

**APPENDIX III-2A-2**

**HydraFlow Express Input and Output**



**GOLDER ASSOCIATES INC.**  
**Professional Engineering Firm**  
**Registration Number F-2578**

**INTENDED FOR PERMITTING**  
**PURPOSES ONLY**

For Part III, Attachment 2, Appendix III-2A-2:  
Hydraflow Express modeling inputs and outputs  
dated September 3, 2020 & September 4, 2020

**HYDRAFLOW EXPRESS**

**DOWNCHUTE**

HAWTHORN PARK RDF

# Channel Report

## DWNCHUTE 1 (GEOMEMBRANE) - Q25

### Trapezoidal

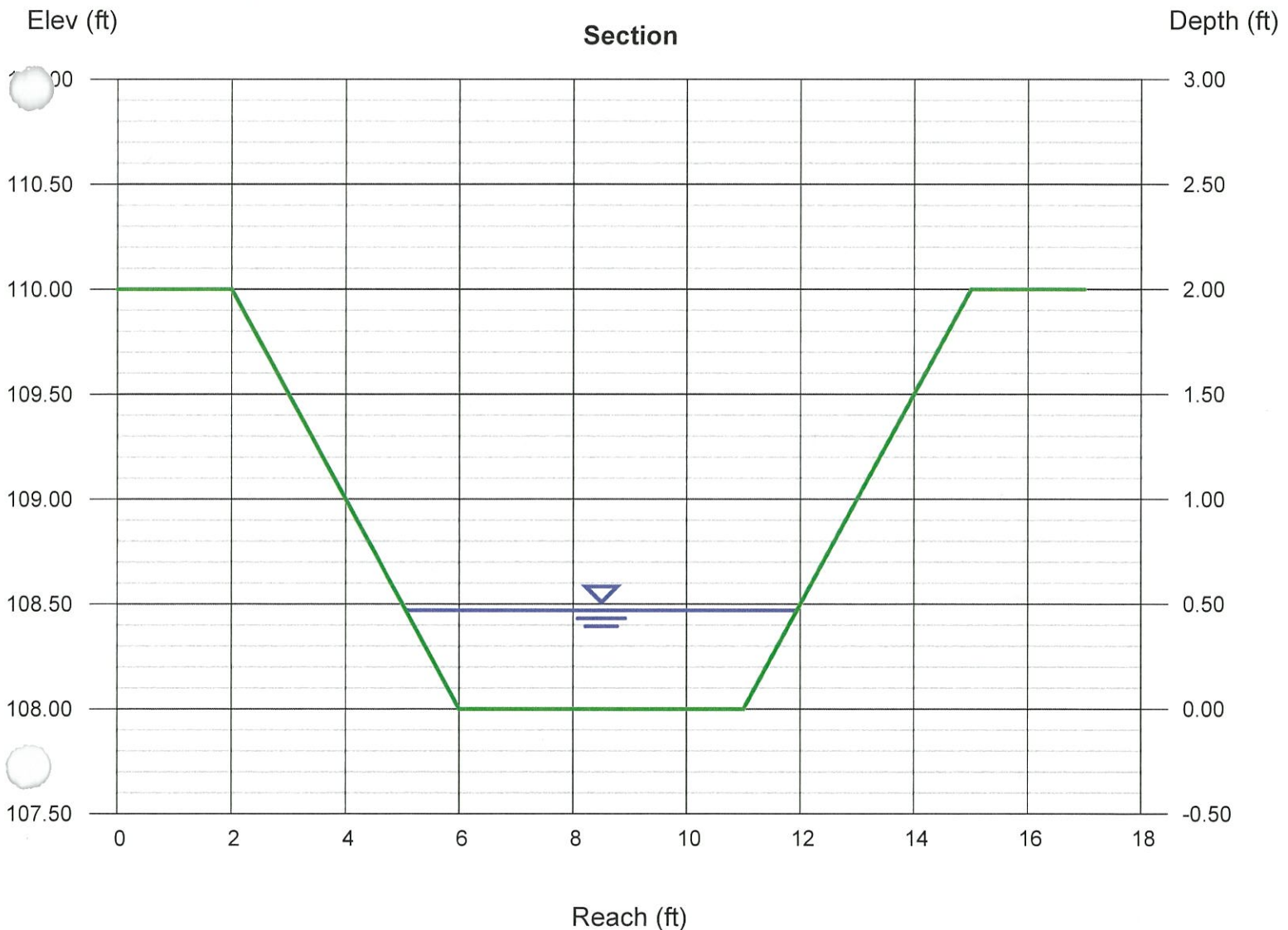
Bottom Width (ft) = 5.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 108.00  
Slope (%) = 25.00  
N-Value = 0.012

