

ADMINISTRAÇÃO DOS PORTOS DO DOURO E LEIXÕES

Hydro-morphological study Douro Estuar

Part 1

Wave penetration calculations

Annex: wave ray diagrams



november 1982 / P613

ADMINISTRAÇÃO DOS PORTOS DO DOURO E LEIXÕES

Hydro-morphological study Douro Estuary

Part 1

Wave penetration calculations

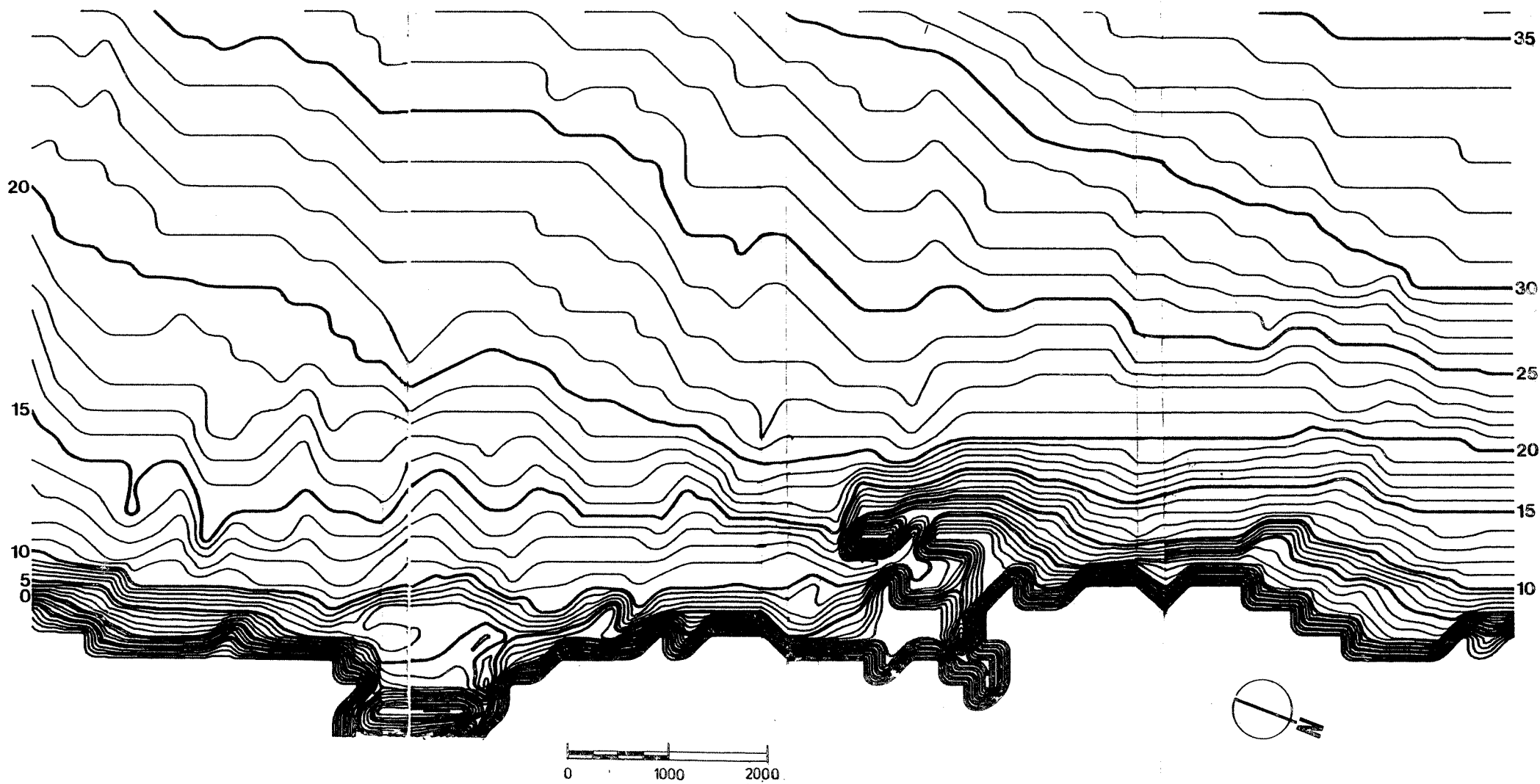
Annex : wave ray diagrams

PORT AND WATERWAY ENGINEERS

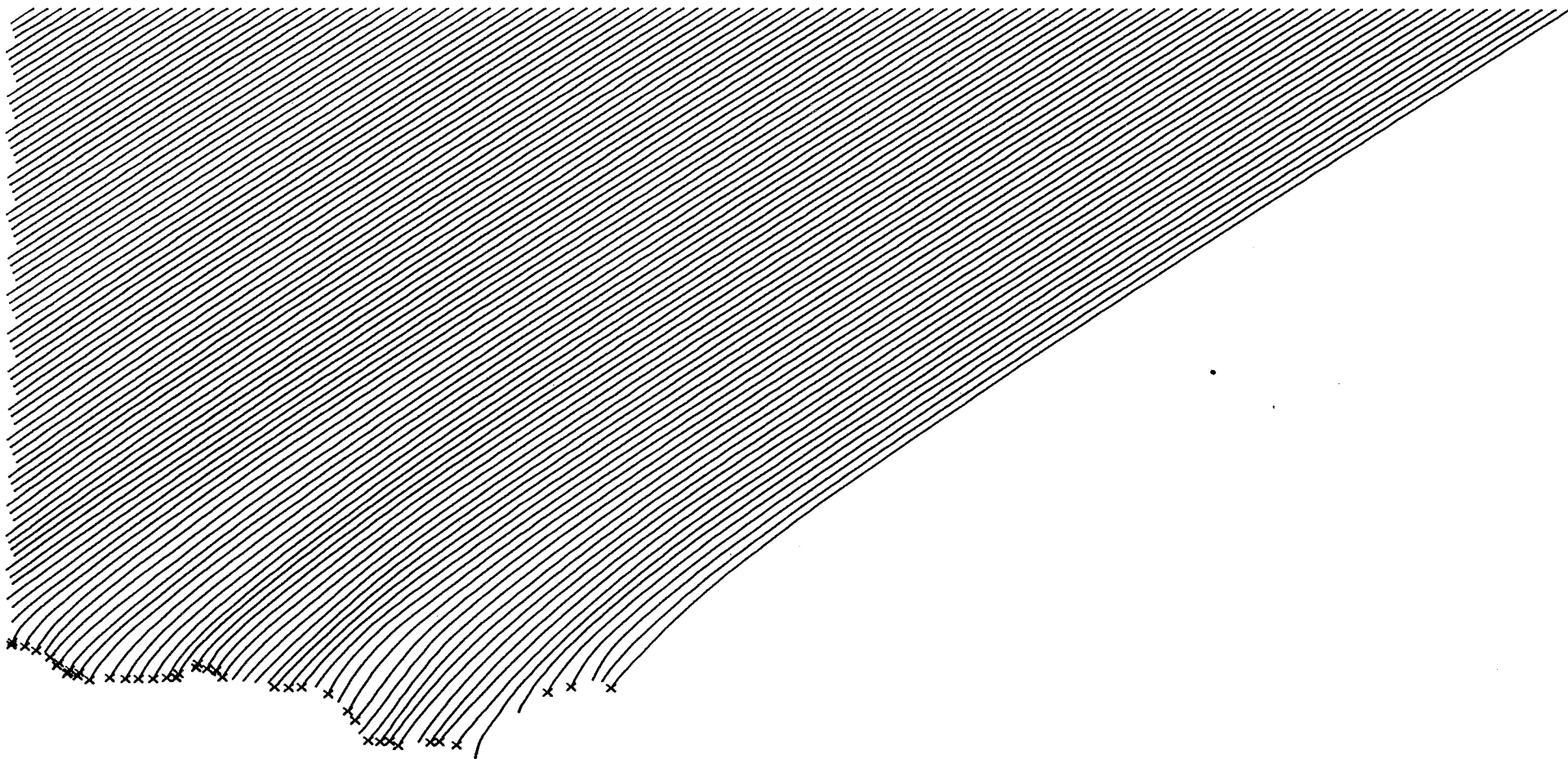
element number	significant wave height (m)	wave-period (sec)	angle of incidence in the model (degrees)	occurrence , %	
1	1	8	147,5	1,70	21,75
2	1	8	132,5	18,53	
3	1	8	117,5	0,77	
4	1	8	102,5	0,51	
5	1	8	80,0	0,24	
6	3	8	132,5	0,69	0,90
7	3	8	117,5	0,21	
8	1	10	147,5	2,25	33,79
9	1	10	132,5	23,34	
10	1	10	117,5	7,26	
11	1	10	102,5	0,64	
12	1	10	80,0	0,30	
13	3	10	147,5	0,69	
14	3	10	132,5	7,55	10,90
15	3	10	117,5	2,35	
16	3	10	102,5	0,21	
17	3	10	80,0	0,10	
18	1	12	147,5	0,63	
19	1	12	132,5	6,87	
20	1	12	117,5	2,14	
21	1	12	102,5	0,19	
22	3	12	147,5	0,76	
23	3	12	132,5	8,23	11,89
24	3	12	117,5	2,56	
25	3	12	102,5	0,23	
26	3	12	80,0	0,11	
27	4,5	12	147,5	0,12	
28	4,5	12	132,5	1,37	
29	4,5	12	117,5	0,43	1,92
30	3	14	147,5	0,19	2,98
31	3	14	132,5	2,05	
32	3	14	117,5	0,64	
33	4,5	14	132,5	0,68	0,89
34	4,5	14	117,5	0,21	

94,76%

**Wave ray diagrams
overall model**



DEPTH CONTOURS AS USED IN THE MATHEMATICAL OVERALL-MODEL

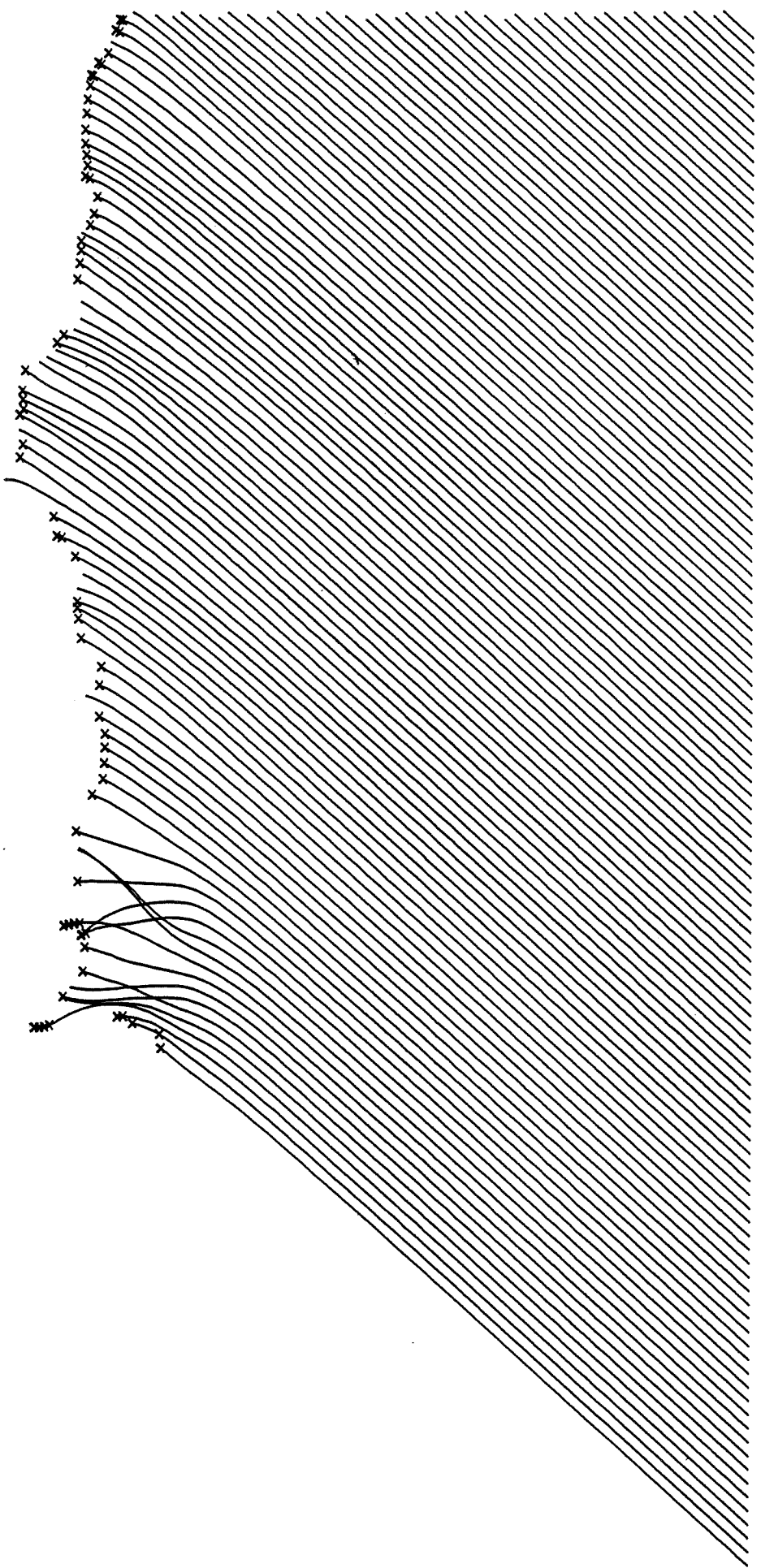


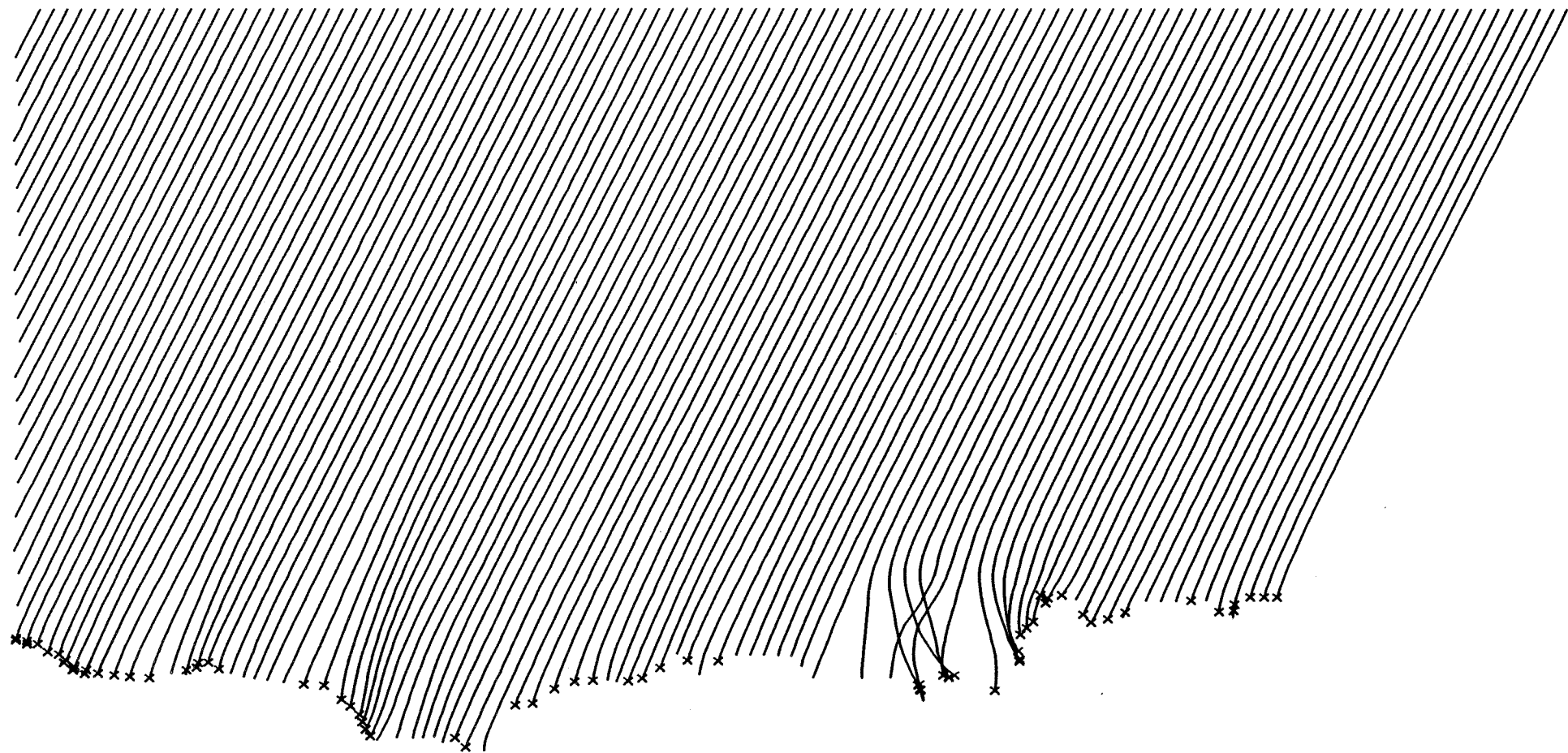
T- 0.00000 H₀- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 147.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 1

T- 0.00000
H- 1.00000
ANGLE OF INCIDENCE 182.500
RISE- 2.00000
DEGREES

WAVE CLIMATE ELEMENT NUMBER 2



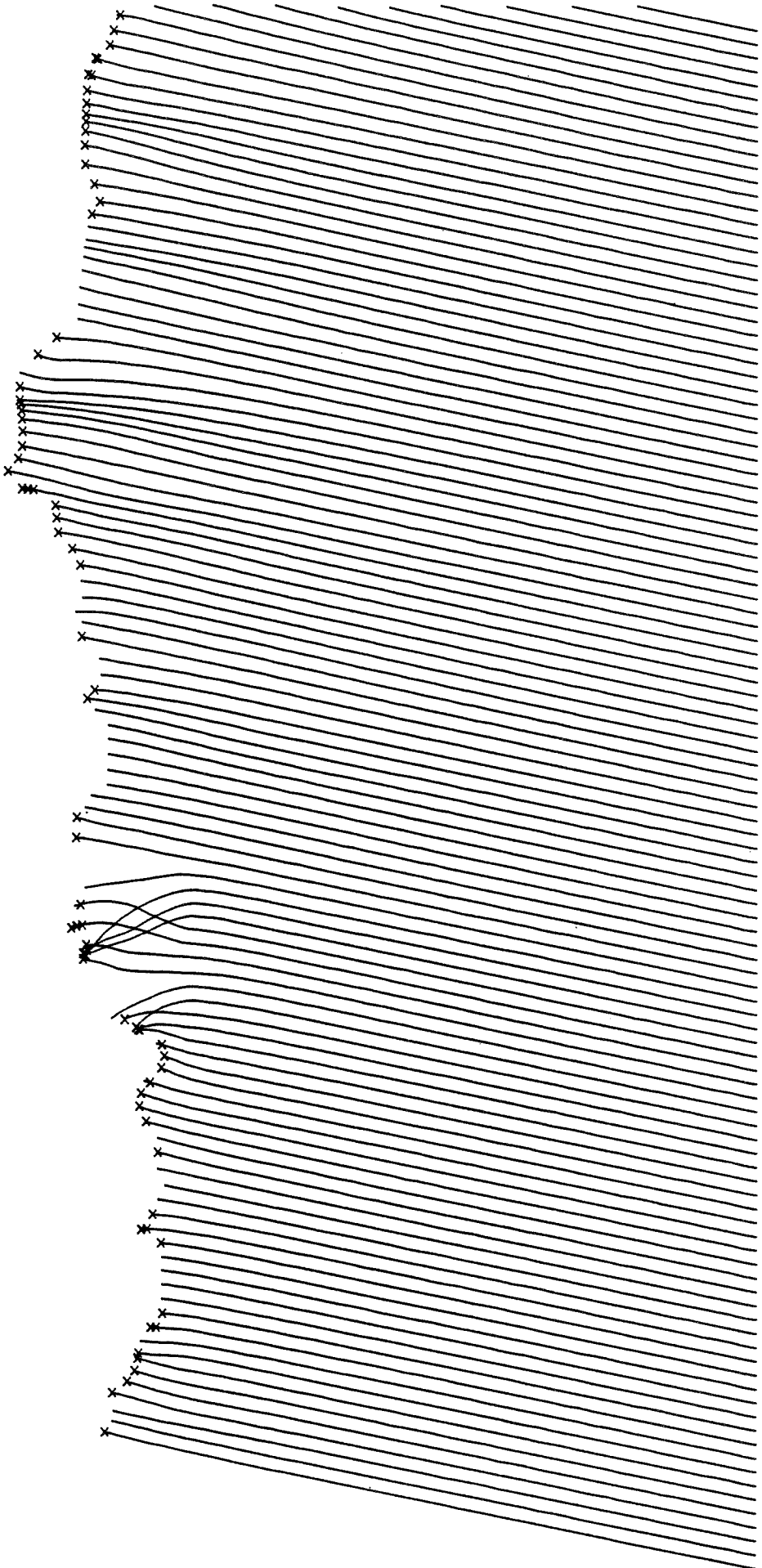


T- 8.00000 H0- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 117.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 3

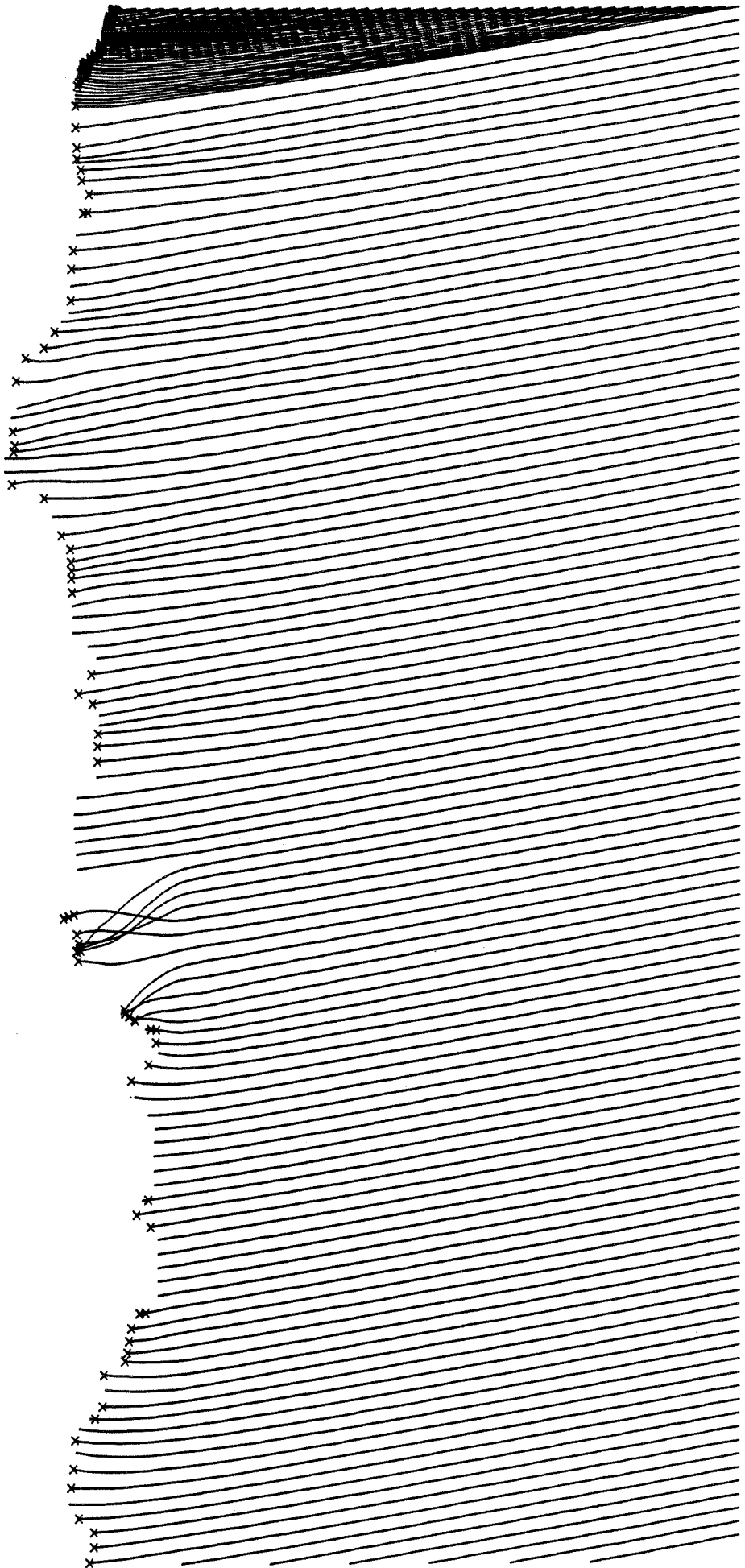
T= 8.000000 HB= 1.000000 RISE= 2.000000
ANGLE OF INCIDENCE 102.0000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 4



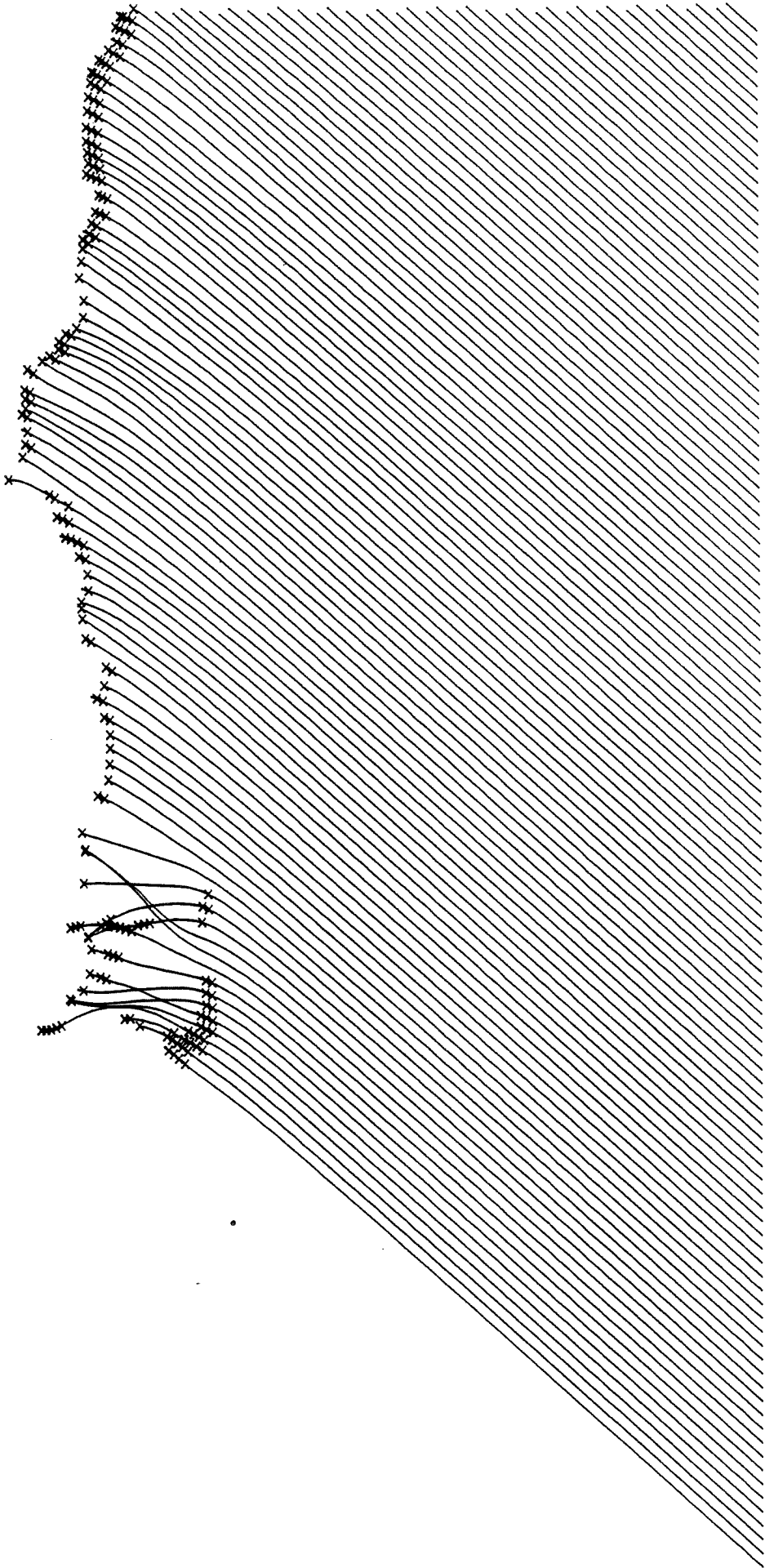
T- 8.00000 H- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 90.00000 DEGREES

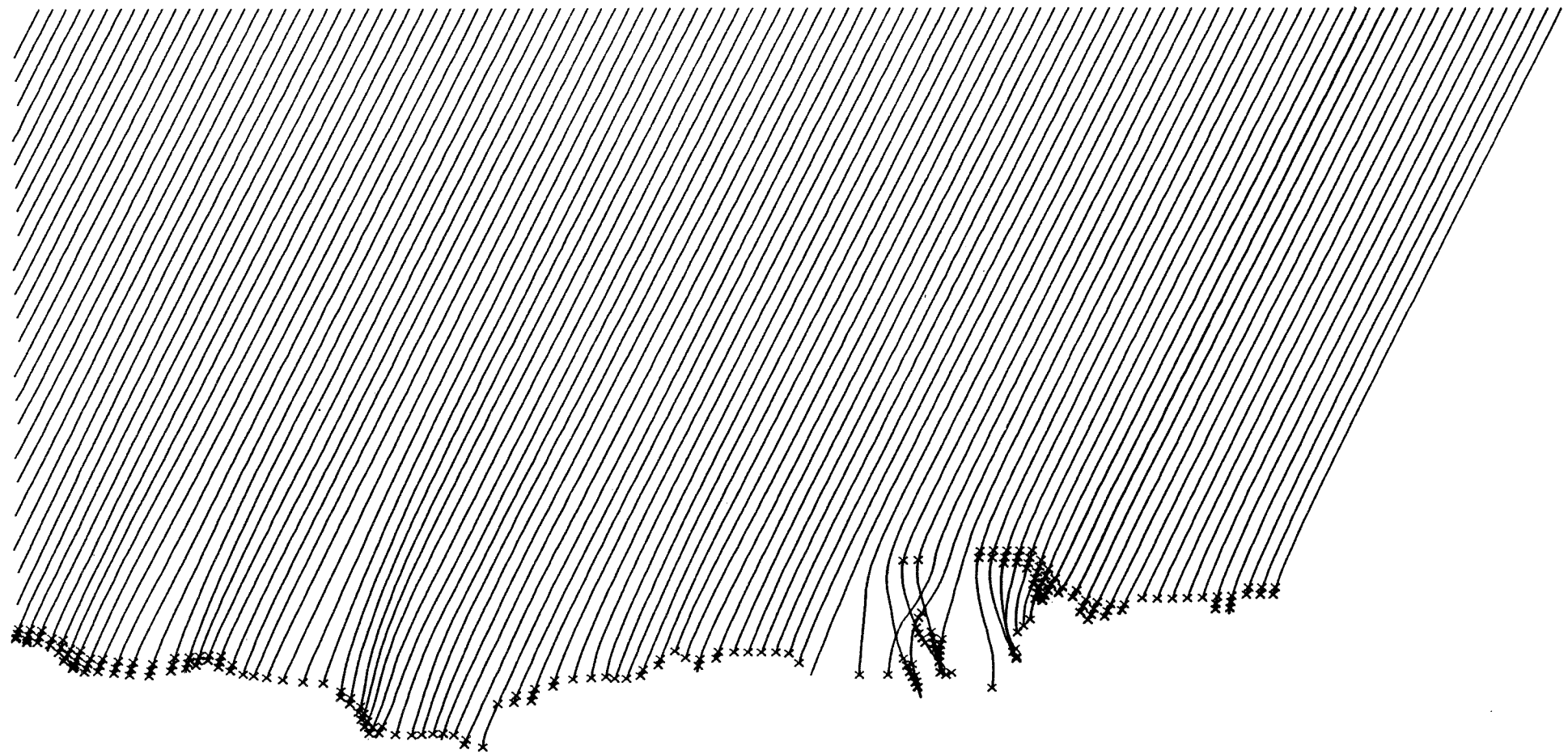
WAVE CLIMATE ELEMENT NUMBER 5



T= 0.00000 HB= 3.00000 RISE= 2.00000
ANGLE OF INCIDENCE 132.5000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 6



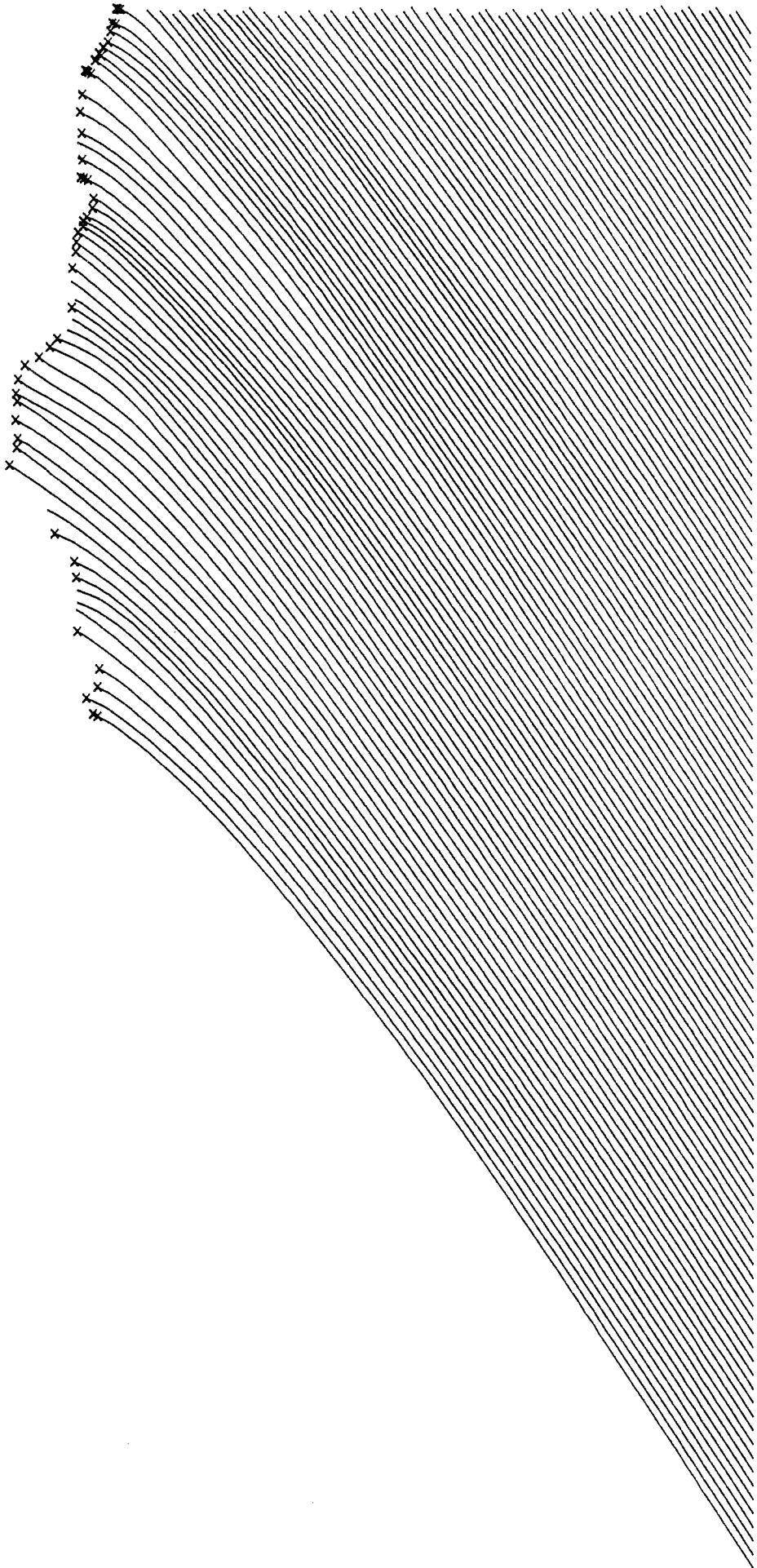


T- 8.00000 HO- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 117.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 7

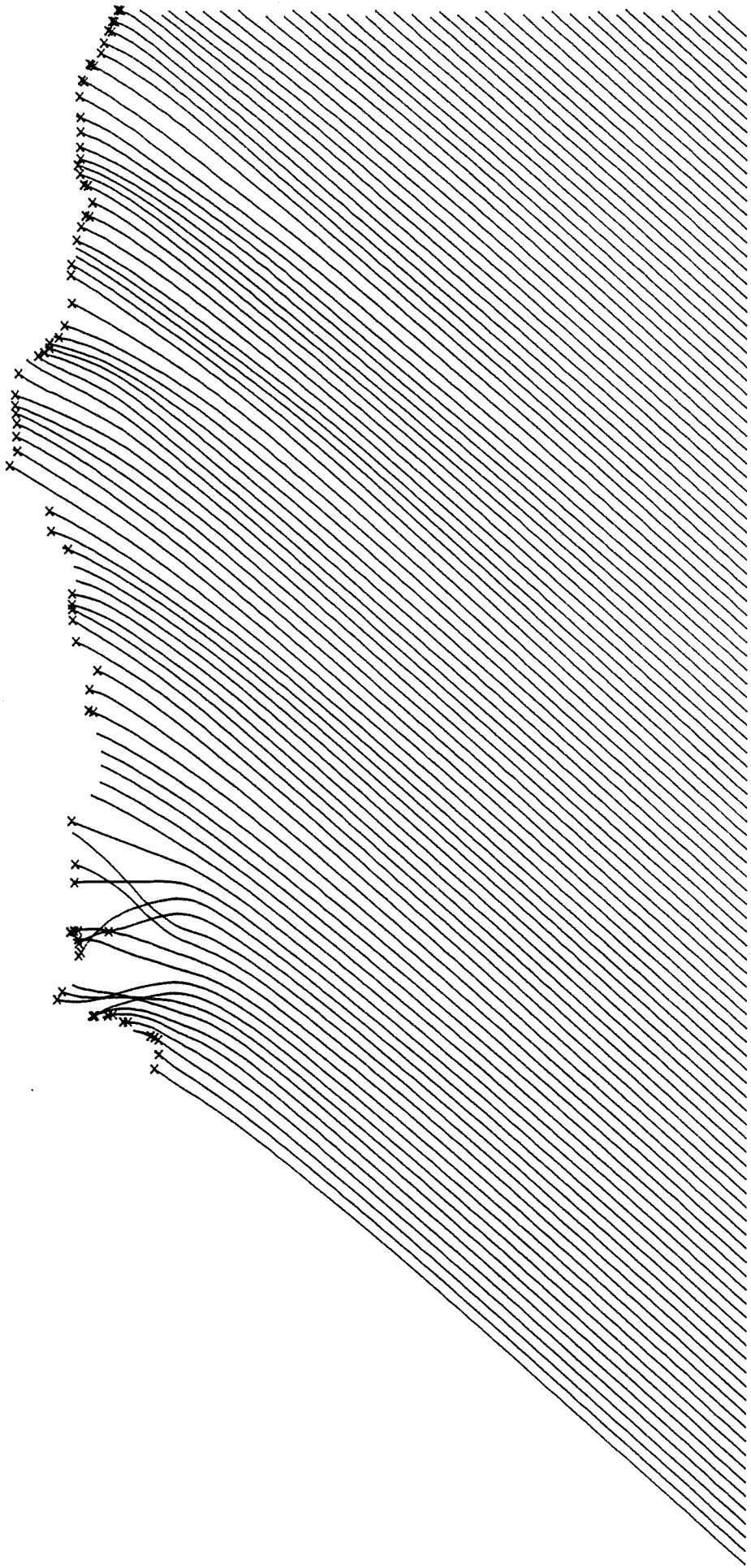
T- 10.00000 H- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 147.500 DEGREES

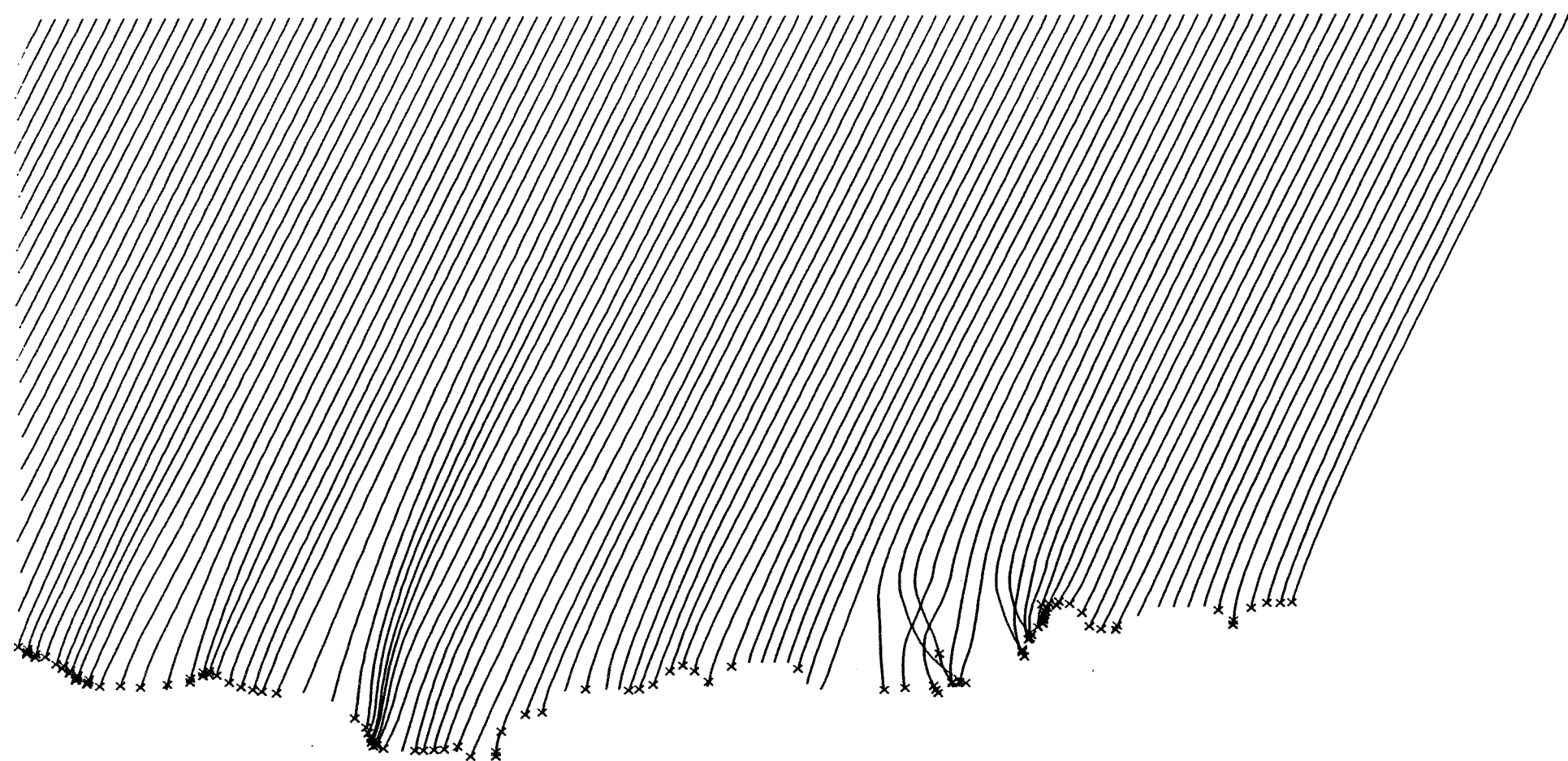
WAVE CLIMATE ELEMENT NUMBER 8



T- 18.00000 H- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 132.500 DEGREES

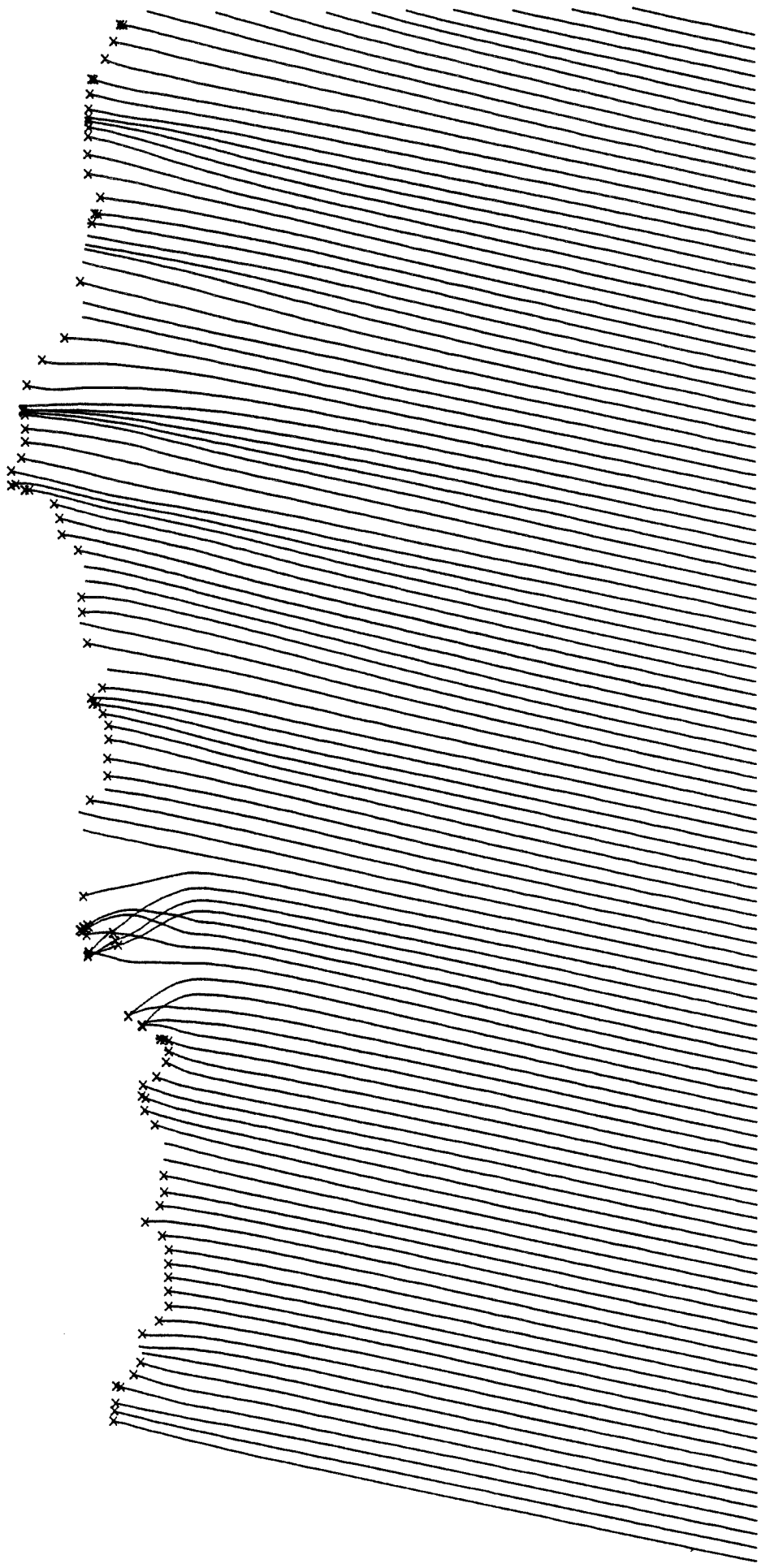
WAVE CLIMATE ELEMENT NUMBER 9





T- 10.0000 HD- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 117.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 10

