



Beach Nourishment

Sanctuary Advisory Council Presentation 4/19/19

John Haynes
City of Monterey Harbormaster
haynes@monterey.org

Sediment to Sanctuary Beaches: Potential for Beneficial Reuse and Beach Nourishment

Max Delaney and Douglas George (PhD)

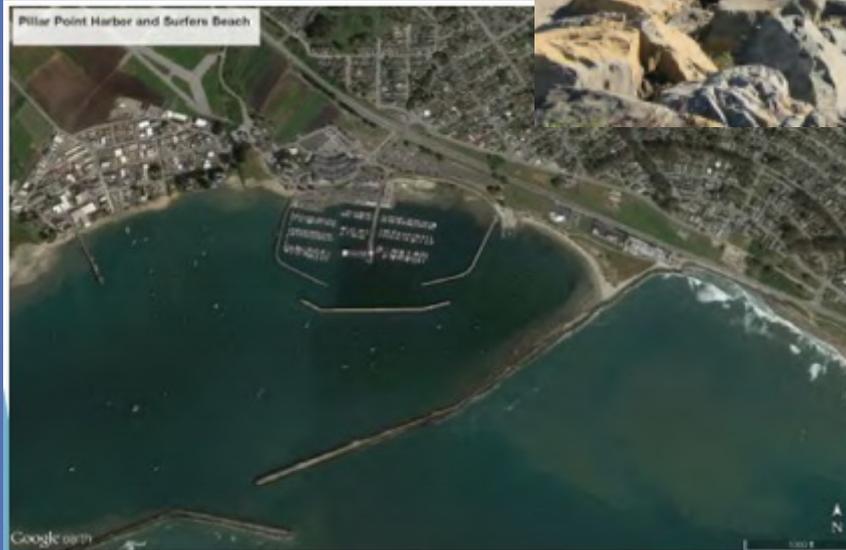
Greater Farallones National Marine Sanctuary

Brad Damitz

San Mateo County Harbor District

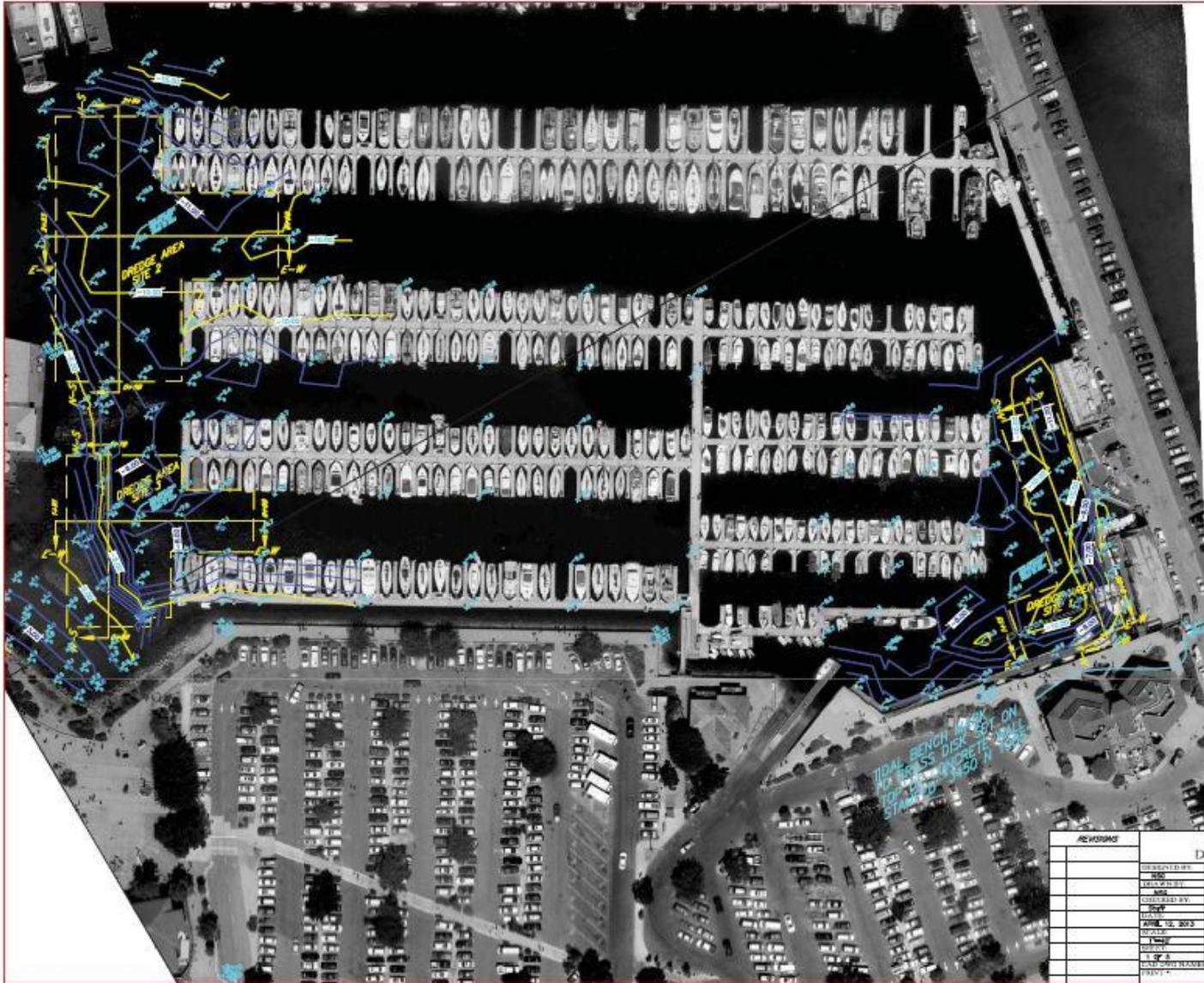
MBNMS and GFNMS Joint Advisory Council Meeting

