

```

Run number: 1
Starting 24 point test
Calculating with integers
Scale: 500
Sorted points
0 10 184
1 36 169
2 44 324
3 192 239
4 212 312
5 219 149
6 231 260
7 264 240
8 272 424
9 274 296
10 284 196
11 301 429
12 323 192
13 358 422
14 389 70
15 390 339
16 396 406
17 400 400
18 416 479
19 435 435
20 446 28
21 463 418
22 482 136
23 489 237

nSites: 24
-> Adding p#0 (10, 184)

BF tree at end of point added:
R---- H1 n#0 nil nil

Beach front (nodeID, PointID, intersections):
#0(p0;nil,nil)

-> Adding p#1 (36, 169)

BF tree at end of point added:
R---- H2 n#1 prior n#0 next n#2
      L---- H1 n#0 prior n# nil next n#1 parent #1
      R---- H1 n#2 prior n#1 next n#nil parent #1

Beach front (nodeID, PointID, intersections):
#0(p0;nil,169) #1(p1;169,169) #2(p0;169,nil)

-> Adding p#2 (44, 324)
At x=44 Adding: e#0, X=144 (63,245) for n#2; prior n#1 next n#3

BF tree at end of point added:
R---- H3 n#1 prior n#0 next n#2
      L---- H1 n#0 prior n# nil next n#1 parent #1
      R---- H2 n#3 prior n#2 next n#4 parent #1
            L---- H1 n#2 prior n#1 next n#3 parent #3
            R---- H1 n#4 prior n#3 next n#nil parent #3

Beach front (nodeID, PointID, intersections):
#0(p0;nil,145) #1(p1;145,183) #2(p0;183,324) #3(p2;324,324) #4(p0;324,nil)

Priority queue:
R----H1 e#0 X=144; n#2

-> Adding p#3 (192, 239)
At x=144 Removing: e#0 n#2 p#(1,0,2) center: (63,245)
Case E
At x=192 Adding: e#1, X=192 (96,244) for n#6; prior n#5 next n#3

BF tree at end of point added:
R---- H3 n#1 prior n#0 next n#5
      L---- H1 n#0 prior n# nil next n#1 parent #1
      R---- H2 n#3 prior n#6 next n#4 parent #1
            L---- H1 n#5 prior n#1 next n#6 parent #3
                  R---- H0 n#6 prior n#5 next n#3 parent #5
            R---- H1 n#4 prior n#3 next n#nil parent #3

Beach front (nodeID, PointID, intersections):

```

#0(p0:nil,-116) #1(p1;-116,239) #5(p3;239,239) #6(p1;239,244) #3(p2;244,1629) #4(p0;1629,nil)

Priority queue:

R----H1 e#1 X=192; n#6

-> Adding p#4 (212, 312)

At x=192 Removing: e#1 n#6 p#(3,1,2) center: (96,244)

Case E

At x=212 Adding: e#2, X=213 (126,296) for n#3; prior n#5 next n#7

BF tree at end of point added:

```
R---- H3 n#3 prior n#5 next n#7
      L---- H2 n#1 prior n#0 next n#5 parent #3
            L---- H1 n#0 prior n# nil next n#1 parent #1
            R---- H1 n#5 prior n#1 next n#3 parent #1
      R---- H2 n#4 prior n#8 next n#nil parent #3
            L---- H1 n#7 prior n#3 next n#8 parent #4
            R---- H0 n#8 prior n#7 next n#4 parent #7
```

Beach front (nodeID, PointID, intersections):

#0(p0:nil,-150) #1(p1;-150,183) #5(p3;183,294) #3(p2;294,312) #7(p4;312,312) #8(p2;312,1796) #4(p0;1796,nil)

Priority queue:

R----H1 e#2 X=213; n#3

-> Adding p#5 (219, 149)

At x=213 Removing: e#2 n#3 p#(3,2,4) center: (126,296)

Case G

At x=219 Adding: e#3, X=222 (129,171) for n#10; prior n#9 next n#5

BF tree at end of point added:

```
R---- H4 n#7 prior n#5 next n#8
      L---- H3 n#1 prior n#0 next n#9 parent #7
            | L---- H1 n#0 prior n# nil next n#1 parent #1
            | R---- H2 n#5 prior n#10 next n#7 parent #1
            | L---- H1 n#9 prior n#1 next n#10 parent #5
            | R---- H0 n#10 prior n#9 next n#5 parent #9
      R---- H2 n#4 prior n#8 next n#nil parent #7
            L---- H0 n#8 prior n#7 next n#4 parent #4
```

Beach front (nodeID, PointID, intersections):

#0(p0:nil,-162) #1(p1;-162,149) #9(p5;149,149) #10(p1;149,174) #5(p3;174,286) #7(p4;286,347) #8(p2;347,1855) #4(p0;1855,nil)

Priority queue:

R----H1 e#3 X=222; n#10

-> Adding p#6 (231, 260)

At x=222 Removing: e#3 n#10 p#(5,1,3) center: (129,171)

Case E

At x=222 Adding: e#4, X=500 (346,236) for n#5; prior n#9 next n#7

At x=231 Invalid: e#4 n#5

At x=231 Adding: e#5, X=293 (236,203) for n#5; prior n#9 next n#11

At x=231 Adding: e#6, X=235 (197,277) for n#12; prior n#11 next n#7

BF tree at end of point added:

```
R---- H4 n#7 prior n#12 next n#8
      L---- H3 n#5 prior n#9 next n#11 parent #7
            | L---- H2 n#1 prior n#0 next n#9 parent #5
            | | L---- H1 n#0 prior n# nil next n#1 parent #1
            | | R---- H1 n#9 prior n#1 next n#5 parent #1
            | | R---- H2 n#11 prior n#5 next n#12 parent #5
            | | R---- H1 n#12 prior n#11 next n#7 parent #11
      R---- H2 n#4 prior n#8 next n#nil parent #7
            L---- H0 n#8 prior n#7 next n#4 parent #4
```

Beach front (nodeID, PointID, intersections):

#0(p0:nil,-183) #1(p1;-183,99) #9(p5;99,184) #5(p3;184,260) #11(p6;260,260) #12(p3;260,278) #7(p4;278,370) #8(p2;370,1955) #4(p0;1955,nil)

Priority queue:

R----H2 e#5 X=293; n#5

L----H1 e#6 X=235; n#12

-> Adding p#7 (264, 240)

At x=235 Removing: e#6 n#12 p#(6,3,4) center: (197,277)

Case E

At x=264 Adding: e#7, X=270 (228,218) for n#11; prior n#5 next n#13

At x=264 Adding: e#8, X=354 (283,308) for n#14; prior n#13 next n#7

BF tree at end of point added:

```
R---- H4 n#7 prior n#14 next n#8
      L---- H3 n#5 prior n#9 next n#11 parent #7
      |    L---- H2 n#1 prior n#0 next n#9 parent #5
      |    |    L---- H1 n#0 prior n# nil next n#1 parent #1
      |    |    R---- H1 n#9 prior n#1 next n#5 parent #1
      |    |    R---- H2 n#13 prior n#11 next n#14 parent #5
      |    |    L---- H1 n#11 prior n#5 next n#13 parent #13
      |    |    R---- H1 n#14 prior n#13 next n#7 parent #13
      |    R---- H2 n#4 prior n#8 next n#nil parent #7
      |    L---- H0 n#8 prior n#7 next n#4 parent #4
```

