



# HARTCROWSER

Delivering smarter solutions

## MEMORANDUM

**DATE:** March 26, 2001

**TO:** Mr. Jim Thomson, P.E., HNTB Corporation

**FROM:** Michael Bailey, P.E., Hart Crowser, Inc.

**RE:** Post-Earthquake Reconnaissance and Photo Documentation  
STIA Third Runway Project  
J-4978-06

Anchorage

Boston

Chicago

Denver

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This memo and accompanying figures and photographs document observations by Hart Crowser on two occasions following the February 28, 2001, Nisqually earthquake.

Fairbanks

Two Hart Crowser engineers (myself and Doug Lindquist) accomplished an initial reconnaissance on March 1, less than 24 hours after the earthquake. The initial reconnaissance included the toe of existing embankment fill constructed in 2000 and 2001, and areas along the toe of the proposed embankment and at the location of the proposed West and North MSE walls. A Hart Crowser geologist, Derek Ormerod, accomplished a second reconnaissance on March 2, which covered the same areas and specifically added portions of the fill constructed in 1998 and 1999. Mr. Ormerod obtained photographic documentation of the observed conditions using both digital and film images.

Jersey City

Hart Crowser's observations were specifically intended to identify any areas of instability, including potential for: sloughing or bulges of the embankment, heave of the native ground surface adjacent to the fill, tension cracks, and liquefaction or evidence of lateral spreading. No evidence of any ground movement, liquefaction, or deformation of any kind related to the earthquake was observed. Our observations indicate the embankment performed well in the earthquake, including those limited areas where previous surficial sloughs or erosion features had occurred at the time of construction.

Juneau

Long Beach

With respect to liquefaction, our reconnaissance specifically included those areas of the proposed future embankment where prior geotechnical investigations and analyses had indicated that liquefaction could occur. However, we observed no evidence of sand boils, lateral spreading, or other instability such as occurred in other parts of the region affected by the Nisqually earthquake. We note that liquefaction is sometimes not apparent until

Portland

1910 Fairview Avenue East  
Seattle, Washington 98102-3699  
Fax 206.328.5581  
Tel 206.324.9530

Seattle



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March 26, 2001

J-4978-06  
Page 2

several hours after the end of shaking, and the timing of our reconnaissance provides solid evidence that liquefaction did not occur at the Third Runway site as a result of the Nisqually earthquake.

Enclosed you will find a list of notes prepared by me and Mr. Ormerod, which briefly describe each photograph taken by Mr. Ormerod; Figures 1 through 4, which are site plan maps showing location and viewing direction for the photographs; a copy of Mr. Ormerod's field observation notes; and copies of 57 digital photographs. Under separate cover we are sending a copy of the film-based photographs (which cover the same views as the digital photographs) to the Port of Seattle.

Please call if you have any questions.

**Enclosures:**

Photo Log Notes (3 pages)

Figures 1 through 4, Earthquake Reconnaissance Photo Location Maps

Field Report and Notes (4 pages)

Photographs No. 1 through 57

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**AR 049976**

**Third Runway Post-Earthquake  
3/2/01 Photo Documentation  
Photo Log Notes**

Sheet 1 of 3

Photo Number	Description of Photo and Notes
1.	East end of 1999 fill.
2.	From same location, view of north end of 1999 fill.
3.	East end (southern half) of 1999 fill.
4.	East end (northern half) of 1999 fill. Note: Black spot is visqueen.
5.	North end of 1999 fill (eastern portion).
6.	North end of 1999 fill (central portion).
7.	North end of 1999 fill (western portion). Note: Recent Phase 3 stockpile at top.
8.	Northwest corner of 1999 fill.
9.	West end of 1999 fill. Note: Contact with 2000 fill.
10.	North facing section of 2000 fill from "pocket" wetland.
11.	Same, adjacent to photo 10.
12.	East facing section of 2000 fill from pocket wetland. Note: Minor sloughs on north facing area contain growing material and/or recent hydroseed (i.e., predate earthquake).
13.	Northeast facing portion of 2000 fill. Note hydroseed on previously sloughed area.
14.	North extension - east face of 2000 fill - minor sloughs preceded earthquake.
15.	Close up of old slough area on east face of north extension on 2000 fill. (Note: Grass growing in and below slough indicates pre-earthquake condition).
16.	North end of north extension of 2000 fill, slough has grass growing in it.
17.	Northwest face of north extension of 2000 fill.
18.	West face (north end) of 2000 fill - hydroseed existing in all slough areas.
19.	West face of bulk of 2000 fill - hydroseed existing in all slough areas. Note: Cobble layer on surface left from construction.
20.	West face of 2000 fill.
21.	Southwest corner of 2000 fill.