August 16, 2017





Monterey Harbor



SURVEY CONTROL COORDINATES:

- PT NUMBER EASTING NORTHERN BEY DATE
- 1 214480.6189 572096.0035 13.8682 2/94
- 2 214480.7298 572153.8489 13.8688 2/94
- 3 214479.7383 572088.8851 13.8688 2/94
- 4 214484.8421 572073.8386 13.8708 1/02
- 5 214433.2249 572087.6274 14.8101 5/04
- 6 214434.8286 572084.8851 13.8436 5/04
- 7 214431.2888 572076.1291 13.8538 1/4/04
- 8 214380.8900 572086.8900 13.8600 5/04
- 9 214380.8900 572087.6274 13.8600 5/04
- 10 214380.8900 572088.3649 13.8600 5/04
- 11 214380.8900 572089.1024 13.8600 5/04
- 12 214380.8900 572089.8399 13.8600 5/04
- 13 214380.8900 572090.5774 13.8600 5/04
- 14 214380.8900 572091.3149 13.8600 5/04
- 15 214380.8900 572092.0524 13.8600 5/04
- 16 214380.8900 572092.7899 13.8600 5/04
- 17 214380.8900 572093.5274 13.8600 5/04
- 18 214380.8900 572094.2649 13.8600 5/04
- 19 214380.8900 572095.0024 13.8600 5/04
- 20 214380.8900 572095.7399 13.8600 5/04
- 21 214380.8900 572096.4774 13.8600 5/04

SURVEY NOTES:

1. COORDINATE SHOWS MARINA AND SHIP COORDINATE POINTS ON CALIFORNIA COORDINATE SYSTEM OF 1983 (NAD 83) & COORDINATES ARE BASED ON COORDINATE VALUES SHOWN FOR POINTS SURVEYED BY PERRY SURVEY ON THE SURVEY FILE IN HOLDING 10 OF BOOK AND TRIM AT FILE 16 IN THE OFFICE OF THE COUNTY RECORDER OF MONTEREY COUNTY AND ANY CORRECTIONS TO THESE COORDINATES WILL BE SHOWN ON RECORD OF CORRECT FILE IN HOLDING 10 OF BOOK AT PAGE 16.
2. BENCHMARK ELEVATION SHOWS HEIGHT ARE BASED ON MEAN LOW LOW WATER BASED ON NATIONAL TIDE GAUGE STATION 8241 NORTH BAY, MONTEREY BAY AND IS TRIM, FOR COUNTY RECORDATION PURPOSES.
3. BENCHMARK ELEVATION SHOWS HEIGHT ARE BASED ON U.S. SURVEY FOOT IN OTHER VERTICAL DATUMS OTHER THAN DATUM SHOWN BY COORDINATE VALUES OF BENCHMARKS.
4. BENCHMARK ELEVATION SHOWS HEIGHT ARE BASED ON DATUM POINTS COORDINATE SYSTEM OF 1983 (NAD 83) (NAD 83) & COORDINATE SYSTEM OF 1983 (NAD 83) (NAD 83).
5. THIS SURVEY WAS PREPARED BY ME IN ACCORDANCE WITH THE REQUIREMENTS OF ANY CORRECTIONS TO THESE COORDINATES.

JOHN W. SMITH, L.S. NO. 5088

NOTES:

1. SEE SHEET 1 THROUGH 4 FOR BENCH POINTS.
2. COORDINATE SHOWS MARINA AND SHIP COORDINATE VALUES SHOWN FOR POINTS SURVEYED BY PERRY SURVEY ON THE SURVEY FILE IN HOLDING 10 OF BOOK AND TRIM AT FILE 16 IN THE OFFICE OF THE COUNTY RECORDER OF MONTEREY COUNTY AND ANY CORRECTIONS TO THESE COORDINATES WILL BE SHOWN ON RECORD OF CORRECT FILE IN HOLDING 10 OF BOOK AT PAGE 16.
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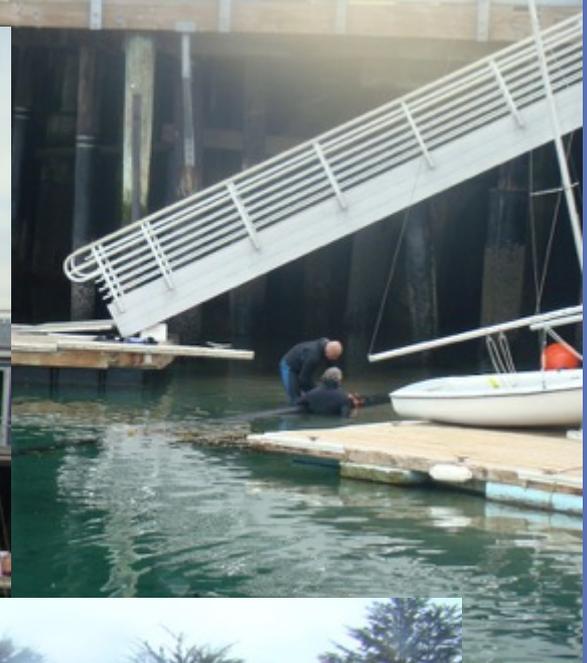
JOHN W. SMITH, L.S. NO. 5088
 MONTEREY, CALIFORNIA
 CITY OF MONTEREY

