



Federal Emergency Management Agency

Washington, D.C. 20472

September 12, 2016

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Craig Cates
Mayor, City of Key West
P. O. Box 1409
Key West, FL 33041

IN REPLY REFER TO:

Case No.: 16-04-4726P
Community Name: City of Key West, FL
Community No.: 120168
Effective Date of
This Revision: **January 24, 2017**

Dear Mayor Cates:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed that provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other enclosures specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Atlanta, Georgia, at (770) 220-5400, or the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Sincerely,

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: Mr. Scott G. Fraser
Floodplain Administrator
City of Key West

Mr. Michael A. Giovannozzi, P.E.
Coastal Engineer

RECEIVED
SEP 19 2016

BY:



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT**

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Key West Monroe County Florida	NO PROJECT	COASTAL ANALYSIS UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 120168		
IDENTIFIER	Steam Plant Condo	APPROXIMATE LATITUDE AND LONGITUDE: 24.562, - 81.798 SOURCE: FIRM Panel DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 12087C1508K DATE: February 18, 2005 TYPE: FIRM* NO.: 12087C1516K DATE: February 18, 2005		NO REVISION TO THE FLOOD INSURANCE STUDY REPORT	

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map

FLOODING SOURCE AND REVISED REACH

Gulf of Mexico to Key West Inlet – area centered at approximately 900 feet northwest of the intersection of White Street and Eaton Street

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Gulf of Mexico to Key West Inlet	Zone VE BFEs*	Zone AE BFEs	NONE YES	YES NONE

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Patrick "Rick" F. Sacbbit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

16-04-4726P

102-I-A-C



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance stillwater elevations computed in the FIS for your community. A comprehensive restudy of your community's flood hazards could establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Jesse Munoz
Director, Mitigation Division
Federal Emergency Management Agency, Region IV
Koger Center - Rutgers Building, 3003 Chamblee Tucker Road
Atlanta, GA 30341
(770) 220-5400

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

A handwritten signature in black ink, appearing to read "Rick F. Sacbibit".

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panels warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

Although portion of the revision area is shown on the above-referenced FIRM panels as being in the unincorporated areas of Monroe County, it is located entirely within the corporate limits of the City of Key West.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

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Patrick "Rick" F. Sacibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below, and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/bfe_status/bfe_main.asp.

LOCAL NEWSPAPER

Name: *Key West Citizen*

Dates: September 19, 2016 and September 26, 2016

Within 90 days of the second publication in the local newspaper, any interested party may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

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Patrick "Rick" F. Sacbbit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

**Monroe County
Unincorporated Areas
125129**

**ZONE VE
(EL 13)**

Gulf of Mexico

COASTAL BASE FLOOD ELEVATIONS
APPLY ONLY LANDWARD OF
0.0 FEET NGVD

**City of
Key West
120168**

*Key West
Inlet*

JOINS PANEL 1516

**REVISED
AREA**

**ZONE VE
(EL 10)**

419⁰⁰⁰ M

**ZONE AE
(EL 10)**

**ZONE AE
(EL 9)**

**U.S. Naval
Reservation**

**City of
Key West
120168**

**ZONE AE
(EL 8)**

**ZONE AE
(EL 10)**

**ZONE VE
(EL 10)**

**ZONE AE
(EL 9)**
**U.S. Naval
Reservation**

**ZONE AE
(EL 7)**

WHITE ST

SPECIAL FLOOD HAZARD AREAS

-  Without Base Flood Elevation (BFE)
Zone A, V, A99
-  With BFE or Depth *Zone AE, AO, AH, VE, AR*
-  Regulatory Floodway
-  0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
-  Future Conditions 1% Annual Chance Flood Hazard *Zone X*
-  Area with Reduced Flood Risk due to Levee
See Notes. *Zone X*

OTHER AREAS OF FLOOD HAZARD

SCALE NOTE: BASEMAP IMAGERY WAS OBTAINED FROM NAIP IN 2007.

Map Projection:
NAD 1983 UTM Zone 17N;
Western Hemisphere; Vertical Datum: NGVD 29

1 inch = 500 feet **1:6,000**

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA
National Flood Insurance Program

**NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP**

MONROE COUNTY, FLORIDA
and Incorporated Areas

PANEL 1508 OF 1585

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
KEY WEST, CITY OF	120168	1508	K
MONROE COUNTY	125129	1508	K

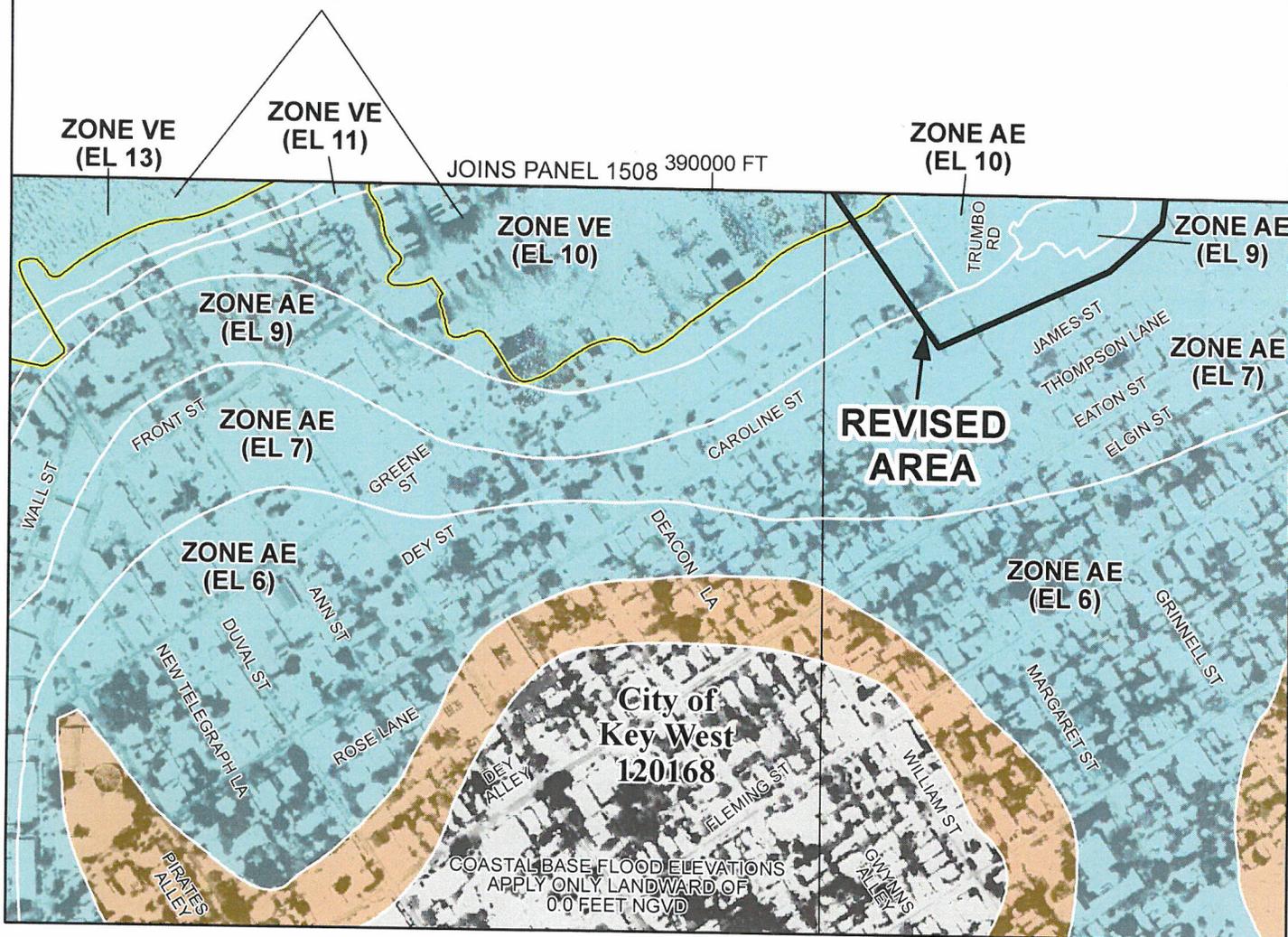
**REVISED TO
REFLECT LOMR
EFFECTIVE: January 24, 2017**

VERSION NUMBER
2.1.3.0

MAP NUMBER
12087C1508K

MAP REVISED
FEBRUARY 18, 2005

**Monroe County
Unincorporated Areas
125129**



SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes. Zone X

SCALE

NOTE: BASEMAP IMAGERY WAS OBTAINED FROM NAIP IN 2007.

Map Projection:
NAD 1983 UTM Zone 17N;
Western Hemisphere; Vertical Datum: NGVD 29

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA
National Flood Insurance Program

**NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP**

MONROE COUNTY, FLORIDA
and Incorporated Areas
PANEL 1516 OF 1585

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
KEY WEST, CITY OF	120168	1516	K
MONROE COUNTY	125129	1516	K

REVISED TO REFLECT LOMR EFFECTIVE: January 24, 2017

VERSION NUMBER
2.1.3.0

MAP NUMBER
12087C1516K

MAP REVISED
FEBRUARY 18, 2005

MT-2 LOMR Submission

Key West Steam Plant Condo
281 Trumbo Road, Key West, FL 33040
Community: Key West, FL
Community No. 120168
Map Panel No. 12087C1508K & 12087C1516K

Prepared By:
Michael A Giovannozzi, PE
534 28th St
West Palm Beach, FL 33407

Prepared For:
AmeriFlood, LLC
4613 Little Road
Trinity, FL 34655

December 15, 2015

December 15, 2015

Letter of Map Revision (LOMR) Request

Community Name: Key West, FL
Community No.: 120168
Map Panel No.: 12087C1508K & 12087C1516K

Project Identifier: **Key West Steam Plant Condo**
Property Locations: 281 Trumbo Road, Key West, FL 33040 (Monroe County)

Introduction

AmeriFlood, LLC herein submits a LOMR request for the above referenced property. The most recent elevation and site data was collected and analyzed in accordance with the *FEMA Guidelines and Specifications for Flood Hazard Mapping Partners, February 2007* (G&S). The accepted Coastal Hazard Analysis Modeling Program (CHAMP) was utilized to analyze the flooding conditions at the project site and the results were delineated on the enclosed maps. The following items are attached to support this LOMR request:

1. Transect Failure Plots
2. Community Concurrence form and Coastal Analysis form;
3. WIS extremal analysis calculation sheets for wave generation in the Gulf of Mexico;
4. Wave Setup Determination;
5. CHAMP input and output data files;
6. Zone Schematic showing CHAMP results;
7. Proposed Flood Insurance Rate Map (FIRM) showing revised zones and effective zones;
8. Topographic Map showing transect locations, topographic data, and revised zones.