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AR 049977

**Third Runway Post-Earthquake  
3/2/01 Photo Documentation  
Photo Log Notes**

Photo Number	Description of Photo and Notes
22.	South face of 2000 fill.
23.	Surface of 1999/2000 fill looking north above 1999 fill - no cracks.
24.	Cobble spoil from construction on west face as viewed from above. Note: Hydroseed on the new fill (Winter 2000/2001) has not yet sprouted.
25.	Surface of 2000 fill - no cracks observed.
26.	AOA fill - north face from 2000 fill.
27.	AOA fill - west face from 2000 fill.
28.	2001 fill - south side.
29.	2001 fill - west side, south end. Photo available in digital format only.
30.	2001 fill - west side, north end.
31.	2001 fill - north side, west end.
32.	2001 fill - north side, east end.
33.	AOA fill - west face, north end.
34.	AOA fill - west face, adjacent to north end.
35.	West Wall area, note former South 160th Street ROW in background.
36.	West Wall area, note PCS straw (erosion prevention mulch) from recent demolition activity.
37.	West Wall area, note PCS straw (erosion prevention mulch) from recent demolition activity.
38.	West Wall area, note PCS straw (erosion prevention mulch) from recent demolition activity, and stakes at proposed toe of MSE wall.
39.	West Wall area (lot 299), note proposed wall stakes.
40.	West Wall area, note proposed wall stakes.
41.	West Wall area.
42.	South wall area, pre-existing steep sided gully feature.

**Third Runway Post-Earthquake  
3/2/01 Photo Documentation  
Photo Log Notes**

Sheet 3 of 3

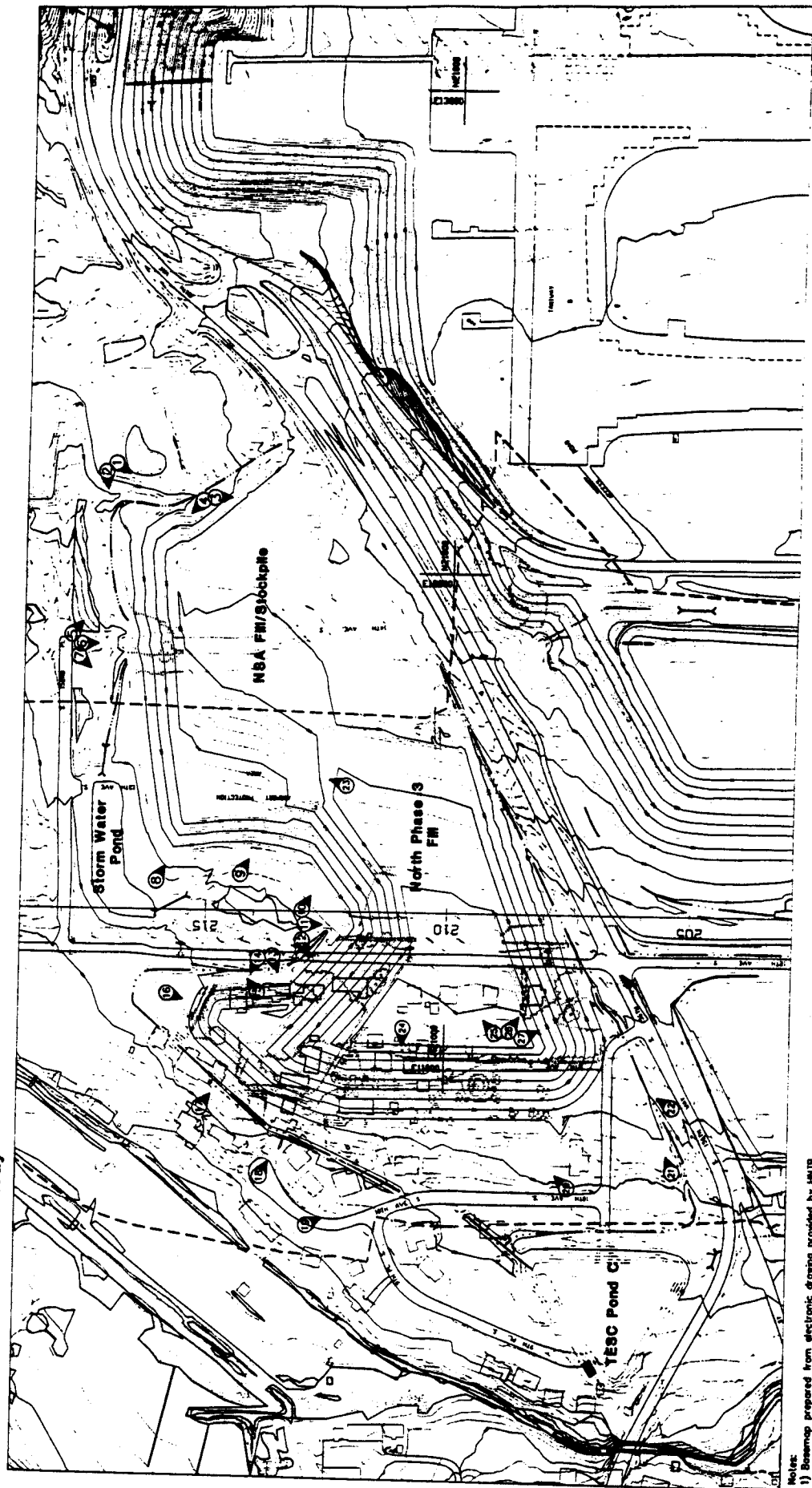
Photo Number	Description of Photo and Notes
43.	South wall area, pre-existing steep sided gully feature.
44.	South end AOA fill, west face, southern end.
45.	Just north of photo 44. Note: Minor slough features have new grass growing in them.
46.	South end of AOA fill, west face - looking at northern end. Minor sloughing, apparently predates earthquake based on vegetation.
47.	South end of AOA fill.
48.	Southwest face of AOA fill. Note: Few older sloughs.
49.	Southwest face of AOA fill - southern portion, note drain pipe at corner to west face.
50.	Same, just south of photo 49.
51.	West face of AOA fill looking north.
52.	Surface of southwest face of AOA fill - no cracks.
53.	Surface of west face of AOA fill - no cracks.
54.	North face of AOA fill.
55.	West face of AOA fill - north end. Note corner of north face.
56.	West face of AOA fill - center. Photo available in digital format only.
57.	West face of AOA fill - south end. Note corner to southwest face. Photo available in digital format only.

