BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT

REGULAR MEETING AGENDA

Sunday, December 11, 2011 at 9:00 a.m.

Home of Wini Lumsden
31330 Broad Beach Road, Malibu, California 90265

Closed Sessions Matters – None

Under this item the GHAD Board shall meet in a closed session to discuss matters pursuant to Government Code Sections 54956.8 and 54956.9 (a).

Regular Session Matters

1) **Call to Order**

2) **Roll Call**

3) **Adoption of Agenda**

4) **Approve Summary of Actions from November 6, 2011 Meeting**

   Recommendation: Chair to conduct vote on approving Summary of Actions from November 6, 2011 Meeting. If passed, Chair to sign Summary of Actions.

5) **Ceremonial/Presentations**

   None.

6) **Public Comments on Items Not on the Agenda**

   Communications from the public concerning matters which are not on the agenda but for which the GHAD Board has subject matter jurisdiction. The GHAD Board may not act on these matters except to refer the matters to staff or schedule the matters for a future agenda.

7) **Consent Calendar**

   None.

8) **Old Business**

   a. Report on status of transfer of restoration project regulatory applications and costs from the TPOA to the GHAD, and presentation of Resolution 2011-04. (GHAD Manager/GHAD Special Counsel).

Recommendation: Consider and adopt Resolution 2011-04, accepting TPOA proposal, in accordance with Motion approved at November 2011 GHAD Board Meeting, for GHAD to acquire an assignment of materials and services spent on the preparation and processing of the applications, assume responsibility for project costs, and replacing the TPOA as the applicant on the applications.

b. Consider financial and accounting checks, balances, and reviews (i.e., Bank Account, Co-signatures on checks and other financial controls).

Recommendation: Consider implementation of financial controls and/or other measures on GHAD accounts, in addition to dual signature requirements on checks (passed by Board on November 6, 2011) and other protocols.

9) **New Business**

None.

10) **Public Hearings**

a. Declaration of Intention to Order Assessment. Review and consider adoption of resolution declaring intention to order an assessment within the GHAD district, and fixing a hearing date of February 5, 2012 to consider the proposed assessment and any protest against same. Includes receipt of Engineer's Report. Receive public comments. (GHAD Special Counsel)

Recommendation: Board Members to review and consider adoption of Resolution No. 2011-05 declaring intention to order an assessment within the GHAD district, and fixing a hearing date of February 5, 2012 to consider the proposed assessment and any protest against the assessment.

11) **GHAD Boardmember Reports**

12) **Future Meetings**

13) **Adjournment**

THE BOARD OF DIRECTORS OF BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT

Adopted this Resolution on December 11, 2011, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

RESOLUTION NO. 2011/04

RESOLUTION APPROVING THE ACQUISITION OF THE ASSETS, RESPONSIBILITIES AND POSITION OF THE BROAD BEACH PROJECT BY THE BROAD BEACH GHAD FROM THE TRANCAS PROPERTY OWNERS ASSOCIATION

WHEREAS, on September 12, 2011, the Malibu City Council adopted Resolution No. 11-41, approving and ordering the formation of the Broad Beach Geologic Hazard Abatement District (GHAD), as a distinct and separate legal entity from the City, and appointing five landowners from within the GHAD boundaries to serve as the initial Board of Directors;

WHEREAS, the GHAD Board recognizes that the GHAD is a political subdivision of the State of California, governed in accordance with GHAD Law (Pub. Res. Code §§ 26500 *et seq.*) and a legal entity that is separate and distinct from the City of Malibu and that the GHAD operations are independent of the City functions;

WHEREAS, on September 25, 2011 the GHAD Board conducted its first meeting and at its meeting on November 6, 2011, the GHAD Board adopted the Plan of Control which sets forth the duties and responsibilities of the GHAD;

WHEREAS, the Trancas Property Owners Association (TPOA) is the applicant on the applications for certain beach protective, repair, nourishment and other related improvements (Broad Beach Project) with the United States Army Corps of Engineers (USACE), California State Lands Commission (SLC), California Coastal Commission (CCC), California Department of Fish & Game (CDFG), and the Regional Water Quality Control Board (RWQCB);

WHEREAS, the GHAD has been formed to devise and implement beach protective and repair improvements, including beach nourishment and rehabilitation measures, in addition to other improvements, as set forth in the Plan of Control and as allowed by GHAD Law (Public Resources Code §§ 26500 *et seq.*);

WHEREAS, in order to carry out the obligations in the Plan of Control and under GHAD law, the GHAD desires to become the applicant on the pending applications where the TPOA currently serves as the applicant and all other applications necessary to carry out its obligations, including possible applications with the California Coastal Commission, Caltrans, the County of Los Angeles, and other agencies;

WHEREAS, TPOA in a letter to the GHAD Board Chair dated November 2, 2011, offered to transfer for adequate consideration all of the written material, files, electronic data, unwritten materials (if any), work product, privileged materials, goodwill, ideas, and all other work on the Broad Beach Project to the GHAD;

WHEREAS, in order to carry out its obligations in the Plan of Control and obligations under GHAD law, the GHAD wishes to acquire the work product articulated in the November 2, 2011 letter from TPOA, including but not limited to: Phase 1 Preliminary Engineering; San Source Investigation Report; Phase 1 Offshore Sand Investigation Study; Phase 2 Offshore Sand Investigation Study; Sampling and Analysis Plan Results Report; Appendix B to the Sampling Analysis Plan Results Report; Addendum to the Sampling and Analysis Plan; Beach and Nearshore Biological Study; Offshore Borrow Sites Biological Study; Sand Dune Habitat Biology Study; Shoreline Morphology Study, Beach Profile Report; Cultural Resources Study for the Beach and Borrow Sites; Essential Fish Habitat Assessment; Coastal Development Permit Application Form and Project Description Attachment; Project Description Attachment to the Coastal Development Permit; CADD Versions of Report and Drawing Figures: As Built Revetment Survey, 30% Design Plan Set, Historic MHTL, Phase 1 Report, SAP Results Report, SAP Addendum, Dune and Special Plan Survey (GIS); and Special Plant and Natural Communities Survey;

WHEREAS, TPOA named the total amount of fees and costs incurred on the Broad Beach Project from its inception until September 12, 2011 (Project Costs) at $2,153,239 and the documentation to support these Project Costs is in the possession of the GHAD Clerk;

WHEREAS, the GHAD and its actions are exempt from the provisions of the California Environmental Quality Act (Pub. Res. Code §§ 21000 *et seq.*) in accordance with Public Resources Code sections 21080(b)(4) and 26559; and

WHEREAS, the GHAD law permits the GHAD to borrow or otherwise incur debt, obtain funding from any public or private source, and repay any financial assistance accepted pursuant to Pub. Res. Code §§ 26591, 26593, 26594.

The Board of Directors of the GHAD HEREBY RESOLVES THAT:

1. Based upon these facts and circumstances, the Board finds that pursuant to the Plan of Control, the GHAD shall assume all responsibilities as the applicant of all applications, permits or other documents it determines is necessary to carry out its obligations in the Plan of Control in order to continue with the implementation of the Broad Beach Project, including all permit application drafts, survey work, title work, studies, and investigative work initiated or contemplated to support any and all permits that have been generated by or on behalf of TPOA.

2. Based upon these facts and circumstances, the Board further finds that the GHAD shall acquire the necessary work product in all reports and studies requested or drafted for the Broad Beach Project by TPOA, including those articulated herein and all other work and work-product related to the Project.

3. Based upon these facts and circumstances, the Board further finds that the TPOA incurred a total of $2,153,239 in Project Costs as of November 6, 2011 and the documentation for these costs are in the possession of the GHAD Clerk. The Board shall acquire, assume responsibility for and pay TPOA for these and other Project Costs incurred by the TPOA through November 6, 2011 as GHAD funds become available; however, not to the detriment of the GHAD's ability to implement the Plan of Control. GHAD funds can be derived from property related assessments that are contemplated to be levied on property within the GHAD boundaries or other financial sources as allowed under GHAD law. The terms of this repayment shall be determined at a later date.

4. Based upon these facts and circumstances, the Board further finds that the GHAD shall be the applicant on all necessary permits and applications moving forward to implement the Broad Beach Project as the GHAD determines necessary in its sole discretion.

ATTEST: ________________________

Clerk of the GHAD Board

THE BOARD OF DIRECTORS OF BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT

Adopted this Resolution on December 11, 2011, by the following vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

RESOLUTION NO. 2011/05

ADOPT RESOLUTION DECLARING THE INTENTION TO ORDER AN ASSESSMENT WITHIN THE TERRITORY OF THE BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT ("GHAD"), AND FIXING A HEARING FOR FEBRUARY 5, 2011 TO CONSIDER THE PROPOSED ASSESSMENT AND ANY PROTESTS AGAINST THE ASSESSMENT.

WHEREAS, on September 12, 2011 the Malibu City Council adopted Resolution No. 11-41 approving and ordering the formation of the Broad Beach Geologic Hazard Abatement District ("GHAD") and appointing the following five landowners to serve as the initial Board of Directors of the GHAD: Steven Levitan, Zan Marquis, Norton Karno, Marshall Grossman and Jeff Lotman (GHAD Board);

WHEREAS, the GHAD Board recognizes that the GHAD is a political subdivision of the State of California, governed in accordance with GHAD Law (Pub. Res. Code §§ 26500 *et seq.*); and a legal entity that is separate and distinct from the City of Malibu and that the GHAD operations are independent of the City functions;

WHEREAS, on November 6, 2011 the GHAD Board approved the Plan of Control, the document that describes the duties and responsibilities of the GHAD;

WHEREAS, in order to pay for the cost and expenses of constructing and operating the improvements for the GHAD, as described in the Plan of Control, pursuant to Public Resources Code sections 26500 *et seq.*, it will be necessary to provide for a reliable source of funding;

WHEREAS, Public Resources Code sections 26650 *et seq.* authorize, after a noticed public hearing, the levy and collection of an assessment upon specially benefited property within the GHAD to pay for the maintenance and operation of GHAD improvements. Article XIII(D) of the California Constitution identifies additional requirements for the levy and collection of assessments;

WHEREAS, a proposed Engineer's Report (Exhibit 1) has been prepared, in compliance with Public Resources Code section 26651(a) and section 4(b) of Article XIII(D) of the

California Constitution. The proposed Engineer's Report explains the purpose of the GHAD and provides the estimated budget, the total assessment that will be chargeable to the properties within the GHAD, the estimated assessment to be levied against each parcel within the GHAD, and a description of the method used in formulating the estimated assessments;

WHEREAS, on December 11, 2011, the GHAD Board held a public hearing on the proposed Engineer's Report; and

WHEREAS, the Engineer's Report is exempt from the provisions of the California Environmental Quality Act (Pub. Res. Code §§ 21000 *et seq.*) in accordance with Public Resources Code sections 21080(b)(4) and 26559.

The Board of Directors of the GHAD HEREBY RESOLVES THAT:

1. The GHAD Board declares its intention, consistent with the requirements of Article XIII(D) of the California Constitution, Public Resources Code section 26650 *et seq.*, Government Code section 53750 *et. seq.* and Elections Code section 4000, to order that the cost and expenses of implementing, and operating any GHAD improvements constructed pursuant to Public Resources Code sections 26500 *et. seq.* to be assessed against those parcels within the GHAD as identified on the attached Boundary Map (Exhibit 2) that are specially benefited by the GHAD improvements.

2. The GHAD Board further declares its intention to assess against those parcels shown on the Boundary Map for the 2012 fiscal year and for subsequent years, all or part of the amounts set forth in the Engineer's Report. The assessment for each parcel may be subject to a supplemental assessment by the taxing authority for the remaining portion of the 2011/2012 tax year.

3. Notwithstanding Paragraph 2 above, the GHAD Board shall not order this assessment if a majority protest exists as defined in Section 4(e) of Article XIII(D) of the California Constitution.

4. Each of the parcels identified on the Boundary Map will receive a particular and distinct special benefit in the form of GHAD improvements and services. These special benefits are described in detail in the Plan of Control and Engineer's Report. The special benefits from the improvements include protection from: erosion due to wave action, flooding from sea level rise and storms, tsunamis, and wave action to private property improvements within the GHAD. The improvements will also specially benefit private property within the GHAD by increasing the performance and longevity of a existing shoreline protective devices within the GHAD. Adding sand to the seaward side of existing shoreline protective devices (revetment and seawalls) will better balance the soil pressures that act upon the landward side of the device and adding sand to a beach fronting a device that has been denuded of sand will move the wave-breaking impact area seaward and away from directly impinging on the protective device. The wider beach will reduce environmental loading on the protective device structures.

5. The GHAD Board has reviewed and considered the proposed Engineer's Report. The GHAD Board directs the GHAD Manager to incorporate comments made by the Board at its meeting on December 11, 2011, if any, and to include all appropriate findings to substantiate the

special benefits derived from the GHAD by each parcel into a final Engineer's Report to be attached to the "Notice of Adoption of Resolution." Depending on input received at the December 11, 2011 GHAD Board meeting, the attached Exhibit "1" may be the final Engineer's Report. The final Engineer's Report shall further substantiate that: 1) the assessment is proportionate to the entire costs that will be undertaken by the GHAD, 2) the amount of the assessment is proportional to, and no greater than, the special benefits conferred on each parcel, and 3) the assessment does not exceed the reasonable costs of the proportional special benefit conferred on each parcel.

6. No later than seven (7) days after the adoption of this Resolution, the GHAD Board directs the GHAD Clerk to mail the "Notice of Adoption of Resolution" (Exhibit 3) to each owner of real property (as shown on the last equalized property tax roll of the County) within the GHAD as shown on the Boundary Map. The sealable Ballot (Exhibit 4) and the final Engineer's Report shall be attached to the Notice of Adoption of Resolution.

7. The GHAD Board will conduct a public hearing on February 5, 2011 at 9:00 a.m. at ______________________________________.

8. The following sub-paragraphs provide the procedures for returning and tabulating the ballots:

a. A copy of the related Notice of Adoption of Resolution, a sealable Ballot and the Engineer's Report will be sent to each of the property owners within the GHAD. The Ballot may be completed and mailed or hand delivered to GHAD Clerk, c/o Marquis Property Company, 29169 Heathercliff Road, #212, Malibu, CA 90265, or may be submitted at the public hearing on February 5, 2011. The Ballot may be withdrawn or changed at any time prior to the conclusion of the public testimony on the proposed assessment at the public hearing.

b. Immediately before the hearing, the GHAD Clerk shall tabulate the ballots. In tabulating the ballots, the ballots shall be weighted according to the proportional financial obligation of the affected property; here, the proportional financial obligation of the affected properties is governed by the amount of linear beach frontage owned by each property owner within the GHAD. At the hearing, the GHAD Board shall consider any objections or protests to the assessment and certify the tabulation of the ballots. The GHAD Board shall not impose the assessment if there is a majority protest. A majority protest exists if, upon conclusion of the hearing, weighted ballots submitted in opposition to the assessment exceed the weighted ballots submitted in favor of the assessment.

c. Inquiries regarding the proposed assessment may be made by mail to the GHAD Clerk, Barbara Hamm, c/o Marquis Property Company, 29169 Heathercliff Road, #212, Malibu, CA 90265 or by phone at (310) 457-3606.

9. Following the public hearing, the GHAD Board shall consider the adoption of the canvas of votes for the GHAD.

10. Upon authorization of the assessment, the GHAD Board shall levy the authorized assessment on each parcel in fiscal year 2012.

11. This Resolution shall become effective immediately upon its passage and adoption.

ATTEST: ______________________________
Clerk of the GHAD Board

EXHIBIT "1"

ENGINEER'S REPORT

ENGINEER'S REPORT

for

BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT
MALIBU, CALIFORNIA
December 7, 2011

[for consideration at December 11, 2011 GHAD Board Meeting]

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ENGINEER'S REPORT

GEOLOGIC HAZARD ABATEMENT DISTRICT – BROAD BEACH
(Pursuant to the Public Resources Code of the State of California, Section 26500 et seq.)

CERTIFICATION OF FILING

This report is presented at the direction of the GHAD Board of Directors. The GHAD is intended to provide monitoring and maintenance of improvements related to geologic hazard management within the Broad Beach GHAD and to levy and collect assessments in order to perform its activities.

The improvements, which are the subject of this report, are defined as any activity necessary or incidental to the prevention, mitigation, abatement, or control of a geologic hazard, construction, maintenance, repair, or operation of improvement; or the issuance and servicing of bonds issued to finance any of the foregoing (Section 26505).

This report consists of seven parts, as follows:

I. **INTRODUCTION**

II. **BACKGROUND**

III. **GEOLOGIC HAZARD ABATEMENT DISTRICT DIAGRAM**

IV. **SERVICE LEVELS**

V. **SITE HISTORY**

VI. **DESCRIPTION OF THE IMPROVEMENTS TO BE INPLEMENTED BY THE GHAD S**

VII. **ASSESSMENT METHOD AND BENEFIT**

VIII. **ASSESSMENT LIMIT - BUDGET**

The undersigned respectfully submits the enclosed Engineer's Report.

Date: December 7, 2011 By: ENGEO Incorporated

____________________, GE
Uri Eliahu

I HEREBY CERTIFY that the enclosed Engineer's Report was filed on the _____ day of _____________.

____
Clerk of the Board
Broad Beach Geologic Hazard Abatement District
Malibu, California

I HEREBY CERTIFY that the enclosed Engineer's Report was approved and confirmed by the GHAD Board on the ______ day of _____________.

____
President of the Board
Broad Beach Geologic Hazard Abatement District
Malibu, California

APPROVED _____________

ENGINEER'S REPORT

for

BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT

for the

ESTABLISHMENT OF AN ASSESSMENT LIMIT

I. INTRODUCTION

The Broad Beach Geologic Hazard Abatement District (GHAD) was formed by the Malibu City Council on September 12, 2011, pursuant to Resolution No. 11-41 under the authority of the California Public Resources Code, Division 17, Section 26500 et seq.

II. BACKGROUND

On November 6, 2011, pursuant to Resolution 2011/03, the GHAD Board of Directors approved the Broad Beach Plan of Control to allow the GHAD to permanently monitor and maintain GHAD improvements (GHAD Plan of Control). The establishment of a real property related assessment to fund the GHAD responsibilities is described in this Engineer's Report.

III. GEOLOGIC HAZARD ABATEMENT DISTRICT BOUNDARIES

The boundaries and legal description for the GHAD are attached hereto as Exhibits A and B.

IV. SERVICE LEVELS

The GHAD's activities are set forth in the Plan of Control and include certain activities necessary or incidental to the prevention, mitigation, abatement, or control of geologic hazards, including construction, retention, repair, or operation of any improvement, and the issuance and servicing of debt or bonds issued to finance any of the foregoing.

The GHAD provides for the administration and review of facilities within the budgeted limits, including the following services:

1. Oversight of GHAD operations.

2. In conjunction with the County Assessor's Office, setting the annual levying of assessments on the property tax rolls.

3. Engagement of technical professionals to perform the monitoring duties as described in the GHAD Plan of Control.

4. Performance of GHAD construction activities in accordance with the GHAD Plan of Control. These activities include, but are not limited to, the following:

   - Beach nourishment and sculpting

   - Construction/restoration of dunes and related natural habitat

   - Beach drainage improvements

5. Performance of GHAD preservation activities in accordance with the GHAD Plan of Control. These activities include, but are not limited to, the following:

   - Inspection of revetment structures

   - Inspection and preservation of restored dunes.

   - Monitoring of accumulated erosion and beach recession.

6. Preparation of annual GHAD budgets.

V. SITE HISTORY

The Broad Beach area is located at the base of the Santa Monica Mountains and adjacent to Santa Monica Bay in Malibu, western Los Angeles County, California, extending from Point Lechuza on the west to Zuma Beach on the east. Although beach width can vary seasonally as well as from year to year, Broad Beach reportedly has been consistently narrowing in width since the early 1970s. The historically wide beach at Broad Beach has gradually narrowed due to an imbalance in the sediment budget, i.e., more sand has left the beach system over the past 40 years than entered it. Since the mid-1970s, Broad Beach has lost an average of 20,000 cubic yards per year. This rate has accelerated over the past five years to approximately 35,000 cubic yards per year. As reported by Moffatt & Nichol, the Engineer of Record for the proposed improvements, Broad Beach is a very narrow ribbon of sand visible primarily at low tide but inundated at high tide (Moffatt & Nichol, 2011 (Exhibit D)).

In general, very little, if any, dry beach exists at higher tide levels, especially in the western portion of the above-described area. Various portions of the beach have been subjected to emergency repair/protective measures in years past due to storms and related erosion events. Temporary armoring (including sandbags) from earlier emergency repairs has become increasingly exposed with time. An emergency rock revetment was installed seaward of the homes in 2010 along most of the length of the beach to protect the private properties (Moffatt & Nichol, 2011).

Because of the general and continuing narrowing of the beach, private improvements, including homes, are threatened by high tides and continuing wave action. In order to reduce the risk of damage and/or destruction of these improvements, a beach restoration program will be implemented.

Beaches essentially act as coastal storm barriers. A beach's size, shape and sand volume help determine how well the beach can protect a developed area during a storm. All the various elements of a beach, including vegetated dunes, the flat portion of the dry sand beach and offshore sand bars, offer a level of natural protection against coastal storms by absorbing and dissipating the energy of breaking waves, either seaward on an offshore bar or directly on the beach itself. To restore the energy-dissipation components to the beach, additional protective measures will be implemented. The profile and geometry of the contemplated beach restoration project ("Project") have been designed solely for the protection of private improvements within the proposed District (Moffatt & Nichol, 2011).

VI. DESCRIPTION OF THE IMPROVEMENTS TO BE INPLEMENTED BY THE GHAD

A. Beach Nourishment

The GHAD-maintained improvements are described in the GHAD Plan of Control. In general, these improvements include the following:

- Sand Nourishment and Beach Replenishment – placing beach material to replenish Broad Beach with "dry" sand between the dune system and shoreline;
- Revetment – Burying the existing revetment in the landward edge of the widened, nourished beach. Imported beach quality material would be placed over the existing revetment to create a restored dune;
- Offshore Beach Material Dredging and Transport – Sourcing beach compatible material at an offshore site or sites;
- Upland Beach Material Dredging and Transport – Sourcing beach compatible material at an upland site or sites;
- Dune Building and Restoration – Building a reservoir of sand and restoring dune habitat with native plant species.

Protection of the beach, dunes, structures, and infrastructure will require nourishment of the beach and restoration of historic dunes and/or improvement of existing dunes. Beach nourishment and sculpting will restore the width of the beach and provide a protective barrier for structures and properties, as well as inward stretches of the beach. The habitat restoration, incorporating native vegetation, will reduce erosion to the dune and beach face. When completed, these improvements will repair existing damage and reduce future inundation- and erosion-related damage from storm surges, wave run-up, and overtopping, as described below.

Beach nourishment is the only shore protection alternative that directly addresses the problem of a sand budget deficit because it is a process of adding sand from outside the eroding system. Further, the placement of a higher and wider beach berm, formed by the appropriate placement of imported beach sand (or nourishment) would reduce wave energy, which would reduce the waves' impact and erosive force. A nourished beach, with sufficient sand volumes and healthy dunes, absorbs storm energy, even during slow-moving storms, and helps prevent damage to structures and infrastructure. The gradual slope of a nourished beach causes storm waves to break farther seaward, as the waves would then form in shallower water. As water rushes up the beach, energy dissipates. Water running back down the beach redistributes sediment, which is deposited in deeper water and moved along the shore. The deposition of sediments in deeper water often creates an offshore sand bar that causes the waves to break farther offshore, further weakening the incoming wave energy, and protecting the dunes and property behind the beach. This gradual and successive weakening of wave energy can significantly reduce damage from waves, inundation, and erosion. The nourished beach berm and dunes also provide a "sand reservoir" that remains landward during normal conditions and provides sand during major storm events, which allows beaches to recover, rebuild, and continue to provide protection (Moffatt & Nichol, 2011).

The Project will include approximately 600,000 cubic yards of sand nourishment, which will provide approximately 80 to 100 feet of dry sand beach seaward of the seaward toe of the restored dune system. Like most beach nourishment projects, the beach will gradually lose sand. Studies indicate that Broad Beach is currently losing sand at a rate of approximately 35,000 cubic yards per year. Thus, while the sand will deplete at different rates depending on weather, tides, and many other factors, a 600,000 cubic yard initial nourishment should last for the 10-year interval prior to the next re-nourishment event (Moffatt & Nichol, 2011).

Three viable sources of beach-quality sand have been identified, including offshore of Marina del Rey, the near-shore zone at Ventura Harbor, and offshore of Zuma Beach. The first two sources can provide the ideal sand grain size for a relatively stable beach nourishment project. The third source offshore Zuma contains finer sand better suited for the dune construction (Moffatt & Nichol, 2011).

B. Monitoring via Sand Backpassing

A proactive beach monitoring plan is critical to the success of the nourishment Project. An important element of the Project is the implementation of a sand backpassing program. Since the beach is not anticipated to erode at the same rate along its length, periodic re-distribution of the sand to "even-out" the resource to preserve a balance of shore protection benefits will be implemented (Moffatt & Nichol, 2011).

The GHAD shall be responsible for the monitoring of the restored beach and dunes. The GHAD's monitoring responsibilities include prevention, abatement, and control of erosion hazards as well as vegetation control within the Project area.

The GHAD's general preservation responsibilities will include:

- Inspection of revetment structures
- Inspection and maintenance of restored dunes
- Monitoring of accumulated erosion and beach recession

Specifics regarding the beach monitoring are as follows (Moffatt & Nichol, 2011):

- Monthly measurement of the dry sand beach width (from the back of beach to the edge of the dry sand "towel area" (at a uniform tidal period)) at five locations:

    - East end – 30756 Broad Beach Road
    - East-central reach – 30916 Broad Beach Road
    - Central reach – 31108 Broad Beach Road
    - West-central reach – 31324 Broad Beach Road
    - West end – 31506/31504 Victoria Point Road

- Semi-annual (spring and fall) beach profile surveys, measured from the back of the dune seaward to a water depth of approximately 40 feet.

- Estimation of the rate and trend of beach width change at each of the measurement points for one year prior to construction and continually after construction for 10 years.

Backpassing should be implemented when any one reach of the beach becomes narrower than required for shore protection and access, while other reaches of the beach are concurrently widening and/or holding sufficiently greater volume of sand than the narrow reach.

In one scenario, the western end of the beach has narrowed but the eastern end contains sufficient sand volume. An objective trigger to quantify this situation is described as follows: the point in time when the averaged dry sand beach width at 31324 Broad Beach Road and 31506/31504 Victoria Point Road ("western average") reaches 50 feet or less for six consecutive months. Simultaneously, the averaged width of the eastern dry sand beach at 30756 Broad Beach Road and 30916 Broad Beach Road ("eastern average") is a minimum of 25 feet wider than the western end.

In another scenario, the eastern end of the beach has narrowed but the western end contains sufficient sand volume. The objective trigger for this situation is determined when the eastern average dry beach width is 50 feet or less for six consecutive months, while the western average dry sand beach width is a minimum of 25 feet wider than the eastern end.

Since the net direction of sand movement (littoral drift) is to the east, it is anticipated that the predominant backpassing operation will be from the east (surplus) toward the west (deficit). Backpassing sand the other direction from west to east may result in more rapid loss of sand from Broad Beach toward the east if conditions of eastward sand transport predominate over time.

Sand backpassing will be implemented using mechanical equipment (scrapers and dozers) to transport sand from the wide reach of beach (surplus area) to widen the narrow reach (deficit area) of beach by between 25 and 50 feet (depending on available volume). Surplus sand to be backpassed shall be scraped from the wetted portion of the beach seaward of the apparent mean high tide line (wetted bound). It is anticipated that the maximum annual sand backpassing volume will be between 25,000 and 50,000 cubic yards of sand over a duration of 2 to 4 weeks.

Backpassing between March 1 and June 15 of each year may need to consider possible constraints posed by spawning grunion and be done sensitively according to guidelines for avoiding grunion. Such guidelines may include traversing the beach below and seaward of the dry sand beach area with earthmoving equipment and can be more fully developed at a later date.

The overall sand backpassing program is subject to approval by the applicable resource agencies as part of the Project entitlement process now underway. Once approved as part of the overall Project, the backpassing activities will be subject to approval of the GHAD Board and the recommendation of the GHAD Manager.

C. Periodic Re-nourishment

It is intended that the initial beach nourishment will last 10 years before re-nourishment will need to be undertaken. Objective triggers are in place as a quantitative basis to determine when re-nourishment should occur. The following is a description of the procedures regarding initial and subsequent re-nourishment.

- Following the issuance of the CDP and then not more frequently than at the 10- and 20-year periods following the issuance of the CDP, dredging of fine-grained sand from offshore Broad Beach will occur. Transport of sand will be provided via slurry pipeline onshore for placement within the boundaries of the restored dune area, burying the existing revetment.

- Following the issuance of the CDP and then not more frequently than at the end of the 10- and 20-year periods following the issuance of the CDP, placement of coarse-grained sand obtained from an offsite, offshore borrow site would occur from the toe of the dune area to the seaward extent of the beach nourishment area.

- Following the issuance of the CDP and then not more frequently than at the end of the 10- and 20-year periods following the issuance of the CDP, dredging of beach-quality larger grained sand from offshore of Dockweiler Beach, outside Ventura Harbor, or such other borrow site would occur as approved by applicable agencies and transported via marine vessel to Broad Beach.

- Following the issuance of the CDP and then not more frequently than at the end of the 10- and 20-year periods following the issuance of the CDP, transfer of the beach-quality sand would occur through a slurry pipeline onshore.

- Following the issuance of the CDP and then not more frequently than at the end of the 10- and 20-year periods following the issuance of the CDP, use of moveable slurry pipelines would occur to allow for placement of dredged sand along various segments of the beach.

- Not more frequently than at the end of the 10- and 20-year periods following the issuance of the CDP, heavy equipment (e.g., scrapers, dozers) would be used to distribute sand to desired locations and depth within the Project area.

VII. ASSESSMENT METHOD AND BENEFIT

A. Special Benefit and Proportionality

The improvements described in this document will confer the following special benefits to the assessed parcels:

1. Protection from erosion due to wave action
2. Protection from flooding associated with storms
3. Protection from sea-level rise

The GHAD improvements described in Section VI are distributed within the GHAD boundaries. Implementation and protection of these improvements provide a special benefit to all real property assessed within the Broad Beach GHAD. As a means of protection from erosion, flooding from sea level rise and storms, tsunamis, and wave action, the proposed beach improvements will provide protection to private property improvements within the GHAD, including homes and the Malibu West Beach Club, and therefore, will provide a special benefit to property owners within the GHAD. These improvements are special benefits conferred on all the assessed parcels in the GHAD – they affect the assessed property in a way that is particular and distinct from their effect on other parcels and that real property in general, and the public at large, do not benefit or share.

