

Appendix AQ: Air Quality Modeling

Construction Emissions Summary

Annual Construction Emissions											
	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	CO2e
Year	tons/year										MT/year
2020	0.35	3.81	2.29	0.01	0.86	0.17	1.03	0.45	0.16	0.61	462.08
2021	0.35	3.41	3.13	0.01	0.05	0.16	0.21	0.01	0.15	0.17	590.65
2022	0.34	2.11	2.21	0.00	0.03	0.10	0.13	0.01	0.09	0.10	407.52
Total Emissions (tons)	1.04	9.33	7.63	0.02	0.94	0.43	1.37	0.47	0.41	0.88	1460.25

Notes: ROG = reactive organic gases; NOx = nitrogen oxides; CO = carbon monoxide; SO2 = sulfur dioxide; PM10 = particulate matter equal or less than 10 micrometers in diameter; PM2.5 = particulate matter equal or less than 2.5 micrometers in diameter

Average Daily Construction Emissions											
	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	
Total Emissions (tons)	1.04	9.33	7.63	0.02	0.94	0.43	1.37	0.47	0.41	0.88	
Average Daily Emissions (pounds/day) ¹	3.51	31.42	25.70	0.06	3.18	1.45	4.63	1.60	1.36	2.96	
Threshold ²	54	54				82			54		
Exceed Threshold?	No	No				No			No		

Notes:
¹Average daily emissions are calculated based on 22 working days per month over a 27-month construction period.
²Thresholds from Table 2-1 of the BAAQMD CEQA Air Quality Guidelines (BAAQMD 2017)
 ROG = reactive organic gases; NOx = nitrogen oxides; CO = carbon monoxide; SO2 = sulfur dioxide; PM10 = particulate matter equal or less than 10 micrometers in diameter; PM2.5 = particulate matter equal or less than 2.5 micrometers in diameter

Total Months of Construction 27
 Working Days/Month 22
 lb/ton 2000

Construction-Related Greenhouse Gas Emissions	
Year	MT CO2e
2020	462.08
2021	590.65
2022	407.52
Total GHG Emissions	1,460.25
Amortized GHG Emissions¹	48.67

Notes:
¹ Amortized construction GHG emissions calculated assuming 30-year project lifetime.
 CO2e = carbon dioxide equivalents; MT = metric tons

Unit Conversions	
tons	pounds
1	2000

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1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	0.88	Acre	0.88	38,332.80	0
Other Non-Asphalt Surfaces	2.35	Acre	2.35	102,366.00	0
Single Family Housing	1.00	Dwelling Unit	0.19	12,275.00	3

1.2 Other Project Characteristics

Urbanization	Urban	Wind Speed (m/s)	2.2	Precipitation Freq (Days)	70
Climate Zone	5			Operational Year	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	294	CH4 Intensity (lb/MWhr)	0.029	N2O Intensity (lb/MWhr)	0.006

1.3 User Entered Comments & Non-Default Data

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Project Characteristics - CO2 intensity factor updated to 2016 PG&E value in CRSR.

Land Use - Single Family Housing square footage includes square footage for the guest house and pool house. Other Non-Asphalt Surfaces to account for landscape and paved areas.

Construction Phase - Project specific construction schedule, assuming building construction last 1.85 years. Site Prep and Grading assumed to occur over 6 months.

Off-road Equipment -

Off-road Equipment - Default equipment supplemented by project specific equipment.

Off-road Equipment - Default equipment supplemented by project specific information.

Off-road Equipment -

Trips and VMT - Haul truck trips based on 10 CY dump truck. Assumes 48 one-way concrete truck trips for foundation/piers during BC phase. Modeled as hauling trips with HHDT, MHDT vehicle class and trip length consistent with vendor trip length. Assumes maximum of 15 worker roundtrips per day.

Energy Use -

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Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	18.00	37.00
tblConstructionPhase	NumDays	230.00	478.00
tblConstructionPhase	NumDays	20.00	35.00
tblConstructionPhase	NumDays	8.00	66.00
tblConstructionPhase	NumDays	18.00	37.00
tblConstructionPhase	NumDays	5.00	66.00
tblGrading	MaterialExported	0.00	10,480.00
tblLandUse	LandUseSquareFeet	1,800.00	12,275.00
tblLandUse	LotAcreage	0.32	0.19
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Building Construction
tblOffRoadEquipment	PhaseName		Building Construction
tblProjectCharacteristics	CO2IntensityFactor	641.35	294
tblTripsAndVMT	HaulingTripLength	20.00	7.30
tblTripsAndVMT	HaulingTripNumber	1,310.00	2,096.00
tblTripsAndVMT	HaulingTripNumber	0.00	48.00
tblTripsAndVMT	HaulingVehicleClass	HHDT	HDT_Mix
tblTripsAndVMT	WorkerTripNumber	15.00	30.00
tblTripsAndVMT	WorkerTripNumber	18.00	30.00
tblTripsAndVMT	WorkerTripNumber	10.00	30.00
tblTripsAndVMT	WorkerTripNumber	59.00	30.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	12.00	0.00

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2.0 Emissions Summary

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2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3527	3.8093	2.2928	5.0700e-003	0.8609	0.1734	1.0343	0.4519	0.1609	0.6128	0.0000	459.3358	459.3358	0.1097	0.0000	462.0789
2021	0.3510	3.4087	3.1270	6.6600e-003	0.0505	0.1611	0.2117	0.0139	0.1527	0.1666	0.0000	587.6675	587.6675	0.1191	0.0000	590.6460
2022	0.3376	2.1128	2.2119	4.6100e-003	0.0320	0.0966	0.1286	8.8000e-003	0.0915	0.1003	0.0000	405.5037	405.5037	0.0847	0.0000	407.6201
Maximum	0.3527	3.8093	3.1270	6.6600e-003	0.8609	0.1734	1.0343	0.4519	0.1609	0.6128	0.0000	587.6675	587.6675	0.1191	0.0000	590.6460

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.3527	3.8093	2.2928	5.0700e-003	0.8609	0.1734	1.0343	0.4519	0.1609	0.6128	0.0000	459.3354	459.3354	0.1097	0.0000	462.0785
2021	0.3510	3.4087	3.1270	6.6600e-003	0.0505	0.1611	0.2117	0.0139	0.1527	0.1666	0.0000	587.6669	587.6669	0.1191	0.0000	590.6454
2022	0.3376	2.1128	2.2118	4.6100e-003	0.0320	0.0966	0.1286	8.8000e-003	0.0915	0.1003	0.0000	405.5033	405.5033	0.0847	0.0000	407.6197
Maximum	0.3527	3.8093	3.1270	6.6600e-003	0.8609	0.1734	1.0343	0.4519	0.1609	0.6128	0.0000	587.6669	587.6669	0.1191	0.0000	590.6454

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	5-1-2020	7-31-2020	1.3580	1.3580
2	8-1-2020	10-31-2020	1.4766	1.4766
3	11-1-2020	1-31-2021	1.6522	1.6522
4	2-1-2021	4-30-2021	0.9156	0.9156
5	5-1-2021	7-31-2021	0.9453	0.9453
6	8-1-2021	10-31-2021	0.9459	0.9459
7	11-1-2021	1-31-2022	0.9114	0.9114
8	2-1-2022	4-30-2022	0.8131	0.8131
9	5-1-2022	7-31-2022	1.0493	1.0493
10	8-1-2022	9-30-2022	0.2980	0.2980
		Highest	1.6522	1.6522

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2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0747	2.2000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0434	0.1705	2.5000e-004	1.0000e-005	0.1790
Energy	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	3.3231	3.3231	1.5000e-004	6.0000e-005	3.3456
Mobile	2.2000e-003	6.7100e-003	0.0248	9.0000e-005	8.0900e-003	7.0000e-005	8.1600e-003	2.1700e-003	7.0000e-005	2.2400e-003	0.0000	7.8677	7.8677	2.8000e-004	0.0000	7.8748
Waste						0.0000	0.0000		0.0000	0.0000	0.2558	0.0000	0.2558	0.0151	0.0000	0.6337
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.0662	0.0869	2.1300e-003	5.0000e-005	0.1554
Total	0.0772	8.8800e-003	0.0416	1.2000e-004	8.0900e-003	1.5100e-003	9.6000e-003	2.1700e-003	1.5100e-003	3.6800e-003	0.4036	11.3003	11.7039	0.0179	1.2000e-004	12.1884

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2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0747	2.2000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0434	0.1705	2.5000e-004	1.0000e-005	0.1790
Energy	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	3.3231	3.3231	1.5000e-004	6.0000e-005	3.3456
Mobile	2.2000e-003	6.7100e-003	0.0248	9.0000e-005	8.0900e-003	7.0000e-005	8.1600e-003	2.1700e-003	7.0000e-005	2.2400e-003	0.0000	7.8677	7.8677	2.8000e-004	0.0000	7.8748
Waste						0.0000	0.0000		0.0000	0.0000	0.2558	0.0000	0.2558	0.0151	0.0000	0.6337
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.0662	0.0869	2.1300e-003	5.0000e-005	0.1554
Total	0.0772	8.8800e-003	0.0416	1.2000e-004	8.0900e-003	1.5100e-003	9.6000e-003	2.1700e-003	1.5100e-003	3.6800e-003	0.4036	11.3003	11.7039	0.0179	1.2000e-004	12.1884

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

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Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	5/1/2020	6/18/2020	5	35	
2	Site Preparation	Site Preparation	6/19/2020	9/18/2020	5	66	
3	Grading	Grading	9/19/2020	12/21/2020	5	66	
4	Building Construction	Building Construction	10/21/2020	8/19/2022	5	478	
5	Paving	Paving	6/30/2022	8/19/2022	5	37	
6	Architectural Coating	Architectural Coating	6/30/2022	8/19/2022	5	37	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 33

Acres of Paving: 3.23

Residential Indoor: 24,857; Residential Outdoor: 8,286; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 8,442 (Architectural Coating – sqft)

OffRoad Equipment

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Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction	Bore/Drill Rigs	1	8.00	221	0.50
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Pumps	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

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Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	30.00	0.00	4.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	30.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	30.00	0.00	2,096.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	11	30.00	23.00	48.00	10.80	7.30	7.30	LD_Mix	HDT_Mix	HDT_Mix
Paving	8	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.3000e-004	0.0000	4.3000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0580	0.5810	0.3807	6.8000e-004		0.0290	0.0290		0.0270	0.0270	0.0000	59.4976	59.4976	0.0168	0.0000	59.9175
Total	0.0580	0.5810	0.3807	6.8000e-004	4.3000e-004	0.0290	0.0295	6.0000e-005	0.0270	0.0270	0.0000	59.4976	59.4976	0.0168	0.0000	59.9175

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3.2 Demolition - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.5000e-004	2.7000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1671	0.1671	2.0000e-005	0.0000	0.1676
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4300e-003	9.7000e-004	0.0102	4.0000e-005	4.1300e-003	3.0000e-005	4.1600e-003	1.1000e-003	2.0000e-005	1.1200e-003	0.0000	3.4415	3.4415	7.0000e-005	0.0000	3.4432
Total	1.4500e-003	1.6200e-003	0.0105	4.0000e-005	4.1600e-003	3.0000e-005	4.2000e-003	1.1100e-003	2.0000e-005	1.1300e-003	0.0000	3.6086	3.6086	9.0000e-005	0.0000	3.6108

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.3000e-004	0.0000	4.3000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0580	0.5810	0.3807	6.8000e-004		0.0290	0.0290		0.0270	0.0270	0.0000	59.4975	59.4975	0.0168	0.0000	59.9174
Total	0.0580	0.5810	0.3807	6.8000e-004	4.3000e-004	0.0290	0.0295	6.0000e-005	0.0270	0.0270	0.0000	59.4975	59.4975	0.0168	0.0000	59.9174

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3.2 Demolition - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	6.5000e-004	2.7000e-004	0.0000	3.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.1671	0.1671	2.0000e-005	0.0000	0.1676
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4300e-003	9.7000e-004	0.0102	4.0000e-005	4.1300e-003	3.0000e-005	4.1600e-003	1.1000e-003	2.0000e-005	1.1200e-003	0.0000	3.4415	3.4415	7.0000e-005	0.0000	3.4432
Total	1.4500e-003	1.6200e-003	0.0105	4.0000e-005	4.1600e-003	3.0000e-005	4.2000e-003	1.1100e-003	2.0000e-005	1.1300e-003	0.0000	3.6086	3.6086	9.0000e-005	0.0000	3.6108

3.3 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5962	0.0000	0.5962	0.3277	0.0000	0.3277	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1345	1.3998	0.7100	1.2500e-003		0.0725	0.0725		0.0667	0.0667	0.0000	110.3212	110.3212	0.0357	0.0000	111.2132
Total	0.1345	1.3998	0.7100	1.2500e-003	0.5962	0.0725	0.6687	0.3277	0.0667	0.3944	0.0000	110.3212	110.3212	0.0357	0.0000	111.2132

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3.3 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-003	1.8300e-003	0.0193	7.0000e-005	7.7900e-003	5.0000e-005	7.8400e-003	2.0700e-003	5.0000e-005	2.1200e-003	0.0000	6.4897	6.4897	1.3000e-004	0.0000	6.4929
Total	2.7000e-003	1.8300e-003	0.0193	7.0000e-005	7.7900e-003	5.0000e-005	7.8400e-003	2.0700e-003	5.0000e-005	2.1200e-003	0.0000	6.4897	6.4897	1.3000e-004	0.0000	6.4929