F:\Docs\Jobs\497806\PhotoLogNotes.doc

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J-4978-06

AR 049979

**Earthquake Reconnaissance Photo Location Map**  
**Fill North of South 156th Way**



**HARTCROWSER**  
 J-4978-00 3/01  
 Figure 1

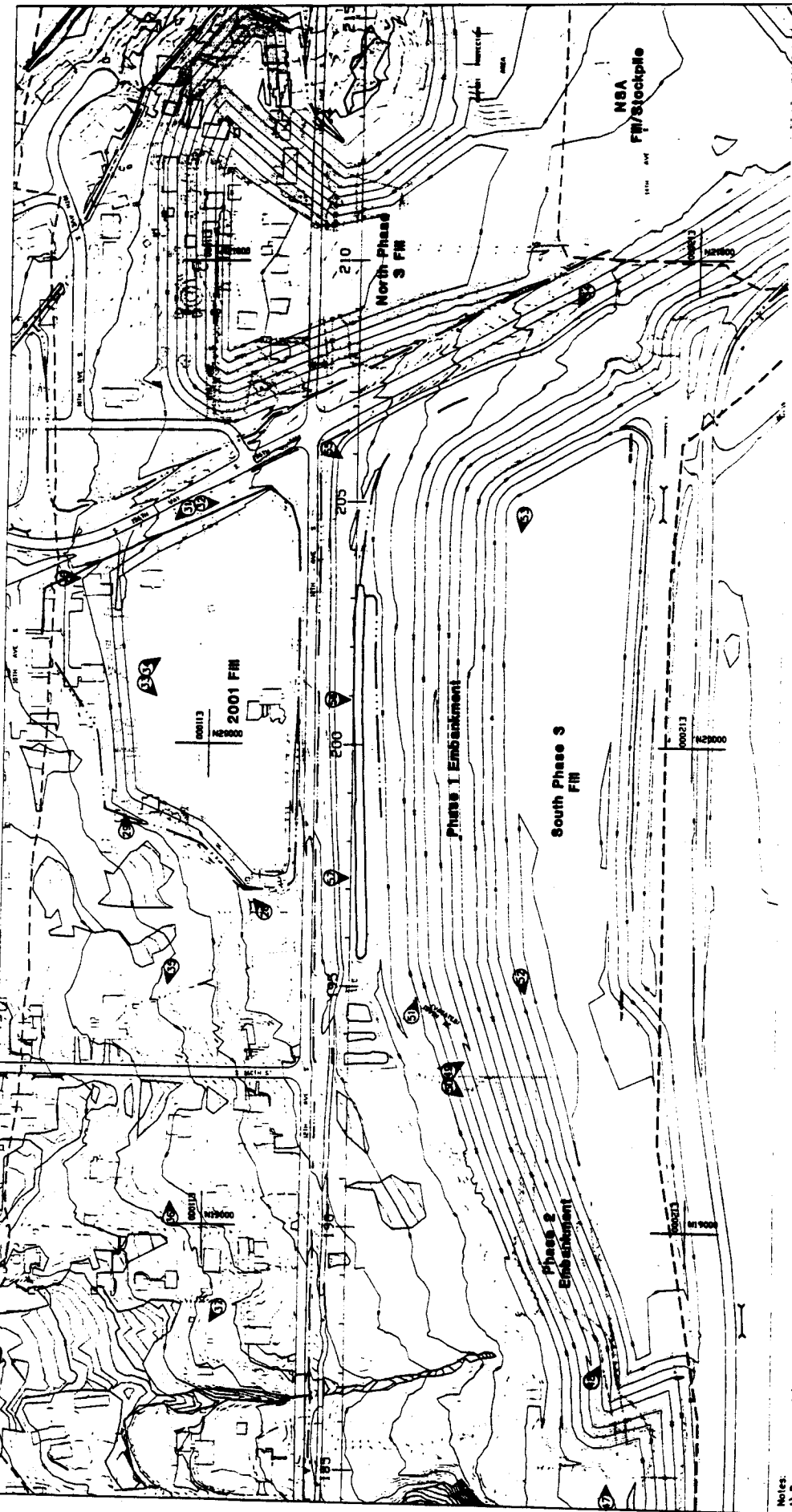


Photo Location, Direction, and Number



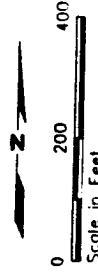
Notes:  
 1) Base map prepared from electronic drawing provided by HNTB entitled, "X\_Taps.dwg," dated 2/20/01  
 2) Wetland delineations prepared from electronic drawing provided by Parametrix entitled, "w\_022201," dated 2/22/01.

