

Washovers Along the South Texas Coast
Recommendations for Closure.

R.P.I., Inc. by J. Sadd, D. Domeracki
& E. Gundlach prepared for Nt. Oceanic
& Atmospheric Administration Box 6

WASHOVERS ALONG THE SOUTH TEXAS COAST AND RECOMMENDATIONS FOR CLOSURE

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and Erich R. Gundlach

Research Planning Institute, Inc.
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Columbia, South Carolina 29205

PREPARED FOR:

Office of Marine Pollution Assessment
Dr. John H. Robinson, Project Manager
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Boulder, Colorado 80302

RPI/R/80/4/18-13

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PURPOSE AND INTRODUCTION

The purpose of this report is to describe each washover from the Rio Grande to Aransas Pass, and recommend methods for closure should overtopping by oil (as occurred during September 1979) become imminent. This study was funded as part of prespill contingency plans for the south Texas coast in preparation for the possible return of IXTOC I oil during 1980.

The effects of hurricanes and tropical storms on the Texas barrier islands and subsequent dynamics of washover formation have been studied by many authors, most notably Hayes (1965, 1967) and McGowen and others (1970). Washover formation and migration within the study area were previously studied by analyzing historical shoreline changes (Morton and Pieper, 1975; 1977a, b). A schematic diagram of washover formation and sedimentation is presented in Figure 1.

ACKNOWLEDGMENTS

We wish to acknowledge the following persons for their contributions to this study. Larry Thebeau and Scott Dinnel helped with the field work. Harry Vaughan of the U.S. Coast Guard Strike Team in Corpus Christi, and Will Ernst, Assistant Scientific Support Coordinator, provided valuable information. All figures were drafted by George Miles. Photographs were reproduced by Burk Scheper from a June 1979 overflight provided by the U.S. Environmental Protection Agency. Diana Gaines and Joyce Hess edited and typed the manuscript.

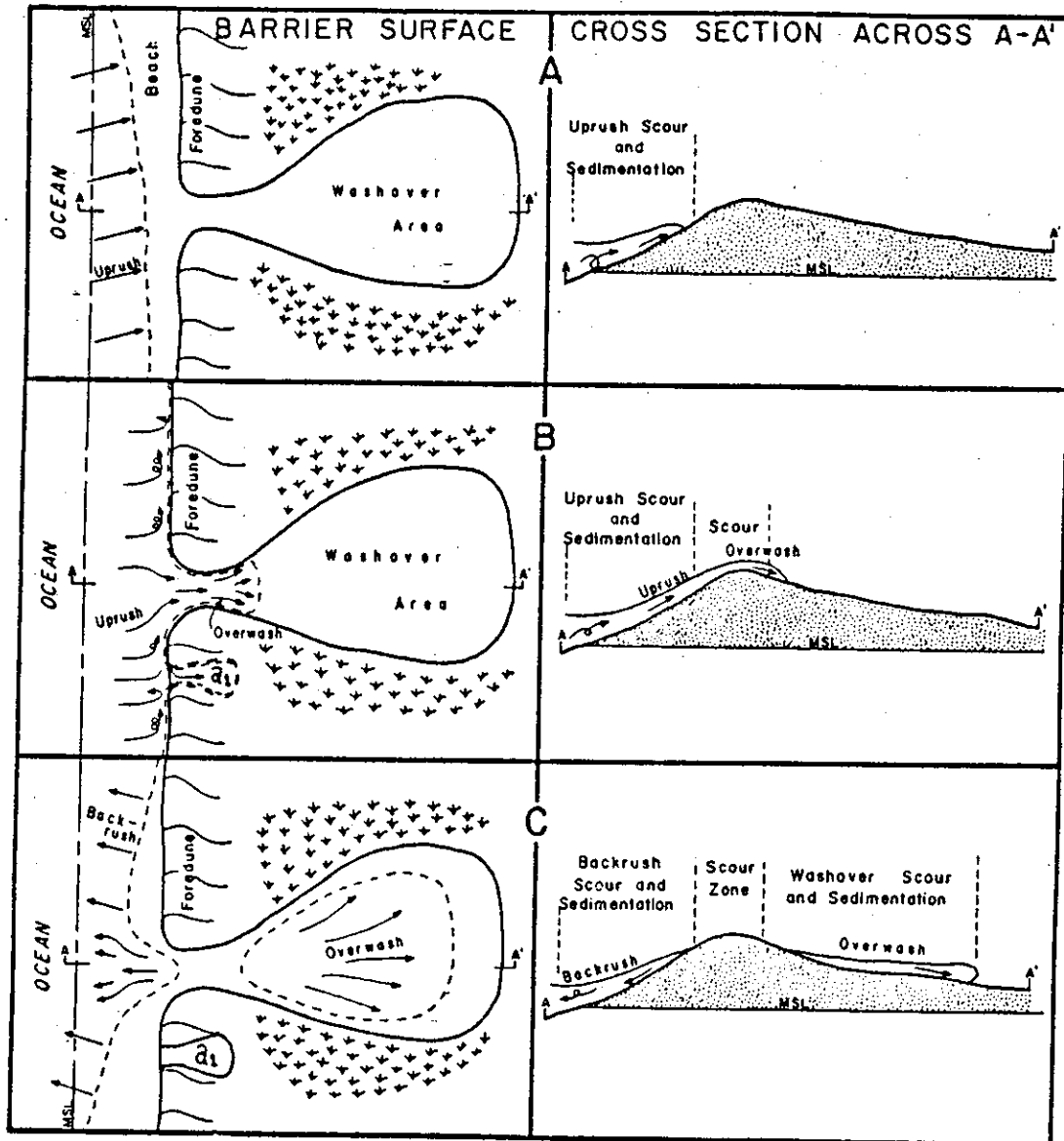


FIGURE 1. Schematic diagram of a washover event. A) During spring tides and/or storm surge, uprushing waves overtop a low area in the foredune ridge. B) Sediment is eroded from the beachface and dunes, and transported landward through the breach in the foredune ridge. C) Sediment and water, under the influence of gravity, are spread across the washover and deposited behind the foredune ridge. The breach in the foredune ridge (scour zone) deepens and widens with repeated overtopping and erosion (from Schwartz, 1975).

METHODS OF STUDY

Field work was accomplished by a three-man, field team during 25 February to 6 March 1980. Each washover between the Rio Grande and Aransas Pass was:

1. Located relative to a prominent feature (usually by vehicle odometer).
2. Measured as to breach width and length.
3. Described on tape.
4. Photographed in detail.
5. Sketched to indicate important geomorphic features.
6. Profiled, using the K. O. Emery (1961) method.
7. Cored to locate depth of the water table.
8. Sampled for grain size.

Using these data, the quantity of usable sand, both from incipient sand dunes and the washover channel, was calculated for each locality. Recommendations for closing the washovers are based on observations made during washover breaching during storms the previous September and from location of the foredune ridge. The proposed closure dike, designed to survive a minor tropical storm similar to last September's, is a "best guess" on our part. A structure designed to withstand a major tropical storm or hurricane would require consultation with a coastal engineer. Of course, during a hurricane, the impact of an oil spill may be minor in comparison.

RESULTS

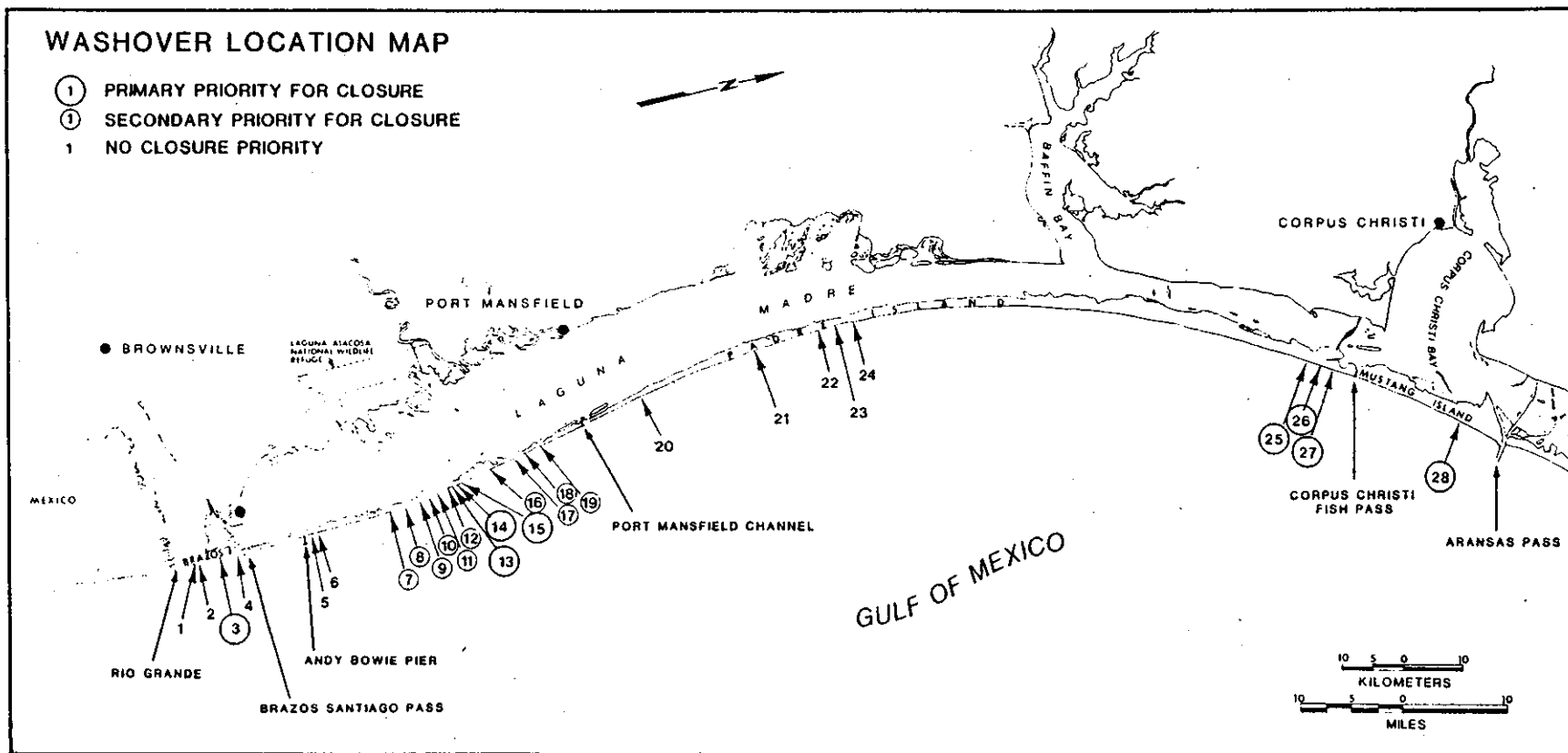
Description of Washovers

The barrier islands south of Aransas Pass are breached by 28 washover channels (Fig. 2), which vary in width from less than 0.2 km (0.1 mi) to greater than 1.6 km (1 mi). Several stabilized areas, which were overtopped previously, were found but not mapped. A thin veneer of windblown sand is present as small dunes in the seaward portion of most washovers. The development of these incipient dune fields is a step in the natural sealing of the breach in the foredune ridge. Incipient dunes are usually not stabilized by vegetation, and show almost continuous sand transport during strong winds. Sand in the washover channel is generally coarser than dune sand and contains a higher percentage of whole and broken shells. Shell fragments are very common across the washover surface.

The compactness or packing of sediment within the washover channels varies considerably. On Brazos and Padre Islands, channel sands contain abundant trapped air and interstratified blue-green algal mats, resulting in a spongy surface. In contrast, to the north in the vicinity of Corpus Christi Fish Pass and Aransas Pass, channel sands are very hard-packed and contain a higher percentage of fine organic debris. Soft sediments would deter the usage of heavy equipment on the washover surface.

WASHOVER LOCATION MAP

- ① PRIMARY PRIORITY FOR CLOSURE
- ① SECONDARY PRIORITY FOR CLOSURE
- 1 NO CLOSURE PRIORITY



LEGEND

- | | | | | | |
|--------------|---------------|----------------|---------------|----------------|----------------|
| 1) BC-N-0.8 | 6) SP-N-1.15 | 11) SP-N-15.0 | 16) SP-N-18.7 | 21) NP-N-18.3 | 26) MFP-S-3.55 |
| 2) BC-N-2.1 | 7) SP-N-8.25 | 12) SP-N-14.4 | 17) SP-N-21.2 | 22) NP-N-24.0 | 27) MFP-S-4.85 |
| 3) BC-N-4.2 | 8) SP-N-9.4 | 13) SP-N-14.6 | 18) SP-N-22.2 | 23) NP-N-25.6 | 28) M-S-10.85 |
| 4) BC-N-6.65 | 9) SP-N-11.4 | 14) SP-N-15.2 | 19) SP-N-24.1 | 24) NP-N-27.4 | |
| 5) SP-N-0.5 | 10) SP-N-12.4 | 15) SP-N-15.45 | 20) NP-N-6.1 | 25) MFP-S-2.35 | |

Description Format

Each washover is herein described. The photographs are copies from the June 1979 overflight provided by the U.S. Environmental Protection Agency. Descriptions of washovers BC-N-0.8 and M-S-10.85 do not have photographs as they were not covered by the aerial photo set. Sketches were drawn from field sketches made by the investigating field scientists. All profiles were run from the back of the washover out to mean water level (MWL) of the Gulf. The solid line below the profile shows the position of static water table as determined from cores (solid vertical lines). The band of low, active, unvegetated sand dunes is labeled as "incipient dune field." The recommended dike locations and the volume of sand required to construct it according to the criteria listed earlier in this report are also shown.

LOCATION NOT COVERED
BY U.S. ENVIRONMENTAL PROTECTION AGENCY
JUNE 1979 AERIAL PHOTO TRACK

SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: BC-N-0.8

LOCATION: 1.28 km (0.8 miles) north of Rio Grande on Brazos Island

BREACH WIDTH: 320 m (970 ft)

WASHOVER LENGTH: 110 m (335 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Moderate (~17 m³/m)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 45 m (136 ft)

COMMENTS: Light growth of Sesuvium on the incipient dune field.

NEAREST PROFILE STATION _____

LOCATION BC-N-0.8

RECORDERS D.D., J.S., L.T.

PHOTOGRAPHS D.D. TXV 6-16

GRAIN SIZE MED-FINE

SAND SUPPLY LOW

Cores Along Strike
(depth of sand)

1 110 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 54 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

DATE 25/FEB/80 0942

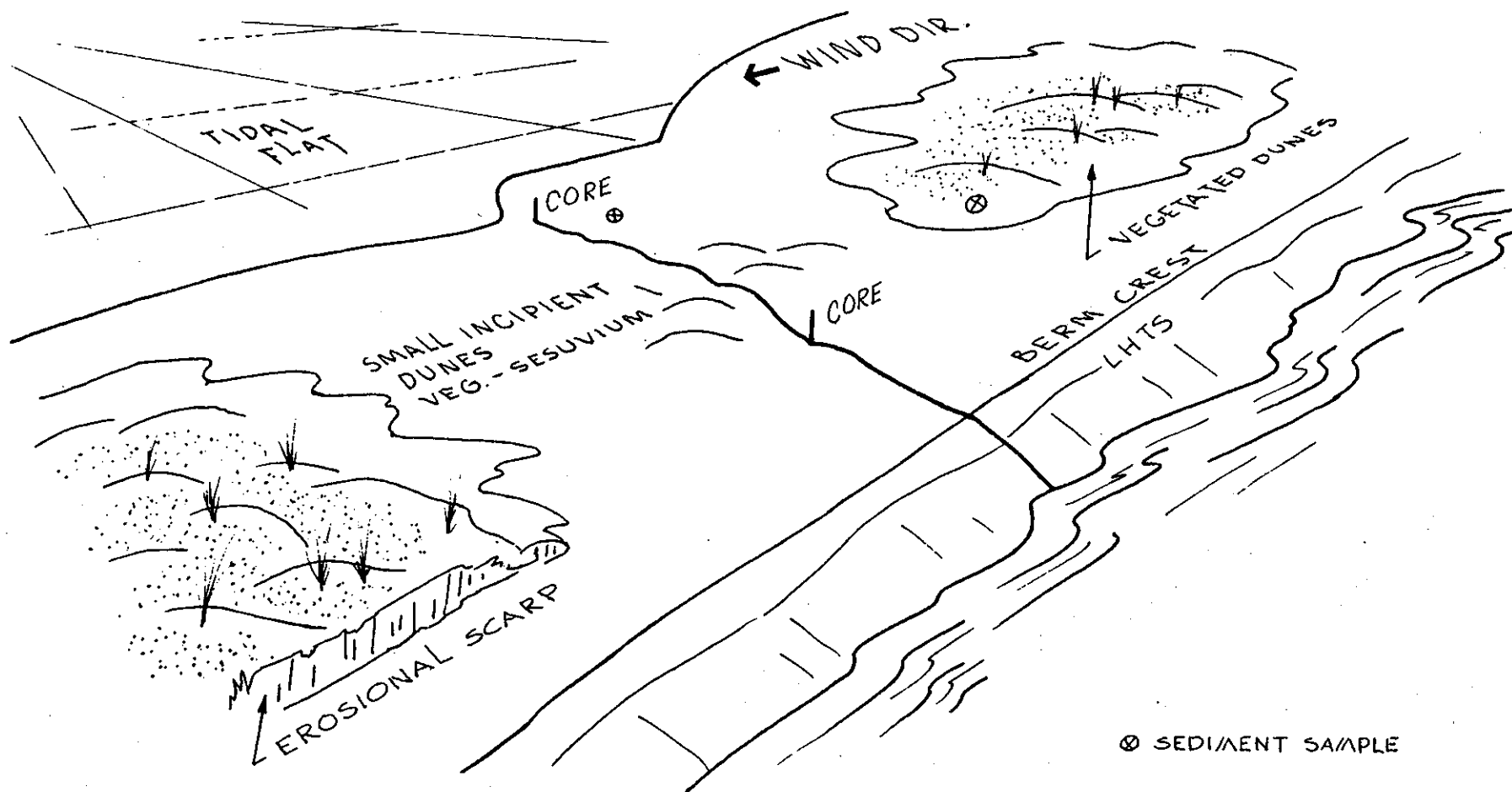
0.8 MILES NORTH/SOUTH OF RIO GRANDE INLET

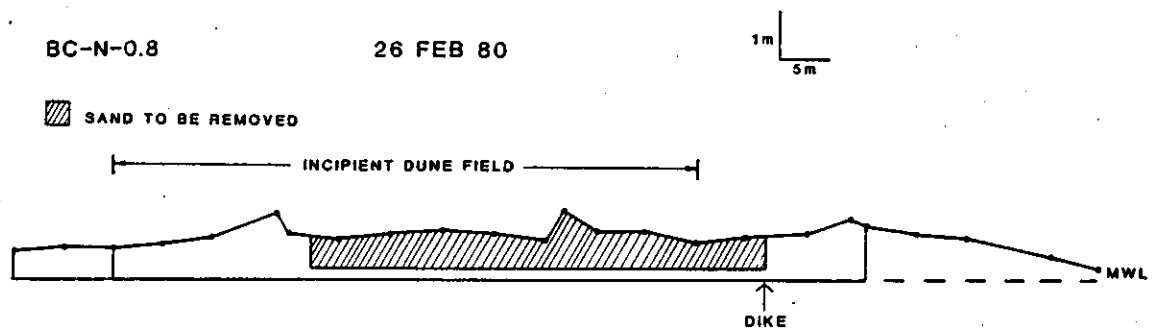
Length of Breach 320 METERS

Depth of Washover 112.5 METERS

Height of Dunes 2-3 METERS

Width of Fore-
dune Ridge Approx. 20-30
METERS







SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: BC-N-2.1

LOCATION: 3.6 km (2.1 miles) north of Rio Grande on Brazos Island

BREACH WIDTH: 1610 m (5300 ft)

WASHOVER LENGTH: 190 m (625 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Low ($\sim 6 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 30 m (98.5 ft)

COMMENTS: If artificial foredune ridge is constructed, the road to Boca Chica and adjacent parking area on the north side of the washover channel would be partially covered. Use of the large dune mound in the center of the washover channel (vegetated by sea oats) for a sand source is not recommended. This is a very wide washover and may be very difficult to close.

NEAREST PROFILE STATION STXB-3

LOCATION BC-N-2.1

RECORDERS D.D. J.S. L.T.

PHOTOGRAPHS D.D. TXW 17-26

GRAIN SIZE _____

SAND SUPPLY LOW

Cores Along Strike
(depth of sand)

WATER TABLE	
1 <u>96</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Cores along Dip
(depth of sand)

WATER TABLE	
1 <u>75</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

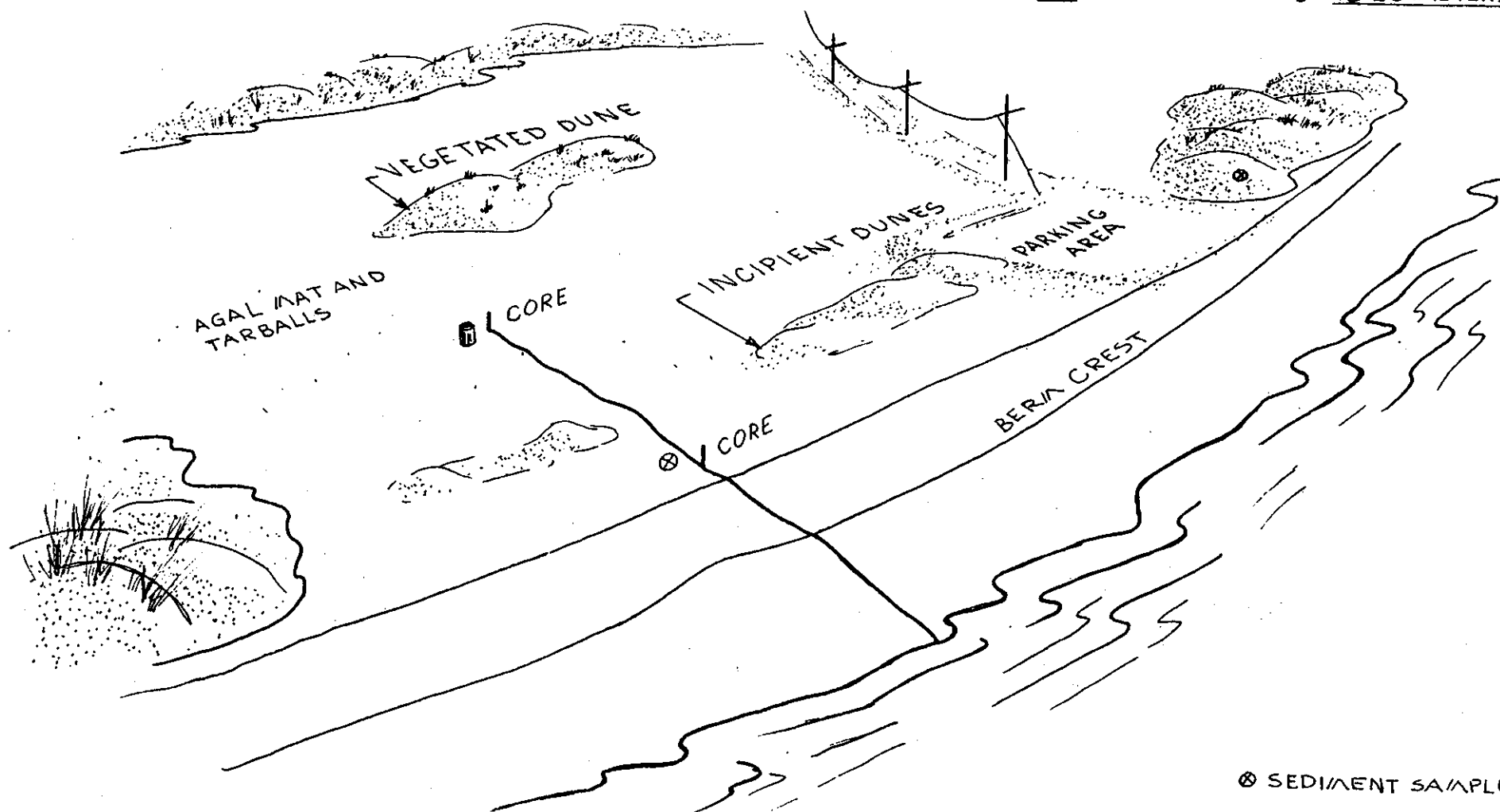
Length of Breach 1610 METERS

Depth of Washover 185.6 METERS

Height of Dunes 2-3 METERS

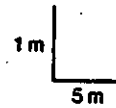
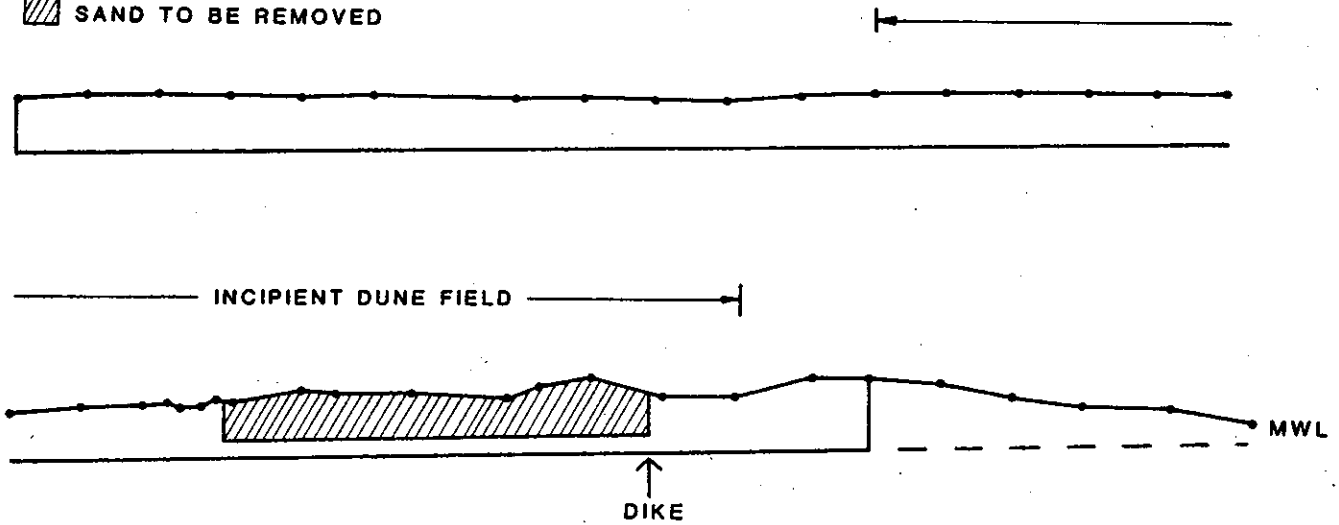
Width of Fore-
dune Ridge 15-20 METERS

2.1 MILES NORTH/SOUTH OF RIO GRANDE INLET



BC-N-2.1

25 FEB 80

 SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: BC-N-4.2 (Primary Priority Closure)

LOCATION: 6.75 km (4.2 miles) north of Rio Grande on Brazos Island

BREACH WIDTH: 730 m (2220 ft)

WASHOVER LENGTH: 260 m (855 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 3-5 m (9-16 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Moderate ($\sim 10 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 36 m (109 ft)

COMMENTS: Foredune ridge to the south has an erosional scarp, indicating erosion during spring tides and/or storms. The proposed dike should be built well back of present foredune ridge trend to escape similar erosion. A field of incipient dunes is in the approximate location for the artificial foredune ridge, thereby facilitating construction.

NEAREST PROFILE STATION STX-B-9 - ON LINE

LOCATION BC-N-4.2

RECORDERS D.D., J.S., L.T.

PHOTOGRAPHS D.D. TXV 36

GRAIN SIZE _____

SAND SUPPLY FAIR

Cores Along Strike
(depth of sand)

WATERLINE
1 68 cm 4 _____ cm
2 _____ cm 5 _____ cm
3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

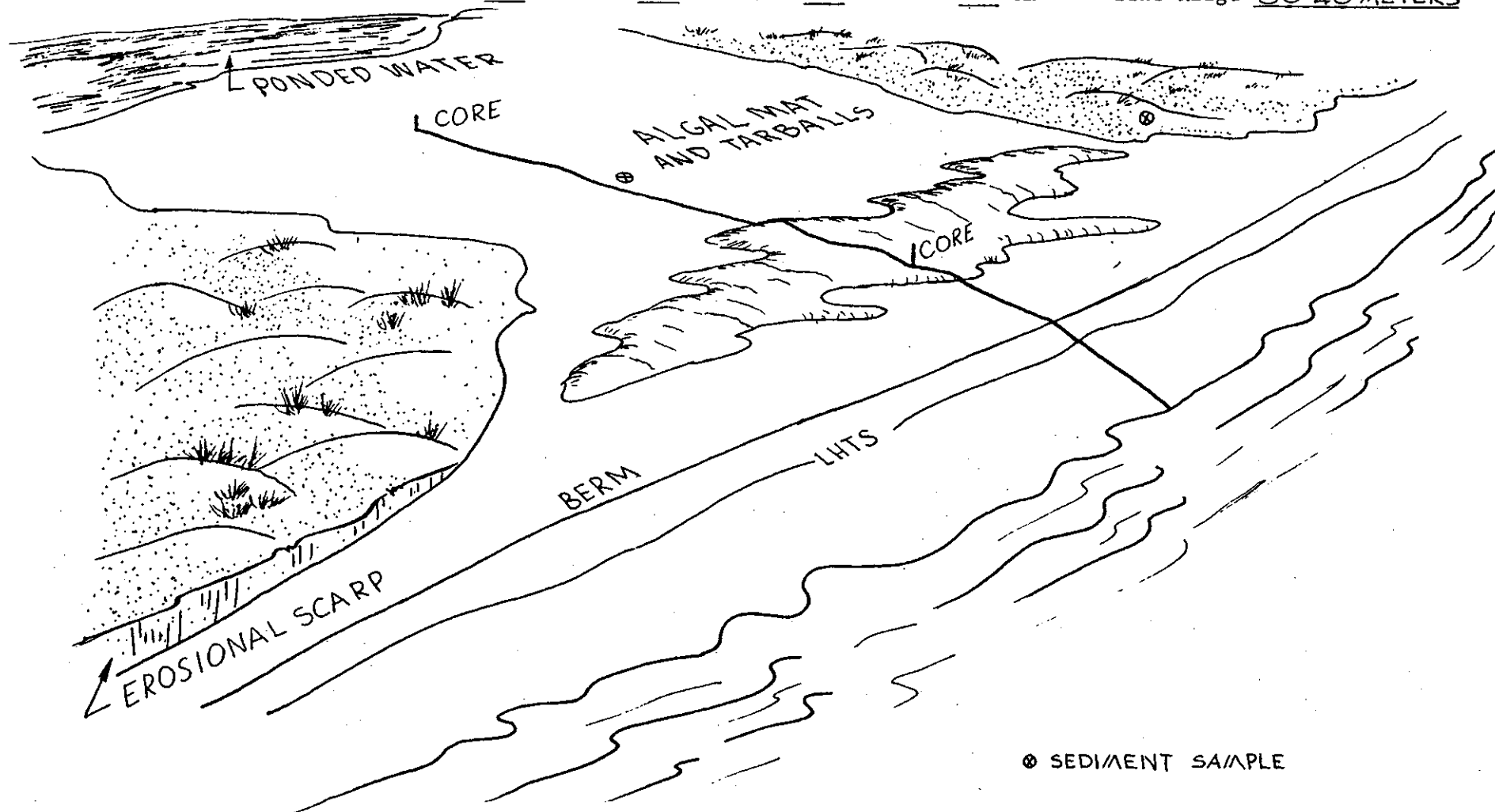
① 52 cm 4 _____ cm
② 52 cm 5 _____ cm
3 _____ cm 6 _____ cm

Length of Breach 730 METERS

Depth of Washover 260 METERS

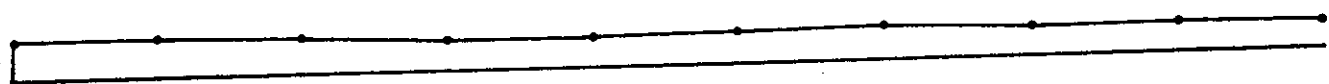
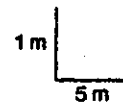
Height of Dunes 3-5 METERS

Width of Fore-
dune Ridge 30-40 METERS



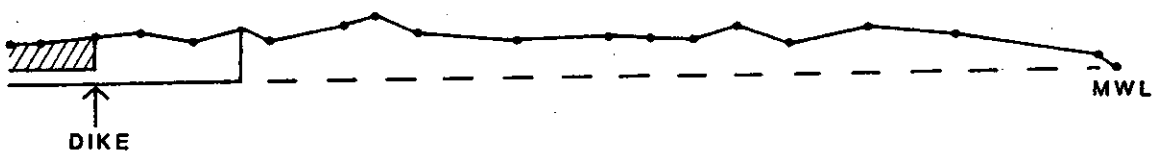
BC-N-4.2

25 FEB 80



— INCIPIENT DUNE FIELD —

■ SAND TO BE REMOVED





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: BC-N-6.65

LOCATION: 10.7 km (6.65 miles) north of Rio Grande on Brazos Island

BREACH WIDTH: 730 m (2220 ft)

WASHOVER LENGTH: 420 m (1270 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-4 m (6-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 50 m (152 ft)

COMMENTS: This is a fairly large washover with essentially no usable dune sand. All sand should be scraped from a wide area (50 m) of channel. The vegetated dune mounds in the distal (landward) portion of the channel and the small medial foredunes should not be used as sources of sand.