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5962	0.0000	0.5962	0.3277	0.0000	0.3277	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1345	1.3998	0.7100	1.2500e-003		0.0725	0.0725		0.0667	0.0667	0.0000	110.3211	110.3211	0.0357	0.0000	111.2131
Total	0.1345	1.3998	0.7100	1.2500e-003	0.5962	0.0725	0.6687	0.3277	0.0667	0.3944	0.0000	110.3211	110.3211	0.0357	0.0000	111.2131

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3.3 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-003	1.8300e-003	0.0193	7.0000e-005	7.7900e-003	5.0000e-005	7.8400e-003	2.0700e-003	5.0000e-005	2.1200e-003	0.0000	6.4897	6.4897	1.3000e-004	0.0000	6.4929
Total	2.7000e-003	1.8300e-003	0.0193	7.0000e-005	7.7900e-003	5.0000e-005	7.8400e-003	2.0700e-003	5.0000e-005	2.1200e-003	0.0000	6.4897	6.4897	1.3000e-004	0.0000	6.4929

3.4 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2168	0.0000	0.2168	0.1112	0.0000	0.1112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0663	0.7318	0.3793	7.7000e-004		0.0332	0.0332		0.0306	0.0306	0.0000	67.9856	67.9856	0.0220	0.0000	68.5353
Total	0.0663	0.7318	0.3793	7.7000e-004	0.2168	0.0332	0.2501	0.1112	0.0306	0.1418	0.0000	67.9856	67.9856	0.0220	0.0000	68.5353

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3.4 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.2800e-003	0.3382	0.1410	8.5000e-004	0.0175	1.0500e-003	0.0186	4.8200e-003	1.0100e-003	5.8200e-003	0.0000	87.5409	87.5409	0.0109	0.0000	87.8141
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-003	1.8300e-003	0.0193	7.0000e-005	7.7900e-003	5.0000e-005	7.8400e-003	2.0700e-003	5.0000e-005	2.1200e-003	0.0000	6.4897	6.4897	1.3000e-004	0.0000	6.4929
Total	0.0120	0.3400	0.1603	9.2000e-004	0.0253	1.1000e-003	0.0264	6.8900e-003	1.0600e-003	7.9400e-003	0.0000	94.0307	94.0307	0.0111	0.0000	94.3070

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2168	0.0000	0.2168	0.1112	0.0000	0.1112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0663	0.7318	0.3793	7.7000e-004		0.0332	0.0332		0.0306	0.0306	0.0000	67.9855	67.9855	0.0220	0.0000	68.5352
Total	0.0663	0.7318	0.3793	7.7000e-004	0.2168	0.0332	0.2501	0.1112	0.0306	0.1418	0.0000	67.9855	67.9855	0.0220	0.0000	68.5352

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3.4 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.2800e-003	0.3382	0.1410	8.5000e-004	0.0175	1.0500e-003	0.0186	4.8200e-003	1.0100e-003	5.8200e-003	0.0000	87.5409	87.5409	0.0109	0.0000	87.8141
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7000e-003	1.8300e-003	0.0193	7.0000e-005	7.7900e-003	5.0000e-005	7.8400e-003	2.0700e-003	5.0000e-005	2.1200e-003	0.0000	6.4897	6.4897	1.3000e-004	0.0000	6.4929
Total	0.0120	0.3400	0.1603	9.2000e-004	0.0253	1.1000e-003	0.0264	6.8900e-003	1.0600e-003	7.9400e-003	0.0000	94.0307	94.0307	0.0111	0.0000	94.3070

3.5 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0733	0.6822	0.5900	1.1200e-003		0.0371	0.0371		0.0351	0.0351	0.0000	96.3734	96.3734	0.0225	0.0000	96.9362
Total	0.0733	0.6822	0.5900	1.1200e-003		0.0371	0.0371		0.0351	0.0351	0.0000	96.3734	96.3734	0.0225	0.0000	96.9362

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3.5 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	3.0000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	1.2000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0692	0.0692	1.0000e-005	0.0000	0.0693
Vendor	2.3200e-003	0.0693	0.0276	1.6000e-004	3.9000e-003	3.5000e-004	4.2400e-003	1.1300e-003	3.3000e-004	1.4600e-003	0.0000	15.8466	15.8466	1.3800e-003	0.0000	15.8811
Worker	2.1300e-003	1.4400e-003	0.0152	6.0000e-005	6.1400e-003	4.0000e-005	6.1800e-003	1.6300e-003	4.0000e-005	1.6700e-003	0.0000	5.1131	5.1131	1.0000e-004	0.0000	5.1156
Total	4.4600e-003	0.0711	0.0429	2.2000e-004	0.0102	3.9000e-004	0.0105	2.7900e-003	3.7000e-004	3.1600e-003	0.0000	21.0290	21.0290	1.4900e-003	0.0000	21.0660

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0733	0.6822	0.5900	1.1200e-003		0.0371	0.0371		0.0351	0.0351	0.0000	96.3733	96.3733	0.0225	0.0000	96.9361
Total	0.0733	0.6822	0.5900	1.1200e-003		0.0371	0.0371		0.0351	0.0351	0.0000	96.3733	96.3733	0.0225	0.0000	96.9361

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3.5 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	3.0000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	1.2000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0692	0.0692	1.0000e-005	0.0000	0.0693
Vendor	2.3200e-003	0.0693	0.0276	1.6000e-004	3.9000e-003	3.5000e-004	4.2400e-003	1.1300e-003	3.3000e-004	1.4600e-003	0.0000	15.8466	15.8466	1.3800e-003	0.0000	15.8811
Worker	2.1300e-003	1.4400e-003	0.0152	6.0000e-005	6.1400e-003	4.0000e-005	6.1800e-003	1.6300e-003	4.0000e-005	1.6700e-003	0.0000	5.1131	5.1131	1.0000e-004	0.0000	5.1156
Total	4.4600e-003	0.0711	0.0429	2.2000e-004	0.0102	3.9000e-004	0.0105	2.7900e-003	3.7000e-004	3.1600e-003	0.0000	21.0290	21.0290	1.4900e-003	0.0000	21.0660

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3314	3.0883	2.9219	5.6000e-003		0.1602	0.1602		0.1518	0.1518	0.0000	484.0232	484.0232	0.1119	0.0000	486.8201
Total	0.3314	3.0883	2.9219	5.6000e-003		0.1602	0.1602		0.1518	0.1518	0.0000	484.0232	484.0232	0.1119	0.0000	486.8201

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3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.3600e-003	5.9000e-004	0.0000	1.4000e-004	0.0000	1.4000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.3430	0.3430	3.0000e-005	0.0000	0.3437
Vendor	9.5900e-003	0.3126	0.1342	7.9000e-004	0.0196	7.2000e-004	0.0203	5.6600e-003	6.8000e-004	6.3400e-003	0.0000	78.5502	78.5502	6.7900e-003	0.0000	78.7199
Worker	9.9800e-003	6.4900e-003	0.0704	2.7000e-004	0.0308	1.9000e-004	0.0310	8.2000e-003	1.7000e-004	8.3700e-003	0.0000	24.7511	24.7511	4.5000e-004	0.0000	24.7623
Total	0.0196	0.3204	0.2051	1.0600e-003	0.0505	9.1000e-004	0.0514	0.0139	8.5000e-004	0.0148	0.0000	103.6442	103.6442	7.2700e-003	0.0000	103.8259

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3314	3.0883	2.9219	5.6000e-003		0.1602	0.1602		0.1518	0.1518	0.0000	484.0227	484.0227	0.1119	0.0000	486.8195
Total	0.3314	3.0883	2.9219	5.6000e-003		0.1602	0.1602		0.1518	0.1518	0.0000	484.0227	484.0227	0.1119	0.0000	486.8195

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3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.0000e-005	1.3600e-003	5.9000e-004	0.0000	1.4000e-004	0.0000	1.4000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.3430	0.3430	3.0000e-005	0.0000	0.3437
Vendor	9.5900e-003	0.3126	0.1342	7.9000e-004	0.0196	7.2000e-004	0.0203	5.6600e-003	6.8000e-004	6.3400e-003	0.0000	78.5502	78.5502	6.7900e-003	0.0000	78.7199
Worker	9.9800e-003	6.4900e-003	0.0704	2.7000e-004	0.0308	1.9000e-004	0.0310	8.2000e-003	1.7000e-004	8.3700e-003	0.0000	24.7511	24.7511	4.5000e-004	0.0000	24.7623
Total	0.0196	0.3204	0.2051	1.0600e-003	0.0505	9.1000e-004	0.0514	0.0139	8.5000e-004	0.0148	0.0000	103.6442	103.6442	7.2700e-003	0.0000	103.8259

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1883	1.7202	1.8263	3.5400e-003		0.0856	0.0856		0.0812	0.0812	0.0000	306.1763	306.1763	0.0703	0.0000	307.9337
Total	0.1883	1.7202	1.8263	3.5400e-003		0.0856	0.0856		0.0812	0.0812	0.0000	306.1763	306.1763	0.0703	0.0000	307.9337

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3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	8.1000e-004	3.7000e-004	0.0000	1.3000e-004	0.0000	1.3000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.2140	0.2140	2.0000e-005	0.0000	0.2145
Vendor	5.6900e-003	0.1859	0.0847	4.9000e-004	0.0124	4.0000e-004	0.0128	3.5800e-003	3.8000e-004	3.9600e-003	0.0000	49.0196	49.0196	4.2600e-003	0.0000	49.1262
Worker	5.9600e-003	3.7000e-003	0.0414	1.7000e-004	0.0195	1.2000e-004	0.0196	5.1800e-003	1.1000e-004	5.2900e-003	0.0000	15.0749	15.0749	2.6000e-004	0.0000	15.0813
Total	0.0117	0.1904	0.1265	6.6000e-004	0.0320	5.2000e-004	0.0325	8.7900e-003	4.9000e-004	9.2900e-003	0.0000	64.3085	64.3085	4.5400e-003	0.0000	64.4220

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1883	1.7202	1.8263	3.5400e-003		0.0856	0.0856		0.0812	0.0812	0.0000	306.1760	306.1760	0.0703	0.0000	307.9333
Total	0.1883	1.7202	1.8263	3.5400e-003		0.0856	0.0856		0.0812	0.0812	0.0000	306.1760	306.1760	0.0703	0.0000	307.9333

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3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	8.1000e-004	3.7000e-004	0.0000	1.3000e-004	0.0000	1.3000e-004	3.0000e-005	0.0000	4.0000e-005	0.0000	0.2140	0.2140	2.0000e-005	0.0000	0.2145
Vendor	5.6900e-003	0.1859	0.0847	4.9000e-004	0.0124	4.0000e-004	0.0128	3.5800e-003	3.8000e-004	3.9600e-003	0.0000	49.0196	49.0196	4.2600e-003	0.0000	49.1262
Worker	5.9600e-003	3.7000e-003	0.0414	1.7000e-004	0.0195	1.2000e-004	0.0196	5.1800e-003	1.1000e-004	5.2900e-003	0.0000	15.0749	15.0749	2.6000e-004	0.0000	15.0813
Total	0.0117	0.1904	0.1265	6.6000e-004	0.0320	5.2000e-004	0.0325	8.7900e-003	4.9000e-004	9.2900e-003	0.0000	64.3085	64.3085	4.5400e-003	0.0000	64.4220

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0181	0.1762	0.2256	3.5000e-004		9.0200e-003	9.0200e-003		8.3300e-003	8.3300e-003	0.0000	30.2953	30.2953	9.5200e-003	0.0000	30.5333
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0181	0.1762	0.2256	3.5000e-004		9.0200e-003	9.0200e-003		8.3300e-003	8.3300e-003	0.0000	30.2953	30.2953	9.5200e-003	0.0000	30.5333

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3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0181	0.1762	0.2256	3.5000e-004		9.0200e-003	9.0200e-003		8.3300e-003	8.3300e-003	0.0000	30.2953	30.2953	9.5200e-003	0.0000	30.5333
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0181	0.1762	0.2256	3.5000e-004		9.0200e-003	9.0200e-003		8.3300e-003	8.3300e-003	0.0000	30.2953	30.2953	9.5200e-003	0.0000	30.5333

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3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1158					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.7800e-003	0.0261	0.0336	5.0000e-005		1.5100e-003	1.5100e-003		1.5100e-003	1.5100e-003	0.0000	4.7235	4.7235	3.1000e-004	0.0000	4.7312
Total	0.1195	0.0261	0.0336	5.0000e-005		1.5100e-003	1.5100e-003		1.5100e-003	1.5100e-003	0.0000	4.7235	4.7235	3.1000e-004	0.0000	4.7312

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3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1158					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.7800e-003	0.0261	0.0336	5.0000e-005		1.5100e-003	1.5100e-003		1.5100e-003	1.5100e-003	0.0000	4.7235	4.7235	3.1000e-004	0.0000	4.7312
Total	0.1195	0.0261	0.0336	5.0000e-005		1.5100e-003	1.5100e-003		1.5100e-003	1.5100e-003	0.0000	4.7235	4.7235	3.1000e-004	0.0000	4.7312

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3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.2000e-003	6.7100e-003	0.0248	9.0000e-005	8.0900e-003	7.0000e-005	8.1600e-003	2.1700e-003	7.0000e-005	2.2400e-003	0.0000	7.8677	7.8677	2.8000e-004	0.0000	7.8748
Unmitigated	2.2000e-003	6.7100e-003	0.0248	9.0000e-005	8.0900e-003	7.0000e-005	8.1600e-003	2.1700e-003	7.0000e-005	2.2400e-003	0.0000	7.8677	7.8677	2.8000e-004	0.0000	7.8748

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated	Mitigated
	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	9.52	9.91	8.62	21,819	21,819
Total	9.52	9.91	8.62	21,819	21,819

