SWCA®
ENVIRONMENTAL CONSULTANTS
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TECHNICAL MEMORANDUM

To: Cam Boyd, Chief Operating Officer
Coastal Community Builders
330 James Way, Suite 270
Pismo beach, CA 93449

From: Ben Snyder, M.S., P.E., Senior Restoration Engineer
Jessica Ha, Assistant Staff Restoration Engineer

Date: July 12, 2023

Re: **Coastal Flood Risk Evaluation for 197 West Grand Avenue, Grover Beach, San Luis Obispo County, California / SWCA Project No. 81984**

EXECUTIVE SUMMARY

SWCA Environmental Consultants (SWCA) evaluated flood risk for the property at 197 West Grand Avenue, Grover Beach, San Luis Obispo County, California, to determine a suitable ground elevation to mitigate coastal flood risk. The parcel elevation should be no lower than the sum of the existing 100-year coastal flood elevation and the projected increase in local sea level. The most up-to-date guidance from federal and state governments was used and a hydraulic model was developed to simulate a wide range of coastal and riverine flood scenarios. The design life of the proposed structure is roughly 75 years; therefore, sea level rise projections for the Year 2100 were used.

Per the Federal Emergency Management Agency (FEMA) flood insurance study for the coastal flood transect nearest to the subject property (Transect 72), the 100-year water surface elevation is 15.2 feet NAVD88. The projected sea level rise is 6.7 feet for the year 2100, assuming high emissions, for the medium-to-high risk category. The sum of sea level rise and 100-year coastal flood is 21.9 feet NAVD88. The topographic survey showed that the existing ground surface is between 19 and 21 feet NAVD88. The development should have a ground floor elevation of at least 22 feet NAVD88 to mitigate coastal flood risk and the effects of climate change for the rest of this century. SWCA's assumptions, methods, and results are provided in the following sections.

BACKGROUND AND OBJECTIVES

Coastal Community Builders (CCB) is proposing a redevelopment project at 197 West Grand Avenue, Grover Beach, San Luis Obispo County, California. Because the subject property is in the coastal zone, the City of Grover Beach (City) requested engineering documentation of coastal flood risk at the subject property. SWCA evaluated flood risk due to sea level rise, storm surge, astronomical tides, wind, waves, and wave runup. An additional source of flood risk, Meadow Creek, was identified during the analysis and evaluated. The creek flows from north to south directly adjacent to the subject property (Figure 1).

Figure 1. Location map showing subject property in relation to the Pacific Ocean and Meadow Creek.

Additional site information was provided to SWCA by CCB, including a property boundary and topographic survey, which are included as Appendix A.

METHODS

Flood risk for the subject property was analyzed using FEMA flood insurance studies and rate maps, State of California projections for sea level rise, and hydraulic modeling of the site. Assumptions and methods related to each task are documented in the following sections.

FEMA Flood Insurance Study

A flood insurance study for San Luis Obispo County and incorporated areas was published by FEMA in May 2017 (FEMA 2017). The study showed that the 100-year water surface elevation, considering tides, storm surge, and wind effects, is 15.2 feet NAVD88 at the transect closest to the subject property (Transect 72). The flood insurance study also reported that the 100-year peak discharge for Meadow Creek is 3,500 cubic feet per second.

State of California Sea-Level Rise Guidance

The State of California Sea-Level Rise Guidance provided probabilistic projections for the height of sea-level rise in feet (California Ocean Protection Council 2018). These probabilistic projections are recommended projections for use in low, medium-high, and extreme risk aversion decisions. An example of a low-risk aversion project would be a coastal trail. An extreme-risk aversion project would be an airport or wastewater treatment facility. Residential developments tend to be in the medium-high risk category. The State of California further refines projections based on assumptions of low or high future emissions. The study was released in 2018, and global carbon dioxide (CO_2) emissions have continued to rise since its publication. Therefore, the “high emissions” scenario was used for this analysis. CCB

directed SWCA to assume that the design life of the structure will extend until at least Year 2100 (CCB 2023). Referring to Table 1 for the Year 2100 high emissions medium-to-high risk aversion, the projected sea level rise is 6.7 feet.

Table 1. Sea Level Rise Projections for Port San Luis, California

		Probabilistic Projections (in feet) (based on Kopp et al. 2014)					H++ scenario (Sweet et al. 2017) *Single scenario
		MEDIAN	LIKELY RANGE		1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds...	66% probability sea-level rise is between...		5% probability sea-level rise meets or exceeds...	0.5% probability sea-level rise meets or exceeds...	
				Low Risk Aversion		Medium - High Risk Aversion	Extreme Risk Aversion
High emissions	2030	0.3	0.2 -	0.5	0.5	0.7	1.0
	2040	0.5	0.3 -	0.7	0.8	1.2	1.6
	2050	0.7	0.5 -	1.0	1.2	1.8	2.6
Low emissions	2060	0.8	0.4 -	1.1	1.4	2.2	
High emissions	2060	1.0	0.6 -	1.3	1.7	2.5	3.7
Low emissions	2070	0.9	0.5 -	1.3	1.7	2.9	
High emissions	2070	1.2	0.8 -	1.7	2.2	3.3	5.0
Low emissions	2080	1.0	0.6 -	1.6	2.1	3.6	
High emissions	2080	1.5	1.0 -	2.1	2.8	4.3	6.4
Low emissions	2090	1.1	0.6 -	1.8	2.5	4.5	
High emissions	2090	1.8	1.1 -	2.6	3.4	5.3	8.0
Low emissions	2100	1.3	0.7 -	2.1	2.9	5.4	
High emissions	2100	2.1	1.3 -	3.1	4.1	6.7	9.9
Low emissions	2110*	1.4	0.8 -	2.2	3.1	5.9	
High emissions	2110*	2.3	1.5 -	3.2	4.2	7.0	11.6
Low emissions	2120	1.5	0.8 -	2.4	3.5	7.0	
High emissions	2120	2.6	1.8 -	3.7	4.9	8.2	13.8
Low emissions	2130	1.6	0.9 -	2.7	4.0	8.0	
High emissions	2130	2.9	2.0 -	4.3	5.7	9.6	16.2
Low emissions	2140	1.7	0.9 -	3.0	4.5	9.2	
High emissions	2140	3.2	2.1 -	4.8	6.4	11.1	18.7
Low emissions	2150	1.9	0.8 -	3.3	5.1	10.5	
High emissions	2150	3.6	2.3 -	5.4	7.3	12.6	21.5

