ____________

☐ **BY SOIL ENGINEER**

Based upon tests and observations, the earth fills placed on the following lots were installed upon properly base material and compacted in compliance with requirements of Section 7021 of the County of Los Angeles Building Code. Fill slope surfaces have been compacted and buttress fills or similar stabilization measures have been installed in accordance with my recommendations as approved by the Building Official. Subdrains have been provided where required, and locations of said subdrains are shown on as-graded plans and/or rough grade reports dated ____________

See field testing report dated 2-8-18 for compaction test data

Lot No(s): ________________________________

EXPANSIVE SOILS	(Yes)	(No)	Lot No(s) N/A.
BUTTRESS FILLS	(Yes)	(No)	Lot No(s) N/A
REINFORCED EARTH WALLS	(Yes)	(No)	Lot No(s) N/A
RESTRICTED USE AREAS	(Yes)	(No)	Lot No(s) N/A

Remarks: ________________________________

Engineer [signature] (Signature) KAREN L. MILLER Reg. No. GE2257 Date: 2-8-18

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER GE 3/31/18 GEOTECHNICAL STATE OF CALIFORNIA

MDN 19709

TRACT ______________ **W.O** 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
09/09/17	1	RAILROAD AVE NB LANES SD BOTTOM 2+67 OX	-15’	14.7	98.6	93	NUKE	A
09/09/17	2	RAILROAD AVENUE NB LANES SD BOTTOM OX	-15’	14.5	97.5	92	NUKE	A
09/09/17	3	RAILROAD AVENUE N/B LANES SD BOTTOM OX	-15’	14.9	99.2	94	NUKE	A
09/12/17	4	SD BOTTOM OX	-15’	10.8	114.6	90	NUKE	B
09/12/17	5	SD BOTTOM OX	-15’	10.6	113.9	90	NUKE	B
09/12/17	6	SD BOTTOM OX	-15’	11.1	115.2	91	NUKE	B
09/13/17	7	SD BOTTOM OX	-15’	11.5	115.5	91	NUKE	B
09/13/17	8	SD NB RAILROAD AVE	-15’	11.7	116.0	91	NUKE	B
09/13/17	9	SD BOTTOM OX	-15’	11.2	116.8	92	NUKE	B
09/14/17	10	NB RAILROAD SD BOTTOM OX	-15’	14.2	110.2	92	NUKE	C
09/14/17	11	NB RAILROAD SD BOTTOM OX	-15’	12.1	114.6	90	NUKE	B
09/14/17	12	NB RAILROAD SD BOTTOM OX	-15’	13.3	108.9	91	NUKE	C
09/18/17	13	NE SIDE GAS LINE	-12	16.9	108.7	91	NUKE	C
09/18/17	14	SE SIDE GAS LINE	-10	15.4	110.3	92	NUKE	C
09/18/17	15	RUNNING E OF GAS LINE	-8	15.0	109.6	91	NUKE	C
09/18/17	16	E OF GAS LINE	-6	13.7	111.7	93	NUKE	C
09/18/17	17	E OF GAS LINE	-4	13.4	115.3	96	NUKE	C
09/18/17	18	SW SIDE BY GAS LINE	-2	14.8	110.7	92	NUKE	C
09/18/17	19	NW SIDE BY GAS LINE	FS	13.5	112.3	94	NUKE	C
09/19/17	20	E OF SLURRIED GAS LINE	-13	12.3	115.6	91	NUKE	B
09/19/17	21	E OF SLURRIED PIPE	-11	10.8	116.1	91	NUKE	B
09/19/17	22	W OF SLURRIED PIPE	-9	13.4	114.8	91	NUKE	B
09/19/17	23	W OF SLURRIED PIPE	-7	11.0	117.3	92	NUKE	B

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT ______________ W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
09/19/17	24	W OF SLURRIED PIPE	-5	12.7	115.1	91	NUKE	B
09/19/17	25	W OF SLURRIED PIPE	-3	11.3	121.2	95	NUKE	B
09/19/17	26	E OF SLURRIED PIPE	-1	11.6	120.7	95	NUKE	B
09/21/17	27	CLASS BASE 1ST LIFT – 6”	1ST 6” OF BASE	14.8	132.6	95	NUKE	E
09/21/17	28	CLASS BASE 1ST LIFT – 6”	1ST 6” OF BASE	14.5	132.9	96	NUKE	E
09/21/17	29	CLASS BASE 1ST LIFT – 6”	1ST 6” OF BASE	15.0	133.2	96	NUKE	E
09/21/17	30	CLASS BASE 2ND LIFT – 6”	2ND 6” OF BASE	14.8	133.7	96	NUKE	E
09/21/17	31	CLASS BASE 2ND LIFT – 6”	2ND 6” OF BASE	14.5	133.1	96	NUKE	E
09/21/17	32	CLASS BASE 2ND LIFT – 6”	2ND 6” OF BASE	14.6	132.6	95	NUKE	E
09/21/17	33	CLASS BASE 3RD LIFT – 6”	3RD 6” OF BASE	15.1	133.8	96	NUKE	E
09/21/17	34	CLASS BASE 3RD LIFT – 6”	3RD 6” OF BASE	14.7	133.4	96	NUKE	E
09/21/17	35	CLASS BASE 3RD LIFT – 6”	3RD 6” OF BASE	14.8	132.7	95	NUKE	E
09/21/17	36	CURB & GUTTER NE SIDE	SG	12.5	119.2	94	NUKE	B
09/21/17	37	CURB & GUTTER E OF STREET	SG	12.0	118.7	93	NUKE	B
09/21/17	38	CURB & GUTTER NE OF SIDE	SG	12.6	117.2	92	NUKE	B
09/25/17	39	NORTH BOUND LANES SD	AC	N/A	147.2	96	NUKE	F
09/25/17	40	NORTH BOUND LANES SD	AC	N/A	146.5	96	NUKE	F
09/25/17	41	NORTH BOUND LANES SD	AC	N/A	145.7	95	NUKE	F
09/25/17	42	NORTH BOUND LANES SD	AC	N/A	146.8	96	NUKE	F
09/25/17	43	NORTH BOUND LANES SD	AC	N/A	146.1	95	NUKE	F
TESTS 44 TO 48 NOT USED.								
09/30/17	49	RAILROAD AVENUE MEDIAN AREA	-15’	13.4	110.4	92	NUKE	C

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TRACT ______________ **W.O 6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
09/30/17	50	RAILROAD AVENUE SOUTH BOUND LANES BOTTOM OX	-15’	13.2	109.2	91	NUKE	C
09/30/17	51	RAILROAD AVENUE SOUTH BOUND LANES BOTTOM OX	-15’	13.3	109.5	91	NUKE	C
09/30/17	52	RAILROAD AVENUE SOUTH BOUND LANES BOTTOM OX	-15’	13.2	108.8	91	NUKE	C
09/30/17	53	RAILROAD AVENUE SOUTH BOUND LANES BOTTOM OX	-15’	12.9	107.9	90	NUKE	C
10/01/17	54	SOUTH BOUND BOTTOM OX	-15’	12.9	108.2	90	NUKE	C
10/01/17	55	SOUTH BOUND BOTTOM OX	-15’	13.0	109.7	91	NUKE	C
10/01/17	56	SOUTH BOUND BOTTOM OX	-15’	13.2	110.5	92	NUKE	C
10/01/17	57	BOTTOM OX SOUTH BOUND LANES INTO SLOPE AREA OF WASH	-15’	12.0	110.9	92	NUKE	C
10/01/17	58	BOTTOM OX SOUTH BOUND LANES INTO SLOPE AREA OF WASH	-15’	10.2	106.1	88	NUKE	C
10/01/17	58A	BOTTOM OX SOUTH BOUND LANES INTO SLOPE AREA OF WASH	RETEST	12.9	108.0	90	NUKE	C
10/01/17	59	BOTTOM OX SOUTH BOUND LANES INTO SLOPE AREA OF WASH	-15’	12.1	110.2	92	NUKE	C
10/01/17	60	BOTTOM OX SOUTH BOUND LANES INTO SLOPE AREA OF WASH	-15’	12.4	111.4	93	NUKE	C
10/04/17	61	CENTER MEDIAN	-7’	12.4	116.3	92	SC	B
10/04/17	62	SOUTH BOUND LANES & ADJACENT AREAS	-7’	13.1	114.2	95	NUKE	C
10/04/17	63	SOUTH BOUND LANES & ADJACENT AREAS	-7’	14.6	115.9	97	NUKE	C
10/04/17	64	SOUTH BOUND LANES & ADJACENT AREAS	-7’	13.8	109.8	92	NUKE	C
10/04/17	65	SOUTH BOUND LANES & ADJACENT AREAS	-5’	9.2	105.9	83	NUKE	B
10/04/17	65A	SOUTH BOUND LANES & ADJACENT AREAS	RETEST	12.3	118.6	93	NUKE	B

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TRACT ______________ **W.O** 6457

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FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
10/04/17	66	SOUTH BOUND LANES & ADJACENT AREAS	-5'	14.4	119.0	94	SC	B
10/05/17	67	RAILROAD AVENUE SOUTH BOUND	-5'	12.5	119.9	94	SC	B
10/05/17	68	RAILROAD AVENUE SOUTH BOUND	-5'	14.3	113.6	95	NUKE	C
10/05/17	69	RAILROAD AVENUE SOUTH BOUND	-5'	12.2	118.8	94	NUKE	B
10/05/17	70	RAILROAD AVENUE SOUTH BOUND	-4'	14.5	114.4	95	NUKE	C
10/05/17	71	RAILROAD AVENUE SOUTH BOUND	-4'	12.6	120.2	95	NUKE	B
10/06/17	72	RAILROAD AVENUE SOUTH BOUND	-27"	12.4	120.2	95	NUKE	B
10/06/17	73	RAILROAD AVENUE SOUTH BOUND	-27"	12.5	120.8	97	NUKE	B
10/06/17	74	RAILROAD AVENUE MEDIAN AREA	-27"	12.2	121.4	96	NUKE	B
10/06/17	75	RAILROAD AVENUE MEDIAN AREA	-27"	13.9	115.8	97	NUKE	C
10/06/17	76	RAILROAD AVE SOUTH BOUND PORTION 1ST LIFT	-21"	15.1	132.0	95	NUKE	E
10/06/17	77	RAILROAD AVE SOUTH BOUND PORTION 1ST LIFT	-21"	15.5	133.6	96	NUKE	E
10/06/17	78	RAILROAD AVE SOUTH BOUND PORTION 1ST LIFT	-21"	15.1	133.7	96	NUKE	E
10/06/17	79	RAILROAD AVE SOUTH BOUND PORTION 2ND LIFT	-21"	15.0	131.9	95	NUKE	E
10/06/17	80	RAILROAD AVE SOUTH BOUND PORTION 2ND LIFT	-21"	15.3	133.3	96	NUKE	E
10/06/17	81	RAILROAD AVE SOUTH BOUND PORTION 2ND LIFT	-21"	15.1	133.8	96	NUKE	E
10/06/17	82	RAILROAD AVE SOUTH BOUND PORTION 3RD LIFT	-21"	15.4	133.4	96	NUKE	E
10/06/17	83	RAILROAD AVE SOUTH BOUND PORTION 3RD LIFT	-21"	15.3	133.6	96	NUKE	E
10/07/17	84	RAILROAD AVENUE SOUTH BOUND 1ST LIFT	AC	N/A	146.0	95	NUKE	F
10/07/17	85	RAILROAD AVENUE SOUTH BOUND 1ST LIFT	AC	N/A	144.7	95	NUKE	F
10/07/17	86	RAILROAD AVENUE NORTH BOUND 1ST LIFT	AC	N/A	143.7	95	NUKE	F
10/07/17	87	RAILROAD AVENUE SOUTH BOUND 2ND LIFT	AC	N/A	145.3	95	NUKE	F

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TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
10/07/17	88	RAILROAD AVENUE SOUTH BOUND 2ND LIFT	AC	N/A	139.8	91	NUKE	F
10/07/17	88A	RAILROAD AVENUE SOUTH BOUND 2ND LIFT	RETEST	N/A	144.8	95	NUKE	F
10/07/17	89	RAILROAD AVENUE SOUTH BOUND 3RD LIFT	AC	N/A	144.6	95	NUKE	F
10/07/17	90	RAILROAD AVENUE SOUTH BOUND 3RD LIFT	AC	N/A	145.8	95	NUKE	F
10/07/17	91	RAILROAD AVENUE NORTH BOUND 3RD LIFT	AC	N/A	146.8	96	NUKE	F
10/07/17	92	RAILROAD AVENUE NORTH BOUND	AC	N/A	152.5	99	NUKE	F
10/07/17	93	RAILROAD AVENUE NORTH BOUND	AC	N/A	152.9	99	NUKE	F
10/07/17	94	RAILROAD AVENUE NORTH BOUND	AC	N/A	145.7	95	NUKE	F
10/07/17	95	RAILROAD AVENUE SOUTH BOUND	AC	N/A	146.9	96	NUKE	F
10/18/17	96	BOTTOM OX ACCESS ROAD	-5’	12.5	119.7	90	SC	D
10/18/17	97	BOTTOM OX ACCESS ROAD	-5’	12.4	119.1	90	NUKE	D
10/19/17	98	ACCESS ROAD	-4’	12.9	120.3	91	SC	D
10/19/17	99	ACCESS ROAD	-4’	13.1	122.7	93	NUKE	D
10/19/17	100	ACCESS ROAD	-4.5’	12.8	121.4	92	NUKE	D
10/19/17	101	BOTTOM OX ACCESS ROAD	-5’	12.3	120.4	91	SC	D
10/20/17	102	ACCESS ROAD	-1’	13.0	121.7	92	SC	D
10/20/17	103	BOTTOM OX ACCESS ROAD	-5’	13.3	122.9	93	NUKE	D
10/20/17	104	ACCESS ROAD	-4’	12.7	119.9	90	NUKE	D
10/23/17	105	ACCESS ROAD	-4’	12.9	120.7	91	SC	D
10/23/17	106	ACCESS ROAD	-3’	12.8	120.5	91	NUKE	D
10/23/17	107	ACCESS ROAD	-2’	13.1	121.9	92	NUKE	D
10/23/17	108	ACCESS ROAD	-2’	9.9	116.7	88	SC	D
10/23/17	108A	ACCESS ROAD	RETEST	12.4	119.4	90	SC	D

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TRACT ______________ **W.O** 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
10/23/17	109	BOTTOM OX ACCESS ROAD	-5’	12.6	120.3	91	NUKE	D
10/24/17	110	ACCESS ROAD	-4’	13.3	122.9	93	SC	D
10/24/17	111	ACCESS ROAD	-4’	12.9	121.8	92	NUKE	D
10/24/17	112	BOTTOM OX ACCESS ROAD	-5’	10.1	117.0	88	NUKE	D
10/24/17	112A	BOTTOM OX ACCESS ROAD	RETEST	12.0	119.9	90	NUKE	D
10/25/17	113	BOTTOM OX ACCESS ROAD	-5’	12.8	122.0	92	SC	D
10/25/17	114	ACCESS ROAD	-4’	13.0	122.8	93	NUKE	D
10/25/17	115	ACCESS ROAD	-1’	13.1	121.5	92	NUKE	D
10/25/17	115A	ACCESS ROAD	RETEST	9.5	115.8	87	NUKE	D
10/25/17	116	ACCESS ROAD	-2’	13.6	123.9	94	NUKE	D
10/25/17	117	ACCESS ROAD	-2’	12.4	121.9	92	NUKE	D
10/26/17	118	ACCESS ROAD	1170	12.1	117.4	92	SC	B
10/26/17	119	ACCESS ROAD	1170	11.8	117.0	92	NUKE	B
10/26/17	120	ACCESS ROAD	1171	11.5	116.2	91	SC	B
10/27/17	121	ACCESS ROAD	1172	15.5	113.8	86	NUKE	D
10/27/17	121A	ACCESS ROAD	RETEST	13.5	118.9	90	NUKE	D
10/27/17	122	ACCESS ROAD	1172	13.3	119.8	90	NUKE	D
10/30/17	123	ACCESS ROAD	1173	11.7	118.4	93	NUKE	B
10/30/17	124	ACCESS ROAD	1174	11.9	117.5	93	NUKE	B
10/30/17	125	ACCESS ROAD	1175	8.9	116.9	88	SC	D
10/30/17	125A	ACCESS ROAD	RETEST	12.0	121.8	92	SC	D
10/31/17	126	ACCESS ROAD	1176	11.9	122.4	92	NUKE	D
10/31/17	127	ACCESS ROAD	SLOPE FACE	14.0	119.9	90	NUKE	D

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TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
10/31/17	128	ACCESS ROAD	1177	12.4	120.2	95	NUKE	B
10/31/17	129	ACCESS ROAD	1177	12.5	121.6	96	SC	B
10/31/17	130	ACCESS ROAD	1176	12.4	120.8	95	NUKE	B
10/31/17	131	ACCESS ROAD	1177	12.1	124.7	94	SC	D
11/01/17	132	ACCESS ROAD	1174	13.4	125.3	95	NUKE	D
11/01/17	133	ACCESS ROAD	1178	13.5	125.5	95	NUKE	D
11/01/17	134	ACCESS ROAD	1178	13.1	123.2	93	NUKE	D
11/01/17	135	ACCESS ROAD	1176	10.1	117.1	88	SC	D
11/01/17	135A	ACCESS ROAD	RETEST	12.4	123.8	93	SC	D
11/02/17	136	ACCESS ROAD	1178	12.9	125.7	95	SC	D
11/02/17	137	ACCESS ROAD	1179	12.8	123.4	93	SC	D
11/02/17	138	ACCESS ROAD	1179	13.0	125.9	95	SC	D
11/02/17	139	ACCESS ROAD	1180	13.3	126.1	95	NUKE	D
11/02/17	140	ACCESS ROAD	1180	13.5	126.8	96	SC	D
11/06/17	141	ACCESS ROAD	1181	13.6	126.7	95	NUKE	D
11/06/17	142	ACCESS ROAD	1177	13.4	124.5	94	NUKE	D
11/06/17	143	ACCESS ROAD	1181	13.4	125.8	95	NUKE	D
11/06/17	144	ACCESS ROAD	1181	14.6	116.2	88	NUKE	D
11/06/17	144A	ACCESS ROAD	RETEST	13.8	120.7	91	NUKE	D
11/07/17	145	ACCESS ROAD	1182	13.1	122.9	93	NUKE	D
11/07/17	146	ACCESS ROAD	SG	13.0	124.6	94	NUKE	D
11/07/17	147	ACCESS ROAD	FG	13.4	124.0	94	NUKE	D
11/08/17	148	ACCESS ROAD	FG	13.1	126.3	95	NUKE	D

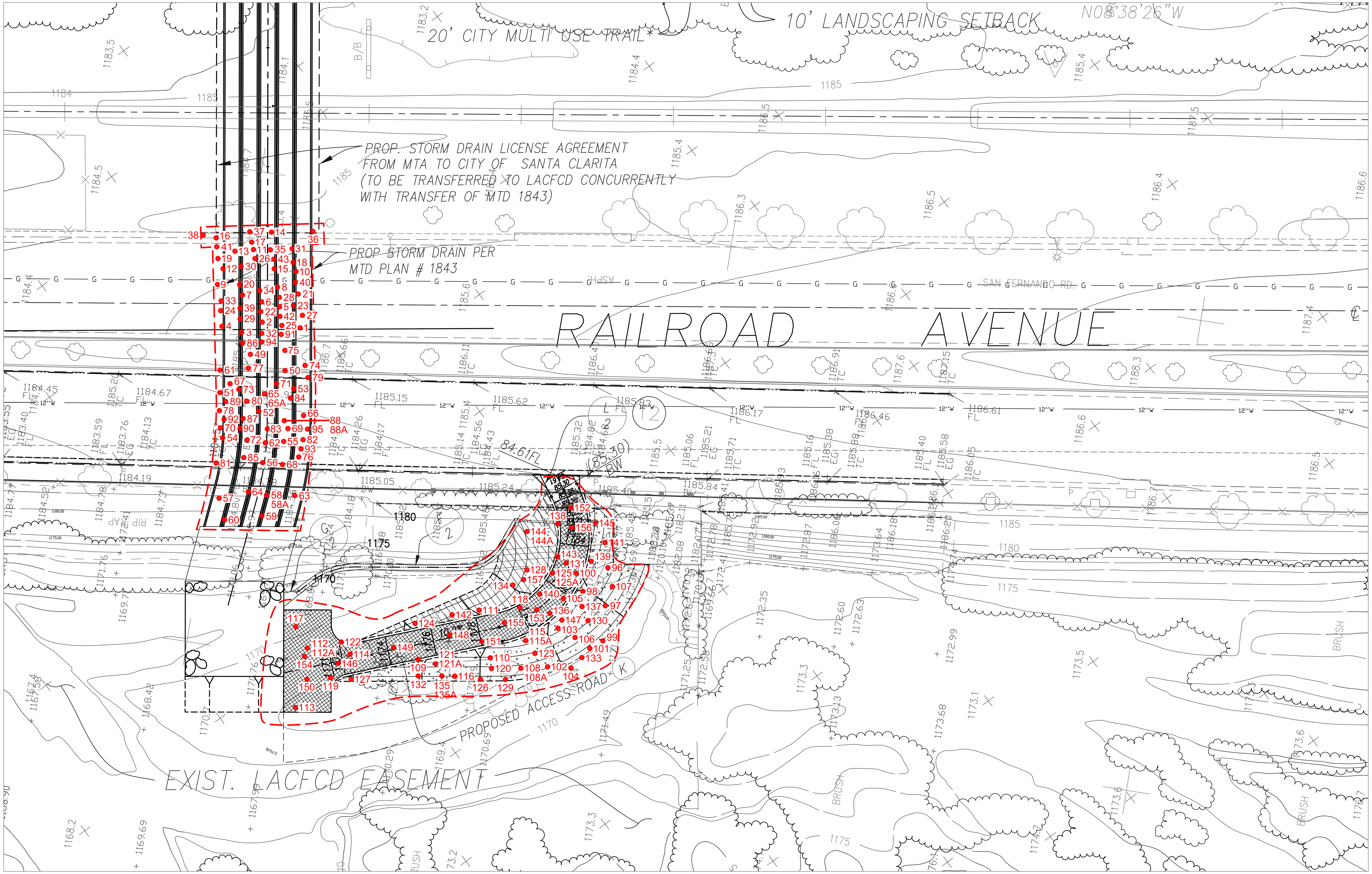
SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT ______________ W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
11/08/17	149	ACCESS ROAD	SG	13.5	126.6	96	NUKE	D
11/08/17	150	ACCESS ROAD	SG	13.3	125.9	95	NUKE	D
11/09/17	151	ACCESS ROAD	SG	13.2	124.8	94	NUKE	D
11/09/17	152	ACCESS ROAD	SG	13.0	125.7	95	NUKE	D
11/10/17	153	ACCESS ROAD	SG	13.4	126.8	95	NUKE	D
11/13/17	154	ACCESS ROAD/ NEXT TO RIPRAP	BASE	16.6	132.2	95	NUKE	E
11/13/17	155	MIDDLE SECTION ACCESS ROAD	BASE	15.8	133.4	96	NUKE	E
11/13/17	156	TOP OF ACCESS ROAD	BASE	16.4	132.7	95	NUKE	E
11/14/17	157	INNER SLOPE AREA	SG	11.7	119.2	93	NUKE	B

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE



EXPLANATION

●157 APPROXIMATE LOCATION OF FIELD DENSITY TEST

APPROXIMATE LIMITS OF COMPACTED FILL INCLUDED IN THIS REPORT

MDN 19709

GSC GeoSoils Consultants Inc.
GEOTECHNICAL • GEOLOGIC • ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

COMPACTION MAP
PARCEL MAP NO. 062646
MTD NO. 1843
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	2/2018	1" = 20'

REVISED

PLATE 1

X:\2001 w.o\gsc-cad\6457\Storm Drain Plans - PM 062646 - MTD 1843\GRADING BASE- 2011_COMPACTION MAP 2-13-18.dwg, 2/19/2018 11:03:14 AM, Adobe PDF.pc3

May 30, 2018
W.O. 6457

TMC
21070 Centre Pointe Parkway
Santa Clarita, California 91350

Attention: Mr. Randy Wrage

Subject: Update Geologic and Geotechnical Engineering Report, Parcel Map No. 062646, Santa Clarita, California

INTRODUCTION

At your request, GeoSoils Consultants, Inc. (GSC) has prepared this update report on the subject property. This update report is a follow up to GSC's report dated September 13, 2011, revised February 2, 2012 (references). This report was submitted to the City of Santa Clarita, and approved in a Development Services Division Letter dated July 10, 2012. A copy of the approval letter is enclosed with this report.

The geologic conditions on site remain unchanged from conditions noted in the approved report. The development plan has not changed from the plan included in the approved report and recommendations contained in the referenced reports remain applicable.

MDN 19951

We appreciate this opportunity to be of service to you. If you have any questions, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

PROFESSIONAL GEOLOGIST
Lance R. Putnam
No. 2469
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LANCE R. PUTNAM
CEG 2469

KAREN L. MILLER
GE 2257

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/26
GEOTECHNICAL
STATE OF CALIFORNIA

LRP.KLM.W/Update G&G Eng Rpt

Encl: References
City of Santa Clarita Approval Letter dated July 10, 2012

cc: (3) Addressee

MDN 19951

REFERENCES

1. GeoSoils Consultants, Inc. dated December 15, 2015, “Update Geologic and Geotechnical Engineering Report, Parcel Map No. 062646, Santa Clarita, Califonria”

2. GeoSoils Consultants, Inc. dated September 10, 2015, “Storm Drain Backfill Compaction Report, Parcel Map #062646, M.T.D. #1843, Santa Clarita, California”

3. GeoSoils Consultants, Inc. dated May 23, 2012, “Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

4. GeoSoils Consultants, Inc. dated September 14, 2011, “Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No 1843, Santa Clarita, California”

5. GeoSoils Consultants, Inc. dated September 13, 2011 (revised February 2, 2012), “Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California”

CITY OF SANTA CLARITA

DEVELOPMENT SERVICES DIVISION
23920 Valencia Boulevard, Suite 302
Santa Clarita, California 91355
(661) 255-4942
(661) 254-3538 FAX

Geotechnical Review Sheet

Review No. 2

City Case #: SOL11-00007 & GRA11-00005
Location: Oak Ridge Drive and Springbrook
Tract/PM No.: PM 62646
Owner/Developer: TMC Hollis
Geotechnical Engineer: GeoSoils Consultants Inc
Engineering Geologist: Lance Putnam/Karen Miller
Design Engineer/Architect: Sikand

Review of:

- Geologic and Geotechnical Engineering Study, Parcel (Map)No 062646, Santa Clarita, California

Action: Report is **accepted** as submitted subject to the following conditions.

CONDITIONS

A. SUBMIT A FINAL COMPACTION REPORT TO DEVELOPMENT SERVICES FOR VERIFICATION THAT THE COMPLETED WORK COMPLIES WITH CITY CODES AND POLICIES
B. THE ROUGH AND FINAL GRADING CERTIFICATION FORMS MUST BE COMPLETED BY THE SOILS ENGINEER AND THE PROJECT CIVIL ENGINEER AND BE SUBMITTED TO DEVELOPMENT SERVICES PRIOR TO GRADING APRPOVAL

COMMENTS

A. FOUNDATION SLAB IS RECOMMENDED TO BE POST TENSIONED.
B. SOILS ARE OF LOW EXPANSIVITY
C. SOILS ARE MILDLY CORROSIVE – NO SPECIAL REQUIREMENTS
D. SULPHATES ARE NEGLIGIBLE - NO SPECIAL REQUIREMENTS

Should you have any questions, please feel free to contact me at (661) 255-4375.

Prepared by: Gabrielle Koontz Dated: 7/10/12

GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

September 17, 2018
W.O. 6457

TMC PROPERTIES
P.O. Box 800970
Santa Clarita, California 91380-0970

Attention: Mr. Mark Sullivan

Subject: Addendum Report, Geologic and Geotechnical Review of Revised Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California

INTRODUCTION

As requested, GeoSoils Consultants, Inc. (GSC) has reviewed the revised (delta 1) storm drain plans for Parcel Map No. 062646 in the City of Santa Clarita. The plans were prepared by Sikand Engineering, and pertinent plans are included as Sheets 1, 3A and 4A. The storm drain will consist of five storm drain lines labeled Line A through Line E.

The revisions to the storm drain plans included the realignment of Line “A” in order to avoid a conflict with an existing high pressure gas line. The storm drain sheets that were revised are sheets 3A (Plan and profile line “A” replacing sheet 3) and 4A (plan and profile line “A” and line “E” replacing sheet 4). Detail sheets 10A and 10B and sheet 13A easement exhibit was also revised. Sheet 1 includes the key map depicting the realignment of Line “A”.

Information presented in the referenced reports has been utilized to prepare this report. Subsurface exploration results were transferred to sheets 3A and 4A in order to present a revised geotechnical map that shows the soil types along the new alignment of storm drain.

MDN 20161

The site is underlain by minor amounts of artificial fill, alluvium, and older alluvium. We recommend removing and recompacting the top five feet of material under the subject site. During grading, all existing fill and the top five feet of alluvium will be removed to competent native material prior to fill placement. It is anticipated the realignment of line “A” will found the storm drain on competent alluvium as depicted on sheets 3A and 4A.

Rubber gaskets are recommended in cut/fill transition areas. The proposed realignment of Line “A” does not expose a transition; therefore no gasketed joints are recommended for the line “A” realignment. All previous recommendations provided in the referenced reports remain applicable. Actual cut/fill transition points will be verified in the field by the Geotechnical Engineer or Geologist. Field inspection at the time of storm drain installation may alter the location or require the addition of rubber gaskets along the alignment. Per County standards, rubber gaskets should be provided for a minimum distance of three pipe lengths on each side of the cut/fill transition (i.e. 24 feet).

The on-site material is considered suitable for use as fill/backfill material, provided it does not contain any debris or organic materials and does not contain rock fragments larger than six inches in diameter. All fill/backfill should be compacted to a minimum 90 percent relative compaction per ASTM Test Designation D-1557-12. Additional grading guidelines are presented in the referenced reports.

Temporary Excavation

Where necessary space is available, temporary unsurcharged embankments may be sloped back without shoring. The slope should not be cut steeper than the following gradient:

Height	Temporary Gradient (Horizontal:Vertical)
0-4’	Near Vertical
Above 4’	1:1

In areas where soils with little or no binder are encountered, shoring or flatter excavation slopes shall be made.

These recommended temporary excavation slopes do not preclude local raveling or sloughing. During the rainy season, temporary cut slopes should be protected by covering the slopes with Visqueen, and preventing runoff over the slopes.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act, and the Construction Safety Act should be met.

Where sloped embankments are used, the top of the slope should be barricaded to prevent equipment and heavy storage loads within five feet of the top of the slope. If the temporary construction embankments are to be maintained for long periods, berms should be constructed along the top of the slope to prevent runoff water from eroding the slope faces.

If temporary shoring is required, heavy duty prefabricated storm drain trench supports referred to as "shields" may be used. All temporary excavations should be observed by our personnel to insure that adverse geologic conditions are not exposed in the excavations, and that modifications of the excavations can be made, if warranted.

"111" STATEMENT

Provided that the recommendations in this report and all relevant reports referenced herein, are implemented, it is GSC's opinion that the proposed MTD 1843 will be safe from the hazards of landslide, settlement or slippage. Furthermore, the completed development will not adversely affect the stability of the adjacent properties nor be adversely affected by adjacent properties.

We hope this satisfies your requirements at this time. If we can be of any further assistance, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/20
GEOTECHNICAL
STATE OF CALIFORNIA

KAREN L. MILLER
GE 2257

PROFESSIONAL GEOLOGIST
Lance R. Putnam
No. 2469
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LANCE R. PUTNAM
CEG 2469

KLM.LRP.W: Addendum Rpt.

Encl: References
Sheets 1, 3A and 4A, Storm Drain Plans

cc: (1) Addressee via email
(1) County of Los Angeles

REFERENCES

1. GeoSoils Consultants, Inc. dated May 30, 2018, "Update Geologic and Geotechnical Engineering Report, Parcel Map No 062646, Santa Clarita, California

2. GeoSoils Consultants, Inc. dated December 15, 2015, "Update Geologic and Geotechnical Engineering Report, Parcel Map No. 062646, Santa Clarita, California "

3. GeoSoils Consultants, Inc. dated September 10, 2015, "Storm Drain Backfill Compaction Report, Parcel Map #062646, M.T.D. #1843, Santa Clarita, California"

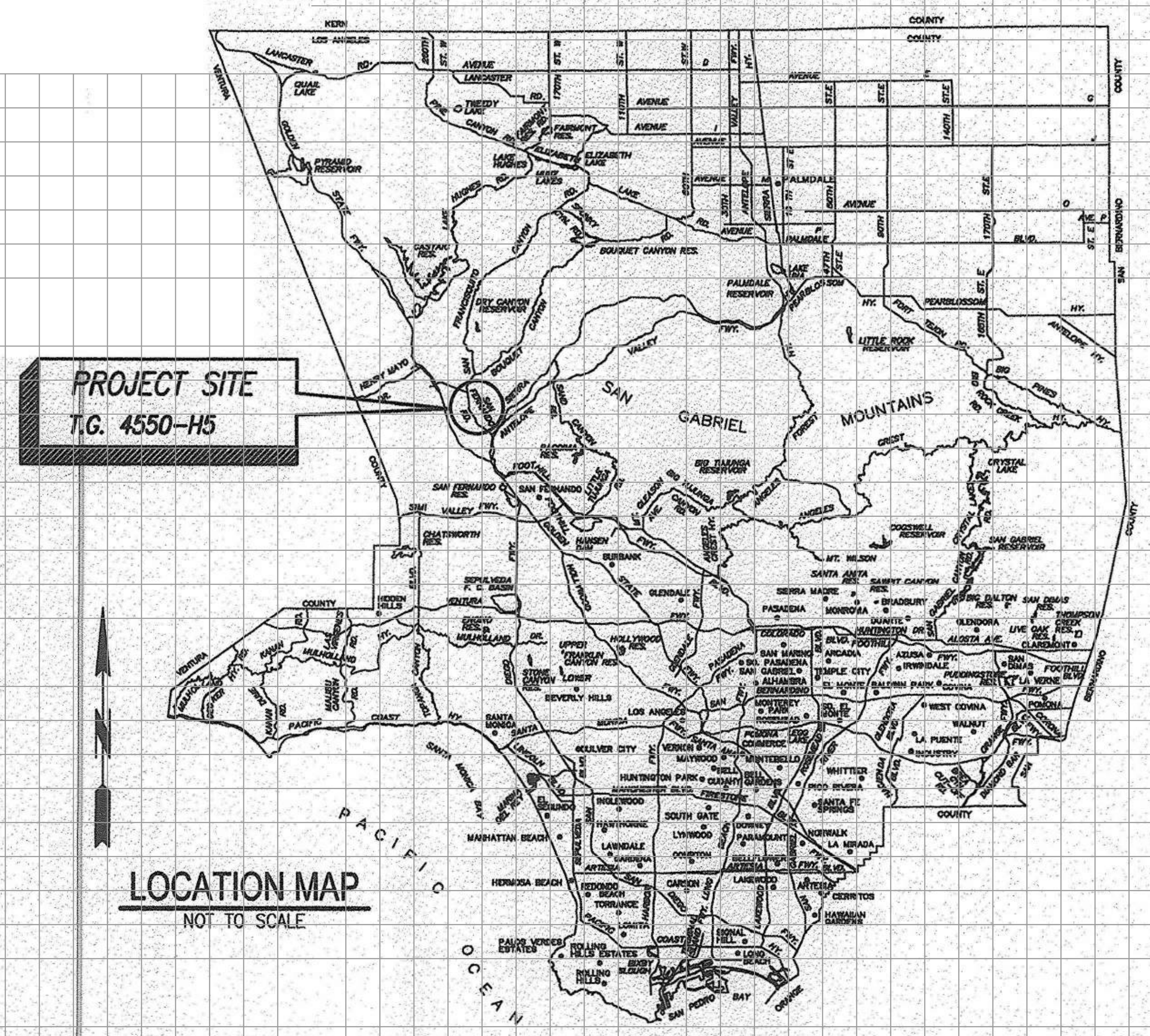
4. GeoSoils Consultants, Inc. dated May 23, 2012, "Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California"

5. GeoSoils Consultants, Inc. dated September 14, 2011, "Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No 1843, Santa Clarita, California"

6. GeoSoils Consultants, Inc. dated September 13, 2011 (revised February 2, 2012), "Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California"

M.T.D NO. 1843

CITY OF SANTA CLARITA
MISCELLANEOUS TRANSFER DRAIN NO.1843
PARCEL MAP NO. 062646

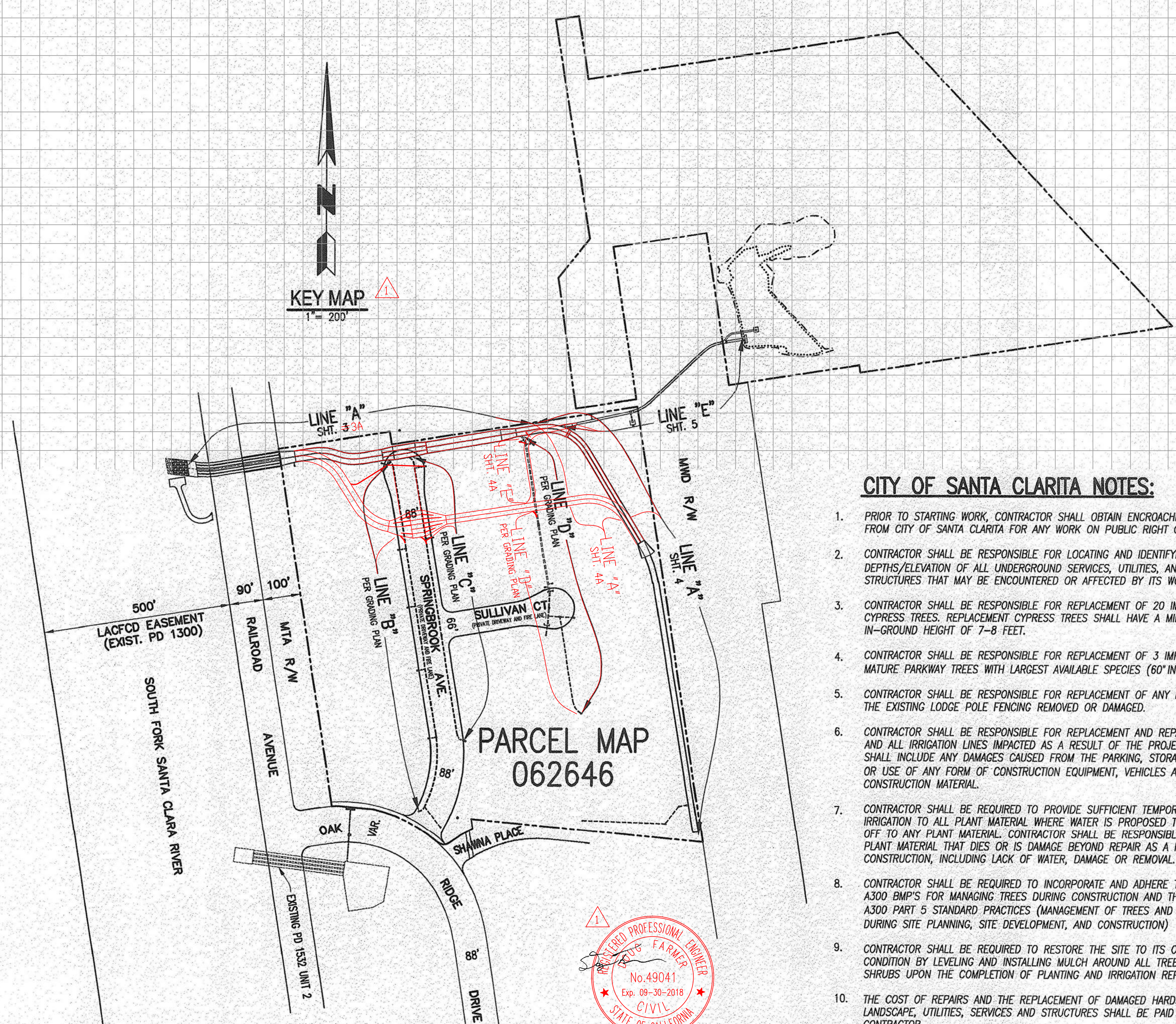


LOCATION MAP
NOT TO SCALE

BENCH MARK: L.A.C.D.P.W. L 5256
DPW BM TAG IN SW COR WINGWALL SPRR BRIDGE 60FT E/O C/L SANFERNANDO RD &1350FT N/O 15TH ST (@ MI MKR #95)
NEWHALL QUAD (1993) ELEV. 1215.531

INDEX TO PROJECT DRAWINGS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	GENERAL NOTES, WATER QUALITY NOTES, STRUCTURAL NOTES & HYDRAULIC ELEMENT TABLE
1 3A ~~3~~	PLAN – LINE "A" PROFILE – LINE "A"
1 4A	PLAN & PROFILE – LINE "A" & LINE "E"
4	PLAN – LINE "A" PROFILE – LINE "A"
5	PLAN – LINE "E" & "E-3" PROFILE – LINE "E" & "E-3"
6	DETENTION/DESILTING BASIN; DOUBLE/SINGLE RCB STEEL SCHEDULES
7	PROFILE – LAT. "A-2" LAT. "A-2" JUNCTION STRUCTURE DETAILS AND R.C. TRAPEZOIDAL CHANNEL SECTIONS
8	ELEVATED INLET STRUCTURAL DETAILS
9	DOUBLE/SINGLE RC BOX STRUCTURAL DETAILS
1 10A	TRANSITION STRUCTURE DETAILS
10	STRUCTURAL DETAILS, FACING SLAB AND ACCESS ROAD DETAIL
1 10B	JUNCTION STRUCTURE DETAILS
11	STRUCTURAL DETAILS
12	STRUCTURAL DETAILS
1 3A ~~13~~	EASEMENT EXHIBIT



LIST OF STANDARD PLANS

		L.A.C.D.P.W.	S.P.P.W.C.	CITY OF LOS ANGELES DEPT. OF WATER AND POWER
1	PIPE ANCHORS AND BACKFILL STABILIZERS		221-2	
2	SUPPORTS FOR CONDUITS ACCESS TRENCHES		224-2	
3	BLANKET PROTECTIONFOR PIPES		225-2	
4	CURB OPENING CATCH BASIN		300-3	
5	MONOLITHIC CATCH BASIN CONNECTION		308-2	
6	CATCH BASIN REINFORCEMENT		309-2	
7	C.B. FACE PLATE ASSEMBLY AND PROTECTION BAR		310-3	
8	CATCH BASIN MANHOLE FRAME AND COVER		312-3	
9	LOCAL DEPRESSIONS AT CATCH BASINS		313-3	
10	MANHOLE - PIPE TO PIPE (MAINLINE ID >= 36")		320-2	
11	MANHOLE - PIPE TO PIPE (MAINLINE ID <= 33")		321-2	
12	MANHOLE - PIPE TO PIPE (LARGE SIDE INLET)		322-2	
13	MANHOLE - CONCRETE BOX STORM DRAIN		323-2	
14	MANHOLE SHAFT WITH ECCENTRIC REDUCER		324-2	
15	JUNCTION STRUCTURE PIPE TO PIPE (INLET I.D. >=24" OR O.D. > 1/2 MAINLINE I.D.)		331-3	
16	JUNCTION STRUCTURE PIPE TO PIPE (INLET I.D. < 24")		332-2	
17	JUNCTION STRUCTUE - PIPE TO RCB		333-2	
18	JUNCTION STRUCTUE - PIPE TO RCB INLET (ID <= 30")		334-2	
19	TRANSITION STRUCTURE - PIPE TO PIPE		340-2	
20	TRANSITION STRUCTURE (RC BOX TO PIPE)		342-2	
21	TRANSITION STRUCTURE (DOUBLE RC BOX TO DOUBLE RC BOX)		344-2	
22	TRANSITION STRUCTURE (DOUBLE RC BOX TO TRIPLE RC BOX)		345-2	
23	SLOPED PROTECTION BARRIER		360-2	
24	TRASH RACK (INCLINED)		361-2	
25	CONCRETE COLLAR		380-4	
26	WINDOW DETAILS FOR MULTIPLE R.C. BOX STRUCTURE		382-2	
27	CHAIN LINK FENCE AND GATES		600-3	
28	24" MANHOLE FRAME AND COVER		630-3	
29	STEEL STEP		635-3	
30	REINFORCED CONCRETE STAIRWAY		640-3	
31	PIPE BEDDING	3080-2 CASE 3		
32	SAFETY REQUIREMENTS	6008-1		
33	DEBRIS DAMS AND BASINS OUTLET WORKS	3097-0		
34	WATER SYSTEM SUPPORT REQUIREMENTS FOR MAINS 16" AND SMALLER			A 3615

CITY OF SANTA CLARITA NOTES:

1. *PRIOR TO STARTING WORK, CONTRACTOR SHALL OBTAIN ENCROACHMENT PERMIT FROM CITY OF SANTA CLARITA FOR ANY WORK ON PUBLIC RIGHT OF WAY.*
2. *CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND IDENTIFYING DEPTHS/ELEVATION OF ALL UNDERGROUND SERVICES, UTILITIES, AND STRUCTURES THAT MAY BE ENCOUNTERED OR AFFECTED BY ITS WORK.*
3. *CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF 20 IMPACTED CYPRESS TREES. REPLACEMENT CYPRESS TREES SHALL HAVE A MINIMUM IN-GROUND HEIGHT OF 7-8 FEET.*
4. *CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF 3 IMPACTED MATURE PARKWAY TREES WITH LARGEST AVAILABLE SPECIES (60" INCH BOX)*
5. *CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF ANY PORTION OF THE EXISTING LODGE POLE FENCING REMOVED OR DAMAGED.*
6. *CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT AND REPAIRS TO ANY AND ALL IRRIGATION LINES IMPACTED AS A RESULT OF THE PROJECT. THIS SHALL INCLUDE ANY DAMAGES CAUSED FROM THE PARKING, STORAGE, STAGING OR USE OF ANY FORM OF CONSTRUCTION EQUIPMENT, VEHICLES AND / OR CONSTRUCTION MATERIAL.*
7. *CONTRACTOR SHALL BE REQUIRED TO PROVIDE SUFFICIENT TEMPORARY IRRIGATION TO ALL PLANT MATERIAL WHERE WATER IS PROPOSED TO BE CUT OFF TO ANY PLANT MATERIAL. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY PLANT MATERIAL THAT DIES OR IS DAMAGE BEYOND REPAIR AS A RESULT OF CONSTRUCTION, INCLUDING LACK OF WATER, DAMAGE OR REMOVAL.*
8. *CONTRACTOR SHALL BE REQUIRED TO INCORPORATE AND ADHERE TO THE ANSI A300 BMP'S FOR MANAGING TREES DURING CONSTRUCTION AND THE ANSI A300 PART 5 STANDARD PRACTICES (MANAGEMENT OF TREES AND SHRUBS DURING SITE PLANNING, SITE DEVELOPMENT, AND CONSTRUCTION)*
9. *CONTRACTOR SHALL BE REQUIRED TO RESTORE THE SITE TO ITS ORIGINAL CONDITION BY LEVELING AND INSTALLING MULCH AROUND ALL TREES AND SHRUBS UPON THE COMPLETION OF PLANTING AND IRRIGATION REPAIRS.*
10. *THE COST OF REPAIRS AND THE REPLACEMENT OF DAMAGED HARDSCAPE, LANDSCAPE, UTILITIES, SERVICES AND STRUCTURES SHALL BE PAID BY THE CONTRACTOR.*
11. *NO WORK IS ALLOWED WITHIN THE PROTECTED ZONE OF ANY OAK TREE WITHOUT PRIOR APPROVAL FROM THE CITY OF SANTA CLARITA OAK TREE SPECIALIST. AT NO TIME SHALL THE USE OF HEAVY EQUIPMENT IS PERMITTED WITHIN THE PROTECTED ZONE OF ANY OAK TREE.*

SCRRA NOTES:

1. SCRRA is not a member of DIGALERT. The Contractor shall call SCRRA's Signal Department at (909) 859-4100 a minimum of five days prior to beginning construction to mark signal and communication cables and conduits. To assure cables and conduits have been marked, no work may proceed until you have been provided with an SCRRA dig number . In case of signal emergencies or grade crossing problems, the contractor shall call SCRRA's 24-hour signal emergency number 1-888-446-9721.
2. Contact SCRRA's consultant/contractor at (714) 920-9037 to arrange for flagging services. Flagging service is dependent on the Employee-In-Charge (EIC) availability and may require a minimum of fifteen working days prior to beginning work. Prior notification of flagging services does not guarantee the availability of the EIC for the proposed date of work.
3. Contact SCRRA's consultant/contractor at (877) 452-0205 to arrange for third party safety training. Allow 24 to 72 hours from the request for safety training to arrange the training.
4. Contractor is to complete SCRRA's Temporary Right of Entry Agreement, Form 6. Real estate license through the approriate member agency will be needed. If so, Form 6 will not be issued until the license agreement has been issued.
5. The applicant and/or the contractor shall follow SCRRA's "Right-of-Way Encroachment Approval Procedures" (SCRRA Form 36)".
6. The applicant and/or the contractor shall follow SCRRA rules and regulations, addressed in "Rules and Requirements for Construction on Railway Property" (SCRRA Form 37)".