NEAREST PROFILE STATION STX8-6

LOCATION BC-N-6.65

RECORDERS D.D., J.S., L.T.

PHOTOGRAPHS D.D. TXN 0-13 (ROLL 2)

GRAIN SIZE _____

SAND SUPPLY LOW

DATE 25/FEB/80 1242

6.65 MILES NORTH/SOUTH OF RIO GRANDE INLET

Cores Along Strike
(depth of sand)
WATERLINE

1	<u>70</u> cm	4	_____ cm
2	_____ cm	5	_____ cm
3	_____ cm	6	_____ cm

Cores along Dip
(depth of sand)
WATERTABLE

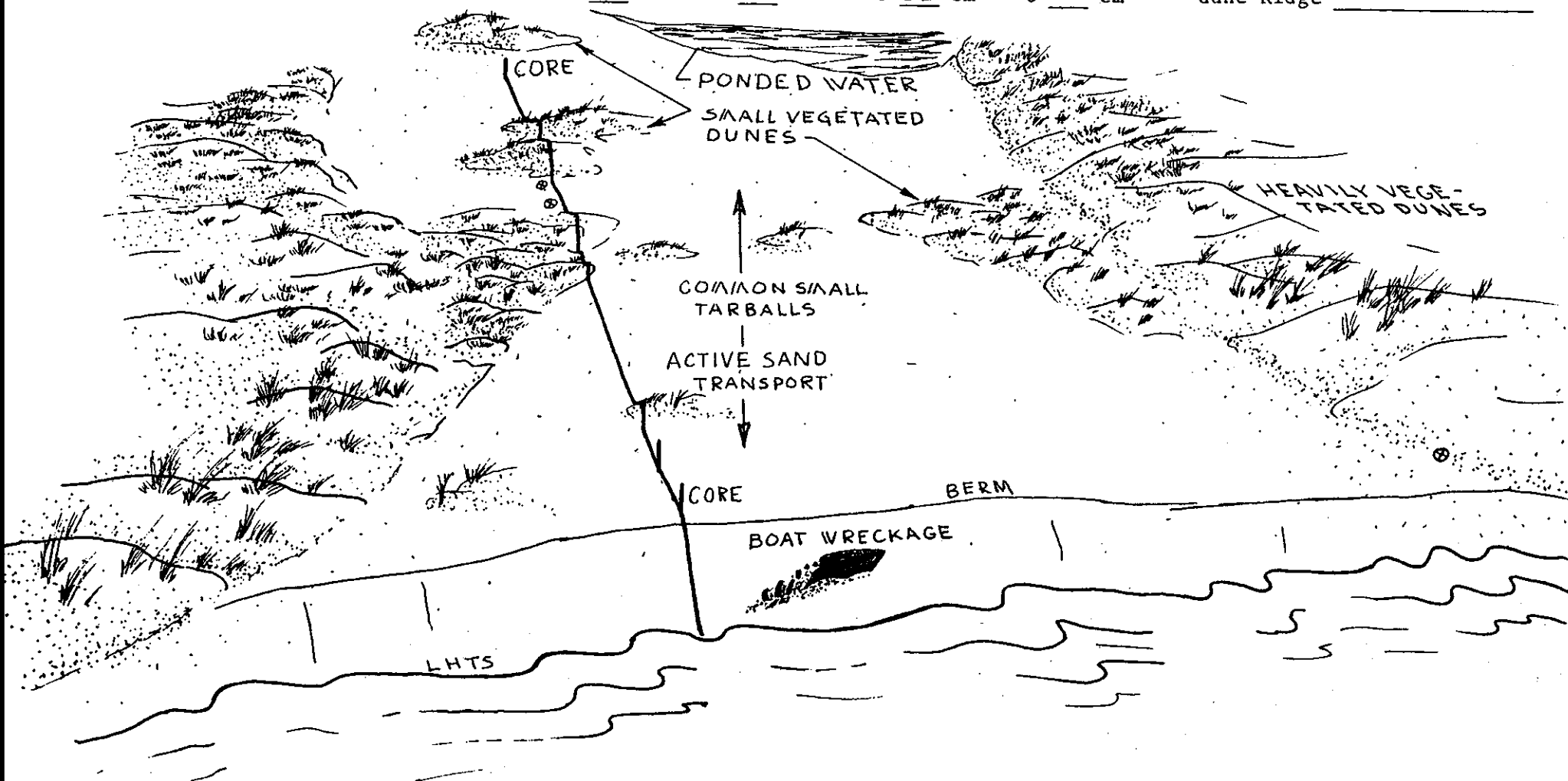
1	<u>48</u> cm	4	_____ cm
2	<u>38</u> cm	5	_____ cm
3	<u>32</u> cm	6	_____ cm

Length of Breach 730 METERS

Depth of Washover 418 METERS

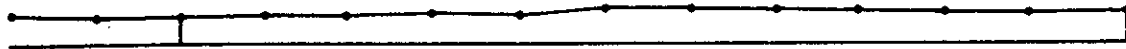
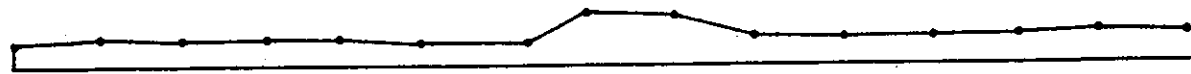
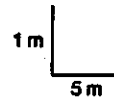
Height of Dunes 2-4 METERS

Width of Fore-
dune Ridge _____



BC-N-6.65

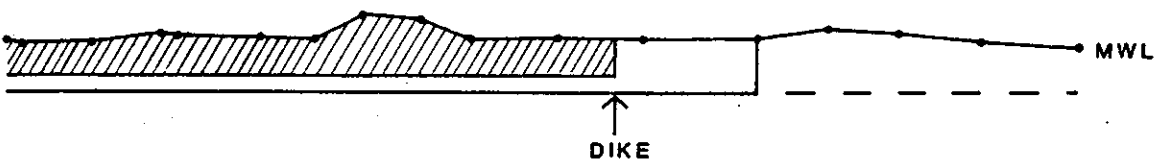
25 FEB 80

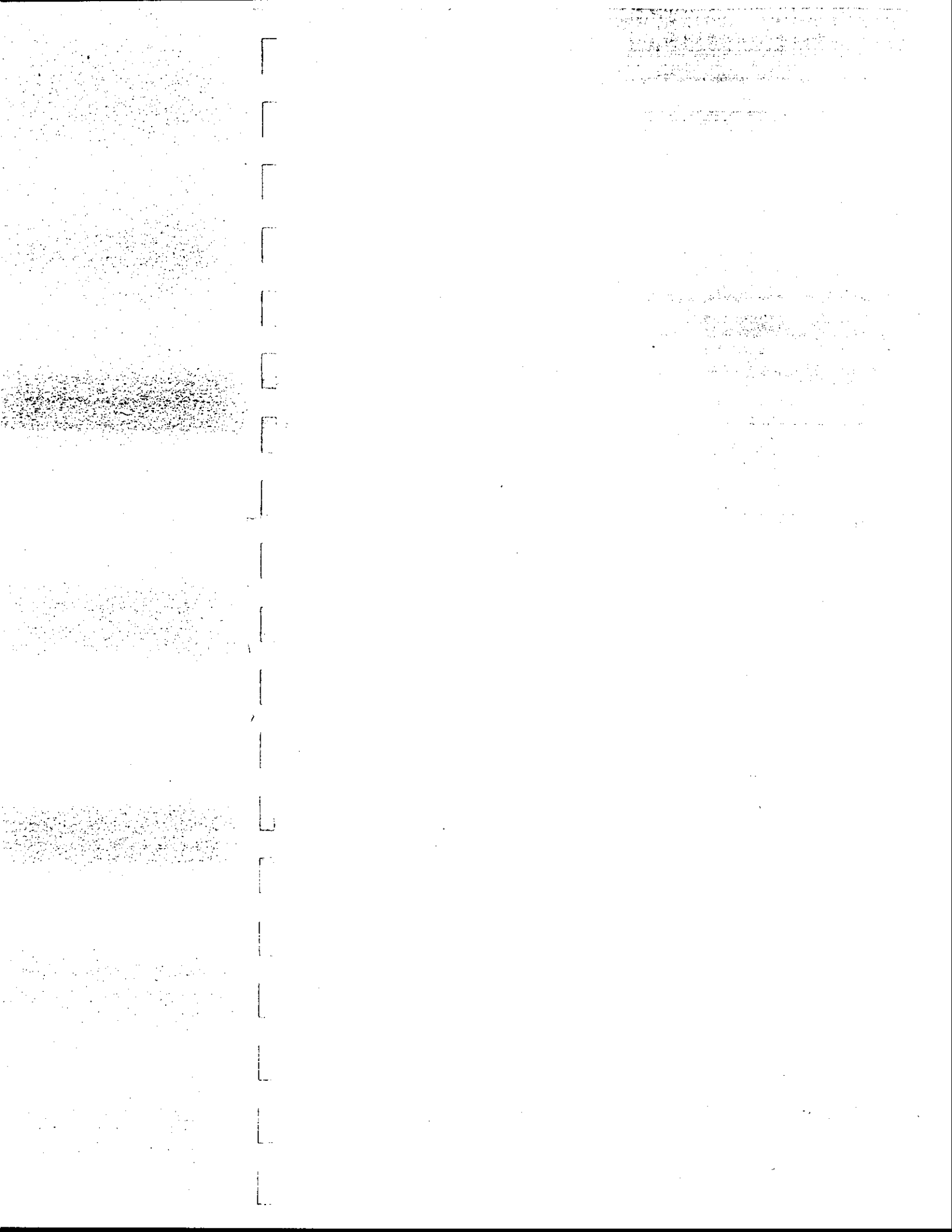


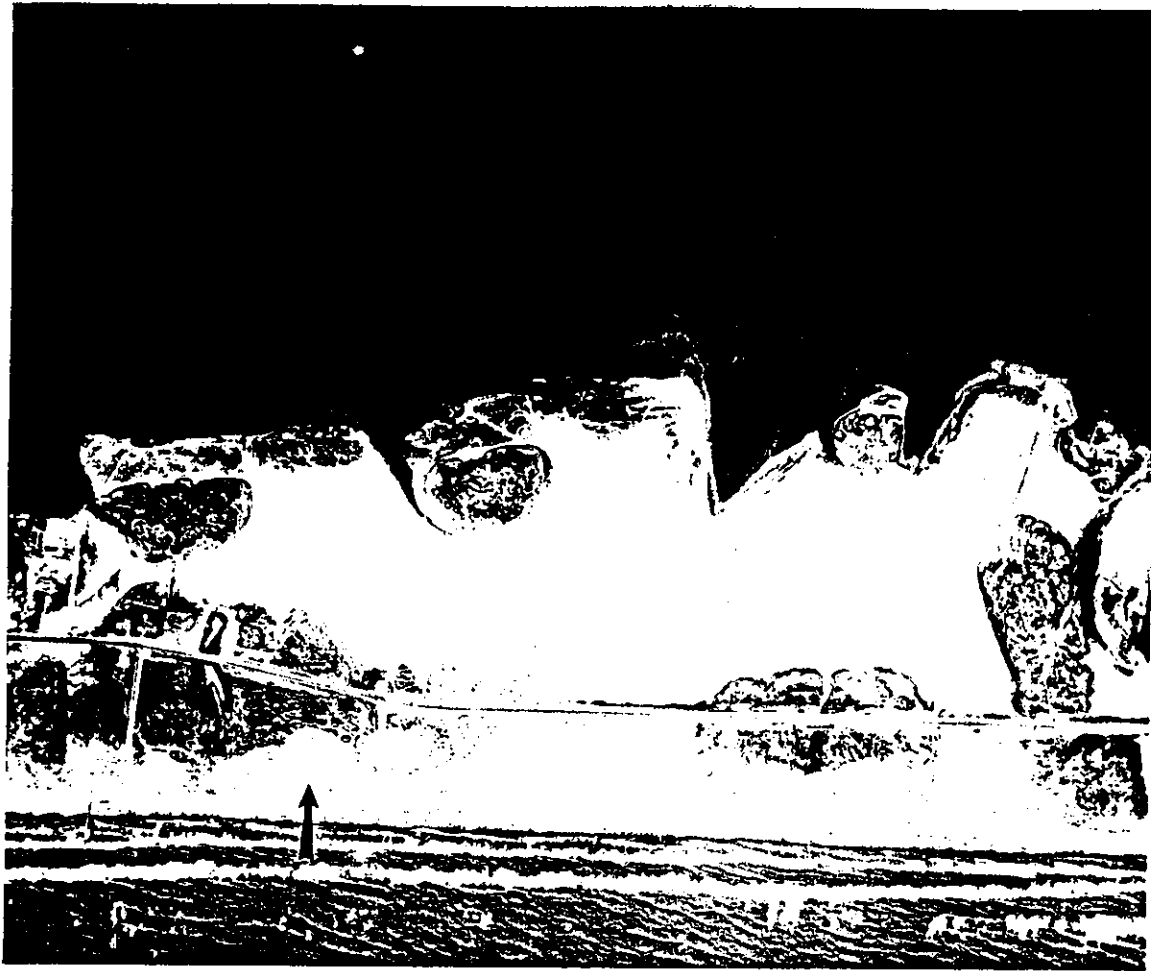
INCIPIENT DUNE FIELD



SAND TO BE REMOVED







SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-0.5

LOCATION: 0.8 km (0.5 miles) north of Andy Bowie Pier

BREACH WIDTH: 400 m (1210 ft)

WASHOVER LENGTH: 230 m (700 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Moderate ($13 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 22 m (67 ft)

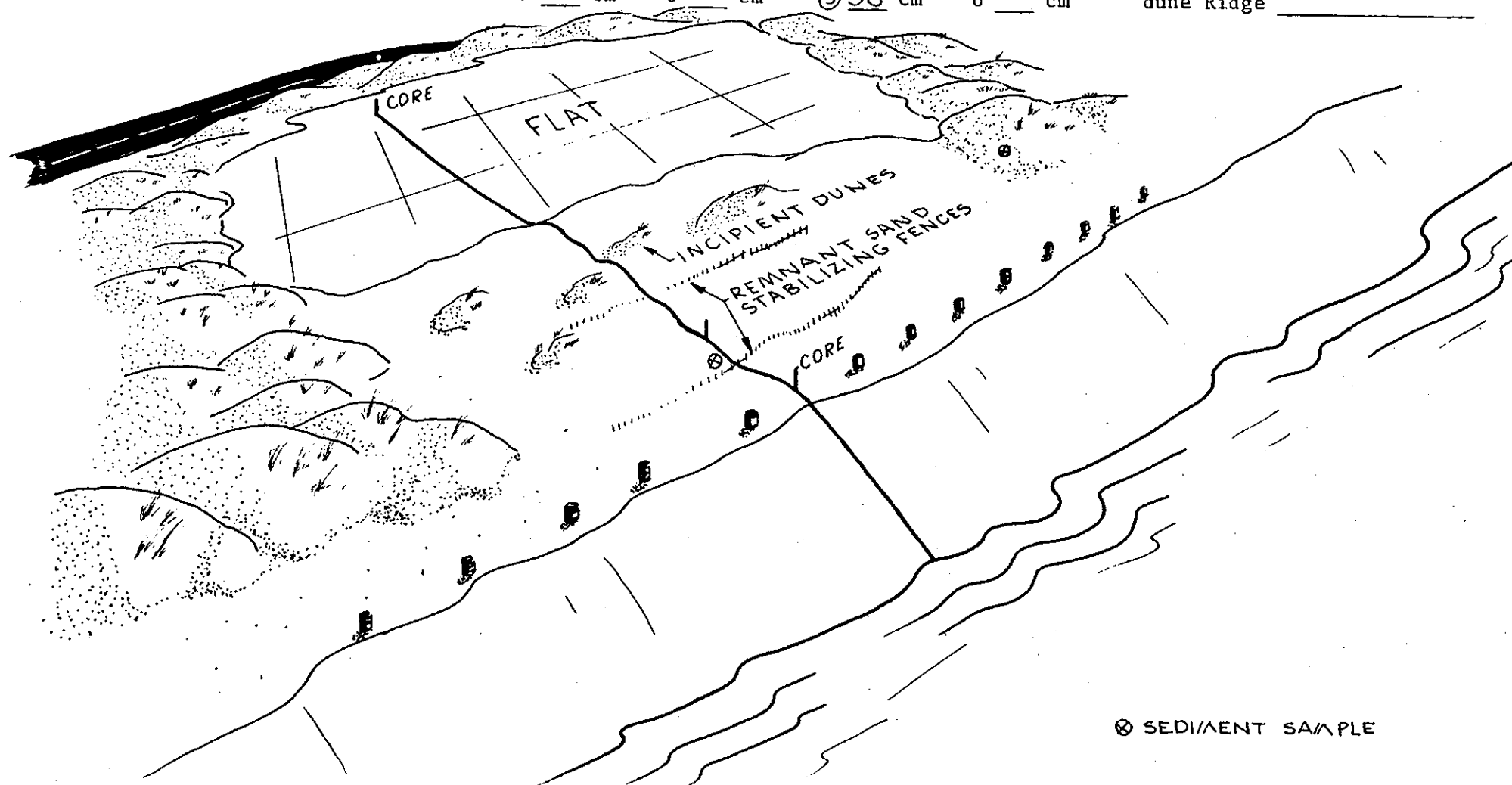
COMMENTS: The remnants of three, sand-stabilizing fences (constructed of wooden slats and cloth) are evident in this washover; however, they have had little effect in reestablishing a foredune ridge.

SAND SUPPLY MOD.

② 40 cm 5 cm Width of Fore-
③ 38 cm 6 cm dune Ridge

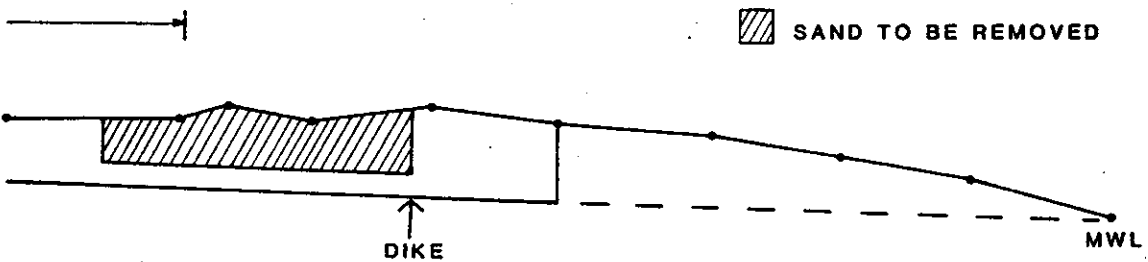
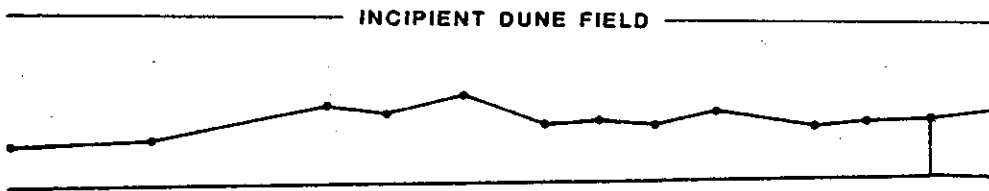
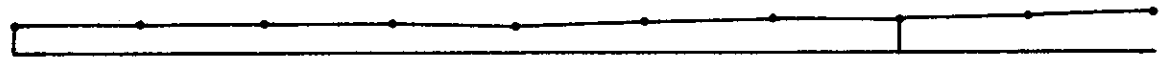
3 cm 6 cm

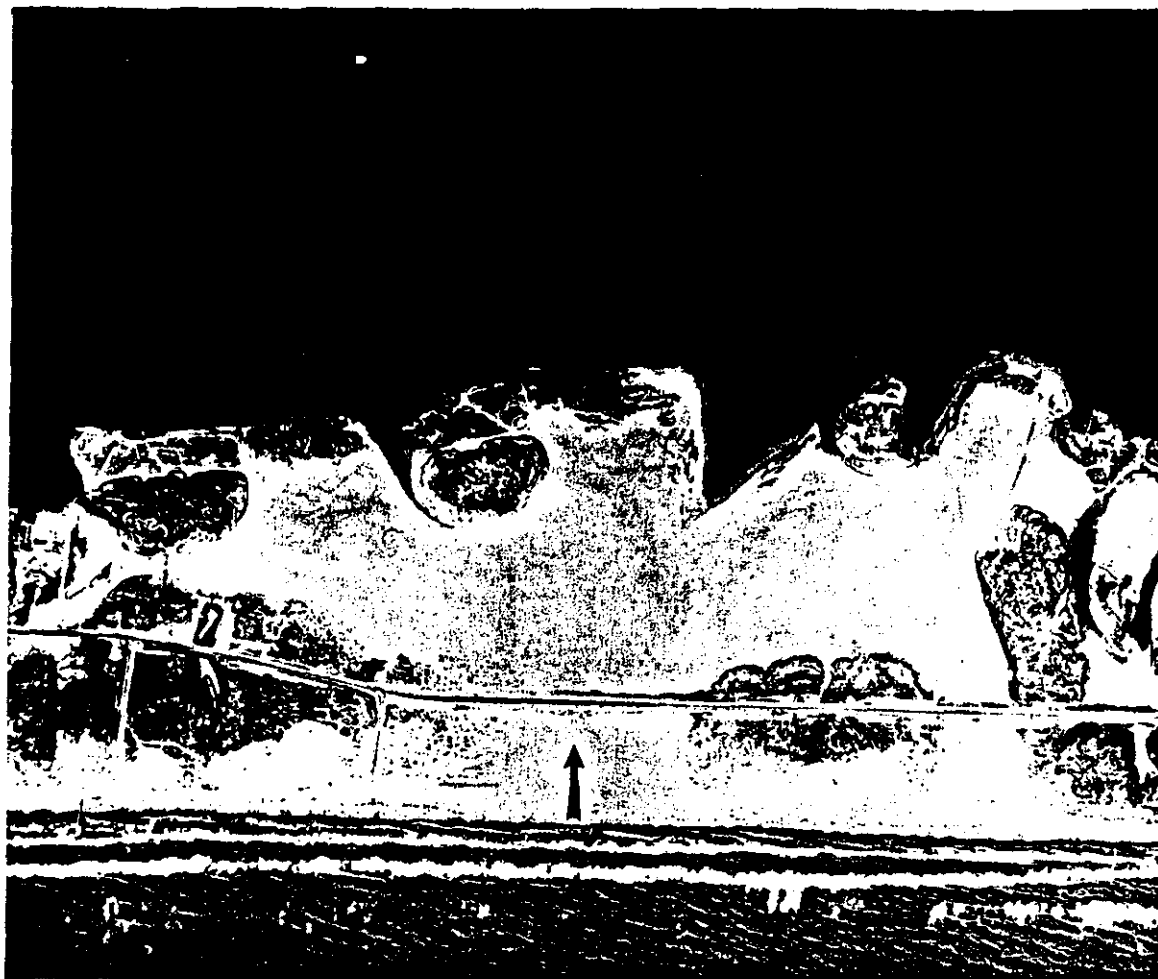
③ 38 cm 6 cm

Width of Fore-
dune Ridge

SP-N-0.5

26 FEB 80

1m
5m



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-1.15

LOCATION: 1.85 km (1.15 miles) north of Andy Bowie Pier

BREACH WIDTH: 160 m (485 ft)

WASHOVER LENGTH: 210 m (635 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-3 m (3-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 50 m (152 ft)

COMMENTS: This is a narrow washover with a developing foredune ridge in its northern portion. Some sand needs to be added to this ridge to bring its dimensions up to the model. Within the southern portion, construction of a closure dike should be relatively easy.

NEAREST PROFILE STATION STXI - 3

LOCATION SP-N - 1.15

RECORDERS D.D., J.S., L.T.

PHOTOGRAPHS D.D. TXN 27-36

GRAIN SIZE _____

SAND SUPPLY HIGH

DATE 26/FEB/80 0945

1.15 MILES NORTH/SOUTH OF ANDY BOWIE PIER INLET

Cores Along Strike
(depth of sand)

① <u>78</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Cores along Dip
(depth of sand)

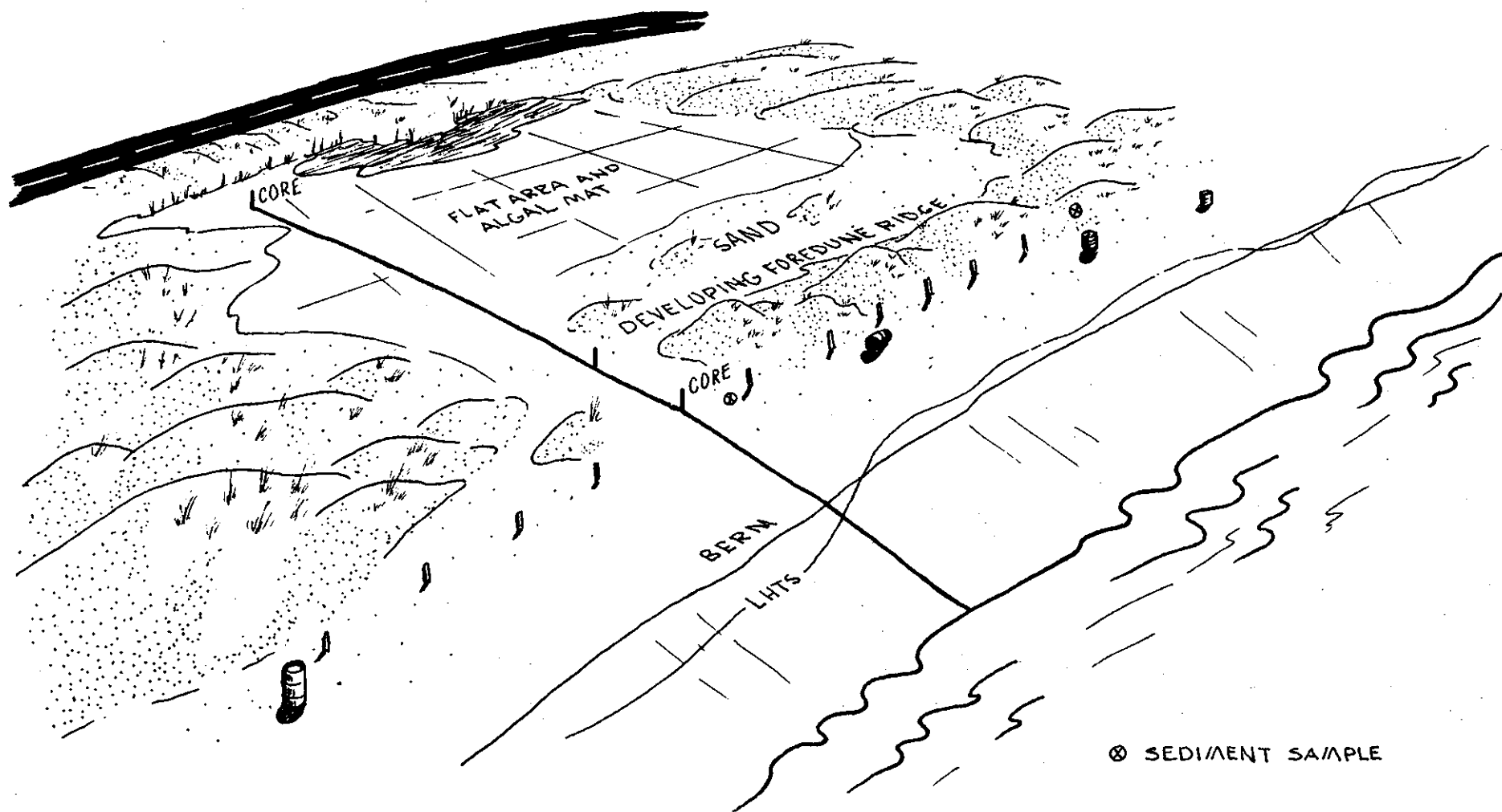
① <u>54</u> cm	4 _____ cm
② <u>32</u> cm	5 _____ cm
3 _____ cm	6 _____ cm

Length of Breach 162 METERS

Depth of Washover 209 METERS

Height of Dunes 1-3 METERS

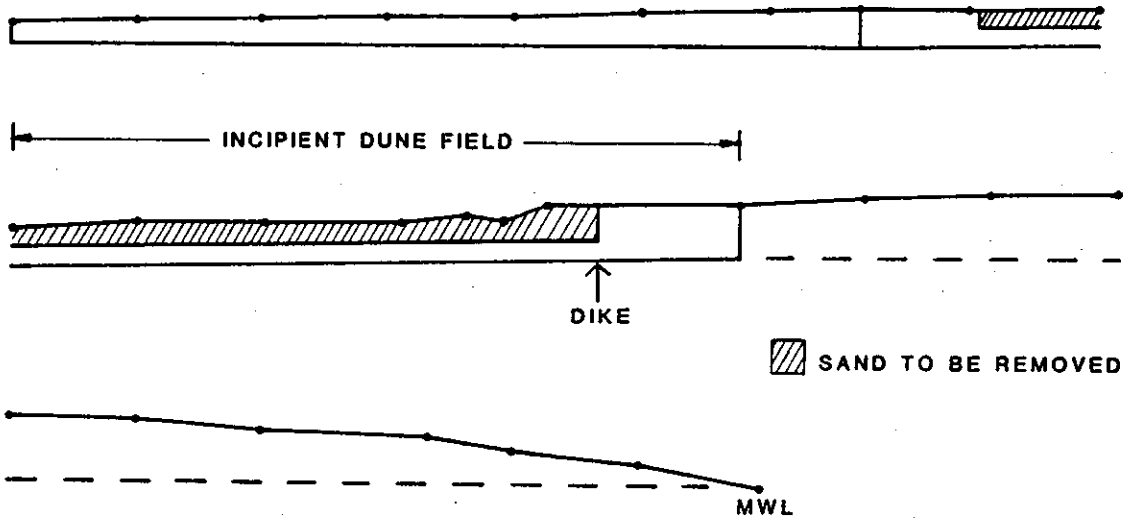
Width of Fore-
dune Ridge _____



SP-N-1.15

26 FEB 80

1m
5m





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-8.25 (Secondary Priority Closure)

LOCATION: 13.1 km (8.25 miles) north of Andy Bowie Pier

BREACH WIDTH: 810 m (2460 ft)

WASHOVER LENGTH: 190 m (580 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-3 m (3-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 35 m (106 ft)

COMMENTS: Because there is virtually no usable dune sand in this area, all sand for construction of an artificial dike must be scraped from the washover channel.

