

John Downing
260 Kala Heights Drive
Port Townsend, Washington
98268

December 5, 1994

Richard Wagner
10 Pinecrest Court
Port Townsend, WA 98368

Dear Richard,

Here are the data sheets and profile plots from our survey last night, along with new plots for the July, September, and October surveys. The extra copes are for Hank and Brian. The profiles I sent you on November 18th are correct, but the horizontal datum lines for MHHW and Chart Datum are shown at the wrong elevations. The corrections are cosmetic and do not affect any of our data or conclusions thus far. Please discard the old plots and keep the new ones for the record.

The last graph shows the elevation differences between the 12/3/94 survey and the earliest full profile at stations 1,2,4,&5. What looked like a lot of erosion last night turns out to be a minor amount. Here is what the data show:

- 1) At stations 1, 2, & 5, erosion of the upper beach (~0-20 feet) has occurred since the earlier surveys. The gain of material at the Station-2 bench mark is the result of a small landslide that was not removed by recent storm waves. Along with the loss of material from the upper beach, some deposition has occurred between 20 and 65 feet. Overall, however, about 0.36 m^3 of material per meter of beach has been lost at these three stations between 0 and 110 feet.
- 2) At station 4, the beach gained about 0.6 m^3 of material per meter of beach between 0 and 110 feet.
- 3) If you multiply the average of the gains and losses at stations 1, 2, 4, & 5 ($0.12 \text{ m}^3/\text{m}$) by the distance between stations 1 and 5 (918m), the total loss was about 110 m^3 for the entire survey area. This is much smaller than my $50,000\text{-m}^3$ estimate and an insignificant amount in my opinion.

I am really pleased with the quality of our data from the last few months of surveying and I think we have learned about all we can until the next really big storm. We should do a post-storm survey if one occurs. Otherwise, we should switch to a quarterly survey schedule beginning in March or April.

Sincerely,



John Downing

Encl.

BEACH SURVEY PROCEDURES

Version: 12/3/94

Background

The purpose of our beach surveys is to measure gains and losses of beach sediment (sand and gravel) over an extended period of time. Hopefully, there will be no measurable loss in the next decade or so. But if the landslides along Kala Point bluff persist, our data will provide a good basis for assessing any losses of beach sediment that may accompany the slides. In addition to this specific objective, our surveys are part of a larger endeavor to monitor the general health and quality of the beaches and wetlands in the Kala Point development. The sediment supplied from and moving through our survey area is vital to the physical beauty and ecological well being of this larger system.

Our approach is to record beach elevations and photograph beach conditions over time. Using the elevation data, sediment volume can be estimated for a narrow section of beach with respect to a fixed datum (-3.00 meters, MLW) at each profile location. By doing this at five fixed locations, several times annually, long-term trends in beach sediment volume should become apparent over the years. Several transects and multiple annual surveys are necessary because the beach is a dynamic and variable system and many data points in space and time will be required to smooth out the variability and reveal real trends. The photographs are important because gains and losses of sediment volume may be accompanied by changes in beach quality. In the first year, monthly surveys should be done so we can get an idea how much the beach changes with the seasons and when storms pass through the area. Post-storm surveys should also be considered when particularly severe storms occur. Once the seasonal and storm-related cycles are known, quarterly or semiannual surveys should suffice for the remaining years of the monitoring program.

Bench Marks & Control

Five temporary bench marks (concrete-filled 4" steel pipes, marked with red flagging and witness stakes) were installed in early 1994 along the bluff edge; see attached map. Elevations of the pipe tops were leveled from the Kuhn U.S.E. survey monument at Kala Point, however, exact horizontal locations were not determined (need to verify horizontal control). The elevations, approximate distances from the Kala Point dock, initial offset from the bluff edge, and magnetic bearing of the survey lines for each bench mark are listed in the table below. Some useful conversions are: 1 meter = 3.2808 feet and 1 foot = 0.3048 meters. Magnetic north is 23° east of true north and 23.3° east of map-grid north.

Survey Equipment

The survey party will need the following equipment: 15', telescoping rod, 200' tape, automatic level & tripod, hand bearing compass, surveyor's notebook, several no. 3 pencils, 35mm camera with 28mm lens & color print film (daylight surveys only). The rodman will need knee boots or waders. For night surveys, the rodman will need a large flashlight to illuminate the rod and each party member

should carry a small one for safe walking on the beach.

Beach Survey Control Data (based on preliminary survey by Dale Schoeneman, April 28, 1994)

B.M. No.	Elev. - MLW	Northing/Easting	Bearing	Offset	Dist. to Dock
1	5.56' (1.695m)	393,429.0'/1,165,376.7'	36.2°	12' (3.7m)	1,400' (427m)
2	5.85' (1.783m)	393,879.2'/1,165,039.4'	26.2°	7' (2.1m)	1,960' (600m)
3	5.98' (1.823m)	394,497.0'/1,164,442.4'	23.7°	2' (0.6m)	2,830' (860m)
4	6.19' (1.887m)	395,796.5'/1,163,419.1'	37.2°	5' (1.5m)	4,090' (1245m)
5	5.56' (1.695m)	396,090.3'/1,163,256.5'	40.7°	3' (0.9m)	4,410' (1345m)

Preparation

The general strategy in scheduling surveys is to maximize exposure of the beach while minimizing the amount of wading the rodman has to do. Schedule monthly surveys for the lowest tide of the month. Quarterly surveys should be done in December, March, June, and September; schedule semiannual ones for early October and April. Post-storm surveys should be done as soon as the beach can be safely accessed after a storm. Check the tide tables in the Port Townsend telephone directory for the lowest spring tide of the month. The lowest tides in March and September are only -0.5 to -1.0 feet (MLLW); in December and June, they exceed -2.0 feet. From October through February, the lowest tides occur at night and surveys will have to be done with flashlights. An experienced party can survey five beach profiles in about three hours in daylight; at night, it takes about one half hour longer.

Prior to surveys, the party chief should do the following:

- 1) Instruct the survey party to meet at the beach about one hour and 45 minutes before low water (two hours for night surveys).
- 2) Arrange with Brian Belmont (385-5281) to pick up the level, rod, tape, and notebook at the KPOA Office the day before the survey.
- 3) Set up the first column-ruled page for each station in the notebook as follows (two such pages will be needed per station):

Station #
 B.M. elevation:
 H.I.:
 Start Time:
 End Time:
 Distance from B.M. to Bluff:
 Photograph exposure numbers:

Data Columns

Dist. (ft.)	T.P. (opt.)	B.S. (ft.)	F.S (ft.)	Elev. (opt.)	Notes
B.M.	--	--	--	--	--
0	--	--	--	--	--
5	--	--	--	--	--
10	--	--	--	--	--
.....	--	--	--	--	--
.....	--	--	--	--	--
150	--	--	--	--	--

On Station

Caution: The automatic level has a delicate suspension mechanism that will not survive rough handling. Always pack it around on the beach in its plastic box.

- 1) Log the start time for the station, the distance from the bench mark to the bluff edge, and observations of debris around the mark in the notebook. From the mark, shoot a compass heading down the beach along the bearing in the table above, and pick a distinctive object, rock, or piece of driftwood near where the heading intersects the waterline. Stretch the tape from the hook on the mark to the object at the waterline.
- 2) Take a photograph of the beach from the waterline to the bluff, looking along the tape. Take two more photos from the 75-foot mark, one looking SW toward the dock and another looking NW toward the paper mill. Log the exposure number in the notebook.

- 3) While steps 1 and 2 are in progress, the level operator sets up the tripod at a location about 30 feet seaward from the mark and offset 20 to 30 feet alongshore from the tape. Adjust the tripod legs so that the top of the head is parallel to the water line on Indian Island and push the pointed feet firmly in the sand. Mount the instrument on the head, level it coarsely with the thumb screws and spirit level, and check that it is about 0.5 to 2.5 feet above the top of the mark. Make the final leveling adjustments. Once the level is set, do not lean on or disturb the tripod. Doing so could result in errors and the necessity to repeat the survey.

Shooting Elevations

Reading the rod is the hardest part of shooting elevations. The rod is divided into 1/100-foot increments by black stripes. These stripes and the white spaces between them are 1/100 of a foot wide, so each transition from white to black (and black to white) marks a 1/100-foot increment. The largest (~1.25") numerals mark whole-foot increments and the smallest (~1/4") ones label one-foot increments between them (these are handy when the whole-foot numbers are not in view). The intermediate (~0.75") numerals mark 1/10-foot increments. In order to determine elevations accurately, the rod must be vertical. When the rod is 5° off vertical at the seaward end of a profile, the resulting elevation error will be about - 5/100 of a foot. At the 40-foot mark, the error will be about half as great (~2.5/100 of a foot). Typically, the rod can be held to within a few degrees of vertical without special care.

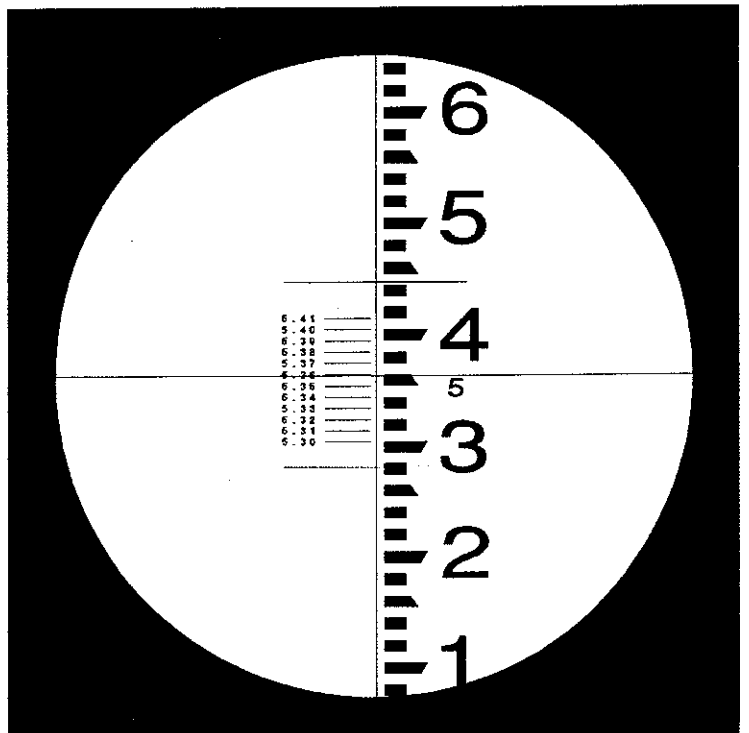
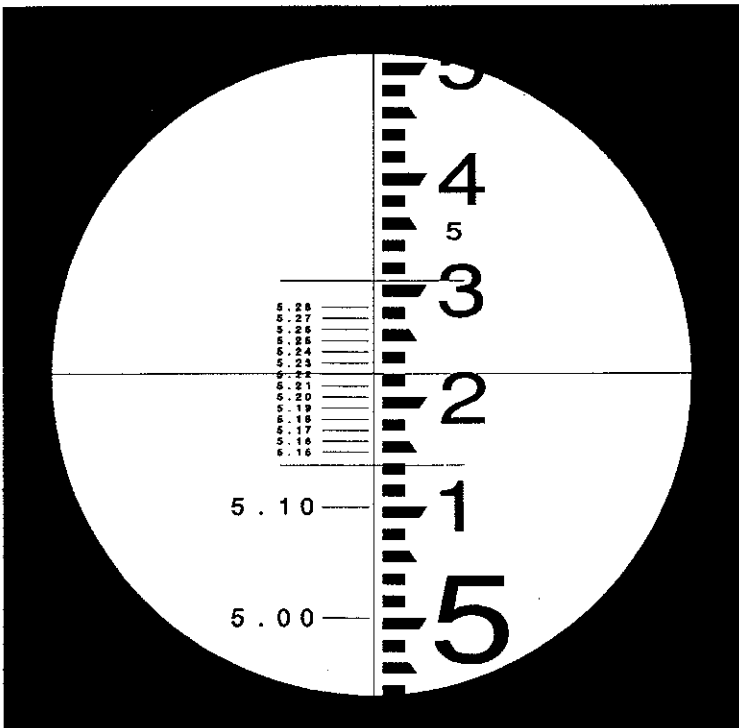
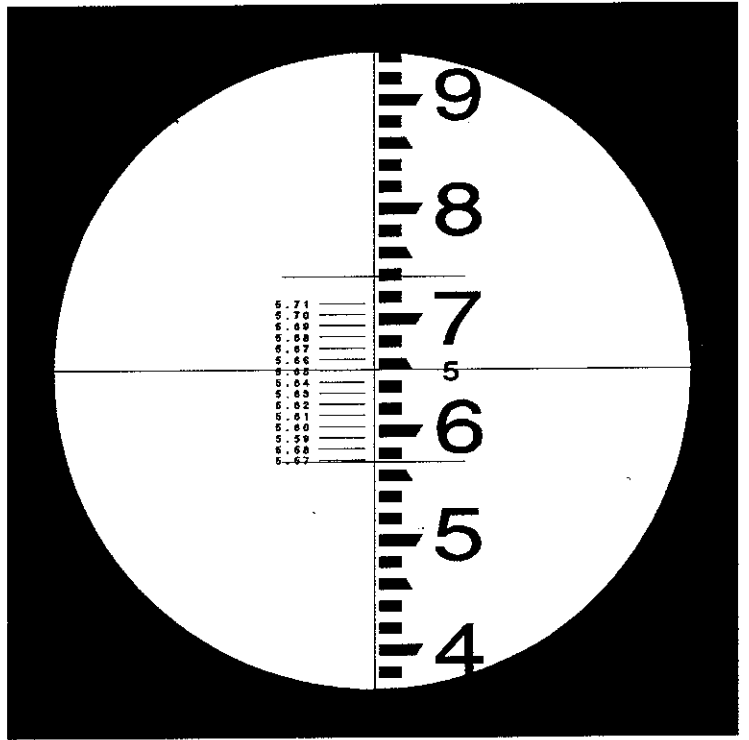
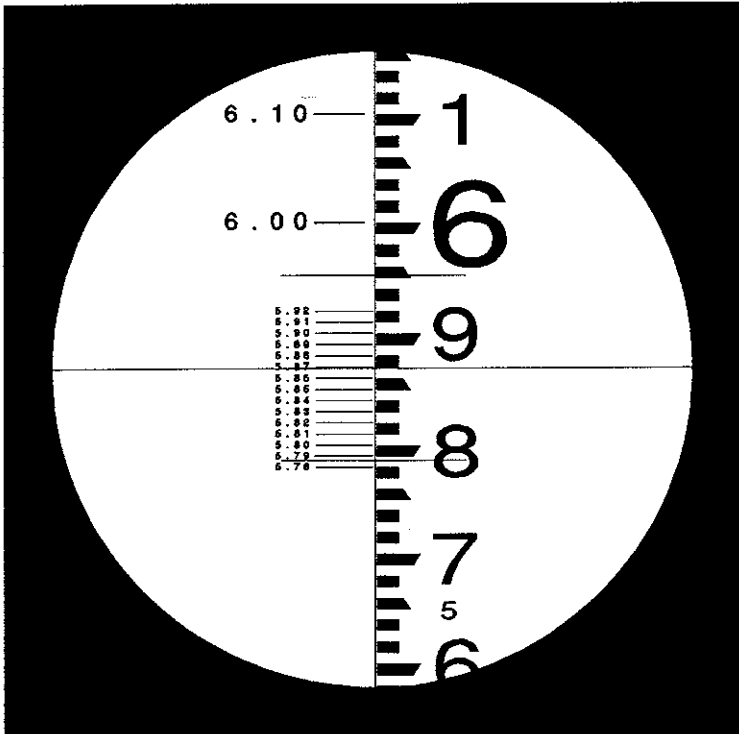
The attached diagrams show the telescope field of view, with vertical and horizontal cross hairs, stadia lines (small horizontal cross hairs used for estimating distances to the rod), and rod readings for several practice shots. Use these to become familiar with the rod's appearance and counting 1/100-foot increments to read elevation.

- 4) Set the rod on top of the mark and adjust it until it is parallel to the vertical cross hair of the level (the rodman can get pretty close by making the rod perpendicular to the waterline on Indian Island). Make a back sight (B.S.) to the mark and read the rod to the nearest 1/100th of a foot at the horizontal cross hair. Log this in the B.S. column on the B.M. line. The height of the instrument (H.I.) is equal to the B.M. elevation plus the B.S. reading; log H.I. in the notebook.
- 5) Move the rod to the 5-foot mark on the tape, and hold the tape approximately level while placing the rod base on the ground. Adjust the rod to vertical by checking the east and north horizons. Make final adjustments as instructed by the level operator. Make a foresight (F.S.) and log the reading in the F.S. column on the appropriate distance line. Write clearly as these numbers will be transferred to a PC spread sheet after the survey.
- 6) Repeat step 5. at 5-foot intervals out to 150 feet, or as far as the rodman can safely wade. Along the way, log the distances to start and end points of gravel or eel grass beds in the notebook. When extending the rod, be sure the black detent button is fully locked in the mating hole. If the detent disengages during the survey, large elevation errors will result.

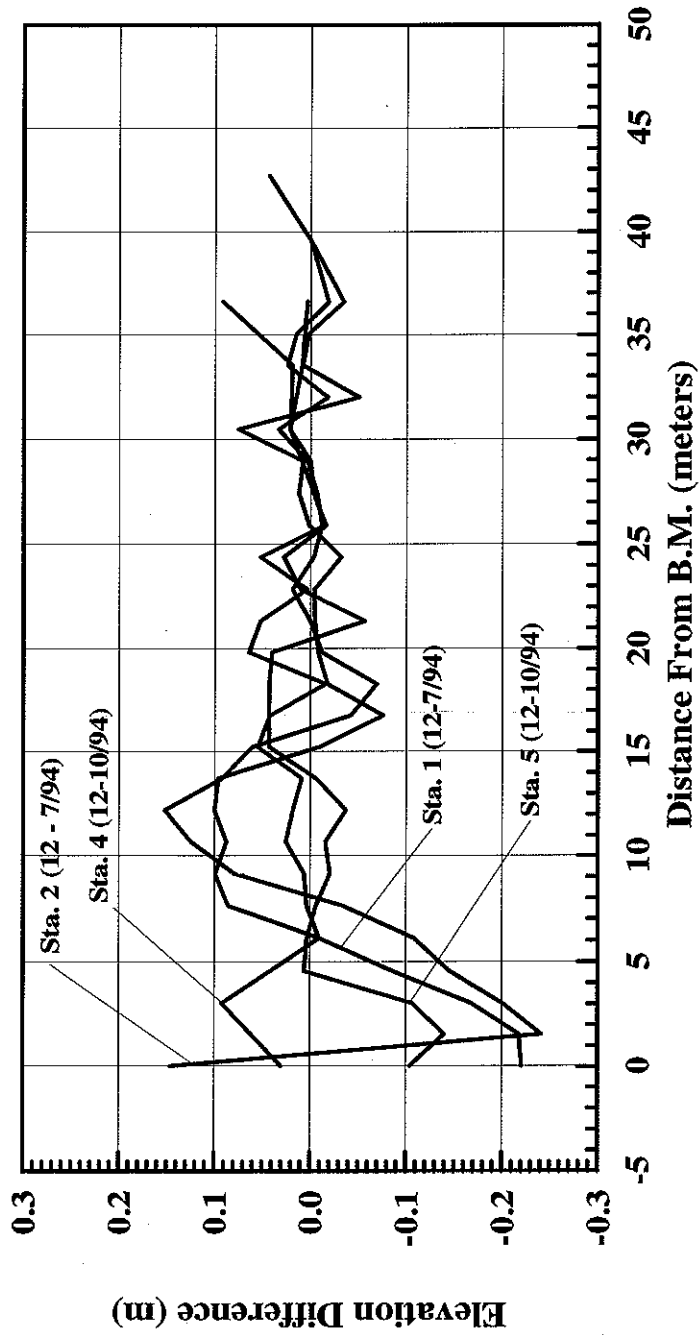
- 7) After completing the survey, and before rolling up the tape, return to the 75-foot mark, repeat the foresight, and log the reading next to the initial one on the 75-foot line. Do the same thing at the bench mark. The differences between the initial and repeat shots should be within a few 1/100th's of a foot. If they are, the survey "closes" and the party can move to the next station. Otherwise, the instrument should be checked (it may have been accidentally disturbed), leveled if necessary, and the line repeated. Pack the level in its box for the moves between stations.
- 8) Log the end time for the station in the notebook.
- 9) Repeat steps 1 through 8 at each station.

Post-survey

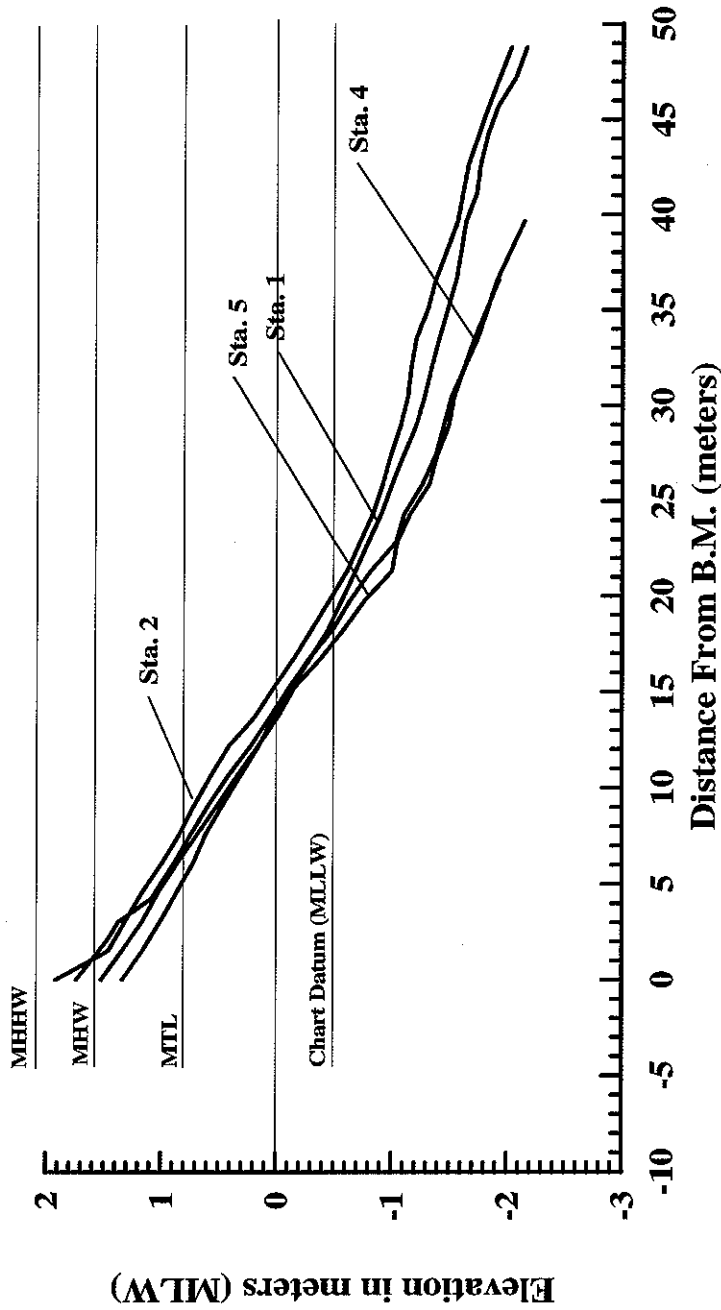
Wash sand off the rod and tape with fresh water. Clean the metal and plastic parts of the level with a soft cloth and store it in its case. Send a xerox copy of the survey notes to the data manager (Richard Wagner or John Downing) for entry in the monitoring program data base. Return the level, rod, tape, and notebook to the KPOA Office as soon as possible after completing the survey.



Kala Point Beach Profiles
Elevation Differences (wrt MLW)
1994 Surveys
File: DEL1294.GRF



Kala Point Beach Profiles
Survey: December 3, 1994
Datums: MHHW = 2.12m, MHW = 1.62m, MTL = 0.81m, MLW = 0m, MLLW = -0.50m
By: Downing, Wagner, Belmont, Oldham
File: KP12394.GRF



Kala Point Beach Survey Data Sheet

Date of Survey: 12/3/94

Data Entry By: j.Downing

File: KP12394.WB1

Datum: MLW

Station: 1

B.M. el. = 5.560' B.S. = 1.51' (1.51') H.I. = 7.07'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	7.070	2.680	1.338	0.000	0.000
5	7.070	3.260	1.161	6.476	6.476
10	7.070	3.740	1.015	6.230	12.706
15	7.070	4.230	0.866	6.005	18.711
20	7.070	4.700	0.722	5.782	24.492
25	7.070	5.070	0.610	5.587	30.079
30	7.070	5.530	0.469	5.394	35.473
35	7.070	6.040	0.314	5.169	40.642
40	7.070	6.570	0.152	4.927	45.569
45	7.070	6.990	0.024	4.706	50.275
50	7.070	7.530	-0.140	4.484	54.759
55	7.070	8.040	-0.296	4.240	58.998
60	7.070	8.540	-0.448	4.005	63.003
65	7.070	8.920	-0.564	3.801	66.804
70	7.070	9.300	-0.680	3.624	70.428
75	7.070	9.670	-0.792	3.450	73.879
80	7.070	10.050	-0.908	3.276	77.154
85	7.070	10.350	-1.000	3.118	80.272
90	7.070	10.670	-1.097	2.974	83.246
95	7.070	11.020	-1.204	2.818	86.065
100	7.070	11.260	-1.277	2.681	88.746
105	7.070	11.470	-1.341	2.577	91.323
110	7.070	11.680	-1.405	2.479	93.802
115	7.070	11.920	-1.478	2.375	96.177
120	7.070	12.16	-1.551	2.263	98.441
125	7.070	12.30	-1.594	2.175	100.616
130	7.070	12.43	-1.634	2.112	102.728
135	7.070	12.74	-1.728	2.010	104.738
140	7.070	12.86	-1.765	1.910	106.649
145	7.070	13.05	-1.823	1.838	108.487
150	7.070	13.35	-1.914	1.725	110.212
155	7.070	13.85	-2.066	1.539	111.751
160	7.070	14.17	-2.164	1.348	113.099

Kala Point Beach Survey Data Sheet**Date of Survey: 12/3/94****Data Entry By: j.Downing****File: KP12394.WB1****Datum: MLW****Station: 2****B.M. el. = 5.850' B.S. = 2.74' (2.74') H.I. = 8.59'**

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	8.590	2.350	1.902	0.000	0.000
5	8.590	3.820	1.454	7.129	7.129
10	8.590	4.270	1.317	6.683	13.811
15	8.590	4.750	1.170	6.467	20.278
20	8.590	5.320	0.997	6.223	26.501
25	8.590	5.830	0.841	5.972	32.473
30	8.590	6.250	0.713	5.756	38.230
35	8.590	6.720	0.570	5.549	43.779
40	8.590	7.240	0.411	5.320	49.099
45	8.590	7.990	0.183	5.025	54.123
50	8.590	8.520	0.021	4.727	58.851
55	8.590	9.090	-0.152	4.472	63.323
60	8.590	9.590	-0.305	4.223	67.546
65	8.590	10.100	-0.460	3.989	71.535
70	8.590	10.590	-0.610	3.757	75.291
75	8.590	10.950	-0.719	3.559	78.851
80	8.590	11.320	-0.832	3.390	82.240
85	8.590	11.600	-0.917	3.239	85.479
90	8.590	11.840	-0.991	3.118	88.597
95	8.590	12.110	-1.073	3.000	91.597
100	8.590	12.310	-1.134	2.890	94.487
105	8.590	12.400	-1.161	2.823	97.310
110	8.590	12.550	-1.207	2.767	100.077
115	8.590	12.880	-1.308	2.656	102.733
120	8.590	13.090	-1.372	2.530	105.264
130	8.590	13.720	-1.564	4.671	109.934
140	8.590	14.030	-1.658	4.234	114.169
150	8.590	14.580	-1.826	3.835	118.003
160	8.590	15.250	-2.030	3.268	121.271

Kala Point Beach Survey Data Sheet

Date of Survey: 12/3/94

Data Entry By: j.Downing

File: KP12394.WB1

Datum: MLW

Station: 4

B.M. el. = 6.190' B.S. = 2.56' (2.56') H.I. = 8.75'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	8.750	3.050	1.737	0.000	0.000
7	8.750	3.950	1.463	9.814	9.814
10	8.750	4.250	1.372	4.039	13.853
14	8.750	5.190	1.085	5.155	19.008
20	8.750	5.830	0.890	7.292	26.300
25	8.750	6.320	0.741	5.814	32.114
30	8.750	6.810	0.591	5.587	37.701
35	8.750	7.380	0.418	5.340	43.041
40	8.750	8.020	0.222	5.059	48.101
45	8.750	8.580	0.052	4.781	52.882
50	8.750	9.120	-0.113	4.525	57.407
55	8.750	9.700	-0.290	4.265	61.672
60	8.750	10.340	-0.485	3.982	65.654
65	8.750	10.850	-0.640	3.715	69.369
70	8.750	11.430	-0.817	3.462	72.831
75	8.750	12.140	-1.033	3.162	75.993
80	8.750	12.380	-1.106	2.941	78.934
85	8.750	12.890	-1.262	2.767	81.702
90	8.750	13.280	-1.381	2.558	84.260
100	8.750	13.720	-1.515	4.731	88.991
110	8.750	14.460	-1.740	4.183	93.174
120	8.750	15.000	-1.905	3.588	96.763
130	8.750	15.790	-2.146	2.971	99.733

Kala Point Beach Survey Data Sheet

Date of Survey: 12/3/94

Data Entry By: j.Downing

File: KP12394.WB1

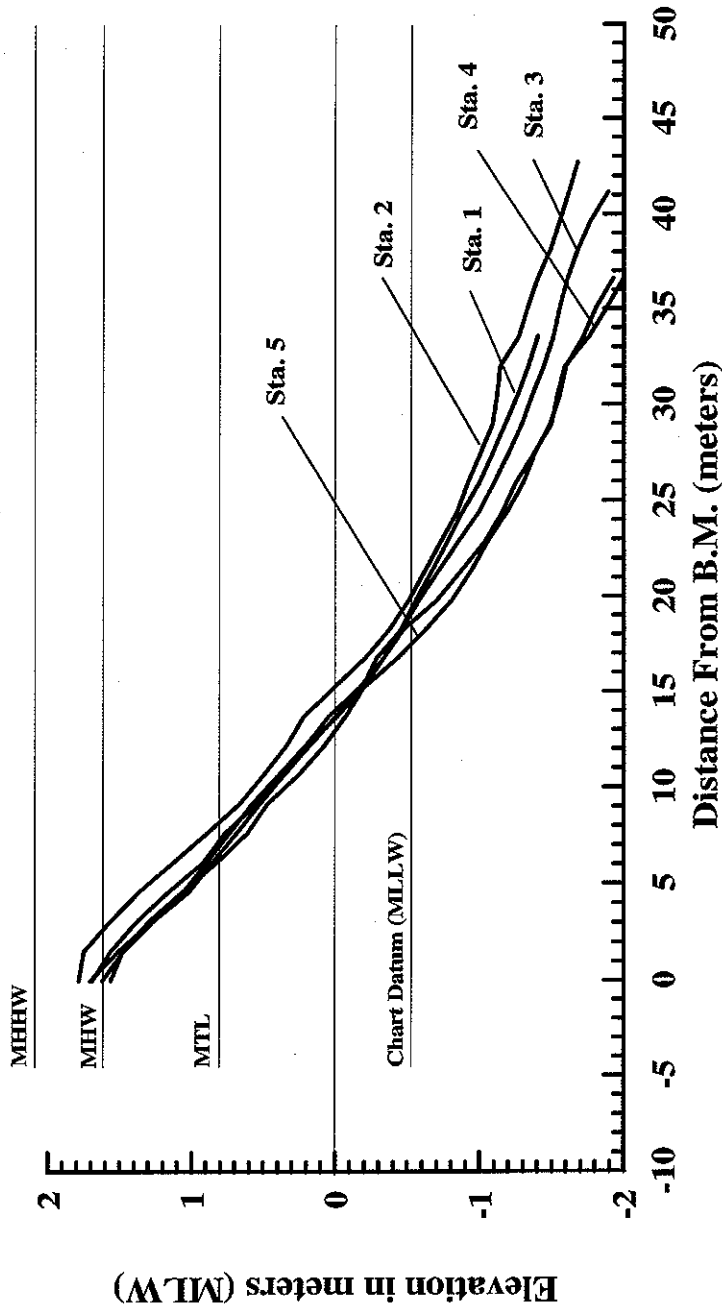
Datum: MLW

Station: 5

B.M. el. = 5.560' B.S. = 2.37' (2.37') H.I. = 7.93'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	7.930	2.940	1.521	0.000	0.000
5	7.930	3.540	1.338	6.750	6.750
10	7.930	4.090	1.170	6.483	13.233
15	7.930	4.560	1.027	6.246	19.479
20	7.930	5.110	0.859	6.009	25.489
25	7.930	5.680	0.686	5.749	31.238
30	7.930	6.260	0.509	5.482	36.720
35	7.930	6.820	0.338	5.217	41.937
40	7.930	7.420	0.155	4.948	46.885
45	7.930	7.990	-0.018	4.676	51.562
50	7.930	8.430	-0.152	4.442	56.003
55	7.930	9.210	-0.390	4.158	60.162
60	7.930	9.840	-0.582	3.831	63.993
65	7.930	10.440	-0.765	3.545	67.538
70	7.930	11.200	-0.997	3.229	70.768
75	7.930	11.350	-1.042	3.018	73.786
80	7.930	11.730	-1.158	2.895	76.681
85	7.930	12.260	-1.320	2.684	79.364
90	7.930	12.480	-1.387	2.510	81.874
95	7.930	12.820	-1.490	2.379	84.253
100	7.930	12.970	-1.536	2.266	86.519
110	7.930	13.540	-1.710	4.197	90.716
120	7.930	14.240	-1.923	3.607	94.323

Kala Point Beach Profiles
Survey: October 10, 1994
Datum: MLW
By: Downing, Wagner, Belmont, Oldham
File: KP101094.GRF



Kala Point Beach Survey Data Sheet

Date of Survey: 10/10/94

Data Entry By: j.Downing

File: KP101094.WB1

Datum: MLW

Station: 1

B.M. el. = 5.560' B.S. = 0.92' (0.92') H.I. = 6.48'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	6.480	1.350	1.564	0.000	0.000
5	6.480	1.620	1.481	6.892	6.892
10	6.480	2.210	1.301	6.692	13.584
15	6.480	2.980	1.067	6.376	19.960
20	6.480	3.770	0.826	6.014	25.974
25	6.480	4.470	0.613	5.668	31.642
30	6.480	4.920	0.475	5.401	37.043
35	6.480	5.650	0.253	5.127	42.170
40	6.480	6.230	0.076	4.823	46.992
45	6.480	6.720	-0.073	4.574	51.566
50	6.480	7.120	-0.195	4.367	55.934
55	6.480	7.570	-0.332	4.170	60.104
60	6.480	7.960	-0.451	3.975	64.079
65	6.480	8.300	-0.555	3.805	67.884
70	6.480	8.670	-0.667	3.641	71.525
75	6.480	9.020	-0.774	3.473	74.998
80	6.480	9.350	-0.875	3.315	78.313
85	6.480	9.740	-0.994	3.148	81.462
90	6.480	10.060	-1.091	2.983	84.445
95	6.480	10.350	-1.180	2.842	87.286
100	6.480	10.620	-1.262	2.712	89.998
105	6.480	10.870	-1.338	2.591	92.589
110	6.480	11.090	-1.405	2.482	95.070

Kala Point Beach Survey Data Sheet

Date of Survey: 10/10/94

Data Entry By: j.Downing

File: KP101094.WB1

Datum: MLW

Station: 2

B.M. el. = 5.850' B.S. = 2.28' (2.28') H.I. = 8.13'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	8.130	2.270	1.786	0.000	0.000
5	8.130	2.380	1.753	7.268	7.268
10	8.130	2.970	1.573	7.105	14.373
15	8.130	3.630	1.372	6.815	21.189
20	8.130	4.420	1.131	6.478	27.667
25	8.130	5.200	0.893	6.114	33.781
30	8.130	5.930	0.671	5.763	39.544
35	8.130	6.500	0.497	5.461	45.005
40	8.130	7.020	0.338	5.208	50.213
45	8.130	7.420	0.216	4.994	55.208
50	8.130	8.100	0.009	4.744	59.951
55	8.130	8.800	-0.204	4.423	64.375
60	8.130	9.350	-0.372	4.133	68.507
65	8.130	9.790	-0.506	3.903	72.410
70	8.130	10.150	-0.616	3.717	76.128
75	8.130	10.520	-0.728	3.548	79.675
80	8.130	10.890	-0.841	3.376	83.051
85	8.130	11.140	-0.917	3.232	86.283
90	8.130	11.430	-1.006	3.106	89.389
95	8.130	11.700	-1.088	2.976	92.365
100	8.130	11.800	-1.119	2.890	95.256
105	8.130	11.880	-1.143	2.849	98.104
110	8.130	12.300	-1.271	2.732	100.837
115	8.130	12.500	-1.332	2.588	103.425
120	8.130	12.72	-1.399	2.491	105.916
125	8.130	13.01	-1.487	2.373	108.289
130	8.130	13.23	-1.554	2.254	110.543
135	8.130	13.44	-1.618	2.154	112.697
140	8.130	13.65	-1.682	2.057	114.754

Note: B.M. buried by landslide. 0-meter F.S. offset 2' NNW, parallel to bluff.

Kala Point Beach Survey Data Sheet

Date of Survey: 10/10/94

Data Entry By: j.Downing

File: KP101094.WB1

Datum: MLW

Station: 3

B.M. el. = 5.980' B.S. = 1.61' (1.62') H.I. = 7.595'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	7.595	2.030	1.696	0.000	0.000
5	7.595	2.460	1.565	7.057	7.057
10	7.595	3.040	1.388	6.822	13.879
15	7.595	3.770	1.166	6.518	20.397
20	7.595	4.580	0.919	6.160	26.557
25	7.595	5.080	0.767	5.856	32.413
30	7.595	5.780	0.553	5.577	37.990
35	7.595	6.430	0.355	5.264	43.254
40	7.595	7.010	0.178	4.978	48.232
45	7.595	7.600	-0.002	4.706	52.939
50	7.595	8.210	-0.187	4.428	57.367
55	7.595	8.520	-0.282	4.214	61.581
60	7.595	9.090	-0.456	4.010	65.591
65	7.595	9.495	-0.579	3.783	69.374
70	7.595	9.930	-0.712	3.588	72.962
75	7.595	10.390	-0.852	3.380	76.343
80	7.595	10.850	-0.992	3.167	79.509
85	7.595	11.200	-1.099	2.979	82.488
90	7.595	11.530	-1.199	2.821	85.309
95	7.595	11.840	-1.294	2.672	87.981
100	7.595	12.070	-1.364	2.547	90.527
105	7.595	12.340	-1.446	2.431	92.958
110	7.595	12.550	-1.510	2.319	95.277
115	7.595	12.700	-1.556	2.235	97.513
120	7.595	12.870	-1.608	2.161	99.674
125	7.595	13.110	-1.681	2.066	101.740
130	7.595	13.400	-1.769	1.943	103.683
135	7.595	13.800	-1.891	1.783	105.465

Kala Point Beach Survey Data Sheet

Date of Survey: 10/10/94

Data Entry By: j.Downing

File: KP101094.WB1

Datum: MLW

Station: 4

B.M. el. = 6.190' B.S. = 2.06' (2.06') H.I. = 8.25'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	8.250	2.650	1.707	0.000	0.000
6	8.250	3.290	1.512	8.429	8.429
10	8.250	4.050	1.280	5.359	13.788
15	8.250	4.780	1.058	6.353	20.141
20	8.250	5.300	0.899	6.063	26.204
25	8.250	5.830	0.738	5.819	32.023
30	8.250	6.330	0.585	5.580	37.603
35	8.250	6.960	0.393	5.317	42.920
40	8.250	7.580	0.204	5.027	47.947
45	8.250	8.110	0.043	4.760	52.707
50	8.250	8.800	-0.168	4.477	57.183
55	8.250	9.340	-0.332	4.191	61.374
60	8.250	9.790	-0.469	3.961	65.335
65	8.250	10.560	-0.704	3.678	69.013
70	8.250	11.100	-0.869	3.373	72.386
75	8.250	11.650	-1.036	3.120	75.507
80	8.250	12.050	-1.158	2.900	78.406
85	8.250	12.340	-1.247	2.739	81.146
90	8.250	12.770	-1.378	2.572	83.718
95	8.250	13.160	-1.496	2.382	86.100
100	8.250	13.290	-1.536	2.261	88.361
105	8.250	13.470	-1.591	2.189	90.550
110	8.250	14.020	-1.759	2.020	92.569
115	8.250	14.430	-1.884	1.797	94.366
120	8.250	14.800	-1.996	1.615	95.981

Kala Point Beach Survey Data Sheet

Date of Survey: 10/10/94

Data Entry By: j.Downing

File: KP101094.WB1

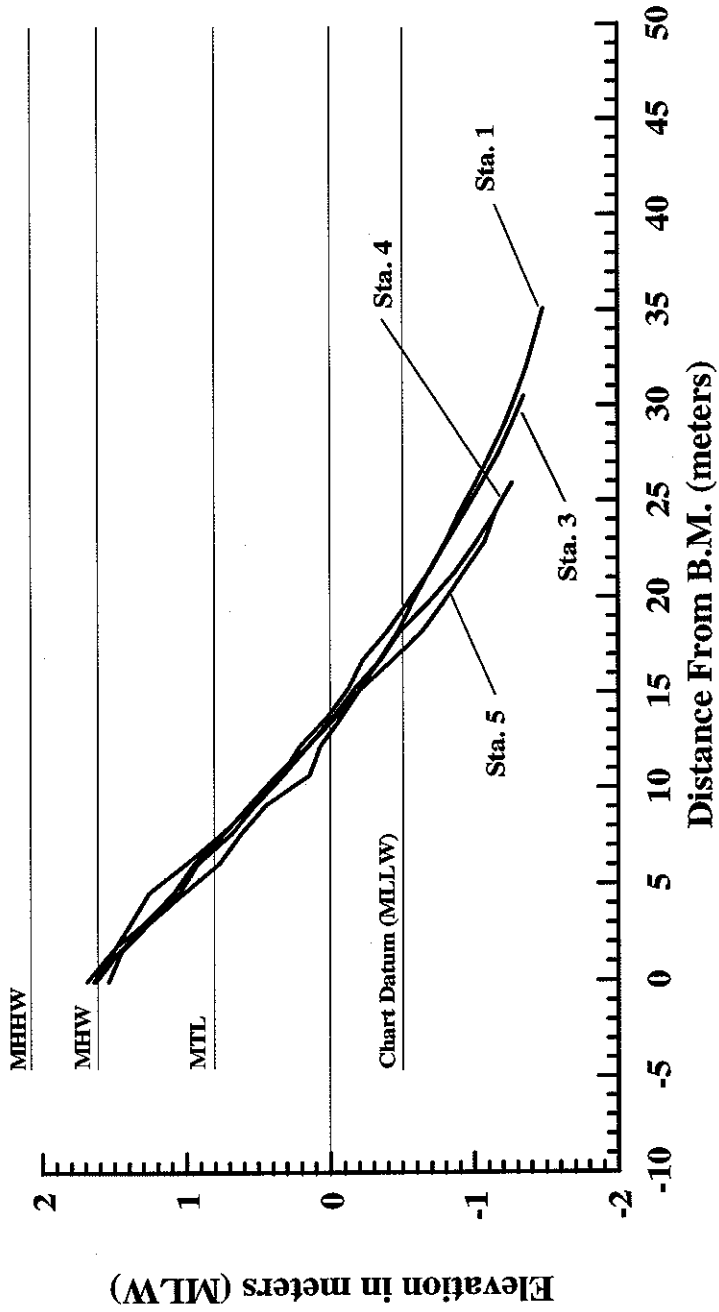
Datum: MLW

Station: 5

B.M. el. = 5.560' B.S. = 0.80' (0.80') H.I. = 6.36'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	6.360	1.030	1.625	0.000	0.000
6	6.360	1.510	1.478	8.323	8.323
10	6.360	2.170	1.277	5.337	13.660
15	6.360	3.010	1.021	6.323	19.983
20	6.360	3.550	0.856	6.002	25.985
25	6.360	4.090	0.692	5.752	31.737
30	6.360	4.620	0.530	5.503	37.240
35	6.360	5.200	0.354	5.245	42.485
40	6.360	5.730	0.192	4.987	47.473
45	6.360	6.400	-0.012	4.709	52.181
50	6.360	7.000	-0.195	4.414	56.595
55	6.360	7.780	-0.433	4.093	60.689
60	6.360	8.410	-0.625	3.766	64.454
65	6.360	9.000	-0.805	3.483	67.937
70	6.360	9.445	-0.940	3.242	71.179
75	6.360	9.810	-1.052	3.054	74.233
80	6.360	10.250	-1.186	2.867	77.101
85	6.360	10.640	-1.304	2.674	79.775
90	6.360	10.900	-1.384	2.523	82.298
95	6.360	11.250	-1.490	2.382	84.680
100	6.360	11.470	-1.557	2.249	86.930
105	6.360	11.610	-1.600	2.166	89.096
110	6.360	12.000	-1.719	2.043	91.138
115	6.360	12.300	-1.810	1.882	93.021
120	6.360	12.680	-1.926	1.725	94.745

Kala Point Beach Profiles
 Survey: September 14, 1994
 Datums: MHHW = 2.12m, MHW = 1.62m, MTL = 0.81m, MLW = 0m, MLLW = -0.50m
 By: Downing, Wagner, Belmont, Oldham
 File: KP91494.GRF



Kala Point Beach Survey Data Sheet

Date of Survey: 9/14/94

Data Entry By: j.Downing

File: KP91494.WB1

Datum: MLW

Station: 1

B.M. el. = 5.560' B.S. = 0.60' (0.68') H.I. = 6.160'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	6.160	1.100	1.542	0.000	0.000
5	6.160	1.390	1.454	6.855	6.855
10	6.160	2.040	1.256	6.636	13.491
15	6.160	2.820	1.018	6.304	19.795
20	6.160	3.620	0.774	5.937	25.733
25	6.160	4.120	0.622	5.635	31.368
30	6.160	4.690	0.448	5.387	36.755
35	6.160	5.670	0.149	5.027	41.782
40	6.160	5.930	0.070	4.739	46.521
45	6.160	6.410	-0.076	4.567	51.088
50	6.160	6.850	-0.210	4.353	55.441
55	6.160	7.280	-0.341	4.151	59.593
60	6.160	7.700	-0.469	3.954	63.547
65	6.160	8.040	-0.573	3.778	67.324
70	6.160	8.410	-0.686	3.613	70.937
75	6.160	8.780	-0.799	3.441	74.378
80	6.160	9.100	-0.896	3.281	77.658
85	6.160	9.490	-1.015	3.116	80.774
90	6.160	9.820	-1.116	2.948	83.723
95	6.160	10.150	-1.216	2.795	86.518
100	6.160	10.400	-1.292	2.660	89.178
105	6.160	10.650	-1.368	2.544	91.723
110	6.160	10.840	-1.426	2.442	94.165
115	6.160	11.030	-1.484	2.354	96.519

Kala Point Beach Survey Data Sheet

Date of Survey: 9/14/94

Data Entry By: j.Downing

File: KP91494.WB1

Datum: MLW

Station: 3

B.M. el. = 5.980' B.S. = 0.23' (0.44') H.I. = 6.210'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	6.210	0.810	1.646	0.000	0.000
5	6.210	1.250	1.512	6.978	6.978
10	6.210	1.660	1.387	6.780	13.758
15	6.210	2.070	1.262	6.590	20.348
20	6.210	2.930	1.000	6.295	26.643
25	6.210	3.730	0.756	5.909	32.552
30	6.210	4.410	0.549	5.566	38.118
35	6.210	5.080	0.344	5.252	43.370
40	6.210	5.510	0.213	4.997	48.367
45	6.210	6.140	0.021	4.751	53.118
50	6.210	6.610	-0.122	4.495	57.613
55	6.210	6.950	-0.226	4.307	61.920
60	6.210	7.510	-0.396	4.098	66.018
65	6.210	7.990	-0.543	3.856	69.874
70	6.210	8.470	-0.689	3.634	73.508
75	6.210	8.860	-0.808	3.432	76.939
80	6.210	9.270	-0.933	3.246	80.185
85	6.210	9.660	-1.052	3.060	83.245
90	6.210	10.040	-1.167	2.881	86.126
95	6.210	10.350	-1.262	2.721	88.847
100	6.210	10.640	-1.350	2.582	91.429

Note: Profile offset 15' north to avoid fallen tree

Kala Point Beach Survey Data Sheet

Date of Survey: 9/14/94

Data Entry By: j.Downing

File: KP91494.WB1

Datum: MLW

Station: 4

B.M. el. = 6.190' B.S. = 1.73' (1.72') H.I. = 7.885'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	7.885	2.320	1.696	0.000	0.000
6	7.885	3.020	1.483	8.393	8.393
10	7.885	3.660	1.288	5.346	13.739
15	7.885	4.320	1.087	6.381	20.120
20	7.885	4.780	0.946	6.121	26.241
25	7.885	5.440	0.745	5.861	32.101
30	7.885	6.030	0.565	5.570	37.672
35	7.885	6.640	0.379	5.292	42.963
40	7.885	7.360	0.160	4.983	47.946
45	7.885	7.950	-0.020	4.679	52.625
50	7.885	8.440	-0.169	4.428	57.053
55	7.885	9.030	-0.349	4.177	61.230
60	7.885	9.480	-0.486	3.935	65.165
65	7.885	10.150	-0.690	3.675	68.840
70	7.885	10.740	-0.870	3.383	72.223
75	7.885	11.220	-1.016	3.134	75.357
80	7.885	11.650	-1.148	2.923	78.280
85	7.885	12.030	-1.263	2.735	1.542

Kala Point Beach Survey Data Sheet

Date of Survey: 9/14/94

Data Entry By: j.Downing

File: KP91494.WB1

Datum: MLW

Station: 5

B.M. el. = 5.560' B.S. = 1.32' (1.31") H.I. = 6.875'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	6.875	1.520	1.632	0.000	0.000
5	6.875	2.050	1.471	6.936	6.936
10	6.875	2.700	1.272	6.662	13.598
15	6.875	3.430	1.050	6.341	19.939
20	6.875	3.840	0.925	6.077	26.016
25	6.875	4.620	0.687	5.800	31.816
30	6.875	5.150	0.526	5.496	37.312
35	6.875	5.790	0.331	5.224	42.537
40	6.875	6.370	0.154	4.941	47.478
45	6.875	6.990	-0.035	4.662	52.140
50	6.875	7.570	-0.212	4.384	56.524
55	6.875	8.300	-0.434	4.079	60.603
60	6.875	8.970	-0.639	3.754	64.357
65	6.875	9.470	-0.791	3.483	67.840
70	6.875	9.940	-0.934	3.257	71.097
75	6.875	10.400	-1.074	3.041	74.139
80	6.875	10.650	-1.151	2.876	77.015

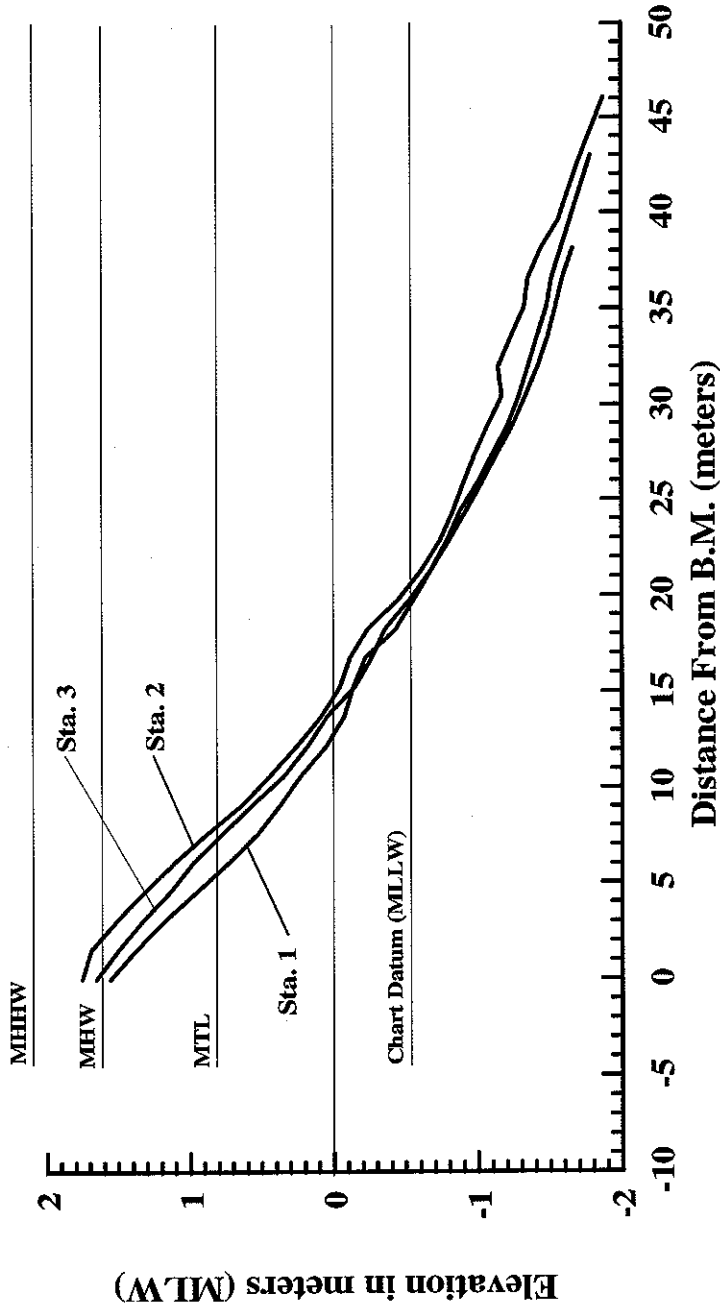
Kala Point Beach Profiles

Survey: July 8, 1994

Datums: MHHW = 2.12m, MHW = 1.62m, MTL = 0.81m, MLW = 0m, MLLW = -0.50m

By: Downing (Sr. & Jr.), Wagner, Belmont, Oldham

File: KP7894.GRF



Kala Point Beach Survey Data Sheet

Date of Survey: 7/8/94

Data Entry By: j.Downing

File: KP7894.WB1

Datum: MLW

Station: 1

B.M. el. = 5.560'

B.S. = 0.205'

H.I. = 5.765'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	5.765	0.650	1.559	0.000	0.000
5	5.765	1.242	1.379	6.810	6.810
10	5.765	1.882	1.183	6.524	13.334
15	5.765	2.641	0.952	6.199	19.533
20	5.765	3.363	0.732	5.855	25.388
25	5.765	4.043	0.525	5.530	30.918
30	5.765	4.550	0.370	5.254	36.172
35	5.765	5.020	0.227	5.027	41.198
40	5.765	5.595	0.052	4.784	45.983
45	5.765	6.000	-0.072	4.557	50.539
50	5.765	6.195	-0.131	4.417	54.957
55	5.765	6.487	-0.220	4.304	59.261
60	5.765	7.177	-0.430	4.076	63.337
65	5.765	7.590	-0.556	3.820	67.157
70	5.765	7.980	-0.675	3.634	70.791
75	5.765	8.350	-0.788	3.457	74.248
80	5.765	8.640	-0.876	3.304	77.552
85	5.765	9.050	-1.001	3.141	80.693
90	5.765	9.402	-1.109	2.964	83.657
95	5.765	9.740	-1.212	2.804	86.461
100	5.765	9.998	-1.290	2.666	89.127
105	5.765	10.202	-1.352	2.558	91.685
110	5.765	10.400	-1.413	2.465	94.150
115	5.765	10.620	-1.480	2.368	96.518
120	5.765	10.740	-1.516	2.289	98.807
141	5.765	11.630	-1.788	8.628	107.435

Kala Point Beach Survey Data Sheet

Date of Survey: 7/8/94

Data Entry By: j.Downing

File: KP7894.WB1

Datum: MLW

Station: 2

B.M. el. = 5.850' B.S. = 0.690' H.I. = 6.540'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	6.540	0.780	1.756	0.000	0.000
5	6.540	0.980	1.695	7.201	7.201
10	6.540	1.560	1.518	7.020	14.220
15	6.540	2.225	1.315	6.730	20.951
20	6.540	2.912	1.106	6.416	27.367
25	6.540	3.670	0.875	6.081	33.448
30	6.540	4.460	0.634	5.721	39.169
35	6.540	5.080	0.445	5.394	44.563
40	6.540	5.690	0.259	5.108	49.671
45	6.540	6.240	0.091	4.839	54.510
50	6.540	6.670	-0.040	4.611	59.121
55	6.540	6.900	-0.110	4.458	63.579
60	6.540	7.315	-0.236	4.308	67.888
65	6.540	8.010	-0.448	4.050	71.938
70	6.540	8.540	-0.610	3.766	75.704
75	6.540	8.960	-0.738	3.545	79.249
80	6.540	9.260	-0.829	3.378	82.627
85	6.540	9.510	-0.905	3.250	85.878
90	6.540	9.770	-0.984	3.132	89.010
95	6.540	10.070	-1.076	3.002	92.011
100	6.540	10.370	-1.167	2.863	94.874
105	6.540	10.290	-1.143	2.811	97.685
110	6.540	10.580	-1.231	2.763	100.448
115	6.540	10.880	-1.323	2.626	103.074
120	6.540	10.980	-1.353	2.533	105.607
125	6.540	11.260	-1.439	2.445	108.051
130	6.540	11.670	-1.564	2.284	110.335
135	6.540	11.890	-1.631	2.138	112.473
140	6.540	12.120	-1.701	2.033	114.507
151	6.540	12.700	-1.877	4.060	118.566

Kala Point Beach Survey Data Sheet

Date of Survey: 7/8/94

Data Entry By: j.Downing

File: KP7894.WB1

Datum: MLW

Station: 3

B.M. el. = 5.980' B.S. = 0.000' H.I. = 5.980'

Dist. (ft.)	H.I. (ft.)	F.S. (ft.)	Elev. (m)	V (cu. m)	TV (cu. m)
0	5.980	0.540	1.658	0.000	0.000
5	5.980	1.060	1.500	6.978	6.978
10	5.980	1.606	1.333	6.730	13.708
15	5.980	2.250	1.137	6.454	20.162
20	5.980	2.770	0.978	6.183	26.345
25	5.980	3.450	0.771	5.905	32.250
30	5.980	4.132	0.563	5.588	37.838
35	5.980	4.850	0.344	5.263	43.102
40	5.980	5.390	0.180	4.971	48.073
45	5.980	5.815	0.050	4.747	52.820
50	5.980	6.440	-0.140	4.503	57.323
55	5.980	6.840	-0.262	4.265	61.589
60	5.980	7.145	-0.355	4.101	65.690
65	5.980	7.720	-0.530	3.897	69.587
70	5.980	8.195	-0.675	3.653	73.241
75	5.980	8.600	-0.799	3.449	76.690
80	5.980	8.990	-0.917	3.264	79.954
85	5.980	9.370	-1.033	3.085	83.039
90	5.980	9.720	-1.140	2.916	85.955
95	5.980	10.070	-1.247	2.753	88.709
100	5.980	10.360	-1.335	2.605	91.313
105	5.980	10.630	-1.417	2.475	93.788
110	5.980	10.860	-1.487	2.359	96.147
115	5.980	11.040	-1.542	2.263	98.410
120	5.980	11.200	-1.591	2.184	100.594
125	5.980	11.440	-1.664	2.092	102.686

Note: Trees down in profile line. Survey offset ~10' to NNW, parallel to bluff.