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2018 CIVIL STATE OF CALIFORNIA

1 CATCH BASINS AND WATER QUALITY DEVICES WILL NOT BE MAINTAINED BY L.A.C.F.C.D.

PRIOR TO ORDERING PIPES, CONTACT GEOTECHNICAL AND MATERIALS ENGINEERING AT (626)458-1707 TO SCHEDULE A D-LOAD INSPECTION. INSPECTION FEES PAYABLE AT THE LAND DEVELOPMENT DIVISION PUBLIC COUNTER WILL BE REQUIRED.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THIS MAP.

THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES SHOWN AND ANY OTHER LINES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING.

REGISTERED CIVIL ENGINEER No. 49041 11-16-16 DATE

REVEIWED BY: Amalia Marreh DATE 12/5/2016

APPROVED FOR CONSTRUCTION BY: SLP UH DATE 12/16/16
ROBERT G. NEWMAN
Director of Public Works Department

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
1	REVISED KEY MAP AND INDEX LIST; ADDED THE NOTE FOR CATCH BASINS AND WATER QUALITY DEVICES	RCE 49041		

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2018 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER 11-16-16 DATE

STD 16-00002

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

PARCEL MAP NO. 062646 SHEET 1 OF 13

GSC GeoSoils Consultants Inc.
GEOTECHNICAL•GEOLOGIC•ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

STORM DRAIN PLANS
PARCEL MAP 062646, MTD 1843
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2018	AS NOTED

REVISED

MDN 20161

SHEET 1

	DELTA	RADIUS	LENGTH	TANGENT
1	15°0'00"	120.00'	31.42'	15.80'
2	66°47'43"	120.00'	139.90'	79.12'
3	66°31'32"	120.00'	139.33'	78.71'

EXPLANATION

- Caf — CERTIFIED ARTIFICIAL FILL
- Qal — ALLUVIUM
- APPROXIMATE GEOLOGIC CONTACT
- B-1 — APPROXIMATE LOCATION OF BORING

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

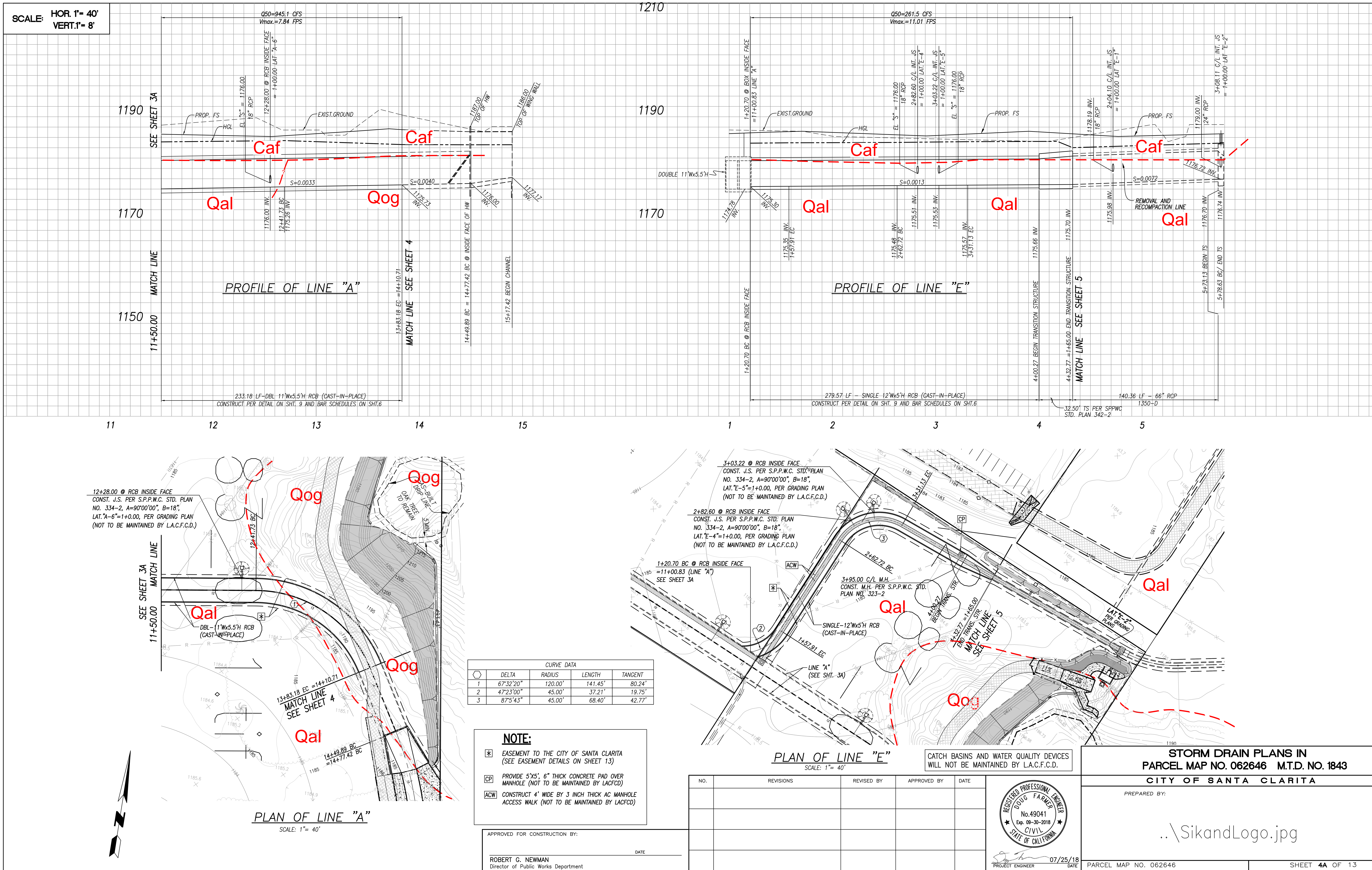
GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646, MTD 1843
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2018	AS NOTED

REVISED

MDN 20161

SHEET 3A



	DELTA	RADIUS	LENGTH	TANGENT
1	67°32'20"	120.00'	141.45'	80.24'
2	47°23'00"	45.00'	37.21'	19.75'
3	87°5'43"	45.00'	68.40'	42.77'

EXPLANATION

Caf	CERTIFIED ARTIFICIAL FILL
Qal	ALLUVIUM
Qog	ALLUVIAL FAN DEPOSITS
	APPROXIMATE GEOLOGIC CONTACT

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

GEOLOGIC MAP
STORM DRAIN PLANS
PARCEL MAP 062646, MTD 1843
TMC PROPERTIES

WORK ORDER	DATE	SCALE
6457	9/2018	AS NOTED

REVISED

MDN 20161

SHEET 4A

GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

March 13, 2020
W.O. 6457

TMC PROPERTIES, LLC
P.O. Box 800970
Santa Clarita, California 91380-0970

Attention: Mr. Randy Wrage

Subject: Geologic and Geotechnical Engineering Review of Revised Rough Grading Plans, Parcel Map 062646, Santa Clarita, California

Dear Mr. Wrage:

As requested, GeoSoils Consultants, Inc. (GSC) has prepared this report addressing the revised Rough Grading Plans, Parcel Map 062646. The grading plans were prepared by Sikand Engineering and are included herein as Sheets 1A, 2, 3A, 4A, 5A, 6, 7A, 8A, 9A, 10A, and 11.

Phase 2 Rough Grading

The Rough Grading Plans are included herein and are very similar to the previously approved Rough Grading Plans for Parcel 062646. The main differences are: 1) the elimination of a cul de sac in the center of the project and, 2) proposed building locations, with proposed grades being very similiar. All grading will be performed in accordance with the revised Grading Plans.

MDN 21381

CONCLUSIONS AND RECOMMENDATIONS

The revised Rough Grading Plans for Parcel Map 062646 are considered feasible from a geologic and geotechnical engineering viewpoint, provided that the recommendations provided in the referenced reports are adhered to and followed. The conclusions and recommendations from the referenced reports remain applicable to the revised rough grading plans.

"111" STATEMENT

It is GSC's opinion that following grading, building sites and future structures will be safe from the hazards of landslide, settlement or slippage. Furthermore, the completed development will not adversely affect the stability of the adjacent properties nor be adversely affected by adjacent properties.

We appreciate this opportunity to be of service to you. If you have any questions regarding the attached reports, or if we may be of further assistance to you, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

PROFESSIONAL GEOLOGIST
Lance R. Putnam
No. 2469
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LANCE R. PUTNAM
CEG 2469

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/22
GEOTECHNICAL
STATE OF CALIFORNIA

KAREN L. MILLER
GE 2257

Encl: References
Sheets 1A, 2, 3A, 4A, 5A, 6, 7A, 8A, 9A, 10A, and 11

cc: (3) Addressee

MDN 21381

REFERENCES

1. GeoSoils Consultants, Inc. dated September 13, 2011, “Geologic and Geotechnical Engineering Study, Parcel No. 062646, Santa Clarita, California”

2. GeoSoils Consultants, Inc. dated September 14, 2011, “Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

3. GeoSoils Consultants, Inc. dated September 13, 2011, (rev. February 2, 2012, “Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California”

4. GeoSoils Consultants, Inc. dated May 23, 2012, “Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

5. GeoSoils Consultants, Inc. dated May 14, 2015, “Addendum Report, MTD No. 1843, Parcel Map No. 062646, Santa Clarita, California”

6. GeoSoils Consultants, Inc. dated September 10, 2015,” Storm Drain Backfill Compaction Report, Parcel Map #062646, M.T.D. #1843, Santa Clarita, California”

7. GeoSoils Consultants, Inc. dated December 15, 2015, “Update Geologic and Geotechnical Engineering Report, Parcel Map No. 062646, Santa Clarita, California”

8. GeoSoils Consultants, Inc. dated September 17, 2018, “Addendum Report, Geologic and Geotechnical Review of Revised Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

9. GeoSoils Consultants, Inc. dated February 8, 2018, “Storm Drain Backfill and Access Road Compaction Report, Parcel Map 62646, M.T. D. 1843, Santa Clarita, California”

10. GeoSoils Consultants, Inc. dated May 30, 2018, “Update Geologic and Geotechnical Engineering Report, Paracel Map No. 062646, Santa Clarita, California”

ROUGH GRADING PLAN
PARCEL MAP NO. 062646
SANTA CLARITA CA

GENERAL NOTES

1. A COPY OF THE GRADING PERMIT AND APPROVED GRADING PLANS SHALL BE IN THE POSSESSION OF A RESPONSIBLE PERSON AND AVAILABLE AT THE SITE AT ALL TIMES.
2. ANY MODIFICATIONS OF, OR CHANGES TO, APPROVED GRADING PLANS SHALL BE APPROVED BY THE CITY ENGINEER PRIOR TO IMPLEMENTATION IN THE FIELD.
3. ALL GRADED SITES SHALL HAVE DRAINAGE SWALES, BERMS, AND OTHER DRAINAGE DEVICES APPROVED AT THE ROUGH GRADING STAGE.
4. THE FIELD ENGINEER SHALL SET DRAINAGE STAKES FOR ALL DRAINAGE DEVICES.
5. ALL STORM DRAIN WORK SHALL BE DONE UNDER CONTINUOUS INSPECTION BY THE FIELD ENGINEER. WEEKLY STATUS REPORTS SHALL BE SUBMITTED BY THE FIELD ENGINEER TO THE ENGINEERING SERVICES DIVISION.
6. FINAL GRADING SHALL BE APPROVED BEFORE OCCUPANCY OF BUILDINGS WILL BE ALLOWED.
7. CONSTRUCTION OF THE RETAINING WALL(S) SHOWN ON THESE PLANS REQUIRES A PERMIT FROM THE BUILDING & SAFETY DIVISION.
8. SEPARATE PLANS FOR TEMPORARY DRAINAGE AND EROSION CONTROL MEASURES TO BE USED DURING THE RAINY SEASON MUST BE SUBMITTED PRIOR TO OCTOBER 1. THE EROSION CONTROL DEVICES SHOWN ON SAID PLANS SHALL BE INSTALLED BY NO LATER THAN NOVEMBER 1 AND MAINTAINED IN OPERABLE CONDITION UNTIL APRIL 15 OF THE FOLLOWING YEAR. (17.90.030)
9. ALL SUBDRAIN OUTLETS SHALL BE SURVEYED FOR LINE AND ELEVATION. THIS SHALL BE SHOWN ON THE AS_BUILT GRADING PLAN INCLUDED IN THE FINAL GEOTECHNICAL AND GEOLOGY REPORT.
10. THE FACES OF CUT AND FILL SLOPES SHALL BE PREPARED AND MAINTAINED TO CONTROL EROSION. THIS CONTROL SHALL CONSIST OF JUTE NETTING AND EFFECTIVE PLANTING, OR OTHER DEVICES SATISFACTORY TO THE CITY ENGINEER. (17.87.020 A)
11. A PREVENTIVE PROGRAM TO PROTECT THE SLOPES FROM POTENTIAL DAMAGE FROM BURROWING RODENTS IS REQUIRED. OWNER SHALL INSPECT SLOPES PERIODICALLY FOR EVIDENCE OF BURROWING RODENTS AND AT FIRST EVIDENCE OF THEIR EXISTENCE SHALL EMPLOY AN EXTERMINATOR FOR THEIR REMOVAL. (17.87.020 H)
12. WHERE NECESSARY, CHECK DAMS, CRIBBING, RIPRAP, OR OTHER DEVICES OR METHODS SHALL BE EMPLOYED FOR EROSION CONTROL. JUTE NETTING SHALL BE IMMEDIATELY INSTALLED ON ANY SLOPES HAVING A VERTICAL HEIGHT OF SEVEN FEET OR MORE AND STEEPER THAN 3:1 (H:V) TO MINIMIZE OR CONTROL EROSION PROBLEMS.
13. ROOF DRAINAGE SHALL BE DIVERTED FROM GRADED SLOPES.
14. ALL CONSTRUCTION AND GRADING WITHIN STORM DRAIN EASEMENT SHALL BE PER APPROVED STORM DRAIN PLAN.

FILL NOTES

15. ALL FILL SHALL BE COMPACTED TO THE FOLLOWING MINIMUM RELATIVE COMPACTION CRITERIA:
    a. 90 PERCENT OF MAXIMUM DRY DENSITY WITHIN 40 FEET BELOW FINISH GRADE
    b. 93 PERCENT OF MAXIMUM DRY DENSITY DEEPER THAN 40 FEET BELOW FINISH GRADE, UNLESS A LOWER RELATIVE COMPACTION (NOT LESS THAN 90 PERCENT OF MAXIMUM DRY DENSITY) IS JUSTIFIED BY THE GEOTECHNICAL ENGINEER.

    THE RELATIVE COMPACTION SHALL BE DETERMINED BY ASTM SOIL COMPACTION TEST D1557–91, WHERE APPLICABLE; WHERE NOT APPLICABLE A TEST ACCEPTABLE TO THE CITY ENGINEER SHALL BE USED. (17.86.030 E)
16. FIELD DENSITY SHALL BE DETERMINED BY A METHOD ACCEPTABLE TO THE CITY ENGINEER, HOWEVER, A MINIMUM OF 10 PERCENT OF THE REQUIRED DENSITY TESTS SHALL BE OBTAINED BY THE SAND CONE METHOD (ASTM D1556). THE REQUIRED 10 PERCENT BY SAND CONE METHOD SHALL BE UNIFORMLY DISTRIBUTED THROUGHOUT THE DEPTHS AND LIMITS OF THE FILL.
17. SUFFICIENT TESTS OF THE FILL SOILS SHALL BE MADE TO DETERMINE THE RELATIVE COMPACTION OF THE FILL IN ACCORDANCE WITH THE FOLLOWING MINIMUM GUIDELINES:
    a. ONE TEST FOR EACH TWO–FOOT VERTICAL LIFT.
    b. ONE TEST FOR EACH 1,000 CUBIC YARDS OF MATERIAL PLACED.
    c. ONE TEST AT THE LOCATION OF THE FINAL FILL SLOPE FOR EACH BUILDING SITE (LOT) IN EACH FOUR–FOOT VERTICAL LIFT OR PORTION THEREOF.
    d. ONE TEST IN THE VICINITY OF EACH BUILDING PAD FOR EACH FOUR–FOOT VERTICAL LIFT OR PORTION THEREOF.

    SUFFICIENT TESTS OF FILL SOILS SHALL BE MADE TO VERIFY COMPLIANCE OF THE SOIL PROPERTIES WITH THE DESIGN REQUIREMENTS INCLUDING SOIL TYPES AND SHEAR STRENGTHS. THE RESULTS OF SUCH TESTING SHALL BE INCLUDED IN THE REPORTS REQUIRED BY SECTION 17.86.030 I.
18. NO FILL SHALL BE PLACED UNTIL STRIPPING OF VEGETATION, REMOVAL OF UNSUITABLE SOILS, AND INSTALLATION OF SUBDRAINS (IF ANY) HAVE BEEN INSPECTED AND APPROVED BY THE GEOTECHNICAL ENGINEER. (17.86.030 B)
19. NO ROCK OR SIMILAR MATERIAL GREATER THAN 12 INCHES IN DIAMETER SHALL BE PLACED IN THE FILL UNLESS RECOMMENDATIONS FOR SUCH PLACEMENT HAVE BEEN SUBMITTED BY THE GEOTECHNICAL ENGINEER AND APPROVED IN ADVANCE BY THE CITY ENGINEER. (17.86.030 D)
20. CONTINUOUS INSPECTION BY THE GEOTECHNICAL ENGINEER OR HIS RESPONSIBLE REPRESENTATIVE SHALL BE PROVIDED DURING ALL FILL PLACEMENT AND COMPACTION OPERATIONS WHERE FILLS HAVE A VERTICAL HEIGHT OR DEPTH GREATER THAN 30 FEET OR SLOPE SURFACE STEEPER THAN 2:1. (17.86.030 H)
21. CONTINUOUS INSPECTION BY THE GEOTECHNICAL ENGINEER OR HIS RESPONSIBLE REPRESENTATIVE SHALL BE PROVIDED DURING ALL SUBDRAIN INSTALLATIONS. (17.86.030 B)
22. FILL SLOPES IN EXCESS OF 2:1 STEEPNESS RATIO ARE TO BE CONSTRUCTED BY THE PLACEMENT OF SOIL AT SUFFICIENT DISTANCE BEYOND THE PROPOSED FINISH SLOPE TO ALLOW COMPACTION EQUIPMENT TO BE OPERATED AT THE OUTER LIMITS OF THE FINAL SLOPE SURFACE. THE EXCESS FILL IS TO BE REMOVED PRIOR TO COMPLETION OF ROUGH GRADING. (OTHER CONSTRUCTION PROCEDURES MAY BE USED WHEN IT IS DEMONSTRATED TO THE SATISFACTION OF THE CITY ENGINEER THAT THE ANGLE OF SLOPE, CONSTRUCTION METHOD AND OTHER FACTORS WILL HAVE EQUIVALENT EFFECT). (17.86.030 E)
23. THE GEOTECHNICAL ENGINEER SHALL PROVIDE SUFFICIENT INSPECTIONS DURING THE PREPARATION OF THE NATURAL GROUND AND THE PLACEMENT AND COMPACTION OF THE FILL TO BE SATISFIED THAT THE WORK IS BEING PERFORMED IN ACCORDANCE WITH THE PLAN AND APPLICABLE CODE REQUIREMENTS. (17.86.030 H)
24. THE GRADING CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 17.88.010 L AT THE COMPLETION OF ROUGH GRADING.

INSPECTION NOTES

25. THE PERMITTEE OR HIS AGENT SHALL NOTIFY THE ENGINEERING SERVICES DIVISION AT LEAST ONE WORKING DAY IN ADVANCE OF REQUIRED INSPECTIONS AT FOLLOWING STAGES OF THE WORK:
    a. PRE–GRADE ITEM. (17.88.010 G1)
    b. INITIAL. WHEN THE SITE HAS BEEN CLEARED OF VEGETATION AND UNAPPROVED FILL AND IT HAS BEEN SCARIFIED, BENCHED OR OTHERWISE PREPARED FOR FILL. NO FILL SHALL BE PLACED PRIOR TO THIS INSPECTION. (17.88.010 G2)
    c. ROUGH. WHEN APPROXIMATE FINAL ELEVATIONS HAVE BEEN ESTABLISHED; DRAINAGE TERRACES, SWALES AND BERMS INSTALLED AT THE TOP OF THE SLOPES; AND THE STATEMENTS REQUIRED IN SECTION 17.88.010 L HAVE BEEN RECEIVED. (17.88.010 G3)
    d. FINAL. WHEN GRADING HAS BEEN COMPLETED; ALL DRAINAGE DEVICES INSTALLED; SLOPE PLANTING ESTABLISHED, IRRIGATION SYSTEMS INSTALLED AND THE AS–BUILT PLANS, REQUIRED STATEMENTS, AND REPORTS HAVE BEEN SUBMITTED. (17.88.010 G4)
26. IN ADDITION TO THE INSPECTION REQUIRED BY THE ENGINEERING SERVICES DIVISION FOR REGULAR GRADING, REPORTS AND STATEMENTS SHALL BE SUBMITTED TO THE CITY ENGINEER IN ACCORDANCE WITH SECTION 17.88.010.

AGENCY NOTES

27. SECURE PERMISSION FROM THE ENGINEERING SERVICES DIVISION FOR CONSTRUCTION OR GRADING WITHIN STREET RIGHT_OF_WAY.
28. GRADING IN FUTURE STREET RIGHT_OF_WAY SHALL BE INSPECTED BY THE CITY.
29. ALL WORK WITHIN THE STREAMBED AND AREAS OUTLINED ON THE GRADING PLANS SHALL CONFORM TO:
    - ARMY CORP 404 PERMIT NUMBER: SPL–2013–00413–JMV
    - CALIFORNIA FISH & WILDLIFE PERMIT NUMBER: 1600–2013–0113–RS
30. A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE PREPARED AND A COPY AVAILABLE FOR REVIEW AT THE PROJECT SITE AT ALL TIMES. ALL MEASURES OUTLINED IN THE PROJECT SWPPP SHALL BE IMPLEMENTED THROUGHOUT THE DURATION OF CONSTRUCTION.

GEOLOGY AND SOILS NOTES

31. ALL RECOMMENDATIONS INCLUDED IN THE CONSULTANT'S SOIL AND GEOLOGY REPORTS SHALL BE COMPLIED WITH AND ARE A PART OF THE GRADING SPECIFICATIONS. (17.83.010 F)
32. GRADING OPERATIONS SHALL BE CONDUCTED UNDER PERIODIC GEOLOGIC INSPECTION WITH MONTHLY INSPECTION REPORTS TO BE SUBMITTED TO THE ENGINEERING SERVICES DIVISION.
33. THE CONSULTING GEOLOGIST SHALL APPROVE ROUGH GRADING BY FINAL REPORT PRIOR TO APPROVAL BY THE CITY ENGINEER. THE FINAL REPORT SHALL INCLUDE AN AS–BUILT GEOLOGIC MAP.

FIRE DEPARTMENT

34. OBTAIN A PERMIT TO OPERATE IN FIRE ZONE NO.4. CALL THE FIRE PREVENTION UNIT AT (661) 286–8821 AND YOU WILL BE DIRECTED TO THE APPROPRIATE JURISDICTIONAL FIRE STATION TO OBTAIN A PERMIT.

STORMWATER POLLUTION PLAN NOTES

1. EVERY EFFORT SHALL BE MADE TO ELIMINATE THE DISCHARGE OF NON–STORMWATER FROM THE PROJECT SITE AT ALL TIMES.
2. ERODED SEDIMENTS AND OTHER POLLUTANTS SHALL BE RETAINED ON SITE AND MAY NOT BE TRANSPORTED FROM THE SITE VIA SHEETFLOW, SWALES, AREA DRAINS, NATURAL DRAINAGE COURSES, OR WIND.
3. STOCKPILES OF EARTH AND OTHER CONSTRUCTION–RELATED MATERIALS SHALL BE PROTECTED FROM BEING TRANSPORTED FROM THE SITE BY THE FORCES OF WIND OR WATER.
4. FUELS, OILS, SOLVENTS, AND OTHER TOXIC MATERIALS SHALL BE STORED IN ACCORDANCE WITH THEIR LISTING AND SHALL NOT CONTAMINATE THE SOIL AND SURFACE WATERS. ALL APPROVED STORAGE CONTAINERS SHALL BE PROTECTED FROM THE WEATHER. SPILLS SHALL BE CLEANED UP IMMEDIATELY AND DISPOSED OF IN A PROPER MANNER. SPILLS SHALL NOT BE WASHED INTO THE DRAINAGE SYSTEM.
5. EXCESS OR WASTE CONCRETE SHALL NOT BE WASHED INTO THE PUBLIC RIGHT–OF–WAY OR ANY OTHER DRAINAGE SYSTEM. PROVISIONS SHALL BE MADE TO RETAIN CONCRETE WASTES ON SITE UNTIL THEY CAN BE DISPOSED OF AS SOLID WASTE.
6. TRASH AND CONSTRUCTION–RELATED SOLID WASTES SHALL BE DEPOSITED INTO A COVERED RECEPTACLE TO PREVENT CONTAMINATION OF RAINWATER AND DISPERSAL BY WIND.
7. SEDIMENTS AND OTHER MATERIALS MAY NOT BE TRACKED FROM THE SITE BY VEHICLE TRAFFIC. THE CONSTRUCTION ENTRANCE ROADWAYS SHALL BE STABILIZED SO AS TO INHIBIT SEDIMENTS FROM BEING DEPOSITED INTO THE PUBLIC RIGHT–OF–WAY. ACCIDENTAL DEPOSITIONS SHALL BE SWEPT UP IMMEDIATELY AND SHALL NOT BE WASHED DOWN BY RAIN OR OTHER MEANS.
8. ANY SLOPES WITH DISTURBED SOILS OR DENUDED OF VEGETATION SHALL BE STABILIZED SO AS TO INHIBIT EROSION BY WIND AND WATER.
9. THE FOLLOWING BMP'S AS OUTLINED IN, BUT NOT LIMITED TO, THE "BEST MANAGEMENT PRACTICE HANDBOOK, CALIFORNIA STORMWATER QUALITY TASK FORCE, SACRAMENTO, CALIFORNIA, THE LATEST REVISED EDITION, MAY APPLY DURING THE CONSTRUCTION OF THIS PROJECT (ADDITIONAL MEASURES MAY BE REQUIRED IF DEEMED APPROPRIATE BY CITY INSPECTORS).

EROSION CONTROL
EC11 – Scheduling
EC2 – Preservation of Existing Vegetation
EC3 – Hydraulic Mulch
EC4 – Hydroseeding
EC5 – Soil Binders
EC6 – Straw Mulch
EC7 – Geotextiles and Mats
EC8 – Wood Mulching
EC9 – Earth Dikes and Drainage Swales
EC10 – Velocity Dissipation Devices
EC11 – Slope Drains
EC12 – Streambank Stabilization
EC13 – Reserved
EC14 – Compost Blankets
EC15 – Soil Preparation/ Roughening
EC16 – Non–vegetated Stabilization

TEMPORARY SEDIMENT CONTROL
SE1 – Silt Fence
SE2 – Sediment Basin
SE3 – Sediment Trap
SE4 – Check Dam
SE5 – Fiber Rolls
SE6 – Gravel Bag Berm
SE7 – Street Sweeping and Vacuuming
SE8 – Sandbag Barrier
SE9 – Straw Bale Barrier
SE10 – Storm Drain Inlet Protection
SE11 – Active Treatment Systems
SE12 – Temporary Silt Dike
SE13 – Compost Socks and Berms
SE14 – Biofilter Bags

WIND EROSION CONTROL
WE1 – Wind Erosion Control

EQUIPMENT TRACKING CONTROL
TC1 – Stabilized Construction Entrance/Exit
TC2 – Stabilized Construction Roadway
TC3 – Entrance/ Outlet Tire Wash

NON–STORMWATER MANAGEMENT
NS1 – Water Conservation Practices
NS2 – Dewatering Operations
NS3 – Paving and Grinding Operations
NS4 – Temporary Stream Crossing
NS5 – Clear Water Diversion
NS6 – Illicit Connection Discharge
NS7 – Potable Water/Irrigation
NS8 – Vehicle and Equipment Cleaning
NS9 – Vehicle and Equipment Fueling
NS10 – Vehicle & Equipment Maintenance
NS11 – Pile Driving Operations
NS12 – Concrete Curing
NS13 – Concrete Finishing
NS14 – Material and Equipment Use
NS15 – Demolition Adjacent To Water
NS16 – Temporary Batch Plants

WASTE MANAGEMENT AND MATERIALS POLUTION CONTROL
WM1 – Material Delivery and Storage
WM2 – Material Use
WM3 – Stockpile Management
WM4 – Spill Prevention and Control
WM5 – Solid Waste Management
WM6 – Hazardous Waste Management
WM7 – Contaminated Soil Management
WM8 – Concrete Waste Management
WM9 – Sanitary/Septic Waste Management
WM10 – Liquid Waste Management

1 PROPOSED STARTING DATE: SEPTEMBER 2019
COMPLETION DATE: JUNE 2020

EARTHWORK SUMMARY	
CUT	44,845 cy.
FILL	34,083 c.y.
OVEREXCAVATION	72,582 c.y.

ESTIMATED EARTHWORK SUMMARY FOR BALANCE

DESCRIPTION	IN PLACE (C.Y.)	SHRINKAGE ± 15 % (C.Y.)	NET CUT (C.Y.)	FILL (C.Y.)
EXCAVATION	33,195		33,195	34,083
OVEREXCAVATION	72,582	10,887	61,695	72,582
STORM DRAIN	11,650		11,650	
		TOTAL	106,540	106,665

TOTAL DISTURBED (GRADED) AREA: 25.2 ACRES

GEOTECHNICAL REPORT DATA

ALL CONSTRUCTION ACTIVITY WILL COMPLY WITH THE SOILS REPORT(S) LISTED BELOW

REPORT TITLE: GEOTECHNICAL INVESTIGATION
REPORT DATE: SEPTEMBER 13, 2011
PREPARED BY: LANCE R. PUTNAM (GEOSOILS CONSULTANTS INC.)

REPORT TITLE: GEOTECHNICAL INVESTIGATION – UPDATE
REPORT DATE: MAY 30, 2018
PREPARED BY: LANCE R. PUTNAM (GEOSOILS CONSULTANTS INC.)

SHEET INDEX

SHEET	DESCRIPTION
1	VICINITY MAP, KEY MAP, BENCH MARK, STANDARD NOTES
2	DETAILS
3–6	GRADING PLAN SHEETS
7–11	PRIVATE STORM DRAIN PLAN SHEETS

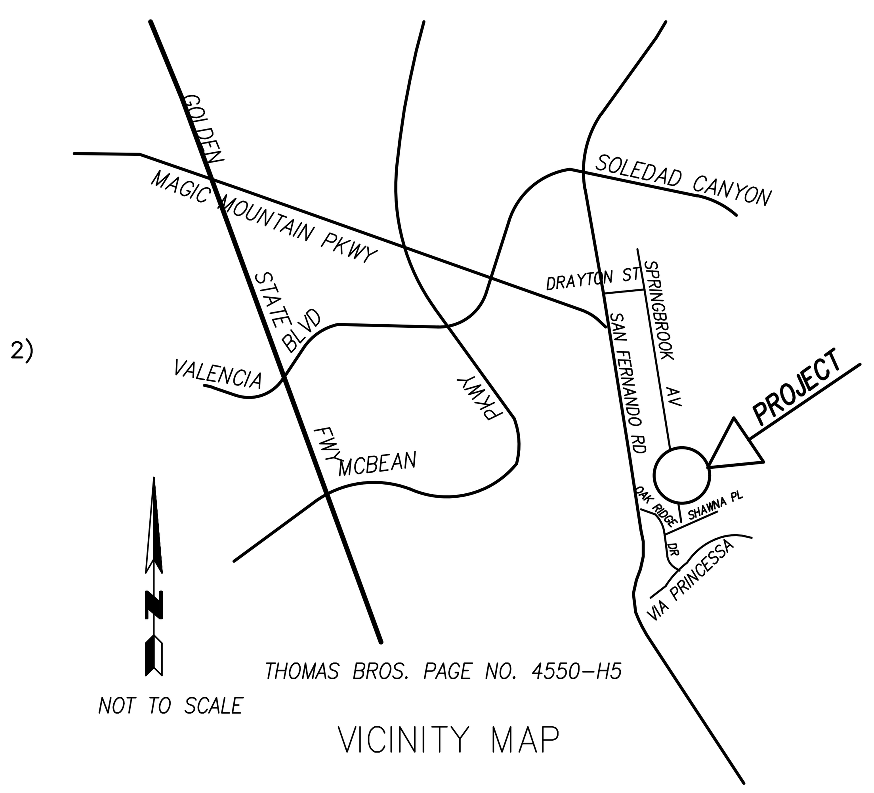
MAINTENANCE OF SLOPES, DRAINAGE DEVICES, AND DEBRIS/IMPACT WALLS IN OPEN SPACE AREAS IS THE RESPONSIBILITY OF OWNER.

TOPOGRAPHY PROVIDED BY: ROBERT J. LUNG AND ASSOCIATES
2832 WALNUT AVE. SUITE E TUSTIN, CA. 92680
DATE OF TOPOGRAPHY: 9–10–2010
PHONE: (714) 832–2077

BENCH MARK: L.A.C.D.P.W. L 5256
DPW BM TAG IN SW COR WINGWALL SPRR BRIDGE 60FT E/O C/L SANFERNANDO RD &1350FT N/O 15TH ST (@ MI MKR #95)
NEWHALL QUAD (1993) ELEV. 1215.531

CONSTRUCTION NOTES

1. INSTALL 24" RCP
2. CONSTRUCT GRATING BASIN WITH ABTECH FILTER 17EA (DETAIL F ON SHT 2)
3. CONSTRUCT TOP OF CUT DRAIN (DETAIL A ON SHT 2)
4. CONSTRUCT INLET 1 EA (DETAIL D ON SHT 2)
5. CONSTRUCT SPLASH PAD 3EA (DETAIL G ON SHT 2)
6. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL C ON SHT 2)
7. CONSTRUCT "V" DITCH (DETAIL B ON SHT 2)
8. CONSTRUCT DOWNDRAIN (DETAIL D ON SHT 2)
9. CONSTRUCT SPLASH WALL (DETAIL E ON SHT 2)
10. CONSTRUCT 3' TRANSITION FROM DETAIL A TO DETAIL D
11. CONSTRUCT ACCESS ROAD (DETAIL K ON SHT 2)
12. CONSTRUCT DRIVEWAY PER DETAIL ON STREET PLAN
13. CONSTRUCT DRIVEWAY PER STD. DETAIL ON STREET PLAN
14. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL N ON SHT 2)



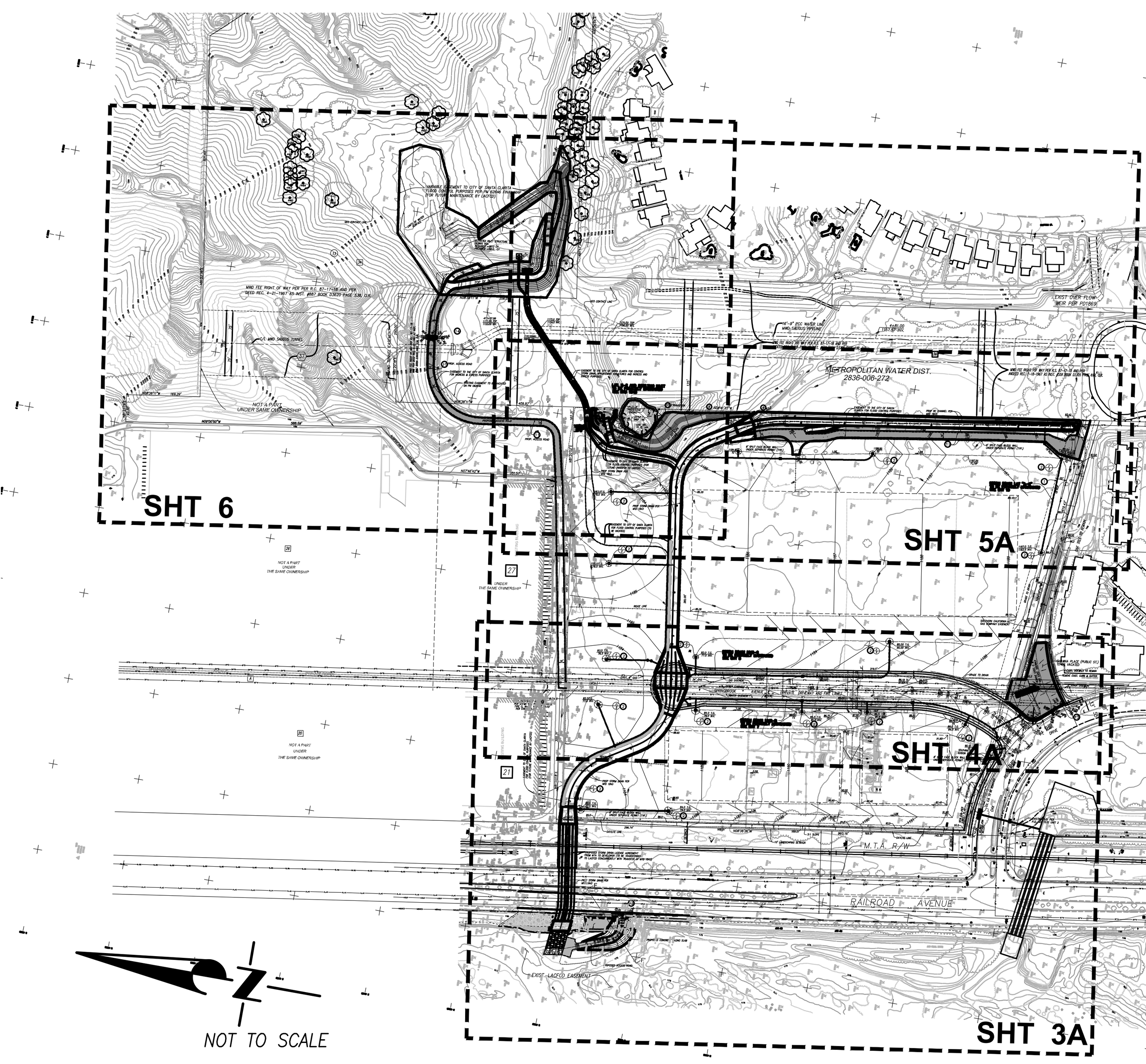
VICINITY MAP

LEGEND:

TRACT BOUNDARY
RIDG LINE
CUT AND FILL LINE
PROPOSED STORM DRAIN AND MANHOLE
PROPOSED ACCESS ROAD
PRIVATE DRIVEWAY AND FIRE LANE
STORM DRAIN MANHOLE ACCESS WALK
FREE STANDING BLOCK WALL
EASEMENT LINE
DAYLIGHT LINE
PROPOSED SLOPE
PROPOSED SLOPE WITH CONCRETE LINING
EXISTING GRADE CONTOUR
PROPOSED GRADE CONTOUR SLOPE
EXISTING SEWER LINE AND MANHOLE
EXISTING WATER LINE
EXISTING GAS LINE
RIDGE LINE
EDGE OF GUTTER LINE
GEOLOGICAL CONTACT LINE
DEBRIS LIMIT
EG EDGE OF GUTTER
INV. INVERT ELEVATION.
TC TOP OF CURB ELEVATION
F.S. FINISHED SURFACE ELEVATION
F.L. FLOW LINE ELEVATION
F.G. FINISH GROUND ELEVATION
L.P. LOW POINT ELEVATION
H.P. HIGH POINT ELEVATION
M.H. MANHOLE
DIRECTION OF FLOW
+ 1055.0 EXISTING SPOT ELEVATION
1000.00 PROPOSED SPOT ELEVATION
Qog OLDER ALLUVIUM DEPOSITS
Qal ALLUVIUM
af ARTIFICIAL FILL
B GEOTEC. BORING LOCATION
OAK TREE
5' OVEREXCAVATION DEPTH

ABBREVIATIONS

AC	ASPHALT CONCRETE
CB	CATCH BASIN
CF	CURB FACE
CL	CENTERLINE
RCP	REINFORCED CONCRETE PIPE
LD	LOCAL DEPRESSION
EG	EDGE OF GUTTER
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL	FLOWLINE
FS	FINISHED SURFACE
G.B.	GRADE BREAK
HP	HIGH POINT
INV	INVERT ELEVATION
MH	MANHOLE
NTS	NOT TO SCALE
TC	TOP OF CURB



1 INDEX MAP
NOT TO SCALE

CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY:

DATE:

DIGALERT
DIAL TOLL FREE 1–800–227–2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

THIS SET OF PLANS AND SPECIFICATION MUST BE KEPT ON THE JOB AT ALL TIMES. IT IS UNLAWFUL TO MAKE ANY CHANGES OR ALTERNATIONS ON SAME WITHOUT WRITTEN PERMISSION FROM THE DEVELOPMENT SERVICES DIVISION.