NEAREST PROFILE STATION STXI-4

DATE 26 FEB 80

LOCATION SP-N-8.25

8.25 MILES NORTH/SOUTH OF ANDY BOWIE PIER INLET

RECORDERS JS, DD, LT

Cores Along Strike
(depth of sand)

Cores along Dip
(depth of sand)

Length of Breach 805 METERS

PHOTOGRAPHS DD.3 TXW-II

Depth of Washover 190 METERS

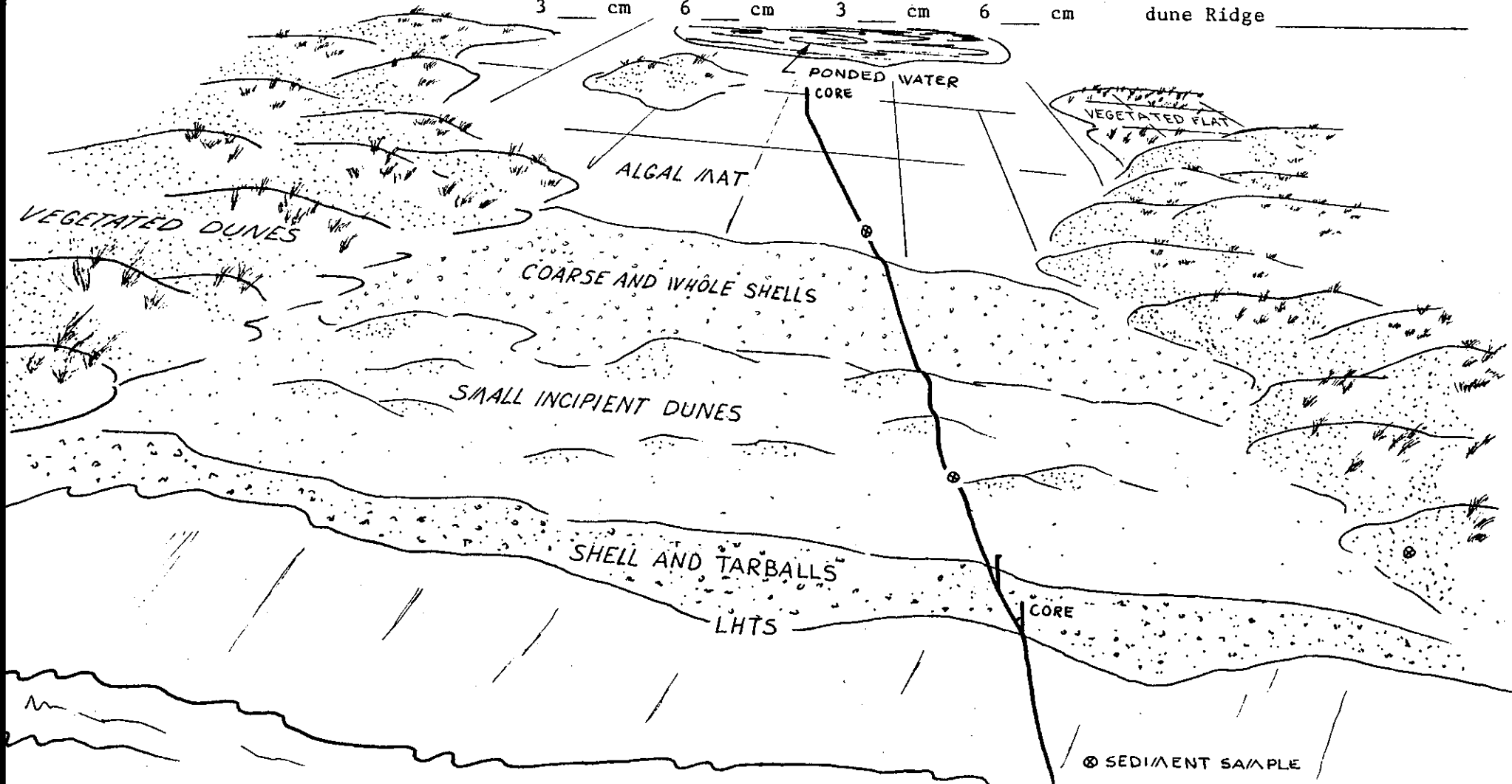
GRAIN SIZE _____

Height of Dunes 1-3 METERS

SAND SUPPLY LOW

Width of Fore-
dune Ridge _____

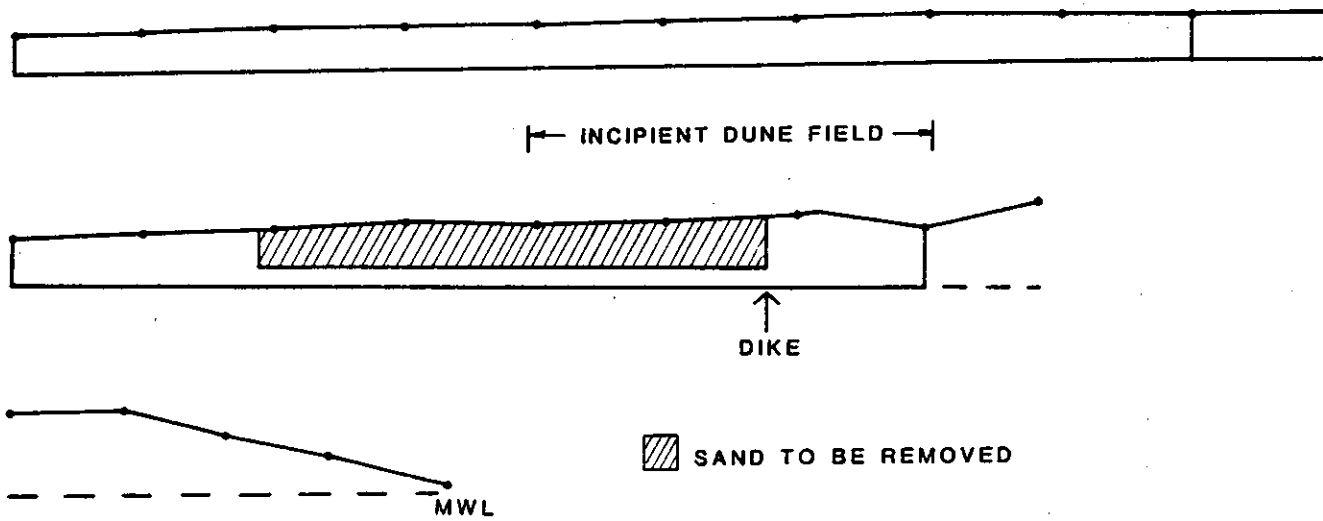
1 <u>83</u> cm	4 _____ cm	1 <u>52</u> cm	4 _____ cm
2 _____ cm	5 _____ cm	2 <u>60</u> cm	5 _____ cm
3 _____ cm	6 _____ cm	3 _____ cm	6 _____ cm

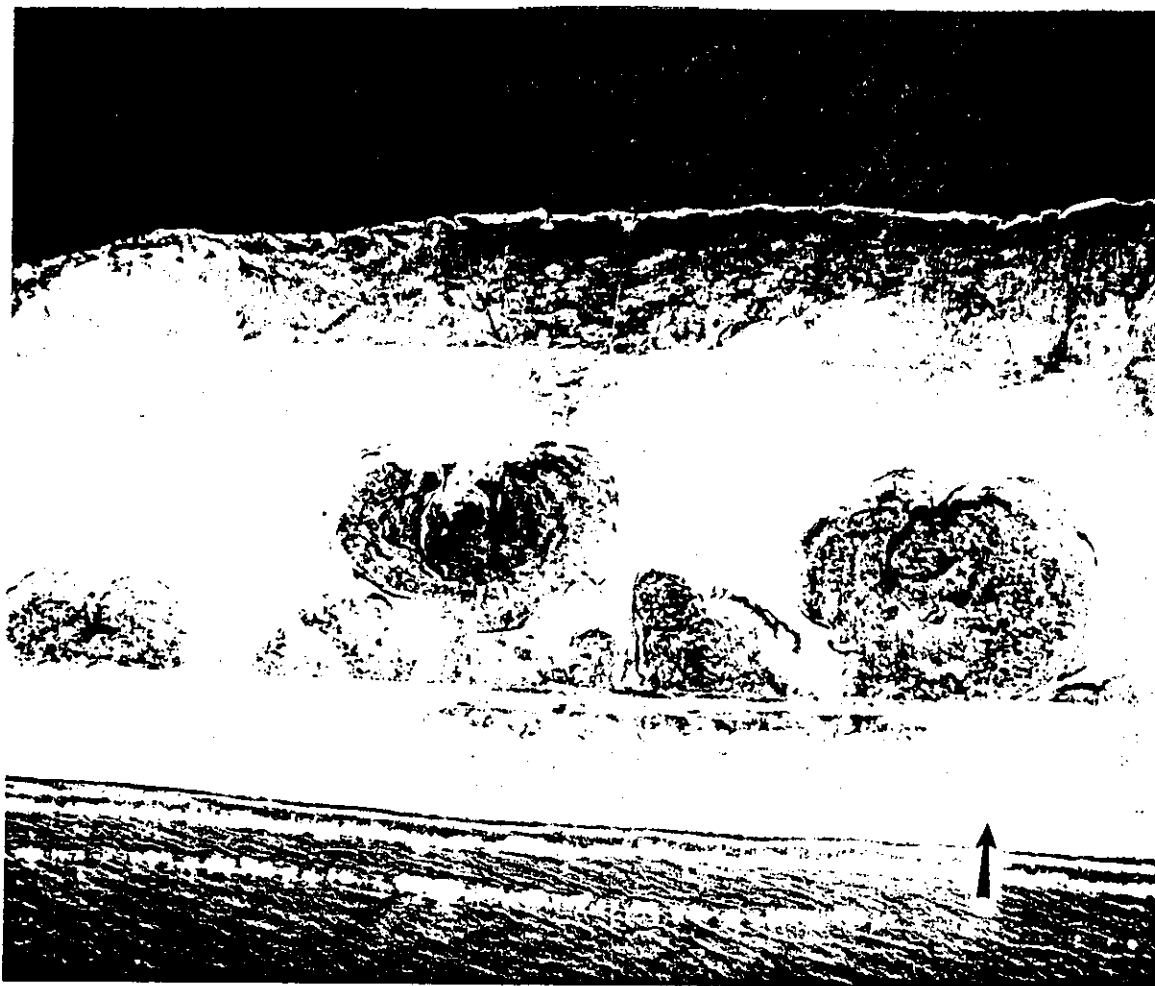


SP-N-8.25

26 FEB 80

1m
5m





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-9.4 (Secondary Priority Closure)

LOCATION: 15.1 km (9.4 miles) north of Andy Bowie Pier

BREACH WIDTH: 480 m (1460 ft)

WASHOVER LENGTH: 290 m (880 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-4 m (6-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 40 m (121 ft)

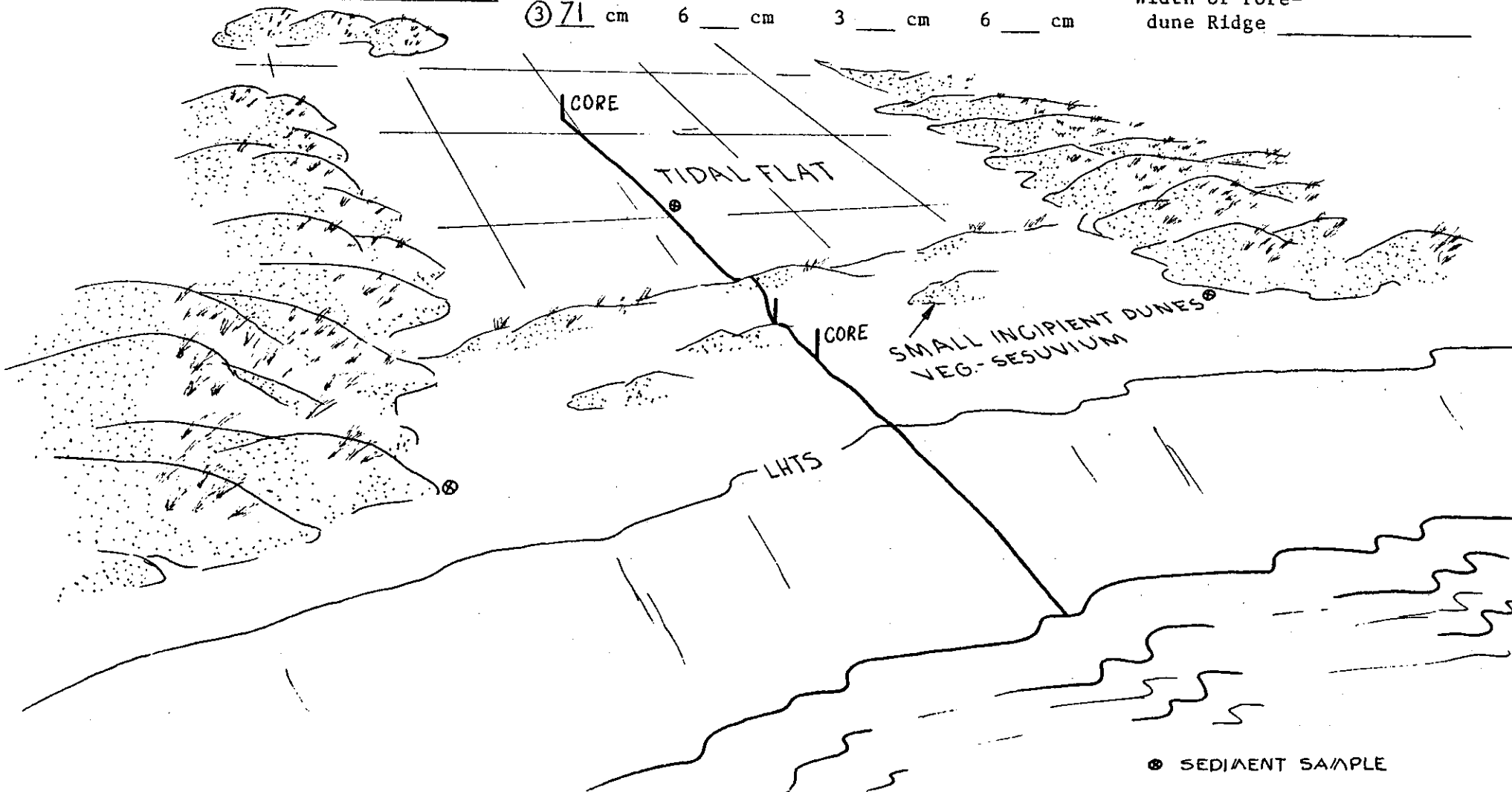
COMMENTS: There is almost no dune sand available for dike construction in this area. All sand must be scraped from the washover channel.

SAND SUPPLY LOW

Width of Fore-
dune Ridge _____

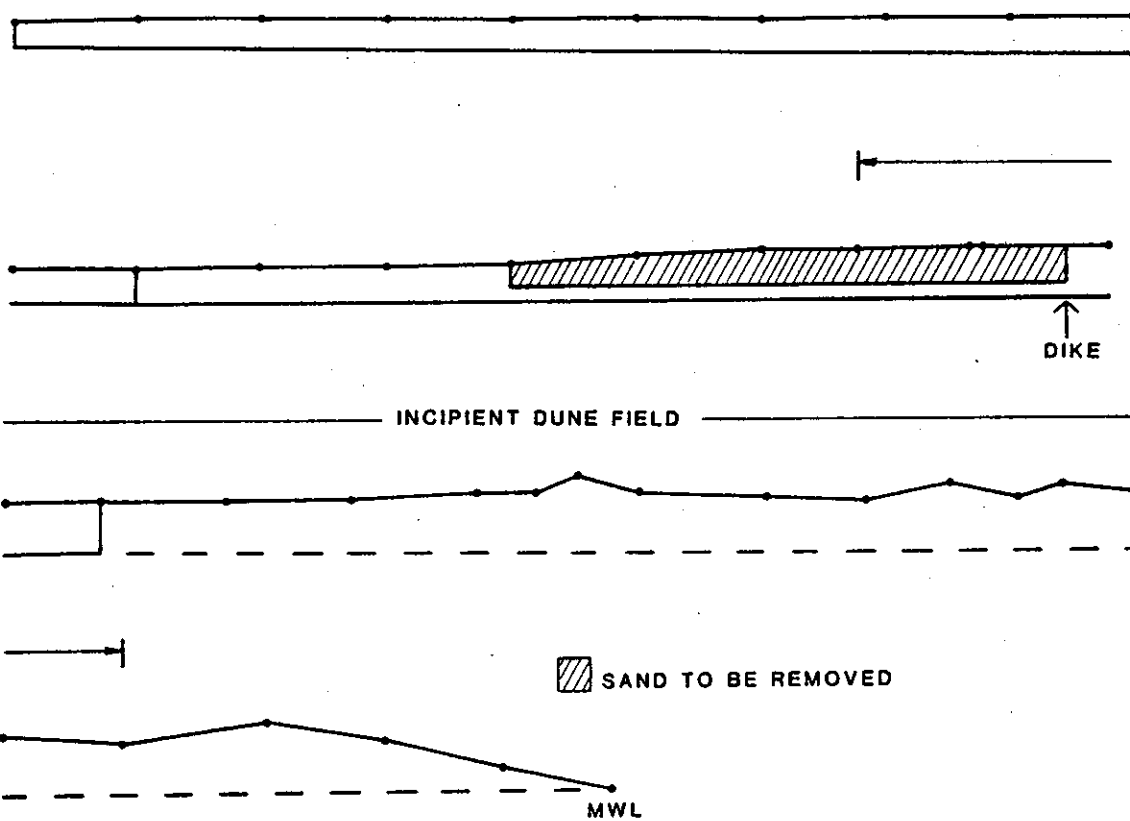
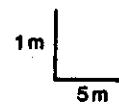
③ 71 cm 6 cm

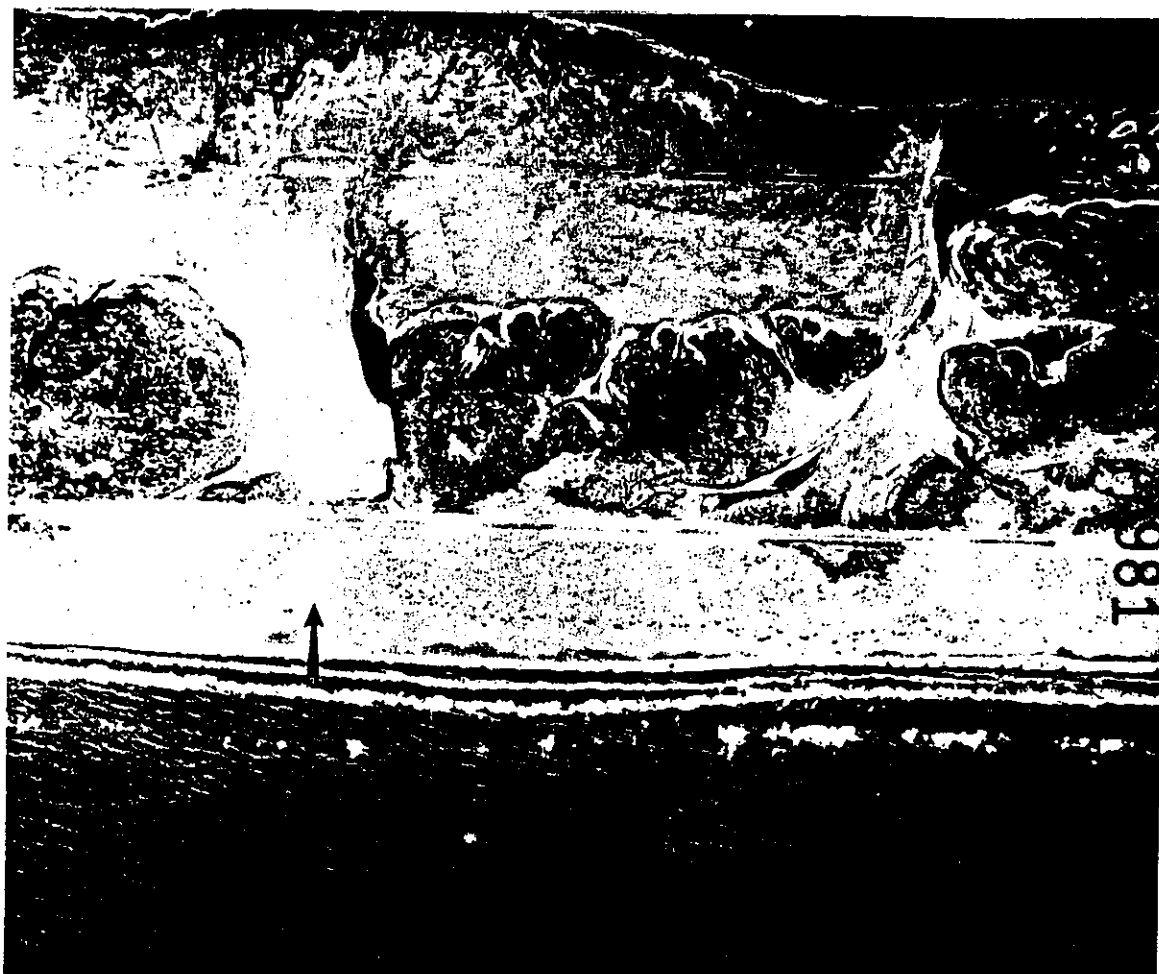
3 cm 6 cm



SP-N-9.4

26 FEB 80





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-11.4 (Secondary Priority Closure)

LOCATION: 18.4 km (11.4 miles) north of Andy Bowie Pier

BREACH WIDTH: 970 m (2950 ft)

WASHOVER LENGTH: 130 m (396 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-4 m (6-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Low ($\sim 7 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 30 m (91 ft)

COMMENTS: There is a small quantity of usable dune sand in this washover and it is spread over a large area. Most construction sand must be scraped from the washover channel. The abundant whole and broken shells present on the washover surface effectively increase the mean grain size of the dike construction sand, which increases the resistance to wind and wave erosion.

NEAREST PROFILE STATION STXI-5

LOCATION SP-N-11.4

RECORDERS J.S., D.D., L.T.

PHOTOGRAPHS TX-W-D.D.-25-36

GRAIN SIZE _____

SAND SUPPLY LOW

DATE 26 FEB. 80 1250 /

11.4 MILES NORTH/SOUTH OF ANDY BOWIE PIER INLET

Cores Along Strike
(depth of sand)

1	<u>66</u> cm	4	___ cm
2	<u>61</u> cm	5	___ cm
3	___ cm	6	___ cm

Cores along Dip
(depth of sand)

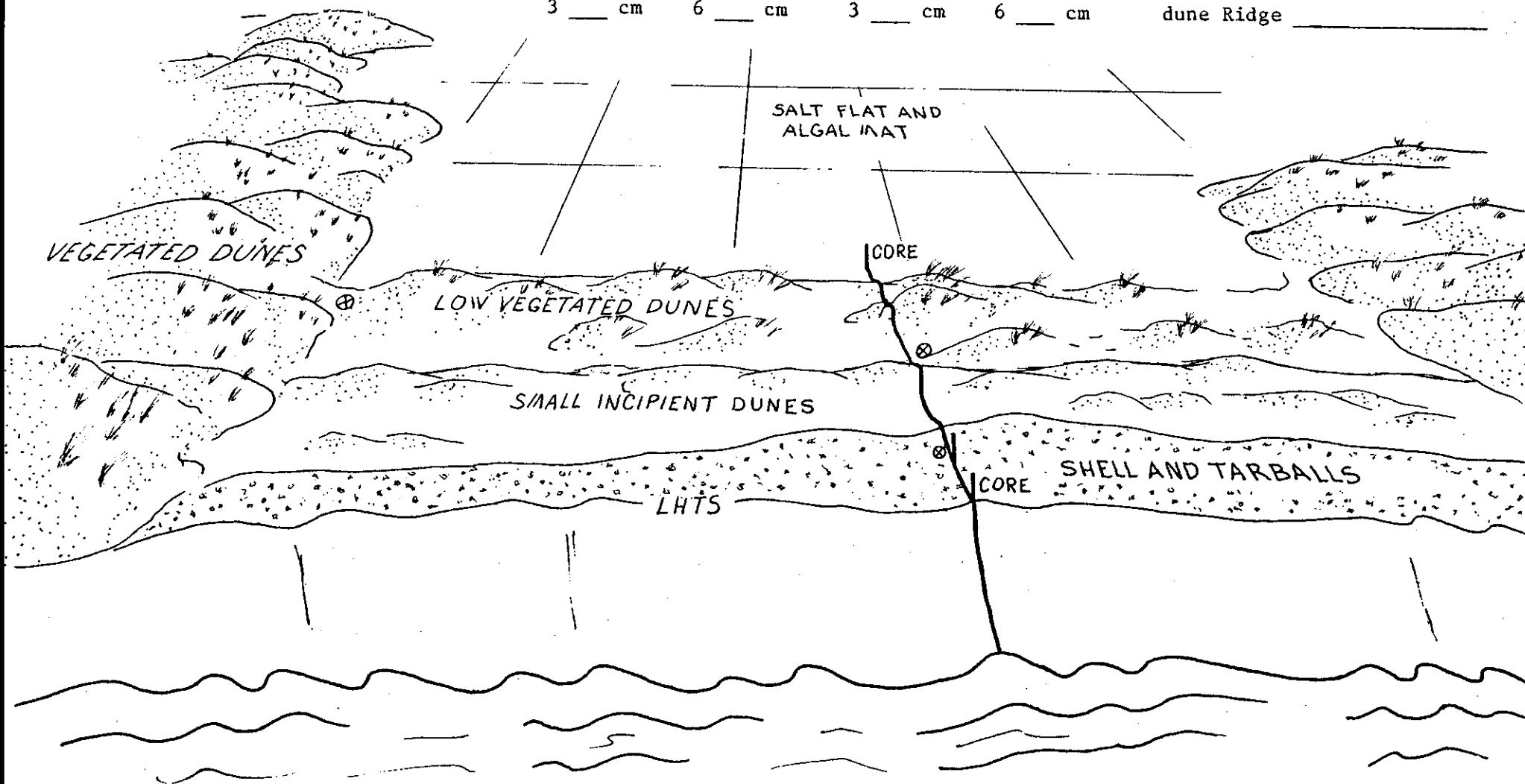
1	<u>66</u> cm	4	___ cm
2	___ cm	5	___ cm
3	___ cm	6	___ cm

Length of Breach 970 METERS

Depth of Washover 132 METERS

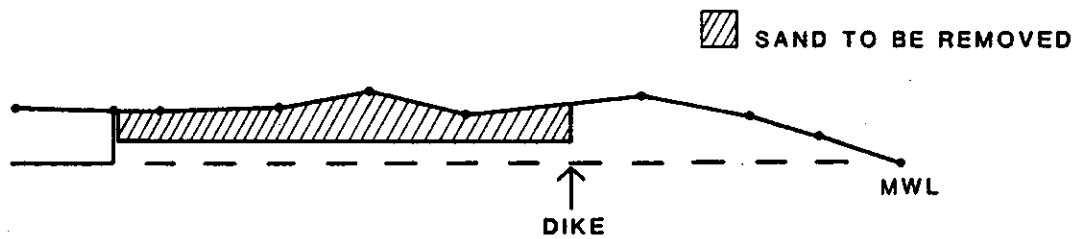
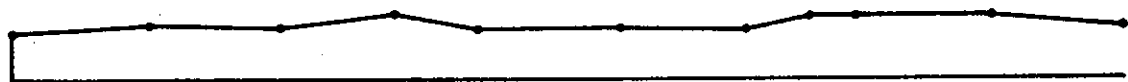
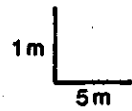
Height of Dunes 2-4 METERS

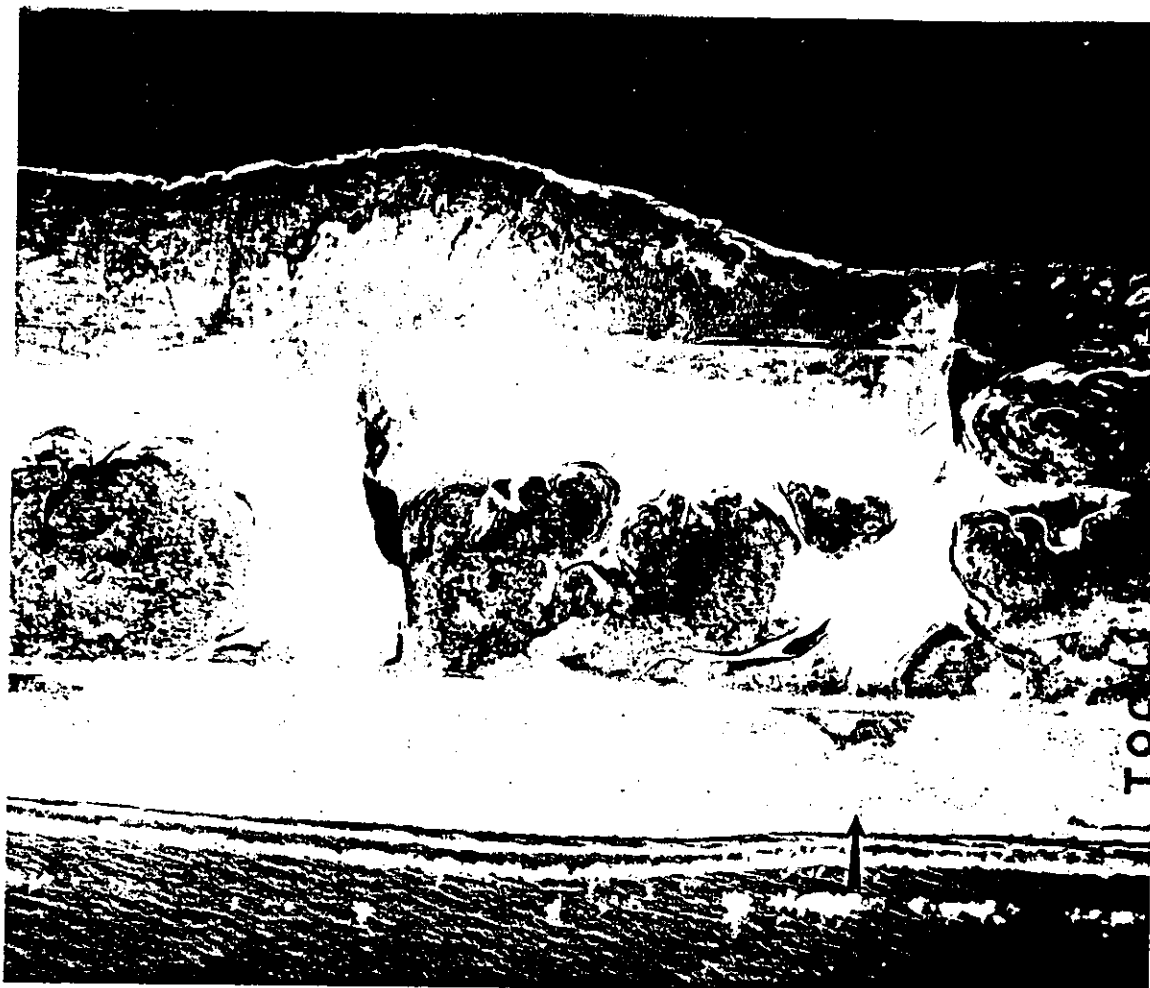
Width of Fore-
dune Ridge _____



SP-N-11.4

26 FEB 80





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-12.4 (Secondary Priority Closure)

LOCATION: 19.5 km (12.4 miles) north of Andy Bowie Pier

BREACH WIDTH: 650 m (1980 ft)

WASHOVER LENGTH: 220 m (670 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-3 m (3-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 75 m (228 ft)

COMMENTS: Because of the absence of usable dune sand and thin channel sand thickness in this area, channel sand must be scraped from 75 m behind the site of the proposed dike.

NEAREST PROFILE STATION STXI-5

LOCATION SP-N-12.4

RECORDERS D.D. J.S. LT.