Background Data:

The subject property is located at 281 Trumbo Rd along the waterfront of Key West Harbor (Figure 1). The rectangular-shaped property is approximately 200ft by 400ft. According to the 2007 LiDAR data, elevations at the site range +4 to +7.5ft NGVD29. The primary flooding source occurs from Key West Harbor, which connects to the Gulf of Mexico, as delineated by FEMA's Transect No. 1 with a 100-year stillwater elevation (including wave setup) of +8.4 ft NGVD29, as reported by the FEMA Monroe County Flood Insurance Study (FIS).

Three transects were used to accurately model the coastal flooding conditions at the project site. The transects were located along Key West Harbor / Gulf of Mexico and were oriented perpendicular to the shoreline. The transects originate offshore and extend inland to a point landward of the effective VE flood zone (coastal high hazard area) and subject building.



Figure 1. Project Location.

The transects were positioned to be representative of the conditions along each profile and to capture the shoreline, upland area, and building footprint. Transect No. 1 was located along the northern reach of the subject area and subsequent transects were located at approximately 200 ft intervals, progressively to the south, with a shore-normal orientation. Transects 1 and 2 are characterized by an unprotected natural shoreline (i.e. no primary frontal dune or structure), while Transect 3 is characterized by a vertical bulkhead.

The CHAMP model requires hydrologic and hydraulic data to accurately model the flooding conditions during extreme conditions. The effective Flood Insurance Study (FIS) for Monroe County, FL, dated February 18, 2005 was used as the source for the hydrologic data. Transect 1 was selected from the effective FIS as being the most representative due to its proximity to the subject site and location along the Gulf of Mexico.

The project datum for this LOMR request was selected to match the project datum used in the effective FIS. The horizontal datum is the North American Datum of 1983 (NAD83), Florida State Plane East. The vertical datum is the National Geodetic Vertical Datum of 1929 (NGVD29). All units are feet.

Stillwater elevation (SWEL) values were obtained from the FIS and input into CHAMP. Table 1 summarizes the SWEL values.

Table 1: Summary of Stillwater Elevations from FIS Transect 1

Frequency	SWEL (ft, NGVD29)
10%	3.2
2%	5.5
1%	5.8
0.2%	7.3

The 1% frequency wave setup value was obtained from the effective FIS and input into CHAMP. Table 2 summarizes the wave setup value.

Table 2: Summary of Wave Setup from FIS Transect 1

Frequency	Wave Setup (ft)
1%	2.6

The National Oceanic and Atmospheric Administration (NOAA) vDatum v3.2 model was used to vertically transform elevation data from a variety of tidal, orthometric, and ellipsoidal vertical datums to NGVD29. Table 3 summarizes the tidal datum elevations.

Table 3: Summary of Tidal Datums

Datum	Elevation (ft, NGVD29)
Mean Higher High Water (MHHW)	1.40
Mean High Water (MHW)	1.11
Mean Sea Level (MSL)	0.55
Mean Low Water (MLW)	-0.04
Mean Lower Low Water (MLLW)	-0.25

Wave data was obtained from the USACE Wave Information Studies (WIS) Station database. WIS Station 73321 was selected due to its location and orientation relative to the subject site. Figure 2 shows the offshore location of the WIS Station. Each WIS Station provides a wave hindcast based on the 33 year return period from 1980-2012. The wave height data is plotted using a log-normal distribution. A linear fit line is drawn through the top 21 events of the entire data set. This method represents the extreme events more accurately than the annual maxima method if more than one significant event occurs in one calendar year. The equation of the best-fit line represents wave height as a function of return period and is calculated at each WIS Station. A detailed calculation sheet for Station 73321 is attached. The results of the analysis are summarized in Table 4.

Table 4: Summary of Significant Wave Height and Peak Period

WIS Station	Buoy Depth (ft)	Significant Wave Height (H_s)	Peak Period (T_p)
73321	85.3	30.8	11.8



Figure 2: Summary of WIS Station Locations

Topographic and bathymetric data was obtained from the NOAA Coastal Services Center. Raw xyz Light Detection and Ranging (LiDAR) data was extracted from the 2007 Florida Division of Emergency Management (FDEM) LiDAR data set. The LiDAR data was collected from 7/12/2007 2/8/2008 and extends from approximately -2 feet to +11 feet NGVD29 in the subject project vicinity. The metadata abstract for the LiDAR data set is included below.

2007 LiDAR Data Set

This data set consists of 110097 records of x,y, and z values. The data set was extracted from a larger classified data set and only includes points classified as Ground within the requested geographic bounds. This Light Detection and Ranging (LiDAR) LAS dataset is a topographic survey conducted for the State of Florida Division of Emergency Management LiDAR Project. These data were produced for the Florida Division of Emergency Management. The LiDAR point cloud was flown at a density sufficient to support a maximum final post spacing of 4 feet for unobscured areas. 3001 Inc. acquired the data from July 12, 2007 through February 8, 2008. The data was divided into 5000' by 5000' cells that serve as the final tiling scheme. The State of Florida Division of Emergency Management LiDAR Survey was collected under the guidance of a Professional Mapper/Surveyor. The data were collected and are organized into 10 blocks. To determine which block or blocks are in your area of interest, download [ch2mhill_block_index_shapefile.zip](#)

at:

ftp://coast.noaa.gov/pub/DigitalCoast/lidar1_z/geoid12a/data/520/supplemental/ch2mhill_block_index_shapefile.zip

Each block has a metadata record, a Survey Report, a Vertical Accuracy Report and a LiDAR Processing Report which may be accessed at:

ftp://coast.noaa.gov/pub/DigitalCoast/lidar1_z/geoid12a/data/520/supplemental/

A raster image was generated from the raw xyz datasets using an inverse distance weighted interpolation technique within ArcGIS v10.0 utilizing the ET-Surface program using a 5 ft cell size. Contours were then generated at 1 ft intervals for both the upland and offshore zones of the subject site. Due to the complex topography at the subject site, the contours were smoothed using ET-Surface's smoothing routine with a 10 ft tolerance. Remnant contours with a polyline length of less than 100 ft were removed to create an aesthetic dataset. Close attention was paid to the bathymetric/topographic interface to ensure any contours used in the analysis were created from data within the proper dataset domain.

Mapping Summary:

The CHAMP model was run for all transects using only the WHAFIS module. The erosion module was not utilized since the site was located inside a semi-protected harbor. Transects 1 and 2 are characterized by an unprotected natural shoreline (i.e. no primary frontal dune or structure), therefore intact transects were imported directly into CHAMP for the WHAFIS analysis. Transect 3 is characterized by a vertical bulkhead; therefore a partial failure analysis was completed prior to running the WHAFIS module, per FEMA Guidelines and Specifications. The RUNUP module was not used since the site was inundated with the total 100-year water level (100-year SWEL plus wave setup) of +8.4ft NGVD29.

Using the WHAFIS modules within CHAMP, the maximum wave height elevation and peak wave period for all transects were found to be 6.43 ft and 11.8 sec, respectively. The resulting Base Flood Elevations and inland extent of the VE zone were based on only WHAFIS results only since RUNUP was not used and a PFD is not present. These results can be seen on the attached Zone Schematic drawing. In all cases, the revised VE/AE gutter was located generally along the +5 ft NGVD29 contour line located seaward of the subject building footprint.

In conclusion, the results of this coastal analysis indicate that part of the existing VE zone has been remapped as an AE zone for the subject site. Therefore, the subject building should be located in AE zone as indicated on the attached Proposed FIRM map. The subject building footprint is located a minimum distance of approximately 55 ft landward of the VE/AE gutter on the Proposed FIRM map. The revised flood zone and approximate distance to the landward extent of the VE zone is summarized in Table 5 for the subject building.

Table 5: Summary of Revised Flood Zones

Property	Address	Revised Flood Zone	BFE (ft, NGVD29)	Min. Dist. (ft) to VE Zone
Steam Plant Condo	281 Trumbo Rd	AE	7, 8, 9	55

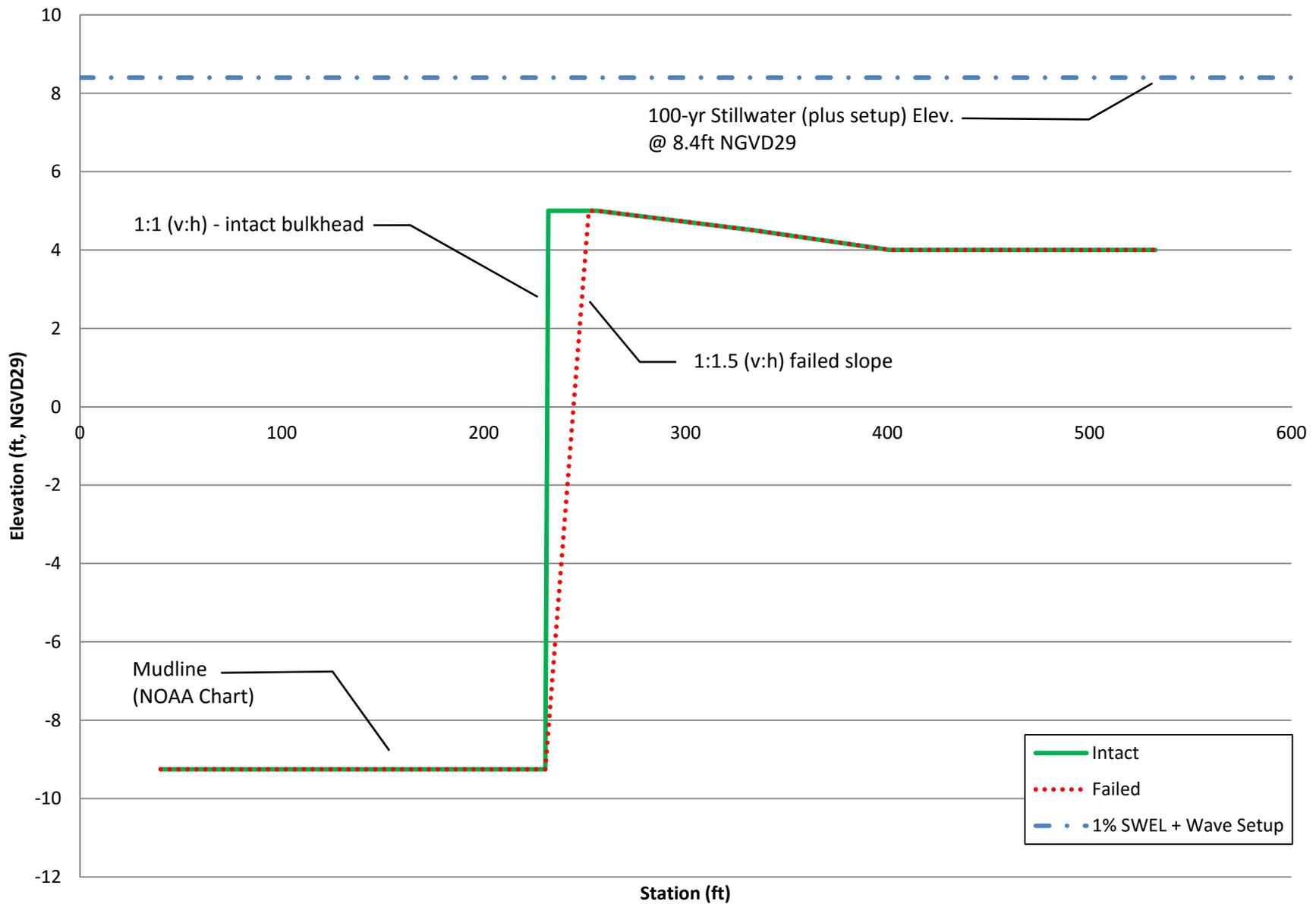
The information included in this submittal should be sufficient for your review and in support of our request for a LOMR. Please do not hesitate to contact me if any additional information is required.