**Earthquake Reconnaissance Photo Location Map  
Embankment Between NSA and West MSE Walls and Phase 3 Fill**



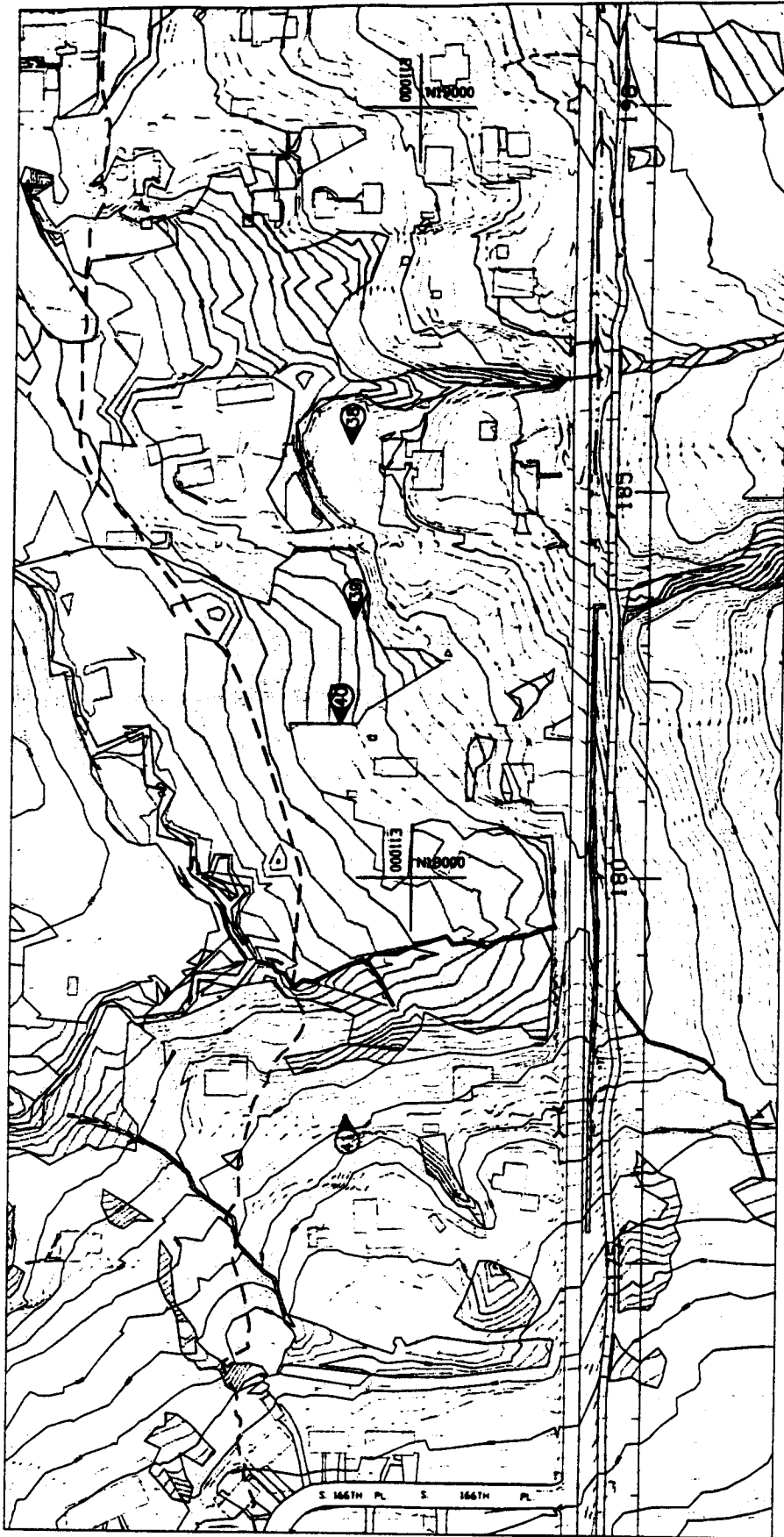
Notes:  
 1) Basemap prepared from electronic drawing provided by HNTB entitled, "X\_topo.dwg," dated 2/20/01  
 2) Wetland delineations prepared from electronic drawing provided by Parametrix entitled, "W\_022201," dated 2/22/01

Photo Location, Direction, and Number



# Earthquake Reconnaissance Photo Location Map

## West MSE Wall Vicinity



Notes:

- 1) Basemap prepared from electronic drawing provided by HNTB entitled, "X\_Topo.dwg," dated 2/20/01.
- 2) Wetland delineations prepared from electronic drawing provided by Parametrix entitled, "W\_022201," dated 2/22/01.