Beach front (nodeID, PointID, intersections):

#0(p0;nil,-240) #1(p1;-240,42) #9(p5;42,197) #5(p3;197,222) #11(p6;222,240) #13(p7;240,240) #14(p6;240,290) #7(p4;290,416) #8(p2;416,2232) #4(p0;2232,nil)

Priority queue:

```
R----H2 e#5 X=293; n#5
      L----H1 e#7 X=270; n#11
      R----H1 e#8 X=354; n#14
```

-> Adding p#8 (272, 424)

At x=270 Removing: e#7 n#11 p#(3,6,7) center: (228,218)

Case E

At x=270 Invalid: e#5 n#5

At x=270 Adding: e#9, X=281 (229,201) for n#5; prior n#9 next n#13

At x=272 Adding: e#10, X=438 (325,324) for n#7; prior n#14 next n#15

At x=272 Adding: e#11, X=272 (136,425) for n#16; prior n#15 next n#8

BF tree at end of point added:

```
R---- H4 n#7 prior n#14 next n#15
      L---- H3 n#5 prior n#9 next n#13 parent #7
      |    L---- H2 n#1 prior n#0 next n#9 parent #5
      |    |    L---- H1 n#0 prior n# nil next n#1 parent #1
      |    |    R---- H1 n#9 prior n#1 next n#5 parent #1
      |    |    R---- H2 n#13 prior n#5 next n#14 parent #5
      |    |    R---- H1 n#14 prior n#13 next n#7 parent #13
      |    R---- H2 n#4 prior n#8 next n#nil parent #7
      |    L---- H2 n#8 prior n#16 next n#4 parent #4
      |    L---- H1 n#15 prior n#7 next n#16 parent #8
      |    R---- H0 n#16 prior n#15 next n#8 parent #15
```

Beach front (nodeID, PointID, intersections):

#0(p0;nil,-254) #1(p1;-254,31) #9(p5;31,199) #5(p3;199,215) #13(p7;215,256) #14(p6;256,292) #7(p4;292,424) #15(p8;424,424) #16(p4;424,425) #8(p2;425,2298) #4(p0;2298,nil)

Priority queue:

```
R----H3 e#8 X=354; n#14
      L----H2 e#9 X=281; n#5
      |    L----H1 e#11 X=272; n#16
      R----H1 e#10 X=438; n#7
```

-> Adding p#9 (274, 296)

At x=272 Removing: e#11 n#16 p#(8,4,2) center: (136,425)

Case E

At x=274 Invalid: e#10 n#7

At x=274 Adding: e#12, X=274 (240,293) for n#7; prior n#14 next n#17

At x=274 Adding: e#13, X=323 (257,360) for n#18; prior n#17 next n#15

BF tree at end of point added:

```
R---- H4 n#7 prior n#14 next n#17
      L---- H3 n#5 prior n#9 next n#13 parent #7
      |    L---- H2 n#1 prior n#0 next n#9 parent #5
      |    |    L---- H1 n#0 prior n# nil next n#1 parent #1
      |    |    R---- H1 n#9 prior n#1 next n#5 parent #1
      |    |    R---- H2 n#13 prior n#5 next n#14 parent #5
      |    |    R---- H1 n#14 prior n#13 next n#7 parent #13
      |    R---- H2 n#8 prior n#15 next n#4 parent #7
      |    L---- H2 n#15 prior n#18 next n#8 parent #8
      |    L---- H1 n#17 prior n#7 next n#18 parent #15
      |    R---- H0 n#18 prior n#17 next n#15 parent #17
      |    R---- H1 n#4 prior n#8 next n#nil parent #8
```

Beach front (nodeID, PointID, intersections):

#0(p0;nil,-258) #1(p1;-258,28) #9(p5;28,199) #5(p3;199,212) #13(p7;212,258) #14(p6;258,293) #7(p4;293,296) #17(p9;296,296) #18(p4;296,404) #15(p8;404,448) #8(p2;448,2315) #4(p0;2315,nil)

Priority queue:

```
R----H3 e#9 X=281; n#5
      L----H1 e#12 X=274; n#7
      R----H2 e#8 X=354; n#14
            L----H1 e#13 X=323; n#18
```

-> Adding p#10 (284, 196)

At x=274 Removing: e#12 n#7 p#(6,4,9) center: (240,293)

Case G

At x=274 Invalid: e#8 n#14

At x=274 Adding: e#14, X=289 (259,270) for n#14; prior n#13 next n#17

At x=281 Removing: e#9 n#5 p#(5,3,7) center: (229,201)

Case F

At x=284 Adding: e#15, X=284 (232,199) for n#20; prior n#19 next n#13

BF tree at end of point added:

```
R---- H4 n#17 prior n#14 next n#18
      L---- H3 n#19 prior n#9 next n#20 parent #17
            |
            L---- H1 n#1 prior n#0 next n#9 parent #19
            |
            | L---- H1 n#0 prior n# nil next n#1 parent #1
            | R---- H1 n#9 prior n#1 next n#19 parent #1
            | R---- H2 n#13 prior n#20 next n#14 parent #19
            | L---- H1 n#20 prior n#19 next n#13 parent #13
            | R---- H1 n#14 prior n#13 next n#17 parent #13
      R---- H3 n#8 prior n#15 next n#4 parent #17
            L---- H2 n#15 prior n#18 next n#8 parent #8
            | L---- H0 n#18 prior n#17 next n#15 parent #15
            R---- H1 n#4 prior n#8 next n#nil parent #8
```

Beach front (nodeID, PointID, intersections):

#0(p0;nil,-275) #1(p1;-275,14) #9(p5;14,196) #19(p10;196,196) #20(p5;196,199) #13(p7;199,266) #14(p6;266,274) #17(p9;274,321) #18(p4;321,384) #15(p8;384,488) #8(p2;488,2399) #4(p0;2399,nil)

Priority queue:

```
R----H2 e#14 X=289; n#14
      L----H1 e#15 X=284; n#20
      R----H1 e#13 X=323; n#18
```

-> Adding p#11 (301, 429)

At x=284 Removing: e#15 n#20 p#(10,5,7) center: (232,199)

Case E

At x=289 Removing: e#14 n#14 p#(7,6,9) center: (259,270)

Case E

At x=289 Adding: e#16, X=440 (352,253) for n#13; prior n#19 next n#17

At x=301 Adding: e#17, X=395 (308,233) for n#15; prior n#18 next n#21

BF tree at end of point added:

```
R---- H4 n#17 prior n#13 next n#18
      L---- H2 n#19 prior n#9 next n#13 parent #17
            |
            L---- H1 n#1 prior n#0 next n#9 parent #19
            |
            | L---- H1 n#0 prior n# nil next n#1 parent #1
            | R---- H1 n#9 prior n#1 next n#19 parent #1
            | R---- H1 n#13 prior n#19 next n#17 parent #19
      R---- H3 n#8 prior n#22 next n#4 parent #17
            L---- H2 n#21 prior n#15 next n#22 parent #8
            | L---- H1 n#15 prior n#18 next n#21 parent #21
            | | L---- H0 n#18 prior n#17 next n#15 parent #15
            | R---- H1 n#22 prior n#21 next n#8 parent #21
      R---- H1 n#4 prior n#8 next n#nil parent #8
```

Beach front (nodeID, PointID, intersections):