CITY OF MONTEREY DEPARTMENT OF PUBLIC WORKS	
APPROVED BY:	MONTEREY MARINA POST-DREDGE SURVEY
DESIGNED BY:	SITE PLAN
CHECKED BY:	MONTEREY MARINA 63C1103
DATE:	
PROJECT NO.:	
DATE:	
CITY ENGINEER:	DATE:
PROJECT NAME:	PROJECT NAME: MONTEREY MARINA POST-DREDGE SURVEY
DATE:	DATE:
DRAWING NO.:	DRAWING NO.:









Monterey Marina Dredged Material Disposal Sites Location Map,
Corps File No. 2009-00221S

Legend

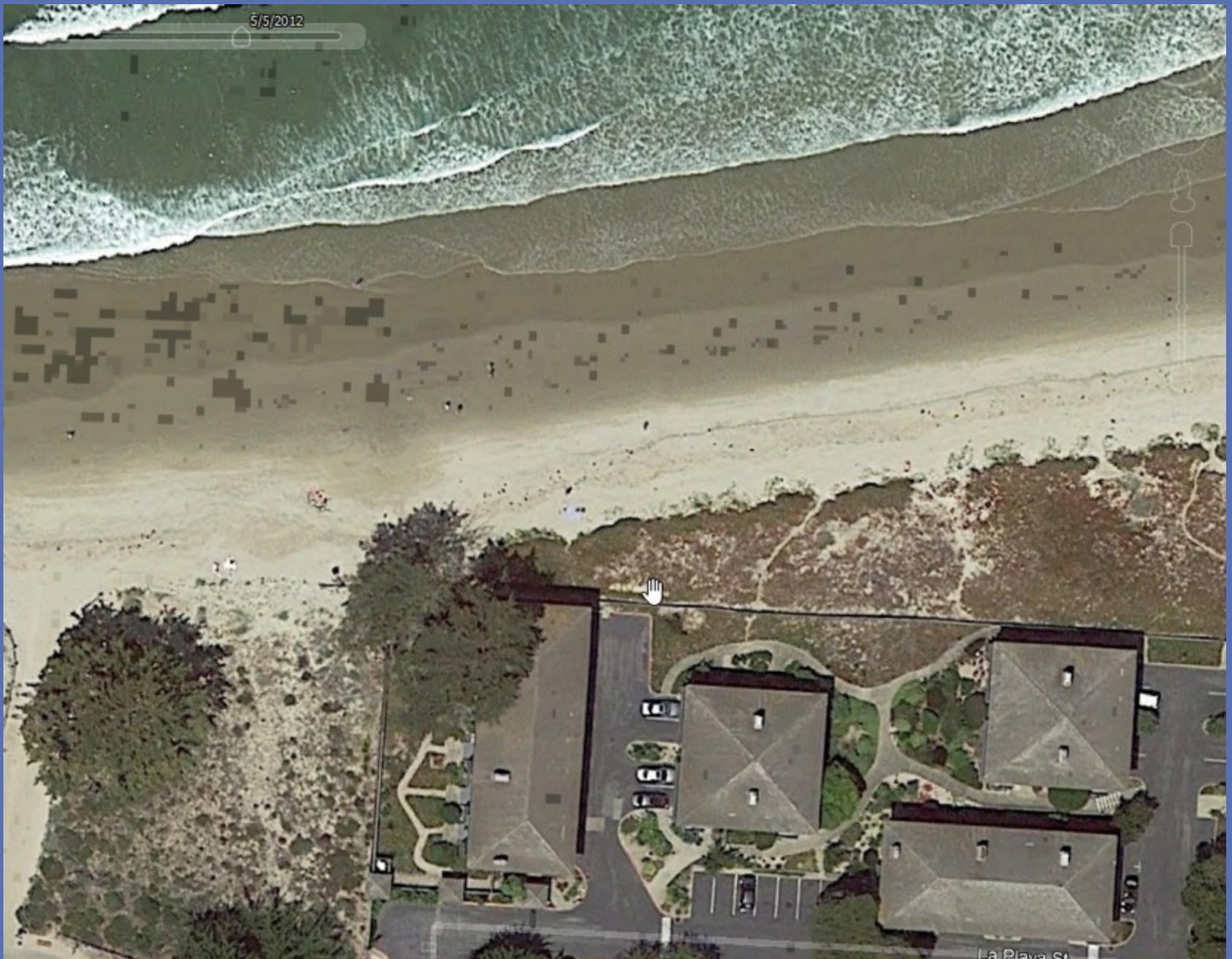
-  Disposal Site A
-  Disposal Site B
-  Monterey Marina