*Most of the available climate model experiments do not extend beyond 2100. The resulting reduction in model availability causes a small dip in projections between 2100 and 2110, as well as a shift in uncertainty estimates (see Kopp et al. 2014). Use of 2110 projections should be done with caution and with acknowledgement of increased uncertainty around these projections.

Hydraulic Modeling

Hydraulic modeling was performed to evaluate a range of existing and future coastal and riverine flooding scenarios, including coincident flooding of Meadow Creek with an extreme high tide event. A digital elevation model (DEM) with 1-meter resolution was retrieved from the U.S. Geological Survey (USGS). The DEM was re-projected to NAD83 California Zone 5, converted to units of U.S. feet, and imported to the U.S. Army Corps of Engineer's hydraulic modeling software program (HEC-RAS Version 6.3.1). A rectilinear mesh was created for the study area using 100-foot grid cells. The mesh was refined by adding additional computation points within the known areas of concentrated flow. The terrain was modified to raise the subject parcel to a height of 22 feet NAVD88 in the proposed conditions scenario.

Maps illustrating distribution of water depths for various scenarios are presented in the following figures. Figure 2 illustrates that the subject property is not inundated by a 100-year flood event under existing conditions. Figure 3 illustrates that the subject property would be inundated by a 100-year flood event under future conditions, without mitigating flood risk by raising the property. Figure 4 illustrates that the property would not be inundated by a 100-year flood event in Year 2100 if raised to 22 feet NAVD88.