4.3 Trip Type Information

Land Use	Miles			Trip %			Trip Purpose %		
	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

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Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.476244	0.050164	0.262181	0.139658	0.017521	0.006864	0.023236	0.006525	0.004137	0.003158	0.009064	0.000471	0.000777
Single Family Housing	0.476244	0.050164	0.262181	0.139658	0.017521	0.006864	0.023236	0.006525	0.004137	0.003158	0.009064	0.000471	0.000777

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1.0645	1.0645	1.1000e-004	2.0000e-005	1.0736
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1.0645	1.0645	1.1000e-004	2.0000e-005	1.0736
NaturalGas Mitigated	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720
NaturalGas Unmitigated	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720

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5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	42323.8	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720
Total		2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	42323.8	2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720
Total		2.3000e-004	1.9500e-003	8.3000e-004	1.0000e-005		1.6000e-004	1.6000e-004		1.6000e-004	1.6000e-004	0.0000	2.2586	2.2586	4.0000e-005	4.0000e-005	2.2720

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5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	7982.49	1.0645	1.1000e-004	2.0000e-005	1.0736
Total		1.0645	1.1000e-004	2.0000e-005	1.0736

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	7982.49	1.0645	1.1000e-004	2.0000e-005	1.0736
Total		1.0645	1.1000e-004	2.0000e-005	1.0736

6.0 Area Detail

6.1 Mitigation Measures Area

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0747	2.2000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0434	0.1705	2.5000e-004	1.0000e-005	0.1790
Unmitigated	0.0747	2.2000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0434	0.1705	2.5000e-004	1.0000e-005	0.1790

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0116					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0570					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.8900e-003	1.3000e-004	8.5700e-003	2.0000e-005		1.2400e-003	1.2400e-003		1.2400e-003	1.2400e-003	0.1271	0.0312	0.1583	2.4000e-004	1.0000e-005	0.1665
Landscaping	2.3000e-004	9.0000e-005	7.4600e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0122	0.0122	1.0000e-005	0.0000	0.0125
Total	0.0747	2.2000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0434	0.1705	2.5000e-004	1.0000e-005	0.1790

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6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0116					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0570					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.8900e-003	1.3000e-004	8.5700e-003	2.0000e-005		1.2400e-003	1.2400e-003		1.2400e-003	1.2400e-003	0.1271	0.0312	0.1583	2.4000e-004	1.0000e-005	0.1665
Landscaping	2.3000e-004	9.0000e-005	7.4600e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0122	0.0122	1.0000e-005	0.0000	0.0125
Total	0.0747	2.2000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0434	0.1705	2.5000e-004	1.0000e-005	0.1790

7.0 Water Detail

7.1 Mitigation Measures Water

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	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0869	2.1300e-003	5.0000e-005	0.1554
Unmitigated	0.0869	2.1300e-003	5.0000e-005	0.1554

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.065154 / 0.0410754	0.0869	2.1300e-003	5.0000e-005	0.1554
Total		0.0869	2.1300e-003	5.0000e-005	0.1554

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7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0.065154 / 0.0410754	0.0869	2.1300e-003	5.0000e-005	0.1554
Total		0.0869	2.1300e-003	5.0000e-005	0.1554

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.2558	0.0151	0.0000	0.6337
Unmitigated	0.2558	0.0151	0.0000	0.6337

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8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.26	0.2558	0.0151	0.0000	0.6337
Total		0.2558	0.0151	0.0000	0.6337

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.26	0.2558	0.0151	0.0000	0.6337
Total		0.2558	0.0151	0.0000	0.6337

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
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10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type
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Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type
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User Defined Equipment

Equipment Type	Number
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11.0 Vegetation

Appendix BIO: Arborist Report

Kiely Arborist Services LLC

Certified Arborist WE#0476A

P.O. Box 6187

San Mateo, CA 94403

650-515-9783

April 27, 2018

Mr. Michael Callan
1233 Oak Street
San Mateo, CA 94402

Site: 101 Tip Toe, Hillsborough, CA

Dear Mr. Callan,

As requested on Tuesday, April 24 2018, I visited the above site to inspect and comment on the trees. A landscape is planned for this site and as required a survey of the protected trees will be provided. A tree protection will be included for any trees to be retained.

Method:

All inspections were made from the ground; the tree was not climbed for this inspection. The trees in question were located on a map provided by you. The trees were then measured for diameter at 54 inches above ground level (DBH or diameter at breast height). A condition rating (CON) is provided using 50 percent vitality and 50 percent form, using the following scale.

1	-	29	Very Poor
30	-	49	Poor
50	-	69	Fair
70	-	89	Good
90	-	100	Excellent

The height of the tree was measured using a Nikon Forestry 550 Hypsometer. The spread was paced off (HT/SP). Comments and recommendations for future maintenance are provided.

Summary:

The trees on site are a mix of native oaks and a couple species of imported trees. The trees are in poor to fair condition with no excellent trees. Several oaks have died due to sudden oak death and should be removed. The majority of the trees are located on the perimeter of the property, ideal for construction.

The majority of the native oaks on site will be retained and impacts to the oaks should be minor to non-existent. The following tree protection plan will help to reduce impacts to the retained trees. Many of the oaks will require regular maintenance to help improve the trees poor form. (common when trees are grown in groups). The following tree protection plan will help to reduce impacts to the retained trees.

Sudden Oak Death Recommendations:

The following recommendations will help lessen the chances of sudden oak death:

- Remove all dead trees (fire danger)
- Remove insignificant bay laurels as the trees are the alternate host of the disease.
- Trim significant bay trees away from oaks and to reduce leaf count.
- Treat the trees for S.O.D. annually in November or March with Agrifoss and a bark penetrant.

Tree Protection Plan:

Tree protection zones should be established and maintained throughout the entire length of the project. Fencing for the protection zones should be 4 foot orange plastic fencing supported by metal poles or stakes pounded into the ground. The support poles should be spaced no more than 10 feet apart on center. The location for the protection fencing should be as close to the dripline as possible still allowing room for construction to safely continue. Signs should be placed on fencing signifying "Tree Protection Zone - Keep Out". No materials or equipment should be stored or cleaned inside the tree protection zones.

Any roots to be cut should be monitored and documented. Large roots or large masses of roots to be cut should be inspected by the site arborist. The site arborist may recommend fertilizing or irrigation if root cutting is significant. Cut all roots clean with a saw or loppers. Roots to be left exposed for a period of time should be covered with layers of burlap and kept moist.

Trenching for irrigation, electrical, drainage or any other reason should be hand dug when beneath the driplines of protected trees. Hand digging and carefully laying pipes below or beside protected roots will dramatically reduce root loss of desired trees thus reducing trauma to the entire tree. Trenches should be backfilled as soon as possible with native material and compacted to near its original level. Trenches that must be left exposed for a period of time should also be covered with layers of burlap or straw wattle and kept moist. Plywood over the top of the trench will also help protect exposed roots below.

Normal irrigation should be maintained throughout the entire length of the project. The imported trees on this site will require irrigation during the warm season months. Some irrigation may be required during the winter months depending on the seasonal rainfall. During the summer months the trees on this site should receive heavy flood type irrigation 2 times a month. During the fall and winter 1 time a month should suffice. Mulching the root zone of protected trees will help the soil retain moisture, thus reducing water consumption.

101 Tip Toe/5/7/18

(3)

The town of Hillsborough requires a tree protection inspection prior to the start of construction. The inspection will include a written letter to the owner, contractor and town planner. Other inspections will be on an as needed basis.

The information included in this report is believed to be true and based on sound arboricultural principles and practices

Sincerely,

Kevin R. Kielty
Certified Arborist WE#0476A

Appendix COA: Town of Hillsborough Conditions of Approval

TOWN OF HILLSBOROUGH

Planning Office
650/375-7422
Fax: 650/375-7415



1600 Floribunda Avenue
Hillsborough
California 94010

Revised April 3, 2013

STANDARD CONDITIONS OF APPROVAL

*for projects approved by the City Council, the Architecture and Design Review Board,
and the Planning Department staff*

This application has been approved, subject to compliance with these conditions, and satisfactorily meeting the requirements, codes and ordinances of the Town of Hillsborough. A final sign-off on the project (or a Certificate of Occupancy) will not be granted until the project has been inspected for compliance with these conditions and requirements. Where applicable, compliance with these conditions shall be reflected on the plans submitted for permit(s).

Property Owner Acknowledgement

I am the owner of this property and, by signing this document, I acknowledge that I understand and agree to the terms of the Standard Conditions dated March 1, 2004 and revised on May 08, 2006.

Owner's Signature

Date

Print Owner's Name: _____

Property Address: _____

Note: This form must be signed and submitted as part of the Building Permit application.

Attachments: Tree Protection for Construction Sites
Requirements for Parking Strips

Permits Required

1. Before beginning work on the project, all necessary permits (such as Demolition, Building, Electrical, Mechanical and Plumbing) must be secured from the Building Department. Separate Permits are required for landscape installation, pools, retaining walls, and certain large tree removals.
2. An Encroachment Permit must be obtained for all work within the Town's right-of-way, including but not limited to landscaping, parking strips, driveways, curbs and gutters, and for work on Town utilities including water, sewer and storm drain piping (Hillsborough Municipal Code (HMC) Section (§) 12.24.010 and §13.32.030).
3. A Grading/Hauling Permit must be obtained for a project with a combined amount of cut and fill exceeding 50 cubic yards of material (HMC §15.24.030). Additionally, City Council approval is required whenever soil-haul to or from the site exceeds 1500 cubic yards (HMC §5.24.070). Projects and/or permits requiring City Council approval due to soil-haul exceeding 1500 cubic yards shall also be subject to environmental review (HMC §15.24.040). The environmental review process generally requires approximately three to nine months to complete and must occur prior to City Council approval. See the City Engineer's Grading/Hauling Application form for additional information. Grading is not permitted between October 15th and April 15th without approval from the City Engineer.

Plan Requirements

4. Site development, including landscaping, shall conform to the approved plans. No significant changes shall be made to the approved plans without Planning Department approval and revisions to the permit(s).
5. Where applicable, plans submitted for a Building Permit shall fully document (on the actual plans) the lot size, structural coverage and floor area (FAR) calculations. The permit plans shall fully document the construction details sufficient to demonstrate that all areas of the house which are not counted as floor area in the FAR calculations on file with the Planning Department will not be constructed as floor area. For example, attic spaces with sloped ceilings which are not included in the FAR calculations shall be detailed and constructed such that the floor-to-ceiling height is less than five feet and basement areas which are not included in the FAR calculations shall be detailed and constructed such that the floor-to-ceiling height is less than six feet (see HMC §17.32.020). Floor area which is not identified in the FAR calculations shall not be permitted.
6. The plans submitted for permit shall address truck traffic issues regarding noise, dust and vehicular and pedestrian safety; the storage of construction materials; clean-up areas; the placement of sanitary and construction facilities; and parking areas for construction vehicles and construction personnel to comply with HMC Chapter 15.26, Construction Management.

Recycling and Waste Reduction

7. Before any demolition and/or construction work is initiated, and before a Demolition or Building Permit is issued, a waste reduction plan shall be submitted to the Building Department for review and approval by the Town's Recycling Coordinator (HMC §15.18.020). The plan shall include, but not be limited to, details on types of materials to be recycled, how they will be transported, and to what facility they will be taken for

recycling. A waste reduction plan packet that includes resource lists and specific recycling requirements is available at the Building Department counter. The Town's Recycling Coordinator is available to provide information and assistance on all aspects of compliance with Town recycling requirements, including the location of recycling facilities and their services. Violation of recycling requirements shall subject the violator to a penalty of up to ten times the Building or Demolition Permit fee (HMC §15.18.040).

8. Reusable items and materials shall be removed before demolition; mixed debris shall be taken to a mixed-debris recycling facility having a franchise agreement with the Town of Hillsborough, and like materials (e.g., scrap wood, metal, glass) shall be kept clean and separated for recycling. Use of debris box service shall be limited to those with franchise agreements with the Town (HMC Chapter 8.12).

Tree Protection

9. An arborist report and tree protection plan shall be submitted to the Building Department to ensure the survival of all trees that are designated "to remain" on the approved plans and which are subject to damage by construction activities and equipment and/or the storage of materials (HMC Chapter 14.04). Please see the attached sheet, Tree Protection for Construction Sites, for further information.
10. Tree protection measures identified in the tree protection plan must remain in place and adequately ensure the protection throughout the construction process; violation of this requirement shall result in a "Stop Work" order issued to the job site and may result in penalties including requirements for tree restoration and/or replacement subject to the direction of the City Engineer (HMC §14.04.06).
11. Trees to be installed within the public right-of-way shall be installed a minimum of seven (7) feet behind the back of existing curb and gutter. Trees planted in the right-of-way shall be installed with root shields/barriers. All work within the right-of-way shall require an Encroachment Permit from Public Works (HMC §21.24.010).
12. Any existing tree within an existing public utility easement where utilities exist shall be removed and replaced outside the easement area. No new trees shall be planted within easements where utilities exist.

Erosion and Sediment Control

13. Developers/owners/builders of projects that disturb one acre or more of land area are required to show clearly on the plans the area of land disturbance. The applicant shall also demonstrate proof of permit coverage from the State Water Resource Control Board under the State Construction Activity Stormwater General Permit, consistent with the Town's National Pollution Discharge Elimination System (NPDES) permit, prior to obtaining a Grading Permit for the site (HMC §15.24.120). For more information please go to the *State Water Resource Control Board's* website at:
<http://www.swrcb.ca.gov/stormwtr/docs/finalconstpermit.pdf>
14. Regardless of project size, an erosion and sediment control plan shall be submitted for review and approval in conjunction with the plans for Building Permit (HMC Chapter 15.24). The erosion control plan shall be in compliance with the Town's Storm Water Pollution Prevention Program (STOPPP) including but not limited to perimeter erosion

control, slope protection, dust control, street sweeping, storm drain inlet protection, concrete handling and disposal, and stockpile sediment control.