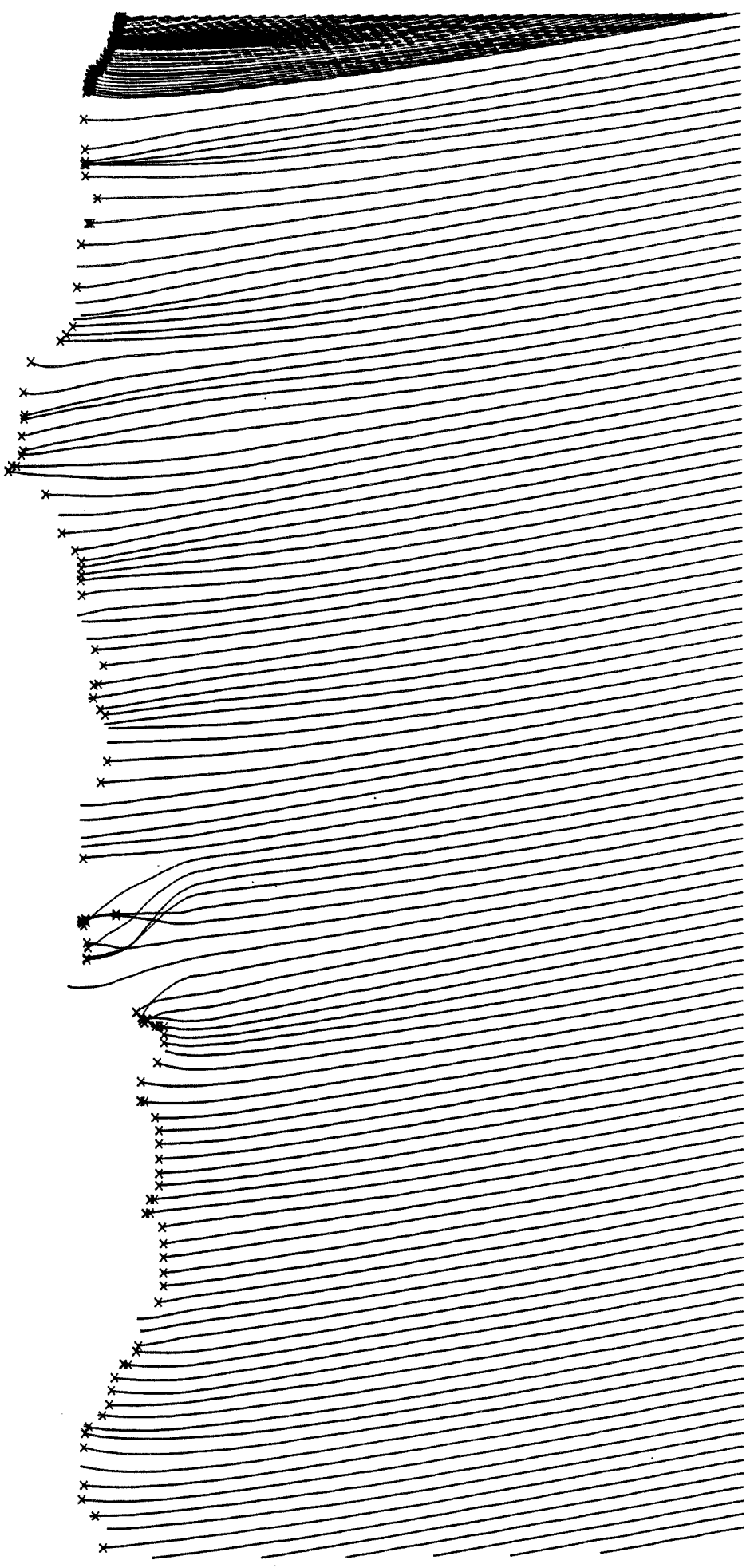


T= 10.00000
ANGLE OF INCIDENCE 102.5000
RISE= 1.000000
DEGREES 2.000000

WAVE CLIMATE ELEMENT NUMBER 11

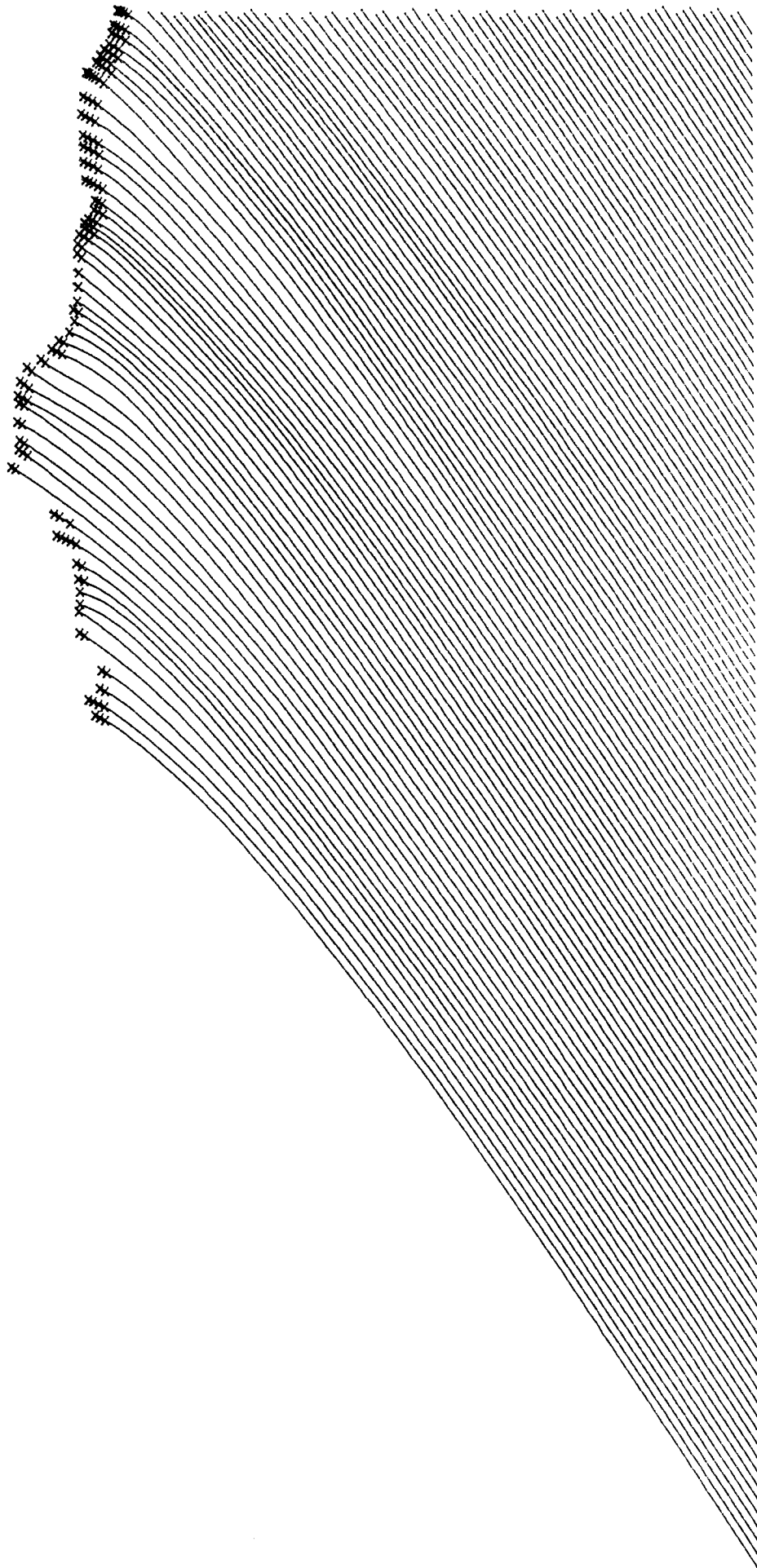
T= 18.00000 Hg= 1.000000 RISE= 2.000000
ANGLE OF INCIDENCE 80.00000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 12



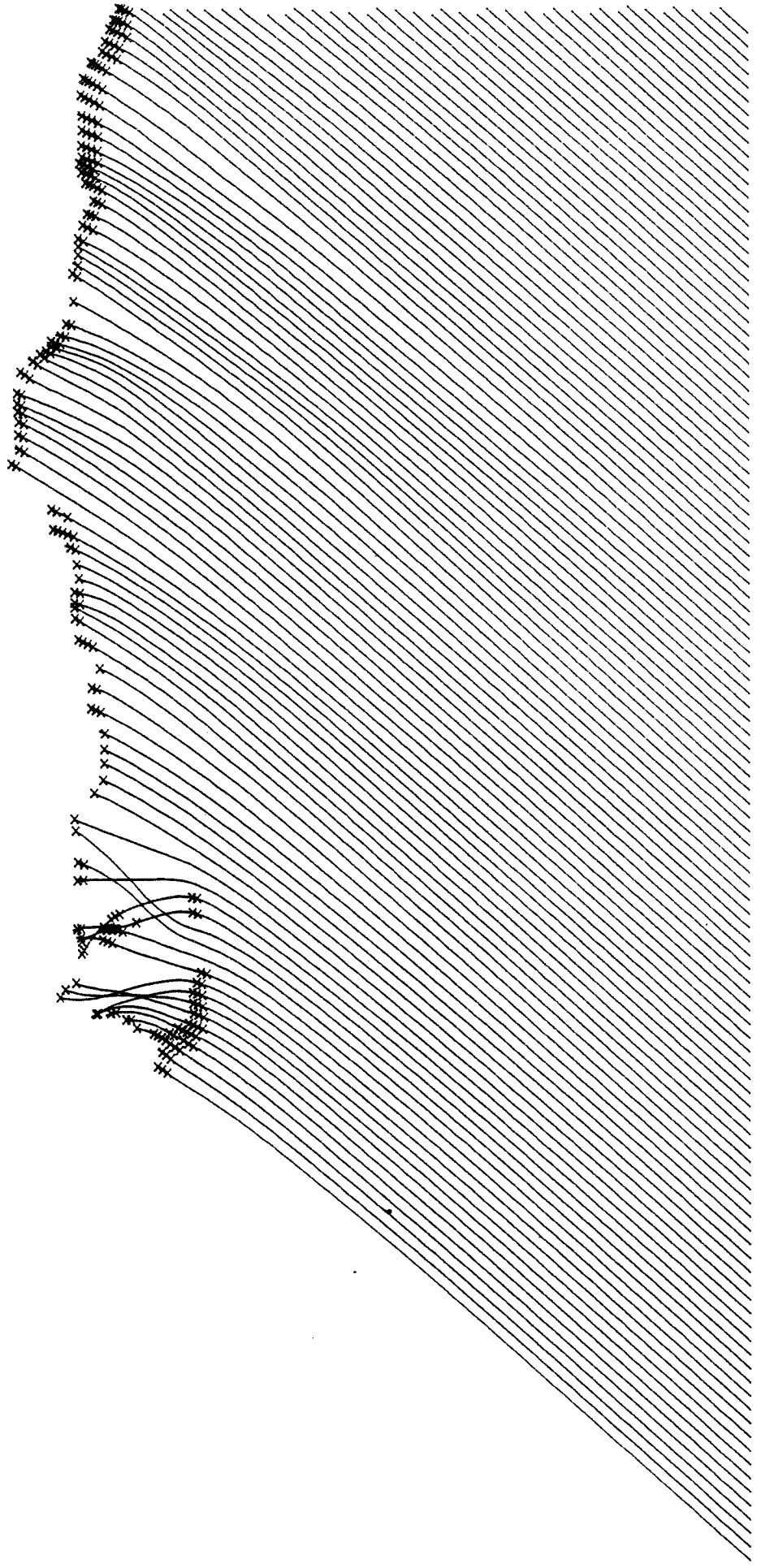
T- 18.0000 H- 3.0000 RISE- 2.0000
ANGLE OF INCIDENCE 147.5000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 13



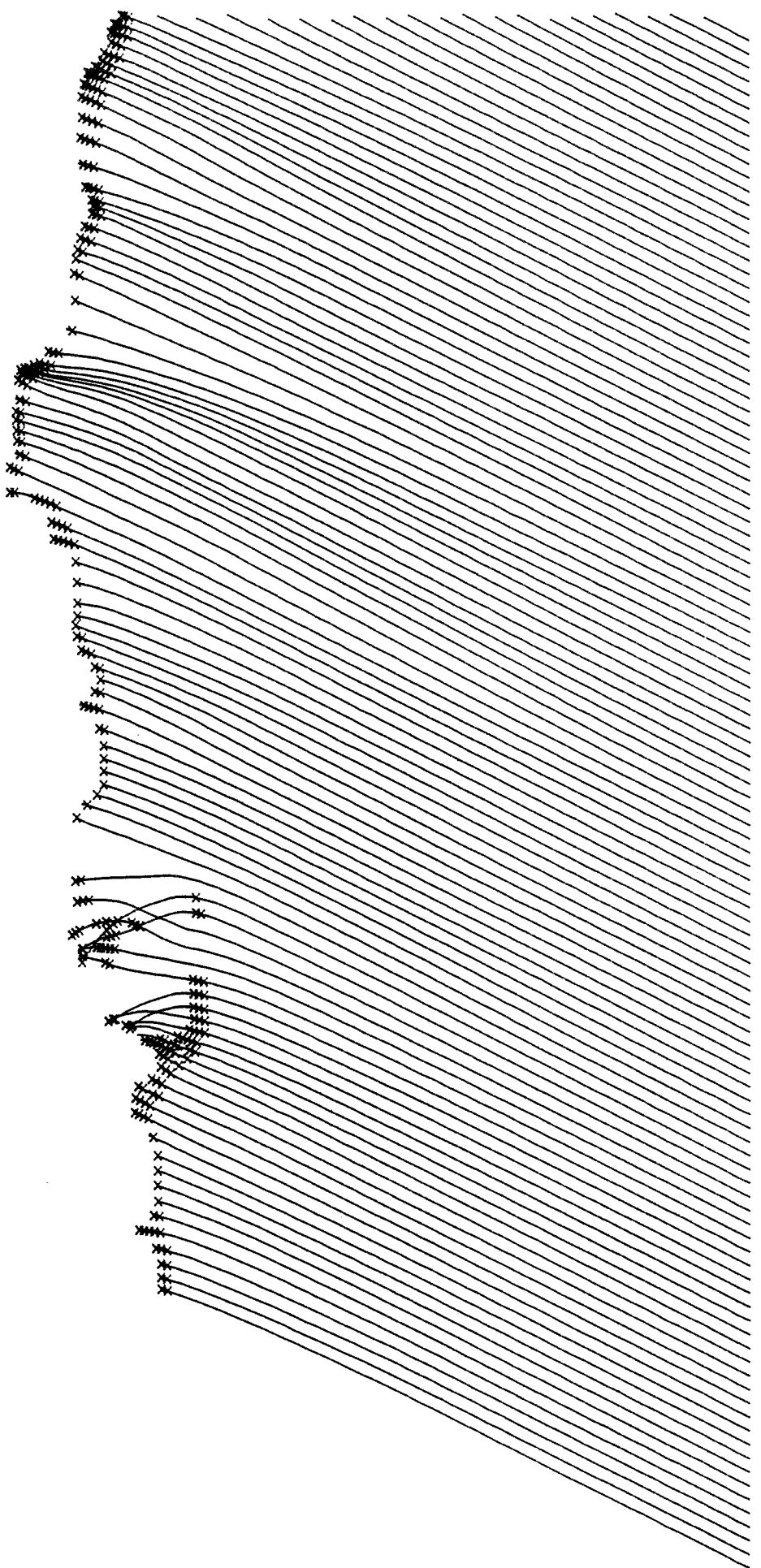
T- 10.00000 H- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 132.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 14



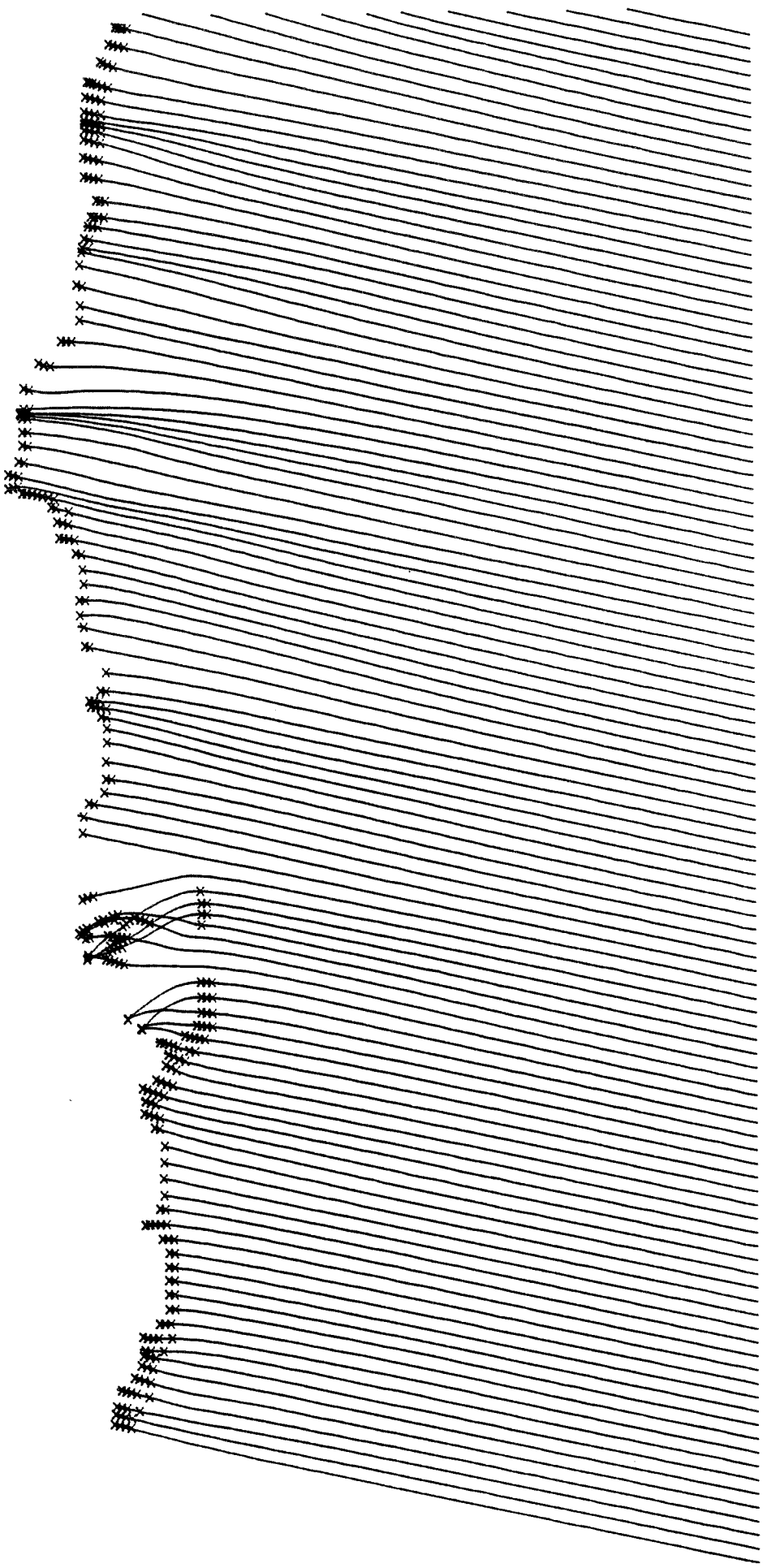
T- 10.00000 H- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 117.5000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 15



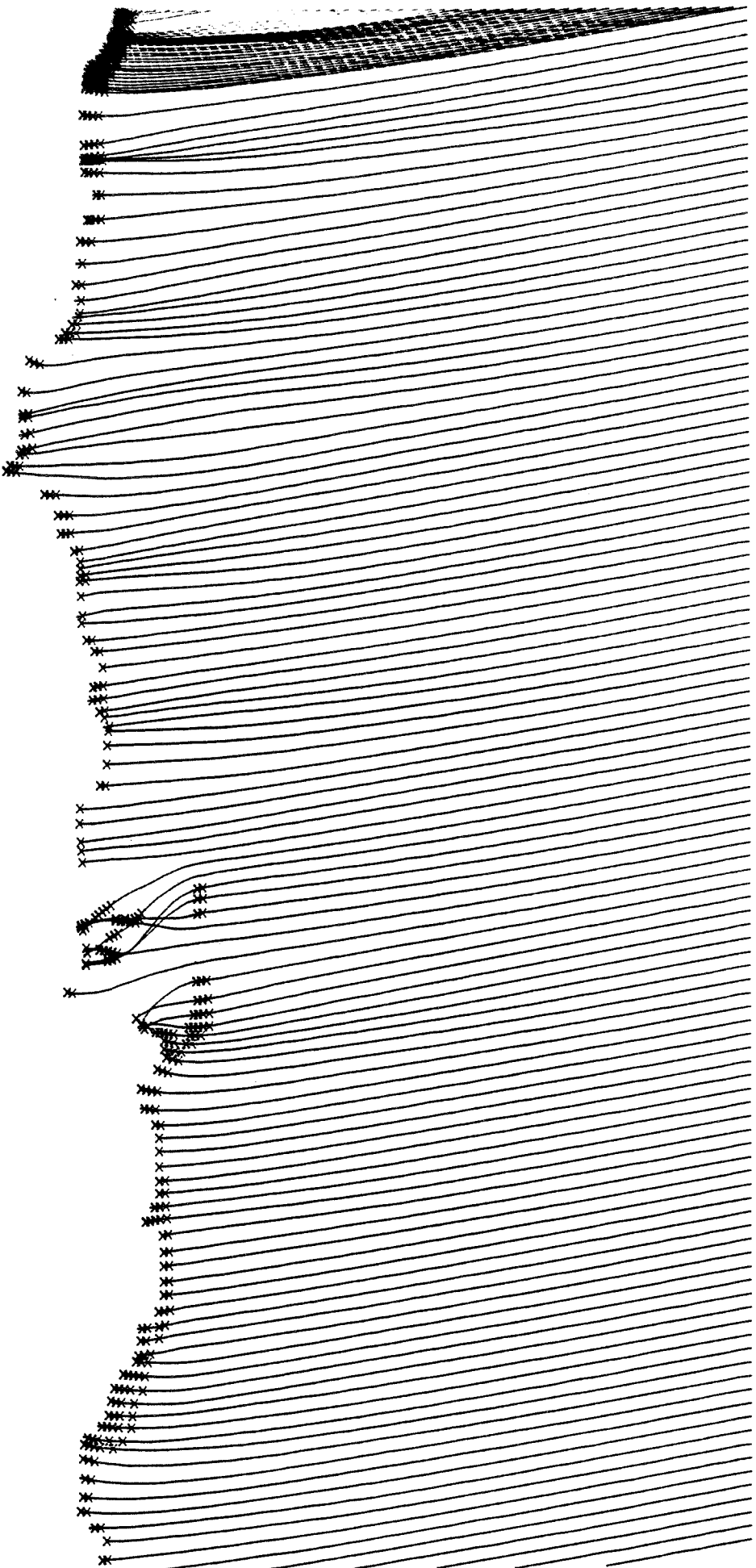
T- 10.00000 H- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 182.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 16



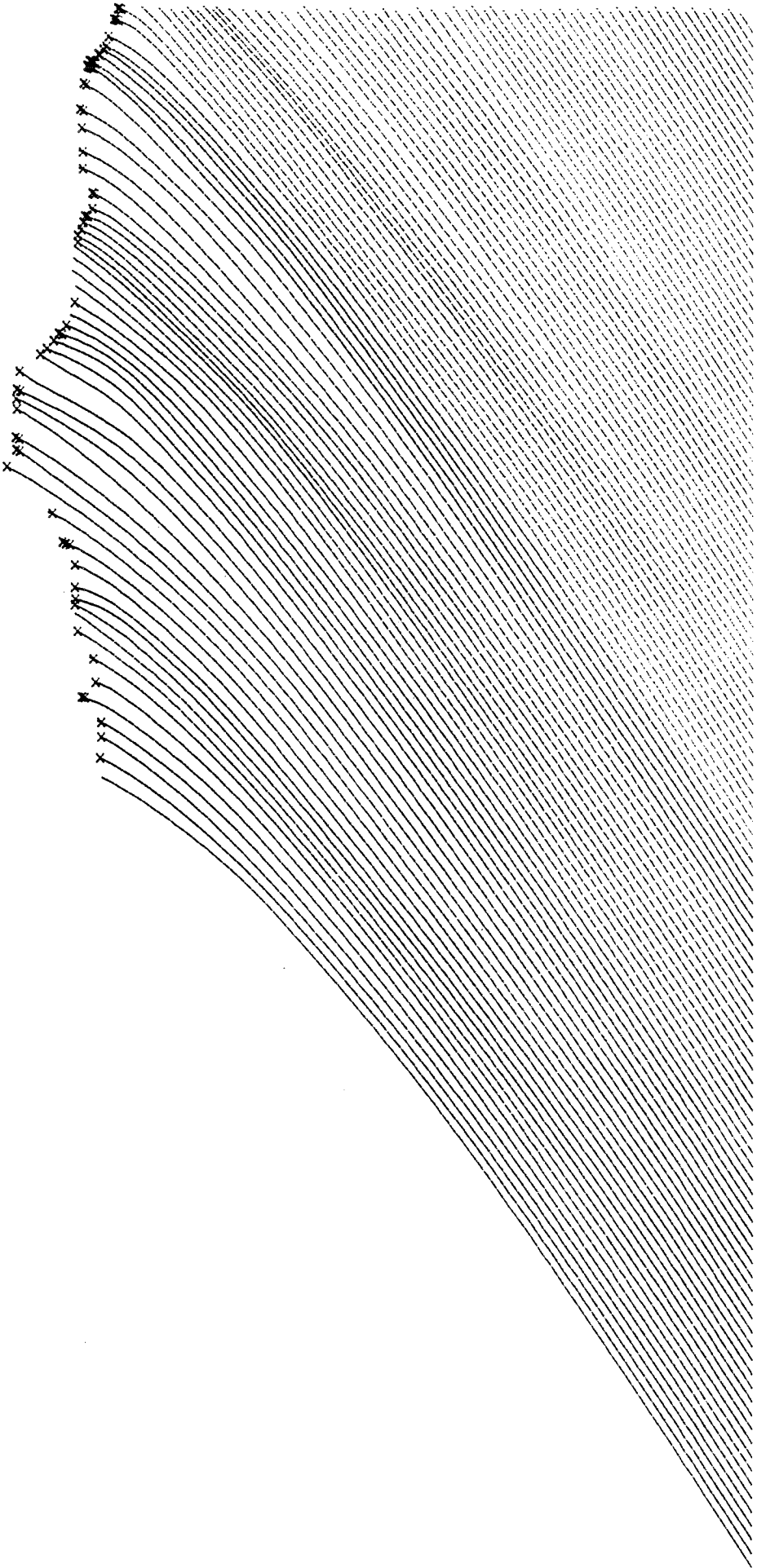
T- 10.0000 RISE- 2.000000
ANGLE OF INCIDENCE 90.0000 DEGREES

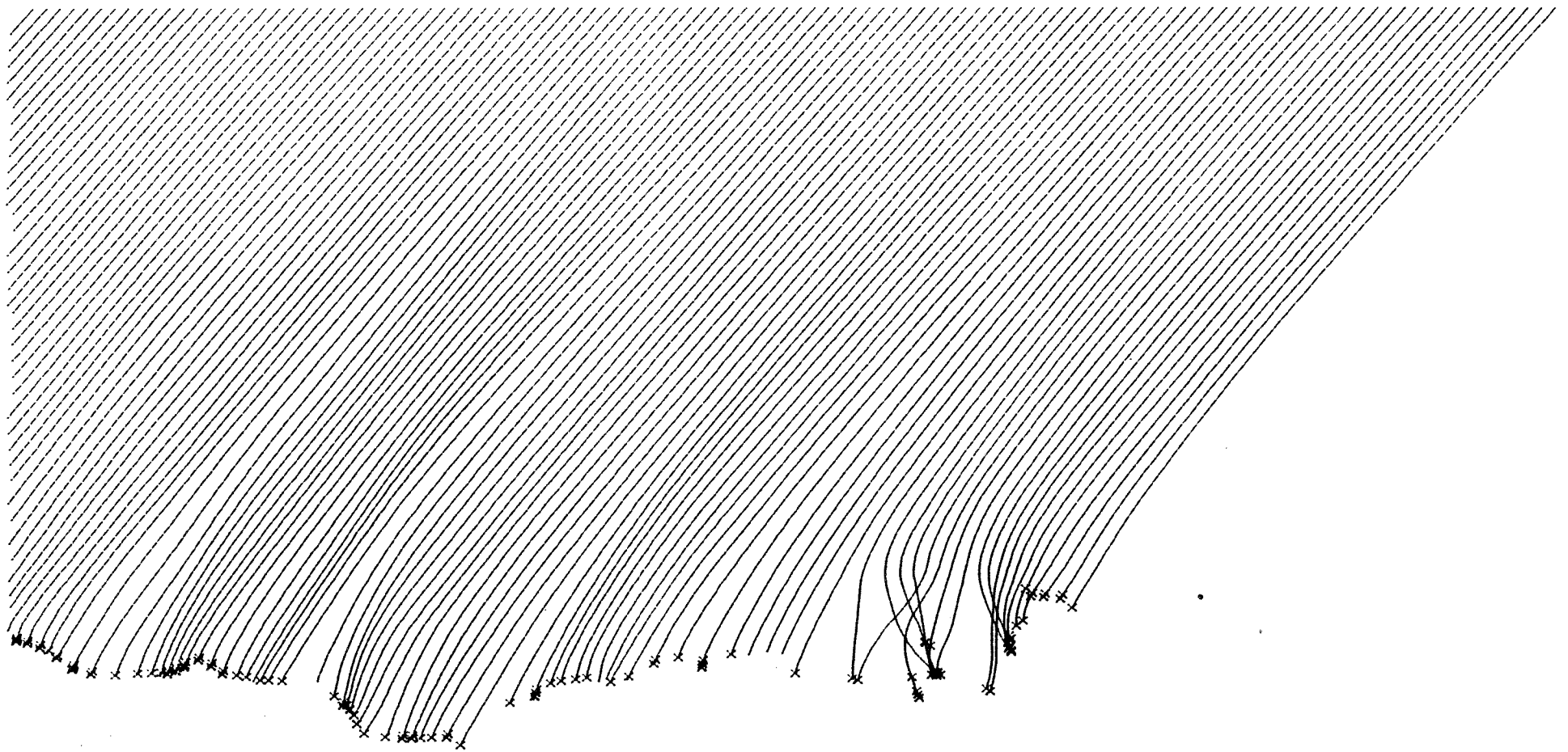
WAVE CLIMATE ELEMENT NUMBER 17



T= 12.0000 18- 1.00000 RISE= 2.00000
ANGLE OF INCIDENCE 147.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 18



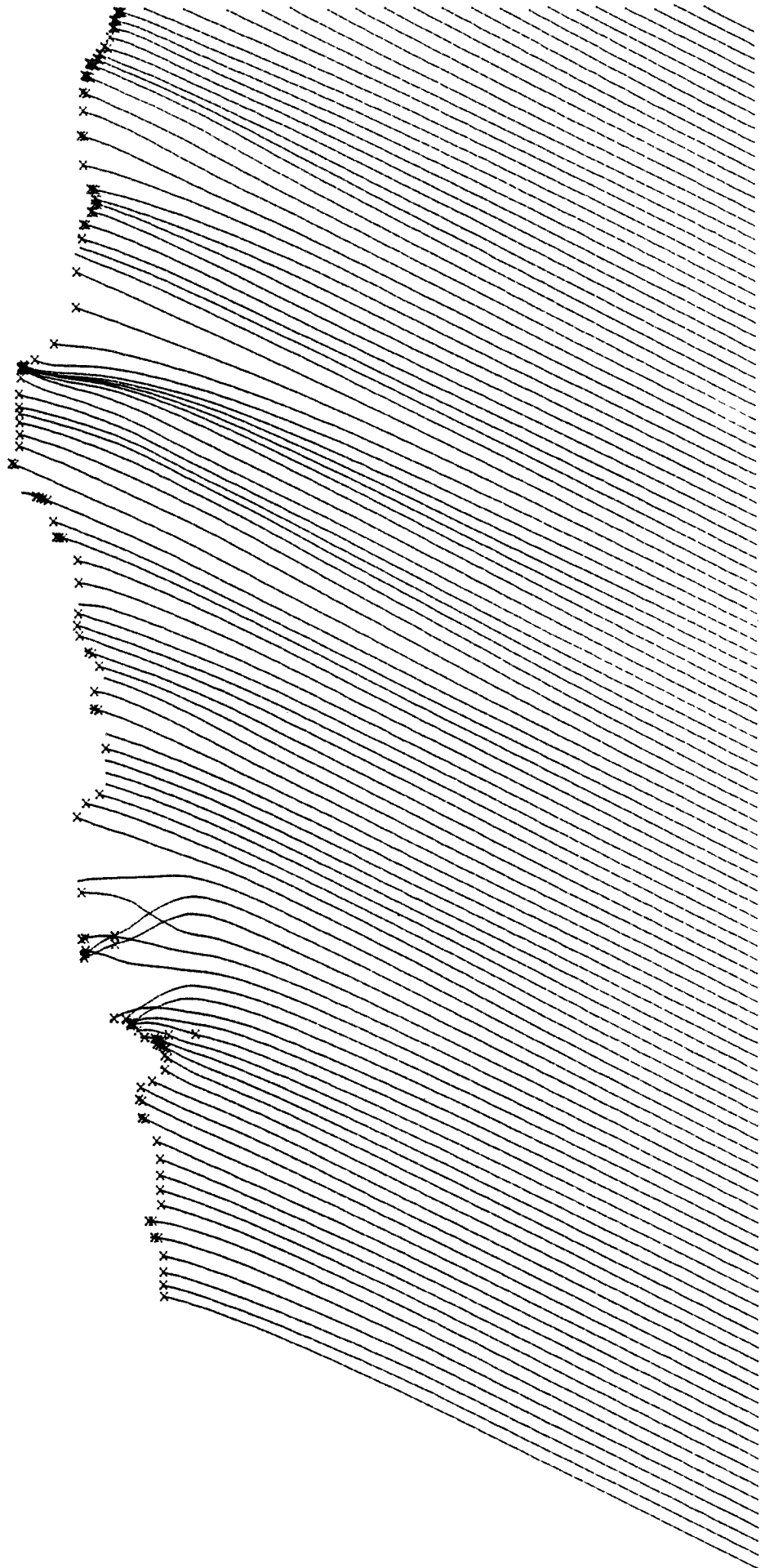


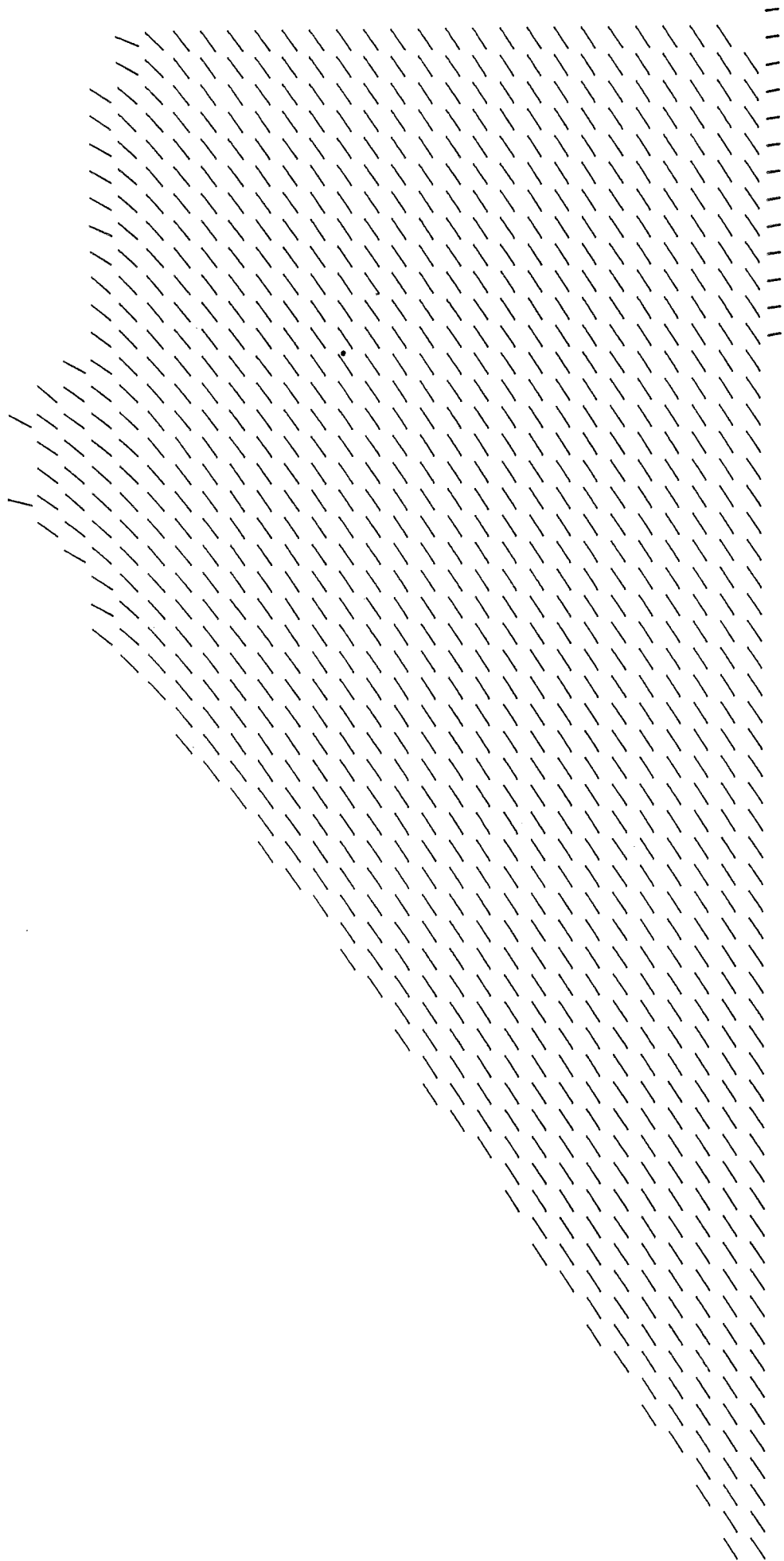
T- 12.0000 H0- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 132.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 19

T- 12.00000 10- 1.00000 RISE- 2.00000
ANGLE OF INCIDENCE 117.500 DEGREES

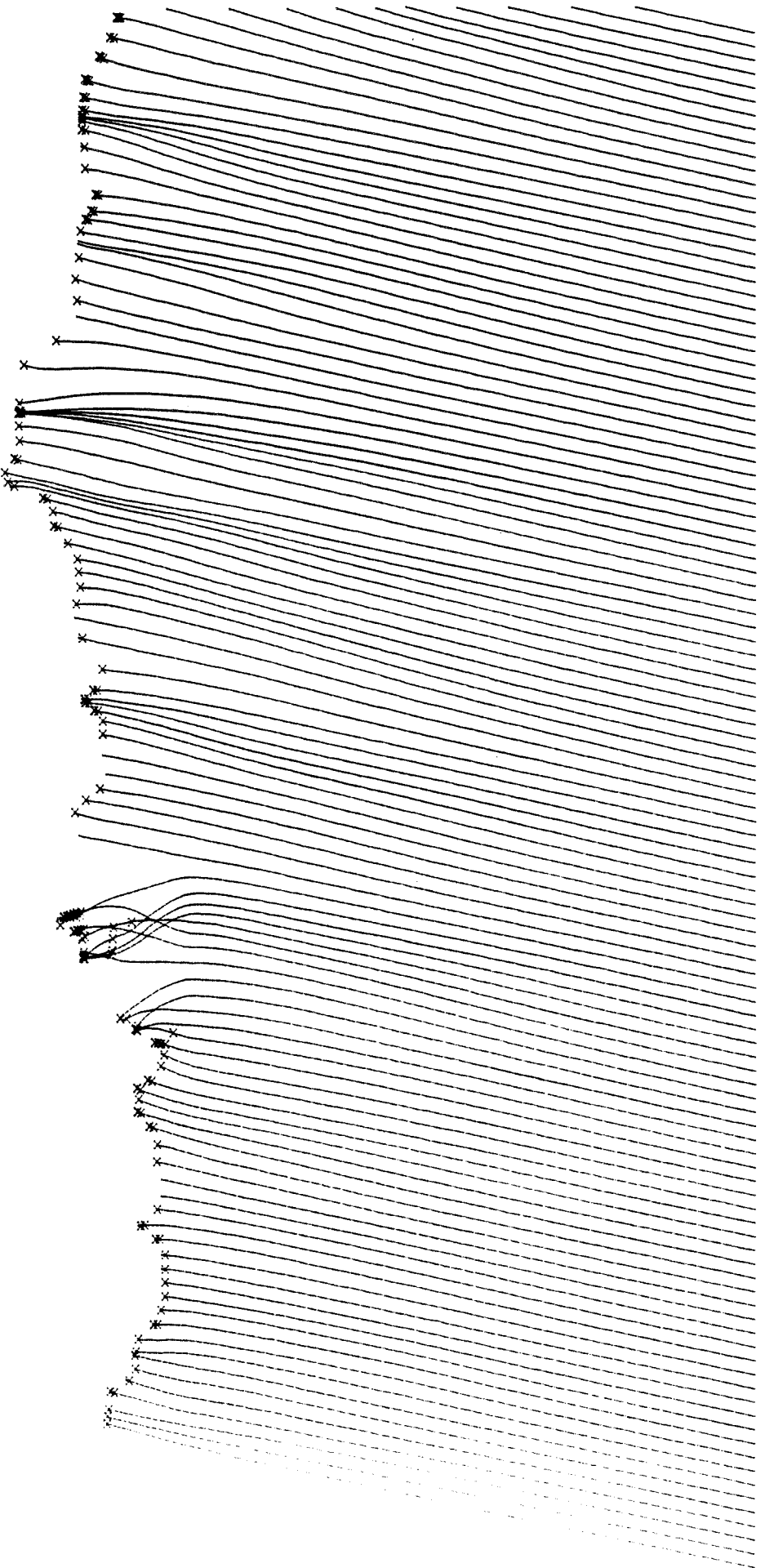
WAVE CLIMATE ELEMENT NUMBER 20

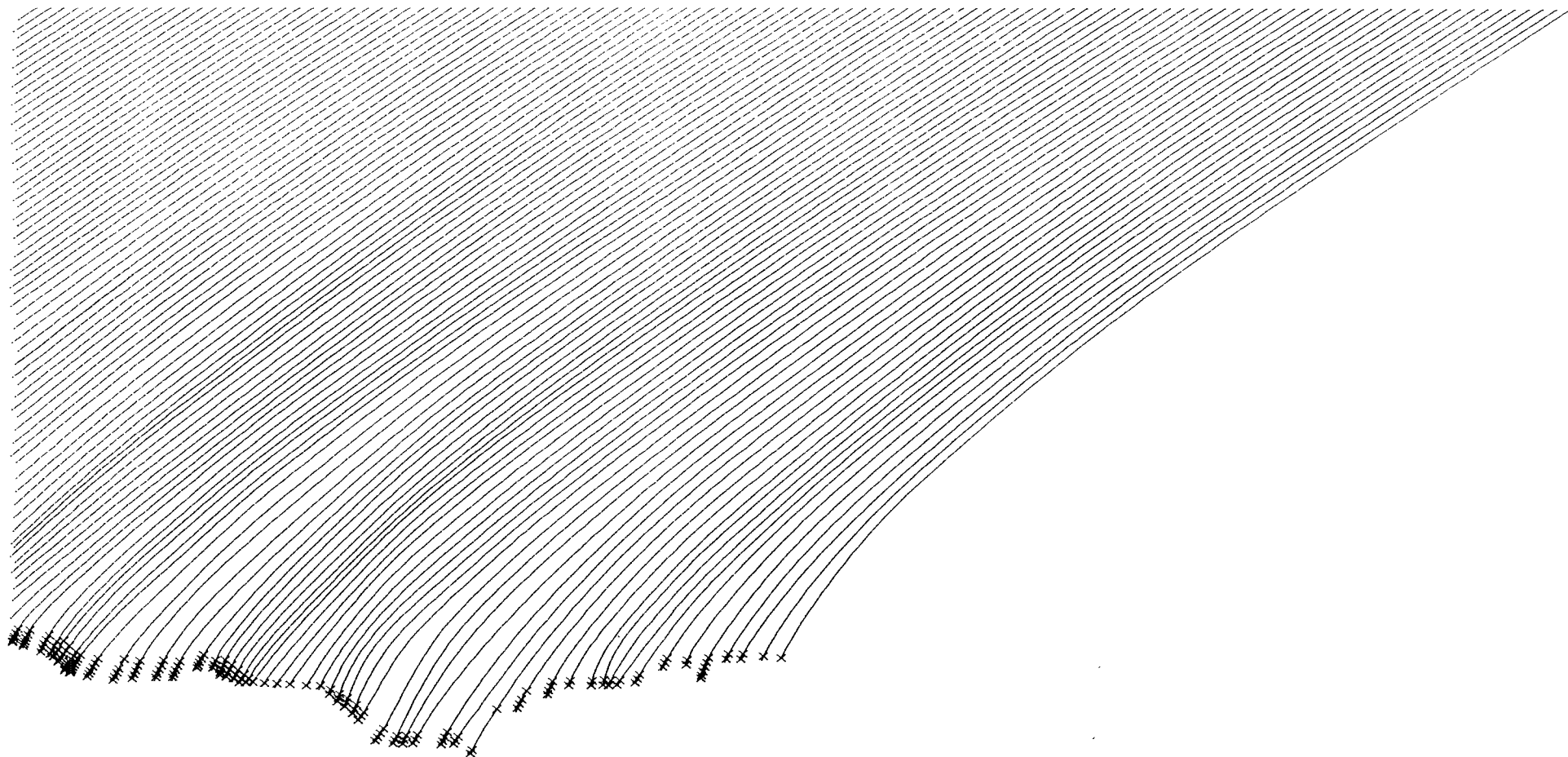




T- 12.00000 RISE- 1.00000
ANGLE OF INCIDENCE 100.5000 DEGREES

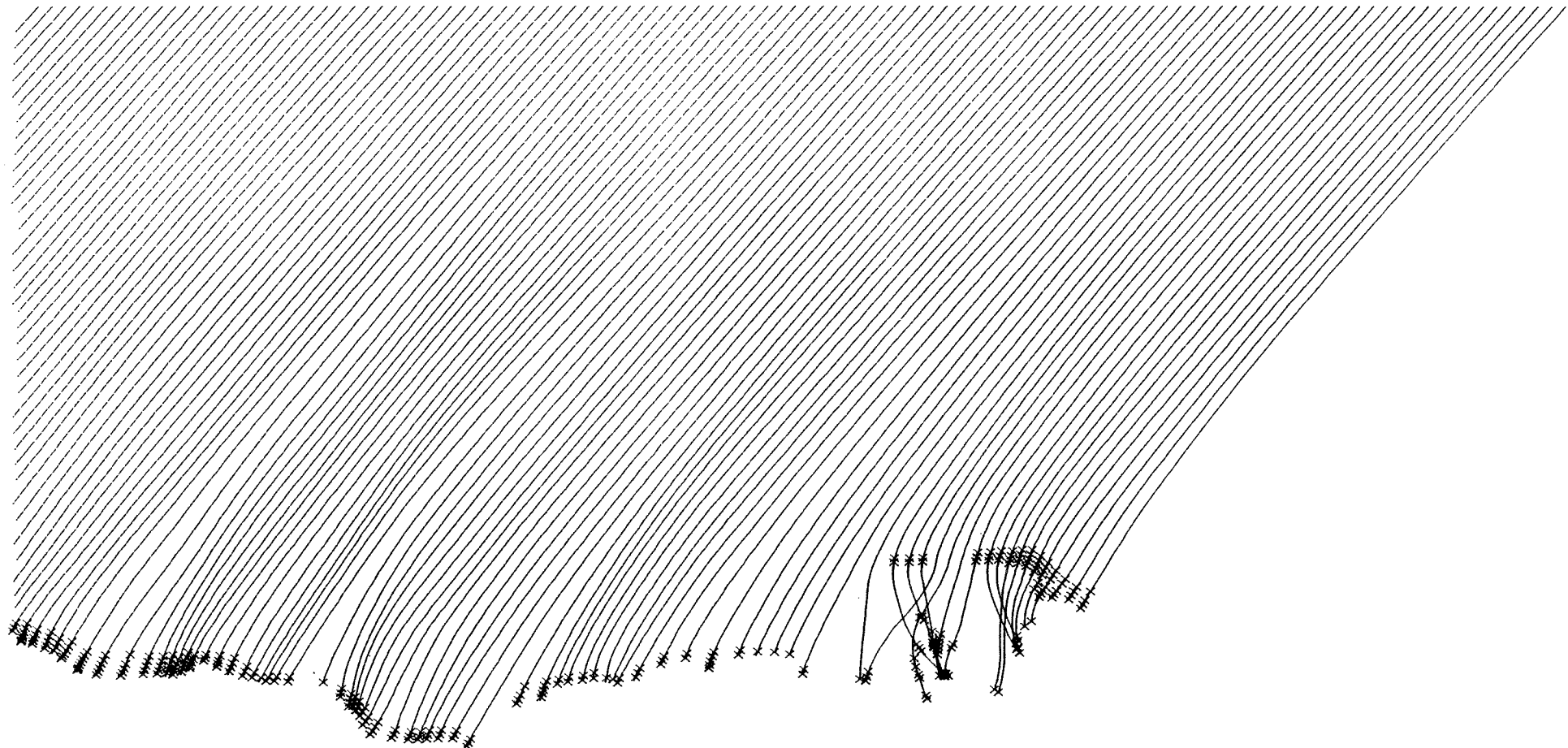
WAVE CLIMATE ELEMENT NUMBER 21





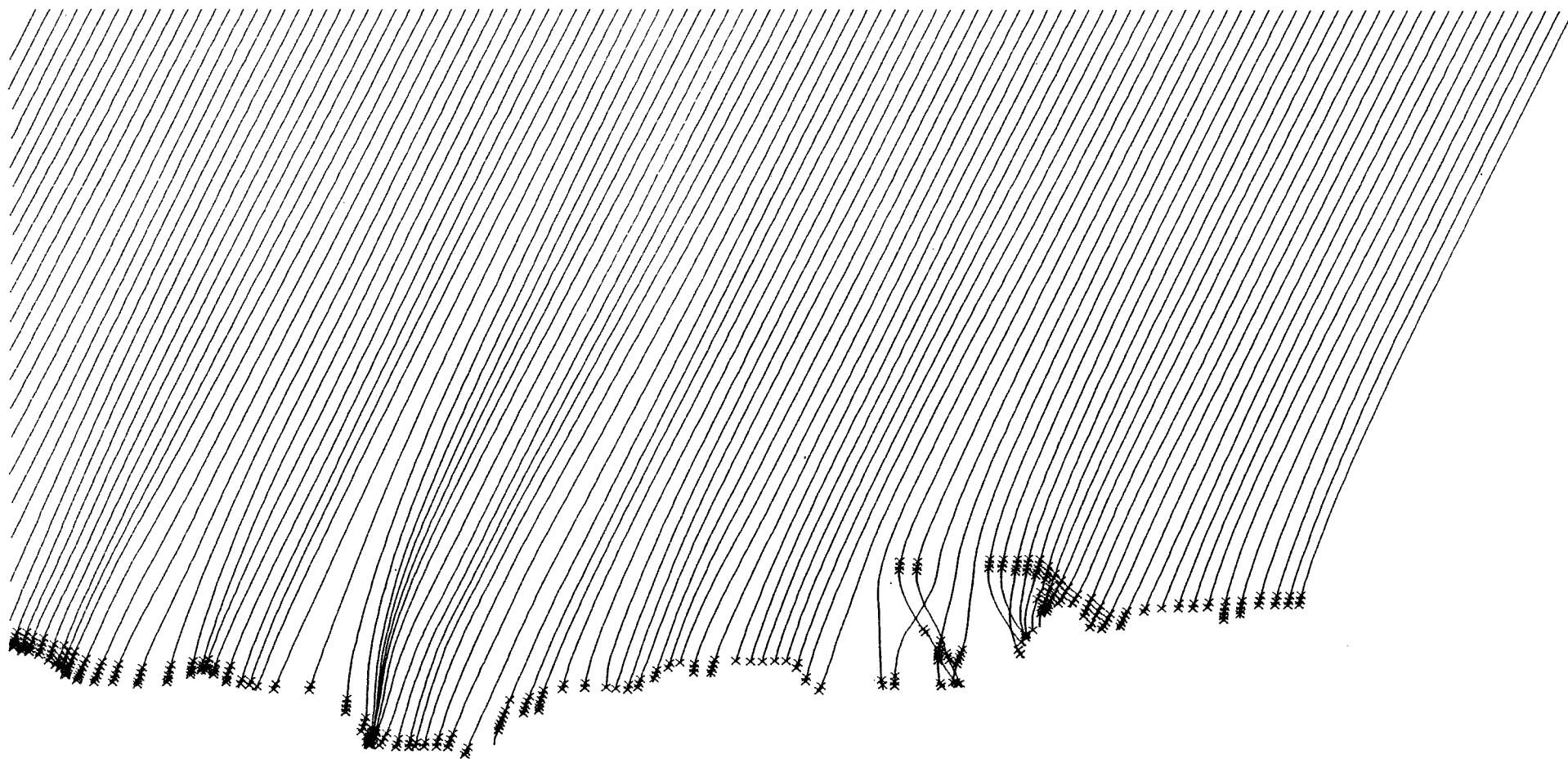
T- 12.0000 H0- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 147.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 22