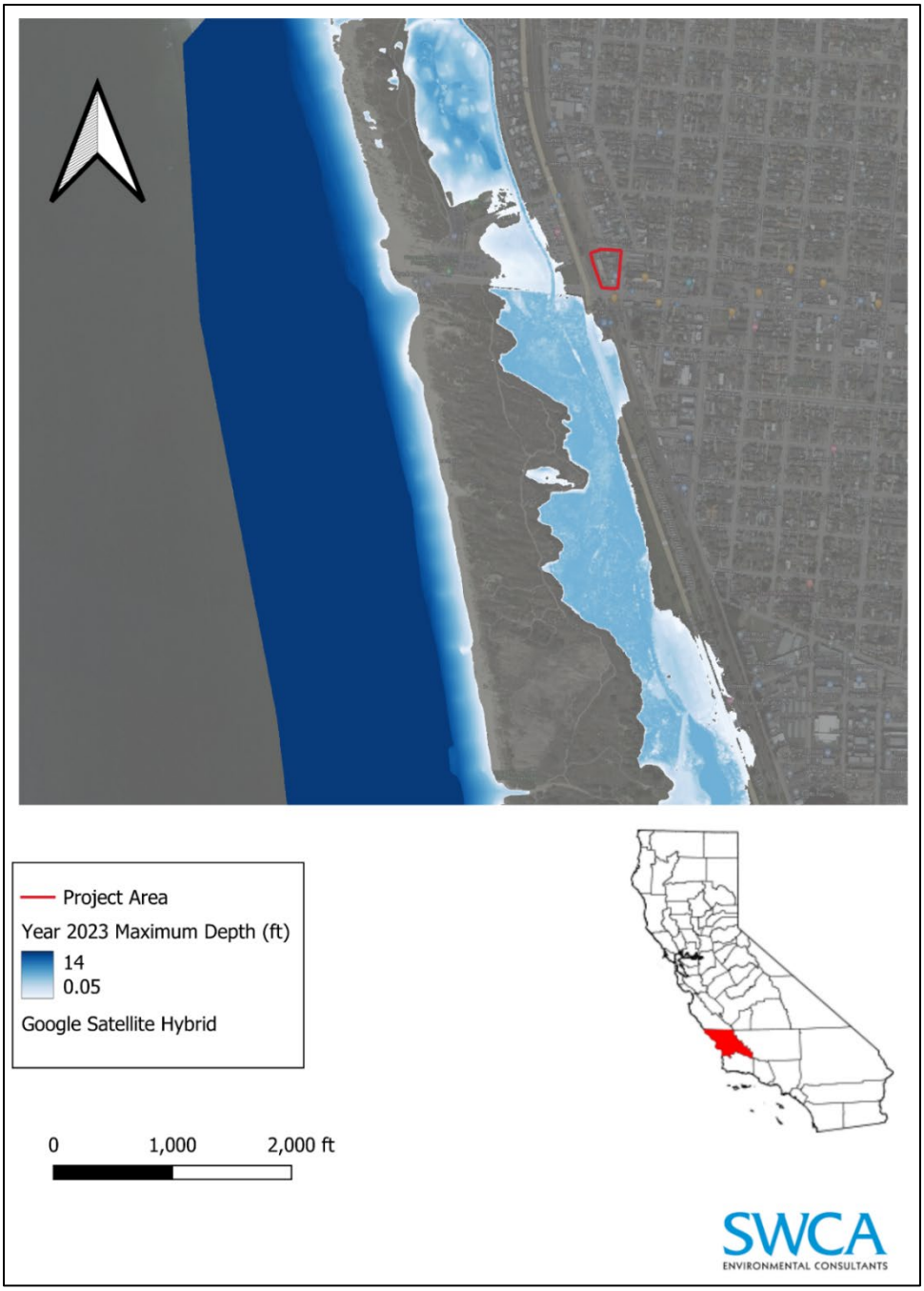


Figure 2. Existing conditions, 100-year flood depth, showing subject parcel to not be inundated.

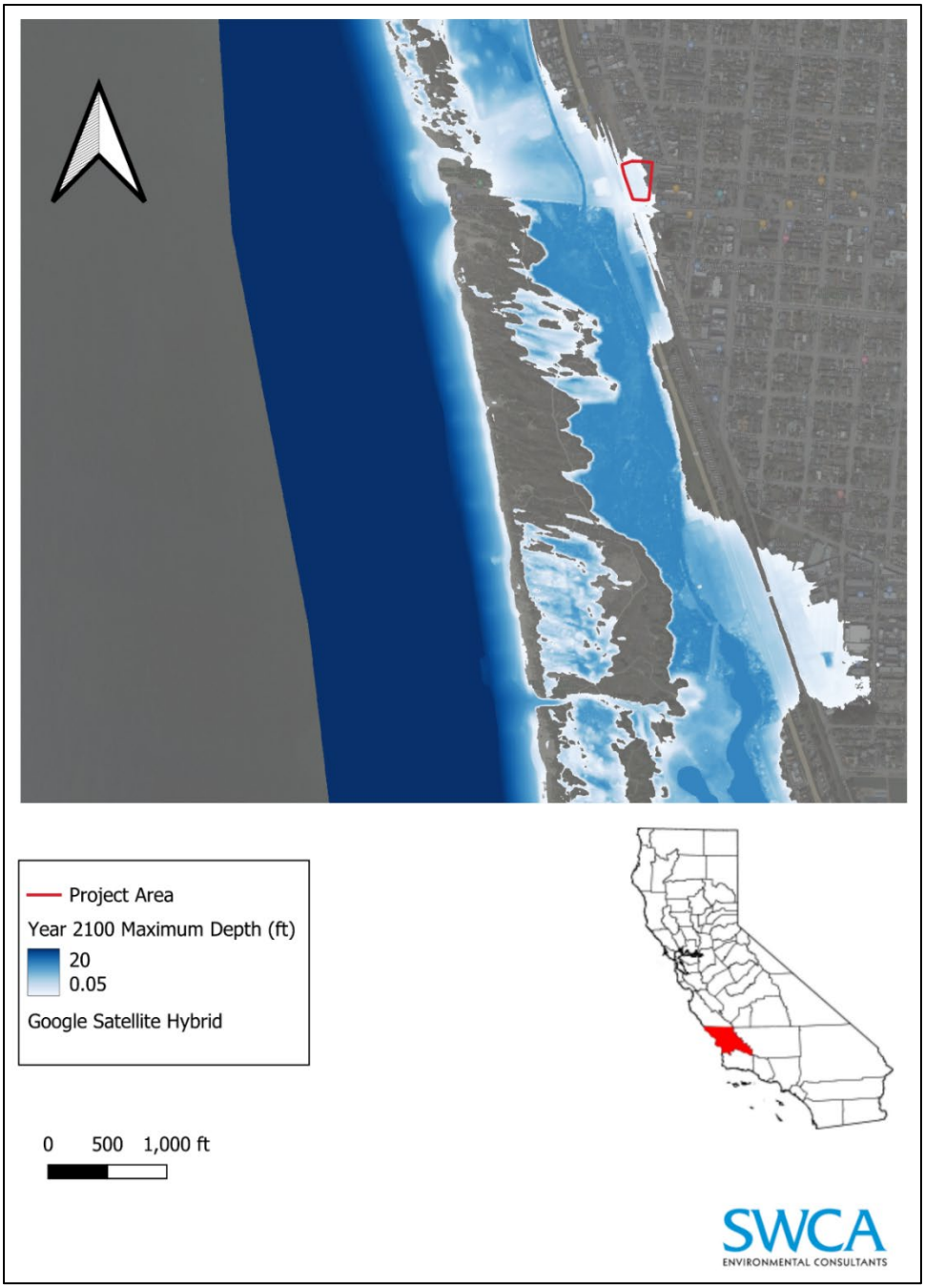


Figure 3. Existing conditions, Year 2100 sea level rise, 100-year flood event, showing subject property to be inundated.