Property owners derive special benefit based in direct proportion to their respective beach frontage. Although volumes of sand placement may differ from time to time on each parcel, the dynamic nature of beach erosion, subsequent sand transport, and the anticipated backpassing maintenance renders the environment within the GHAD district boundaries as a semi-closed, discrete system in which special benefit is derived based on proportional beach frontage. Therefore, owners with greater beach frontage derive greater special benefit than owners with lesser beach frontage. Moffat & Nichol finds that the proposed improvements and activities equalize the special benefit derived by properties within the GHAD based on pro rata length of beachfront per assessed parcel.

The special benefit is proportional to the length of beach frontage, regardless of the presence of pre-existing protective structures, such as revetments or seawalls. As described by representatives of Moffatt & Nichol (the Engineer of Record for the proposed improvements), the proposed beach nourishment Project will directly benefit the performance and longevity of an existing seawall in two important ways. First, the beach nourishment is adding soil to the seaward side of an existing seawall, thereby acting to better balance the soil pressures that act upon the landward side of the wall. Second, adding sand to a beach fronting a seawall that has been denuded of sand will move the wave-breaking impact area seaward and away from directly impinging on the seawall. The wider beach will allow wave energy to dissipate more gradually on the sloping sand beach, thereby reducing environmental loading on the seawall structure.

There is no special benefit for properties outside of the district. Like most assessments, special benefits conferred by the improvement have the effect of creating general benefits (i.e., an improved beach area that the public may use). This effect does not transform the special benefits into general benefits. The general benefits are incidental to the improvements and are not included in the assessment determination. The improvements are not being implemented for the benefit of the general public. The subject parcels will be assessed only for the reasonable costs of the proportional specific benefits conferred on that parcel.

Nevertheless, it is recognized that the general public may benefit from the improvements. Such potential benefits include the replacement of beach area that has eroded over years. These improvements may cause the beach area use by members of the public. These general benefits are incidental to the special benefits conferred onto the assessed parcels—a byproduct of the intended benefit. Even though these general benefits may occur, the assessed parcels are only being assessed the reasonable costs of the improvements creating the specific benefit that are being provided directly to the assessed parcels. Furthermore, the proposed improvements are not provided to accommodate any public benefit.

B. Assessment Method

Lots will be assessed based on the width of their respective beach frontage; the assessment will be based on a unit rate times the linear footage of beach frontage.

VIII. ASSESSMENT LIMIT - BUDGET

A financial analysis was performed to provide a framework for an operating budget for the on-going abatement, mitigation, prevention and control of geologic hazards within the GHAD boundaries. In preparation of the budget, several factors were considered including:

- Proposed Improvements
- Elements Requiring Preservation

Based on the estimated expenses for on-going operations and the allowance for one future beach re-nourishment event (10 years after the initial re-nourishment), a budget was prepared for the purpose of estimating initial assessment levels (Exhibit C).

The Engineer recommends an average annual assessment limit of $430 per foot of beach frontage for each residential lot (Fiscal Year 2012 dollars). The proposed initial assessment level will be adjusted annually to reflect the percentage change in the Los Angeles metropolitan area Consumers Price Index (CPI) for All Urban Consumers. The assessment limit will be adjusted annually using an initial date of April 2011 for the CPI. Each subsequent annual adjustment will be calculated using the 12-month period from April to April. The assessment shall be levied by the GHAD following formation of the GHAD and the authorization of the assessment.

EXHIBIT A

Legal Description

EXHIBIT B

GHAD Boundary

8588.000.000
December 7, 2011

EXHIBIT C

Broad Beach GHAD Budget

8588.000.000
December 7, 2011

EXHIBIT C
Broad Beach Geologic Hazard Abatement Di
Budget – December 7, 2011

ASSUMPTIONS	
Beach Frontage Within Project (LF)	
Annual Assessment per Foot of Beach Frontage (current $)	
Annual Adjustment in Assessment (estimated)	~~3.5%~~
Escalation in Annual Costs (estimated)	3.5%
Investment Earnings (estimated)	5%
Frequency of Sand Nourishment (years)	10
Cost of Sand Nourishment (current $)	$11,896,000

ESTIMATED ANNUAL EXPENSES IN 2012 DOLLARS	
Ongoing consulting and maintenance	$1,411,594
Administration, Accounting, & Insurance	$21,600
Permitting Fees	$147,172
Debt Service	$100,000
TOTAL	**$1,680,336**

ESTIMATED ANNUAL EXPENSES IN 2013 DOLLARS	
Ongoing consulting and maintenance	$114,245
Administration, Accounting, & Insurance	$453,561
Sand Nourishment	$14,725,583
Debt Service	$4,560,587
TOTAL	**$19,853,976**

ESTIMATED ANNUAL EXPENSES IN 2014 DOLLARS	
Ongoing consulting and maintenance	$221,744
Administration, Accounting, & Insurance	$55,436
Debt Service	$2,460,587
TOTAL	**$2,737,767**

8588.000.000
December 7, 2011

EXHIBIT D

Moffat & Nichol
Coastal Engineering Appendix to the Broad Beach Geologic Hazard Abatement District
Engineer's Report

8588.000.000
December 7, 2011

Broad Beach Restoration Project

Coastal Engineering Appendix
To The Broad Beach
Geologic Hazard Abatement District
Engineers Report

PREPARED FOR:

TRANCAS PROPERTY OWNER'S ASSOCIATION

PREPARED BY:

moffatt & nichol

3780 KILROY AIRPORT WAY, SUITE 600, LONG BEACH, CA 90806

DECEMBER 2011

JOB NO. 6935

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1.0 PROBLEM DESCRIPTION

Broad Beach is located in the northwest portion of the County of Los Angeles within the City of Malibu, California. The project area is comprised of the shoreline area fronting approximately 114 residences and a beach club spanning approximately from Lechuza Point to Trancas Creek.

Development along Broad Beach began in the 1930s, consisting of small beach cottages. Given the limited infrastructure available, septic systems and leach fields were typically installed close to the sand dunes seaward of the residences. As construction continued and the site was further developed, most leach fields continued to remain.

1.1 Beach Erosion and Loss of Related Shore Protection

Broad Beach has historically been a relatively wide beach, especially through the early 1970s. Residential development continued and most lots were developed by the late 1980s when the beach was considerably wider than it is today. Aerial photographs from 1972 (Photo 1-1) provide a clear illustration of a very large sand volume on the beach. Presently, Broad Beach is a very narrow ribbon of sand visible primarily at low tide, but inundated at high tide (Photo 1-2).

Photo 1-1. 1972 Aerial Photo (California Coastal Records, 2009)

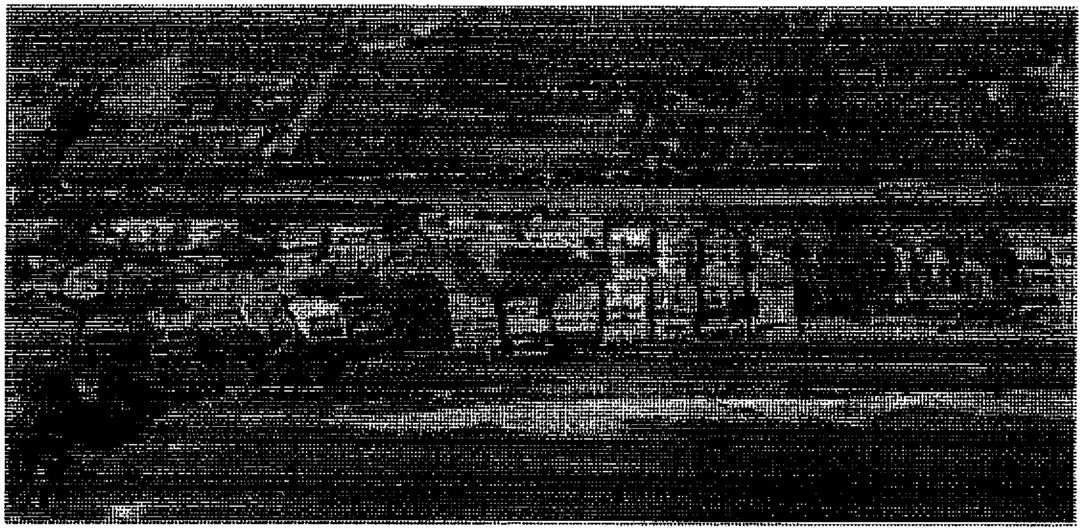


Photo 1-2. 2009 Aerial Photo (California Coastal Records, 2009)

Several recent studies of the coastal region encompassing Broad Beach have identified a trend of continued erosion without any significant recovery in beach width since the early 1970s. The beach is narrowing because of a negative sand balance due either to a reduction in sand supply entering around Lechuza Point, or a change in the magnitude and/or direction of the wave energy that increases the amount of sand leaving the Broad Beach. Between 1974 and 2009, approximately 600,000 cubic yards (cy) of sand was lost at Broad Beach, a majority of which has moved east to Zuma Beach. Studies conclude that this trend of erosion appears to have accelerated in the last two decades. Recent El Niño storm seasons have exacerbated the shoreline recession resulting in structural damage and further beach erosion.

The 1997-1998 El Niño storms caused considerable shoreline erosion and related storm wave damage along the California coastline. Many Broad Beach homes were threatened, causing many homeowners to construct temporary sand bag revetments to protect residential structures and leach fields. One residence suffered significant structural damage. During one particularly severe storm in early February 1998, with sand bags already in place, the active beach scarp retreated more than 30 feet in the course of two days.

The 2007/2008 winter season, though milder than the 1997-1998 winter, also resulted in significant retreat of the beach. Many of the homeowners responded with construction of more substantial sand bag revetments, which were authorized through emergency Coastal Development Permits issued by the City of Malibu. Examples of these revetments are shown in Photo 1-3 and Photo 1-4. In addition to these structures, there are timber and concrete seawalls and rock revetments at various residences along the west end of Broad Beach. Waves and higher tides run up to the foot of historically wide dunes along the east end of Broad Beach. The prognosis for the condition of Broad Beach is very poor, given the erosional trends and lack of remaining beach. The visual quality of the beach has been seriously impacted by the unsightly temporary sand bagging and emergency shore protection measures. In addition, opportunities for lateral access along the beach for the public and residents alike are severely limited.

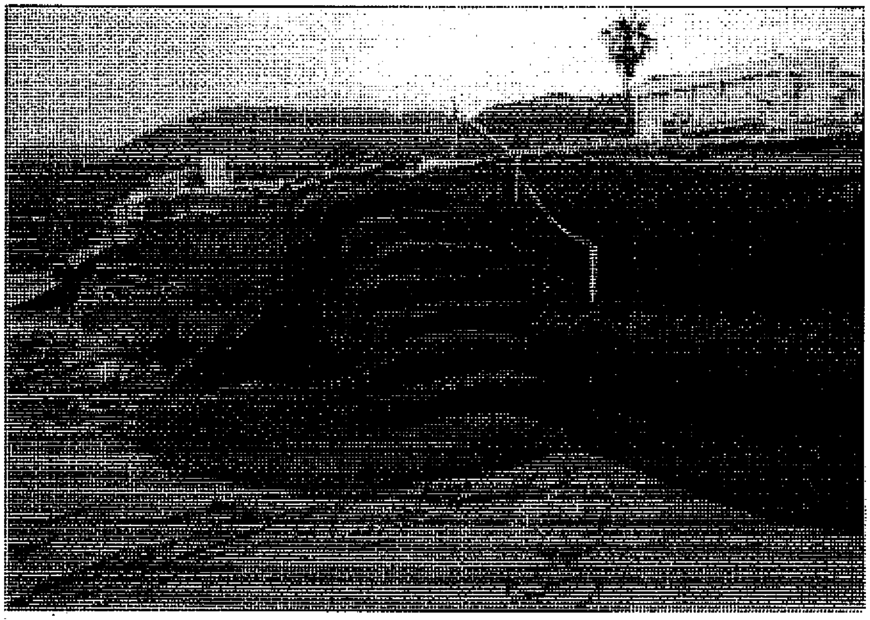


Photo 1-3. Temporary Sandbag Revetment (May 2009)

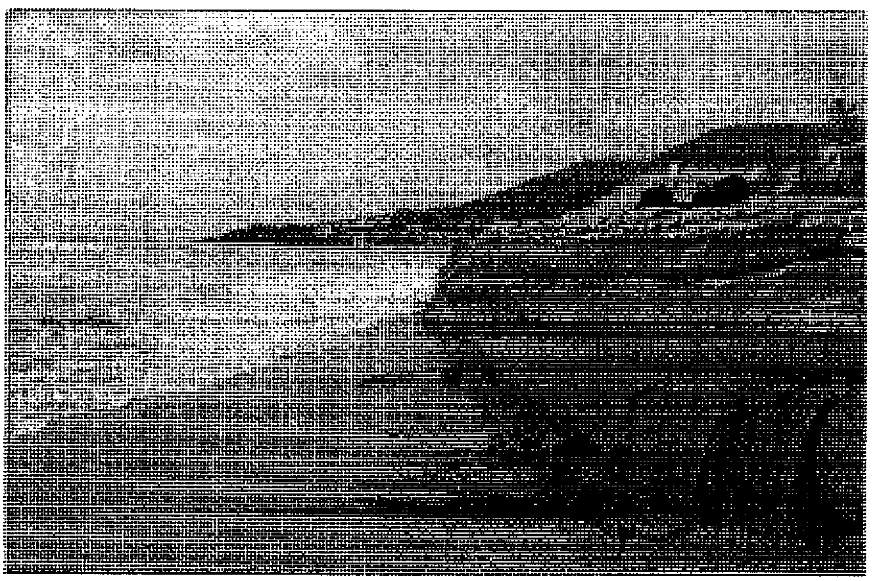


Photo 1-4. Temporary Sandbag Revetment (December 2009)

1.2 Homeowners Take Action

The Trancas Property Owner's Association (TPOA), representing most of the property owners along the Broad Beach shoreline, elected to take action in early 2009 to develop a long term solution to protect against shoreline erosion and reduce the threat to private property. During preparation of the initial planning studies for the restoration of Broad Beach, a large El Niño winter was forecast for the 2009/2010 winter season. In December of 2009 there was a significant narrowing of the beach due to storm wave attack resulting in widespread failure of the existing temporary emergency sandbag revetments, especially at the west end of the beach. Photo 1-5 illustrates the eroded shoreline condition near the west end of Broad Beach; Photo 1-6 shows conditions toward the east. It became evident that these temporary structures would not provide sufficient shore protection for the upcoming winter. Acute and significant erosion was proceeding, resulting in significant loss of dune habitat and threatening of residential structures. Undermining and failure of several approved "On-Site Waste Water Treatment Systems" (OSTs) was also imminent without immediate action. Combined with the prediction of moderate to severe El Niño conditions for the upcoming winter, the need for immediate emergency action became apparent. As a result, the TPOA was forced to seek an Emergency Coastal Development Permit to implement an interim shore protection measure to halt the critical erosion until the longer term project is in place.

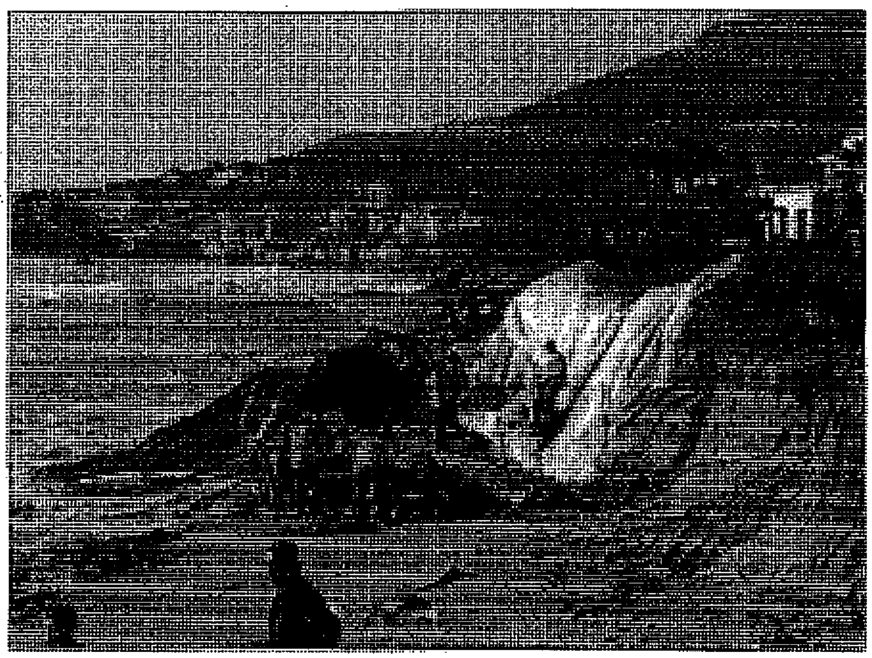


Photo 1-5. Severe Erosion and Dune Damage at West Broad Beach (January 2010)

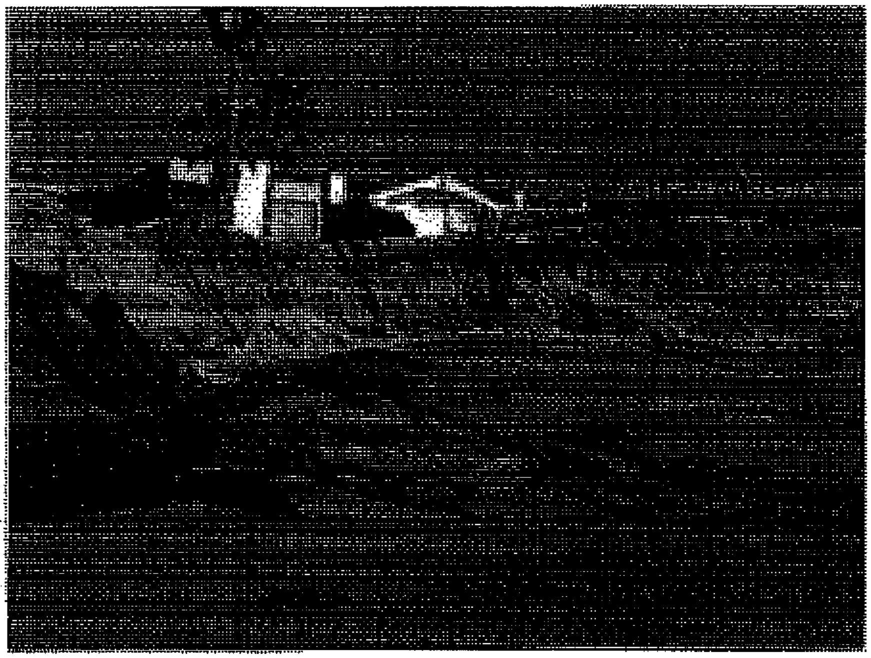


Photo 1-6. Temporary Sandbag Revetment Failure and Dune Damage (January 2010)

Under the emergency situation, a temporary rock revetment was considered the minimum action necessary, and the least environmentally damaging alternative. The temporary rock revetment design was developed to stabilize the shoreline against further erosion for the 2009/2010 El Niño season. Other temporary revetment alternatives consisting of geotextile bags were providing a clear demonstration that they were inadequate to provide reliable shore protection and were providing a false sense of security. In addition to their lack of hydraulic stability, the failed geo-bag (sandbag) system was proving to be a source of debris and litter on the beach.

The temporary rock revetment design was developed to provide the minimum necessary protection while allowing for rapid construction. Specific elements of the temporary revetment include:

- Filter fabric to eliminate loss of dune material through voids in the stone matrix;
- Reduced armor size (1/2 to 2 ton) stone to allow for faster construction using readily available, stockpiled stone;
- Reduced revetment volume to allow for faster construction and lateral beach access; and
- Shallower toe elevation for improved constructability.

The following photographs show the completed revetment that extends from Trancas Creek for about 4,100 feet west terminating just past the western public access point for Broad Beach.

Photo 1-1-7 Emergency Revetment (February 2010)

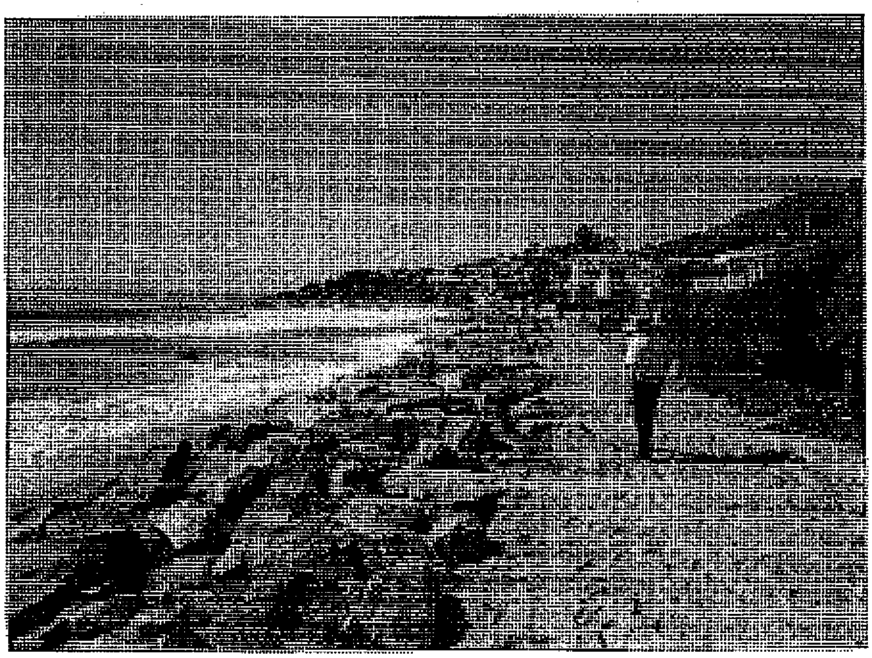


Photo 1-1-8. Emergency Revetment (February 2010)

2.0 PROJECT BACKGROUND

2.1 Regional Coastal Setting

The Southern California coast is a complex, tectonically-active region and is characterized as a collision coast wherein the Pacific Ocean plate subducts on contact with the North American plate. From a geologic time perspective, the process manifests itself in the form of narrow offshore shelves cut by submarine canyons, uplifted by coastal mountains and coastal erosion.

Broad Beach exemplifies a typical Southern California stretch of coastline, comprising a sandy beach backed by coastal bluffs. Broad Beach is located at the western (upcoast) end of a 4 mile long hook-shaped beach between the Point Lechuza and Point Dume as shown in Figure 2-1. With a total length of just over 1 mile, Broad Beach is bounded by Point Lechuza to the west and Trancas Creek to the east. Zuma Beach and Point Dume State Beach make up the remainder of the hook-shaped beach. This hook-shaped beach is referred to as the Zuma Littoral Subcell (ZLS) throughout this report. Broad Beach and the ZLS lie within the Modern Malibu Littoral Cell (MMLC) shown in Figure 2-2. The MMLC is bounded by Port Hueneme to the north and Marina Del Rey to the south.

Littoral cells are defined as essentially self contained beach compartments bounded by geographic features such as headlands or submarine canyons that limit the movement of sand between cells. Each compartment consists of sand sources (such as rivers, streams, and coastal bluff erosion), sand sinks (such as coastal dunes and submarine canyons), and beaches which provide pathways for wave-driven sand movement within a littoral cell.

The south-southwest facing MMLC coastline is directly exposed to swell generated in the southern hemisphere. These swells approach Malibu from the southwest, south, and southeast, but the great decay distances typically result in waves of low heights and long periods. Despite sheltering from the Channel Islands, the Broad Beach area is exposed to North Pacific swell through the Santa Barbara Channel. North Pacific generated swells are the most energetic source of waves in the region and the north-westerly approach angle results in a pre-dominant longshore sand transport direction from the west to east in the MMLC.

Due to the wave climate and pre-dominant longshore sand transport direction, Broad Beach and the ZLS depend on sand delivered from upcoast sources including fluvial discharges from coastal watersheds of the Santa Monica Mountains and erosion of coastal bluffs. Mugu Submarine Canyon captures almost all of the longshore sand supply and represents the upcoast limit of potential sand sources for the ZLS.

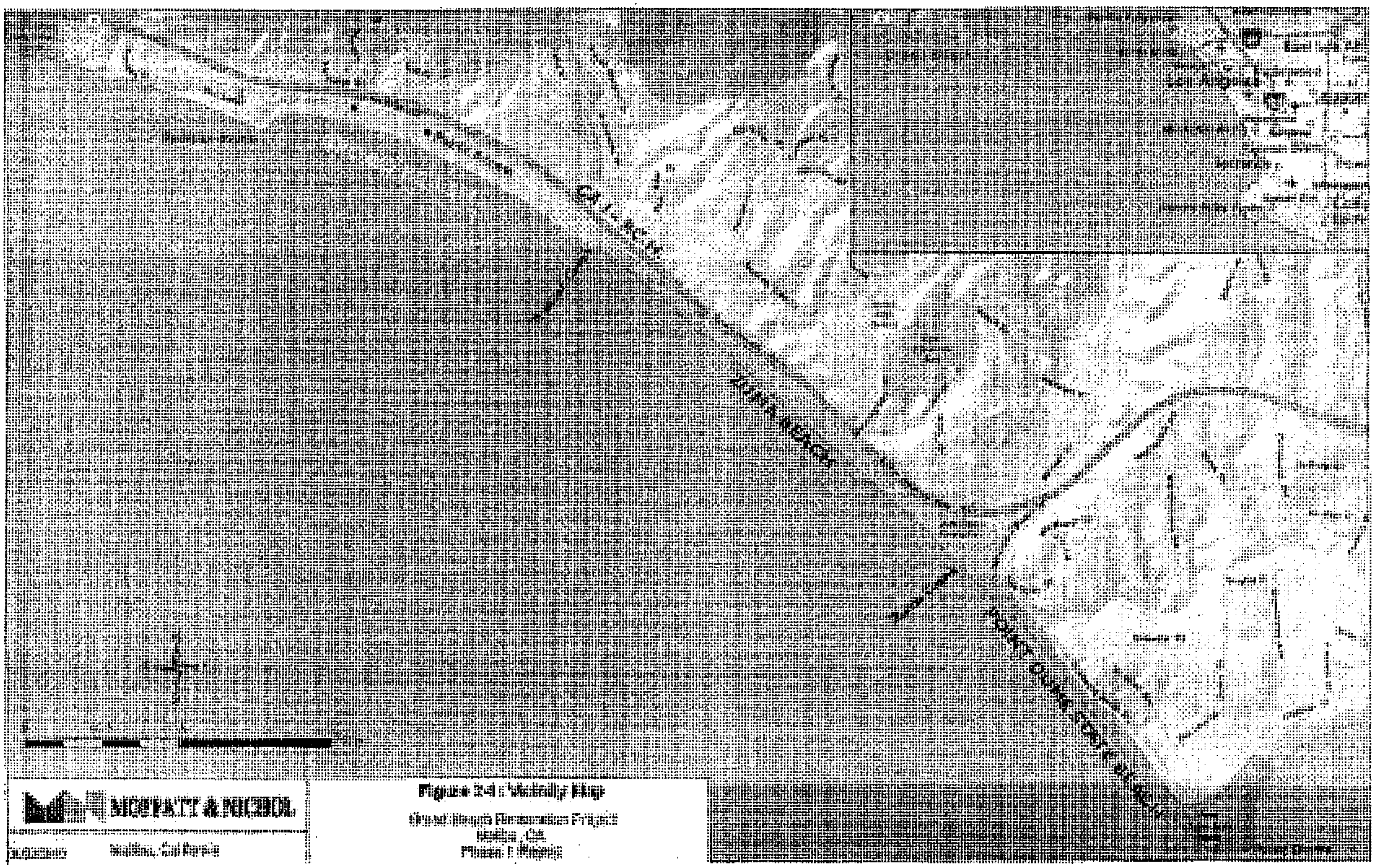


Figure 2-1. Vicinity Map

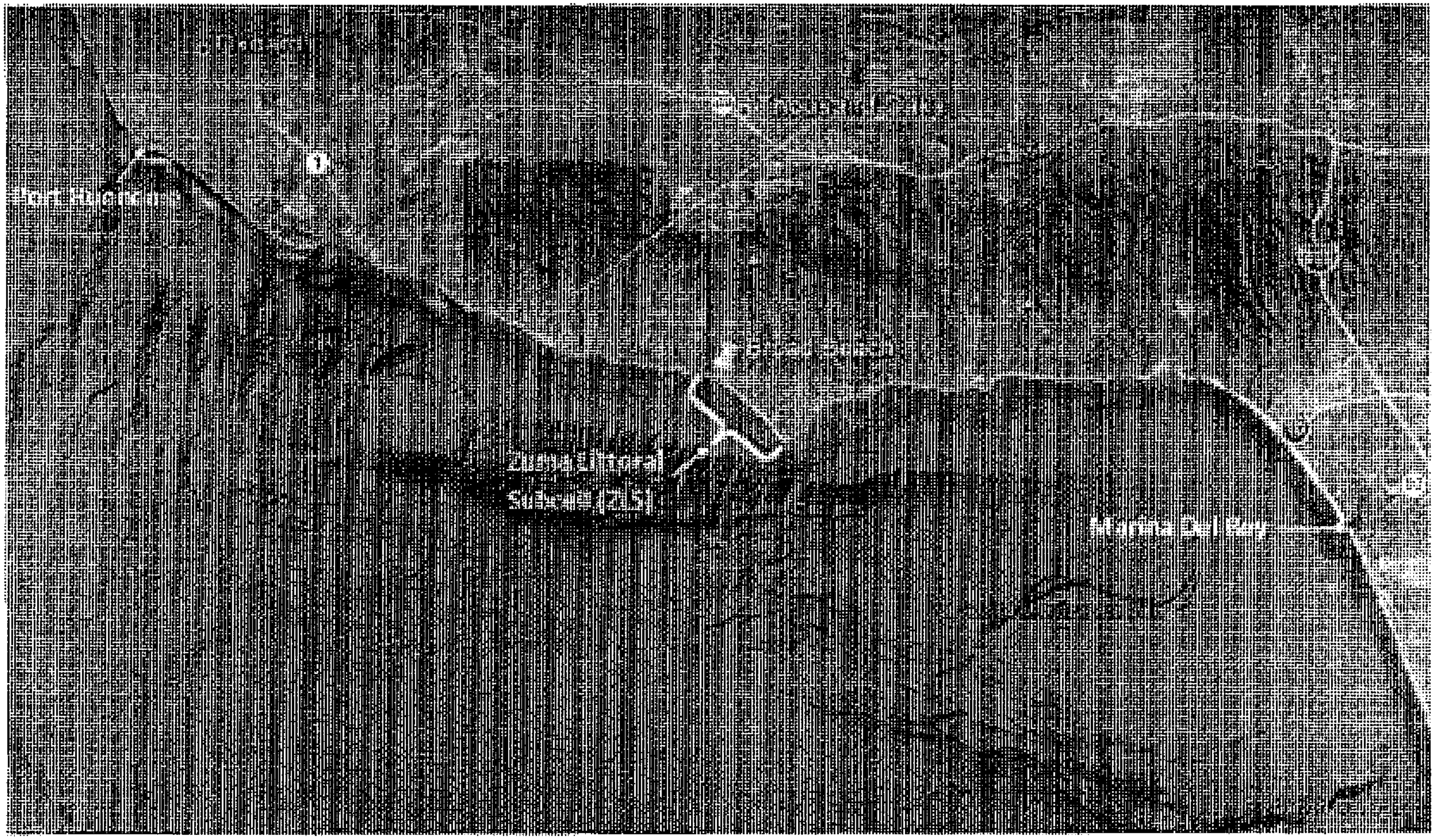


Figure 2-2. Location Map, Modern Malibu Littoral Cell (MMLC)

2.2 Existing Broad Beach Coastal Development

The coastal community of Broad Beach is currently protected by a temporary rock revetment fronting most properties west of the Malibu West Beach Club and east of 31350 Broad Beach Road. Shore protective devices west of this address consist of individual measures constructed for one or two lots. These measures include rock revetments, concrete vertical seawalls, and timber seawalls. Several properties do not have any shore protective structure in place and some are supported by piles which are currently exposed.