Sincerely,

Michael A Giovannozzi, P.E.
Coastal Engineer

Attachment 1
Transect Failure Plots

Transect 3 - Structure Failure



Attachment 2
Community Concurrence form and Coastal Analysis form

U.S. DEPARTMENT OF HOMELAND SECURITY
 FEDERAL EMERGENCY MANAGEMENT AGENCY
OVERVIEW & CONCURRENCE FORM

*O.M.B No. 1660-0016
 Expires February 28, 2014*

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

- CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).
- LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
120168	City of Key West	FL	12087C	1508K	02/18/05
120168	City of Key West	FL	12087C	1516K	02/18/05

2. a. Flooding Source: Key West Harbor / Gulf of Mexico

- b. Types of Flooding: Riverine Coastal Shallow Flooding (e.g., Zones AO and AH)
 Alluvial fan Lakes Other (Attach Description)

3. Project Name/Identifier: Steam Plant Condo

4. FEMA zone designations affected: VE, AE (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

- Physical Change Improved Methodology/Data Regulatory Floodway Revision Base Map Changes
 Coastal Analysis Hydraulic Analysis Hydrologic Analysis Corrections
 Weir-Dam Changes Levee Certification Alluvial Fan Analysis Natural Changes
 New Topographic Data Other (Attach Description)

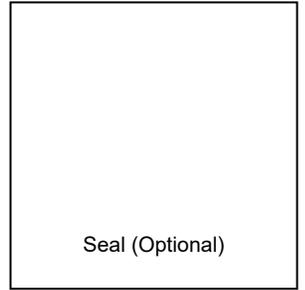
Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)

Required if ...

- | | |
|--|---|
| <input type="checkbox"/> Riverine Hydrology and Hydraulics Form (Form 2) | New or revised discharges or water-surface elevations |
| <input type="checkbox"/> Riverine Structures Form (Form 3) | Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam |
| <input checked="" type="checkbox"/> Coastal Analysis Form (Form 4) | New or revised coastal elevations |
| <input type="checkbox"/> Coastal Structures Form (Form 5) | Addition/revision of coastal structure |
| <input type="checkbox"/> Alluvial Fan Flooding Form (Form 6) | Flood control measures on alluvial fans |



DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
COASTAL ANALYSIS FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Key West Harbor / Gulf of Mexico

Note: Fill out one form for each flooding source studied.

A. COASTLINE TO BE REVISED

Describe limits of study area: Key West Harbor, northeast of intersection of Grinnell St and Trumbo Rd

B. EFFECTIVE FIS

The area being revised in the effective FIS was studied by detailed methods using (check all that apply):

- | | |
|--|---|
| <input checked="" type="checkbox"/> Storm surge modeling | <input checked="" type="checkbox"/> Wave setup computations |
| <input checked="" type="checkbox"/> Wave height computations | <input type="checkbox"/> Wave runup computations |
| <input type="checkbox"/> Wave overtopping computations | <input type="checkbox"/> Dune erosion computations |
| <input type="checkbox"/> Primary Frontal Dune Assessment | <input type="checkbox"/> N/A (area not studied by detailed methods) |

C. REVISED ANALYSIS

1. Number of transects in revised analysis: 3

2. Information used to prepare the revision (check all that apply):

- | | |
|---|--|
| <input type="checkbox"/> Wave setup analyses (complete Items 3, 4, and 5 below) | <input type="checkbox"/> Wave overtopping assessment (complete Items 4 and 5) |
| <input type="checkbox"/> Stillwater elevation determinations (complete Item 3) | <input checked="" type="checkbox"/> More detailed topographic information (complete Section E) |
| <input type="checkbox"/> Erosion considerations (complete Item 4) | <input type="checkbox"/> Shore protection structures (attach completed Coastal Structures Form - Form 5) |
| <input type="checkbox"/> Wave runup analysis (complete Items 4 and 5) | <input type="checkbox"/> Primary frontal dune assessment (complete Item 5) |
| <input checked="" type="checkbox"/> Wave height analysis (complete Items 4 and 5) | <input type="checkbox"/> Other, attach basis of revision request with explanation |

3. Stillwater Elevation Determination

a. How were stillwater elevations determined?

- Gage analysis (If revised gage analysis was used, provide copies of gage data and revised analysis.)
 Storm surge analysis
 Other (Describe): Effective FIS, Transect 1

b. Specify what datum was used in the calculations: NGVD29

If not the FIS datum, have the calculations been adjusted to the FIS datum? Yes No Conversion factor: _____

c. Was the storm surge analysis revised? Yes No

d. If a new storm surge model was used, attach a detailed description of the differences between the current and the revised analyses, and why the revised analysis should replace the current analysis.

C. REVISED ANALYSIS (continued)

e. If wave setup was computed, attach a description of methodology used.
Amount of wave setup added to stillwater elevation: 2.6 feet

4. Revised Analysis (i.e., erosion, wave height, wave runup, primary frontal dune, and wave overtopping)

If DHS-FEMA procedures were utilized to perform the revision, attach a detailed description of differences between the current and the revised analyses, and why the revised analysis should replace the current analysis.

If DHS-FEMA procedures were not utilized to perform the revision, provide full documentation on methodology and/or models used; including operational program, detailed differences between methodology and/or models utilized and DHS-FEMA's methodology and/or models. Also, attach an explanation of why new methodology and/or models should replace current methodology and/or models.

If revision reflects more detailed topographic information and fill has been/will be placed in a V Zone, and is not protected from erosion by a shore protection structure, provide a detailed description of how the fill has been treated in the revised analysis.

5. Wave Runup, Wave Height, And Wave Overtopping Analysis

Wave height analyses along a transect are greatly affected by starting wave conditions that propagate inland. Wave runup and overtopping analyses are typically considered when wave heights and/or wave runup are close to or greater than the crest of shore protection structures or natural land forms.

a. Was an analysis performed to determine starting wave height and period for input into WHAFIS?

If Yes, attach an explanation of the method utilized. If No, explain why these analyses were not performed.

Yes No

b. Was wave setup included in wave height analysis and removed for erosion and wave runup analyses?

Yes No

c. Was an overtopping analysis performed for any coastal shore protection structures or natural land forms that may be overtopped?

Yes No

If Yes, attach an explanation of the methodology utilized and describe in detail the results of the analysis.

If overtopping was not analyzed, attach an explanation for why these analyses were not performed.

D. RESULTS

1. Stillwater storm surge elevation: 5.8 feet NGVD29 Datum

2. Wave setup: 2.6 feet

3. Starting deep-water significant wave condition:
height: 30.8 ft period: 11.8 sec

4. Maximum wave height elevation: 12.9 feet

5. Maximum wave runup elevation: n/a feet

6. Estimated amount of maximum overtopping: n/a cfs/feet

7. Has this revision changed the Limit of Moderate Wave Action (LiMWA)? Yes No N/A

8. The areas designated as coastal high hazard areas (V Zones) have:
 increased decreased both

Attach a description where they have increased and/or decreased.

9. As a result of the revised analyses, the V Zone location has shifted a maximum of 155 feet seaward and 0 feet landward of its existing position.

10. Does this revision reflect the location of the primary frontal dune?
 Yes No

11. The Base Flood Elevations have:
 increased decreased

a. What was the greatest increase? 2 feet

b. What was the greatest decrease? 0 feet

12. The special flood hazard area has:
 increased decreased both

Attach a description where it has increased or decreased.

E. MAPPING REQUIREMENTS

A certified topographic map must be submitted showing the following information (where applicable): effective, existing conditions, and proposed conditions 1%-annual-chance floodplain boundaries, revised shoreline due to either erosion or accretion, location and alignment of all transects, correct location and alignment of any structures, current community easements and boundaries, boundary of the requester's property, certification of a professional engineer registered in the subject State, location and description of reference marks, and the referenced vertical datum (NGVD, NAVD, etc.).

Note that the existing or proposed conditions floodplain boundaries to be shown on the revised FIRM must tie-in with the effective floodplain boundaries. Please attach a copy of the current FIRM annotated to show the revised 1%-annual-chance floodplain boundaries that tie-in with effective 1%-annual-chance floodplain boundaries along the entire extent of the area of revision.

Attachment 3
WIS extremal analysis calculation sheets for wave generation in the Gulf of Mexico

CALCULATION SHEET

Sheet: 1 / 2

Rev: 0

Michael A Giovannozzi, PE

534 28th St
West Palm Beach, FL 33407

phone: 561-703-5230

Project:

Key West Steam Plant

Calc By:

MAG

Date: 12/02/15

Subject:

Offshore Wave Determination

Chk By:

EC

Date: 12/02/15

Project Location: 281 Tumbo Rd, Key West, FL 33040

Monroe County, FL

Project Coords: 24.56243 N

81.7981 W

Nearest WIS Wave Stations

100-yr Return Period

Station ID	Distance (miles)	Direction	Depth (ft)	Wave Height (ft)	Wave Period (sec)
73321	43.5	NW	85.3	30.8	11.8

<-- Selected Offshore Wave*



* The WIS Station 73321 was selected due to its location and orientation relative to the project site.