T- 12.0000 H0- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 132.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 23

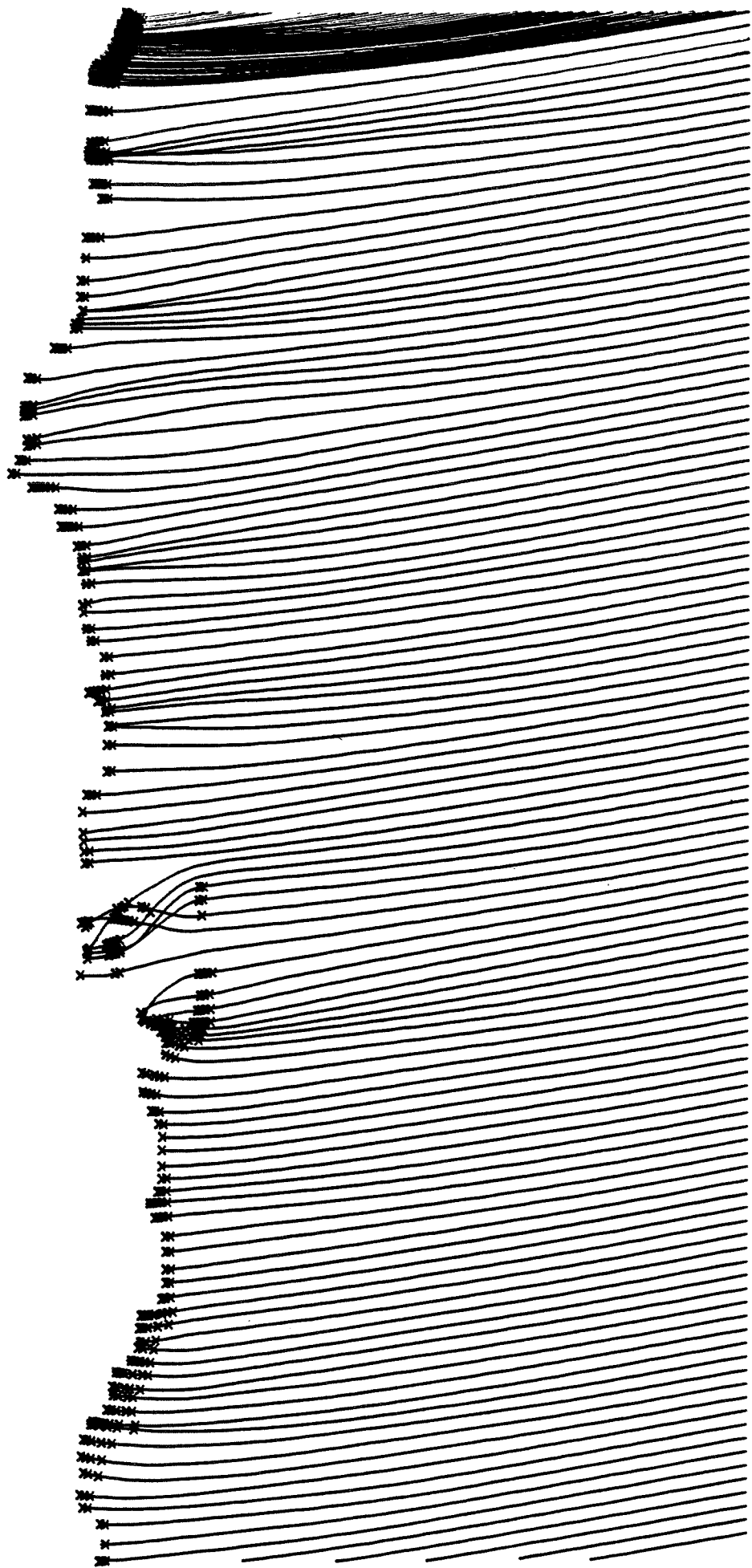


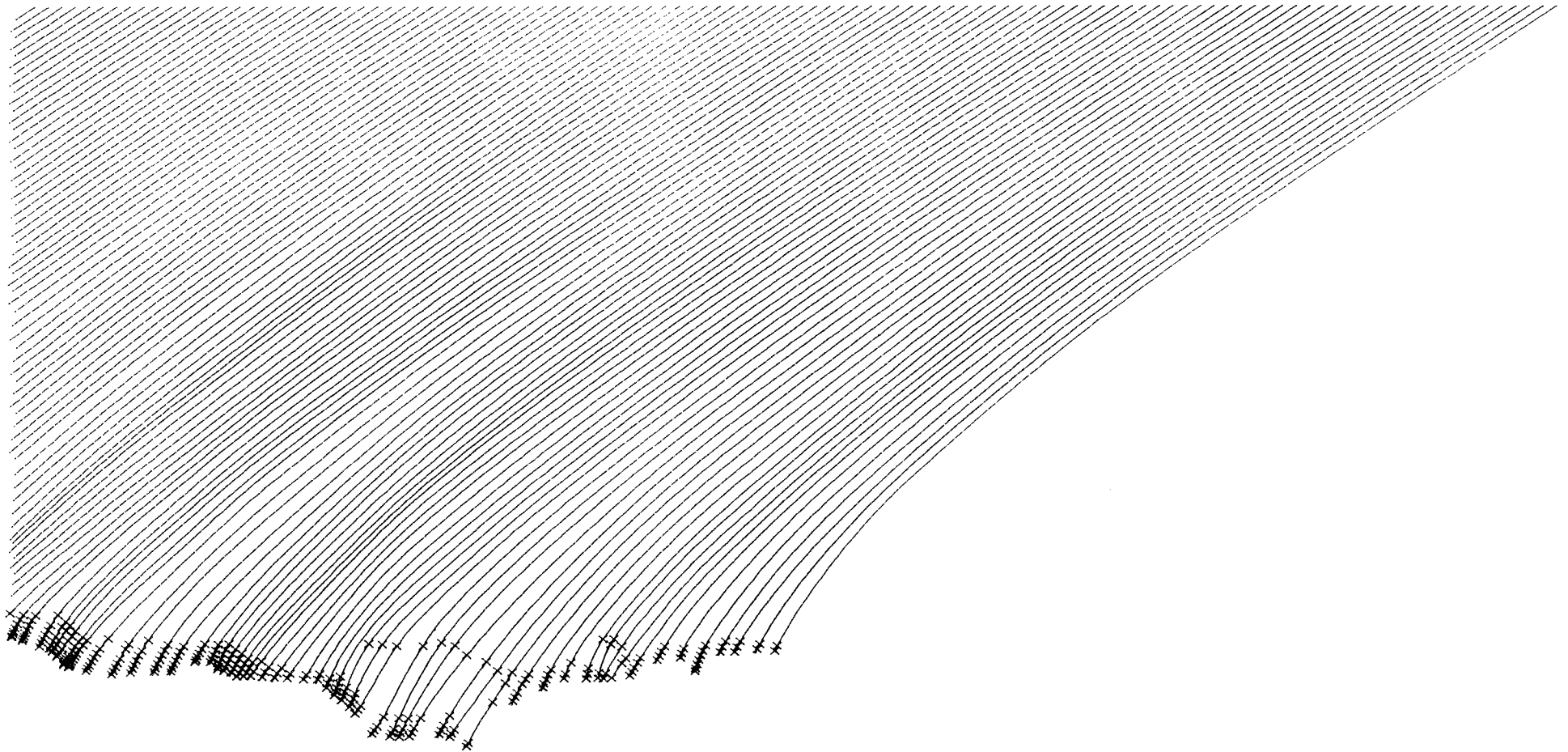
T- 12.0000 H0- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 117.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 24

2-12-0000 04 000000 0000 0000
00 000000 00 000000 0000 0000

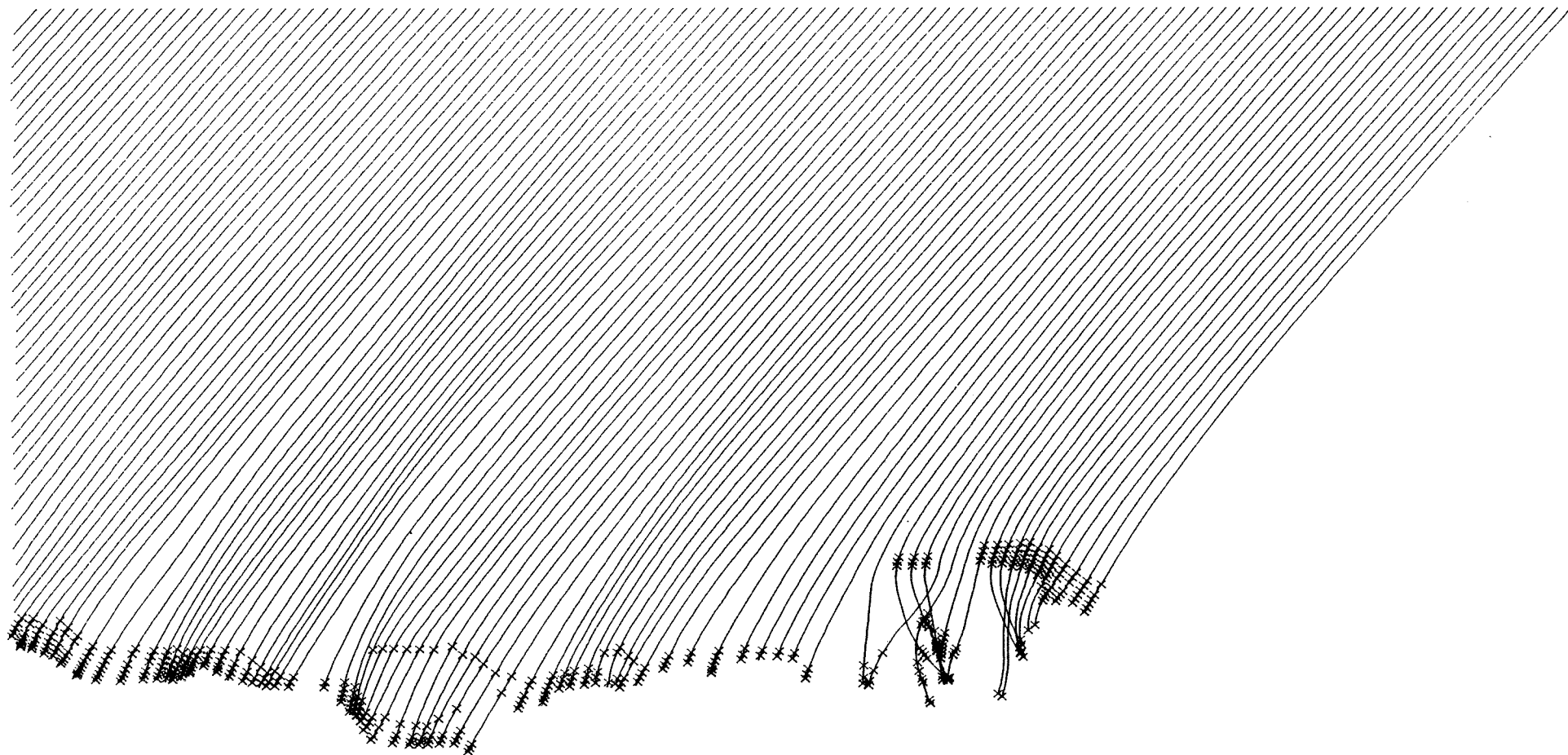
WAVE CLIMATE ELEMENT NUMBER 26





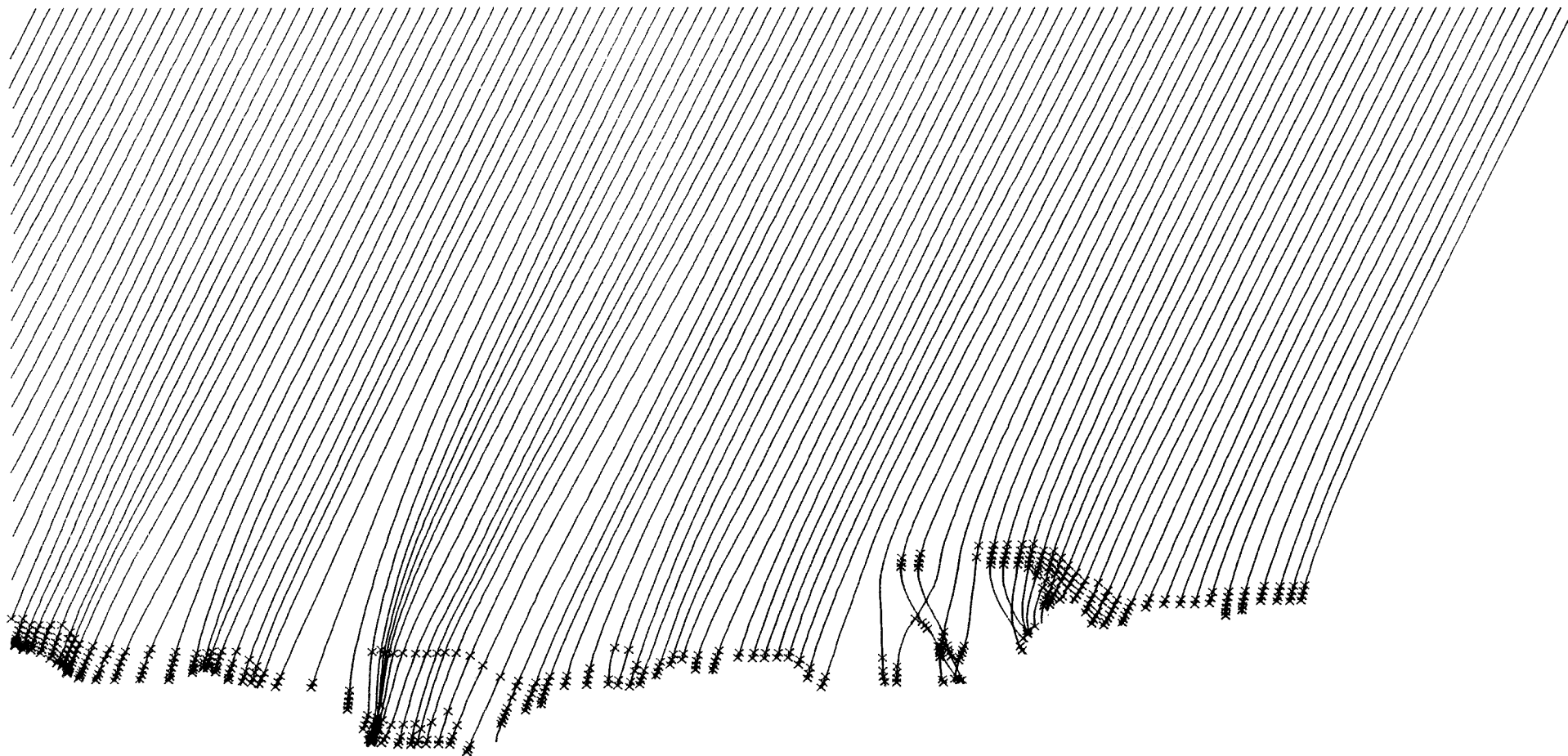
T- 12.0000 H0- 4.50000 RISE- 2.00000
ANGLE OF INCIDENCE 147.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 27



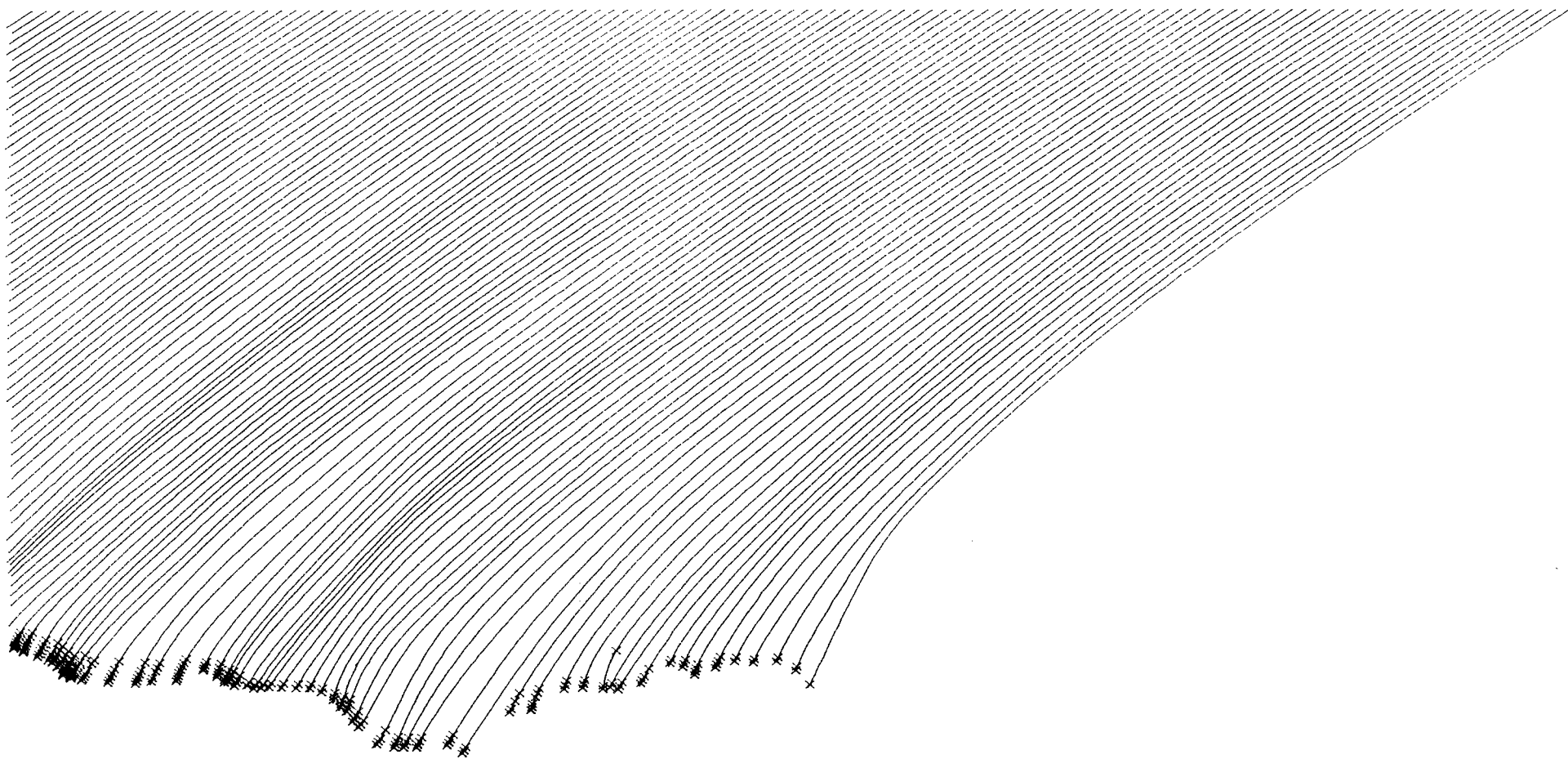
T- 12.0000 H0- 4.50000 RISE- 2.00000
ANGLE OF INCIDENCE 132.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 28



T- 12.0000 H0- 4.50000 RISE- 2.00000
ANGLE OF INCIDENCE 117.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 29



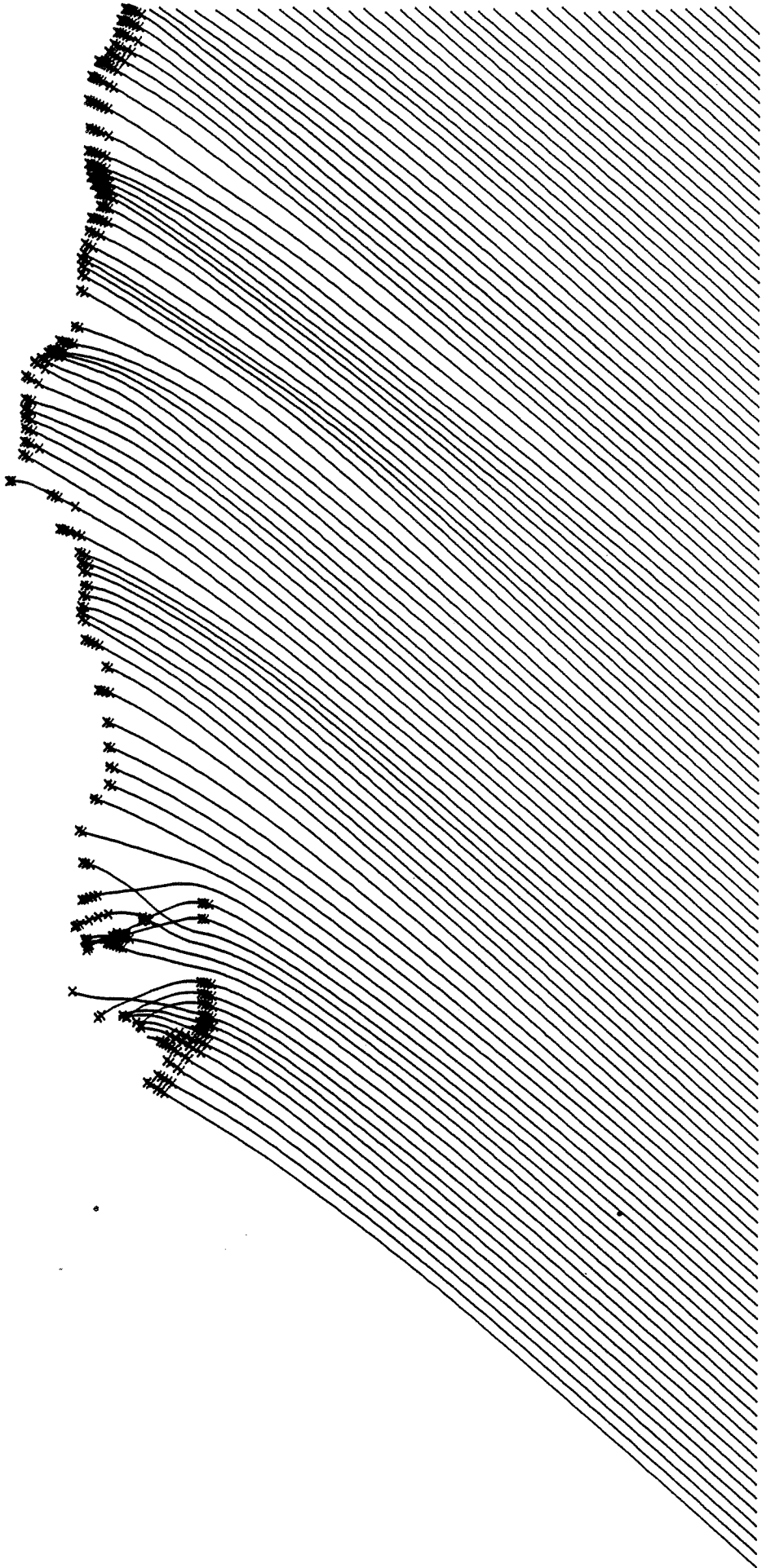
T- 14.0000 H- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 147.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 30

T- 14.00000
H- 3.00000
ANGLE OF INCIDENCE 132.500

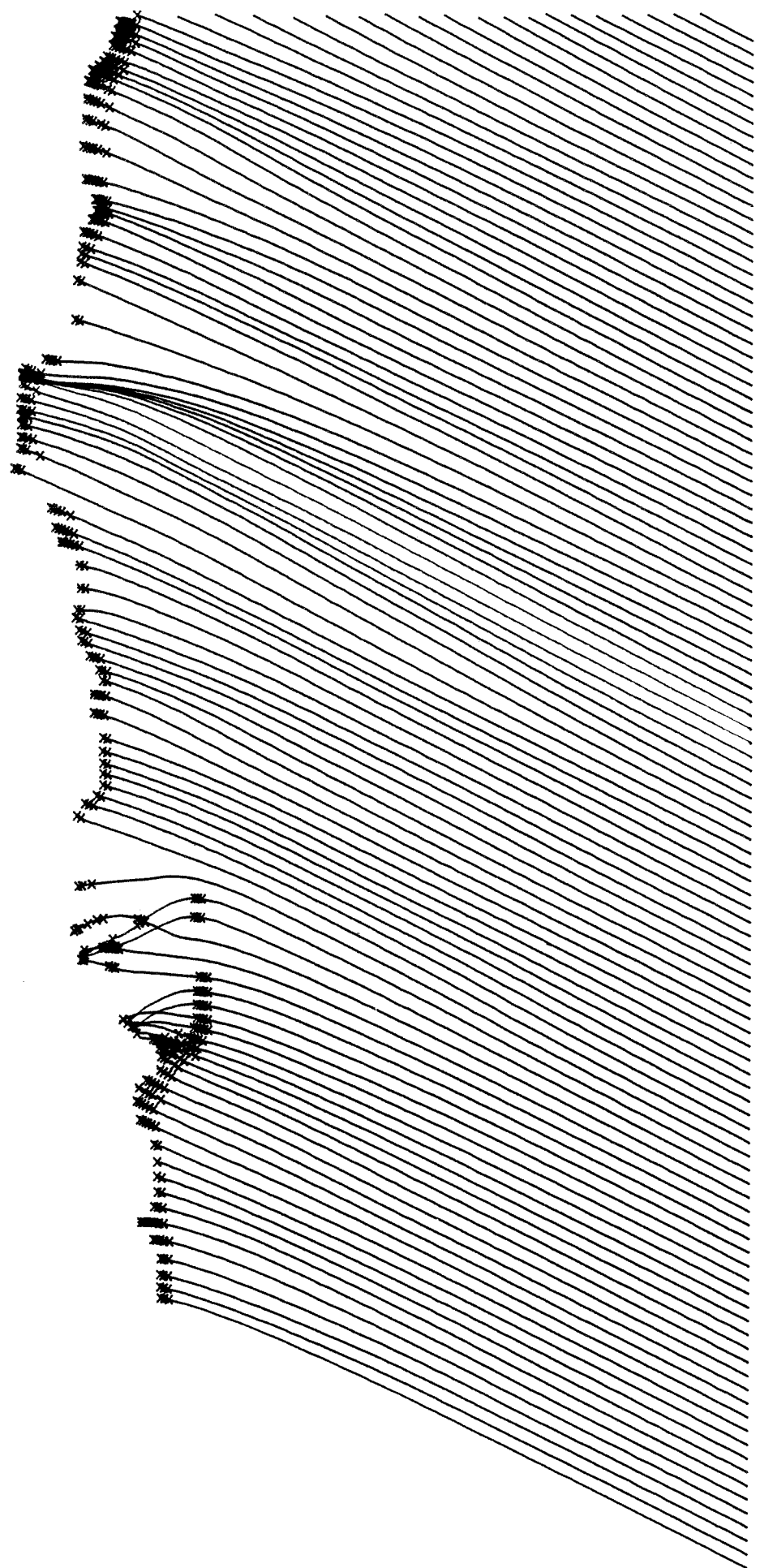
RISE- 2.00000
DEGREES

WAVE CLIMATE ELEMENT NUMBER 31



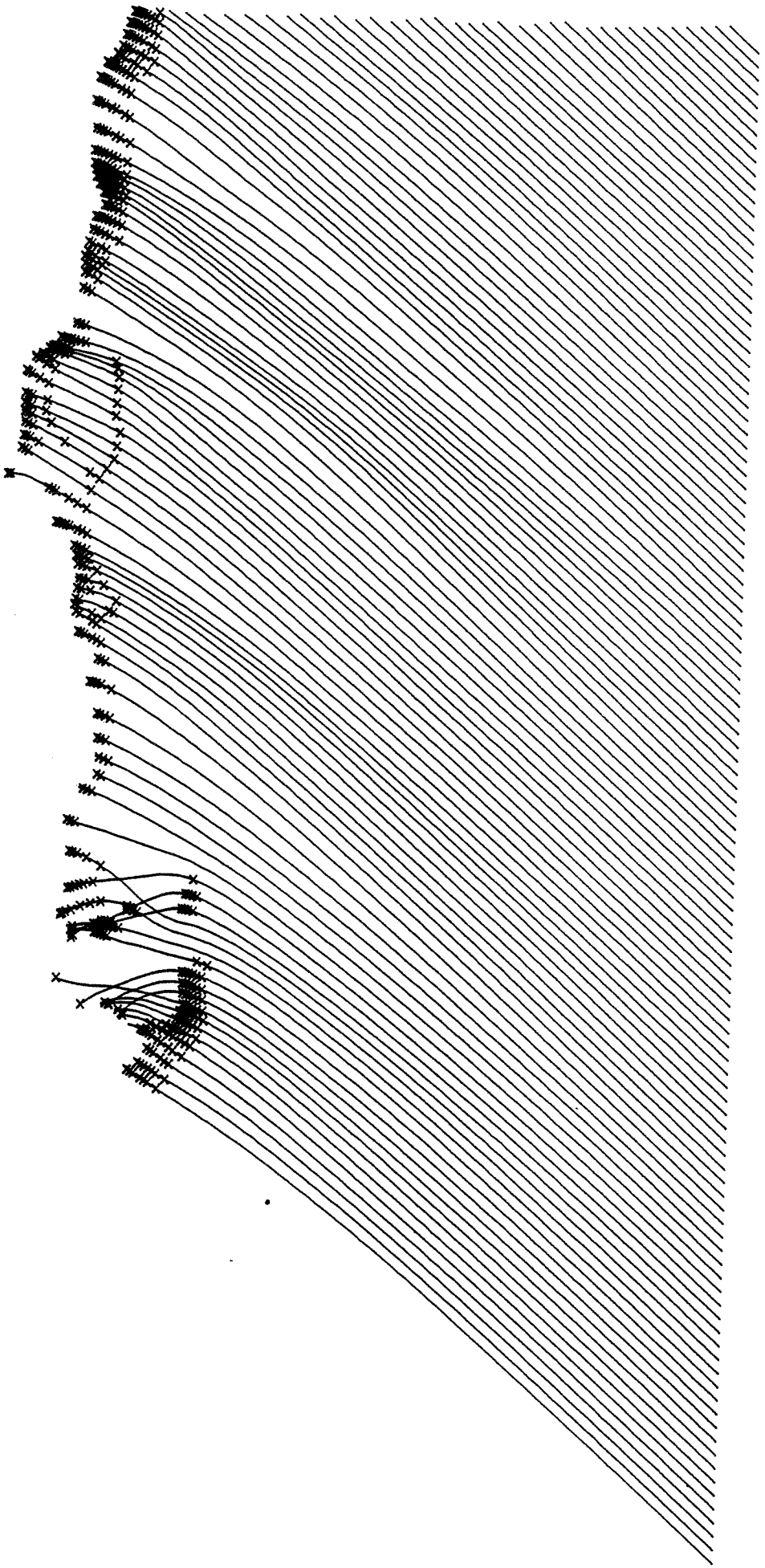
T- 14.00000 H- 3.00000 RISE- 2.00000
ANGLE OF INCIDENCE 117.5000 DEGREES

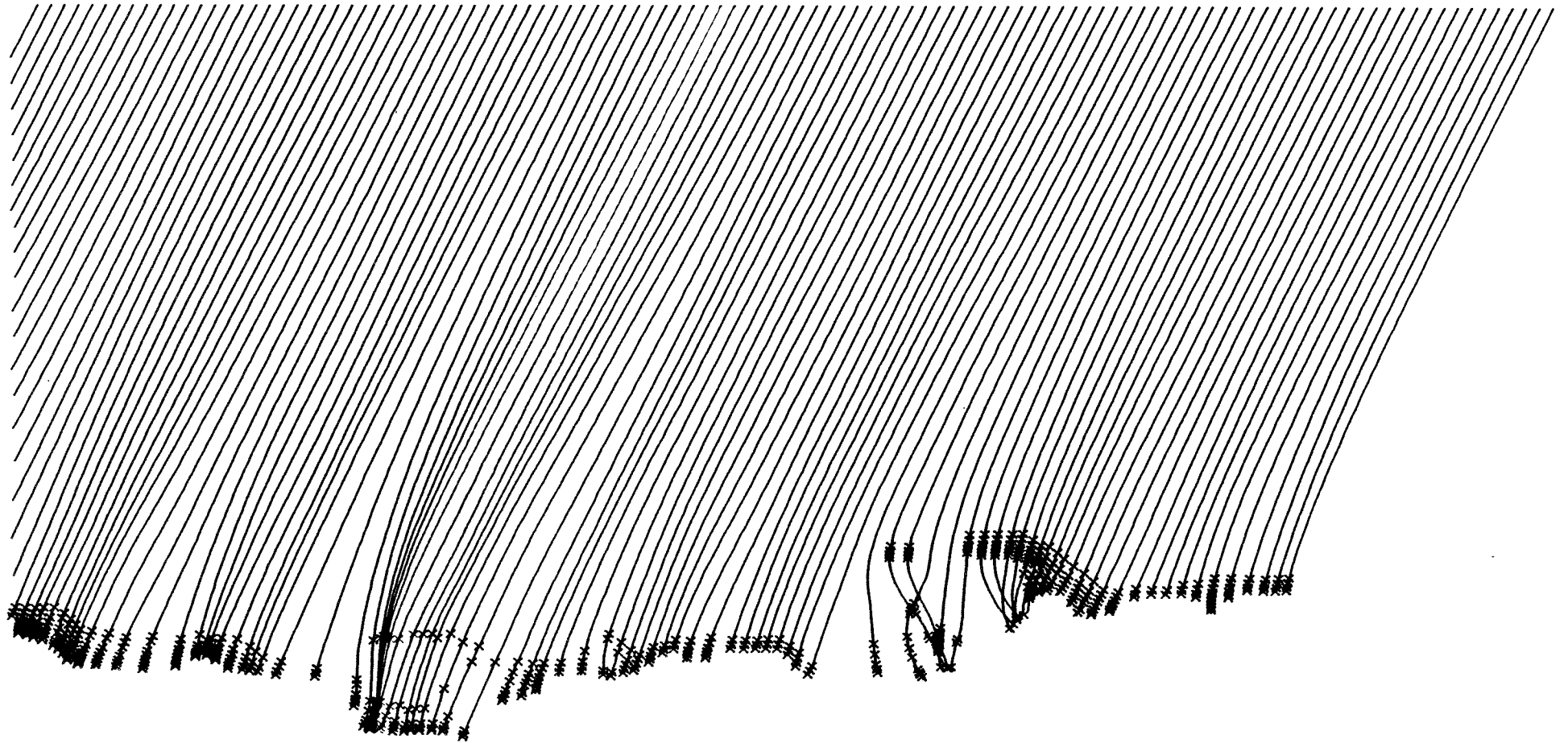
WAVE CLIMATE ELEMENT NUMBER 32



T= 14.0000 H= 4.50000 RISE= 2.00000
ANGLE OF INCIDENCE 122.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 33





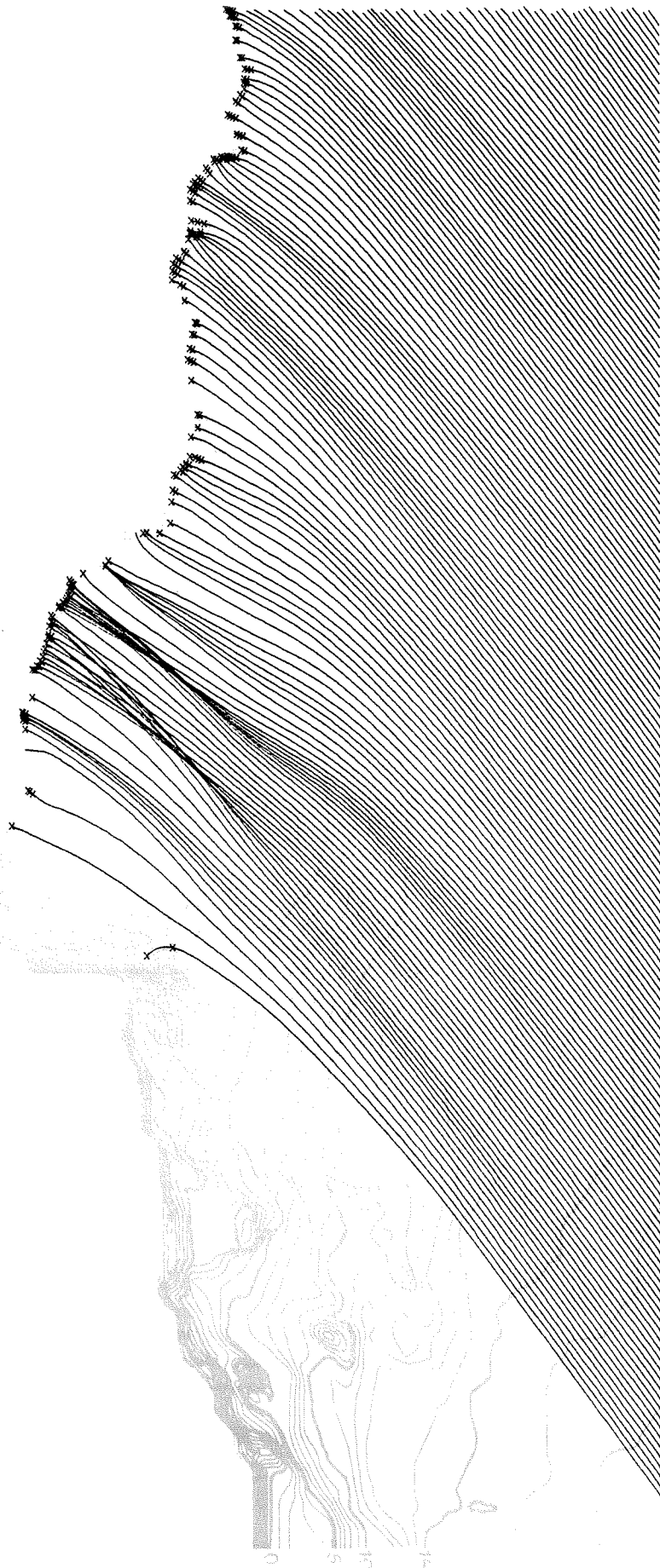
T- 14.0000 H0- 4.50000 RISE- 2.00000
ANGLE OF INCIDENCE 117.500 DEGREES

WAVE CLIMATE ELEMENT NUMBER 34

**Wave ray diagrams
detailed model**

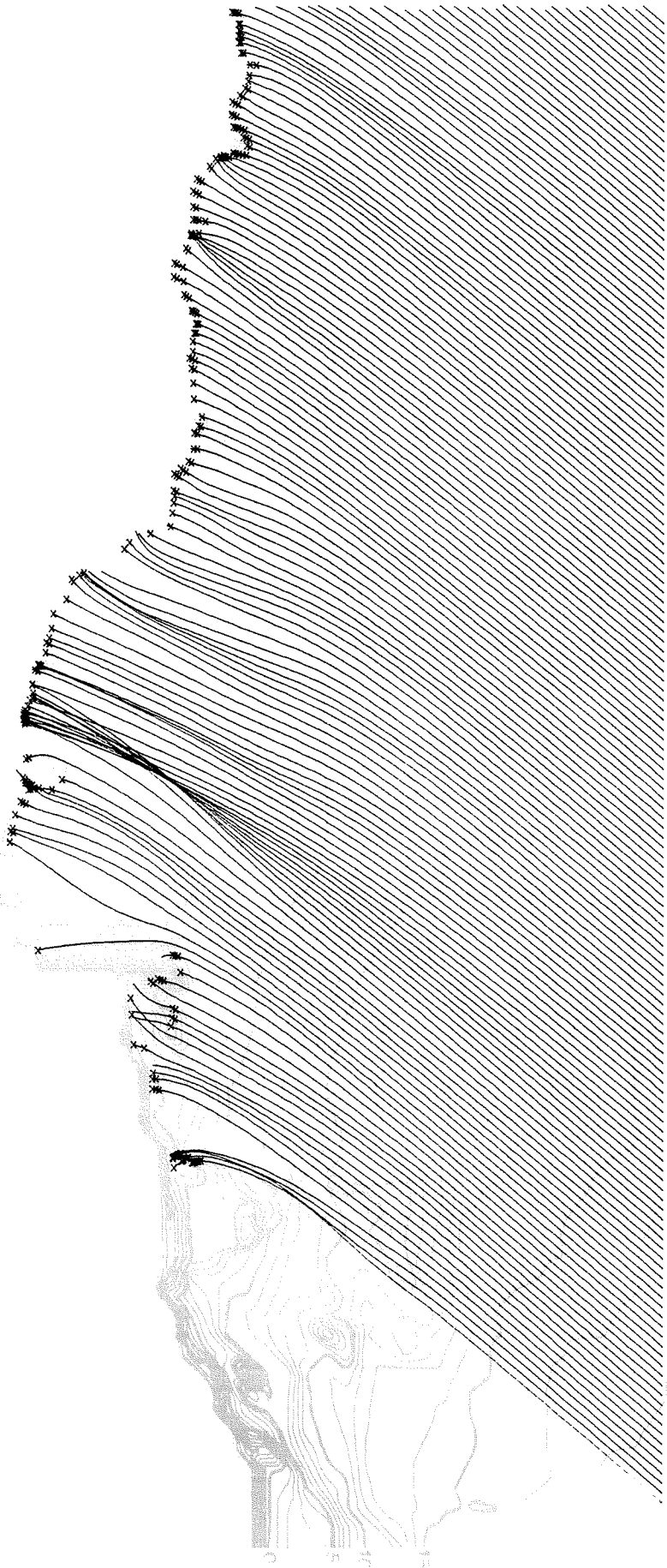
T- 8.000000
ANGLE OF INCIDENCE 144.418 DEGREES
RISE- 2.000000

WAVE CLIMATE ELEMENT NUMBER 1



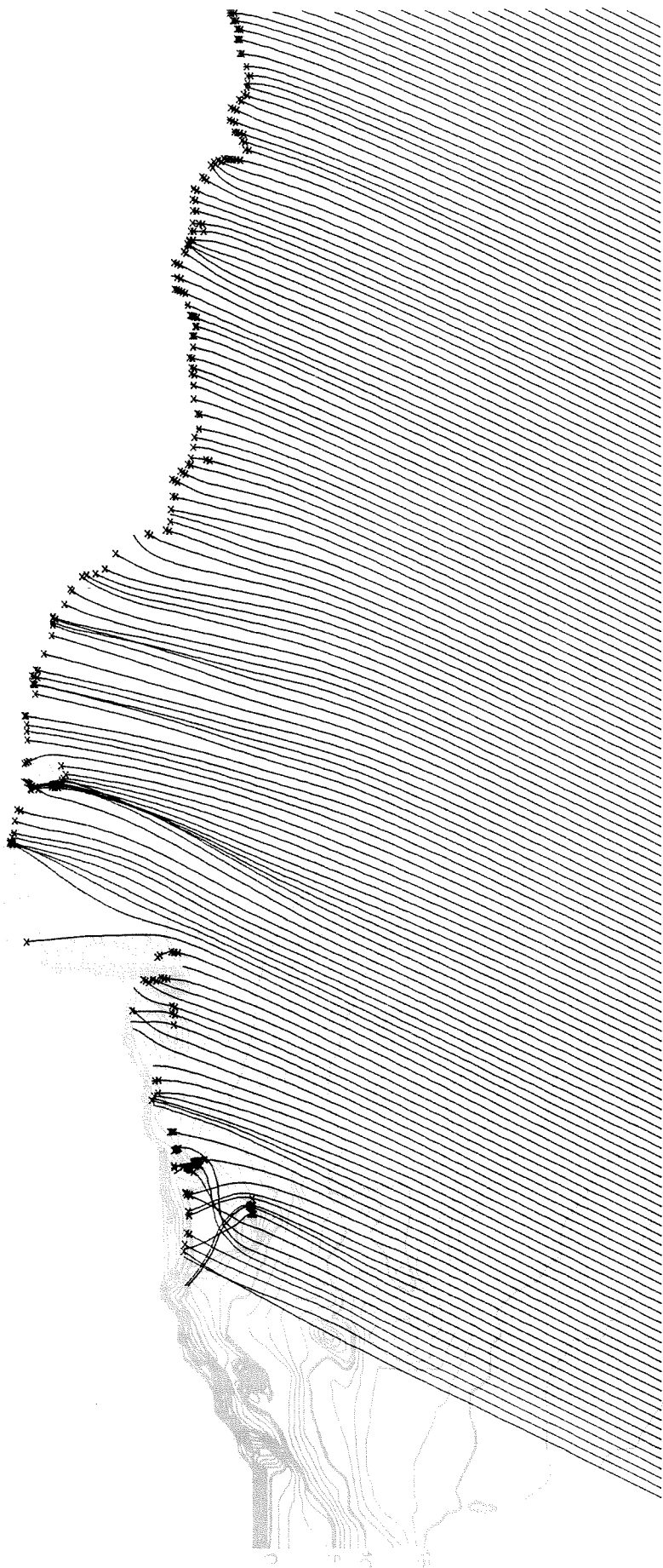
1- 8.00000 10- 2.00000 RISE- 2.00000
ANGLE OF INCIDENCE 100.000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 2