2.3 Public Access

Public access to Broad Beach is available via lateral access from Zuma Beach County Park and two vertical access points from Broad Beach Road. Ample parking is available at Zuma Beach but is somewhat limited at the vertical access points.

Vertical access to Broad Beach is provided in two locations at 31344 and 31200 Broad Beach Road via easements between private properties. A component of the emergency revetment project was the improvement of vertical public access paths operated and maintained by Los Angeles County Department of Beaches and Harbors. A concrete walkway and steps to the beach were constructed over the temporary revetment to maintain vertical access at these locations. These vertical public access paths will be incorporated into each proposed alternative.

The eroded shoreline along Broad Beach has significantly limited the recreational beach area and lateral access. There is essentially no dry beach available along most of the beach and during even moderate high tides of 3-4 feet, most of the beach is submerged with waves breaking directly onto the temporary revetment.

In addition to existing physical limitations, lateral access along Broad Beach is affected by a complicated mix of public land, Offers to Dedicate (OTDs) public lateral access easements and private property. Land seaward the mean high tide line (MHTL) is considered public land. The existing easements along Broad Beach vary from one property to the next according to the recorded grants and in some areas may influence lateral access available to the public. Some recorded grants provide for a designated "buffer" seaward from authorized development on a property and the portion available for public access. The buffer typically varies from 5 feet to 50 feet wide along Broad Beach.

3.0 COASTAL PROCESSES

This section describes general coastal processes that are relevant to the selection and design of solutions to the coastal erosion problems at Broad Beach. These processes include sand movement, tide levels, sea level rise, and wave climate. This section also includes a discussion of the historical shoreline changes at Broad Beach which are important to understand potential sand loss rates for beach nourishment solutions.

3.1 Water Levels

Water levels are in a constant state of fluctuation subject to short term changes due to tides and storm surge and long term changes associated with sea level rise. Water levels and elevations on land throughout this study are referenced to the Mean Lower Low Water (MLLW) datum. MLLW, as shown in Table 3-1, is approximately 2.8 feet below mean sea level averaged over the most recent tidal epoch. The following sections discuss the processes that influence water levels with a focus on those causing elevated water levels that are most often responsible for coastal-related flooding and damage.

3.1.1 <u>Tides</u>

The tides at Broad Beach are classified as mixed semidiurnal (two unequal highs and lows per day). Tide characteristics from the Los Angeles tide gage nearest the project site are shown in Table 3-1. These are based on the most recent (1983-2001) tidal epoch.

Table 3-1. Water Levels at Broad Beach, Based on LA Outer Harbor Tide Station (NOAA/NOS, 2008)

Water Level	Elevation to MLLW Vertical Datum
Extreme High (Observed January 27, 1983)	+7.8 feet
Mean Higher High Water (MHHW)	+5.5 feet
Mean High Water (MHW)	+4.7 feet
Mean Sea Level (MSL), 1983-2001 Epoch	+2.8 feet
National Geodetic Vertical Datum -1929 (NGVD29)	+2.6 feet
Mean Low Water (MLW)	+0.9 feet
North American Vertical Datum – 1988 (NAVD88)	+0.2 feet
Mean Lower Low Water (MLLW)	0.0 feet
Extreme Low (Observed December 17, 1933)	-2.7 feet

3.1.2 <u>Storm Effects</u>

In Southern California, the highest tides of the year typically occur in the winter months. Wave overtopping and wave-related coastal damage often occurs when an extremely high tide coincides with high storm waves. A statistical analysis of extreme water elevations was developed based on recorded annual extreme high water elevations obtained from the National Ocean Service for the outer Los Angeles Harbor reference tide station. Water elevation records were available from 1923 to 2002. Table 3-2 shows the annual extreme high water elevation versus recurrence interval. The extreme still water levels combined with sea level rise projections provide the basis for estimating a design water depth for coastal engineering analyses.

Table 3-2. Extreme Water Levels versus Recurrence Interval

Recurrence Interval (Years)	Extreme Still Water Elevation (Feet, MLLW)
5	7.4
10	7.6
25	7.7
50	7.9
100	8.0

3.1.3 *Long Term Sea Level Rise*

Sea level is rising as the result of general global warming that melts ice caps and expands the water column through heating and possibly due to decadal effects such as the El Niño Southern Oscillation and the Pacific Decadal Oscillation.

At a given coastal site, the rate of eustatic (global) sea level rise is of less practical importance than the local rate of sea level rise relative to the land. This relative sea level rise is the net sum of the global sea level rise and local tectonic conditions (land uplift or subsidence). In the Los Angeles (LA) area, long term records (84 years) at the NOAA LA Outer Harbor tide station indicate a water level change of 0.27 ±0.09 feet per century (NOAA 2009). This is in comparison to the historic global eustatic average sea level rise rate of 0.6 ±0.2 feet per century (IPCC 2007). This comparison indicates that the LA area water level is not rising as fast as the global eustatic rise rate, suggesting that land uplift has contributed to the reduced rate of relative sea level rise in the LA area. Based on the NOAA tide station, this equates to 0.33 feet per century of uplift in the LA Harbor area. The California Coastal Commission cites uplift at Point Dume (just downcoast of Broad Beach) as 0.10 to 0.12 feet per century, indicating that the LA Harbor area uplift may be slightly more than that of the Broad Beach area.

Moffatt & Nichol (M&N) has developed estimates of future relative sea level rise in the Southern California area based on the work of others, specifically the Intergovernmental Panel on Climate Change (IPCC), S. Rahmstorf in a follow-up study, and the recent *California 2008 Climate Change Scenarios Assessment* (CA Climate Change Center, 2009). (The Rahmstorf analysis addresses possible model limitations associated with IPCC predictions of global sea level rise). For future relative sea level rise, assuming that the LA Harbor area continues to have land uplift of 0.33 feet per century (0.04 inches per year), three plausible scenarios were identified:

- Low rate of increase: Sea level rise continues at the average of low sea level rise projections for different emissions scenarios given in the 2007 IPCC Report (IPCC 2007). Relative to the value in 2000, the sea level rises **2 inches by 2050 and 9 inches by 2100.** These projections are fairly consistent with the most recent Coastal Commission "90% probability" projections for the Santa Monica area (CCC 2001).

- Likely high rate of increase: Sea level rise according to the mid-range of predictions from the recent *California 2008 Climate Change Scenarios Assessment* (CA Climate Change Center, 2009). This is similar to the mid-range of Rahmstorf's projections and is above the highest values given in the 2007 IPCC Report (IPCC 2007). Relative to the value in 2000, the sea level rises **12 inches by 2050 and 37 inches by 2100.** These projections are fairly consistent with the most recent Coastal Commission "10% probability" projections for the Santa Monica area (CCC 2001).

- Highest rate of increase: As specified by the California State Coastal Conservancy (CA State Coastal Conservancy 2009) and based on the highest predictions from the recent *California 2008 Climate Change Scenarios Assessment* (CA Climate Change Center 2009). Taking into account local uplift, the sea level rises **16 inches by 2050 and 52 inches by 2100.**

Since this project will require regulatory agency permits, it is important to understand the sea level rise requirements of the jurisdictional agencies, including the State of California and federal government. Three guidance documents have been prepared by the State of California regarding the issue of sea level rise:

1. *California State Coastal Conservancy Memo (2009).* This policy statement includes the following direction:
   - "Prior to the completion of the National Academies of Science report on sea level rise, consistent with Executive Order S-13-08, the Conservancy will consider the following sea level rise scenarios in assessing project vulnerability and, to the extent feasible, reducing expected risks and increasing resiliency to sea level rise:
     - 16 inches (40 cm) by 2050.
     - 55 inches (140 cm) by 2100."
   - These numbers are the basis of what was used as the "highest rate of increase" prediction above.
2. *Executive Order S-13-08.* The executive order directs the California Resources Agency to request that the National Academy of Sciences convene an independent panel to complete the first California Sea Level Rise Assessment report. This report is intended to be completed no later than December 1, 2010,

but is behind schedule and may be available in mid-2012. The final Sea Level Rise Assessment Report will advise how California should plan for sea level rise. Additionally, the Executive Order states that prior to the release of the final Sea Level Rise Assessment Report that all state agencies planning construction projects in areas vulnerable to future sea level rise shall, for the purposes of planning, consider a range of sea level rise scenarios for the years 2050 and 2100 in order to assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise. Sea level rise estimates should be used in conjunction with appropriate local information regarding local uplift and subsidence, coastal erosion rates, predicted higher high water levels, storm surge, and storm wave data.

3. _California Coastal Commission (2001)._ The California Coastal Commission published a paper titled "Overview of Sea Level Rise and Some Implications for Coastal California" on June 1, 2001 (CCC 2001). The paper recognized that the continued rise in sea level will affect almost all coastal systems by increasing the inundation of low coastal areas and potential for storm damage, beach erosion, and beach retreat. Regarding implications, the report states that:

   - "In California, it is likely that a combination of hard engineering, soft engineering, accommodation / adaptation, and retreat responses will be considered to address sea level rise. There are situations where each response may be appropriate and well-suited. In all coastal projects, it is important to recognize and accept that there will be changes in sea level and in other coastal processes over time."

In addition to the three State of California guidelines, the U.S. Army Corps of Engineers has released guidance, Engineering Circular No. 1165-211 (USACE 2009), stating that the scenarios developed by the National Research Council (NRC) in 1987 should be used in planning civil works projects potentially affected by sea level rise. Specifically, the following scenarios should be used:

- The current trend in sea level rise should be used as the "low sea level rise" scenario. This is generally consistent with the "low rate of increase" prediction above.
- The modified NRC Curve I, which assumes 0.5 meters rise between 1986 and 2100, (20 inches between 2000 and 2100), should be used as the "medium sea level rise" scenario.
- The modified NRC Curve III, which assumes 1.5 meters rise between 1986 and 2100, (59 inches between 2000 and 2100), should be used as the "high sea level rise" scenario. This is close to the California State Coastal Conservancy (2009) guideline and the "highest rate of increase" prediction above.

More rapid scenarios have been discussed in the scientific literature, particularly in light of possible nonlinear effects such as instability of the Antarctic and Greenland Ice Sheets. The likelihood of these more rapid scenarios is unclear.

The potential impacts of sea-level rise on the beach and dune system are difficult to quantify with any certainty. If the beach were treated as a simple sloped structure with a 30:1 (horizontal to vertical) slope, then the waterline could move landward by as much as 30 feet or more by the year 2050. However, since the beach is dynamic, it has the ability to respond to water level changes and the results are rarely linear. In addition, there is a dune at Broad Beach which further complicates the situation. It is clear, however, that sea-level rise places the landside structures at additional and increasing levels of risk, and should be considered a fundamental part of any design solution.

The primary effect of sea level rise on beaches is that the position of the shoreline will retreat landward. In general, on beaches which have a slope of 10:1 (horizontal:vertical), each inch of sea level rise would result in 10 inches of beach retreat (loss of beach width). For beaches which have a slope of 30:1, each inch of sea level rise would result in 30 inches of beach retreat, i.e. the flatter beaches would experience a greater amount of shoreline retreat. Based on the projected sea level rise numbers above and assuming no modifications to the shoreline, future beach retreat along LA area beaches was estimated for the range of scenarios (lower rate to highest rate); these values are shown in Table 3-3.

Table 3-3. Beach Retreat Due to Sea Level Rise Rates at Los Angeles Area Beaches

Beach Slopes Horizontal : Vertical	Horizontal Beach Retreat From 2010 Shoreline (Lower Rate to Highest Rate, Feet)	
	Year 2030	Year 2050
10:1 (Steeper)	1 to 5	1 to 11
20:1	1 to 11	3 to 21
30:1 (Flatter)	2 to 13	3 to 27

At Broad Beach, the foreshore beach slopes (area seaward of scarp face or edge of dune) are close to 30:1. The distance between the existing high tide line (MHW) and the back beach (edge of dune or edge of scarp face) is close to zero along much of the Broad Beach shoreline, i.e. the high tide line is already at the back beach line. Based on this and the sea level rise numbers in the table above, the scarp face would move almost 30 feet landward by 2050 just due to sea level rise if no back beach shore protection was in place.

3.2 Waves

Wave climate is the primary force for generating alongshore sediment transport and is therefore a critical element of any study aiming to evaluate and quantify sediment transport rates and associated change in beach sand volume and shoreline position.

This section provides a summary of the wave climate along Broad Beach and discusses the wave data sources used to evaluate the regional and local historic beach performance.

3.2.1 Wave Exposure

The southern exposure of Malibu and the proximity of the Channel Islands offshore limit the direction from which potentially destructive storm waves can impinge upon the area. The islands serve to create wave exposure windows, dissipating and reflecting wave energy and thereby modifying the wave conditions along the mainland shoreline. Upcoast shoreline features also serve to create wave exposure windows and refract waves before they reach the Malibu area. Wave exposure windows for the Malibu shoreline are illustrated Figure 3-1.

In general, there are three main types of waves which occur along the southern California coast and which could occur through the Malibu wave exposure windows: North Pacific swell, southern swell, and seas generated locally. The North Pacific swell events are the most significant source of extreme waves in the region. The Broad Beach area is exposed to North Pacific swell through the Santa Barbara Channel. Swell from winter storms in the southern hemisphere reach California during the months of May through October. These swells approach Malibu from the southwest, south, and southeast, but are partially blocked by the Channel Islands. Additionally, the great decay distances result in waves of low heights and long periods.

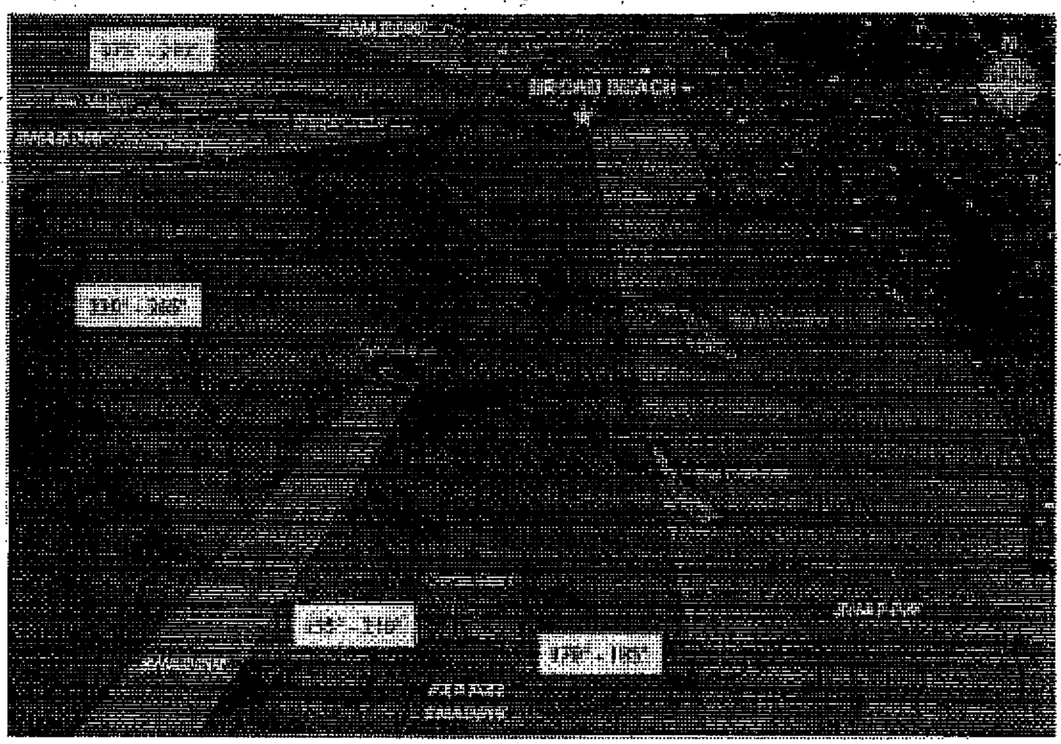


Figure 3-1. Wave Exposure Windows at Broad Beach

Wave direction affects how the sand moves along the shoreline. Waves that travel through the Santa Barbara Channel to Malibu from the west (North Pacific swell waves) are especially effective at moving sand alongshore from west to east. South swells arriving nearly straight onto the shore of Malibu are more effective at moving sand in a cross-shore direction, either offshore to deeper water or onshore from deeper water.

Scripps Institution of Oceanography operates and maintains ocean monitoring stations through the Coastal Data Information Program (CDIP). The closest CDIP monitoring station to Broad Beach is CDIP Buoy 102 offshore of Point Dume in 365 meter water depth. The significant wave heights and wave periods based on wave direction at this buoy are shown in Figure 3-2 and Figure 3-3 respectively.

Flick and O'Reilly (2008) studied wave exposure at Broad Beach based on the closest NOAA wave buoy (Buoy 46025, approximately 33 miles northwest of Catalina Island). Their study presented wave transformation coefficients that can be used to determine the relative wave height at Broad Beach as a function of the offshore wave period and direction of wave travel. The study showed that Broad Beach is vulnerable to a broad swath of southerly and south-westerly approaching waves (from 170° to about 240°) where the refraction coefficients are close to 1 (high) or ever larger in a few instances. Wave exposure falls off rapidly for essentially all wave periods for approach directions north of about 260°.

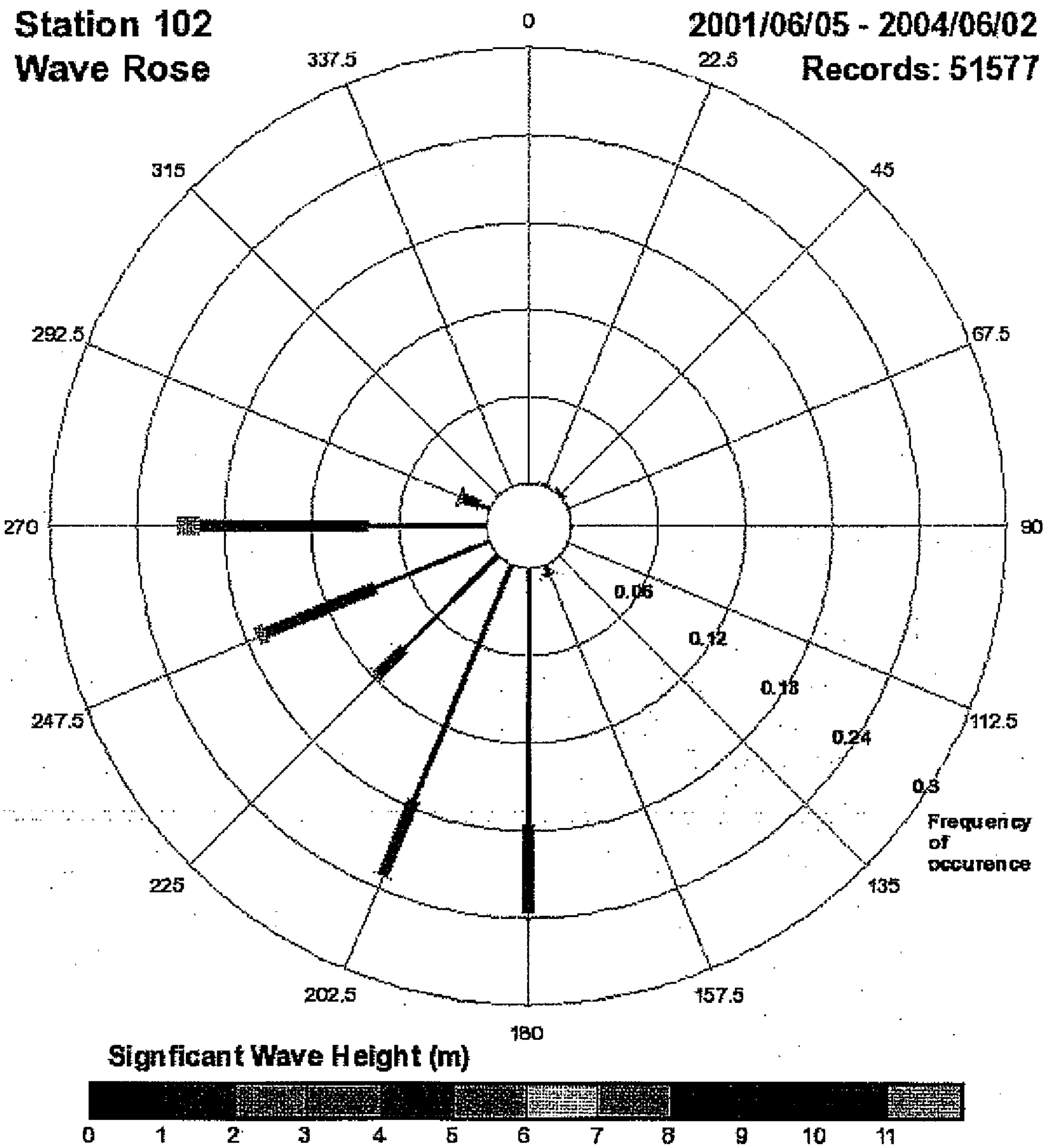


Figure 3-2. Significant Wave Height (Wave Rose) Offshore of Point Dume (CDIP, 2010)

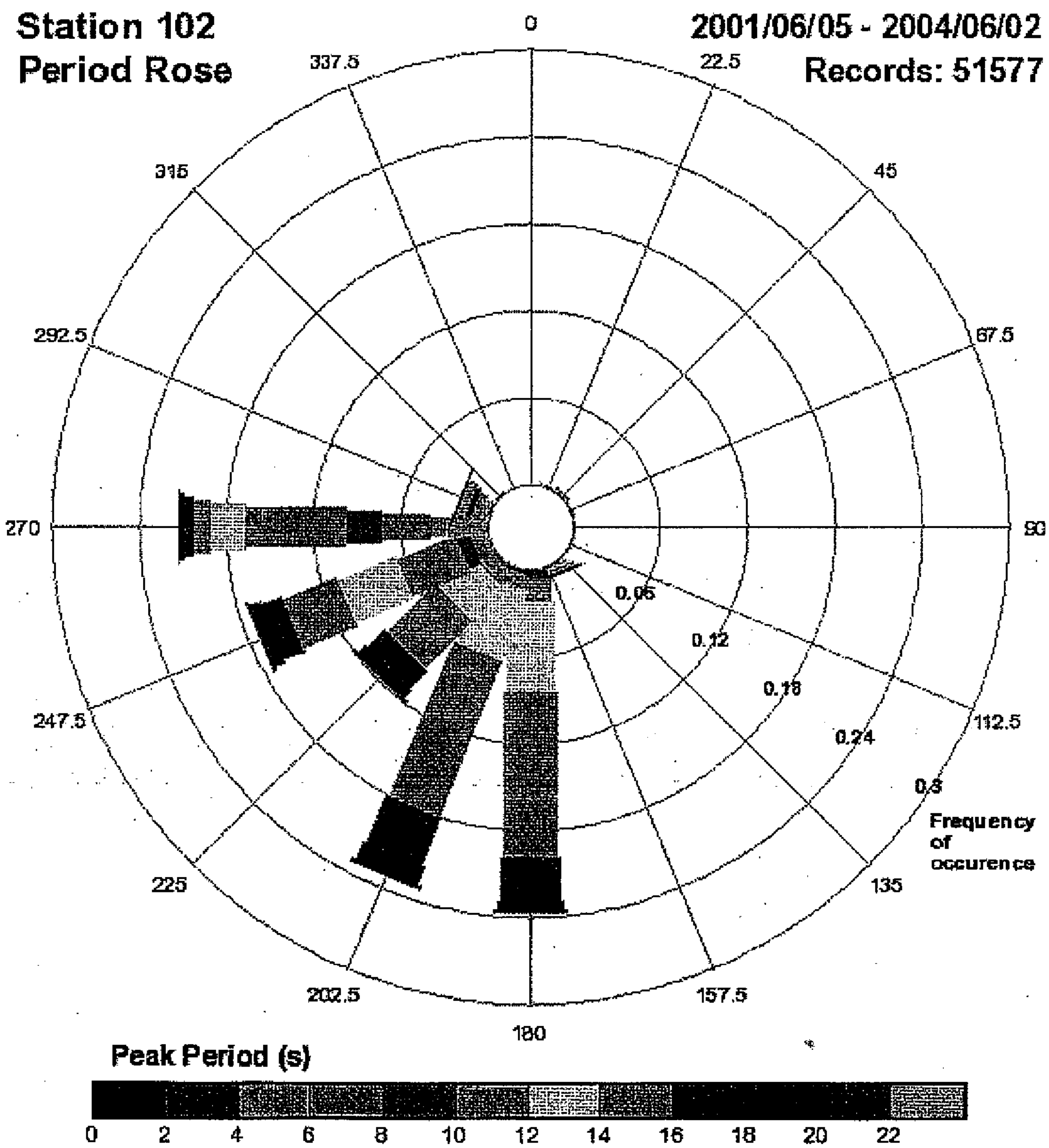


Figure 3-3. Peak Wave Period (Period Rose) Offshore of Point Dume (CDIP, 2010)

3.2.2 Extreme Waves

Flick and O'Reilly (2008) also noted a number of large wave events that stand out in the NOAA wave buoy records. These include the maximum measured wave height of about 26 feet on January 19, 1988 and several other wave-storm events exceeding 20 feet. Based on the NOAA wave buoy data from 1982 to 2001, the mean monthly wave heights varied by only 50% or so (range of 3.3 to 5 feet), whereas the seasonal variation in the extreme wave heights varied by a factor of four (from ~6.5 feet in July to 26 feet in January). Extreme wave heights drop substantially to about 13 feet by April and May each year, and stay that way on average through October.

El Niño conditions cause increased storminess and have historically increased the frequency and intensity of higher local waves, increasing the severity of beach erosion and coastal flooding. El Niño conditions occur on average every 2-5 years, and usually last about 12 months. Strong El Niños occur less frequently and they come in many different varieties, with no two ever the same, (Flick, 2009). Whether and how waves from any particular El Niño winter affect southern California is largely determined by the tracks storms take as they travel from their generation regions in the western Pacific off Asia toward the Eastern Pacific and North America. These tracks are determined by the path of the mid-latitude jet stream, which depends on the relative positions of the North Pacific high pressure system and the Aleutian low. About two-thirds of El Niños are associated with strong winter storm activity in southern California. (Flick, 2009)

El Niños have occurred most recently in 1982-83, 1986-87, 1991-92, 1994-95 and 1997-98, 2002-03, 2006-2007, and 2009/2010. The 1997-98 was the strongest on record and it developed more rapidly than any El Niño of the past 40 years. The 1982-83 El Niño is also considered to be one of the most major recent storm events and caused considerable damage along the coast of California.

3.2.3 Design Wave for Shoreline Structures

The critical design case for shallow water shoreline structures is when wave breaking takes place in front of the structure (CEM 2003). The maximum height of waves which can break upon a shoreline structure is limited by the water depth fronting the structure. The water depth varies over time based on tide levels and will increase with future sea level rise. This analysis is based on this maximum depth-limited breaking wave height which is defined as the "design wave height". Deep water waves exceeding the design wave height will break offshore and dissipate much of their energy before they reach the shoreline structure.

A statistical evaluation of extreme high water elevations was developed based on the recorded annual extreme high water elevations obtained from the NOAA/NOS LA Outer Harbor reference tide station (Table 3-4). The effect of future relative sea level rise must also be included in the determination of the design water depth.

The extreme scour elevation is also required to determine the design water depth at the toe of any potential shore protection device. Due to the variability of the sand elevations from seasonal changes and storm events, it is difficult to predict with great accuracy the depth of scour. But, based on experience in Southern California, a scour depth of 0 feet

MLLW is appropriate to reduce undermining. Therefore, scour depth at the toe of the structure is estimated to reach the mean lower low water elevation.

Based on the probabilistic extreme high water elevations, sea level rise, and assumed scour elevation, a range of potential design water depths was calculated, i.e. the low end of the range was calculated based on a 5-year recurrence high water elevation with a low rate sea level rise. A high end estimate was calculated based on a 100-year recurrence high water elevation with the highest rate sea level rise.

Factors other than water depth which affect the maximum wave height are the incident wave period and nearshore beach slope. Longer period waves will result in higher design breaking waves (USACE 1984). A design wave period, T, of 16 seconds was selected as the design period to obtain the breaking wave height, as this represents the average of the most frequently occurring storm-generated swell in this region. Based on available beach profiles in the Broad Beach area, nearshore slopes ranged from approximately 25:1 (horizontal:vertical) to 30:1.

Estimates of breaking wave heights were developed using methods described in the *Shore Protection Manual* (USACE 1984) and *Coastal Engineering Manual* (USACE 2003), for the range of potential design water depths. The results (range of potential breaking wave heights) are shown in Table 3-4.