15. The approved erosion control plan shall be implemented continually for the duration of the project until landscaping or ground cover is installed and established.
16. All project contractors and the property owner(s) shall comply with NPDES Best Management Practices (BMPs) to prevent contaminated or non-storm water discharge into the storm drain system (HMC §13.50.040 and §13.50.120). General guidance for selecting and implementing BMPs can be found at:
<http://www.cabmphandbooks.com/Construction.asp>
17. Failure to comply with the approved construction BMPs will result in the issuance of correction notices, citations and/or a project "Stop Work" order. Fee schedules have been established for additional inspections and for "Stop Works" (HMC §13.50.150 and §13.50.180).

Landscaping Installation and Maintenance

18. For new houses, landscaping shall be installed within 6 months of the date of issuance of a Certificate of Occupancy. Provided, however, that the applicant shall obtain a final inspection within one (1) year of the sheetrock nailing inspection (HMC §17.56.090(A)).
19. For additions and remodels, all new landscaping indicated on the plans (or required by condition) shall be installed and have received the final inspection prior to securing a final inspection from the Building Department on the house (HMC §17.56.090(B)).
20. All landscaping shall be installed in compliance with the Town's National Pollution Discharge Elimination System (NPDES) permit (HMC §13.50.120 and §15.24.120).
21. All landscaping shall be properly installed, using soil amendments and other techniques to ensure successful growth, and shall be properly maintained in good health (or replaced) for a period of at least 90 days (HMC §8.16.035 and §13.50.010).

Lighting and Street Numbers

22. Exterior lights (including those on façades, walkways, pilasters, porches, etc.) shall be installed in such a manner that there shall be no illumination on adjacent properties, streets, or the sky.
23. The house address shall be clearly delineated with numerals at least 4 inches in height that contrast with their background and are visible from the street. These numerals shall be at the street, rather than on the face of the house.

Driveways

24. Unless otherwise approved by the Fire Department, all new or reconfigured driveways shall have a minimum width of fourteen (14) feet (HMC §12.12.050(E)), with a maximum slope of 16%, except that the first fifteen (15) feet shall have a slope no greater than 5%. Please also see the Fire Department Requirements listed below.

25. All new driveway cuts are subject to the approval of the City Engineer and plans shall demonstrate optimum site distance for each location proposed.

Curbs, Gutters and Parking Strips

26. Curbs, gutters, driveway approaches, and parking strips shall be installed or repaired/replaced to Town standards, as required by the City Engineer, prior to the Building Department's final sign-off on the construction project (HMC §12.04.120 and §12.24.070). Please see the attached sheet regarding parking strips.

Grading, Drainage and Utilities

27. Grading, Drainage and Utility plans shall be submitted with the first submittal of plans for plan check to the Building Department, if applicable (see HMC Chapter 15.24). Delays will result if these plans are not submitted with the initial submittal.
28. Grading plans shall include the total area of land disturbance (in square feet) clearly delineated on the plans, total cut/fill/import/export quantities in cubic yards, and total impermeable areas in square feet (structural and hardscape). All quantities shall be shown in tabular form on grading plans (HMC §15.24.040).
29. Positive measures shall be taken during the design of projects that contain basement excavations to prohibit draining/pumping of the ground water after construction is completed. If sub-foundation drains are used they shall not drain any water below the normal high water mark for ground water aquifers/springs. The Geotechnical Engineer of record shall determine the normal high water mark for the project, using defensible engineering methods, and design the project to withstand both lateral earth pressures and hydrostatic pressures. The applicant shall submit plans for dewatering during construction if needed (the plan shall include all discharge locations, methods, and details).
30. All storm water collected from impervious surfaces, including but not limited to roofs, patios/decks and driveways, shall drain to an approved drainage system after filtration / detention through landscaping features where feasible. All roof leaders shall be directed to landscape features prior to being collected in closed conduits which lead to an approved facility. No collected water shall be allowed to drain onto any adjoining property, unless there is an approved easement and an approved drainage facility (HMC §13.50.040).
31. All projects that increase the onsite imperviousness (structural and hardscape) by more than or equal to 1,000 square feet shall be required to detain the difference between the existing and proposed runoff quantities for the site as a whole using the Town's criteria for calculating runoff.
32. All utilities to, and within, the project shall be placed underground. All public utilities shall be located and provided within public utility easements and sized to meet Town and utility company standards. If the City Engineer determines that installation of a new water main or hydrant is required as a public improvement for fire suppression, these facilities should be installed before framing of the structure begins.
33. Pressure reducing and isolation valves shall be installed for all water services. Isolation valves shall be placed on the discharge side and within one foot of the water meter box (HMC §15.16.080(C)). Pressure reducing valves are required when the system pressure exceeds 80 psi and shall be located on the exterior wall of the structure and/or between

the isolation valve and the structure. A backflow prevention device shall be installed between the meter and the isolation valve.

34. A water backflow prevention device and isolation valve shall be installed for all irrigation and fire suppression systems (HMC §15.16.085). A pressure-reducing valve may be necessary depending on the maximum operating pressure of the irrigation system.
35. Ultra-low-flush toilets, meeting the Town's requirements, shall be installed for all remodeled and/or new bathrooms.
36. If the addition, replacement or repair of a sewer lateral is required by the City Engineer, such improvements shall be installed prior to issuance of the Certificate of Occupancy (HMC §13.32.110).
37. Sanitary sewer lateral cleanouts shall be installed at the property line and within three feet of the building as required by the City Engineer and the Building Official (HMC §13.32.080). A sewer backflow prevention device is required on all sewer laterals, unless otherwise waived in writing by the Building Official. The Town's Backflow Protection Ordinance requires that at least two elements of backwater protection system be installed on all properties by January 2007, unless waived by the Building Official.

Pool, Spa, and Fountain Discharges

38. Pool (including swimming pools, hot tubs, spas and fountains) discharge drains shall not be connected directly to the storm drain system (HMC §13.50.010).
39. When draining is necessary, a hose or other temporary system shall be directed into a sanitary sewer cleanout. The cleanout shall be installed in a readily accessible area within 20 feet of the pool (HMC §13.50.010).
40. Pool water shall be de-chlorinated prior to discharging to the sanitary system (HMC §13.50.010).

Fire Department Requirements

41. Installation of an automatic fire sprinkler system is required for all new homes and accessory structures equipped with sleeping areas, cooking areas and/or bathrooms (HMC §15.20.090).
42. Installation of an automatic fire sprinkler is required for all additions and remodels (or combination thereof) that equal 1,500 sq. ft. or more (HMC §15.20.090(A)(2)).
43. Automatic fire sprinkler systems shall conform to the requirements of the National Fire Protection Association pamphlet #13D for residences. Automatic fire sprinkler contractors should call the Central County Fire Department Fire Prevention Bureau at 650/375-7421 for sprinkler requirements or to schedule a fire flow test (HMC §15.20.090(B)).
44. Every new structure or addition shall have an adequate supply of water for firefighting purposes; this water supply is termed "fire flow". Fire flow shall be determined at a ratio of water to fire area (square footage per single parcel). Every new structure or addition shall have immediate access to fire hydrants. The number of fire hydrants required per property and their spacing is determined by the amount of required fire flow. Refer to

- Appendix III-A and III-B of the Uniform Fire Code to determine the fire flow for a given amount of square footage and the number of fire hydrants required (California Fire Code, Title 24 §903).
45. An all-weather road surface capable of supporting the weight of fire apparatus shall be in service prior to combustible materials being delivered to the construction site (California Fire Code, Title 24 §8703).
 46. All hydrants shall have a 3-foot diameter clearance from all obstructions and 6-foot clear width to the street (California Fire Code, Title 24 §1001.7.2).
 47. To maintain an effective firebreak, flammable vegetation and combustible growth shall be removed and cleared away. Fire-resistant landscaping is recommended. (See California Fire Code, Title 24 §1103.2.4)
 48. New structures and additions shall be situated such that the furthest point of the entire building shall not exceed 150 feet from the public street (California Fire Code, Title 24 §902).
 49. New structures and additions shall be situated such that the furthest point of the entire building shall not exceed 500 feet from the nearest public fire hydrant (California Fire Code, Title 24 Appendix III-B).
 50. Roofing materials shall be Class "A" roof coverings as classified by the Uniform Building Code (HMC §15.20.100).
 51. Chimneys used in conjunction with fireplaces, barbecues, or heating appliances in which solid fuel is used shall be provided with an approved spark arrestor. Portions of trees that extend within 10 feet of the outlet of any chimney must be removed. (See HMC § 15.20.080.)
 52. Wood siding or wood decks are prohibited to any building constructed on a lot contiguous to Town Open Space if such building is located on a slope in excess of ten percent (10%) (HMC §15.20.120 and §15.20.130).
 53. Wood siding or wood decks on existing structures shall be removed from any building on a lot contiguous to Town Open Space if such building is located on a slope in excess of ten percent (10%) before any exterior remodeling of such building or structure shall be permitted (HMC §15.20.120 and §15.20.130).

Floodplain Management Regulations - *these relate only to the following properties:*

50 & 99 **Baywood Ave.;**

100, 130, 150, 170, 190, 194, 222, 230, 240, 250, 260, 310, 320, 330 & 340 **Bridge Rd.;**

10 & 20 **Creekwood Way;**

91, 96, 100, 760, 805, 807, 815, 891 & 893 **Crystal Springs Rd.;**

107, 109, 123 & 139 **De Sabla Rd.;**

125, 235, 245, 303, 325, 333, 401, 501, 515, 525, 545, 555, 565, 585, 595, 731, 739, 757, 763, 775 & 777 **El Cerrito Ave.;**

5 & 8 **Homs Ct.;**

15, 25, 30 & 35 **Laureldale Rd.**;
90 **Rockridge Rd.**;
300, 320 & 383 **Sierra Drive**; and,
200, 260 & 270 **Stonehedge Rd.**

54. Any proposed development in the area designated as "Special Flood Hazard Area" will require a Development Permit, which is a preliminary assessment of the project by the Flood Plain Administrator/Building Official, before an application is made for a Building Permit (HMC §15.44.030).
55. The Flood Plain Administrator/Building Official shall grant or deny Development Permits in accordance with the HMC Chapter 15.44.

Creek Protection

56. No structures shall be constructed or installed within twenty (20) feet from the top of bank of any water course

TOWN OF HILLSBOROUGH
SAN MATEO COUNTY

Planning Office
650/375-7411
Fax: 650/375-7415



1600 Floribunda Ave.
Hillsborough
California 94010

TREE PROTECTION FOR CONSTRUCTION SITES

The protection of trees is a high priority in the Town of Hillsborough. Tree protection measures are required *prior to* issuance of a Grading Permit or a Demolition Permit.

Steps for Tree Protection

1. Consult with an arborist about what measures must be taken to preserve and enhance the life of trees which are designated “to remain” on the site during and after the construction process. Have a report prepared by a licensed arborist.
2. Submit to the Building/Planning Department the arborist report, along with two (2) copies of a tree protection plan which incorporates the recommendations. The plan shall include:
 - The specific location of the trees, with the species identified and their actual canopies shown;
 - The location of the construction trailer, debris box(es), portable toilets (if any), worker/equipment parking areas (if any), and the staging areas for construction materials;
 - A list of the equipment (which is moved by having someone drive/operate it) which will be used for the job; and,
 - The locations of, and specifications for, the tree protection measures consistent with the arborist report.

Note: For some jobs the installation of netting will **not** be a sufficient protection measure; construction fencing may be required to protect the roots of trees, especially if there will be heavy equipment on the site or if grading is involved.

3. When the report and tree protection plan have been approved, install the plan. **The approved plan shall be kept on the construction site at all times.**
4. Before work on the job may commence, or any Demolition, Grading, or Building Permit is issued, the tree protection measures must be installed and certified by a licensed arborist that the plan has been installed according to the report and the approved plan. To document the arborist's certification, a signed, stamped and dated letter from the arborist must be submitted to the Building Department; once the arborist certification is received, you may arrange for an inspection by the Town.
5. If at any time during the construction period the tree protection measures are found to have been jeopardized, the job will be stopped until steps #2 – 4 have been repeated, including remediation for any potential damage. If damage has occurred sufficient to endanger the life of a tree which was to have been protected, a public hearing to consider mitigation measures may be required.

Appendix GEO: Geotechnical Investigation

**GEOTECHNICAL INVESTIGATION FOR
PROPOSED NEW RESIDENCE**

at the

Tiptoe Lane Property
101 Tiptoe Lane
Hillsborough, California

Report Prepared for:

CHS Construction, Inc.

Report Prepared by:

GeoForensics, Inc.

June 2018

GEOFORENSICS INC.

Consulting Soil Engineering

303 Vintage Park Drive #220, Foster City, CA 94404

Phone: (650) 349-3369 Fax: (650) 571-1878

File: 218130

June 10, 2018

CHS Construction, Inc.
45-A North B Street
San Mateo, CA 94401

Attention: Chi-Hwa Shao

Subject: **Tiptoe Property**
101 Tiptoe Lane
Hillsborough, California
GEOTECHNICAL INVESTIGATION
FOR PROPOSED NEW RESIDENCE

Mr. Shao:

In accordance with your authorization, we have performed a subsurface investigation into the geotechnical conditions present at the location of the proposed improvements planned for the site. This report summarizes the conditions we measured and observed, and presents our opinions and recommendations for the design and construction of the proposed new residence, additional dwelling unit (ADU), retaining wall, and sports court.