#0(p0;nil,-304) #1(p1;-304,-8) #9(p5;-8,162) #19(p10;162,219) #13(p7;219,267) #17(p9;267,340) #18(p4;340,371) #15(p8;371,429) #21(p11;429,429) #22(p8;429,531) #8(p2;531,2541) #4(p0;2541,nil)

Priority queue:

```
R----H2 e#17 X=395; n#15
      L----H1 e#13 X=323; n#18
      R----H1 e#16 X=440; n#13
```

-> Adding p#12 (323, 192)

At x=323 Adding: e#18, X=380 (295,112) for n#19; prior n#9 next n#23

At x=323 Adding: e#19, X=352 (308,233) for n#24; prior n#23 next n#13

BF tree at end of point added:

```
R---- H4 n#17 prior n#13 next n#18
      L---- H3 n#19 prior n#9 next n#23 parent #17
            |
            | L---- H1 n#1 prior n#0 next n#9 parent #19
            | | L---- H1 n#0 prior n# nil next n#1 parent #1
            | | R---- H1 n#9 prior n#1 next n#19 parent #1
            | R---- H2 n#13 prior n#24 next n#17 parent #19
```

```

|           L---- H1 n#23 prior n#19 next n#24 parent #13
|           R---- H0 n#24 prior n#23 next n#13 parent #23
R---- H3 n#8 prior n#22 next n#4 parent #17
      L---- H2 n#21 prior n#15 next n#22 parent #8
            L---- H1 n#15 prior n#18 next n#21 parent #21
            L---- H0 n#18 prior n#17 next n#15 parent #15
            R---- H1 n#22 prior n#21 next n#8 parent #21
            R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-343) #1(p1;-343,-36) #9(p5;-36,146) #19(p10;146,192) #23(p12;192,192) #24(p10;192,226)
#13(p7;226,265) #17(p9;265,360) #18(p4;360,360) #15(p8;360,399) #21(p11;399,467) #22(p8;467,577)
#8(p2;577,2725) #4(p0;2725,nil)

```

Priority queue:

```

R----H3 e#17 X=395; n#15
      L----H2 e#19 X=352; n#24
      |     L----H1 e#13 X=323; n#18
      |     R----H1 e#18 X=380; n#19
      R----H1 e#16 X=440; n#13

```

-> Adding p#13 (358, 422)

At x=323 Removing: e#13 n#18 p#(9,4,8) center: (257,360)

Case E

At x=323 Invalid: e#17 n#15

At x=323 Adding: e#20, X=367 (298,360) for n#15; prior n#17 next n#21

At x=352 Removing: e#19 n#24 p#(12,10,7) center: (308,233)

Case E

At x=352 Invalid: e#16 n#13

At x=352 Adding: e#21, X=393 (327,258) for n#13; prior n#23 next n#17

At x=358 Adding: e#22, X=461 (312,280) for n#21; prior n#15 next n#25

BF tree at end of point added:

```

R---- H4 n#17 prior n#13 next n#15
      L---- H3 n#19 prior n#9 next n#23 parent #17
      |     L---- H1 n#1 prior n#0 next n#9 parent #19
      |     |     L---- H1 n#0 prior n# nil next n#1 parent #1
      |     |     R---- H1 n#9 prior n#1 next n#19 parent #1
      |     |     R---- H2 n#13 prior n#23 next n#17 parent #19
      |     |     L---- H1 n#23 prior n#19 next n#13 parent #13
      R---- H3 n#22 prior n#26 next n#8 parent #17
            L---- H1 n#21 prior n#15 next n#25 parent #22
            |     L---- H1 n#15 prior n#17 next n#21 parent #21
            |     R---- H1 n#25 prior n#21 next n#26 parent #21
            |     |     R---- H0 n#26 prior n#25 next n#22 parent #25
            R---- H2 n#8 prior n#22 next n#4 parent #22
            R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-403) #1(p1;-403,-79) #9(p5;-79,124) #19(p10;124,137) #23(p12;137,237) #13(p7;237,261)
#17(p9;261,360) #15(p8;360,368) #21(p11;368,422) #25(p13;422,422) #26(p11;422,510) #22(p8;510,641)
#8(p2;641,3018) #4(p0;3018,nil)

```

Priority queue:

```

R----H3 e#18 X=380; n#19
      L----H1 e#20 X=367; n#15
      R----H2 e#21 X=393; n#13
      R----H1 e#22 X=461; n#21

```

-> Adding p#14 (389, 70)

At x=367 Removing: e#20 n#15 p#(9,8,11) center: (298,360)

Case E

At x=367 Adding: e#23, X=8375 (4290,-450) for n#17; prior n#13 next n#21

At x=367 Invalid: e#22 n#21

At x=367 Adding: e#24, X=397 (321,356) for n#21; prior n#17 next n#25

At x=380 Removing: e#18 n#19 p#(5,10,12) center: (295,112)

Case G

At x=389 Adding: e#25, X=638 (66,-402) for n#9; prior n#1 next n#27

At x=389 Adding: e#26, X=394 (300,101) for n#28; prior n#27 next n#23

BF tree at end of point added:

```

R---- H5 n#17 prior n#13 next n#21
      L---- H4 n#23 prior n#28 next n#13 parent #17
      |     L---- H3 n#1 prior n#0 next n#9 parent #23
      |     |     L---- H1 n#0 prior n# nil next n#1 parent #1
      |     |     R---- H2 n#27 prior n#9 next n#28 parent #1
      |     |     |     L---- H1 n#9 prior n#1 next n#27 parent #27
      |     |     |     R---- H1 n#28 prior n#27 next n#23 parent #27
      R---- H2 n#13 prior n#23 next n#17 parent #23

```

```

R---- H3 n#22 prior n#26 next n#8 parent #17
|
L---- H2 n#21 prior n#17 next n#25 parent #22
|   R---- H1 n#25 prior n#21 next n#26 parent #21
|       R---- H0 n#26 prior n#25 next n#22 parent #25
R---- H2 n#8 prior n#22 next n#4 parent #22
|   R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-457) #1(p1;-457,-116) #9(p5;-116,70) #27(p14;70,70) #28(p5;70,105) #23(p12;105,255) #13(p7;255,258)
#17(p9;258,357) #21(p11;357,366) #25(p13;366,471) #26(p11;471,547) #22(p8;547,695) #8(p2;695,3277)
#4(p0;3277,nil)

```

Priority queue:

```

R----H3 e#24 X=397; n#21
|   L----H2 e#21 X=393; n#13
|       |   R----H1 e#26 X=394; n#28
R----H2 e#23 X=8375; n#17
|   L----H1 e#25 X=638; n#9

```

-> Adding p#15 (390, 339)