Table 3-4. Broad Beach Breaking Wave Heights Range

Probabilistic Still Water Elevation Based on LA Harbor Tide Gage Statistics		Probabilistic Sea Level Rise by 2050 (Feet)		Design Water Level (Feet, MLLW)	Maximum Scour Depth (Feet, MLLW)	Design Water Depth (Feet)	Breaking Wave Height (Feet)
Recurrence Interval (Years)	Elevation (Feet, MLLW)						
5	7.4	Low Rate	0.2	7.6	0.0	**7.6**	**8.3**
25	7.7	Likely High Rate	1.0	8.7	0.0	**8.7**	**9.6**
100	8.0	Highest Rate	4.3	12.3	0.0	**12.3**	**13.3**

These large breaking wave heights are indicative of the relatively steep nearshore profile fronting Broad Beach and the significant estimates of future sea level rise.

3.3 Sediment Transport Rate Analysis

The preceding sections summarize existing and available data used to describe historic and recent shoreline locations, the wave climate that plays an important role in the shoreline dynamics, and the water level variations and projected future sea level rise that can affect wave conditions and shoreline location. This section draws upon this information and other data sources to conduct detailed analysis to quantify historic shoreline changes and sediment transport rates which will be the key parameters in the development of a long-term shoreline restoration project.

The average Broad Beach volume changes relative to an arbitrary base are presented in Figure 3-4 through Figure 3-6, and include the associated trendlines. Figure 3-4 shows the full 63-year data record. Figure 3-5 illustrates the trend over the past 41 years during which the beach was generally erosive. Figure 3-6 shows the most recent five-year time period. By reviewing the changes in volumes, as well as rates of change in volume, trends in the sediment transport regime can be assessed. The earliest switch from rise to fall in the volume of the littoral sediment lens appears to have occurred in the late 1960s and 1970s. The peak was followed by a progressive loss until the present. The trendlines indicate the following:

- Figure 3-5: 1968-2009, 41 years of data - 20,000 cubic yards per year (cyy) loss.
- Figure 3-6: 2004-2009, 5 years of data - 35,000 cyy loss.

These trends indicate that there is a continuing pattern of erosion since the 1970s and that the erosional trends are accelerating

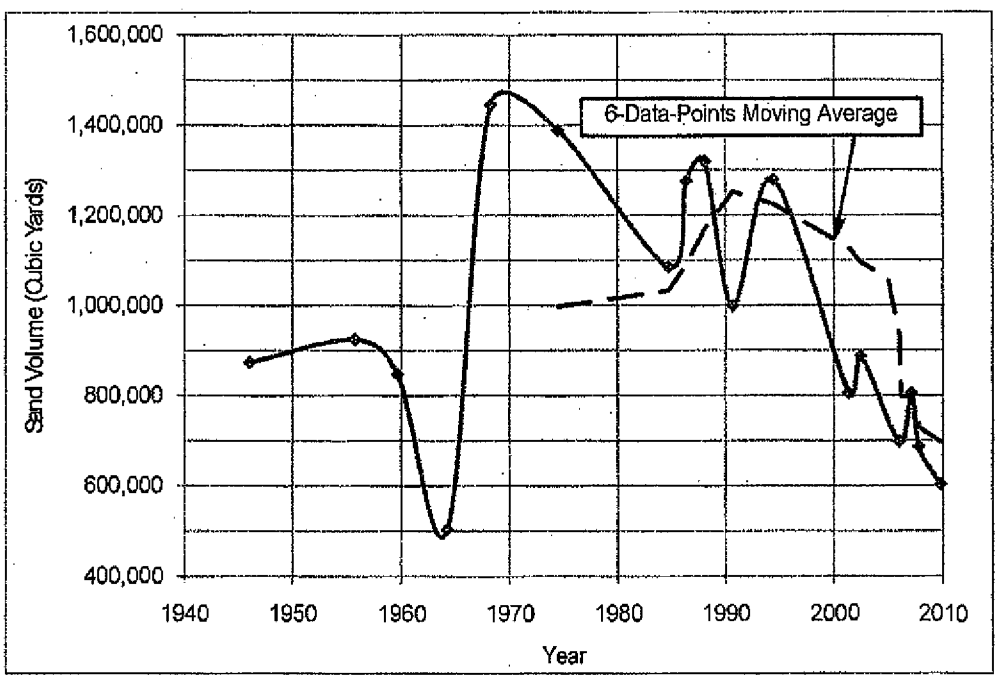


Figure 3-4. Volumetric Changes, 1946-2009

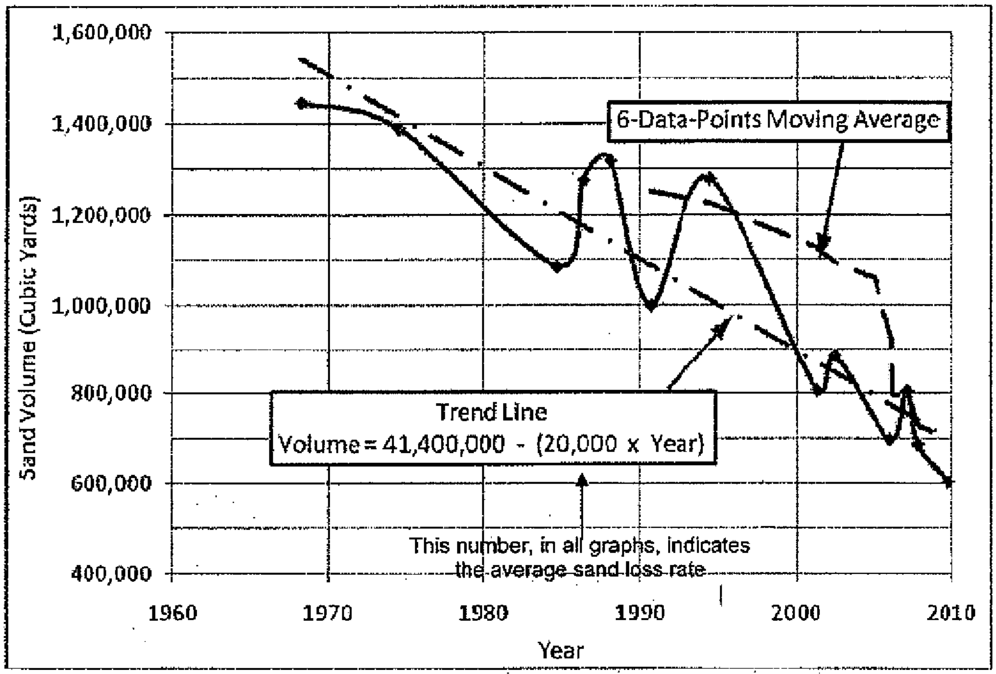


Figure 3-5. Volumetric Changes, 1968-2009

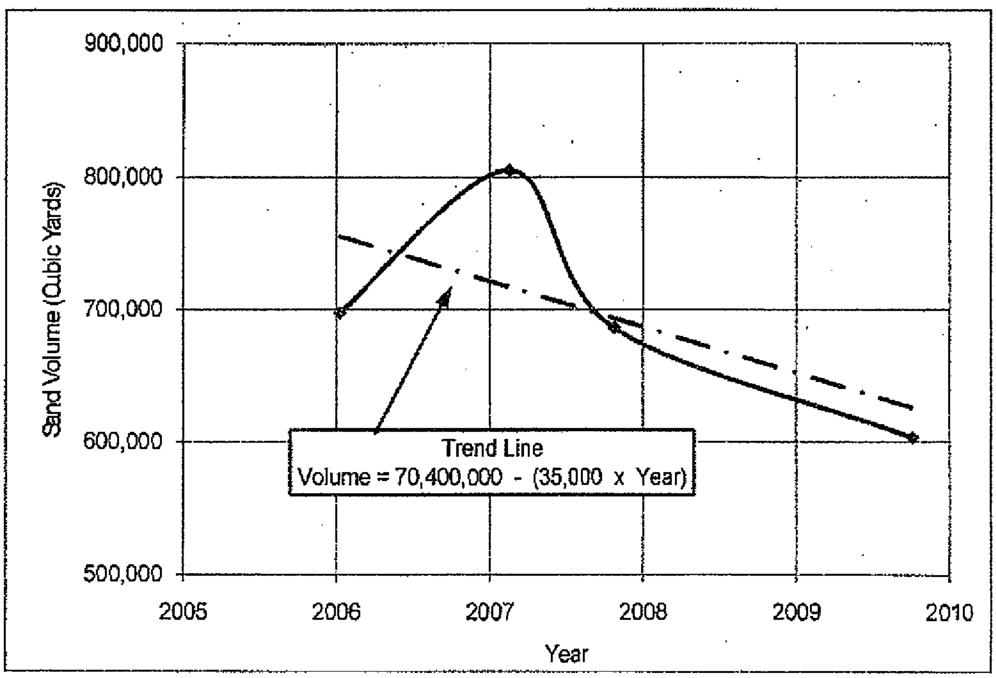


Figure 3-6. Volumetric Changes, 2006-2009

3.4 Summary

Sand loss estimates were developed based on the sum of two components of sand loss: (1) the current "natural" loss rate projected into the future, and (2) the additional loss due to beach widening (beach nourishment).

Between 1974 and 2009, approximately 600,000 cy of sand were lost at Broad Beach. On average, the shoreline moved inland an average 65 feet. The greatest recession occurred close to Lechuza Point and tapered off toward Trancas Creek. Once the sand budget turned negative in 1974, the Broad Beach loss rate increased thereafter by approximately 900 cyy. By 2009, the natural sand loss rate was about 35,000 cyy at Broad Beach.

The Broad Beach shoreline is retreating because of a negative sand balance. Sea level rise accounts for less than 5 percent of that imbalance. An analysis of wave measurements and historical beach and shoreface data also argues against the notion of a decades-long transport of hundreds of thousands of cubic yards offshore. Rather, the sand imbalance is due to a positive longshore sand transport gradient. The analysis indicates the gradient is either due to a reduction in sand supply entering around Lechuza Point, or a change in the alongshore component of wave energy that increases the amount leaving near Trancas Creek.

4.0 DESCRIPTION OF PROPOSED PROJECT

4.1 Project Objectives

The objective of the Broad Beach Restoration Project is to design, permit, and implement a long-term shoreline restoration program that provides erosion control and property protection, with ancillary benefits of improved recreation and public access opportunities, aesthetics, and environmental stewardship. The need for this project is a result of a decade's long trend of shoreline erosion that has recently accelerated and reached a critical point in which residential structures and onsite wastewater treatment systems are threatened by coastal erosion and flooding. The major objectives of the proposed project are as follows:

- Protect existing homes, structures and other improvements including septic systems along Broad Beach from coastal erosion;
- Create and maintain a wide sandy beach backed by a restored dune system similar to that which historically occurred along this reach of coastline;
- Develop a cost-effective long-term plan for maintaining shore protection along Broad Beach; and
- Provide for enhanced public access along Broad Beach while maintaining homeowner beach access and privacy.

4.2 Project Description

The proposed Project would include validation and permitting of the existing emergency revetment, beach nourishment, and sand dune restoration. These elements, in addition to a long-term maintenance plan, are summarized in this section and discussed in detail in following sections.

As part of the long-term strategy for protection of homes and septic systems from coastal erosion, the proposed Project seeks permanent approval of the emergency rock revetment constructed in 2010, including permits by the city of Malibu and the CCC. If approved, the revetment would remain in place and would be buried beneath a new system of sand dunes located at the landward edge of the widened, nourished beach. Additional nourishment is proposed to keep this shore protection structure buried over approximately the next 20 years, unless severe beach erosion or other conditions preclude maintaining sufficient beach width for protection. The revetment would serve as a last line of defense against future severe erosion during extreme storm events.

The proposed Project would include the deposition of 600,000 cy of sand onto Broad Beach creating a wide sandy beach backed by a system of sand dunes designed to replicate the existing dunes at the east end of the project. For beach nourishment and dune restoration, sand would be dredged and transported from offshore Broad Beach and from a site either off Dockweiler Beach in LA County or from a site outside Ventura Harbor. The Project also includes future efforts to maintain the enlarged beach, including annual or biannual backpassing of sand from the wide reach to the narrow reach of Broad Beach and one additional major renourishment event estimated to occur 10 years after completion of the initial nourishment and dune restoration.

4.3 Beach Nourishment Design

Beach nourishment is a proven method to stabilize or advance a shoreline against erosion and protect threatened upland areas and is often called the "soft solution" because it retains the environmental, recreational, and aesthetic aspects of the beach, without hard structures. Beach nourishment projects constructed with larger volumes and coarser materials tend to remain on the upper portion of the beach for longer time periods. Smaller and finer-grained projects tend to disperse more rapidly and remain on the upper beach for a shorter time period.

The advantages of beach nourishment are inherent in the "soft solution" description. The beach remains as a recreational and environmental amenity to the site. Nourishment allows the beach to adjust to different wave conditions and natural seasonal variation. It can also be an economical solution if there is a readily available source of sand from an inland location or if there is a local offshore sand source. The general disadvantage of beach nourishment is that the beach remains vulnerable to very large storms and it requires periodic maintenance to stabilize or advance the shoreline position.

For purposes of beach and dune design, the beach nourishment plan for Broad Beach was separated into three reaches (A, B, and C) based on environmental sensitivity. The design of the beach nourishment was tailored to account for conditions within each reach; therefore substantial variations in width, slope, and elevation occur across the reaches as shown in Figure 4-1.

Reach A extends for 400 feet from Lechuza Point to 31502 Victoria Point Road, at or near the home constructed on pilings over the beach. This reach includes the majority of the area that supports environmentally sensitive rocky intertidal habitat, rocky outcrops, offshore reef and associated surf grass and kelp habitats. Reach A was designed to have a higher beach berm and narrower beach footprint to be protective of sensitive intertidal and nearshore rocky habitat. Reach B extends approximately 500 feet east of Reach A from 31500 Victoria Point Road to 31418 Broad Beach Road and includes the transition between the environmentally sensitive rocky habitat areas to less constrained sandy beach and intertidal areas. Reach C includes the majority of the Project area and extends for approximately 5,000 feet east from 31412 Broad Beach Road to the east end of the site just upcoast of Trancas Creek and supports less sensitive sandy beach and intertidal habitats.

The top of the existing emergency rock revetment would be buried beneath up to 8 feet of sand; currently exposed foundations, seawalls and pilings of homes on the west end of the beach would be covered by sand. Depending on location, the profile of the new dry sand beach berm would be roughly 12 to 17 feet above MLLW or existing low tide winter sand levels. The new post-construction dry sand beach berm would extend seaward of the dunes by 65 to 110 feet. At its widest point, the combined new beach and dune system would extend for 250 feet seaward from approximately the top of the existing revetment to surf zone on the face of beach berm.

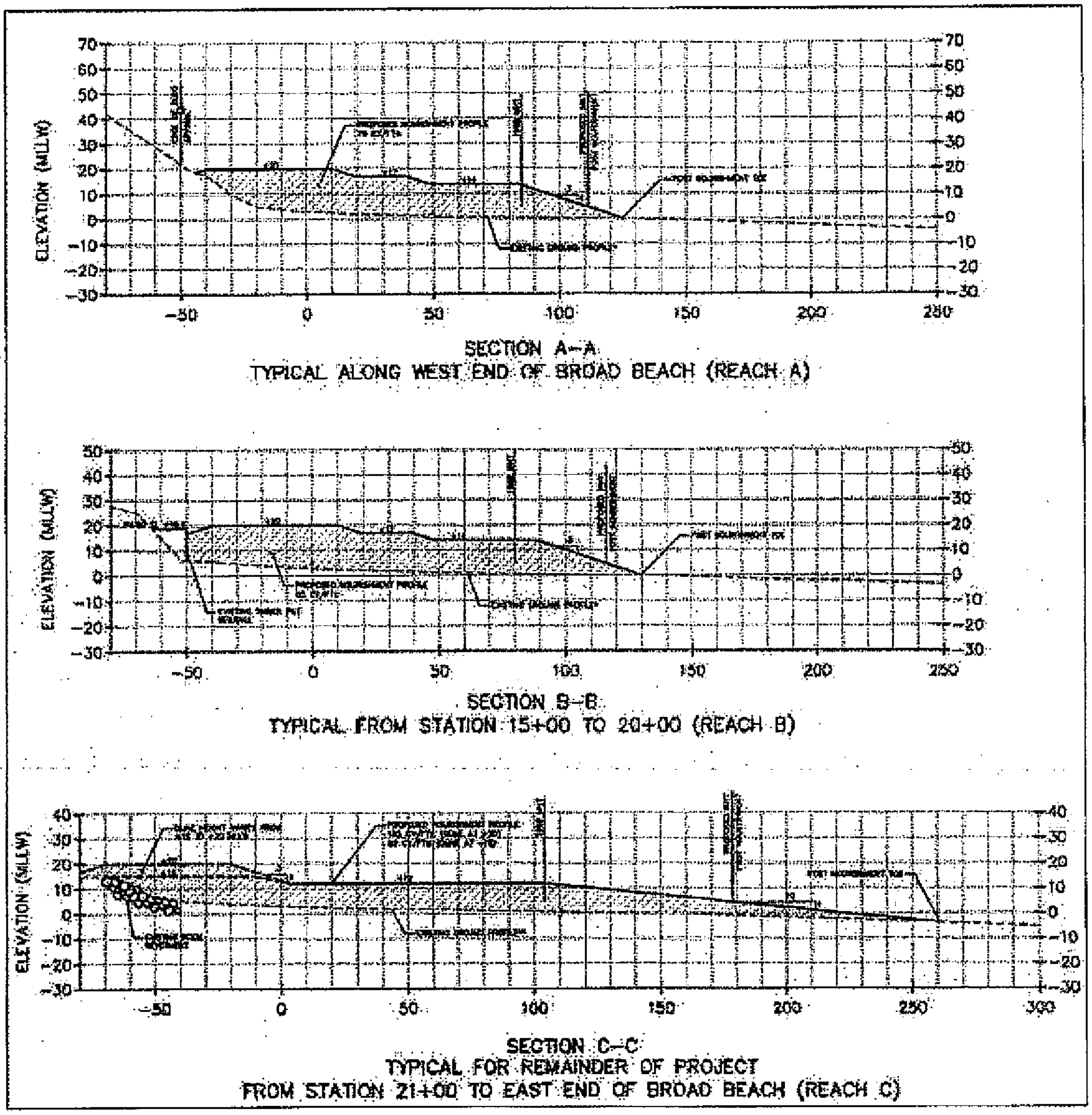


Figure 4-1. Dune Restoration & Beach Nourishment Sections

4.4 Sand Sources

Two main types of sand sources exist, one from offshore, and the other from the upland. Typically, offshore ocean sand sources can provide high quality marine sand at a relatively low overall cost, with minimal environmental impact. Upland sediment sources can also provide sandy beach compatible material, which may be more immediately available than offshore sand, but which may also lead to increased impacts and costs from trucking. Upland sand is typically found behind dams, at quarries, at flood control sites in rivers and detention basins, and at certain alluvial deposits.

Three primary offshore sand sources would potentially be used for the proposed Project: one for fine-grained sand and two for beach-quality coarser grain sand. A total of 600,000 cy of sand would be dredged and placed at Broad Beach. Of this, approximately 100,000 cy would be fine-grained sand dredged from Central Trancas offshore Broad Beach and placed as new sand dune habitat. Approximately 500,000 cy would be dredged either off Dockweiler Beach or adjacent to Ventura Harbor and placed as beach nourishment.

The dune sand at the Central Trancas site will be dredged from a deposit of fine-grained sand located in a water depth range between 45 and 60 feet approximately 0.25 mile offshore of the eastern segment of Broad Beach, shown in Figure 4-2. This existing sediment deposit stretches for approximately 3.4 miles along the coast from Lechuza Point east to Point Dume and is roughly 1 mile wide. Dredging would be confined to approximately 40 acres which would be excavated to a depth of 10 feet using a hopper dredge. This material is chemically clean and compatible with those materials found on the Broad Beach. Grain size analysis of the Central Trancas material indicates the deposit consists of mostly fine to very fine sand with an average grain size between 0.12 to 0.15 mm. Since this material is well below the ideal grain size for beach nourishment this material will be used only for dune restoration.

Sand for beach nourishment should be of a larger grain size in order to better resist erosion. Two locations have been identified as being suitable and available for use in the proposed Project. The primary site is approximately 115 acres in area located in 40 to 50 feet of water depth off Dockweiler Beach near Marina del Rey, approximately 23 miles to the south. This site is shown in Figure 4-3. A secondary source of beach nourishment sand is located in the shoal area immediately outside Ventura Harbor, 36 miles to the north.

Results from the sediment sampling and analysis show that the material from the Dockweiler borrow site are chemically clean and physically compatible with the receiving beach for beach nourishment. The material is ideal for beach nourishment in that the material is coarser than the existing beach sand (mean grain size approximately 0.5mm) so it will remain in place longer after placement, and the fines content matches the fines composition of the dry beach (<1% fines). The Project proposes to utilize Dockweiler North and possibly the northern half of Dockweiler South (if needed) as the borrow area for 500,000 cy of beach nourishment material.

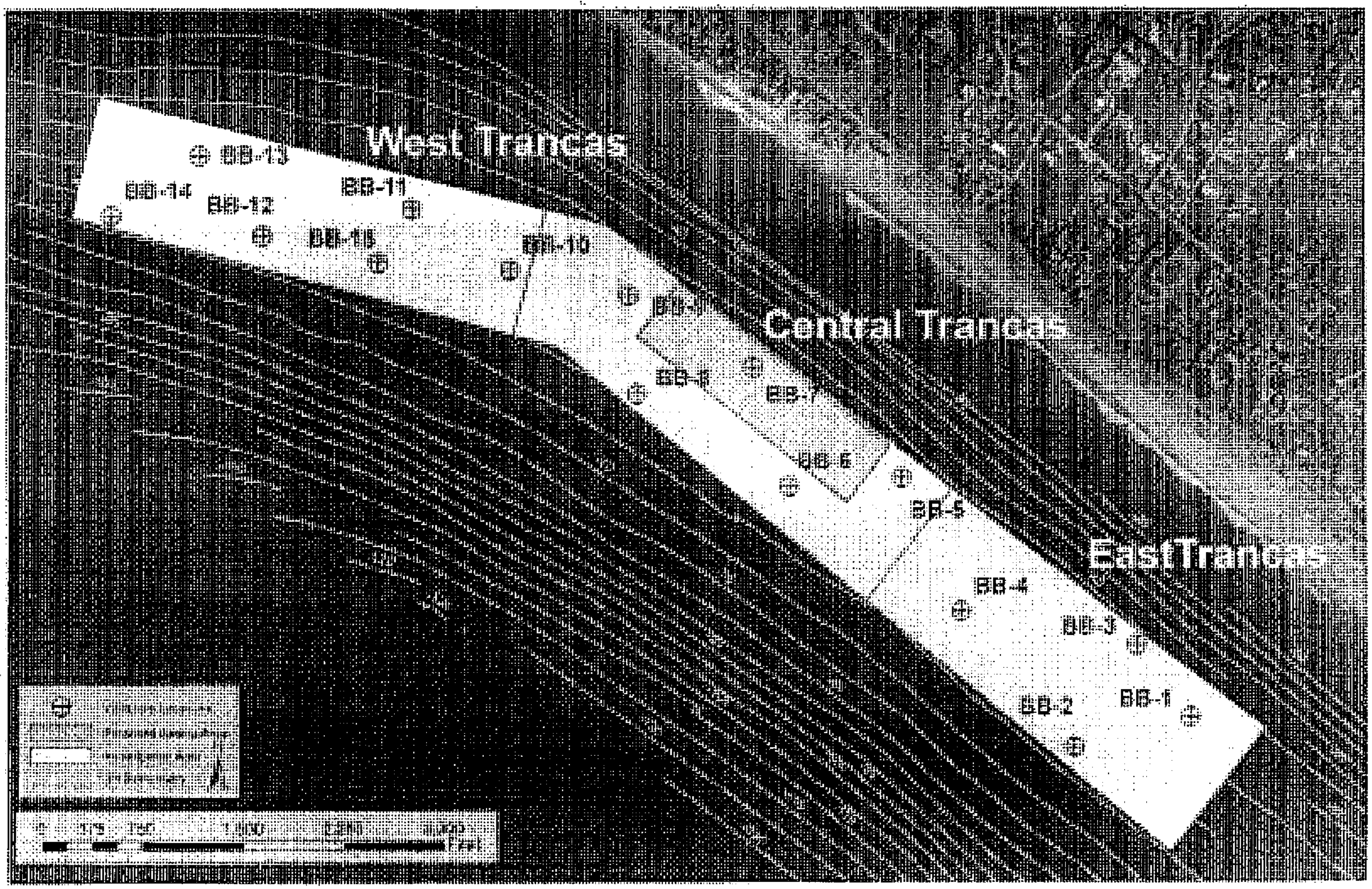


Figure 4-2. Central Trancas Sand Source Location

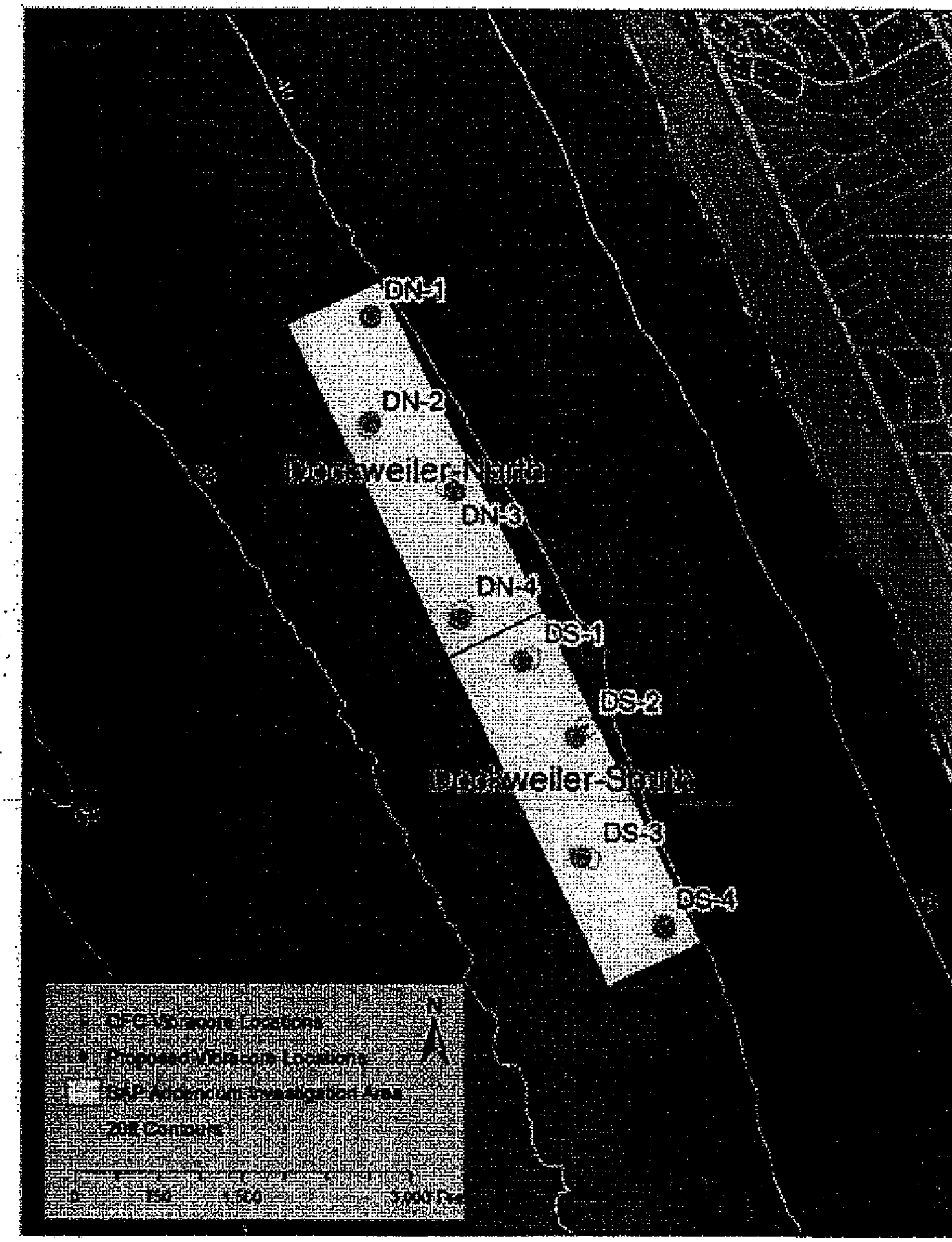


Figure 4-3. Dockweiler Sand Source Location

4.5 Beach Fill and Dune Restoration Construction

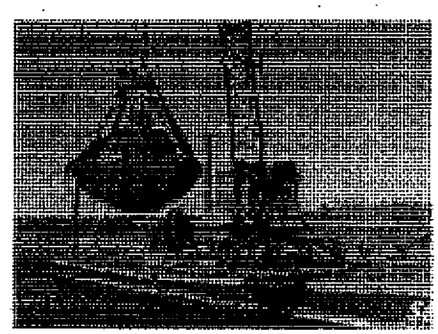
This section provides a general description of the construction methods associated with a beach nourishment project. Construction for the proposed Project is proposed to involve the following sequence of events – some of the tasks may occur concurrently:

- Dredging the offshore borrow sites with either a clamshell dredge, hopper dredge or cutterhead suction dredge;
- Transporting the sand via hopper or scow to Broad Beach and pumping sand through floating/submerged discharge lines to the beach (use of booster pumps as necessary);
- Discharging the sand at Broad Beach within training dikes;
- Redistributing the sand as needed with earthmoving equipment, such as bulldozers, and grading the beach fills to required dimensions; and
- Annual redistribution of the sand as needed from the wide reach of the beach to the narrow reach using heavy equipment such as scrapers and bull dozers.

Major beach nourishment and dune restoration construction activity is estimated to extend over a period of four months beginning in October 2012. Dredging would occur throughout that time, first with beach sand being dredged from Dockweiler Beach or Ventura Harbor, and secondly dune sand being dredged from offshore of Broad Beach. Earthwork activities will occur along Broad Beach simultaneous with the dredging activity to shape the beach and dune to the correct dimensions. Planting, fencing, signage, and placement of temporary irrigation systems within the dunes will be the final tasks of the Project, extending into early 2013.