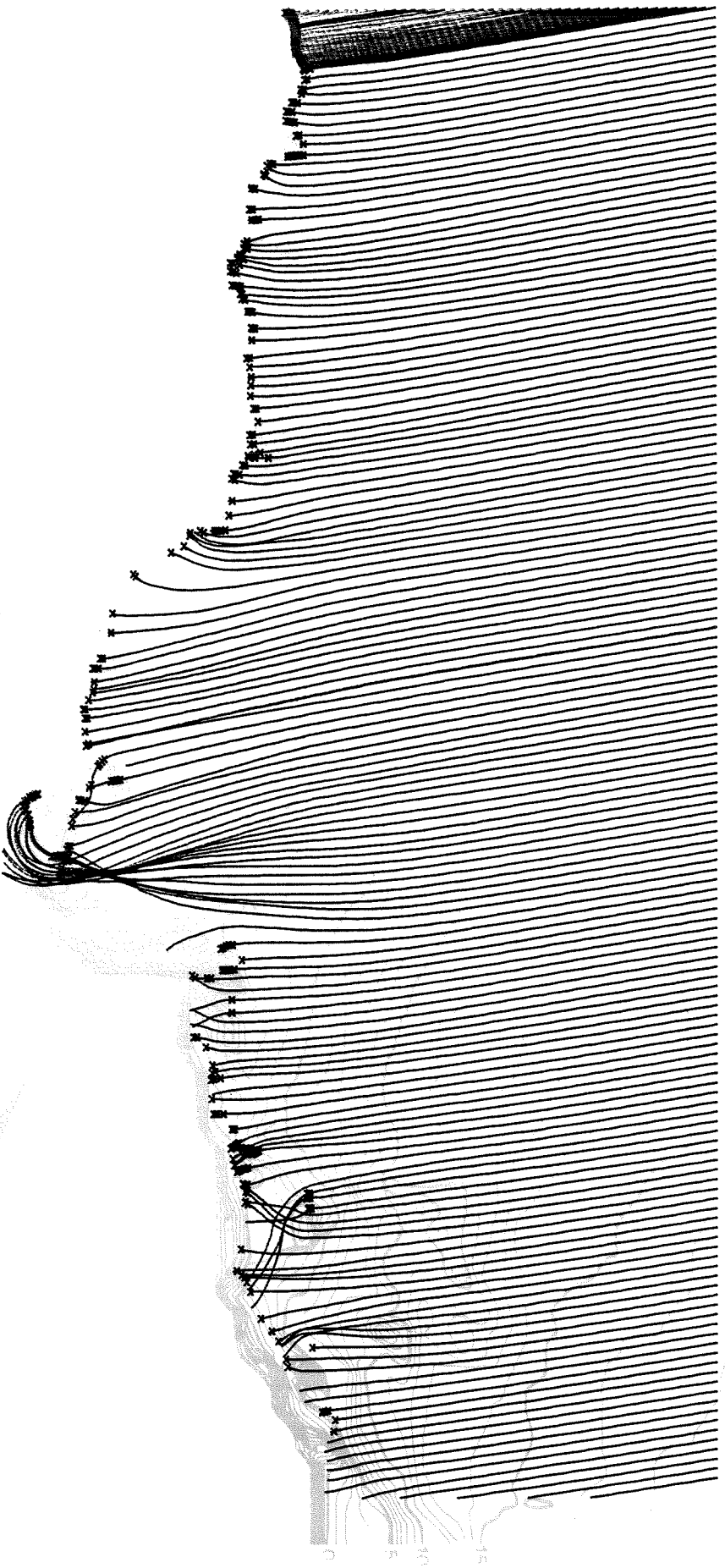
T - 8. 0.00000 180 - 0.00000
ANGLE OF INCIDENCE 110.00000
RISE - 2.00000
DECREAS

WAVE CLIMATE ELEMENT NUMBER 3



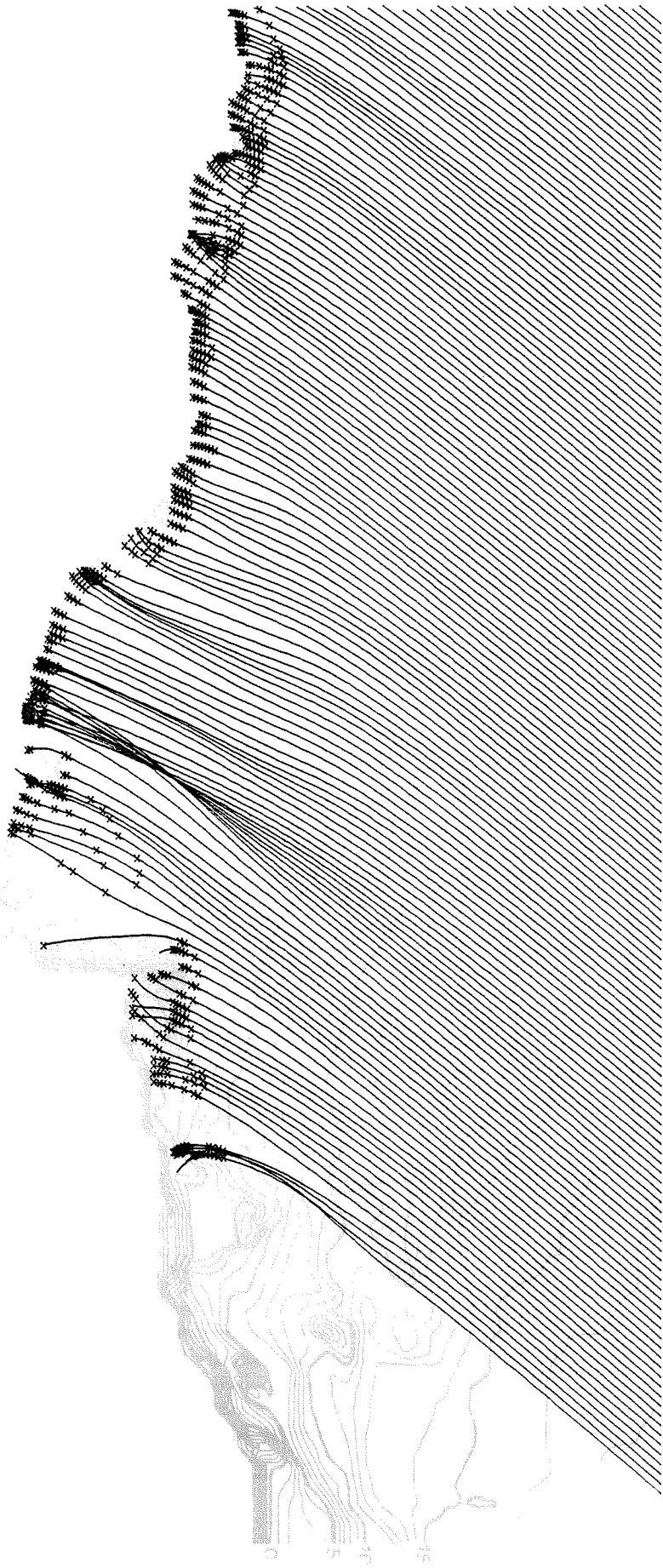
1-10-60 100-100000 1000-100000
WAVE CLIMATE ELEMENT NUMBER 5

WAVE CLIMATE ELEMENT NUMBER 5



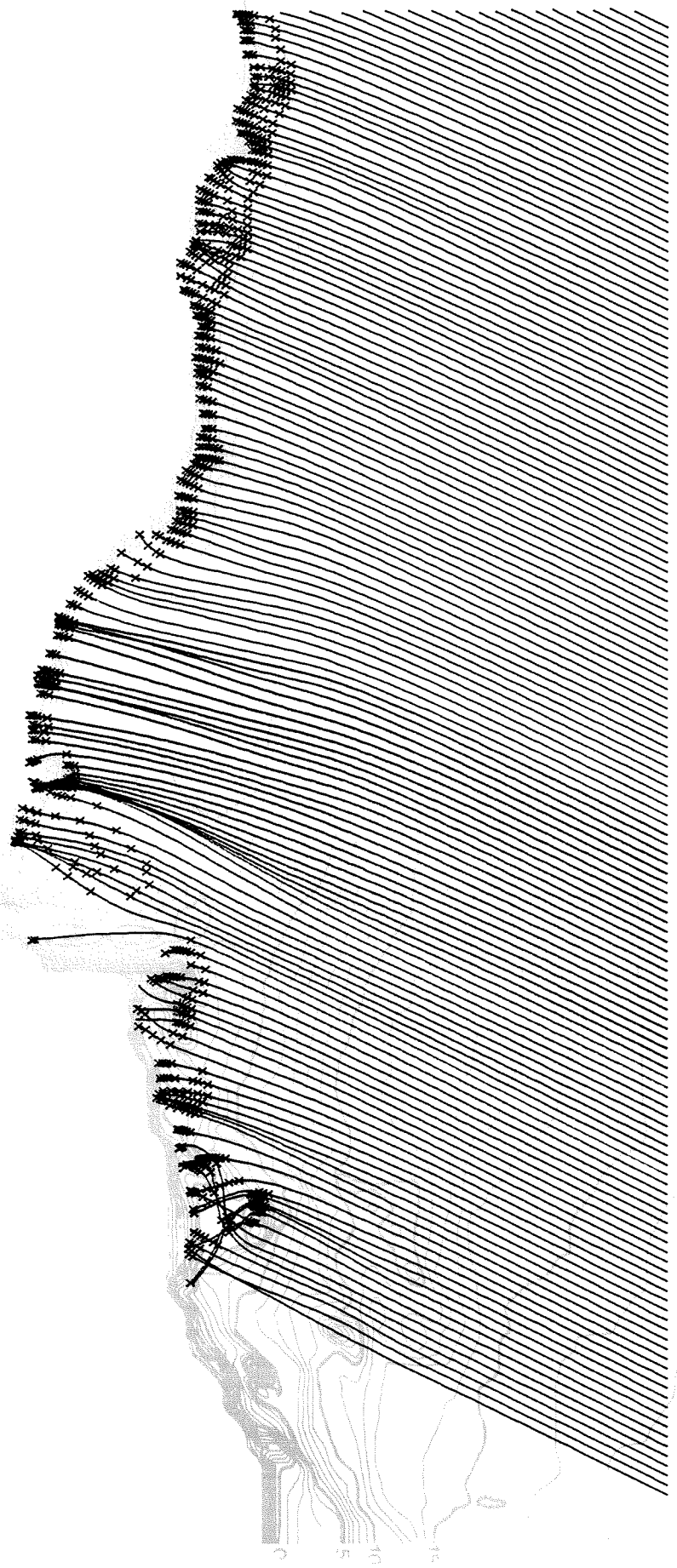
T - 5.00000
ANGLE OF INCIDENCE 130.0000
RICE - 2.00000
DEGREES

WAVE CLIMATE ELEMENT NUMBER 6



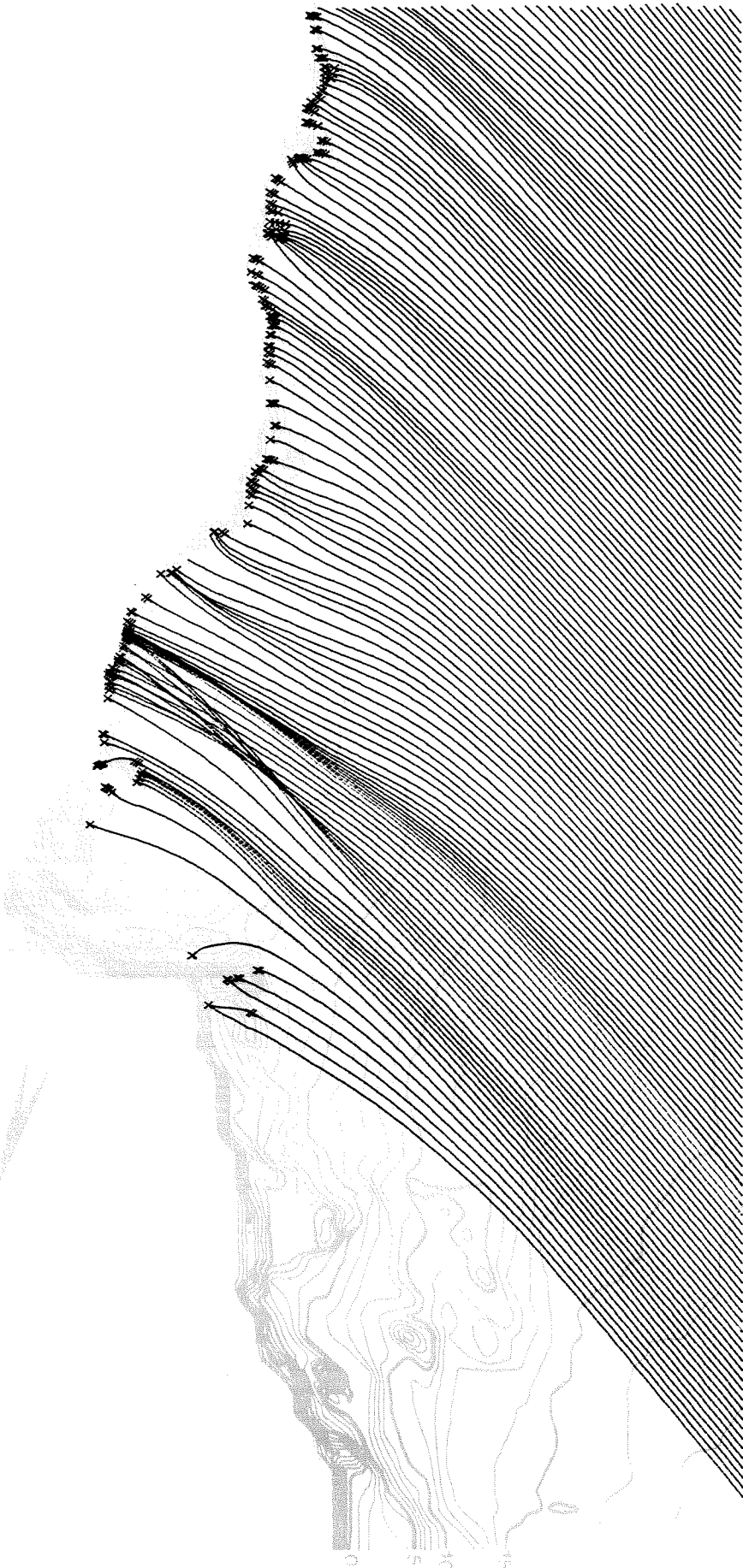
T- 0.00000
H- 2.07000
ANGLE OF INCIDENCE 180.000
RHS- 2.00000
RESERVED

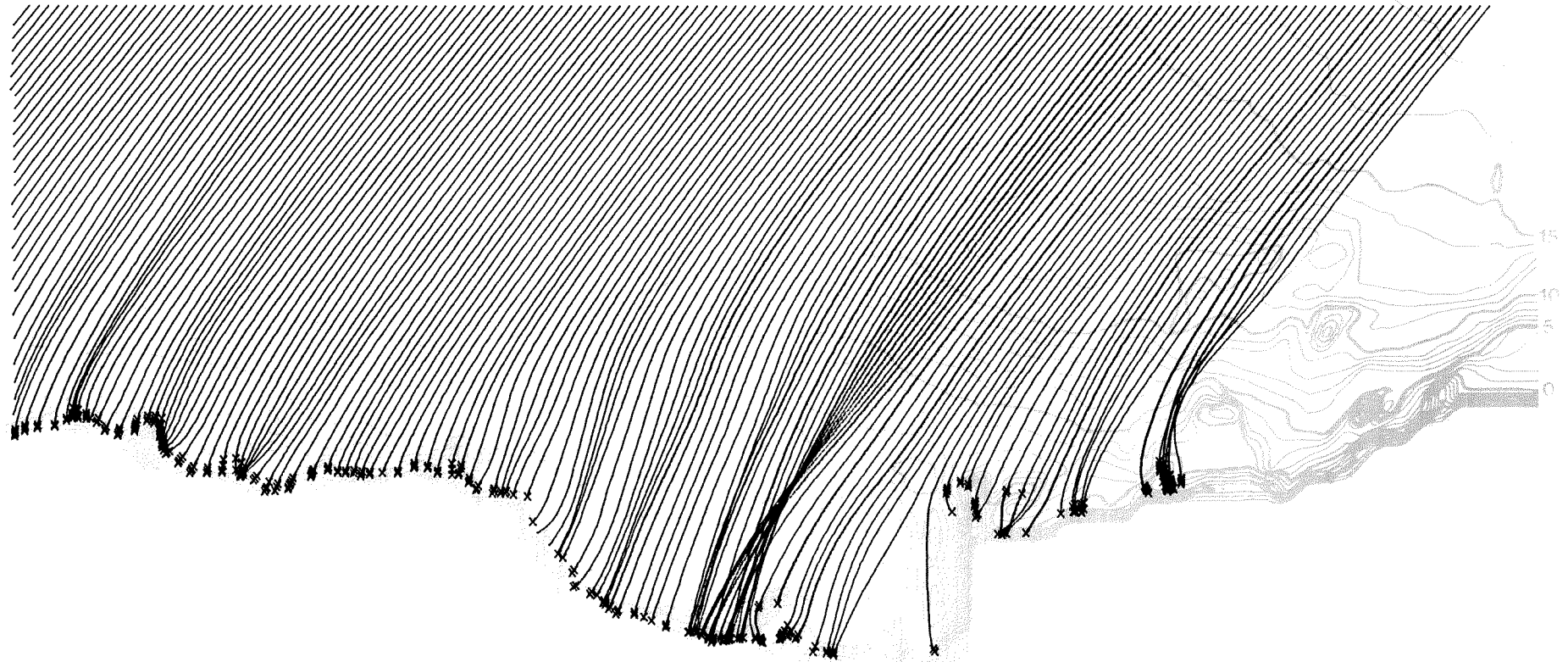
WAVE CLIMATE ELEMENT NUMBER 7



1- 10.0000 10- .000000 FILE- 2.00000
ANGLE OF INCIDENCE 141.450 DEGREES

WAVE CLIMATE ELEMENT NUMBER 8





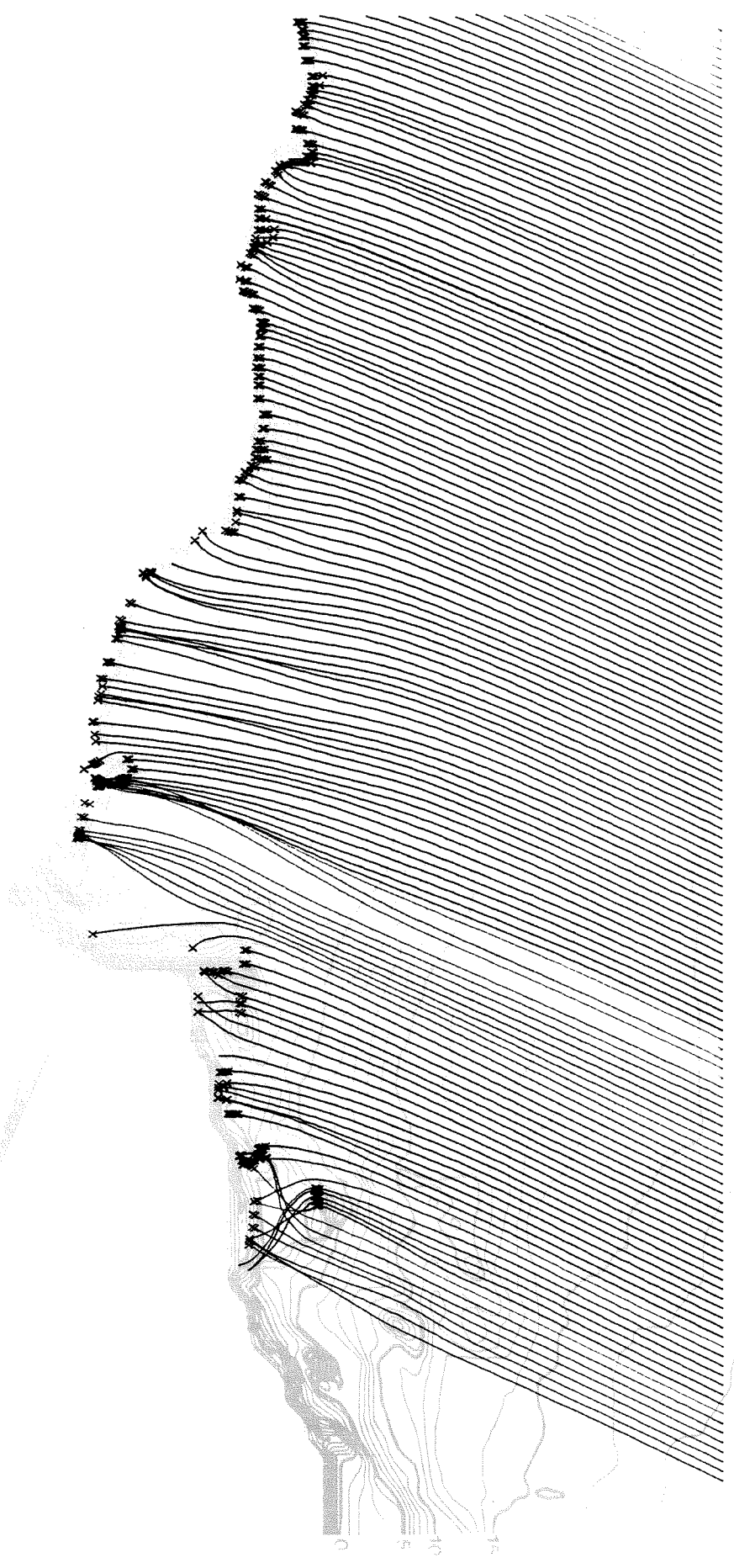
T= 10.0000 H0= .900000 RIDE= 2.00000
ANGLE OF INCIDENCE 120.340 DEGREES

WAVE CLIMATE ELEMENT NUMBER 9



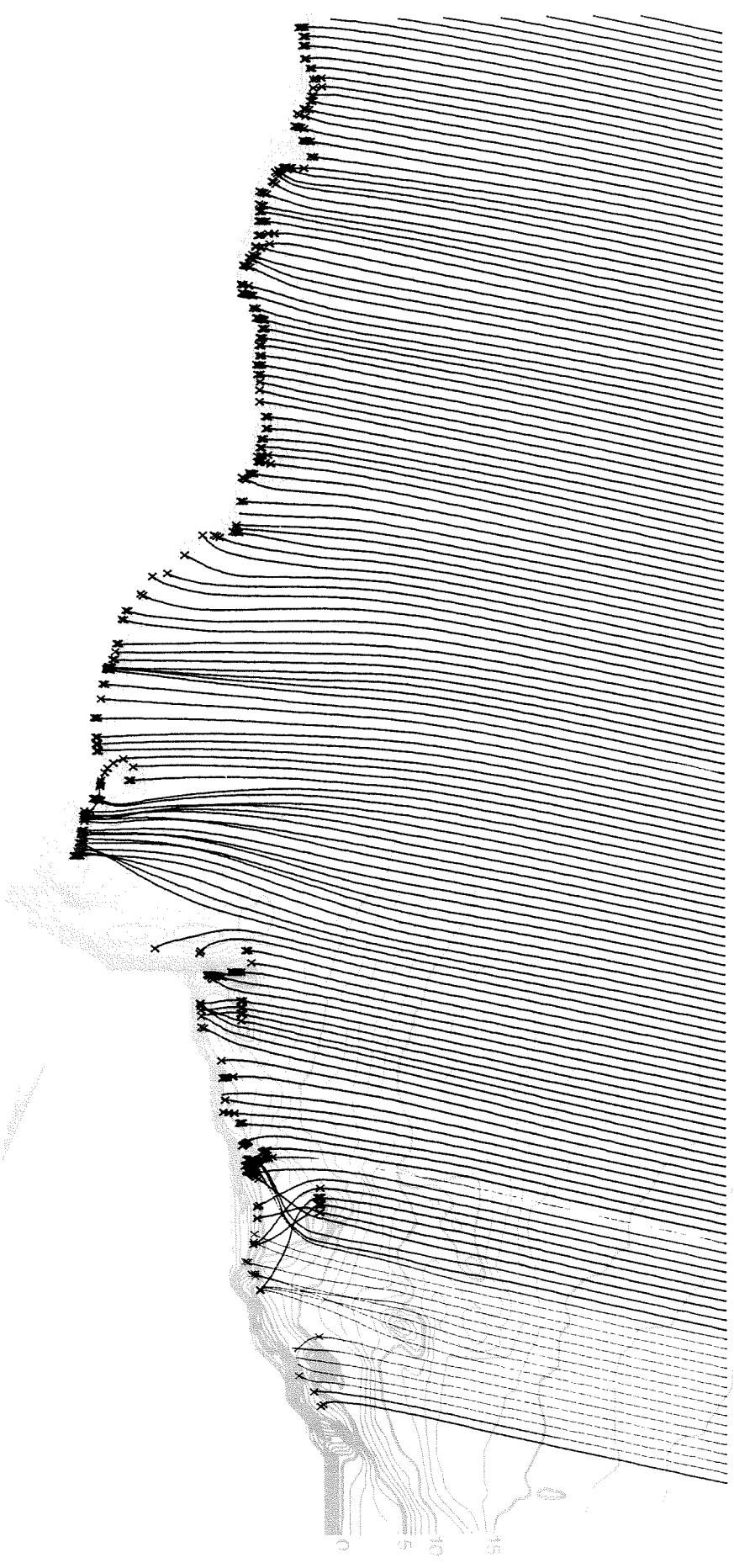
T = 10,000 H = 10,000
SCALE OF INCIDENCE 1/10,000 RISE = 2,000
ELEVATION

WAVE CLIMATE ELEMENT NUMBER 10



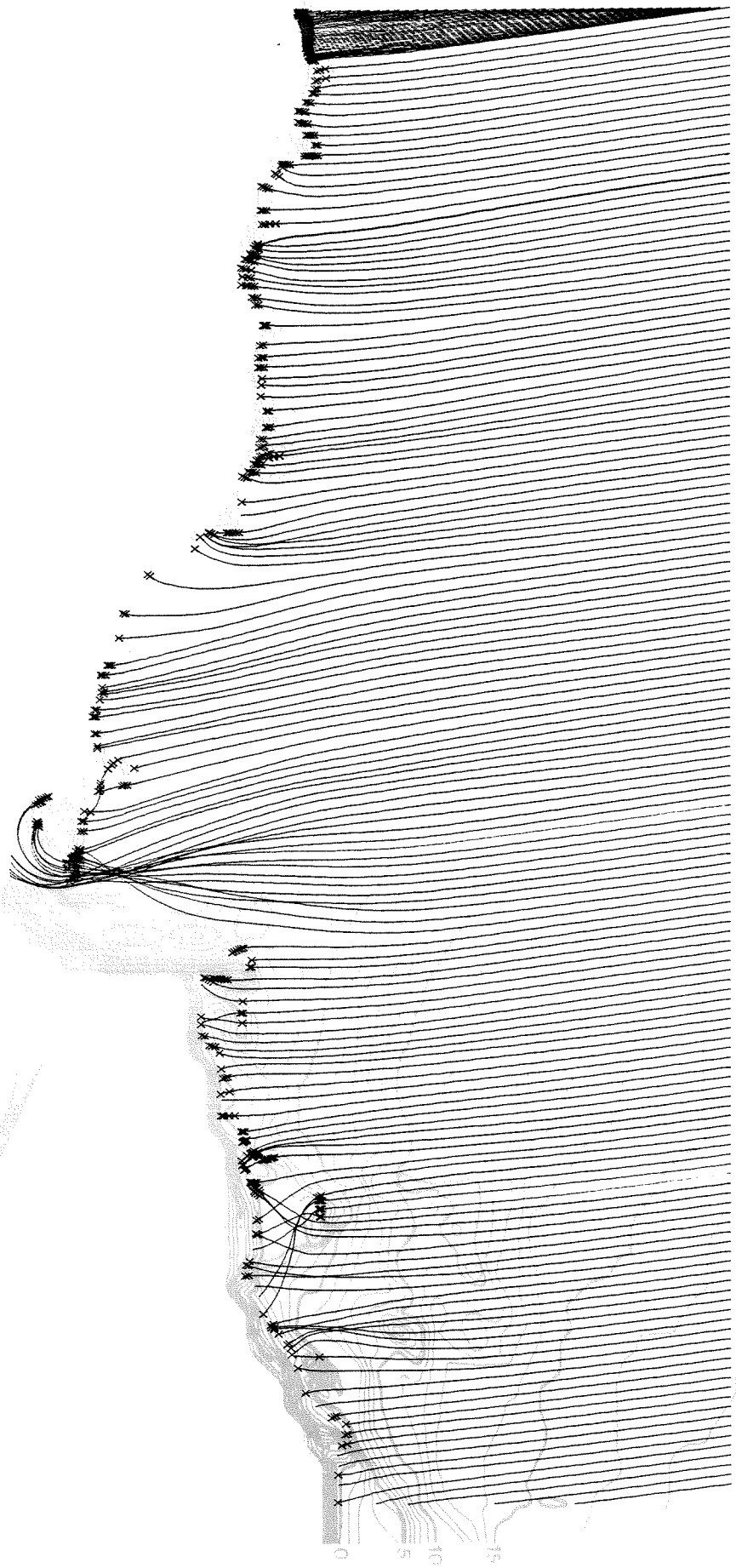
T= 10.0000 H= .000000 DT= 2.00000
ANGLE OF INCIDENCE 102.700 DEGREES

WAVE CLIMATE ELEMENT NUMBER 11



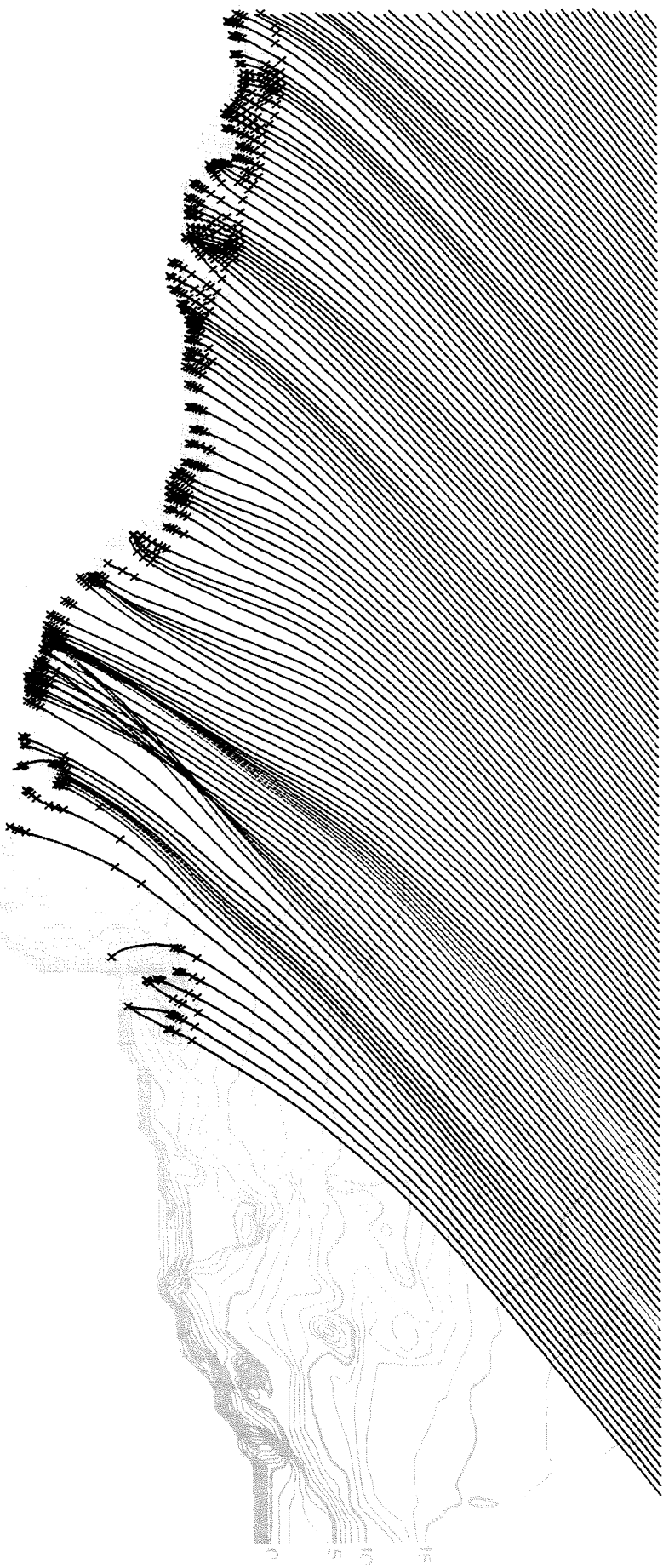
T= 10.0000 H0= .800000 RISE= 2.00000
ANGLE OF INCIDENCE 92.8100 DEGREES

WAVE CLIMATE ELEMENT NUMBER 12



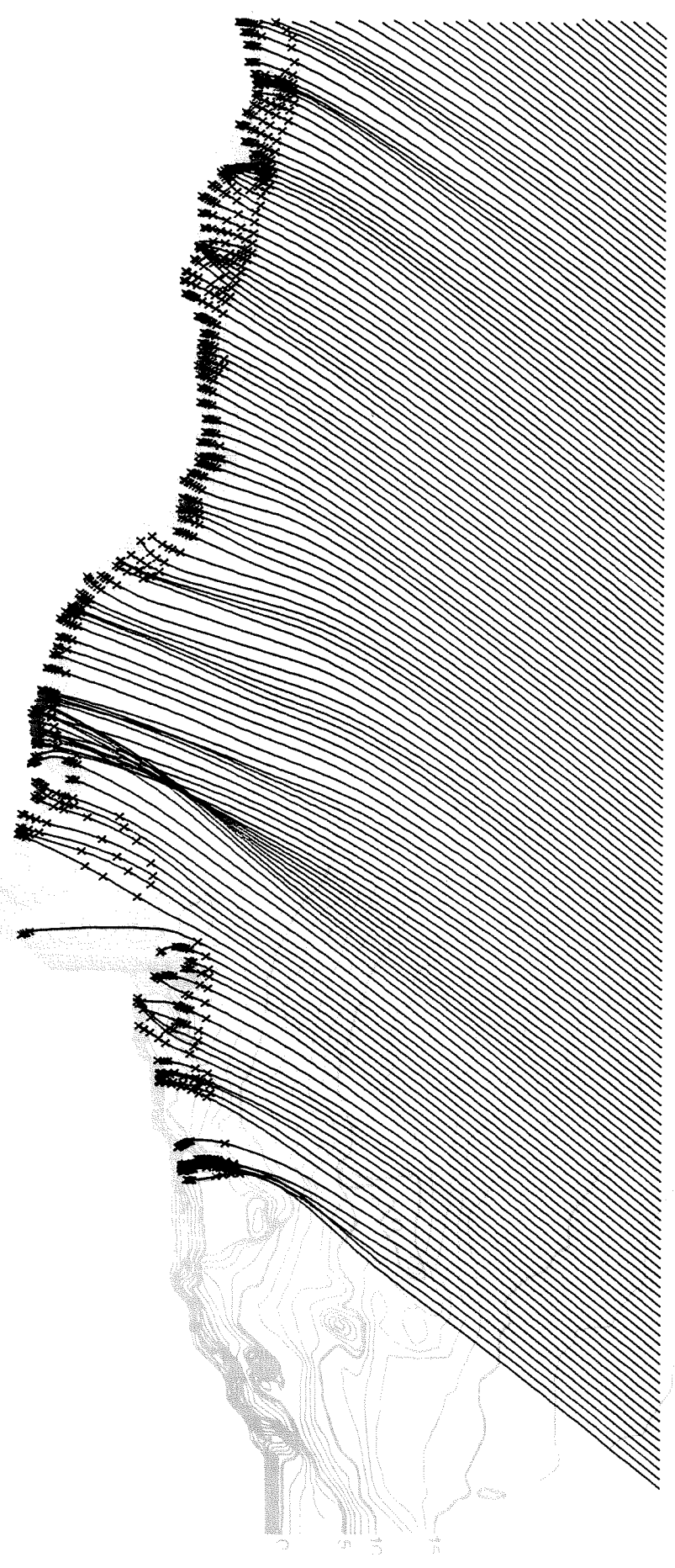
T= 10.0000 HR= 2.87000
AREA OF INFLUENCE 141.00 DIMENSION

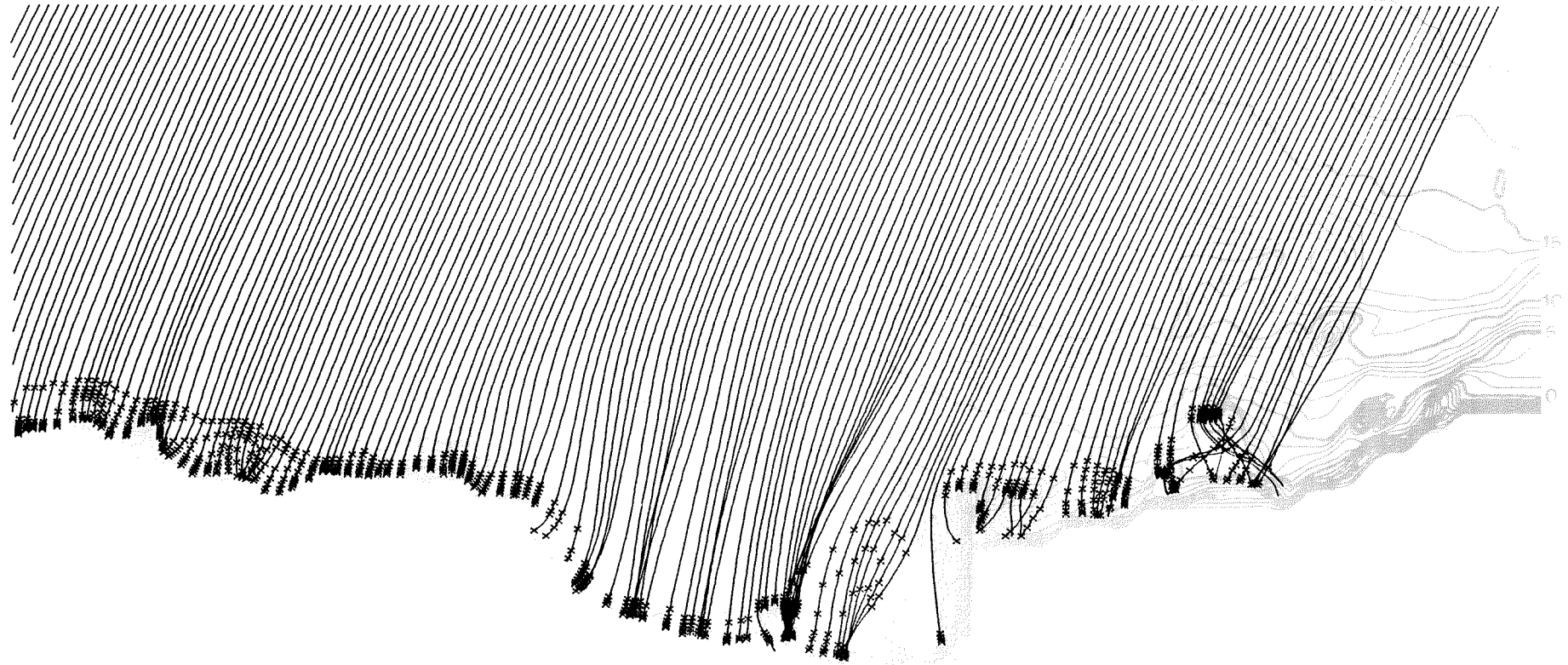
WAVE CLIMATE ELEMENT NUMBER 13



1- 10.0000 10- 2.9700 111E- 2.0000
SCALE OF LENGTHS 100.000 1000000

WAVE CLIMATE ELEMENT NUMBER 14





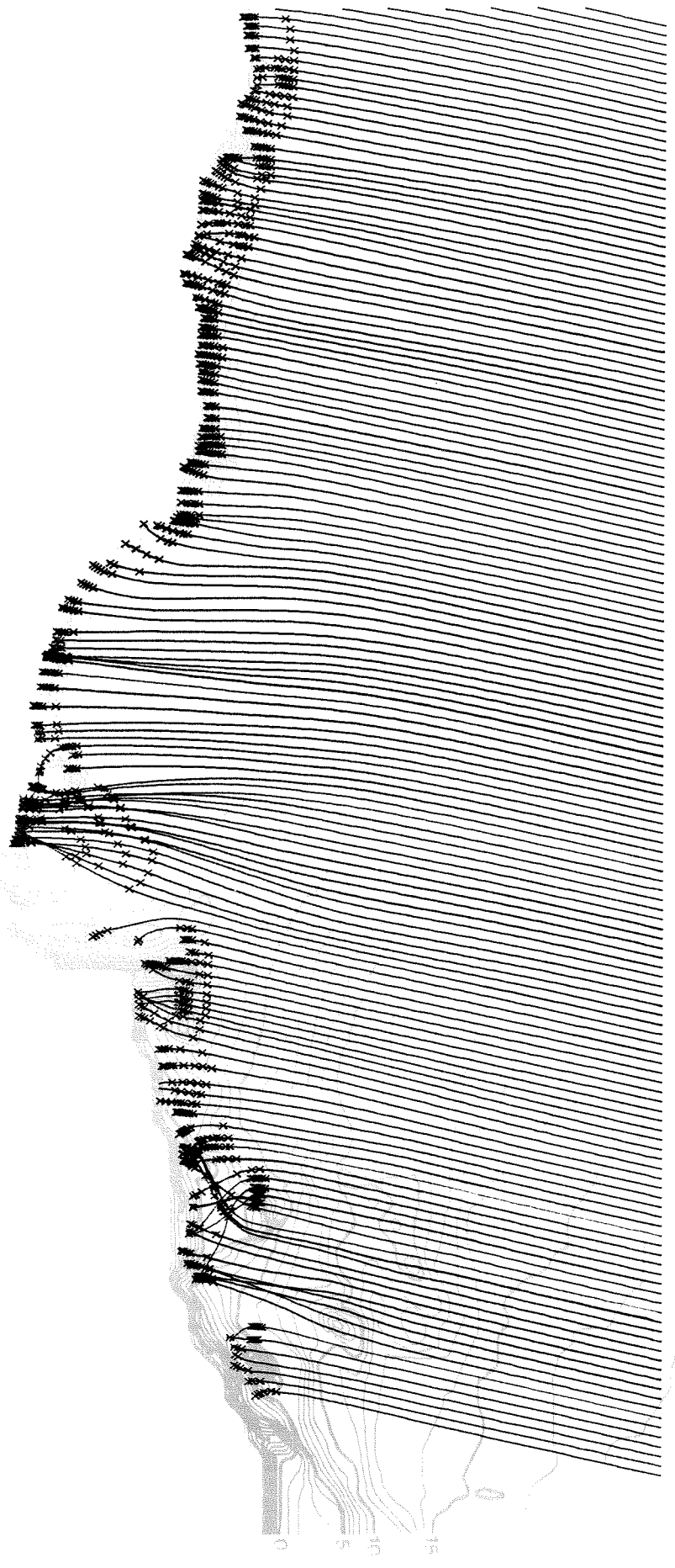
T= 10.0000 H0= 2.07000 RISE= 2.00000
ANGLE OF INCIDENCE 110.320 DEGREES

WAVE CLIMATE ELEMENT NUMBER 15



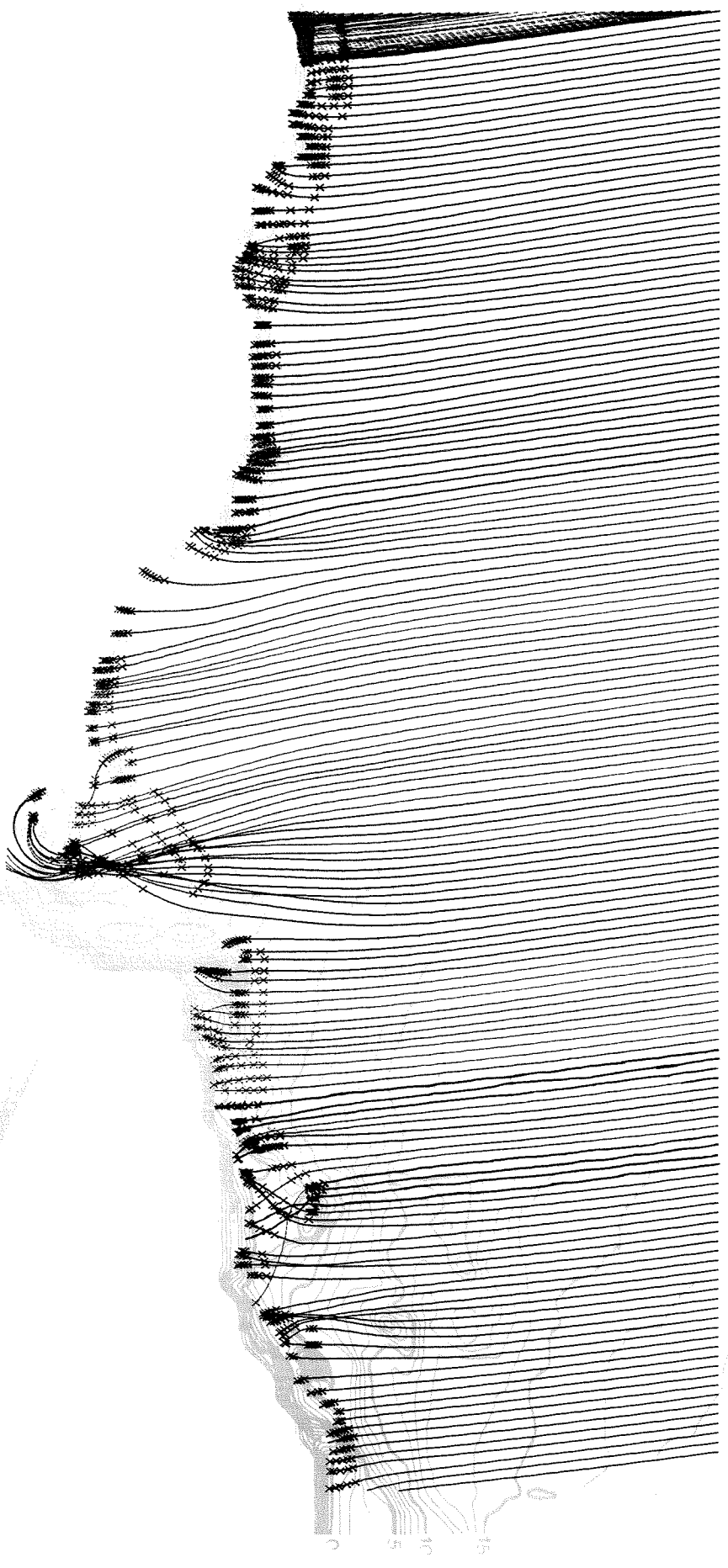
1- 10,000 HP- 8,81000 NITE- 8,0000
NAME OF INCHANCE 100,1700 DRAWERS