At x=390 Invalid: e#23 n#17

At x=390 Adding: e#27, X=449 (356,252) for n#17; prior n#13 next n#29

At x=390 Adding: e#28, X=392 (318,356) for n#30; prior n#29 next n#21

BF tree at end of point added:

```

R---- H5 n#17 prior n#13 next n#29
|   L---- H4 n#23 prior n#28 next n#13 parent #17
|       |   L---- H3 n#1 prior n#0 next n#9 parent #23
|       |       |   L---- H1 n#0 prior n# nil next n#1 parent #1
|       |       |       R---- H2 n#27 prior n#9 next n#28 parent #1
|       |       |           |   L---- H1 n#9 prior n#1 next n#27 parent #27
|       |       |           |       R---- H1 n#28 prior n#27 next n#23 parent #27
R---- H2 n#13 prior n#23 next n#17 parent #23
|   R---- H3 n#22 prior n#26 next n#8 parent #17
|       |   L---- H2 n#21 prior n#30 next n#25 parent #22
|       |       |   L---- H1 n#29 prior n#17 next n#30 parent #21
|       |       |       |   R---- H0 n#30 prior n#29 next n#21 parent #29
|       |       |       |       R---- H1 n#25 prior n#21 next n#26 parent #21
|       |       |       |           R---- H0 n#26 prior n#25 next n#22 parent #25
R---- H2 n#8 prior n#22 next n#4 parent #22
|   R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-459) #1(p1;-459,-117) #9(p5;-117,55) #27(p14;55,84) #28(p5;84,104) #23(p12;104,256) #13(p7;256,258)
#17(p9;258,339) #29(p15;339,339) #30(p9;339,357) #21(p11;357,364) #25(p13;364,472) #26(p11;472,548)
#22(p8;548,696) #8(p2;696,3285) #4(p0;3285,nil)

```

Priority queue:

```

R----H3 e#24 X=397; n#21
|   L----H2 e#21 X=393; n#13
|       |   L----H1 e#28 X=392; n#30
|       |       R----H1 e#26 X=394; n#28
R----H2 e#25 X=638; n#9
|   L----H1 e#27 X=449; n#17

```

-> Adding p#16 (396, 406)

At x=392 Removing: e#28 n#30 p#(15,9,11) center: (318,356)

Case E

At x=392 Invalid: e#24 n#21

At x=392 Adding: e#29, X=393 (321,360) for n#21; prior n#29 next n#25

At x=393 Removing: e#21 n#13 p#(12,7,9) center: (327,258)

Case E

At x=393 Invalid: e#27 n#17

At x=393 Adding: e#30, X=431 (350,268) for n#17; prior n#23 next n#29

At x=393 Removing: e#29 n#21 p#(15,11,13) center: (321,360)

Case F

At x=394 Removing: e#26 n#28 p#(14,5,12) center: (300,101)

Case E

At x=394 Adding: e#31, X=4644 (2362,1216) for n#23; prior n#27 next n#17

At x=396 Adding: e#32, X=407 (361,375) for n#25; prior n#29 next n#31

BF tree at end of point added:

```

R---- H4 n#25 prior n#29 next n#31
|   L---- H3 n#17 prior n#23 next n#29 parent #25
|       |   L---- H2 n#27 prior n#9 next n#23 parent #17
|       |       |   L---- H1 n#1 prior n#0 next n#9 parent #27
|       |       |       |   L---- H1 n#0 prior n# nil next n#1 parent #1
|       |       |       |       R---- H1 n#9 prior n#1 next n#27 parent #1
R---- H1 n#23 prior n#27 next n#17 parent #27

```

```

R---- H1 n#29 prior n#17 next n#25 parent #17
R---- H2 n#22 prior n#26 next n#8 parent #25
L---- H2 n#26 prior n#32 next n#22 parent #22
      L---- H1 n#31 prior n#25 next n#32 parent #26
            R---- H0 n#32 prior n#31 next n#26 parent #31
R---- H2 n#8 prior n#22 next n#4 parent #22
      R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-469) #1(p1;-469,-124) #9(p5;-124,28) #27(p14;28,105) #23(p12;105,258) #17(p9;258,312)
#29(p15;312,365) #25(p13;365,406) #31(p16;406,406) #32(p13;406,478) #26(p11;478,556) #22(p8;556,707)
#8(p2;707,3335) #4(p0;3335,nil)

```

Priority queue:

```

R----H3 e#25 X=638; n#9
      L----H2 e#30 X=431; n#17
          |   L----H1 e#32 X=407; n#25
R----H1 e#31 X=4644; n#23

```

-> Adding p#17 (400, 400)

At x=400 Adding: e#33, X=405 (362,379) for n#31; prior n#25 next n#33

BF tree at end of point added:

```

R---- H4 n#25 prior n#29 next n#31
      L---- H3 n#17 prior n#23 next n#29 parent #25
            L---- H2 n#27 prior n#9 next n#23 parent #17
                  L---- H1 n#1 prior n#0 next n#9 parent #27
                        L---- H1 n#0 prior n# nil next n#1 parent #1
                              R---- H1 n#9 prior n#1 next n#27 parent #1
                                    R---- H1 n#23 prior n#27 next n#17 parent #27
                                            R---- H1 n#29 prior n#17 next n#25 parent #17
R---- H3 n#22 prior n#26 next n#8 parent #25
      L---- H2 n#33 prior n#31 next n#34 parent #22
            |   L---- H1 n#31 prior n#25 next n#33 parent #33
            |   R---- H1 n#26 prior n#32 next n#22 parent #33
            |   |   L---- H2 n#32 prior n#34 next n#26 parent #26
            |   |   |   L---- H1 n#34 prior n#33 next n#32 parent #32
R---- H2 n#8 prior n#22 next n#4 parent #22
      R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-476) #1(p1;-476,-129) #9(p5;-129,16) #27(p14;16,111) #23(p12;111,260) #17(p9;260,305)
#29(p15;305,370) #25(p13;370,390) #31(p16;390,400) #33(p17;400,400) #34(p16;400,418) #32(p13;418,482)
#26(p11;482,560) #22(p8;560,713) #8(p2;713,3369) #4(p0;3369,nil)

```

Priority queue:

```

R----H3 e#25 X=638; n#9
      L----H2 e#32 X=407; n#25
          |   L----H1 e#33 X=405; n#31
          |   R----H1 e#30 X=431; n#17
R----H1 e#31 X=4644; n#23

```

-> Adding p#18 (416, 479)

At x=405 Removing: e#33 n#31 p#(13,16,17) center: (362,379)

Case E

At x=405 Invalid: e#32 n#25

At x=405 Adding: e#34, X=407 (360,375) for n#25; prior n#29 next n#33

At x=407 Removing: e#34 n#25 p#(15,13,17) center: (360,375)