CALCULATION SHEET

Sheet: 2 / 2

Rev: 0

Michael A Giovannozzi, PE

 534 28th St
 West Palm Beach, FL 33407

phone: 561-703-5230

Project:

Key West Steam Plant

Calc By: MAG

Date: 12/02/15

Subject:

Offshore Wave Determination

Chk By: EC

Date: 42340

Project Location: 281 Tumbo Rd, Key West, FL 33040

Monroe County, FL

Project Coords: 24.56243 N

81.7981 W

WIS Station

73321

Latitude: 25

Longitude: -82.2

Depth: 26 m

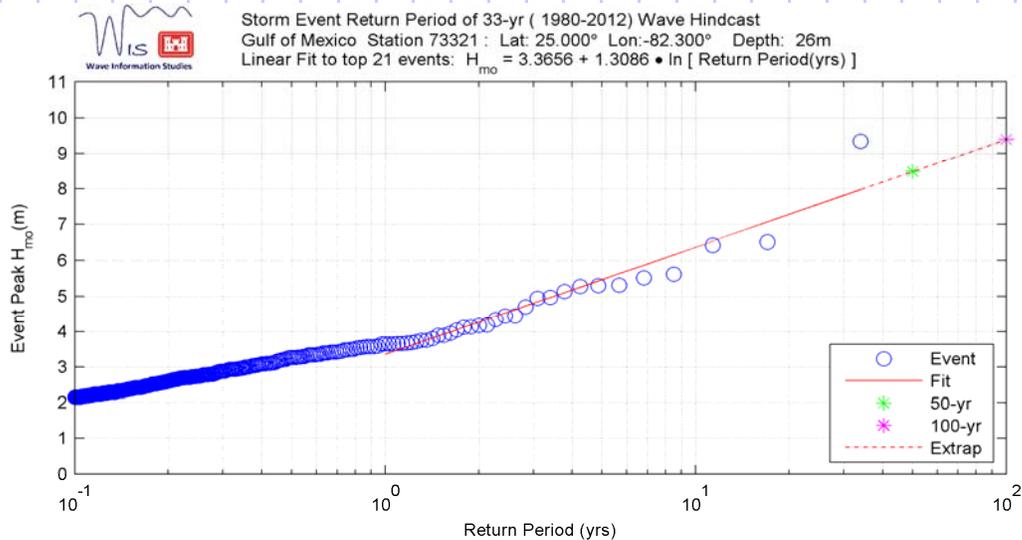
85.3 ft

 100-yr H_s = 9.4 m using linear fit from figure below

30.8 ft

 T_p = 11.8 sec using SPM (1984) Eq 3-64, page 3-85 for Hurricane Wave

$$T = 2.13\sqrt{H_s}$$



Top 10 events based on Peak H _{mo}									
Event	Date/Time(UTC)	H _{mo}	T _p	θ _{mean}	Event	Date/Time(UTC)	H _{mo}	T _p	θ _{mean}
1	2005/10/24 07:00	9.34	13.33	191.0	6	1993/03/14 01:00	5.31	11.23	292.0
2	2004/08/13 15:00	6.52	9.72	180.0	7	1999/10/15 13:00	5.30	8.46	47.0
3	1998/09/25 18:00	6.43	9.06	76.0	8	1985/11/19 23:00	5.27	8.40	72.0
4	2005/08/26 20:00	5.62	8.36	154.0	9	2012/08/26 23:00	5.14	8.38	74.0
5	2005/09/21 00:00	5.52	8.44	83.0	10	1992/02/06 17:00	4.97	11.81	262.0

An event is defined as any period when H_{mo} > 2.00m
 θ_{mean} is direction that waves are arriving from

Attachment 4
Wave Setup Determination

CALCULATION SHEET

Sheet: 1 / 1

Rev: 0

Michael A Giovannozzi, PE
 534 28th St
 West Palm Beach, FL 33407
 phone: 561-703-5230

Project: **Key West Steam Plant**
 Subject: **Wave Setup Linear Regression Analysis**

Calc By: **MAG** Date: **2-Dec-15**
 Chk By: **EC** Date: **2-Dec-15**

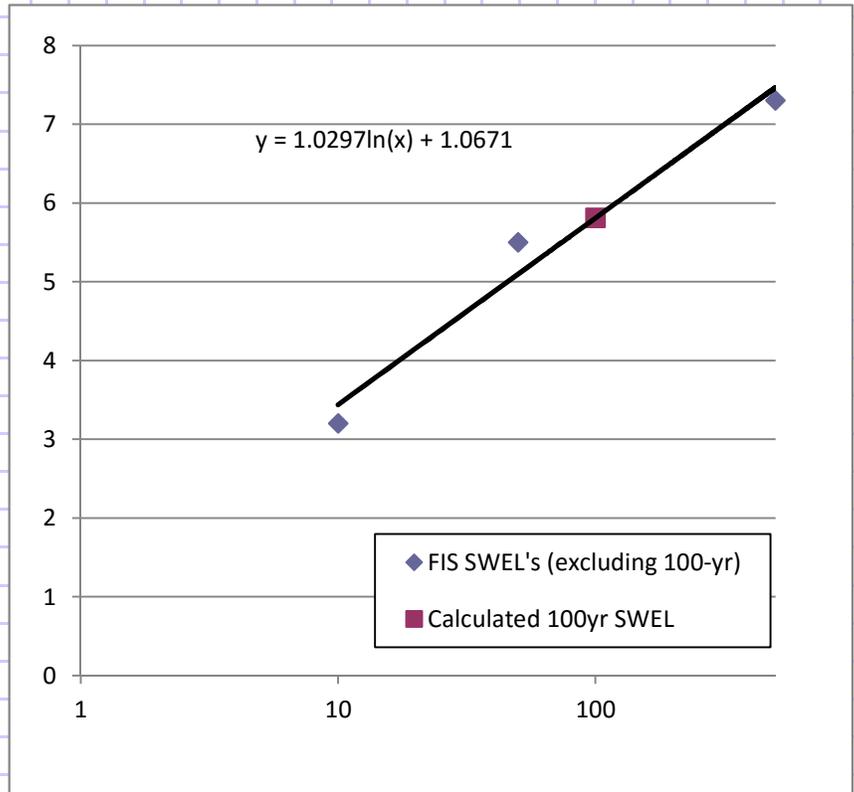
Determination of 100 yr SWEL and 100 yr Wave Setup by Linear Regression Analysis

FIS Data:

Return Period	SWEL
10 yr	3.2 ft
50 yr	5.5 ft
100 yr	8.4* ft
500 yr	7.3 ft

100 yr SWEL (without wave setup) can be computed with trendline equation, therefore:

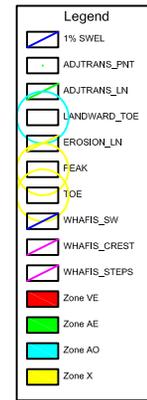
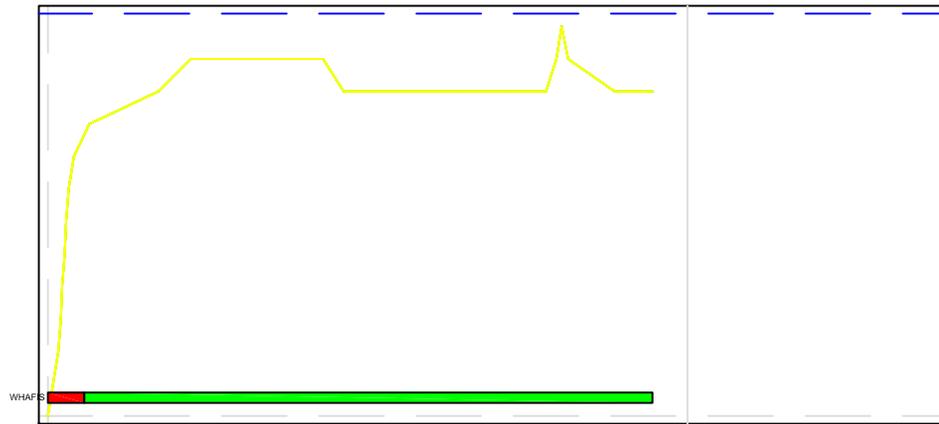
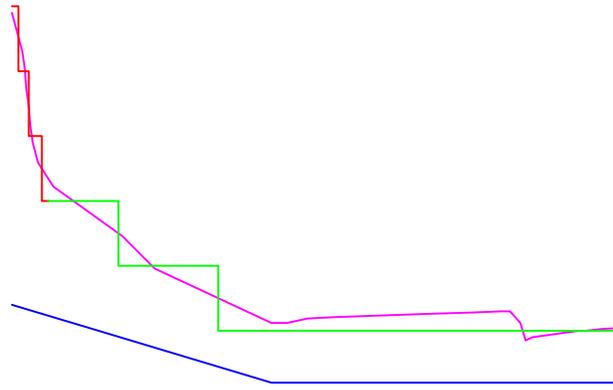
100 yr SWEL =	5.8	ft
---------------	-----	----



* FIS gives 100-yr SWEL (including wave setup) as 8.4 ft
 therefore, the 100-yr wave setup us equal to 2.6 ft

Attachment 5
CHAMP input and output data files

STEAM PLANT CONDO
TRANSECT 1



493

- Transect: 1 Date: 4/11/2016

IE	0.00	0.00	0.00	3.2	8.4	49.3	11.8		
IF	4	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	8	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	10	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	11	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	13	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	14	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	16	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	20	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	32	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	85	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	110	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	200	5.50	0.00	7.2	0.00	0.00	0.00	0.00	0.00
IF	212	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	228	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	250	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	320	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	353	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	377	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	384	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	392	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	396	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	401	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	437	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	439	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	442	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	456	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	466	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ET									

File: wl.out

WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)

Executed on: Mon Apr 11 13:50:56 2016

Input file: T:_Hanson_Under Contract\18. Steam Plant_ Coastal Analysis\Wave Analysis\CHAMP\Steam Plant\wl.dat

Output file: T:_Hanson_Under Contract\18. Steam Plant_ Coastal Analysis\Wave Analysis\CHAMP\Steam Plant\wl.out

- Transect: 1 Date: 4/11/2016

THIS IS

A 100-YEAR CASE

PART1 INPUT

IE	0.000	0.000	0.000	3.200	8.400	49.300	11.800	0.000
0.125	0.000							
IF	4.000	0.500	0.000	8.376	0.000	0.000	0.000	0.000
0.125	0.000							
IF	8.000	1.000	0.000	8.352	0.000	0.000	0.000	0.000
0.167	0.000							
IF	10.000	1.500	0.000	8.340	0.000	0.000	0.000	0.000
0.333	0.000							
IF	11.000	2.000	0.000	8.334	0.000	0.000	0.000	0.000
0.333	0.000							
IF	13.000	2.500	0.000	8.322	0.000	0.000	0.000	0.000
0.333	0.000							
IF	14.000	3.000	0.000	8.316	0.000	0.000	0.000	0.000
0.333	0.000							
IF	16.000	3.500	0.000	8.304	0.000	0.000	0.000	0.000
0.167	0.000							
IF	20.000	4.000	0.000	8.280	0.000	0.000	0.000	0.000
0.063	0.000							
IF	32.000	4.500	0.000	8.208	0.000	0.000	0.000	0.000
0.015	0.000							
IF	85.000	5.000	0.000	7.890	0.000	0.000	0.000	0.000
0.013	0.000							
IF	110.000	5.500	0.000	7.740	0.000	0.000	0.000	0.000
0.004	0.000							

Page: 1

File: wl.out

IF	200.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	212.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
-0.018	0.000							
IF	228.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
-0.013	0.000							
IF	250.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	320.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	353.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	377.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	384.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.033	0.000							
IF	392.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
0.083	0.000							
IF	396.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	401.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
-0.024	0.000							
IF	437.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
-0.013	0.000							
IF	439.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	442.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	456.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	466.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
ET	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000							