WAVE CLIMATE ELEMENT NUMBER 16

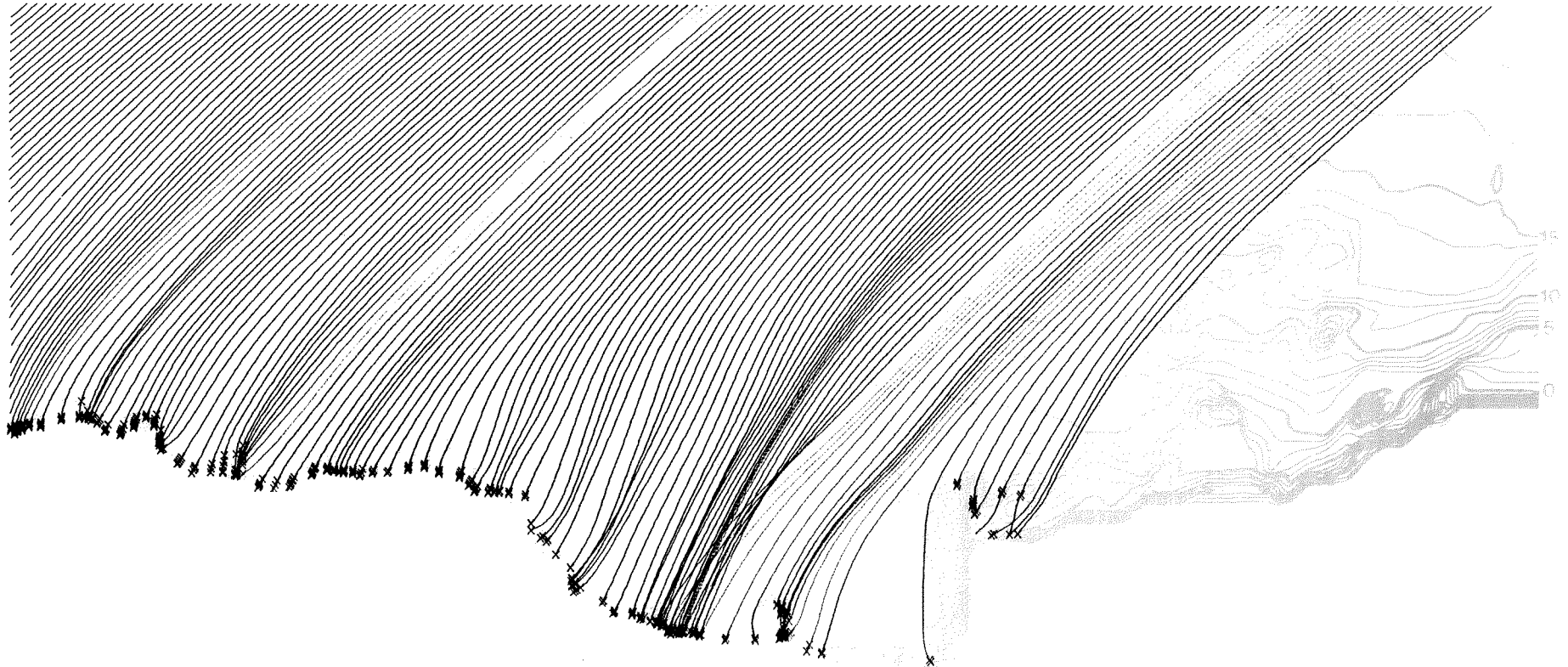


T- 10.0000 H0- 2.9700 RISE- 2.0000
ANGLE OF INCIDENCE 82.8100 DEGREES

WAVE CLIMATE ELEMENT NUMBER 17



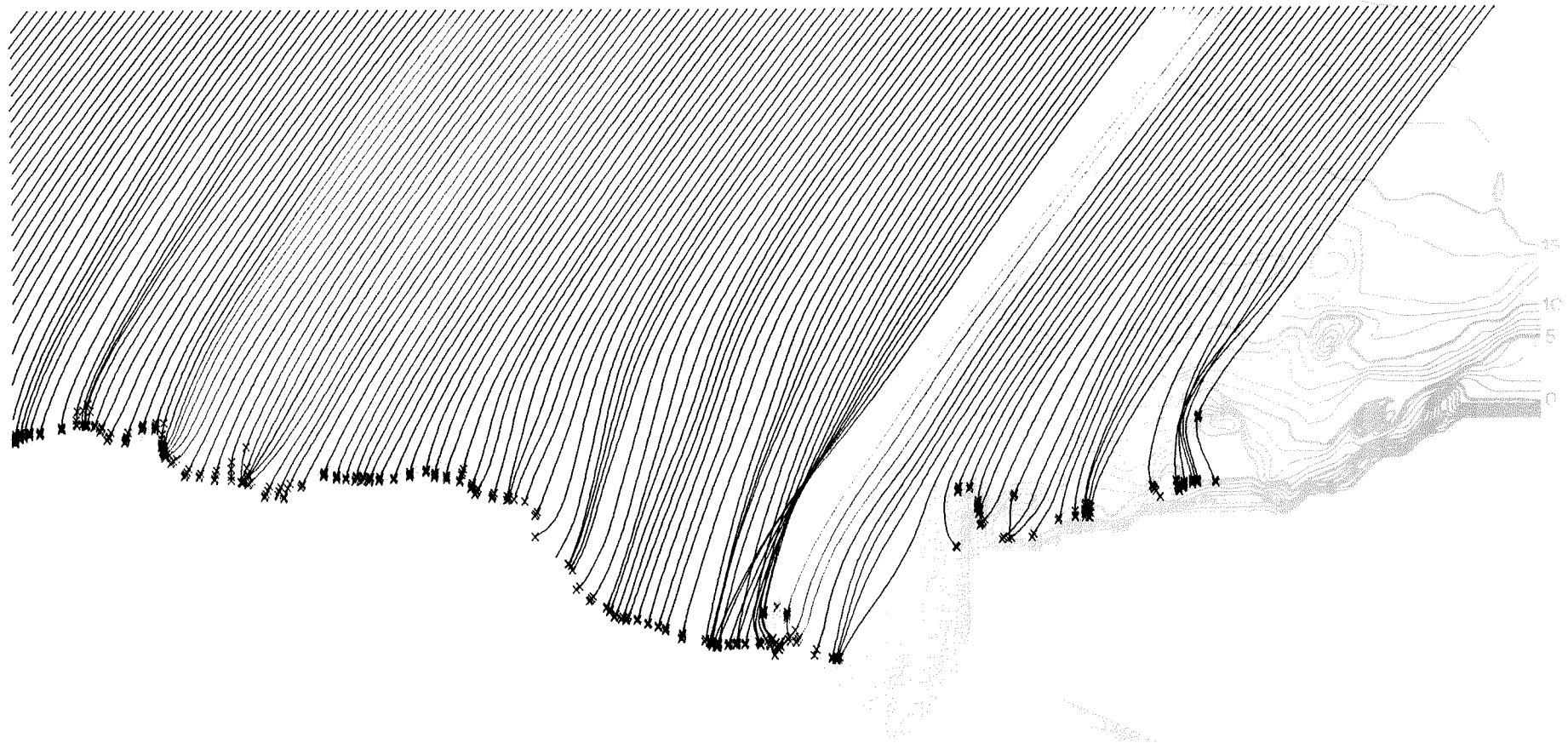
8



T= 12.0000 H0= 1.00000 R100= 2.00000
ANGLE OF INCIDENCE 130.000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 18





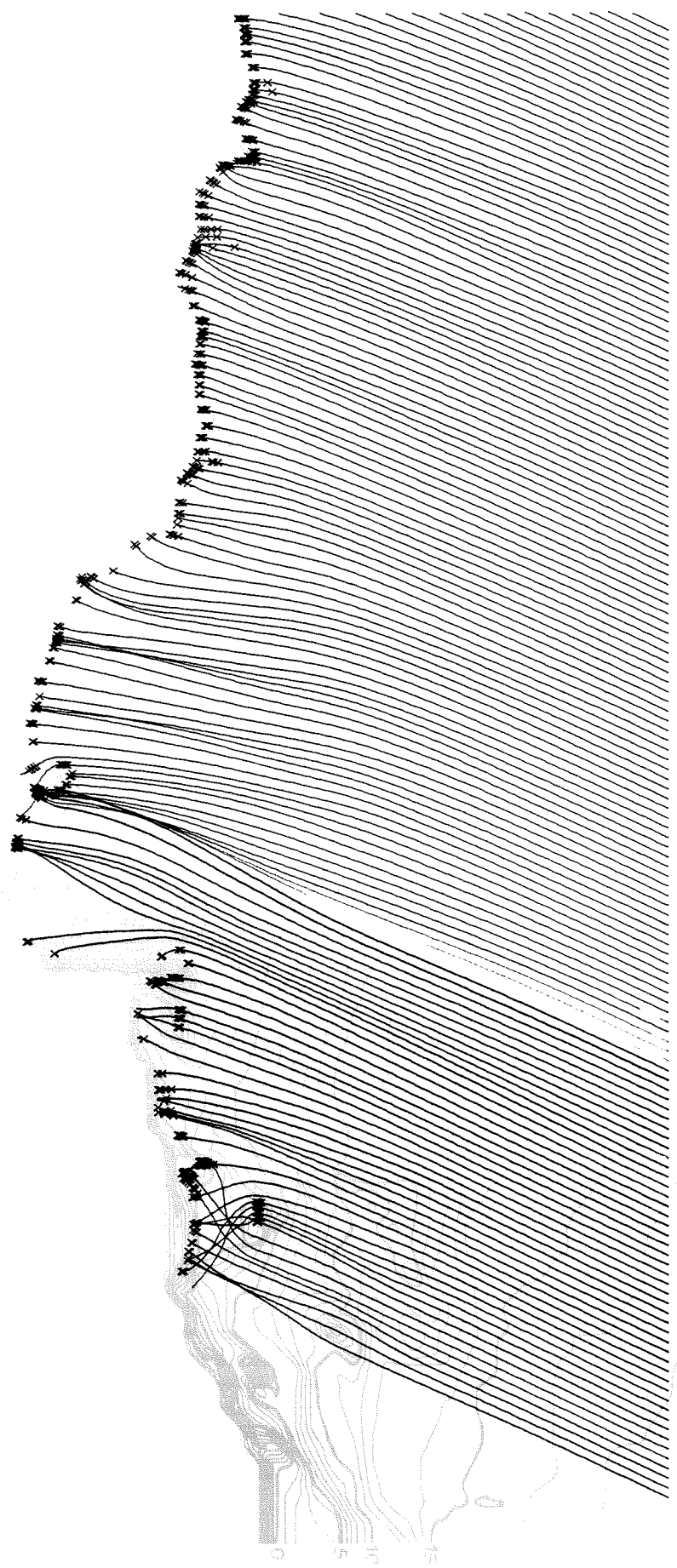
T= 12.0000 H0= 1.00000 RIBE= 2.00000
ANGLE OF INCIDENCE 128.270 DEGREES

WAVE CLIMATE ELEMENT NUMBER 19



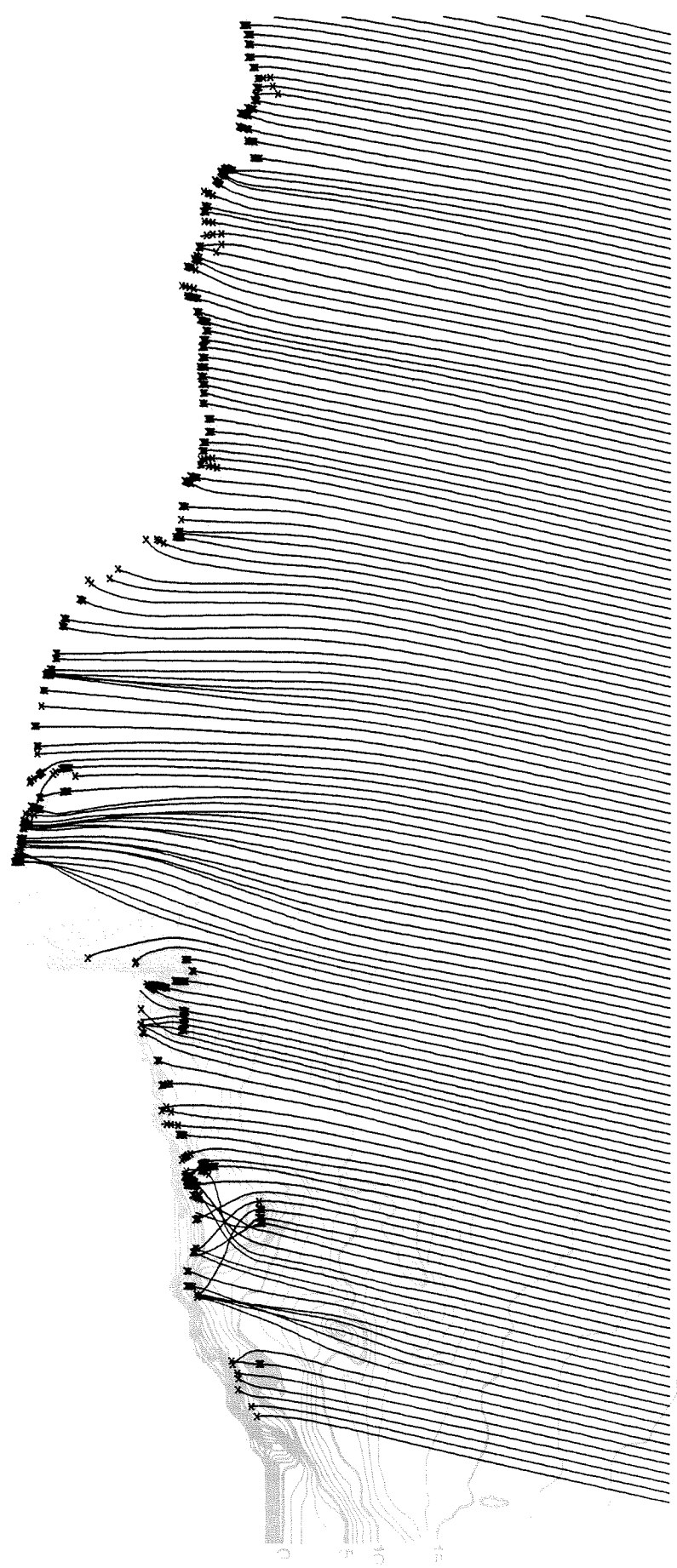
L- 12.0000 H0- 1.00000 R1H0- 2.00000
ANGLE OF INCIDENCE 118.990 DEGREES

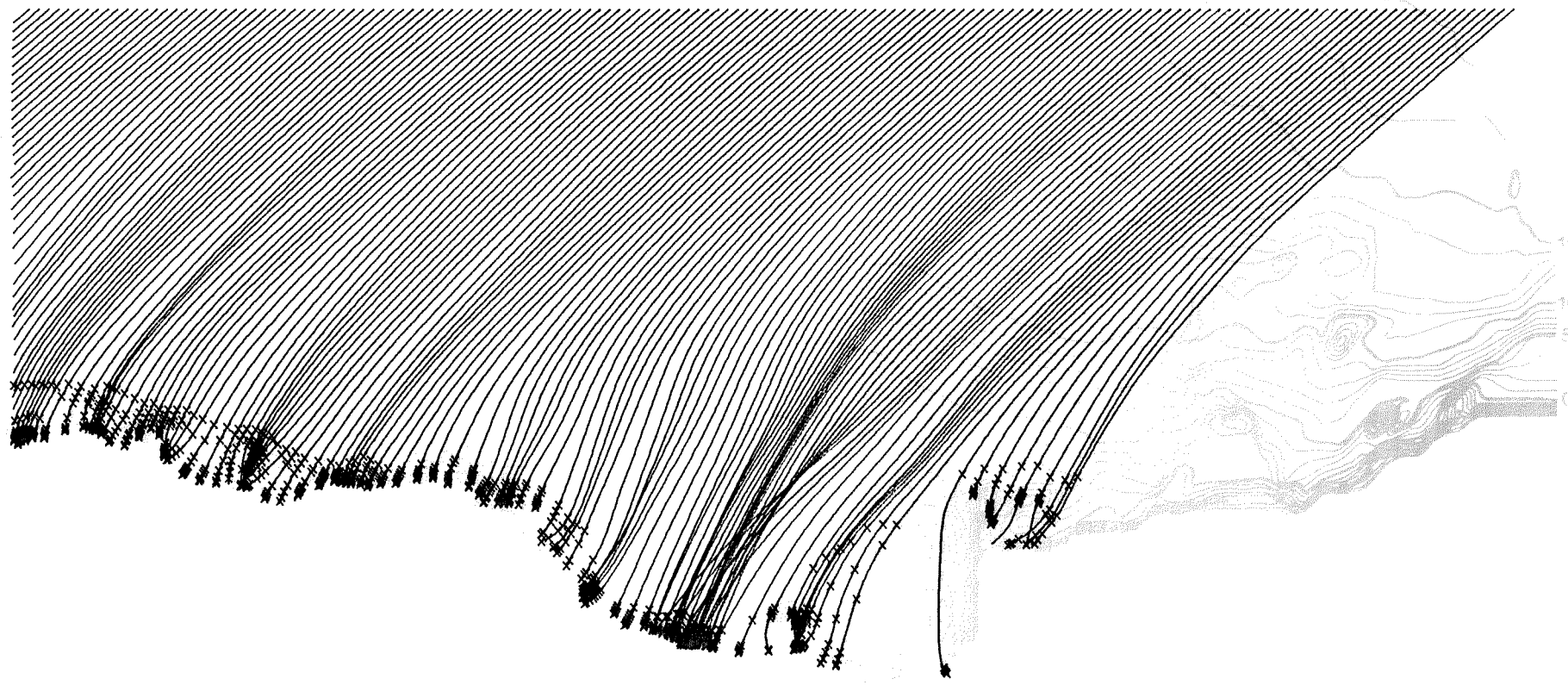
WAVE CLIMATE ELEMENT NUMBER 20



T- 12.0000 Hg- 1.0000 NISC- 2.0000
ANGLE OF INCIDENCE 180.0000 DEGREES

WAVE CLIMATE ELEMENT NUMBER 21





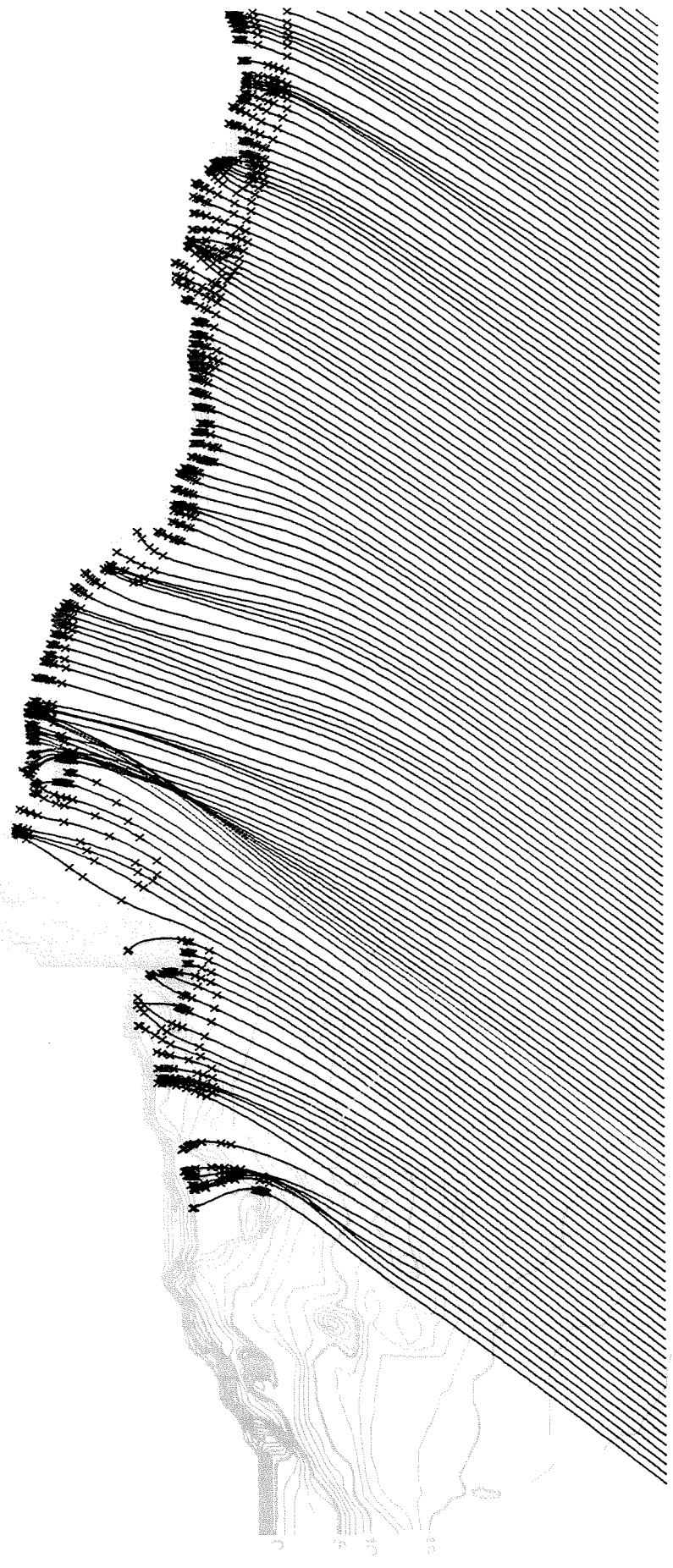
T= 12.0000 H0= 2.0000 RIDE= 2.00000
ANGLE OF INCIDENCE 180.000 DENEFER

WAVE CLIMATE ELEMENT NUMBER 22



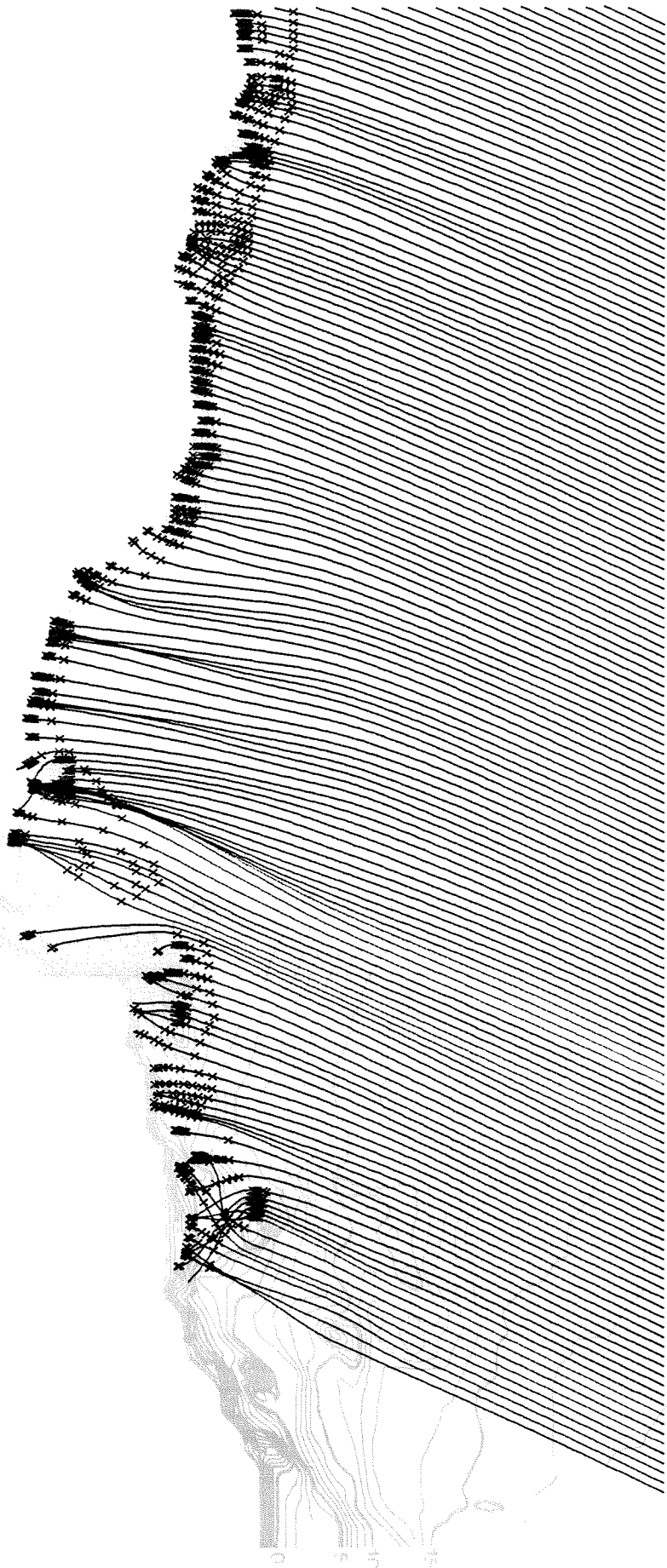
T= 12.0000 HZ= 8.00000 TIME= 3.00000
ANGLE OF INCIDENCE 150.270 DEGREES

WAVE CLIMATE ELEMENT NUMBER 23



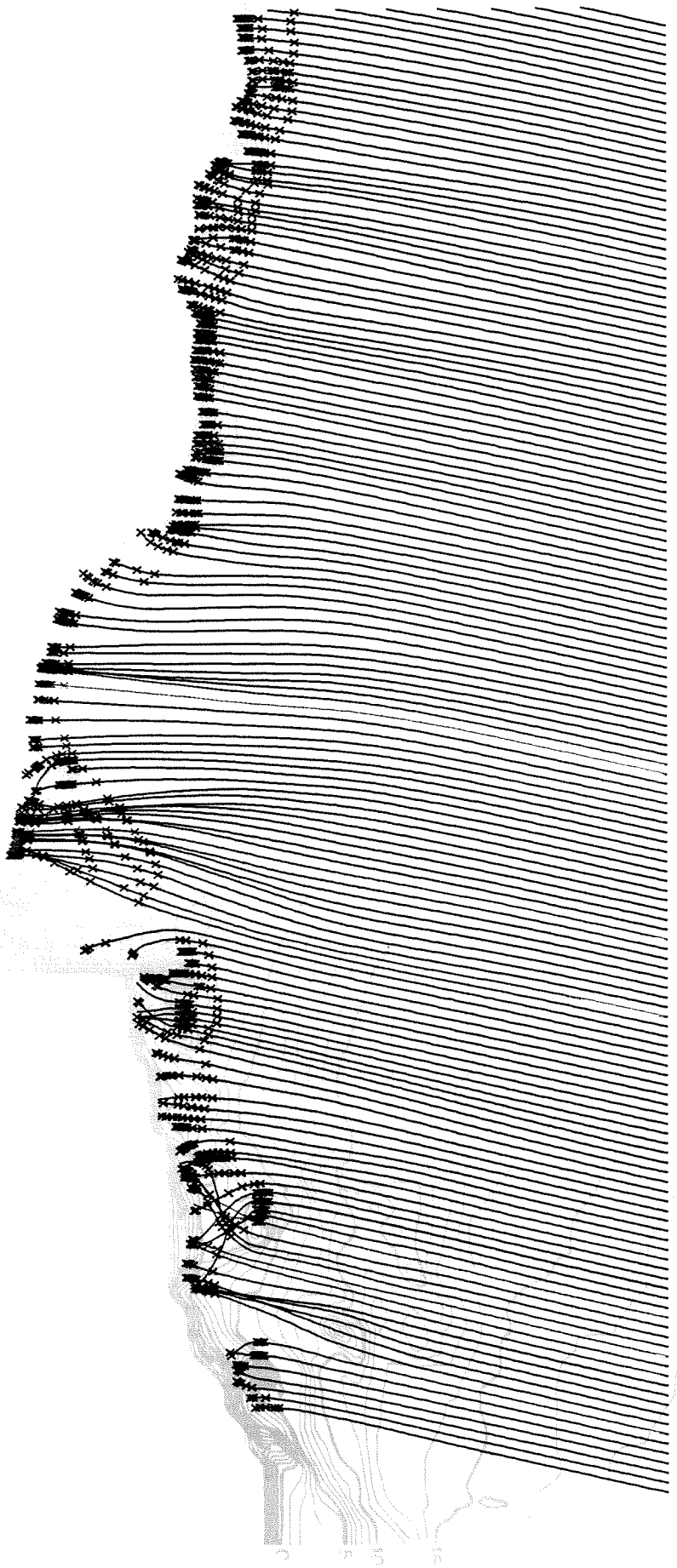
T= 12.0000 Hz= 2.000000 FREQ= 2.00000
SCALE OF VERTICALS 100.0000 PERCENT

WAVE CLIMATE ELEMENT NUMBER 24



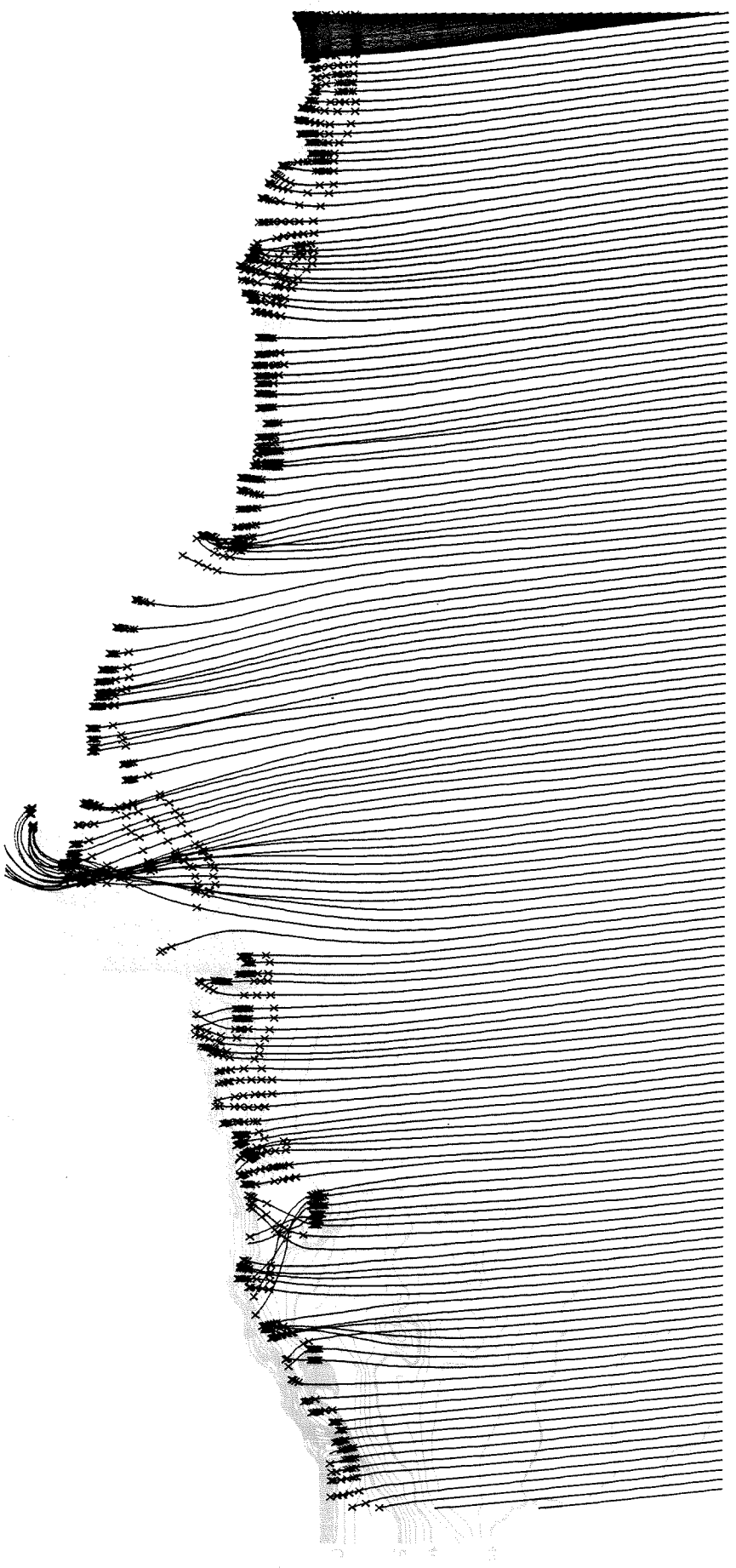
1- 12.0000 10- 2.00000
ANGLE OF INCIDENCE 100.000 DEGREE 2.00000

WAVE CLIMATE ELEMENT NUMBER 25



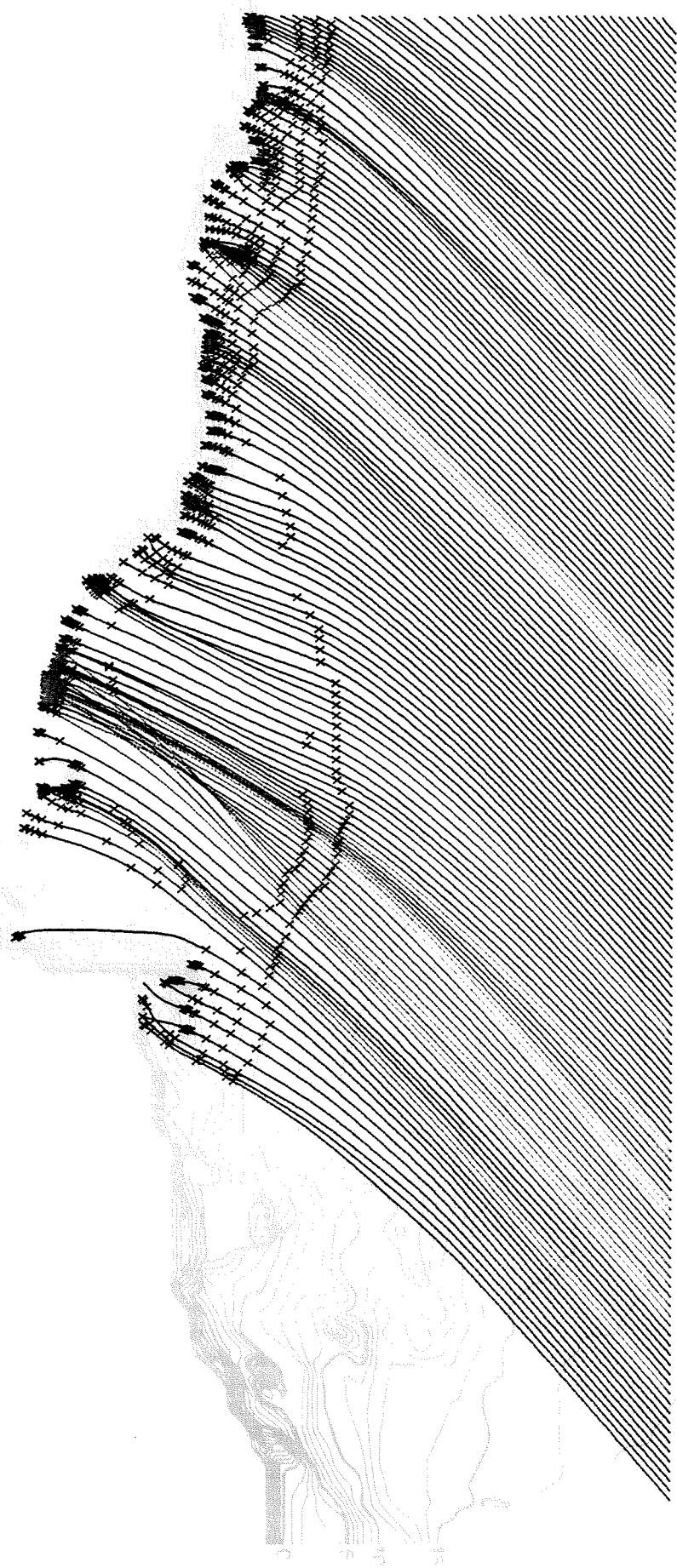
L- 12.0000 H- 2.00000 RISE- 2.00000
ANGLE OF INCIDENCE 89.4700 DEGREES

WAVE CLIMATE ELEMENT NUMBER 26



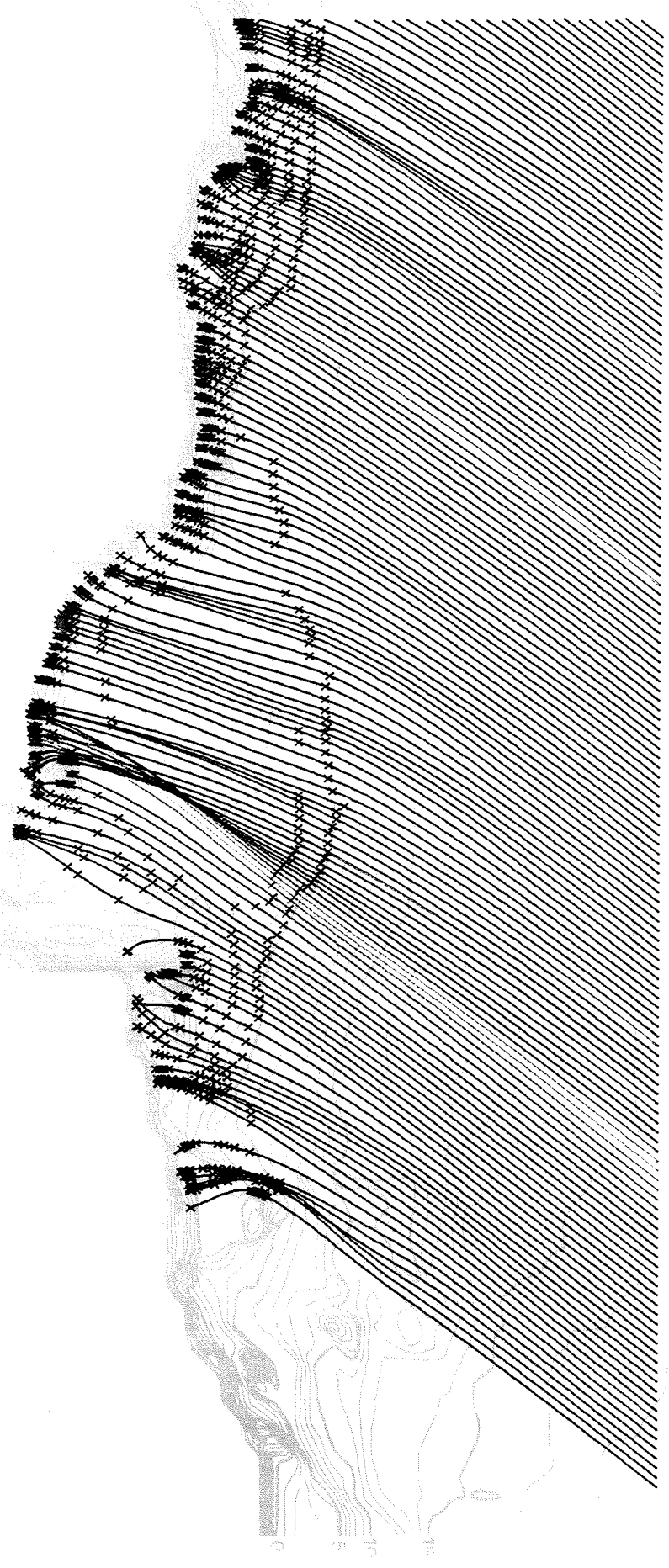
T= 12.0000 H= 4.4000 HIR= 2.0000
ANGLE OF INCIDENCE 150.000 DEGREE

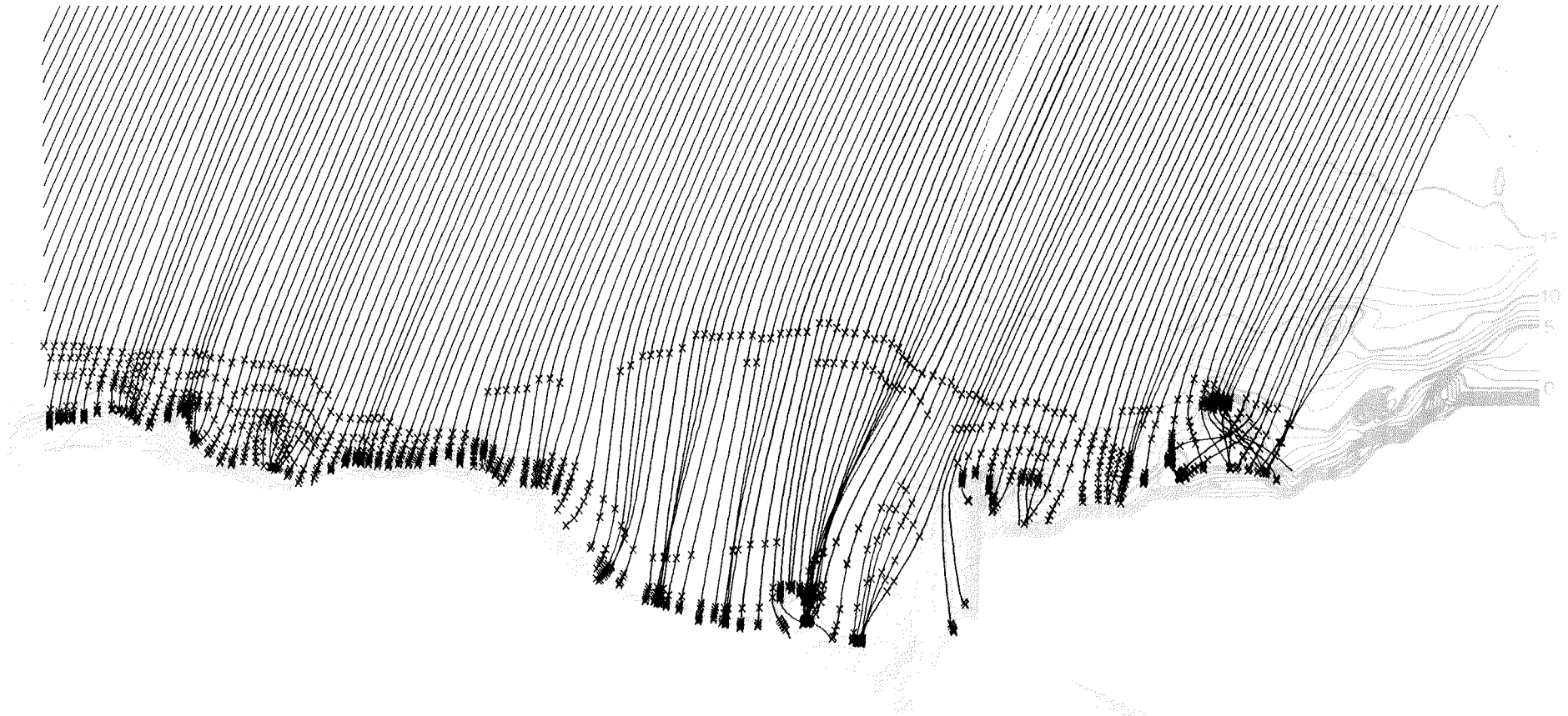
WAVE CLIMATE ELEMENT NUMBER 27



WAVE CLIMATE ELEMENT NUMBER 28
T= 15.0000 H= 4.4000 RISE= 2.0000
ANGLE OF INCIDENCE 58.270 DEGREES

WAVE CLIMATE ELEMENT NUMBER 28



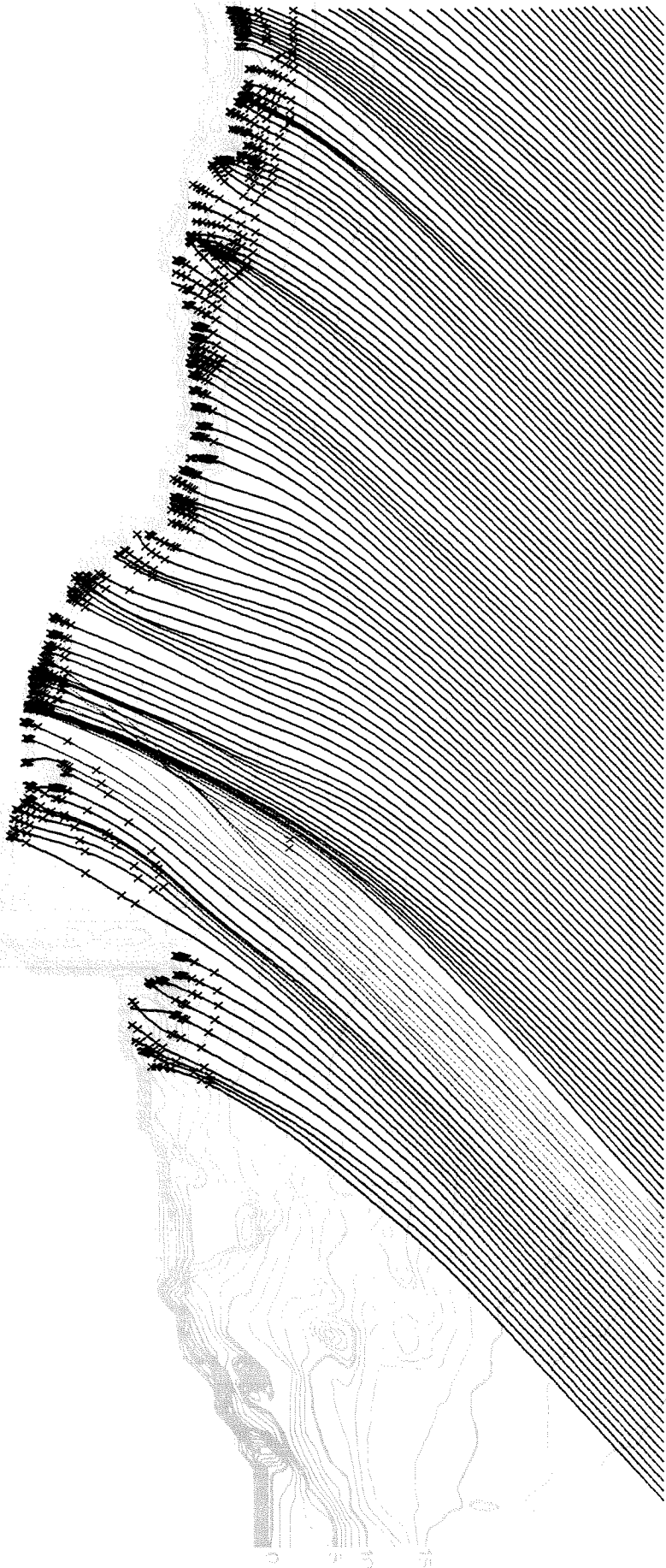


T= 12.0000 HO= 4.48000 RISE= 2.00000
ANGLE OF INCIDENCE 118.800 DEGREES

WAVE CLIMATE ELEMENT NUMBER 29

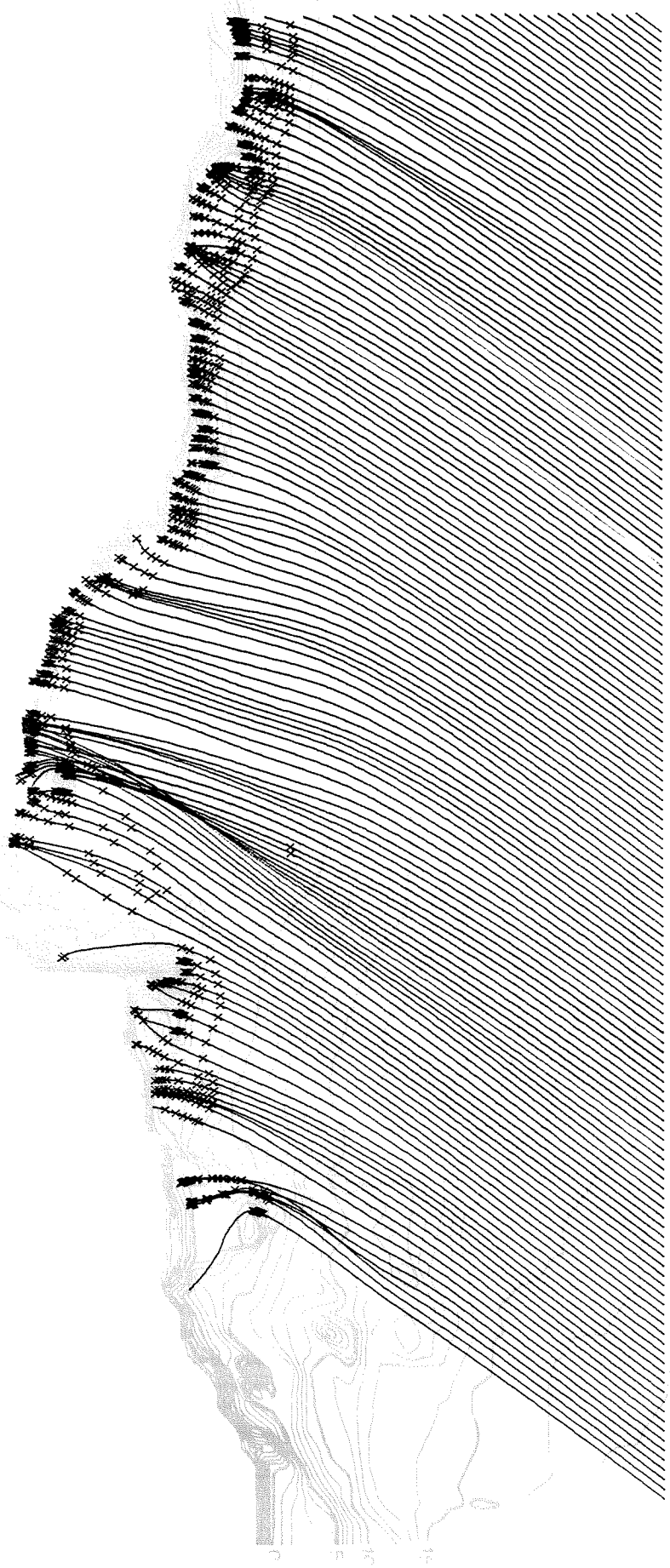
1:14,000 10- 8,0000 1111- 2,0000
SCALE OF DISTANCE 1:14,000
ELEVATION