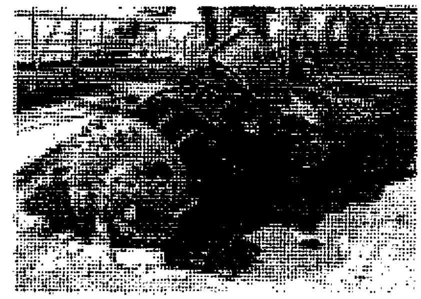
Beach nourishment operations would include the use of dredge vessels to dredge sediment from the offshore borrow sites and transfer the sediment to Broad Beach. The contractor may use one or more of several different dredges and transport vessels depending on the chosen sand source and equipment availability. Some of the options for dredge vessels are described below.

Clamshell dredge: This type of dredge could potentially be used to obtain sand from the Ventura Harbor site. Barge clamshell dredges are not self-propelled and would therefore need a small tugboat to maneuver within the channel. From a barge, the operation would begin when the bucket assembly, attached by a long arm (up to 100 feet) is lowered, in the open position, into the water and allowed to settle into the seafloor to collect sediments. As the dredge operator pulls the bucket up, it closes on the sediment, pulling out up to 5 cy of water-sediment mix. The dredge operator can then deposit the water-sediment mix onto a scow (see below) for transport to the receiver beach.



A clamshell dredge could potentially be used to obtain sand from the Ventura Harbor site, minimizing the amount of water in the sediment load.

Cutterhead suction dredge: This type of dredge could potentially be used to obtain the fine-grained sand from the Trancas deposit offshore Broad Beach or coarse-grained beach-quality sand from the Dockweiler offshore site. In the event that sand is delivered to offshore Broad Beach from a scow (see below), this dredge could also be used to transfer that sand to the beach. A cutterhead suction dredge is a self-propelled vessel that uses a long arm to extend down to the sea floor to dredge sediment. A cutterhead dredge breaks up sediment material along the seafloor, then uses a vacuum mechanism to suck sediment into an intake line and pump it directly to shore, or a transport vessel, through a discharge line.



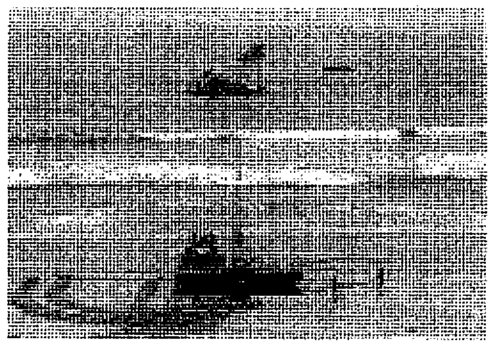
A cutterhead suction dredge (a cutterhead is shown here) would potentially be used to obtain fine-grained sand from the Trancas deposit and beach-quality sand from the Ventura Harbor site.

For the fine-grained sand at Trancas, the cutterhead dredge would anchor above the borrow site while its arm swings back and forth to dredge up sediment. It would then pump a mixture of sediment and sea water through a floating discharge line directly onto Broad Beach. The discharge line would be assembled afloat, connected to the cutterhead suction dredge, and pulled to land by tugboats, or assembled on land and dragged offshore to the dredge by tugboat. Unlike the hopper dredge, the cutterhead dredge would remain off of Broad Beach at the dredge site for the entire operation while pipelines carry the material. If the cutterhead suction dredge were used at the Ventura Harbor site for coarse-grained sand, it would pump the dredged sand into a scow for transport to Broad Beach.

Hopper dredge: This type of dredge may be preferable for obtaining beach-quality sand from the Dockweiler site due to the distance between the source and receiver sites. The hopper dredge is a self-propelled vessel that loads sediment from an offshore borrow site, then moves to a receiver site for sand placement. The hopper dredge contains one or two large drag-arms that move along the ocean floor and collect sediment. The drag heads are about 10 feet square. The hopper dredge moves along the ocean surface with its arms extended, making passes back and forth until its hull is fully loaded with sediment. The vessel can hold approximately 2,000 to 5,000 cy of sediment per load, depending on which vessel is selected. The hopper dredge has the ability to dump the collected sediment out the bottom of the hull, or it can be pumped out.

A hopper dredge could potentially be used at both the Dockweiler site for beach-quality sand and at the Trancas deposit for dune sand.

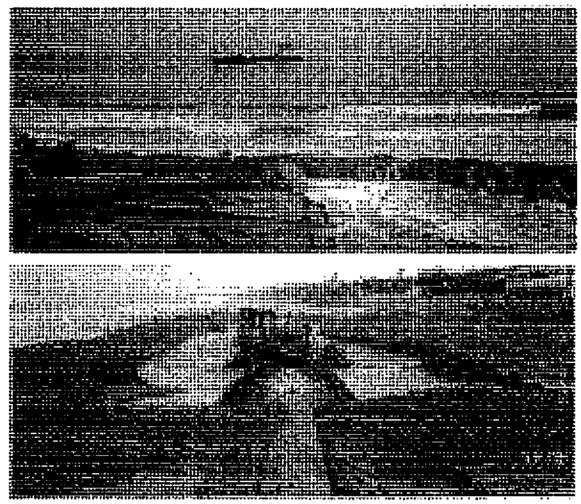
Dredge discharge pipeline to beach: The dredge discharge line would either be floating or placed on the beach. During the operation, floating pipeline segments would be subject to weather and wave conditions. If substantial wave action is anticipated, any floating pipe would be temporarily dismantled until suitable wave conditions returned. The pipeline could then be temporarily staged along the beach and reconstructed once wave conditions allow. Coordination with the U.S. Coast Guard would be a critical component of floating pipeline placement. Onshore pipeline segments would be placed along the toe of the revetment. The discharge line would be placed on top of the existing sand or cobbles and be buried at intervals to provide for pipe anchoring and for beach access to the public. Areas of active construction (e.g., training dikes, or where sand is redistributed by earthmoving equipment) would be cordoned off from the public with signs. Construction crews would also be on-site to monitor the construction site to prohibit public access. All other areas of the discharge line would be open to public use. Maintenance of the discharge line would occur as necessary. The line may be affected by waves and tides and may periodically require added support, protection, or relocation. Earthmoving equipment and cranes may be used to maintain onshore portions of pipeline. More frequent line maintenance than typical may be required for the onshore line at Broad Beach as little room exists for line placement and protection at this site.



Offshore dredge pipelines would come straight ashore through the surf zone and would be exposed to wave action.

Placement of dredged materials: Training dikes would be constructed to reduce turbidity and aid in the retention of pumped sand at receiving beaches. The training dike system would consist of two dikes–one that is perpendicular to the beach connected to one that is parallel to the beach, forming an "L" with the long end parallel to shore. Sand would be placed at a single discharge point behind (i.e., landward of) the dikes. The material coming from the dredge material discharge pipeline would be a slurry mix of sand and water. The dikes would be used to direct the flow of the discharge and slow the velocity of the slurry effluent, thereby allowing more sediment to settle onto the beach instead of remaining in suspension and being transported back into the surf zone. Given how little sand currently exists at the Broad Beach site, an initial quantity of sand would need to be discharged on the highest portion of the beach at low tide before training dikes could be constructed.

Beaches would be formed by deposition of sand from the dredge discharge line within the training dikes. Sand would be graded and spread along the beach to the dimensions of the beach fill plan using two bulldozers. The dozers and one crane may be used to progressively move the discharge pipeline along the beach as the fill is placed and the beach fill is lengthened. Sand placement around storm drain outlets would be designed to allow proper drainage. The dune would most likely be formed by deposition of sand from the dredge discharge line within a raised and diked containment system. Sand would be graded and spread over the existing revetment on the east and up against existing foundations and seawalls in the west to a 60- to 80-foot wide dune field of 15 to 20 feet in height using smaller bulldozers.



Dredged sand would be pumped onto the beach within training dikes, in order to capture sand and minimize the amount of turbidity in coastal waters.

4.6 Objective Triggers for Backpassing

Based on the beach erosion experienced during the last several El Niño winter seasons and the trends identified in the historic shoreline assessment, certain triggers for initiation of beach management actions need to be established to eliminate the need for future "emergency" shore protection projects, as well as equalize the benefit of the beach nourishment project over the entire length. The goal of these triggers would be to identify when beach erosion is reaching a point that threatens project benefits (e.g., protection of private property) and to permit sufficient time to implement management actions to maintain these benefits.

Specifics regarding the beach monitoring that will be implemented to determine a "trigger for backpassing" are as follows:

- Monthly measurement of the dry sand beach width (from the back of beach to the edge of the dry sand "towel area") at five locations (reference Figure 4-4):
    - East end – 30756 Broad Beach Road
    - East-central reach – 30916 Broad Beach Road
    - Central reach – 31108 Broad Beach Road
    - West-central reach – 31324 Broad Beach Road
    - West end – 31506/31504 Victoria Point Road
- Semi-annual (spring and fall) beach profile surveys, measured from the back of the dune seaward to a water depth of approximately 40 feet.

- Estimation of the rate and trend of beach width change at each of the measurement points for one year prior to construction and continually after construction for 10 years.

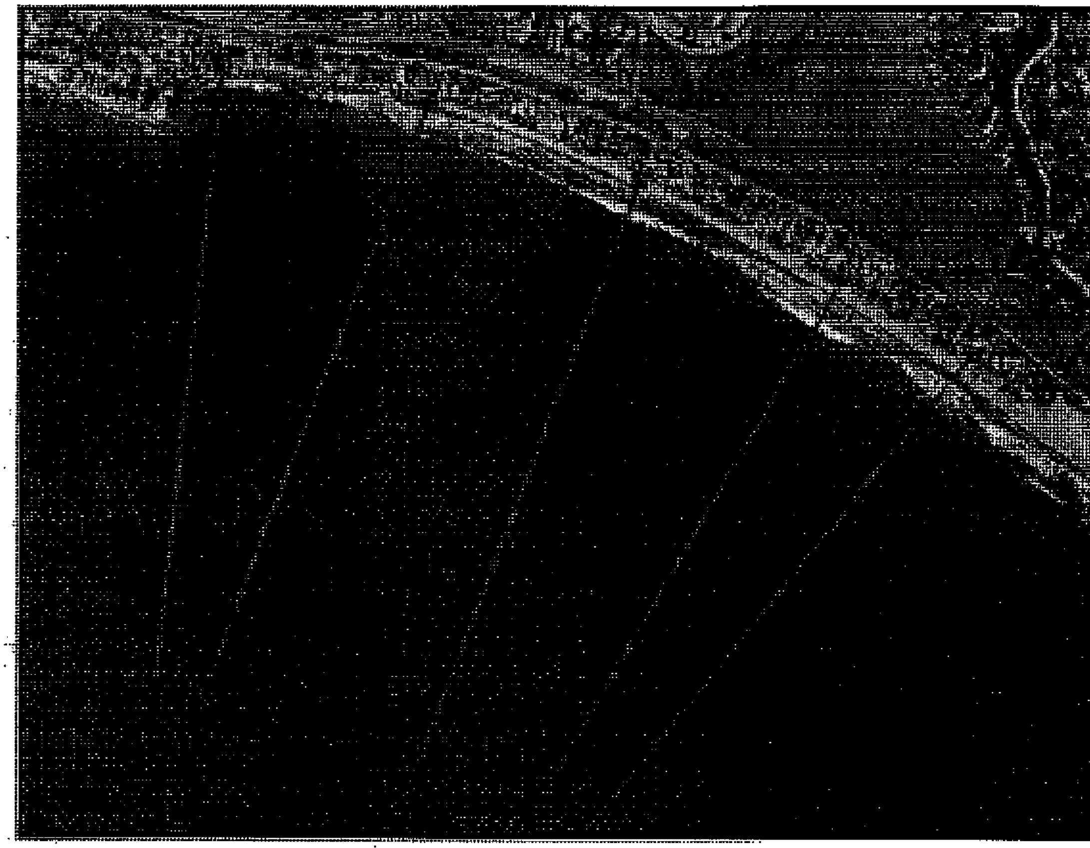


Figure 4-4. Beach Monitoring Stations

Backpassing should be implemented when any one reach of the beach becomes narrower than required for shore protection, while other reaches of the beach are concurrently widening and/or holding sufficiently greater volume of sand than the narrow reach.

In one scenario, the western end of the beach has narrowed but the eastern end contains sufficient sand volume. An objective trigger to quantify this situation is described as follows: the point in time when the averaged dry sand beach width at 31324 Broad Beach Road and 31506/31504 Victoria Point Road ("western average") reaches 50 feet or less for 6 consecutive months. Simultaneously, the averaged width of the eastern dry sand beach at 30756 Broad Beach Road and 30916 Broad Beach Road ("eastern average") is a minimum of 25 feet wider than the western end.

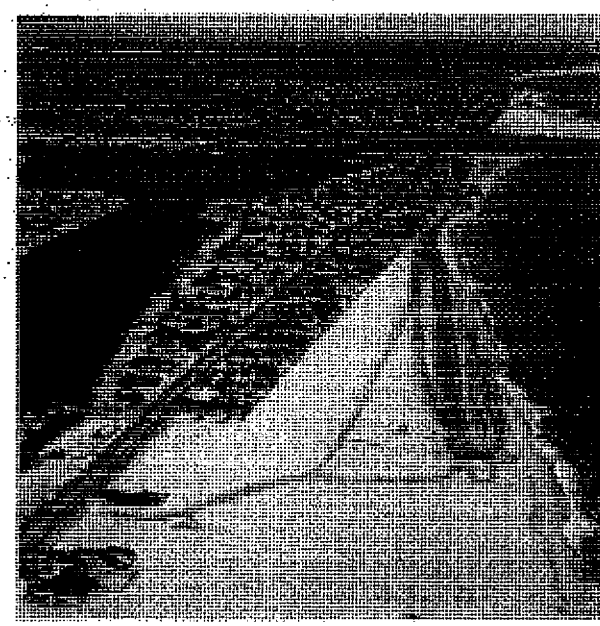
In another scenario, the eastern end of the beach has narrowed but the western end contains sufficient sand volume. The objective trigger for this situation is determined when the eastern average dry beach width is 50 feet or less for 6 consecutive months, while the western average dry sand beach width is a minimum of 25 feet wider than the eastern end.

Since the net direction of sand movement (littoral drift) is to the east, it is anticipated that the predominant backpassing operation will be from east (surplus) toward the west (deficit). Backpassing sand the other direction from west to east may result in more rapid loss of sand from Broad Beach toward the east if conditions of eastward sand transport predominate over time.

The primary functions of sand backpassing are two-fold: (1) Equalize the benefit of the sand beach over the entire project length; and (2) extend the life of this significant investment by retaining the sand longer within the Broad Beach project limits.

4.7 Sand backpassing operation

Backpassing would involve the use of heavy equipment (e.g., scrapers, bulldozers) to excavate sand from the down drift "sand rich" segment of Broad Beach and its transport back up drift to the eroding reach of Broad Beach. If the longshore sand transport pattern at Broad Beach remains in its current state of west to east transport, the source beach would be in the vicinity of Trancas Creek and the receiver beach would be in the vicinity of Lechuza Point. If the pattern reverses, sand will naturally accumulate near Lechuza Point and elsewhere on Broad Beach making backpassing unnecessary.



Sand backpassing operations such as this one in Long Beach typically involve the use of bulldozers and scrapers to excavate sand from wider down drift areas for movement up drift to narrow eroded beaches. Backpassing at Broad Beach would occur in alternate years and involve movement of approximately 25,000 cubic yards of sand from the Beach's east to west end.

Backpassing is proposed to extend the practical lifetime of this beach nourishment project by recycling sand back upcoast and reduce or eliminate exposure of the revetment. It is anticipated that backpassing will occur on an annual or biannual basis over the next 20 years resulting in an estimated 20 to 40 backpassing events over the life of this project. Backpassing is less expensive, and generally less environmentally intrusive and requires less time than small-scale nourishment from either onshore sources via trucking due to high unit cost or from offshore dredging due to equipment mobilization costs. This process is a fairly common practice and regularly takes place at southern California beaches in Long Beach, Seal Beach, and Newport Beach.

5.0 SUMMARY DISCUSSION OF PROJECT BENEFITS

The primary purpose of the Project is to provide the benefit of shoreline restoration and protection of coastal property from damages related to shoreline erosion and resulting direct exposure to high water levels and storm waves. These benefits are achieved by restoring the historically wide sandy beach and dune system exemplified by Broad Beach of the early 1970s.

Implementation, maintenance, and protection of these improvements provide a special benefit to all property owners within the project area. Property owners derive special benefit based in direct proportion to their respective beach frontage. Although volumes of sand placement may differ from time to time on each parcel, the dynamic nature of beach erosion, subsequent sand transport, and the anticipated backpassing maintenance renders the environment within the project boundaries as a semi-closed, discrete system in which special benefit is derived based on proportional beach frontage. Therefore, owners with greater beach frontage derive greater special benefit than owners with lesser beach frontage. The proposed improvements combined with the anticipated regular backpassing activities equalize the special benefit derived by properties within the project area based on pro rata length of beachfront per assessed parcel.

6.0 REFERENCES

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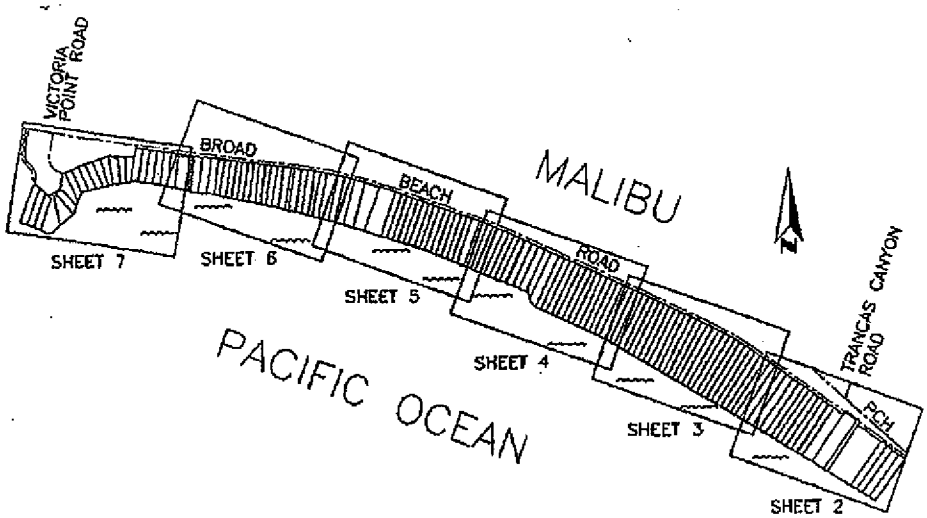
EXHIBIT "2"

GHAD BOUNDARY MAP

03/14/11	EXHIBIT "B" PLOT TO ACCOMPANY LEGAL DESCRIPTION	SHEET 1 OF 7



RECORD INFORMATION

THE CENTERLINES, RIGHTS-OF-WAY, AND PROPERTY LINES SHOWN HERON ARE BASED ON THE FOLLOWING RECORD MAPS AS FILED IN THE OFFICE OF THE LOS ANGELES COUNTY RECORDER:

TRACT NO. 12314	BOOK 232	PAGES 23-24
TRACT NO. 12909	BOOK 263	PAGES 37-38
TRACT NO. 31986	BOOK 1081	PAGES 78-79
TRACT NO. 32003	BOOK 1081	PAGES 28-29
TRACT NO. 25166	BOOK 695	PAGES 29-31
RECORD OF SURVEY	BOOK 76	PAGES 20-21
F.M. 11698-1		PAGES A1-A8
F.M. 11260-2		PAGES A1-A13

DEEDS REFERENCED AS XX-XXXXXXX INDICATE RECORDED INSTRUMENT NUMBER IN THE LOS ANGELES COUNTY RECORDERS OFFICE.

⚠1 60-FOOT STRIP OF LAND DESCRIBED IN DEEDS RECORDED IN BOOK 21735, PAGE 135 AND BOOK 21722, PAGE 190, FILED IN THE OFFICE OF THE LOS ANGELES COUNTY RECORDER

LINE TABLE

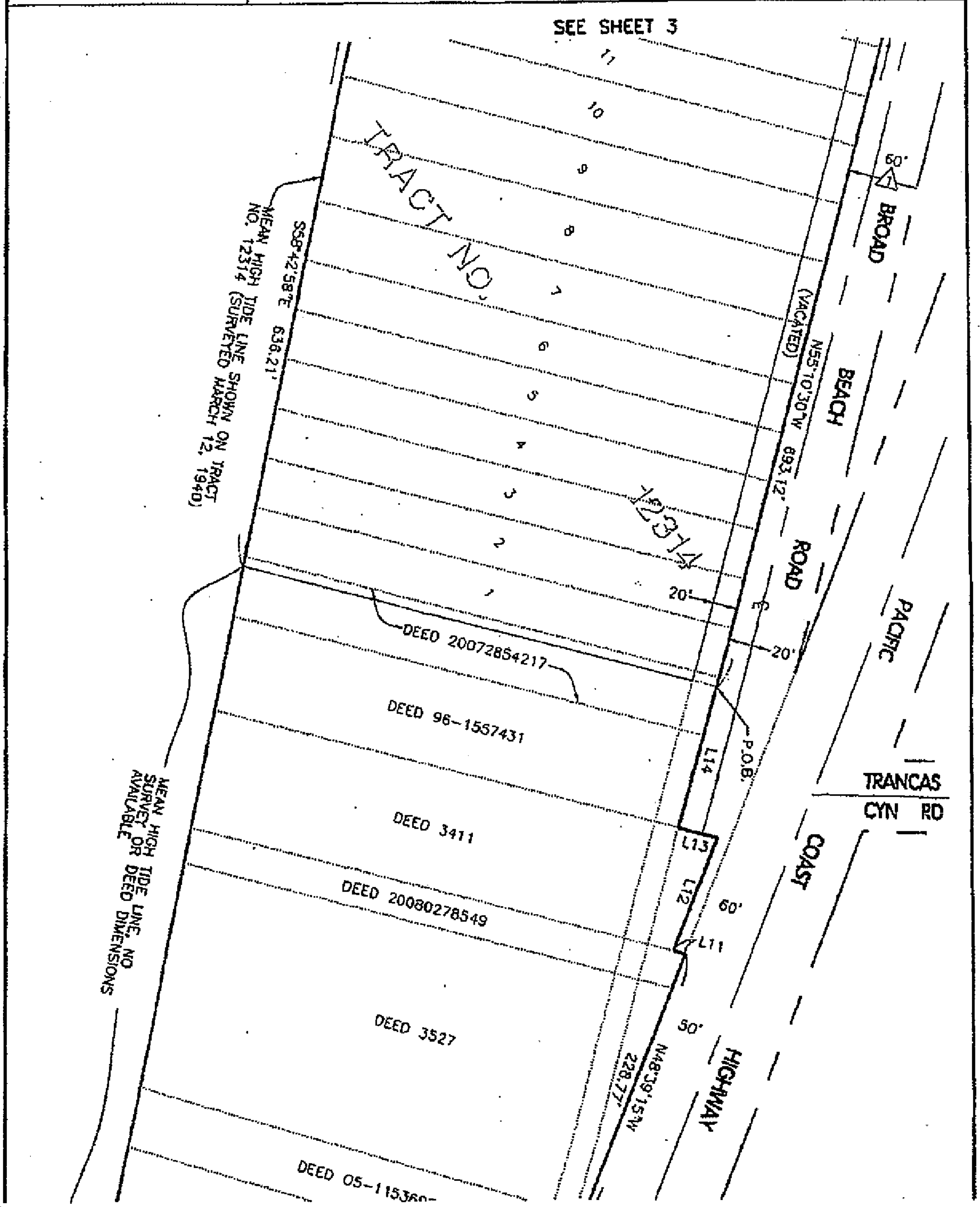
LINE	BEARING	DISTANCE
L1	S07°28'30"W	65.06'
L2	N84°58'01"W	131.25'
L3	S76°12'50"W	31.00'
L4	N17°26'00"W	11.00'
L5	S72°34'00"W	105.92'
L6	S64°51'00"W	68.42'
L7	S04°26'30"W	110.00'
L8	S56°26'55"W	59.24'
L9	S32°46'52"E	27.00'
L10	N57°13'08"E	16.36'
L11	S34°49'30"W	10.07'
L12	N48°39'15"W	100.66'
L13	S34°49'30"W	32.91'
L14	N55°10'30"W	121.95'

CURVE TABLE

CURVE	DELTA ANGLE	ARC LENGTH	RADIUS
C1	7°43'00"	134.68'	1000.00'
C2	29°35'30"	51.65'	100.00'

LEGEND

03/14/11	EXHIBIT "B" PLAT TO ACCOMPANY LEGAL DESCRIPTION	SHEET 2 OF 7



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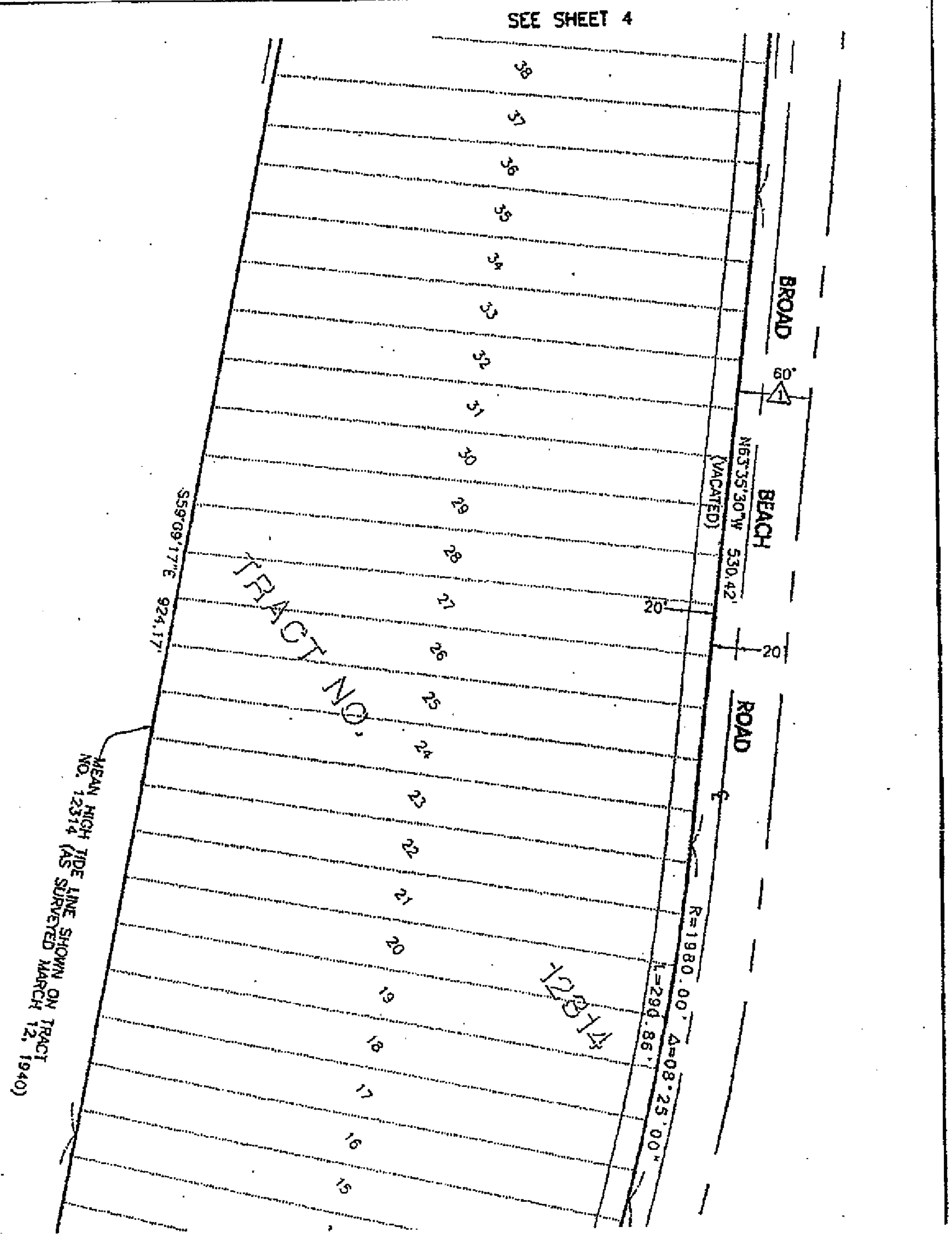