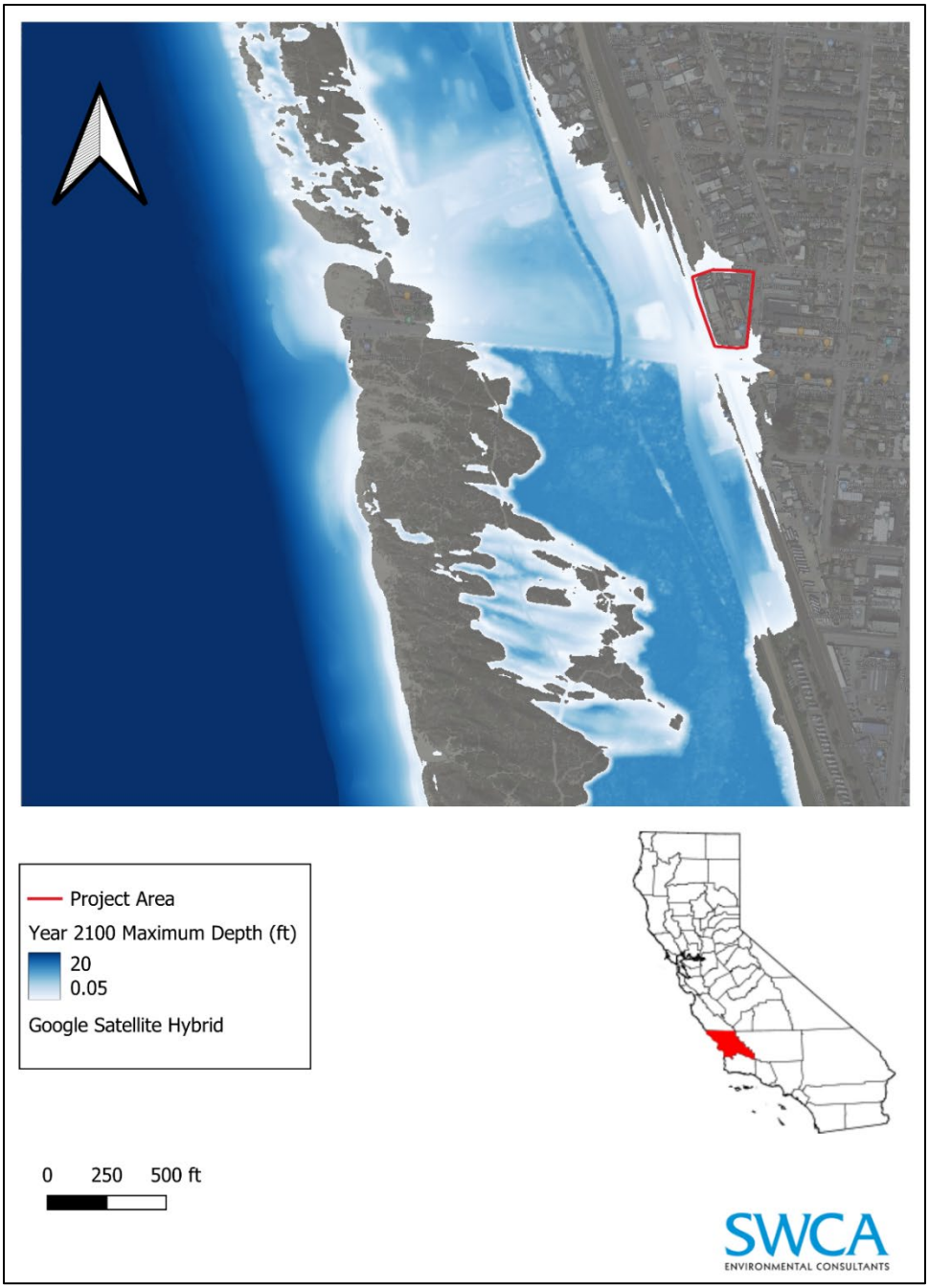


Figure 4. Proposed conditions, Year 2100 sea level rise, 100-year flood event, showing subject property to not be inundated when raised to 22 feet NAVD88.

CONCLUSION

This engineering evaluation of coastal and riverine flood risk for the property at 197 West Grand Avenue has identified 22 feet NAVD88 as a suitable elevation to mitigate flood risk due to future sea level rise.

REFERENCES

California Ocean Protection Council. 2018. *State of California Sea-Level Rise Guidance: 2018 Update*. Available at: http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf. Accessed July 2023.

Coastal Community Builders. 2023. Personal communication. Email from Cam Boyd to Ben Snyder, P.E. June 8.

Federal Emergency Management Agency (FEMA). 2017. *Flood Insurance Study: San Luis Obispo County, CA*. FIS No. 06079CV001C. Available at: https://msc.fema.gov/portal/home. Accessed July 2023.

APPENDIX A

Additional Site Information

ABBREVIATIONS

AC	ASPHALT	HW	HEADWALL
AP	ANGLE POINT	ICV	IRRIGATION VALVE
BC	BEGIN CURVE	INV	INVERT ELEVATION
BLD	BUILDING	JP	JOINT POLE
BOL	BOLLARD	MKR	MARKER
BSW	BACK OF SIDE WALK	MON	MONUMENT
CB	CATCH BASIN	OHW	OVERHEAD WIRES
CF	CURB FACE	PB	PULL BOX
CL	CHAIN LINK FENCE	PP	POWER POLE
CMP	CORRUGATED METAL PIPE	PST	POST
CO	CLEAN OUT(SEWER)	PVC	PLASTIC PIPE
CONC	CONCRETE	RCP	REINFORCED CONCRETE PIPE
DI	DROP INLET	RR	RAILROAD
DIA	DIAMETER	RW	RETAINING WALL
DWY	DRIVEWAY	R/W	RIGHT OF WAY
EC	END OF CURVE	SD	STORM DRAIN
ELEC	ELECTRIC	SL	STREET LIGHT
EP	EDGE OF PAVEMENT	SS	SANITARY SEWER
ESMT	EASEMENT	SW	SIDEWALK
EUC	EUCALYPTUS	SDMH	STORM DRAIN MANHOLE
EXIST	EXISTING	SSMH	SANITARY SEWER MANHOLE
FNC	FENCE	TC	TOP OF CURB
FF	FINISH FLOOR	TELE	TELEPHONE
FG	FINISH GRADE	THRESH	THRESHOLD
FH	FIRE HYDRANT	TW	TOP OF WALL
FL	FLOW LINE	TYP	TYPICAL
FS	FINISH SURFACE	WM	WATER METER
GB	GRADE BREAK	WS	WHITE STRIPE
GM	GAS METER	WV	WATER VALVE
GRD	GROUND		