WAVE CLIMATE ELEMENT NUMBER 30



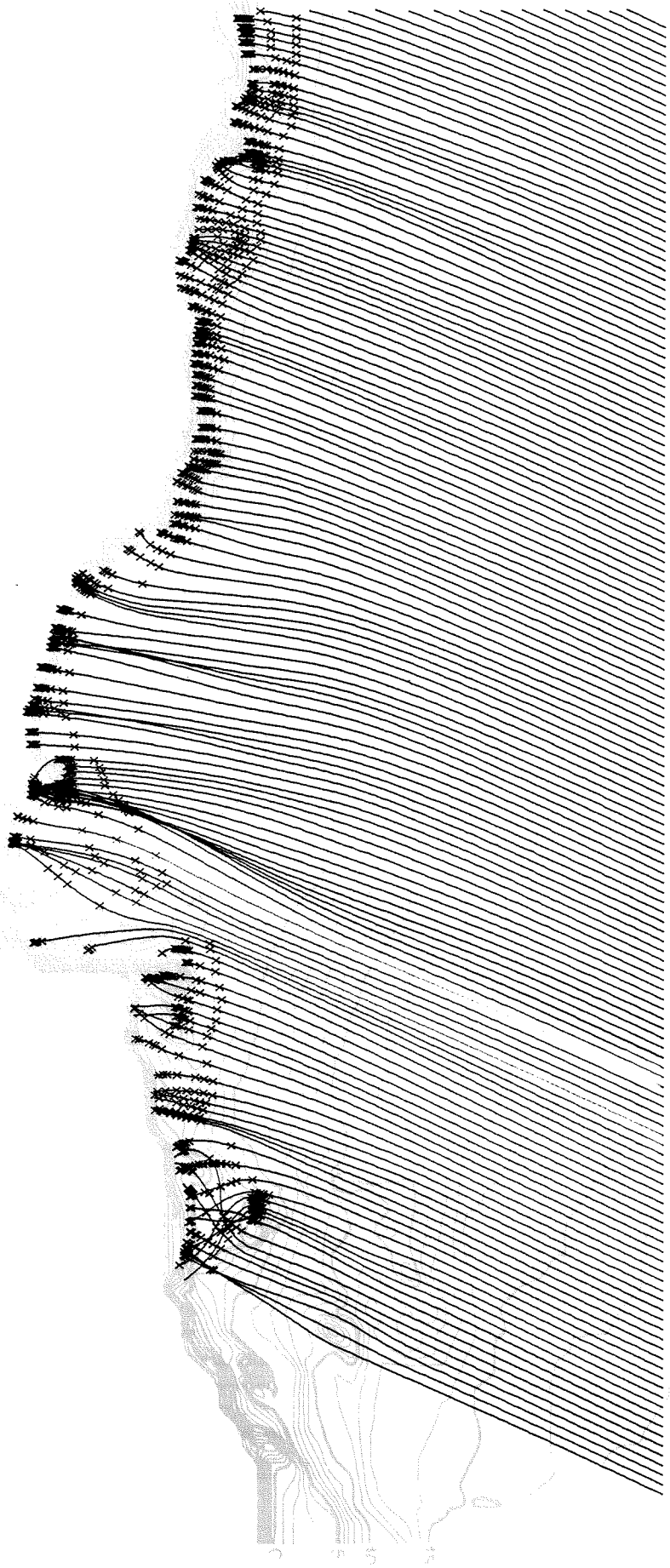
T= 14.0000 H= 3.0000 RHF= 2.0000
ANGLE OF INCIDENCE 127.470 DEGREE

WAVE CLIMATE ELEMENT NUMBER 31



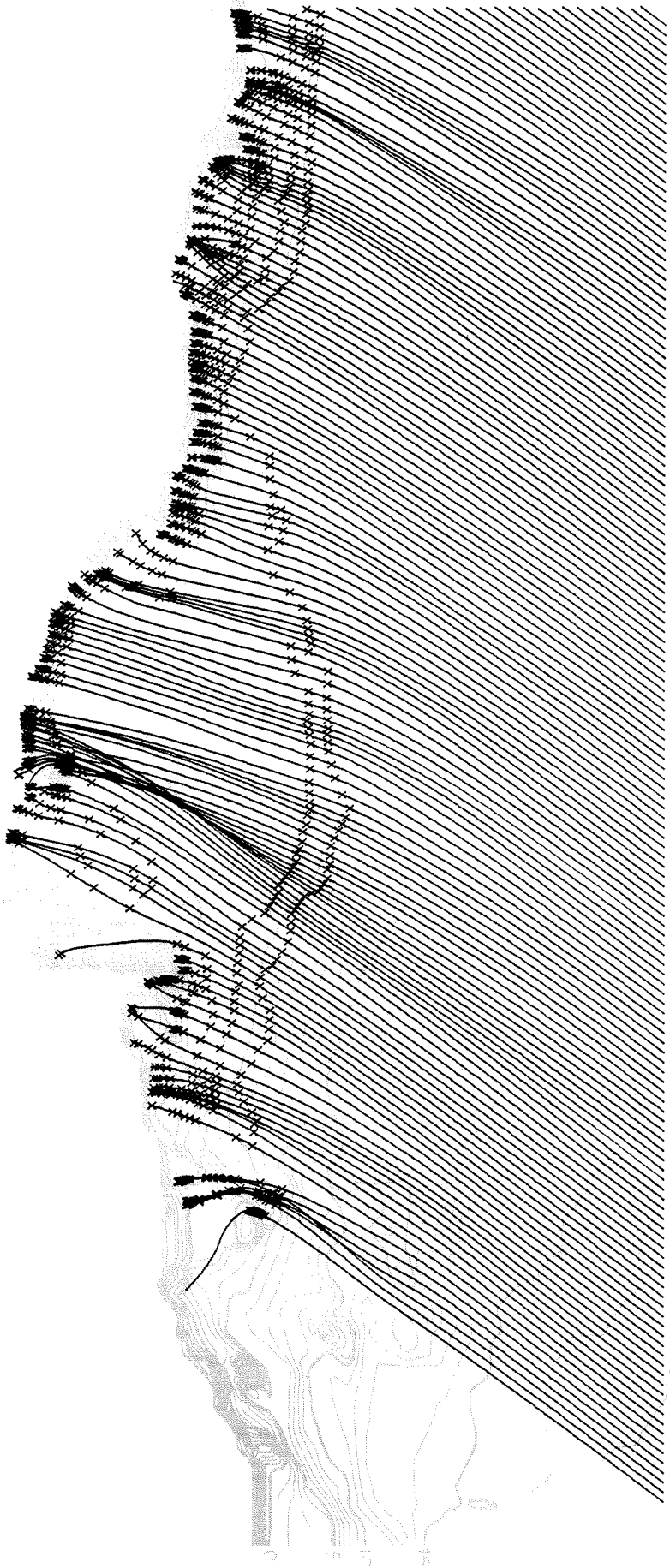
L- 14.0000 HP- 8.00000 NISE- 2.00000
ANGLE OF INCIDENCE 110.790 DEGREES

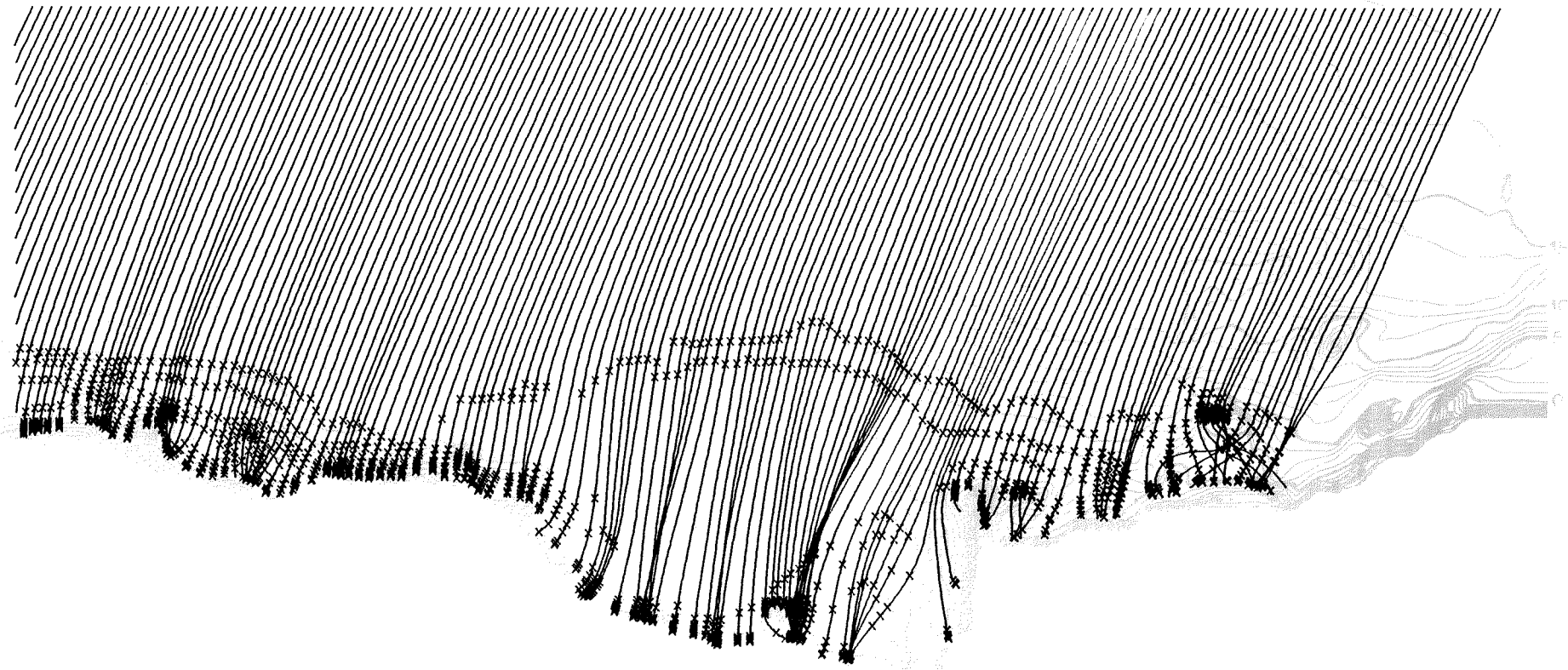
WAVE CLIMATE ELEMENT NUMBER 32



1- 14,000 No- 4,0000
ANGLE OF INCIDENCE 127.070
RANGE 2,00000
DISPERS

WAVE CLIMATE ELEMENT NUMBER 33



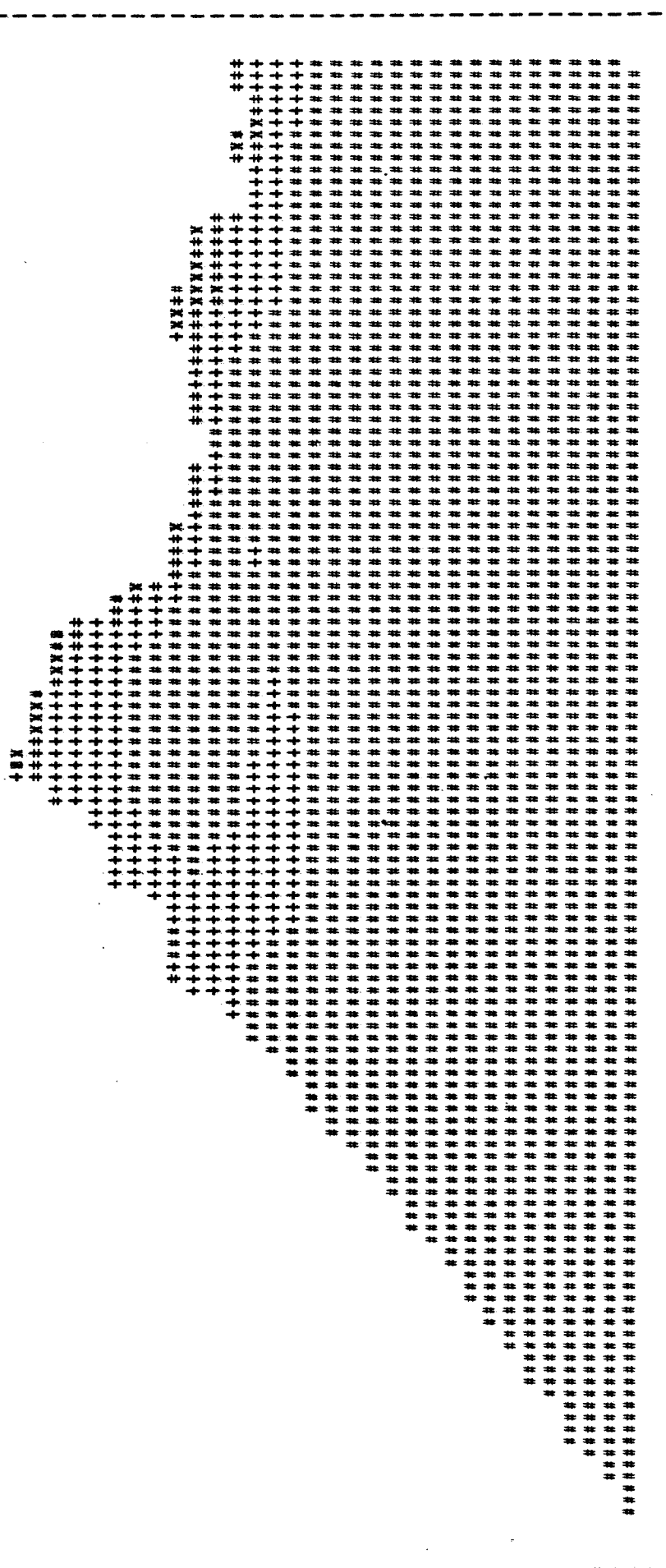


T= 14.0000 HD= 4.02000 RISE= 2.00000
ANGLE OF INCIDENCE 110.700 DEGREES

WAVE CLIMATE ELEMENT NUMBER 34



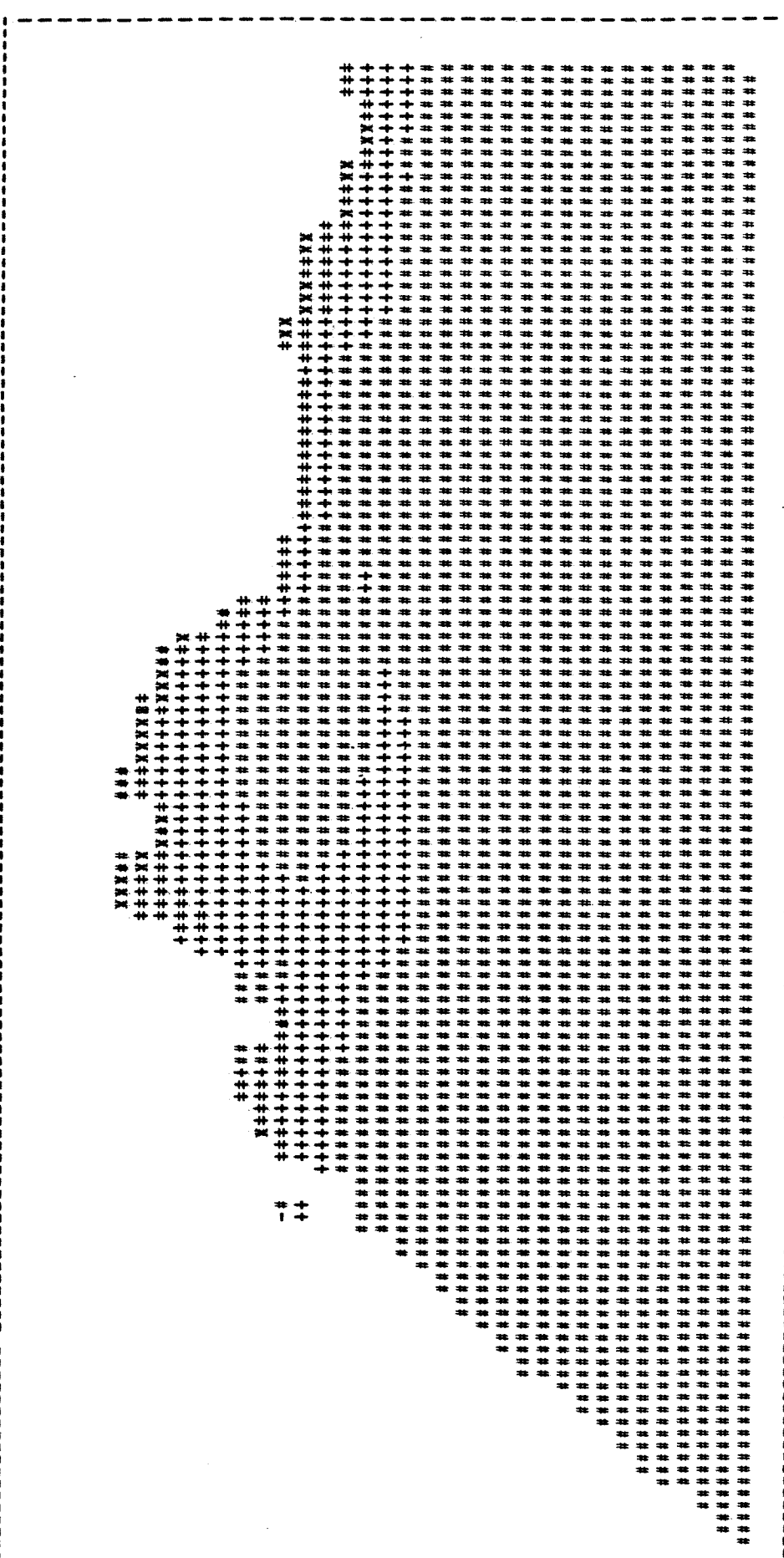
**Wave height charts
detailed model**



VALUE LESS THAN .60 TO .70
VALUE FROM .70 TO .80
VALUE FROM .80 TO .90
VALUE FROM .90 TO 1.00

+++++ VALUE FROM 1.00 TO 1.10
+++++ VALUE FROM 1.10 TO 1.20
+++++ VALUE FROM 1.20 TO 1.30
+++++ VALUE FROM 1.30 TO 1.40

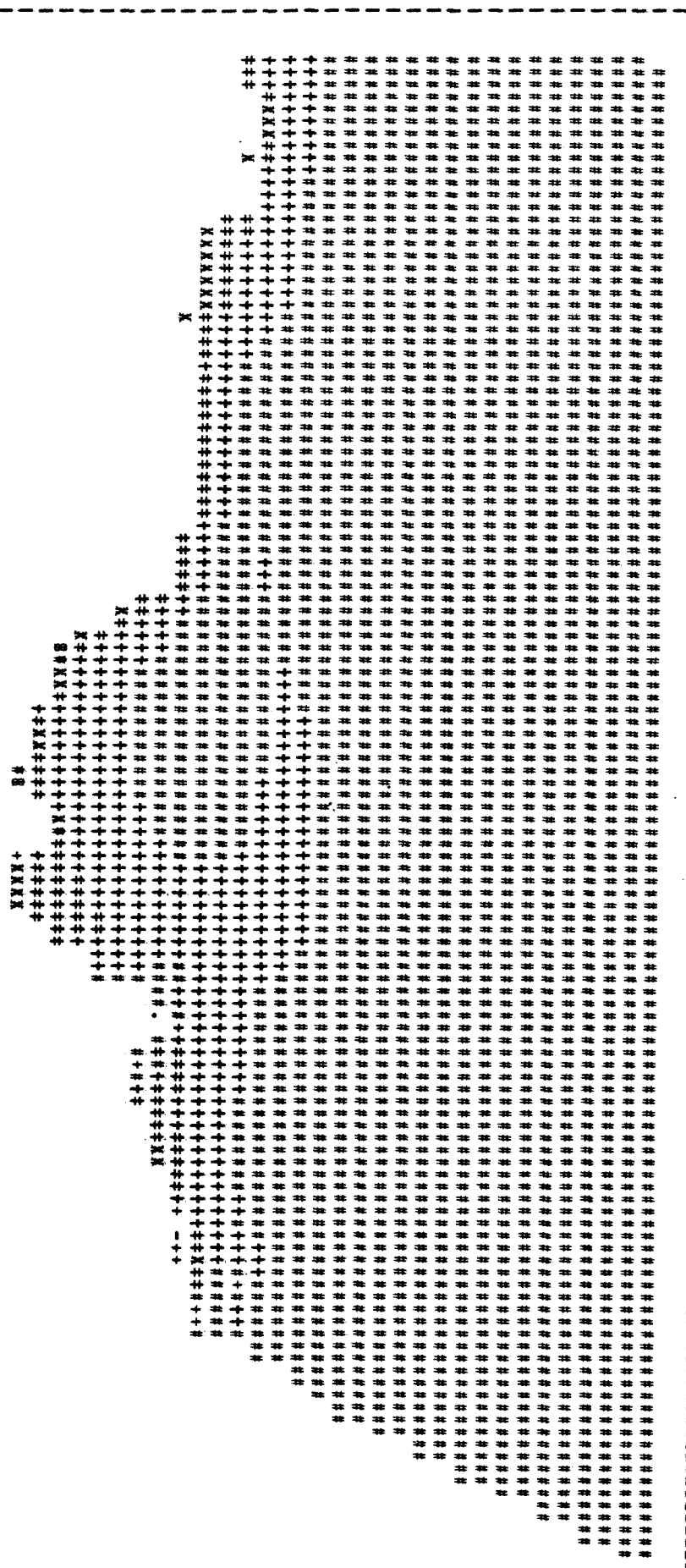
***** WAVE HEIGHT CHART *****
** WAVE CLIMATE ELEMENT 1**



VALUE LESS THAN .60 TO .70
VALUE FROM .70 TO .80
VALUE FROM .80 TO .90
VALUE FROM .90 TO 1.00

+++++ VALUE FROM 1.00 TO 1.10
+++++ VALUE FROM 1.10 TO 1.20
XXXXX VALUE FROM 1.20 TO 1.30
***** VALUE FROM 1.30 TO 1.40
***** VALUE GREATER THAN 1.40

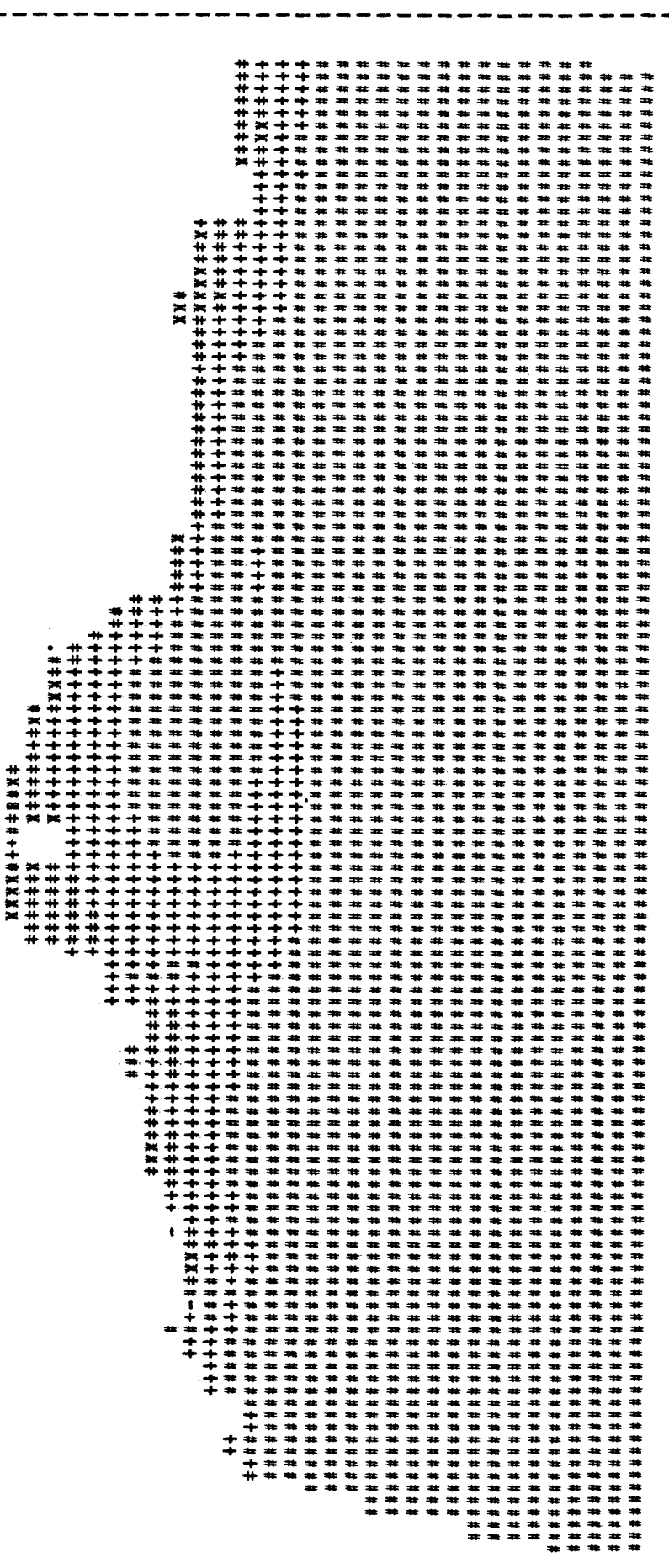
*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 2



VALUE LESS THAN .60
 VALUE FROM .60 TO .70
 VALUE FROM .70 TO .80
 VALUE FROM .80 TO .90
 VALUE FROM .90 TO 1.00

+++++ VALUE FROM 1.00 TO 1.10
 ##### VALUE FROM 1.10 TO 1.20
 ##### VALUE FROM 1.20 TO 1.30
 ##### VALUE FROM 1.30 TO 1.40
 ##### VALUE GREATER THAN 1.40

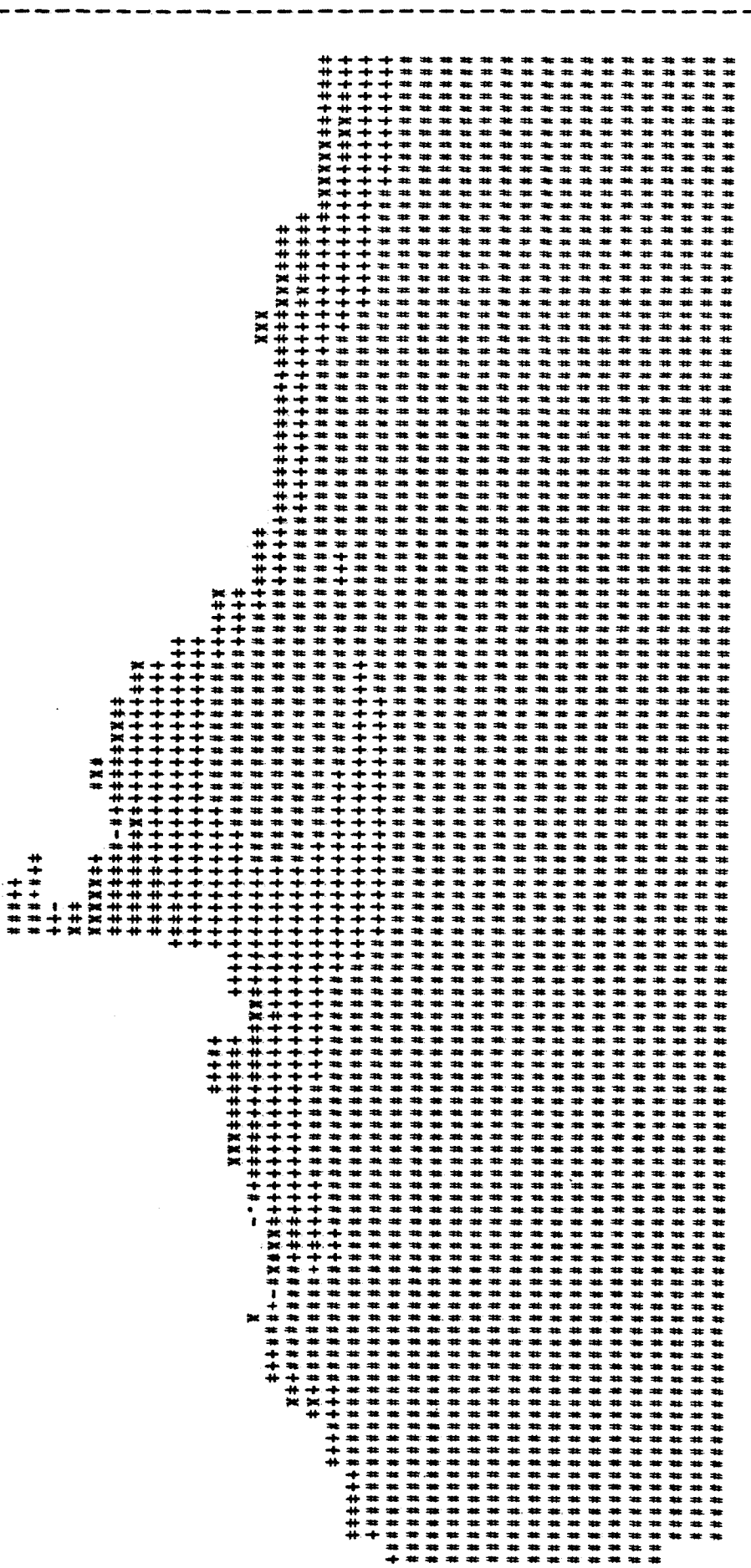
***** WAVE HEIGHT CHART *****
 ** WAVE CLIMATE ELEMENT 3**



VALUE LESS THAN .60
VALUE FROM .70
VALUE FROM .80
VALUE FROM .90
VALUE FROM 1.00

+++++ VALUE FROM 1.00 TO 1.10
VALUE FROM 1.10 TO 1.20
VALUE FROM 1.20 TO 1.30
VALUE FROM 1.30 TO 1.40
VALUE GREATER THAN 1.40

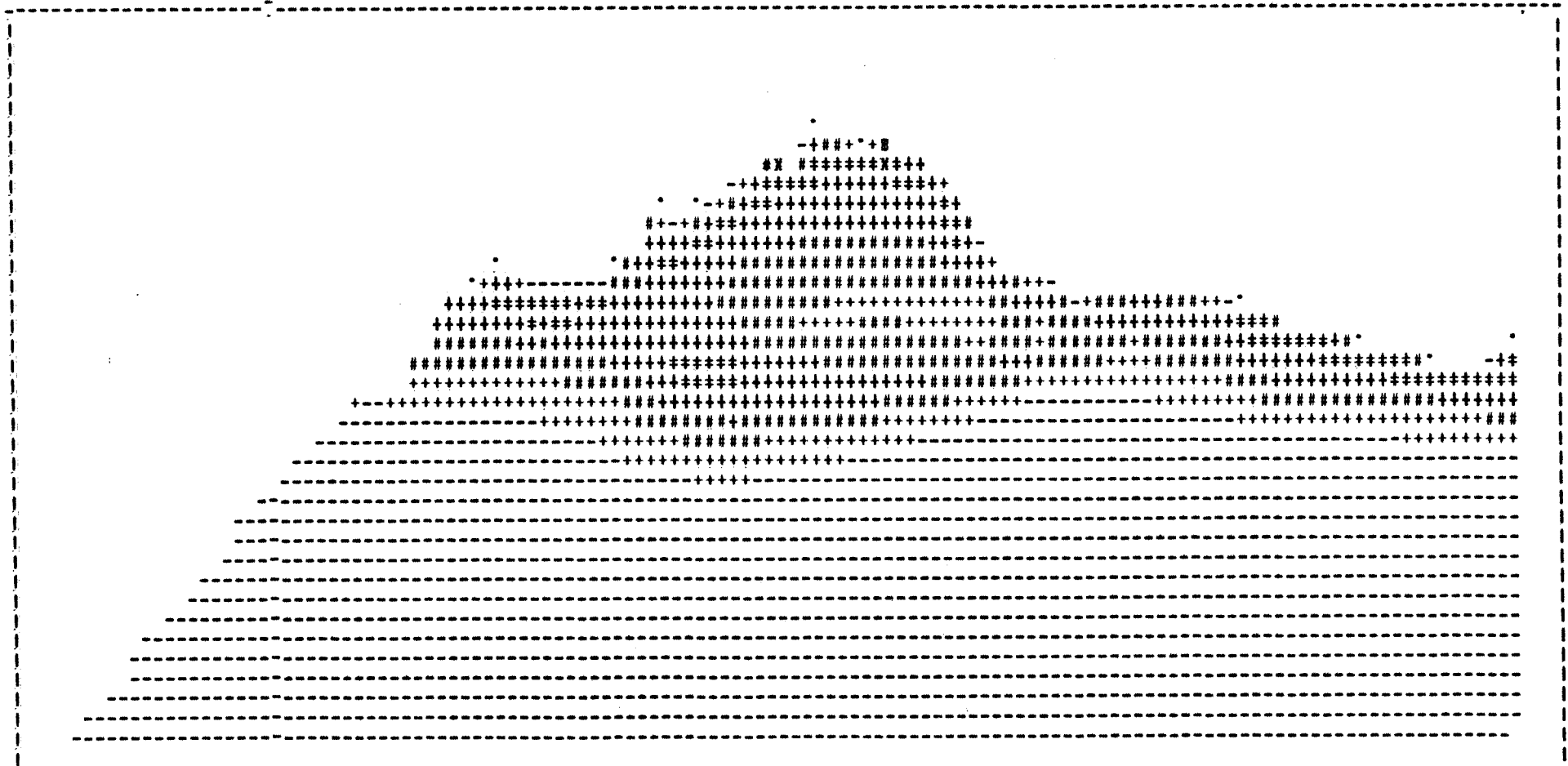
***** WAVE HEIGHT CHART *****
** WAVE CLIMATE ELEMENT 4**



VALUE LESS THAN .60 TO .70
 VALUE FROM .70 TO .80
 VALUE FROM .80 TO .90
 VALUE FROM .90 TO 1.00

+++++ VALUE FROM 1.00 TO 1.10
 ##### VALUE FROM 1.10 TO 1.20
 ##### VALUE FROM 1.20 TO 1.30
 ##### VALUE FROM 1.30 TO 1.40
 ##### VALUE GREATER THAN 1.40

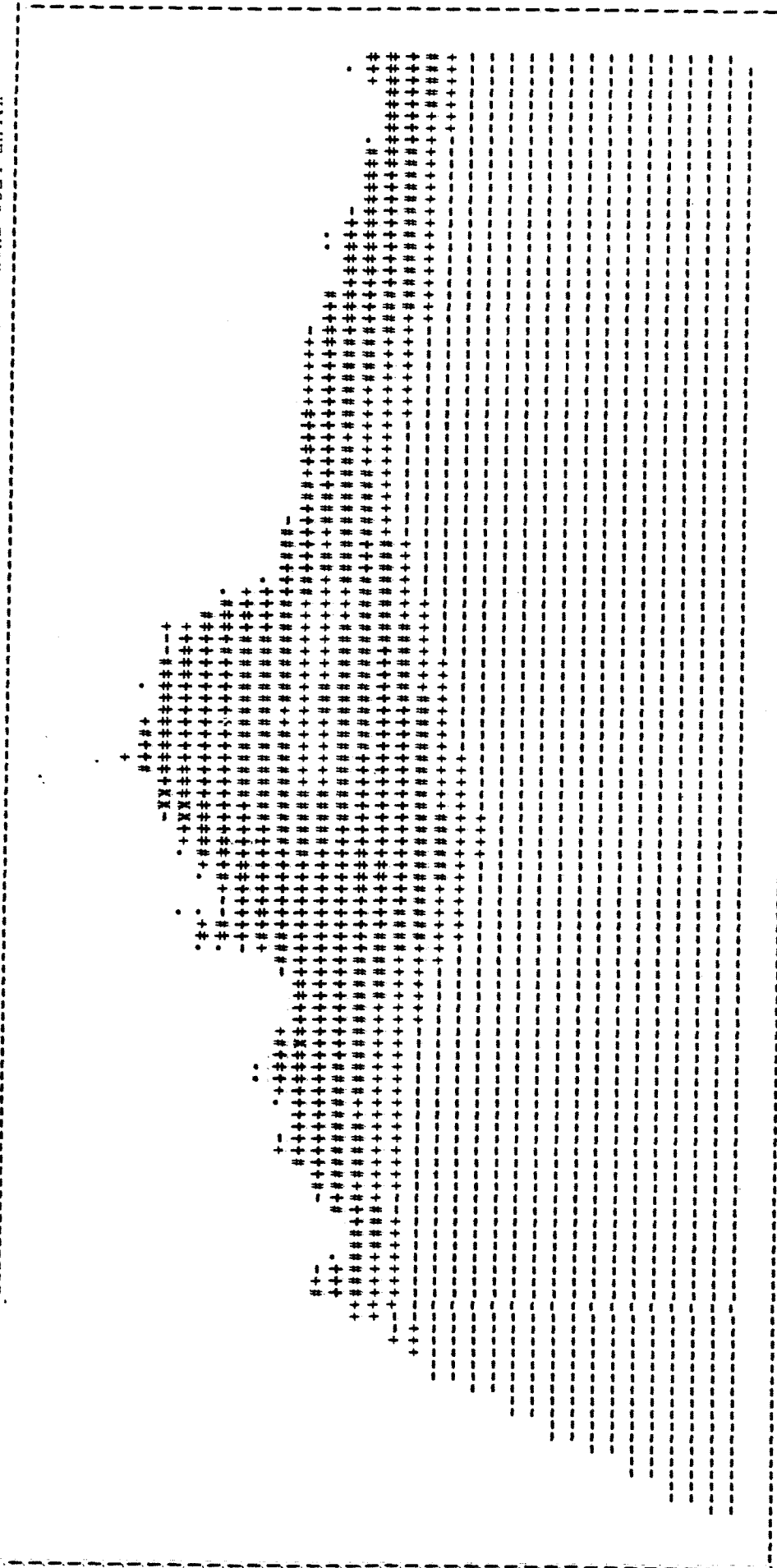
***** WAVE HEIGHT CHART *****
 ** WAVE CLIMATE ELEMENT 5**



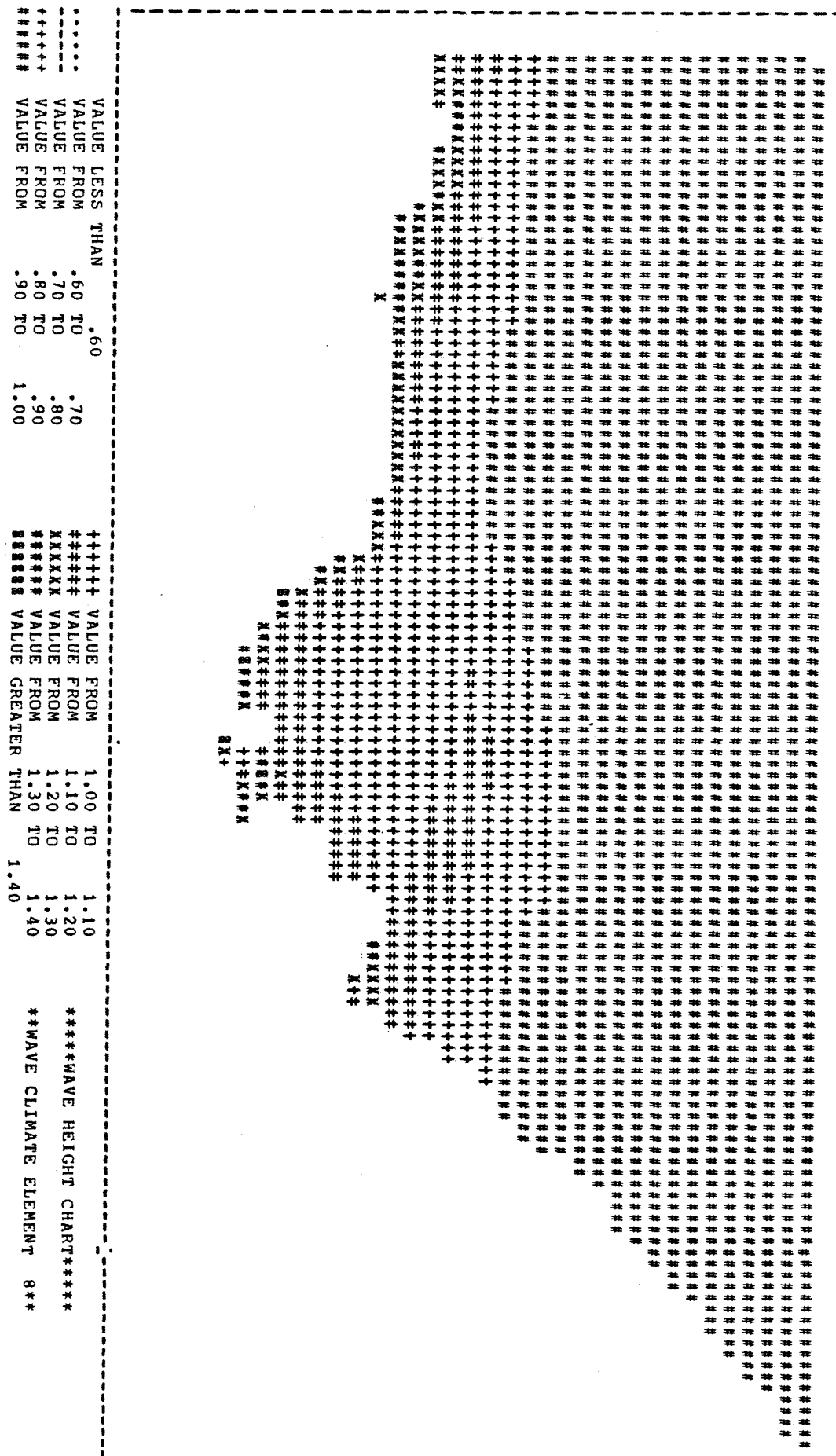
.....	VALUE FROM	2.60 TO	2.70	+++++	VALUE FROM	3.10 TO	3.20
-----	VALUE FROM	2.70 TO	2.80	XXXXX	VALUE FROM	3.20 TO	3.30
+++++	VALUE FROM	2.80 TO	2.90	#####	VALUE FROM	3.30 TO	3.40
#####	VALUE FROM	2.90 TO	3.00	#####	VALUE GREATER THAN	3.40	

*****WAVE HEIGHT CHART*****

WAVE CLIMATE ELEMENT 6



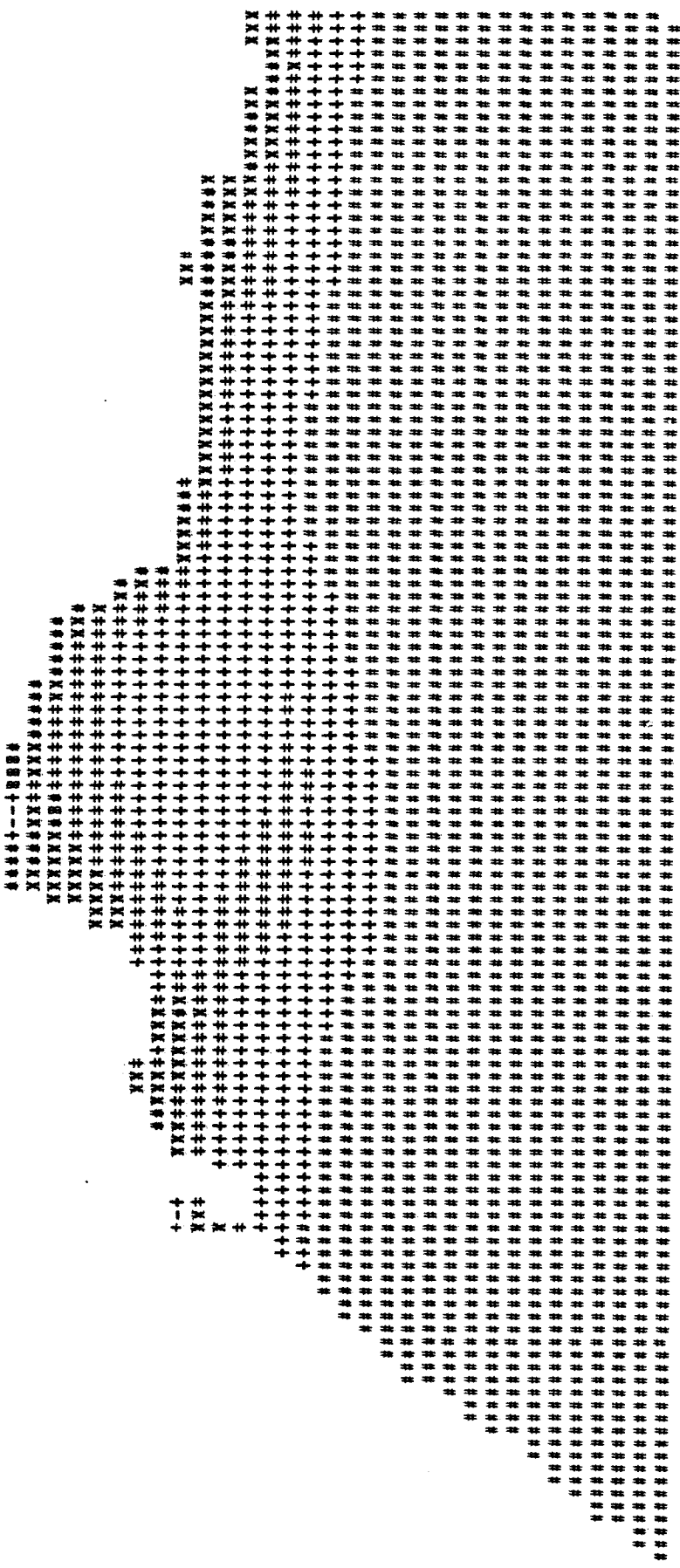
.....	VALUE LESS THAN	2.60	2.70	+++	VALUE FROM	3.00 TO	3.10	*****
-----	VALUE FROM	2.60 TO	2.80	#####	VALUE FROM	3.10 TO	3.20	*****
+++++	VALUE FROM	2.70 TO	2.90	#####	VALUE FROM	3.20 TO	3.30	*****
#####	VALUE FROM	2.80 TO	3.00	#####	VALUE FROM	3.30 TO	3.40	*****
	VALUE FROM	2.90 TO		#####	VALUE GREATER THAN	3.40		**WAVE CLIMATE ELEMENT 7**