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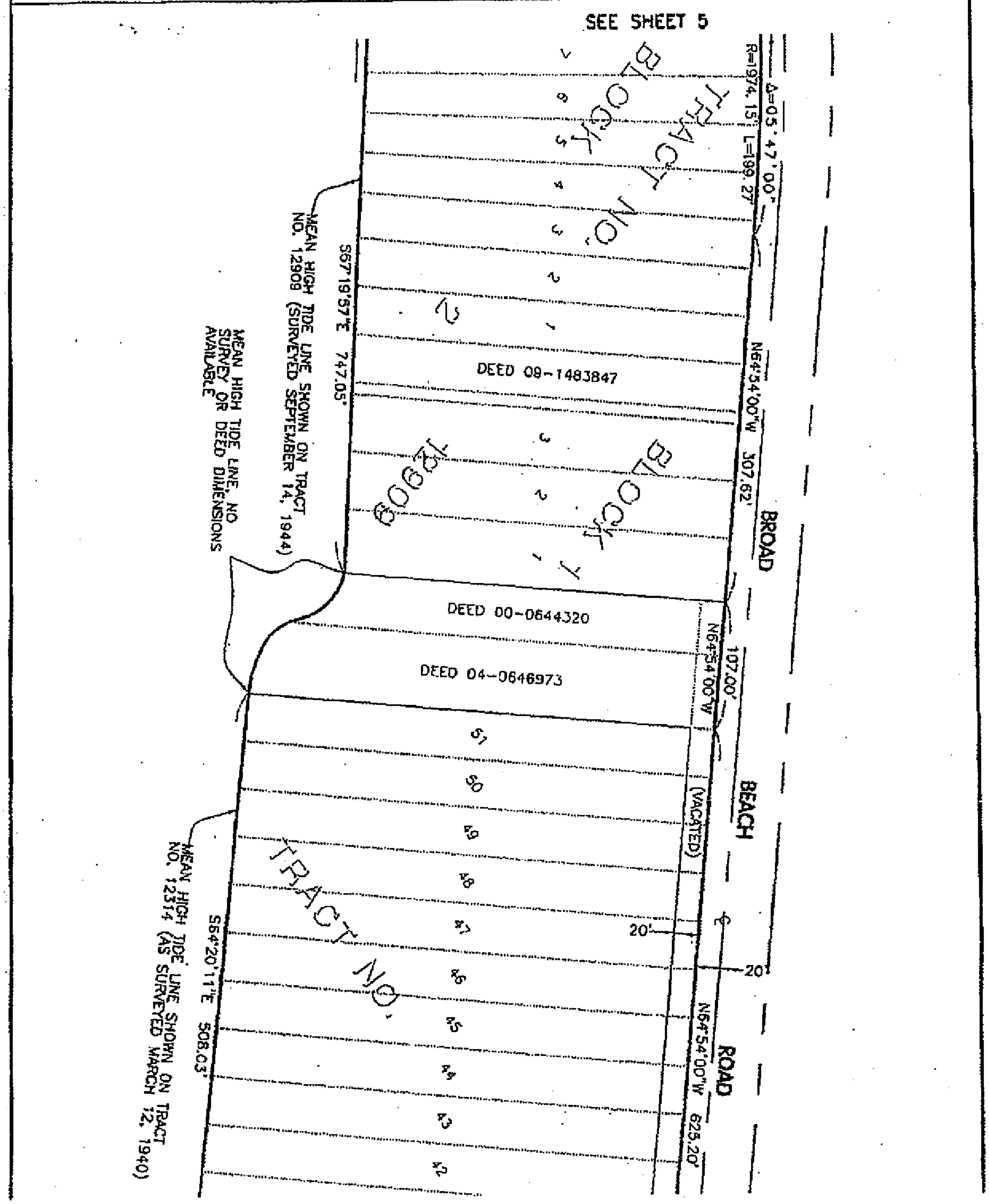
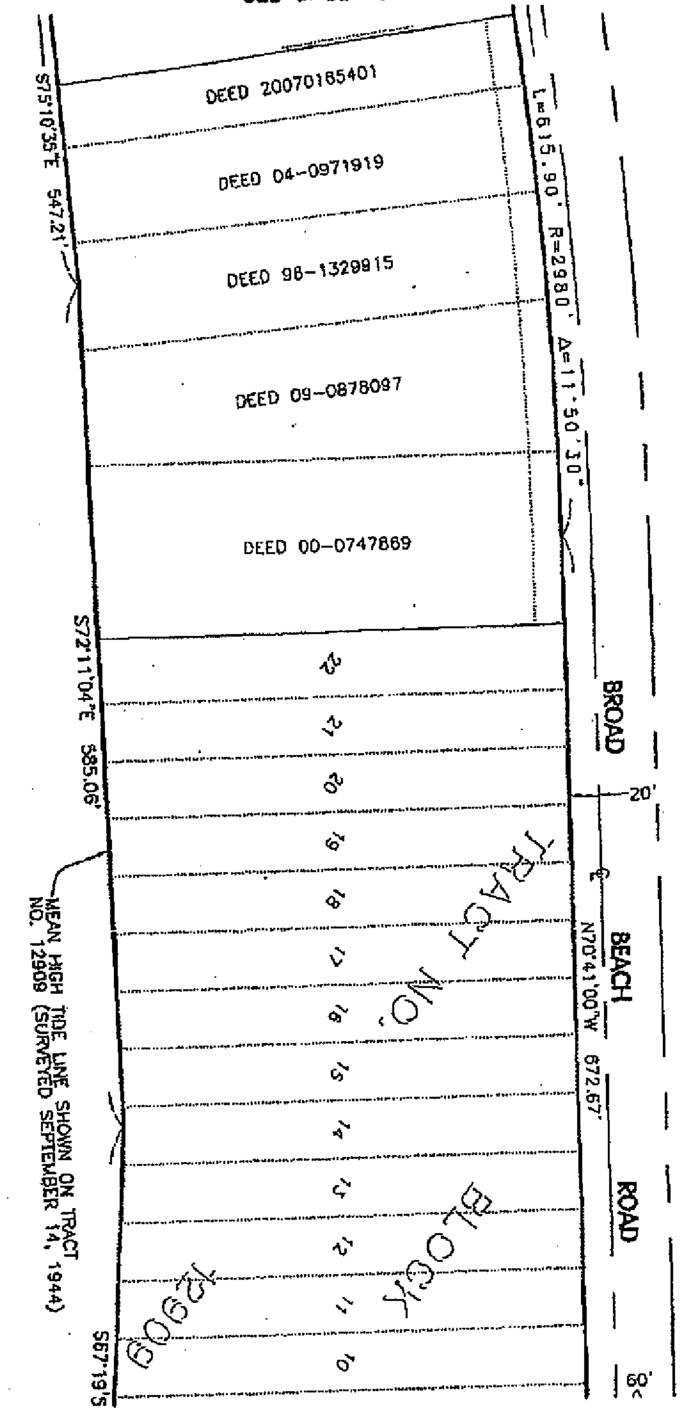


03/14/11	EXHIBIT "B" PLAT TO ACCOMPANY LEGAL DESCRIPTION	SHEET 5 OF 7

SEE SHEET 6



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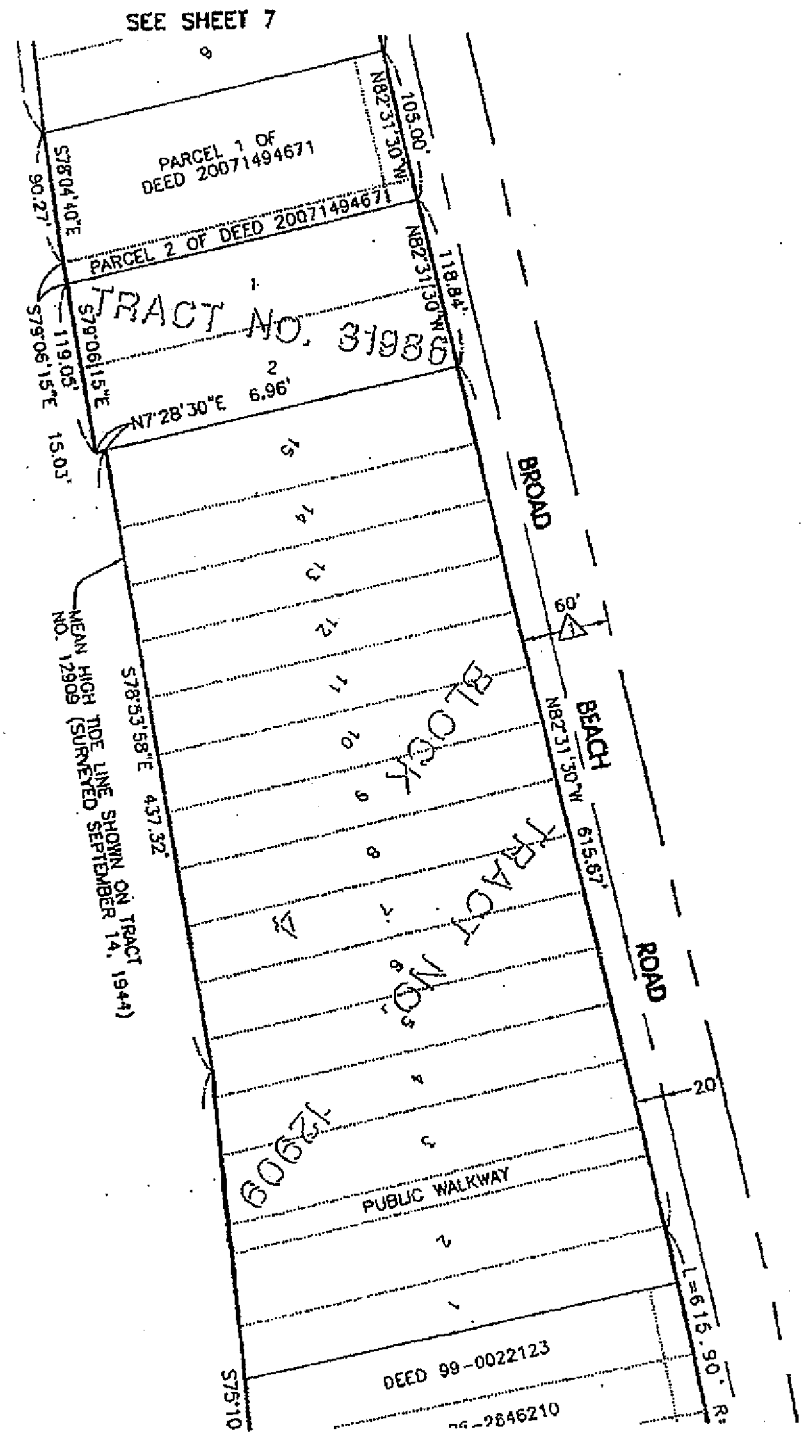
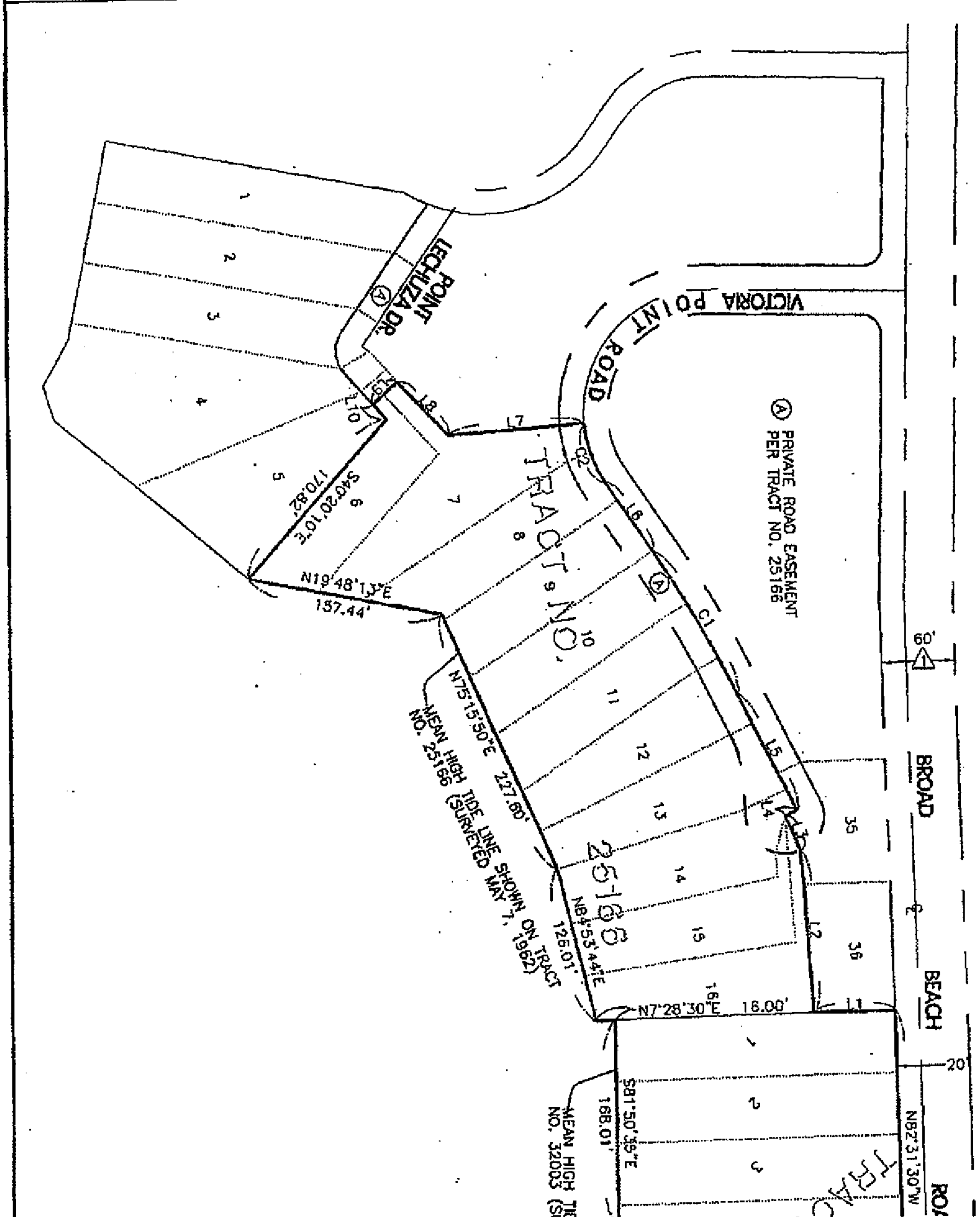
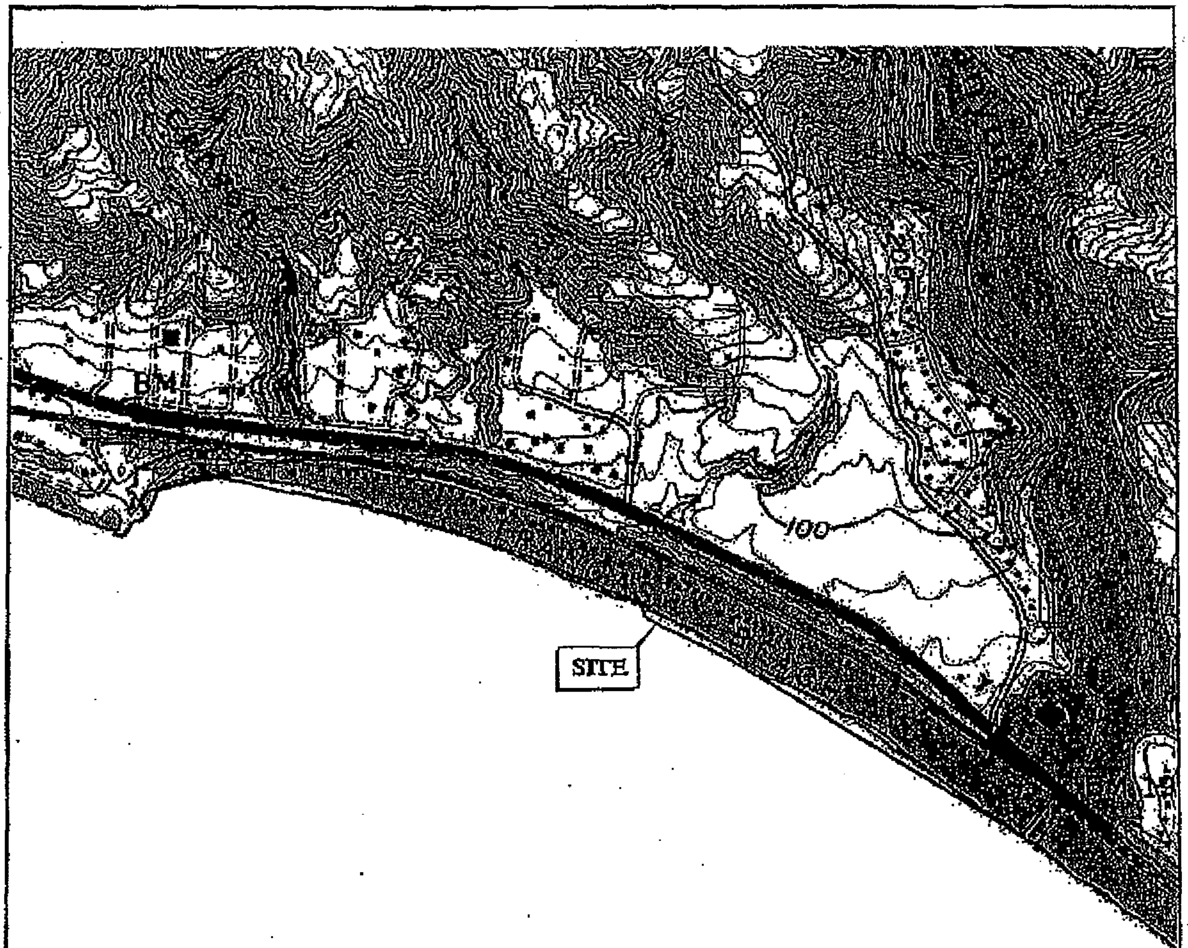


03/14/11	EXHIBIT "B" PLAT TO ACCOMPANY LEGAL DESCRIPTION	SHEET 7 OF 7





EXPLANATION

LIQUEFACTION

AREAS WHERE HISTORIC OCCURRENCE OF LIQUEFACTION, OR LOCAL GEOLOGICAL, GEOTECHNICAL AND GROUNDWATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED

EARTHQUAKE-INDUCED LANDSLIDES

AREAS WHERE PREVIOUS OCCURRENCE OF LANDSLIDE MOVEMENT, OR LOCAL TOPOGRAPHIC, GEOLOGICAL, GEOTECHNICAL AND SUBSURFACE WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED

N

0 FEET 1000
0 METERS 500

BASE MAP SOURCE: CALIFORNIA DEPARTMENT OF CONSERVATION, CALIFORNIA GEOLOGICAL SURVEY, 2002

ENGEO — Expect Excellence —	SEISMIC HAZARD ZONE MAP	PROJECT NO.: 8588.000.000		FIGURE NO
	BROAD BEACH GHAD	SCALE: AS SHOWN		1
	MALIBU, CALIFORNIA	DRAWN BY: DLB	CHECKED BY: TB	

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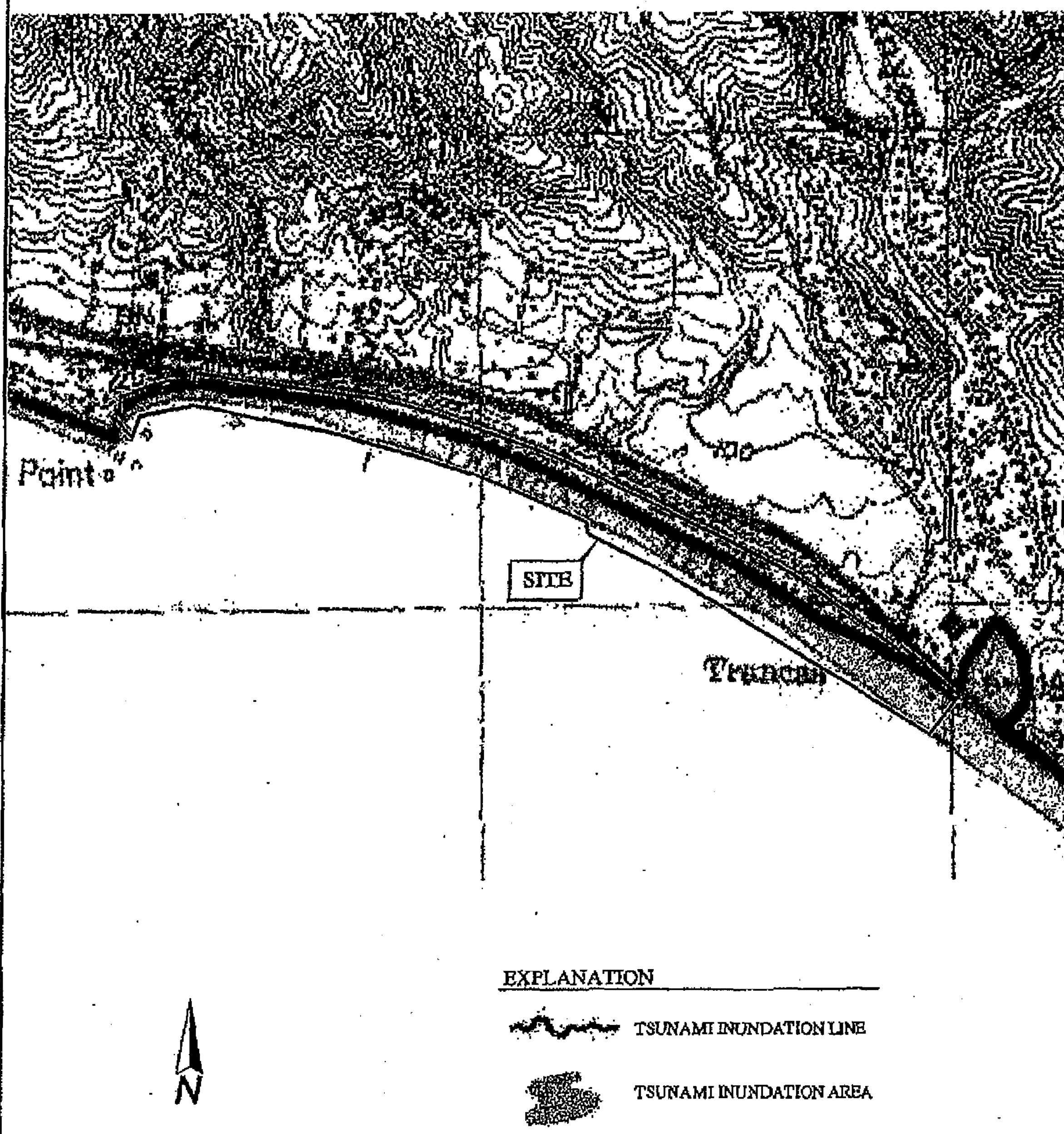
ORIGINAL FIGURE PRINTED IN COLOR

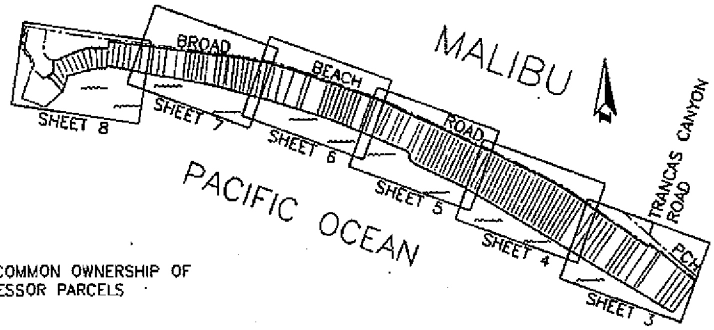


BASE MAP SOURCE: CALIFORNIA EMERGENCY MANAGEMENT AGENCY, CGS, USC

ENGEO Expect Excellence	TSUNAMI INUNDATION BROAD BEACH GHAD MALIBU, CALIFORNIA	PROJECT NO.: 8588.000.000 SCALE: AS SHOWN DRAWN BY: DLB CHECKED BY: TB	FIGURE NO. 2

ORIGINAL FIGURE PRINTED IN COLOR

ASSESSMENT DIAGRAM



☐ REPRESENTS COMMON OWNERSHIP OF MULTIPLE ASSESSOR PARCELS

#	ASSESSOR PARCEL #	STREET ADDRESS	FRONTAGE CALCULATION
1	4469-026-009	30708 PACIFIC COAST HWY	48'
2	4469-026-008	30712 PACIFIC COAST HWY	57'
3	4469-026-007	30718 PACIFIC COAST HWY	50'
4	4469-026-006	30724 PACIFIC COAST HWY	50'
5	4469-026-005	30732 PACIFIC COAST HWY	190'
6	4469-026-011	30750 PACIFIC COAST HWY	30'
7	4469-026-016	30756 PACIFIC COAST HWY	100'
8	4469-026-002	30760 BROAD BEACH RD	80'
9	4469-026-012	30800 BROAD BEACH RD	50'
10	4470-013-028	30804 BROAD BEACH RD	42'
11	4470-013-002	30810 BROAD BEACH RD	42'
12	4470-013-030	NO ADDRESS	84'
12	4470-013-029	NO ADDRESS	42'
13	4470-013-004	30826 BROAD BEACH RD	42'
14	4470-013-005	30830 BROAD BEACH RD	55'
15	4470-013-006	30838 BROAD BEACH RD	40'
16	4470-013-007	30842 BROAD BEACH RD	50'
17	4470-013-008	30846 BROAD BEACH RD	60'
18	4470-013-009	30852 BROAD BEACH RD	39'
18	4470-013-010	30856 BROAD BEACH RD	39'
18	4470-013-011	30860 BROAD BEACH RD	39'
19	4470-013-012	30866 BROAD BEACH RD	39'
20	4470-013-013	30870 BROAD BEACH RD	39'
21	4470-013-014	30874 BROAD BEACH RD	39'
22	4470-013-015	30900 BROAD BEACH RD	39'
23	4470-013-016	30904 BROAD BEACH RD	39'
24	4470-013-017	30908 BROAD BEACH RD	39'
25	4470-013-018	30916 BROAD BEACH RD	39'
26	4470-013-019	30918 BROAD BEACH RD	39'
27	4470-013-020	30924 BROAD BEACH RD	39'
28	4470-013-021	30928 BROAD BEACH RD	39'
29	4470-013-022	30930 BROAD BEACH RD	39'
30	4470-013-023	30936 BROAD BEACH RD	39'
31	4470-013-024	30940 BROAD BEACH RD	39'
32	4470-013-025	30944 BROAD BEACH RD	39'
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34	4470-013-027	30952 BROAD BEACH RD	40'
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40	4470-014-006	30978 BROAD BEACH RD	40'
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43	4470-014-009	31008 BROAD BEACH RD	40'
44	4470-014-010	31012 BROAD BEACH RD	40'
45	4470-014-011	31016 BROAD BEACH RD	40'
46	4470-014-012	31020 BROAD BEACH RD	40'
47	4470-014-013	31022 BROAD BEACH RD	40'
48	4470-014-014	31026 BROAD BEACH RD	40'
49	4470-014-015	31030 BROAD BEACH RD	40'
50	4470-014-016	31034 BROAD BEACH RD	40'
51	4470-014-017	31038 BROAD BEACH RD	40'
52	4470-014-018	31042 BROAD BEACH RD	40'
53	4470-014-019	31048 BROAD BEACH RD	40'
54	4470-014-020	31052 BROAD BEACH RD	40'

PREPARED BY:

DRAFT

RICHARD C. MAHER, PLS 7564 DATE
THIS DOCUMENT IS PRELIMINARY UNLESS SIGNED

03/23/11

ASSESSMENT DIAGRAM

☐ REPRESENTS COMMON OWNERSHIP OF MULTIPLE ASSESSOR PARCELS

#	ASSESSOR PARCEL #	STREET ADDRESS	FRONTAGE CALCULATION
55	4470-014-021	31054 BROAD BEACH RD	40'
56	4470-014-022	31058 BROAD BEACH RD	40'
57	4470-015-030	31064 BROAD BEACH RD	62'
58	4470-015-031	31070 BROAD BEACH RD	45'
58	4470-015-004	31100 BROAD BEACH RD	99'
59	4470-015-029	31108 BROAD BEACH RD	60'
60	4470-015-027	31112 BROAD BEACH RD	40'
60	4470-015-006	31118 BROAD BEACH RD	80'
61	4470-015-007	31122 BROAD BEACH RD	38'
62	4470-015-033	31134 BROAD BEACH RD	104'
63	4470-015-011	31138 BROAD BEACH RD	35'
64	4470-015-012	31202 BROAD BEACH RD	51'
64	4470-015-013	31206 BROAD BEACH RD	40'
65	4470-015-014	31212 BROAD BEACH RD	40'
66	4470-015-015	31214 BROAD BEACH RD	40'
67	4470-015-016	31220 BROAD BEACH RD	40'
68	4470-015-017	31224 BROAD BEACH RD	40'
69	4470-015-018	31228 BROAD BEACH RD	40'
70	4470-015-019	31232 BROAD BEACH RD	40'
71	4470-015-020	31236 BROAD BEACH RD	40'
72	4470-015-021	31240 BROAD BEACH RD	40'
73	4470-015-032	31250 BROAD BEACH RD	160'
74	4470-015-025	31260 BROAD BEACH RD	45'
75	4470-016-032	31272 BROAD BEACH RD	120'
76	4470-016-003	31280 BROAD BEACH RD	88'
77	4470-016-004	31284 BROAD BEACH RD	75'
78	4470-016-037	31302 BROAD BEACH RD	68'
79	4470-016-036	31310 BROAD BEACH RD	45'
80	4470-016-031	31316 BROAD BEACH RD	73'
81	4470-016-028	31322 BROAD BEACH RD	45'
82	4470-016-027	31324 BROAD BEACH RD	34'
83	4470-016-008	31330 BROAD BEACH RD	47'
84	4470-016-010	31336 BROAD BEACH RD	38'
85	4470-016-011	31340 BROAD BEACH RD	50'
86	4470-016-012	31346 BROAD BEACH RD	48'
87	4470-016-013	31350 BROAD BEACH RD	41'
88	4470-016-033	31360 BROAD BEACH RD	81'
89	4470-016-016	31364 BROAD BEACH RD	40'
90	4470-016-017	31368 BROAD BEACH RD	40'
91	4470-016-018	31372 BROAD BEACH RD	40'
92	4470-016-019	31376 BROAD BEACH RD	40'
93	4470-016-020	31380 BROAD BEACH RD	40'
94	4470-016-025	31388 BROAD BEACH RD	80'
95	4470-016-026	31406 BROAD BEACH RD	95'
96	4470-017-069	31412 BROAD BEACH RD	61'
97	4470-017-068	31418 BROAD BEACH RD	59'
98	4470-017-067	31430 BROAD BEACH RD	105'
98	4470-017-066	NO ADDRESS	50'
99	4470-017-065	31438 BROAD BEACH RD	50'
100	4470-017-064	31444 BROAD BEACH RD	50'
101	4470-017-063	31450 BROAD BEACH RD	50'
102	4470-017-062	31454 BROAD BEACH RD	50'
103	4470-017-061	31460 BROAD BEACH RD	51'
104	4470-017-038	31500 VICTORIA POINT RD	50'
105	4470-017-037	31502 VICTORIA POINT RD	47'
106	4470-017-036	31504 VICTORIA POINT RD	54'
107	4470-017-035	31506 VICTORIA POINT RD	46'
108	4470-017-034	31508 VICTORIA POINT RD	46'
109	4470-017-033	31516 VICTORIA POINT RD	51'
110	4470-017-032	31520 VICTORIA POINT RD	50'
111	4470-017-031	31528 VICTORIA POINT RD	50'
112	4470-017-030	31532 VICTORIA POINT RD	51'
113	4470-017-029	31536 VICTORIA POINT RD	53'
114	4470-017-028	6525 POINT LECHUZA DR	58'

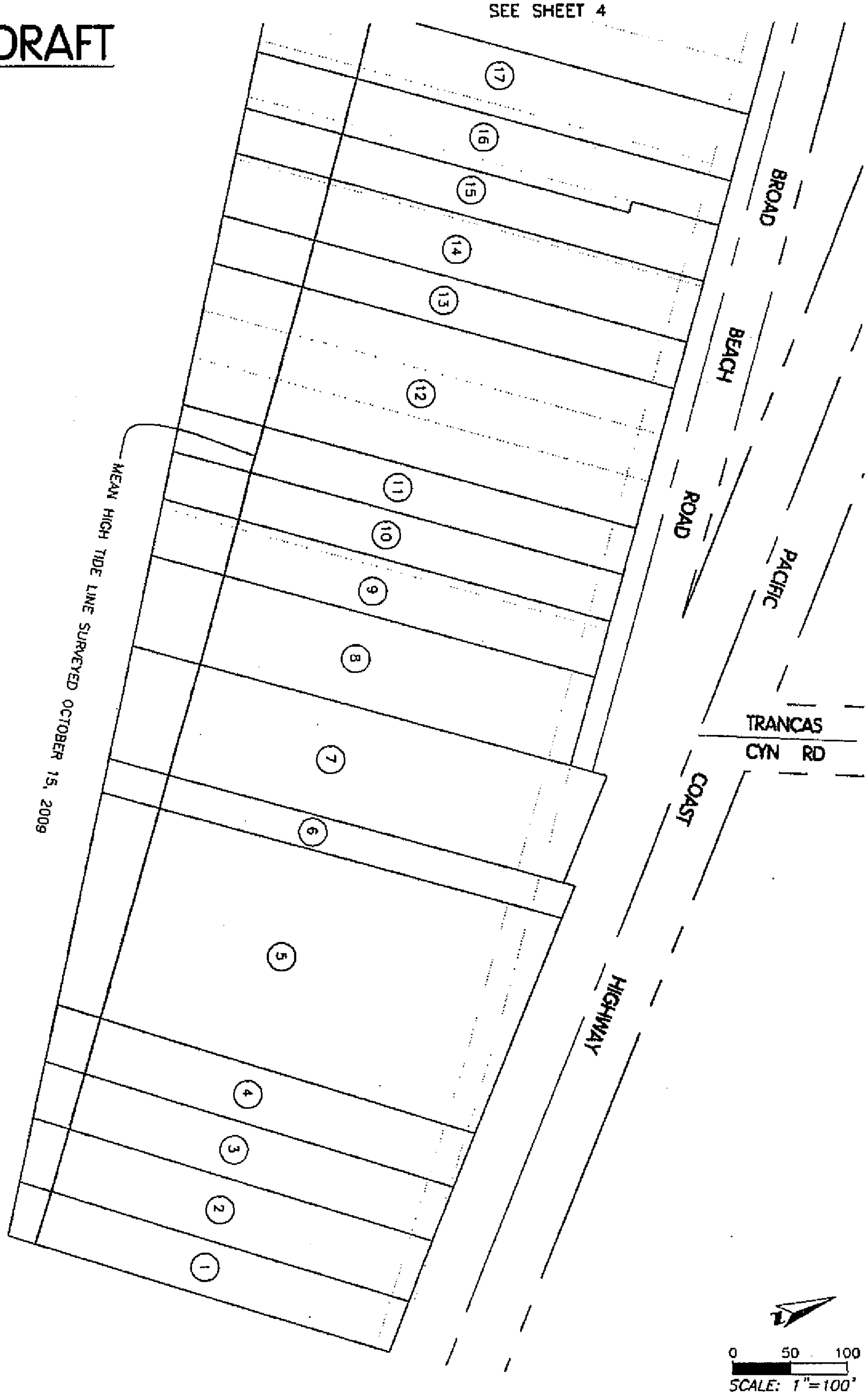
NOTE:
FRONTAGE CALCULATIONS ARE THE INVERSE DISTANCE BETWEEN THE INTERSECTIONS OF THE MEAN HIGH TIDE LINE SURVEYED ON OCTOBER 15TH, 2009 WITH PROPERTY SIDE LINES. FROM ASSESSOR PARCEL NUMBER 4470-017-028 EASTERLY TO ASSESSOR PARCEL NUMBER 4470-017-063 THE MEAN HIGH TIDE LINE LIES AT SEA WALLS OR ON AN EXISTING ROCK REVETMENT. ITS LOCATION WAS DETERMINED FROM AERIAL PHOTOGRAMETRY CONTOURS COMPILED FROM PHOTOGRAPHY COLLECTED ON OCTOBER 15TH, 2009.