Site Description

The subject site is a relatively level to steeply sloping, irregularly-shaped parcel located on the western side of Tiptoe Lane (at the approximate location shown on Figure 1). For purposes of description in this report, it is assumed that the property faces eastward. The property is bounded by other developed single family residential lots to the sides and rear, and street to the east.

The site is currently an undeveloped hillside knoll covered by small to medium bushes, with some large trees and grasses, although there is an asphalt driveway which leads from the street into the southern end of the property.

The ground surface in the site vicinity has an overall slope down towards the northeast (as shown on Figure 2). At the site, the ground slopes gently to the northeast, with steeper slopes down to the northwest and southeast. Surface gradients range from 20:1 to 2:1 (horizontal:vertical, H:V). It appears that little or no grading work has been previously performed at the site.

Proposed Construction

We understand that the current development for the site proposes the construction of a new single-family residence, additional dwelling unit (ADU), various retaining walls, pool, and sports court. The house is to be of conventional, wood-framed construction. New foundation loads are expected to be typical for this type of structure (i.e. light).

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Excavation work at the site is expected to be limited to crawlspace and foundation excavations. Cuts and fills up to 8 feet thick may be required for the proposed construction. Retaining walls up to 6 feet tall, but often terraced up the slope are also anticipated for this scope of work.

INVESTIGATION

Scope and Purpose

The purpose of our investigation was to determine the nature of the subsurface conditions so that we could provide geotechnical recommendations for the construction of the proposed new structures proposed for the site. In order to achieve this purpose, we have performed the following scope of work:

- 1 - visited the property to observe the geotechnical setting of the area to be developed;
- 2 - reviewed relevant published geotechnical maps;
- 3 - drilled 3 borings near the location of the proposed improvements;
- 4 - performed laboratory testing on collected soil samples;
- 5 - assessed the collected information and prepared this report.

The findings of these work items are discussed in the following sections of this report.

Site Observations

We visited the site on June 30, 2018 to observe the geotechnically relevant site conditions. During our visit, we noted the following conditions:

- A - The existing site consists of a natural hillside knoll, with gentle top and moderately to steeply sloping sides. We did not observe any evidence of previous slope instability across the property, although some areas were relatively heavily covered by brush which may make full assessment difficult.
- B - The site drainage would be characterized as sheet flow off the slopes.

Geologic Map Review

We reviewed the *Geology of the Onshore Part of San Mateo County, California: Derived from the Digital Database Open-File 98-137*, by Earl E. Brabb, R.W. Graymer, and D.L. Jones (1998). The relevant portion of the Brabb, Graymer, and Jones map has been reproduced in Figure 3.

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The Brabb, Graymer, and Jones map indicates that the site is on the border of two bedrock types, sheared rock (map symbol "fs") and serpentinite ("sp"). The authors describe the shear rock as consisting of "predominantly graywacke, siltstone, and shale, substantial portions of which have been sheared, but includes hard blocks of all other Franciscan rock types."

Our subsurface exploration (see below) encountered clay and sand soils over sandstone bedrock, which we judged to be consistent with the sheared rock mapping.

Subsurface Exploration

On May 30, 2018 we drilled 3 borings at the site at the locations shown on Figure *. The borings were drilled using a Mobile B-24 truck-mounted drilling rig equipped with 4.0 inch diameter, helical flight augers. Logs of the soils encountered during drilling record our observations of the cuttings traveling up the augers and of relatively undisturbed samples collected from the base of the advancing holes. The final boring logs are based upon the field logs with occasional modifications made upon further laboratory examinations of the recovered samples and laboratory test results. The final logs are attached in Appendix A.

The relatively undisturbed samples were obtained by driving a 3.0 inch (outer diameter) Modified California Sampler and a Standard Penetration Sampler (as noted on logs) into the base of the advancing hole by repeated blows from a 140 pound hammer lifted 30 inches. On the logs, the number of blows required to drive the sampler the final 12 inches of the 18 inch drive, have been recorded as the Blow Counts. These blows have not been adjusted to reflect equivalent blows of any other type of sampler or hammer, or to account for the different samplers used.

Subsurface Conditions

The borings all encountered upper layers of clayey sand/sandy clay which graded to sandstone bedrock at depths between 6 to 9 feet below existing grades. The sandstone continued to the base of the borings at depths of just under 15 feet. The borings were terminated in the bedrock, but did not encounter refusal to deeper penetration. Please refer to Appendix A for a more detailed description of each boring.

No free groundwater was encountered during the drilling of the holes. However, during periods of heavy rain or late in the winter, groundwater seepage may exist at shallower depths, most likely as perched water atop the bedrock.

Laboratory Testing

The relatively undisturbed samples collected during the drilling process were returned to the laboratory for testing of engineering properties. In the lab, selected soil samples were tested for moisture content and density. The results of the laboratory tests are attached to this report in Appendix B.

CONCLUSIONS AND RECOMMENDATIONS

General

Based upon our investigation, we believe that the proposed improvements can be safely constructed. Geotechnical development of the site is controlled steep slopes, but aided by the non-expansive nature of the site soils and relatively shallow bedrock.

The recommendations in this report should be incorporated into the design and construction of the proposed new site improvements.

Seismicity

The greater San Francisco Bay Area is recognized by Geologists and Seismologists as one of the most active seismic regions in the United States. Several major fault zones pass through the Bay Area in a northwest direction which have produced approximately 12 earthquakes per century strong enough to cause structural damage. The faults causing such earthquakes are part of the San Andreas Fault System, a major rift in the earth's crust that extends for at least 700 miles along western California. The San Andreas Fault System includes the San Andreas, San Gregorio, Hayward, Calaveras Fault Zones, and other faults.

During 1990, the U.S. Geological Survey cited a 67 percent probability that an earthquake of Richter magnitude 7, similar to the 1989 Loma Prieta Earthquake, would occur on one of the active faults in the San Francisco Bay Region in the following 30 years. Recently, this probability was increased to 70 percent, as a result of studies in the vicinity of the Hayward Fault. A 23 percent probability is still attributed specifically to the potential for a magnitude 7 earthquake to occur along the San Andreas Fault by the year 2020.

Ground Rupture - The lack of mapped active fault traces through the site, suggests that the potential for primary rupture due to fault offset on the property is low.

Ground Shaking - The subject site is likely to be subject to very strong to violent ground shaking during its life span due to a major earthquake in one of the above-listed fault zones. Current (2016) building code design may be followed by the structural engineer to minimize damages due to seismic shaking, using the following input parameters from the USGS Java Ground Motion Parameter Calculator based upon ASCE 7-10 design parameters:

Site Class - C	$SM_s = 2.612$	$SM_1 = 1.631$	$SD_s = 1.742$	$SD_1 = 1.087$
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Landsliding - The subject site and the surrounding area are gently to steeply sloping. Fortunately, the site is underlain by competent bedrock material at relatively shallow depths. Therefore, the hazard due to large-scale seismically-induced landsliding is, in our opinion, relatively low for the site. However, as with any slope, minor sloughing of the steeper site slopes could occur during earthquake

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shaking (or during periods of prolonged rainfall). The proposed improvements should not be affected by any such sloughing, as they will be supported by the stable bedrock materials at the site where proximate to steep slopes.

Liquefaction - Liquefaction most commonly occurs during earthquake shaking in loose fine sands and silty sands associated with a high ground water table. These conditions were demonstrated to be absent down to the site bedrock. Therefore, it is our opinion the liquefaction is unlikely to *affect the/*occur on the subject property.

Ground Subsidence - Ground subsidence may occur when poorly consolidated soils densify as a result of earthquake shaking. Since the proposed building site is underlain at shallow depths by resistant materials, the hazard due to ground subsidence is, in our opinion, considered to be low.

Lateral Spreading - Lateral spreading may occur when a weak layer of material, such as a sensitive or liquefiable soil, loses its shear strength as a result of earthquake shaking. Overlying blocks of competent material may be translated laterally towards a free face. Susceptible soils and free face conditions are not present proximate to or at the site, hence, the hazard due to lateral spreading is, in our opinion, considered to be low.

Site Preparation and Grading

All debris resulting from the demolition of existing improvements should be removed from the site and may not be used as fill. Any existing underground utility lines to be abandoned should be removed from within the proposed building envelope and their ends capped outside of the building envelope.

Any vegetation and organically contaminated soils should be cleared from the building area. All holes resulting from removal of tree stumps and roots, or other buried objects, should be over-excavated into firm materials and then backfilled and compacted with native materials.

The placement of fills at the site is expected to include: site reconfiguration (building pad preparations); utility trench backfill, retaining wall backfill, slab subgrade materials, and finished drainage and landscaping grading. These and all other fills should be placed in conformance with the following guidelines:

Fills may use organic-free soils available at the site or import materials. Import soils should be free of construction debris or other deleterious materials and be non-expansive. *A minimum of 3 days prior to the placement of any fill, our office should be supplied with a 30 pound sample (approximately a full 5 gallon bucket) of any soil or baserock to be used as fill (including native and import materials) for testing and approval.*

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All areas to receive fills should be stripped of organics and loose or soft near-surface soils. Fills should be placed on level benches in lifts no greater than 6 inches thick (loose) and be compacted to at least 90 percent of their Maximum Dry Density (MDD), as determined by ASTM D-1557. In pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of soil subgrade beneath any pavements should be compacted to at least 95 percent of its MDD.

All unretained fills to be placed on slopes steeper than 6 to 1 (horizontal to vertical, H:V) will need to be keyed and benched into competent native materials. Any retained fills will need to be benched into competent native materials, however, a formal keyway is not required. The entire base of any keyway should extend into competent weathered bedrock materials, located about 5 to 9 feet below grade. The entire bases of all benches should extend into or through competent * colluvial soils, as identified in the field by representatives from our office. It should be anticipated that the outer edge of bench excavations will extend at least 8 feet below native grade. Keyways and benches should be sloped back into the hillside at a minimum 2% gradient.

For fills over 5 feet thick, or where deemed necessary by our personnel, a blanket drain should be provided within any keyway excavations, and chimney drains should be provided at the back of any benches identified by our office in the field. The blanket drain should cover the entire keyway and consist of a minimum 6 inch thick layer of clean crushed drain rock completely covered (top and sides) with filter fabric (Mirafi 140N or approved equivalent). Chimney drains should consist of a minimum 6 inch wide column of clean crushed drain rock, also wrapped with filter fabric, for at least half the height and for the full width of the bench. These systems should drain to 4 inch diameter perforated pipes, placed at the base of the drain rock. The pipes should consist of Schedule 40 PVC or SDR 35. No flexible, corrugated pipe may be used within any drainage system installed as part of this project. The bench drain pipes may connect to the keyway blanket drain pipe. A solid line should be used to convey the water to an appropriate discharge point. We note that *Caltrans Class 2 permeable rock* is an acceptable substitution for clean drain rock and filter fabric.

Temporary, dry-weather, vertical excavations should remain stable for short periods of time to heights of 5 feet. All excavations should be shored or sloped in accordance with OSHA standards.

Our borings did not encounter hard bedrock, but within this bedrock unit there are often hard zones of bedrock which require heavy excavation equipment. It may also be necessary to utilize hand-held jackhammers to clean out the footing excavations.

Permanent cut and/or fill slopes should be no steeper than 2:1 (H:V). However, even at this gradient, minor sloughing of slopes may still occur in the future. Positive drainage improvements (e.g. drainage swales, catch basins, etc.) should be provided to prevent water from flowing over the tops of cut and/or fill slopes.

Foundations – Spread Footings

Due to the relatively non-expansive nature and high strength of the site soils and bedrock, the foundations for the house, cabana, and ADU may consist of conventional spread footings. Should any of these improvements be located on a slope steeper than 6H:1V, then drilled piers would be required (see retaining wall section for drilled pier recommendations).

All footings should be a minimum of 15 inches wide. Strip footings should be embedded a minimum of 24 inches below exterior grade and 18 inches below interior grade, *whichever is deeper*. Stepped footings need only be embedded 18 inches below exterior grade at the toe. Isolated footings (e.g. interior pads or exterior post supports) should be embedded at least 24 inches below lowest adjacent grade.

All footings should bear on competent soils or bedrock, as verified by our office in the field. Localized deepening of footings may be required to reach competent materials.

The footings should be founded below an imaginary line projecting at a 1:1 slope from the base of any adjacent, parallel utility trenches. The footings must be embedded so that there is a minimum of 20 feet of horizontal cover between the face of the footings and any adjacent, parallel slope.

The footings should be designed to exert pressures on the ground, which do not exceed 2500 psf for Dead plus Live Loads. The weight of the embedded portion of the footings may be neglected when determining bearing pressures. Lateral pressures may be resisted by friction between the base of the footings and the ground surface. A friction coefficient of 0.35 may be assumed. Alternatively, lateral pressures may be resisted by a passive pressure of 350 pcf EFW assumed to be acting against the face of the footings (or shear keys, if required). These values may be increased 1/3 for transient loads (i.e. seismic and wind).

Footings should be nominally reinforced with four #4 bars (two at top and two at bottom). The designer should determine actual width, embedment and reinforcement for the footings.

If the above recommendations are followed, total foundation settlements should be less than 1 inch, while differential settlements should be less than 3/4 inches.

Retaining Walls

Retaining walls which are located on, or within 10 feet of the crest of, slopes steeper than 5:1 (H:V) should utilize a pier and grade beam foundation system. Site retaining walls which located on level areas (flatter than 5:1, H:V) may be supported by drilled piers or by spread footings depending upon wall type.