### Highlighted

Depth (ft) = 0.47  
Q (cfs) = 92.40  
Area (sqft) = 2.79  
Velocity (ft/s) = 33.10  
Wetted Perim (ft) = 7.10  
Crit Depth, Yc (ft) = 1.74  
Top Width (ft) = 6.88  
EGL (ft) = 17.50

### Calculations

Compute by: Known Q  
Known Q (cfs) = 92.40





# Channel Report

## DWNCHUTE 2 (GEOMEMBRANE) - Q25

### Trapezoidal

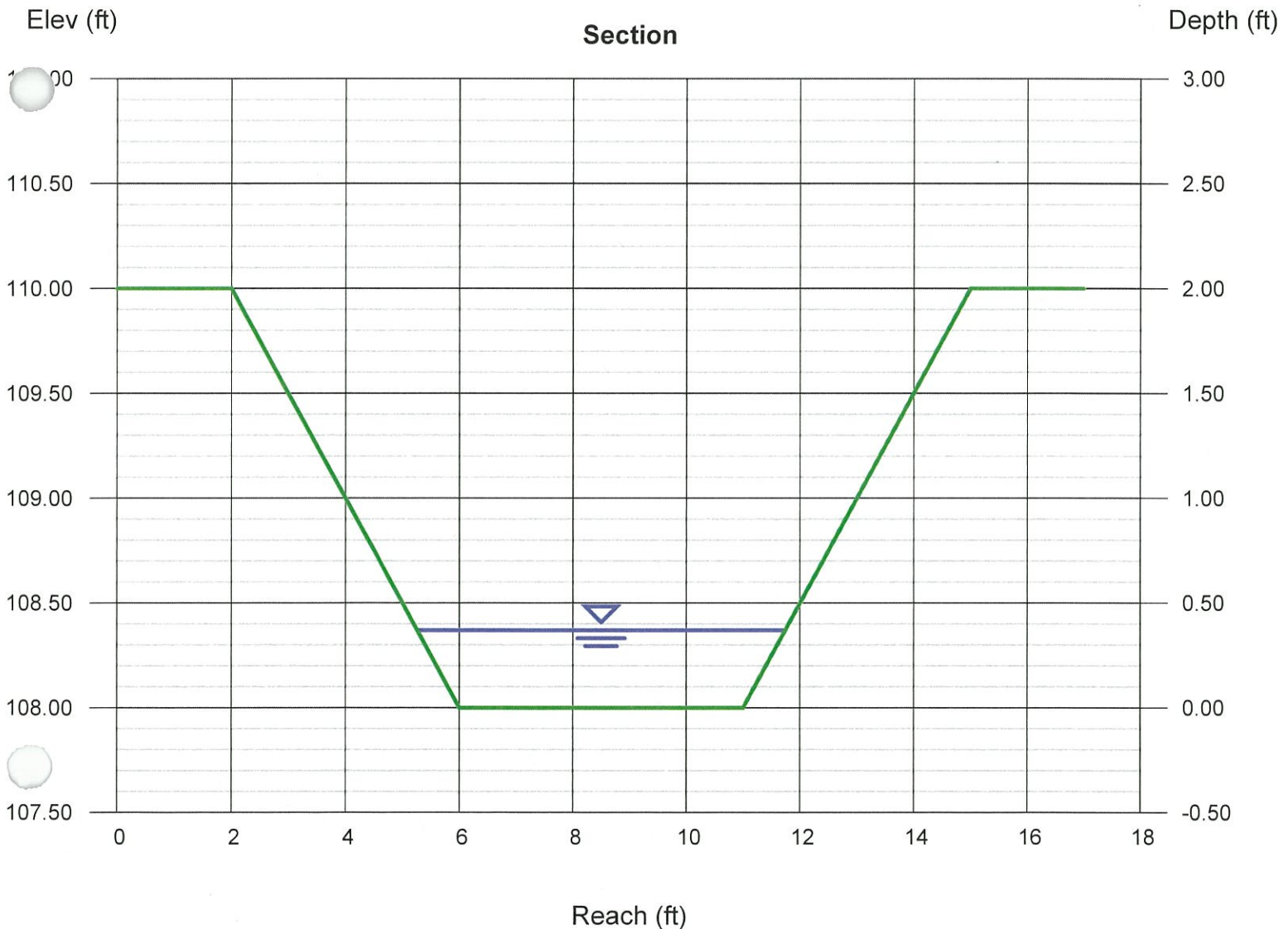
Bottom Width (ft) = 5.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 108.00  
Slope (%) = 25.00  
N-Value = 0.012