THE STAMPING OF THESE PLANS AND SPECIFICATIONS SHALL NOT BE USED AS A SUBSTITUTE FOR PERMIT OR MEANS AS AN APPROVAL OF ANY VIOLATION OF THE PROVISIONS OF ANY CITY OR COUNTRY ORDINANCE OR STATE LAW.

GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS, CA 91406
TEL (818) 785–2158 FAX (818) 785–1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM 2469 1/15/2020
DATE

PROFESSIONAL GEOLOGIST
Lance R. Putnam
No. 2469
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/20
GEOTECHNICAL
STATE OF CALIFORNIA

PREPARED FOR:
TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259–4400

PREPARED BY:
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
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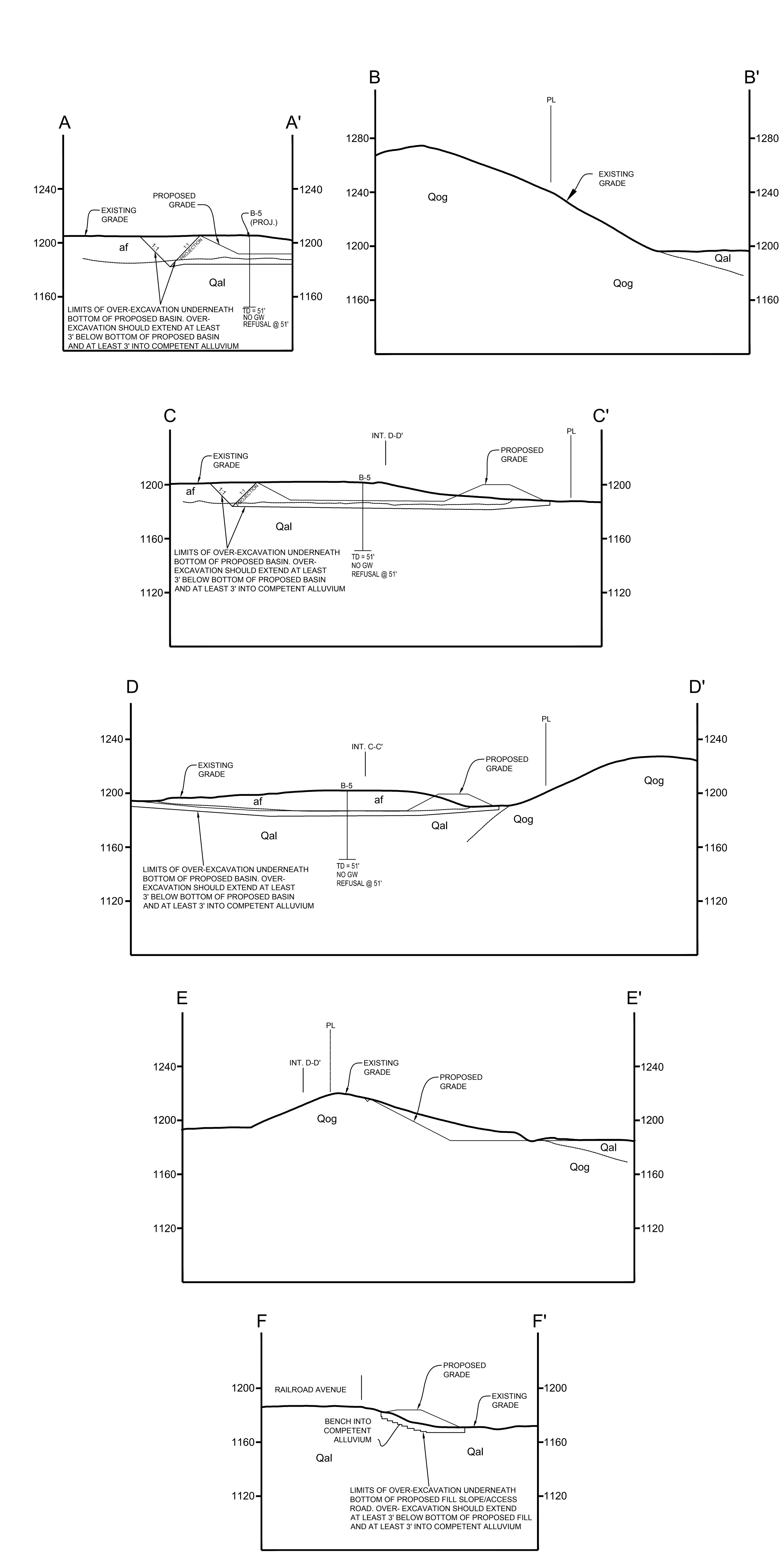
REGISTERED PROFESSIONAL ENGINEER
DOUG FARMER
No.49041
Exp. 09–30–2020
CIVIL
STATE OF CALIFORNIA
PROJECT ENGINEER DATE

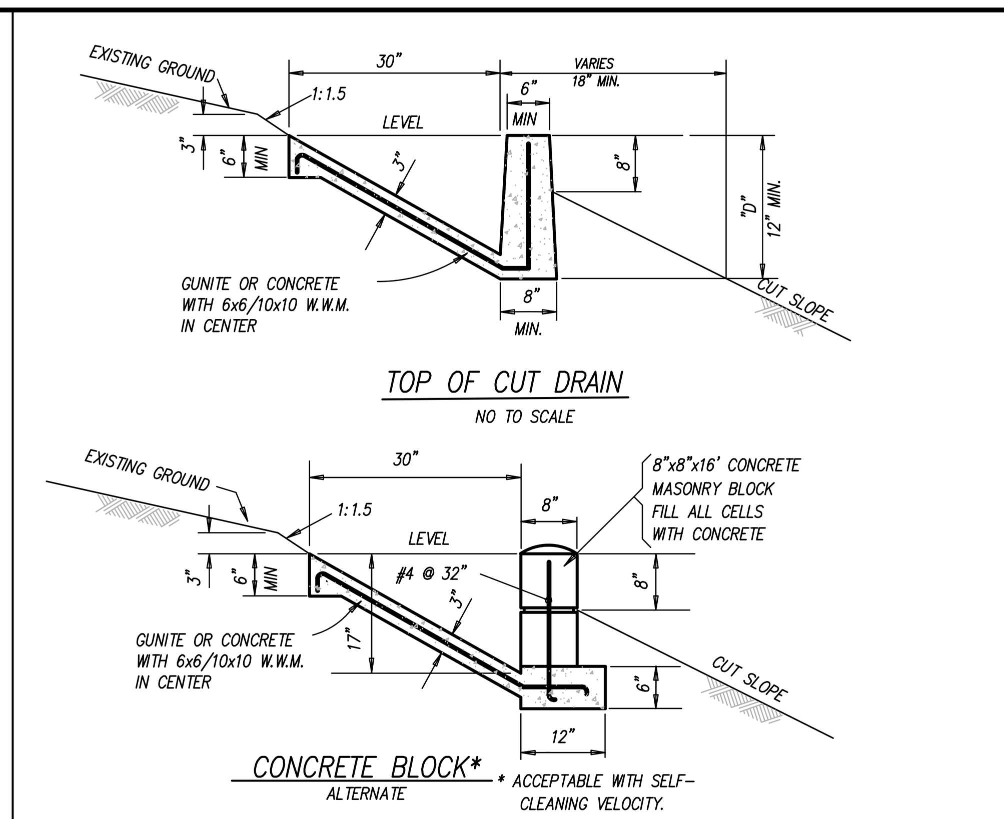
NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	REVISED INDEX MAP, START AND COMPLETION DATE SHEET 1 SUPERSEDED BY SHEET 1A	DOUG FARMER, RCE 49041		

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
VICINITY MAP, SHEET INDEX, BENCH MARK, STANDARD NOTES

SCALE: AS SHOWN
DATE: 11/12/2019
JOB NO. 5099–037–02
CASE NO: GRA18–00019
SHEET: 1A OF 11

x:\sikand\5099–037\02\engineering\grading\dwg\rg–tmc–saugus.dwg 1/8/2020
GRA18-00019

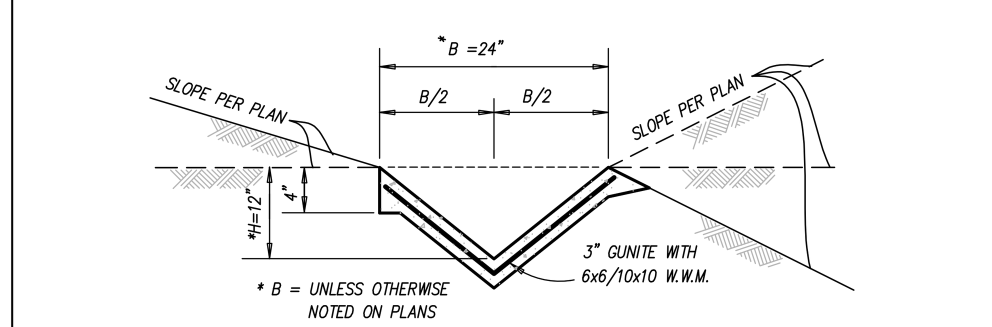




TOP OF CUT DRAIN
NO TO SCALE

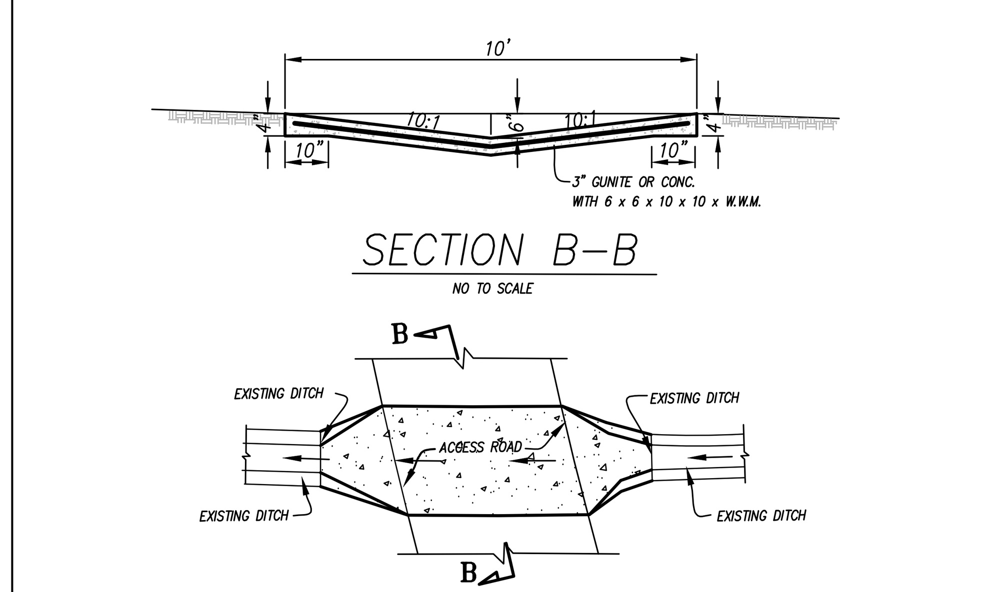
CONCRETE BLOCK*
ALTERNATE
* ACCEPTABLE WITH SELF-CLEANING VELOCITY.

TOP OF CUT DRAIN (A)
NO TO SCALE



* B = UNLESS OTHERWISE NOTED ON PLANS
*H = UNLESS OTHERWISE NOTED ON PLANS

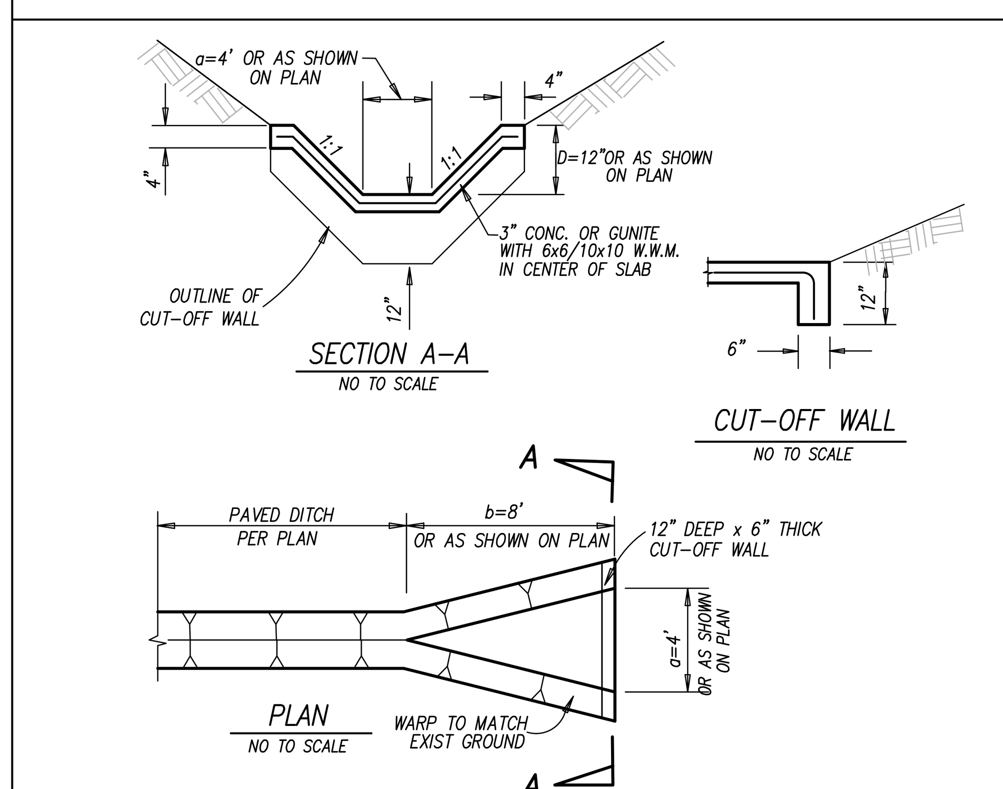
"V" DITCH (B)
NOT TO SCALE



SECTION B–B
NO TO SCALE

PLAN
NTS

CONC. DRAINAGE APRON (C)
NO SCALE

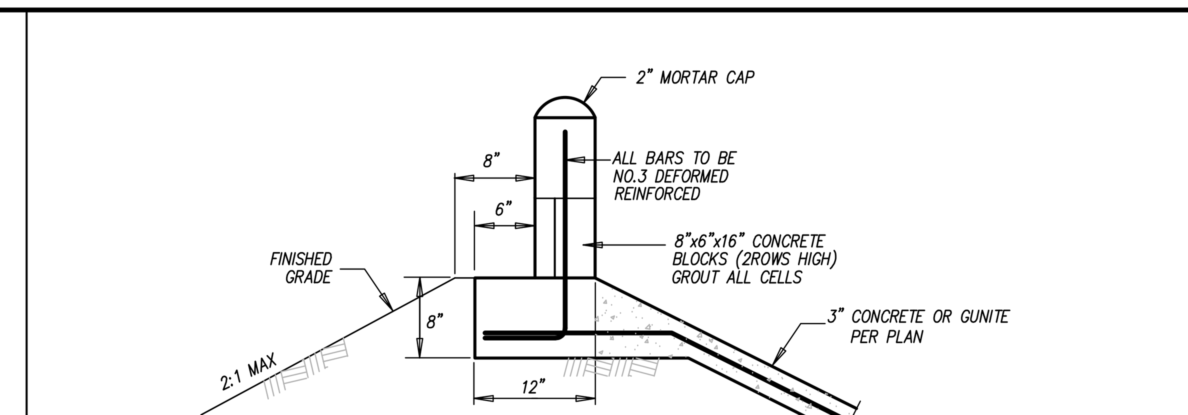


SECTION A–A
NO TO SCALE

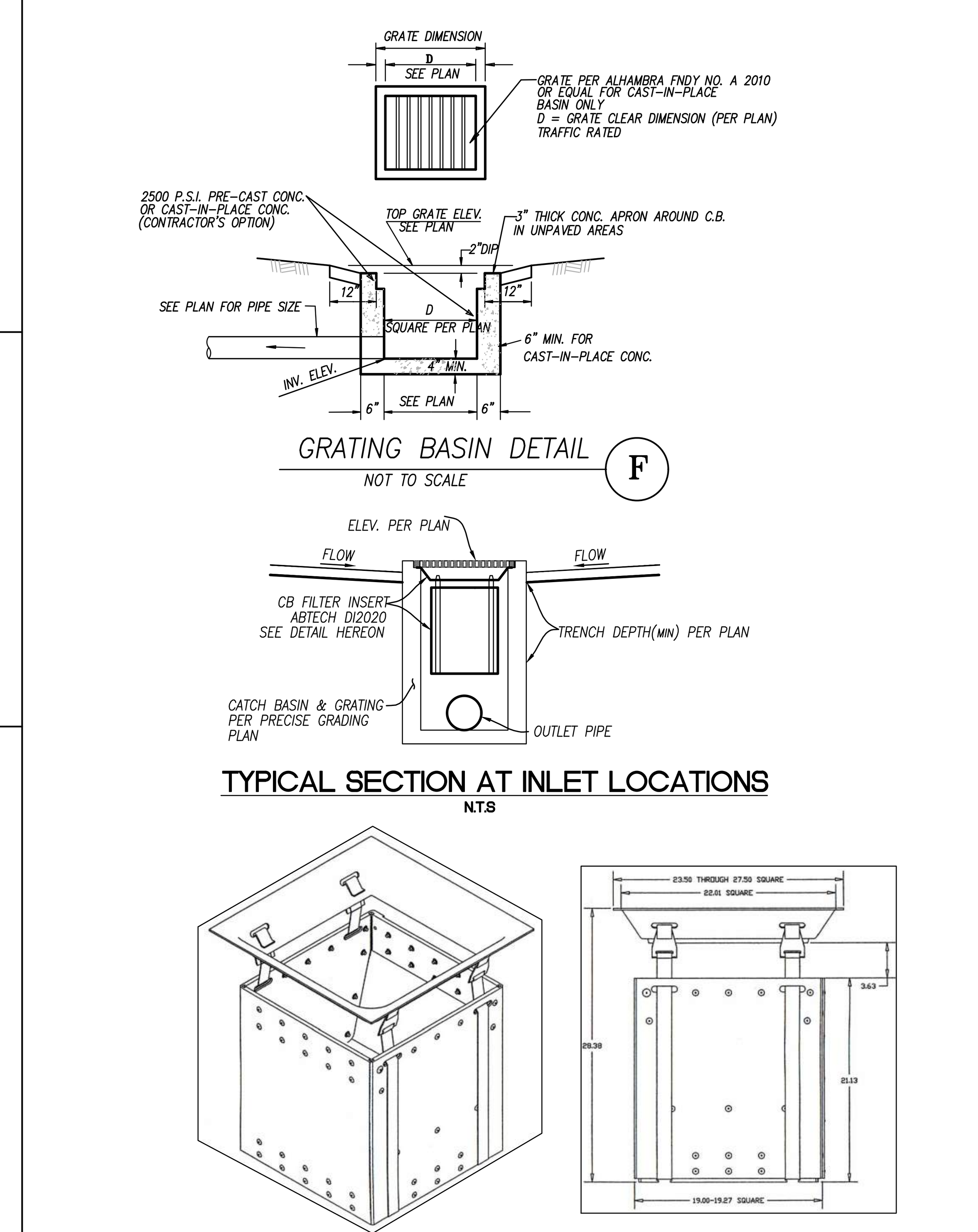
CUT–OFF WALL
NO TO SCALE

PLAN
NO TO SCALE

INLET DETAIL (D)
NO TO SCALE



SPLASH WALL DETAIL (E)
NO TO SCALE

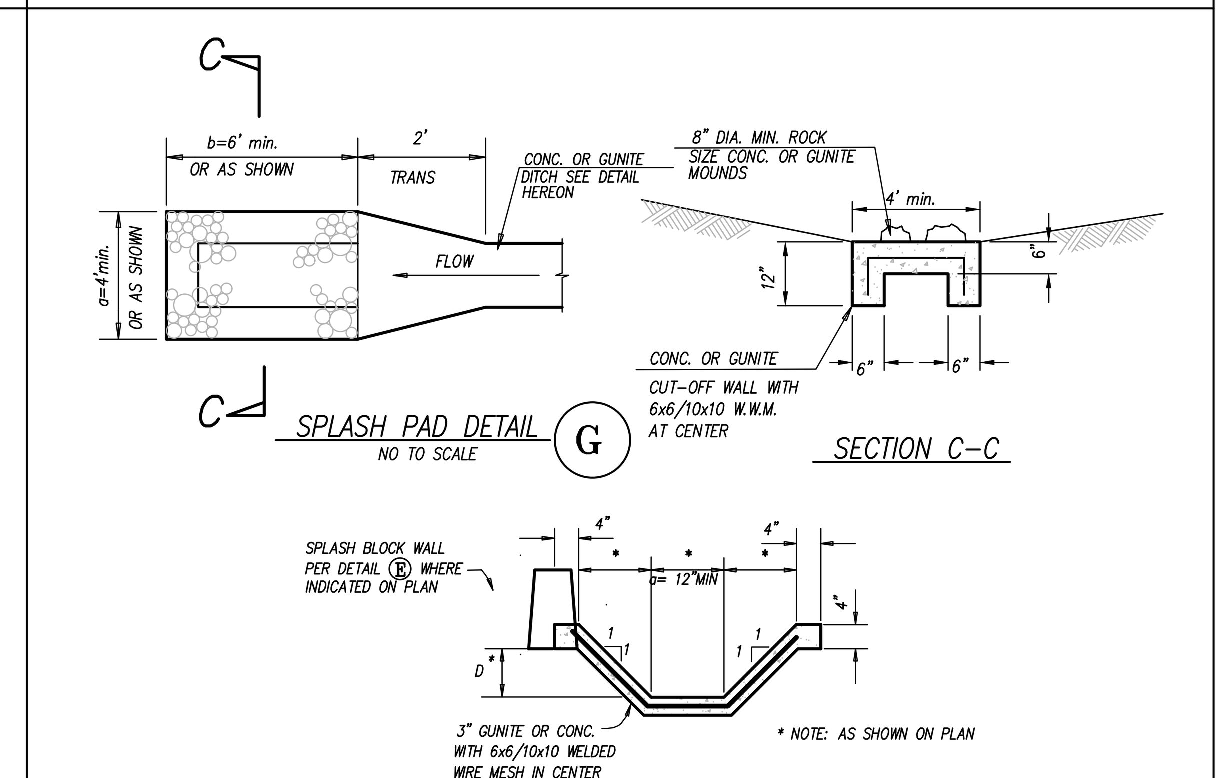


GRATING BASIN DETAIL (F)
NOT TO SCALE

TYPICAL SECTION AT INLET LOCATIONS
N.T.S

ABTECH DI2020 DETAIL
with Straps, Hooks and Collar
N.T.S

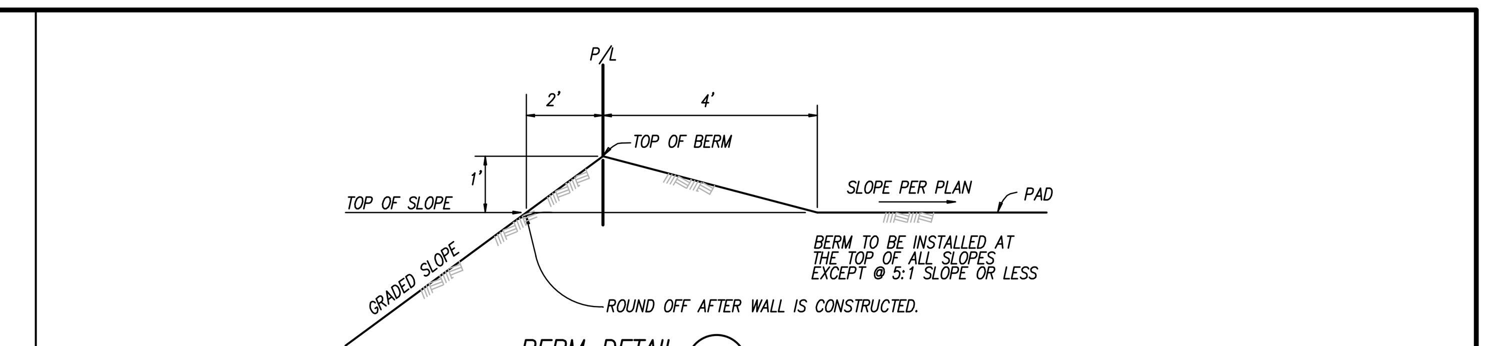
- FLOW RATES THROUGH FILTERS EXCEED 500GPM
- REMOVES UP TO 95% OF HYDROCARBONS PRESENT IN STORMWATER RUNOFF



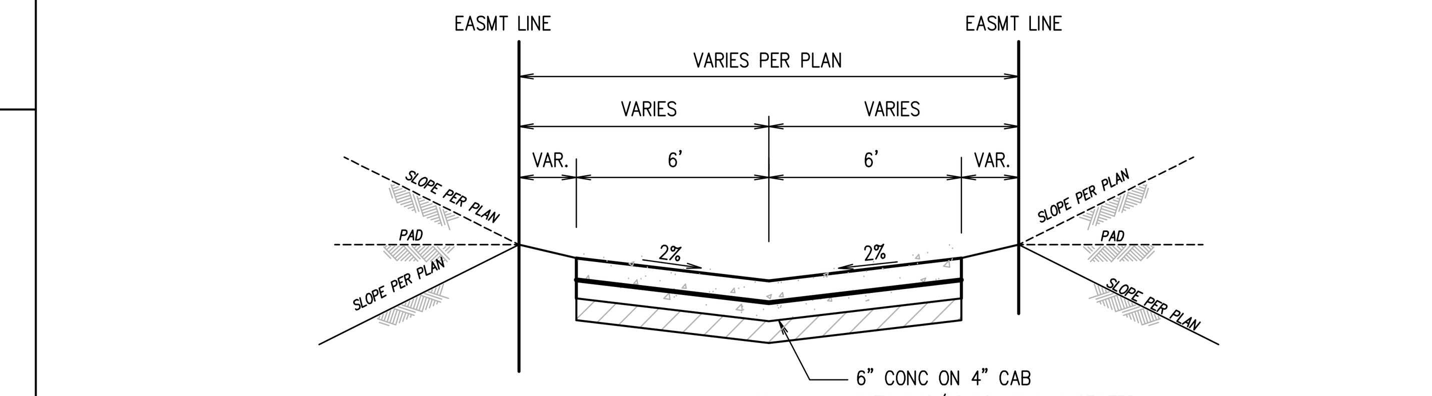
SPLASH PAD DETAIL (G)
NO TO SCALE

SECTION C–C

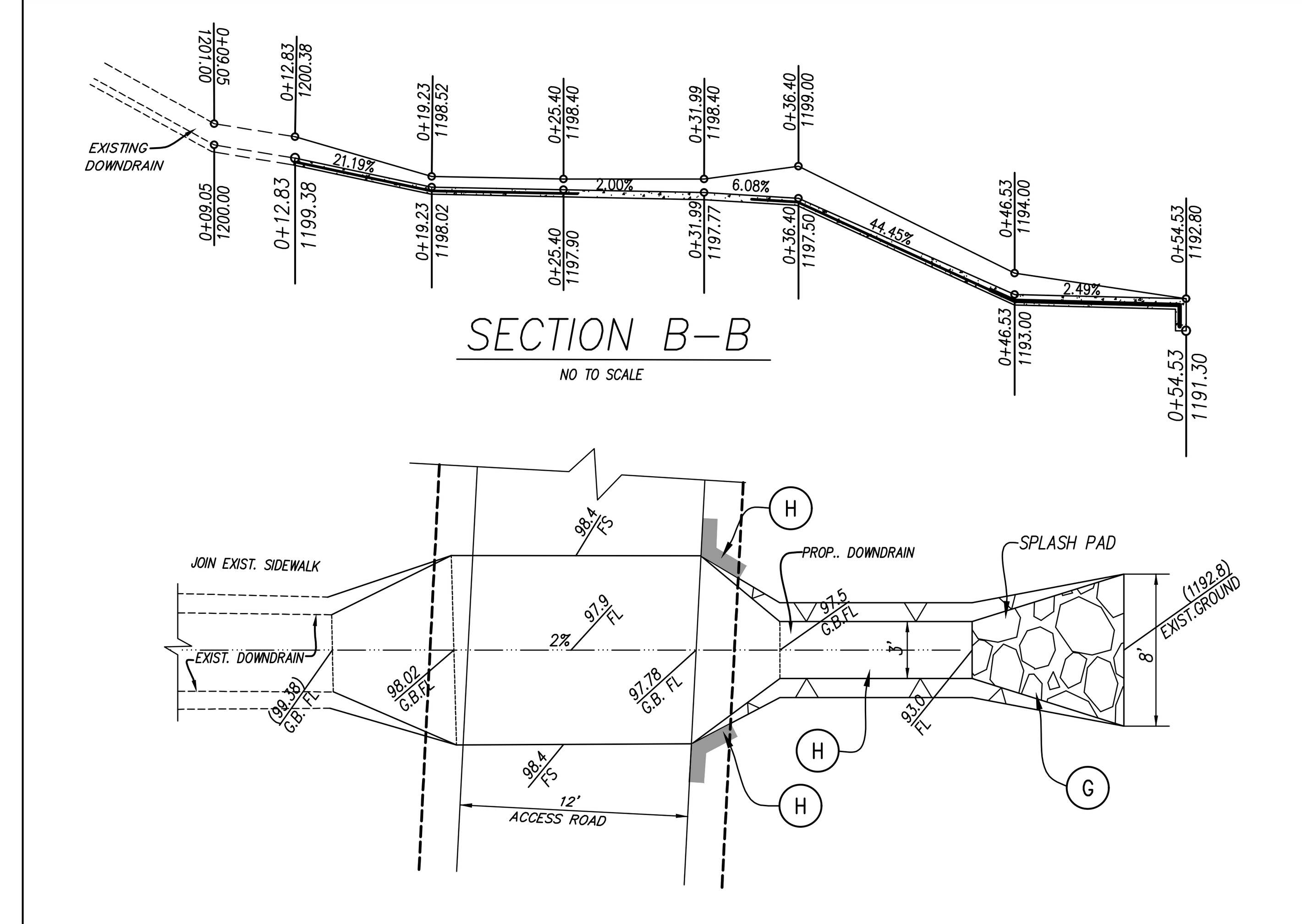
DOWNDRAIN DETAIL (H)
NOT TO SCALE



BERM DETAIL (J)
NO TO SCALE

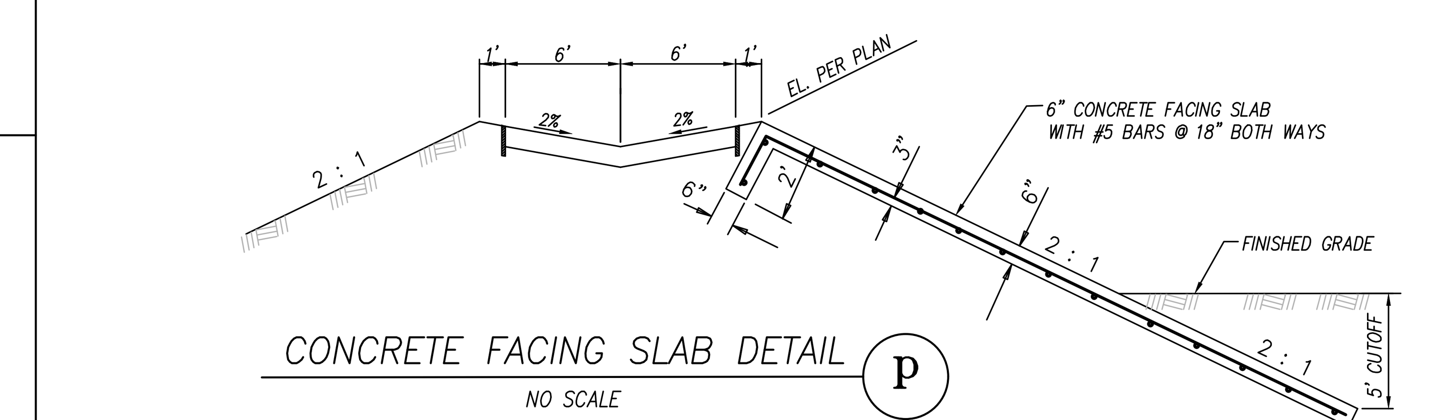


TYPICAL ACCESS ROAD (K)
NOT TO SCALE



SECTION B–B
NO SCALE

CONC. DRAINAGE APRON (N)
NO SCALE



CONCRETE FACING SLAB DETAIL (P)
NO SCALE

CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY:
DATE:

THIS SET OF PLANS AND SPECIFICATION MUST BE KEPT ON THE JOB AT ALL TIMES. IT IS UNLAWFUL TO MAKE ANY CHANGES OR ALTERNATIONS ON SAME WITHOUT WRITTEN PERMISSION FROM THE DEVELOPMENT SERVICES DIVISION.

THE STAMPING OF THESE PLANS AND SPECIFICATIONS SHALL NOT BE USED AS A SUBSTITUTE FOR PERMIT OR MEANS AS AN APPROVAL OF ANY VIOLATION OF THE PROVISIONS OF ANY CITY OR COUNTRY ORDINANCE OR STATE LAW.

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GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS, CA 91406
TEL. (818) 785-2158 FAX (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 1/15/2020 DATE

PROFESSIONAL GEOLOGIST — Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL — KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL — STATE OF CALIFORNIA

PREPARED FOR:
TMC PROPERTIES, INC.
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ATTN: MARK SULLIVAN (661)259–4400

PREPARED BY:
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REGISTERED PROFESSIONAL ENGINEER — DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL — STATE OF CALIFORNIA
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
△				

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646

SCALE:	AS SHOWN
DATE:	11/12/2019
JOB NO.	5099-037-02
CASE NO.	GRA18-00019
SHEET:	2 OF 11

GRA18-00019

CONSTRUCTION NOTES

1. INSTALL 24" RCP
2. CONSTRUCT GRATING BASIN WITH ABTECH FILTER 17EA (DETAIL F ON SHT 2)
3. CONSTRUCT TOP OF CUT DRAIN (DETAIL A ON SHT 2)
4. CONSTRUCT INLET 1 EA (DETAIL D ON SHT 2)
5. CONSTRUCT SPLASH PAD 3EA (DETAIL G ON SHT 2)
6. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL C ON SHT 2)
7. CONSTRUCT "V" DITCH (DETAIL B ON SHT 2)
8. CONSTRUCT DOWNDRAIN (DETAIL D ON SHT 2)
9. CONSTRUCT SPLASH WALL (DETAIL E ON SHT 2)
10. CONSTRUCT 3' TRANSITION FROM DETAIL A TO DETAIL D
11. CONSTRUCT ACCESS ROAD (DETAIL K ON SHT 2)
12. CONSTRUCT DRIVEWAY PER DETAIL ON STREET PLAN
13. CONSTRUCT DRIVEWAY PER STD. DETAIL STREET PLAN
14. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL N ON SHT 2)

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CITY OF SANTA CLARITA
APPROVED
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GRADING AND DRAINAGE
CHAPTER 17
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BY: ____________

DATE: ____________

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PLANS PREPARED UNDER THE DIRECTION OF: 1/15/2020
LANCE R. PUTNAM # 2469 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

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REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	SHORTENED SPRINGBROOK AVENUE & REVISED STORM DRAIN LINES. SHEET 3 SUPERSEDED BY SHEET 3A	DOUG FARMER, RCE 49041		

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646

SCALE:	AS SHOWN
DATE:	11/12/2019
JOB NO.	5099-037-02
CASE NO:	GRA18-00019
SHEET:	3A OF 11

GRA18-00019

CONSTRUCTION NOTES

1. INSTALL 24" RCP
2. CONSTRUCT GRATING BASIN WITH ABTECH FILTER 17EA (DETAIL F ON SHT 2)
3. CONSTRUCT TOP OF CUT DRAIN (DETAIL A ON SHT 2)
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13. CONSTRUCT DRIVEWAY PER STD. DETAIL STREET PLAN
14. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL N ON SHT 2)

SCALE: 1" = 40'

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CITY OF SANTA CLARITA
APPROVED
FOR
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CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY: ____________

DATE: ____________

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GRA18-00019

GEOTECHNICAL REVIEW BY:

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PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 — 1/15/2020 DATE

PROFESSIONAL GEOLOGIST — Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

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REGISTERED PROFESSIONAL ENGINEER — DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL — STATE OF CALIFORNIA

PROJECT ENGINEER — DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	SHORTENED SPRINGBROOK AVENUE & REVISED STORM DRAIN LINES. SHEET 4 SUPERSEDED BY SHEET 4A	DOUG FARMER, RCE 49041		

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646

SCALE: AS SHOWN
DATE: 11/12/2019
JOB NO. 5099-037-02
CASE NO: GRA18-00019
SHEET: 4A OF 11

CONSTRUCTION NOTES

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13. CONSTRUCT DRIVEWAY PER STD. DETAIL STREET PLAN
14. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL N ON SHT 2)

SCALE: 1" = 40'

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CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY:

DATE:

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GRA18-00019

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PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 1/15/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

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REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	REVISED GRADING AND STORM DRAIN LINES AS SHOWN SHEET 5 SUPERSEDED BY SHEET 5A	DOUG FARMER, RCE 49041		

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646

SCALE:	AS SHOWN
DATE:	11/12/2019
JOB NO.	5099-037-02
CASE NO.	GRA18-00019
SHEET:	5A OF 11

CONSTRUCTION NOTES

1. INSTALL 24" RCP
2. CONSTRUCT GRATING BASIN WITH ABTECH FILTER 17EA (DETAIL F ON SHT 2)
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CITY OF SANTA CLARITA
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CHAPTER 17
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BY: ____________

DATE: ____________

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PLANS PREPARED UNDER THE DIRECTION OF:

LANCE R. PUTNAM # 2469 — 1/15/2020 DATE

PROFESSIONAL GEOLOGIST — Lance R. Putnam — No. 2469 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — KAREN L. MILLER — No. 2257 — Exp. 3/31/20 — GEOTECHNICAL — STATE OF CALIFORNIA

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REGISTERED PROFESSIONAL ENGINEER — DOUG FARMER — No.49041 — Exp. 09-30-2020 — CIVIL — STATE OF CALIFORNIA

PROJECT ENGINEER — DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
△				

CITY OF SANTA CLARITA

ROUGH GRADING PLAN

PARCEL MAP 062646

SCALE: AS SHOWN
DATE: 11/12/2019
JOB NO. 5099-037-02
CASE NO: GRA18-00019
SHEET: 6 OF 11

GRA18-00019

SCALE: HOR. 1"= 40'
VERT.1"= 8'

CONSTRUCTION NOTES

▲ CONSTRUCT PER STREET PLAN.
CATCH BASIN MODIFIED TO INCLUDE CATCH BASIN FILTER BY ABTECH INDUSTRIES MODEL C01414 WITH OARS OR APPROVED EQUAL.

CURVE DATA

⬡	DELTA	RADIUS	LENGTH	TANGENT
1	32°44'02"	22.50'	12.85'	6.61'
2	35°0'35"	323.00'	197.36'	101.87'
3	47°59'36"	22.50'	18.85'	10.02'

PLAN OF LINE "B"
(TO BE PRIVATELY MAINTAINED)

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

CONSTRUCTION NOTES

▣ CONSTRUCT PER STREET PLAN.
CATCH BASIN MODIFIED TO INCLUDE CATCH BASIN FILTER BY ABTECH INDUSTRIES MODEL C01414 OR APPROVED EQUAL.