5/5/2012



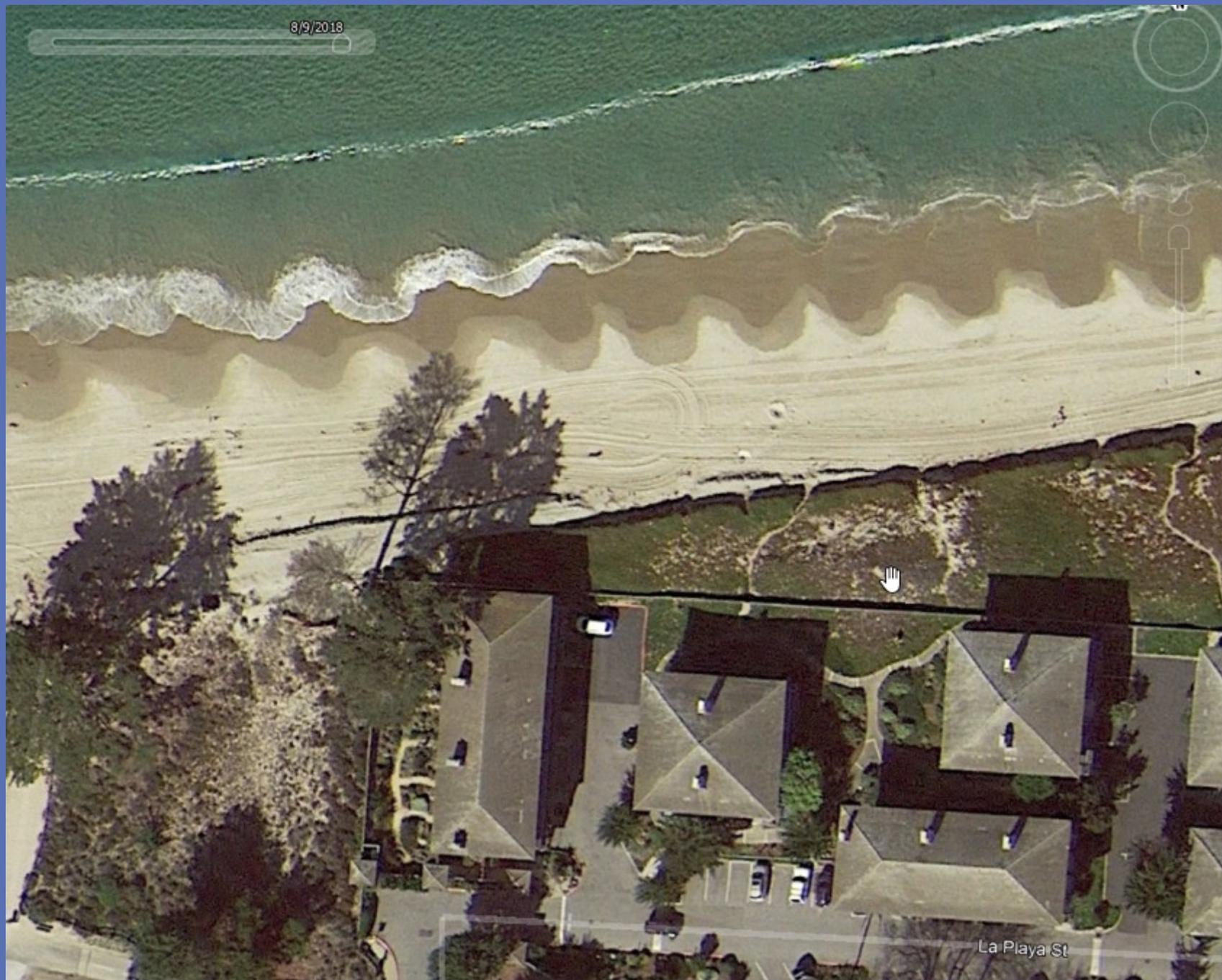
La Playa St

10/19/2016



La Playa St

8/9/2018



La Playa St



**MONTEREY HARBOR MAINTENANCE DREDGING PROJECT
SAMPLING AND ANALYSIS RESULTS
MONTEREY COUNTY, CALIFORNIA
(EPISODE 4)**

Prepared For:
CITY OF MONTEREY
Office of the Harbormaster 256 Figueroa Street Monterey, California 93940

Prepared by:
RED HILLS ENVIRONMENTAL, LLC
3820 Gloria Court, Los Gatos, CA 95033
Phone (408) 435-9300, Fax (408) 353-9299
redhills@redhills.com
Contact: Steve Krack PG4876