VALUE LESS THAN .60 TO .70
VALUE FROM .70 TO .80
VALUE FROM .80 TO .90
VALUE FROM .90 TO 1.00

+++++ VALUE FROM 1.00 TO 1.10
+++++ VALUE FROM 1.10 TO 1.20
+++++ VALUE FROM 1.20 TO 1.30
+++++ VALUE FROM 1.30 TO 1.40

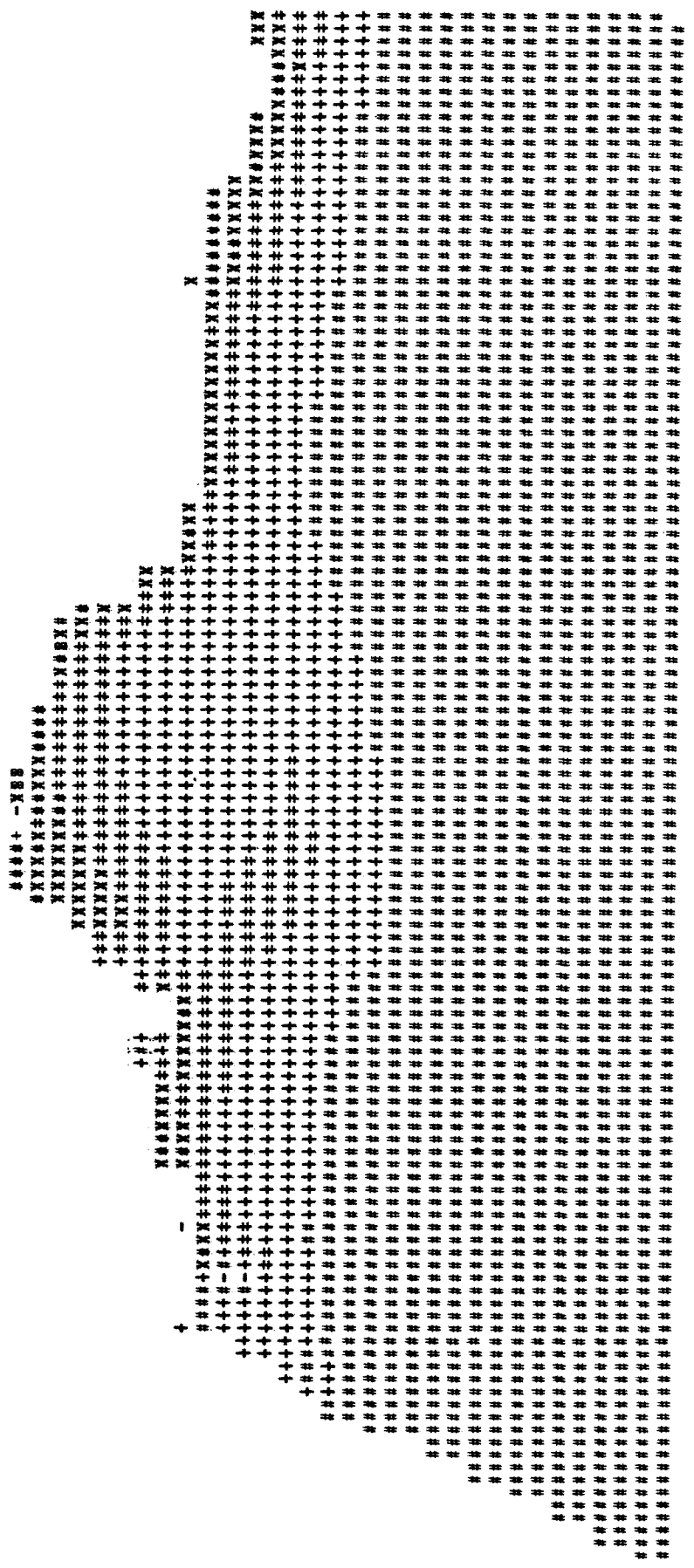
***** WAVE HEIGHT CHART *****
** WAVE CLIMATE ELEMENT 8 **



VALUE LESS THAN .60 TO .70
VALUE FROM .70 TO .80
VALUE FROM .80 TO .90
VALUE FROM .90 TO 1.00

+++++ VALUE FROM 1.00 TO 1.10
VALUE FROM 1.10 TO 1.20
VALUE FROM 1.20 TO 1.30
VALUE FROM 1.30 TO 1.40
VALUE GREATER THAN 1.40

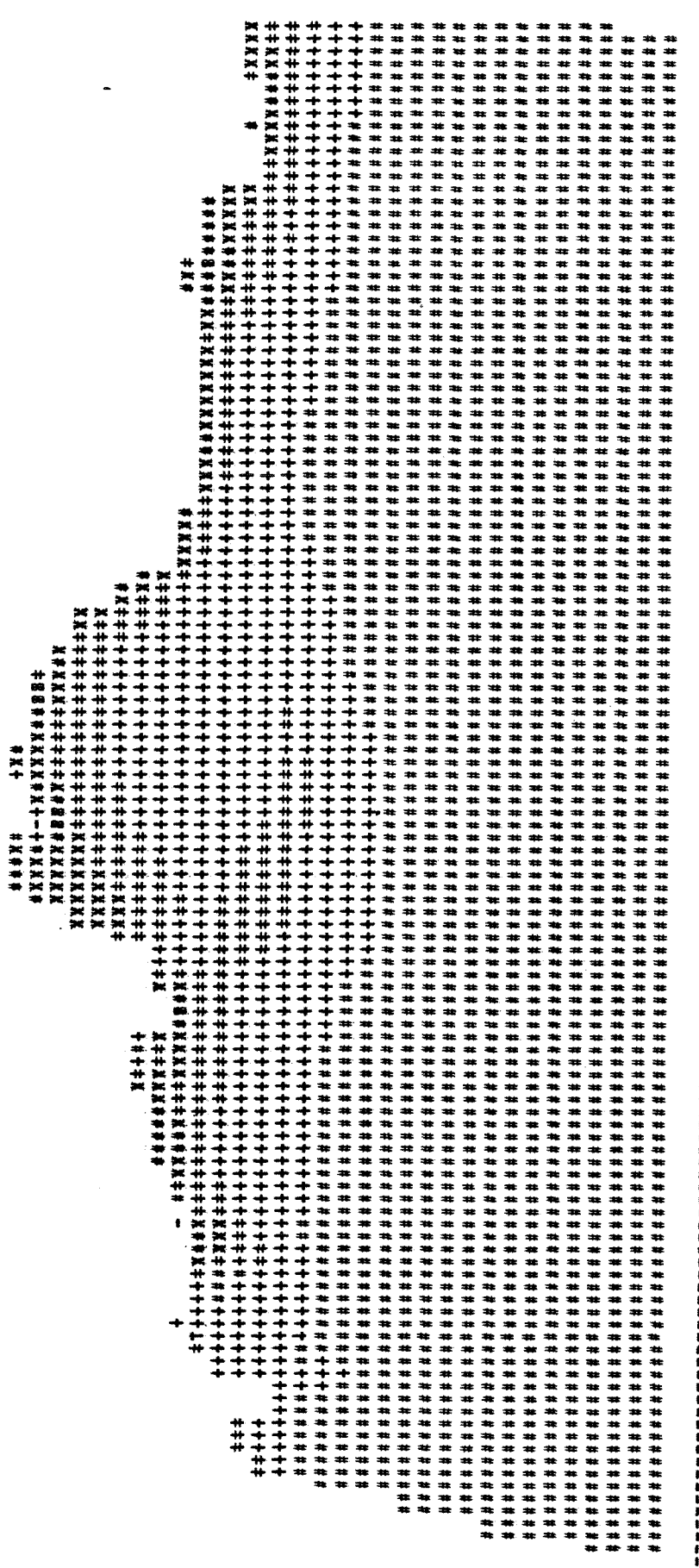
*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 9



VALUE LESS THAN
-60 TO .60
-70 TO .70
-80 TO .80
-90 TO .90
1.00

+++++ VALUE FROM 1.00 TO 1.10
VALUE FROM 1.10 TO 1.20
VALUE FROM 1.20 TO 1.30
VALUE FROM 1.30 TO 1.40
VALUE GREATER THAN 1.40

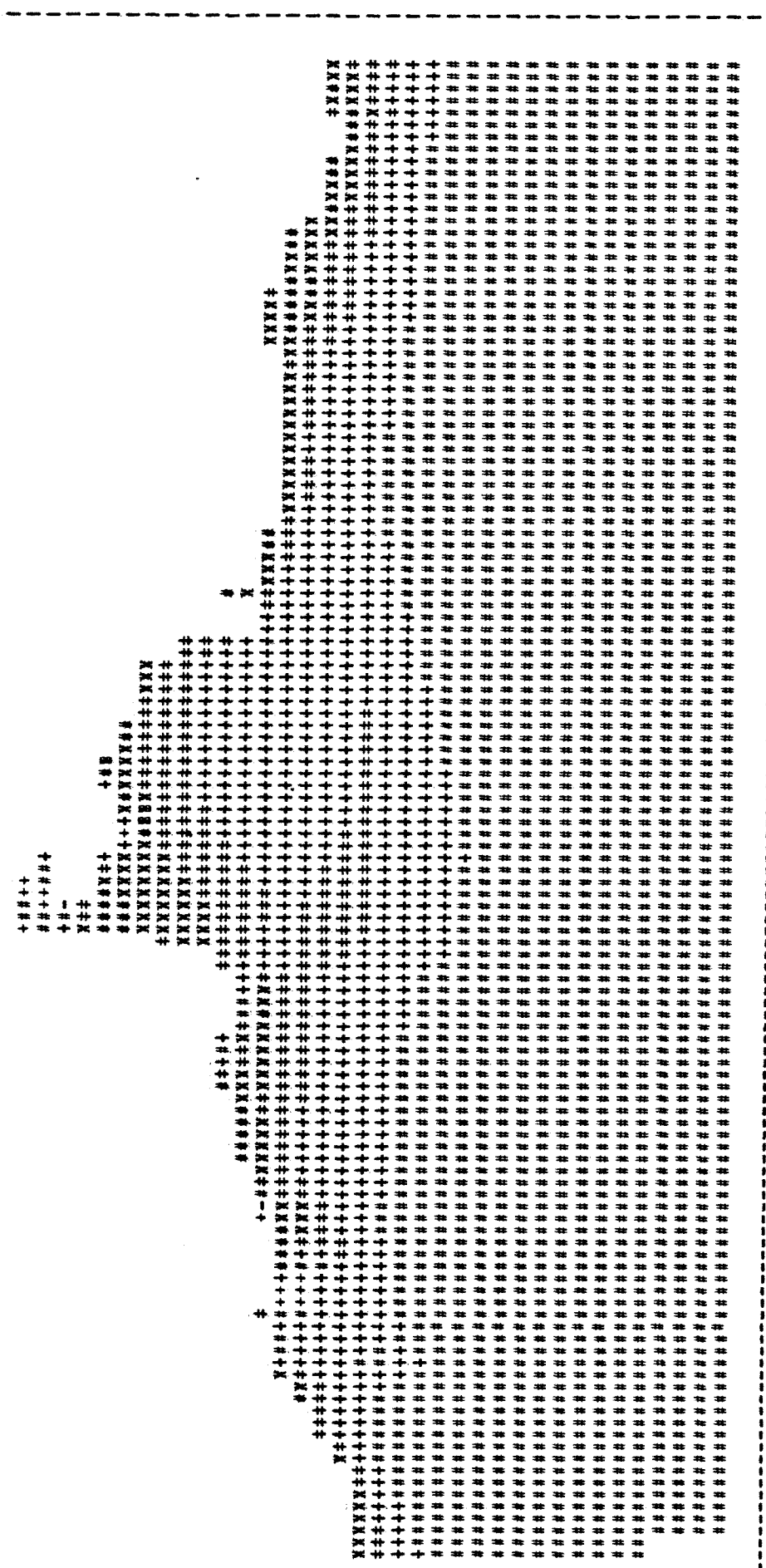
*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 10



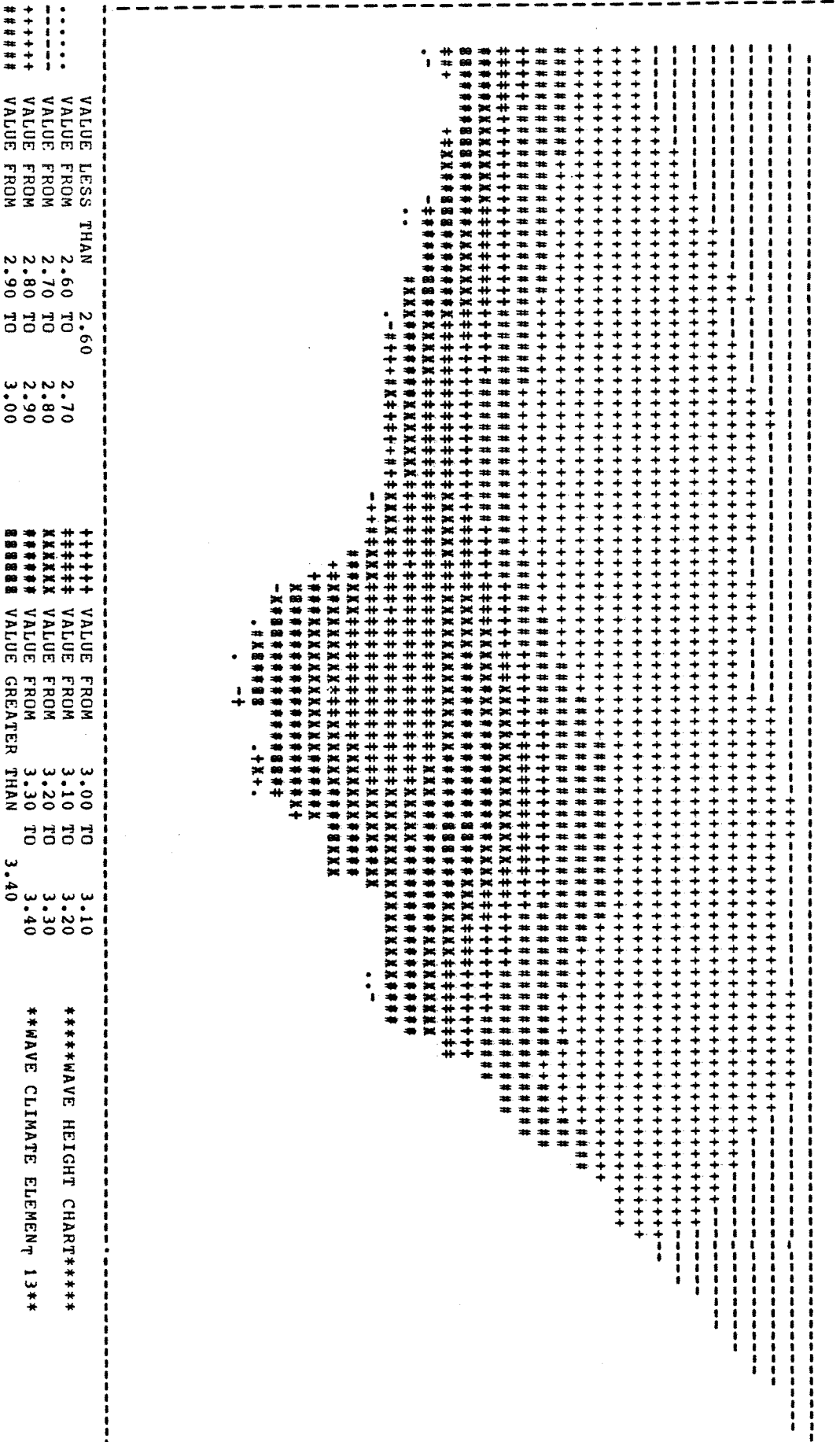
VALUE LESS THAN .60
VALUE FROM .70
VALUE FROM .80
VALUE FROM .90
VALUE TO .60
VALUE TO .70
VALUE TO .80
VALUE TO .90
TO 1.00

VALUE FROM 1.00 TO 1.10
VALUE FROM 1.10 TO 1.20
VALUE FROM 1.20 TO 1.30
VALUE FROM 1.30 TO 1.40
TO 1.10
TO 1.20
TO 1.30
TO 1.40

*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 11



VALUE LESS THAN	.60	TO	.70	VALUE FROM	1.00	TO	1.10	*****WAVE HEIGHT CHART*****
VALUE FROM	.60	TO	.70	VALUE FROM	1.10	TO	1.20	
VALUE FROM	.70	TO	.80	VALUE FROM	1.20	TO	1.30	
VALUE FROM	.80	TO	.90	VALUE FROM	1.30	TO	1.40	**WAVE CLIMATE ELEMENT 12**
VALUE FROM	.90	TO	1.00	VALUE GREATER THAN	1.40			



VALUE LESS THAN 2.60

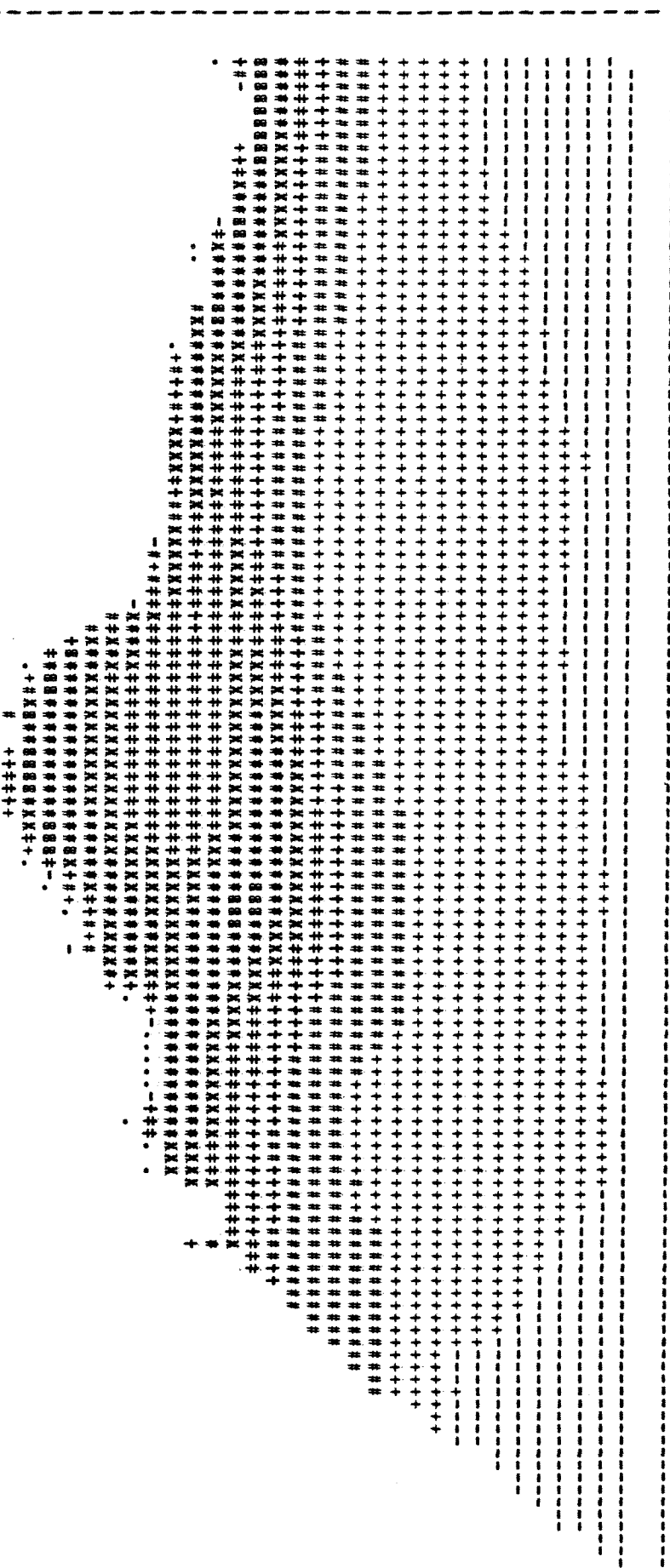
VALUE FROM 2.60 TO 2.70

VALUE FROM 2.70 TO 2.80
+++++
VALUE FROM 2.80 TO 2.90

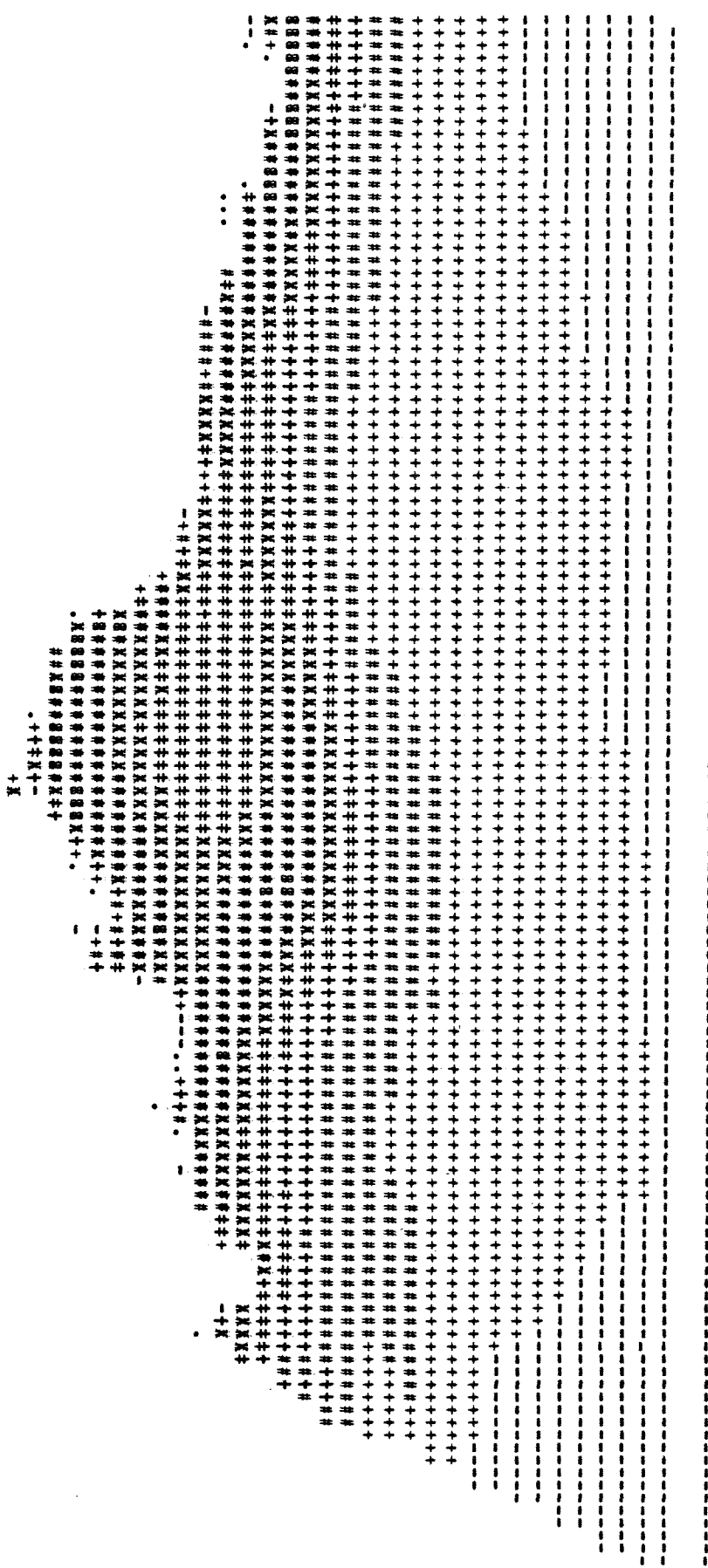
VALUE FROM 2.90 TO 3.00

+++++ VALUE FROM 3.00 TO 3.10
VALUE FROM 3.10 TO 3.20
VALUE FROM 3.20 TO 3.30
VALUE FROM 3.30 TO 3.40

*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 13

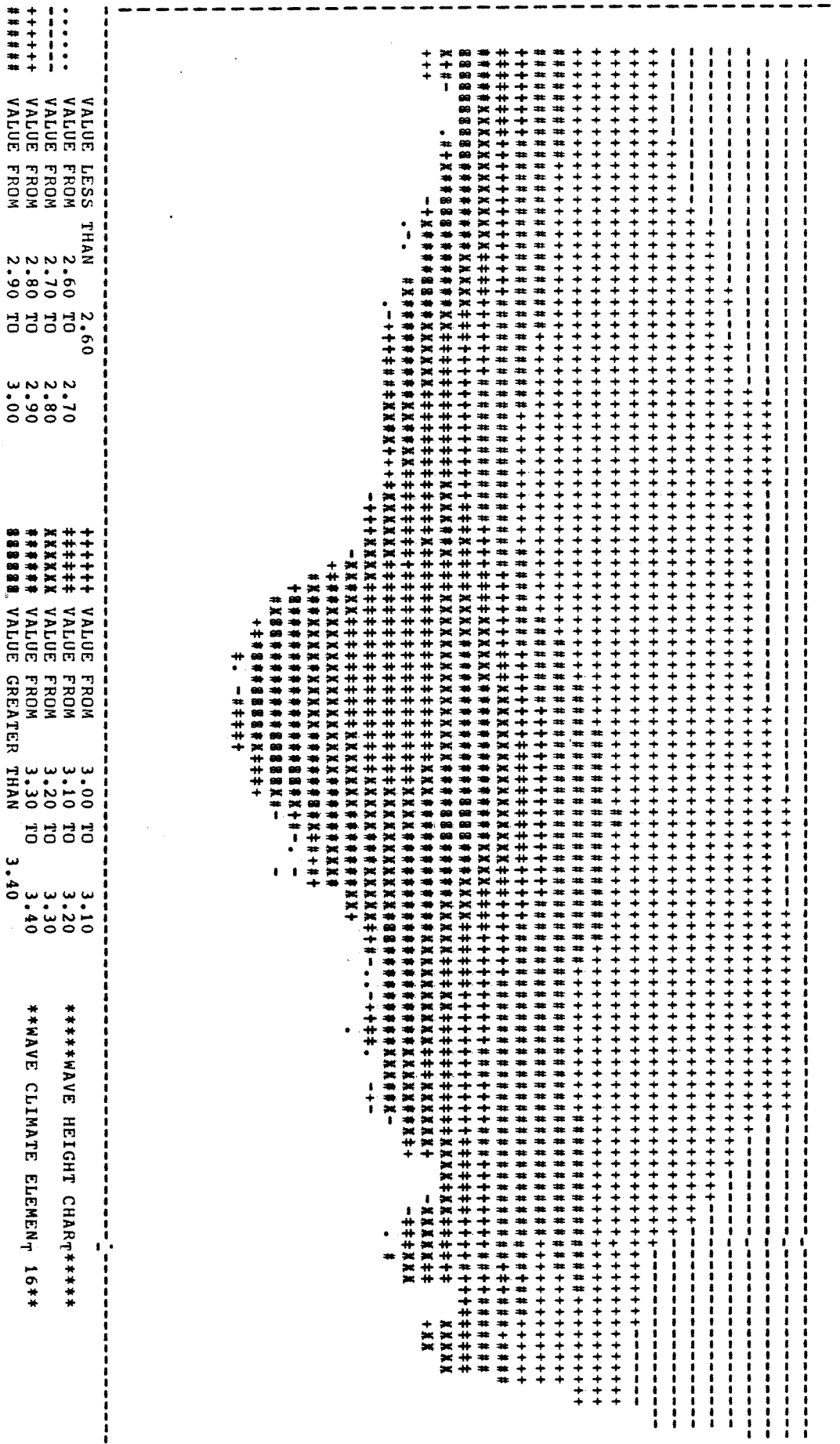


VALUE LESS THAN 2.60 2.70 2.80 2.90 3.00 TO 3.10 3.20 3.30 3.40
*****WAVE HEIGHT CHART*****
VALUE FROM 2.60 TO 2.70
VALUE FROM 2.70 TO 2.80
VALUE FROM 2.80 TO 2.90
VALUE FROM 2.90 TO 3.00
VALUE FROM 3.00 TO 3.10
VALUE FROM 3.10 TO 3.20
VALUE FROM 3.20 TO 3.30
VALUE FROM 3.30 TO 3.40
***WAVE CLIMATE ELEMENT 14**



VALUE LESS THAN 2.60 2.70 2.80 2.90 3.00 TO 3.10 TO 3.20 TO 3.30 TO 3.40
*****WAVE HEIGHT CHART*****
VALUE FROM 2.60 TO 2.70 KKKKKK VALUE FROM 3.10 TO 3.20
VALUE FROM 2.70 TO 2.80 KKKKKK VALUE FROM 3.20 TO 3.30
VALUE FROM 2.80 TO 2.90 KKKKKK VALUE FROM 3.30 TO 3.40
VALUE FROM 2.90 TO 3.00 KKKKKK VALUE GREATER THAN 3.40

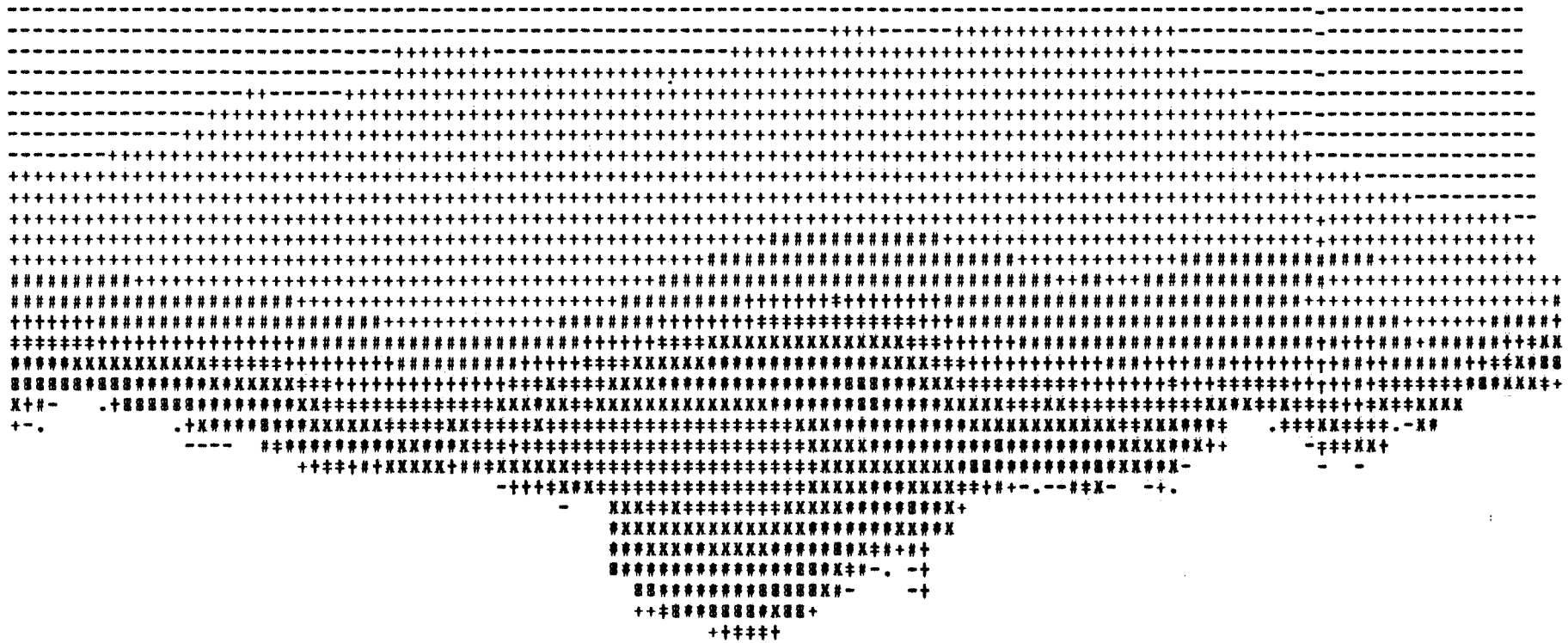
WAVE CLIMATE ELEMENT 15



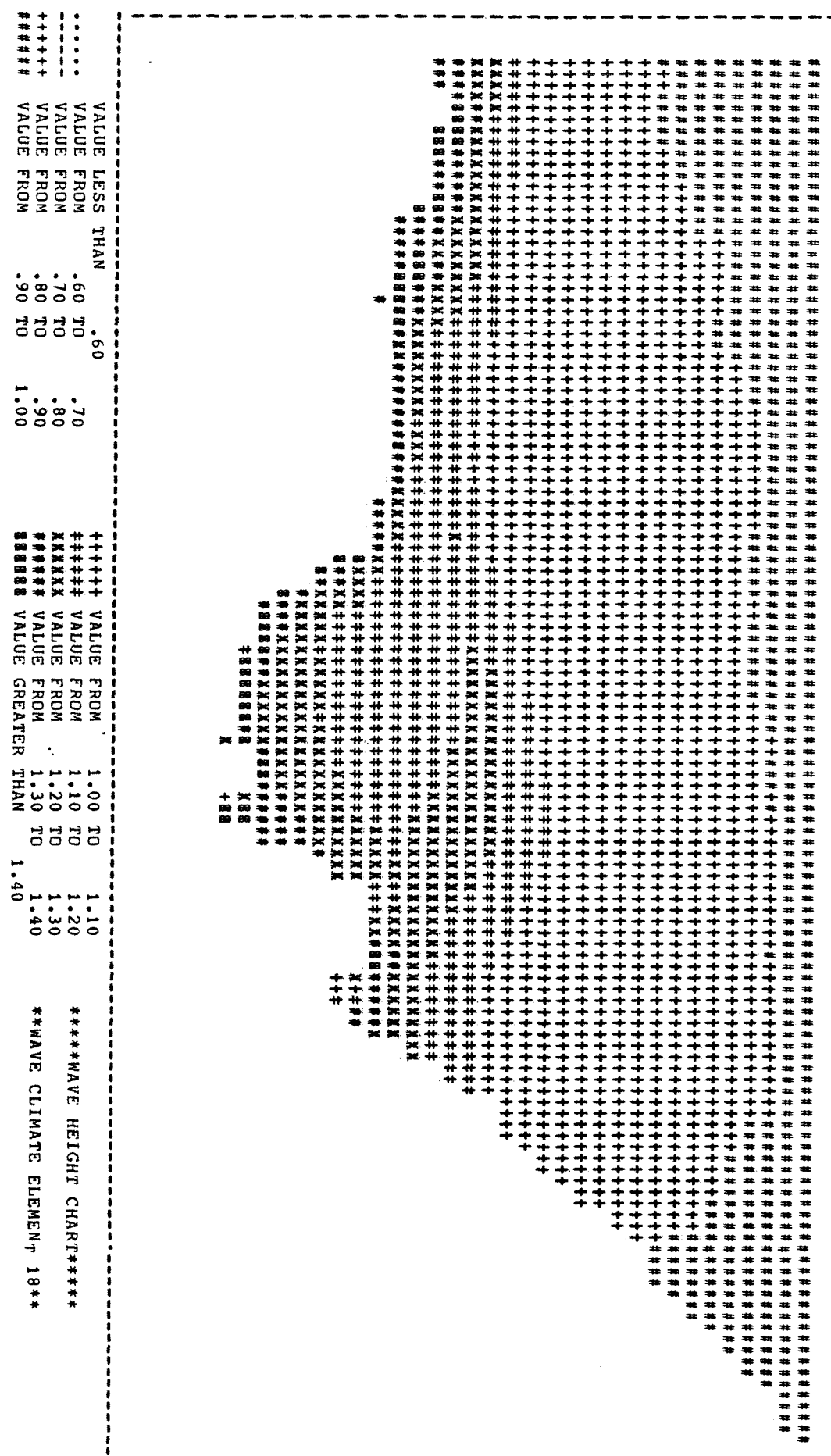
..... VALUE LESS THAN 2.60 TO 2.70
----- VALUE FROM 2.70 TO 2.80
+++++++ VALUE FROM 2.80 TO 2.90
VALUE FROM 2.90 TO 3.00

+++++++ VALUE FROM 3.00 TO 3.10
VALUE FROM 3.10 TO 3.20
VALUE FROM 3.20 TO 3.30
VALUE FROM 3.30 TO 3.40

***** WAVE HEIGHT CHARACTER *****
***** WAVE CLIMATE ELEMENT 16**



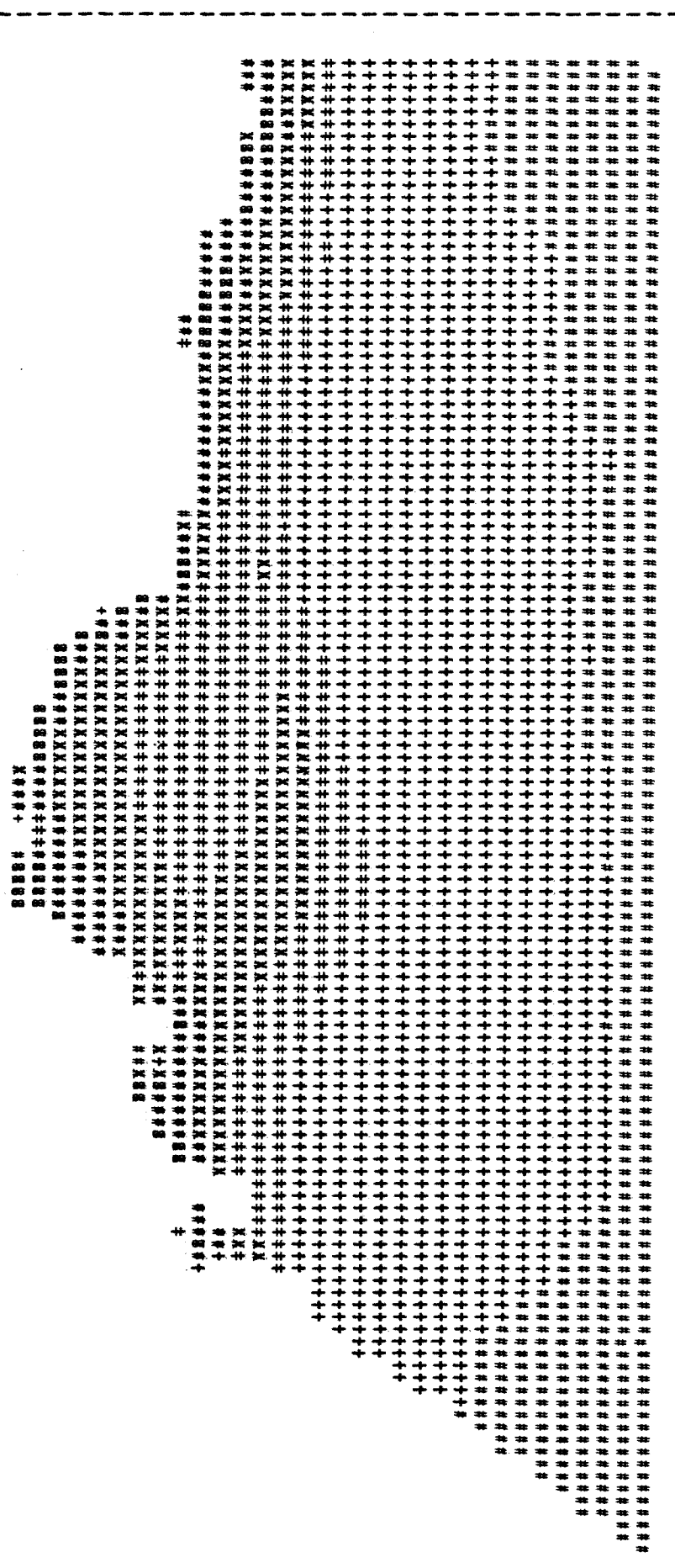
.....	VALUE LESS THAN	2.60	+++++	VALUE FROM	3.00 TO	3.10		
-----	VALUE FROM	2.60 TO	2.70	#####	VALUE FROM	3.10 TO	3.20	*****WAVE HEIGHT CHART*****
+++++	VALUE FROM	2.70 TO	2.80	XXXXXX	VALUE FROM	3.20 TO	3.30	
#####	VALUE FROM	2.80 TO	2.90	#####	VALUE FROM	3.30 TO	3.40	**WAVE CLIMATE ELEMENT 17**
	VALUE FROM	2.90 TO	3.00	#####	VALUE GREATER THAN	3.40		



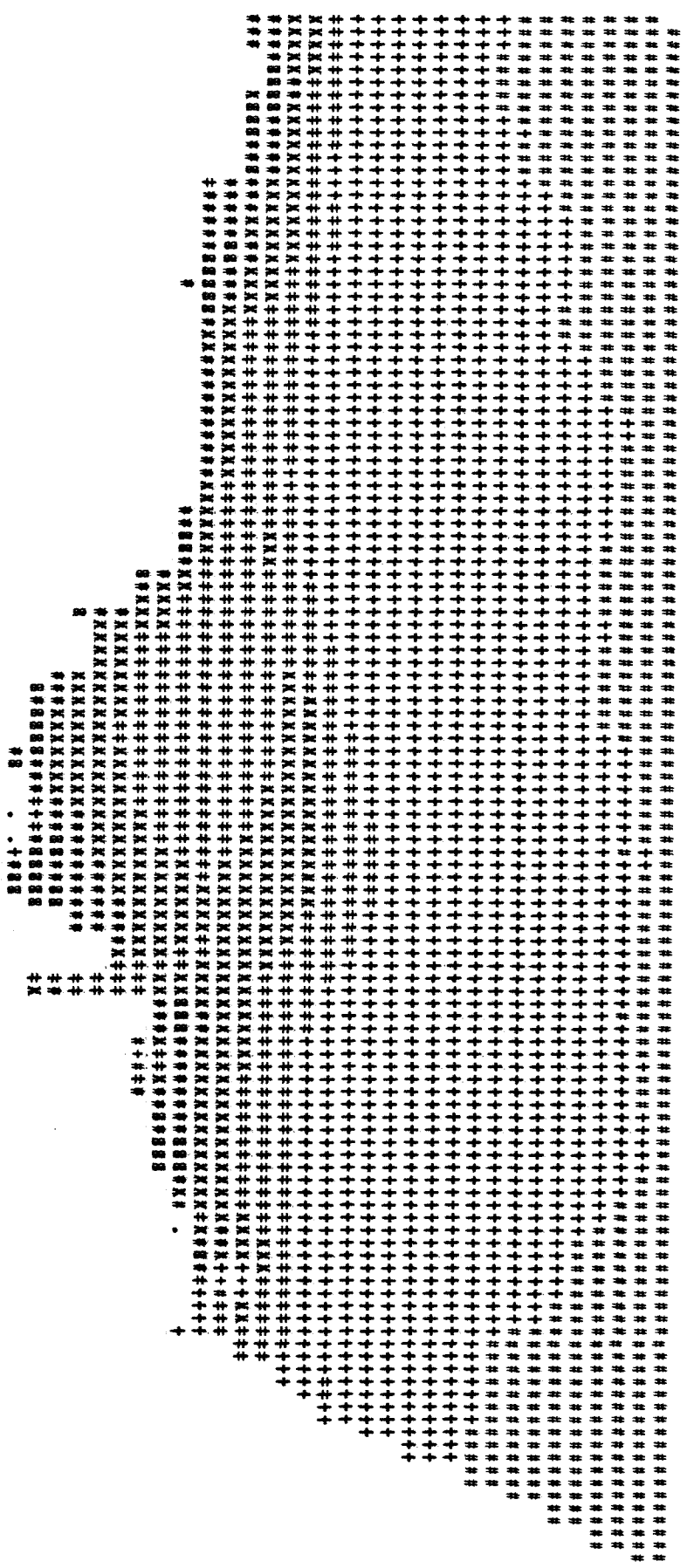
..... VALUE LESS THAN .60
----- VALUE FROM .70
+++++++ VALUE FROM .80
VALUE FROM .90
VALUE FROM 1.00

+++++++ VALUE FROM 1.00 TO 1.10
VALUE FROM 1.10 TO 1.20
VALUE FROM 1.20 TO 1.30
VALUE FROM 1.30 TO 1.40

***** WAVE HEIGHT CHART*****
*** WAVE CLIMATE ELEMENT ***
***** WAVE CLIMATE ELEMENT ***

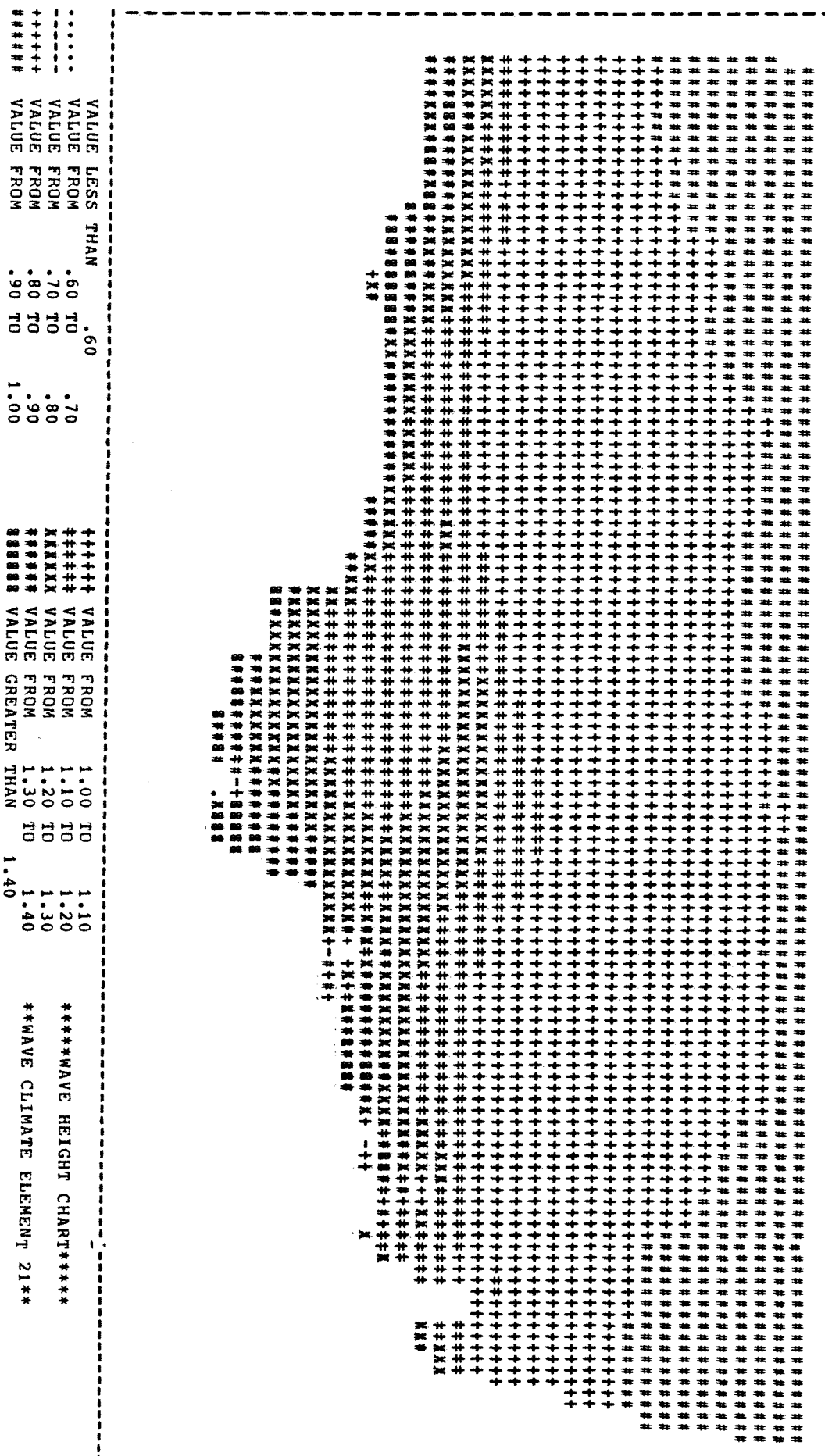


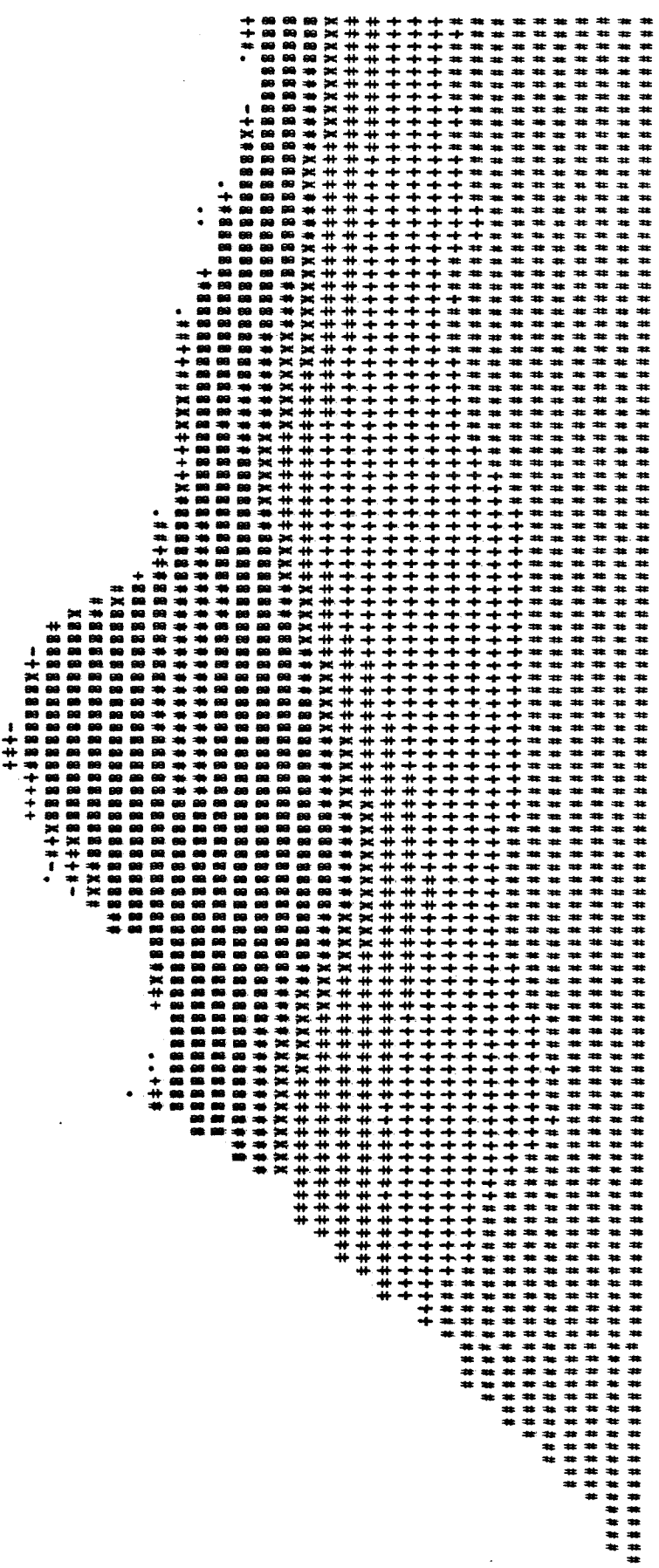
.....	VALUE LESS THAN	.60	.70	+++++	VALUE FROM	1.00 TO	1.10	*****	WAVE HEIGHT CHART*****
-----	VALUE FROM	.70 TO	.80	#####	VALUE FROM	1.10 TO	1.20		
+++++	VALUE FROM	.80 TO	.90	#####	VALUE FROM	1.20 TO	1.30		
####+	VALUE FROM	.90 TO	1.00	#####	VALUE FROM	1.30 TO	1.40	**NAVE CLIMATE ELEMENT 19**	
				#####	VALUE GREATER THAN	1.40			