DIGALERT
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CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY: ____________

DATE: ____________

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GRA18-00019

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PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 1/15/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

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PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	REVISED PLAN AND PROFILE OF LINE "B" AND LAT'S SHEET 7 SUPERSEDED BY SHEET 7A	DOUG FARMER, RCE 49041		

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LINE "B"

SCALE: AS SHOWN
DATE: 07/05/2018
JOB NO. 5099-037-02
CASE NO. GRA11-00005
SHEET: 7A OF 11

SCALE: HOR. 1"= 40' VERT.1"= 8'

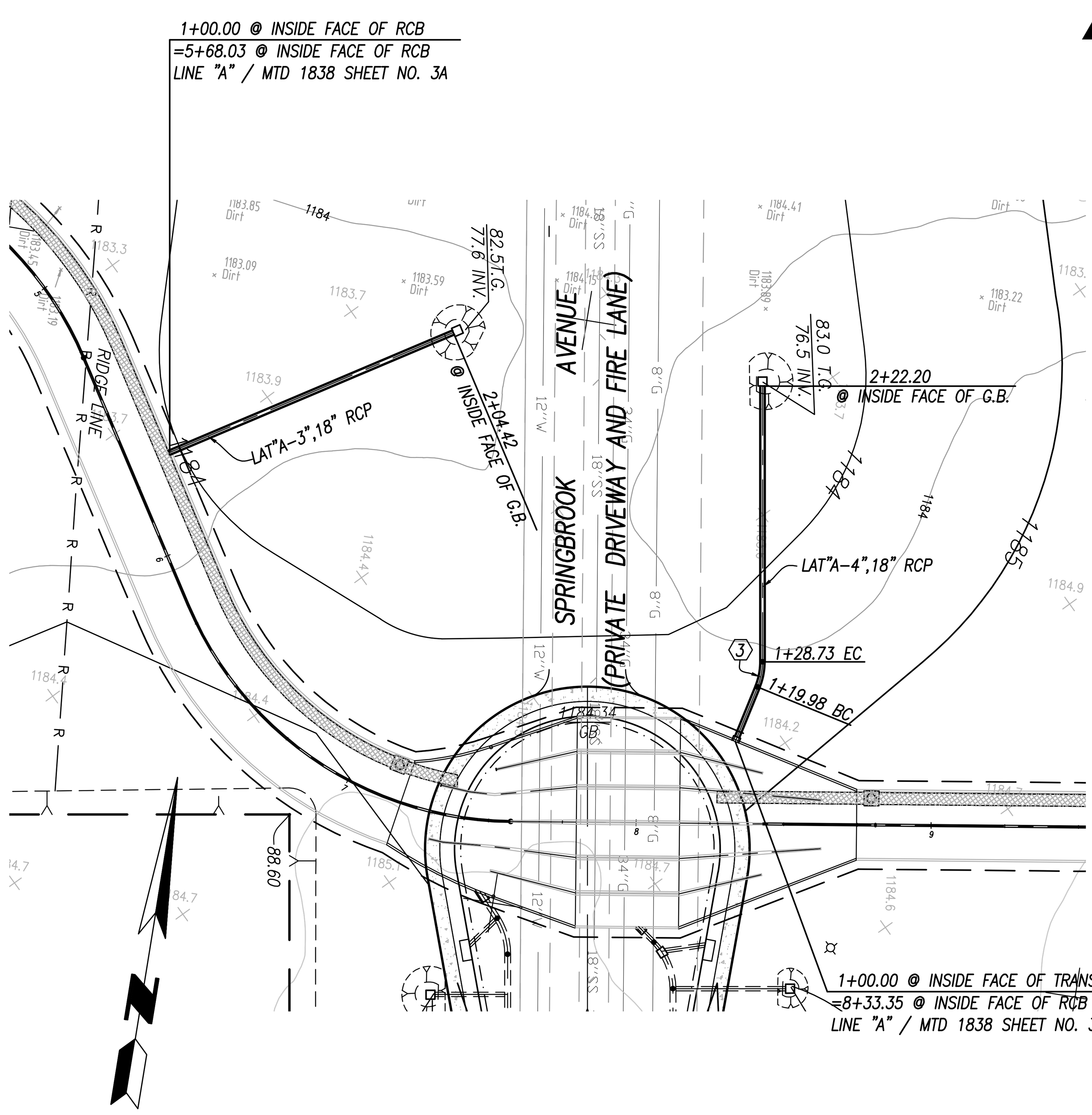
LAT "A-3"
SCALE: HORIZ. 1"=40' VERT. 1"=8' (SEE PLAN HEREON)

LAT "A-4"
SCALE: HORIZ. 1"=40' VERT. 1"=8' (SEE PLAN HEREON)

LAT "C-1"
SCALE: HORIZ. 1"=40' VERT. 1"=8' (SEE PLAN HEREON)

LAT "C-2"
SCALE: HORIZ. 1"=40' VERT. 1"=8' (SEE PLAN HEREON)

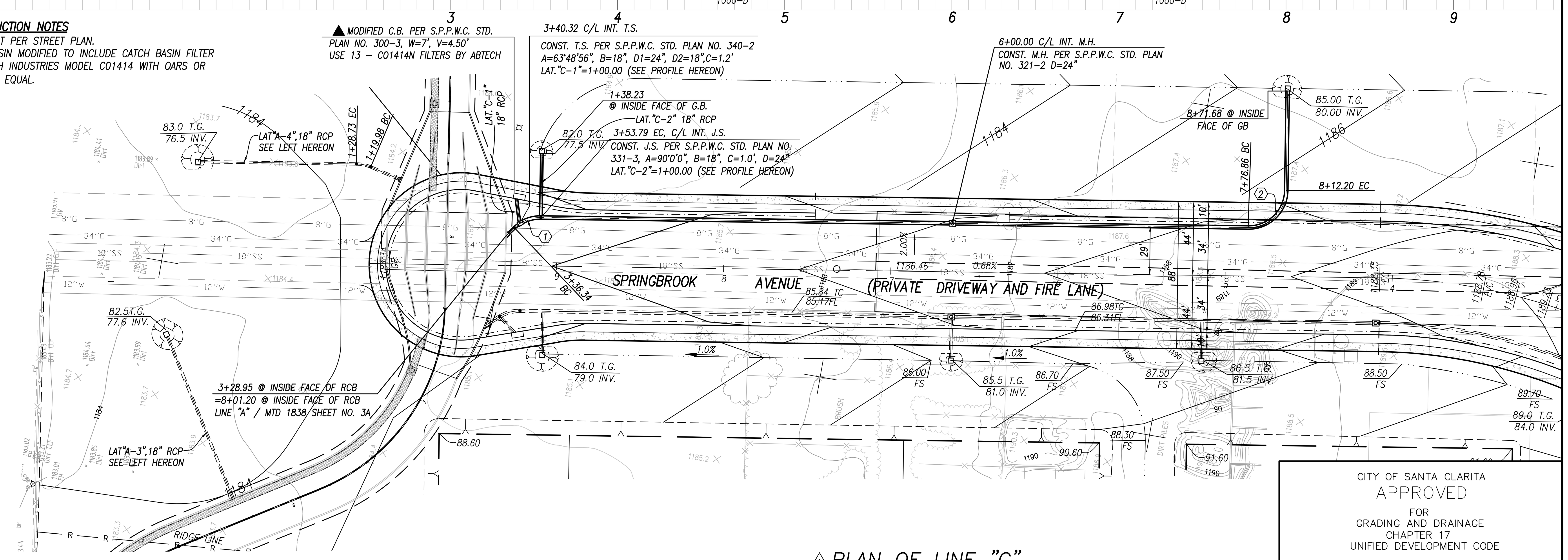
PROFILE OF LINE "C"
(TO BE PRIVATELY MAINTAINED)



PLAN OF LAT'S "A-3" & "A-4"
(TO BE PRIVATELY MAINTAINED)

CONSTRUCTION NOTES

▲ CONSTRUCT PER STREET PLAN. CATCH BASIN MODIFIED TO INCLUDE CATCH BASIN FILTER BY ABTECH INDUSTRIES MODEL C01414 WITH OARS OR APPROVED EQUAL.



PLAN OF LINE "C"
(TO BE PRIVATELY MAINTAINED)

CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
1	44°26'30"	22.50'	17.45'	9.19'
2	78°5'29"	22.50'	30.67'	18.25'
3	22°16'23"	22.50'	8.75'	4.43'

SCALE: 1" = 40'

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CHAPTER 17
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BY:

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GRA18-00019

GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS CA, 91406
TEL. (818) 785-2158 FAX. (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 1/15/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

PREPARED FOR:
TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

PREPARED BY:
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info@sikand.com

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	REVISED PLAN AND PROFILE OF LINE "C" AND LAT'S REVISED PLAN AND PROFILE OF LAT'S "A-3" & "A-4" SHEET 8 SUPERSEDED BY SHEET 8A	DOUG FARMER, RCE 49041		

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LINE "C"
LATERALS "A-3" & "A-4"

SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099-037-02
CASE NO.	GRA11-00005
SHEET:	8A OF 11

SCALE: HOR. 1"= 40' VERT.1"= 8'

△ LAT "A–5"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE MTD 1838 PLAN SHEET NO. 3A)

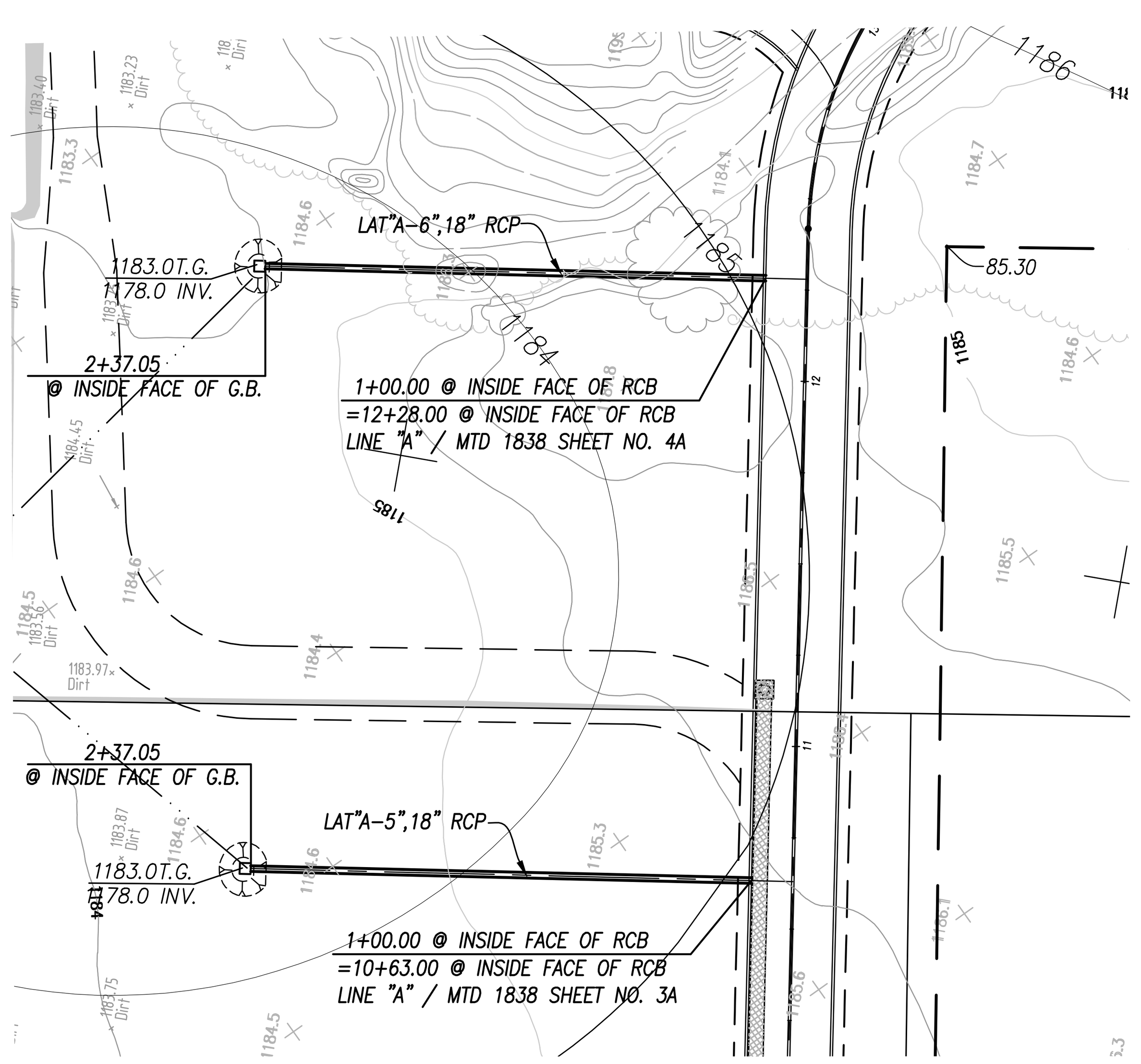
△ LAT "A–6"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE MTD 1838 PLAN SHEET NO. 4A)

△ PROFILE OF LINE "F"
(TO BE PRIVATELY MAINTAINED)

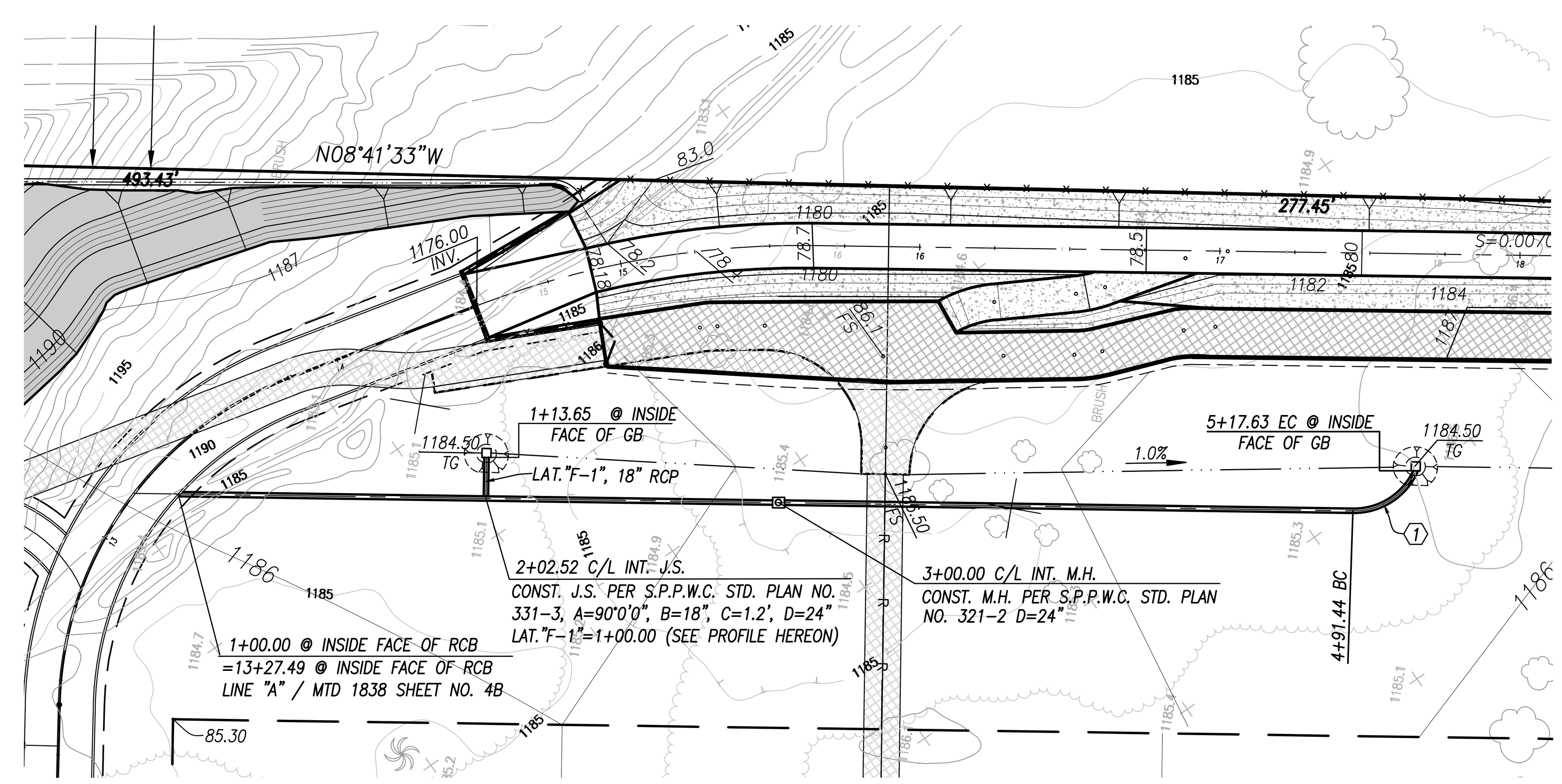
△ LAT "F–1"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE PLAN HEREON)

△ LAT "B–2"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE PLAN ON SHEET 7)

△ LAT "B–3"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE PLAN ON SHEET 7)



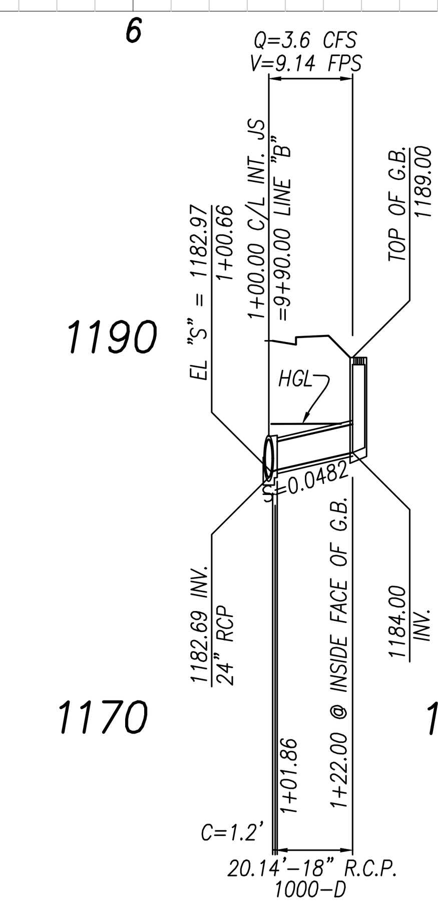
△ PLAN OF LAT'S "A–5" & 'A–6"
(TO BE PRIVATELY MAINTAINED)



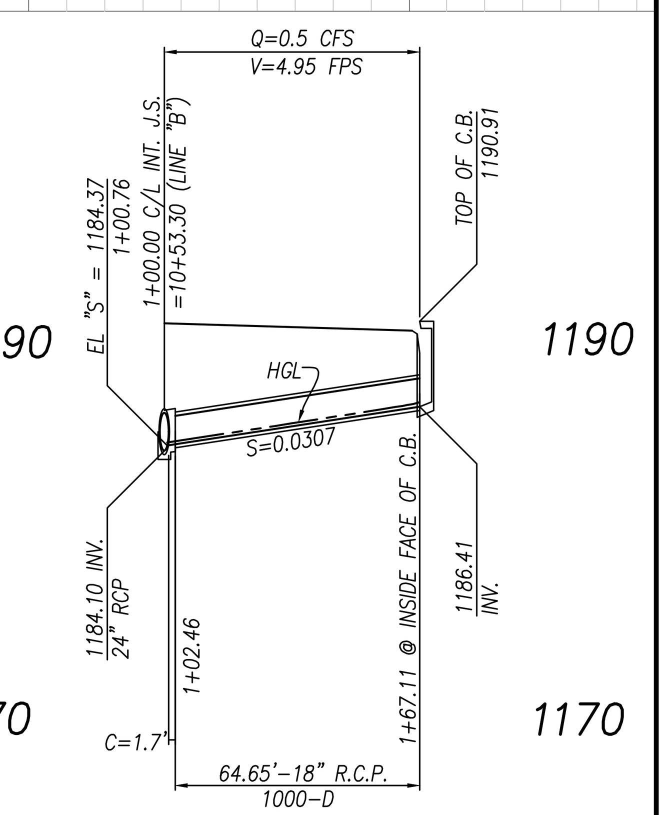
	CURVE DATA			
	DELTA	RADIUS	LENGTH	TANGENT
1	66°41'42"	22.50'	26.19'	14.81'

△ PLAN OF LINE "F"
(TO BE PRIVATELY MAINTAINED)

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



△ LAT "B–4"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE PLAN ON SHEET 7)



△ LAT "B–5"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE PLAN ON SHEET 7)

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BY: __________

DATE: __________

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REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

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PROJECT ENGINEER DATE

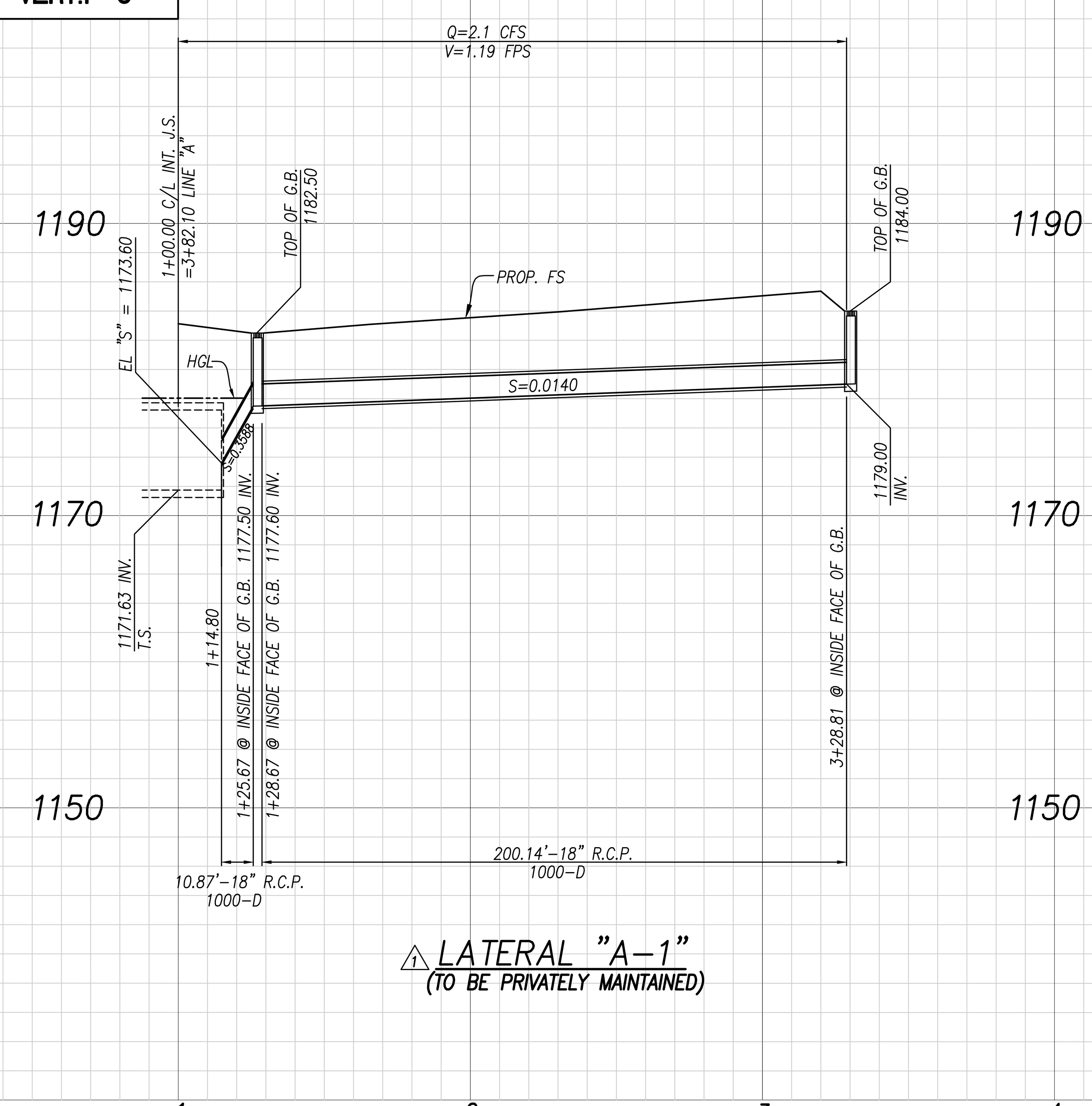
NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
△	DELETED LINE "D", ADDED PLAN AND PROFILE OF LINE "F", REVISED PLAN AND PROFILE OF LAT'S "A–5" & "A–6" & REVISED PROFILE OF LAT'S "B–2" TO "B–5" SHEET 9 SUPERSEDED BY SHEET 9A	DOUG FARMER, RCE 49041		

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LATERALS

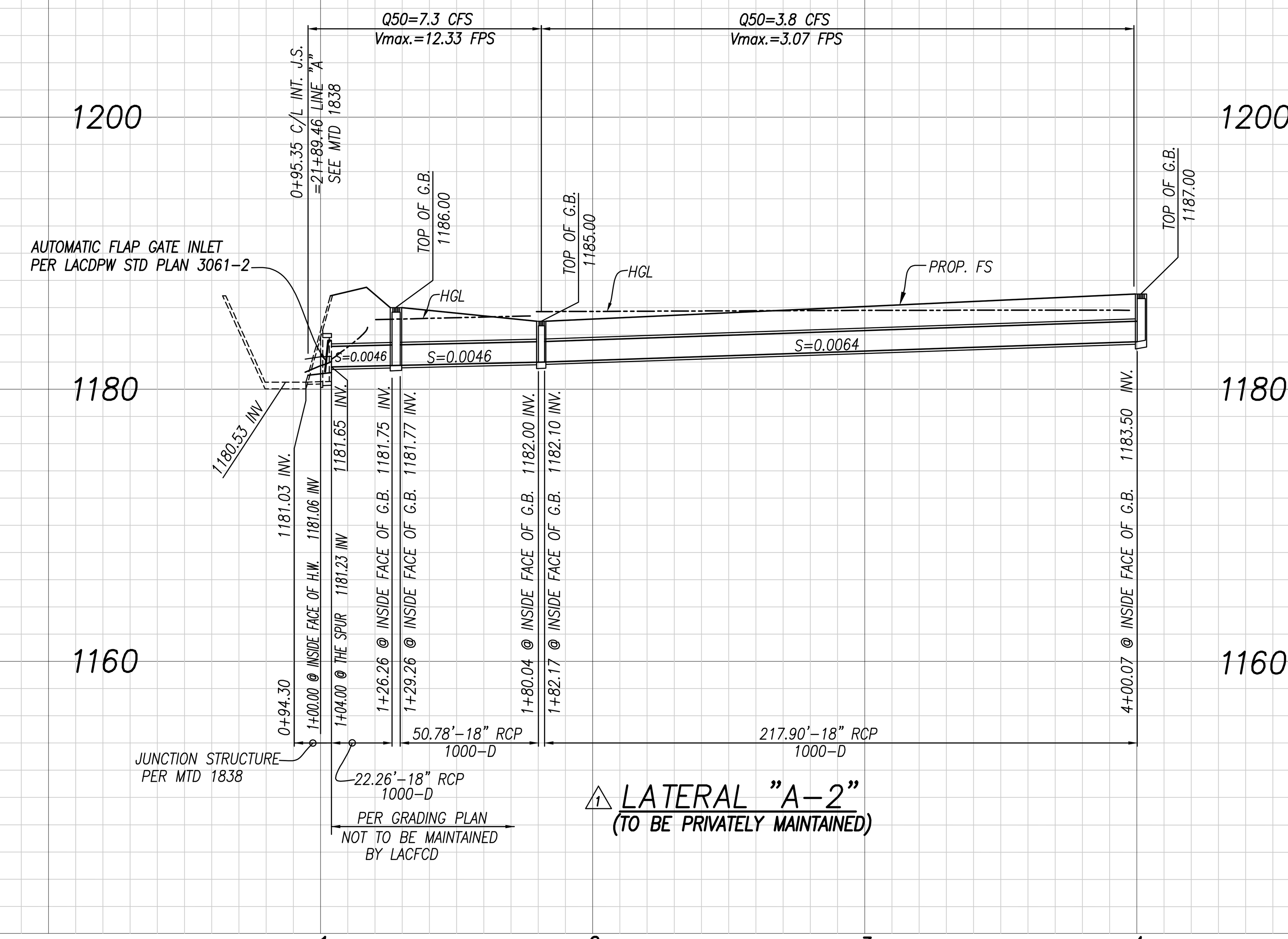
SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099–037–02
CASE NO.	GRA11–00005
SHEET:	9A OF 11

GRA18–00019

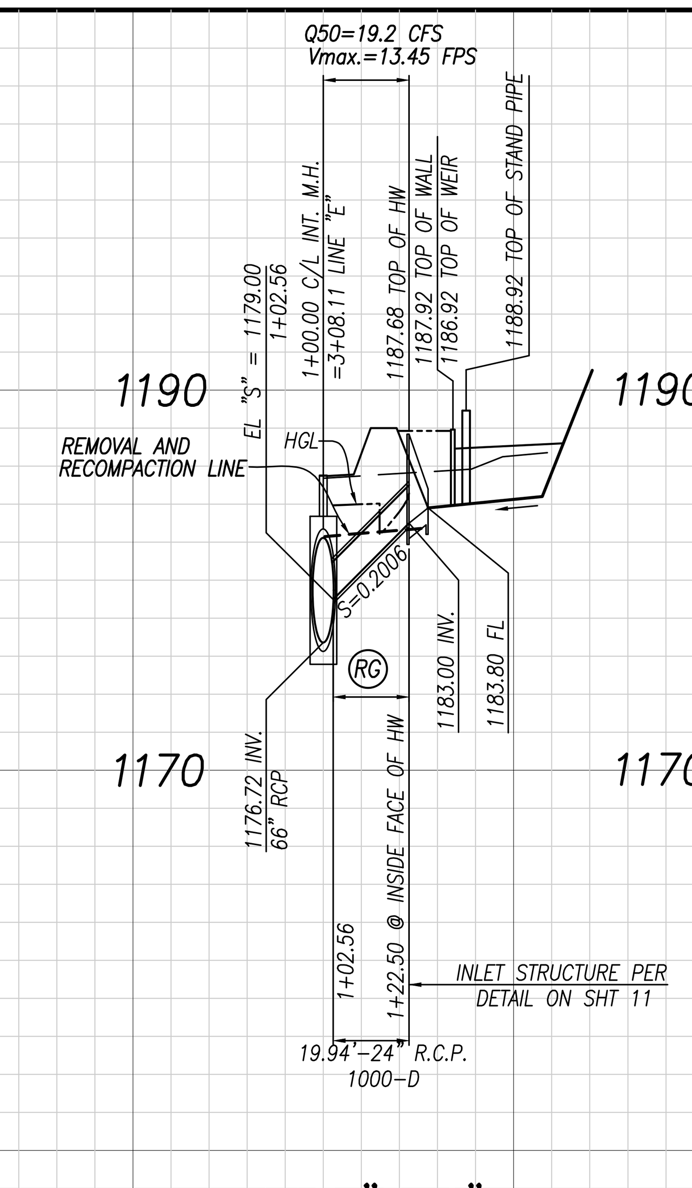
SCALE: HOR. 1"= 40'
VERT.1"= 8'



LATERAL "A-1"
(TO BE PRIVATELY MAINTAINED)

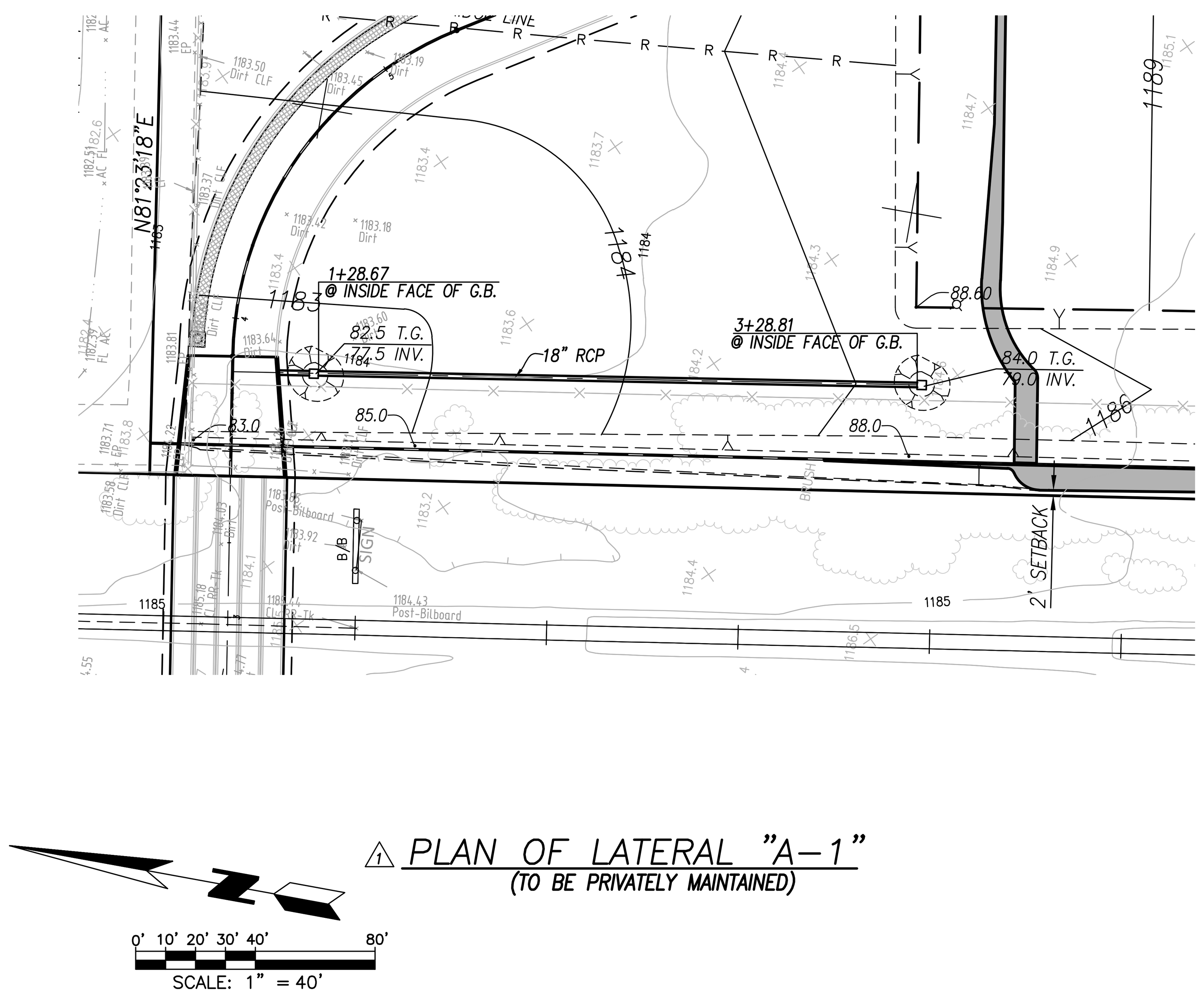


LATERAL "A-2"
(TO BE PRIVATELY MAINTAINED)



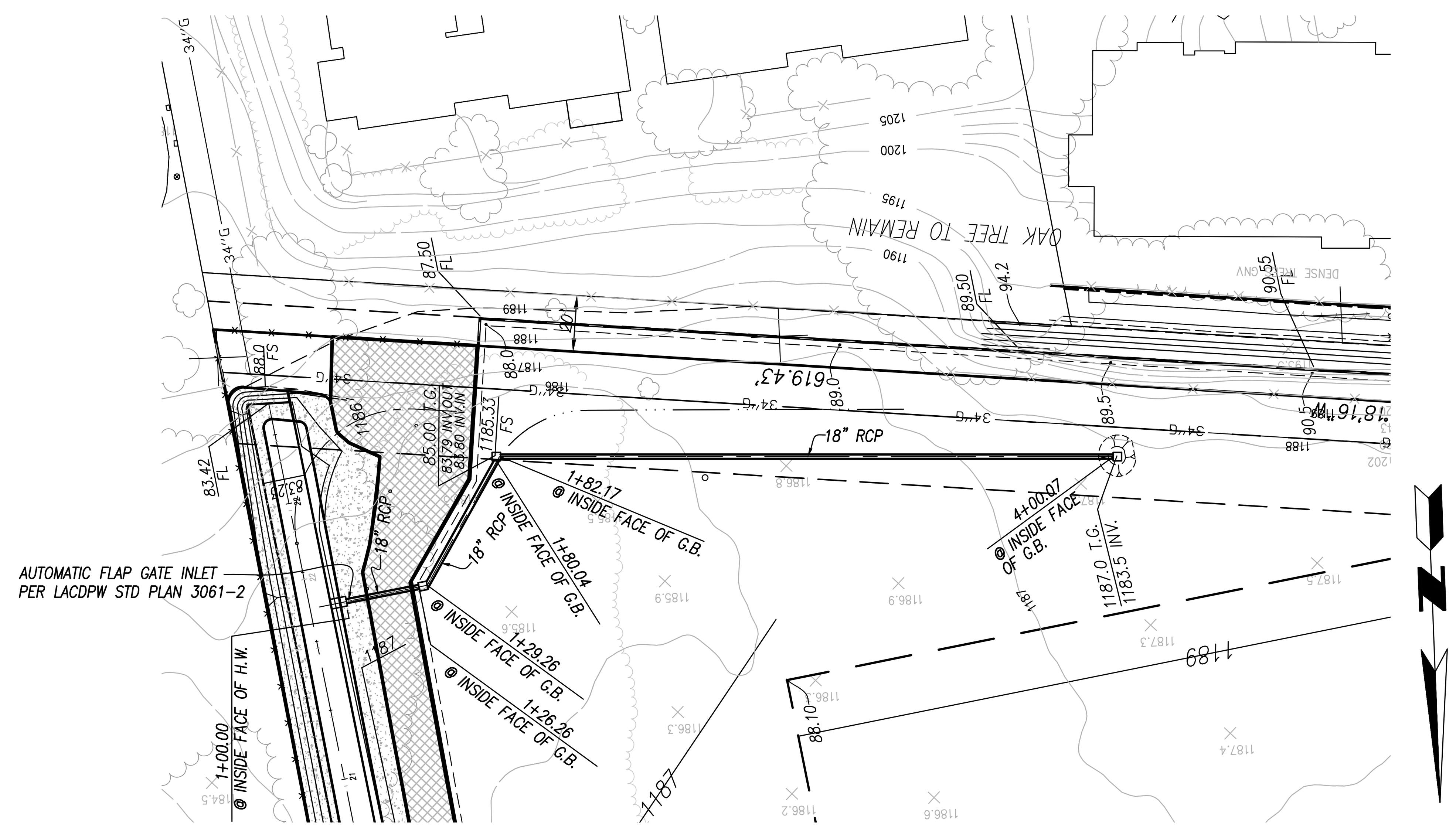
LAT "E-2"
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
(SEE MTD 1838 PLAN
SHEET NO. 5)

RG PROVIDE RUBBER GASKET JOIN PIPE ON BOTH SIDES OF CUT/FILL TRANSITION (3 JOINTS MIN.)



PLAN OF LATERAL "A-1"
(TO BE PRIVATELY MAINTAINED)

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



PLAN OF LATERAL "A-2"
(TO BE PRIVATELY MAINTAINED)

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

CITY OF SANTA CLARITA
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BY: ____________

DATE: ____________

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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/20
GEOTECHNICAL
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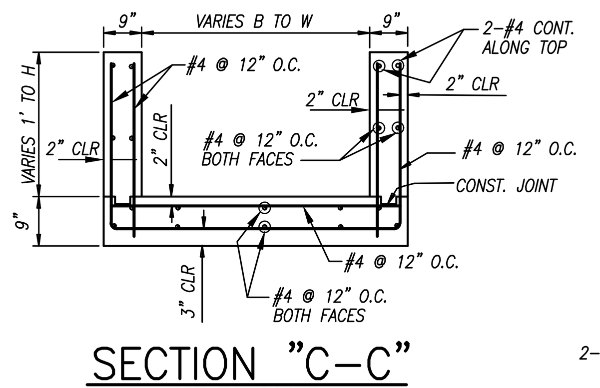
DOUG FARMER
No.49041
Exp. 09-30-2020
CIVIL
STATE OF CALIFORNIA
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	DELETED LAT "D-3-1" AND PROFILE OF LAT'S "E-1", "E-4" AND "E-5". REVISED PLAN AND PROFILE OF LAT "A-2" & ADDED PLAN AND PROFILE OF LAT "A-1" SHEET 10 SUPERSEDED BY SHEET 10A	DOUG FARMER, RCE 49041		

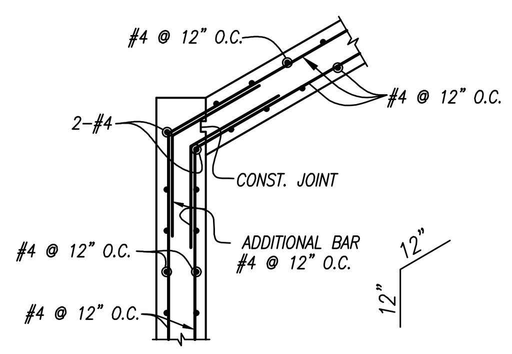
CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LATERAL "A-2" AND LATERAL "D-3-1"

SCALE: AS SHOWN
DATE: 07/05/2018
JOB NO. 5099-037-02
CASE NO. GRA11-00005
SHEET: 10A OF 11

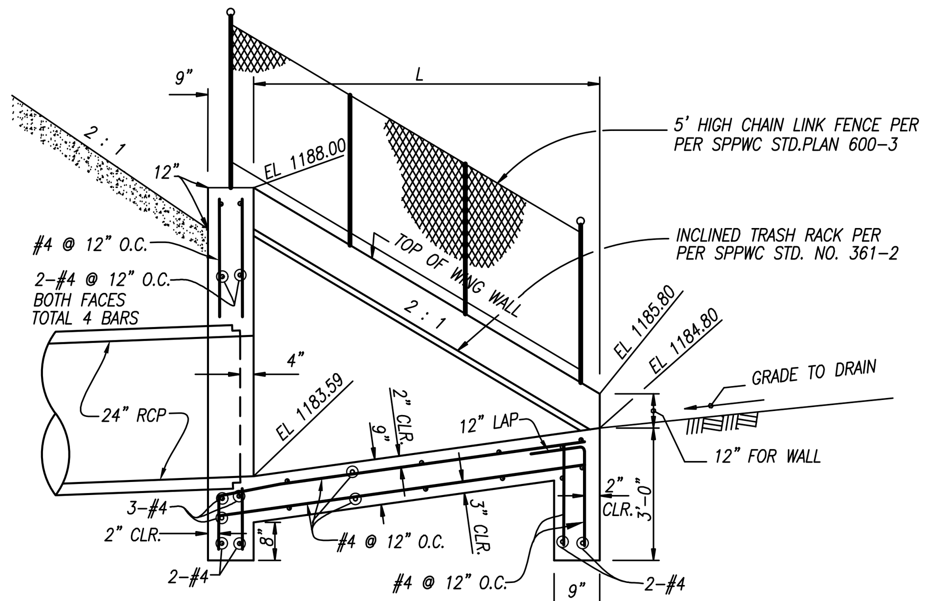
GRA18-00019



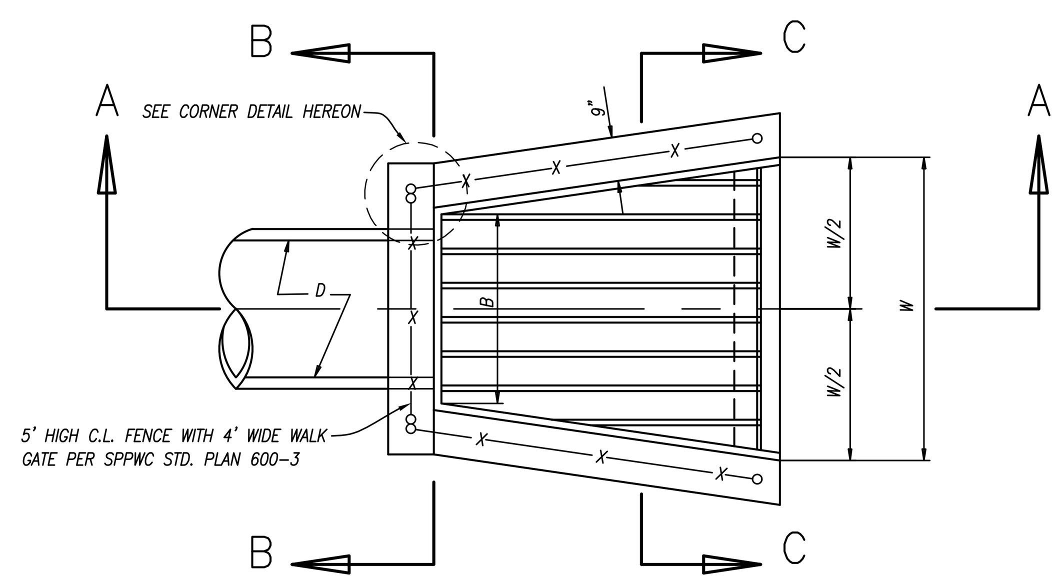
SECTION "C-C"
NOT TO SCALE

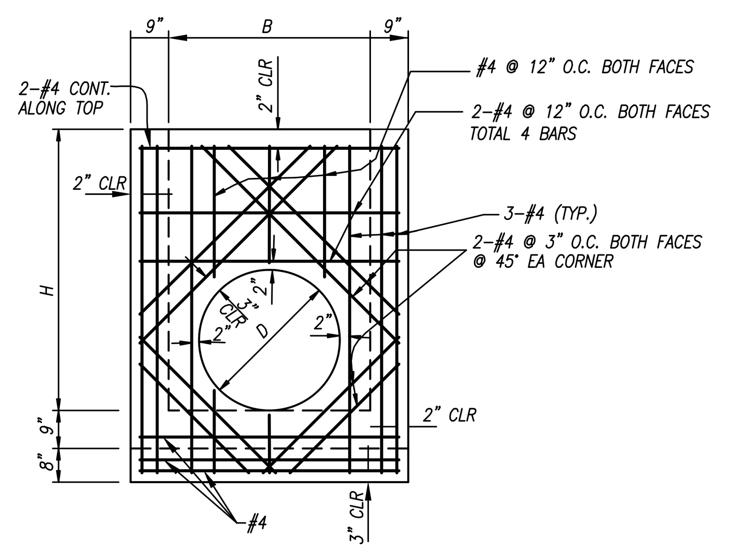


CORNER DETAIL
NOT TO SCALE



SECTION "A-A"
NOT TO SCALE



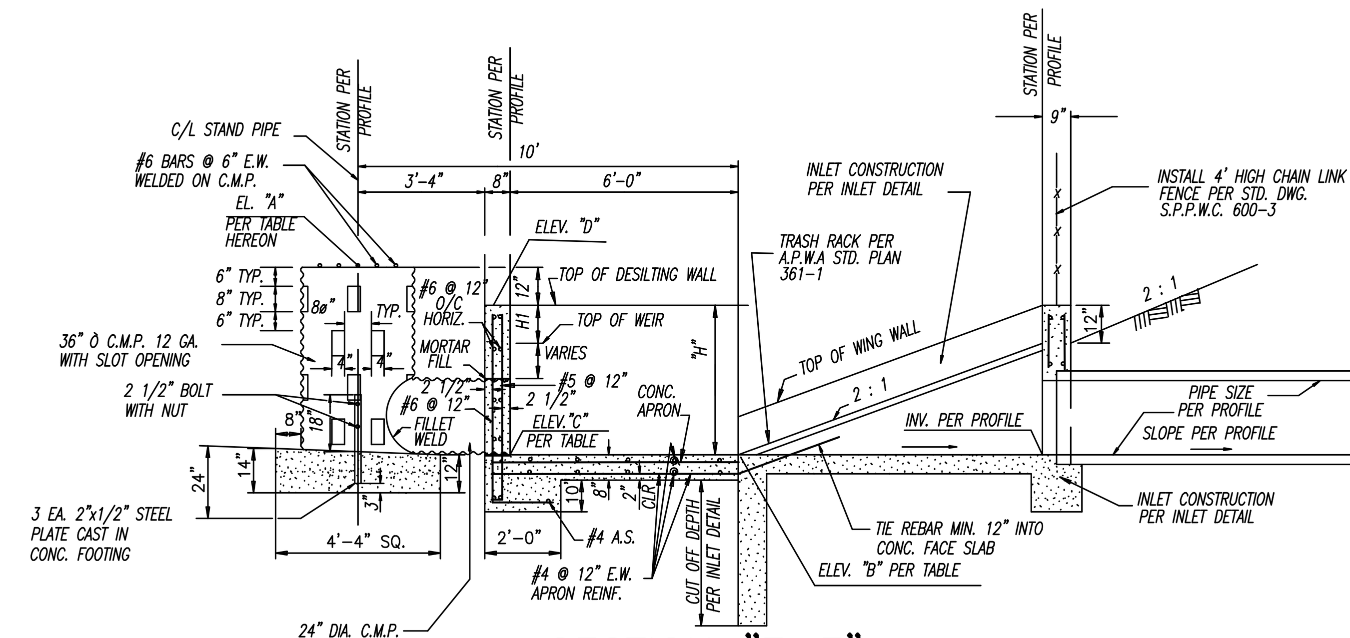


SECTION "B-B"
NOT TO SCALE

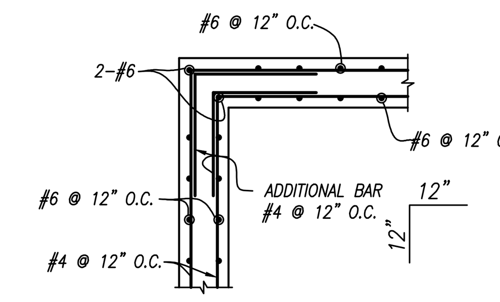
INLET STRUCTURE DIMENSIONS					
LINE	D	L	B	H	W
LAT. E-2	24"	5'	3'	4.68'	4'