PHOTOGRAPHS TXIV DD4-1-10- 1112

GRAIN SIZE _____

SAND SUPPLY LOW

DATE 26/FEB/80

12.4 MILES NORTH/SOUTH OF ANDY BOWIE PIER INLET

Cores Along Strike
(depth of sand)

1 <u>62</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Cores along Dip
(depth of sand)

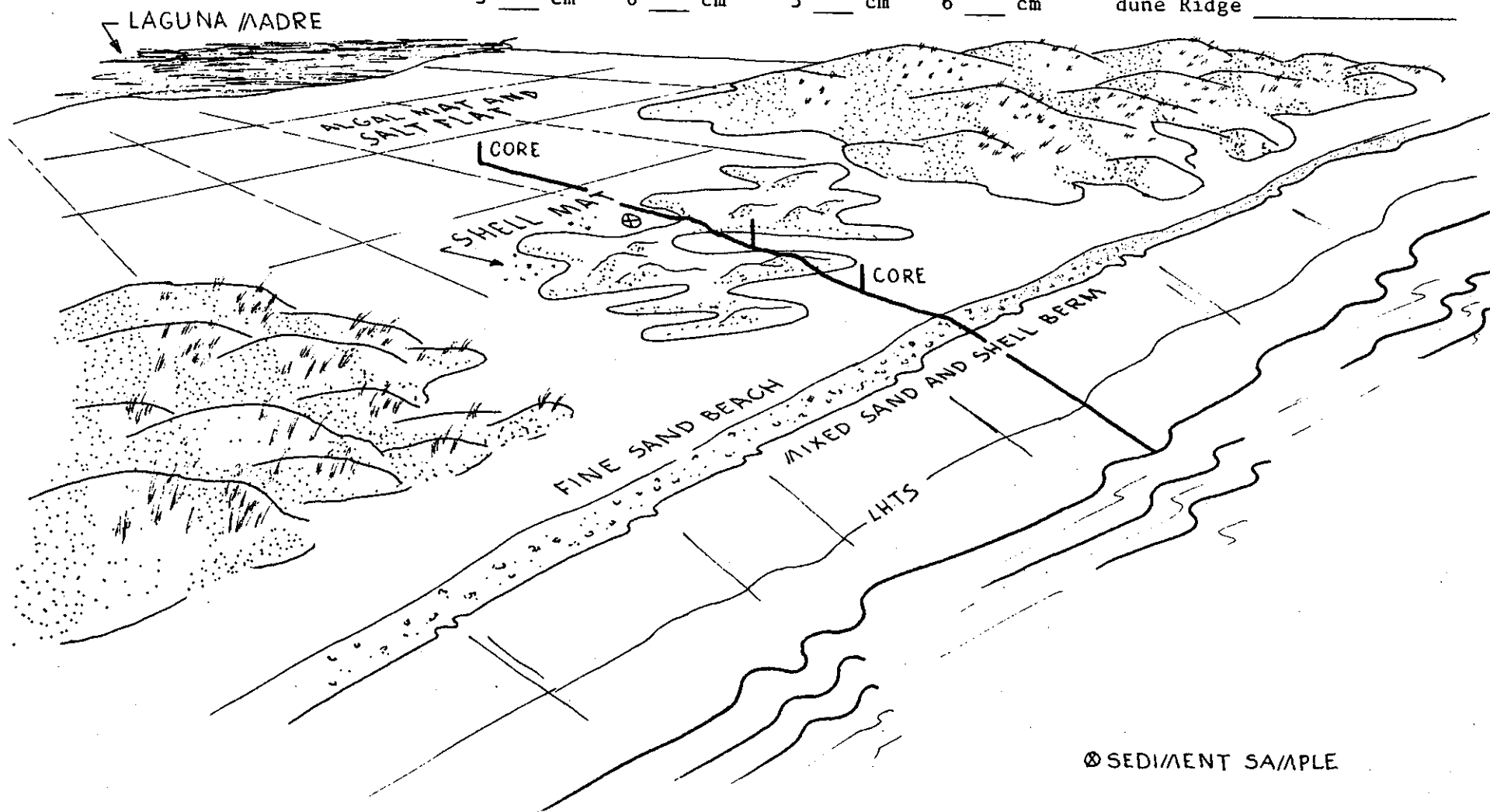
① <u>65</u> cm	4 _____ cm
② <u>52</u> cm	5 _____ cm
3 _____ cm	6 _____ cm

Length of Breach 646 METERS

Depth of Washover 225 METERS

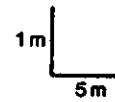
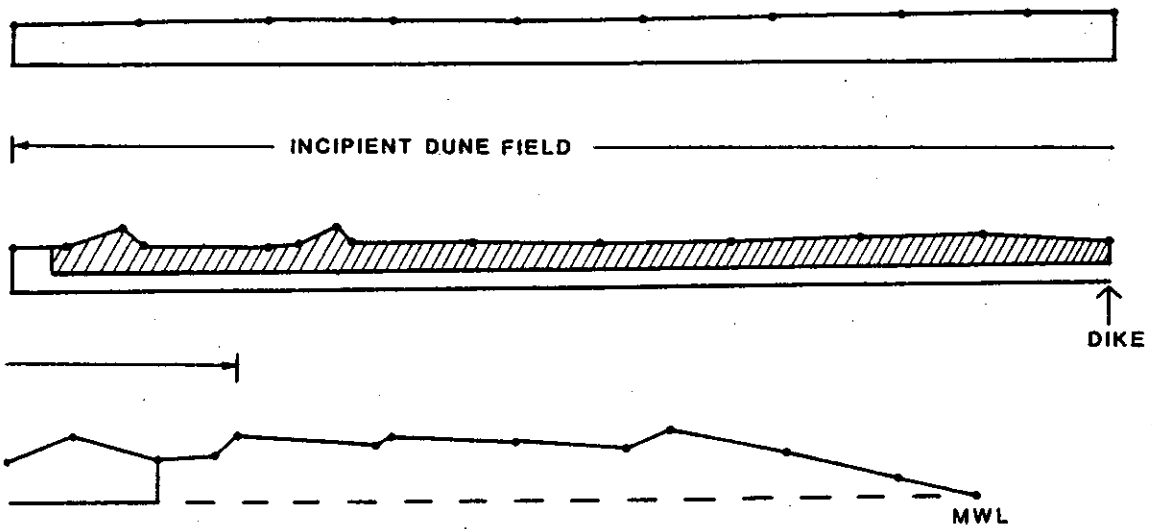
Height of Dunes 1-3 METERS

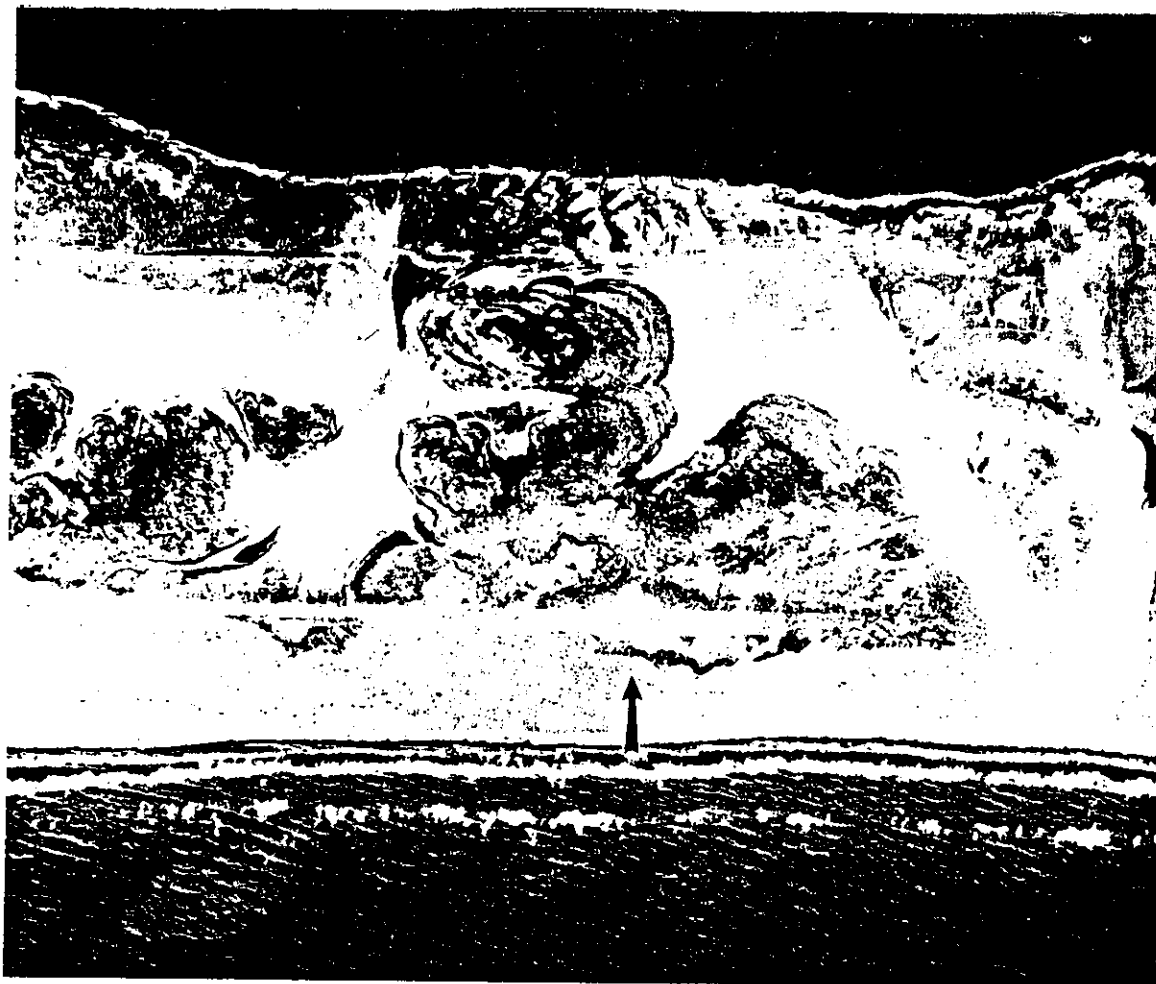
Width of Fore-
dune Ridge _____



SP-N-12.7

26 FEB 80

 SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m.

STATION: SP-N-13.0 (Secondary Priority Closure)

LOCATION: 20.9 km (13.0 miles) north of Andy Bowie Pier

BREACH WIDTH: 162 m (494 ft)

WASHOVER LENGTH: 159 m (525 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-3 m (3-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: High ($\sim 24 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 25 m (76 ft)

COMMENTS: This washover is narrow and has abundant usable dune sand.
Construction of an artificial foredune ridge should be easier
here than in most of the other washovers.

NEAREST PROFILE STATION SIXI-6

LOCATION SP-N-13.0

RECORDERS J.S., D.D., L.T.

PHOTOGRAPHS TXW DD4 12-24

GRAIN SIZE _____

SAND SUPPLY MODERATE

DATE 26 FEB 80

13.0 MILES NORTH/SOUTH OF ANDY BOWIE PIER INLET

Cores Along Strike
(depth of sand)

① <u>60</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Cores along Dip
(depth of sand)

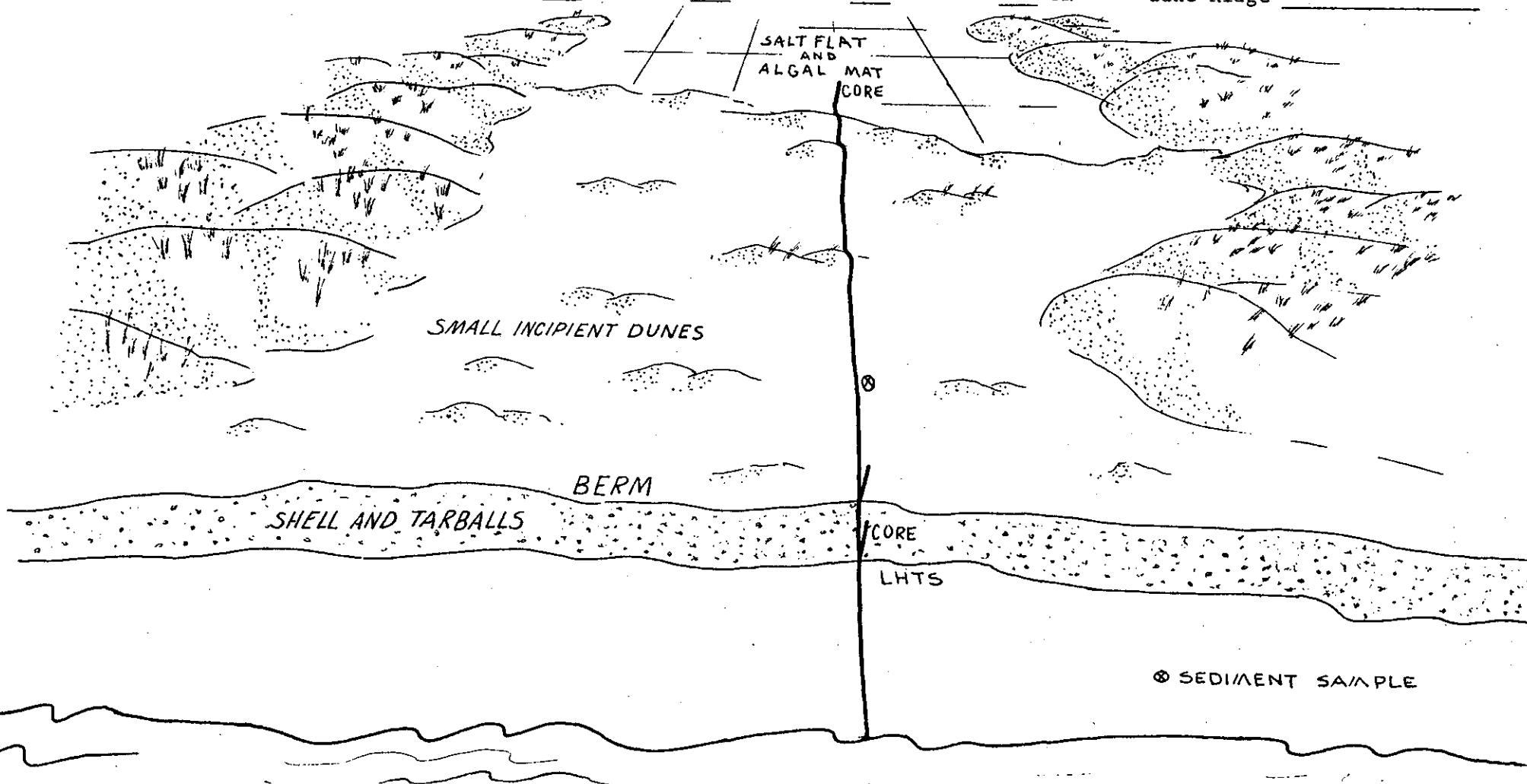
① <u>38</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Length of Breach 162 METERS

Depth of Washover 159 METERS

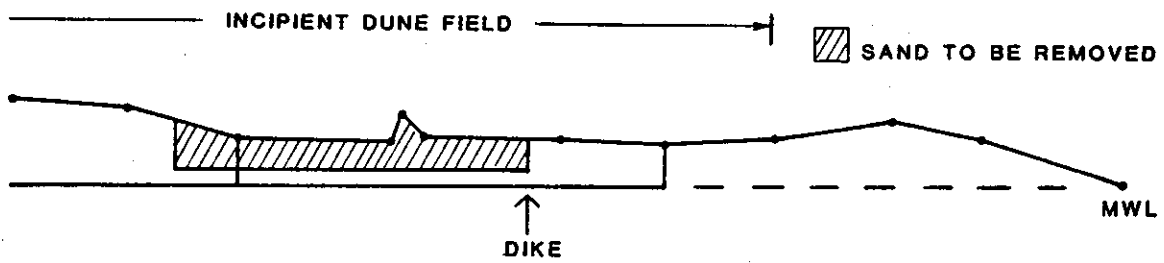
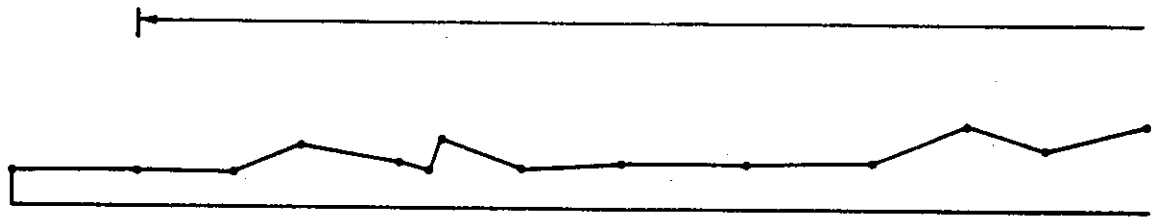
Height of Dunes 1-3 METERS

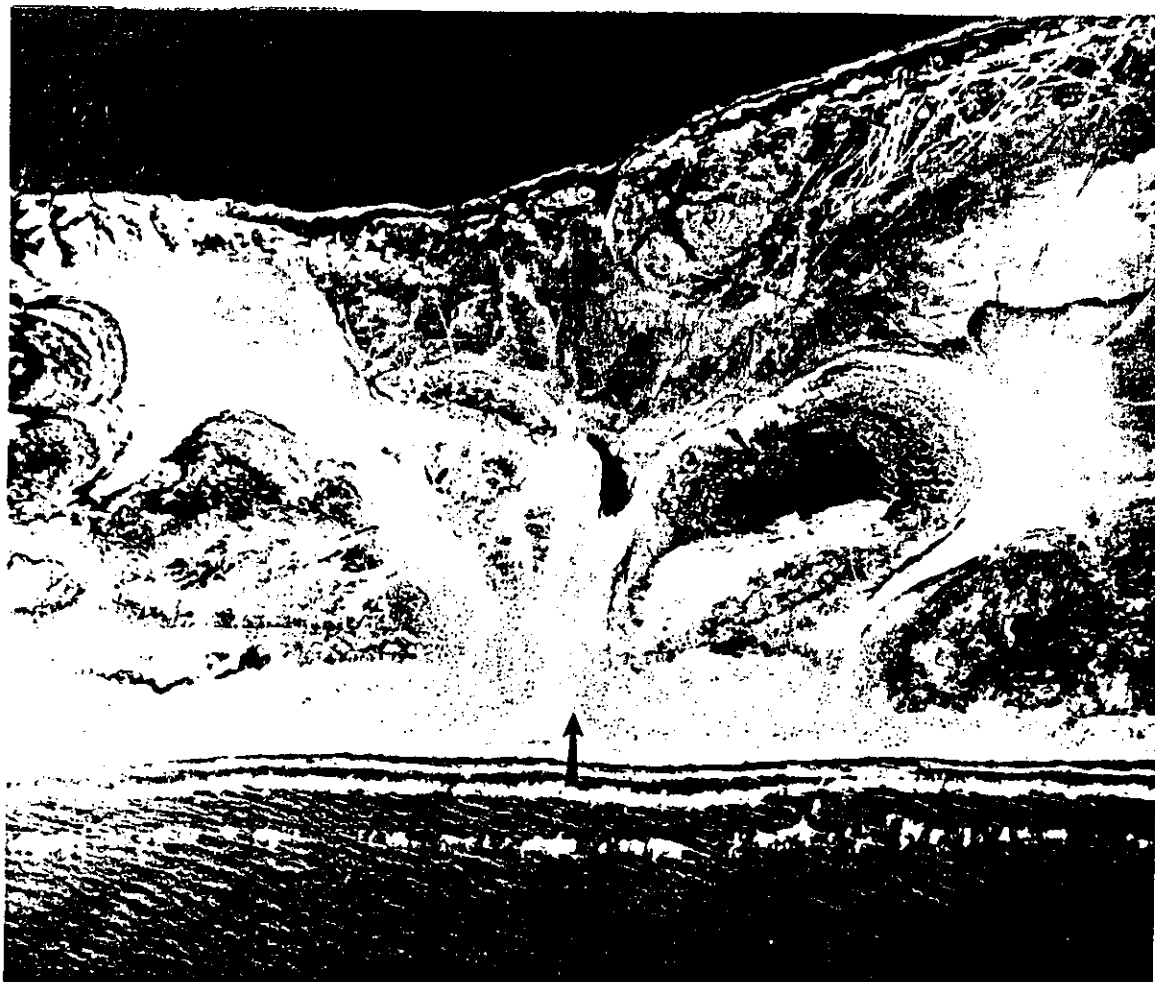
Width of Fore-dune Ridge _____



SP-N-13.0

26 FEB 80

1m
5m



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-14.4 (Secondary Priority Closure)

LOCATION: 23.2 km (14.4 miles) north of Andy Bowie Pier

BREACH WIDTH: 320 m (970 ft)

WASHOVER LENGTH: 110 m (335 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-4 m (3-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 30 m (91 ft)

COMMENTS: In the southern portion of this washover is a man-made loading ramp, constructed of clay. It can be extended to the north with scraped sand to form an artificial dike.

NEAREST PROFILE STATION STXI-6

LOCATION SP-N-14.4

RECORDERS D.D., J.S., L.T.

PHOTOGRAPHS D.O. 4 TXW 24-36

GRAIN SIZE _____

SAND SUPPLY LOW

DATE 26 FEB 80 1500

14.4 MILES NORTH/SOUTH OF ANDY BOWIE PIER INLET

Cores Along Strike
(depth of sand)

① <u>78</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Cores along Dip
(depth of sand)

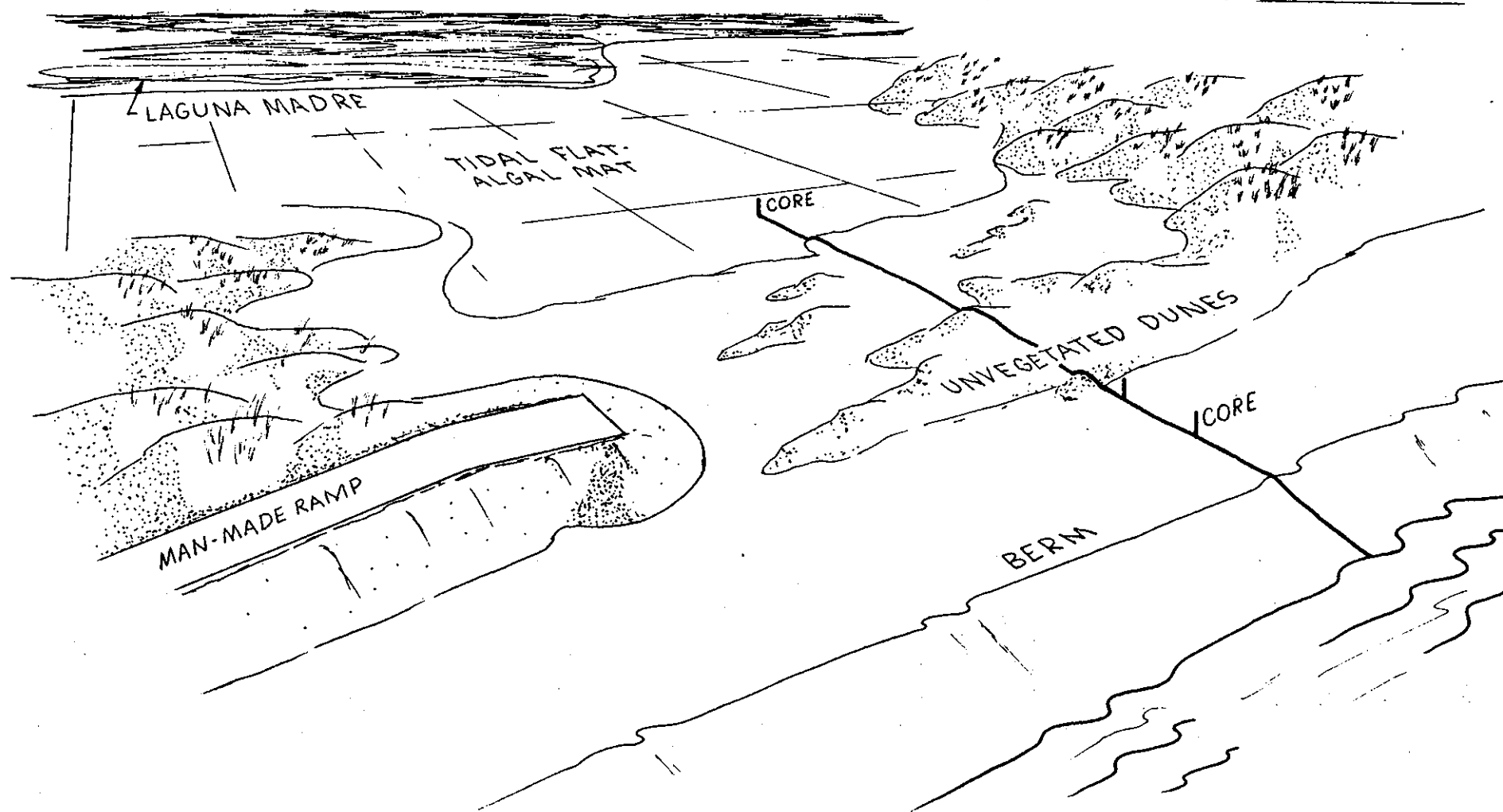
① <u>56</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

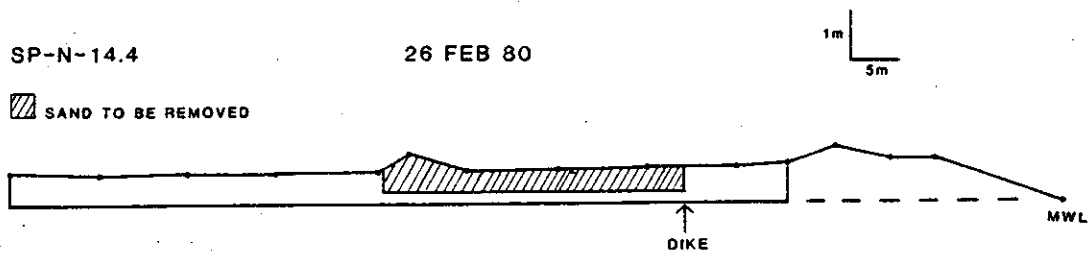
Length of Breach 323 METERS

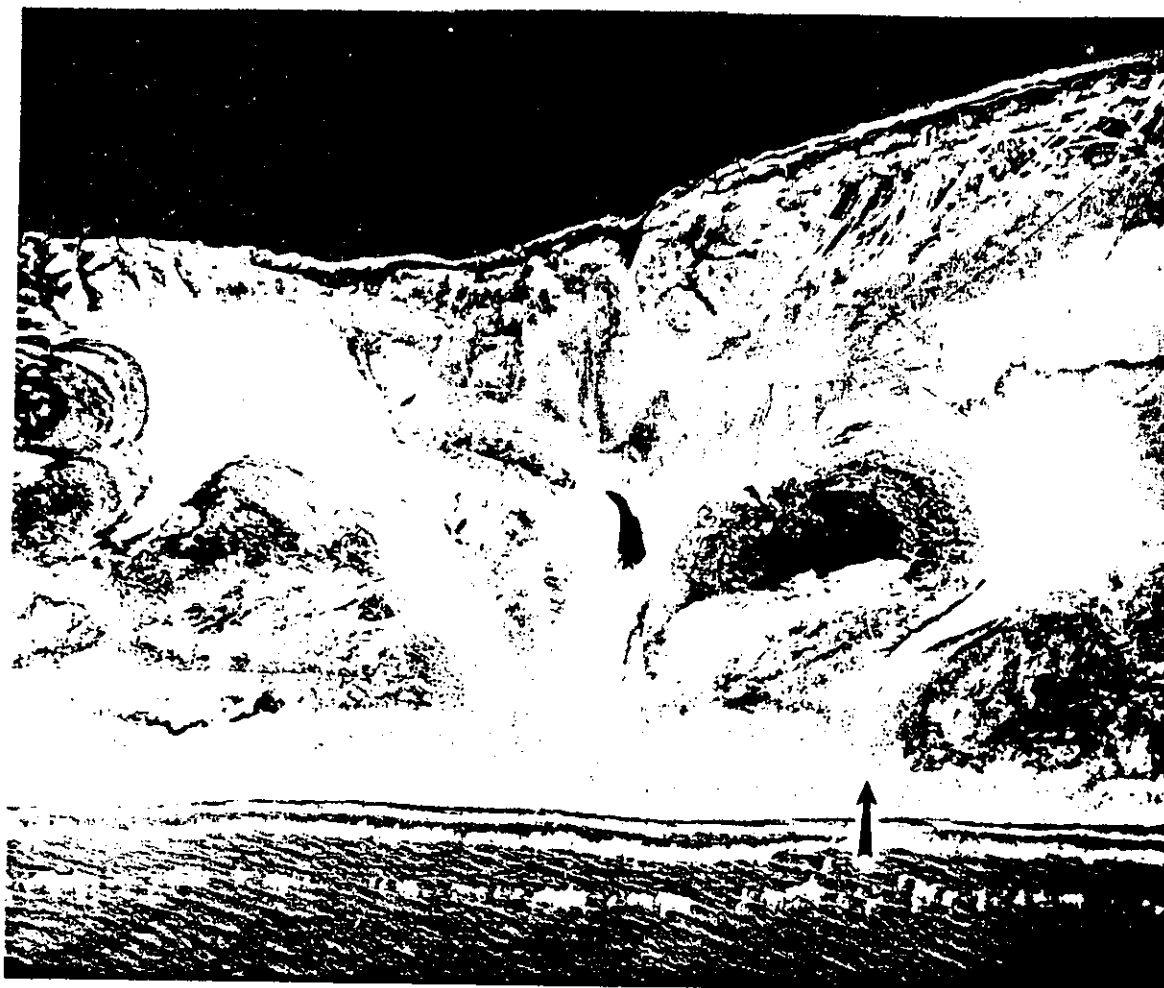
Depth of Washover 109 METERS

Height of Dunes 1-4 METERS

Width of Fore-dune Ridge _____







SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-14.6 (First Priority Closure)

LOCATION: 23.4 km (14.6 miles) north of Andy Bowie Pier

BREACH WIDTH: 320 m (972 ft)

WASHOVER LENGTH: 150 m (457 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-4 m (6-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: High ($\sim 30 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: see comments

COMMENTS: This washover contains sufficient quantities of usable sand, both as incipient dunes and channel sand. If only dune sand is used for dike ridge construction, the necessary average width to scrape is 50 m (152 ft), while only 23 m (70 ft) must be scraped if dune and channel sand are utilized.