NOTE: ABBREVIATIONS SHOWN ABOVE MAY OR MAY NOT BE EVIDENT ON MAP.

MAP SYMBOLS

- WV — WATER VALVE
- FIRE HYDRANT
- GV — GAS VALVE OR METER
- SEWER MANHOLE OR CLEANOUT
- STORM DRAIN MANHOLE
- TRAFFIC FLOW
- DRAINAGE FLOW
- HANDICAP SPACE
- AREA LIGHT
- SIGN POST
- UTILITY POLE
- WELL
- MONUMENT
- STREET LIGHT
- WATER METER
- CATCH BASIN OR OTHER STRUCTURE AS NOTED

NOTE: ALL SYMBOLS SHOWN ABOVE MAY OR MAY NOT BE EVIDENT ON MAP.

TABLE A ITEM NOTES

ITEM 2 – ADDRESSE OF SURVEYED PROPERTY; 197 W. GRAND AVE, GROVER BEACH, CA.

ITEM 3 – FLOOD ZONE'S AFFECTING THE PROPERTY: "AREA OF MINIMAL FLOOD HAZARD, ZONE X" AS SHOWN PER MAP NO. 06079C1582H IN COMMUNITY NUMBER 060306 CITY OF GROVER BEACH.

ITEM 4 – THE LAND AREA OF THE PROPERTY SURVEYED IS 7.65 ACRES.

ITEM 8 – ALL SUBSTANTIAL AND READILY VISIBLE FEATURES ARE SHOWN HEREON.

ITEM 9 – PARKING SPACE COUNT – NO STRIPING VISIBLE.

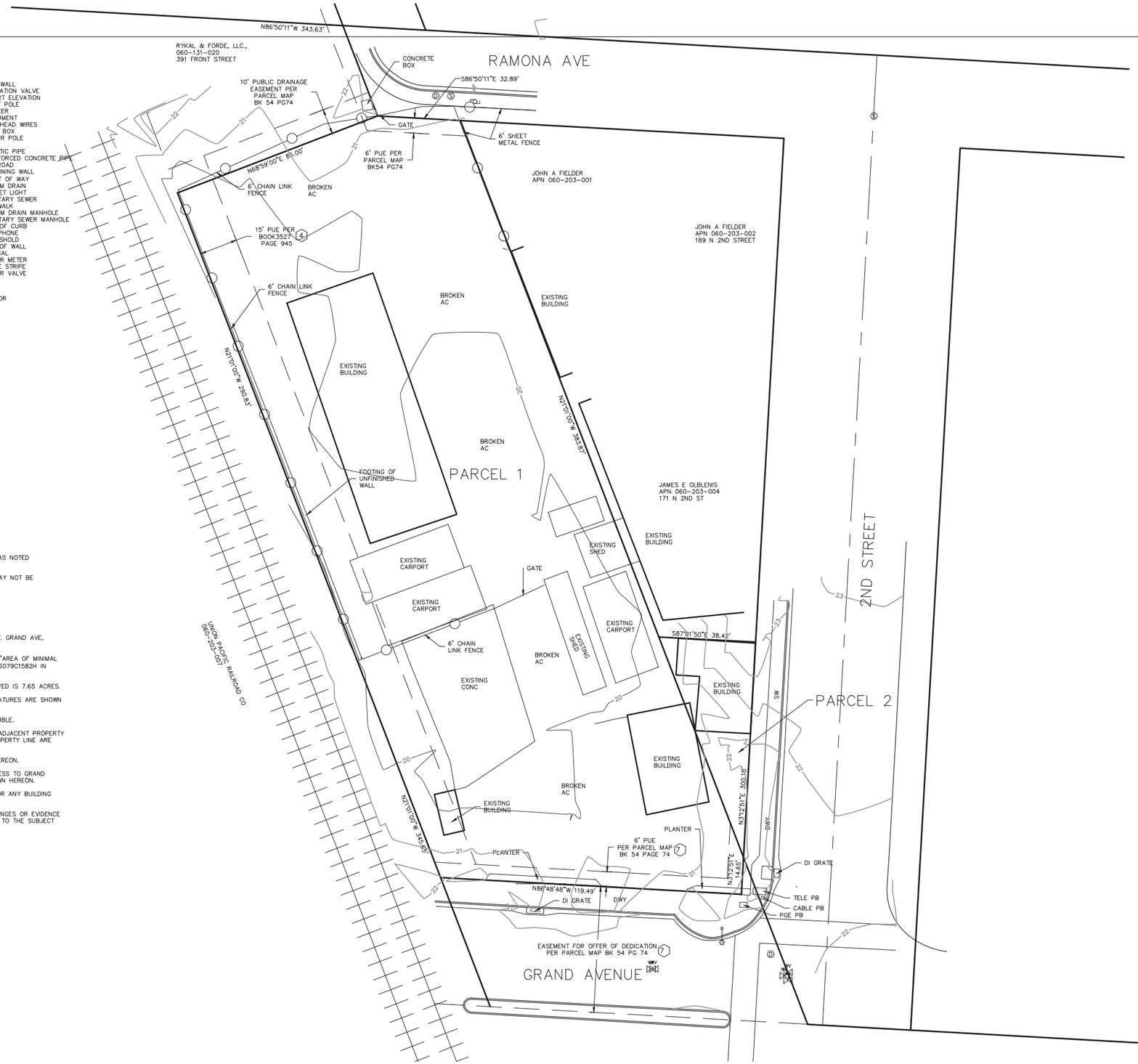
ITEM 10 – DISTANCES FROM FACE OF BUILDINGS TO ADJACENT PROPERTY LINES AND THE SITE WALL ALONG THE EASTERLY PROPERTY LINE ARE SHOWN HEREON.