DESITING INLET STRUCTURE DETAIL
NOT TO SCALE

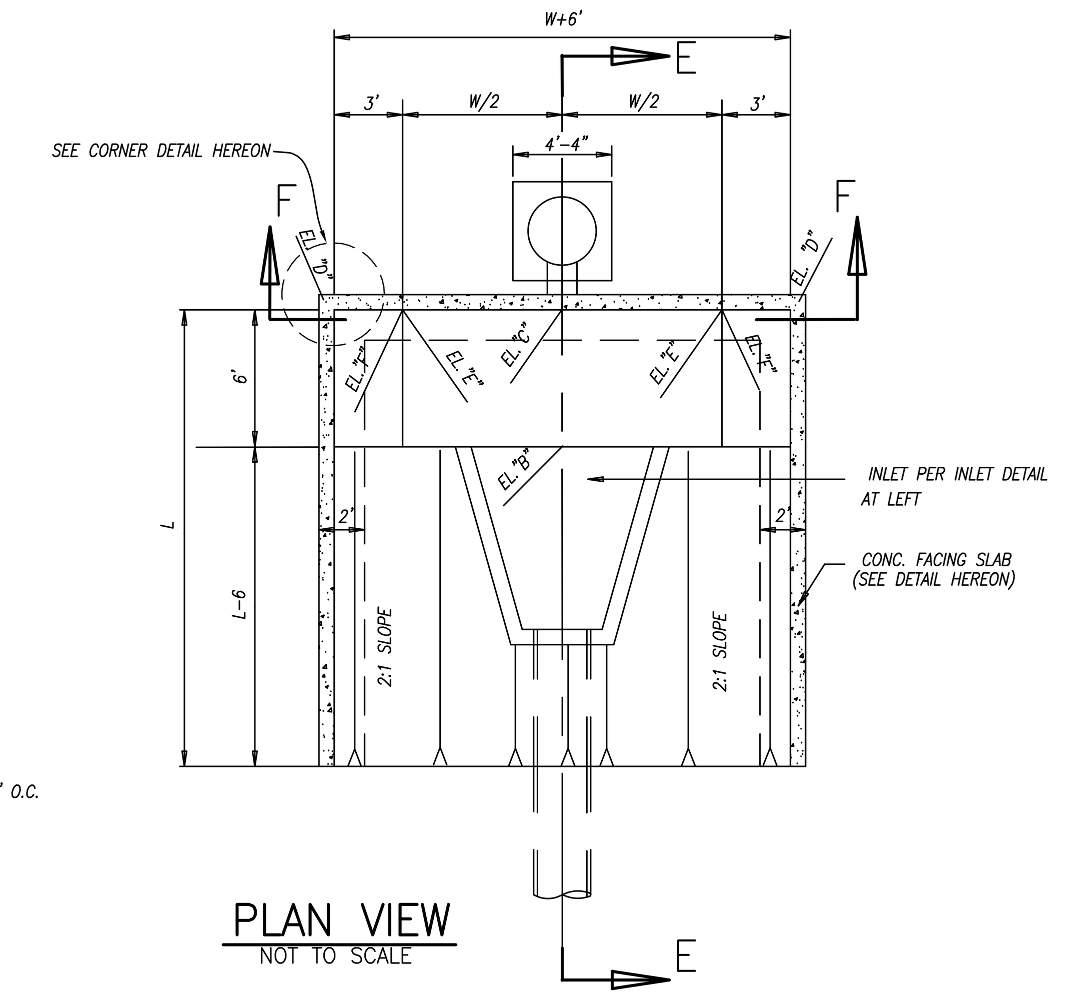
NOT TO BE MAINTAINED BY L.A.C.F.C.D.
HOA MAINTENANCE



SECTION "E-E"
NOT TO SCALE



CORNER DETAIL
NOT TO SCALE



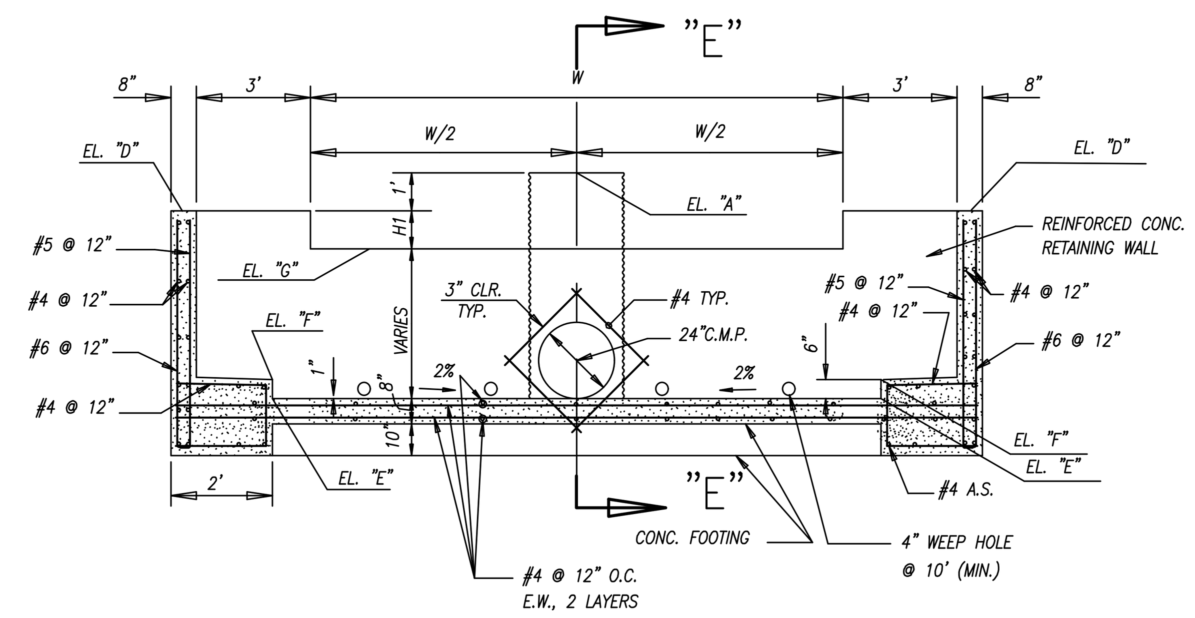
PLAN VIEW
NOT TO SCALE

LINE	EL. "A"	EL. "B"	EL. "C"	EL. "D"	EL. "E"	EL. "F"	EL. "G"
LAT. E-2	1188.92	1183.80	1183.92	1187.92	1183.98	1184.48	1186.92

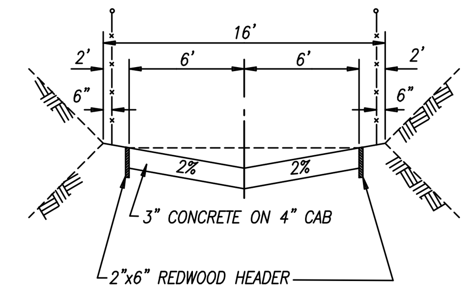
DESILTING WALL DIMENSIONS					
LINE	PLAN SHT. No.	H	W	H1	L
LAT. E-2	4	3'	6'	1'	14.24'

DESILTING WALL & STAND PIPE

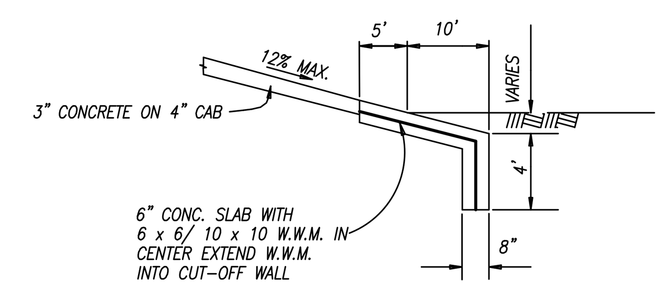
NOT TO BE MAINTAINED BY L.A.C.F.C.D.
HOA MAINTENANCE



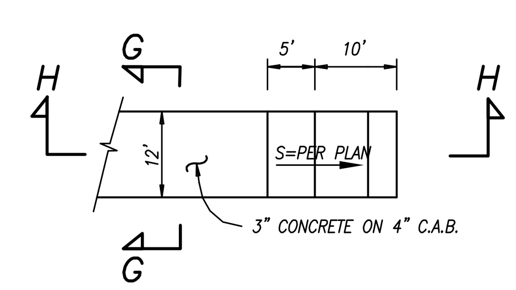
SECTION "F-F"
DESILTING WALL & STAND PIPE
NOT TO SCALE



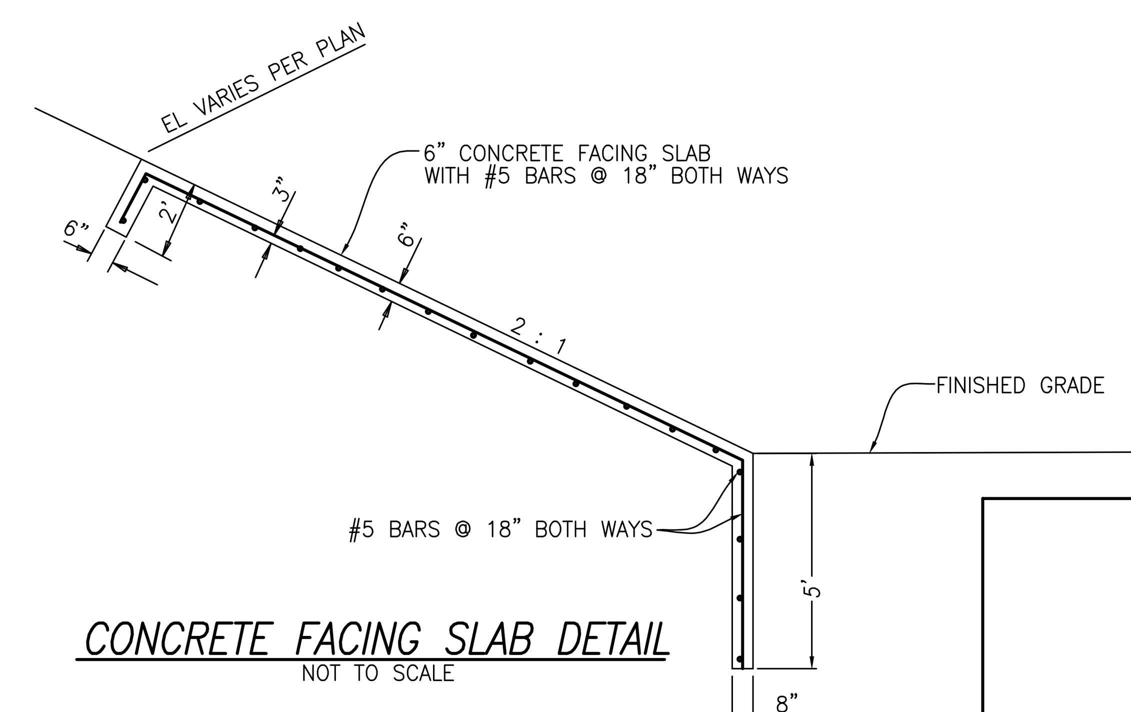
SECTION G-G
NOT TO SCALE



SECTION H-H
(CUTOFF WALL)
NOT TO SCALE



ACCESS ROAD DETAILS
NOT TO SCALE



CONCRETE FACING SLAB DETAIL
NOT TO SCALE

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△				

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
LATERAL "E-2"

SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099-037-02
CASE NO.	GRA11-00005
SHEET:	11 OF 11

GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

March 1, 2021
W.O. 6457

TMC PROPERTIES, LLC
P.O. Box 800970
Santa Clarita, California 91380-0970

Attention: Mr. Randy Wrage

Subject: Pavement Section Recommendations, Parcel Map 062646, Santa Clarita, California

Dear Mr. Wrage:

As requested, GeoSoils Consultants, Inc. (GSC) has prepared this letter regarding pavement design for the project site. Representative soil samples were obtained from the near surface materials for "R" value testing. The results are provided in Appendix A. Based on the R-value, the following recommendations may be utilized for a Traffic Index (TI) of 9. It is understood existing utility lines underlying Springbrook Avenue limits remove and recompaction and therefore will require the use of geotextiles to mitigate the areas above the utilities. Table 1 provides pavement recommendations that may be applied with or without geogrid, dependent on the project needs.

TABLE 1
PAVEMENT RECOMMENDATIONS

Traffic Index	Subgrade "R"-value	Geogrid	AC Thickness (inches)	Class 2 Aggregate(1) Base Thickness (inches)
9	69	None	5.0	4.2
		Tensar Triax TX8 (2)	5.0	4.2

(1) CalTrans Class 2 Aggregate Base, R≥78, SE ≥ 22 (or approved equivalent).
(2) Tensar Triax to be installed per manufacturer's guidelines

The recommended pavement sections provided above are meant as minimums. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases

MDN 21958

beyond that intended, as reflected by the traffic indexes used for design, increased maintenance and repair could be required for the pavement section.

PAVEMENT GRADING RECOMMENDATIONS

General

If adverse conditions are encountered during the preparation of subgrade materials, special construction methods may be recommended or need to be employed.

Subgrade

Within proposed pavement areas, all surficial deposits of loose soil material should be removed and recompacted. After the loose soils are removed, the bottom is to be scarified to a depth of 12 inches; moisture conditioned as necessary, and compacted to 95 percent of maximum laboratory density, as determined by ASTM Test Method D-1557-12. Should Tensar Geogrid be used, the subgrade should be steel drum rolled with no scarification necessary prior to placement.

Deleterious material, excessively wet or dry pockets, concentrated zones of oversized rock fragments, and any other unsuitable materials encountered during grading should be removed.

The compacted fill material should then be brought to the elevation of the proposed subgrade for the pavement. The subgrade should be proof-rolled in order to ensure a uniformly firm and unyielding surface.

All grading and fill placement should be observed by the project geotechnical engineer and/or his representative.

Base

Compaction tests are required for the recommended base section. Minimum relative compaction required will be 95 percent of the maximum laboratory density as determined by ASTM Test Method D-1557-12 for base material. Base aggregate should be in accordance to the "Standard Specifications for Public Works Construction" (green book) current edition.

Paving

Prime coat may be omitted if all of the following conditions are met:

1. The asphalt pavement layer is placed within two weeks of completion of base and/or subbase course.
2. Traffic is not routed over completed base before paving.
3. Construction is completed during the dry season of May through October.
4. The base is free of dirt and debris.

If construction is performed during the wet season of November through April, prime coat may be omitted if no rain occurs between completion of base course and paving, and the time between completion of base and paving is reduced to three days, provided the base is free of dirt and debris. Where prime coat has been omitted and rain occurs, traffic is routed over base course, or paving is delayed, measures shall be taken to restore base course, subbase course, and subgrade to conditions that will meet specifications as directed by the geotechnical engineer.

We hope this satisfies your requirements at this time. If you have any questions, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

JONATHAN GURUNATHAN
Staff Engineer

KAREN L. MILLER
GE 2257

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3-31-22
GEOTECHNICAL
STATE OF CALIFORNIA

Encl: Appendix A, "R" Values

cc: (1) Addressee

APPENDIX A

"R" VALUES

ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

GEOSOILS CONSULTANTS, INC.
6634 VALJEAN AVE.
VAN NUYS, CA 91406

DATE: 12/07/2020

P.O. NO: Verbal

LAB NO: C-4323

SPECIFICATION: CA 301

MATERIAL: Brown, Silty Sand w. trace F. Gravel

Project: W.O.: 6457

ANALYTICAL REPORT
"R" VALUE

BY EXUDATION	BY EXPANSION
69	66

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

October 6, 2021
W.O. 6457

COVINGTON DEVELOPMENT PARTNERS
14180 Dallas Parkway, Ste. 730
Dallas, Texas 75254

Attention: Dana Whitmer

Subject: Geotechnical Engineering Reliance Letter, Proposed Sportsman's Lodge Development, 12833 Ventura Boulevard, Studio City, Los Angeles, California

As requested, GeoSoils Consultants, Inc. (GSC) has prepared this geotechnical engineering reliance letter for the subject site. Covington Development Partners and its respective affiliates may rely upon these reports referenced in connection with the subject project. If another geotechnical consultant is retained to take over the project, then they shall assume geotechnical responsibly of the data within the referenced reports.

We appreciate this opportunity to be of service to you. If you have any questions regarding the content of this letter or any other aspects of the project, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

CERTIFIED ENGINEERING GEOLOGIST
RUDY F. RUBERTI
No. 1708
STATE OF CALIFORNIA

RUDY F. RUBERTI
CEG 1708

Encl: References

cc: (1) Addressee

MDN 22463

6634 Valjean Avenue, Van Nuys, California 91406 Phone: (818) 785-2158 Fax: (818) 7

REFERENCES

1. GeoSoils Consultants, Inc. dated September 13, 2011, “Geologic and Geotechnical Engineering Study, Parcel No. 062646, Santa Clarita, California”

2. GeoSoils Consultants, Inc. dated September 14, 2011, “Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

3. GeoSoils Consultants, Inc. dated September 13, 2011, (rev. February 2, 2012, “Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California”

4. GeoSoils Consultants, Inc. dated May 23, 2012, “Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

5. GeoSoils Consultants, Inc. dated May 14, 2015, “Addendum Report, MTD No. 1843, Parcel Map No. 062646, Santa Clarita, California”

6. GeoSoils Consultants, Inc. dated September 10, 2015,” Storm Drain Backfill Compaction Report, Parcel Map #062646, M.T.D. #1843, Santa Clarita, California”

7. GeoSoils Consultants, Inc. dated December 15, 2015, “Update Geologic and Geotechnical Engineering Report, Parcel Map No. 062646, Santa Clarita, California”

8. GeoSoils Consultants, Inc. dated September 17, 2018, “Addendum Report, Geologic and Geotechnical Review of Revised Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

9. GeoSoils Consultants, Inc. dated February 8, 2018, “Storm Drain Backfill and Access Road Compaction Report, Parcel Map 62646, M.T. D. 1843, Santa Clarita, California”

10. GeoSoils Consultants, Inc. dated May 30, 2018, “Update Geologic and Geotechnical Engineering Report, Paracel Map No. 062646, Santa Clarita, California”

11. GeoSoils Consultants, Inc. dated March 13, 2020, “Geologic and Geotechnical Engineering Review of Revised Rough Grading Plans, Parcel Map 062646, Santa Clarita, California”

FINAL COMPACTION REPORT
Building Pads 1 to 3 and Basin Area
Parcel Map 06246,
Santa Clarita, California

for

TMC Properties, LLC

November 19, 2021 W.O. 6457

MDN 22500

GeoSoils Consultants Inc.

November 19, 2021
W.O. 6457

TMC PROPERTIES, LLC
P.O. BOX 800970
Santa Clarita, California 91380-0970

Attention: Mr. Randy Wrage

Subject: Final Compaction Report, Building Pads 1-3 and Basin Area, Parcel Map 062646, Santa Clarita, California

INTRODUCTION

Submitted herewith is a summary of the observation and testing services provided by GeoSoils Consultants, Inc. (GSC) during grading operations for Building Pads 1 to 3 and associated improvements of Parcel Map 062646.

The purpose of the grading was to provide building pads for the construction of three industrial buildings, associated street, basin and other improvements. Storm drain backfill will be included under a separate report.

Grading plans were prepared by Sikand Engineering and are included as the base maps for our Compaction Maps Plates 1A to 1C. Tests performed during the grading of the parcel are included in Table I of this report. All compaction tests performed pertaining to Building Pads 1 to 3 are included on Plates 1A to 1C and within this report.

The following ASTM Standards were used:

Laboratory Standard for Maximum Density:	ASTM D-1557-12
Field Density Test Methods:	ASTM D-1556-07 - Sand Cone

MDN 22500

ASTM D-2922-05 - Nuclear Densometer

ASTM D-3017-05 - Nuclear Densometer

Field density tests were taken at vertical intervals of no more than 2 feet or at every 500 cubic yards of fill placed.

Expansive soil conditions have been evaluated for the subject site in accordance with ASTM D-4829. Representative samples of the soils near-finished pad grade were recovered for expansion index testing and classification. The results yielded expansion indices in the low range. Structural foundation recommendations are included in the text of this report.

GENERAL DISCUSSION

The following is a discussion of the grading operations, as they were performed on the subject site. In general, the terms "compact" and "compacted" in this report refer to 90 percent of the relative maximum density of the soils used, and as percent for base material used, as determined by ASTM Test Designation D-1557-12, at a moisture content near-optimum.

1. Deleterious material, such as organic matter, was removed from the areas to be graded prior to fill placement.

2. All loose and compressible soils were removed to firm older alluvium per the approved recommendations. Removals extended a minimum of five feet below original ground surface or below proposed finished grades, whichever was deeper.

3. Removals below Springbrook Avenue extended approximately 18 inches to 2 feet below existing grade due to the existing utilities within the street. The access road leading to the basin was scarified, premoistened, and compacted to a depth of approximately 18 inches.

4. The maximum dry density and optimum moisture content for each of the major soil types used were determined according to ASTM Test Method D-1557-12. The following table presents the laboratory test results:

LABORATORY TEST DATA			
Soil Type	**Description**	**Maximum Dry Density (pcf)**	**Optimum Moisture (%)**
A	Orange brown, silty SAND	123.5	11.5
B	Brown, slightly sandy silt	120.0	11.0
C	Orange brown, clayey, fine sand	127.5	10.0
D	Brown, fine to coarse sand with gravel	131.0	8.5
E	Brown, slightly clayey, sandy silt	129.0	8.5
F	Orange brown slightly clayey SAND	126.0	9.0
G	Base	129.0	9.0
H	Base	154.0	6.0
I	Brown slightly clayey, fine to coarse SAND	127.0	9.5
J	Base	125.0	9.0
K	Brown clayey very fine, coarse SAND	126.0	11.0
L	Asphalt Concrete	152.0	-

5. Upon completion of necessary removals, areas to receive fill were scarified to a depth of 12 inches, watered and mixed as required to achieve adequate moisture conditions, and recompacted.

6. Fill consisted of cleaned on-site soils which were placed in horizontal lifts restricted to six to eight inches in thickness, watered as required to achieve adequate moisture conditions, and compacted to a minimum of 90 percent relative compaction for the soil type used. In the event of failing tests, the fill was reworked until the desired relative compaction was achieved.

7. The maximum depth of fill placed on the lots during the current phase of grading included in this report was approximately 18 feet located within the basin area.

8. Fill placed on surfaces is having a slope gradient steeper than 5:1 were keyed and benched into competent material.

9. Field density tests were performed using the sand cone method (ASTM D-1556-07), and nuclear densometer (ASTM D-2992-05; ASTM D-3017-05). Field density tests were taken at vertical intervals of approximately 2 feet, or at every 500 cubic yards of fill placed. A minimum of one sand cone test for every five nuclear tests was performed during fill monitoring.

Visual classification of the soils in the field was the basis for determining which maximum density value to use for a given density test. Single checkpoint maximum density tests were performed periodically to supplement visual classification of soils.

10. Expansion index tests were performed in accordance with ASTM D-4829-11. The results indicate an expansion index range in the low range.

11. A minimum relative compaction of at least 90 percent was required on all 2:1 fill slopes within the subject site. This was achieved by either, overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.

12. Samples of on-site soils collected from finished lot grades included in this report were analyzed for sulfate content. The results of these tests range between 20 to 45 ppm. Which indicates a negligible sulfate content for the materials tested.

SEISMICITY

The following are seismic design parameters for the subject tract based on the 2019 California Building Code (CBC).

2019 CBC Section 1613, Earthquake Loads	
Site Class Definition (Table 1613.5.2)	D
Mapped Spectral Response Acceleration Parameter, S_s (Figure 1613.5(3) for 0.2 second)	2.321
Mapped Spectral Response Acceleration Parameter, S_1 (Figure 1613.5(4) for 1.0 second)	0.813
Site Coefficient F_a (Table 1613.5.3(1) short period)	1.2
Site Coefficient F_v (Table 1613.5.3(2) 1-second period)	1.7
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter S_{MS} (Eq. 16-37)	2.785
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter S_{M1} (Eq. 16-38)	1.382
Design Spectral Response Acceleration Parameter, S_{DS} (Eq. 16-39)	1.857
Design Spectral Response Acceleration Parameter, S_{D1} (Eq. 16-40)	0.921
Notes: 1. Site Class Designation: Class D is recommended based on subsurface condition. 2. Ss, SMs, and SDs are spectral response accelerations for the period of 0.2 second. 3. S1, SM1, and SD1 are spectral response accelerations for the period of 1.0 second. 4. These values may only be utilized where the value of the seismic response coefficient, Cs, satisfies equation 12.8-3 or 12.8-4 of the ASCE Standard 7-16	

Conformance to the above criteria for seismic design does not constitute any guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid all damage, since such design may be economically prohibitive.

FOUNDATION DESIGN RECOMMENDATIONS

It is anticipated that proposed land use may not be totally restricted to existing graded lots. Infringement may occur into areas over, into, or upon graded slopes. Preliminary site plans should be reviewed by this office to insure satisfactory consideration is given to site conditions and requirements of the Grading Code of the City of Santa Clarita. The elevations of the primary fill areas included in this report represent the finished grades for various lots. All foundation plans should be reviewed by this office to insure satisfactory consideration is given to site conditions and requirements of the Grading Code of the City of Santa Clarita. The following foundation criteria are applicable to the compacted fill areas addressed herein.

Soil samples were collected at the finished grades of the building pads to test for expansion index and sulfate contents. Review of the laboratory test data by HDR (an independent laboratory) indicate the lots have a negligible sulfate content. In addition, the laboratory test results indicate the near surface materials are moderately corrosive to ferrous metals such as steel or iron. A corrosion engineer is recommended to be consulted.

Expansion index tests conducted on soil samples at finished grade elevation indicate a low expansion potential for all lots.

The following foundation criteria are recommended:

I. Conventional Foundation

1. An allowable soil bearing pressure of 1,500 pounds per square foot, including dead and real live loads, can be utilized for design of conventional foundations into compacted fill. The above bearing value may be increased by one-third when considering short duration seismic or wind loads. Footings are recommended to be continuous and should have a minimum width of 12 inches and a minimum embedment depth of 12 inches for one-story structures and 18 inches for two-story structures for low EI soils.

   The allowable bearing value may be increased by 20 percent for each additional foot below the minimum depth recommended, plus 10 percent for each additional foot wider than the minimum width recommended up to a maximum value of 3,000 pounds per square foot.

2. A friction coefficient for concrete on compacted soil of 0.4 and a lateral (passive) bearing value of 250 pounds per square foot, per foot of depth, may be employed to resist lateral loads. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third. For design of isolated piles, the allowable passive pressure may be increased by 100 percent (see Table A for other conventional foundation recommendations).

3. In order to minimize the potential effects of seismic activity, expansive soils, secondary settlement and hydroconsolidation or hydrocompression, we recommend an alternate foundation system (i.e., post-tensioned slab foundations and/or mat foundation systems) be used.

II. <u>Post-Tensioned Slab Foundation</u>

These post-tensioned slabs should be designed in accordance with the recommendations of either the California Foundation Slab Method or Post-Tensioning Institute. Based on review of laboratory data for the on-site materials, the average soil modulus of subgrade reaction, K, to be used for design is 100 pounds per cubic inch. Specific recommendations for the design of *California Foundation Slab* and *Post Tension Institute* methods are presented below.

A surface bearing value of 1,000 pounds per square foot can also be used in design.

1. <u>California Foundation Slab (Spanability) Method</u>

It is recommended that slabs be designed for a free span of 15 feet. From a soil expansion/shrinkage standpoint, a common contributing factor to distress of structures using post-tensioned slabs is fluctuation of moisture in soils underlying the perimeter of the slab, compared to the center, causing a "dishing" or "arching" of the slabs. To mitigate this possibility, a combination of soil presaturation and construction of a perimeter "cut off" wall should be employed.

All slab foundation areas should be moisture conditioned to at least optimum moisture, but no more than 5 percent above optimum moisture for a depth of at least 12 inches below subgrade low EI soil. A continuous perimeter curtain wall should extend to a depth of at least 12 inches below exterior grade for low EI to preserve this moisture. The cut-off walls may be integrated into the slab design or independent of the slab and should be a minimum of 6 (six) inches wide.

2. **Post-Tensioning Institute Method**

Post-tensioned slabs should have sufficient stiffness to resist excessive bending due to non-uniform swell and shrinkage of subgrade soils. The differential movement can occur at the corner, edge, or center of slab. The potential for differential uplift can be evaluated using design specifications of the Post-Tensioning Institute. The following table presents suggested minimum coefficients to be used in the Post-Tensioning Institute design method.

Suggested Coefficients	
Thornthwaite Moisture Index	-20 in/yr
Depth to Constant Soil Suction	9 (feet)
Constant Soil Suction: (pf)	3.8

The coefficients are considered minimums and may not be adequate to represent worst case conditions such as adverse drainage, excess watering, and/or improper landscaping and maintenance. The above parameters are applicable provided structures have gutters and downspouts, yard drains, and positive drainage is maintained away from structure perimeters. Also, the values may not be adequate if the soils below the foundation become saturated or dry such that shrinkage occurs. The parameters are provided with the expectation that subgrade soils below the foundations are maintained in a relatively uniform moisture condition. Responsible irrigation of landscaping adjacent to the foundation must be practiced since over-irrigation of landscaping can cause problems. Therefore, it is important that information regarding drainage, site maintenance, settlements and effects of expansive soils be passed on to future homeowners.

Based on the above parameters, the following values were obtained from the Post Tensioning Institute Design manual. If a stiffer slab is desired, higher values of y_m may be warranted.

Expansion Index of Soil Subgrade	Low EI
e_m center lift	9.0 feet
e_m edge lift	4.7 feet
Y_m center lift	0.34-inch
Y_m edge lift	0.48-inch

Deepened footings/edges around the slab perimeter must be used as indicated above to minimize non-uniform surface moisture migration (from an outside source) beneath the slab. An edge depth of at least 12 inches should be considered for low EI soil. The bottom of the deepened footing/edge should be designed to resist tension, using cable or reinforcement per the Structural Engineer.

3. **Mat Foundation**

Mat foundation could either be designed as a beam on an elastic foundation or using the method of static equilibrium (i.e., the mat is assumed to move as a rigid body when the loads are applied and the reaction pressures are going to be distributed linearly across the bottom of the mat).

For mat foundation, the criteria under post-tensioned slab may be used for design.

III. Conventional Slab-On-Grade Floor

We offer the following floor slab recommendations and comments for purposes of slab-on-grade floor design and construction:

Reinforcement

Concrete slabs should be reinforced with a minimum No. 4 rebar at 16 inches on-center in both directions. All slab reinforcement should be properly positioned at mid-height in the slab during placement of concrete.

Thickness

The design engineer should determine the actual thickness of the slabs based on proposed loadings and use. However, minimum slab thickness of five inches is recommended.

Slab Sectioning

To minimize transgression of shrinkage cracks, slabs must not exceed 20-foot sections. Sectioning can be performed by expansion joints, plastic joints, saw cutting, or proper tooling during concrete placement. It is suggested that slabs not be tied structurally to heavily loaded walls or columns, until most of the dead loads are in place to permit minor differential settlement.

IV. **General Recommendations**

1. The above parameters are applicable provided structures have gutters and downspouts and positive drainage is maintained away from structures. Therefore, it is important that information regarding drainage, and site maintenance be passed on to future homeowners. All slab foundation areas should be moisture conditioned to at least optimum moisture, but no more than 5 percent above optimum moisture for a depth of at least 12 inches below subgrade for low EI soil. The subgrade soil moisture should be observed by a Soil Engineer or his representative prior to pouring concrete. It is suggested the above stated moisture be obtained and maintained at least a suggested 2 days prior to pouring concrete.

2. A 10-mil Visqueen vapor barrier should be placed underneath habitable area slabs and/or slabs with floor coverings. This barrier can be placed directly on the subgrade soils, but should be overlain by a two-inch layer of imported sand. This vapor barrier shall be lapped and sealed (especially around the utility perforations) adequately to provide a continuous waterproof barrier under the entire slab.

3. The above recommendations assume, and GeoSoils Consultants, Inc. strongly recommends, that surface water will be kept from infiltrating into the subgrade adjacent to the house foundation system. This may include, but not be limited to rain water, roof water, landscape water and/or leaky plumbing. The pad/units are to be fine graded at the completion of construction to include positive drainage away from the structure and roof water will be collected via gutters, downspouts, and transported to the street in buried drain pipes. Homebuyers should be cautioned against constructing open draining planters adjacent to the houses, or obstructing the yard drainage in any way.

4. Utility trenches beneath the slabs should be backfilled with compacted native soil materials, free of rocks.

5. Subgrade soil beneath footings and slabs should be premoistened prior to placement of concrete.

6. Standard Santa Clarita structural setback guidelines are applicable, except where superseded by specific recommendations by the Project Geologist and Geotechnical Engineer.

   Building or structure footings shall be set back a horizontal distance, x, from the face of adjacent descending slope. The horizontal distance is calculated as $x=H/3$, where H is the height of slope. The distance x should not be less than 5 feet nor more than 40 feet. The distance x may be provided by deepening the footings.

7. Prior to placing concrete in the footing excavations, an inspection should be made by our representative to ensure that the footings are free of loose and disturbed soils and are embedded in the recommended material.

IV. Retaining Wall Recommendations

The following recommendations should be followed for retaining wall design and construction. Wall footings should have a minimum width of 18 inches and a minimum embedment depth of 18 inches.

The equivalent fluid pressures recommended are based on the assumption of a uniform backfill and no build-up of hydrostatic pressure behind the wall. To prevent the build-up of lateral soil pressures in excess of the recommended design pressures, overcompaction of the fill behind the wall should be avoided. This can be accomplished by placement of the backfill above a 45-degree plane projected upward from the base of the wall, in horizontal lifts not exceeding 8 inches in loose depth, and compacted with hand-operated or small self propelled vibrating plates. (Note: Placement of free-draining material in this zone could also prevent the build-up of lateral soils pressures). All walls must conform to International Building Code setback requirements.

1. **<u>Conventional (Yielding) Retaining Walls</u>**

All recommendations for active lateral earth pressures contained herein assume that the anticipated retaining structures are in tight contact with the fill, soil (or bedrock) that they are supposed to support. The earth support system must be sufficient stiff to hold horizontal movements in the soil to less than one percent of the height of the vertical face, but should be free-standing to the point that they yield at the top at least 0.1 percent of the height of the wall.

2. **<u>Earth Pressures on Conventional (Yielding) Walls</u>**

The earth pressures on walls retaining self-draining, granular materials, compacted fill or undisturbed native soil shall be assumed equal to that exerted by an equivalent fluid having a density not less than that shown in the following table:

Backfill Slope (Horizontal:Vertical)	Equivalent Fluid Density
Level	30 pcf
5:1	33 pcf
4:1	35 pcf
3:1	38 pcf
2:1	43 pcf

3. **<u>Restrained (Non-Yielding) Walls</u>**

Earth pressures will be greater on walls where yielding at the top of the wall is limited to less than one-thousandth the height of the wall either by stiffness (i.e., return walls, etc.) or structural floor network prior to backfilling. Utilizing the recommended backfill compaction of 90 percent Modified Proctor Density per ASTM D-1557-12, we recommend the following equivalent fluid density for non-yielding walls:

Backfill Slope (Horizontal:Vertical)	Equivalent Fluid Density
Level	45 pcf
2:1	65 pcf

4. **General**

a. If water is allowed to saturate the backfill, the lateral pressure would exceed the active pressure provided. Clayey or expansive soils should not be used for backfilling behind retaining walls.

b. Any anticipated, superimposed loading (i.e., upper retaining walls, other structures, etc.) except retained earth, shall be considered as surcharge and provided for in the design.

c. A vertical component equal to one-third of the horizontal force so obtained may be assumed at the plane of application of force.

d. The walls should be constructed with weepholes near the bottom on five-foot centers or with perforated drainpipe in a gravel envelope at the bottom and behind the wall. A one-foot thick zone of clean, granular, free-draining material should be placed behind the wall to within three feet of the surface. On-site soil should be used for the remainder of the backfill and should be compacted to 90 percent relative compaction as determined by ASTM Test Designation D-1557-12. All proposed subterranean walls should be waterproofed and backdrained.

e. A concrete-lined swale is recommended to be placed behind retaining walls that can intercept surface runoff from upslope areas. This surface runoff shall be transferred to an approved drainage channel via non-erosive drainage devices.

Flatwork

Concrete slabs cast on-grade may be used in exterior areas. All exterior slabs on-grade shall be at least four (4) inches in thickness. Provisions for thermal cracking should be incorporated into the design and construction of all exterior slabs, which shall include control joints spaced at no greater than eight feet apart. As a minimum standard, all exterior slabs shall be reinforced with No. 4 bars, 18 inches on center in both directions. Slab areas shall be cleared of all loose soil and construction debris prior to pouring concrete.

LIMITATIONS

This office assumes no responsibility for any alterations made to the slope or pad grades within the areas included in this report subsequent to rough grading, without our knowledge and written approval.

All ramps made through slopes and pads and other areas of disturbance which require the placement of compacted fill to restore them to the original condition, will not be reviewed unless such backfilling operations are performed under our observation and tested for required compaction. Loose material cast over compacted slopes shall negate our certification of slope face compaction unless the material is removed in accordance with our instructions.

Due to the low cohesion of some of the soils used on-site, landscape planting of the slopes should proceed as soon after completion of grading as possible. This will minimize minor slope erosion caused by winter runoff.

We further recommend that a slope maintenance program be initiated on the subject tract. The program should include a landscape watering schedule which would protect against overwatering of slopes at any time. We also recommend that the homeowners be apprised that shallow surficial failures can be caused on slopes by heavy watering.

REGULATORY COMPLIANCE

The cuts, fills, and materials processing under the purview of this report have been completed under the observation of, and with selective testing by GeoSoils Consultants, Inc., and are found to be in compliance with the Grading Code of the City of Santa Clarita, California.

Our findings were made and recommendations prepared in conformance with generally accepted professional engineering practices, and no warranty is implied or made. No certification of compacted fill beyond the limits and grades indicated in this report are intended or implied.

We appreciate this opportunity to be of service to you. If you have any questions regarding this report, or if we may be of any further service to you, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/22
GEOTECHNICAL
STATE OF CALIFORNIA

KAREN L. MILLER
GE 2257

Encl: References
Engineer's Certificate of Compliance
Table I, Field Density Test Results (1 through 338)
Table A, Foundation and Slab Recommendations (Los Angeles)
Plates 1A to 1C, Compaction Maps

cc: (1) Addressee

REFERENCES

1. GeoSoils Consultants, Inc. dated September 13, 2011, “Geologic and Geotechnical Engineering Study, Parcel No. 062646, Santa Clarita, California”

2. GeoSoils Consultants, Inc. dated September 14, 2011, “Geologic and Geotechnical Review of Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

3. GeoSoils Consultants, Inc. dated September 13, 2011, (rev. February 2, 2012, “Geologic and Geotechnical Engineering Study, Parcel Map No. 062646, Santa Clarita, California”

4. GeoSoils Consultants, Inc. dated May 23, 2012, “Response to County of Los Angeles Soils Engineering and Geologic Review Sheets dated November 18, 2011 and September 28, 2011, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

5. GeoSoils Consultants, Inc. dated May 14, 2015, “Addendum Report, MTD No. 1843, Parcel Map No. 062646, Santa Clarita, California”

6. GeoSoils Consultants, Inc. dated September 10, 2015,” Storm Drain Backfill Compaction Report, Parcel Map #062646, M.T.D. #1843, Santa Clarita, California”

7. GeoSoils Consultants, Inc. dated December 15, 2015, “Update Geologic and Geotechnical Engineering Report, Parcel Map No. 062646, Santa Clarita, California”

8. GeoSoils Consultants, Inc. dated September 17, 2018, “Addendum Report, Geologic and Geotechnical Review of Revised Storm Drain Plans, Parcel Map No. 062646, MTD No. 1843, Santa Clarita, California”

9. GeoSoils Consultants, Inc. dated February 8, 2018, “Storm Drain Backfill and Access Road Compaction Report, Parcel Map 62646, M.T. D. 1843, Santa Clarita, California”

10. GeoSoils Consultants, Inc. dated May 30, 2018, “Update Geologic and Geotechnical Engineering Report, Paracel Map No. 062646, Santa Clarita, California”

City of Santa Clarita
Development Services Division
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

FINAL GRADE CERTIFICATION

Tract or Parcel No. 062646

Lot No(s). Building Pads 1-3 and Basin Area

Address or Location of Property: Santa Clarita

Owner: TMC Properties, LLC Contractor: ______

FIELD ENGINEER

Based upon observations, the grading subsequent to the rough grading has been completed in accordance with the approved plans and specifications. Surface drainage devices are in place as shown on the approved plans. Provisions have been made for drainage of surface waters around proposed buildings and their appurtenances.