Case G

At x=416 Adding: e#35, X=432 (391,447) for n#32; prior n#34 next n#35

At x=416 Adding: e#36, X=419 (339,500) for n#36; prior n#35 next n#26

BF tree at end of point added:

```

R---- H5 n#33 prior n#29 next n#34
      L---- H3 n#17 prior n#23 next n#29 parent #33
            L---- H2 n#27 prior n#9 next n#23 parent #17
                  L---- H1 n#1 prior n#0 next n#9 parent #27
                        L---- H1 n#0 prior n# nil next n#1 parent #1
                              R---- H1 n#9 prior n#1 next n#27 parent #1
                                    R---- H1 n#23 prior n#27 next n#17 parent #27
                                            R---- H1 n#29 prior n#17 next n#33 parent #17
R---- H4 n#22 prior n#26 next n#8 parent #33
      L---- H3 n#32 prior n#34 next n#35 parent #22
            |   L---- H1 n#34 prior n#33 next n#32 parent #32
            |   R---- H1 n#26 prior n#36 next n#22 parent #32
            |   |   L---- H1 n#35 prior n#32 next n#36 parent #26
            |   |   |   R---- H0 n#36 prior n#35 next n#26 parent #35
R---- H2 n#8 prior n#22 next n#4 parent #22
      R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

#0(p0:nil,-504) #1(p1;-504,-148) #9(p5;-148,-23) #27(p14;-23,125) #23(p12;125,264) #17(p9;264,284)  
#29(p15;284,372) #33(p17;372,408) #34(p16;408,435) #32(p13;435,479) #35(p18;479,479) #36(p13;479,497)  
#26(p11;497,579) #22(p8;579,740) #8(p2;740,3503) #4(p0;3503,nil)

Priority queue:

R----H3 e#25 X=638; n#9  
| L----H2 e#30 X=431; n#17  
| | L----H1 e#36 X=419; n#36  
| | R----H1 e#35 X=432; n#32  
R----H1 e#31 X=4644; n#23

-> Adding p#19 (435, 435)

At x=419 Removing: e#36 n#36 p#(18,13,11) center: (339,500)

Case E

At x=419 Adding: e#37, X=556 (231,746) for n#26; prior n#35 next n#22

At x=431 Removing: e#30 n#17 p#(12,9,15) center: (350,268)

Case F

At x=431 Invalid: e#31 n#23

At x=431 Adding: e#38, X=660 (491,204) for n#23; prior n#27 next n#29

At x=432 Removing: e#35 n#32 p#(16,13,18) center: (391,447)

Case G

At x=432 Adding: e#39, X=496 (442,433) for n#34; prior n#33 next n#35

At x=435 Invalid: e#39 n#34

At x=435 Adding: e#40, X=443 (418,417) for n#34; prior n#33 next n#37

At x=435 Adding: e#41, X=436 (397,445) for n#38; prior n#37 next n#35

BF tree at end of point added:

R---- H4 n#35 prior n#38 next n#26  
| L---- H3 n#33 prior n#29 next n#34 parent #35  
| | L---- H2 n#27 prior n#9 next n#23 parent #33  
| | | L---- H1 n#1 prior n#0 next n#9 parent #27  
| | | | L---- H1 n#0 prior n# nil next n#1 parent #1  
| | | | R---- H1 n#9 prior n#1 next n#27 parent #1  
| | | | R---- H1 n#29 prior n#23 next n#33 parent #27  
| | | | L---- H1 n#23 prior n#27 next n#29 parent #29  
| | R---- H2 n#37 prior n#34 next n#38 parent #33  
| | | L---- H1 n#34 prior n#33 next n#37 parent #37  
| | | R---- H1 n#38 prior n#37 next n#35 parent #37  
R---- H2 n#22 prior n#26 next n#8 parent #35  
| L---- H2 n#26 prior n#35 next n#22 parent #22  
| R---- H2 n#8 prior n#22 next n#4 parent #22  
| | R---- H1 n#4 prior n#8 next n#nil parent #8

Beach front (nodeID, PointID, intersections):

#0(p0:nil,-537) #1(p1;-537,-170) #9(p5;-170,-61) #27(p14;-61,136) #23(p12;136,267) #29(p15;267,368)  
#33(p17;368,414) #34(p16;414,435) #37(p19;435,435) #38(p16;435,445) #35(p18;445,542) #26(p11;542,602)  
#22(p8;602,771) #8(p2;771,3661) #4(p0;3661,nil)

Priority queue:

R----H3 e#25 X=638; n#9  
| L----H2 e#40 X=443; n#34  
| | L----H1 e#41 X=436; n#38  
| | R----H1 e#37 X=556; n#26  
R----H1 e#38 X=660; n#23

-> Adding p#20 (446, 28)

At x=436 Removing: e#41 n#38 p#(19,16,18) center: (397,445)

Case E

At x=443 Removing: e#40 n#34 p#(17,16,19) center: (418,417)

Case E

At x=443 Adding: e#42, X=570 (479,356) for n#33; prior n#29 next n#37

At x=446 Adding: e#43, X=681 (34,-471) for n#27; prior n#9 next n#39

At x=446 Adding: e#44, X=799 (559,241) for n#40; prior n#39 next n#23

BF tree at end of point added:

R---- H4 n#35 prior n#37 next n#26  
| L---- H3 n#33 prior n#29 next n#37 parent #35  
| | L---- H2 n#27 prior n#9 next n#39 parent #33  
| | | L---- H1 n#1 prior n#0 next n#9 parent #27  
| | | | L---- H1 n#0 prior n# nil next n#1 parent #1  
| | | | R---- H1 n#9 prior n#1 next n#27 parent #1  
| | | R---- H1 n#29 prior n#23 next n#33 parent #27  
| | | | L---- H2 n#23 prior n#40 next n#29 parent #29  
| | | | | L---- H1 n#39 prior n#27 next n#40 parent #23  
| | | | | R---- H0 n#40 prior n#39 next n#23 parent #39  
| | R---- H1 n#37 prior n#33 next n#35 parent #33  
R---- H2 n#22 prior n#26 next n#8 parent #35



```

L---- H2 n#26 prior n#35 next n#22 parent #22
R---- H2 n#8 prior n#22 next n#4 parent #22
      R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-556) #1(p1;-556,-183) #9(p5;-183,-82) #27(p14;-82,28) #39(p20;28,28) #40(p14;28,141)
#23(p12;141,262) #29(p15;262,367) #33(p17;367,414) #37(p19;414,455) #35(p18;455,564) #26(p11;564,615)
#22(p8;615,789) #8(p2;789,3753) #4(p0;3753,nil)

```

Priority queue:

```

R----H3 e#25 X=638; n#9
      L----H2 e#37 X=556; n#26
      |    R----H1 e#42 X=570; n#33
      R----H2 e#43 X=681; n#27
      L----H1 e#38 X=660; n#23
      R----H1 e#44 X=799; n#40

```

-> Adding p#21 (463, 418)

```

At x=463 Adding: e#45, X=467 (434,401) for n#37; prior n#33 next n#41
At x=463 Adding: e#46, X=549 (482,482) for n#42; prior n#41 next n#35

```

BF tree at end of point added:

```

R---- H4 n#35 prior n#42 next n#26
      L---- H3 n#33 prior n#29 next n#37 parent #35
      |    L---- H2 n#27 prior n#9 next n#39 parent #33
      |    |    L---- H1 n#1 prior n#0 next n#9 parent #27
      |    |    |    L---- H1 n#0 prior n# nil next n#1 parent #1
      |    |    |    R---- H1 n#9 prior n#1 next n#27 parent #1
      |    |    |    R---- H1 n#29 prior n#23 next n#33 parent #27
      |    |    |    L---- H2 n#23 prior n#40 next n#29 parent #29
      |    |    |    |    L---- H1 n#39 prior n#27 next n#40 parent #23
      |    |    |    |    R---- H0 n#40 prior n#39 next n#23 parent #39
      |    |    |    R---- H2 n#41 prior n#37 next n#42 parent #33
      |    |    |    L---- H1 n#37 prior n#33 next n#41 parent #41
      |    |    |    R---- H1 n#42 prior n#41 next n#35 parent #41
      |    |    R---- H2 n#22 prior n#26 next n#8 parent #35
      |    L---- H2 n#26 prior n#35 next n#22 parent #22
      |    R---- H2 n#8 prior n#22 next n#4 parent #22
      |    R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-585) #1(p1;-585,-202) #9(p5;-202,-113) #27(p14;-113,-29) #39(p20;-29,60) #40(p14;60,147)
#23(p12;147,255) #29(p15;255,365) #33(p17;365,404) #37(p19;404,418) #41(p21;418,418) #42(p19;418,462)
#35(p18;462,595) #26(p11;595,635) #22(p8;635,817) #8(p2;817,3895) #4(p0;3895,nil)

```

Priority queue:

