# APPENDIX B

## Slope Stability Analysis Under Static Conditions - Computer Output

```
PROFIL
GENWAL - Proposed storage pad expansion with debris slope at base of slope
scoured
6
6
0.0 100.0 25.0 100.0 1
25.0 100.0 50.0 102.0 1
50.0 102.0 53.3 131.7 1
53.3 131.7 55.0 131.8 1
55.0 131.8 67.0 140.4 1
67.0 140.4 150.0 140.4 1
SOIL
1
120.0 130.0 700.0 46.0 0.0 0.0 1
CIRCL2
11
10
50.0 52.0
55.0 90.0
0.0
3.0
80.0
5.0
```

GEOSLOPE
Version 3.11

Supplied by GEOCOMP Corp.
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--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

PROBLEM DESCRIPTION GENWAL - Proposed storage pad expansion
with debris slope at base of slope scour

BOUNDARY COORDINATES

6 TOP BOUNDARIES
6 TOTAL BOUNDARIES

| BOUNDARY NO. | X-LEFT | Y-LEFT | X-RIGHT | Y-RIGHT | SOIL TYPE BELOW BND |
|---|---|---|---|---|---|
| 1 | .00 | 100.00 | 25.00 | 100.00 | 1 |
| 2 | 25.00 | 100.00 | 50.00 | 102.00 | 1 |
| 3 | 50.00 | 102.00 | 53.30 | 131.70 | 1 |
| 4 | 53.30 | 131.70 | 55.00 | 131.80 | 1 |
| 5 | 55.00 | 131.80 | 67.00 | 140.40 | 1 |
| 6 | 67.00 | 140.40 | 150.00 | 140.40 | 1 |

ISOTROPIC SOIL PARAMETERS

1 TYPE(S) OF SOIL

| SOIL TYPE NO. | TOTAL UNIT WT. | SATURATED UNIT WT. | COHESION INTERCEPT | FRICTION ANGLE (DEG) | PORE PRESSURE PARAMETER | PRESSURE CONSTANT | PIEZOMETRIC SURFACE NO. |
|---|---|---|---|---|---|---|---|
| 1 | 120.0 | 130.0 | 700.0 | 46.0 | .00 | .0 | 1 |

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

110 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 11 POINTS EQUALLY SPACED ALONG THE GROUND SURFACE BETWEEN X = 50.00
AND X = 52.00

EACH SURFACE TERMINATES BETWEEN X = 55.00
AND X = 90.00

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = .00

3.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

RESTRICTIONS HAVE BEEN IMPOSED UPON THE ANGLE OF INITIATION.
THE ANGLE HAS BEEN RESTRICTED BETWEEN THE ANGLES OF 5.0 AND 80.0 DEG.

FACTOR OF SAFETY CALCULATION HAS GONE THROUGH TEN ITERATIONS

FACTOR OF SAFETY FOR THE PRECEDING SPECIFIED SURFACE = 2.320

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

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FAILURE SURFACE # 1 SPECIFIED BY 17 COORDINATE POINTS

SAFETY FACTOR = 1.583

X-CENTER = -226.27
Y-CENTER = 318.27
RADIUS = 350.85

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.00 | 102.00 | 52.19 |
| 2 | 51.84 | 104.37 | 52.68 |
| 3 | 53.66 | 106.76 | 53.17 |
| 4 | 55.46 | 109.16 | 53.66 |
| 5 | 57.23 | 111.58 | 54.15 |
| 6 | 58.99 | 114.01 | 54.64 |
| 7 | 60.73 | 116.46 | 55.13 |
| 8 | 62.44 | 118.92 | 55.62 |
| 9 | 64.14 | 121.39 | 56.11 |
| 10 | 65.81 | 123.88 | 56.60 |
| 11 | 67.46 | 126.39 | 57.09 |
| 12 | 69.09 | 128.91 | 57.58 |
| 13 | 70.70 | 131.44 | 58.07 |
| 14 | 72.29 | 133.99 | 58.56 |
| 15 | 73.85 | 136.55 | 59.05 |
| 16 | 75.39 | 139.12 | 59.54 |
| 17 | 76.15 | 140.40 | |