1

END END FETCH SURGE ELEV SURGE ELEV INITIAL INITIAL BOTTOM
AVERAGE

Page: 2

File: w1.out

	STATION	ELEVATION	LENGTH	10-YEAR	100-YEAR	WAVE HEIGHT	W. PERIOD		SLOPE
IE 0.000	A-ZONES 0.000	0.000	0.000	3.200	8.400	49.300	11.800	0.000	0.125
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 4.000	0.500	0.000	8.376	0.000	0.000	0.000	0.000	0.125
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 8.000	1.000	0.000	8.352	0.000	0.000	0.000	0.000	0.167
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 10.000	1.500	0.000	8.340	0.000	0.000	0.000	0.000	0.333
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 11.000	2.000	0.000	8.334	0.000	0.000	0.000	0.000	0.333
	END	END	NEW SURGE	NEW SURGE					BOTTOM

Page: 3

File: w1.out

	AVERAGE STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 13.000	2.500	0.000	8.322	0.000	0.000	0.000	0.000	0.333
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 14.000	3.000	0.000	8.316	0.000	0.000	0.000	0.000	0.333
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 16.000	3.500	0.000	8.304	0.000	0.000	0.000	0.000	0.167
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 20.000	4.000	0.000	8.280	0.000	0.000	0.000	0.000	0.063
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 32.000	4.500	0.000	8.208	0.000	0.000	0.000	0.000	0.015

Page: 4

File: w1.out

	END AVERAGE STATION A-ZONES	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE
IF 0.000	85.000	5.000	0.000	7.890	0.000	0.000	0.000	0.000	0.013
IF 0.000	110.000	5.500	0.000	7.740	0.000	0.000	0.000	0.000	0.004
IF 0.000	200.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	212.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	-0.018
IF 0.000	228.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	-0.013

Page: 5

File: w1.out

	END AVERAGE STATION A-ZONES	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE
IF 0.000	250.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	320.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	353.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	377.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	384.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.033

Page: 6

	END AVERAGE STATION A-ZONES	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE
IF 0.000	392.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	0.083
IF 0.000	396.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	401.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	-0.024
IF 0.000	437.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	-0.013
IF 0.000	439.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000

0.000

	END AVERAGE STATION A-ZONES	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE
IF 0.000	442.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	456.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	466.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000

-----END OF
TRANSECT-----

NOTE:

SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.

1

PEAK WAVE PERIOD, AND WAVE CREST ELEVATIONS

LOCATION	CONTROLLING WAVE HEIGHT	SPECTRAL PEAK WAVE PERIOD	WAVE CREST ELEVATION
IE 0.00	6.43	11.80	12.90
IF 4.00	6.04	11.80	12.60
IF 8.00	5.64	11.80	12.30
IF 10.00	5.26	11.80	12.02
IF 11.00	4.87	11.80	11.74
IF 13.00	4.48	11.80	11.46
IF 14.00	4.10	11.80	11.18
IF 16.00	3.71	11.80	10.90
IF 20.00	3.31	11.80	10.59
IF 32.00	2.87	11.80	10.22
IF 85.00	2.24	11.80	9.46
IF 110.00	1.74	11.80	8.96
IF 200.00	1.32	11.80	8.12
IF 212.00	1.32	11.80	8.12
IF 228.00	1.41	11.80	8.19
IF 250.00	1.44	11.80	8.21
IF 320.00	1.52	11.80	8.26

IF 353.00	1.55	11.80	8.28
IF 377.00	1.57	11.80	8.30
IF 384.00	1.57	11.80	8.30
IF 392.00	1.32	11.80	8.12
IF 396.00	0.93	11.80	7.85
IF 401.00	1.00	11.80	7.90
IF 437.00	1.14	11.80	8.00
IF 439.00	1.14	11.80	8.00
IF 442.00	1.15	11.80	8.00
IF 456.00	1.18	11.80	8.03
IF 466.00	1.21	11.80	8.04

TRANSMITTED WAVE HEIGHT AT LAST FETCH OR OBSTRUCTION = 1.21 WHICH EXCEEDS 0.5.

PART3 LOCATION OF AREAS ABOVE 100-YEAR SURGE
NO AREAS ABOVE 100-YEAR SURGE IN THIS TRANSECT

PART4 LOCATION OF SURGE CHANGES

STATION	10-YEAR SURGE	100-YEAR SURGE
4.00	3.20	8.38
8.00	3.20	8.35

10.00	3.20	8.34
11.00	3.20	8.33
13.00	3.20	8.32
14.00	3.20	8.32
16.00	3.20	8.30
20.00	3.20	8.28
32.00	3.20	8.21
85.00	3.20	7.89
110.00	3.20	7.74
200.00	3.20	7.20

PART5 LOCATION OF V ZONES

STATION OF GUTTER	LOCATION OF ZONE
28.41	WINDWARD

PART6 NUMBERED A ZONES AND V ZONES

STATION OF GUTTER	ELEVATION	ZONE DESIGNATION	FHF
0.00	12.90	V16 EL=13	80

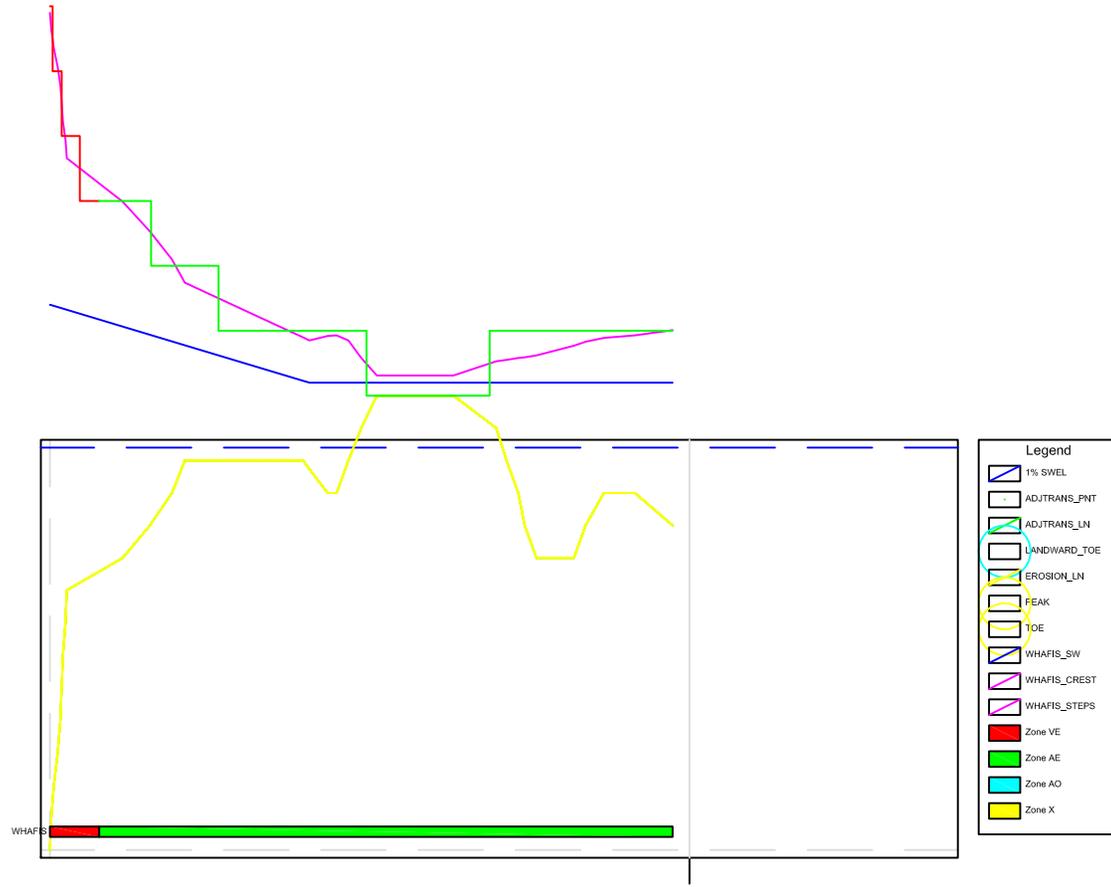
4.00	12.60	V16 EL=13	80
5.37	12.50	V16 EL=12	80
8.00	12.30	V16 EL=12	80
10.00	12.02	V16 EL=12	80
11.00	11.74	V16 EL=12	80
12.72	11.50	V16 EL=11	80
13.00	11.46	V16 EL=11	80
14.00	11.18	V16 EL=11	80
16.00	10.90	V16 EL=11	80
20.00	10.59	V16 EL=11	80

23.01	10.50			
		V16	EL=10	80
28.41	10.34			
		A11	EL=10	55
32.00	10.22			
		A11	EL=10	55
82.06	9.50			
		A11	EL= 9	55
85.00	9.46			
		A11	EL= 9	55
110.00	8.96			
		A11	EL= 9	55
159.42	8.50			
		A11	EL= 8	55
200.00	8.12			
		A11	EL= 8	55
466.00	8.04			

ZONE TERMINATED AT END OF TRANSECT

PART 7 POSTSCRIPT NOTES

STEAM PLANT CONDO
TRANSECT 2



- Transect: 2 Date: 4/11/2016

IE	0.00	0.00	0.00	3.2	8.4	49.3	11.8		
IF	1	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	3	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	6	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	8	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	9	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	10	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	12	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	13	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	56	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	77	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	94	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	104	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	159	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	172	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	195	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	200	6.00	0.00	7.2	0.00	0.00	0.00	0.00	0.00
IF	214	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	221	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	230	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	240	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	252	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	311	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	344	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	352	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	361	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	366	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	375	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	404	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	413	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	427	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	451	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	480	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ET									

WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)

Executed on: Mon Apr 11 13:51:32 2016

Input file: T:_Hanson_Under Contract\18. Steam Plant_ Coastal Analysis\Wave Analysis\CHAMP\Steam Plant\w2.dat

Output file: T:_Hanson_Under Contract\18. Steam Plant_ Coastal Analysis\Wave Analysis\CHAMP\Steam Plant\w2.out