```

R----H4 e#25 X=638; n#9
      L----H3 e#37 X=556; n#26
      |    L----H2 e#45 X=467; n#37
      |    |    R----H1 e#46 X=549; n#42
      |    |    R----H1 e#42 X=570; n#33
      R----H2 e#43 X=681; n#27
      L----H1 e#38 X=660; n#23
      R----H1 e#44 X=799; n#40

```

-> Adding p#22 (482, 136)

```

At x=467 Removing: e#45 n#37 p#(17,19,21) center: (434,401)

```

Case E

```

At x=467 Invalid: e#42 n#33
At x=467 Adding: e#47, X=505 (445,361) for n#33; prior n#29 next n#41
At x=482 Invalid: e#44 n#40
At x=482 Adding: e#48, X=506 (446,88) for n#40; prior n#39 next n#43
At x=482 Adding: e#49, X=484 (399,154) for n#44; prior n#43 next n#23

```

BF tree at end of point added:

```

R---- H4 n#33 prior n#29 next n#41
      L---- H3 n#27 prior n#9 next n#39 parent #33
      |    L---- H1 n#1 prior n#0 next n#9 parent #27
      |    |    L---- H1 n#0 prior n# nil next n#1 parent #1
      |    |    R---- H1 n#9 prior n#1 next n#27 parent #1
      |    |    R---- H2 n#43 prior n#40 next n#44 parent #27
      |    |    |    L---- H1 n#39 prior n#27 next n#40 parent #43
      |    |    |    R---- H1 n#40 prior n#39 next n#43 parent #39
      |    |    |    R---- H1 n#29 prior n#23 next n#33 parent #43
      |    |    |    L---- H2 n#23 prior n#44 next n#29 parent #29
      |    |    |    |    L---- H1 n#44 prior n#43 next n#23 parent #23
      |    |    R---- H3 n#35 prior n#42 next n#26 parent #33
      |    |    L---- H2 n#41 prior n#33 next n#42 parent #35
      |    |    R---- H1 n#42 prior n#41 next n#35 parent #41

```

```

R---- H2 n#22 prior n#26 next n#8 parent #35
      L---- H2 n#26 prior n#35 next n#22 parent #22
      R---- H2 n#8 prior n#22 next n#4 parent #22
      R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-618) #1(p1;-618,-224) #9(p5;-224,-146) #27(p14;-146,-70) #39(p20;-70,73) #40(p14;73,136)
#43(p22;136,136) #44(p14;136,154) #23(p12;154,249) #29(p15;249,363) #33(p17;363,382) #41(p21;382,441)
#42(p19;441,467) #35(p18;467,627) #26(p11;627,658) #22(p8;658,847) #8(p2;847,4054) #4(p0;4054,nil)

```

Priority queue:

```

R----H4 e#25 X=638; n#9
      L----H3 e#46 X=549; n#42
      |    L----H2 e#47 X=505; n#33
      |    |    L----H1 e#49 X=484; n#44
      |    |    R----H1 e#48 X=506; n#40
      |    R----H1 e#37 X=556; n#26
      R----H2 e#43 X=681; n#27
      L----H1 e#38 X=660; n#23

```

-> Adding p#23 (489, 237)

At x=484 Removing: e#49 n#44 p#(22,14,12) center: (399,154)

Case E

```

At x=484 Invalid: e#38 n#23
At x=484 Adding: e#50, X=539 (427,233) for n#23; prior n#43 next n#29
At x=489 Invalid: e#50 n#23
At x=489 Adding: e#51, X=501 (412,192) for n#23; prior n#43 next n#45
At x=489 Adding: e#52, X=490 (397,247) for n#46; prior n#45 next n#29

```

BF tree at end of point added:

```

R---- H5 n#33 prior n#29 next n#41
      L---- H4 n#43 prior n#40 next n#23 parent #33
      |    L---- H3 n#27 prior n#9 next n#39 parent #43
      |    |    L---- H1 n#1 prior n#0 next n#9 parent #27
      |    |    |    L---- H1 n#0 prior n# nil next n#1 parent #1
      |    |    |    R---- H1 n#9 prior n#1 next n#27 parent #1
      |    |    R---- H2 n#39 prior n#27 next n#40 parent #27
      |    |    R---- H1 n#40 prior n#39 next n#43 parent #39
      |    R---- H2 n#45 prior n#23 next n#46 parent #43
      |    |    L---- H1 n#23 prior n#43 next n#45 parent #45
      |    |    R---- H1 n#29 prior n#46 next n#33 parent #45
      |    |    L---- H1 n#46 prior n#45 next n#29 parent #29
      R---- H3 n#35 prior n#42 next n#26 parent #33
      |    L---- H2 n#41 prior n#33 next n#42 parent #35
      |    R---- H1 n#42 prior n#41 next n#35 parent #41
      R---- H2 n#22 prior n#26 next n#8 parent #35
      |    L---- H2 n#26 prior n#35 next n#22 parent #22
      |    R---- H2 n#8 prior n#22 next n#4 parent #22
      |    R---- H1 n#4 prior n#8 next n#nil parent #8

```

Beach front (nodeID, PointID, intersections):

```

#0(p0;nil,-630) #1(p1;-630,-232) #9(p5;-232,-158) #27(p14;-158,-85) #39(p20;-85,78) #40(p14;78,109)
#43(p22;109,170) #23(p12;170,237) #45(p23;237,237) #46(p12;237,247) #29(p15;247,363) #33(p17;363,375)
#41(p21;375,446) #42(p19;446,468) #35(p18;468,638) #26(p11;638,666) #22(p8;666,858) #8(p2;858,4113)
#4(p0;4113,nil)

```

Priority queue:

```

R----H4 e#46 X=549; n#42
      L----H3 e#47 X=505; n#33
      |    L----H2 e#51 X=501; n#23
      |    |    L----H1 e#52 X=490; n#46
      |    R----H1 e#48 X=506; n#40
      R----H2 e#25 X=638; n#9
      L----H1 e#37 X=556; n#26
      R----H1 e#43 X=681; n#27

```

Processing remaining circle events

At x=490 Removing: e#52 n#46 p#(23,12,15) center: (397,247)

Case E

At x=490 Adding: e#53, X=620 (505,351) for n#29; prior n#45 next n#33

```

R---- H5 n#33 prior n#29 next n#41
      L---- H4 n#43 prior n#40 next n#23 parent #33
      |    L---- H3 n#27 prior n#9 next n#39 parent #43
      |    |    L---- H1 n#1 prior n#0 next n#9 parent #27
      |    |    |    L---- H1 n#0 prior n# nil next n#1 parent #1
      |    |    |    R---- H1 n#9 prior n#1 next n#27 parent #1
      |    R---- H2 n#39 prior n#27 next n#40 parent #27

```