### Highlighted

Depth (ft) = 0.37  
Q (cfs) = 60.70  
Area (sqft) = 2.12  
Velocity (ft/s) = 28.58  
Wetted Perim (ft) = 6.65  
Crit Depth, Yc (ft) = 1.38  
Top Width (ft) = 6.48  
EGL (ft) = 13.07

### Calculations

Compute by: Known Q  
Known Q (cfs) = 60.70



# Channel Report

## DWNCHUTE 3 (GEOMEMBRANE) - Q25

### Trapezoidal

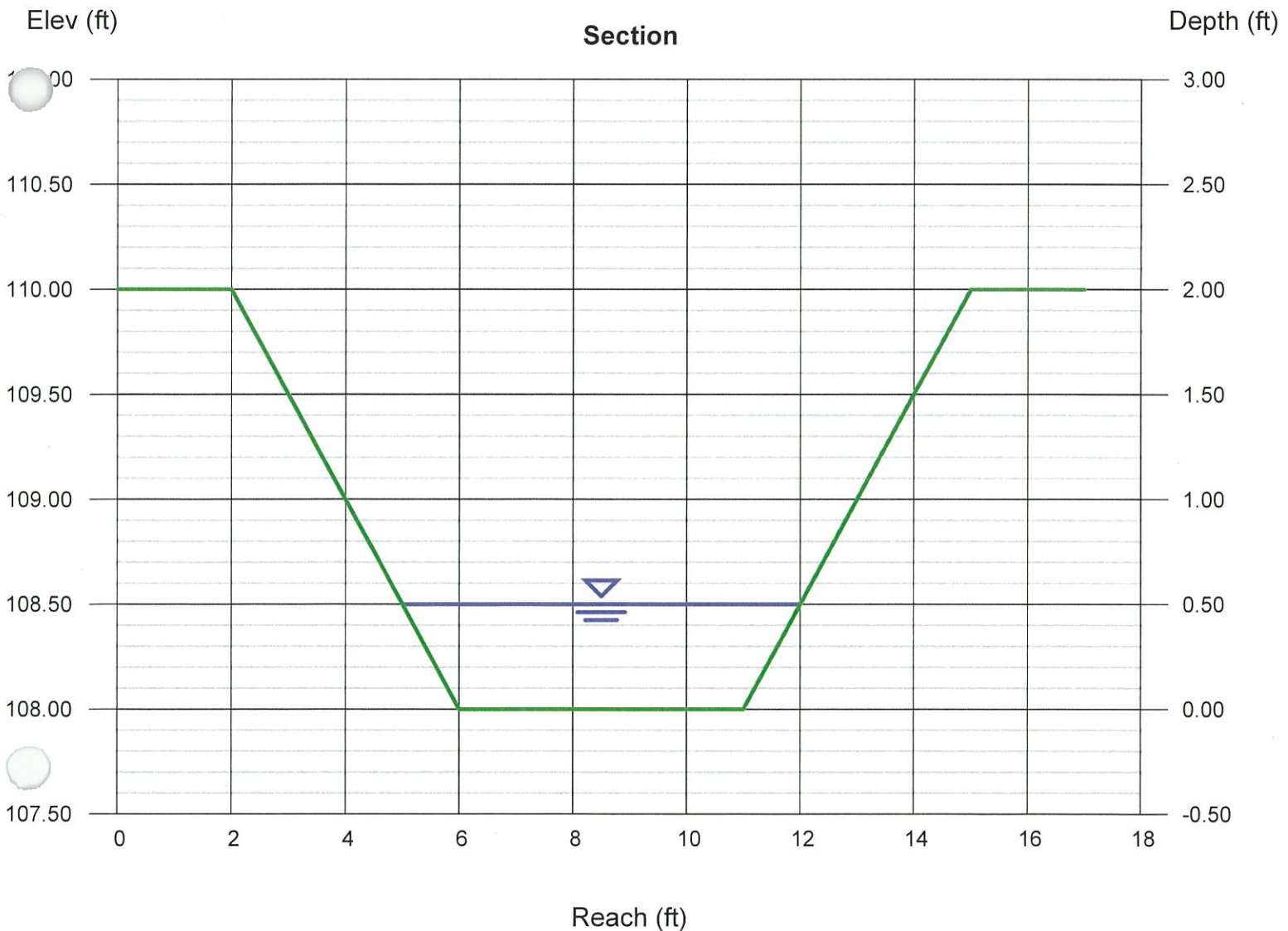
Bottom Width (ft) = 5.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 108.00  
Slope (%) = 25.00  
N-Value = 0.012

### Highlighted

Depth (ft) = 0.50  
Q (cfs) = 101.40  
Area (sqft) = 3.00  
Velocity (ft/s) = 33.80  
Wetted Perim (ft) = 7.24  
Crit Depth, Yc (ft) = 1.83  
Top Width (ft) = 7.00  
EGL (ft) = 18.26