- Transect: 2 Date: 4/11/2016

THIS IS

A 100-YEAR CASE

PART1 INPUT

IE	0.000	0.000	0.000	3.200	8.400	49.300	11.800	0.000
0.500	0.000							
IF	1.000	0.500	0.000	8.394	0.000	0.000	0.000	0.000
0.333	0.000							
IF	3.000	1.000	0.000	8.382	0.000	0.000	0.000	0.000
0.200	0.000							
IF	6.000	1.500	0.000	8.364	0.000	0.000	0.000	0.000
0.200	0.000							
IF	8.000	2.000	0.000	8.352	0.000	0.000	0.000	0.000
0.333	0.000							
IF	9.000	2.500	0.000	8.346	0.000	0.000	0.000	0.000
0.500	0.000							
IF	10.000	3.000	0.000	8.340	0.000	0.000	0.000	0.000
0.333	0.000							
IF	12.000	3.500	0.000	8.328	0.000	0.000	0.000	0.000
0.333	0.000							
IF	13.000	4.000	0.000	8.322	0.000	0.000	0.000	0.000
0.023	0.000							
IF	56.000	4.500	0.000	8.064	0.000	0.000	0.000	0.000
0.016	0.000							
IF	77.000	5.000	0.000	7.938	0.000	0.000	0.000	0.000
0.026	0.000							
IF	94.000	5.500	0.000	7.836	0.000	0.000	0.000	0.000
0.037	0.000							

IF	104.000	6.000	0.000	7.776	0.000	0.000	0.000	0.000
0.008	0.000							
IF	159.000	6.000	0.000	7.446	0.000	0.000	0.000	0.000
0.000	0.000							
IF	172.000	6.000	0.000	7.368	0.000	0.000	0.000	0.000
0.000	0.000							
IF	195.000	6.000	0.000	7.230	0.000	0.000	0.000	0.000
0.000	0.000							
IF	200.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000
-0.026	0.000							
IF	214.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
-0.024	0.000							
IF	221.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
0.031	0.000							
IF	230.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000
0.053	0.000							
IF	240.000	6.500	0.000	7.200	0.000	0.000	0.000	0.000
0.045	0.000							
IF	252.000	7.000	0.000	7.200	0.000	0.000	0.000	0.000
0.007	0.000							
IF	311.000	7.000	0.000	7.200	0.000	0.000	0.000	0.000
-0.005	0.000							
IF	344.000	6.500	0.000	7.200	0.000	0.000	0.000	0.000
-0.024	0.000							
IF	352.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000
-0.059	0.000							
IF	361.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
-0.071	0.000							
IF	366.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
-0.071	0.000							
IF	375.000	4.500	0.000	7.200	0.000	0.000	0.000	0.000
-0.013	0.000							
IF	404.000	4.500	0.000	7.200	0.000	0.000	0.000	0.000
0.013	0.000							
IF	413.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000
0.043	0.000							
IF	427.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000
0.013	0.000							
IF	451.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000

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-0.009      0.000
IF 480.000  5.000   0.000   7.200   0.000   0.000   0.000   0.000
-0.017      0.000
ET 0.000    0.000   0.000   0.000   0.000   0.000   0.000   0.000
0.000      0.000

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1

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      END      END      FETCH SURGE ELEV SURGE ELEV  INITIAL  INITIAL
      AVERAGE  STATION ELEVATION  LENGTH  10-YEAR  100-YEAR WAVE HEIGHT  W. PERIOD
      A-ZONES
IE 0.000  0.000   0.000   3.200   8.400   49.300   11.800   0.000   0.500
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 1.000  0.500   0.000   8.394   0.000   0.000   0.000   0.000   0.333
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 3.000  1.000   0.000   8.382   0.000   0.000   0.000   0.000   0.200
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 6.000  1.500   0.000   8.364   0.000   0.000   0.000   0.000   0.200
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 8.000  2.000   0.000   8.352   0.000   0.000   0.000   0.000   0.333
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 9.000  2.500   0.000   8.346   0.000   0.000   0.000   0.000   0.500
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 10.000  3.000   0.000   8.340   0.000   0.000   0.000   0.000   0.333
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 12.000  3.500   0.000   8.328   0.000   0.000   0.000   0.000   0.333
0.000