Photo Location, Direction, and Number

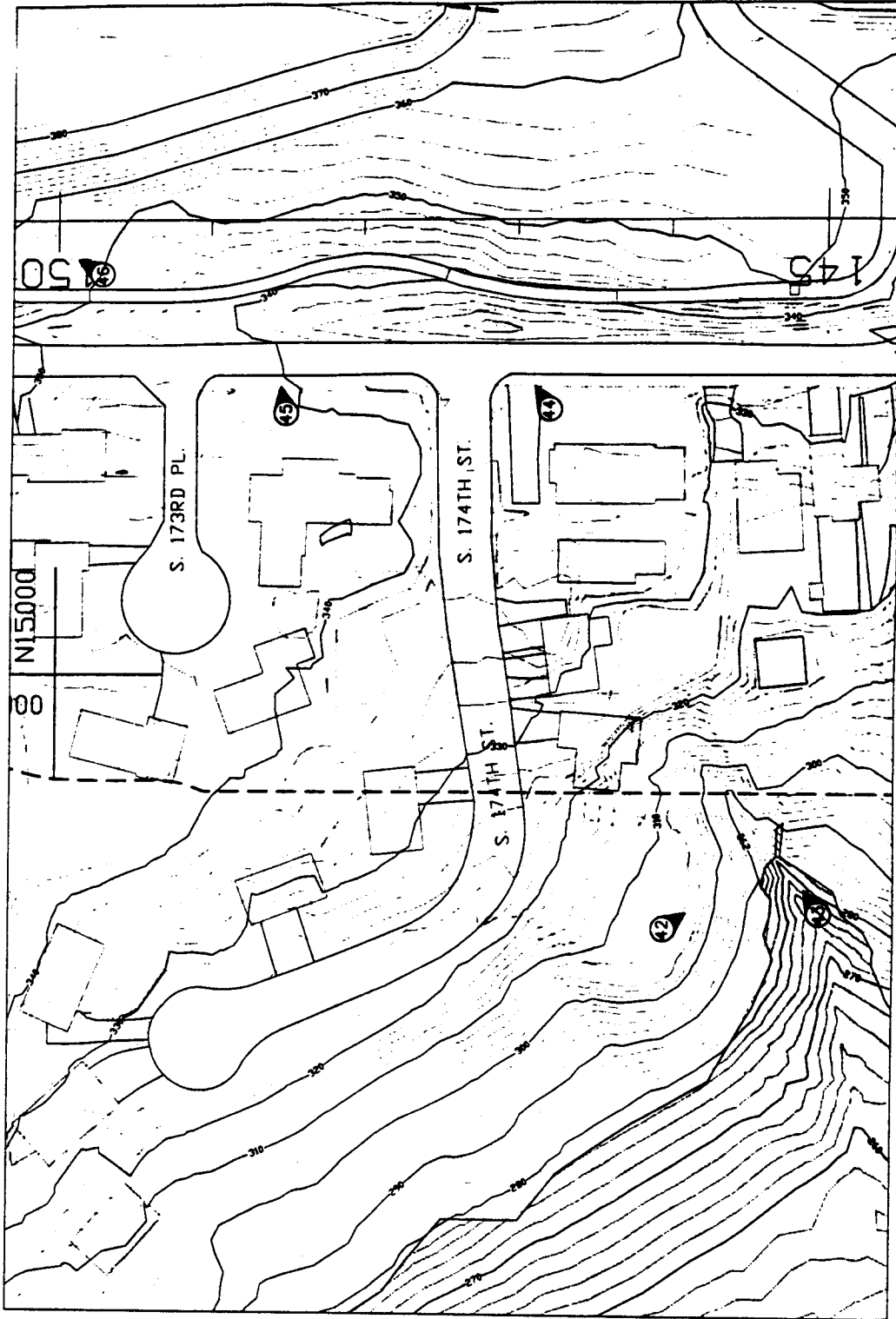
**HARTCROWSER**  
J-4978-06 3/01  
Figure 3



RC 3/8/01 1=100 (ref)see drawing file, chorio-8.pcz  
49780653

# Earthquake Reconnaissance Photo Location Map

## South MSE Wall Vicinity



Notes:

- 1) Basemap prepared from electronic drawing provided by HNTB entitled, "X\_Topo.dwg," dated 2/20/01.
- 2) Wetland delineations prepared from electronic drawing provided by Parametrix entitled, "W\_022201," dated 2/22/01.

Photo Location, Direction and Number



**HARTCROWSER**  
J-4978-08 3/01  
Figure 4



# HARTCROWSER

## FIELD REPORT

Hart Crowser, Inc.  
1910 Fairview Avenue East  
Seattle, Washington 98102-3639  
FAX 206.328.5587  
206.324.9530

Job No. 4978-06  
Field Report No. \_\_\_\_\_  
Page 1 of 1  
DATE 3/2/01  
S M T W Th (F) S

JOB 32 - Post-Earthquake Assessment ARRIVAL TIME: 1015  
LOCATION SeaTac WA DEPARTURE TIME: 1630  
CLIENT HNTB WEATHER: Lt rain, Sunbreaks  
PURPOSE OF OBSERVATIONS Visual observations of fill areas  
H-C REPRESENTATIVE DJD H C PROJECT MANAGER M. Bailey  
CONTRACTOR - PERMIT NO. \_\_\_\_\_  
CONTRACTOR REP. - JOB PHONE \_\_\_\_\_

This report presents opinions formed as a result of our observation of the contractor's activities relating to geotechnical engineering. We rely on the contractor to comply with the plans and specifications throughout the duration of the project irrespective of the presence of the Hart Crowser representative. The presence of our field representative will be for the purpose of providing observation and field testing. Our work does not include supervision or direction of the actual work of the contractor, his employees or agents. Neither the presence of our representative nor the observation and testing by our firm shall excuse the contractor in any way for defects discovered in his work. Our firm will not be responsible for job or site safety on this project. The conclusions and recommendations of this field report are subject to review by the Hart Crowser Project Manager.