| SLICE NO. | X | DX | DW | DQ | DU | DN | DSr |
|---|---|---|---|---|---|---|---|
| 1 | 50.92 | 1.84 | 1564.91 | .00 | .00 | 457.11 | 741.43 |
| 2 | 52.57 | 1.46 | 3469.14 | .00 | .00 | 2327.11 | 1965.03 |
| 3 | 53.48 | .36 | 1083.11 | .00 | .00 | 776.80 | 950.61 |
| 4 | 54.33 | 1.34 | 3880.66 | .00 | .00 | 2749.57 | 2241.46 |
| 5 | 55.23 | .46 | 1266.32 | .00 | .00 | 887.29 | 1022.91 |
| 6 | 56.35 | 1.78 | 4777.27 | .00 | .00 | 3312.08 | 2609.54 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 58.11 | 1.76 | 4477.53 | .00 | .00 | 3048.24 | 2436.90 |
| 8 | 59.86 | 1.74 | 4176.98 | .00 | .00 | 2782.24 | 2262.84 |
| 9 | 61.59 | 1.72 | 3875.97 | .00 | .00 | 2514.29 | 2087.51 |
| 10 | 63.29 | 1.69 | 3574.77 | .00 | .00 | 2244.58 | 1911.04 |
| 11 | 64.97 | 1.67 | 3273.69 | .00 | .00 | 1973.31 | 1733.53 |
| 12 | 66.40 | 1.19 | 2169.54 | .00 | .00 | 1250.00 | 1260.24 |
| 13 | 67.23 | .46 | 794.36 | .00 | .00 | 442.35 | 731.77 |
| 14 | 68.28 | 1.63 | 2494.25 | .00 | .00 | 1263.20 | 1268.88 |
| 15 | 69.90 | 1.61 | 1973.77 | .00 | .00 | 784.25 | 955.48 |
| 16 | 71.49 | 1.59 | 1463.65 | .00 | .00 | 311.26 | 645.99 |
| 17 | 73.07 | 1.56 | 964.15 | .00 | .00 | -155.57 | 340.53 |
| 18 | 74.62 | 1.54 | 475.51 | .00 | .00 | -616.02 | 39.24 |
| 19 | 75.77 | .75 | 57.98 | .00 | .00 | -475.27 | 131.33 |

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FAILURE SURFACE # 2 SPECIFIED BY 16 COORDINATE POINTS

SAFETY FACTOR = 1.584

X-CENTER = -13.14
Y-CENTER = 167.20
RADIUS = 89.61

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.20 | 103.80 | 45.93 |
| 2 | 52.29 | 105.96 | 47.85 |
| 3 | 54.30 | 108.18 | 49.77 |
| 4 | 56.24 | 110.47 | 51.69 |
| 5 | 58.10 | 112.83 | 53.60 |
| 6 | 59.88 | 115.24 | 55.52 |
| 7 | 61.58 | 117.72 | 57.44 |
| 8 | 63.19 | 120.24 | 59.36 |
| 9 | 64.72 | 122.83 | 61.28 |
| 10 | 66.16 | 125.46 | 63.20 |
| 11 | 67.51 | 128.13 | 65.11 |
| 12 | 68.78 | 130.86 | 67.03 |
| 13 | 69.95 | 133.62 | 68.95 |
| 14 | 71.02 | 136.42 | 70.87 |
| 15 | 72.01 | 139.25 | 72.79 |
| 16 | 72.36 | 140.40 | |

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FAILURE SURFACE # 3 SPECIFIED BY 16 COORDINATE POINTS

SAFETY FACTOR = 1.592
X-CENTER = -92.96
Y-CENTER = 199.06
RADIUS = 172.79

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.00 | 102.00 | 56.32 |
| 2 | 51.66 | 104.50 | 57.32 |
| 3 | 53.28 | 107.03 | 58.31 |
| 4 | 54.86 | 109.58 | 59.31 |
| 5 | 56.39 | 112.16 | 60.30 |
| 6 | 57.88 | 114.76 | 61.30 |
| 7 | 59.32 | 117.40 | 62.29 |
| 8 | 60.71 | 120.05 | 63.29 |
| 9 | 62.06 | 122.73 | 64.28 |
| 10 | 63.36 | 125.43 | 65.28 |
| 11 | 64.62 | 128.16 | 66.27 |
| 12 | 65.83 | 130.91 | 67.27 |
| 13 | 66.98 | 133.67 | 68.26 |
| 14 | 68.10 | 136.46 | 69.26 |
| 15 | 69.16 | 139.26 | 70.25 |
| 16 | 69.57 | 140.40 | |