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      END      END  NEW SURGE  NEW SURGE
      AVERAGE  STATION ELEVATION  10-YEAR  100-YEAR
      A-ZONES
IF 13.000  4.000   0.000   8.322   0.000   0.000   0.000   0.000   0.023
0.000

```

	END AVERAGE STATION A-ZONES	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE
IF 0.000	56.000	4.500	0.000	8.064	0.000	0.000	0.000	0.000	0.016
IF 0.000	77.000	5.000	0.000	7.938	0.000	0.000	0.000	0.000	0.026
IF 0.000	94.000	5.500	0.000	7.836	0.000	0.000	0.000	0.000	0.037
IF 0.000	104.000	6.000	0.000	7.776	0.000	0.000	0.000	0.000	0.008
IF 0.000	159.000	6.000	0.000	7.446	0.000	0.000	0.000	0.000	0.000

0.000									
IF 0.000	172.000	6.000	0.000	7.368	0.000	0.000	0.000	0.000	0.000
IF 0.000	195.000	6.000	0.000	7.230	0.000	0.000	0.000	0.000	0.000
IF 0.000	200.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000	-0.026
IF 0.000	214.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	-0.024

IF 0.000	221.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	0.031
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	230.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000	0.053
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	240.000	6.500	0.000	7.200	0.000	0.000	0.000	0.000	0.045
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	252.000	7.000	0.000	7.200	0.000	0.000	0.000	0.000	0.007
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	311.000	7.000	0.000	7.200	0.000	0.000	0.000	0.000	-0.005
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE

IF 0.000	A-ZONES 344.000	6.500	0.000	7.200	0.000	0.000	0.000	0.000	-0.024
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 352.000	6.000	0.000	7.200	0.000	0.000	0.000	0.000	-0.059
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 361.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	-0.071
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 366.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	-0.071
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	A-ZONES 375.000	4.500	0.000	7.200	0.000	0.000	0.000	0.000	-0.013
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM

	STATION A-ZONES	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	404.000	4.500	0.000	7.200	0.000	0.000	0.000	0.000	0.013
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION A-ZONES	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	413.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	0.043
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION A-ZONES	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	427.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	0.013
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION A-ZONES	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	451.000	5.500	0.000	7.200	0.000	0.000	0.000	0.000	-0.009
	END AVERAGE	END	NEW SURGE	NEW SURGE					BOTTOM
	STATION A-ZONES	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF 0.000	480.000	5.000	0.000	7.200	0.000	0.000	0.000	0.000	-0.017

-----END OF

TRANSECT-----

NOTE:

SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.

1

PART2: CONTROLLING WAVE HEIGHTS, SPECTRAL
PEAK WAVE PERIOD, AND WAVE CREST ELEVATIONS

	LOCATION	CONTROLLING WAVE HEIGHT	SPECTRAL PEAK WAVE PERIOD	WAVE CREST ELEVATION
IE	0.00	6.43	11.80	12.90
IF	1.00	6.05	11.80	12.63
IF	3.00	5.67	11.80	12.35
IF	6.00	5.27	11.80	12.06
IF	8.00	4.89	11.80	11.77
IF	9.00	4.50	11.80	11.50
IF	10.00	4.12	11.80	11.22
IF	12.00	3.73	11.80	10.94
IF	13.00	3.34	11.80	10.66
IF	56.00	2.76	11.80	9.99
IF	77.00	2.28	11.80	9.53
IF	94.00	1.81	11.80	9.10

IF	104.00	1.38	11.80	8.74
IF	159.00	1.12	11.80	8.23
IF	172.00	1.06	11.80	8.11
IF	195.00	0.96	11.80	7.90
IF	200.00	0.93	11.80	7.85
IF	214.00	1.02	11.80	7.92
IF	221.00	1.04	11.80	7.93
IF	230.00	0.93	11.80	7.85
IF	240.00	0.55	11.80	7.58
IF	252.00	0.16	11.80	7.31
IF	311.00	0.16	11.80	7.31
IF	344.00	0.48	11.80	7.53
IF	352.00	0.50	11.80	7.55
IF	361.00	0.54	11.80	7.58
IF	366.00	0.55	11.80	7.59
IF	375.00	0.60	11.80	7.62
IF	404.00	0.81	11.80	7.77
IF	413.00	0.91	11.80	7.83
IF	427.00	0.99	11.80	7.89

IF	451.00	1.05	11.80	7.93
IF	480.00	1.16	11.80	8.01

TRANSMITTED WAVE HEIGHT AT LAST FETCH OR OBSTRUCTION = 1.16 WHICH EXCEEDS 0.5.

PART3 LOCATION OF AREAS ABOVE 100-YEAR SURGE

NO AREAS ABOVE 100-YEAR SURGE IN THIS TRANSECT

PART4 LOCATION OF SURGE CHANGES

STATION	10-YEAR SURGE	100-YEAR SURGE
1.00	3.20	8.39
3.00	3.20	8.38
6.00	3.20	8.36
8.00	3.20	8.35
9.00	3.20	8.35
10.00	3.20	8.34
12.00	3.20	8.33
13.00	3.20	8.32
56.00	3.20	8.06
77.00	3.20	7.94
94.00	3.20	7.84

104.00	3.20	7.78
159.00	3.20	7.45
172.00	3.20	7.37
195.00	3.20	7.23
200.00	3.20	7.20

PART5 LOCATION OF V ZONES

STATION OF GUTTER	LOCATION OF ZONE
38.10	WINDWARD

PART6 NUMBERED A ZONES AND V ZONES

STATION OF GUTTER	ELEVATION	ZONE DESIGNATION	PHF
0.00	12.90		
		V16 EL=13	80
1.00	12.63		
		V16 EL=13	80
1.92	12.50		
		V16 EL=12	80
3.00	12.35		

		V16 EL=12	80
6.00	12.06		
		V16 EL=12	80
8.00	11.77		
		V16 EL=12	80
8.99	11.50		
		V16 EL=11	80
9.00	11.50		
		V16 EL=11	80
10.00	11.22		
		V16 EL=11	80
12.00	10.94		
		V16 EL=11	80
13.00	10.66		
		V15 EL=11	75
23.31	10.50		
		V15 EL=10	75
38.10	10.29		
		A10 EL=10	50
56.00	9.99		

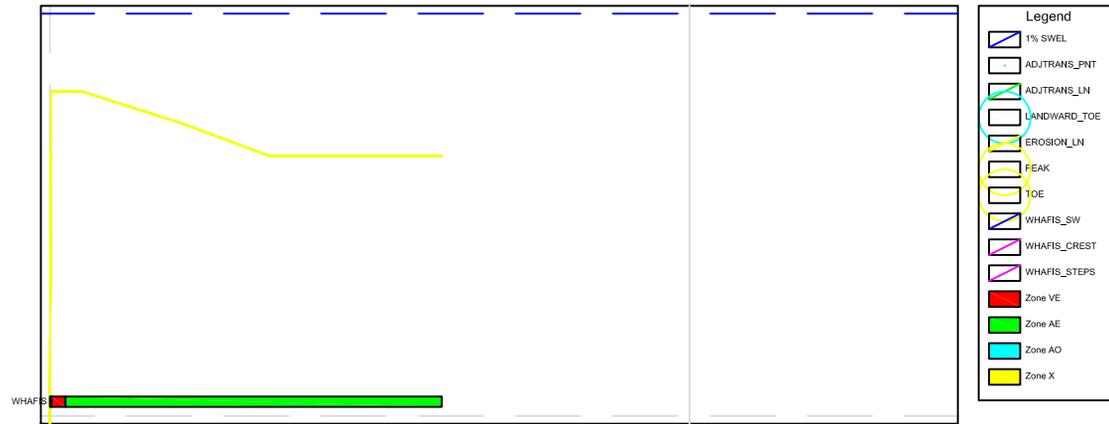
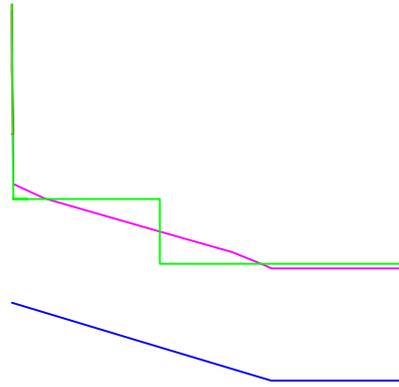
		A10 EL=10	50
77.00	9.53		
		A10 EL=10	50
78.27	9.50		
		A10 EL= 9	50
94.00	9.10		
		A10 EL= 9	50
104.00	8.74		
		A10 EL= 9	50
130.14	8.50		
		A10 EL= 8	50
159.00	8.23		
		A10 EL= 8	50
172.00	8.11		
		A10 EL= 8	50
195.00	7.90		
		A10 EL= 8	50
200.00	7.85		
		A10 EL= 8	50

243.59	7.50		
		A10 EL= 7	50
339.15	7.50		
		A10 EL= 8	50
480.00	8.01		

ZONE TERMINATED AT END OF TRANSECT

PART 7 POSTSCRIPT NOTES

STEAM PLANT CONDO
TRANSECT 3 - INTACT



- Legend
- 1% SWEL
 - ADTRANS_PNT
 - ADTRANS_LN
 - LANDWARD_TOE
 - EROSION_LN
 - PEAK
 - IDE
 - WHAFIS_SW
 - WHAFIS_CREST
 - WHAFIS_STEPS
 - Zone VE
 - Zone AE
 - Zone AO
 - Zone X

- Transect: 3 Date: 4/11/2016

IE	0.00	0.00	0.00	3.2	8.4	49.3	11.8		
IF	1	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	12	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	15	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	25	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	103	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	170	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	197	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	200	4.00	0.00	7.2	0.00	0.00	0.00	0.00	0.00
IF	302	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ET									

WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)
 Executed on: Mon Apr 11 13:52:03 2016
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 Plant\w3.dat
 Output file: T:_Hanson_Under Contract\18. Steam Plant__ Coastal Analysis\Wave Analysis\CHAMP\Steam
 Plant\w3.out

- Transect: 3 Date: 4/11/2016

THIS IS

A 100-YEAR CASE

PART1 INPUT

IE	0.000	0.000	0.000	3.200	8.400	49.300	11.800	0.000
5.000	0.000							
IF	1.000	5.000	0.000	8.394	0.000	0.000	0.000	0.000
0.417	0.000							
IF	12.000	5.000	0.000	8.328	0.000	0.000	0.000	0.000
0.000	0.000							
IF	15.000	5.000	0.000	8.310	0.000	0.000	0.000	0.000
0.000	0.000							
IF	25.000	5.000	0.000	8.250	0.000	0.000	0.000	0.000
-0.006	0.000							
IF	103.000	4.500	0.000	7.782	0.000	0.000	0.000	0.000
-0.007	0.000							
IF	170.000	4.000	0.000	7.380	0.000	0.000	0.000	0.000
-0.005	0.000							
IF	197.000	4.000	0.000	7.218	0.000	0.000	0.000	0.000
0.000	0.000							
IF	200.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	302.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
ET	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000							

1

	END AVERAGE STATION	END ELEVATION	FETCH LENGTH	SURGE 10-YEAR	ELEV 100-YEAR	SURGE WAVE HEIGHT	INITIAL W. PERIOD	BOTTOM SLOPE
IE	0.000	0.000	0.000	3.200	8.400	49.300	11.800	0.000
0.000								5.000
IF	1.000	5.000	0.000	8.394	0.000	0.000	0.000	0.417
0.000								
IF	12.000	5.000	0.000	8.328	0.000	0.000	0.000	0.000
0.000								
IF	15.000	5.000	0.000	8.310	0.000	0.000	0.000	0.000
0.000								