Plan Approval Date or Latest Plan Revision Date ______

Lot No. (s): ______

Remarks: ______

Engineer's Seal and Exp. Date (Below)

Signature ______

Date ______

SOIL ENGINEER

Based field observations and testing, the earthwork performed subsequent to Rough Grade inspection has been completed in accordance with Chapter 17.27.020 of the Unified Development Code and the recommendations of the approved soils reports on file with the City.

See the final compaction report(s) dated 11-19-21 for areas requiring specific compaction and completed after Rough Grade approval.

Lot No. (s): Building Pads 1 to 3

Remarks: ______

Signature: Karen L. Miller

Date: 11-19-21

Engineer's Seal and Exp. Date (Below)

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/22
GEOTECHNICAL
STATE OF CALIFORNIA

PLANTING & IRRIGATION STATEMENT BY LANDSCAPE ARCHITECT OR CIVIL ENGINEER

Planting on slopes is established and irrigation system(s) installed in conformance with the approved plans and applicable provisions of the building code.

Landscape Architect Seal or Engineer's Seal and Exp. Date (Below)

Remarks: ______

Signature: ______

Date: ______

TRACT ______________ W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
10/15/19	1	OX EAST PORTION OF SITE	1181	11.3	118.1	93	SC	C
10/15/19	2	BLDG 1 ENVELOPE	1181	12.4	112.0	91	SC	A
10/15/19	3	SE OF BLDG 1	1180	12.9	115.7	94	NUKE	A
10/16/19	4	BLDG 1 ENVELOPE	1181	12.0	111.2	93	SC	A
10/16/19	5	SW OF BLDG 1	1181	11.3	116.8	92	NUKE	C
10/16/19	6	E OF BLDG 1	1179	12.0	119.6	94	NUKE	C
10/17/19	7	BLDG 1 ENVELOPE	1181	11.3	118.1	93	SC	C
10/17/19	8	BLDG 1 ENVELOPE	1180	11.6	110.2	92	NUKE	B
10/18/19	9	E OF BLDG 1	1178	11.1	116.8	92	NUKE	C
10/18/19	10	BLDG 1 ENVELOPE	1180	10.9	115.8	91	NUKE	C
10/18/19	11	W OF BLDG 1	1182	10.0	105.6	88	SC	B
10/18/19	11A	W OF BLDG 1	RETEST	11.3	108.3	90	SC	B
10/21/19	12	BLDG 1 OX	1178	11.3	119.0	93	SC	C
10/21/19	13	W OF BLDG 1	1180	13.1	115.4	93	NUKE	A
10/22/19	14	W OF BLDG 1	1180	12.8	113.1	94	SC	B
10/22/19	15	BLDG 1 OX	1177	13.2	112.8	91	NUKE	A
10/23/19	16	BLDG 1 OX	1179	12.9	112.3	94	SC	B
10/23/19	17	BLDG 1 OX	1179	12.4	111.9	93	NUKE	B
10/24/19	18	E OF BLDG 1	1176	9.7	118.4	90	SC	D
10/24/19	19	BLDG 1 OX	1176	9.4	112.4	88	NUKE	C
10/24/19	19A	BLDG 1 OX	RETEST	11.7	119.8	94	NUKE	C
10/24/19	20	S OF BLDG 1	1183	10.5	123.2	94	NUKE	D
10/24/19	21	S OF BLDG 1	1182	11.0	118.1	93	NUKE	C

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT ______________ W.O 6457

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FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
10/24/19	22	SE OF BLDG 1	1183	10.3	122.0	93	NUKE	D
10/28/19	23	BLDG ENVELOPE	1179	12.0	120.8	95	SC	C
10/29/19	24	E OF BLDG 1	1180	12.3	114.9	93	SC	A
10/29/19	25	BLDG ENVELOPE	1179	10.3	122.6	94	NUKE	D
10/29/19	26	E OF BLDG 1	1178	13.2	117.1	95	NUKE	A
10/30/19	27	BLDG ENVELOPE	1179	8.7	112.7	88	SC	C
10/30/19	27A	BLDG ENVELOPE	RETEST	11.2	118.4	93	SC	C
10/30/19	28	BLDG ENVELOPE	1183	10.4	124.9	95	NUKE	D
10/30/19	29	BLDG ENVELOPE	1183	10.1	122.6	94	NUKE	D
10/30/19	30	E OF BLDG 1	1182	12.6	114.7	93	NUKE	A
10/30/19	31	E OF BLDG 1	1183	11.8	120.3	94	NUKE	C
10/31/19	32	S OF BLDG 1	1185	11.9	121.3	95	SC	C
10/31/19	33	E OF BLDG 1	1184	10.2	124.1	95	NUKE	D
10/31/19	34	BLDG ENVELOPE	1185	7.9	119.7	91	NUKE	D
10/31/19	34A	BLDG ENVELOPE	RETEST	10.4	124.8	95	NUKE	D
11/1/19	35	BLDG 1 ENVELOPE BOTTOM	1177	11.1	118.4	93	SC	C
11/1/19	36	BLDG 1 ENVELOPE BOTTOM	1178	9.9	122.1	93	NUKE	D
11/1/19	37	BLDG 1	1179	10.0	122.9	94	NUKE	D
11/1/19	38	BLDG 1	1181	10.1	123.3	94	NUKE	D
11/1/19	39	BLDG 1 ENVELOPE BOTTOM	1179	11.9	114.5	95	NUKE	B
11/1/19	40	BLDG 1 ENVELOPE BOTTOM	1177	12.0	121.9	96	SC	C
11/1/19	41	PKG N OF BLDG 1	1179	11.8	121.3	95	NUKE	C
11/1/19	42	PKG N OF BLDG 1	1178	11.8	113.7	95	NUKE	B

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TRACT ________________ **W.O** 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
11/1/19	43	PKG N OF BLDG 1	1179	8.9	107.0	89	NUKE	B
11/1/19	43A	PKG N OF BLDG 1	RETEST	11.7	113.6	95	NUKE	B
11/1/19	44	PKG N OF BLDG 1	1179	10.3	124.7	95	SC	D
11/1/19	45	BLDG 1 OX ENVELOPE	1185	11.9	121.7	95	NUKE	C
11/1/19	46	E OF BLDG 1	1184	11.7	121.0	95	NUKE	C
11/1/19	47	BLDG 1 OX	1181	10.3	124.9	95	NUKE	D
11/1/19	48	BLDG 1 OX	1182	10.2	124.4	95	NUKE	D
11/1/19	49	BLDG 1 OX	1181	10.5	126.0	96	NUKE	D
11/4/19	50	EASTERLY PORTION OF SITE	1185	10.6	125.0	95	SC	D
11/4/19	51	EASTERLY PORTION OF SITE	1186	10.5	125.3	96	NUKE	D
11/4/19	52	EASTERLY PORTION OF SITE	1183	10.1	124.9	95	NUKE	D
11/4/19	53	EASTERLY PORTION OF SITE	1183	8.3	120.5	92	NUKE	D
11/4/19	53A	EASTERLY PORTION OF SITE	1183	9.9	125.1	95	NUKE	D
11/4/19	54	EASTERLY PORTION OF SITE	1180	11.9	121.8	96	NUKE	C
11/4/19	55	EASTERLY PORTION OF SITE	1180	12.0	122.1	96	NUKE	C
11/4/19	56	EASTERLY PORTION OF SITE	1179	9.8	125.1	95	SC	D
11/4/19	57	EASTERLY PORTION OF SITE	1180	10.4	124.8	95	SC	D
11/5/19	58	EASTERLY PORTION OF SITE	1180	9.9	124.5	95	SC	D
11/5/19	59	EASTERLY PORTION OF SITE	1182	10.3	124.1	95	NUKE	D
11/5/19	60	EASTERLY PORTION OF SITE	1183	9.5	124.7	95	NUKE	D
11/5/19	61	EASTERLY PORTION OF SITE	1182	10.5	125.3	96	NUKE	D
11/5/19	62	EASTERLY PORTION OF SITE	1180	10.4	125.2	96	NUKE	D
11/5/19	63	EASTERLY PORTION OF SITE	1180	11.8	121.6	95	NUKE	C

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TRACT ______________ **W.O** 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
11/5/21	64	EASTERLY PORTION OF SITE	1184	11.5	121.2	95	NUKE	C
11/5/21	65	EASTERLY PORTION OF SITE	1184	10.3	124.0	95	NUKE	D
11/5/21	66	EASTERLY PORTION OF SITE	1184	10.4	124.4	95	SC	D
11/5/21	67	EASTERLY PORTION OF SITE	1184	11.4	120.9	95	NUKE	C
11/6/21	68	SE PORTION OF SITE	1182	12.4	114.9	93	SC	A
11/6/21	69	SE PORTION OF SITE	1184	12.7	115.6	94	NUKE	A
11/6/21	70	SE PORTION OF SITE	1183	11.6	113.3	94	NUKE	B
11/6/21	71	SE PORTION OF SITE	1183	10.3	110.0	89	NUKE	A
11/6/21	71A	SE PORTION OF SITE	RETEST	13.3	115.9	94	NUKE	A
11/6/21	72	LOADING DOCK BLDG 2	1181	11.8	114.8	95	NUKE	A
11/6/21	73	SE PORTION OF SITE	1183	10.0	123.9	95	SC	D
11/6/21	74	SE PORTION OF SITE	1185	10.1	124.3	95	NUKE	D
11/6/21	75	LOADING DOCK BLDG 2	1182	10.0	124.0	95	SC	D
11/6/21	76	SE PORTION OF SITE	1183	10.5	125.1	95	NUKE	D
11/6/21	77	SE PORTION OF SITE	1183	10.3	124.8	95	NUKE	D
11/7/19	78	EASTERLY PORTION OF THE SITE	1179	10.0	123.9	95	NUKE	C
11/7/19	79	EASTERLY PORTION OF THE SITE	1181	12.0	121.8	96	NUKE	C
11/7/19	80	EASTERLY PORTION OF THE SITE	1183	10.2	124.2	95	NUKE	D
11/7/19	81	EASTERLY PORTION OF THE SITE	1180	10.4	124.6	95	NUKE	D
11/8/19	82	EASTERLY PORTION OF THE SITE	1179	10.3	124.1	95	SC	D
11/8/19	83	EASTERLY PORTION OF THE SITE	1179	12.0	121.9	96	NUKE	C
11/8/19	84	EASTERLY PORTION OF THE SITE	1180	8.4	120.2	93	NUKE	D
11/8/19	84A	EASTERLY PORTION OF THE SITE	RETEST	10.4	124.7	95	NUKE	D

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TRACT ______________ **W.O** 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
11/8/19	85	EASTERLY PORTION OF THE SITE	1180	10.5	121.9	96	NUKE	D
11/8/19	86	EASTERLY PORTION OF THE SITE	1178	11.7	121.6	95	SC	C
11/12/19	87	EASTERLY PORTION OF THE SITE	1178	13.2	117.1	95	SC	A
11/12/19	88	EASTERLY PORTION OF THE SITE	1178	11.9	114.0	95	NUKE	B
11/12/19	89	EASTERLY PORTION OF THE SITE	1177	13.0	117.4	95	NUKE	A
11/12/19	90	EASTERLY PORTION OF THE SITE	1178	12.0	114.7	96	NUKE	B
11/12/19	91	EASTERLY PORTION OF THE SITE	1179	11.7	120.9	95	NUKE	C
11/12/19	92	EASTERLY PORTION OF THE SITE	1179	11.8	121.2	95	SC	C
11/12/19	93	EASTERLY PORTION OF THE SITE	1180	11.7	121.0	95	NUKE	C
11/12/19	94	EASTERLY PORTION OF THE SITE	1178	11.8	114.4	95	NUKE	B
11/12/19	95	EASTERLY PORTION OF THE SITE	1179	11.1	109.9	89	NUKE	A
11/12/19	95A	EASTERLY PORTION OF THE SITE	RETEST	13.2	117.3	95	NUKE	A
11/12/19	96	EASTERLY PORTION OF THE SITE	1181	12.0	121.9	96	NUKE	C
11/12/19	97	EASTERLY PORTION OF THE SITE	1180	11.7	113.8	95	SC	B
11/12/19	98	EASTERLY PORTION OF THE SITE	1179	11.6	120.9	95	NUKE	C
11/12/19	99	EASTERLY PORTION OF THE SITE	1181	11.9	121.3	95	NUKE	C
11/12/19	100	EASTERLY PORTION OF THE SITE	1177	12.0	121.8	96	NUKE	C
11/14/19	101	BLDG 3 BOTTOM OX	1181	12.3	114.9	93.	SC	A
11/14/19	102	BLDG 3 BOTTOM	1180	11.1	110.1	92	NUKE	B
11/14/19	103	BLDG 3 BOTTOM	1179	11.4	112.8	94	NUKE	B
11/14/19	104	BLDG 3 BOTTOM	1180	11.8	122.4	96	NUKE	C
11/15/19	105	BLDG 1 LOADING DOCK	1176	12.6	113.9	92	SC	A
11/15/19	106	BLDG 1 LOADING DOCK	1178	12.9	115.4	93	NUKE	A

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TRACT ______________ W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
11/15/19	107	BLDG 1 LOADING DOCK	1179	11.7	121.3	95	SC	C
11/16/19	108	BLDG 1 LOADING & SITE	1177	11.9	114.8	96	NUKE	B
11/16/19	109	BLDG 1 LOADING & SITE	1178	9.3	107.0	89	NUKE	B
11/16/19	109A	BLDG 1 LOADING & SITE	RETEST	11.4	115.9	94	NUKE	B
11/16/19	110	BLDG 1 LOADING & SITE	1177	11.5	120.9	95	NUKE	C
11/16/19	111	BLDG 1 LOADING & SITE	1181	11.7	121.2	95	SC	C
11/17/19	112	BLDG 1 LOADING & SITE	1180	12.0	121.9	96	SC	C
11/17/19	113	BLDG 1 LOADING & SITE	1183	10.1	124.8	95	NUKE	D
11/17/19	114	BLDG 1 LOADING & SITE	1183	10.3	125.0	95	NUKE	D
11/17/19	115	BLDG 1 LOADING & SITE	1183	10.5	125.5	96	SC	D
11/17/19	116	BLDG 1 LOADING DOCK	1177	11.8	112.2	94	NUKE	B
11/17/19	117	BLDG 1 LOADING DOCK	1178	12.0	114.7	96	NUKE	B
11/17/19	118	BLDG 1 LOADING DOCK	1180	11.9	121.9	96	SC	C
11/21/19	119	SW CORNER OF BLDG 1	1182	11.1	121.3	95	SC	C
11/21/19	120	SW CORNER OF BLDG 1	1183	11.6	121.9	95	NUKE	C
11/21/19	121	SW CORNER OF BLDG 1	1185	11.4	121.0	95	NUKE	C
11/21/19	122	EAST SIDE BLDG 1 SOUTH LOADING DOCK	1183	11.6	113.9	95	NUKE	B
11/21/19	123	EASTERLY OX	1184	11.7	114.5	95	NUKE	B
11/21/19	124	EAST SIDE BLDG 1 MIDDLE LOADING DOCK	1184	11.5	114.1	95	NUKE	B
11/21/19	125	EAST SIDE BLDG 1 MIDDLE LOADING DOCK	1184	11.5	120.9	95	SC	C
11/22/19	126	EAST SIDE BLDG 1 NORTH LOADING DOCK	1176	11.3	123.1	94	SC	D
11/22/19	127	EAST SIDE BLDG 1 NORTH LOADING DOCK	1178	11.9	125.5	96	NUKE	D
11/22/19	128	EAST SIDE BLDG 1 NORTH LOADING DOCK	1180	11.8	121.9	96	NUKE	C

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FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
11/22/19	129	EAST SIDE BLDG 1 NORTH LOADING DOCK	1182	11.9	124.7	95	NUKE	D
11/22/19	130	BLDG 1 OX	1183	12.0	125.6	96	SC	D
11/22/19	131	WEST SIDE BLDG 1 NORTH LOADING DOCK	1176	11.8	122.9	96	NUKE	C
11/22/19	132	WEST SIDE BLDG 1 NORTH LOADING DOCK	1177	11.7	124.6	95	NUKE	D
11/22/19	133	WEST SIDE BLDG 1 MIDDLE LOADING DOCK	1177	12.0	122.9	96	NUKE	C
11/22/19	134	WEST SIDE BLDG 1 MIDDLE LOADING DOCK	1179	9.1	117.9	90	SC	D
11/22/19	134A	WEST SIDE BLDG 1 MIDDLE LOADING DOCK	RETEST	11.8	124.3	95	SC	D
11/25/19	135	EASTERLY OX	1179	12.2	115.9	94	SC	A
11/25/19	136	EASTERLY OX	1179	11.8	118.2	93	NUKE	C
11/25/19	137	WEST SIDE BLDG 1 NORTH LOADING DOCK	1178	11.9	118.9	93	NUKE	C
11/25/19	138	WEST SIDE BLDG 1 NORTH LOADING DOCK	1180	11.9	114.7	93	NUKE	A
11/25/19	139	EASTERLY OX	1182	11.7	121.4	95	SC	C
11/25/19	140	WEST SIDE BLDG 1 NORTH LOADING DOCK	1182	12.0	121.8	96	NUKE	C
11/26/19	141	BLDG 3	1181	11.8	114.3	95	SC	B
11/26/19	142	BLDG 3	1179	9.4	106.9	89	NUKE	B
11/26/19	142A	BLDG 3	RETEST	11.3	113.8	95	NUKE	B
11/26/19	143	WEST OF BLDG 2	1182	12.1	117.3	95	NUKE	A
11/26/19	144	WEST OF BLDG 3	1180	12.4	116.8	95	SC	A
11/26/19	145	WEST OF BLDG 3	1179	12.6	117.7	95	NUKE	A
12/11/19	146	BLDG 3 OX	1180	11.8	122.7	95	SC	C
12/11/19	147	BLDG 3 OX	1180	10.5	126.0	96	NUKE	D
12/11/19	148	W'LY OX	1181	11.7	123.3	97	NUKE	C
12/11/19	149	W'LY OX	1183	12.0	122.9	96	SC	C

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Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
12/12/19	150	W'LY OX	1181	10.4	125.8	96	SC	D
12/12/19	151	W'LY OX	1181	11.7	122.6	96	NUKE	C
12/12/19	152	BLDG 3 OX	1182	7.9	116.7	89	SC	D
12/12/19	152A	BLDG 3 OX	RETEST	9.9	124.4	95	SC	D
12/13/19	153	BLDG 3 OX	1180	10.5	125.0	95	NUKE	D
12/13/19	154	BLDG 3 OX	1182	11.3	122.8	96	NUKE	C
12/13/19	155	W'LY OX	1180	11.4	123.0	96	NUKE	C
12/13/19	156	W'LY OX	1182	10.5	125.9	96	SC	D
11/14/17	157	BLDG #3 OX	1181	8.1	115.8	88	NUKE	D
11/14/17	157A	BLDG #3 OX	RETEST	10.3	125.3	96	NUKE	D
12/16/19	158	W'LY OX	1178	13.2	117.3	95	NUKE	A
12/16/19	159	W'LY OX	1181	11.9	125.0	95	SC	D
12/16/19	160	W'LY OX	1179	13.4	117.8	95	NUKE	A
12/16/19	161	W'LY OX	1180	12.0	123.0	96	NUKE	C
12/16/19	162	W'LY OX	1182	11.8	125.7	96	SC	D
12/16/19	163	W'LY OX	1181	11.5	134.2	95	SC	D
12/16/19	164	W'LY OX	1183	11.7	124.7	95	NUKE	D
12/16/19	165	W'LY OX	1181	12.0	125.0	95	NUKE	D
12/16/19	166	BLDG 3 OX	1183	11.3	123.9	95	SC	D
12/16/19	167	BETWEEN BLDG 2&3	1184	11.9	124.5	95	SC	D
12-18-19	168	E'LY OX	1183	12.0	122.0	96	NUKE	C
12-18-19	169	E'LY OX	1183	8.9	118.9	91	NUKE	D
12-18-19	169A	E'LY OX	RETEST	10.3	124.3	95	NUKE	D

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Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
12-18-19	170	BASIN OX	1185	11.0	115.8	91	SC	C
12-20-21	171	BASIN BERM OX	1185	11.2	116.3	92	NUKE	C
12-20-21	172	BASIN BOTTOM	1184	12.9	116.9	95	NUKE	A
12-20-21	173	BASIN OX	1183	12.7	114.6	93	NUKE	A
12-20-21	174	BASIN OX	1184	12.8	115.1	93	SC	A
01-02-20	175	BASIN OX	1185	10.9	116.7	92	NUKE	C
01-02-20	176	BASIN OX	1188	12.8	114.9	93	NUKE	A
01-02-20	177	BASIN OX	1184	10.7	116.0	91	SC	C
01-02-20	178	BASIN OX	1185	13.1	115.7	94	SC	A
01-02-20	179	BASIN OX	1185	11.7	112.9	94	NUKE	B
01-02-20	180	BASIN OX	1186	11.1	110.9	92	NUKE	B
01-02-20	181	BLDG 2 OX	1184	10.3	124.7	95	NUKE	D
01-02-20	182	W'LY OX SOUTH OF BLDG 2	1186	10.5	125.0	95	NUKE	D
01-02-20	183	BLDG 2 OX	1184	10.4	124.4	95	NUKE	D
01-02-20	184	W'LY OX	1183	10.1	124.1	95	SC	D
01-02-20	185	BLDG 3 OX	1181	11.0	121.2	95	SC	C
01-06-20	186	BASIN	1185	7.6	112.3	86	SC	D
01-06-20	186A	BASIN	RETEST	10.0	123.4	94	SC	D
01-06-20	187	BASIN	1185	10.3	126.1	96	NUKE	D
01-13-20	188	BASIN	1186	10.5	127.3	97	NUKE	D
01-13-20	189	BASIN	1188	9.8	124.6	94	NUKE	D
01-13-20	190	BASIN	1187	10.1	124.2	95	SC	D
01-14-20	191	BASIN	1187	10.2	123.7	94	SC	D

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TRACT ______________ **W.O 6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
01-14-20	192	BASIN	1188	10.4	125.0	95	NUKE	D
01-14-20	193	BASIN	1187	10.1	123.7	94	NUKE	D
01-15-20	194	BASIN	1190	9.1	124.0	95	NUKE	D
01-15-20	195	BASIN	1100	13.2	117.3	95	SC	A
01-16-20	196	BASIN	1192	12.9	115.6	93	SC	A
01-16-20	197	BASIN	1186	12.3	112.3	95	NUKE	B
01-16-20	198	BASIN	1188	12.8	114.2	95	NUKE	B
01-16-20	199	BASIN	1188	11.7	110.0	92	NUKE	B
01-23-20	200	BASIN	1188	9.7	122.8	93	SC	D
01-23-20	201	BASIN	FG	10.1	123.0	94	SC	D
01-23-20	202	BASIN	FG	10.4	124.6	95	NUKE	D
02-04-20	203	BLDG # 1	1182	12.2	116.4	96	SC	B
02-04-20	204	BLDG # 1	1184	12.0	115.2	95	NUKE	B
02-04-20	205	BLDG # 1	1184	9.9	124.2	95	NUKE	D
02-04-20	206	BLDG # 1	1183	9.7	116.3	89	SC	D
02-04-20	206A	RETEST	RETEST	10.3	126.7	96	SC	D
02-04-20	207	BLDG # 1	1185	11.2	125.0	95	NUKE	D
02-04-20	208	BLDG # 1	1185	11.7	126.2	96	NUKE	D
02-10-20	209	BLDG #2	1185	10.3	126.0	96	NUKE	D
02-10-20	210	BLDG #3	1185	12.2	125.4	95	Sc	D
02-10-20	211	BLDG #3	1186	10.0	126.9	96	NUKE	D
02-10-20	212	BLDG #2	1186	9.8	125.2	95	SC	D
02-10-20	213	BLDG #3	1184	10.3	124.3	95	SC	D

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Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
02-10-20	214	BLDG #3	1183	7.2	115.3	88	NUKE	D
02-10-20	214A	BLDG #3	RETEST	9.7	127.1	97	NUKE	D
02-10-20	215	BLDG #3	1182	10.4	125.0	95	SC	D
02-10-20	216	BLDG #3	1182	10.3	124.3	95	NUKE	D
02-10-20	217	BLDG #3	1184	9.2	125.2	95	NUKE	D
02-10-20	218	BLDG #3	1183	8.7	115.3	88	SC	D
02-10-20	218A	BLDG #3	RETEST	8.8	126.1	96	SC	D
11-16-20	219	EAST	1179	9.7	121.0	93	SC	E
11-16-20	220	EAST	1179	10.1	119.2	92	NUKE	E
11-16-20	221	EAST	1178	9.2	118.7	91	NUKE	E
11-16-20	222	EAST	1180	10.4	122.3	94	SC	E
11-16-20	223	EAST	1181	10.3	121.3	93	SC	E
11-16-20	224	EAST	1181	9.6	122.4	95	NUKE	E
11-16-20	225	W. BLDG #1	1185	9.7	118.7	92	NUKE	E
11-16-20	226	W. BLDG #1	1183	10.2	118.9	91	NUKE	E
11-16-20	227	W. BLDG #1	1184	10.0	122.4	94	SC	E
11-16-20	228	SOUTH OF BLDG 1	1184	9.3	122.6	95	NUKE	E
11-16-20	229	SOUTH OF BLDG 1	1181	9.6	123.2	95	SC	E
11-16-20	230	SOUTH OF BLDG 1	1180	8.7	124.2	96	NUKE	E
11-16-20	231	SOUTH OF BLDG 1	1180	11.1	124.1	96	NUKE	E
11-16-20	232	SOUTH OF BLDG 1	1181	10.2	121.0	94	SC	E
11-16-20	233	SOUTH OF BLDG 1	1183	9.5	120.6	93	NUKE	E
11-30-20	234	E'LY PORTION OF SITE	1183	9.4	123.1	95	SC	E

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TABLE I
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Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
11-30-20	235	E'LY PORTION OF SITE	1184	10.0	120.5	93	NUKE	E
12-01-20	236	E'LY PORTION OF SITE	1183	10.2	120.0	93	NUKE	E
12-01-20	237	E'LY PORTION OF SITE	1184	10.4	119.7	92	SC	E
12-02-20	238	E'LY PORTION OF SITE	1187	9.3	121.7	93	NUKE	E
12-03-20	239	E'LY PORTION OF SITE	1182	9.0	124.2	96	SC	E
12-04-20	240	E'LY PORTION OF SITE	1184	8.8	123.7	96	NUKE	E
12-04-20	241	E'LY PORTION OF SITE	1183	10.2	121.6	94	NUKE	E
12-04-20	242	E'LY PORTION OF SITE	1184	6.9	114.2	87	SC	E
12-04-20	242A	E'LY PORTION OF SITE	RETEST	9.7	118.7	91	SC	E
12-07-20	243	E'LY PORTION OF SITE	85	9.0	123.0	95	SC	E
12-07-20	244	E'LY PORTION OF SITE	FG	11.2	122.6	94	NUKE	E
12-08-20	245	E'LY PORTION OF SITE	86	10.8	119.5	93	NUKE	E
12-09-20	246	E'LY PORTION OF SITE	FG	11.3	119.8	93	SC	E
12-09-20	247	E'LY PORTION OF SITE	FG	11.7	120.2	93	NUKE	E
12-10-20	248	E'LY PORTION OF SITE	1186	10.1	123.0	95	NUKE	E
12-10-20	249	E OF BLDG 1	1186	9.0	119.1	92	SC	E
12-10-20	250	E OF BLDG 1	SG	9.6	120.4	93	NUKE	E
01-05-21	251	S/W BLDG 1	SG	8.9	120.8	93	SC	E
01-05-21	252	E OF BLDG 1	SG	9.2	121.0	94	NUKE	E
01-05-21	253	E OF BLDG 1	SG	9.1	119.3	92	SC	E
01-05-21	254	E OF BLDG 1	SG	10.3	118.9	92	NUKE	E
01-06-21	255	W. BLDG 1	SG	10.2	119.0	92	NUKE	E
01-06-21	256	N/E # 1	SG	10.1	121.1	99	NUKE	E

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TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
001-07-21	257	SLOPE FACE	SF	12.7	118.1	95	SC	A
01-07-21	258	SLOPE FACE	SF	13.2	117.3	95	NUKE	A
01-08-21	259	BASIN	1189	9.2	121.1	96	NUKE	F
01-08-21	260	BASIN	1187	9.0	119.9	95	NUKE	F
01-11-21	261	N/E PORTION OF SITE	1178	9.5	116.9	93	NUKE	F
01-13-21	262	N/E PORTION OF SITE	1179	9.7	118.6	94	SC	F
01-14-21	263	N/E PORTION OF SITE	1182	10.1	119.8	95	NUKE	F
01-15-21	264	N/E PORTION OF SITE	SG	10.8	120.9	96	SC	F
01-19-21	265	N/E PORTION OF SITE	1186	10.6	120.1	95	NUKE	F
01-20-21	266	N/E PORTION OF SITE	1187	8.4	111.1	88	SC	F
01-20-21	266A	N/E PORTION OF SITE	RETEST	9.9	118.4	94	SC	F
01-21-21	267	S'LY PORTION OF SITE	1187	10.9	121.2	96	NUKE	F
01-21-21	268	S'LY PORTION OF SITE	1188	11.0	120.9	96	NUKE	F
02-21-21	269	BLDG OX 1	1183	10.0	119.2	95	SC	F
02-21-21	270	N/ BLDG 3	1180	10.4	120.2	95	NUKE	F
02-25-21	271	BLDG 3	1184	11.0	121.4	96	SC	F
02-25-21	272	N OF BLDG 3	1180	10.8	120.9	96	NUKE	F
02-25-21	273	N/W BLDG 3	1179	10.2	119.8	95	NUKE	F
06-05-21	274	BLDG 2	FG	10.2	119.8	95	SC	F
06-05-21	275	BLDG 1	FG	10.8	121.3	96	NUKE	F
06-25-21	276	E/ BLDG 1	FG	10.4	120.7	96	NUKE	F
09-24-21	277	W'LY PORTION OF SITE	FG	11.1	121.3	95	SC	I
09-24-21	278	W'LY PORTION OF SITE	1184	11.0	120.9	95	NUKE	I

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TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
09-24-21	279	BASIN	SG	10.9	121.6	96	NUKE	I
09-24-21	280	BASIN	SG	10.1	123.9	95	NUKE	D
09-24-21	281	BASIN	FG	9.9	124.4	95	SC	D
09-24-21	282	N'LY PORTION OF SITE	1181	9.8	124.0	95	NUKE	D
09-24-21	283	N'LY PORTION OF SITE	1182	9.6	123.7	94	SC	D
09-24-21	284	N'LY PORTION OF SITE	SG	9.3	124.1	95	NUKE	D
09-24-21	285	EAST OF 1	FG	10.6	120.9	95	SC	I
09-24-21	286	BLDG 1	FG	11.2	121.5	96	NUKE	I
09-24-21	287	BLDG 3	1185	10.8	121.1	95	NUKE	I
09-24-21	288	BLDG 3	1185	11.4	122.8	97	NUKE	I
09-24-21	289	BLDG 3	1183	11.1	121.4	96	NUKE	I
09-30-21	290	W'LY PORTION OF THE SITE	1181	10.8	121.0	95	SC	I
09-30-21	291	W'LY PORTION OF THE SITE	1180	10.9	120.8	95	NUKE	I
09-30-21	292	W'LY PORTION OF THE SITE	1180	11.0	121.3	95	NUKE	I
10-01-21	293	W'LY PORTION OF THE SITE	1181	10.4	120.6	95	SC	I
10-01-21	294	W'LY PORTION OF THE SITE	1181	11.1	120.9	95	NUKE	I
10-02-21	295	BLDG 3	1184	11.4	121.7	96	NUKE	I
10-02-21	296	BLDG 3	1185	11.3	122.4	96	SC	I
10-05-21	297	W'LY PORTION OF SITE	1181	11.5	122.8	97	SC	I
10-05-21	298	W'LY PORTION OF SITE	1186	11.1	121.7	96	NUKE	I
10-06-21	299	W'LY PORTION OF SITE	1185	11.0	120.9	95	SC	I
10-11-21	300	W'LY PORTION OF SITE	1184	12.0	120.4	96	SC	K
10-11-21	301	W'LY PORTION OF SITE	1185	12.2	121.6	97	NUKE	K

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FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
10-14-21	302	W'LY PORTION OF SITE	1185	12.7	121.0	96	NUKE	K
10-14-21	303	W'LY PORTION OF SITE	1182	12.4	120.4	96	NUKE	K
10-15-21	304	W'LY PORTION OF SITE	1181	12.7	120.8	96	SC	K
10-16-21	305	W'LY PORTION OF SITE	1182	12.9	119.4	95	NUKE	K
12-16-21	306	W'LY PORTION OF SITE	1183	13.0	119.9	95	NUKE	K
10-20-21	307	BLDG 3	1185	12.5	120.3	95	NUKE	K
10-20-21	308	W'LY PORTION OF SITE	SG	12.6	121.4	96	SC	K
10-20-21	309	W'LY PORTION OF SITE	SG	12.1	119.8	95	NUKE	K
01-21-21	310	ACCESS RD	SG	9.7	124.7	95	NUKE	D
01-21-21	311	ACCESS RD	SG	7.8	117.6	90	NUKE	D
01-21-21	311A	ACCESS RD	RETEST	9.6	124.1	95	NUKE	D
01-21-21	312	ACCESS RD	SG	9.9	125.2	96	SC	D
01-21-21	313	ACCESS RD	SG	10.2	125.0	95	NUKE	D
01-21-21	314	ACCESS RD	BASE	8.1	118.0	91	NUKE	G
01-21-21	314A	ACCESS RD	RETEST	10.4	122.8	95	NUKE	G
01-21-21	315	ACCESS RD	BASE	10.8	123.0	96	NUKE	G
08-19-21	316	C & G SPRINGBROOK	SG	10.4	125.1	95	NUKE	D
08-19-21	317	C & G SPRINGBROOK	SG	10.0	124.9	95	NUKE	D
08-19-21	318	C & G SPRINGBROOK	SG	10.3	124.6	95	NUKE	D
08-19-21	319	C & G SPRINGBROOK	SG	10.4	125.2	96	NUKE	D
08-19-21	320	C & G SPRINGBROOK	SG	10.1	123.9	95	NUKE	D
08-19-21	321	C & G SPRINGBROOK	SG	10.2	124.2	95	NUKE	D
08-19-21	322	C & G SPRINGBROOK	BASE	10.0	119.3	95	NUKE	J

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TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
08-19-21	323	C & G SPRINGBROOK	BASE	10.1	118.8	95	NUKE	J
08-19-21	324	C & G SPRINGBROOK	BASE	10.4	119.8	96	NUKE	J
08-20-21	325	C & G SPRINGBROOK	BASE	9.9	119.0	95	NUKE	J
08-20-21	326	C & G SPRINGBROOK	BASE	10.6	119.7	96	SC	J
08-20-21	327	C & G SPRINGBROOK	BASE	10.0	119.2	95	NUKE	J
08-20-21	328	C & G SPRINGBROOK	BASE	9.8	118.7	95	NUKE	J
08-13-21	329	SPRINGBROOK	SG	9.9	123.9	95	NUKE	D
08-13-21	330	SPRINGBROOK	SG	10.0	124.4	95	NUKE	D
08-13-21	331	SPRINGBROOK	SG	9.7	124.2	95	SC	D
08-13-21	332	SPRINGBROOK	SG	10.2	124.7	95	NUKE	D
09-03-21	333	SPRINGBROOK	AC	-	143.9	95	NUKE	L
09-03-21	334	SPRINGBROOK	AC	-	145.9	96	NUKE	L
09-03-21	335	SPRINGBROOK	AC	-	144.1	95	NUKE	L
09-03-21	336	SPRINGBROOK	AC	-	144.8	95	NUKE	L
09-03-21	337	SPRINGBROOK	AC	-	145.0	95	NUKE	L
09-03-21	338	SPRINGBROOK	AC	-	145.9	96	NUKE	L

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TABLE A

FOUNDATION AND SLAB RECOMMENDATIONS

ONE AND TWO-STORY RESIDENTIAL BUILDINGS

	Expansion Index 0-50 Low Expansion	**Expansion Index 51-90 Medium Expansion**	**Expansion Index 91-130 High Expansion**
1-Story Footings	All footings 12” deep. Four No. 4 bars, two top and two bottom; footings continuous.	Exterior footings 18” deep. Interior footings 15” deep. Four No. 4 bars, two top and two bottom; footings continuous.	Exterior footings 24” deep. Interior footings 18” deep. Four No. 4 bars: two top and two bottom. Footings continuous.
2-Story Footings	All footings 18” deep; continuous. Four No. 4 bars, two top and two bottom.	All footings 18” deep; continuous. Four No. 4 bars, two top and two bottom.	All footings 24” deep; continuous. Four No. 4 bars: two top and two bottom.
Garage Door Grade Beam	12” deep. Four No. 4 bars, two top and two bottom.	18” deep. Four No. 4 bars, two top and two bottom.	24” deep. Four No. 4 bars: two top and two bottom.
Living Area Floor Slabs	4” thick. No. 4 bars at 16” both ways at mid-height. Six mil Visqueen vapor barrier sandwiched between, 1” sand layers.	4” thick. No. 4 bars at 16” both ways at mid-height. Slab steel should be doweled into exterior footings. Six mil Visqueen vapor barrier sandwiched between two, 2” sand layers.	4” thick. No. 4 bars at 16” both ways at mid-height. Six mil Visqueen vapor barrier sandwiched between two, 2” sand layers. Slab steel should be doweled into exterior footings.
Garage Floor Slabs	4” thick. No. 4 bars at 16” both ways at mid-height and ¼ slabs. Isolate from stem wall footings. No moisture barrier required. 2” sand base required.	4” thick. No. 4 bars at 16” both ways at mid-height and ¼ slabs. Isolate from stem wall footings. No moisture barrier required. 4” sand base required.	4” thick. No. 4 bars at 16” both ways at mid-height and ¼ slabs. Isolate from stem wall footings. No moisture barrier required. 4” sand base required.
Pre-soaking of Living Area and Garage Slab Soils	No pre-soaking required. Pre-moisten soil prior to pouring concrete.	Soak 18” depth to 5% above optimum moisture content.	Soak to 24” depth to 5% above optimum moisture content.

Note: An allowable soil bearing value of 1500 pounds per square foot, including dead and live loads, may be used for design of footings and foundation founded at the recommended depths. All footings should have a minimum width of 15 inches and should be continuous. A friction coefficient for concrete on natural and compacted soil of 0.4, and a lateral soils bearing value of 250 pounds per square foot, per foot of depth, may be employed to resist lateral loads. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one third.

If wire mesh is provided for slabs under Medium and High expansion soils, then No. 3 bars at 24” on center dowels should be provided in exterior footings and bent 3’ into slabs. The bent bars are not allowed between floating slabs and footings.

GSC GeoSoils Consultants Inc.
GEOTECHNICAL • GEOLOGIC • ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

COMPACTION MAP
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	11/2021	1" = 40'

REVISED ____ PLATE 1A

EXPLANATION

●338 APPROXIMATE LOCATION OF FIELD DENSITY TEST

APPROXIMATE LIMITS OF COMPACTED FILL INCLUDED IN THIS REPORT

CONSTRUCTION NOTES

1. INSTALL 24" RCP
2. CONSTRUCT GRATING BASIN WITH ABTECH FILTER 17EA (DETAIL F ON SHT 2)
3. CONSTRUCT TOP OF CUT DRAIN (DETAIL A ON SHT 2)
4. CONSTRUCT INLET 1 EA (DETAIL D ON SHT 2)
5. CONSTRUCT SPLASH PAD 3EA (DETAIL G ON SHT 2)
6. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL C ON SHT 2)
7. CONSTRUCT "V" DITCH (DETAIL B ON SHT 2)
8. CONSTRUCT DOWNDRAIN (DETAIL D ON SHT 2)
9. CONSTRUCT SPLASH WALL (DETAIL E ON SHT 2)
10. CONSTRUCT 3' TRANSITION FROM DETAIL A TO DETAIL D
11. CONSTRUCT ACCESS ROAD (DETAIL K ON SHT 2)
12. CONSTRUCT DRIVEWAY PER DETAIL ON STREET PLAN
13. CONSTRUCT DRIVEWAY PER STD. DETAIL STREET PLAN
14. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL N ON SHT 2)

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

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UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE
BY: 7AD0C55E00D74... 6/10/2020
DATE:

THIS SET OF PLANS AND SPECIFICATION MUST BE KEPT ON THE JOB AT ALL TIMES. IT IS UNLAWFUL TO MAKE ANY CHANGES OR ALTERNATIONS ON SAME WITHOUT WRITTEN PERMISSION FROM THE DEVELOPMENT SERVICES DIVISION.