FEBRUARY 2006

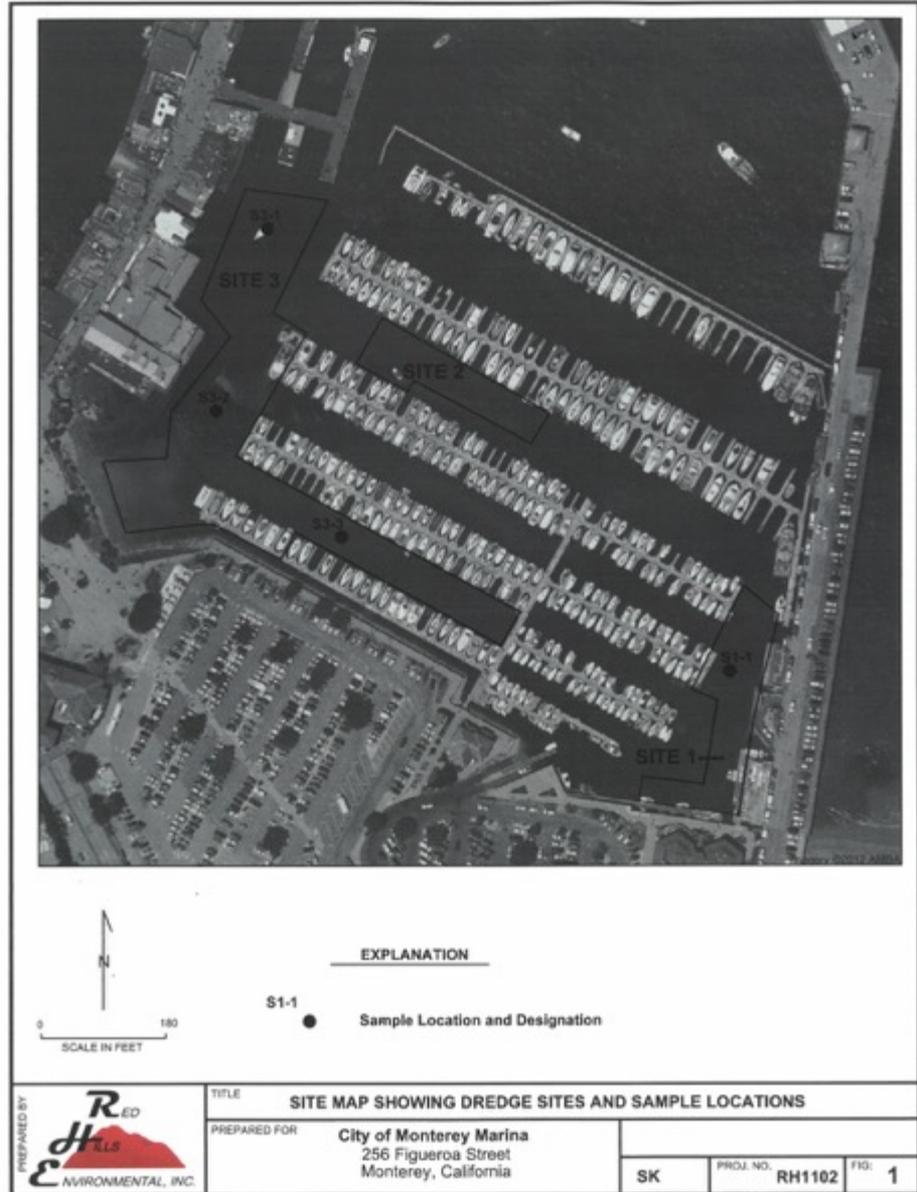


TABLE 3
2016
CHEMICAL ANALYTICAL DATA
COMPOSITE SEDIMENT SAMPLES
MONTEREY HARBOR
MONTEREY, CALIFORNIA

PARAMETER	ANALYTICAL METHOD	SITE1-COMP 01/28/16	SITE3-COMP 01/28/16	ERL	ERM
METALS					
Arsenic	EPA 7061	PPM	PPM	PPM	PPM
Cadmium	EPA 6020	2.71	2.14	1.2	70
Chromium	EPA 6020	0.374	0.260	1.2	9.6
Copper	EPA 6020	9.74	8.32	81	370
Lead	EPA 6020	33.5	31.2	34	270
Mercury	EPA 7471A	65.8	14.4	46.7	219
Nickel	EPA 6020	0.108	0.094	0.15	0.71
Selenium	EPA 7741	7.36	5.42	20.9	51.6
Silver	EPA 6020	<0.99	<0.127	—	—
Zinc	EPA 6020	<0.127	43.8	150	410
BTYLSINS					
Dibutyltin	Krone et al.	PPB	PPB	PPB	PPB
Monobutyltin	Krone et al.	6.4	11.8	—	—
Tributyltin	Krone et al.	<3.8	<3.8	—	—
Tributyltin	Krone et al.	<3.8	<3.8	—	—
Tributyltin	Krone et al.	<3.8	5.1	—	—
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)					
Acenaphthene	EPA 8270C	PPB	PPB	PPB	PPB
Acenaphthylene	EPA 8270C	<13	<13	16	500
Anthracene	EPA 8270C	20	13	44	640
Benzo[a]anthracene	EPA 8270C	40	13	85.3	1100
Benzo[a]pyrene	EPA 8270C	66	32	261	1800
Benzo[b]fluoranthene	EPA 8270C	91	41	430	1600
Benzo[k]fluoranthene	EPA 8270C	18	37	—	—
Benzo[e]pyrene	EPA 8270C	62	29	—	—
Benzo[ghi]perylene	EPA 8270C	—	71	—	—
Biphenyl	EPA 8270C	<13	<13	—	—
Chrysene	EPA 8270C	83	37	384	2800
Dibenz[a,h]anthracene	EPA 8270C	<13	<13	63.4	290
2,8-Dimethylnaphthalene	EPA 8270C	<13	<13	—	—
Fluoranthene	EPA 8270C	130	64	70	670
Fluorene	EPA 8270C	<13	<13	19	540
Indene[1,2,3-cd]pyrene	EPA 8270C	46	22	—	—
1-Methylanthracene	EPA 8270C	<13	<13	240	1800
1-Methylnaphthalene	EPA 8270C	<13	<13	160	2100
1-Methylphenanthrene	EPA 8270C	<13	<13	—	—
Naphthalene	EPA 8270C	<13	<13	160	2100
Phenanthrene	EPA 8270C	21	13	240	1800
Pyrene	EPA 8270C	53	37	665	2600
1,6,7-Trimethylnaphthalene	EPA 8270C	140	85	—	—
TOTAL PAHs		891	431	4,000	45,000
PESTICIDES					
Aldrin	EPA 8081A	PPB	PPB	PPB	PPB