COMMENTS: HC rep on-site at the request of the Port and HNTB to visually inspect and photo document the various fill areas associated with the third runway expansion. This visit was a result of the recent 6.8 earthquake centered north of Olympia. The HC rep visually inspected all of the fill areas including: the North Fill area (9900' E. of N. The most recent fill S of 156<sup>th</sup> and West of 12<sup>th</sup> Ave S, the South End Ave Fill (east of 12<sup>th</sup> and South of viewpoint park) and the Act Fill (east of 12<sup>th</sup> and just south of 156<sup>th</sup>). No cracking, recent soil movement, sand boils, or other signs of impact from the recent earthquake were observed. The sidewalls and surfaces of all of the fills were inspected and documented with digital and standard photographs. The HC rep also inspected portions of the ground surface that are to underlay the west and south walls. These areas also showed no signs of adverse impact from the recent earthquake. It should be noted that some portions of the fill sidewalls contained sloughs that were determined to pre-date the earthquake due to the presence of either hydro-seed or grass growing in the sloughed area. The west face of the North fill (N of 156<sup>th</sup>) contained several gravel "bulges" that were also covered with hydroseed and therefore pre-date the recent earthquake.

BY:

REVIEWED BY:

I have read and understand the content of this Field Report

DJD  
HART CROWSER REPRESENTATIVE

Michael Bailey  
HART CROWSER PROJECT MANAGER

CONTRACTOR REPRESENTATIVE

AR 049984

# HART CROWSER FIELD NOTES

Project 32- Post- Earthquake

Purpose of Field Work: photo documentation

Photo log & Notes

Page 1 of 3  
 Job No. 4979-06  
 Date 2/2/01  
 HC Rep. D20  
 P.M. M. Baile

- ① East end of 99 Fill
- ② From same location side view of N end of 99 fill
- ③ East end (southern half) of 99 Fill
- ④ ~~East~~ East end (northern 1/2) of 99 fill note: black spot is vine weevils
- ⑤ N. End of 99 fill (eastern portion)
- ⑥ N. end of 99 fill (central portion)
- ⑦ N end of 99 fill (western portion) note: recent stake pile @ top
- ⑧ N W corner of 99 fill
- ⑨ West end of 99 fill note contact w/ 2000 fill
- ⑩ N facing section of 00 fill from "pockets" wetland
- ⑪ adjacent to ⑩ same
- ⑫ East facing section of 00 fill from pocket wetland  
 note: minor sloughs on N. facing area all contain growing material and/or recent hydro seed i.e. pre-date earthquake
- ⑬ NE facing portion of 00 fill - note hydro seed on sloughed area
- ⑭ N extension - E face of 00 fill - minor sloughs
- ⑮ close up of slough area on E face of N extension of 00 fill  
 note: grass growing

end of disk

⑯ N end of N extension of 00 fill slough has grass growing in it

⑰ NW face of N extension of 00 fill

⑱ W face (N. end) of 00 fill  
 -hydro seed existing in all slough areas

⑲ W face of bulk of 00 fill  
 -hydro seed existing on all slough areas

⑳ W face of 00 fill  
 - note: gravel "bulges"

㉑ SW corner of 00 fill  
 note: hydro seed on gravel "bulges"  
 from this angle

㉒ S face of 00 fill

Site or Exploration Plan (use back of page if necessary)

**HART CROWSER FIELD NOTES**

Page 2 of 3  
 Job No. 4993-06  
 Date 3/2/01  
 HC Rep. DRO  
 P.M. M. B. H.

Project 312 - post Earthquake  
 Purpose of Field Work Visual Inspection

- (23) surface of 99/00 fill looking at above 99 fill - No cracks
- (24) gravel "bulges" on West face from above - note horizontal on all of the gravel
- (25) surface of 00 fill - no cracks observed
- (26) AOA fill - N face from 00 fill
- (27) AOA fill - W face from 00 fill
- (28) 01' fill - S side
- (29) 01' fill - W side S end
- (30) 01' fill - W side N end
- (31) 01' fill - N side W end
- (32) 01' fill - N side E end
- (33) AOA fill - West face N end
- (34) AOA fill - West face adjacent to N end
- (35) West Wall area note 160<sup>th</sup>
- (36) West Wall area note PCS stain from recent dump activity
- (37) West Wall area same note
- (38) West Wall area same note and toe of wall stakes
- (39) West Wall area (lot 299) same note: wall cracks
- (40) West Wall area note: wall stakes
- (41) West Wall area lower prop note wall stake in foreground
- (42) South Wall area steep sided earth feature

end of camera

if

dist

(43) Same as 42	Site or Exploration Plan (use back of page if necessary)
(44) South end AOA fill West face southern end	
(45) just north of 44 note: minor slash features have new grass growing in them	
(46) South end AOA fill West face - looking @ northern end all slash in pre dated rock	