### Calculations

Compute by: Known Q  
Known Q (cfs) = 101.40



# Channel Report

## DOWNCHUTE 4 (GEOMEMBRANE) - Q25

### Trapezoidal

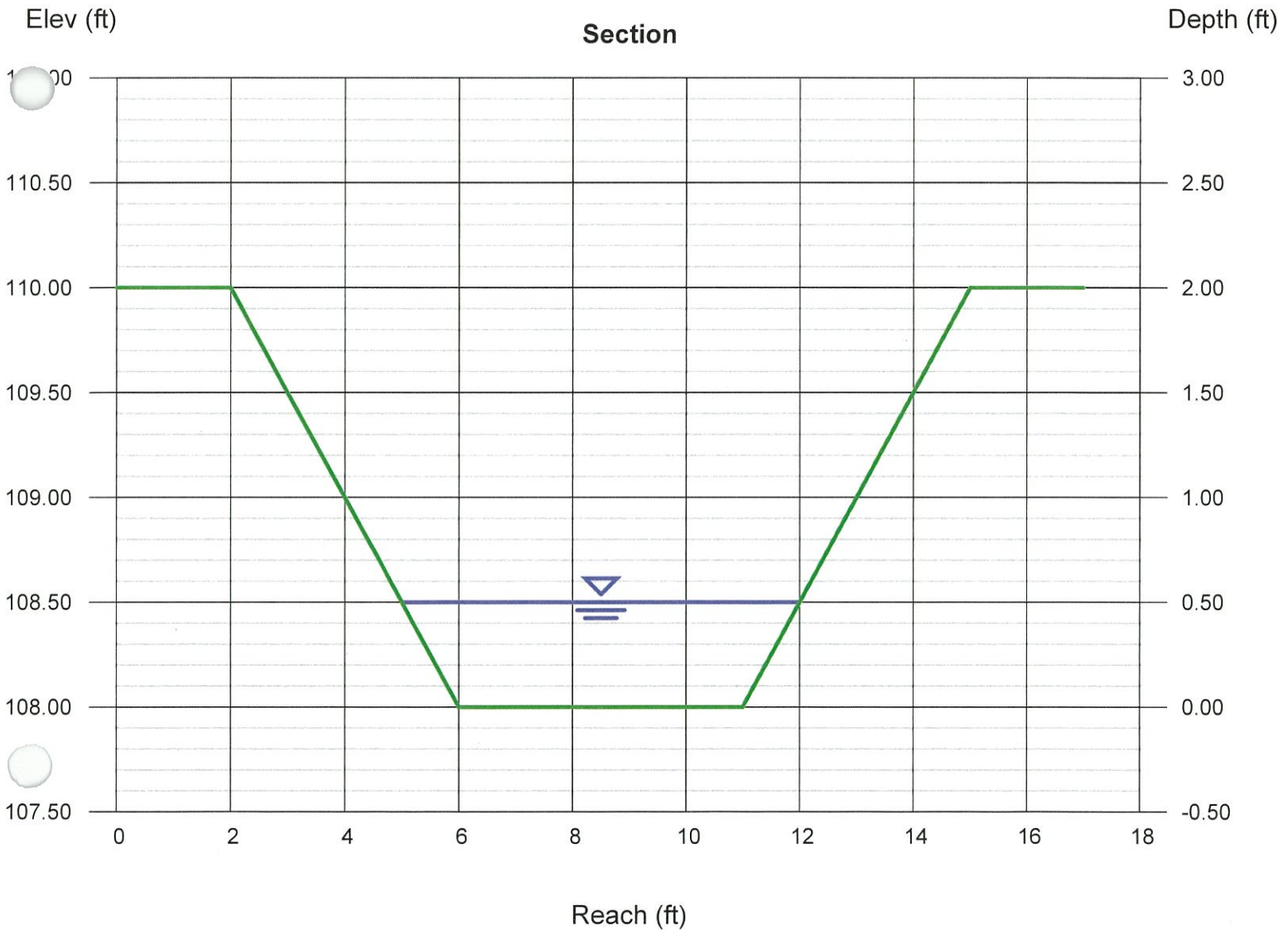
Bottom Width (ft) = 5.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 108.00  
Slope (%) = 25.00  
N-Value = 0.012

### Highlighted

Depth (ft) = 0.50  
Q (cfs) = 102.50  
Area (sqft) = 3.00  
Velocity (ft/s) = 34.17  
Wetted Perim (ft) = 7.24  
Crit Depth, Yc (ft) = 1.84  
Top Width (ft) = 7.00  
EGL (ft) = 18.65