NEAREST PROFILE STATION STXI-6

LOCATION SP-N-14.6

RECORDERS DD, LT, JS

PHOTOGRAPHS DD5 TXW-11

GRAIN SIZE _____

SAND SUPPLY MODERATE

DATE 27 FEB 80 0815

14.6 MILES NORTH/SOUTH OF ANDY BOWIE PIER INLET

Cores Along Strike
(depth of sand)

① <u>71</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Cores along Dip
(depth of sand)

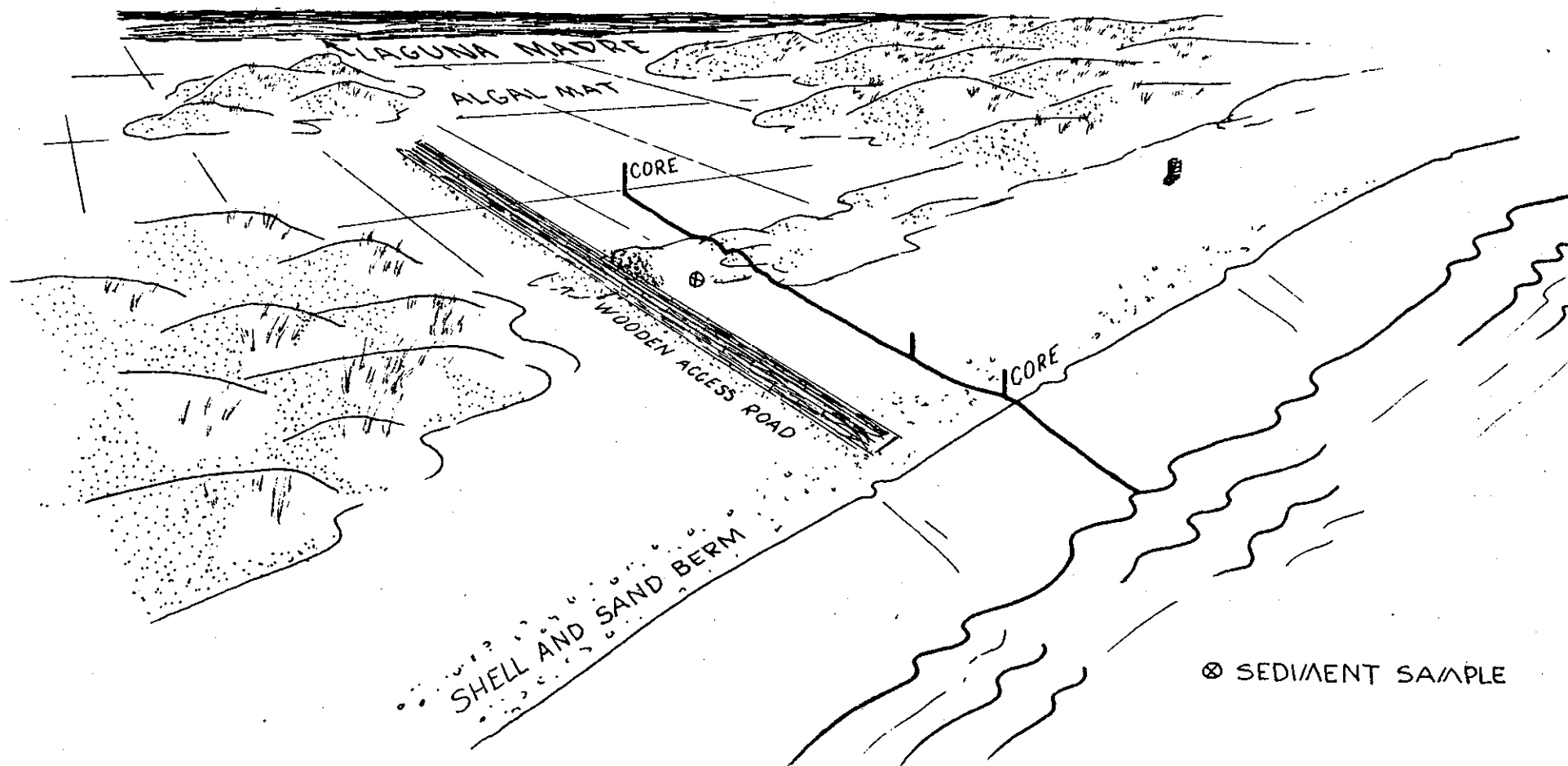
① <u>62</u> cm	4 _____ cm
2 _____ cm	5 _____ cm
3 _____ cm	6 _____ cm

Length of Breach 323 METERS

Depth of Washover 148 METERS

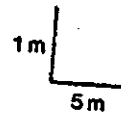
Height of Dunes 2-4 METERS

Width of Fore-
dune Ridge _____

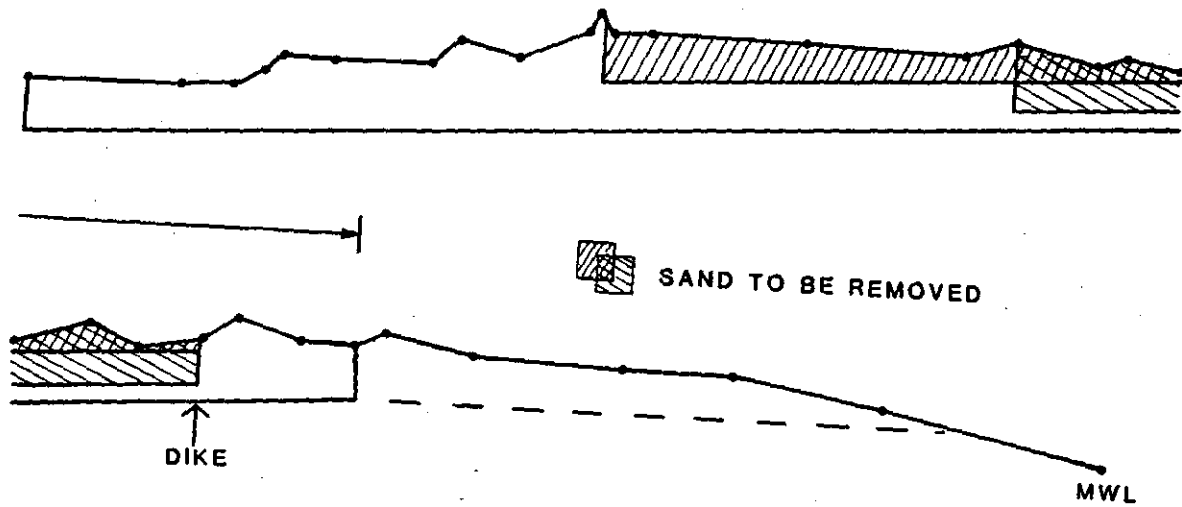


SP-N-14.6

27 FEB 80



INCIPIENT DUNE FIELD





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-15.2 (Secondary Priority Closure)

LOCATION: 24.4 km (15.2 miles) north of Andy Bowie Pier

BREACH WIDTH: 240 m (730 ft)

WASHOVER LENGTH: 240 m (730 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-4 m (6-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Low ($\sim 7 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 42 m (127 ft)

COMMENTS: There is little dune sand in this washover, but most is close enough to the recommended dike location to be utilized. The length of washover channel to be scraped is higher than most, but the breach is fairly narrow, so the extra time required to scrape the larger area is minimal.

NEAREST PROFILE STATION STX1-7

DATE 27 FEB 80

LOCATION SP-N - 15.2

15.2 MILES NORTH/SOUTH OF ANDY BOWIE PIER

RECORDERS LT DD JS

Cores Along Strike
(depth of sand)

Cores along Dip
(depth of sand)

Length of Breach 242 M

PHOTOGRAPHS TX-W-DD-4 11-22

Depth of Washover 240 M

GRAIN SIZE _____

1 78 cm 4 _____ cm

1 56 cm 4 _____ cm

Height of Dunes 2-4 M

SAND SUPPLY LOW

2 _____ cm 5 _____ cm

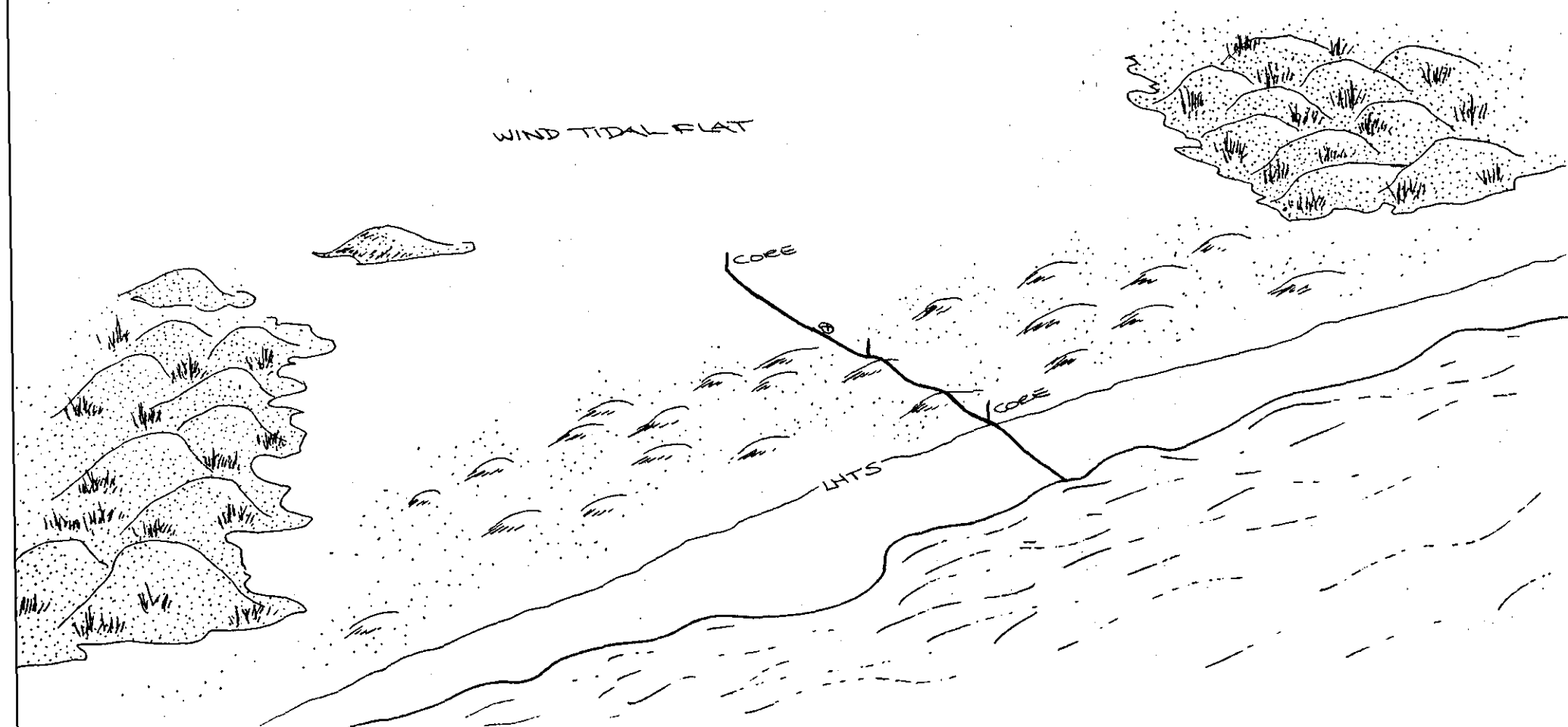
2 43 cm 5 _____ cm

Width of Fore-
dune Ridge _____

3 _____ cm 6 _____ cm

3 _____ cm 6 _____ cm

WIND TIDAL FLAT

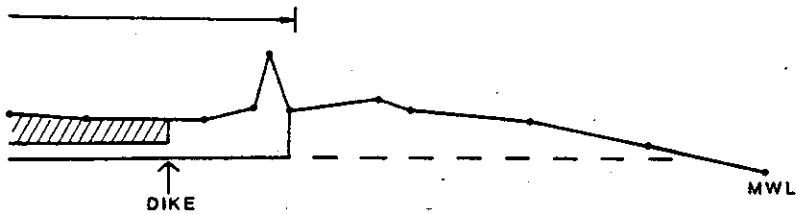
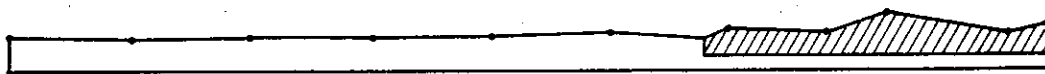


SP-N-15.2

27 FEB 80

 SAND TO BE REMOVED

INCIPIENT DUNE FIELD





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-15.45 (Secondary Priority Closure)

LOCATION: 24.8 km (15.45 miles) north of Andy Bowie pier.

BREACH WIDTH: 1050 m (3200 ft)

WASHOVER LENGTH: 170 m (517 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-3 m (3-9 ft)

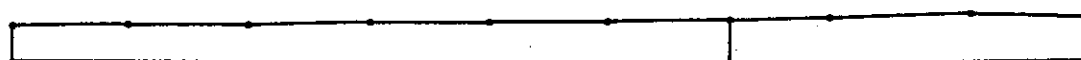
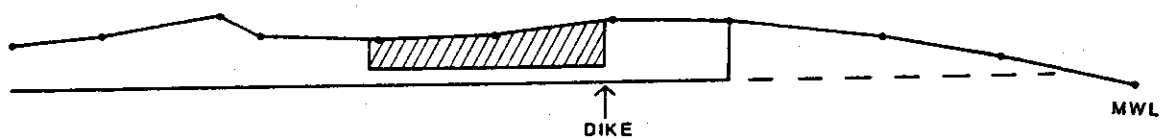
DUNE SAND SUPPLY IN WASHOVER CHANNEL: Low ($< 5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 20 m (61 ft)

COMMENTS: This washover is quite wide, but has a developing foredune ridge and a relatively thick prism of usable channel sand above the water table. The stabilized dune mounds in the distal (landward) portion of the washover, vegetated with sea oats, should not be used. The foredune ridge to the north of this washover exhibits a basal scarp indicative of wave erosion during spring tides and/or storms. The dike should be located ten meters behind the present foredune ridge trend and slope seaward to help avoid future erosion.

SP-N-15.45

27 FEB 80

 SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-18.7 (Secondary Priority Closure)

LOCATION: 30.0 km (18.7 miles) north of Andy Bowie Pier

BREACH WIDTH: 730 m (2220 ft)

WASHOVER LENGTH: 230 m (700 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Moderate ($\sim 15 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: see comments

COMMENTS: A washover of moderate width having a good supply of channel and dune sand. Scraping channel sand requires only 25 m (76 ft) scrape width, while using only dune sand entails scraping 60 m (182 ft). Foredune ridges on both sides of washover exhibit a spring tide/storm erosional scarp, emphasizing the necessity to build any artificial structure back from the main trend of the foredune ridge. Presently, there is an access road in this washover (used by oil drilling crews) leading to a well site in the back barrier area. This road would be closed by construction of the proposed dike.

NEAREST PROFILE STATION STXI-7

LOCATION SP-N-18.7

RECORDERS JS DD CT

PHOTOGRAPHS DD6 TXW 1-11

GRAIN SIZE _____

SAND SUPPLY LOW

Cores Along Strike
(depth of sand)

1 78 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 46 cm 4 _____ cm

2 42 cm 5 _____ cm

3 _____ cm 6 _____ cm

DATE 27 FEB 80

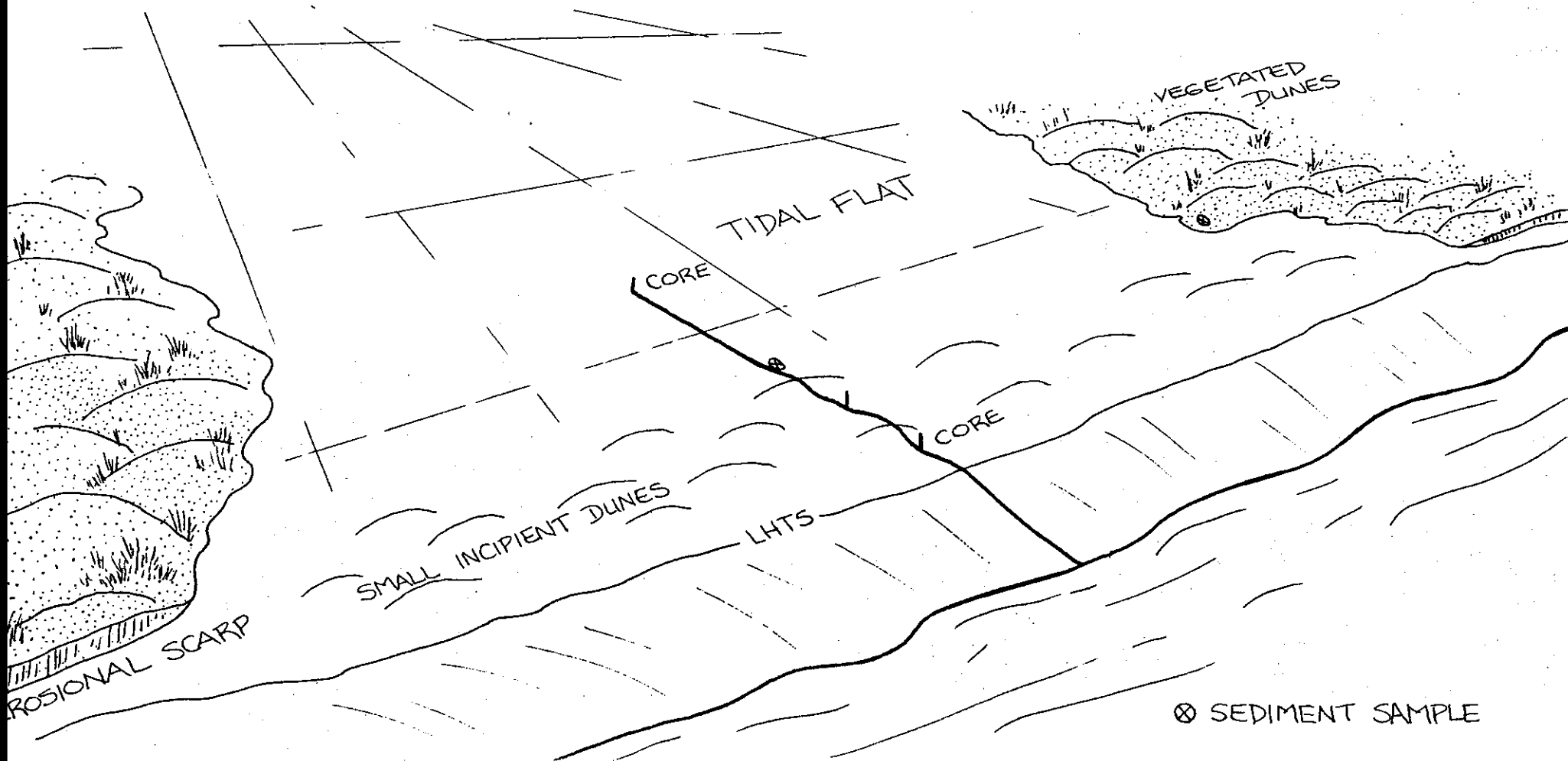
18.7 MILES NORTH/SOUTH OF ANDY BOWIE PIER

Length of Breach 727 M

Depth of Washover 233 M

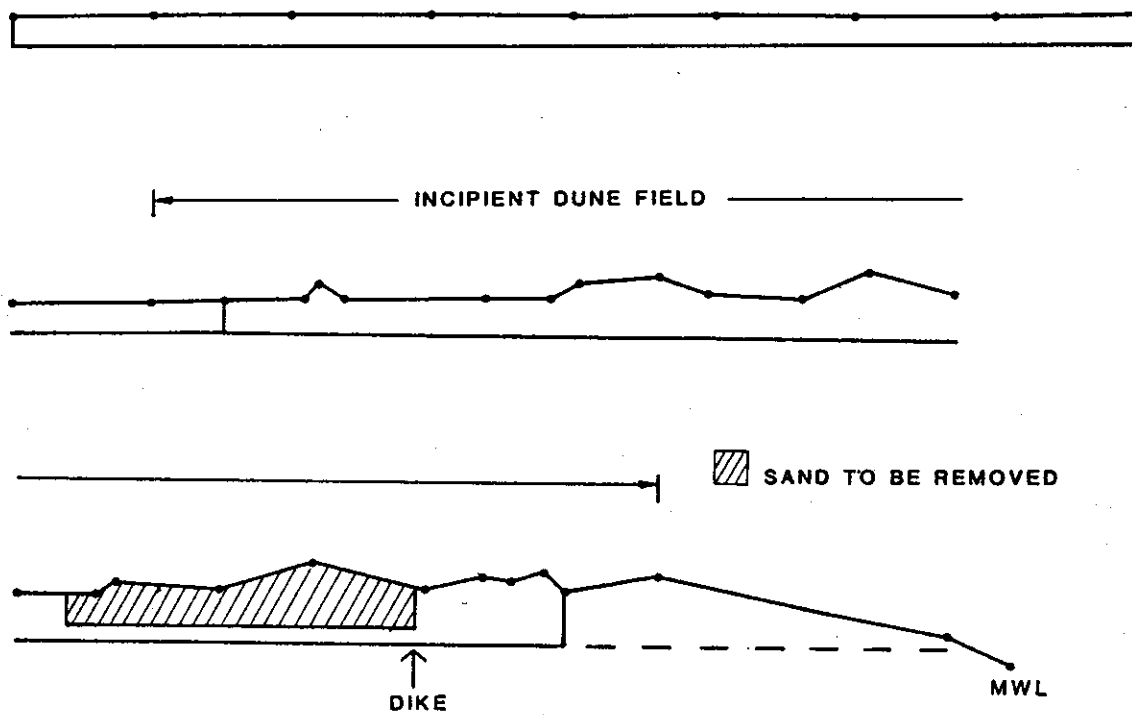
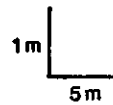
Height of Dunes 2-3 METERS

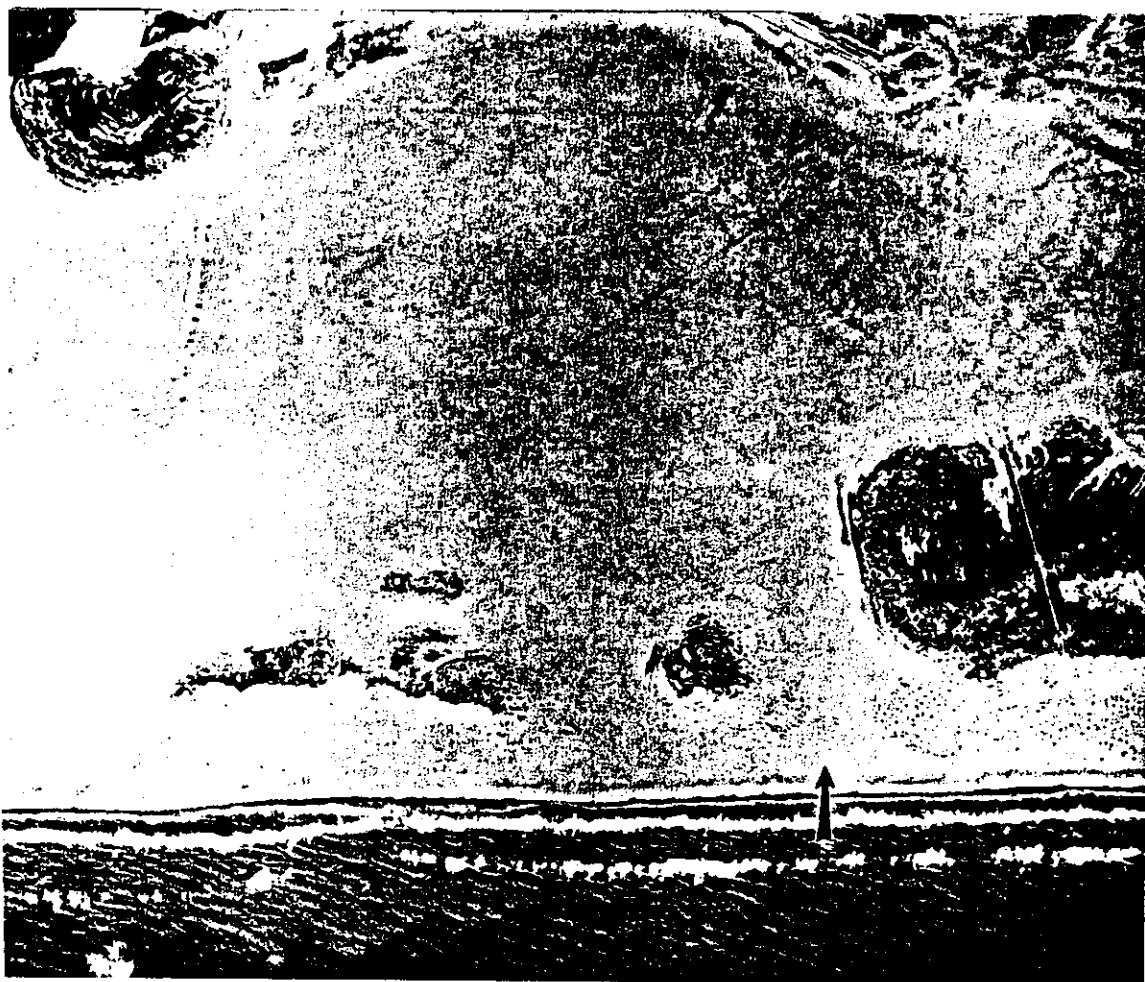
Width of Fore-
dune Ridge _____



SP-N-18.7

27 FEB 80





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-21.2 (Secondary Priority Closure)

LOCATION: 34 km (21.2 miles) north of Andy Bowie Pier

BREACH WIDTH: 160 m (487 ft)

WASHOVER LENGTH: 140 m (426 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: High ($\sim 27 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 30 m (91 ft)

COMMENTS: There is a relative abundance of dune sand in this washover, but it is spread over a wide area and most is about 75 m (228 ft) landward of the proposed dike location. Utilizing channel sand requires scraping a width of 30 m.

NEAREST PROFILE STATION STX1-8

DATE 27 FEB 80

LOCATION SP-N - 21.2

21.2 MILES NORTH/SOUTH OF ANDY BOWIE PIER

RECORDERS DD LT JS

Cores Along Strike
(depth of sand)

Cores along Dip
(depth of sand)

Length of Breach 162 M

PHOTOGRAPHS DDG TXN 12-

Depth of Washover 142 M

GRAIN SIZE _____

1 74 cm 4 _____ cm

1 50 cm 4 _____ cm

Height of Dunes _____

SAND SUPPLY HIGH

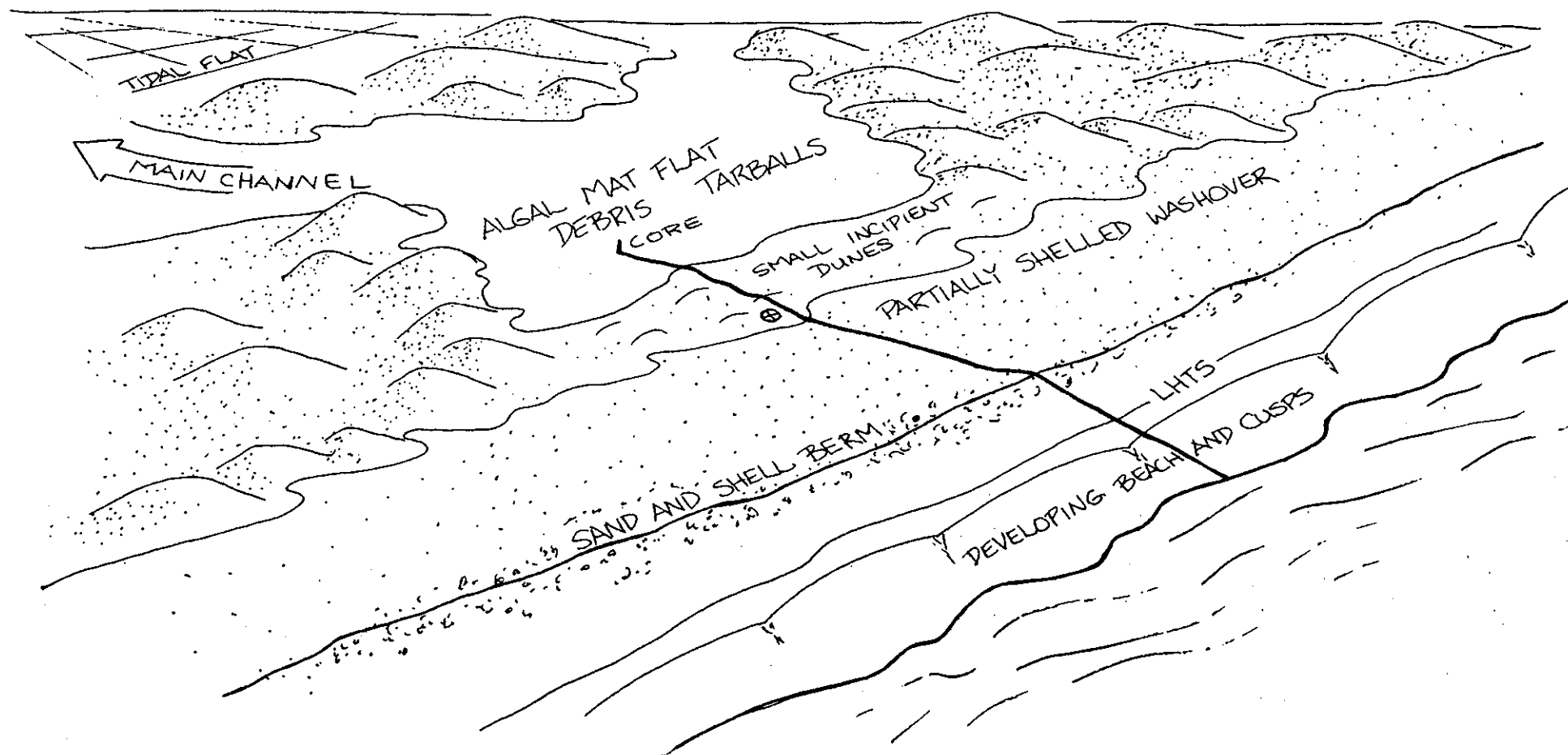
2 _____ cm 5 _____ cm

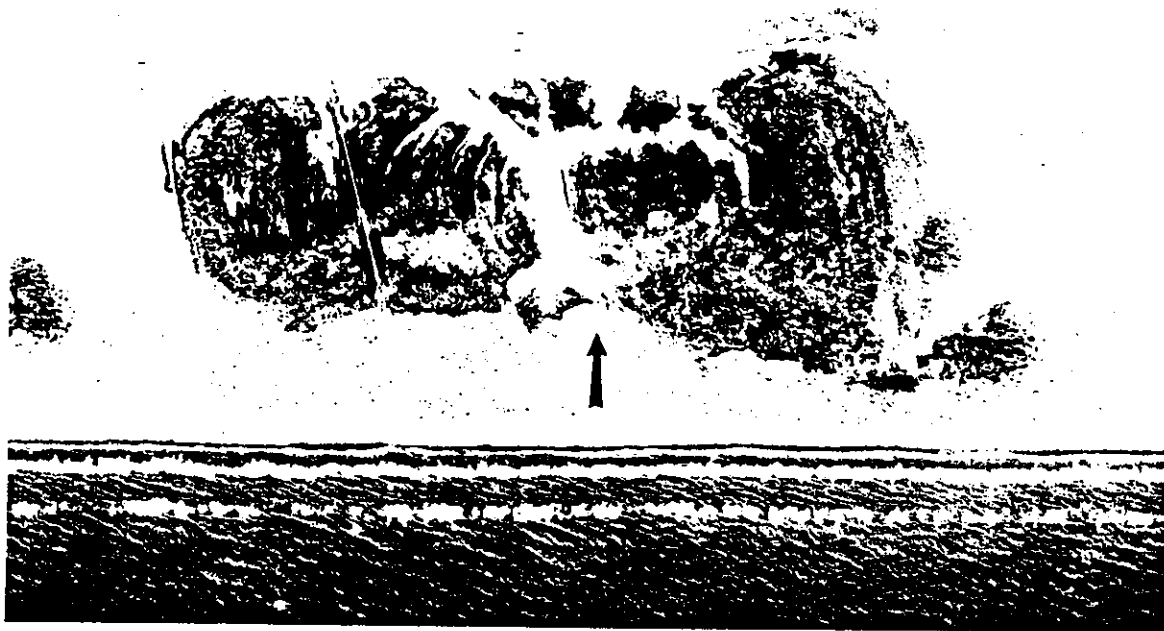
2 _____ cm 5 _____ cm

Width of Fore-
dune Ridge _____

3 _____ cm 6 _____ cm

3 _____ cm 6 _____ cm





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-22.2 (Secondary Priority Closure)

LOCATION: 35.6 km (22.2 miles) north of Andy Bowie Pier

BREACH WIDTH: 320 m (970 ft)

WASHOVER LENGTH: 200 m (610 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-4 m (6-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 53 m (161 ft)

COMMENTS: This washover has a low supply of dune sand manifested as numerous small, sparsely vegetated incipient dunes.