ITEM 13 – ADJOINING OWNERS NAMES ARE SHOWN HEREON.

ITEM 14 – THE SUBJECT PROPERTY HAS DIRECT ACCESS TO GRAND AVENUE, N. 2ND STREET, AND RAMONA AVE AS SHOWN HEREON.

ITEM 16 – NO EVIDENCE OBSERVED OF EARTHWORK OR ANY BUILDING CONSTRUCTION AT THE TIME OF THE SURVEY.

ITEM 17 – NO PROPOSED STREET RIGHT OF WAY CHANGES OR EVIDENCE OF RECENT STREET OR SIDEWALK REPAIRS ADJACENT TO THE SUBJECT PROPERTY.



20' 0' 10' 20' 40'

1 inch = 20 ft.

TITLE REPORT EXCEPTIONS AND EXCLUSIONS

COMMITMENT FOR TITLE INSURANCE FROM FIDELITY NATIONAL TITLE COMPANY DATED MARCH 22, 2023, COMMITMENT NO. FSLC-01523003520WL.

(4) EASEMENT FOR PUBLIC UTILITIES, RECORDED JUNE 15, 1990, IN BOOK 3527, PAGE 945 OF OFFICIAL RECORDS. SHOWN HEREON.

(6) A NOTICE THAT SAID LAND IS INCLUDED WITHIN A PROJECT AREA OF THE REDEVELOPMENT AGENCY SHOWN BELOW, AND THAT PROCEEDINGS FOR THE REDEVELOPMENT OF SAID PROJECT HAVE BEEN INSTITUTED UNDER THE REDEVELOPMENT LAW (SUCH REDEVELOPMENT TO PROCEED ONLY AFTER THE ADOPTION OF THE REDEVELOPMENT PLANS) AS DISCLOSED BY A DOCUMENT. RECORDED DECEMBER 17, 1993, AS INST. NO. 1993-078882, OFFICIAL RECORDS. NOTHING SHOWN.

(7) ANY AND ALL OFFERS OF DEDICATION, CONDITIONS, RESTRICTIONS, EASEMENTS, FENCELINE/BOUNDARY DISCREPANCIES, NOTES AND/OR PROVISIONS SHOWN OR DISCLOSED BY THE MAP RECORDED IN BOOK 54, PAGE 74 OF MAPS. SHOWN HEREON.

(8) MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED SUPPLEMENTAL FINAL ORDER AND JUDGMENT, RECORDED NOVEMBER 4, 2010 AS INST. NO. 2010056018 OF OFFICIAL RECORDS. SHOWN HEREON.

(9) MATTERS CONTAINED IN THAT CERTAIN DOCUMENT ENTITLED EASEMENT DEED BY COURT ORDER IN SETTLEMENT OF LANDOWNER ACTION, RECODED SEPTEMBER 4, 2013, AS INST. NO. 2013051267 OF OFFICIAL RECORDS. REFERENCE IS MADE TO SAID DOCUMENT RECORDED MARCH 12, 2014 AS INST. NO. 2014-009569 OF OFFICIAL RECORDS. SHOWN HEREON.

(15) ANY RIGHTS OF THE PARTIE IN POSSESSION OF A PORTION OF, OR ALL OF, SAID LAND, WHICH RIGHTS ARE NOT DISCLOSED BY PUBLIC RECORD. NOTHING SHOWN.

(16) ANY EASEMENTS NOT DISCLOSED BY THE PUBLIC RECORDS AS TO MATTERS AFFECTING TITLE TO REAL PROPERTY, WHETHER OR NOT SAID EASEMENTS ARE VISIBLE AND APPARENT. SHOWN HEREON.

(18) DISCREPANCIES, CONFLICTS IN BOUNDARY LINES, SHORTAGE IN AREA, ENCROACHMENTS, OR ANY OTHER MATTERS WHICH A CORRECT SURVEY WOULD DISCLOSE AND WHICH ARE NOT SHOWN BY PUBLIC RECORDS. NOTHING SHOWN.

(19) MATTERS WHICH MAY BE DISCLOSED BY AN INSPECTION AND/OR BY A CORRECT ALTA/NSPS LAND TITLE SURVEY OF SAID LAND THAT IS SATISFACTORY TO THE COMPANY, AND/OR BY INQUIRY OF THE PARTIES IN POSSESSION THEREOF. NOTHING SHOWN.