```

| | R---- H1 n#40 prior n#39 next n#43 parent #39
| R---- H2 n#45 prior n#23 next n#29 parent #43
| | L---- H1 n#23 prior n#43 next n#45 parent #45
| | R---- H1 n#29 prior n#45 next n#33 parent #45
R---- H3 n#35 prior n#42 next n#26 parent #33
| L---- H2 n#41 prior n#33 next n#42 parent #35
| R---- H1 n#42 prior n#41 next n#35 parent #41
R---- H2 n#22 prior n#26 next n#8 parent #35
| L---- H2 n#26 prior n#35 next n#22 parent #22
R---- H2 n#8 prior n#22 next n#4 parent #22
| R---- H1 n#4 prior n#8 next n#nil parent #8

```

Priority queue

```

R----H4 e#46 X=549; n#42
| L----H2 e#47 X=505; n#33
| | L----H1 e#51 X=501; n#23
| | R----H1 e#48 X=506; n#40
R----H3 e#25 X=638; n#9
| L----H2 e#37 X=556; n#26
| | R----H1 e#53 X=620; n#29
R----H1 e#43 X=681; n#27

```

At x=501 Removing: e#51 n#23 p#(22,12,23) center: (412,192)

Case E

```

R---- H5 n#33 prior n#29 next n#41
| L---- H4 n#43 prior n#40 next n#45 parent #33
| | L---- H3 n#27 prior n#9 next n#39 parent #43
| | | L---- H1 n#1 prior n#0 next n#9 parent #27
| | | L---- H1 n#0 prior n# nil next n#1 parent #1
| | | R---- H1 n#9 prior n#1 next n#27 parent #1
| | | R---- H2 n#39 prior n#27 next n#40 parent #27
| | | R---- H1 n#40 prior n#39 next n#43 parent #39
| | R---- H2 n#45 prior n#43 next n#29 parent #43
| | R---- H1 n#29 prior n#45 next n#33 parent #45
R---- H3 n#35 prior n#42 next n#26 parent #33
| L---- H2 n#41 prior n#33 next n#42 parent #35
| R---- H1 n#42 prior n#41 next n#35 parent #41
R---- H2 n#22 prior n#26 next n#8 parent #35
| L---- H2 n#26 prior n#35 next n#22 parent #22
R---- H2 n#8 prior n#22 next n#4 parent #22
| R---- H1 n#4 prior n#8 next n#nil parent #8

```

Priority queue

```

R----H4 e#46 X=549; n#42
| L----H2 e#47 X=505; n#33
| | R----H1 e#48 X=506; n#40
R----H3 e#25 X=638; n#9
| L----H2 e#37 X=556; n#26
| | R----H1 e#53 X=620; n#29
R----H1 e#43 X=681; n#27

```

At x=505 Removing: e#47 n#33 p#(15,17,21) center: (445,361)

Case G

At x=505 Invalid: e#53 n#29

At x=505 Adding: e#54, X=572 (481,328) for n#29; prior n#45 next n#41

```

R---- H5 n#41 prior n#29 next n#42
| L---- H4 n#43 prior n#40 next n#45 parent #41
| | L---- H3 n#27 prior n#9 next n#39 parent #43
| | | L---- H1 n#1 prior n#0 next n#9 parent #27
| | | L---- H1 n#0 prior n# nil next n#1 parent #1
| | | R---- H1 n#9 prior n#1 next n#27 parent #1
| | | R---- H2 n#39 prior n#27 next n#40 parent #27
| | | R---- H1 n#40 prior n#39 next n#43 parent #39
| | R---- H2 n#45 prior n#43 next n#29 parent #43
| | R---- H1 n#29 prior n#45 next n#41 parent #45
R---- H3 n#35 prior n#42 next n#26 parent #41
| L---- H1 n#42 prior n#41 next n#35 parent #35
R---- H2 n#22 prior n#26 next n#8 parent #35
| L---- H2 n#26 prior n#35 next n#22 parent #22
R---- H2 n#8 prior n#22 next n#4 parent #22
| R---- H1 n#4 prior n#8 next n#nil parent #8

```

Priority queue

```

R----H3 e#37 X=556; n#26
| L----H2 e#46 X=549; n#42
| | L----H1 e#48 X=506; n#40
R----H2 e#25 X=638; n#9
| L----H1 e#54 X=572; n#29
R----H1 e#43 X=681; n#27

```

At x=506 Removing: e#48 n#40 p#(20,14,22) center: (446,88)

Case E

```

R---- H4 n#41 prior n#29 next n#42
  L---- H3 n#43 prior n#39 next n#45 parent #41
    L---- H2 n#27 prior n#9 next n#39 parent #43
      L---- H1 n#1 prior n#0 next n#9 parent #27
        L---- H1 n#0 prior n# nil next n#1 parent #1
          R---- H1 n#9 prior n#1 next n#27 parent #1
            R---- H1 n#39 prior n#27 next n#43 parent #27
              R---- H2 n#45 prior n#43 next n#29 parent #43
                R---- H1 n#29 prior n#45 next n#41 parent #45
R---- H3 n#35 prior n#42 next n#26 parent #41
  L---- H1 n#42 prior n#41 next n#35 parent #35
    R---- H2 n#22 prior n#26 next n#8 parent #35
      L---- H2 n#26 prior n#35 next n#22 parent #22
        R---- H2 n#8 prior n#22 next n#4 parent #22
          R---- H1 n#4 prior n#8 next n#nil parent #8

```

Priority queue

```

R----H3 e#37 X=556; n#26
  L----H1 e#46 X=549; n#42
    R----H2 e#25 X=638; n#9
      L----H1 e#54 X=572; n#29
        R----H1 e#43 X=681; n#27

```

At x=549 Removing: e#46 n#42 p#(21,19,18) center: (482,482)

Case E

```

R---- H4 n#41 prior n#29 next n#35
  L---- H3 n#43 prior n#39 next n#45 parent #41
    L---- H2 n#27 prior n#9 next n#39 parent #43
      L---- H1 n#1 prior n#0 next n#9 parent #27
        L---- H1 n#0 prior n# nil next n#1 parent #1
          R---- H1 n#9 prior n#1 next n#27 parent #1
            R---- H1 n#39 prior n#27 next n#43 parent #27
              R---- H2 n#45 prior n#43 next n#29 parent #43
                R---- H1 n#29 prior n#45 next n#41 parent #45
R---- H3 n#22 prior n#26 next n#8 parent #41
  L---- H2 n#35 prior n#41 next n#26 parent #22
    R---- H1 n#26 prior n#35 next n#22 parent #35
      R---- H2 n#8 prior n#22 next n#4 parent #22
        R---- H1 n#4 prior n#8 next n#nil parent #8

```

Priority queue

```

R----H3 e#25 X=638; n#9
  L----H2 e#37 X=556; n#26
    | R----H1 e#54 X=572; n#29
      R----H1 e#43 X=681; n#27

```

At x=556 Removing: e#37 n#26 p#(18,11,8) center: (231,746)

Case E

```

R---- H4 n#41 prior n#29 next n#35
  L---- H3 n#43 prior n#39 next n#45 parent #41
    L---- H2 n#27 prior n#9 next n#39 parent #43
      L---- H1 n#1 prior n#0 next n#9 parent #27
        L---- H1 n#0 prior n# nil next n#1 parent #1
          R---- H1 n#9 prior n#1 next n#27 parent #1
            R---- H1 n#39 prior n#27 next n#43 parent #27
              R---- H2 n#45 prior n#43 next n#29 parent #43
                R---- H1 n#29 prior n#45 next n#41 parent #45
R---- H3 n#22 prior n#35 next n#8 parent #41
  L---- H1 n#35 prior n#41 next n#22 parent #22
    R---- H2 n#8 prior n#22 next n#4 parent #22
      R---- H1 n#4 prior n#8 next n#nil parent #8

```

Priority queue