KDM MERIDIAN, INC. (949)768-0731

03/23/11	ASSESSMENT DIAGRAM	SHEET 3 OF 8

SEE SHEET 4

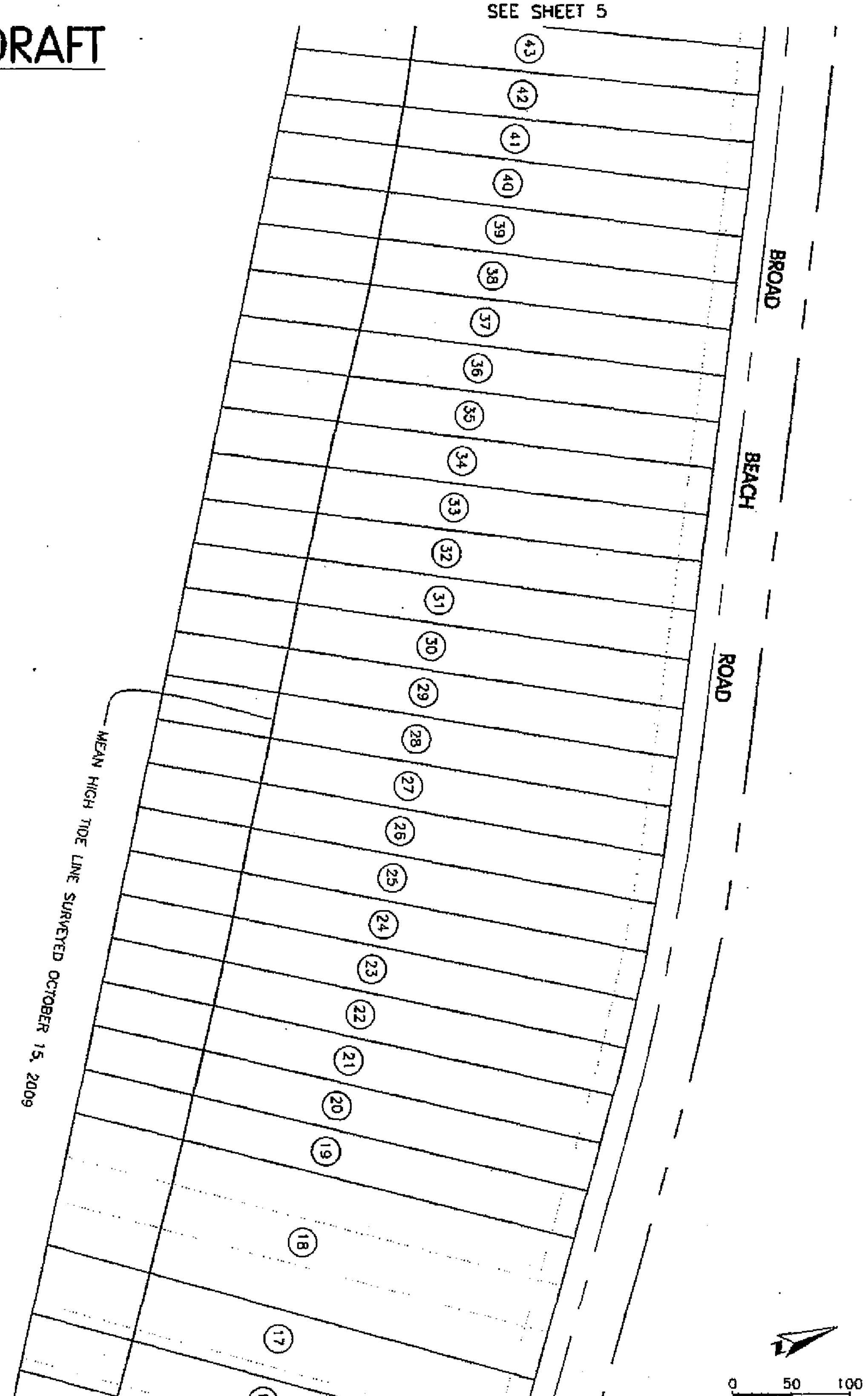
DRAFT



03/23/11	ASSESSMENT DIAGRAM	SHEET 4 OF 8

DRAFT

SEE SHEET 5



SEE SHEET 3

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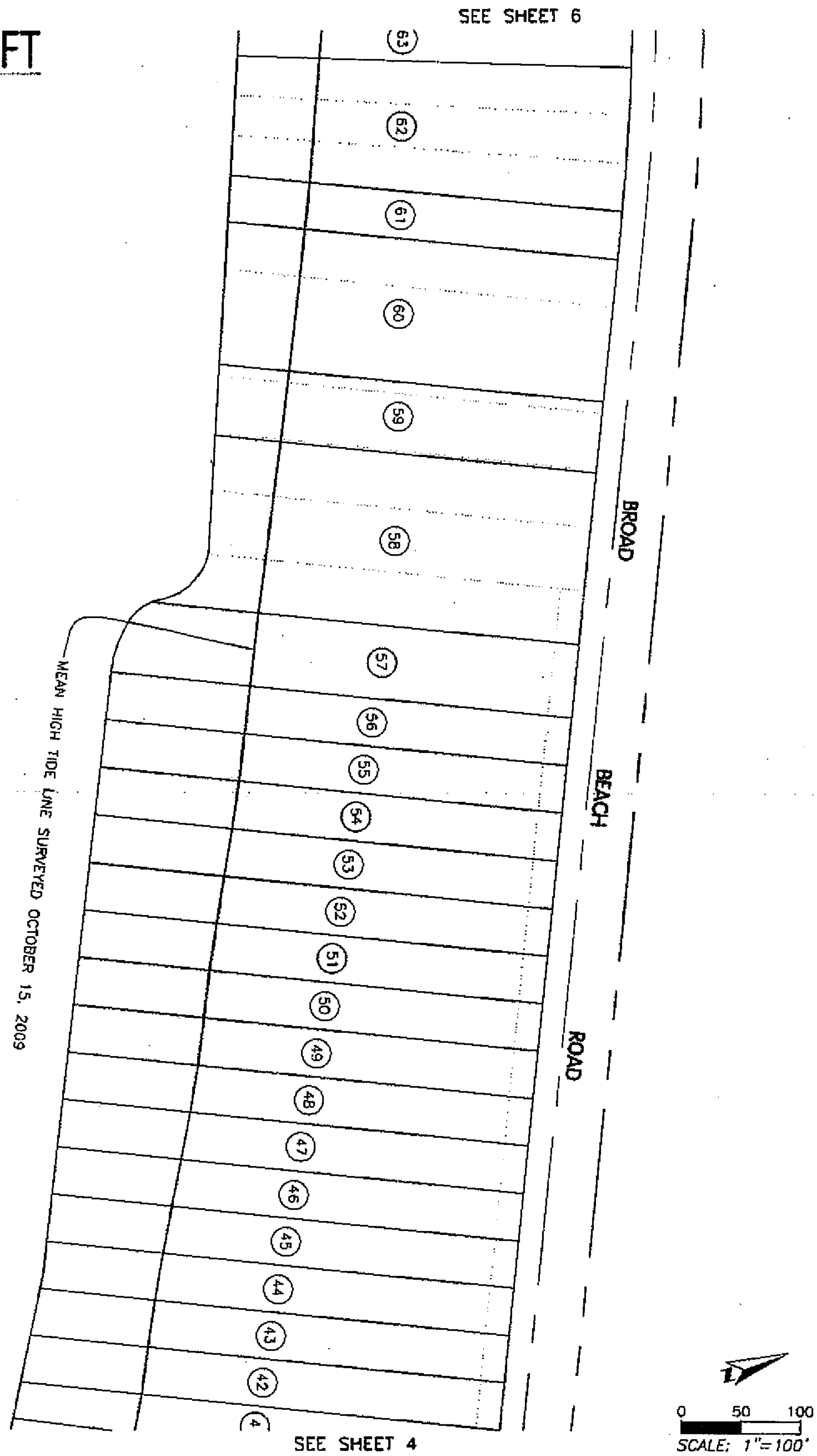
SEE SHEET 6
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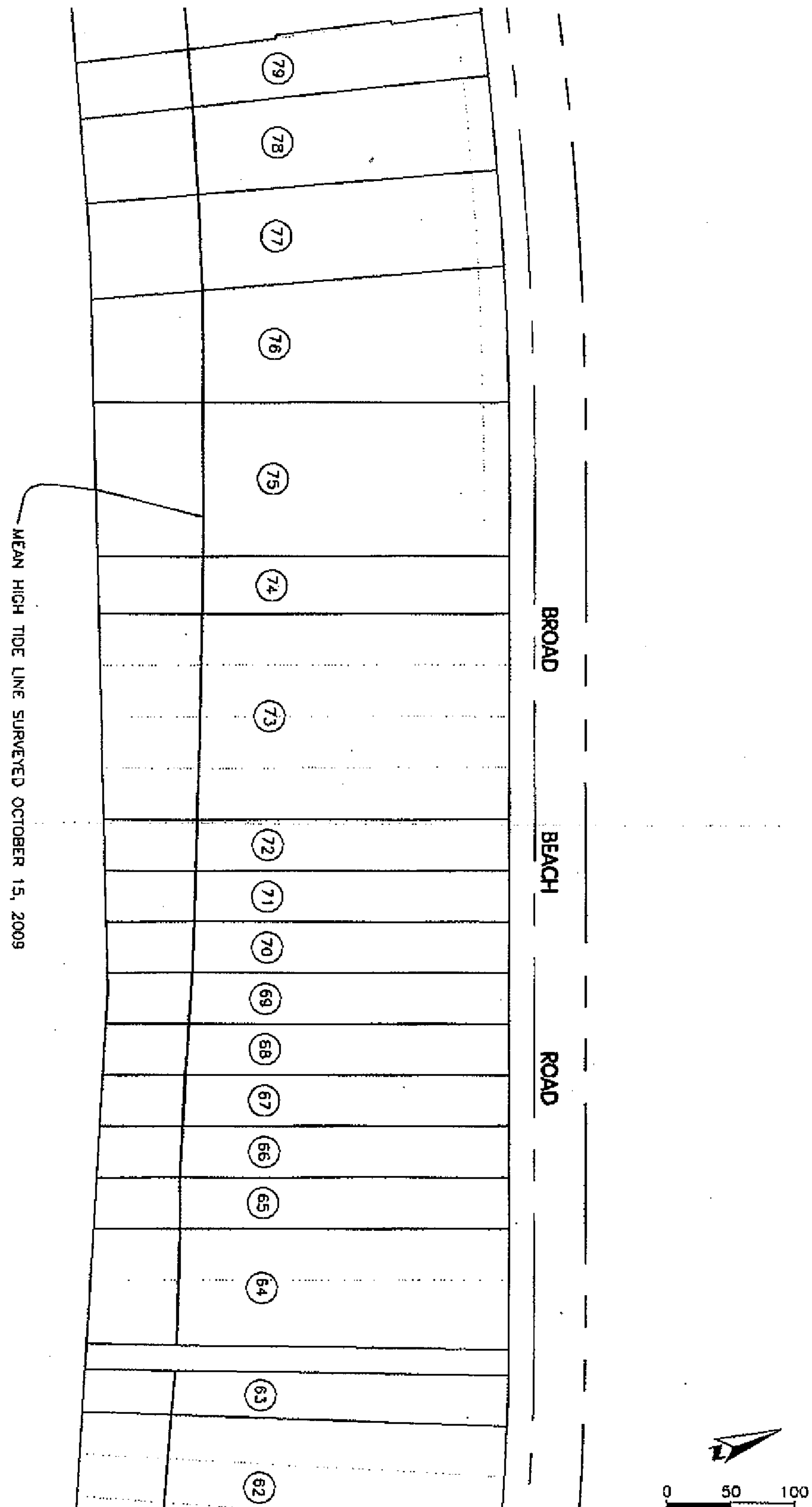
42
BROAD BEACH ROAD
MEAN HIGH TIDE LINE SURVEYED OCTOBER 15, 2009
0 50 100
SCALE: 1"=100'
SEE SHEET 4

03/23/11

ASSESSMENT DIAGRAM

SEE SHEET 7

DRAFT



SEE SHEET 5

03/23/11	ASSESSMENT DIAGRAM	SHEET 7 OF 8

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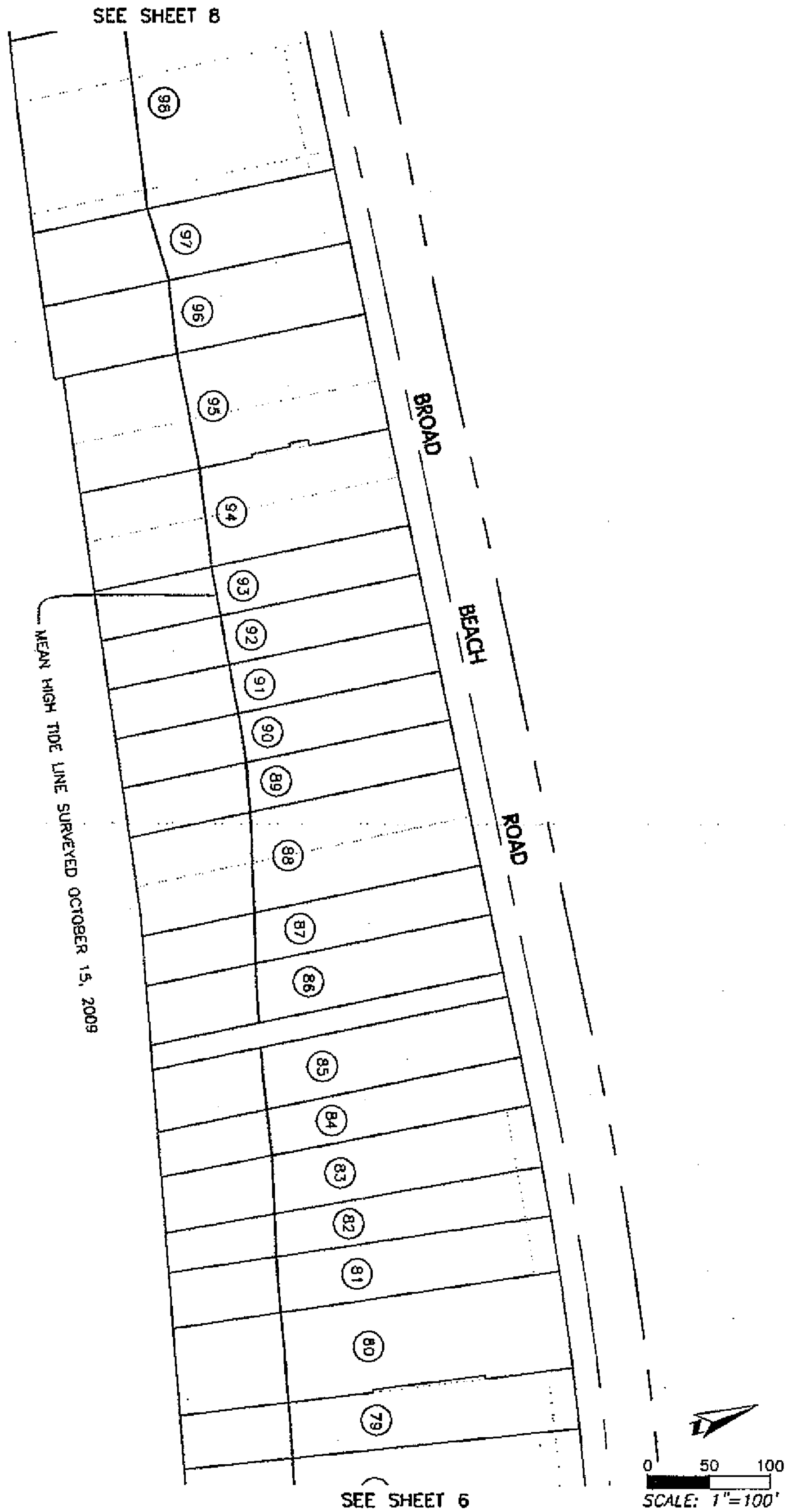

KDM MERIDIAN, INC. (949)768-0731

ASSESSMENT DIAGRAM

03/23/11

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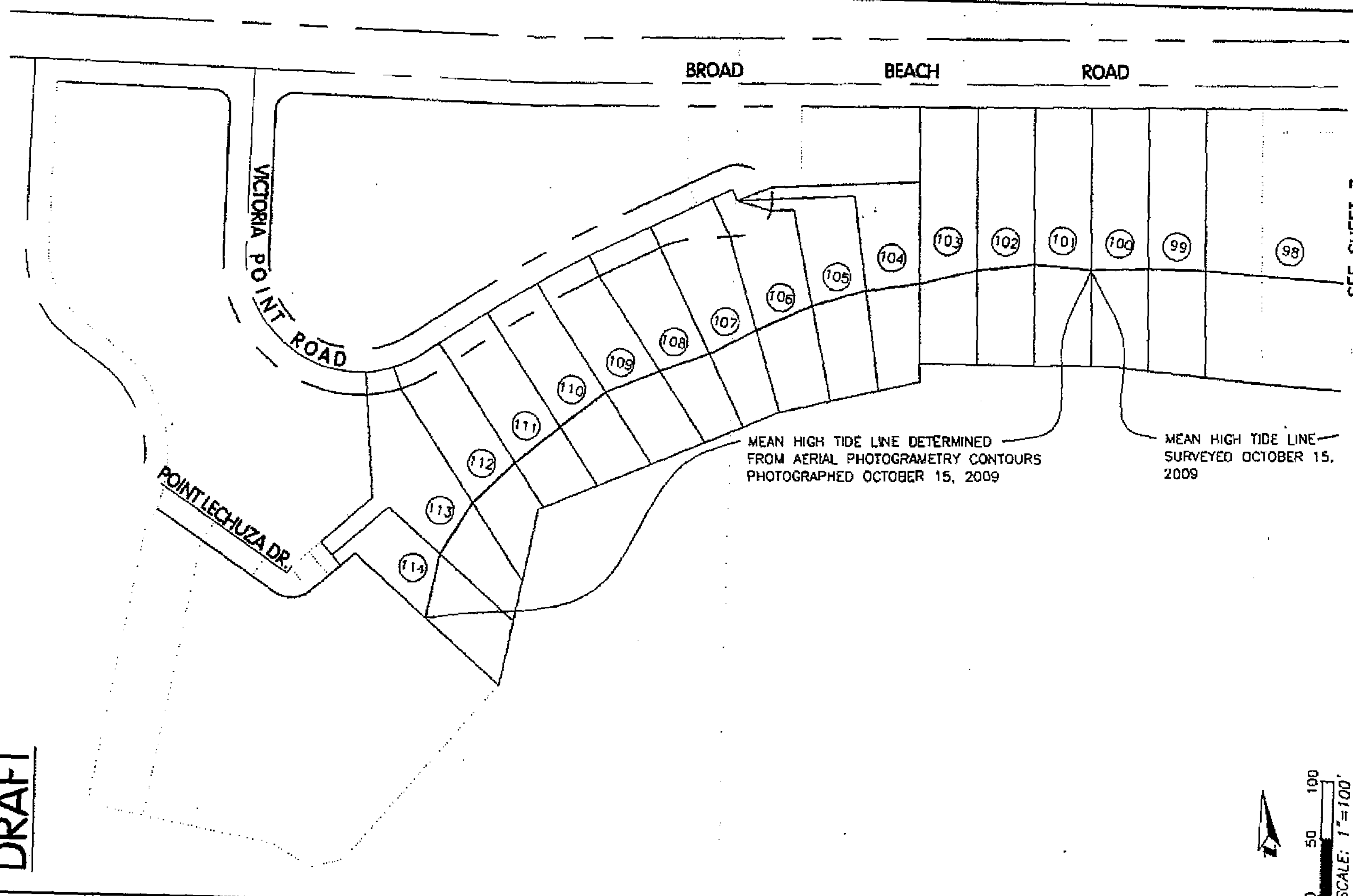

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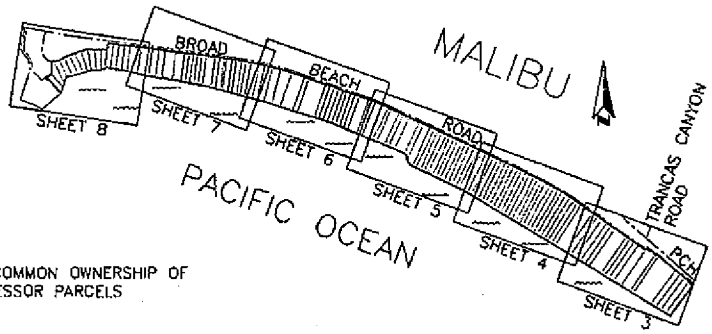

☐ REPRESENTS COMMON OWNERSHIP OF MULTIPLE ASSESSOR PARCELS

#	ASSESSOR PARCEL #	STREET ADDRESS	FRONTAGE CALCULATION
1	4469-026-009	30708 PACIFIC COAST HWY	48'
2	4469-026-008	30712 PACIFIC COAST HWY	57'
3	4469-026-007	30718 PACIFIC COAST HWY	50'
4	4469-026-006	30724 PACIFIC COAST HWY	50'
5	4469-026-005	30732 PACIFIC COAST HWY	190'
6	4469-026-011	30750 PACIFIC COAST HWY	30'
7	4469-026-016	30756 PACIFIC COAST HWY	100'
8	4469-026-002	30760 BROAD BEACH RD	80'
9	4469-026-012	30800 BROAD BEACH RD	50'
10	4470-013-028	30804 BROAD BEACH RD	42'
11	4470-013-002	30810 BROAD BEACH RD	42'
12	4470-013-030	NO ADDRESS	84'
12	4470-013-029	NO ADDRESS	42'
13	4470-013-004	30826 BROAD BEACH RD	42'
14	4470-013-005	30830 BROAD BEACH RD	55'
15	4470-013-006	30838 BROAD BEACH RD	40'
16	4470-013-007	30842 BROAD BEACH RD	50'
17	4470-013-008	30846 BROAD BEACH RD	60'
18	4470-013-009	30852 BROAD BEACH RD	39'
18	4470-013-010	30856 BROAD BEACH RD	39'
18	4470-013-011	30860 BROAD BEACH RD	39'
19	4470-013-012	30866 BROAD BEACH RD	39'
20	4470-013-013	30870 BROAD BEACH RD	39'
21	4470-013-014	30874 BROAD BEACH RD	39'
22	4470-013-015	30900 BROAD BEACH RD	39'
23	4470-013-016	30904 BROAD BEACH RD	39'
24	4470-013-017	30908 BROAD BEACH RD	39'
25	4470-013-018	30916 BROAD BEACH RD	39'
26	4470-013-019	30918 BROAD BEACH RD	39'
27	4470-013-020	30924 BROAD BEACH RD	39'
28	4470-013-021	30928 BROAD BEACH RD	39'
29	4470-013-022	30930 BROAD BEACH RD	39'
30	4470-013-023	30936 BROAD BEACH RD	39'
31	4470-013-024	30940 BROAD BEACH RD	39'
32	4470-013-025	30944 BROAD BEACH RD	39'
33	4470-013-026	30948 BROAD BEACH RD	40'
34	4470-013-027	30952 BROAD BEACH RD	40'
35	4470-014-001	30956 BROAD BEACH RD	40'
36	4470-014-002	30962 BROAD BEACH RD	40'
37	4470-014-003	30966 BROAD BEACH RD	40'
38	4470-014-004	30970 BROAD BEACH RD	40'
39	4470-014-005	30974 BROAD BEACH RD	40'
40	4470-014-006	30978 BROAD BEACH RD	40'
41	4470-014-007	30980 BROAD BEACH RD	34'
42	4470-014-008	31000 BROAD BEACH RD	40'
43	4470-014-009	31008 BROAD BEACH RD	40'
44	4470-014-010	31012 BROAD BEACH RD	40'
45	4470-014-011	31016 BROAD BEACH RD	40'
46	4470-014-012	31020 BROAD BEACH RD	40'
47	4470-014-013	31022 BROAD BEACH RD	40'
48	4470-014-014	31026 BROAD BEACH RD	40'
49	4470-014-015	31030 BROAD BEACH RD	40'
50	4470-014-016	31034 BROAD BEACH RD	40'
51	4470-014-017	31038 BROAD BEACH RD	40'
52	4470-014-018	31042 BROAD BEACH RD	40'
53	4470-014-019	31048 BROAD BEACH RD	40'
54	4470-014-020	31052 BROAD BEACH RD	40'

PREPARED BY:

DRAFT

RICHARD C. MAHER, PLS 7564 DATE

THIS DOCUMENT IS PRELIMINARY UNLESS SIGNED

03/23/11	# ASSESSMENT DIAGRAM	SHEET 2 OF 8

REPRESENTS COMMON OWNERSHIP OF MULTIPLE ASSESSOR PARCELS

#	ASSESSOR PARCEL #	STREET ADDRESS	FRONTAGE CALCULATION
55	4470-014-021	31054 BROAD BEACH RD	40'
56	4470-014-022	31058 BROAD BEACH RD	40'
57	4470-015-030	31064 BROAD BEACH RD	62'
58	4470-015-031	31070 BROAD BEACH RD	45'
58	4470-015-004	31100 BROAD BEACH RD	99'
59	4470-015-029	31108 BROAD BEACH RD	60'
60	4470-015-027	31112 BROAD BEACH RD	40'
60	4470-015-006	31118 BROAD BEACH RD	80'
61	4470-015-007	31122 BROAD BEACH RD	38'
62	4470-015-033	31134 BROAD BEACH RD	104'
63	4470-015-011	31138 BROAD BEACH RD	35'
64	4470-015-012	31202 BROAD BEACH RD	51'
64	4470-015-013	31206 BROAD BEACH RD	40'
65	4470-015-014	31212 BROAD BEACH RD	40'
66	4470-015-015	31214 BROAD BEACH RD	40'
67	4470-015-016	31220 BROAD BEACH RD	40'
68	4470-015-017	31224 BROAD BEACH RD	40'
69	4470-015-018	31228 BROAD BEACH RD	40'
70	4470-015-019	31232 BROAD BEACH RD	40'
71	4470-015-020	31236 BROAD BEACH RD	40'
72	4470-015-021	31240 BROAD BEACH RD	40'
73	4470-015-032	31250 BROAD BEACH RD	160'
74	4470-015-025	31260 BROAD BEACH RD	45'
75	4470-016-032	31272 BROAD BEACH RD	120'
76	4470-016-003	31280 BROAD BEACH RD	88'
77	4470-016-004	31284 BROAD BEACH RD	75'
78	4470-016-037	31302 BROAD BEACH RD	68'
79	4470-016-036	31310 BROAD BEACH RD	45'
80	4470-016-031	31316 BROAD BEACH RD	73'
81	4470-016-028	31322 BROAD BEACH RD	45'
82	4470-016-027	31324 BROAD BEACH RD	34'
83	4470-016-008	31330 BROAD BEACH RD	47'
84	4470-016-010	31336 BROAD BEACH RD	38'
85	4470-016-011	31340 BROAD BEACH RD	50'
86	4470-016-012	31346 BROAD BEACH RD	48'
87	4470-016-013	31350 BROAD BEACH RD	41'
88	4470-016-033	31360 BROAD BEACH RD	81'
89	4470-016-016	31364 BROAD BEACH RD	40'
90	4470-016-017	31368 BROAD BEACH RD	40'
91	4470-016-018	31372 BROAD BEACH RD	40'
92	4470-016-019	31376 BROAD BEACH RD	40'
93	4470-016-020	31380 BROAD BEACH RD	40'
94	4470-016-025	31388 BROAD BEACH RD	80'
95	4470-016-026	31406 BROAD BEACH RD	95'
96	4470-017-069	31412 BROAD BEACH RD	61'
97	4470-017-068	31418 BROAD BEACH RD	59'
98	4470-017-067	31430 BROAD BEACH RD	105'
98	4470-017-066	NO ADDRESS	50'
99	4470-017-065	31438 BROAD BEACH RD	50'
100	4470-017-064	31444 BROAD BEACH RD	50'
101	4470-017-063	31450 BROAD BEACH RD	50'
102	4470-017-062	31454 BROAD BEACH RD	50'
103	4470-017-061	31460 BROAD BEACH RD	51'
104	4470-017-038	31500 VICTORIA POINT RD	50'
105	4470-017-037	31502 VICTORIA POINT RD	47'
106	4470-017-036	31504 VICTORIA POINT RD	54'
107	4470-017-035	31506 VICTORIA POINT RD	46'
108	4470-017-034	31508 VICTORIA POINT RD	46'
109	4470-017-033	31516 VICTORIA POINT RD	51'
110	4470-017-032	31520 VICTORIA POINT RD	50'
111	4470-017-031	31528 VICTORIA POINT RD	50'
112	4470-017-030	31532 VICTORIA POINT RD	51'
113	4470-017-029	31536 VICTORIA POINT RD	53'
114	4470-017-028	6525 POINT LECHUZA DR	58'

NOTE:
FRONTAGE CALCULATIONS ARE THE INVERSE DISTANCE BETWEEN THE INTERSECTIONS OF THE MEAN HIGH TIDE LINE SURVEYED ON OCTOBER 15TH, 2009 WITH PROPERTY SIDE LINES. FROM ASSESSOR PARCEL NUMBER 4470-017-028 EASTERLY TO ASSESSOR PARCEL NUMBER 4470-017-063 THE MEAN HIGH TIDE LINE LIES AT SEA WALLS OR ON AN EXISTING ROCK REVETMENT. ITS LOCATION WAS DETERMINED FROM AERIAL PHOTOGRAMETRY CONTOURS COMPILED FROM PHOTOGRAPHY COLLECTED ON OCTOBER 15TH, 2009.