LEGAL DESCRIPTION:

File No.: FSLC-01523003520WL

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF GROVER BEACH, COUNTY OF SAN LUIS OBISPO, STATE OF CALIFORNIA AND IS DESCRIBED AS FOLLOWS:

PARCEL 1:
PARCEL 2 OF PARCEL MAP GB 00-028, IN THE CITY OF GROVER BEACH, COUNTY OF SAN LUIS OBISPO, STATE OF CALIFORNIA, ACCORDING TO MAP RECORDED MAY 18, 2000, IN BOOK 54, PAGE 74 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY AND BY CERTIFICATE OF CORRECTION RECORDED JULY 14, 2000, INSTRUMENT NO. 2000-039308, OFFICIAL RECORDS.

EXCEPTING THEREFROM ALL MINERALS, MINERAL RIGHTS, OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LAND AS RESERVED BY SOUTHERN PACIFIC TRANSPORTATION COMPANY IN DEED RECORDED JUNE 15, 1990, IN BOOK 3527, PAGE 945, OFFICIAL RECORDS.

APN: 060-203-006

PARCEL 2:
LOT 6 IN BLOCK 66 OF BECKETT'S RESUBDIVISION OF PART OF THE TOWN OF GROVER, IN THE CITY OF GROVER BEACH, COUNTY OF SAN LUIS OBISPO, STATE OF CALIFORNIA, ACCORDING TO MAP RECORDED NOVEMBER 9, 1925, IN BOOK 3, PAGE 70 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

EXCEPTING THEREFROM THAT PORTION THEREOF DESCRIBED IN THE DEED TO THE SOUTHERN PACIFIC COMPANY, A CORPORATION, RECORDED OCTOBER 10, 1894, IN BOOK 23, PAGE 314 OF DEEDS.
APN: 060-203-003

SURVEYORS NOTES

THIS ALTA/NSPS SURVEY IS BASED ON THE COMMITMENT FOR TITLE INSURANCE FROM FIDELITY NATIONAL TITLE COMPANY DATED MARCH 22, 2023, COMMITMENT NO. FSLC-01523003520WL.

BEARINGS AND DISTANCES SHOWN HEREON ARE PER PARCEL MAP BOOK 54 PAGE 74, AND RECORD OF SURVEY BOOK 9, PAGE 45, OFFICIAL RECORDS, SAN LUIS OBISPO COUNTY.

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE EASTERLY PROPERTY LINE OF PARCEL 1 OF THE TITLE REPORT, BETWEEN TWO FOUND REBAR AND CAPS LS5661, PER PM BOOK 54 PAGE 74.

BENCHMARK

THE BENCHMARK FOR THIS SURVEY IS THE TOP OF A MAG NAIL SET IN THE ASPHALT IN RAMONA AVENUE BEING CONTROL POINT #27 AND HAVING AN ELEVATION OF 26.00 FEET. PER OPUS SOLUTION(NAVD88).

ALTA/NSPS LAND TITLE SURVEY

TO FIDELITY NATIONAL TITLE COMPANY; KELLY A. FOSTER REVOCABLE TRUST; COASTAL COMMUNITY BUILDERS; THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2,3,4,5,8,9,13,16,17,OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON APRIL 26, 2023.

DATE OF PLAT OR MAP MAY 8, 2023.

DRAFT

MARSHALL D. FARGEN LS 8962 DATE

LICENSED LAND SURVEYOR
MARSHALL DUNCAN FARGEN
L.S. 8962
STATE OF CALIFORNIA

Fargen Surveying Inc. Santa Maria

2624 AIRPARK DRIVE
SANTA MARIA, CA 93455
PHONE: 805-934-5727
FAX: 805-934-3448
DATE: MAY 2023

197 W GRAND AVE ALTA.DWG

JOB: 23032 | SHEET 1 OF 1

402 W. Grand
PROJECT STATS:

Area and Density:
- Total site area 1.03 Acres
  - Density taken to Center of street
  - Density site area = 1.16 acres
  - Allowable units = 23 DU's

Height and setbacks:
- 50' allowed height
- Setbacks
  - 0' all sides

Parking Required:
- 1 space / 1bedroom
- 1.5 spaces / 2+ bedroom
- 1/4 spaces guest
- 1:450 spaces Commercial
- 1:1500 outdoor Dining

1 space credit for each 22 linear feet of street frontage

rrm design group

197 W. GRAND AVE - GROVE BEACH
FEASIBILITY STUDY

1"=60'-0"

2636-01-XXXX
31 MARCH 2023

OPTION 1
PROJECT STATS:

Mixed Use Building
- 4,500 square feet footprint
  - 3,500 square feet Commercial
  - 23 Garage parking spaces
- 2 or 3 stories of residential above

23 3-bedroom units
- (23 1,800 3bd Towns)
- (1 corner 1,800 3bed town)
  - 23 total units (23 DU'S)

Parking Required:
- 1.5 space / unit = 34.5 spaces
- 1/4 spaces guest = 5.75 spaces
- 1:450 spaces Commercial = 7.7 spaces
- 1:1500 Patio = 1 space

Total Required: 49 spaces

Parking Provided:
- 18 Tandem Garage Spaces (36 spaces)
- 5 Garage spaces (for units above Retail)
- 5 Street spaces
- 20 Surface spaces

Total Provided: 76 spaces

OPTION 1

1"=50'-0"