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FAILURE SURFACE # 4 SPECIFIED BY 15 COORDINATE POINTS

SAFETY FACTOR = 1.639

X-CENTER = 2.42
Y-CENTER = 157.34
RADIUS = 70.56

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.40 | 105.60 | 44.06 |
| 2 | 52.56 | 107.69 | 46.50 |
| 3 | 54.62 | 109.87 | 48.93 |
| 4 | 56.59 | 112.13 | 51.37 |
| 5 | 58.46 | 114.47 | 53.81 |
| 6 | 60.24 | 116.89 | 56.24 |
| 7 | 61.90 | 119.39 | 58.68 |
| 8 | 63.46 | 121.95 | 61.12 |
| 9 | 64.91 | 124.58 | 63.55 |
| 10 | 66.25 | 127.26 | 65.99 |
| 11 | 67.47 | 130.00 | 68.42 |
| 12 | 68.57 | 132.79 | 70.86 |
| 13 | 69.56 | 135.63 | 73.30 |
| 14 | 70.42 | 138.50 | 75.73 |
| 15 | 70.90 | 140.40 | |

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FAILURE SURFACE # 5 SPECIFIED BY 16 COORDINATE POINTS

SAFETY FACTOR = 1.694

X-CENTER = -1430.94
Y-CENTER = 1028.77
RADIUS = 1746.23

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.20 | 103.80 | 58.06 |
| 2 | 51.79 | 106.35 | 58.16 |
| 3 | 53.37 | 108.90 | 58.26 |
| 4 | 54.95 | 111.45 | 58.36 |
| 5 | 56.52 | 114.00 | 58.46 |
| 6 | 58.09 | 116.56 | 58.56 |
| 7 | 59.66 | 119.12 | 58.65 |
| 8 | 61.22 | 121.68 | 58.75 |
| 9 | 62.77 | 124.25 | 58.85 |
| 10 | 64.32 | 126.82 | 58.95 |
| 11 | 65.87 | 129.39 | 59.05 |
| 12 | 67.41 | 131.96 | 59.15 |
| 13 | 68.95 | 134.53 | 59.24 |
| 14 | 70.49 | 137.11 | 59.34 |
| 15 | 72.02 | 139.69 | 59.44 |
| 16 | 72.44 | 140.40 | |

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FAILURE SURFACE # 6 SPECIFIED BY 17 COORDINATE POINTS

SAFETY FACTOR = 1.703

X-CENTER = -68.42
Y-CENTER = 234.85
RADIUS = 176.76

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.20 | 103.80 | 42.64 |
| 2 | 52.41 | 105.84 | 43.61 |
| 3 | 54.58 | 107.91 | 44.58 |
| 4 | 56.72 | 110.01 | 45.55 |
| 5 | 58.82 | 112.15 | 46.53 |
| 6 | 60.88 | 114.33 | 47.50 |
| 7 | 62.91 | 116.54 | 48.47 |
| 8 | 64.90 | 118.79 | 49.44 |
| 9 | 66.85 | 121.07 | 50.42 |
| 10 | 68.76 | 123.38 | 51.39 |
| 11 | 70.63 | 125.72 | 52.36 |
| 12 | 72.46 | 128.10 | 53.33 |

| | | | |
|---|---|---|---|
| 13 | 74.25 | 130.51 | 54.31 |
| 14 | 76.00 | 132.94 | 55.28 |
| 15 | 77.71 | 135.41 | 56.25 |
| 16 | 79.38 | 137.90 | 57.22 |
| 17 | 80.99 | 140.40 | |