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Wall Forces - Any unrestrained retaining walls required for the proposed construction should be designed to resist an active pressure of 45 pcf Equivalent Fluid Weight (EFW) in supporting soils with retained slopes less than 4:1 (H:V). An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

Where a retaining wall is located within a horizontal distance less than twice the height of the lower retaining wall, the lower retaining wall will need to be designed for an additional surcharge pressure from the upper wall(s). Once the geometry of such walls has been determined, please provide our office with a cross-section so that we can determine the required surcharges.

Any restrained retaining walls required should be designed for the aforementioned active pressures with an additional uniform pressure of $8H$ psf, where H is the height of the wall in feet. We leave it to the design professional's judgment in determining whether a wall is restrained or not. An additional uniform force of $10H$ psf may be applied to account for seismic forces on the wall, although it is our opinion that such forces need not be applied.

All retaining walls should also be designed to resist a point load applied at the midpoint of the wall, equal to $\frac{1}{2}$ the maximum applied surcharge.

Drilled Piers - Any wall which is located on, or within 15 feet of the crest of, slopes steeper than 5:1 (H:V) should utilize a drilled pier foundation system.

We note that pier-supported walls may not rely upon a toe footing to resist overturning forces. All vertical and lateral forces should be resisted by piers. This may require the use of a staggered, double row of piers, depending upon the wall height and any surcharges.

If drilled piers are utilized beneath a concrete or block wall, they will need to be connected by a concrete grade beam. No grade beam is required for a wood lagging wall.

If used, drilled piers should penetrate a minimum of 5 feet below lowest adjacent grade, and 5 feet into competent native materials, whichever is deeper. In sloping areas, the piers should penetrate a minimum of 10 feet below lowest adjacent grade, and 5 feet into competent weathered rock, whichever is deeper. It should be assumed that up to 9 feet of overburden will exist at the site, so nominal pier depths may range from 5 to 15 feet below lowest adjacent grade.

The piers should have a minimum diameter of 16 inches and be nominally reinforced with a minimum of four #4 bars vertically. Piers should be spaced no closer than 4 diameters, center to center. Actual pier depth, diameter, reinforcement, and spacing should be determined by the structural engineer.

A friction value of 500 psf may be assumed to act on that portion of the pier below a depth of 2 feet. Lateral support may be assumed to be developed along the length of the pier below 2 feet, using a

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passive pressure of 400 pcf Equivalent Fluid Weight (EFW), however, for passive resistance to start, the pier must be embedded so that there is a minimum of 10 feet of horizontal cover between the face of the footing and any adjacent, parallel slope. Passive resistance may be assumed to act over 1.5 projected pier diameters. Above 2 feet, no frictional or lateral support may be assumed. These design values may be increased 1/3 for transient loads (i.e. seismic and wind).

Spread Footings - For detached site walls in level areas (flatter than 5:1, H:V for a distance of at least 15 feet beyond the retaining wall footing), spread footings may be used. Footings should be designed using an allowable bearing pressure of 2500 psf, at a minimum depth of 24 inches below adjacent grade, or on competent materials as approved by our office in the field. Lateral pressures may be resisted by a passive pressure of 300 pcf EFW assumed to be acting against the sides of the footings (or shear keys, if required). Passive resistance may start at a depth of 1 foot below exterior grade. Alternatively, lateral pressures may be resisted by friction between the base of the footings and the ground surface. A friction coefficient of 0.40 may be assumed. Frictional and passive resistance may not be used in combination. The above values may be increased 1/3 for transient loads.

Wall Drainage - The above values have been provided assuming that back-of-wall drains will be installed to prevent build-up of hydrostatic pressures behind all walls. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. We also recommend that any interior retaining walls, or walls through which efflorescence transmission would be undesirable, should be waterproofed. The waterproofing should be specified by the designer, though we suggest the use of Bituthene, Miradri, or other similar waterproofing membrane. Surface drainage above the wall should preclude overtopping of the wall, and should also preclude ponding on the ground surface above the wall. *Additionally, the ground surface above all walls should form a drainage swale to carry water to the sides of the wall and/or to area drain locations.*

The back-of-wall drain systems should be installed with a minimum 3-inch diameter perforated pipe placed a minimum of 4 inches below the top of the footing (preferably at the base of the footing heel). The pipe should not be placed on top of the heel of the wall footing unless seepage through the base of the wall is acceptable. Perforations should be placed face-down (at 5 and 7 o'clock). The perforated pipe should connect to a solid discharge line, which discharges away from the new structures. This solid line should not connect to surface water drain lines (i.e. downspout and area drain lines). If water transmission through the base of a wall is not a concern, then weep holes may be used in place of the pipe.

If used, the gravel system should consist of a minimum 12 inch wide column of drain rock ($3/8$ to $3/4$ inch clean, crushed rock) extending the full width of the wall. The rock should continue to within 12 inches of finish grade. Prior to backfilling with the drain rock, a layer of filter fabric (Mirafi 140N or approved equivalent) should be placed against all soil surfaces to separate the rock and soil. The filter fabric should wrap over the top of the gravel and then a 12 inch thick cap of native soils should be placed at the top of the drain. If concrete flatwork is to directly overlay the back-of-wall drain, or if the drain is located in a crawlspace area, then the soil cap should be eliminated.

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If prefabricated drainage panels are used, a packet of filter fabric-wrapped drain rock should be placed around the perforated collector pipe at the base of the panel. The tops of the panels should be sealed and secured in accordance with the manufacturer's recommendations. The base of the drainage panels should extend down below the top of the filter fabric-wrapped drain rock.

We note that Caltrans Class II permeable rock may be utilized in lieu of clean drain rock and filter fabric. The Class II permeable rock needs to be compacted into place, and needs to be certified by the quarry or rockery that it meets the Caltrans Class II permeable rock specifications.

Ratproofing

Hillsborough requires that the crawl space surface be covered by concrete rat-proofing. We recommend the crawlspace be covered by a 2 inch thick layer of concrete ratproofing underlain by a 15 mil vapor barrier (e.g. Stego Wrap). The vapor barrier should be placed as soon as the crawlspace subgrade is exposed in order to limit moisture loss during construction. The rat slab may be placed at any time prior to floor joist installation. It would be prudent to slope the subgrade or top of ratproofing to a low area where any trapped water can drain through the foundation to the perimeter footing drain.

Slabs-on-Grade

The at-grade house and ADU floors may consist of concrete slabs-on-grade, although it may be preferable to design concrete floor slabs as mat slabs which can also accommodate the building loads and integrate with the foundation elements (use a modulus of subgrade reaction of 50 pci for such designs). The driveway, any sidewalks or patios, and garage floor may consist of conventional concrete slabs-on-grade on a compacted subgrade, though it should be expected that some post-construction cracking of such slabs may occur. We have provided guidelines to help reduce post-construction cracking, however, it is nearly impossible to economically eliminate all shifting/cracking.

To help reduce cracking, we recommend slabs be a minimum of 4 inches thick and be nominally reinforced with #4 bars at 18 inches on center, each way. Slabs which are thinner or more lightly reinforced may experience undesirable cosmetic cracking. However, actual reinforcement and thickness should be determined by the structural engineer based upon anticipated usage and loading.

In large non-interior slabs (e.g. patios, garage, etc.), score joints should be placed at a maximum of 10 feet on center. In sidewalks, score joints should be placed at a maximum of 5 feet on center. All slabs should be separated from adjacent improvements (e.g. footings, porches, columns, etc.) with expansion joints. Interior floor slabs will experience shrinkage cracking. These cosmetic cracks may be sealed with epoxy or other measures specified by the architect.

All interior slabs (including garage slab) should be underlain by a minimum of 4 inches of clean ¾ inch crushed drain rock. The drain rock should be covered by a vapor barrier which conforms to

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ASTM E1745-97 (e.g. Stego Wrap or an approved equivalent). The architect or structural engineer should determine if sand is required over the vapor barrier.

Slabs which will be subject to light vehicular loads and through which moisture transmission is not a concern (e.g. driveway) should be underlain by at least 6 inches of compacted baserock, in lieu of any sand and gravel. Exterior landscaping flatwork (e.g. patios and sidewalks) may be placed directly on proof-rolled soil subgrade materials (e.g. no granular subgrade), however, they will be potentially subject to greater amounts of shifting and moisture transmission.

As stated previously, in pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of native soil subgrade beneath any pavements should be compacted to at least 95 percent of its MDD.

House floor slabs should be tied to the foundations to limit differential movements. The garage slabs may be tied or left to free float.

Pool

Shells - The pool (and spa) shell(s) should be designed to resist an active soil pressure of 45 pcf Equivalent Fluid Weight (EFW) in supporting soils with retained slopes less than 4:1 (H:V). An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

Where the pool or spa shell extends above grade and retains water (free-standing), it should be designed to resist an active water pressure of 63 pcf EFW on the inside face of the shell, in addition to the active soil forces on the outside of the shell below the free-standing portions. Where the pool or spa shell extends above the water line and retains soil, the aforementioned active soil pressures should be utilized for the design of this "wall". Behind any section of wall above the water line, a back-of-wall drain will need to be installed to prevent build-up of hydrostatic pressures. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. Such drains can discharge into a perforated pipe which carries any collected water to an appropriate discharge location, or they may connect to the gravel layer at the base of the pool (see below).

A minimum of 10 feet of horizontal soil cover is required for resistance along the downhill side of the pool (or spa). If less than 10 feet of horizontal cover exists, then the downslope side of the pool (or spa) should be designed as a free-standing wall, in addition to being designed to withstand the active soil pressures.

If a retaining wall is located on the downhill side of the pool (or spa), the retaining wall will need to be designed to resist lateral forces imparted by the pool (or spa) and any retained soils.

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Base - The base of the pool and spa need to be founded in dense native materials, as identified by our office in the field, or on new engineered fills (see above listed requirements for keying, benching, and compaction).

A minimum 4 inch thick layer of drain rock ($\frac{3}{4}$ inch clean crushed rock) should be placed along the base of the entire pool (and spa) excavation(s). A perforated pipe should be placed at the deep end of the pool to collect any water which drains into the rock. Ideally, this line should drain via gravity. Alternatively, a solid discharge line should be connected to the perforated pipe and should carry collected water to a sump well. The sump should be fitted for a pump, but the pump does not need to be installed unless the pool is to be drained. In addition, a hydrostatic relief valve should be installed at the deep end of the pool.

Decking - The decking around the pool (and spa) may consist of raised wood decking, concrete slabs-on-grade, or interlocking pavers. If concrete slabs are used, they should be constructed in a manner consistent with recommendations provided in the **Slab-on-Grade** section of this report. All decking should be structurally isolated from the pool and spa shells and the skimmer. This can be achieved through the use of full-depth expansion joints between the decking and pool coping. If it is desired to extend the decking over the edge of the pool shell (i.e. no coping stone), a horizontal expansion joint should be placed to completely separate the decking from the bond beam and coping tiles.

Drainage

Surface Drainage - Adjacent to any buildings, the ground surface should slope at least 5 percent away from the foundations within 5 feet of the perimeter. Impervious surfaces should have a minimum gradient of 2 percent away from the foundation.

Surface water should be directed away from all buildings into drainage swales, or into a surface drainage system (i.e. catch basins and a solid drain line). "Trapped" planting areas should not be created next to any buildings without providing means for drainage (i.e. area drains).

All roof eaves should be lined with gutters. Due to city requirements, the downspouts cannot tie directly to an underground pipe system, so they will need to discharge onto splash blocks or other paved surfaces.

Under-Slab Subdrain - Where concrete floor slabs are used, the perimeter footing subdrain should be replaced by an under-slab drainage system consisting of perforated pipes at 20 foot spacings (on direction) at the base of the granular section under the slabs.

Footing Drain - Due to the city requirements which preclude the tying of downspouts to underground pipes, we recommend that a perimeter footing drain be installed to intercept water attempting to enter the crawlspace.

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The footing drain system, if installed, should consist of a 12 inch wide gravel-filled trench, *dug at least 12 inches below the elevation of the adjacent crawlspace*. The trench should be lined with a layer of filter fabric (Mirafi 140N or equivalent) to prevent migration of silts and clays into the gravel, but still permit the flow of water. Then 1 to 2 inches of drain rock (clean crushed rock or pea gravel) should be placed in the base of the lined trench. Next a perforated pipe (minimum 3 inch diameter) should be placed on top of the thin rock layer. The perforations in the pipe should be face down. The trench should then be backfilled with more rock to within 6 inches of finished grade. The filter fabric should be wrapped over the top of the rock. Above the filter fabric 6 inches of native soils should be used to cap the drain. If concrete slabs are to directly overlay the drain, then the gravel should continue to the base of the slab, without the 6 inch soil cap. This drain should not be connected to any surface drainage system.

Drainage Discharge - The surface drain lines should discharge at least 15 feet away from the house, preferably at the street. The discharge location(s) should be protected by energy dissipaters to reduce the potential for erosion. Care should be taken not to direct concentrated flows of water towards neighboring properties. This may require the use of multiple discharge points.

Due to the steep nature of the site slopes, the use of a percolation system for storm water disposal is not advised.

The footing drain, under-slab drains, and any back-of-wall drain lines should discharge independently from the surface drainage system.

Drainage Materials - Drain lines should consist of hard-walled pipes (e.g. SDR 35 or Schedule 40 PVC). In areas where vehicle loading is not a possibility, SDR 38 or HDPE pipes may be used. Corrugated, flexible pipes may not be used in any drain system installed at the property.