VALUE LESS THAN	VALUE FROM	VALUE TO	VALUE FROM	VALUE TO
.60	#####	1.00 TO	1.10	#####
.70	#####	1.10 TO	1.20	#####
.80	#####	1.20 TO	1.30	#####
.90	#####	1.30 TO	1.40	#####

*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 20

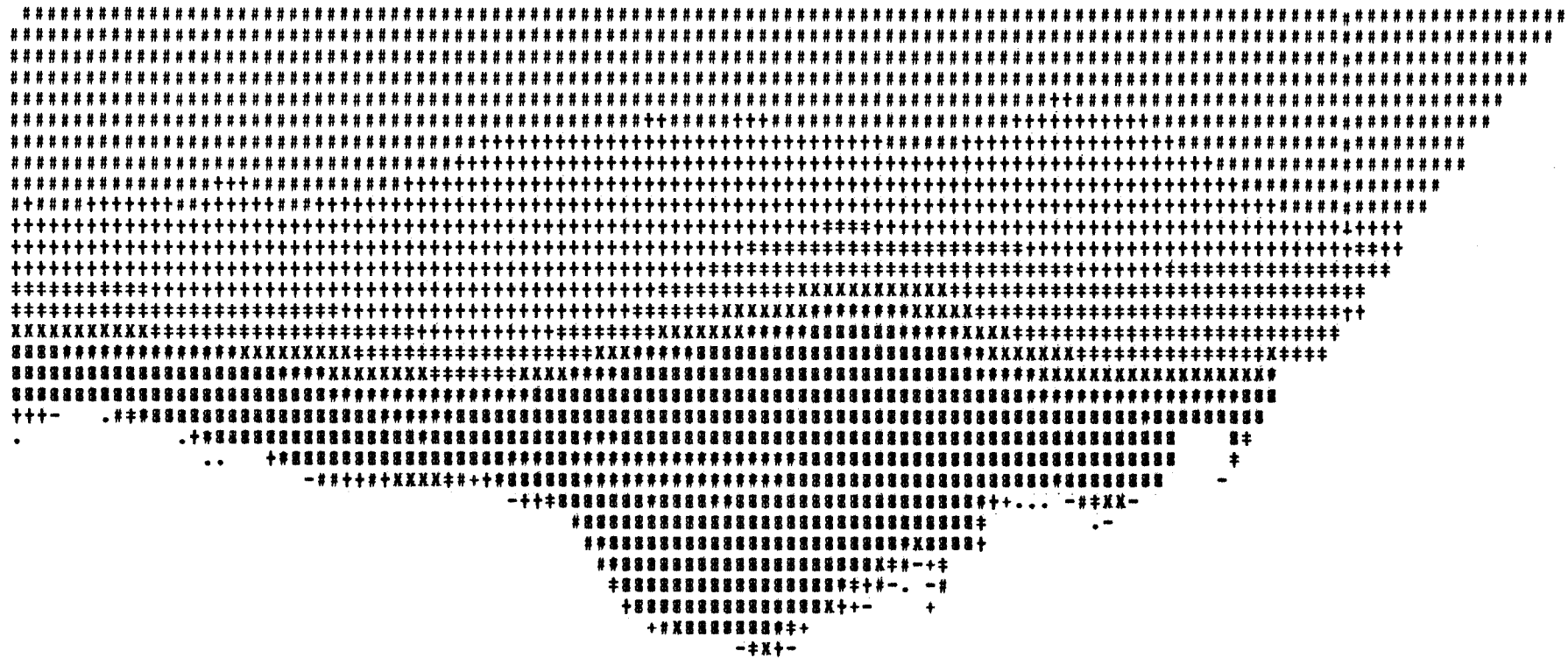




VALUE LESS THAN 2.60 TO 2.70
VALUE FROM 2.70 TO 2.80
++++++ VALUE FROM 2.80 TO 2.90
***** VALUE FROM 2.90 TO 3.00

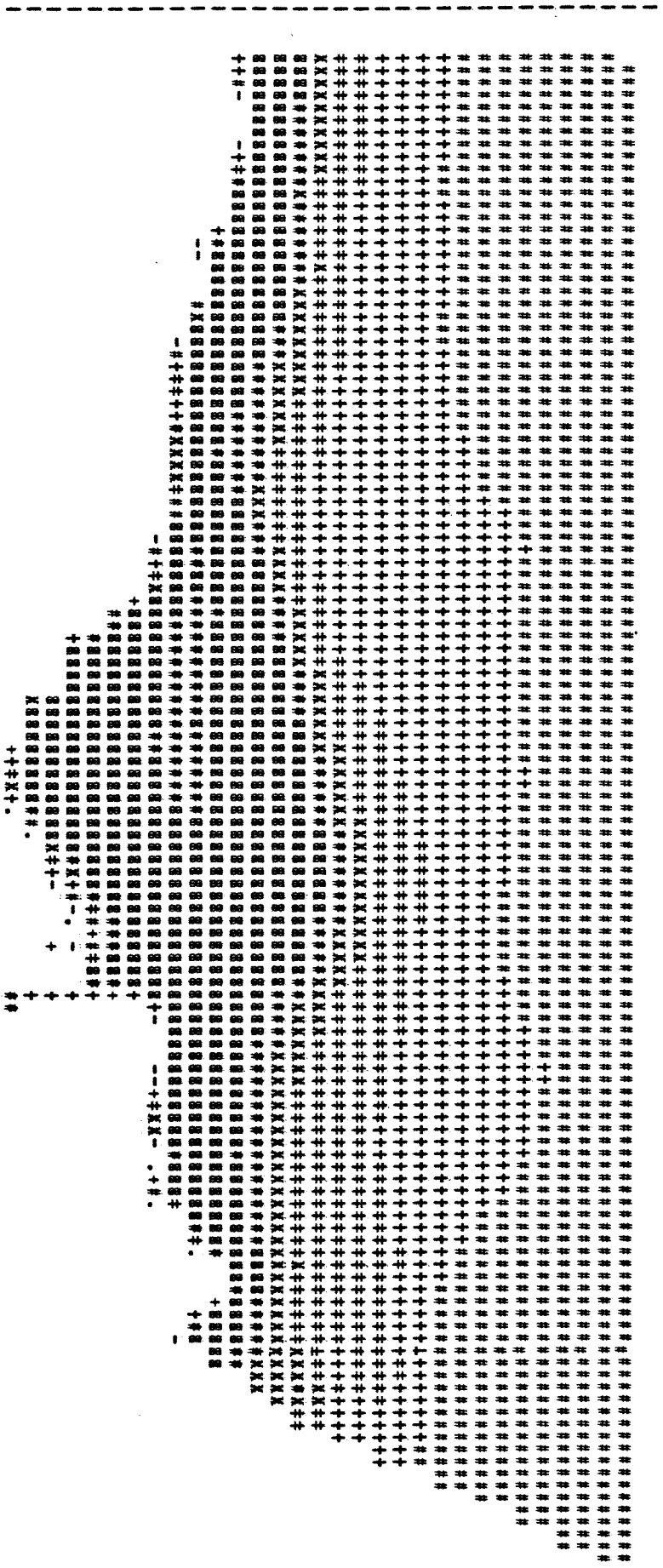
++++++ VALUE FROM 3.00 TO 3.10
++++++ VALUE FROM 3.10 TO 3.20
***** VALUE FROM 3.20 TO 3.30
***** VALUE GREATER THAN 3.30 TO 3.40

***** WAVE HEIGHT CHART *****
***** WAVE CLIMATE ELEMENT 22**

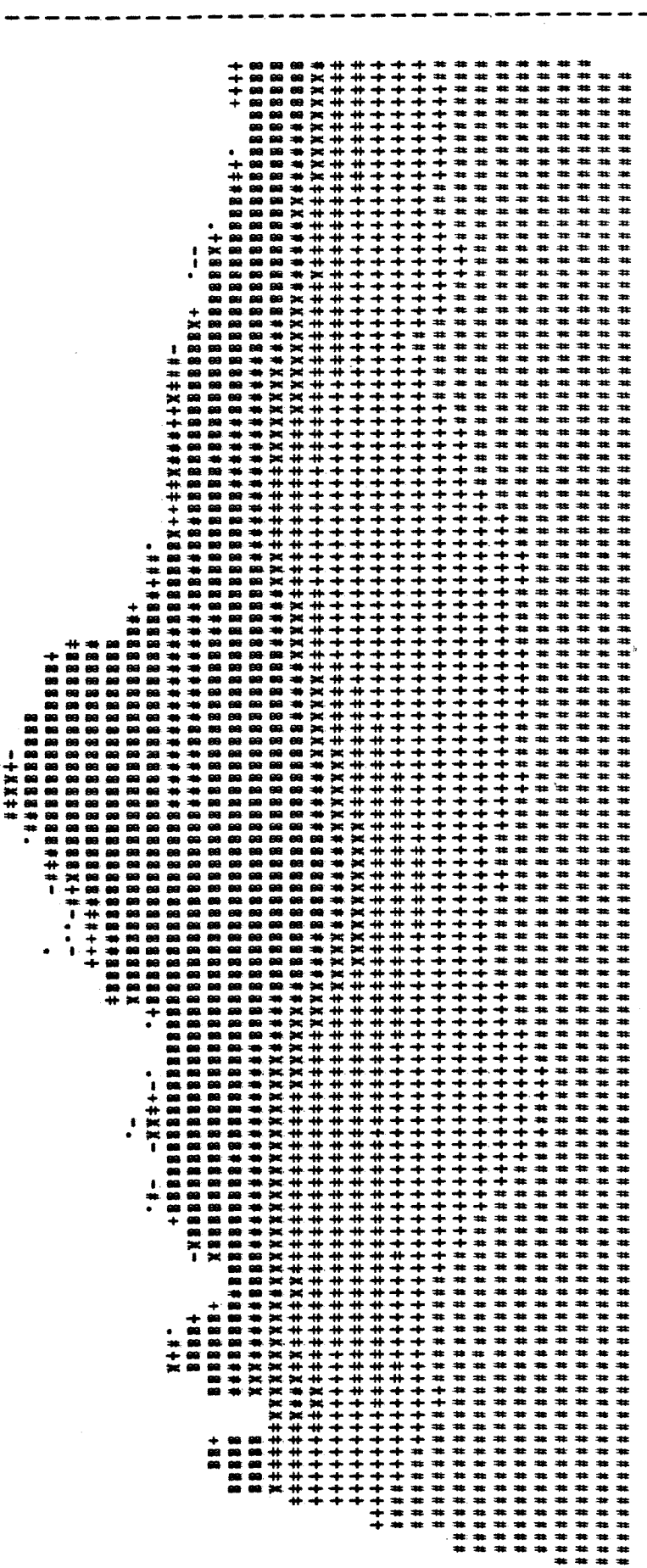


.....	VALUE LESS THAN	2.60	+++++	VALUE FROM	3.00 TO	3.10	
-----	VALUE FROM	2.60 TO	2.70	#####	VALUE FROM	3.10 TO	3.20
+++++	VALUE FROM	2.70 TO	2.80	XXXXXX	VALUE FROM	3.20 TO	3.30
#####	VALUE FROM	2.80 TO	2.90	#####	VALUE FROM	3.30 TO	3.40
	VALUE FROM	2.90 TO	3.00	#####	VALUE GREATER THAN	3.40	

*****WAVE HEIGHT CHAR_T*****
 WAVE CLIMATE ELEMENT 23

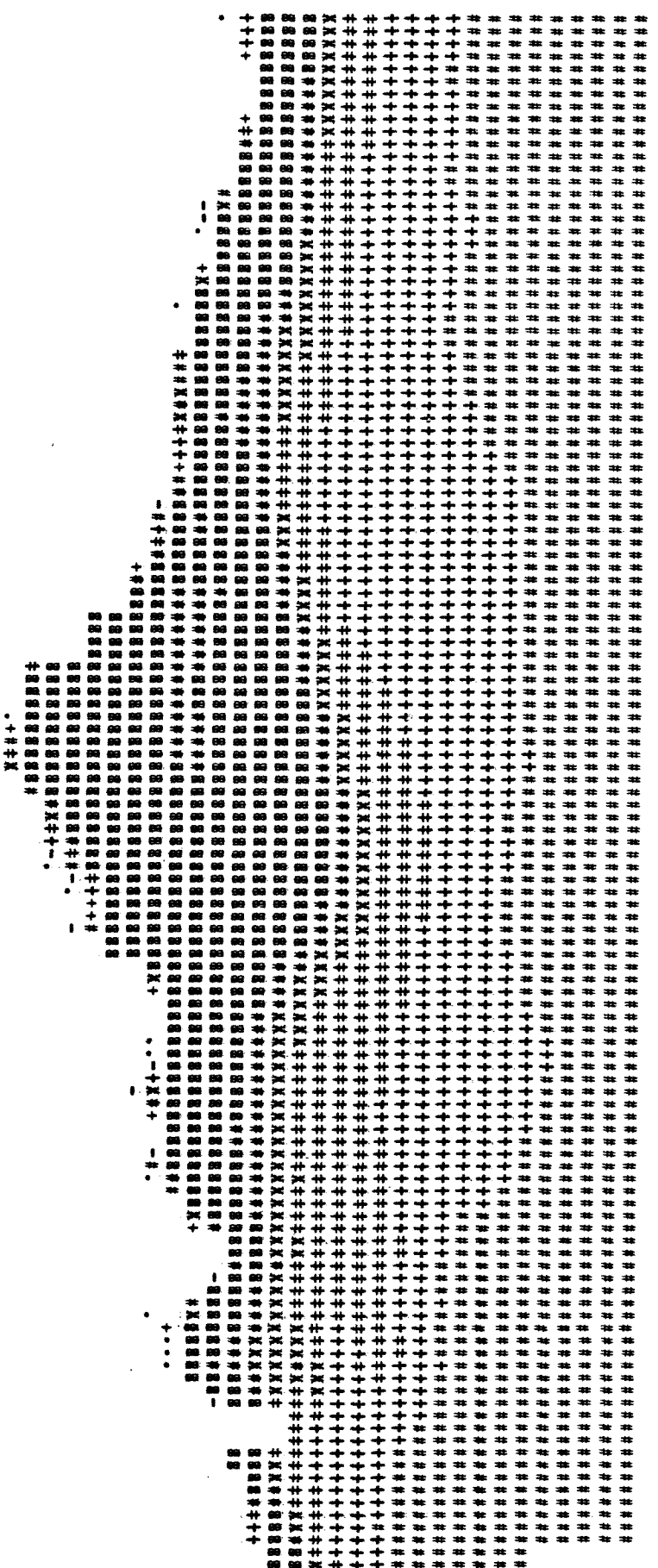


----- VALUE LESS THAN 2.60 TO 2.70 ++++++ VALUE FROM 3.00 TO 3.10 ***** WAVE HEIGHT CHART*****
----- VALUE FROM 2.70 TO 2.80 ##### VALUE FROM 3.10 TO 3.20
+++++ VALUE FROM 2.80 TO 2.90 ##### VALUE FROM 3.20 TO 3.30 ** WAVE CLIMATE ELEMENT 24**
VALUE FROM 2.90 TO 3.00 ##### VALUE GREATER THAN 3.30 TO 3.40



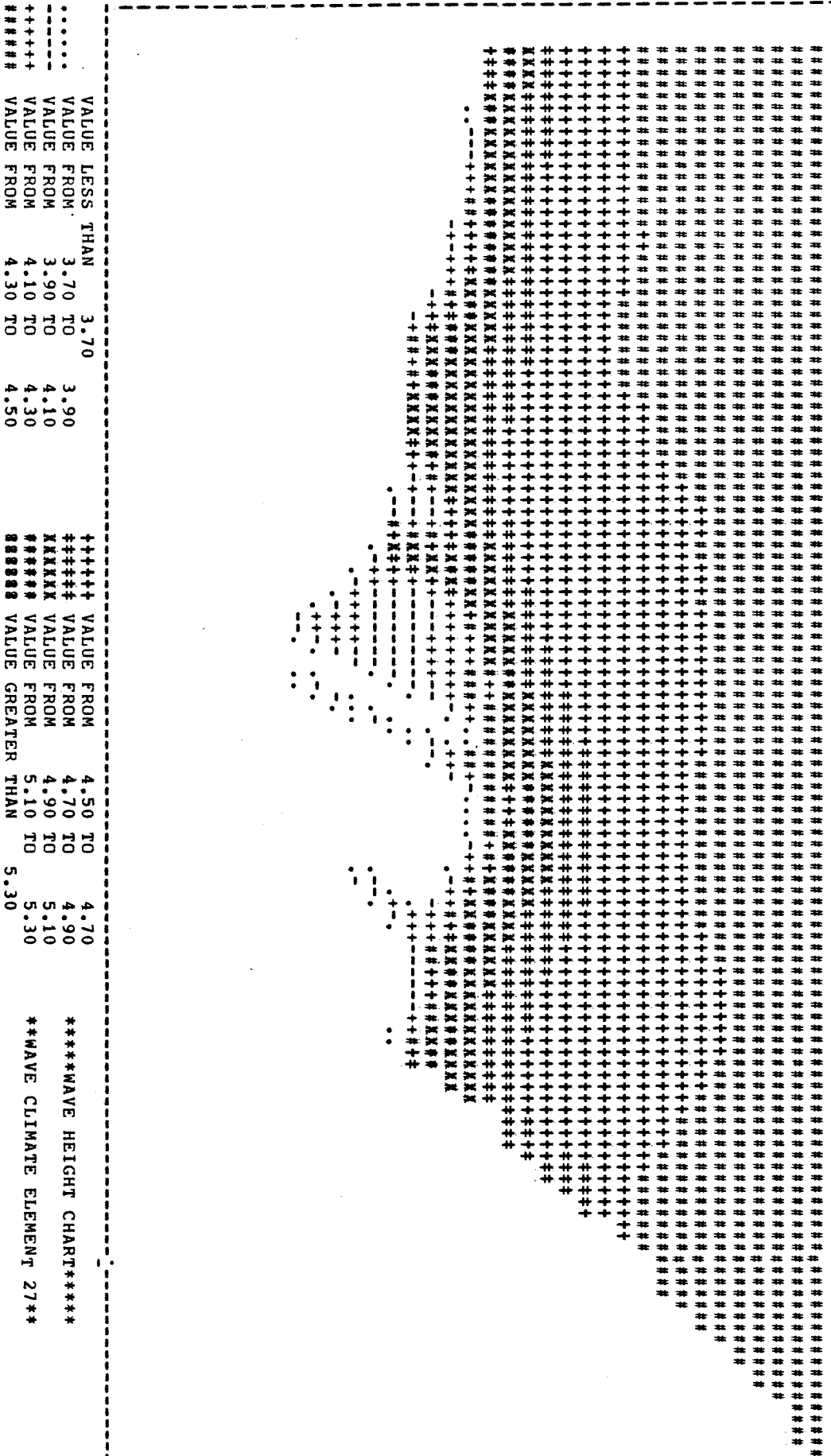
VALUE LESS THAN 2.60 TO 2.70 ++++++ VALUE FROM 3.00 TO 3.10 ***** WAVE HEIGHT CHART*****

VALUE FROM 2.70 TO 2.80 ##### VALUE FROM 3.10 TO 3.20
+++++ VALUE FROM 2.80 TO 2.90 ##### VALUE FROM 3.20 TO 3.30
VALUE FROM 2.90 TO 3.00 ##### VALUE FROM 3.30 TO 3.40 ** WAVE CLIMATE ELEMENT 25**



VALUE LESS THAN	2.60	2.60	2.70	3.00	TO	3.10	
VALUE FROM	2.70	TO	2.80	VALUE FROM	3.10	TO	3.20
VALUE FROM	2.80	TO	2.90	VALUE FROM	3.20	TO	3.30
VALUE FROM	2.90	TO	3.00	VALUE FROM	3.30	TO	3.40
VALUE FROM	2.90	TO	3.00	VALUE GREATER THAN	3.40		

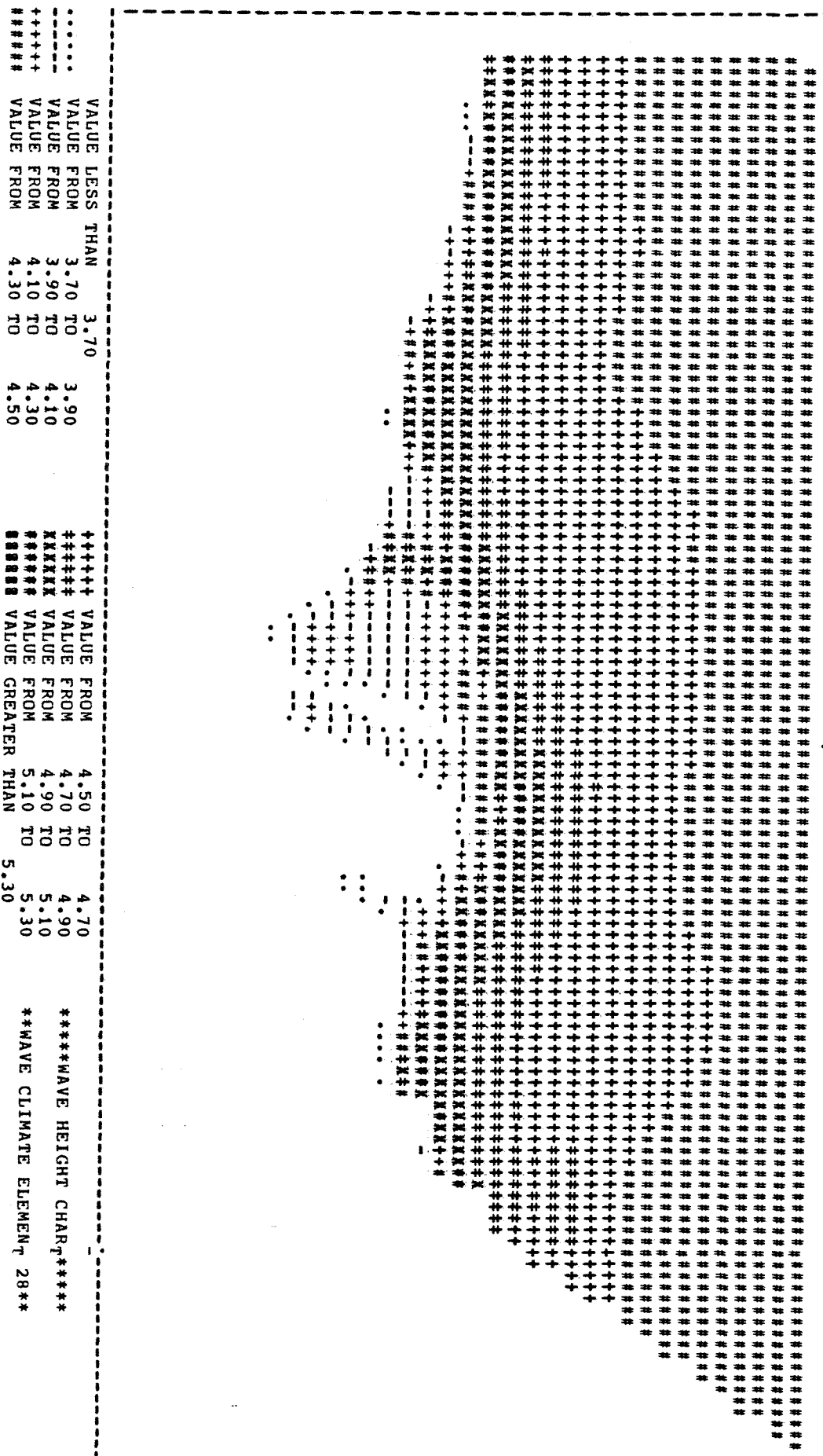
*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 26

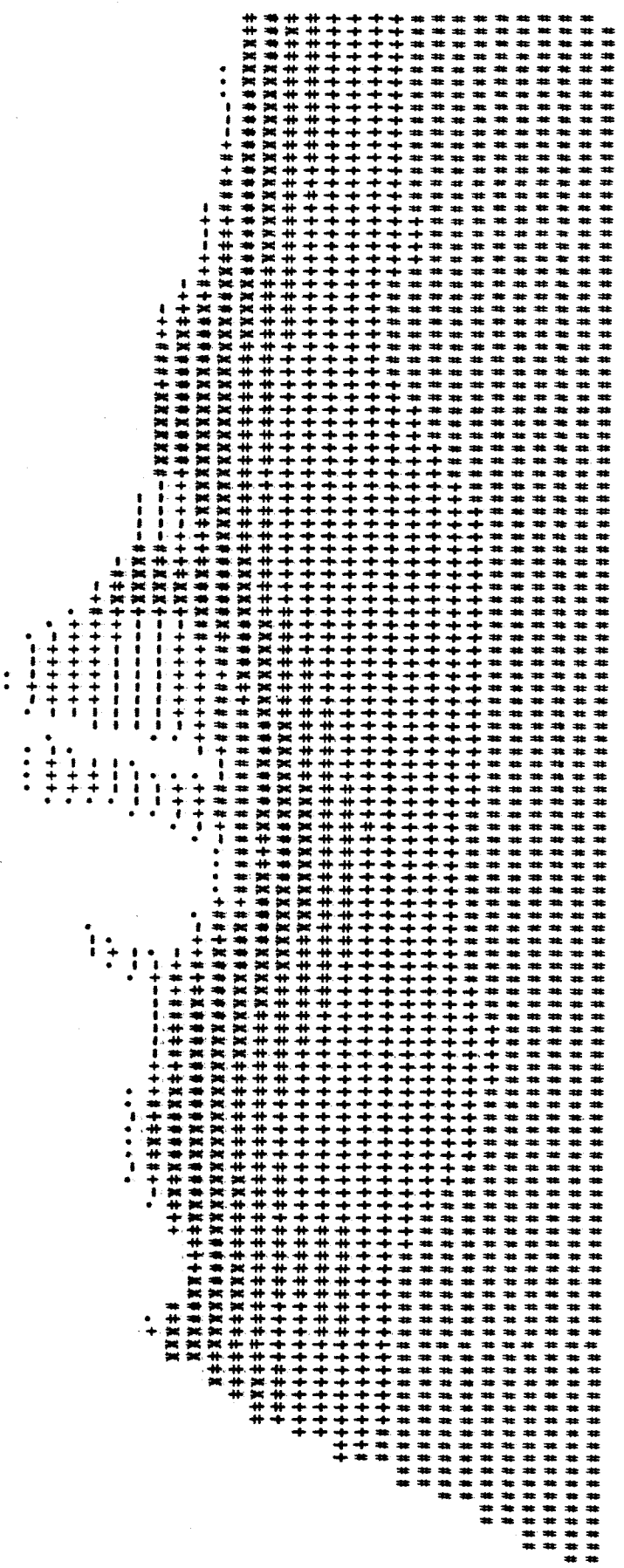


VALUE LESS THAN 3.70 TO 3.90
VALUE FROM 3.70 TO 3.90
VALUE FROM 3.90 TO 4.10
VALUE FROM 4.10 TO 4.30
VALUE FROM 4.30 TO 4.50

+++++ VALUE FROM 4.50 TO 4.70
VALUE FROM 4.70 TO 4.90
XXXXXX VALUE FROM 4.90 TO 5.10
VALUE FROM 5.10 TO 5.30
VALUE GREATER THAN 5.30

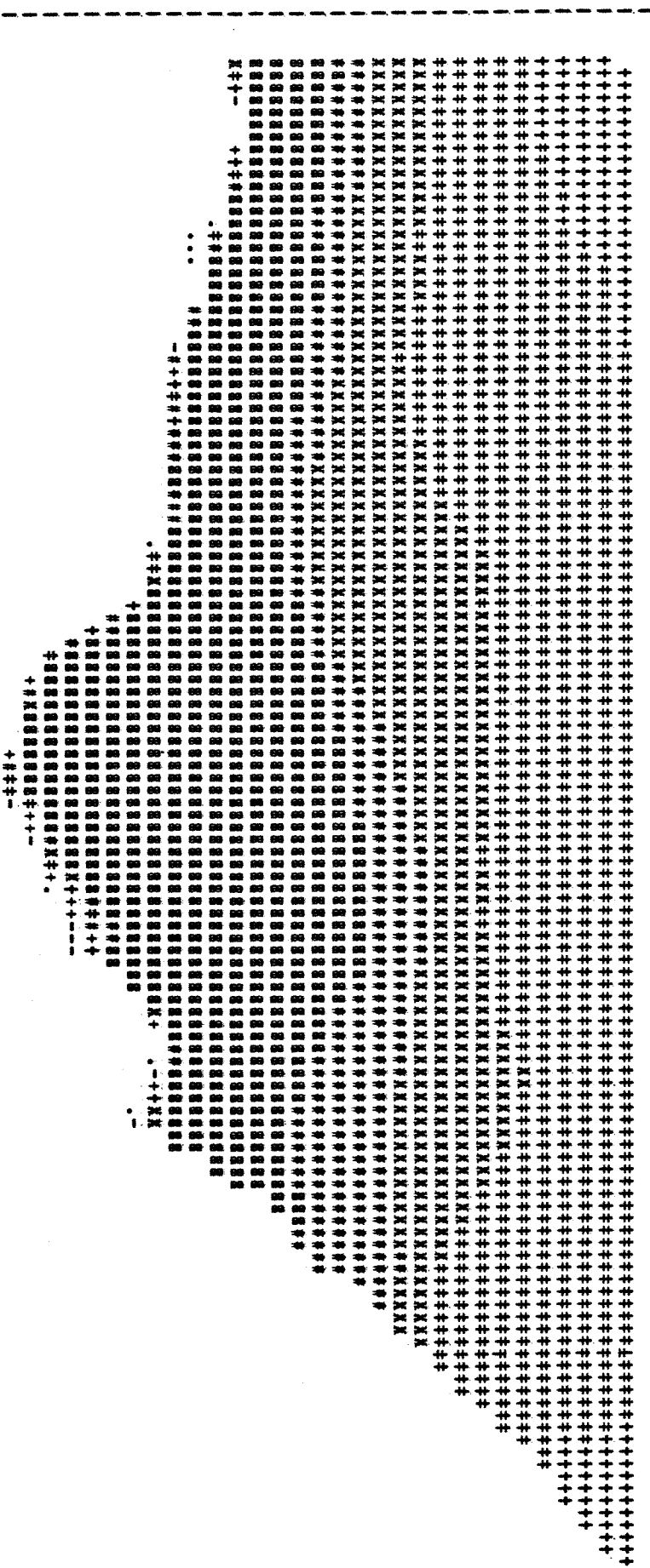
*****WAVE HEIGHT CHART*****
WAVE CLIMATE ELEMENT 27





VALUE LESS THAN	3.70	3.90	4.50 TO	4.70
VALUE FROM	3.70 TO	4.10	4.70 TO	4.90
VALUE FROM	4.10 TO	4.30	4.90 TO	5.10
VALUE FROM	4.30 TO	4.50	5.10 TO	5.30

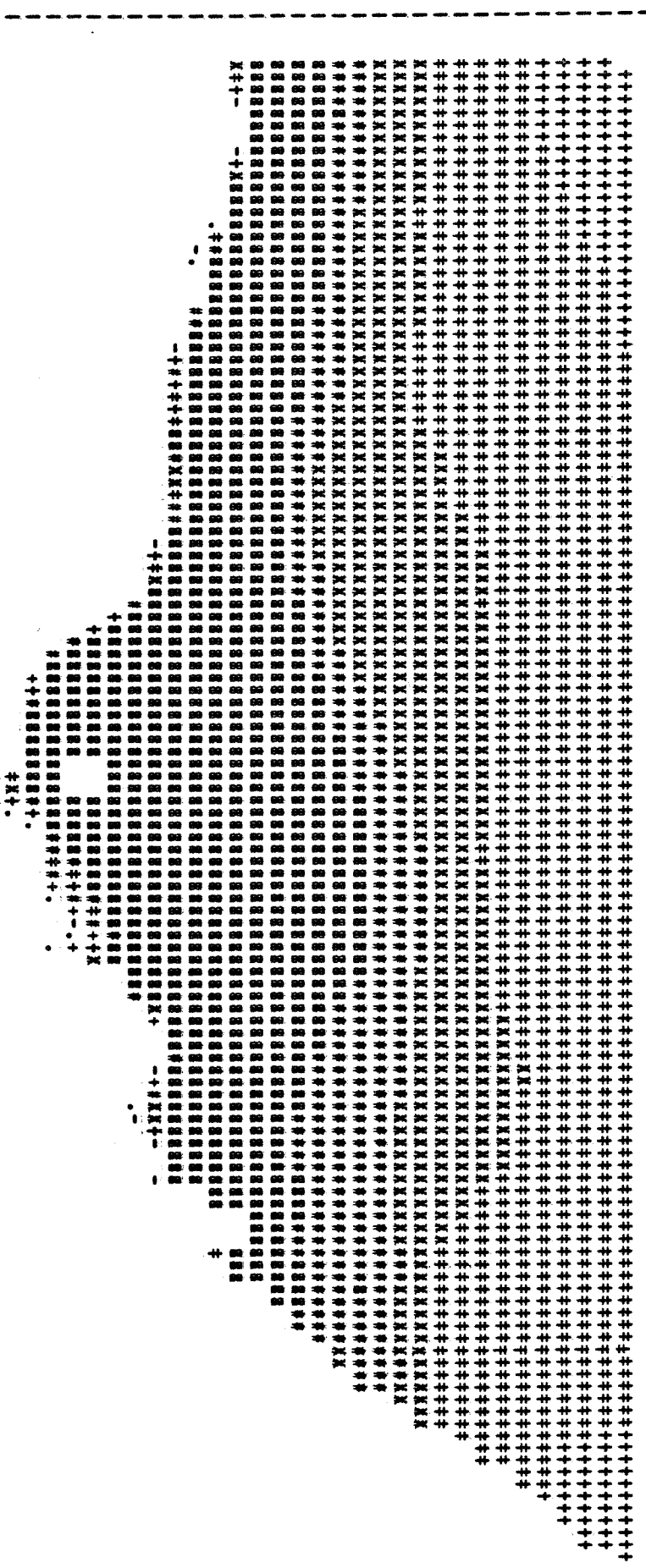
*****WAVE HEIGHT CHART*****
 WAVE CLIMATE ELEMENT 29



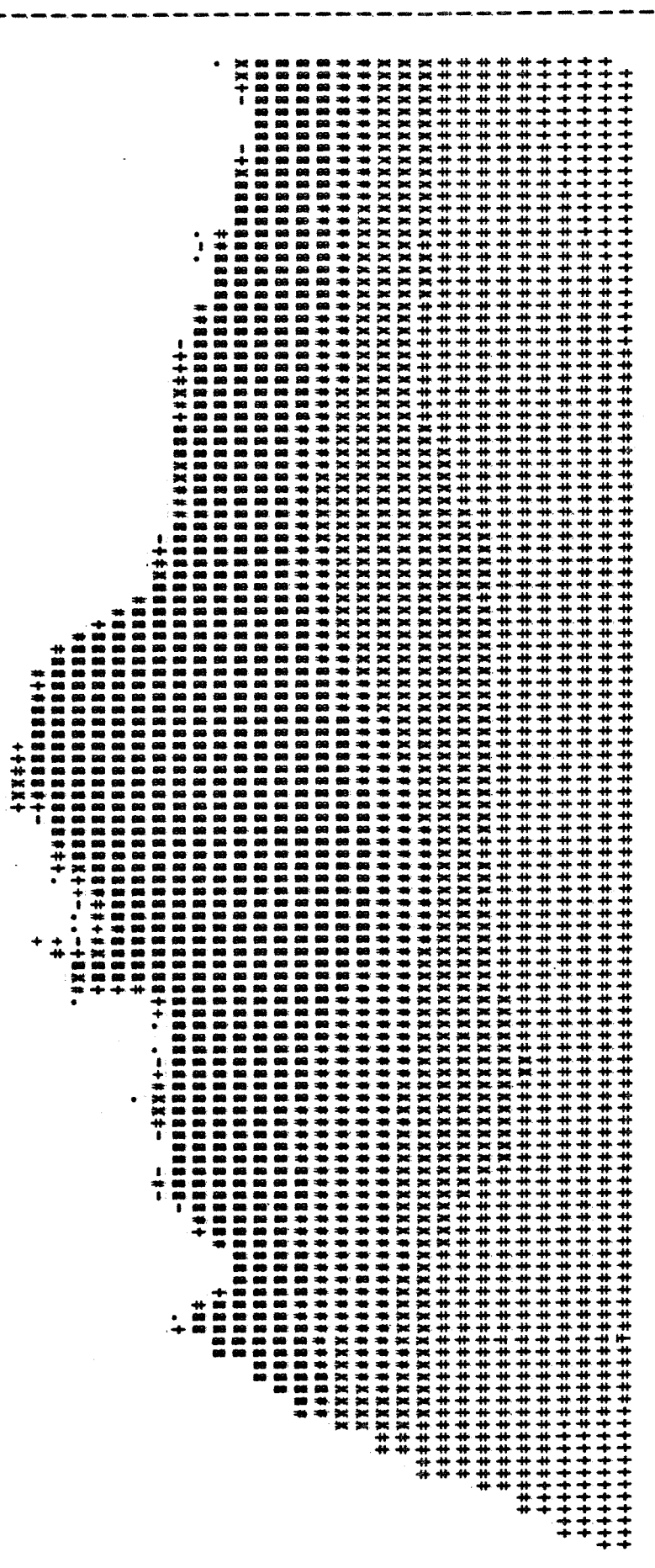
VALUE LESS THAN 2.60 TO 2.70 *****
 VALUE FROM 2.60 TO 2.80 *****
 VALUE FROM 2.70 TO 2.80 *****
 VALUE FROM 2.80 TO 2.90 *****
 VALUE FROM 2.90 TO 3.00 *****

VALUE FROM 3.00 TO 3.10 *****
 VALUE FROM 3.10 TO 3.20 *****
 VALUE FROM 3.20 TO 3.30 *****
 VALUE FROM 3.30 TO 3.40 *****
 VALUE GREATER THAN 3.40 *****

*****WAVE HEIGHT CHART*****
 WAVE CLIMATE ELEMENT 30

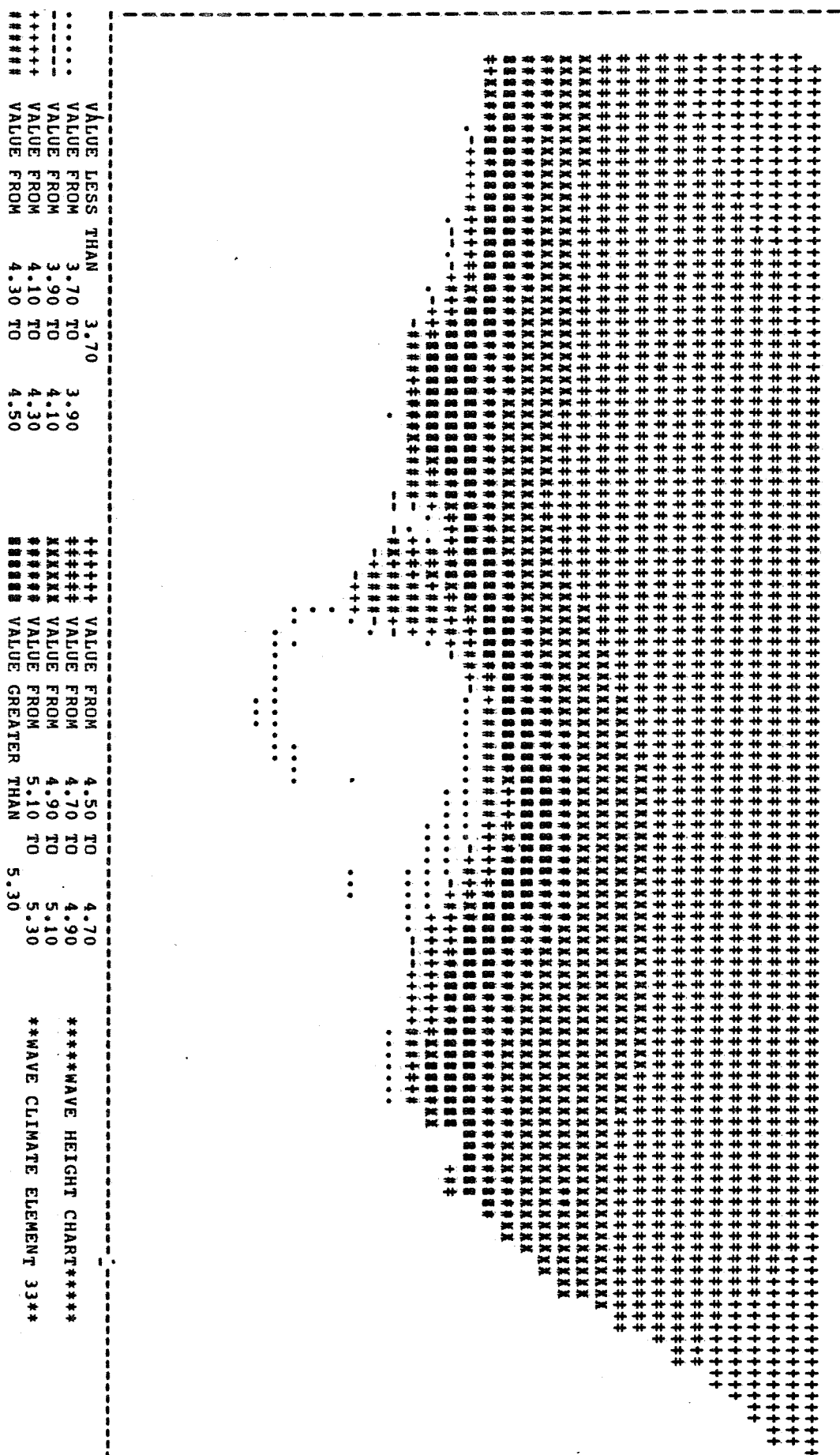


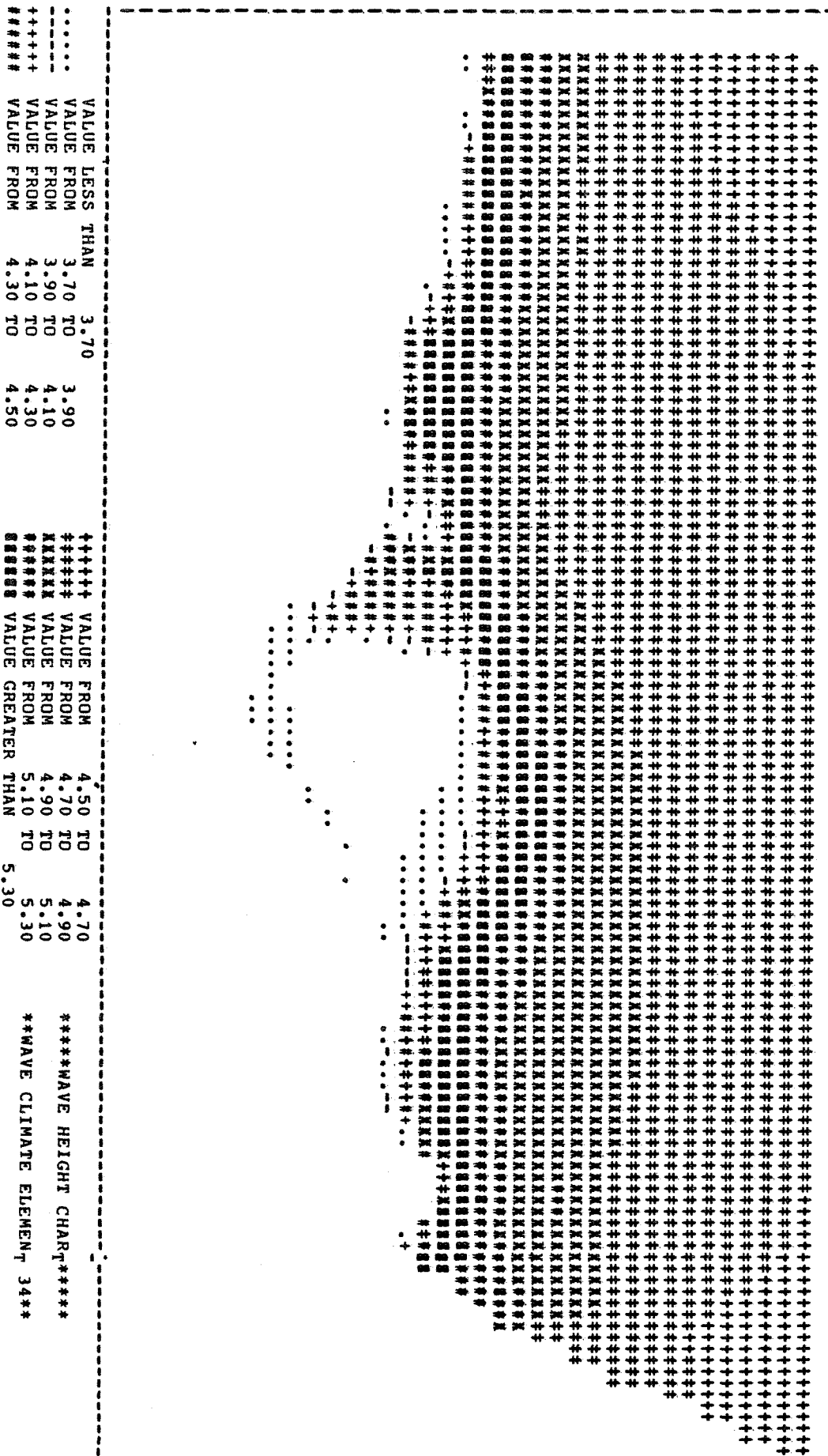
VALUE LESS THAN	2.60	2.70	3.00 TO	3.10	*****WAVE HEIGHT CHART*****
VALUE FROM	2.60 TO	2.80	3.10 TO	3.20	
VALUE FROM	2.70 TO	2.90	3.20 TO	3.30	
VALUE FROM	2.80 TO	3.00	3.30 TO	3.40	**WAVE CLIMATE ELEMENT 31**
VALUE FROM	2.90 TO				



VALUE LESS THAN 2.60 TO 2.70
VALUE FROM 2.60 TO 2.80
VALUE FROM 2.70 TO 2.90
VALUE FROM 2.80 TO 3.00
VALUE FROM 2.90 TO 3.10
VALUE FROM 3.00 TO 3.20
VALUE FROM 3.10 TO 3.30
VALUE FROM 3.20 TO 3.40
VALUE GREATER THAN 3.40

WAVE HEIGHT CHART
WAVE CLIMATE ELEMENT 32





 WAVE CLIMATE ELEMENT 34