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FAILURE SURFACE # 7 SPECIFIED BY 19 COORDINATE POINTS

SAFETY FACTOR = 1.704

X-CENTER = -648.15
Y-CENTER = 764.60
RADIUS = 962.53

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.00 | 102.00 | 46.59 |
| 2 | 52.06 | 104.18 | 46.76 |
| 3 | 54.12 | 106.37 | 46.94 |
| 4 | 56.17 | 108.56 | 47.12 |
| 5 | 58.21 | 110.76 | 47.30 |
| 6 | 60.24 | 112.96 | 47.48 |
| 7 | 62.27 | 115.18 | 47.66 |
| 8 | 64.29 | 117.39 | 47.84 |
| 9 | 66.30 | 119.62 | 48.01 |
| 10 | 68.31 | 121.85 | 48.19 |
| 11 | 70.31 | 124.08 | 48.37 |
| 12 | 72.30 | 126.33 | 48.55 |
| 13 | 74.29 | 128.57 | 48.73 |
| 14 | 76.27 | 130.83 | 48.91 |
| 15 | 78.24 | 133.09 | 49.09 |
| 16 | 80.20 | 135.36 | 49.26 |
| 17 | 82.16 | 137.63 | 49.44 |
| 18 | 84.11 | 139.91 | 49.62 |
| 19 | 84.53 | 140.40 | |

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FAILURE SURFACE # 8 SPECIFIED BY 17 COORDINATE POINTS

SAFETY FACTOR = 1.758

X-CENTER = -126.92
Y-CENTER = 285.45
RADIUS = 252.56

FAILURE SURFACE #10 SPECIFIED BY 19 COORDINATE POINTS

SAFETY FACTOR = 1.850

X-CENTER = 20.10
Y-CENTER = 163.40
RADIUS = 68.29

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.00 | 102.00 | 27.22 |
| 2 | 52.67 | 103.38 | 29.74 |
| 3 | 55.27 | 104.86 | 32.26 |
| 4 | 57.81 | 106.47 | 34.77 |
| 5 | 60.27 | 108.18 | 37.29 |
| 6 | 62.66 | 109.99 | 39.81 |
| 7 | 64.97 | 111.92 | 42.33 |
| 8 | 67.18 | 113.94 | 44.84 |
| 9 | 69.31 | 116.05 | 47.36 |
| 10 | 71.34 | 118.26 | 49.88 |
| 11 | 73.28 | 120.55 | 52.39 |
| 12 | 75.11 | 122.93 | 54.91 |
| 13 | 76.83 | 125.38 | 57.43 |
| 14 | 78.45 | 127.91 | 59.95 |
| 15 | 79.95 | 130.51 | 62.46 |
| 16 | 81.34 | 133.17 | 64.98 |
| 17 | 82.60 | 135.89 | 67.50 |
| 18 | 83.75 | 138.66 | 70.02 |
| 19 | 84.39 | 140.40 | |

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| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.40 | 105.60 | 44.94 |
| 2 | 52.52 | 107.72 | 45.62 |
| 3 | 54.62 | 109.87 | 46.30 |
| 4 | 56.70 | 112.04 | 46.98 |
| 5 | 58.74 | 114.23 | 47.66 |
| 6 | 60.76 | 116.45 | 48.34 |
| 7 | 62.76 | 118.69 | 49.02 |
| 8 | 64.72 | 120.95 | 49.70 |
| 9 | 66.66 | 123.24 | 50.38 |
| 10 | 68.58 | 125.55 | 51.06 |
| 11 | 70.46 | 127.89 | 51.74 |
| 12 | 72.32 | 130.24 | 52.42 |
| 13 | 74.15 | 132.62 | 53.10 |
| 14 | 75.95 | 135.02 | 53.78 |
| 15 | 77.72 | 137.44 | 54.46 |
| 16 | 79.47 | 139.88 | 55.14 |
| 17 | 79.83 | 140.40 | |

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FAILURE SURFACE # 9 SPECIFIED BY 13 COORDINATE POINTS

SAFETY FACTOR = 1.812

X-CENTER = -15.12
Y-CENTER = 156.97
RADIUS = 82.31

| POINT NO. | X-SURF | Y-SURF | ALPHA (DEG) |
|---|---|---|---|
| 1 | 50.60 | 107.40 | 54.02 |
| 2 | 52.36 | 109.83 | 56.11 |
| 3 | 54.04 | 112.32 | 58.20 |
| 4 | 55.62 | 114.87 | 60.29 |
| 5 | 57.10 | 117.48 | 62.37 |
| 6 | 58.49 | 120.14 | 64.46 |
| 7 | 59.79 | 122.84 | 66.55 |
| 8 | 60.98 | 125.59 | 68.64 |
| 9 | 62.07 | 128.39 | 70.73 |
| 10 | 63.06 | 131.22 | 72.82 |
| 11 | 63.95 | 134.09 | 74.90 |
| 12 | 64.73 | 136.98 | 76.99 |
| 13 | 65.23 | 139.13 | |