NEAREST PROFILE STATION STX1-8

LOCATION SP-N-22.2

RECORDERS JS

PHOTOGRAPHS _____

GRAIN SIZE _____

SAND SUPPLY MODERATE

Cores Along Strike
(depth of sand)

1 77 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 54 cm 4 _____ cm

2 56 cm 5 _____ cm

3 _____ cm 6 _____ cm

DATE 27 FEB 80

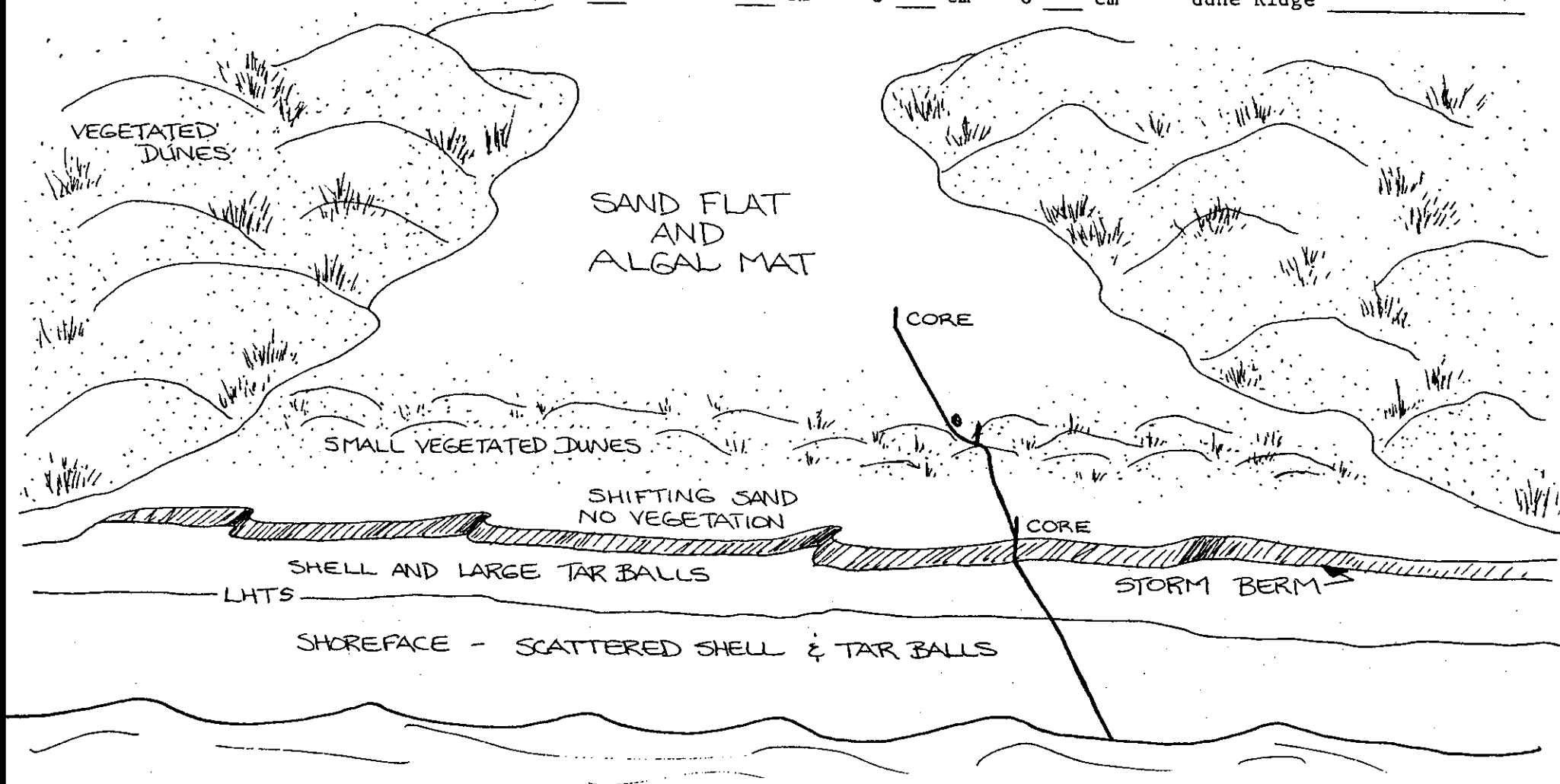
22.2 MILES NORTH/SOUTH OF ANDY BOWIE PIER

Length of Breach 320 M

Depth of Washover 200 M

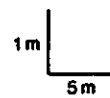
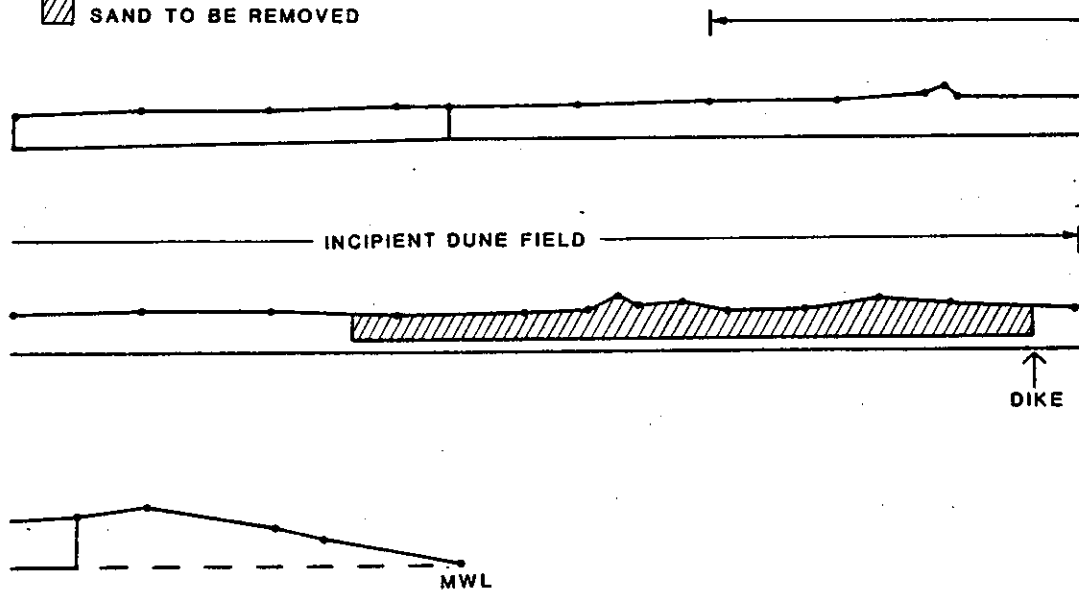
Height of Dunes 2-4 M

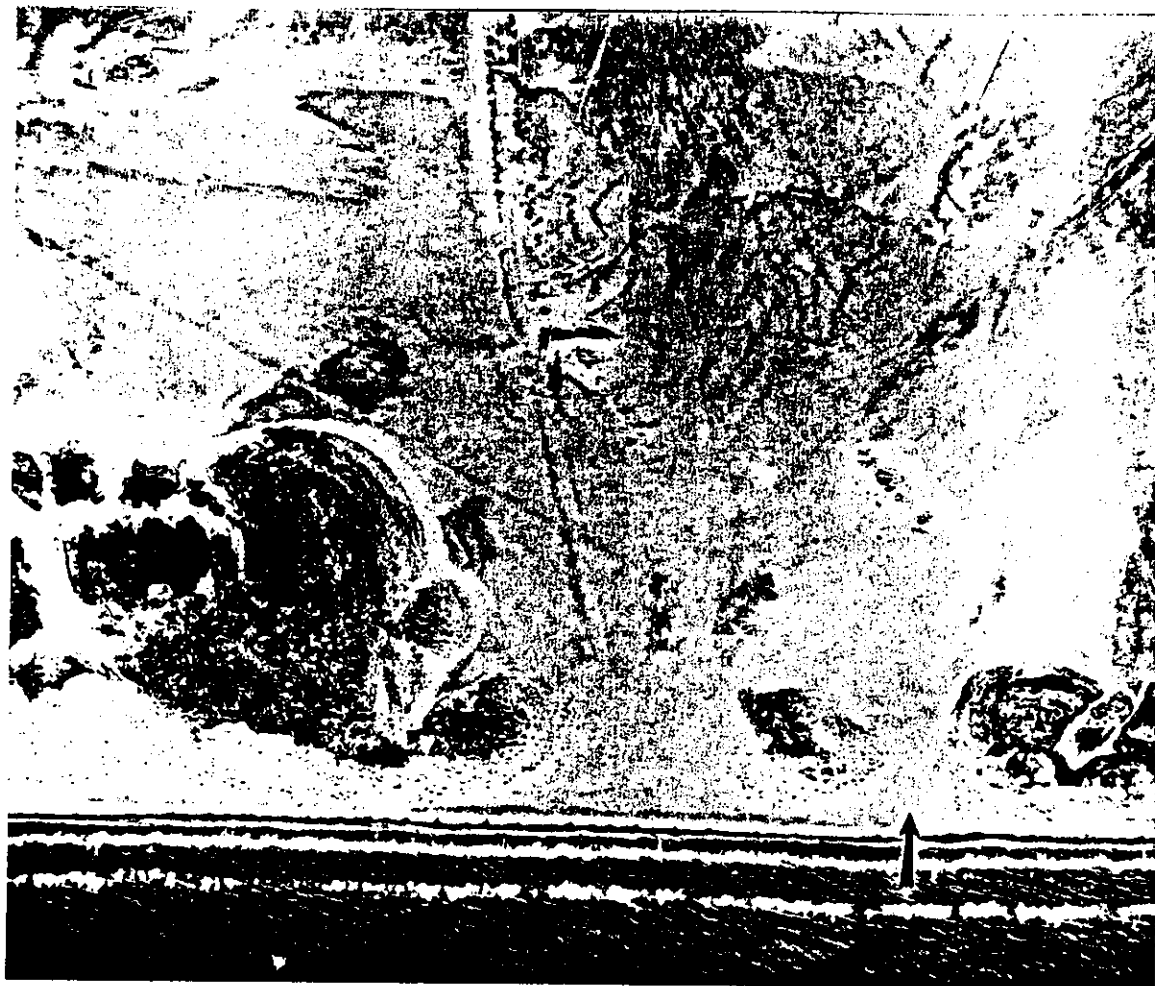
Width of Fore-
dune Ridge _____



SP-N-22.2

27 FEB 80

 SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: SP-N-24.1

LOCATION: 38.6 km (24.1 miles) north of Andy Bowie Pier

BREACH WIDTH: 320 m (970 ft)

WASHOVER LENGTH: 150 m (455 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-3 m (3-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Moderate ($\sim 16 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 25 m (76 ft)

COMMENTS: A fairly narrow breach with abundant usable sand. Probably
one of the easier washovers to dike.

NEAREST PROFILE STATION STXI-9

LOCATION SP-N-24.1

RECORDERS JS LT DD

PHOTOGRAPHS DDG TXW 1-16

GRAIN SIZE _____

SAND SUPPLY LOW-MODERATE

Cores Along Strike
(depth of sand)

1	<u>86</u> cm	4	_____ cm
2	_____ cm	5	_____ cm
3	_____ cm	6	_____ cm

Cores along Dip
(depth of sand)

1	<u>56</u> cm	4	_____ cm
2	<u>48</u> cm	5	_____ cm
3	_____ cm	6	_____ cm

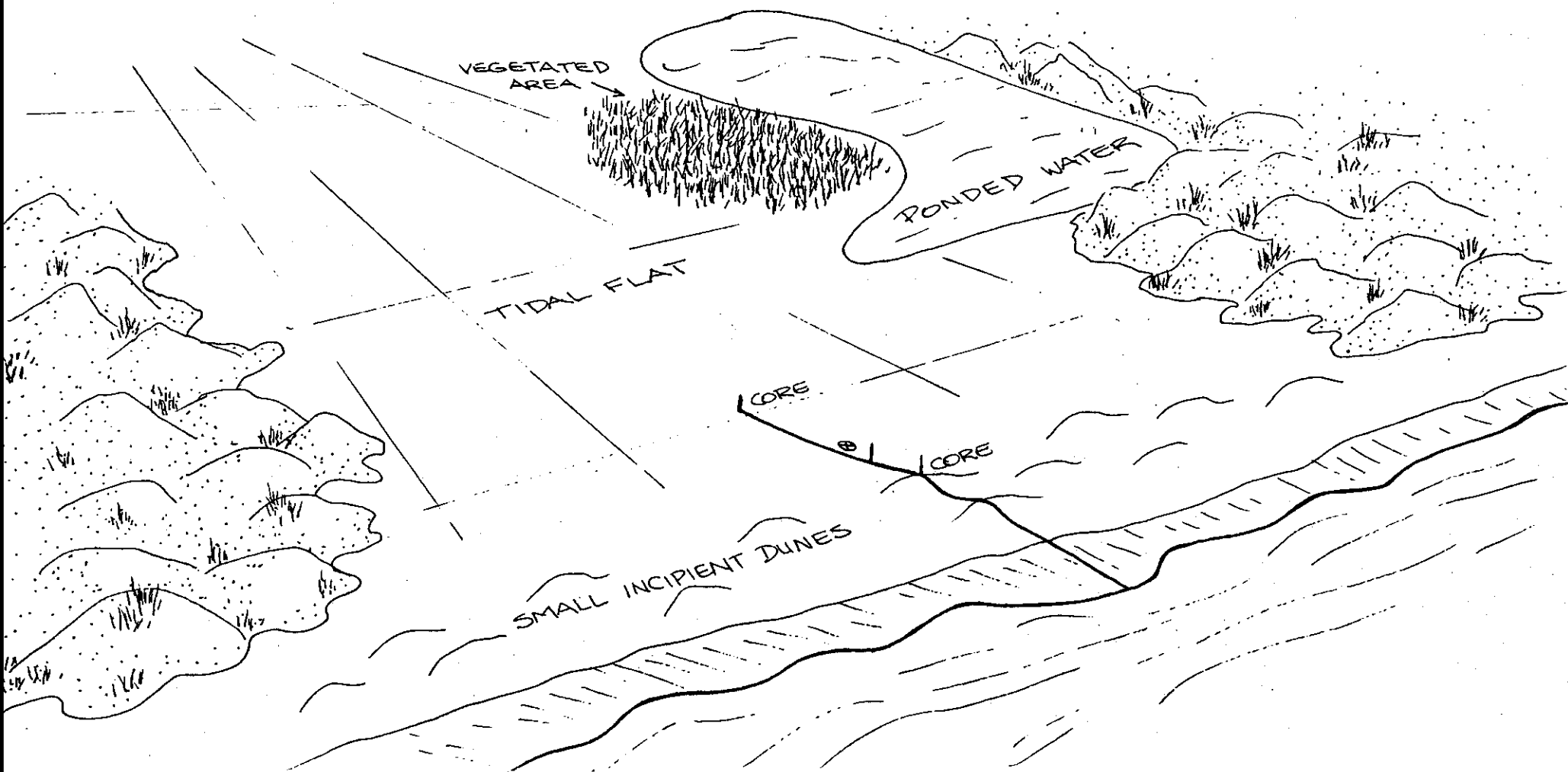
Length of Breach 323 M

Depth of Washover 153 M

Height of Dunes _____

Width of Fore-
dune Ridge _____

24.1 MILES NORTH/SOUTH OF ANDY BOWIE PIER

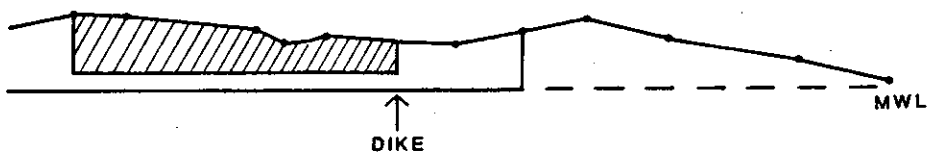


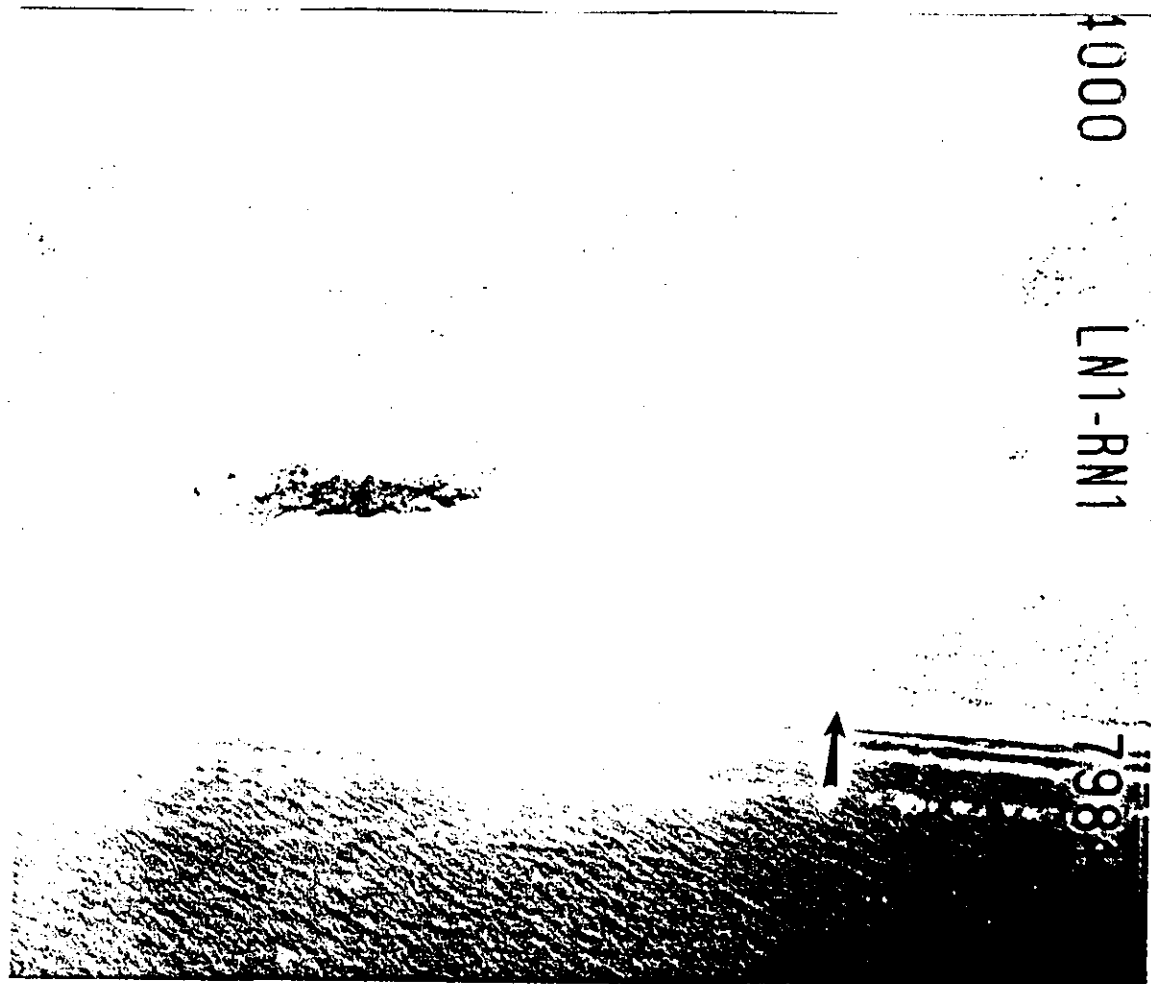
SP-N-24.1

27 FEB 80

1m
5m SAND TO BE REMOVED

— INCIPIENT DUNE FIELD —>





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: NP-N-6.1

LOCATION: 9.7 km (6.1 miles) north of Port Mansfield Jetties

BREACH WIDTH: 160 m (487 ft)

WASHOVER LENGTH: 170 m (517 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Moderate ($\sim 11 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 15 m (457 ft)

COMMENTS: A narrow washover with a migrating dune field which is developing a foredune ridge. Most of the dune sand is usable for construction. High (4-7 m), vegetated back-dunes and a wide, wind tidal flat serve to naturally protect Laguna Madre from storm transported oil.

NEAREST PROFILE STATION STX - 3

LOCATION NP - N - 6.1

RECORDERS LT, JS

PHOTOGRAPHS LTNP4 - 16-36

GRAIN SIZE _____

SAND SUPPLY LOW - MODERATE

Cores Along Strike
(depth of sand)

1 96 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 65 cm 4 _____ cm

2 56 cm 5 _____ cm

3 _____ cm 6 _____ cm

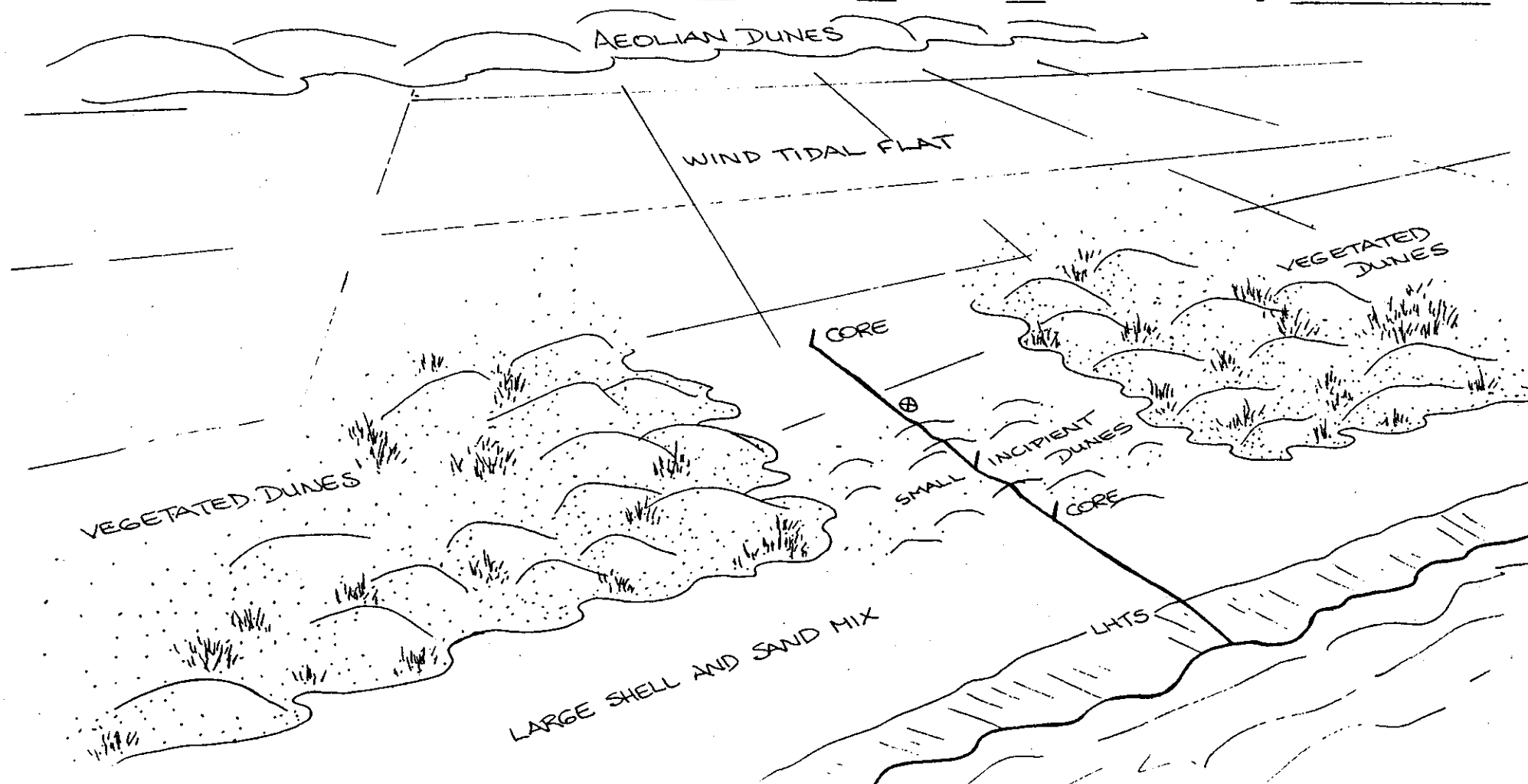
Length of Breach 160 M

Depth of Washover 167 M

Height of Dunes 2-3 M

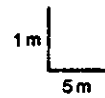
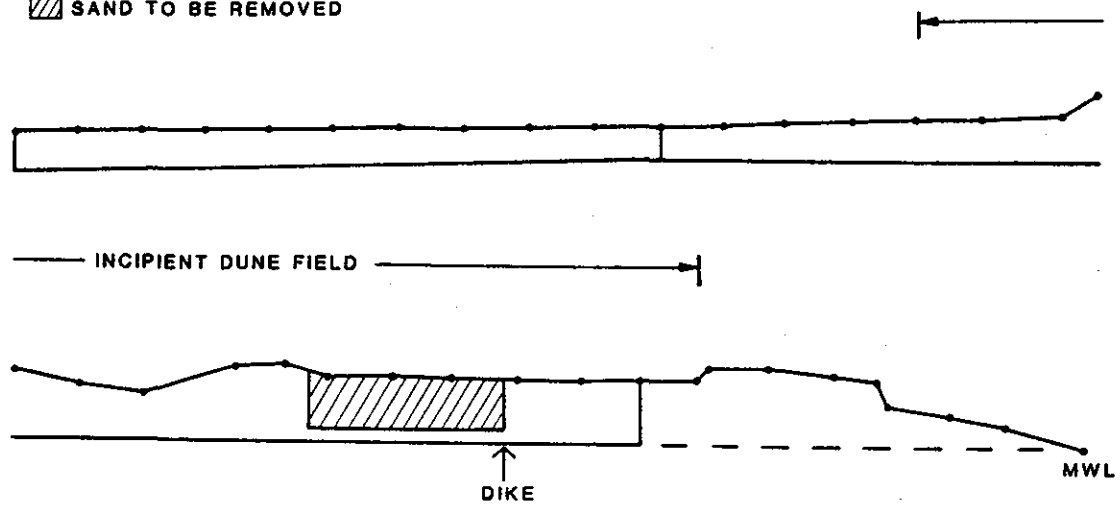
Width of Fore-
dune Ridge _____

6.1 MILES NORTH/SOUTH OF PORT MANSFIELD INLET



NP-N-6.1

4 MARCH 80

 SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: NP-N-18.3

LOCATION: 29.4 km (18.3 miles) north of Port Mansfield Jetties

BREACH WIDTH: 320 m (970 ft)

WASHOVER LENGTH: 170 m (517 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-3 m (3-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Low ($\sim 7 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 20 m (61 ft)

COMMENTS: The medial dune mound (vegetated with sea oats) should not be considered a source of construction sand. A highly vegetated back dune trend and wide, wind tidal flat help protect Laguna Madre in this area.

NEAREST PROFILE STATION STX-6

LOCATION NP-N-18.3

RECORDERS JS LT

PHOTOGRAPHS LTNP II 1-18

GRAIN SIZE _____

SAND SUPPLY LOW-MODERATE

Cores Along Strike
(depth of sand)

1 93 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 82 cm 4 _____ cm

2 63 cm 5 _____ cm

3 _____ cm 6 _____ cm

DATE 4 MARCH 80

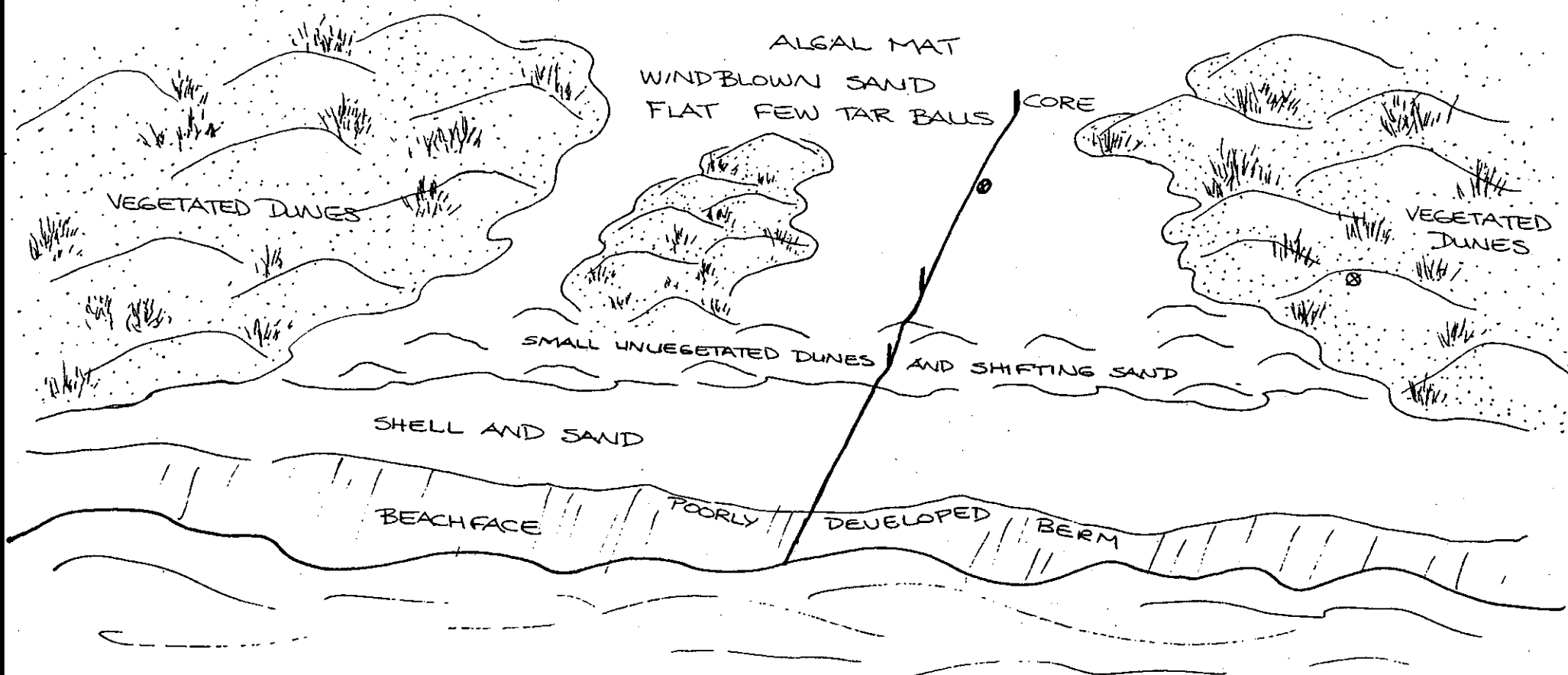
18.3 MILES NORTH/SOUTH OF PORT MANSFIELD INLET

Length of Breach 320 M

Depth of Washover 166 M

Height of Dunes 1-3 M

Width of Fore-
dune Ridge _____

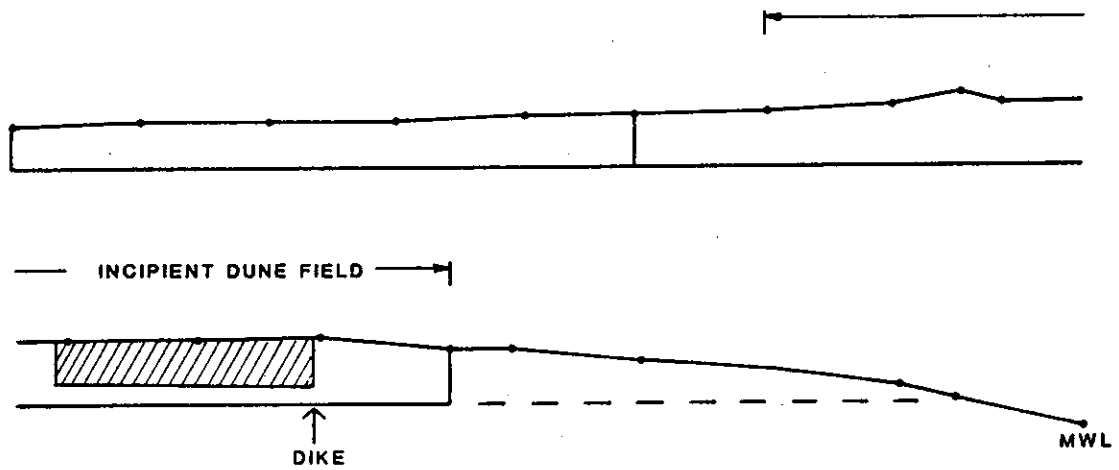


NP-N-18.3

4 MARCH 80

1m
5m

 SAND TO BE REMOVED





SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: NP-N-24.0 (Primary Priority Closure)

LOCATION: 38.5 km (24.0 miles) north and Port Mansfield jetties. Located at the N.P.S. 35 mile marker.