**HART CROWSER FIELD NOTES**

Project 3R- post earthquake assessment

Purpose of Field Work Visual Inspection

Page 3 of 3  
Job No. 4973-06  
Date 3/2/01  
HC Rep. D/20  
P.M. M. Binky

- (47) S end of AOA Fill
- (48) SW Face of AOA fill - note few older clumps
- (49) SW Face of AOA Fill - southern portion, note drain pipe @ corner to W face
- (50) some just S of (49)
- end of  
series #3 (51) West Face of AOA fill looking N
- (52) Surface of SW Face of AOA Fill - no cracks
- (53) Surface of W Face of AOA Fill - no cracks
- (54) N Face of AOA fill
- end of  
series #2 (55) W. Face of AOA fill - N. end note corner to N face
- (56) W Face of AOA Fill - center
- (57) W Face of AOA Fill - S. end - note corner to SW face

Site or Exploration Plan (use back of page if necessary)	



Photograph 1 -



Photograph 2 -



Photograph 3 -



Photograph 4 -



Photograph 5 -



Photograph 6 -





Photograph 7 -



Photograph 8 -



Photograph 9 -



Photograph 10 -



Photograph 11 -



Photograph 12 -



Photograph 13 -



Photograph 14 -



Photograph 15 -



Photograph 16 -



Photograph 17 -



Photograph 18 -



Photograph 19 -



Photograph 20 -

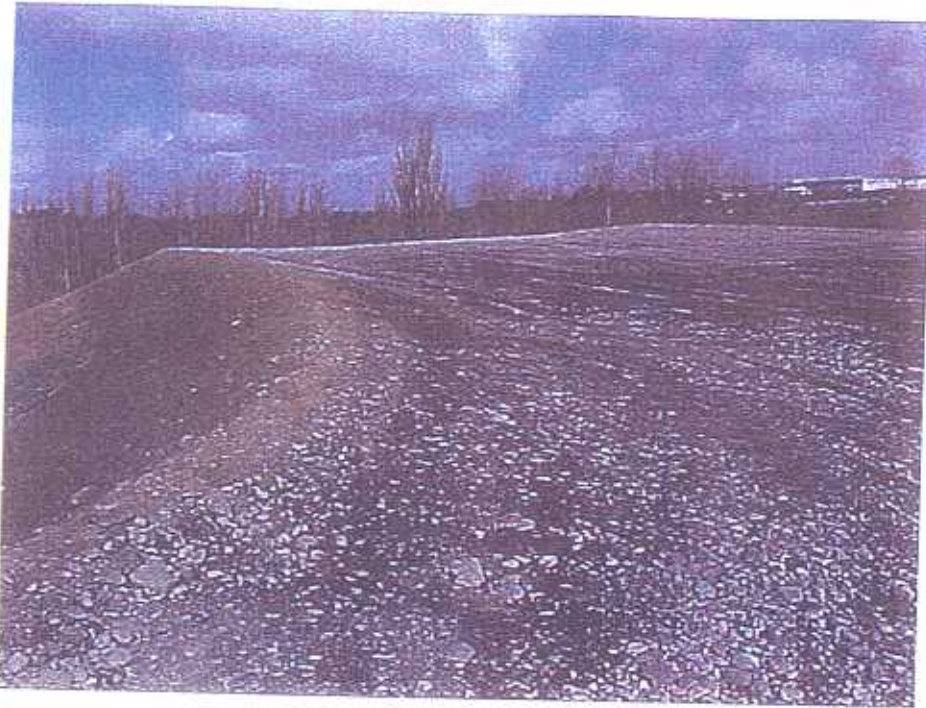


Photograph 21 -



Photograph 22 -





Photograph 23 -



Photograph 24 -



Photograph 25 -



Photograph 26 -



Photograph 27 -



Photograph 28 -



Photograph 29 -



Photograph 30 -



Photograph 31 -



Photograph 32 -



Photograph 33 -



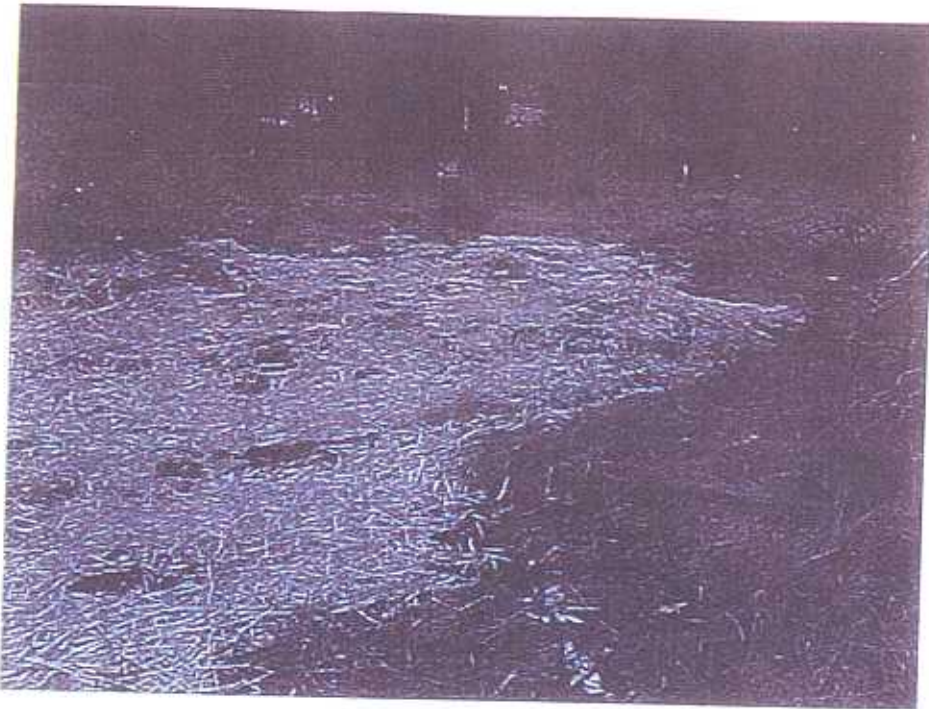
Photograph 34 -



Photograph 35 -



Photograph 36 -



Photograph 37 -

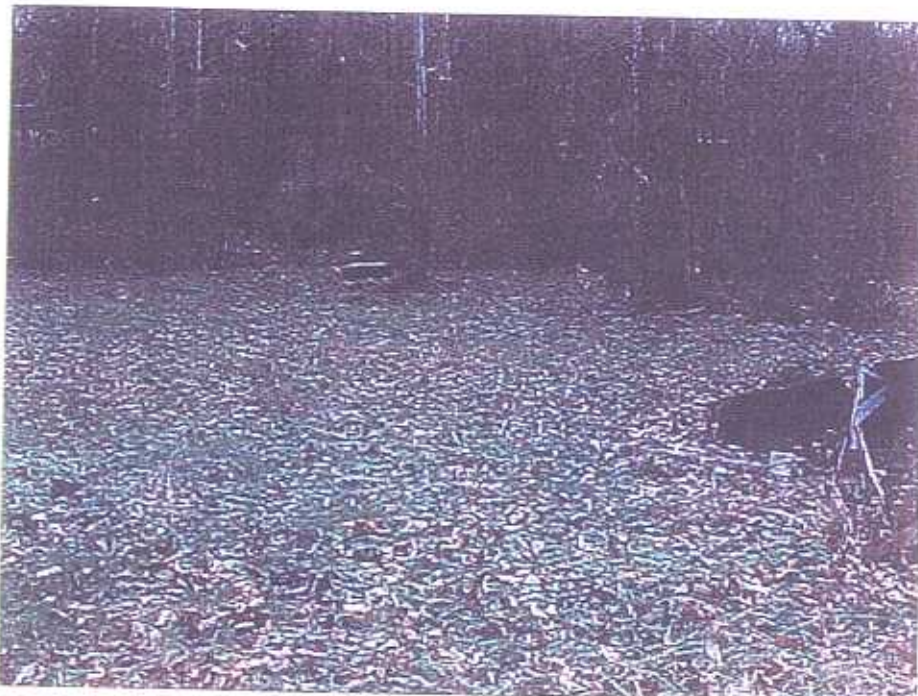


Photograph 38 -





Photograph 39 -



Photograph 40 -



Photograph 41 -



Photograph 42 -



Photograph 43 -



Photograph 44 -



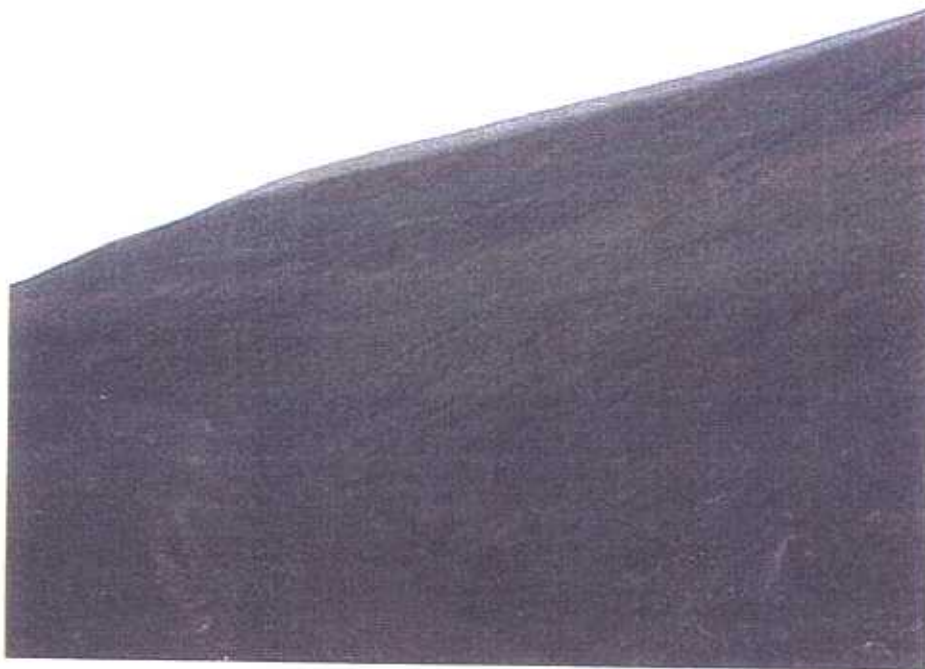
Photograph 45 -



Photograph 46 -



Photograph 47 -



Photograph 48 -



Photograph 49 -



Photograph 50 -



Photograph 51 -



Photograph 52 -



Photograph 53 -



Photograph 54 -





Photograph 55 -



Photograph 56 -



Photograph 57 -