IF	25.000	5.000	0.000	8.250	0.000	0.000	0.000	-0.006
0.000								

	END AVERAGE STATION A-ZONES	END ELEVATION	NEW SURGE 10-YEAR	NEW SURGE 100-YEAR					BOTTOM SLOPE
IF 0.000	103.000	4.500	0.000	7.782	0.000	0.000	0.000	0.000	-0.007
IF 0.000	170.000	4.000	0.000	7.380	0.000	0.000	0.000	0.000	-0.005
IF 0.000	197.000	4.000	0.000	7.218	0.000	0.000	0.000	0.000	0.000
IF 0.000	200.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
IF 0.000	302.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000

0.000

-----END OF
TRANSECT-----

NOTE:

SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.

1

PART2: CONTROLLING WAVE HEIGHTS, SPECTRAL
PEAK WAVE PERIOD, AND WAVE CREST ELEVATIONS

LOCATION	CONTROLLING WAVE HEIGHT	SPECTRAL PEAK WAVE PERIOD	WAVE CREST ELEVATION
IE 0.00	6.43	11.80	12.90
IF 1.00	2.63	11.80	10.23
IF 12.00	2.58	11.80	10.13
IF 15.00	2.56	11.80	10.10
IF 25.00	2.52	11.80	10.01
IF 103.00	2.54	11.80	9.56
IF 170.00	2.58	11.80	9.18
IF 197.00	2.49	11.80	8.96
IF 200.00	2.48	11.80	8.93
IF 302.00	2.48	11.80	8.93

TRANSMITTED WAVE HEIGHT AT LAST FETCH OR OBSTRUCTION = 2.48 WHICH EXCEEDS 0.5.

PART3 LOCATION OF AREAS ABOVE 100-YEAR SURGE
NO AREAS ABOVE 100-YEAR SURGE IN THIS TRANSECT

PART4 LOCATION OF SURGE CHANGES

STATION	10-YEAR SURGE	100-YEAR SURGE
1.00	3.20	8.39
12.00	3.20	8.33
15.00	3.20	8.31
25.00	3.20	8.25
103.00	3.20	7.78
170.00	3.20	7.38
197.00	3.20	7.22
200.00	3.20	7.20

PART5 LOCATION OF V ZONES

STATION OF GUTTER	LOCATION OF ZONE
0.90	WINDWARD

PART6 NUMBERED A ZONES AND V ZONES

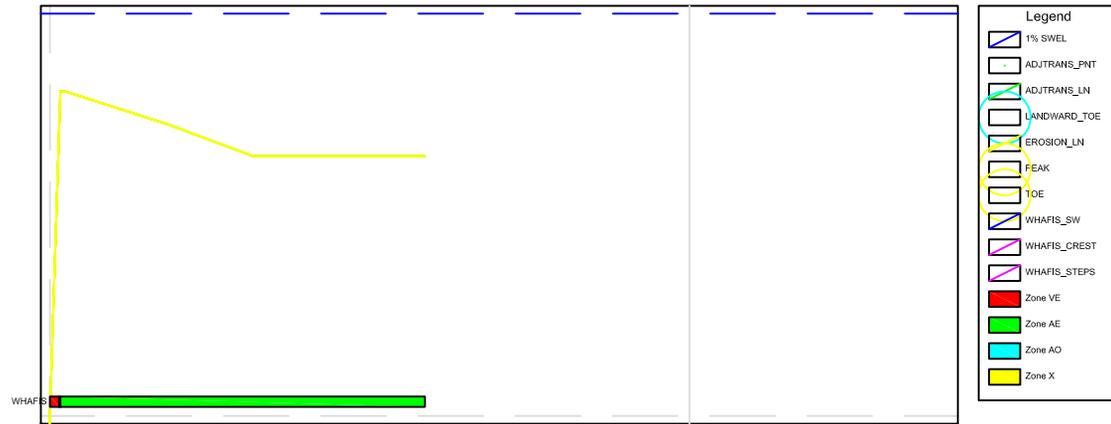
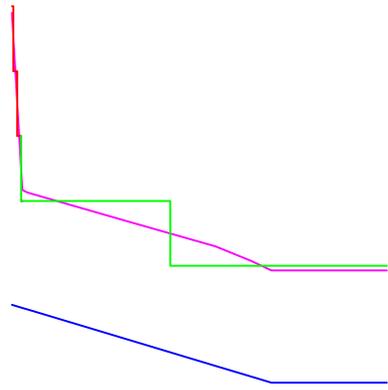
STATION OF GUTTER	ELEVATION	ZONE DESIGNATION	FHF
0.00	12.90	V16 EL=13	80
0.15	12.50	V16 EL=12	80
0.53	11.50	V16 EL=11	80
0.90	10.50	V16 EL=10	80
0.90	10.50	A12 EL=10	60
1.00	10.23	A12 EL=10	60
12.00	10.13	A12 EL=10	60
15.00	10.10	A12 EL=10	60
25.00	10.01		

		A12 EL=10	60
103.00	9.56		
		A12 EL=10	60
113.78	9.50		
		A12 EL= 9	60
170.00	9.18		
		A12 EL= 9	60
197.00	8.96		
		A12 EL= 9	60
200.00	8.93		
		A12 EL= 9	60
302.00	8.93		

ZONE TERMINATED AT END OF TRANSECT

PART 7 POSTSCRIPT NOTES

STEAM PLANT CONDO
TRANSECT 3 - FAILED



493

- Transect: 3F Date: 4/11/2016

IE	0.00	0.00	0.00	3.2	8.4	49.3	11.8		
IF	8	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	12	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	90	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	157	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	184	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IF	200	4.00	0.00	7.2	0.00	0.00	0.00	0.00	0.00
IF	289	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ET									

WAVE HEIGHT COMPUTATIONS FOR FLOOD INSURANCE STUDIES (WHAFIS VERSION 4.0G, 08_2007)
 Executed on: Mon Apr 11 13:52:32 2016
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 Output file: T:_Hanson_Under Contract\18. Steam Plant_ Coastal Analysis\Wave Analysis\CHAMP\Steam
 Plant\w3F.out

- Transect: 3F Date: 4/11/2016

THIS IS

A 100-YEAR CASE

PART1 INPUT

IE	0.000	0.000	0.000	3.200	8.400	49.300	11.800	0.000
0.625	0.000							
IF	8.000	5.000	0.000	8.352	0.000	0.000	0.000	0.000
0.417	0.000							
IF	12.000	5.000	0.000	8.328	0.000	0.000	0.000	0.000
-0.006	0.000							
IF	90.000	4.500	0.000	7.860	0.000	0.000	0.000	0.000
-0.007	0.000							
IF	157.000	4.000	0.000	7.458	0.000	0.000	0.000	0.000
-0.005	0.000							
IF	184.000	4.000	0.000	7.296	0.000	0.000	0.000	0.000
0.000	0.000							
IF	200.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
IF	289.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000
0.000	0.000							
ET	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000							

1

END AVERAGE STATION	END ELEVATION	FETCH LENGTH	SURGE 10-YEAR	ELEV 100-YEAR	SURGE 100-YEAR	ELEV WAVE HEIGHT	INITIAL W. PERIOD	INITIAL	BOTTOM SLOPE
---------------------	---------------	--------------	---------------	---------------	----------------	------------------	-------------------	---------	--------------

A-ZONES									
IE	0.000	0.000	0.000	3.200	8.400	49.300	11.800	0.000	0.625
0.000									
END AVERAGE STATION ELEVATION 10-YEAR 100-YEAR SURGE 10-YEAR SURGE 100-YEAR WAVE HEIGHT INITIAL W. PERIOD INITIAL BOTTOM SLOPE									
IF	8.000	5.000	0.000	8.352	0.000	0.000	0.000	0.000	0.417
0.000									
END AVERAGE STATION ELEVATION 10-YEAR 100-YEAR SURGE 10-YEAR SURGE 100-YEAR WAVE HEIGHT INITIAL W. PERIOD INITIAL BOTTOM SLOPE									
IF	12.000	5.000	0.000	8.328	0.000	0.000	0.000	0.000	-0.006
0.000									
END AVERAGE STATION ELEVATION 10-YEAR 100-YEAR SURGE 10-YEAR SURGE 100-YEAR WAVE HEIGHT INITIAL W. PERIOD INITIAL BOTTOM SLOPE									
IF	90.000	4.500	0.000	7.860	0.000	0.000	0.000	0.000	-0.007
0.000									
END AVERAGE STATION ELEVATION 10-YEAR 100-YEAR SURGE 10-YEAR SURGE 100-YEAR WAVE HEIGHT INITIAL W. PERIOD INITIAL BOTTOM SLOPE									
IF	157.000	4.000	0.000	7.458	0.000	0.000	0.000	0.000	-0.005
0.000									
END AVERAGE STATION ELEVATION 10-YEAR 100-YEAR SURGE 10-YEAR SURGE 100-YEAR WAVE HEIGHT INITIAL W. PERIOD INITIAL BOTTOM SLOPE									

File: w3F.out

	STATION	ELEVATION	10-YEAR	100-YEAR					SLOPE
IF	184.000	4.000	0.000	7.296	0.000	0.000	0.000	0.000	0.000
0.000									

	END AVERAGE STATION	END ELEVATION	NEW SURGE	NEW SURGE					BOTTOM SLOPE
IF	200.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
0.000									

	END AVERAGE STATION	END ELEVATION	NEW SURGE	NEW SURGE					BOTTOM SLOPE
IF	289.000	4.000	0.000	7.200	0.000	0.000	0.000	0.000	0.000
0.000									

-----END OF
TRANSECT-----

NOTE:

SURGE ELEVATION INCLUDES CONTRIBUTIONS FROM ASTRONOMICAL AND STORM TIDES.

1

PART2: CONTROLLING WAVE HEIGHTS, SPECTRAL
PEAK WAVE PERIOD, AND WAVE CREST ELEVATIONS

LOCATION	CONTROLLING WAVE HEIGHT	SPECTRAL PEAK WAVE PERIOD	WAVE CREST ELEVATION
----------	----------------------------	------------------------------	-------------------------

Page: 3

File: w3F.out

IE	0.00	6.43	11.80	12.90
IF	8.00	2.60	11.80	10.17
IF	12.00	2.58	11.80	10.13
IF	90.00	2.60	11.80	9.68
IF	157.00	2.64	11.80	9.30
IF	184.00	2.55	11.80	9.08
IF	200.00	2.48	11.80	8.93
IF	289.00	2.48	11.80	8.93

TRANSMITTED WAVE HEIGHT AT LAST FETCH OR OBSTRUCTION = 2.48 WHICH EXCEEDS 0.5.

PART3 LOCATION OF AREAS ABOVE 100-YEAR SURGE
NO AREAS ABOVE 100-YEAR SURGE IN THIS TRANSECT

PART4 LOCATION OF SURGE CHANGES

STATION	10-YEAR SURGE	100-YEAR SURGE
8.00	3.20	8.35
12.00	3.20	8.33
90.00	3.20	7.86
157.00	3.20	7.46
184.00	3.20	7.30

Page: 4

200.00 3.20 7.20

PART5 LOCATION OF V ZONES

STATION OF GUTTER	LOCATION OF ZONE
7.16	WINDWARD

PART6 NUMBERED A ZONES AND V ZONES

STATION OF GUTTER	ELEVATION	ZONE DESIGNATION	FHF
0.00	12.90	V16 EL=13	80
1.18	12.50	V16 EL=12	80
4.10	11.50	V16 EL=11	80
7.03	10.50	V16 EL=10	80
7.16	10.48	A12 EL=10	60
8.00	10.17		

		A12 EL=10	60
12.00	10.13	A12 EL=10	60
90.00	9.68	A12 EL=10	60
122.02	9.50	A12 EL= 9	60
157.00	9.30	A12 EL= 9	60
184.00	9.08	A12 EL= 9	60
200.00	8.93	A12 EL= 9	60
289.00	8.93		

ZONE TERMINATED AT END OF TRANSECT

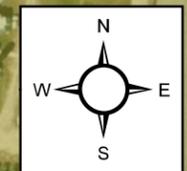
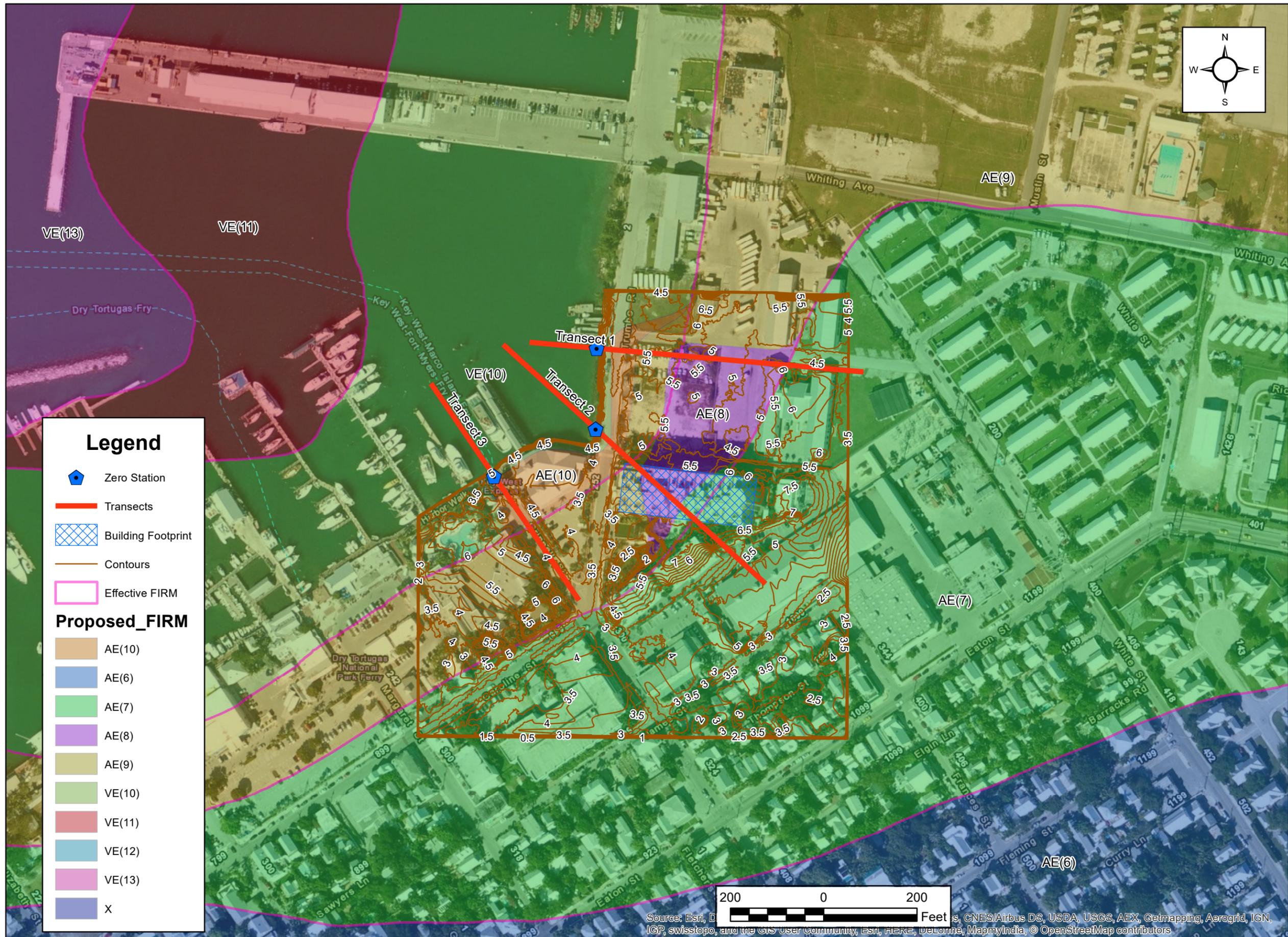
PART 7 POSTSCRIPT NOTES

Attachment 6
Zone Schematic showing CHAMP results and Proposed FIRM Revision

Attachment 7
Proposed FIRM Map showing revised zones and effective zones

Attachment 8

Topographic Map showing transect locations, topographic data, and revised zones



AmeriFlood, LLC
 4613 Little Road
 Trinity, FL 34655
 800-263-7435

Prepared By:
Michael A Giovannozzi, PE
 534 28th St
 West Palm Beach, FL 33407
 561-703-5230

DESIGNED BY:
MAG

DRAWN BY:
EC

CHECKED BY:
MAG

REVISION HISTORY:

DATE	ISSUANCE
12/15/2015	ISSUED

CERTIFICATION:
 I HEREBY CERTIFY THAT THE INFORMATION ON THIS MAP PERTAINING TO THE REMAPPING OF THE FLOOD ZONES REPRESENTS MY BEST EFFORTS TO INTERPRET THE DATA AVAILABLE.
 ALL ELEVATIONS REFERENCED TO NGVD29

ENGINEER'S STAMP:

PROJECT NAME:
STEAM PLANT CONDOMINIUM
Key West, FL

DRAWING TITLE:
TOPOGRAPHIC MAP

FILE NAME: SteamPlant - TOPO.MXD		
DRAWING SCALE: 1" = 200'		
DRAWING #: T-1	AREA: N/A	SHEET #: 1 of 1

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