2636-01-XXXX
31 MARCH 2023

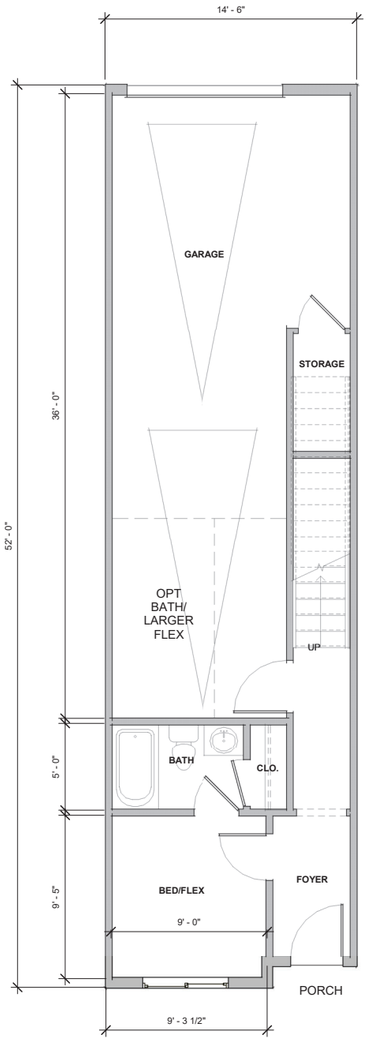
rrm design group

197 W. GRAND AVE - GROVE BEACH
FEASIBILITY STUDY

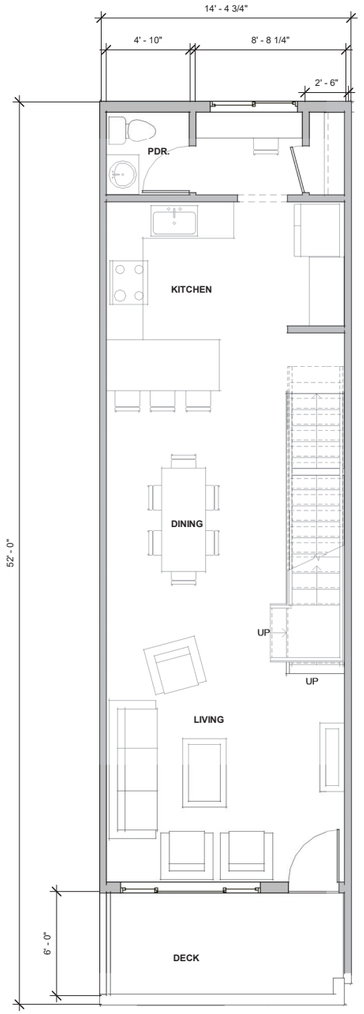
rrm design group

197 W. GRAND AVE - GROVE BEACH
FEASIBILITY STUDY

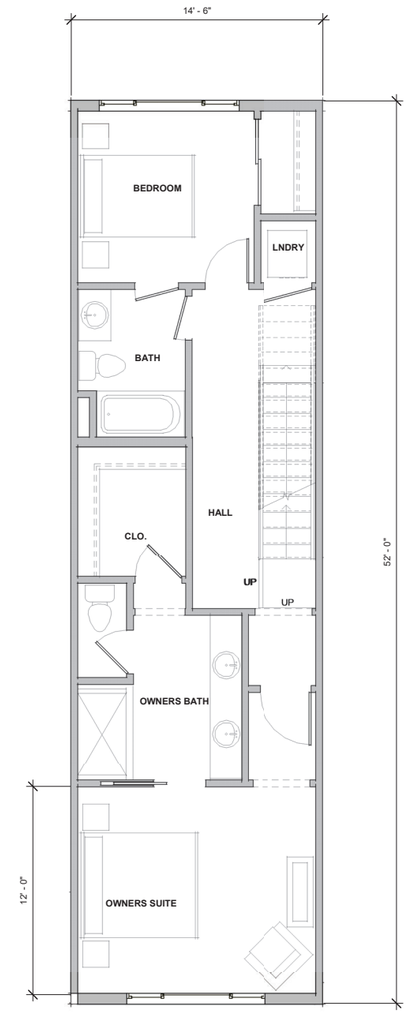
2636-01-XXXX
31 MARCH 2023



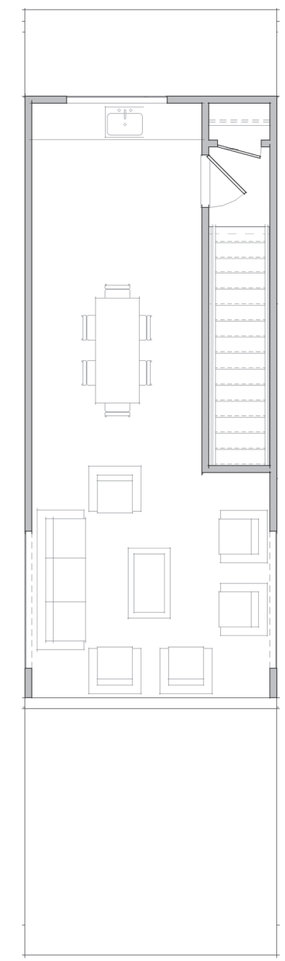
1 GROUND FLOOR PLAN
SCALE: 1/4" = 1'-0"



2 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"



3 03-THIRD FLOOR
SCALE: 1/4" = 1'-0"



4 04 - ROOF DECK
SCALE: 1/4" = 1'-0"

0' 4' 8' 16'

rrm design group

GROVER BEACH TOWNS

197 GRAND AVE, GROVER BEACH, CA

SCHEMATIC FLOOR PLAN

A2