alpha-BHC	EPA 8081A	<1.3	<1.3	—	—
beta-BHC	EPA 8081A	<2.5	<2.5	—	—
delta-BHC	EPA 8081A	<1.3	<1.3	—	—
gamma-BHC	EPA 8081A	<2.5	<2.5	—	—
Chlordane (Technical)	EPA 8081A	<1.3	<1.3	—	—
Dieldrin	EPA 8081A	<1.3	<1.3	—	—
Trans-nonachlor	EPA 8081A	<1.3	<1.3	—	—
2,4'-DDD	EPA 8081A	<1.3	<1.3	2	20
2,4'-DDE	EPA 8081A	<2.5	<2.5	2.2	27
2,4'-DDT	EPA 8081A	<1.3	<1.3	1	7
4,4'-DDD	EPA 8081A	<1.3	<1.3	1.58	46.1
4,4'-DDE	EPA 8081A	<1.3	<1.3	—	—
4,4'-DDT	EPA 8081A	<1.3	<1.3	—	—
Endosulfan I	EPA 8081A	<1.3	<1.3	—	—
Endosulfan II	EPA 8081A	<1.3	<1.3	—	—
Endosulfan Sulfate	EPA 8081A	<1.3	<1.3	—	—
Endrin	EPA 8081A	<1.3	<1.3	—	—
Endrin Aldehyde	EPA 8081A	<1.3	<1.3	—	—
Endrin Ketone	EPA 8081A	<1.3	<1.3	—	—
Heptachlor	EPA 8081A	<1.3	<1.3	—	—
Heptachlor Epoxide	EPA 8081A	<1.3	<1.3	—	—
Methoxychlor	EPA 8081A	<1.3	<1.3	—	—
Toxaphene	EPA 8081A	<25	<25	—	—
Alpha-Chlordane	EPA 8081A	<1.3	<1.3	—	—
Gamma-Chlordane	EPA 8081A	<2.5	<2.5	—	—
Cis-nonachlor	EPA 8081A	<1.3	<1.3	—	—
Oryzthodane	EPA 8081A	<1.3	<1.3	—	—
POLYCHLORINATED BIPHENYLS (PCBs)					
Arochlor-1016	EPA 8081A	PPB	PPB	PPB	PPB
Arochlor-1221	EPA 8081A	<12	<12	—	—
Arochlor-1232	EPA 8081A	<13	<12	—	—
Arochlor-1242	EPA 8081A	<13	<12	—	—
Arochlor-1248	EPA 8081A	<13	<12	—	—
Arochlor-1254	EPA 8081A	<13	<12	—	—
Arochlor-1260	EPA 8081A	<13	<12	—	—
Arochlor-1262	EPA 8081A	<13	<12	—	—

Notes: SEE NEXT PAGE

METALS

Arsenic	EPA 7061
Cadmium	EPA 6020
Chromium	EPA 6020
Copper	EPA 6020
Lead	EPA 6020
Mercury	EPA 7471A
Nickel	EPA 6020
Selenium	EPA 7741
Silver	EPA 6020
Zinc	EPA 6020

PESTICIDES

Aldrin	EPA 8081A
alpha-BHC	EPA 8081A
beta-BHC	EPA 8081A
delta-BHC	EPA 8081A
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Chlordane (Technical)	EPA 8081A
Dieldrin	EPA 8081A
Trans-nonachlor	EPA 8081A
2,4'-DDD	EPA 8081A
2,4'-DDE	EPA 8081A
2,4'-DDT	EPA 8081A
4,4'-DDD	EPA 8081A

Oxychlordane EPA 8081A

POLYCHLORINATED BIPHENYLS (PCBs)