ASSESSMENT DIAGRAM

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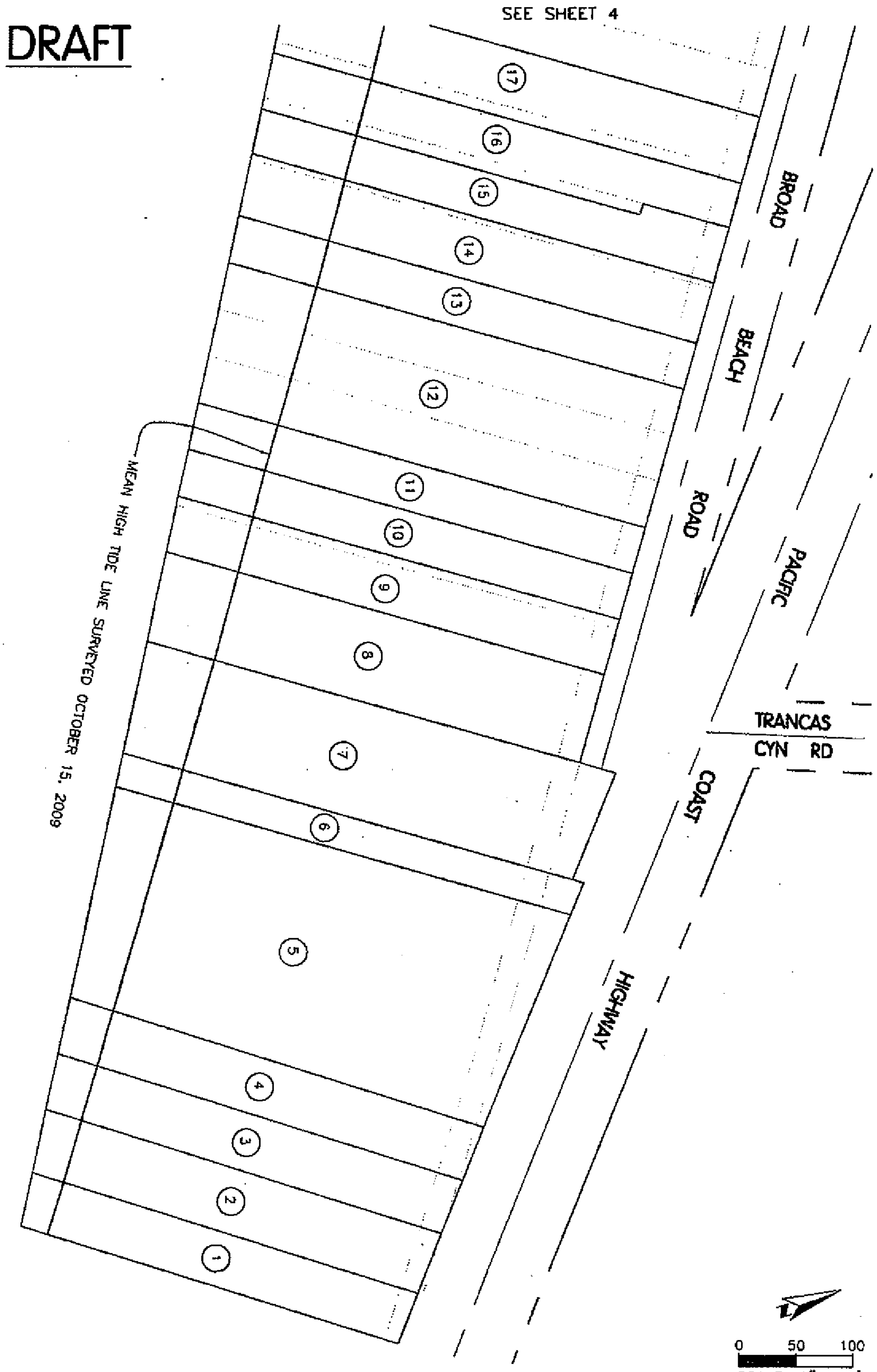

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ASSESSMENT DIAGRAM

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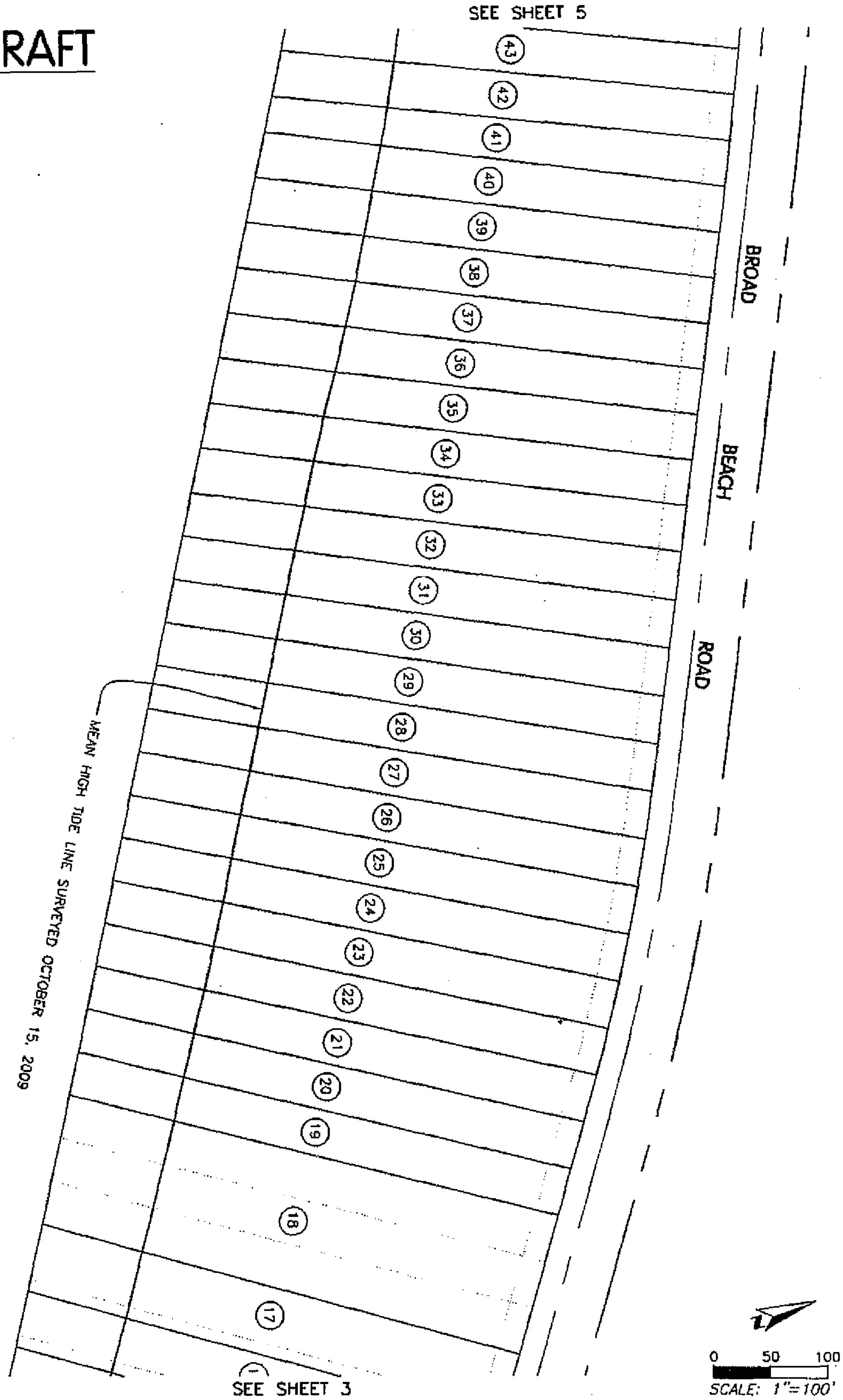

03/23/11	ASSESSMENT DIAGRAM	SHEET 5 OF 8

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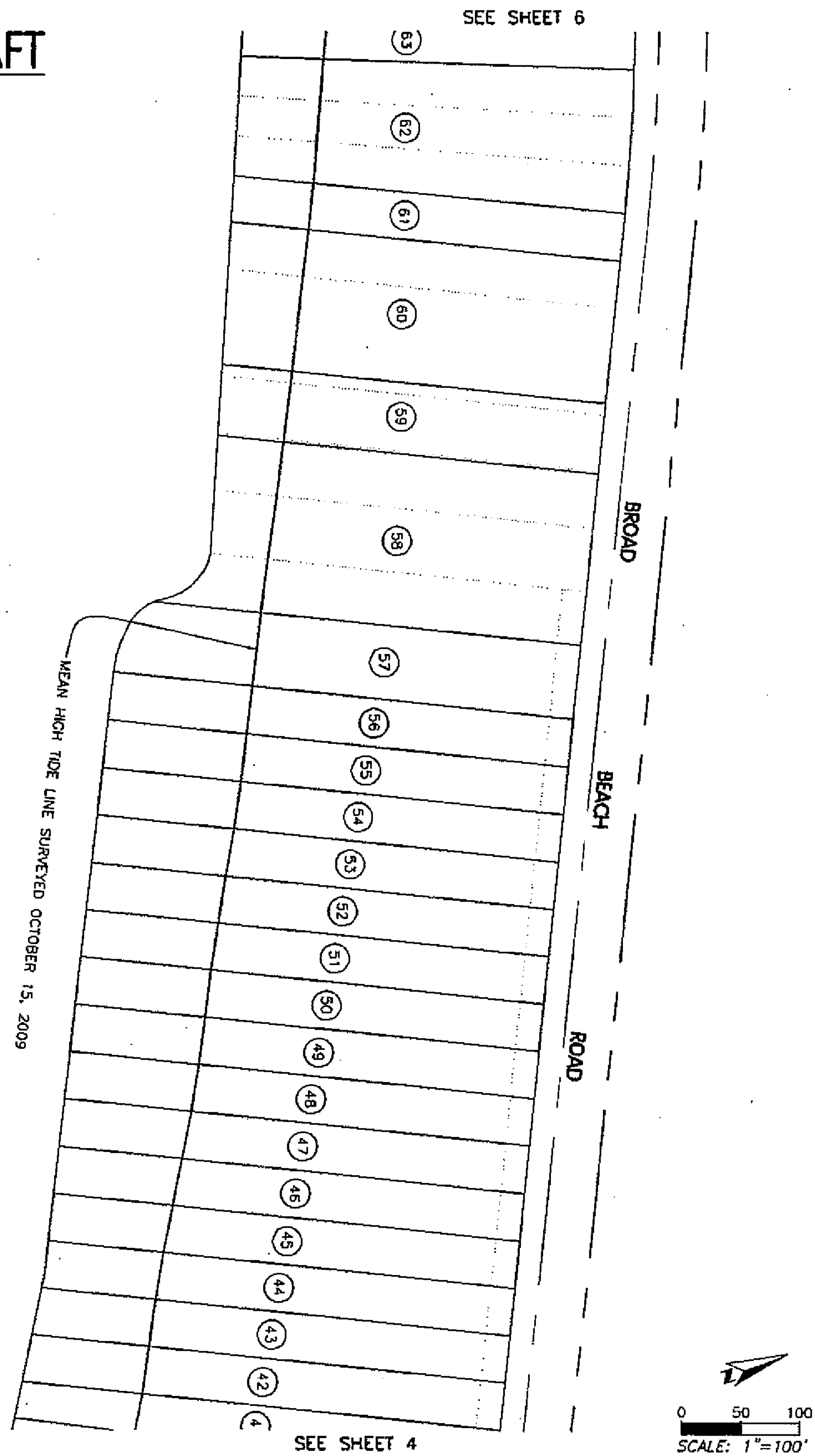

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03/23/11	ASSESSMENT DIAGRAM	SHEET 6 OF 8

SEE SHEET 7

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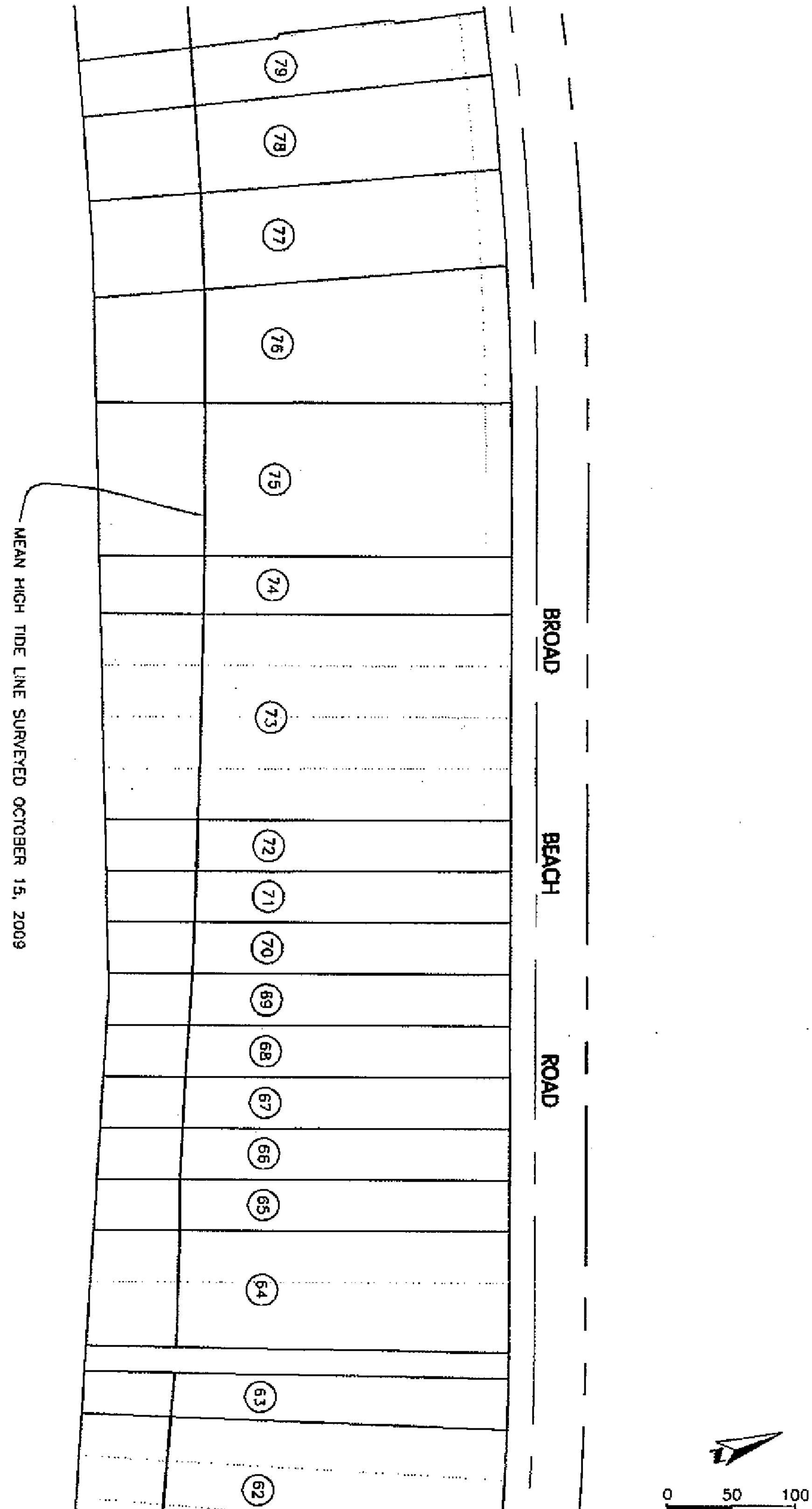
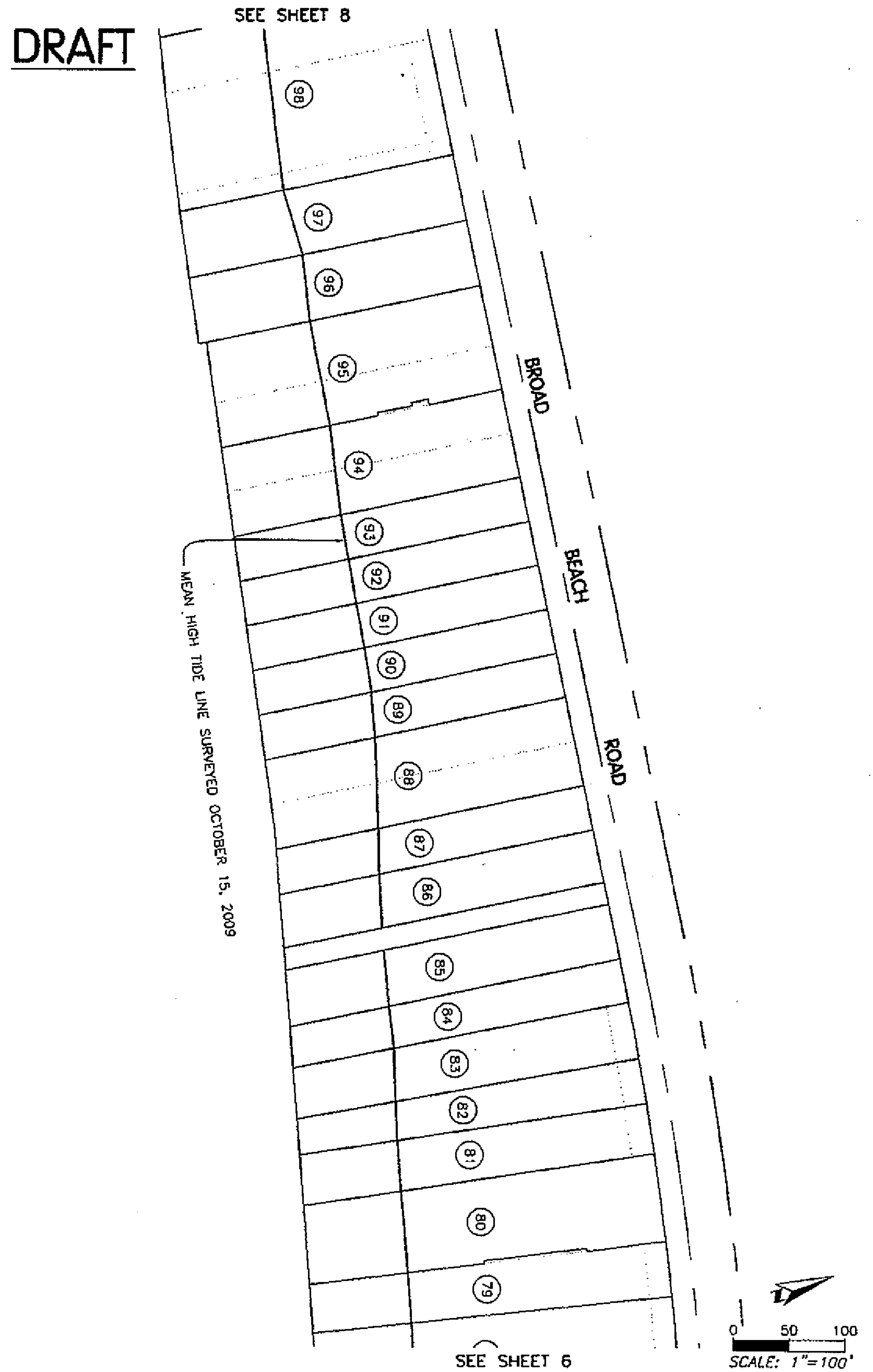


SEE SHEET 5

03/23/11

ASSESSMENT DIAGRAM



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ASSESSMENT DIAGRAM

03/23/11

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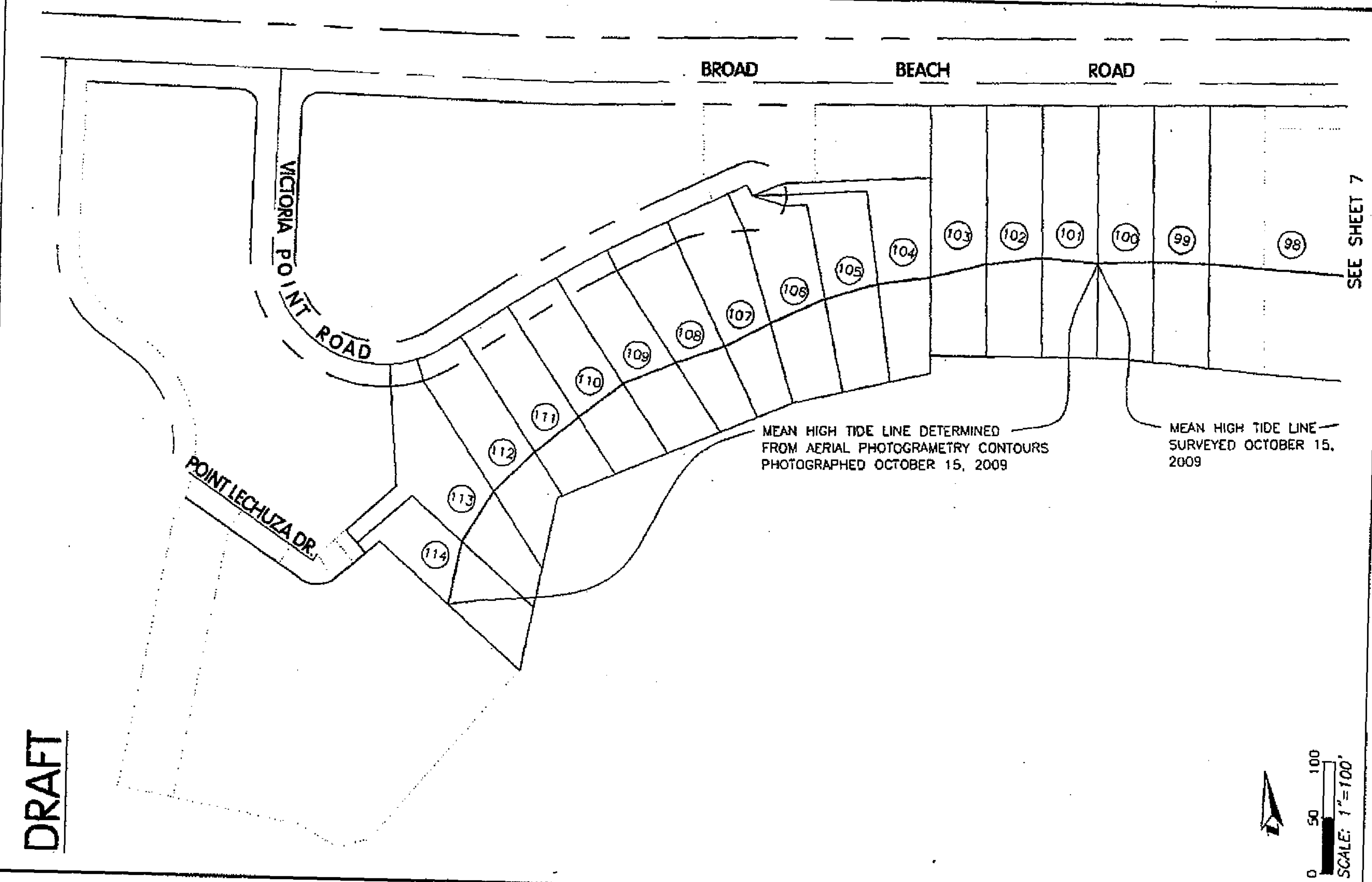

KDM MERIDIAN, INC.

(949)768-0731

EXHIBIT 2

EXHIBIT "3"

NOTICE OF ADOPTION OF RESOLUTION

NOTICE OF ADOPTION OF RESOLUTION BY THE BOARD OF DIRECTORS OF THE BROAD BEACH GEOLOGIC HAZARD ABATEMENT DISTRICT

On September 12, 2011, the Malibu City Council adopted Resolution No. 11-41, approving and ordering the formation of the Broad Beach Geologic Hazard Abatement District and appointing the following five landowners to act as the initial Board of Directors of the GHAD ("GHAD Board"): Steven Levitan, Zan Marquis, Norton Karno, Marshall Grossman and Jeff Lotman (GHAD Board).

On November 6, 2011, the GHAD Board approved the Plan of Control for GHAD. The Plan of Control describes the improvements to be implemented by the GHAD in addition to its other responsibilities and obligations.

<u>NOTICE IS HEREBY GIVEN</u> that:

On December 11, 2011, the GHAD Board adopted Resolution No. 2011/05 declaring its intention to impose an assessment on the property within the GHAD boundaries and fixing a public hearing to consider adoption of this assessment to finance the cost and expenses of the maintenance and operation of the improvements implemented by the GHAD as allowed by Public Resources Code Section 26650 *et seq*. The ~~total~~ yearly estimated budget as set forth in the attached Engineer's Report is $2,700,000. If the assessment is adopted, it is anticipated that each parcel you own will be assessed a maximum of $430 per linear foot per year, for a total assessment of $______________ plus an annual adjustment to reflect the percentage change in the Los Angeles Metropolitan Area Consumers Price ~~Index~~ for All Urban Consumers. The assessment for each parcel will be levied beginning the 2012 fiscal year, and may be subject to a supplemental assessment by the taxing authority for the remaining portion of the 2011/2012 tax year. Unless the GHAD is terminated, the assessment will continue to be levied in perpetuity.

The Engineer's Report for the GHAD, attached hereto, was prepared by a registered engineer certified in the State of California, and describes in detail the reason for the assessment and the basis upon which the amount of the proposed assessment was calculated. The Engineer's Report specifically sets forth the yearly estimated budget, the total assessment that will be chargeable to the entire GHAD territory, the proposed estimated assessments to be levied each year against each parcel of property, and a description of the method used in formulating the estimated assessment. A copy of the Engineer's Report is also available for inspection at the office of the GHAD Clerk, Barbara Hamm, c/o Marquis Property Company, 29169 Heathercliff Road, #212, Malibu, CA 90265.

The GHAD Board will conduct a public hearing on February 5, 2011 at 9:00 a.m. at [Marquis Property Company, 29169 Heathercliff Road, #212, Malibu, CA 90265] [31330 Broad Beach Road, Malibu, CA 90265] ________________________________, on the proposed assessment.

The following paragraphs provide the procedures for returning and tabulating the ballots:

1. A copy of this Notice of Adoption of Resolution, a sealable Ballot and the Engineer's Report has been sent to each of the property owners within the GHAD. The Ballot may be completed and mailed or hand delivered to GHAD Clerk, c/o Marquis Property

Company, 29169 Heathercliff Road, #212, Malibu, CA 90265, or may be submitted at the public hearing on February 5, 2011. The Ballot may be withdrawn or changed at any time prior to the conclusion of the public testimony on the proposed assessment at the public hearing.

2. Immediately before the hearing, the GHAD Clerk shall tabulate the ballots. In tabulating the ballots, the ballots shall be weighted according to the proportional financial obligation of the affected property; here, the proportional financial obligation of the affected properties is governed by the amount of linear beach frontage owned by each property owner within the GHAD. At the hearing, the GHAD Board shall consider any objections or protests to the assessment and certify the tabulation of the ballots. The GHAD Board shall not impose the assessment if there is a majority protest. A majority protest exists if, upon conclusion of the hearing, weighted ballots submitted in opposition to the assessment exceed the weighted ballots submitted in favor of the assessment.

3. Inquires regarding the proposed assessment may be made by mail to the GHAD Clerk, Barbara Hamm, c/o Marquis Property Company, 29169 Heathercliff Road, #212, Malibu, CA 90265 or by phone at (310) 457-3606.

EXHIBIT "4"

BALLOT

BALLOT

Identification of Parcel(s): ______________________

Record(s) Owner: ____________________________

______ Yes, I/we approve the proposed annual benefit assessment described in the attached Notice on the property described by the parcel numbers identified in this Ballot.

______ No, I/we do not approve the proposed annual benefit assessment described in the attached Notice on the property described by the parcel numbers identified in this Ballot.

____
Signature of Record Owner or Authorized
Representative of the above-identified parcel(s)

Mail or deliver sealed Ballot to:

Clerk of the Board of Directors,
Broad Beach Geologic Hazard Abatement
District
c/o Marquis Property Company
29169 Heathercliff Road, #212
Malibu, CA 90265

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