Surface drain lines (e.g. downspouts, area drains, etc.) should be laid with a minimum 2 percent gradient (¼ inch of fall per foot of pipe). Any subsurface drain systems (e.g. footing drains) should be laid with a minimum 1 percent gradient (1/8 inch of fall per foot of pipe).

Utility Lines

Only mechanical means of compaction of trench backfill will be allowed. Jetting of sands is not acceptable. Trench backfill should be compacted to at least 90 percent of its MDD. However, under pavements, concrete flatwork, and footings the upper 12 inches of trench backfill must be compacted to at least 95 percent of its MDD.

Pavement

The new driveway may consist of concrete, interlocking pavers, or asphaltic concrete over Caltrans Class II aggregate base (baserock). The asphalt should have a minimum thickness of 2½ inches. The

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baserock should have a minimum thickness of 6 inches. All of the baserock and the upper 6 inches of soil subgrade should attain a minimum compaction of 95 percent of its MDD.

Plan Review and Construction Observations

The use of the recommendations contained within this report is contingent upon our being contracted to review the plans, and to observe geotechnically relevant aspects of the construction.

We should be provided with a full set of plans to review at the same time the plans are submitted to the building/planning department for review. A minimum of one working week should be provided for review of the plans.

At a minimum, our observations should include: key and bench excavations; compaction testing of fills and subgrades; footing excavations; pier drilling; slab and driveway subgrade preparation; pool excavation; installation of any drainage system (e.g. back-of-wall, under-slab, footing, and surface), and final grading. A minimum of 48 hours notice should be provided for all construction observations.

LIMITATIONS

This report has been prepared for the exclusive use of the addressee, and their architects and engineers for aiding in the design and construction of the proposed development. It is the addressee's responsibility to provide this report to the appropriate design professionals, building officials, and contractors to ensure correct implementation of the recommendations.

The opinions, comments and conclusions presented in this report were based upon information derived from our field investigation and laboratory testing. Conditions between or beyond our borings may vary from those encountered. Such variations may result in changes to our recommendations and possibly variations in project costs. Should any additional information become available, or should there be changes in the proposed scope of work as outlined above, then we should be supplied with that information so as to make any necessary changes to our opinions and recommendations. Such changes may require additional investigation or analyses, and hence additional costs may be incurred.

Our work has been conducted in general conformance with the standard of care in the field of geotechnical engineering currently in practice in the San Francisco Bay Area for projects of this nature and magnitude. We make no other warranty either expressed or implied. By utilizing the design recommendations within this report, the addressee acknowledges and accepts the risks and limitations of development at the site, as outlined within the report.

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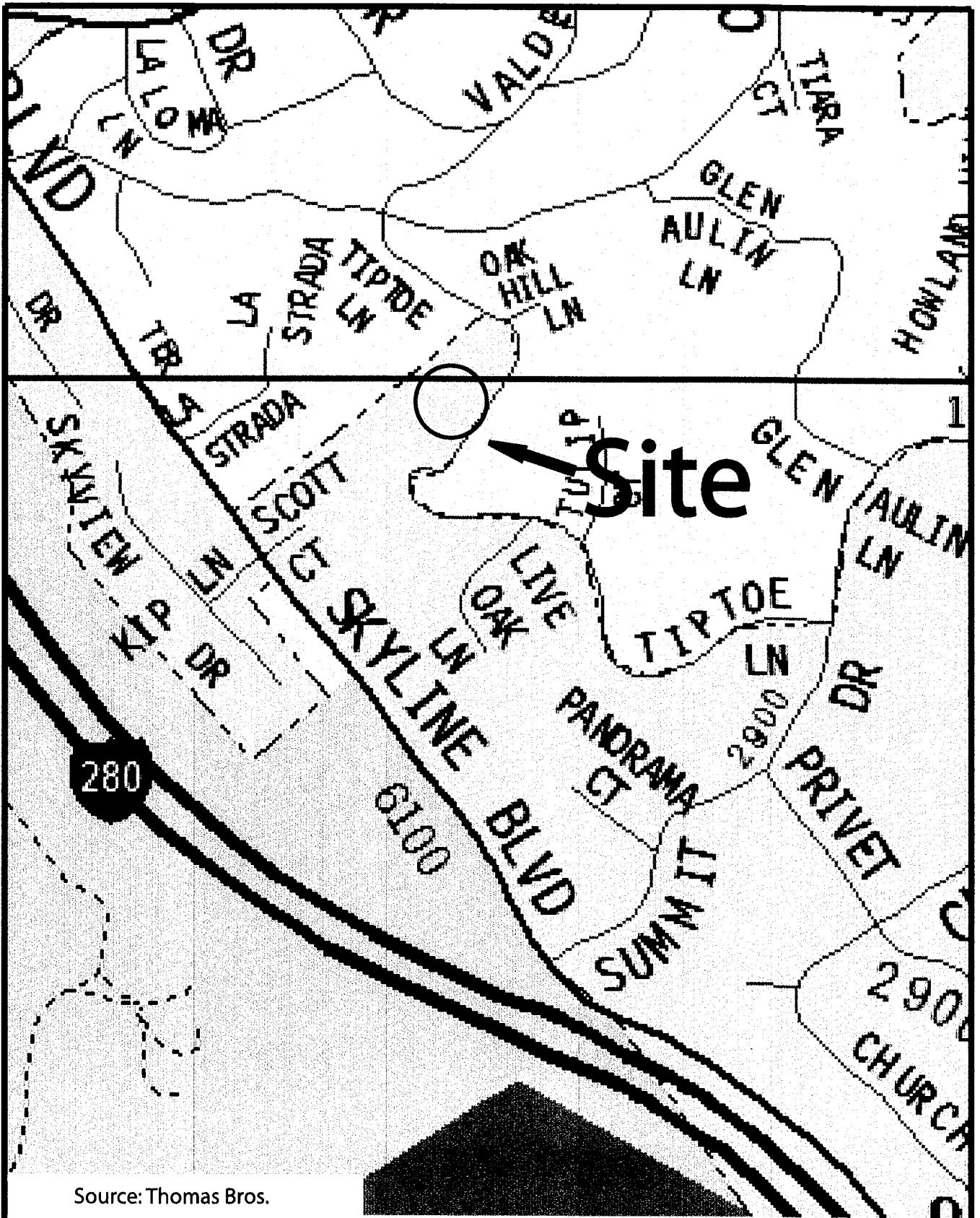
Respectfully Submitted;
GeoForensics, Inc.



Daniel F. Dyckman, PE, GE
Senior Geotechnical Engineer, GE 2145



cc: 5 to addressee



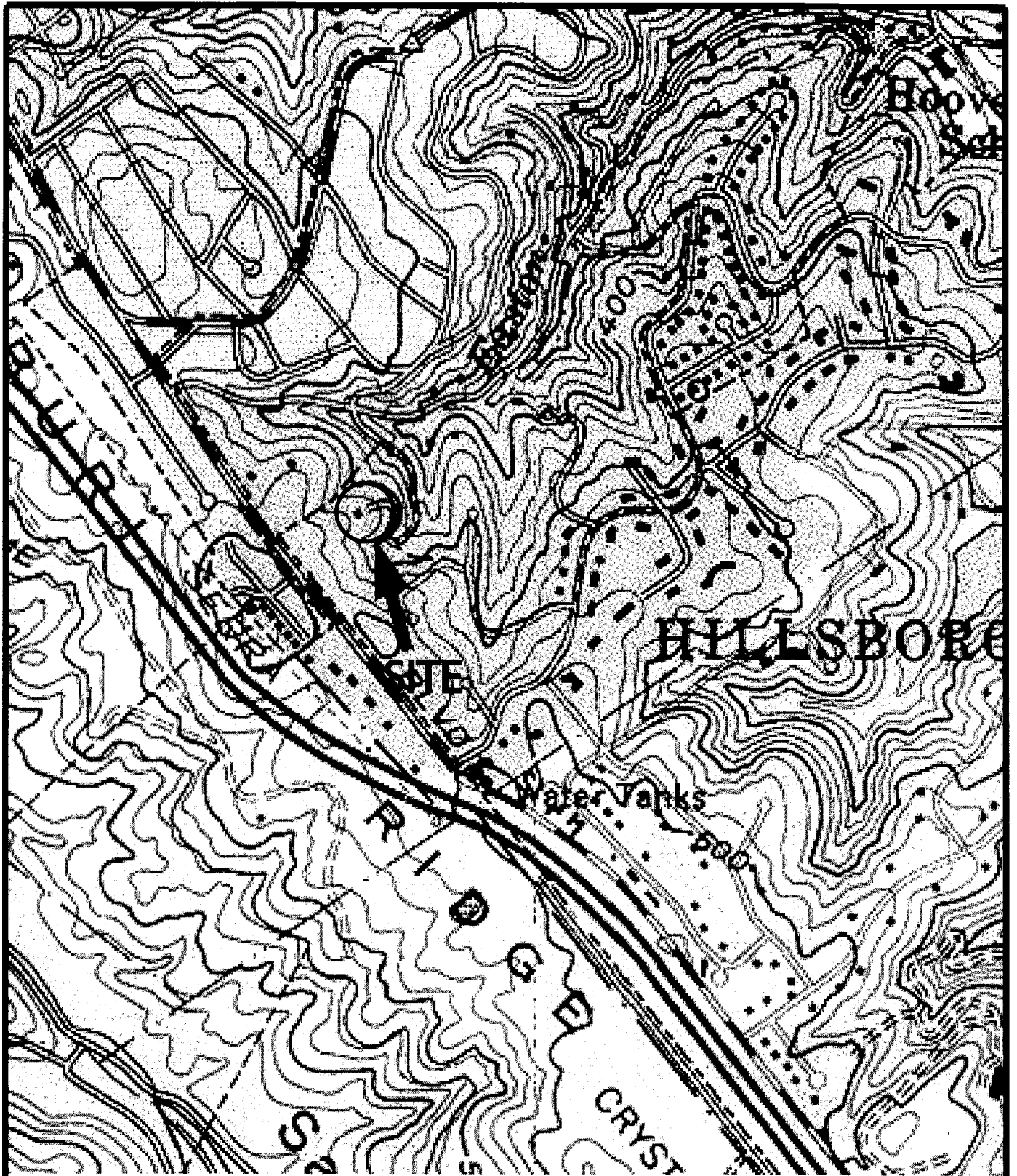
Source: Thomas Bros.

GEOFORENSICS, INC.

561 Pilgrim Dr., Suite D, Foster City, CA 94404

Tel: (650) 349-3369 Fax: (650) 571-1878

Figure 1 - Site Location



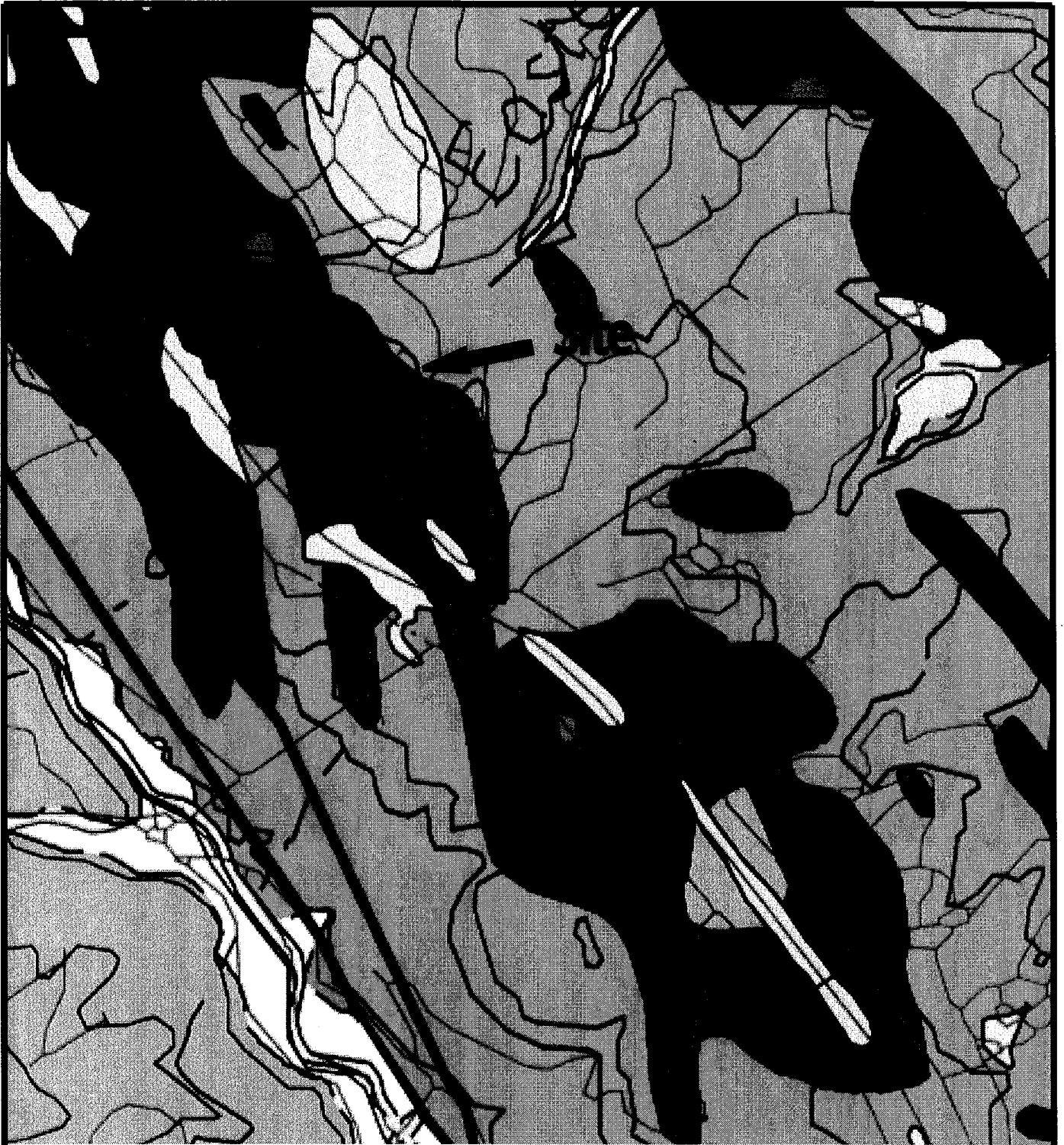
Base: Topo

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Figure 2 - Regional Topography



fsr

Sheared rock (melange)—Predominantly graywacke, siltstone, and shale, substantial portions of which have been sheared, but includes hard blocks of all other Franciscan rock types. Total thickness of unit is unknown, but is probably at least several tens of meters