Arochlor-1016	EPA 8081A
Arochlor-1221	EPA 8081A
Arochlor-1232	EPA 8081A
Arochlor-1242	EPA 8081A
Arochlor-1248	EPA 8081A
Arochlor-1254	EPA 8081A
Arochlor-1260	EPA 8081A
Arochlor-1262	EPA 8081A

Notes: SEE NEXT PAGE

[DRAFT]

AB-691 State Public Trust Lands
Sea Level Rise Assessment
City of Monterey, California

Prepared For:



The City Of Monterey
580 Pacific Street
Monterey, CA 93940

Prepared By:



3780 Kilroy Airport Way, Suite 600
Long Beach, CA 90806

Michael Baker

INTERNATIONAL

2729 Prospect Park Drive, Suite 220
Rancho Cordova, CA 95670

March 2019

[DRAFT]

AB-691 State Public Trust Lands Sea Level Rise Assessment City of Monterey

AB-691 State Public Trust Lands Sea Level Rise Assessment
City of Monterey, California

Prepared For



The City Of Monterey
580 Pacific Street
Monterey, CA 93940

Prepared By



March 2019

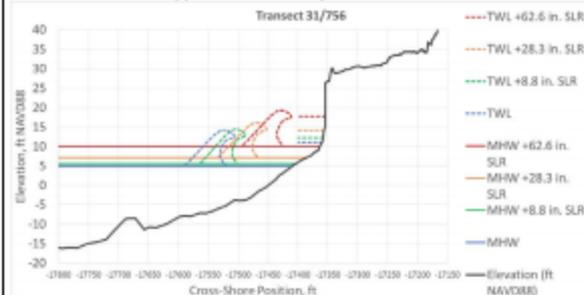
5.4 Monterey Plaza Hotel



2. Sea Level Rise
Current
Coastal Sea Level Rise
Impacts: steep beach erosion, loss of public access, recreational activities impacted by sandy beach erosion. Buildings have an elevated foundation.

1. Site Description

Cannery Row waterfront visitor serving commercial parcels with lodging uses. Large, pile supported structures with a small sandy pocket beach backed by a seawall.



2030: < 1 ft SLR (8.8 in.)

Coastal Storm: 100-YR (1% annual chance) wave runup TWL 12 ft at site.
Impacts: Rising sea levels shift the sandy shoreline landward, further reducing the buffer for storm erosion, impacting sandy shore coastal habitat to damage from breaking waves. Building damage could result in flood made.

2060: ~2 ft SLR (28.3 in.)

Coastal Storm: 100-YR (1% annual chance) wave runup TWL 14 ft at site.
Impacts: Public access, recreation, erosion, and coastal habitat impacts progress could experience up to 1 ft of inundation from breaking waves, increased

2100: ~5 ft SLR (62.6 in.)

Coastal Storm: 100-YR (1% annual chance) wave runup TWL 18 ft at site.
Impacts: Public access along the shoreline and recreational beach use seawall; however, the first floor and deck levels of the pile supported 100-Year event. The extent and severity of damage is expected to significantly substantial under these conditions and result in extended periods of closure to the intertidal zone.

3. Impact Threshold (Trigger)

Wave uplift forces and flooding could be problematic for the pile supported structures for an extreme event combined with ~1 ft of SLR. These hazards increase substantial beach access will decline with rising sea levels and be completely eliminated under the highest SLR scenario. Public access, recreation (and associated revenue streams), and

4. Adaptation

Deck areas will need to be closed (and furniture secured/removed) for safety during significant wave events, the frequency of closure will increase with SLR. Beach nourishment retention will become more difficult with rising sea levels.

[DRAFT]

AB-691 State Public Trust Lands

Sea Level City of Mo

Beach loss at the Plaza Hotel Beach and McAbee Beach could also impact access to the water for swimming, diving, kayaking and paddling. Below are a few adaptation strategies for maintaining these pocket beaches and preserving access to the ocean.

8.3.1 Short-term Strategy: Opportunistic Beach Nourishment

The pocket beaches within the study area are confined by rocky outcroppings, small headlands, or breakwaters which act as barriers to sediment movement in the longshore direction. These beaches are also limited from landward migration and further cliff erosion by existing development. Therefore, the natural sources of sediment from cliff erosion or fluvial discharge are no longer providing a significant amount of sediment to these beaches which prohibits their ability to naturally adapt to sea level rise.



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An opportunistic beach nourishment program could be an effective measure to supply sediment to these pocket beaches to help adapt to rising sea levels. These types of programs have been implemented in numerous California beach cities and typically involve designated receiver beaches and requirements for sediment compatibility that have been subject to the environmental review process. Given the relatively small pocket beaches and sheltered wave climate even a small amount of beach quality sediment (i.e. 1,000 to 5,000 cubic yards) could offer significant and lasting benefits.