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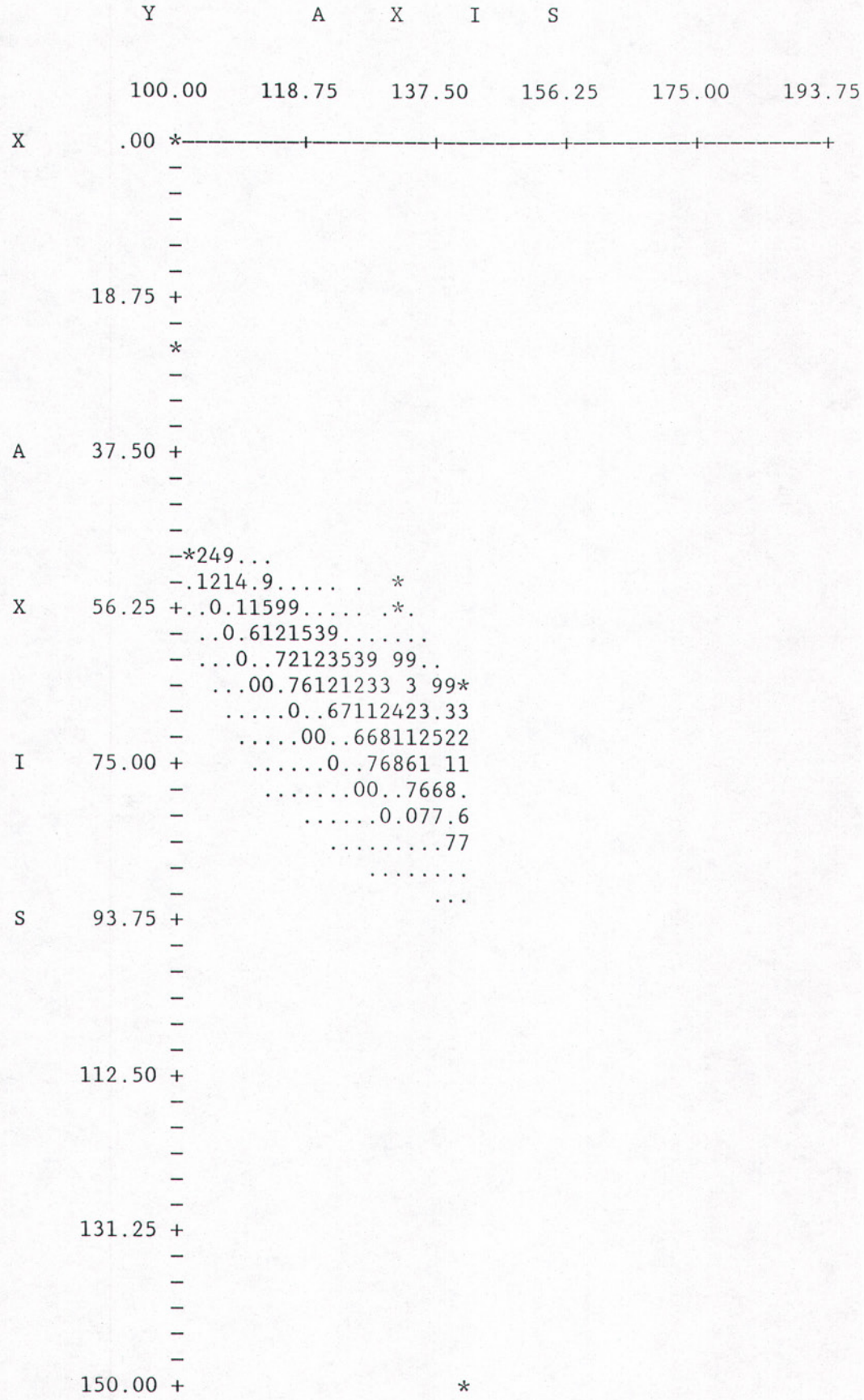
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X .00
18.75
A 37.50
X 56.25
I 75.00
S 93.75
112.50
131.25
150.00