GEOLOGY OF THE ONSHORE PART OF SAN MATEO COUNTY, CALIFORNIA; DERIVED FROM THE DIGITAL DATABASE OPEN-FILE 98-137

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Figure 3 - Geologic Map



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Figure 4 - Boring Locations

APPENDIX A - BORING LOGS

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (70)
5	1-1		67	Silty SAND with clay - dark brown, sl. moist (SM) Clayey SAND - green brown and orange brown, moist, medium dense (SC)	111.0	15.7
10	1-2		70	Clayey SAND (weathered Sandstone) - green brown and orange brown, moist, dense (SC/RX)	109.7	14.7
15	1-3		69	as above but very dense		16.7
20				Bottom of Boring @ 14.5 ft No Groundwater		
25						
30						

Logged by: BA
 Job No: 218130
 Drilled on 5/30/18

Mobile B-24 Drilling Rig
 140 Pound Hammer





Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A1 - Log of Boring 1

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (70)
	2-1		20	Clayey SAND - brown, moist, medium dense (SC)	110.8	11.7
5	2-2		21	Clayey SAND - green brown and greenish gray, moist, medium dense, organic odor (SC)	109.5	18.2
10	2-3		76	Clayey SAND (weathered Sandstone) - orange brown and green gray, moist, dense	109.4	16.0
15	2-4		41	(SC/RX)		15.3
20				Bottom of Boring @ 14.5 ft No Groundwater		
25						
30						

Logged by: BA
Job No: 218130
Drilled on 5/30/18

Mobile B-24 Drilling Rig
140 Pound Hammer

Mod. Cal
Sampler
SPT
Sampler

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Figure A2 - Log of Boring 2

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	3-1		37	silty clayey SAND - dark brown, sl. moist (SM/SC)	106.0	19.9
				Clayey SAND - green gray and orange brown, moist, med. dense (SC)		
10	3-2		60	Clayey SAND (weathered Sandstone) - green gray and orange brown, moist, dense (SC/RX)	113.0	16.1
15	3-3		45			13.6
15				Bottom of Boring @ 13.5 ft		
20				No Groundwater		
25						
30						

Logged by: BA
 Job No: 218130
 Drilled on 5/30/18

Mobile B-24 Drilling Rig
 140 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A3 - Log of Boring 3

APPENDIX B - LABORATORY TEST RESULTS



Moisture-Density-Porosity Report

Cooper Testing Labs, Inc. (ASTM D7263b)

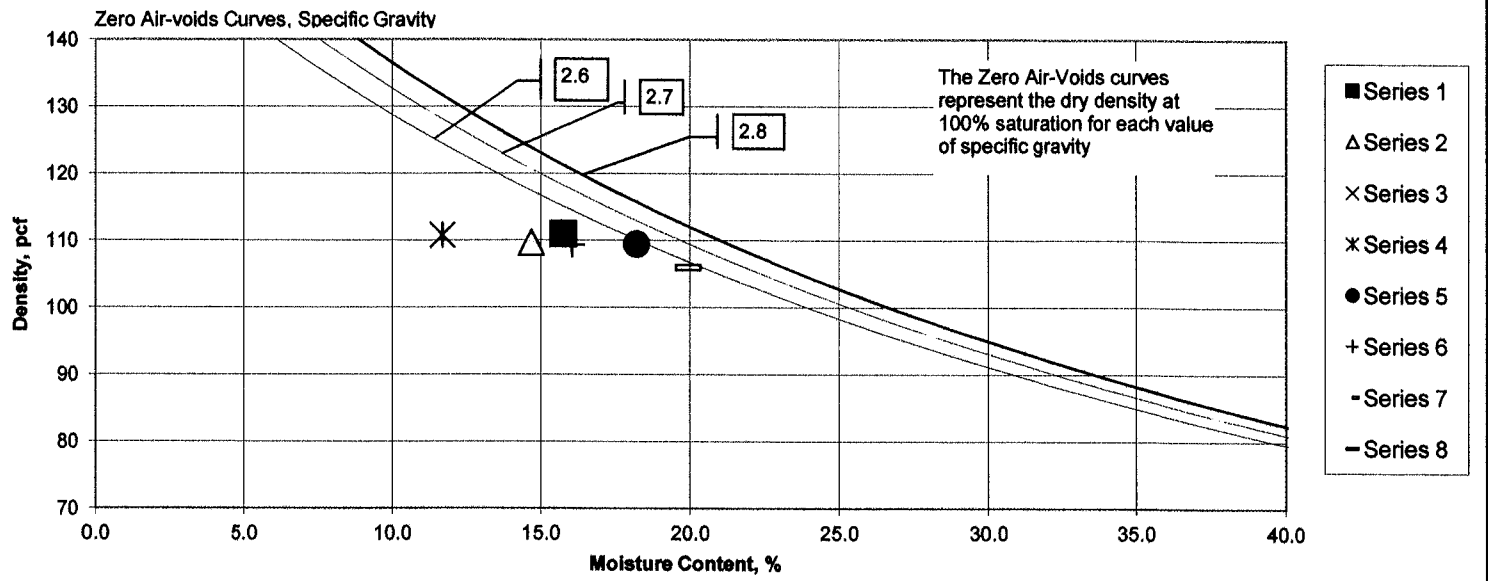
CTL Job No: <u>060-2652a</u>	Project No. <u>218130</u>	By: <u>RU</u>
Client: <u>GeoForensics</u>	Date: <u>06/06/18</u>	
Project Name: <u>Tiptoe</u>	Remarks:	

Boring:	1-1	1-2	1-3	2-1	2-2	2-3	2-4	3-1
Sample:								
Depth, ft:	4	8.5	14	2	6	10	14	3
Visual Description:	Pale Olive Sandy CLAY	Pale Olive Sandy CLAY	Pale Olive Sandy CLAY	Yellowish Brown Sandy CLAY	Yellowish Brown Sandy CLAY	Pale Olive Sandy CLAY	Pale Olive Sandy CLAY	Pale Olive Sandy CLAY

Actual G_s								
Assumed G_s	2.70	2.70		2.70	2.70	2.70		2.70
Moisture, %	15.7	14.7	16.7	11.7	18.2	16.0	15.3	19.9
Wet Unit wt, pcf	128.5	125.8		123.8	129.4	126.9		127.1
Dry Unit wt, pcf	111.0	109.7		110.8	109.5	109.4		106.0
Dry Bulk Dens. pb. (g/cc)	1.78	1.76		1.78	1.75	1.75		1.70
Saturation, %	81.7	73.7		60.4	90.8	79.8		91.0
Total Porosity, %	34.2	35.0		34.3	35.1	35.2		37.2
Volumetric Water Cont., G_w, %	28.0	25.8		20.7	31.9	28.1		33.8
Volumetric Air Cont., G_a, %	6.3	9.2		13.6	3.2	7.1		3.4
Void Ratio	0.52	0.54		0.52	0.54	0.54		0.59
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (G_s) was used then the saturation, porosities, and void ratio should be considered approximate.

Moisture-Density





Moisture-Density-Porosity Report

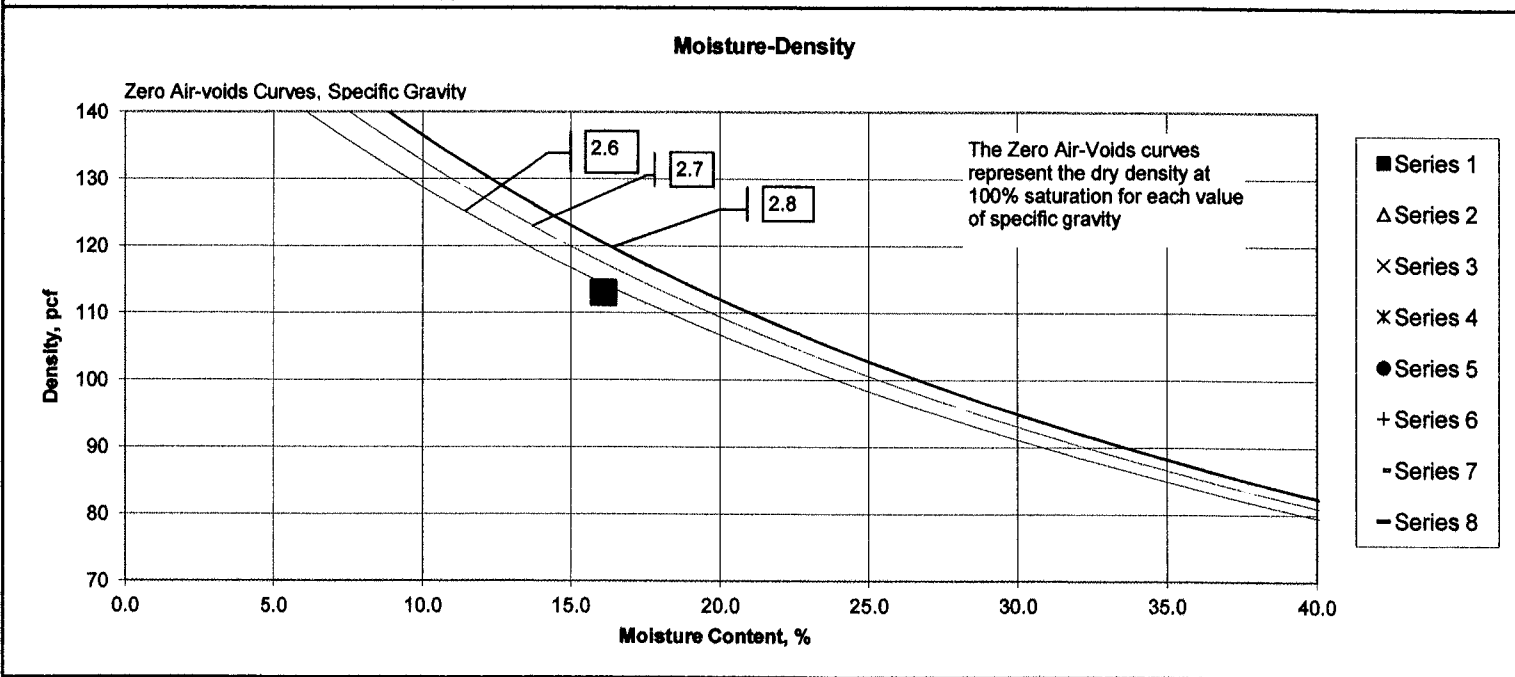
Cooper Testing Labs, Inc. (ASTM D7263b)

CTL Job No: <u>060-2652b</u>	Project No. <u>218130</u>	By: <u>RU</u>
Client: <u>GeoForensics</u>	Date: <u>06/06/18</u>	
Project Name: <u>Tiptoe</u>	Remarks:	

Boring:	3-2	3-3					
Sample:							
Depth, ft:	8	13					
Visual Description:	Pale Olive Sandy CLAY	Pale Olive Sandy CLAY					

Actual G _s								
Assumed G _s	2.70							
Moisture, %	16.1	13.6						
Wet Unit wt, pcf	131.2							
Dry Unit wt, pcf	113.0							
Dry Bulk Dens. pb. (g/cc)	1.81							
Saturation, %	88.2							
Total Porosity, %	33.0							
Volumetric Water Cont, Gw, %	29.1							
Volumetric Air Cont., Gs, %	3.9							
Void Ratio	0.49							
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation, porosities, and void ratio should be considered approximate.



Appendix NOI: Noise Modeling

Project-Generated Construction Source Noise Prediction Model

101 Tiptoe - Construction Equipment Noise



Location	Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Assumptions:	Reference Emission	Usage
				Noise Levels (L _{max}) at 50 feet ¹	Factor ¹
Threshold*	1,002	50	Man Lift	75	0.2
	50	83	Excavator	81	0.4
North	50	83	Concrete Pump Truck	81	0.2
West	100	75	Front End Loader	79	0.4
East	100	75	Auger Drill Rig	84	0.2
South	50	83	Dump Truck	76	0.4
Outside Property Line	25	90			
			Ground Type	Soft	
			Ground Factor	0.50	

Predicted Noise Level ²	L _{eq} dBA at 50 feet ²
Man Lift	68.0
Excavator	77.0
Concrete Pump Truck	74.0
Front End Loader	75.0
Auger Drill Rig	77.0
Dump Truck	72.0
Combined Predicted Noise Level (L_{eq} dBA at 50 feet)	
82.5	

Sources:

¹ Obtained from the FHWA Roadway Construction Noise Model, January 1981

² Based on the following from the Federal Transit Noise and Vibration Prediction Criteria:

$$L_{eq}(\text{equip}) = E.L. + 10 \cdot \log(U.F.) - 20 \cdot \log(D/50) - 10 \cdot G \cdot \log(D/50)$$

Where: E.L. = Emission Level;

U.F. = Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold