

O & M INSPECTION REPORT  
FOR NAVIGATION AND SHORE PROTECTION PROJECTS

1. PROJECT NAME: WAIANAE SMALL BOAT HARBOR

2. DATE OF INSPECTION: 29 AUGUST 2002

3. INSPECTION PERSONNEL:

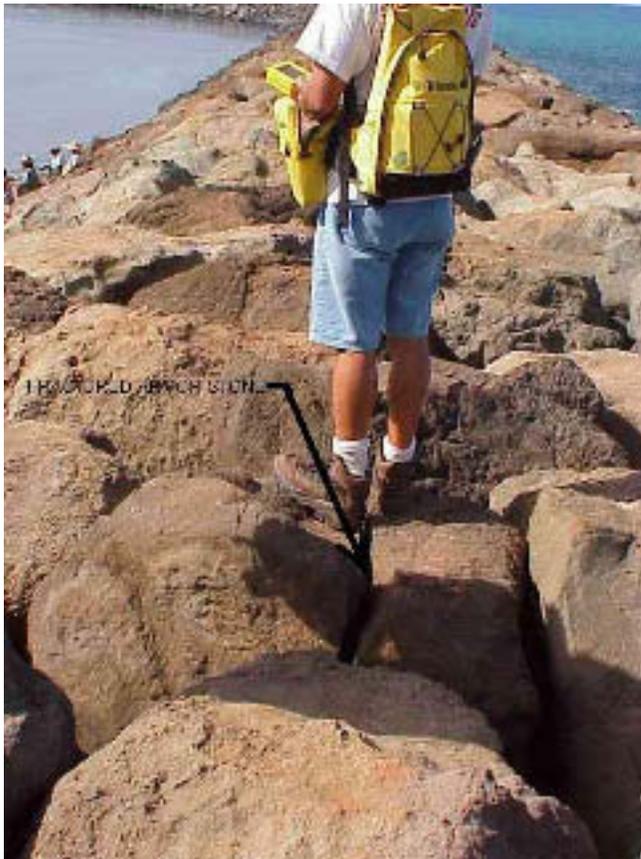
|              |     |          |
|--------------|-----|----------|
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4. DISCUSSION:

INSPECTED PORTION OF PROJECT CONSISTS OF 1,690 FEET LONG MAIN BREAKWATER AND A 220 FEET LONG STUB BREAKWATER.

SITE CONDITIONS: CLEAR SKIES. MODERATE WINDS. TIDE WAS LOW, BUT RISING. CONDUCTED SITE INSPECTION AND NOTED THE FOLLOWING (SEE **GIS INDEX MAP and LIST OF ITEMS TO MONITOR TABLE**, WHICH CORRESPONDS TO THE PICTURES BELOW, NEAR THE END OF THIS INSPECTION REPORT):

**1,690 FEET MAIN BREAKWATER:**



STA. 0+55, Crest: Fractured armor stone.



Sta. 1+64, OS: Fractured armor stone at water line.



Sta. 1+96, OS: Fractured armor stone at hinge.

Sta. 2+00, Crest: White Marker - 9 Dots (Not Pictured)



Sta. 2+55, OS: Dislodged armor stone sitting at water line.

Sta. 2+80, Crest: Perched armor stone on sideslope (no picture).



Sta. 2+92, Crest: Fractured armor stone.



Sta. 3+29, Crest: Fractured armor stone.



Sta. 3+88, OS: Cracked armor stone at hinge. UL is slightly exposed in this area.



Sta. 4+00, Crest: Marker indicating approximate start location of concrete dolosse.



Sta. 4+55, OS: 1 - Dolosse, 8-14-78, on sideslope with broken shank.

Sta. 4+75, OS: 2 - Dolosse with broken shank and fluke.  
1 - Dolosse, #13, 12-20-77, with broken fluke shank.  
1 - Dolosse - broken.  
(no picture)

Sta. 4+96, OS: 1 - Dolosse with broken shank bellow #15, 8-3-78.



Sta. 5+15, Crest: Fractured armor stone.



Sta. 5+25, OS: 2 - Dolosse on sidelsope with broken shank.



Sta. 5+35, OS: 1 - Dolosse at water line with broken fluke shank below #1, 8-2-77.



Sta. 5+40, OS: 1 - Dolosse, #4, 7-20-78, on sideslope with fractured shank.



Sta. 5+48, OS: 1 - Dolosse on sideslope with broken fluke shank.



Sta. 5+58, OS: 1 - Dolosse on sideslope with broken fluke shank..



Sta. 5+51, Crest: Fractured armor stone.



Sta. 5+70, OS: 1 - Dolosse on sideslope with broken fluke and shank. There is also a 1 foot separation between the crest hinge and start of the dolosse sideslope - possibly sliding of slope.



Sta. 5+75, OS: 1 - Dolosse on sideslope with broken shank.



Sta. 5+80, OS: 1 - Dolosse, #10, 7-20-78, on sideslope with broken fluke shank.



Sta. 5+88, OS: 1 - Dolosse, #34, 7-20-78, on sideslope with broken shank.



Sta. 5+98, OS: 1 - Dolosse at water line with broken shank.



Sta. 6+10, OS: 1 - Dolosse at water line with broken shank below #31, 7-18-78.

Sta. 6+20, OS: 1 - Dolosse with broken fluke tip and fluke shank.  
1 - Dolosse with broken shank.  
Both beneath #17, 7-18-78  
(no picture)



Sta. 6+50, OS: 1 - Dolosse near water line with broken shank.



Sta. 6+65, OS: 1 - Dolosse at hinge with broken fluke shank below #38, 6-5-78.

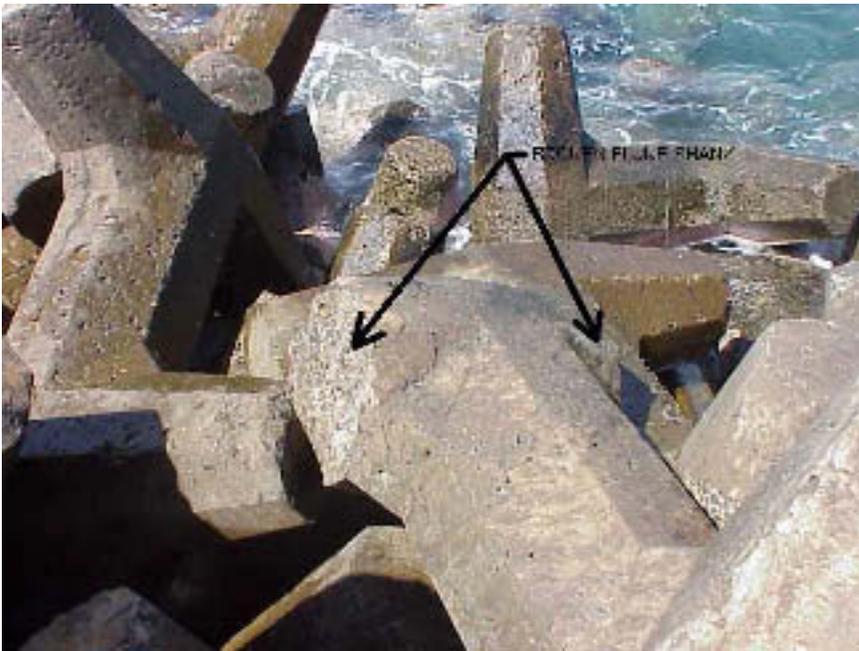


Sta. 6+70, OS: 1 - Broken dolosse used as under layer to other dolosse structures above it.

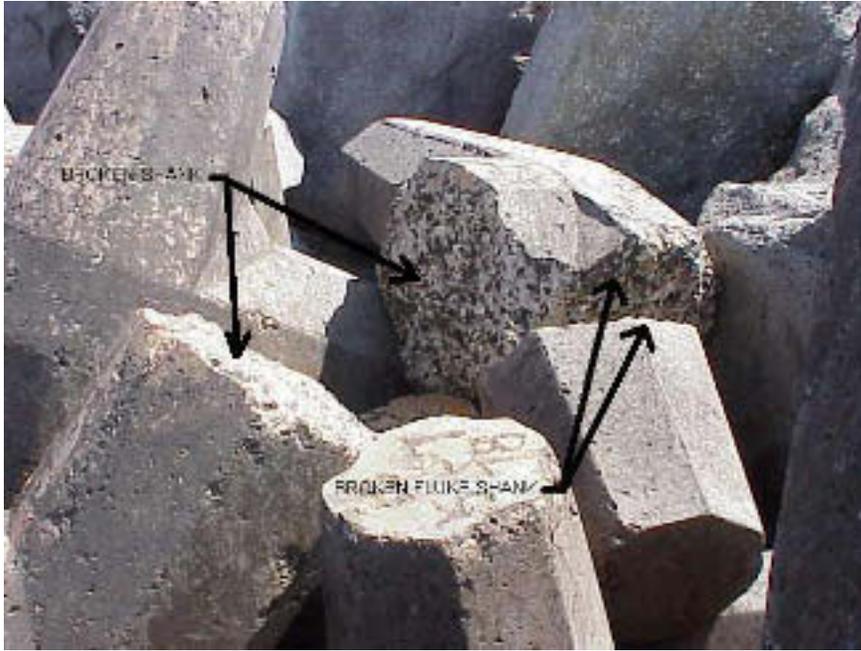
Sta. 6+75, OS: 1 - Dolosse at water line with broken shank (no picture).



Sta. 7+10, OS: 1 - Dolosse on sideslope with broken shank below #30, 6-2-78.



Sta 7+15, OS: 1 - Dolosse on sideslope with two broken fluke shanks below #20, 6-7-78.



Sta 7+25, OS: 1 - Dolosse on hinge with a fluke shank and a shank break between #30 & #16, 6-7-78.

Sta. 7+45, OS: 1 - Dolosse with broken shank and fluke shank break below #22, 6-17-78.



Sta. 7+50, Crest: 1 - Fractured green armor stone.



Sta. 7+65, OS: 1 - Dolosse on sideslope with broken fluke.  
 1 - Dolosse on sideslope with cracked shank identified as #11, 6-8-78.



Sta. 7+67, OS: 1 - Dolosse at water line with broken fluke shank.  
 1 - Dolosse at water line with broken fluke tip.

Sta. 7+70, OS: 1 - Dolosse at water line with broken fluke tip.



Sta. 7+95, OS: 1 - Dolosse at water line with broken shank.  
White marker target located on crest (no picture of marker).



Sta. 8+15, Crest: 1 - Dolosse on sideslope with broken shank next to #6, 6-7-78.



Sta. 8+25, OS: 1 - Dolosse at water line with broken shank below #12, 4-27-78.



Sta. 8+30, OS: 1 - Dolosse on sideslope with broken fluke shank.



Sta. 8+35, OS: 1 - Dolosse at water line with broken fluke.



Sta. 8+35, OS: 1 - Dolosse on sideslope with shank break.



Sta. 8+48, OS: 2 - Dolosse on sideslope with broken shank.



Sta. 8+70, OS: 2 - Dolosse on sideslope with broken shank.



Sta. 8+85, Crest: Weathered and fractured armor stone.



Sta. 8+90, OS: 1 - Dolosse at crest with broken shank (no picture).  
1 - Dolosse on sideslope with broken fluke shank.



Sta. 9+00, Crest: 2 - Dolosse with broken fluke shanks.



Sta. 9+30, OS: 1 - Dolosse at hinge with broken shank.  
2 - Dolosse at hinge with broken fluke shank.



Sta. 9+35, OS: 1 - Dolosse, #25, 10-7-77, near water line with broken shank.



Sta. 9+62, OS: 1 - Dolosse on sideslope with broken shank.  
2 - Dolosse on sideslope with broken fluke shank.



Sta. 9+82, OS: 3 to 5 - Dolosse with fluke shank breaks spread over this area.

Sta. 9+95, Crest: White marker/target (no picture).



Sta. 10+40, OS: 2 - Dolosse at water line with broken shank.  
1 - Dolosse at water line with broken shank and fluke shank.



Sta. 10+75, OS: 1 - Dolosse at water line with broken fluke shank below #41, 5-30-78.



Sta. 11+10, OS: 1 - Dolosse on sideslope with broken shank.



Sta. 11+10, OS: 1 - Dolosse at water line with broken shank.



Sta. 11+15, OS: 1 - Dolosse, #42, 5-26-78, at hinge with broken fluke.



Sta. 11+28, OS: 2 - Dolosse at water line with broken shank.



Sta. 11+28, OS: 1 - Dolosse at hinge with broken fluke shank.



Sta. 11+50, OS: 2 - Dolosse on sideslope with broken shank next to #41, 5-25-78. Marker with 9 dots (no Picture).



Sta, 11+75, OS: 1 - Dolosse at water line with broken shank.



Sta. 12+10, OS: 1 - Dolosse at water line with broken shank.



Sta. 12+22, Crest: Fractured armor stone.



Sta. 12+42, OS: 1 - Dolosse at water line with broken shank.



Sta. 12+55, OS: 1 - Dolosse on sideslope with broken fluke shank.



Sta. 12+95, OS: 1 - Dolosse on sideslope with broken fluke shank.

Sta. 13+00, Crest: Marker with 9 dots (no picture).



Sta. 13+25, OS: 1 - Dolosse on sideslope with broken shank.  
1 - Dolosse at hinge with broken fluke shank (not pictured)



Sta. 13+50, OS: 2 - Dolosse at water line with broken fluke shank.



Sta. 13+60, OS: 1 - Dolosse on sideslope with broken shank.



Sta. 13+65, OS: 1 - Dolosse, #11, 1-19-78, at hinge with broken fluke shank.



Sta. 13+75, OS: 1 - Dolosse on sideslope with broken shank below #28, 1-19-78.  
1 - Dolosse on sideslope with broken fluke shank (not pictured).



Sta. 13+85, OS: 1 - Dolosse, #41, 6-12-78, on sideslope with broken shank (not pictured).  
1 - Dolosse on sideslope with broken fluke shank.



Sta. 14+05, OS: 1 - Dolosse at hinge with broken shank.



Sta. 14+20, OS: 2 - Dolosse on sideslope with broken shank.



Sta. 14+30, Crest: Fractured armor stone.



Sta. 14+35, OS: 2 - Dolosse on sideslope with broken fluke shank.



Sta. 14+55, OS: 1 - Dolosse on sideslope with broken fluke shank.



Sta. 14+65, OS: 1 - Dolosse at water line with broken fluke shank.



Sta. 14+75, Crest: Cracked and weathered armor stone.



Sta. 14+75, OS: 1 - Dolosse on sideslope with broken fluke shank.  
Separation of dolosse from crest at hinge between sta. 14+55 and sta. 14+90.



Sta. 15+05, OS: 1 - Dolosse, #15, 11-15-77, on sideslope with broken shank.



Sta. 15+30, OS: 1 - Dolosse on sideslope with broken fluke shank below #21, 11-14-77.



Sta. 15+50, OS: 1 - Dolosse on sideslope with broken shank below #17, 11-14-77.



Sta. 15+65, OS: 2 - Dolosse at water line with broken fluke shank below #8, 12-14-77.



Sta. 15+82, OS: 1 - Dolosse on sideslope with broken shank.



Sta. 15+82, OS: 1 - Dolosse at water line with broken shank.



Sta. 15+60 to Sta. 15+95, OS: Separation of dolosse from crest hinge. Sideslope is may be sliding.



Sta. 16+05, OS: 1 - Dolosse on sideslope with broken fluke shank below #4, 1-13-78.



Sta. 16+20, OS: 1 - Dolosse on sideslope with broken fluke tip next to #8, 1-18-78.

Sta. 16+30, Crest: Marker with 9 dots (no picture).



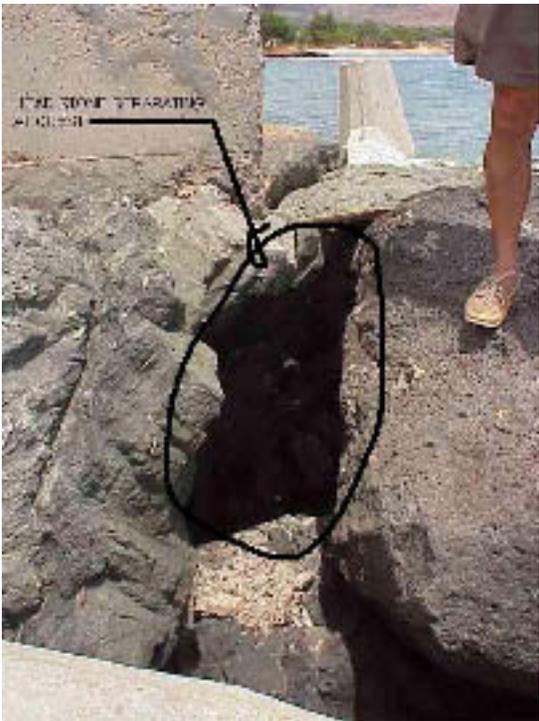
Sta. 16+45, OS: 1 - Dolosse at hinge with broken fluke shank next to #20, 1-13-78.



Sta. 16+55, OS: 1 - Dolosse, #25, 11-28-77, on sideslope with broken shank.  
1 - Dolosse on sideslope with broken fluke shank.



Sta. 16+70, 45Degrees OS: 1 - Navigational monument above headstone with separation from crest.



Sta. 16+75, 45Degrees OS: 1 - Headstone with a 2'x3' separation from crest. Hole is 3' Deep.



Sta. 16+75 and Sta. 16+76, OS: 1 - Dolosse at water line with broken fluke shank below #9, 12-7-77.



Sta. 16+77, 90Degrees HS: 1 - Dolosse, #21 12-7-77, on sideslope with broken shank.



Sta. 16+78, 90 Degrees OS: 1 - Dolosse, #12, 12-7-77, on sideslope with broken fluke shank.

Sta. 16+79, Crest: Marker with 9 dots.

Sta. 16+83, 5 Degrees OS: 1 - Dolosse, #15, 8-15-78, at head section with broken fluke tip (no picture).



Sta. 16+83, 5 Degrees HS: 1 - Dolosse, #11, 8-15-78, at head section with broken shank.



Sta. 16+83, 45 Degrees HS: 1 - Dolosse on sideslope with broken shank below #3, 8-15-78.



Sta. 16+90, 45 Degrees OS: 1 - Dolosse on sideslope with broken shank next to #30, 12-7-77.

**220 FEET STUB BREAKWATER INSPECTION - OCT. 2, 2002**

\* = From report dated 9 July 2001.



Overview of stub breakwater.

\*0+00 Replace faded Corps of Engineers warning sign. Mounted on 2 twisted 2"x2" metal posts. Both concrete footings fractured and exposed. Tripping hazard. Footing posts, and sign need replacement. New posts needed. (2002 comment - Sign and posts are no longer there.)



\*Sta. 0+25, OS, 1 dislodged armor stone at toe.



Sta. 0+36, Crest, 9 dot marker with all 9 dots missing.

\*Sta 0+70, HS, 2' void (no picture).



Sta. 0+78, OS, void on side slope with under layer exposed. Void also at water line.

\*0+85, OS, 1 fractured armor stone at hinge; armor stone at center line is disintegrating (no picture).



Sta. 0+86, Crest, 3.5'L x 2.5'W x 2.5'D void with exposed under layer.

Sta. 0+86, HS, Dislodged armor stone at water line creating a small void (no picture).



Sta. 0+80 to Sta. 0+90, HS and crest, minimal contact between armor stones. There is a major disparity between some of the armor stone sizes also.

\*Sta. 0+90, HS, 2' void at hinge (no picture).

\*Sta. 1+70, HS, 1 fractured armor stone at hinge (no picture).



Sta. 1+80, Crest, 2'x2'x2' void with exposed under layer.



\*Sta. 1+80, OS, 1 fractured armor stone at hinge.



\*Sta. 2+00, OS, 4' void. Underlayer exposed. 1 armor stone displaced 3'.

\*Sta. 2+10, HS 1 armor stone displaced (45 degrees). Loose armor stones from void.



\*Sta. 2+20, OS, 1 armor stone at toe displaced 5' (10 degrees).



\*Sta. 2+20, HS, 2' void (20 degrees).



Overview from Sta. 2+20 to Sta 0+00.



Sta. 2+20, Crest, 3'x3'x2' deep void. Nine (9) dot marker with 6 missing dots and 1 damaged dot. Sign stating, "Slow - No Wakes".

5. CONCLUSION:

TRIMBLE GLOBAL POSITIONING EQUIPMENT WAS USED TO RECORD DEFECTS WITHIN THE MAIN BREAKWATER AS WELL AS A BASELINE STATIONING WHEREVER POSSIBLE. GIS EQUIPMENT WAS NOT ABLE TO PINPOINT EXACT LOCATION OF DEFECTS ALONG WATERLINE OF BREAKWATER; THE ELECTRONIC EQUIPMENT IS NOT WATER RESISTANT. BASELINE STATIONING WAS APPROXIMATE AS MEASURING TAPE WASN'T PULLED CONSISTENTLY THROUGHOUT THE INSPECTION DUE TO TIME CONSTRAINTS. WHERE MEASURING TAPE WASN'T PULLED STATIONING WAS DETERMINED VIA IDENTIFICATION OF LANDMARKS OR DEFECTS FROM INSPECTION REPORT DATE 9-JULY-2001. HOWEVER, THE BASELINE STATIONING WAS REFINED USING THE GIS SOFTWARE.

MAIN BREAKWATER: FROM THE GIS ARCVIEW MAP, AREAS OF MAIN CONCERN ARE AT THE TRANSITION ZONE (STATION 3+90 TO 8+90), AND HEAD AND OFF SHORE TRUNK SECTIONS ADJACENT HEAD (STATION 13+50 TO HEAD) ON OCEANSIDE. THESE AREAS FORM CLUSTERS OF DEFECTS IN PROXIMITY TO EACH OTHER.

THE MAIN BREAKWATER IS BEGINNING TO SHOW SIGNS OF DOLO MOVEMENT AND SIDESLOPE SETTLING, PARTICULARLY BETWEEN STA. 14+50 AND 16+00, OCEANSIDE. THIS AREA NEEDS TO BE MONITORED AND COMPARED TO PREVIOUS PHOTOGRAPHS ANNUALLY. THE STRUCTURE REMAINS SERVICEABLE AND NO FAILURE IS ANTICIPATED IN THE NEXT YEAR.

\*(AS QUOTED FROM REPORT DATED 9 JULY 2001) THE MAIN BREAKWATER IS BEGINNING TO SHOW SIGNS OF DOLO MOVEMENT AND SIDESLOPE SETTLING, PARTICULARLY BETWEEN STA. 12+00 AND 14+50, OCEANSIDE. THIS AREA NEEDS TO BE MONITORED AND COMPARED TO PREVIOUS PHOTOGRAPHS ANNUALLY. THE STRUCTURE REMAINS SERVICEABLE AND NO FAILURE IS ANTICIPATED IN THE NEXT YEAR.

THE STUB BREAKWATER WAS NOT INSPECTED USING THE TRIMBLE GPS DUE TO TIME CONSTRAINTS. HOWEVER, IT WAS INSPECTED ON ANOTHER DAY (TRIMBLE GPS NOT USED). RESULTS OF THE INSPECTION SHOWED LITTLE CHANGE FROM LAST YEAR. THE STUB BREAKWATER DOES NOT APPEAR TO HAVE ANY SUBSTANTIAL CHANGES AND REMAINS SERVICEABLE AND NO FAILURE IS ANTICIPATED IN THE NEXT YEAR. HOWEVER, NEW SIGN AND POST NEED TO BE PLACED.

SIGNED: \_\_\_\_\_  
ERIC LI, E.I.T., CIVIL WORKS TECHNICAL BRANCH

SIGNED: \_\_\_\_\_  
JAMES PENNAZ, P.E., Ch, CIVIL WORKS TECHNICAL BRANCH

ENCLOSURE(S):

- PROJECT INDEX MAP
- GIS INDEX MAP OF DEFECTS CORRESPONDING TO PHOTOS ABOVE
- LIST OF ITEMS TO MONITOR TABLE - MAIN BREAKWATER INSPECTED AUG. 29, 2002
- LIST OF ITEMS TO MONITOR TABLE - STUB BREAKWATER INSPECTED OCT. 2, 2002
- DEFECTS LIST FROM INSPECTION REPORT DATED 9-JULY-2001  
(MAIN BREAKWATER)
- CONDITION OF IMPROVEMENT DATE 30 SEPTEMBER 1993
- MAIN BREAKWATER STATIONING
- STUB BREAKWATER STATIONING