BREACH WIDTH: 160 m (487 ft)

WASHOVER LENGTH: 150 m (456 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO CONSTRUCT MODEL CLOSURE STRUCTURE: 22 m (67 ft)

COMMENTS: Well-developed and vegetated back dunes somewhat aid the natural protection of Laguna Madre; however, the ponded water in this washover delineates a channel that would funnel water (and oil) directly back into Laguna Madre in the event of a storm. The back-barrier, wind-tidal flat is wide and offers some protection.

NEAREST PROFILE STATION STX-8

LOCATION NP-N 24.0

RECORDERS LT JS

PHOTOGRAPHS LTNP 2-19-36

GRAIN SIZE _____

SAND SUPPLY MODERATE

Cores Along Strike
(depth of sand)

1 112 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 59 cm 4 _____ cm

2 62 cm 5 _____ cm

3 _____ cm 6 _____ cm

DATE 4 MARCH 80

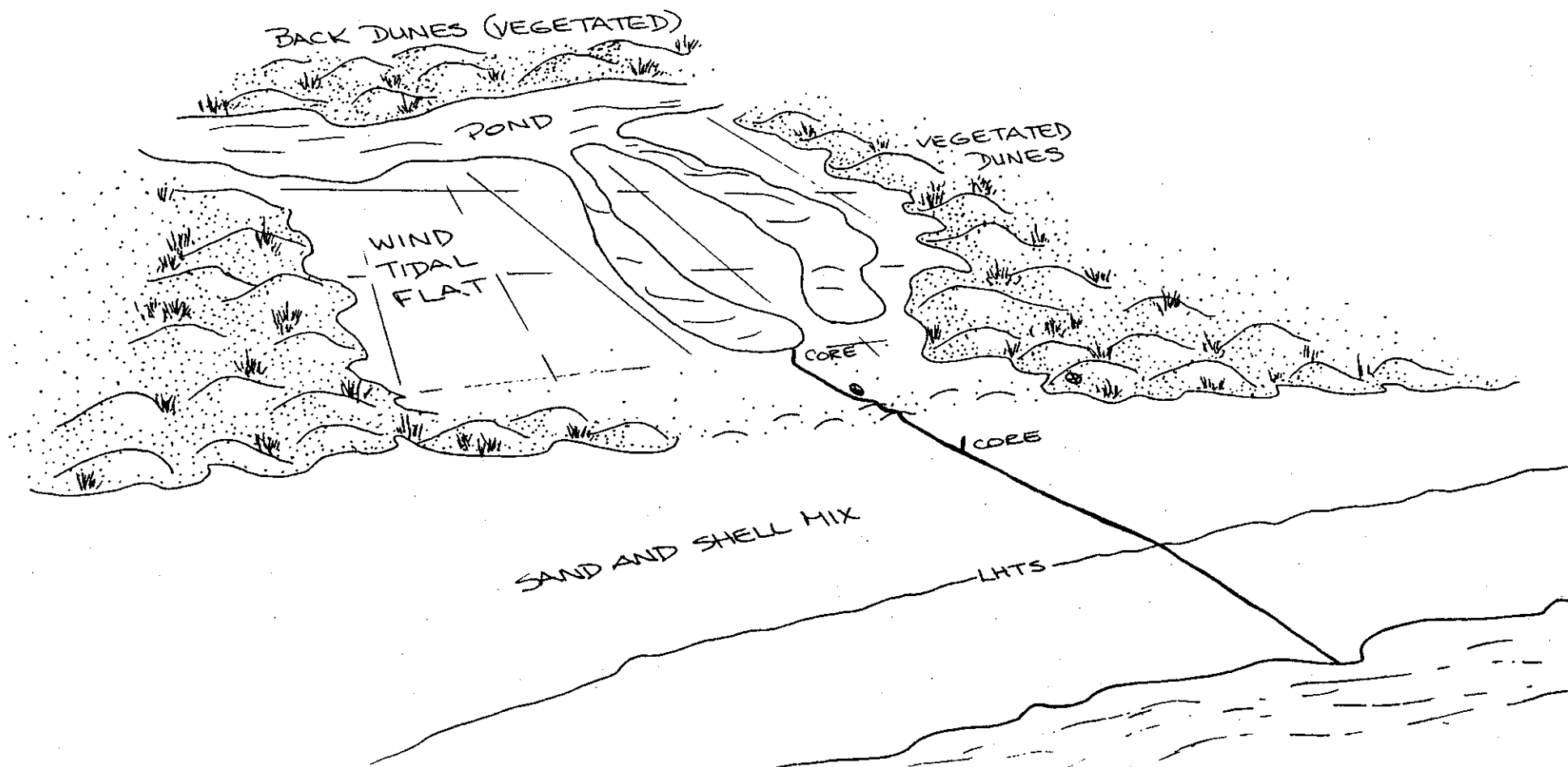
24.0 MILES NORTH/SOUTH OF MANSFIELD INLET

Length of Breach 160 M

Depth of Washover 148 M

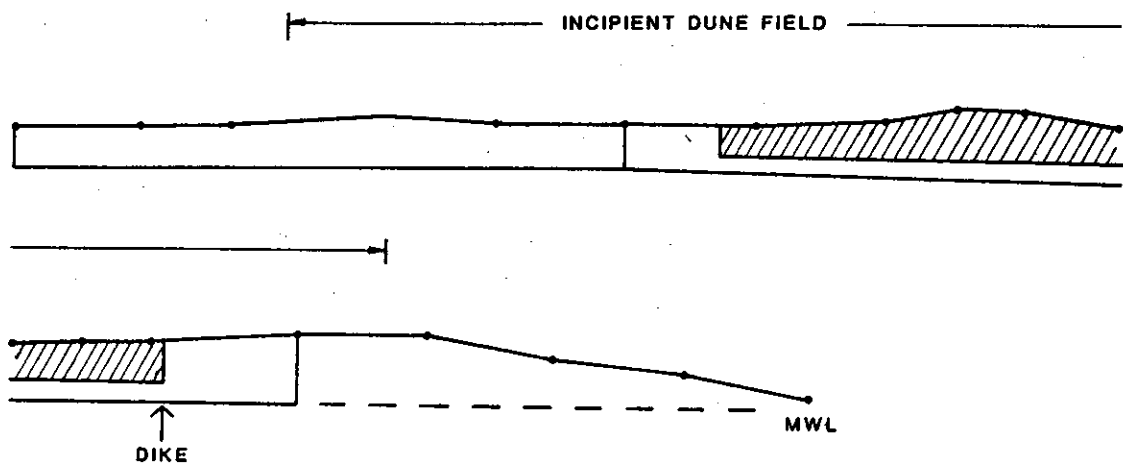
Height of Dunes 2-3 M

Width of Fore-
dune Ridge _____



NP-N-24.0

4 MARCH 80

 SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: NP-N-25.6 (Primary Priority Closure)

LOCATION: 41.1 km (25.6 miles) north of Port Mansfield Jetties

BREACH WIDTH: 160 m (486 ft)

WASHOVER LENGTH: 110 m (335 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-5 m (6-16 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 22 m (67 ft)

COMMENTS: Pounded water in the washover channel restricts heavy equipment access to channel sand and indicates an avenue of sand/oil transport into Laguna Madre in the event of storm surge. No other usable sand source exists locally. The wind tidal flat is fairly wide offering some protection.

NEAREST PROFILE STATION STX-8

LOCATION NP-N - 25.6

RECORDERS LT JS

PHOTOGRAPHS LTNP3-1-22

GRAIN SIZE _____

SAND SUPPLY LOW

Cores Along Strike
(depth of sand)

1 108 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

DATE 5 MARCH 80

25.6 MILES NORTH/SOUTH OF MANSFIELD INLET

Cores along Dip
(depth of sand)

1 62 cm 4 _____ cm

2 56 cm 5 _____ cm

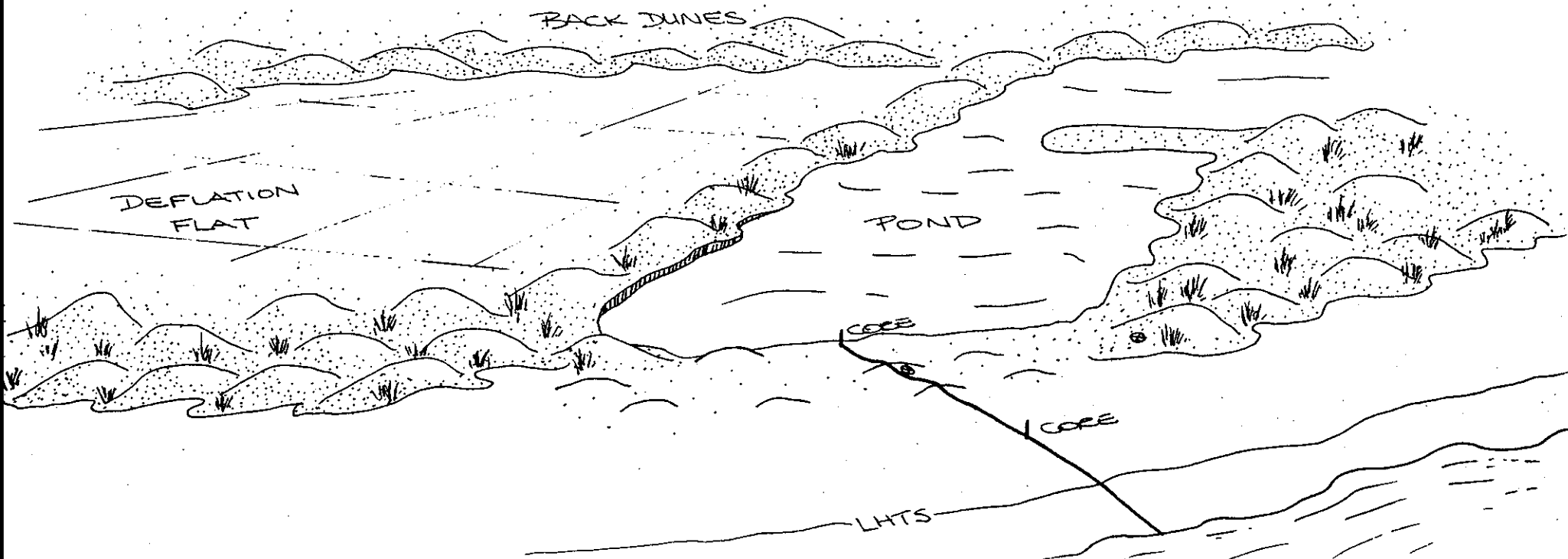
3 _____ cm 6 _____ cm

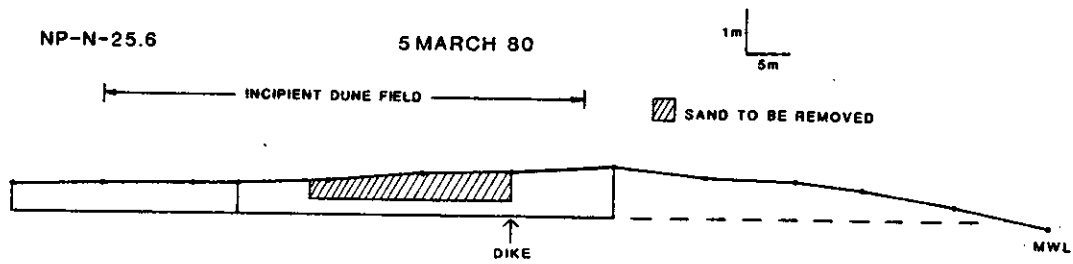
Length of Breach 160 M

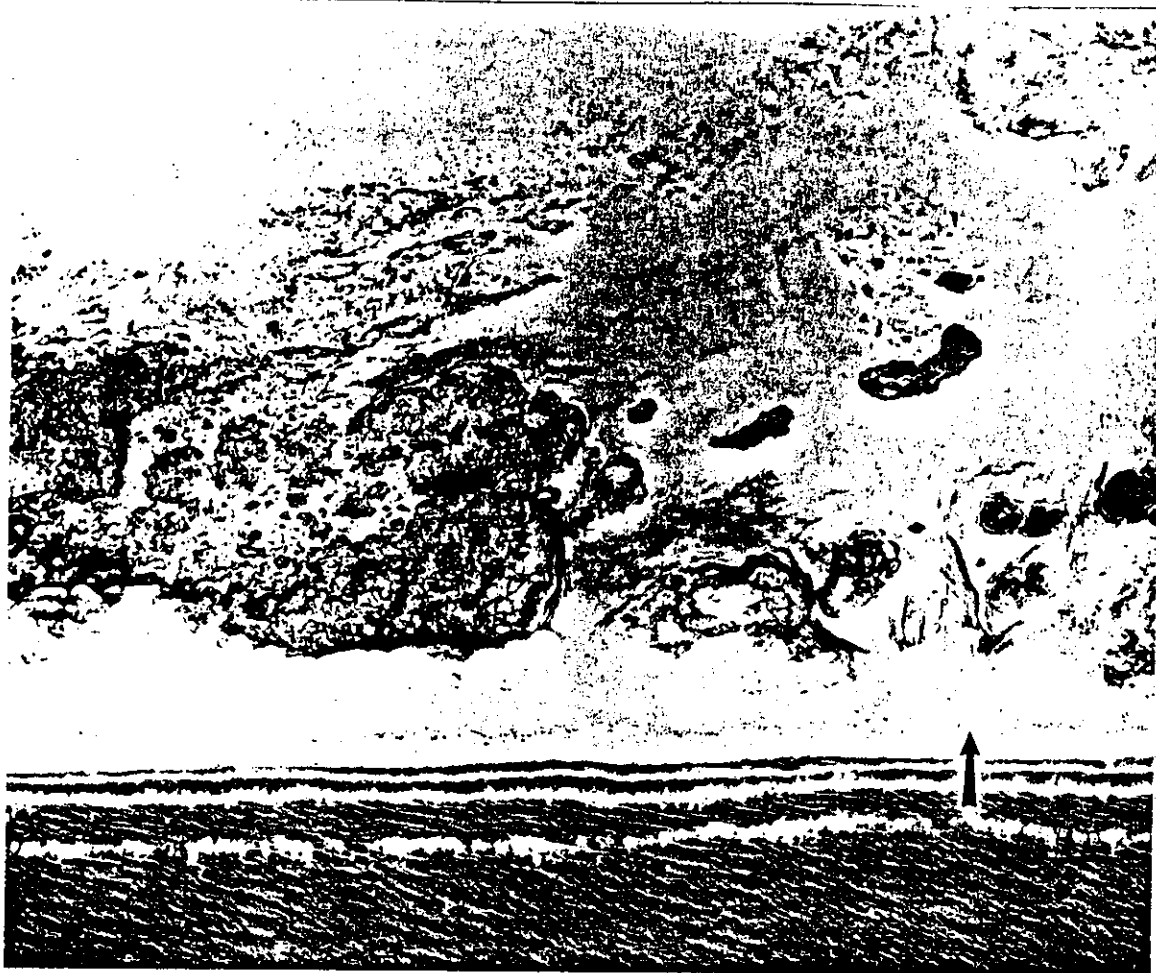
Depth of Washover 113 M

Height of Dunes 2-5 M

Width of Fore-
dune Ridge _____







SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: NP-N-27.4 (Primary Priority Closure)

LOCATION: 44 km (27.35 miles) north of Port Mansfield Jetties

BREACH WIDTH: 80 m (243 ft)

WASHOVER LENGTH: 120 m (366 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 3-5 m (9-16 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Insignificant ($<5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 20 m (61 ft)

COMMENTS: A very narrow washover requiring a fairly narrow scrape width to build the proposed dike. Pounded water in the washover channel may restrict heavy equipment access.

NEAREST PROFILE STATION STX-9

LOCATION NP-N-27.4

RECORDERS LT JS

PHOTOGRAPHS LTNP-3-23-36

GRAIN SIZE _____

SAND SUPPLY LOW - NO I.D.F.

Cores Along Strike
(depth of sand)

1 112 cm 4 _____ cm
2 _____ cm 5 _____ cm
3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 72 cm 4 _____ cm
2 51 cm 5 _____ cm
3 _____ cm 6 _____ cm

DATE 5 MARCH 80

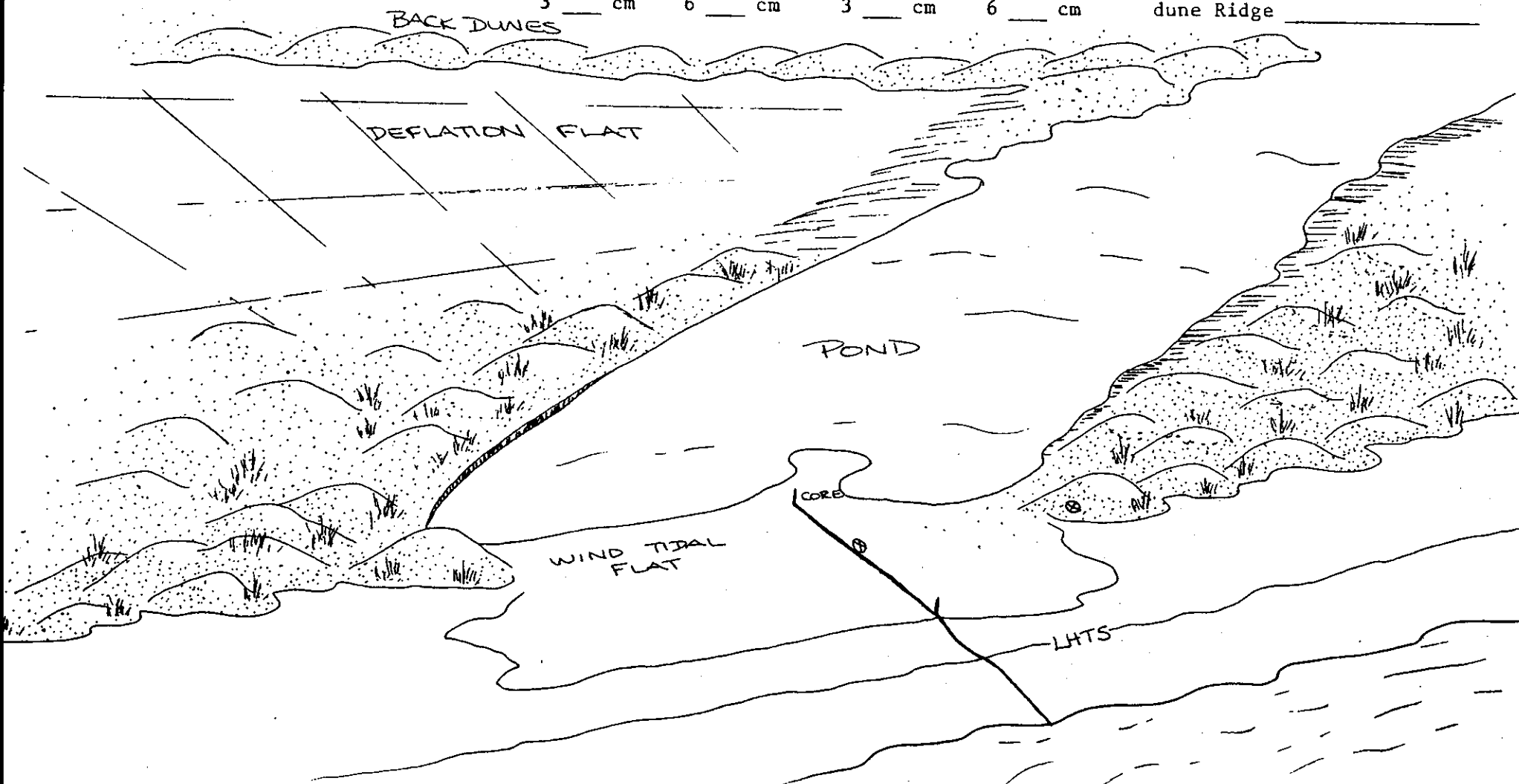
27.4 MILES NORTH/SOUTH OF MANSFIELD INLET

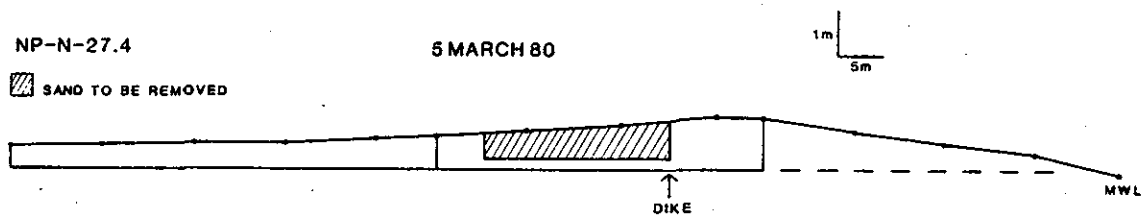
Length of Breach 80 M

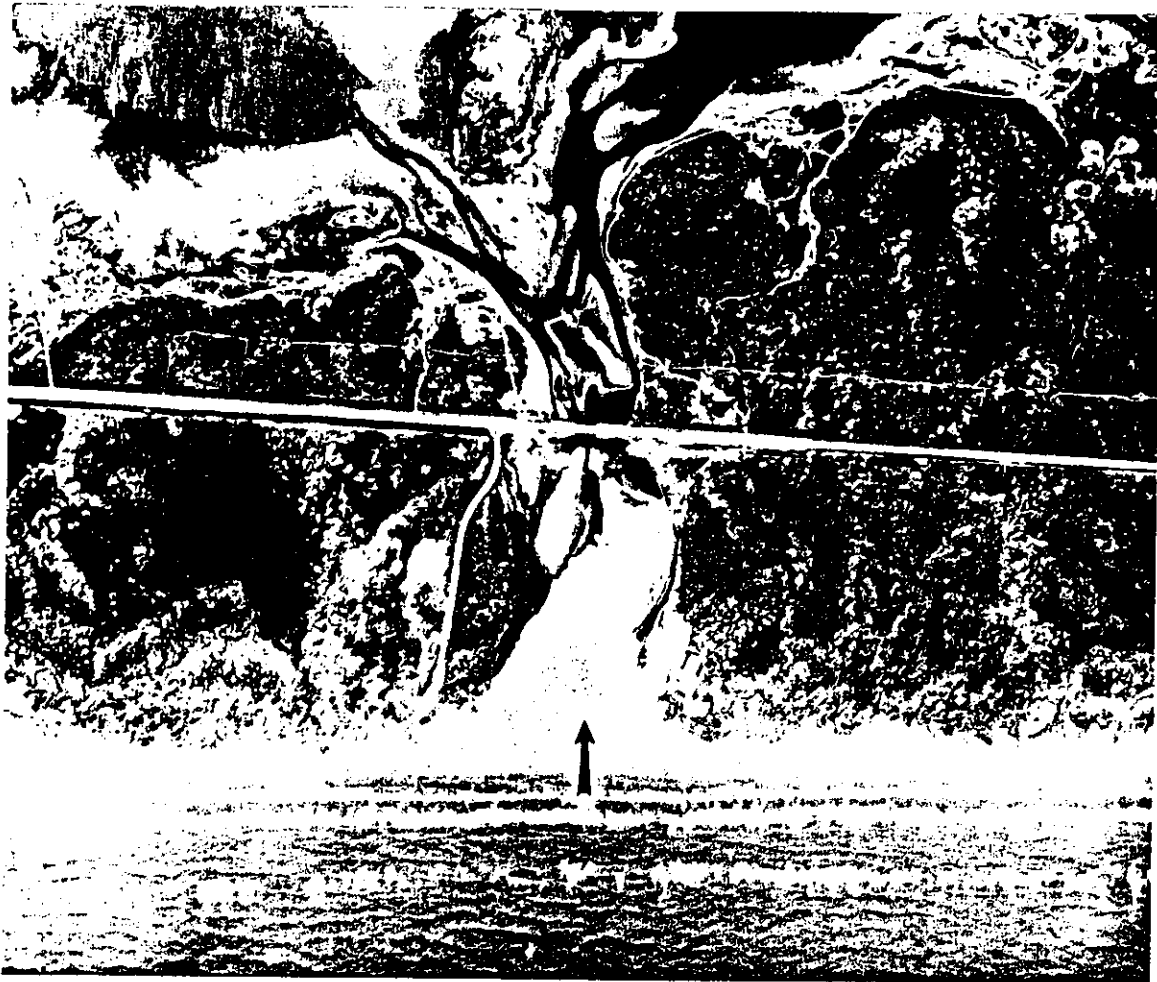
Depth of Washover 122 M

Height of Dunes 3-5 M

Width of Fore-dune Ridge _____







SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: MFP-S-2.35 (Primary Priority Closure)

LOCATION: 3.77 km (2.35 miles) south of Corpus Christi Fish Pass

BREACH WIDTH: 400 m (1210 ft)

WASHOVER LENGTH: 190 m (577 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 1-4 m (3-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: High ($\sim 34 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 20 (61 ft)

COMMENTS: This washover has abundant usable sand which is very accessible.
The channel sand is quite hard-packed.

NEAREST PROFILE STATION STX/A - 6

DATE 6 MARCH 80

LOCATION MFP-S - 2.35

2.35 MILES NORTH/SOUTH OF FISH PASS INLET

RECORDERS JS LT

Cores Along Strike
(depth of sand)

Cores along Dip
(depth of sand)

Length of Breach 400 M

PHOTOGRAPHS LTM 19-36

Depth of Washover 192 M

GRAIN SIZE _____

1 89 cm 4 _____ cm

1 75 cm 4 _____ cm

Height of Dunes 1-4 M

SAND SUPPLY MODERATE

2 _____ cm 5 _____ cm

2 75 cm 5 _____ cm

Width of Fore-
dune Ridge _____

3 _____ cm 6 _____ cm

3 _____ cm 6 _____ cm

VEGETATED DUNES

ALGAL MAT
WINDSWEPT SAND FLAT
FEW TAR BALLS

CORE

INCIPIENT DUNES
UNVEGETATED

CORE

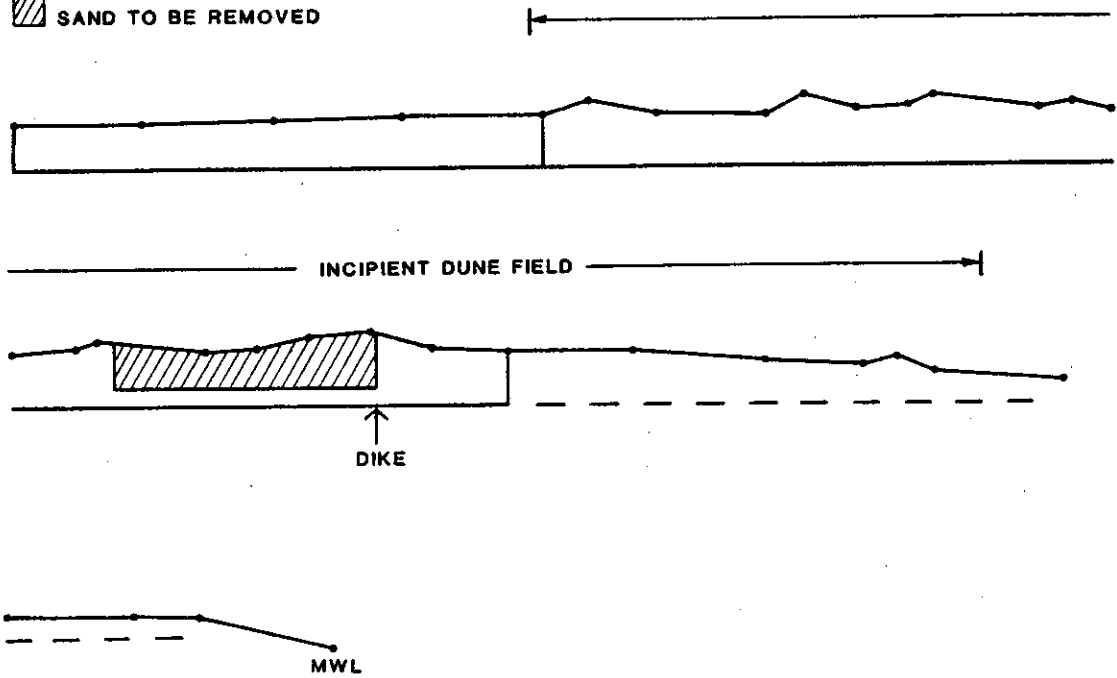
BEACHFACE - POORLY

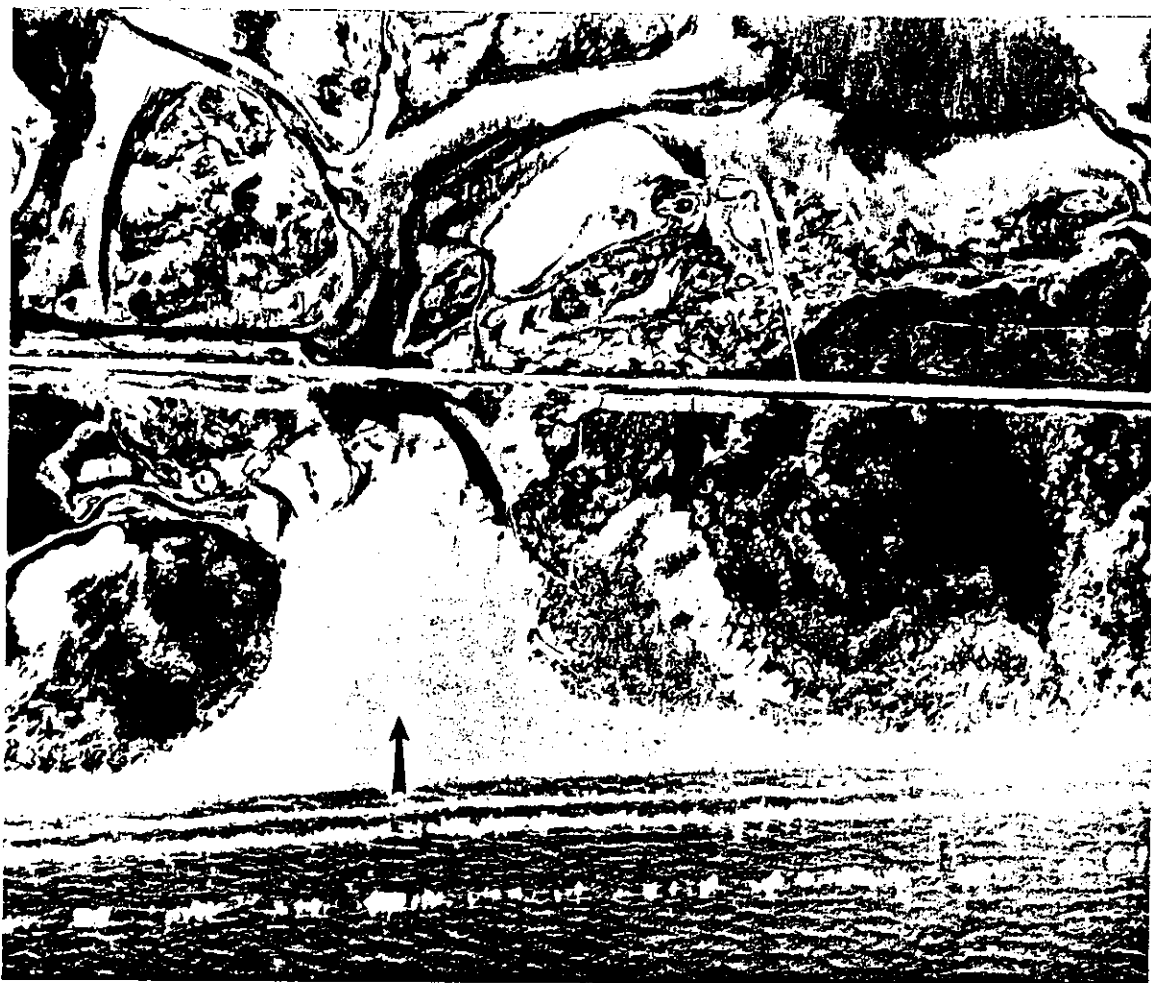
DEVELOPED

CUSPS

MFP-S-2.35

MARCH 80

 SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: MFP-S-3.55 (Primary Priority Closure)

LOCATION: 5.7 km (3.55 miles) south of Corpus Christi Fish Pass

BREACH WIDTH: 650 m (1980 ft)

WASHOVER LENGTH: 300 m (910 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-4 m (6-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: High ($\sim 33 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 22 m (67 ft)

COMMENTS: This is a very accessible area, as a paved road runs through the washover channel. The sand is also quite hard-packed. The ponded reentrant behind opens into Laguna Madre allowing possible introduction of oil during a storm surge.