```

R----H2 e#25 X=638; n#9
  L----H1 e#54 X=572; n#29
    R----H1 e#43 X=681; n#27

```

At x=572 Removing: e#54 n#29 p#(23,15,21) center: (481,328)

Case E

```

R---- H4 n#41 prior n#45 next n#35
  L---- H3 n#43 prior n#39 next n#45 parent #41
    L---- H2 n#27 prior n#9 next n#39 parent #43
      L---- H1 n#1 prior n#0 next n#9 parent #27
        L---- H1 n#0 prior n# nil next n#1 parent #1
          R---- H1 n#9 prior n#1 next n#27 parent #1
            R---- H1 n#39 prior n#27 next n#43 parent #27
              R---- H1 n#45 prior n#43 next n#41 parent #43
R---- H3 n#22 prior n#35 next n#8 parent #41
  L---- H1 n#35 prior n#41 next n#22 parent #22
    R---- H2 n#8 prior n#22 next n#4 parent #22
      R---- H1 n#4 prior n#8 next n#nil parent #8

```

Priority queue

R----H2 e#25 X=638; n#9  
R----H1 e#43 X=681; n#27

At x=638 Removing: e#25 n#9 p#(1,5,14) center: (66,-402)

Case E

At x=638 Invalid: e#43 n#27

At x=638 Adding: e#55, X=667 (55,-444) for n#27; prior n#1 next n#39

R---- H4 n#41 prior n#45 next n#35  
L---- H3 n#27 prior n#1 next n#39 parent #41  
| L---- H2 n#1 prior n#0 next n#27 parent #27  
| L---- H1 n#0 prior n# nil next n#1 parent #1  
| R---- H2 n#43 prior n#39 next n#45 parent #27  
| L---- H1 n#39 prior n#27 next n#43 parent #43  
| R---- H1 n#45 prior n#43 next n#41 parent #43  
R---- H3 n#22 prior n#35 next n#8 parent #41  
L---- H1 n#35 prior n#41 next n#22 parent #22  
R---- H2 n#8 prior n#22 next n#4 parent #22  
R---- H1 n#4 prior n#8 next n#nil parent #8

Priority queue

R----H1 e#55 X=667; n#27

At x=667 Removing: e#55 n#27 p#(1,14,20) center: (55,-444)

Case G

R---- H4 n#41 prior n#45 next n#35  
L---- H3 n#39 prior n#1 next n#43 parent #41  
| L---- H2 n#1 prior n#0 next n#39 parent #39  
| L---- H1 n#0 prior n# nil next n#1 parent #1  
| R---- H2 n#43 prior n#39 next n#45 parent #39  
| R---- H1 n#45 prior n#43 next n#41 parent #43  
R---- H3 n#22 prior n#35 next n#8 parent #41  
L---- H1 n#35 prior n#41 next n#22 parent #22  
R---- H2 n#8 prior n#22 next n#4 parent #22  
R---- H1 n#4 prior n#8 next n#nil parent #8

Empty queue

BF at end

R---- H4 n#41 prior n#45 next n#35  
L---- H3 n#39 prior n#1 next n#43 parent #41  
| L---- H2 n#1 prior n#0 next n#39 parent #39  
| L---- H1 n#0 prior n# nil next n#1 parent #1  
| R---- H2 n#43 prior n#39 next n#45 parent #39  
| R---- H1 n#45 prior n#43 next n#41 parent #43  
R---- H3 n#22 prior n#35 next n#8 parent #41  
L---- H1 n#35 prior n#41 next n#22 parent #22  
R---- H2 n#8 prior n#22 next n#4 parent #22  
R---- H1 n#4 prior n#8 next n#nil parent #8

Beach front (nodeID, PointID, intersections):

#0(p0;nil,-939) #1(p1;-939,-444) #39(p20;-444,52) #43(p22;52,181) #45(p23;181,338) #41(p21;338,524)  
#35(p18;524,913) #22(p8;913,1140) #8(p2;1140,5603) #4(p0;5603,nil)

Segments:

0 (19,169), (0,137) 1 (19,169), (63,245)  
2 (63,245), (0,261) 3 (0,0), (0,0)  
4 (63,245), (96,244) 5 (98,239), (129,171)  
6 (98,239), (96,244) 7 (96,244), (126,296)  
8 (128,312), (126,296) 9 (128,312), (136,425)  
10 (126,296), (197,277) 11 (126,149), (110,0)  
12 (126,149), (129,171) 13 (129,171), (229,201)  
14 (206,260), (228,218) 15 (206,260), (197,277)  
16 (197,277), (240,293) 17 (241,240), (228,218)  
18 (241,240), (259,270) 19 (228,218), (229,201)  
20 (137,424), (257,360) 21 (137,424), (136,425)  
22 (136,425), (103,500) 23 (241,296), (240,293)  
24 (241,296), (257,360) 25 (240,293), (259,270)  
26 (229,201), (232,199) 27 (235,196), (295,112)  
28 (235,196), (232,199) 29 (232,199), (308,233)  
30 (259,270), (327,258) 31 (286,429), (298,360)  
32 (286,429), (274,500) 33 (303,192), (295,112)  
34 (303,192), (308,233) 35 (257,360), (298,360)  
36 (308,233), (327,258) 37 (329,422), (321,360)  
38 (329,422), (339,500) 39 (298,360), (318,356)  
40 (295,112), (300,101) 41 (286,70), (253,0)  
42 (286,70), (300,101) 43 (324,339), (350,268)  
44 (324,339), (318,356) 45 (318,356), (321,360)  
46 (327,258), (350,268) 47 (321,360), (360,375)  
48 (300,101), (399,154) 49 (374,406), (362,379)  
50 (374,406), (391,447) 51 (394,400), (362,379)

52 (394,400), (418,417)	53 (362,379), (360,375)
54 (360,375), (445,361)	55 (359,479), (391,447)
56 (359,479), (339,500)	57 (339,500), (338,500)
58 (350,268), (397,247)	59 (391,447), (397,445)
60 (405,435), (418,417)	61 (405,435), (397,445)
62 (397,445), (482,482)	63 (418,417), (434,401)
64 (402,28), (381,0)	65 (402,28), (446,88)
66 (444,418), (434,401)	67 (444,418), (482,482)
68 (434,401), (445,361)	69 (412,136), (446,88)
70 (412,136), (399,154)	71 (399,154), (412,192)
72 (400,237), (412,192)	73 (400,237), (397,247)
74 (397,247), (481,328)	75 (412,192), (500,185)
76 (445,361), (481,328)	77 (446,88), (500,70)
78 (482,482), (500,495)	79 (0,0), (0,0)
80 (481,328), (500,331)	81 (0,0), (0,0)
82 (0,0), (0,0)	

Approx elapsed time: 1 ms

Segments: 83

Triangles: 37

Convex hull: 9 points

Parabola intersections: 704

Circle tests: 117

BF insert comparisons: 63

Priority queue records created: 56

Max BF width: 19

Max BF depth: 5

Max PQ count: 8

Max PQ depth: 4

Andrew's monotone chain convex hull: (Point IDs)

0 1 20 22 23 21 18 8 2

Voronoi hull: (Point IDs)

0 1 20 22 23 21 18 8 2

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