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GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS, CA 91406
TEL. (818) 785-2158 FAX. (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM RCE# 2469 6/8/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

6/8/2020

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/22 GEOTECHNICAL STATE OF CALIFORNIA

PREPARED FOR:
TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

PREPARED BY:
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY	CITY APPROVALS	APPROVAL DATE
1	SHORTENED SPRINGBROOK AVENUE & REVISED STORM DRAIN LINES. SHEET 3 SUPERSEDED BY SHEET 3A	DOUG FARMER, RCE 49041		6/11/2020

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646

SCALE:	AS SHOWN
DATE:	11/12/2019
JOB NO.	5099-037-02
CASE NO.	GRA18-00019

SHEET: 3A OF 11

GRA18-00019

CONSTRUCTION NOTES

1. INSTALL 24" RCP
2. CONSTRUCT GRATING BASIN WITH ABTECH FILTER 17EA (DETAIL F ON SHT 2)
3. CONSTRUCT TOP OF CUT DRAIN (DETAIL A ON SHT 2)
4. CONSTRUCT INLET 1 EA (DETAIL D ON SHT 2)
5. CONSTRUCT SPLASH PAD 4EA (DETAIL G ON SHT 2)
6. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL C ON SHT 2)
7. CONSTRUCT "V" DITCH (DETAIL B ON SHT 2)
8. CONSTRUCT DOWNDRAIN (DETAIL D ON SHT 2)
9. CONSTRUCT SPLASH WALL (DETAIL E ON SHT 2)
10. CONSTRUCT 3' TRANSITION FROM DETAIL A TO DETAIL D
11. CONSTRUCT ACCESS ROAD (DETAIL K ON SHT 2)
12. CONSTRUCT DRIVEWAY PER DETAIL ON STREET PLAN
13. CONSTRUCT DRIVEWAY PER STD. DETAIL STREET PLAN
14. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL N ON SHT 2)

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

COMPACTION MAP
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	11/2021	1" = 40'

REVISED ___ PLATE 1B

SEE PLATE 1A FOR EXPLANATION

GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS, CA 91406
TEL. (818) 785–2158 FAX. (818) 785–1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM RCE# 2469 — 6/8/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

6/8/2020

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/22 GEOTECHNICAL STATE OF CALIFORNIA

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info@sikand.com

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA
PROJECT ENGINEER — 6-3-20 DATE

DIGALERT DIAL TOLL FREE 1–800–227–2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE
BY:
DATE: 6/10/2020

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NO.	REVISION	REVISED BY (SIGNATURE/PRINT NAME & NUMBER)	CITY APPROVALS	APPROVAL DATE
1	SHORTENED SPRINGBROOK AVENUE & REVISED STORM DRAIN LINES. SHEET 4 SUPERSEDED BY SHEET 4A	DOUG FARMER, RCE 49041	Shannon Pickett	6/11/2020

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646

SCALE: AS SHOWN
DATE: 11/12/2019
JOB NO. 5099–037–02
CASE NO: GRA18–00019
SHEET: 4A OF 11

GRA18–00019

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CONSTRUCTION NOTES

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2. CONSTRUCT GRATING BASIN WITH ABTECH FILTER 17EA (DETAIL F ON SHT 2)
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11. CONSTRUCT ACCESS ROAD (DETAIL K ON SHT 2)
12. CONSTRUCT DRIVEWAY PER DETAIL ON STREET PLAN
13. CONSTRUCT DRIVEWAY PER STD. DETAIL STREET PLAN
14. CONSTRUCT CONC. DRAINAGE APRON 1EA (DETAIL N ON SHT 2)

MDN 22500

GSC GeoSoils Consultants Inc.
GEOTECHNICAL • GEOLOGIC • ENVIRONMENTAL
6634 Valjean Avenue
Van Nuys, CA 91406

COMPACTION MAP
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	11/2021	1" = 40'

REVISED

PLATE 1C

SEE PLATE 1A FOR EXPLANATION

CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY:

DATE: 11/30/2018

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GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS CA, 91406
TEL. (818) 785-2158 FAX. (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM RCE# 2469 7/13/18 DATE

PREPARED FOR:
TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

PREPARED BY:
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info@sikand.com

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646

SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099-037-02
CASE NO.	GRA18-00019
SHEET:	6 OF 11

GRA18-00019

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STORM DRAIN BACKFILL COMPACTION REPORT,
Parcel Map #062646
Santa Clarita, California

for

TMC

February 14, 2022 W.O. 6457

MDN 22662

GeoSoils Consultants Inc.

GeoSoils Consultants Inc.
GEOTECHNICAL GEOLOGIC ENVIRONMENTAL

February 14, 2022
W.O. 6457

TMC
21070 Centre Pointe Parkway
Santa Clarita, California 91350

Attention: Mr. Randy Wrage

Subject: Storm Drain Backfill Compaction Report, Parcel Map #062646
Santa Clarita, California

INTRODUCTION

Submitted herein is a summary of the observation and testing service provided by GeoSoils Consultants, Inc. (GSC) of the storm drain trench backfill for Parcel 062646 consisting of Lines A, B, C, E, and F.

Field density test results are presented in Table I. The approximate locations of these tests are indicated on the approved plans beginning at Station 3+47.23 of Line A. This area is adjacent to the rail easement and the test locations are shown on the enclosed Compaction Maps indicated on Plates 1A to 1G. All bottoms were established in competent alluvium material and approved by this office before backfill was placed.

The following ASTM Standards were used:

Laboratory Standards for Maximum Density	ASTM D-1557-12	
Field Density Test Method	ASTM D-1556-15	Sand Cone
	ASTM D-6938-15	Nuclear Densometer

The relationship between maximum dry density and optimum moisture content for the soil types used in the project were determined in the laboratory and the results are listed, as follows.

LABORATORY TEST DATA			
Soil Type	**Description**	**Maximum Dry Density (pcf)**	**Optimum Moisture (%)**
A	Brown orange, silty, very fine to fine SAND	123.5	11.5
B	Brown slightly sandy SILT	120.0	11.0
C	Orange brown silty fine to coarse SAND	127.5	10.0
D	Light brown silty SAND	131.0	8.5
E	Brown slightly Clayey sandy SILT	129.0	8.5
F	Grey Brown silty fine to Coarse SAND	126.0	9.0

The subject trenches were backfilled utilizing on-site material which was placed in lifts and mechanically compacted to a minimum of 95 percent relative compaction using an excavator with a sheepsfoot attachment as well as a rubber tire loader. Moisture conditioning was accomplished with a water truck. Field density tests were performed in the trench backfill to verify the compaction during the fill process. Field density tests were taken every two feet or 500 cubic yards of material placed. Storm drain consists of precast, pour in place, and plastic pipe.

"111" STATEMENT

It is our opinion that the site development will be safe from the hazards of landslide, settlement, or slippage and will not adversely affect the stability of property outside of the subject development.

REGULATORY COMPLIANCE

Placement of fills and/or processing of materials under the purview of this report have been completed under the observation of, and with selective testing by, GeoSoils Consultants, Inc., and are found to be in compliance with the grading specifications of the City of Santa Clarita and the County of Los Angeles. Our findings were made and recommendations prepared in conformance with generally accepted professional engineering practices, and no further warranty is implied or made.

We appreciate the opportunity to be of service. If you should have any questions regarding this report, or if we may be of further service to you, please do not hesitate to contact us.

Very truly yours,

GEOSOILS CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/24
GEOTECHNICAL
STATE OF CALIFORNIA

KAREN L. MILLER
GE 2257

Encl: Engineer's Certificate of Compliance
Table I, Field Density Test Results (1 to 289)
Plates 1A to 1G, Compaction Maps

cc: (3) Addressee

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
900 South Fremont Avenue
Alhambra, California 91803

SUPERVISED TRENCH BACKFILL INSPECTION CERTIFICATE

Submit: Two copies to Head Construction Inspector prior to issuance of Certificate of Partial Acceptance.

PERMIT NUMBER ________________________ PROJECT NUMBER ________________________

LOCALITY ______Santa Clarita______________________ FIRM NAME ________________________

Backfill in Streets

I certify that all backfill placed in trenches within the street right of way was properly compacted in compliance with the Standard Specifications for Public Works Construction current addition, and The Additions and Amendments to The Standard Specifications for Public Works Construction current addition.

See attached report dated ______2/14/22______ for compaction test data.

Remarks:

____

____

Engineer ________________________ Reg. No. ____GE 2257____ Dated ____2/14/22____
(Signature) (Wet Stamp Req.)

REGISTERED PROFESSIONAL ENGINEER
KAREN L. MILLER
No. 2257
Exp. 3/31/24
GEOTECHNICAL
STATE OF CALIFORNIA

Special Backfill in Designated Areas

I certify that all backfill placed in trenches within areas designated for special backfill per approved plans or special provisions was properly compacted in compliance with requirements of said plans and/or provisions.

See attached report dated ______________________ for compaction test data.

Remarks

____

____

Engineer ________________________ Reg. No. _______________ Dated _______________
(Signature) (Wet Stamp Req.)

P:\ldpub\Permits\Forms\Trench Backfill\Backfill Cert(PERMITS).docx

TRACT PM 062646 W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
3-9-21	1	SD BF W OF SPRINGBROOK	-6.0	11.2	109.3	91	SC	B
3-9-21	2	SD BF W OF SPRINGBROOK	-4.0	11.0	107.9	90	NUKE	B
3-9-21	3	SD BF W OF SPRINGBROOK	-4.5	11.3	111.0	93	NUKE	B
3-9-21	4	SD BF W OF SPRINGBROOK	-2.0	11.6	111.2	93	NUKE	B
3-9-21	5	SD BF W OF SPRINGBROOK	-2.5	12.0	110.9	90	NUKE	A
3-10-21	6	SD BF W OF SPRINGBROOK	-5.5	10.9	109.6	91	SC	B
3-10-21	7	SD BF W OF SPRINGBROOK	-3.5	11.5	110.8	92	NUKE	B
3-10-21	8	SD BF W OF SPRINGBROOK	-2.0	11.0	108.5	90	NUKE	B
3-11-21	9	SD BF W OF SPRINGBROOK	TOP OF BOX	12.9	113.3	92	SC	A
3-11-21	10	SD BF W OF SPRINGBROOK	TOP OF BOX	11.4	111.5	93	NUKE	B
3-11-21	11	SD BF W OF SPRINGBROOK	2.0	12.0	114.8	96	SC	B
3-18-21	12	LINE A STA 4+05	-5.5	11.0	119.1	93	SC	C
3-18-21	13	LINE A STA 4+15	-5.0	11.2	120.9	95	NUKE	C
3-18-21	14	LINE A STA 4+40	-5.0	12.4	117.3	95	SC	A
3-18-21	15	LINE A STA 4+30	-3.0	8.2	113.2	89	NUKE	C
3-18-21	15A	LINE A STA 4+30	RETEST	11.6	120.8	95	NUKE	C
3-19-21	16	LINE A STA 3+95	-5.0	9.8	113.7	89	NUKE	C
3-19-21	16A	LINE A STA 3+95	RETEST	11.4	121.6	95	NUKE	C
3-19-21	17	LINE A STA 4+25	-5.0	13.2	117.9	96	SC	A
3-19-21	18	LINE A STA 4+10	-3.0	12.8	116.6	95	NUKE	A
3-23-21	19	LINE A STA 4+35	-3.0	13.0	115.5	94	SC	A
3-23-21	20	LINE A STA 4+20	-1.0	12.8	117.3	95	NUKE	A
3-25-21	21	LINE A STA 4+22	-1.0	12.6	114.7	96	SC	B

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT **PM 062646** **W.O** **6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
3-25-21	22	LINE A STA 4+50	-5.0	12.4	117.9	95	NUKE`	A
3-25-21	23	LINE A STA 4+60	-3.0	12.2	117.6	95	NUKE	A
3-25-21	24	LINE A STA 4+75	-1.0	10.9	121.5	93	NUKE	C
3-26-21	25	LINE A STA 4+65	TOP	12.7	113.8	95	SC	B
3-26-21	26	LINE A STA 4+85	-3.5	12.4	117.8	95	SC	A
3-26-21	27	LINE A STA 4+55	-3.5	12.4	117.8	95	SC	A
3-26-21	28	LINE A STA 5+00	-2.0	12.6	116.9	95	NUKE	A
3-29-21	29	SD LINE A STA 4+65	TOP	12.0	113.9	93	SC	A
3-29-21	30	SD LINE A STA 3+60	TOP 2.0	12.1	115.7	94	NUKE	A
3-29-21	31	SD LINE A STA 4+00	TOP 2.0	12.7	117.1	95	NUKE	A
3-29-21	32	SD LINE A STA 4+40	TOP 2.0	11.8	115.5	96	NUKE	B
3-30-21	33	SD LINE A STA 4+95	-5.5	12.6	117.0	95	SC	A
3-30-21	34	SD LINE A STA 5+25	-3.5	11.4	119.9	94	SC	C
3-30-21	35	SD LINE A STA 5+10	-2.0	12.0	122.2	96	NUKE	C
4-1-21	36	SD LINE A STA 5+40	TOP 1.0	11.8	121.5	95	NUKE	C
4-1-21	37	SD LINE A STA 5+40	-5.0	12.0	122.1	96	NUKE	C
4-1-21	38	SD LINE A STA 5+20	-3.0	12.3	117.4	95	NUKE	A
4-1-21	39	SD LINE A STA 5+30	-1.0	12.8	113.9	95	SC	B
4-2-21	40	SD LINE A TOP OF SD	2.0	12.7	114.8	96	NUKE	B
12.9	41	SD LINE A TOP OF SD	2.0	12.9	116.7	94	NUKE	A
4-2-21	42	SD LINE A STA 5+60	-5.0	12.5	114.4	95	NUKE	B
4-5-21	43	SD LINE A STA 5+85	-3.0	11.0	120.9	95	SC	C
4-5-21	44	SD LINE A STA 6+00	-1.0	8.9	113.8	89	NUKE	C

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
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S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT PM 062646 W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
4-5-21	44A	SD LINE A STA 6+00	RETEST	11.2	121.7	95	NUKE	C
4-6-21	45	SD LINE A STA 5+90	-5.0	13.1	117.7	95	NUKE	A
4-6-21	46	SD LINE A STA 6+10	-3.0	11.2	120.3	94	SC	C
4-8-21	47	SD LINE A STA 5+70	-1.0	11.9	121.0	95	SC	C
4-8-21	48	SD LINE A STA 5+70	TOP 1.5	11.6	120.8	95	NUKE	C
4-12-21	49	SD LINE A STA	-5.0	12.7	114.9	96	NUKE	B
4-12-21	50	SD LINE A STA	-5.0	11.5	120.9	95	SC	C
4-13-21	51	SD LINE A STA	-3.0	11.4	120.2	94	SC	C
4-14-21	52	SD LINE A STA	-1.0	13.0	117.4	95	SC	A
4-14-21	53	SD LINE A STA	TOP	11.7	120.8	95	NUKE	C
4-20-21	54	LINE A STA 7+95	1175	11.2	121.7	95	SC	C
4-20-21	55	LINE A STA 7+60	1174	10.8	120.4	94	NUKE	C
4-20-21	56	LINE A STA 8+40	1176	11.4	120.8	95	SC	C
4-22-21	57	LINE A STA 7+75	1177	7.3	117.0	89	NUKE	D
4-22-21	57A	LINE A STA 7+75	RETEST	9.4	121.9	93	NUKE	D
4-22-21	58	LINE A STA 8+15	1178	11.4	121.2	95	SC	C
4-22-21	59	SD LINE A-3 LATERAL	-3.0	10.8	118.6	93	NUKE	C
4-22-21	60	SD LINE A-3 LATERAL	-4.0	12.9	116.5	94	NUKE	A
4-22-21	61	SD LINE A-3 LATERAL	-2.0	13.1	117.2	95	SC	A
4-22-21	62	SD LINE A-3 LATERAL	-3.0	11.2	119.2	94	NUKE	C
5-3-21	63	SD LINE A STA 9+62	1176	9.8	113.7	89	NUKE	C
5-3-21	63A	SD LINE A STA 9+62	RETEST	11.3	120.5	95	NUKE	C
5-3-21	64	SD LINE A STA 10+20	1178	11.6	120.6	95	NUKE	C

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A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT PM 062646 W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
5-3-21	65	SD LINE A STA 9+95	1180	13.0	117.1	95	NUKE	A
5-3-21	66	SD LINE A STA 10+60	1181	13.3	117.4	95	SC	A
5-3-21	67	SD LINE A STA 10+15	1180	11.8	120.8	95	NUKE	C
5-3-21	68	SD LINE A STA 10+40	1183	11.1	108.9	85	SC	A
5-3-21	68A	SD LINE A STA 10+40	RETEST	11.8	112.9	92	SC	A
5-3-21	68B	SD LINE A STA 10+40	RETEST	12.6	116.8	95	SC	A
5-14-21	69	SD LINE A STA 9+60	1179	10.5	125.8	96	NUKE	D
5-14-21	70	SD LINE A STA 10+25	1180	13.2	119.3	97	SC	A
5-15-21	71	SD LINE A STA 9+90	1181	9.0	109.1	88	NUKE	A
5-15-21	71A	SD LINE A STA 9+90	RETEST	12.3	117.4	95	NUKE	A
5-15-21	72	SD LINE A STA 9+80	1183	12.1	115.7	96	NUKE	B
5-15-21	73	SD LINE A STA 10+10	1184	12.0	123.3	97	SC	C
5-15-21	74	SD LINE A STA 10+50	1186	13.1	118.8	96	SC	A
5-15-21	75	LINE A TOP OF LINE STA 9+55	1185	11.1	121.3	95	NUKE	C
5-15-21	76	LINE A TOP OF LINE STA 10+10	1185	11.6	122.9	96	NUKE	C
5-15-21	77	LINE A TOP OF LINE STA 11+60	1185	11.4	122.0	96	SC	C
5-7-21	78	SD LINE A1 STA 1+70	1181	12.9	114.1	95	NUKE	B
5-7-21	79	SD LINE A1 STA 2+20	1182	12.7	114.9	96	NUKE	B
5-7-21	80	SD LINE A1 STA 3+00	1182	8.8	105.7	88	NUKE	B
5-7-21	80A	SD LINE A1 STA 3+00	RETEST	11.9	113.8	95	NUKE	B
5-7-21	81	SD LINE A1 STA 1+45	SG	13.1	118.9	96	SC	A
5-7-21	82	SD LINE A1 STA 1+90	SG	12.9	119.9	97	SC	A
5-7-21	83	SD LINE A1 STA 2+55	SG	12.4	115.5	96	SC	B

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT PM 062646 W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
5-10-21	84	SD LINE A LATERAL 5 STA 1+15	1182	11.8	114.8	96	NUKE	B
5-10-21	85	SD LINE A LATERAL 5 STA 1+54	1182	11.4	115.9	97	SC	B
5-11-21	86	SD LINE A LATERAL 5 STA 1+20	1181	12.4	119.1	96	NUKE	A
5-11-21	87	SD LINE A LATERAL 6 STA 2+00	1182	12.0	121.6	96	NUKE	C
5-12-21	88	SD LINE A LATERAL 4 STA 1+10	1177	12.0	114.9	96	SC	B
5-12-21	89	SD LINE A LATERAL 4 STA 1+25	1178	9.1	112.8	88	NUKE	C
5-12-21	89A	SD LINE A LATERAL 4 STA 1+25	RETEST	11.4	121.3	95	NUKE	C
5-12-21	90	SD LATERAL 4 STA 2+10	1179	13.5	118.3	96	NUKE	A
5-12-21	91	SD LINE A LATERAL 4 STA 1+55	1180	13.3	117.4	95	SC	A
5-13-21	92	SD LINE B LATERAL 5	1189	13.1	116.9	95	NUKE	A
5-13-21	93	SD LINE B LATERAL 5	1187	12.8	115.7	96	SC	C
5-13-21	94	SD LINE B LATERAL 5	1188	12.0	122.0	96	NUKE	C
5-13-21	95	SD LINE B LATERAL 5	SG	12.6	122.7	96	SC	C
5-13-21	96	SD LINE B LATERAL 5	SG	13.2	123.9	95	NUKE	D
5-18-21	97	SD LINE B STA 10+60	1187	10.1	113.0	92	SC	A
5-18-21	97A	SD LINE B STA 10+60	RETEST	11.9	119.4	97	SC	A
5-18-21	98	SD LINE B STA 10+70	1188	11.0	121.9	96	NUKE	C
5-18-21	99	SD LINE B STA 10+00	1187	13.5	109.8	91	NUKE	B
5-18-21	99A	SD LINE B STA 10+00	RETEST	12.2	115.9	97	NUKE	B
5-19-21	100	SD LINE B STA 10+40	SG	12.3	119.4	97	NUKE	A
5-19-21	101	SD LINE B STA 9+45	1186	12.4	118.6	96	SC	A
5-19-21	102	SD LINE B STA 8+50	1186	12.7	114.9	96	NUKE	B
5-19-21	103	SD LINE B STA 9+00	SG	13.1	117.3	95	NUKE	A

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S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT **PM 062646** **W.O** **6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
5-19-21	104	SD LINE B STA 8+40	SG	11.4	120.6	95	SC	C
5-19-21	105	SD LINE B STA 8+00	1185	11.8	121.1	95	NUKE	C
5-20-21	106	SD LINE B STA 7+00	1185	12.6	118.1	96	NUKE	A
5-20-21	107	SD LINE B STA 6+50	1185	12.2	115.1	96	SC	B
5-20-21	108	SD LINE B STA 6+50	1184	11.8	120.5	95	NUKE	C
5-20-21	109	SD LINE B STA 5+80	1184	9.9	110.1	89	NUKE	A
5-20-21	109A	SD LINE B STA 5+80	RETEST	12.9	117.6	95	NUKE	A
5-21-21	110	SD LINE B STA 5+40	1184	12.0	115.8	96	NUKE	B
5-21-21	111	SD LINE B STA 5+50	1184	12.2	118.8	96	SC	A
5-21-21	112	SD LINE B STA 4+55	1183	11.7	120.9	95	NUKE	C
5-21-21	113	SD LINE B STA 4+20	1184	11.3	122.6	96	NUKE	C
5-21-21	114	SD LINE B STA 3+90	SG	10.9	123.5	97	SC	C
5-24-21	115	SD LINE C STA 8+33	1184	9.9	121.8	97	NUKE	F
5-24-21	116	SD LINE C STA 7+50	1184	10.1	123.9	95	NUKE	D
5-24-21	117	SD LINE C STA 6+20	1182	10.3	124.7	95	SC	D
5-24-21	118	SD LINE C STA 5+10	1185.2	11.1	121.9	96	NUKE	C
5-24-21	119	SD LINE C STA 4+50	1181.5	11.9	120.9	95	SC	C
5-26-21	120	SD LINE E EAST SIDE STA 1+40	1176	12.0	119.4	97	NUKE	A
5-26-21	121	SD LINE E EAST SIDE STA 1+80	1176	14.4	118.5	96	NUKE	A
5-26-21	122	SD LINE E EAST SIDE STA 1+60	1178	12.1	114.9	96	NUKE	B
5-27-21	123	SD LINE E EAST SIDE STA 2+20	1177	10.4	123.7	97	SC	C
5-27-21	124	SD LINE E EAST SIDE STA 2+50	1178	10.9	123.0	96	NUKE	C
5-27-21	125	SD LINE E WEST SIDE STA 1+35	1176	10.6	123.2	96	NUKE	C

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S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT PM 062646 **W.O 6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
5-27-21	126	SD LINE E WEST SIDE STA 1+55	1177	10.0	120.9	96	NUKE	F
5-27-21	127	SD LINE E WEST SIDE STA 1+45	1178	10.2	120.6	96	SC	F
5-27-21	128	SD LINE E WEST SIDE STA 1+90	1177	11.9	121.7	95	NUKE	C
6-7-21	129	SD LINE E WEST SIDE STA 2+35	1177	10.5	123.8	97	NUKE	C
6-7-21	130	SD LINE E WEST SIDE STA 1+70	1179	9.7	125.1	95	NUKE	D
6-7-21	131	SD LINE E WEST SIDE STA 2+50	1179	10.8	122.8	96	SC	C
6-7-21	132	SD LINE E WEST SIDE STA 2+70	1176	12.8	115.1	90	NUKE	C
6-7-21	132A	SD LINE E WEST SIDE STA 2+70	RETEST	11.0	120.8	95	NUKE	C
6-8-21	133	SD LINE E EAST SIDE STA 2+70	1180	10.8	121.6	96	NUKE	C
6-8-21	134	SD LINE E EAST SIDE STA 2+95	1181	9.4	126.1	96	SC	D
6-8-21	135	SD LINE E EAST SIDE STA 2+00	1180	10.3	122.9	95	NUKE	E
6-9-21	136	SD LINE E WEST SIDE STA 2+90	1174	10.8	119.9	95	NUKE	F
6-9-21	137	SD LINE E WEST SIDE STA 2+45	1180	10.3	120.4	96	NUKE	F
6-9-21	138	SD LINE E WEST SIDE STA 2+10	1181	9.8	121.0	96	NUKE	F
6-15-21	139	SD LINE A SOUTH SIDE STA 9+50	1176	11.7	115.3	96	NUKE	B
6-15-21	140	SD LINE A SOUTH SIDE STA 9+10	1178	11.8	120.6	95	SC	A
6-15-21	141	SD LINE A SOUTH SIDE STA 9+20	1180	12.3	119.2	96	NUKE	C
6-15-21	142	SD LINE A SOUTH SIDE STA 8+90	1178	10.8	120.9	95	NUKE	A
6-15-21	143	SD LINE A SOUTH SIDE STA 8+60	1182	8.9	115.3	90	NUKE	C
6-15-21	143A	SD LINE A SOUTH SIDE STA 8+60	RETEST	11.0	121.5	95	NUKE	C
6-16-21	144	SD LINE A NORTH SIDE STA 9+00	1176	10.4	124.1	95	NUKE	D
6-16-21	145	SD LINE A NORTH SIDE STA 8+50	1178	11.0	122.8	96	SC	C
6-16-21	146	SD LINE A NORTH SIDE STA 9+40	1178	10.8	122.2	96	NUKE	C

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TRACT PM 062646 **W.O 6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
6-16-21	147	SD LINE A NORTH SIDE STA 8+70	1180	7.8	117.1	89	NUKE	D
6-16-21	147A	SD LINE A NORTH SIDE STA 8+70	RETEST	8.9	125.3	96	NUKE	D
6-16-21	148	SD LINE A NORTH SIDE STA 9+25	1180	10.1	124.8	95	SC	D
6-16-21	149	SD LINE A TO OF PRECAST STA 8+90	1182.5	10.6	123.5	97	NUKE	C
6-16-21	150	SD LINE A TO OF PRECAST STA 8+50	1183	9.7	123.3	96	NUKE	E
6-22-21	151	SD LINE A TO OF PRECAST STA 9+15	1183	10.1	121.4	96	SC	F
6-22-21	152	SD LINE A TO OF PRECAST STA 8+20	1183	10.4	120.9	96	NUKE	F
6-22-21	153	SD LINE A TO OF PRECAST STA 8+10	1183	10.4	124.8	95	NUKE	D
6-22-21	154	SD LINE A TO OF PRECAST STA 7+65	1183	10.0	121.9	97	NUKE	F
6-22-21	155	SD LINE A TO OF PRECAST STA 7+55	1183	10.3	125.1	95	SC	D
6-28-21	156	SD LATERAL A2 STA 3+25	1185.5	11.7	120.7	95	SC	C
6-28-21	157	SD LATERAL A2 STA 3+10	SG	11.8	119.5	97	NUKE	A
6-28-21	158	SD LATERAL A2 STA 1+55	SG	11.4	115.8	96	NUKE	B
6-28-21	159	SD LATERAL A2 STA 2+00	SG	10.5	123.9	95	NUKE	D
6-28-21	160	SD LINE C LATERAL C-1	1181	10.1	124.7	95	SC	D
6-28-21	161	SD LINE C LATERAL C-1	1183	10.3	125.0	95	NUKE	D
6-28-21	162	SD LINE C LATERAL C-2	1181	11.9	114.4	95	NUKE	B
6-28-21	163	SD LINE C LATERAL C-2	1183	12.1	118.4	96	SC	A
6-28-21	164	SD LINE C STA 3+80	1182	11.8	114.9	96	NUKE	B
6-28-21	165	SD LINE C STA 4+10	1183	9.6	125.8	96	NUKE	D
6-30-21	166	SD LINE C MH STA 6+00	1180	9.1	126.6	97	SC	D
6-30-21	167	SD LINE C MH STA 6+00	1182	12.0	121.2	95	NUKE	C
6-30-21	168	SD LINE C MH STA 6+00	1184	11.6	115.9	97	SC	B

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A-1 - INDICATES A RETEST OF A FAILING TEST
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TRACT PM 062646 **W.O 6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
6-30-21	169	SD LINE B LATERAL STA 9+00	1187	11.9	118.9	96	NUKE	A
6-30-21	170	SD LINE B LATERAL STA 9+00	1188	11.4	121.8	96	NUKE	C
6-30-21	171	SD LINE B LATERAL STA 9+00	1189	12.4	114.6	95	NUKE	D
6-30-21	172	SD LINE B MH STA 8+53	1184	11.8	120.5	95	SC	C
6-30-21	173	SD LINE B MH STA 8+53	1186	8.9	126.7	97	NUKE	D
6-30-21	174	SD LINE B MH STA 8+53	SG	12.4	117.9	95	NUKE	A
7-6-21	175	SD LINE B LATERAL 3	1185	11.9	119.1	96	NUKE	A
7-6-21	176	SD LINE B LATERAL 3	1186	11.3	120.6	95	NUKE	C
7-6-21	177	SD LINE B LATERAL 3	1185	10.6	122.7	96	SC	C
7-6-21	178	SD LINE B LATERAL 3	1186	9.8	125.3	96	NUKE	D
7-6-21	179	SD LINE B STA 7+75	1185	9.4	124.4	96	NUKE	E
7-6-21	180	SD LINE B MH STA 6+00	1184	10.8	122.8	96	NUKE	C
7-6-21	181	SD LINE B MH STA 6+00	1185	10.7	123.4	97	SC	C
7-6-21	182	SD LINE B MH STA 6+00	1185.5	10.1	120.6	96	NUKE	F
7-6-21	183	SD LINE B LATERAL-2 STA 6+00	1183	11.4	120.9	95	NUKE	C
7-6-21	184	SD LINE B LATERAL 2 STA 6+00	1184	11.6	116.1	97	SC	B
7-6-21	185	SD LINE B LATERAL 1 STA 37+55	1182	11.7	121.0	95	NUKE	C
7-6-21	186	SD LINE B LATERAL 1	1182.5	10.3	123.9	95	NUKE	D
7-6-21	187	SD LINE B STA 3+75	1183	9.9	124.4	95	NUKE	D
7-9-21	188	SD LINE B STA 3+50	1184	10.2	125.8	96	NUKE	D
7-9-21	189	SD LINE B LATERAL 6	1180.5	11.2	122.7	96	NUKE	C
7-9-21	190	SD LINE B STA 3+29	SG	9.9	125.8	96	SC	D
7-9-21	191	SD LINE A NORTH SIDE STA 6+25	1174	9.8	124.9	95	NUKE	D

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TRACT **PM 062646** **W.O** **6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
7-9-21	192	SD LINE A NORTH SIDE STA 6+20	1175	9.6	124.3	95	NUKE	D
7-13-21	193	SD LINE A NORTH SIDE STA 7+05	1175	7.6	117.4	90	SC	D
7-13-21	193A	SD LINE A NORTH SIDE STA 7+05	RETEST	10.4	123.9	95	SC	D
7-13-21	194	SD LINE A NORTH SIDE STA 6+65	1175	10.6	124.2	95	NUKE	D
7-13-21	195	SD LINE A NORTH SIDE STA 6+95	1177	11.2	122.1	96	NUKE	C
7-13-21	196	SD LINE A NORTH SIDE STA 6+75	1178	13.1	117.9	95	NUKE	A
7-13-21	197	SD LINE A STA 6+40	1174	10.3	123.2	95	NUKE	E
7-13-21	198	SD LINE A STA 6+60	1176	9.9	124.7	96	NUKE	D
7-13-21	199	SD LINE A STA 6+30	1176	10.2	123.9	95	SC	D
7-14-21	200	SD LINE A STA 6+75	1178	11.2	116.2	97	SC	B
7-14-21	201	SD LINE A STA 7+00	1175	13.0	117.8	95	NUKE	A
7-14-21	202	SD LINE A STA 7+30	1177	12.7	118.8	96	NUKE	A
7-14-21	203	SD LINE A STA 6+85	1178	11.0	123.1	97	NUKE	C
7-14-21	204	SD LINE A STA 7+35	1179	12.4	119.1	97	SC	A
7-14-21	205	SD LINE A STA 6+50	1180	10.8	122.8	96	NUKE	C
7-14-21	206	SD LINE A STA 7+40	1182	11.4	121.6	95	NUKE	C
7-14-21	207	SD LINE A TOP OF PRECAST STA 6+45	1182	11.6	120.9	95	NUKE	C
7-14-21	208	SD LINE A TOP OF PRECAST STA 7+00	1182	10.9	122.6	96	SC	C
7-14-21	209	SD LINE A TOP OF PRECAST STA 7+40	1182	8.1	116.2	91	NUKE	C
7-14-21	209A	SD LINE A TOP OF PRECAST STA 7+40	RETEST	11.2	121.6	95	NUKE	C
7-15-21	210	SD LINE A SOUTH SIDE STA 12+00	1177	11.3	122.8	96	NUKE	C
7-15-21	211	SD LINE A SOUTH SIDE STA 11+60	1178	11.1	122.0	96	NUKE	C
7-15-21	212	SD LINE A SOUTH SIDE STA12+40	1179	9.3	120.5	96	NUKE	F

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TRACT PM 062646 **W.O 6457**

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
7-15-21	213	SD LINE A SOUTH SIDE STA 12+10	1181	11.9	121.7	95	SC	C
7-15-21	214	SD LINE A SOUTH SIDE STA 13+05	1176	9.7	124.0	95	NUKE	D
7-15-21	215	SD LINE A SOUTH SIDE STA 12+10	1178	9.9	124.7	95	NUKE	D
7-15-21	216	SD LINE A SOUTH SIDE STA 13+20	1177	11.6	119.5	97	NUKE	A
7-15-21	217	SD LINE A SOUTH SIDE STA 13+90	1177	11.7	121.2	95	NUKE	C
7-15-21	218	SD LINE A SOUTH SIDE STA 13+30	1179	10.0	125.8	96	SC	D
7-15-21	219	SD LINE A SOUTH SIDE STA 14+10	1179	10.4	125.0	95	SC	D
7-15-21	220	SD LINE A SOUTH SIDE STA 13+65	1181	10.1	120.9	96	NUKE	F
7-15-21	221	SD LINE A SOUTH SIDE STA 12+50	1181	9.7	123.3	96	NUKE	E
7-16-21	222	SD LINE A NORTH SIDE STA 12+10	1177	10.1	122.8	95	NUKE	E
7-16-21	223	SD LINE A NORTH SIDE STA 12+10	12+70	9.1	125.9	96	SC	D
7-16-21	224	SD LINE A NORTH SIDE STA 11+65	1179	9.0	126.7	97	SC	D
7-16-21	225	SD LINE A NORTH SIDE STA 12+30	1179	9.7	124.6	95	NUKE	D
7-16-21	226	SD LINE A NORTH SIDE STA 11+80	1180	10.4	123.8	97	NUKE	C
7-16-21	227	SD LINE A NORTH SIDE STA 12+50	1180	10.5	123.2	97	SC	C
7-16-21	228	SD LINE A NORTH SIDE STA 12+20	1182	9.6	123.9	95	NUKE	D
7-20-21	229	SD LINE A NORTH SIDE STA 13+40	1178	10.3	124.7	95	NUKE	D
7-20-21	230	SD LINE A NORTH SIDE STA 14+00	1178	9.0	125.4	96	NUKE	D
7-20-21	231	SD LINE A NORTH SIDE STA 13+15	1180	10.1	124.1	95	SC	D
7-20-21	232	SD LINE A NORTH SIDE STA 13+70	1180	9.2	125.9	96	NUKE	D
7-20-21	233	SD LINE A NORTH SIDE STA 13+30	1182	11.6	120.8	95	NUKE	E
7-20-21	234	SD LINE A NORTH SIDE STA 13+90	1184	10.3	124.9	97	NUKE	E
7-21-21	235	LINE A TOP OF PRECAST STA 13+50	1184	9.7	123.1	95	SC	E

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TRACT PM 062646 **W.O** 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
7-21-21	236	LINE A TOP OF PRECAST STA 12+70	1183	9.9	123.9	96	NUKE	E
7-21-21	237	LINE A TOP OF PRECAST STA 12+20	1183	10.2	124.7	95	NUKE	D
7-21-21	238	LINE A TOP OF PRECAST STA 11+70	1183	8.9	124.0	96	NUKE	E
7-21-21	239	SD TOP OF PRECAST STA 13+15	1183	9.0	123.7	96	NUKE	E
7-21-21	240	SD LINE A NORTH SIDE STA 10+85	1176	11.8	121.7	95	NUKE	C
7-21-21	241	SD LINE A NORTH SIDE STA 11+00	1176	10.9	122.6	96	NUKE	C
7-21-21	242	SD LINE A NORTH SIDE STA 11+45	1177	11.6	121.8	96	NUKE	C
7-21-21	243	SD LINE A NORTH SIDE STA 11+2	1179	11.5	122.4	96	NUKE	C
7-26-21	244	SD LINE A SOUTH SIDE STA 11+05	1178	10.0	123.9	95	NUKE	D
7-26-21	245	SD LINE A SOUTH SIDE STA 10+85	1179	11.3	122.9	96	NUKE	C
7-26-21	246	SD LINE A SOUTH SIDE STA 11+35	1177	9.4	122.8	95	SC	E
7-26-21	247	SD LINE A SOUTH SIDE STA 11+75	1178	10.4	123.3	97	SC	C
7-26-21	248	SD LINE A SOUTH SIDE STA 10+75	1180	9.1	126.9	97	NUKE	D
7-26-21	249	SD LINE A SOUTH SIDE STA 11+15	1180	9.7	122.7	96	SC	C
7-28-21	250	SD LINE A SOUTH SIDE STA 11+90	1179	9.0	123.2	97	NUKE	C
7-28-21	251	SD LINE A SOUTH SIDE STA 11+60	1180	9.6	125.7	96	NUKE	D
7-28-21	252	SD LINE A SOUTH SIDE STA 12+40	1182	9.5	126.1	96	NUKE	D
7-28-21	253	SD LINE A SOUTH SIDE STA 12+10	1181	9.3	124.7	97	SC	E
7-28-21	254	SD LINE A SOUTH SIDE STA 12+90	1180	9.4	125.2	96	NUKE	D
7-28-21	255	SD LINE A SOUTH SIDE STA 12+70	1182	8.9	126.8	97	SC	D
7-29-21	256	SD LINE E OVER MWD ZONE STA 4+00	1184	9.8	125.9	96	NUKE	D
7-29-21	257	SD LINE E OVER MWD ZONE STA 4+20	1185	10.7	121.5	96	NUKE	F
7-29-21	258	SD LINE E OVER MWD ZONE STA 4+00	SG	10.1	125.0	95	SC	D

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT PM 062646 W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
7-29-21	259	SD LINE E OVER MWD ZONE STA 3+70	SG	10.3	124.8	95	NUKE	D
7-29-21	260	SD LINE E OVER MWD ZONE STA 4+80	1180	10.5	124.0	95	NUKE	D
7-29-21	261	SD LINE E OVER MWD ZONE STA 5+40	1182	11.3	121.9	96	NUKE	C
7-29-21	262	SD LINE E OVER MWD ZONE STA 5+10	1184	11.8	122.5	96	NUKE	C
7-29-21	263	SD LINE E OVER MWD ZONE STA 5+60	1183	11.7	122.9	96	NUKE	C
7-29-21	264	SD LINE E OVER MWD ZONE STA 5+80	1185	12.0	121.4	95	SC	C
7-29-21	265	SD LINE E OVER MWD ZONE STA 5+00	SG	10.2	124.5	95	NUKE	D
7-29-21	266	SD LINE F STA 1+30	1182	10.3	123.9	96	NUKE	E
8-3-21	267	SD LINE F STA 1+90	1182	9.8	125.1	95	SC	D
8-3-21	268	SD LINE F STA 2+70	1183	10.1	123.8	95	NUKE	E
8-3-21	269	SD LINE F STA 1+55	1184	11.2	121.1	95	NUKE	C
8-3-21	270	SD LINE F STA 2+40	1183	10.6	121.9	96	SC	C
8-3-21	271	SD LINE F STA 3+80	1184	10.8	120.2	95	NUKE	F
9-13-21	272	SD LINE F STA 4+15	1184	9.0	124.5	95	NUKE	D
9-13-21	273	SD LINE F STA 3+25	SG	9.0	124.4	96	NUKE	E
9-13-21	274	SD LINE F STA 4+00	1183	9.3	123.4	96	SC	E
9-13-21	275	SD LINE F STA 4+55	1184	10.4	120.9	96	NUKE	F
9-14-21	276	SD LINE F STA 4+85	SG	8.9	126.6	97	NUKE	D
9-14-21	277	SD LINE F STA 3+00	SG	9.1	124.8	97	NUKE	E
9-15-21	278	SD LINE F MH STA 3+00	1182	10.1	121.1	96	NUKE	F
9-15-21	279	SD LINE F MH STA 3+00	1183	10.4	123.7	97	NUKE	C
9-15-21	280	SD LINE F MH STA 3+00	1180	10.8	122.8	96	SC	C
9-15-21	281	SD LINE F MH STA 3+00	1183	8.8	125.4	96	NUKE	D

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

TRACT PM 062646 W.O 6457

TABLE I
FIELD DENSITY TEST RESULTS

Date of Test	Test No.	Test Location	Depth or Elev. (feet)	Moisture (%)	Dry Density (pcf)	Relative Compaction (%)	Test Type	Soil Type
9-15-21	282	SD LINE F MH STA 3+00	1183	10.0	124.1	96	SC	E
10-11-21	283	SD LINE F END	1185	10.2	123.0	95	SC	E
10-11-21	284	SD LINE A TO F TIE IN	1182	9.8	123.9	96	NUKE	E
10-18-21	285	SD LINE A TO F TIE IN	1184	8.8	123.9	95	NUKE	D
10-18-21	286	SD LATERAL A-2	SG	10.7	122.8	96	SC	C
10-19-21	287	SD LATERAL A-2	SG	9.9	123.7	96	NUKE	E
10-19-21	288	SD LATERAL A-2	SG	11.3	123.4	97	SC	C
10-19-21	289	SD LATERAL A-2	SG	9.0	124.1	96	NUKE	E

SC - INDICATES SAND CONE TEST
F.G. – INDICATES FINISHED GRADE
NUKE - INDICATES NUCLEAR DENSOMETER TEST
S.G. - INDICATES SUBGRADE
A-1 - INDICATES A RETEST OF A FAILING TEST
AC – ASPHALT CONCRETE

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

COMPACTION MAP
MTD NO. 1843
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	3/2022	1" = 40'

REVISED

PLATE 1A

SCALE: HOR. 1"= 40' VERT. 1"= 8'

NOTE:

- [*] EASEMENT TO THE CITY OF SANTA CLARITA (SEE EASEMENT DETAILS ON SHEET 13A)
- [**] C/L OF WINDOW PER SPPWC STD. PLAN 382-2
- 5' HIGH CHAINLINK FENCE PER SPPWC STD. PLAN 600-3, TO BE MAINTAINED BY H.O.A.
- [BPR] PROVIDE BLANKET PROTECTION SEE S.P.P.W.C. STD PLAN 225-2
- CONCRETE FACING SLAB PER DETAIL ON SHEET 10
- [CP] PROVIDE 5'X5', 6" THICK CONCRETE PAD OVER MANHOLE (NOT TO BE MAINTAINED BY LACFCD)
- [ACW] CONSTRUCT 4' WIDE BY 3 INCH THICK AC MANHOLE ACCESS WALK (NOT TO BE MAINTAINED BY LACFCD)

CURVE DATA

⬡	DELTA	RADIUS	LENGTH	TANGENT
1	15°0'00"	120.00'	31.42'	15.80'
2	66°47'43"	120.00'	139.90'	79.12'
3	66°31'32"	120.00'	139.33'	78.71'

APPROVED FOR CONSTRUCTION BY:
MIKE HENNAWAY
CITY ENGINEER
DATE 4-10-19

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
1	THIS SHEET REPLACES SHEET 3	RCE 49041	Y.M.	4-1-19
2	RELOCATED LINE "E"	RCE 49041	DocuSigned by: Shannon Pickett	6/3/2020
3	ADDED SEWER CROSSING DETAIL FOR 18" SEWER.	DOUG FARMER RCE 32363	DocuSigned by: Shannon Pickett	8/30/2021

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER 03/22/19 DATE

STORM DRAIN PLANS IN PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

PREPARED BY:

SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

PARCEL MAP NO. 062646

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

COMPACTION MAP
MTD NO. 1843
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	3/2022	1" = 40'

REVISED

PLATE 1B

MDN 22662

LINE DATA – LINE "E"		
L#	BEARING	LENGTH
1	N00°29'17"W	123.92'
2	N39°49'40"E	29.53'
3	N77°54'43"E	13.87'

CURVE DATA				
#	DELTA	RADIUS	LENGTH	TANGENT
1	67°32'20"	120.00'	141.45'	80.24'
2	38°52'48"	45.00'	30.54'	15.88'
3	40°18'57"	45.00'	31.66'	16.52'
4	38°05'03"	45.00'	29.91'	15.53'

NOTE:

EASEMENT TO THE CITY OF SANTA CLARITA (SEE EASEMENT DETAILS ON SHEET 13)

CATCH BASINS AND WATER QUALITY DEVICES WILL NOT BE MAINTAINED BY L.A.C.F.C.D.