NEAREST PROFILE STATION STX/A-6

LOCATION MFP-S-3.55

RECORDERS LT SD

PHOTOGRAPHS LTM2-3-21

GRAIN SIZE _____

SAND SUPPLY LOW TO MODERATE

DATE 10 MARCH 80 1100

3.55 MILES NORTH/SOUTH OF FISH PASS INLET

Cores Along Strike
(depth of sand)

1 86 cm 4 _____ cm
2 _____ cm 5 _____ cm
3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

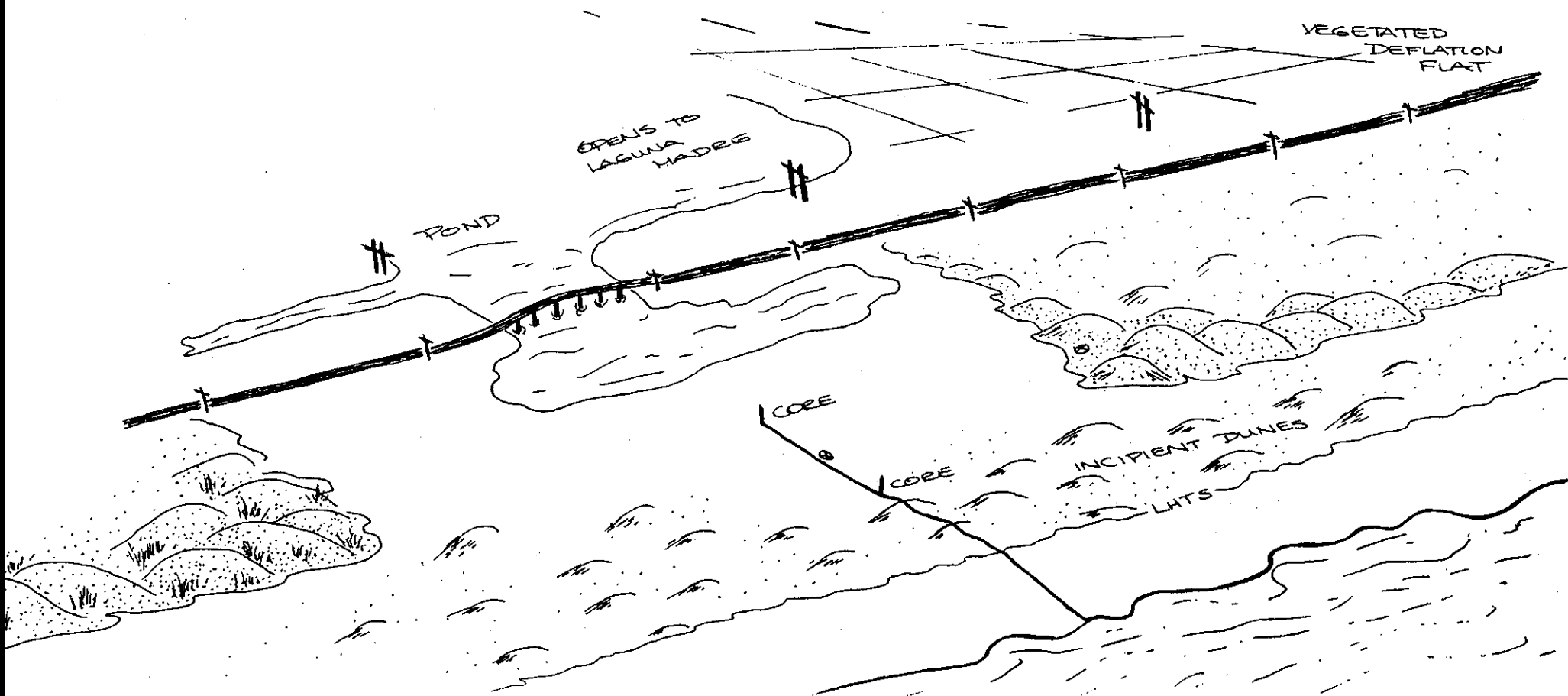
1 70 cm 4 _____ cm
2 66 cm 5 _____ cm
3 _____ cm 6 _____ cm

Length of Breach 650 M

Depth of Washover 298 M

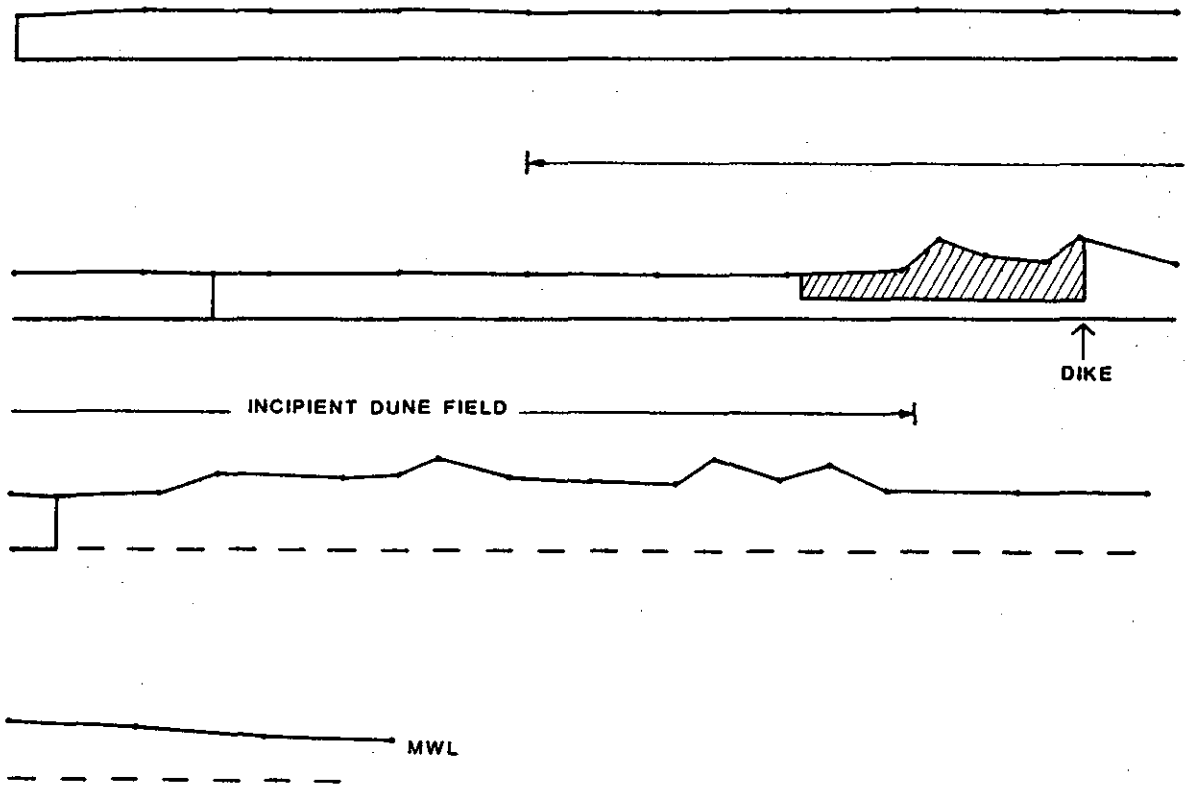
Height of Dunes 2-4 M

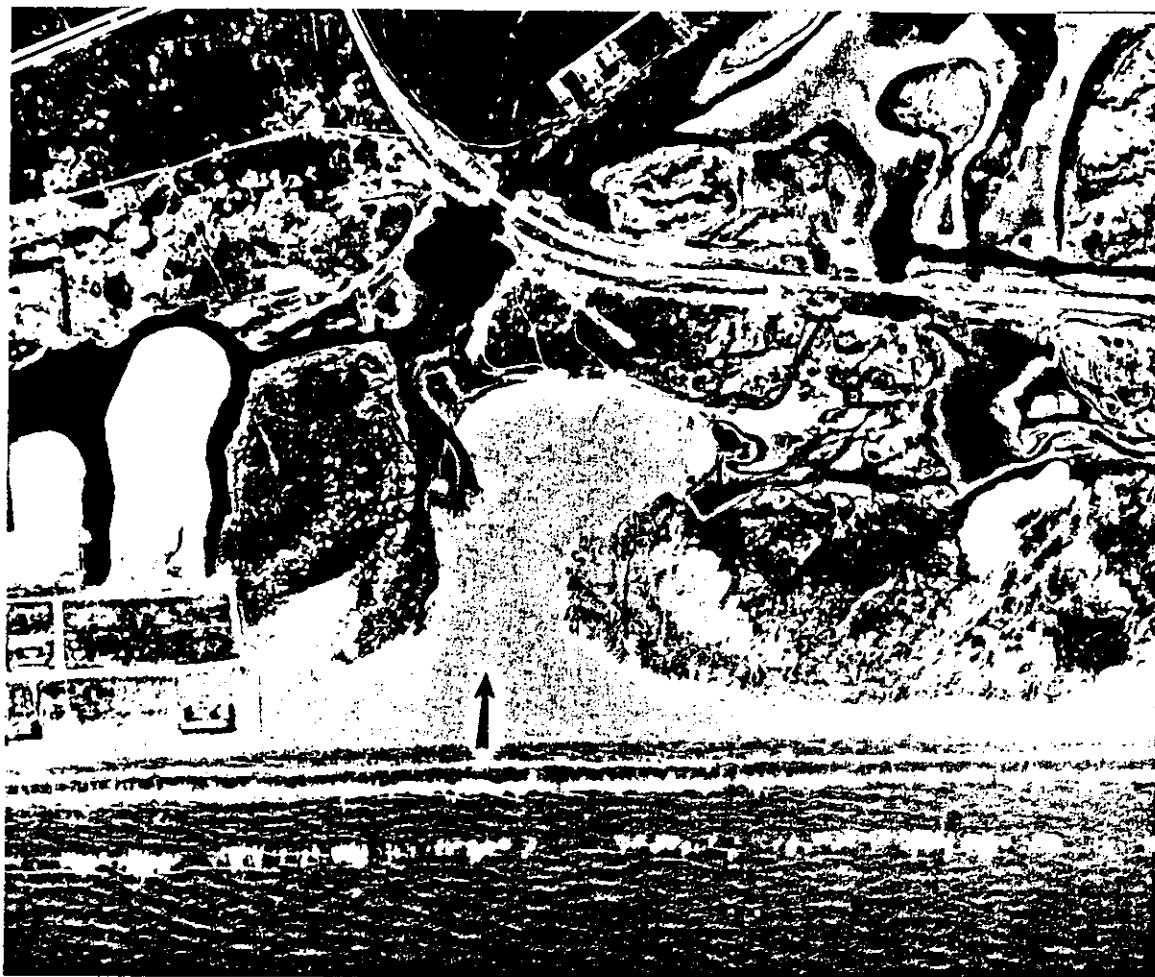
Width of Fore-dune Ridge _____



MFP-S-3.55

10 MARCH 80

1m
5m SAND TO BE REMOVED



SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: MFP-S-4.85 (Primary Priority Closure)

LOCATION: 7.76 km (4.85 miles) south of Corpus Christi Fish Pass

BREACH WIDTH: 290 m (870 ft)

WASHOVER LENGTH: 240 m (730 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 2-3 m (6-9 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Moderate ($\sim 12 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 22 m (67 ft)

COMMENTS: This washover is easily accessible owing to a nearby access road and heavy beach traffic on hard-packed sand. The developing foredunes are well vegetated and large ($>1 \text{ m}$) with gaps in between. Pounded water behind the washover opens into Laguna Madre.

NEAREST PROFILE STATION STX/A - 7

LOCATION MFP - 3 - 485

RECORDERS LT SD

PHOTOGRAPHS LTM2 - 22 - 38

GRAIN SIZE _____

SAND SUPPLY LOW TO MODERATE

DATE 10 MARCH 80

485 MILES NORTH/SOUTH OF FISH PASS INLET

Cores Along Strike
(depth of sand)

1 78 cm 4 _____ cm
2 _____ cm 5 _____ cm
3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

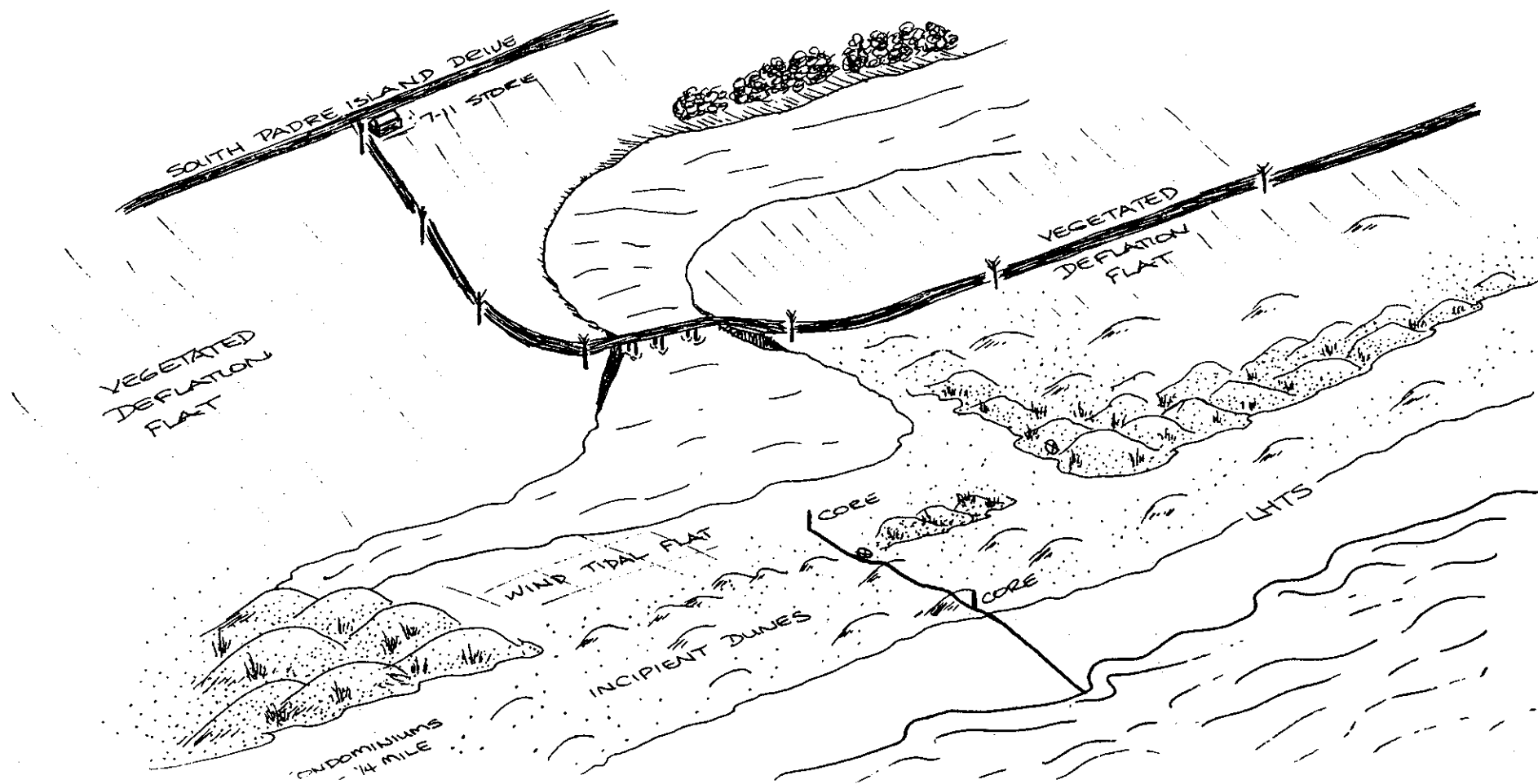
1 68 cm 4 _____ cm
2 62 cm 5 _____ cm
3 _____ cm 6 _____ cm

Length of Breach 288 M

Depth of Washover 239 M

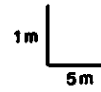
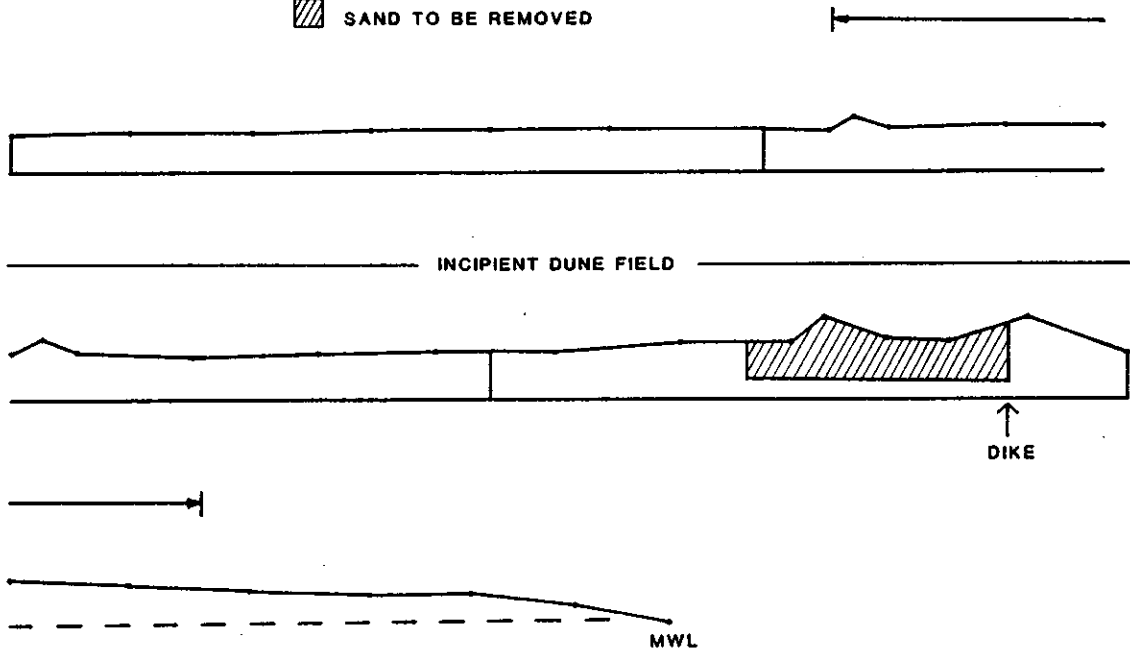
Height of Dunes 2-3 M

Width of Fore-
dune Ridge _____



MFP-S-4.85

10 MARCH 80

 SAND TO BE REMOVED

LOCATION NOT COVERED
BY U.S. ENVIRONMENTAL PROTECTION AGENCY
JUNE 1979 AERIAL PHOTO TRACK

SCALE 1:18,000

1 INCH = 1500 FEET

1 cm = 180 m

STATION: M-S-10.85 (Primary Priority Closure)

LOCATION: 17.4 km (10.85 miles) south of Aransas Pass on Mustang Island

BREACH WIDTH: 60 m (182 ft)

WASHOVER LENGTH: 120 m (366 ft)

AVERAGE HEIGHT OF ADJACENT FOREDUNE RIDGE: 3-4 (9-12 ft)

DUNE SAND SUPPLY IN WASHOVER CHANNEL: Low ($\sim 5 \text{ m}^3/\text{m}$)

LENGTH OF WASHOVER CHANNEL REQUIRED TO SCRAPE SUFFICIENT SAND TO
CONSTRUCT MODEL CLOSURE STRUCTURE: 24 m (73 ft)

COMMENTS: Located very close to access road (about 150 m) and the sand
is quite hard packed.

NEAREST PROFILE STATION STXM-4

LOCATION M-S 1085

RECORDERS LT JS

PHOTOGRAPHS LTM1-1-18

GRAIN SIZE _____

SAND SUPPLY _____

Cores Along Strike
(depth of sand)

1 82 cm 4 _____ cm

2 _____ cm 5 _____ cm

3 _____ cm 6 _____ cm

Cores along Dip
(depth of sand)

1 79 cm 4 _____ cm

2 52 cm 5 _____ cm

3 _____ cm 6 _____ cm

DATE 6 MARCH 80

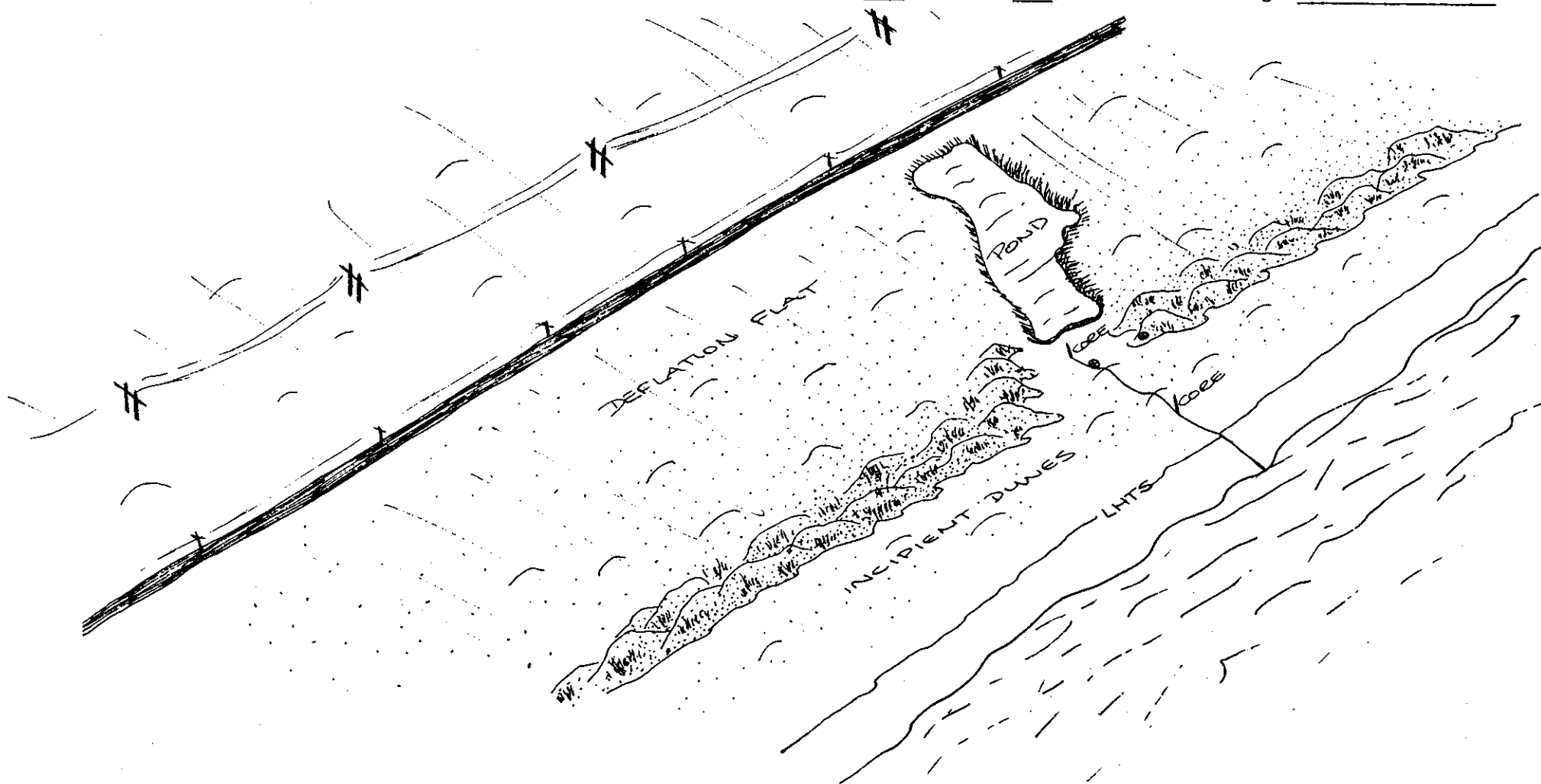
10.85 MILES NORTH/SOUTH OF PORT ARKANSAS INLET

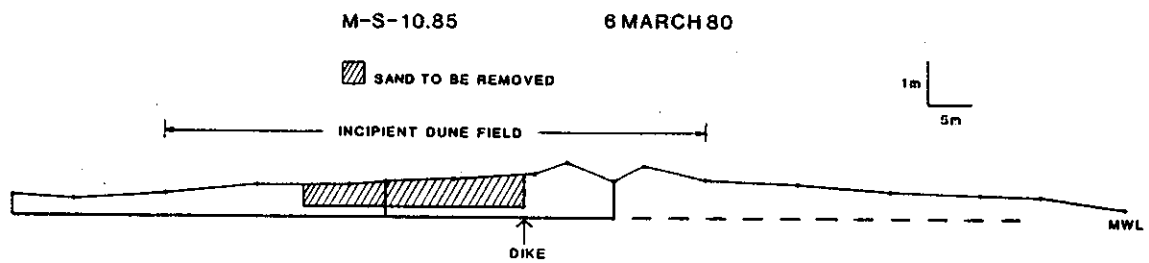
Length of Breach 60 M

Depth of Washover 122 M

Height of Dunes 2.3 M

Width of Fore-
dune Ridge _____



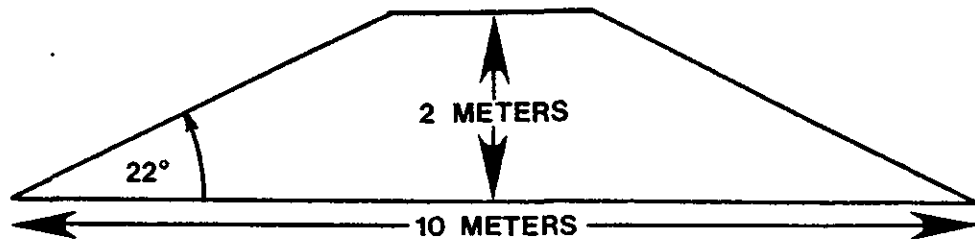


Proposed Methods for Washover Closure

The following guidelines for the closure structure and sand source are recommended if it is decided that the washovers should be sealed.

Closure structure.

1. The following dimensions for a closure structure, constructed of sand, are recommended:



This is approximately the shape and size of the smaller, stable foredune ridges in south Texas.

2. To avoid rapid erosion of the structure, it should be located at least ten meters (30 ft) behind the present trend of the adjacent, stabilized foredune ridge. This is especially critical in areas where the foredune ridge exhibits a basal erosional scarp, an indication of dune erosion during spring tides and/or storms.
3. The structure should be built as soon before an impending storm as possible. An unvegetated sand structure exposed to strong easterly winds would suffer numerous blowouts, reducing its height and

effectiveness. Normally, these storms do not threaten the Texas coast until August, so washover closure should not be initiated during spring or early summer.

Sand source.

1. To avoid entrapment of heavy equipment, sand utilized from the washover channel should not be taken from any deeper than 25 cm (10 in) above the water table.
2. Sand utilized from local dunes should not be taken from dunes stabilized by climax vegetation (e.g., sea oats). This includes the present stable fore-dune ridge and back-island dunes, and any isolated, stabilized dune mounds in the washover channel. Care should be exercised to prevent this vegetation from being run over by heavy equipment.
3. Dune sand may be taken from the incipient dune field (a band of low, unvegetated dunes which parallels the stable dune trend). These dunes are usually low (10-50 cm (4-10 in)), of flat or barchan morphology, and commonly have formed around small clumps of Sesuvium. During construction of the dike, some Sesuvium would be destroyed; however, because it is able to rapidly recolonize an area, its loss would not be permanent.
4. Sand from the beach in front of the foredune ridge or incipient dune field should not be removed, as

shoreline erosion may occur due to oversteepening of the beachface. The South Padre Island beaches are presently eroding, and additional sand removal would compound the problem.

5. Channel sand, which is coarser and contains a relatively high concentration of shell debris, is preferred over use of the finer and more easily erodable dune sand.

Priorities for Washover Closure

Because of the usual time and personnel shortages during a spill, it is appropriate that certain washovers receive priority closure. We recommend that eight washovers are given "primary closure priority" based on the data in this report. Washovers BC-N-4.2, SP-N-14.6, MFP-S-2.35, MFP-S-4.85, and M-S-10.85 are accorded primary priority closure because the elevation of the storm berm is significantly lower at these localities than elsewhere in the study area (Fig. 3). These washovers would breach during a smaller magnitude storm. Washovers NP-N-24.0, NP-N-25.6, NP-N-27.4, and MFP-S-3.55 are also accorded first priority closure as each has a relatively flat profile and terminates very close to Laguna Madre. There is a higher probability for introduction of oil into the lagoon at these four washovers.

We recommend "secondary priority closure" to those remaining washovers south of Port Mansfield and north of SP-N-3.2 (Fig. 2). The barrier island is much more narrow in this

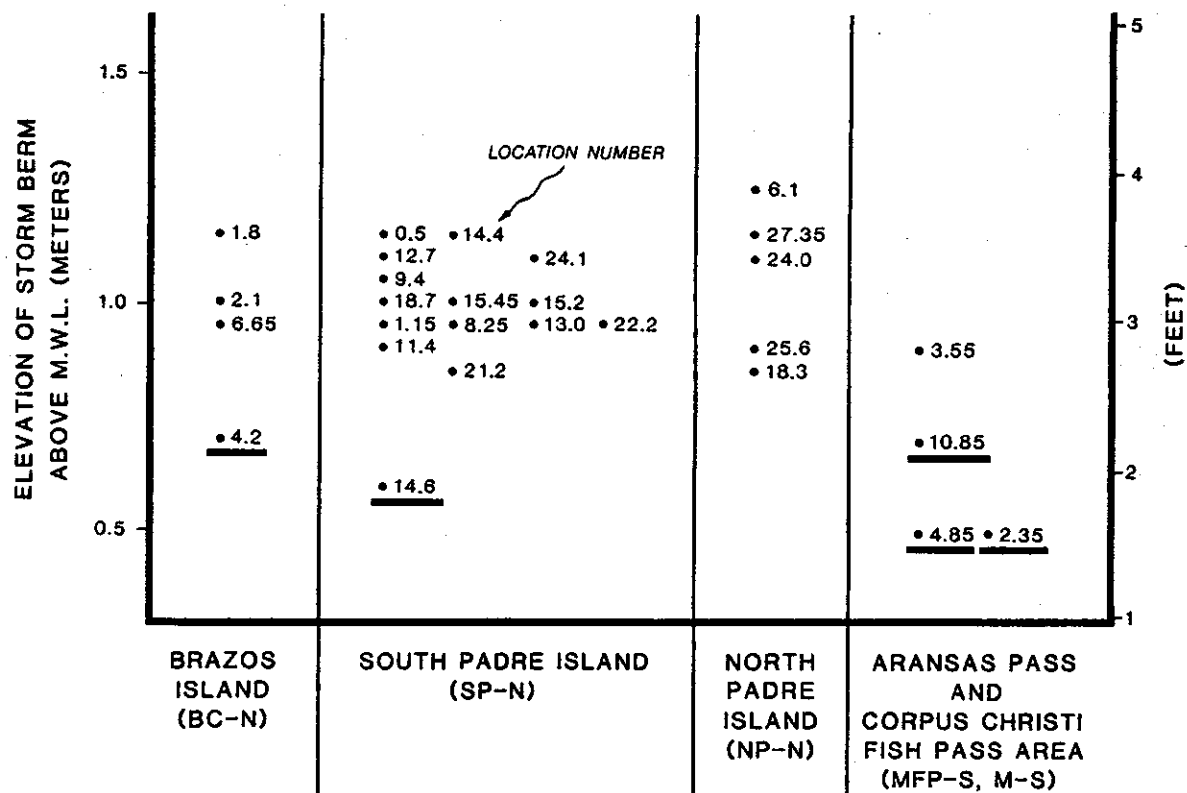


FIGURE 3. Plot of storm berm elevations for each washover in this study. Note that all seem to group around a berm elevation of about one meter except for those boldly underlined. The underlined washovers are given primary closure priority.

area, and the lagoonward termini of these washovers are much closer to Laguna Madre. Primary and secondary priorities for washover closures are designated on individual washover descriptions.

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