Santa Cruz Harbor

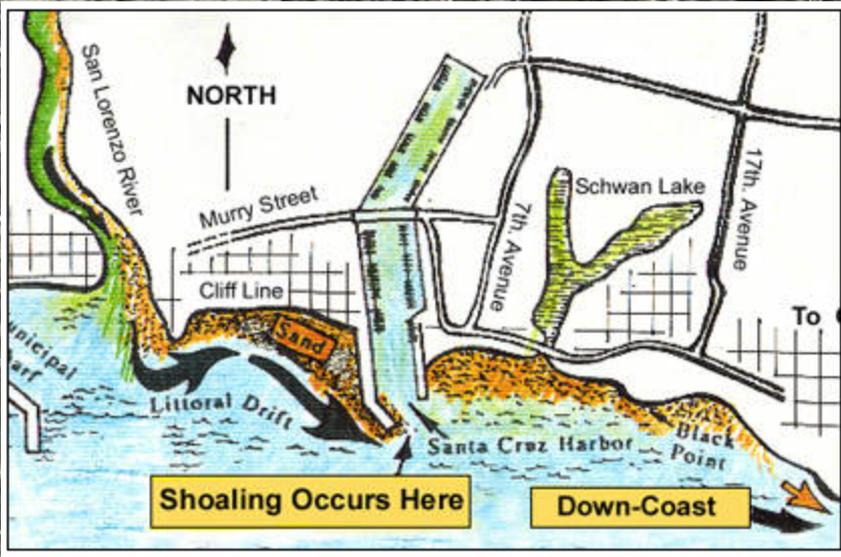






Seabright

3/2002



Shoaling Occurs Here

Down-Coast





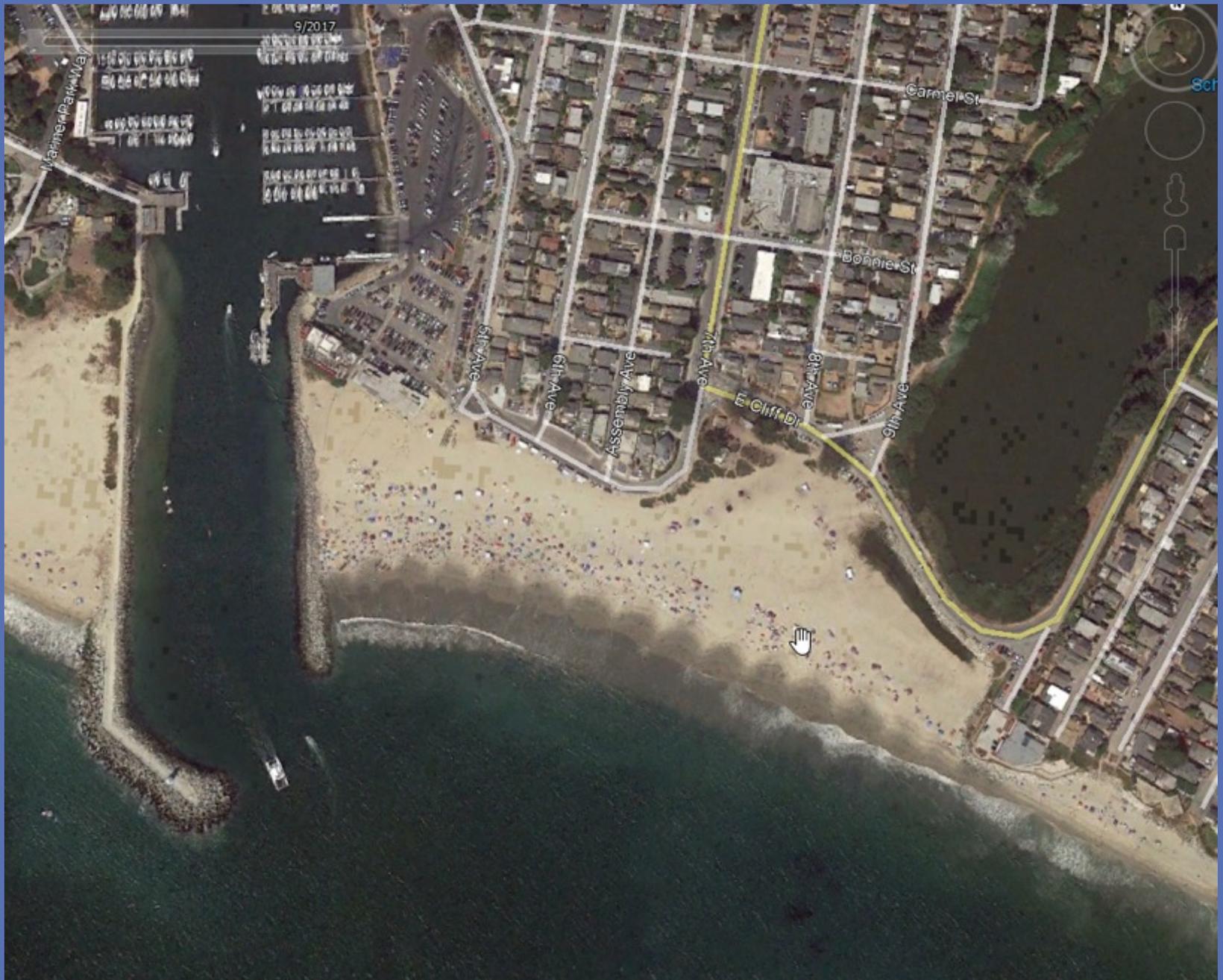
W-42

SEABRIGHT BEACH

SANTA CRUZ, CALIFORNIA













02/03/2010 15:40