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
2	ADDED REALIGNED LINE A AND LINE E PLAN AND PROFILE	RCE 49041	Shannon Pickett	6/3/2020

APPROVED FOR CONSTRUCTION BY:
MIKE HENNAWY
CITY ENGINEER
DATE 6/3/2020

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER 03/22/19

STORM DRAIN PLANS IN PARCEL MAP NO. 062646 M.T.D. NO. 1843

CITY OF SANTA CLARITA

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PARCEL MAP NO. 062646

GSC GeoSoils Consultants Inc.
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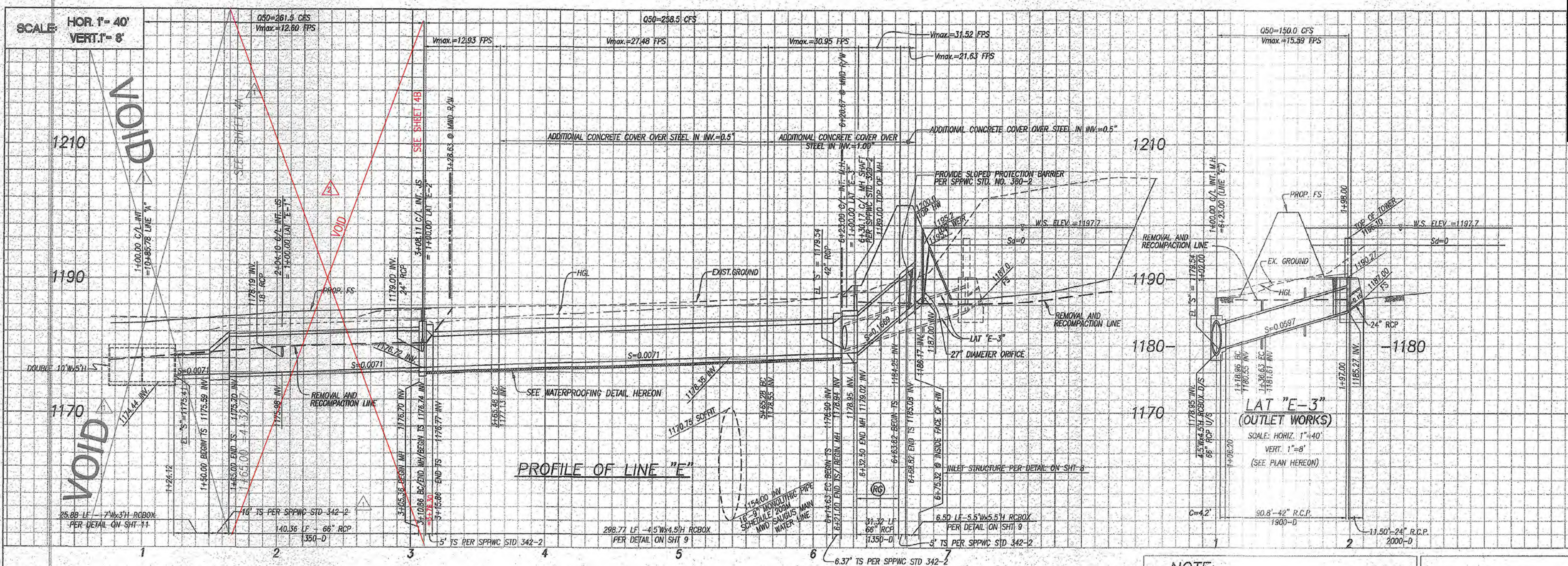
Van Nuys, CA 91406

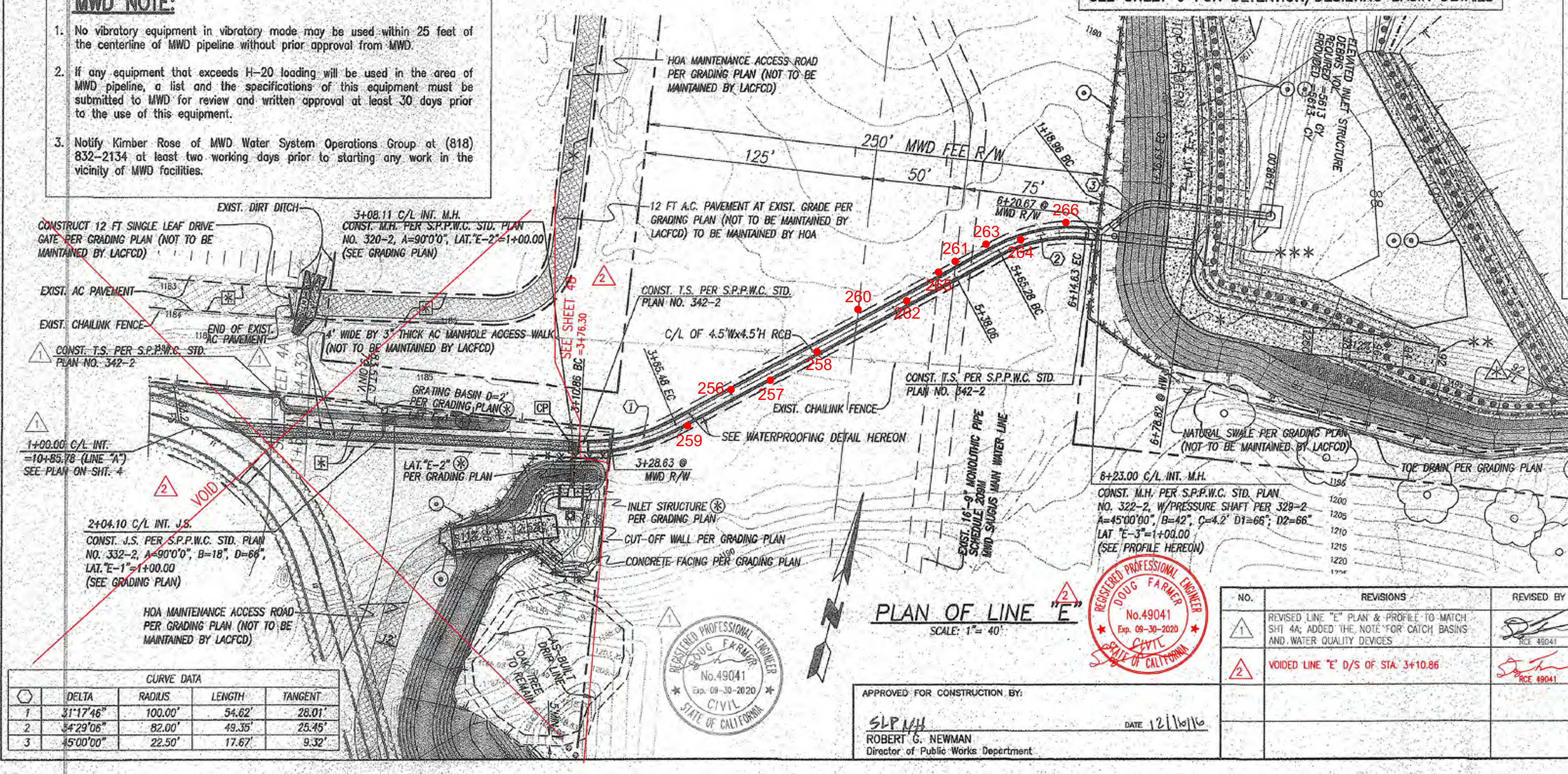
COMPACTION MAP
MTD NO. 1843
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	3/2022	1" = 40'

REVISED — PLATE 1C

MDN 22662





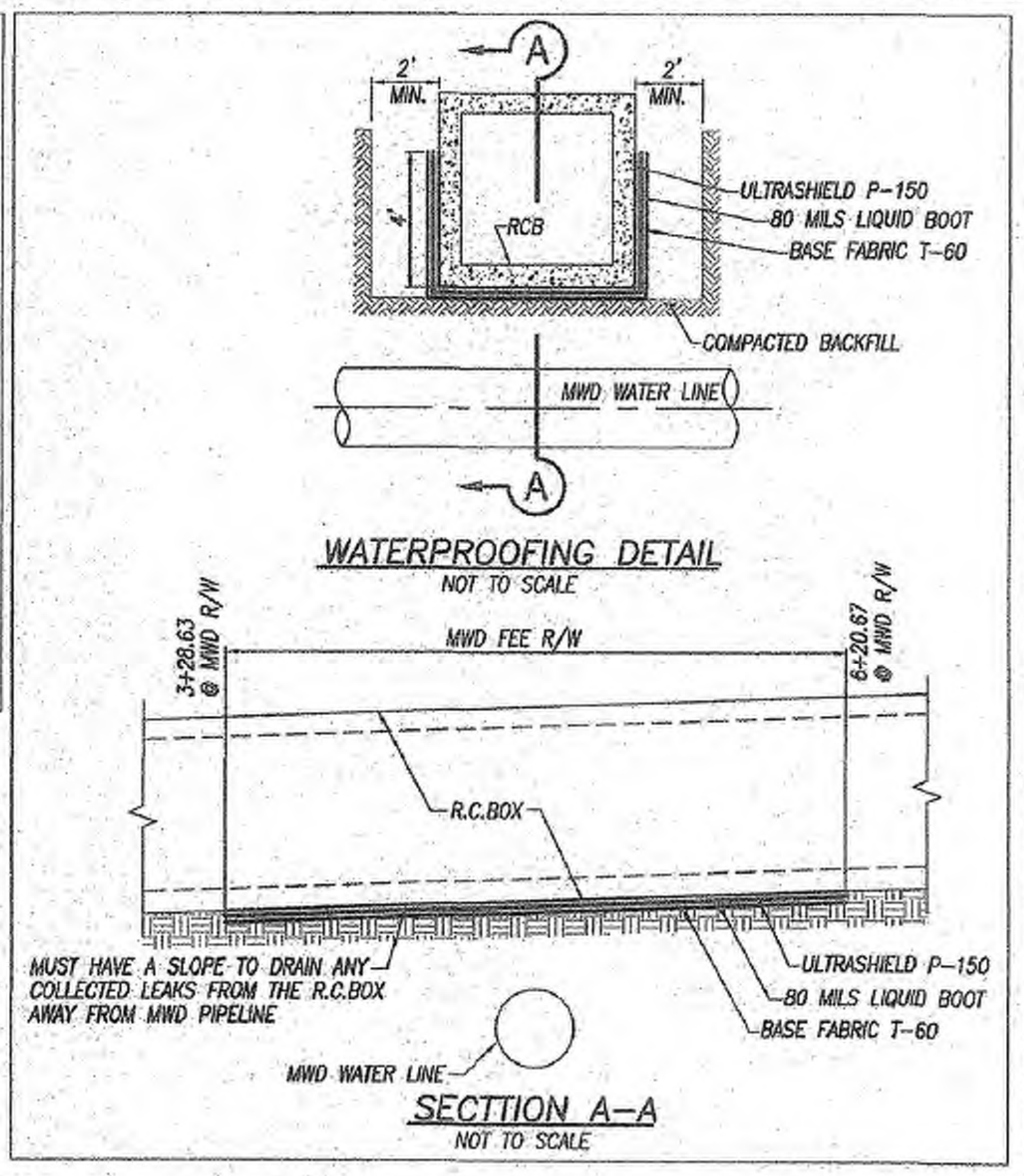
MWD NOTE:

1. No vibratory equipment in vibratory mode may be used within 25 feet of the centerline of MWD pipeline without prior approval from MWD.
2. If any equipment that exceeds H-20 loading will be used in the area of MWD pipeline, a list and the specifications of this equipment must be submitted to MWD for review and written approval at least 30 days prior to the use of this equipment.
3. Notify Kimber Rose of MWD Water System Operations Group at (818) 832-2134 at least two working days prior to starting any work in the vicinity of MWD facilities.

NOTE:

- (*) NOT TO BE MAINTAINED BY CITY OF SANTA CLARITA OR LACFCD
- (•) 5' HIGH CHAINLINK FENCE PER SPPWC STD. PLAN 600-3, TO BE MAINTAINED BY H.O.A.
- (•)(•) CONCRETE FACING SLAB PER DETAIL ON SHEET 10
- DEBRIS STORAGE LIMIT
- EASEMENT TO THE CITY OF SANTA CLARITA (SEE EASEMENT DETAILS ON SHEET 12)
- * CONSTRUCT 12' ACCESS ROAD PER DETAIL ON SHEET 10
- ** CUT-OFF WALL PER DETAIL ON SHEET 10
- *** CONSTRUCT ELEVATED INLET STRUCTURE AND OUTLET WORKS PER DETAILS ON SHEET 8
- CP PROVIDE 5'X5' CONCRETE PAD OVER MANHOLE (NOT TO BE MAINTAINED BY LACFCD)
- RG PROVIDE RUBBER GASKET JOIN PIPE ON BOTH SIDES OF CUT/FILL TRANSITION (3 JOINTS MIN.)

CATCH BASINS AND WATER QUALITY DEVICES WILL NOT BE MAINTAINED BY L.A.C.F.C.D.



CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
1	31°17'46"	100.00'	54.62'	28.01'
2	34°29'06"	82.00'	49.35'	25.45'
3	45°00'00"	22.50'	17.67'	9.32'

APPROVED FOR CONSTRUCTION BY:
ROBERT G. NEWMAN
Director of Public Works Department
DATE 12/16/16

NO.	REVISIONS	REVISED BY	APPROVED BY	DATE
1	REVISED LINE "E" PLAN & PROFILE TO MATCH SHT 4A; ADDED THE NOTE FOR CATCH BASINS AND WATER QUALITY DEVICES	RCE 49041		4-1-19
2	VOIDED LINE "E" D/S OF STA. 3+10.86	RCE 49041	Shannon Pickett	6/3/2020

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER 11-15-16

STORM DRAIN PLANS IN
PARCEL MAP NO. 062646 M.T.D. NO. 1843
CITY OF SANTA CLARITA

PREPARED BY:
SIKAND Engineering | Planning | Surveying
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Van Nuys, CA 91411
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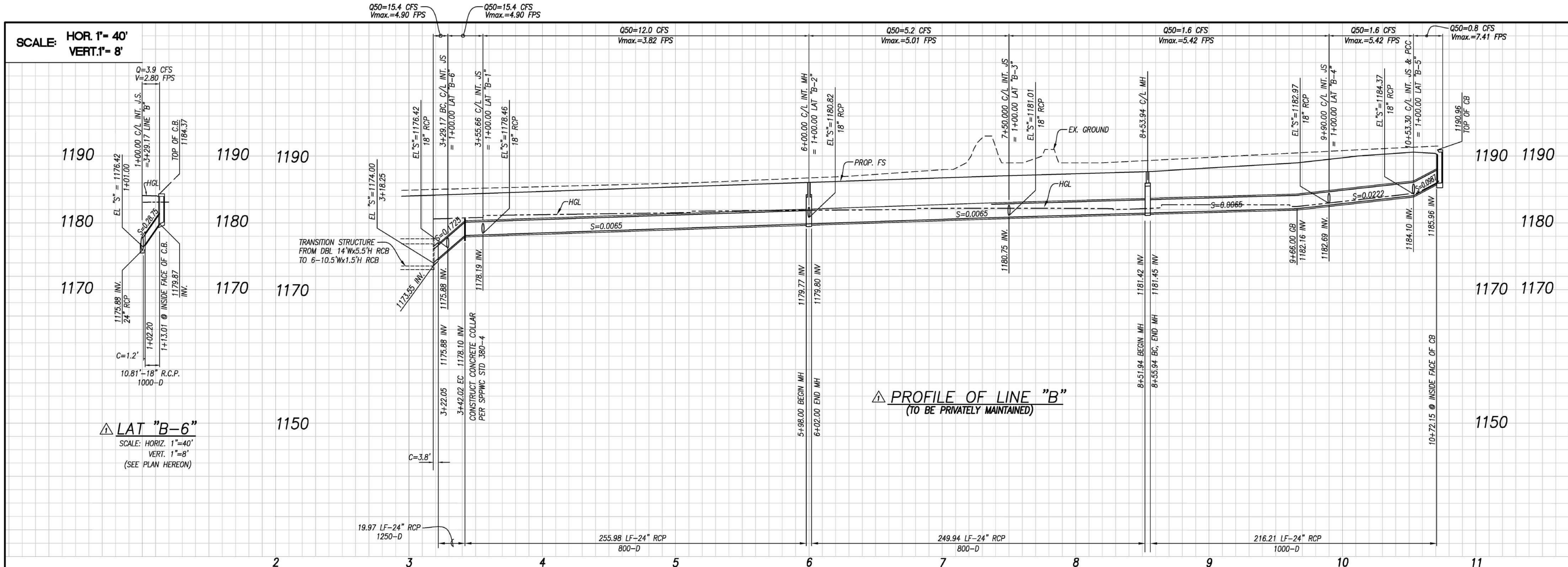
Fax: (818) 901-7451
info@sikand.com

PARCEL MAP NO. 062646 — SHEET 5 OF 13

X:\2001 w.o\gsc-cad\6457\1-26-22\current\COMPACTION MAP.dwg, 3/17/2022 12:07:13 PM, AutoCAD PDF (High Quality Print).pc3

SCALE: HOR. 1"= 40' VERT.1"= 8'



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6634 Valjean Avenue
Van Nuys, CA 91406

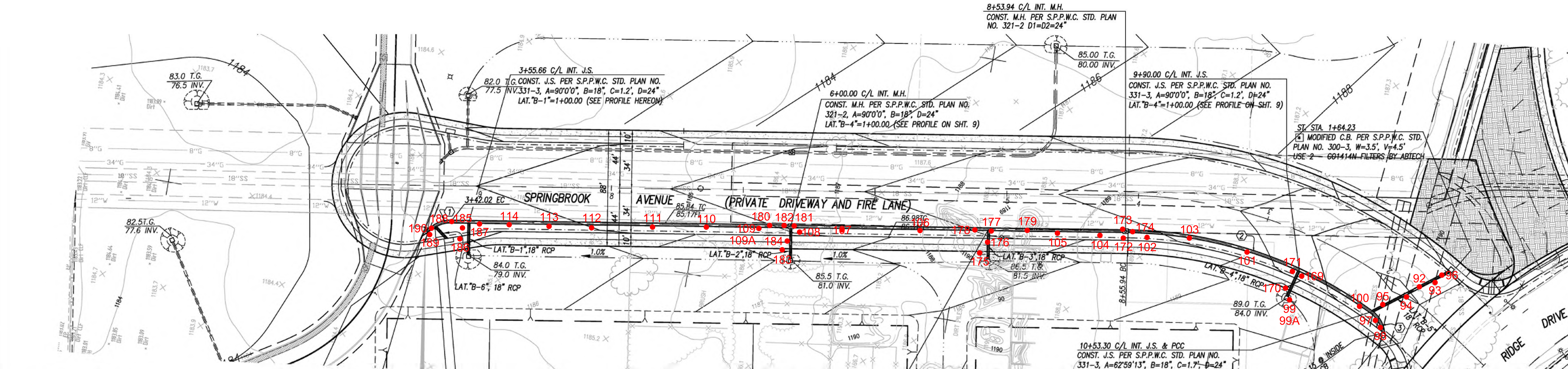
COMPACTION MAP
MTD NO. 1843
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	3/2022	1" = 40'

REVISED

PLATE 1D

MDN 22662



CONSTRUCTION NOTES

▲ CONSTRUCT PER STREET PLAN.
CATCH BASIN MODIFIED TO INCLUDE CATCH BASIN FILTER BY ABTECH INDUSTRIES MODEL C01414 WITH OARS OR APPROVED EQUAL.

CURVE DATA

⬡	DELTA	RADIUS	LENGTH	TANGENT
1	32°44'02"	22.50'	12.85'	6.61'
2	35°0'35"	323.00'	197.36'	101.87'
3	47°59'36"	22.50'	18.85'	10.02'

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

CONSTRUCTION NOTES

▣ CONSTRUCT PER STREET PLAN.
CATCH BASIN MODIFIED TO INCLUDE CATCH BASIN FILTER BY ABTECH INDUSTRIES MODEL C01414 OR APPROVED EQUAL.

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CITY OF SANTA CLARITA
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FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY:
DATE: 7/10/2020

THIS SET OF PLANS AND SPECIFICATION MUST BE KEPT ON THE JOB AT ALL TIMES. IT IS UNLAWFUL TO MAKE ANY CHANGES OR ALTERNATIONS ON SAME WITHOUT WRITTEN PERMISSION FROM THE DEVELOPMENT SERVICES DIVISION.

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GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS, CA 91406
TEL. (818) 785-2158 FAX (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 1/15/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

PREPARED FOR:
TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

PREPARED BY:
SIKAND
Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
Tel: (818) 787-8550
Fax: (818) 901-7451
info@sikand.com

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA

PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY	CITY APPROVALS	APPROVAL DATE
1	REVISED PLAN AND PROFILE OF LINE "B" AND LAT'S SHEET 7 SUPERSEDED BY SHEET 7A	DOUG FARMER, RCE 49041		6/11/2020

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LINE "B"

SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099-037-02
CASE NO.	GRA11-00005
SHEET:	7A OF 11

GRA18-00019

	DELTA	RADIUS	LENGTH	TANGENT
1	44°26'30"	22.50'	17.45'	9.19'
2	78°5'29"	22.50'	30.67'	18.25'
3	22°16'23"	22.50'	8.75'	4.43'

CURVE DATA

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

COMPACTION MAP
MTD NO. 1843
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	3/2022	1" = 40'

REVISED
PLATE 1E
MDN 22662

CITY OF SANTA CLARITA
APPROVED
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CHAPTER 17
UNIFIED DEVELOPMENT CODE
BY:
DATE: 6/10/2020

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VAN NUYS CA, 91406
TEL. (818) 785-2158 FAX. (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469
1/15/2020
DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

PREPARED FOR:
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SANTA CLARITA, CA 91350
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Engineering | Planning | Surveying
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info@sikand.com

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA
6-3-20
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY	CITY APPROVALS	APPROVAL DATE
1	REVISED PLAN AND PROFILE OF LINE "C" AND LAT'S REVISED PLAN AND PROFILE OF LAT'S "A-3" & "A-4" SHEET 8 SUPERSEDED BY SHEET 8A	DOUG FARMER, RCE 49041		6/11/2020

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LINE "C"
LATERALS "A-3" & "A-4"

SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099-037-02
CASE NO.	GRA18-00019
SHEET:	8A OF 11

GRA18-00019

SCALE: HOR. 1"= 40' VERT.1"= 8'

GSC GeoSoils Consultants Inc.
6634 Valjean Avenue
Van Nuys, CA 91406

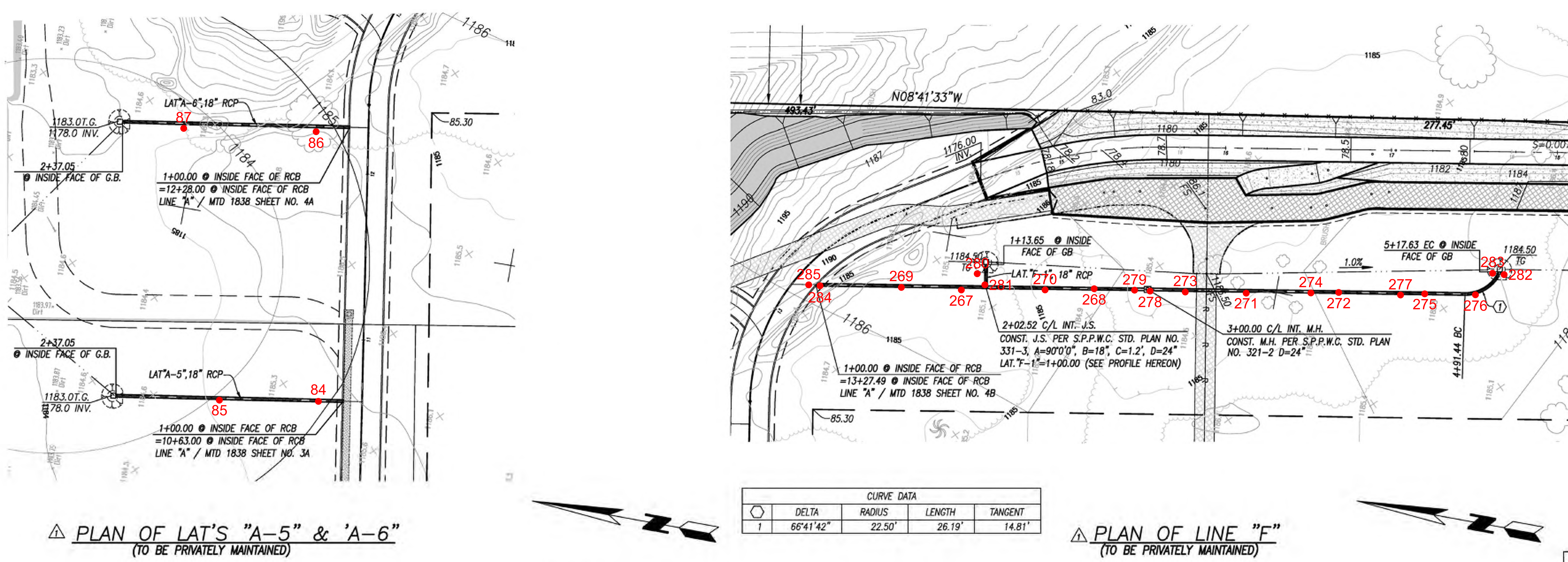
COMPACTION MAP
MTD NO. 1843
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	3/2022	1" = 40'

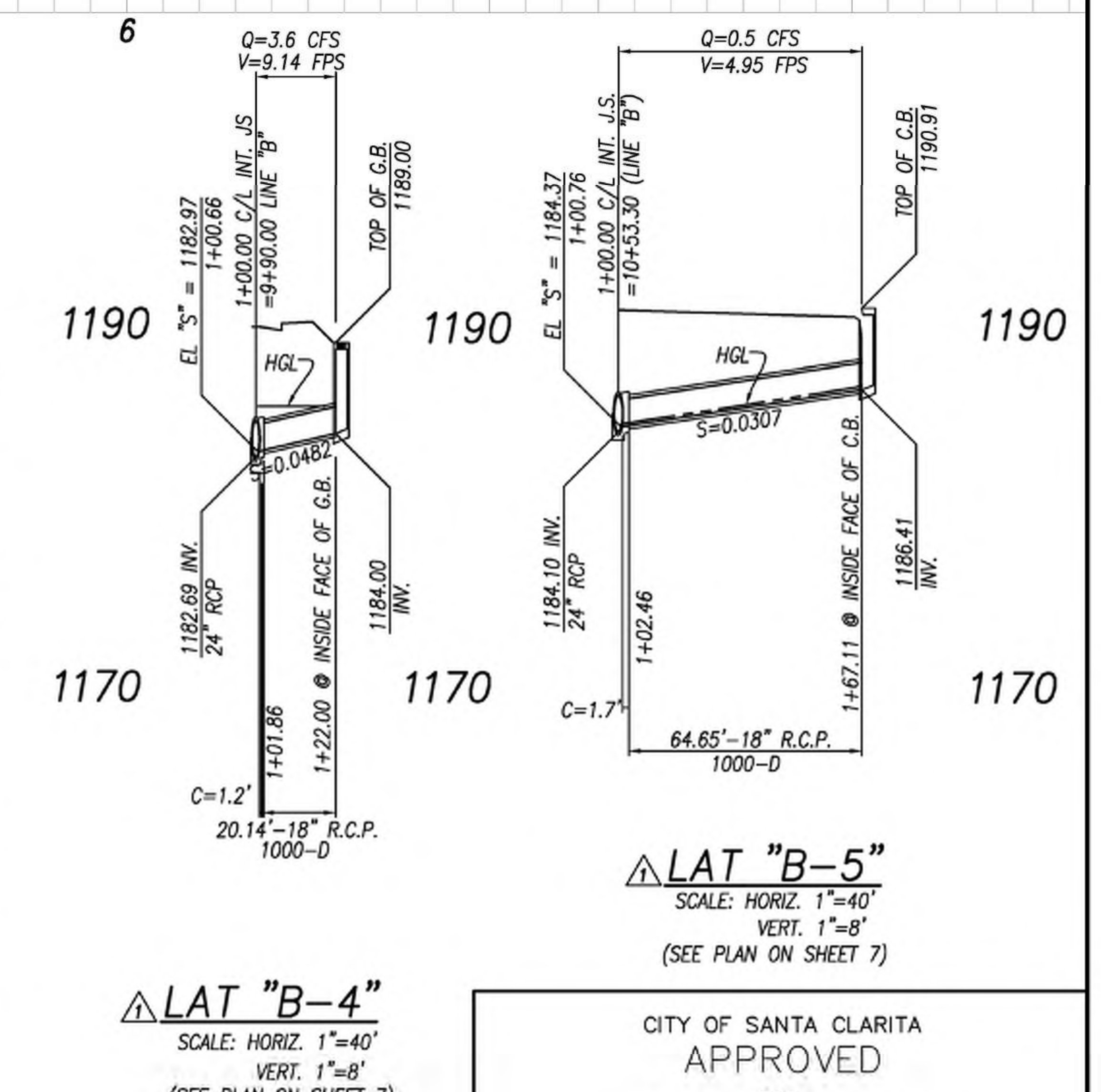
REVISED

PLATE 1F

MDN 22662



	DELTA	RADIUS	LENGTH	TANGENT
CURVE DATA				
1	66°41'42"	22.50'	26.19'	14.81'



CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE
BY:
DATE: 9/10/2020

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VAN NUYS CA, 91406
TEL. (818) 785-2158 FAX. (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 1/15/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

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Fax: (818) 901-7451
info@sikand.com

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA
6-3-20
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY	CITY APPROVALS	APPROVAL DATE
1	DELETED LINE "D", ADDED PLAN AND PROFILE OF LINE "F", REVISED PLAN AND PROFILE OF LAT'S "A-5" & "A-6" & REVISED PROFILE OF LAT'S "B-2" TO "B-5" SHEET 9 SUPERSEDED BY SHEET 9A	DOUG FARMER, RCE 49041		9/10/2020

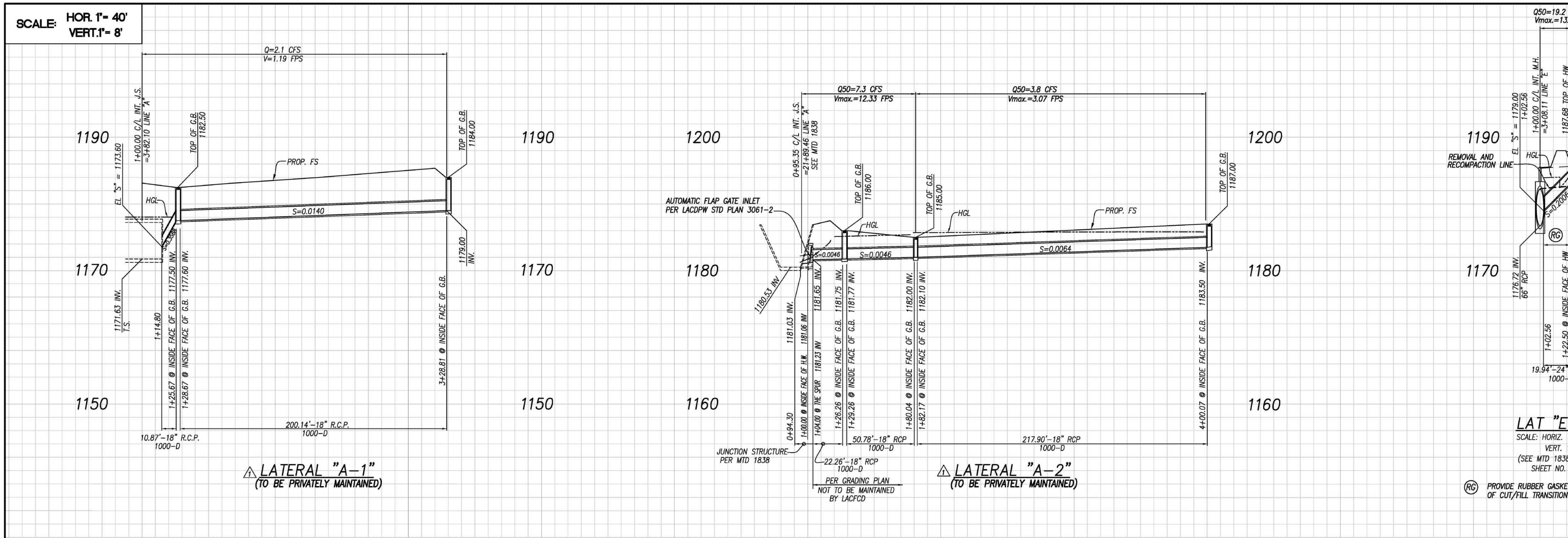
CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LATERALS

SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099-037-02
CASE NO.	GRA18-00019
SHEET:	9A OF 11

GRA18-00019

w:o\gsc-cad\6457\1-26-22\current\COMPACTION MAP.dwg, 3/17/2022 12:06:48 PM, AutoCAD PDF (High Quality Print).pc3

SCALE: HOR. 1"= 40' VERT.1"= 8'



GSC GeoSoils Consultants Inc. GEOTECHNICAL • GEOLOGIC • ENVIRONMENTAL

6634 Valjean Avenue
Van Nuys, CA 91406

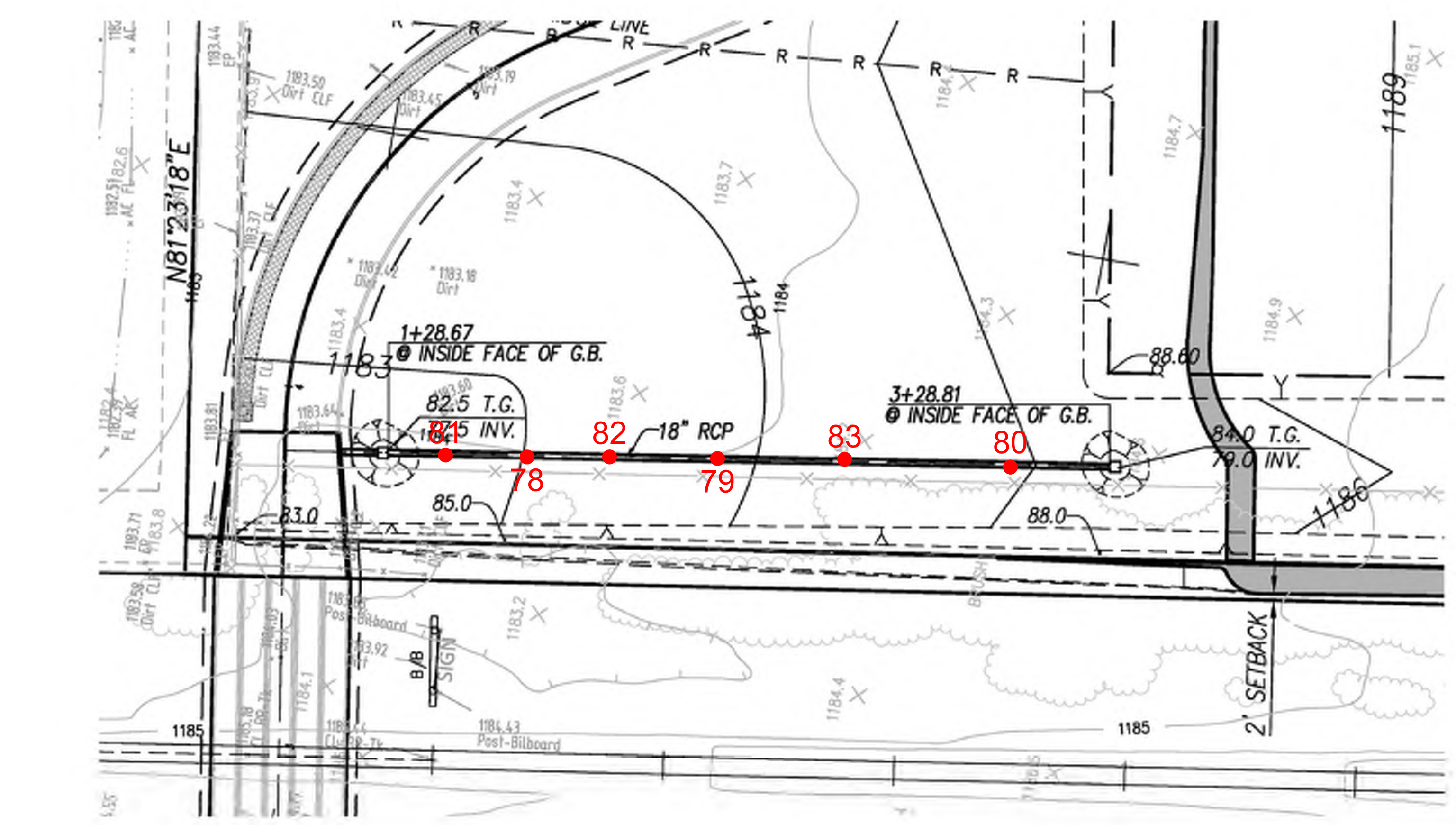
COMPACTION MAP
MTD NO. 1843
PARCEL MAP 062646
SANTA CLARITA, CALIFORNIA
TMC

WORK ORDER	DATE	SCALE
6457	3/2022	1" = 40'

REVISED

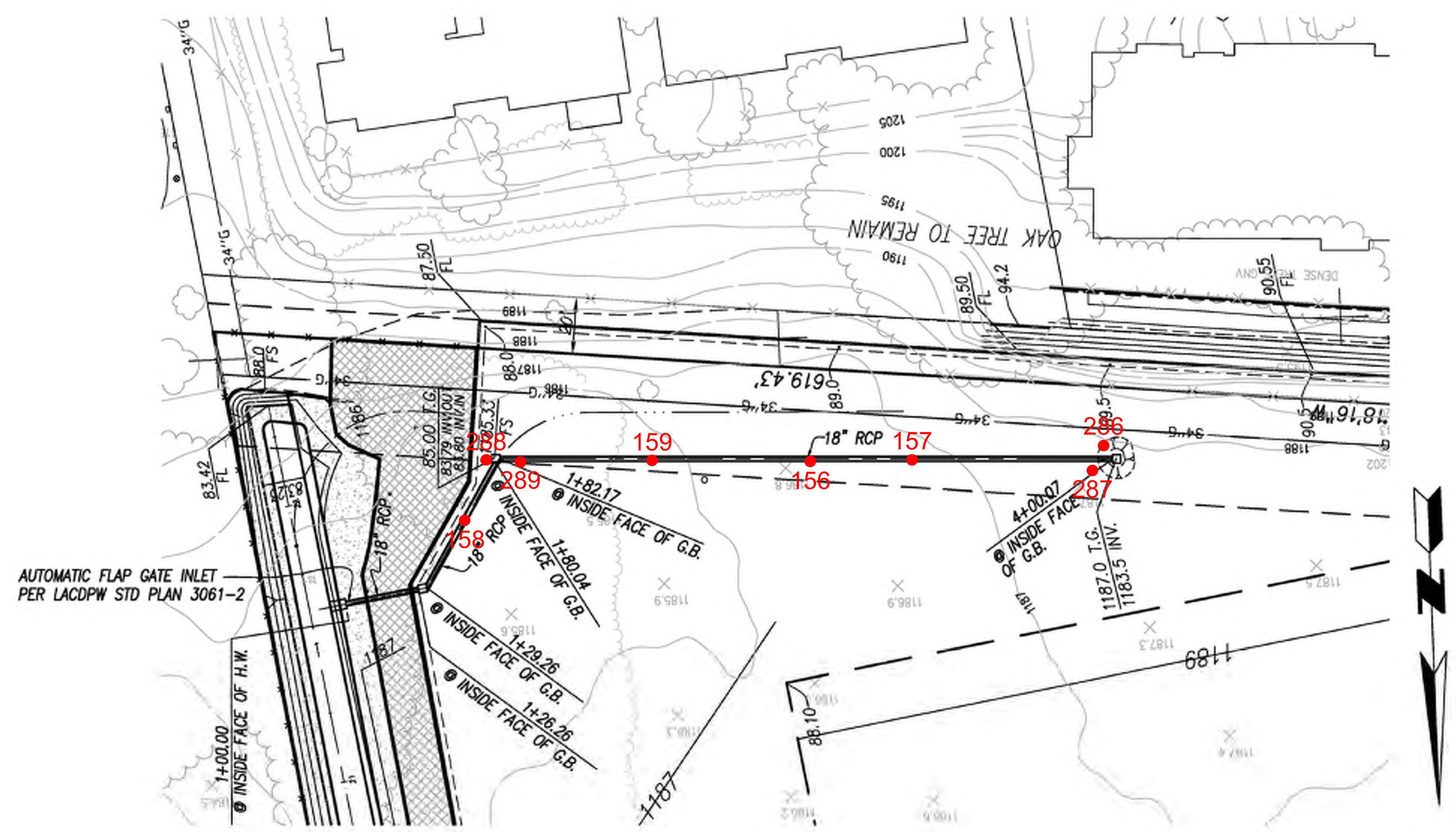
PLATE 1G

MDN 22662



PLAN OF LATERAL "A-1"
(TO BE PRIVATELY MAINTAINED)

SCALE: 1" = 40'



PLAN OF LATERAL "A-2"
(TO BE PRIVATELY MAINTAINED)

SCALE: 1" = 40'

DIGALERT
DIAL TOLL FREE 1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

CITY OF SANTA CLARITA
APPROVED
FOR
GRADING AND DRAINAGE
CHAPTER 17
UNIFIED DEVELOPMENT CODE

BY:
DATE: 7/10/2020

THIS SET OF PLANS AND SPECIFICATION MUST BE KEPT ON THE JOB AT ALL TIMES. IT IS UNLAWFUL TO MAKE ANY CHANGES OR ALTERNATIONS ON SAME WITHOUT WRITTEN PERMISSION FROM THE DEVELOPMENT SERVICES DIVISION.

THE STAMPING OF THESE PLANS AND SPECIFICATIONS SHALL NOT BE USED AS A SUBSTITUTE FOR PERMIT OR MEANS AS AN APPROVAL OF ANY VIOLATION OF THE PROVISIONS OF ANY CITY OR COUNTRY ORDINANCE OR STATE LAW.

GEOTECHNICAL REVIEW BY:
GeoSoils Consultants Inc.
6634 VALJEAN AVENUE
VAN NUYS CA. 91406
TEL. (818) 785-2158 FAX. (818) 785-1548
PLANS PREPARED UNDER THE DIRECTION OF:
LANCE R. PUTNAM # 2469 1/15/2020 DATE

PROFESSIONAL GEOLOGIST Lance R. Putnam No. 2469 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER KAREN L. MILLER No. 2257 Exp. 3/31/20 GEOTECHNICAL STATE OF CALIFORNIA

PREPARED FOR:
TMC PROPERTIES, INC.
25655 SPRINGBROOK AVENUE
SANTA CLARITA, CA 91350
ATTN: MARK SULLIVAN (661)259-4400

PREPARED BY:
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Engineering | Planning | Surveying
15230 Burbank Blvd.
Van Nuys, CA 91411
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info@sikand.com

REGISTERED PROFESSIONAL ENGINEER DOUG FARMER No.49041 Exp. 09-30-2020 CIVIL STATE OF CALIFORNIA
6-3-20
PROJECT ENGINEER DATE

NO.	REVISION	REVISED BY	CITY APPROVALS	APPROVAL DATE
1	DELETED LAT "D-3-1" AND PROFILE OF LAT'S "E-1", "E-4" AND "E-5". REVISED PLAN AND PROFILE OF LAT "A-2" & ADDED PLAN AND PROFILE OF LAT "A-1" SHEET 10 SUPERSEDED BY SHEET 10A	DOUG FARMER, RCE 49041		2020

CITY OF SANTA CLARITA
ROUGH GRADING PLAN
PARCEL MAP 062646
STORM DRAIN LATERAL "A-2" AND LATERAL "D-3-1"

SCALE:	AS SHOWN
DATE:	07/05/2018
JOB NO.	5099-037-02
CASE NO.	GRA18-00019
SHEET:	10A OF 11

GRA18-00019