### Calculations

Compute by: Known Q  
Known Q (cfs) = 102.50





# Channel Report

## DOWNCHUTE 5 (GEOMEMBRANE) - Q25

### Trapezoidal

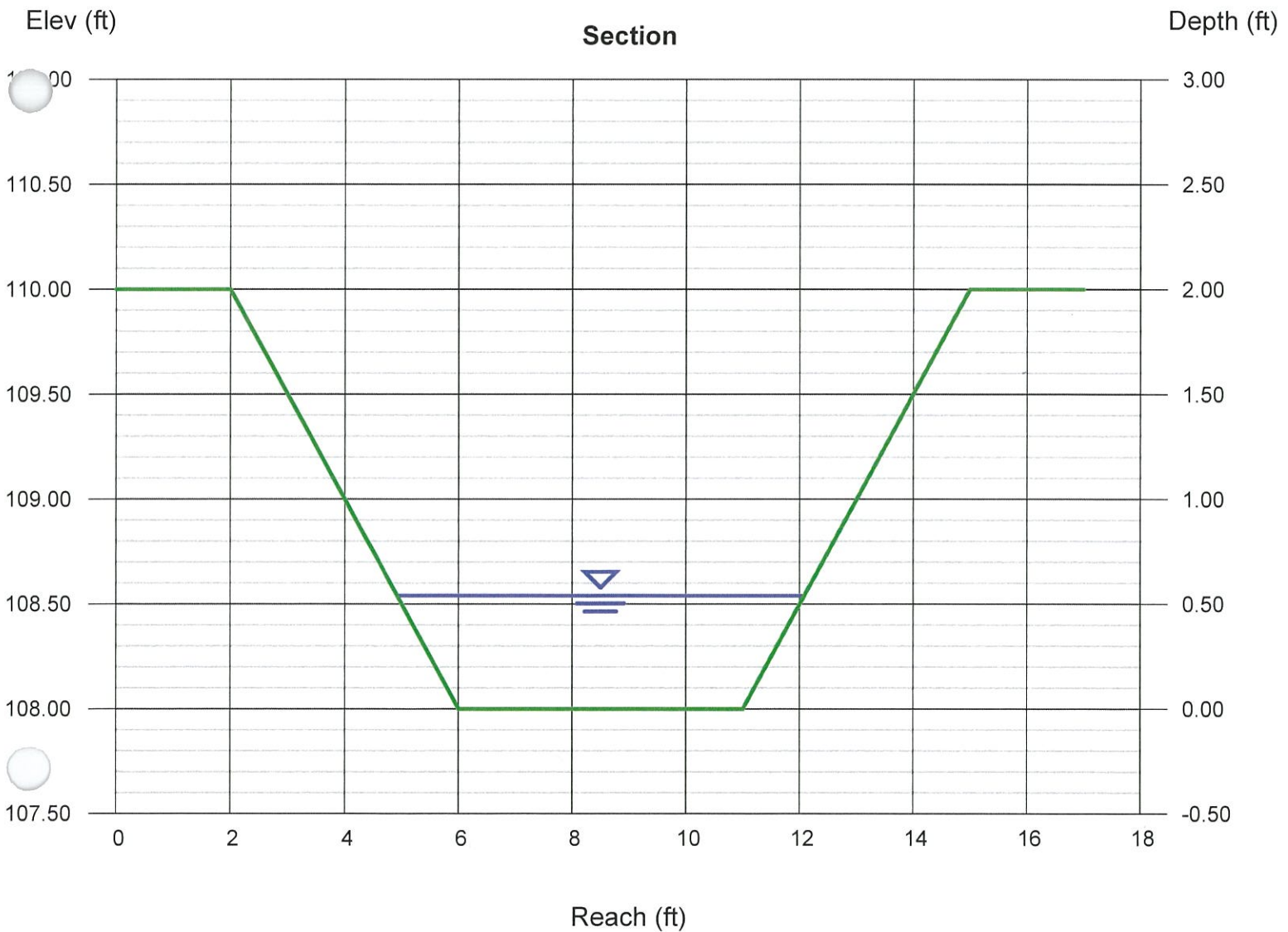
Bottom Width (ft) = 5.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 108.00  
Slope (%) = 25.00  
N-Value = 0.012

### Highlighted

Depth (ft) = 0.54  
Q (cfs) = 115.60  
Area (sqft) = 3.28  
Velocity (ft/s) = 35.21  
Wetted Perim (ft) = 7.41  
Crit Depth, Yc (ft) = 1.96  
Top Width (ft) = 7.16  
EGL (ft) = 19.81

### Calculations

Compute by: Known Q  
Known Q (cfs) = 115.60





# Channel Report

## DWNCHUTE 6 (GEOMEMBRANE) - Q25

### Trapezoidal

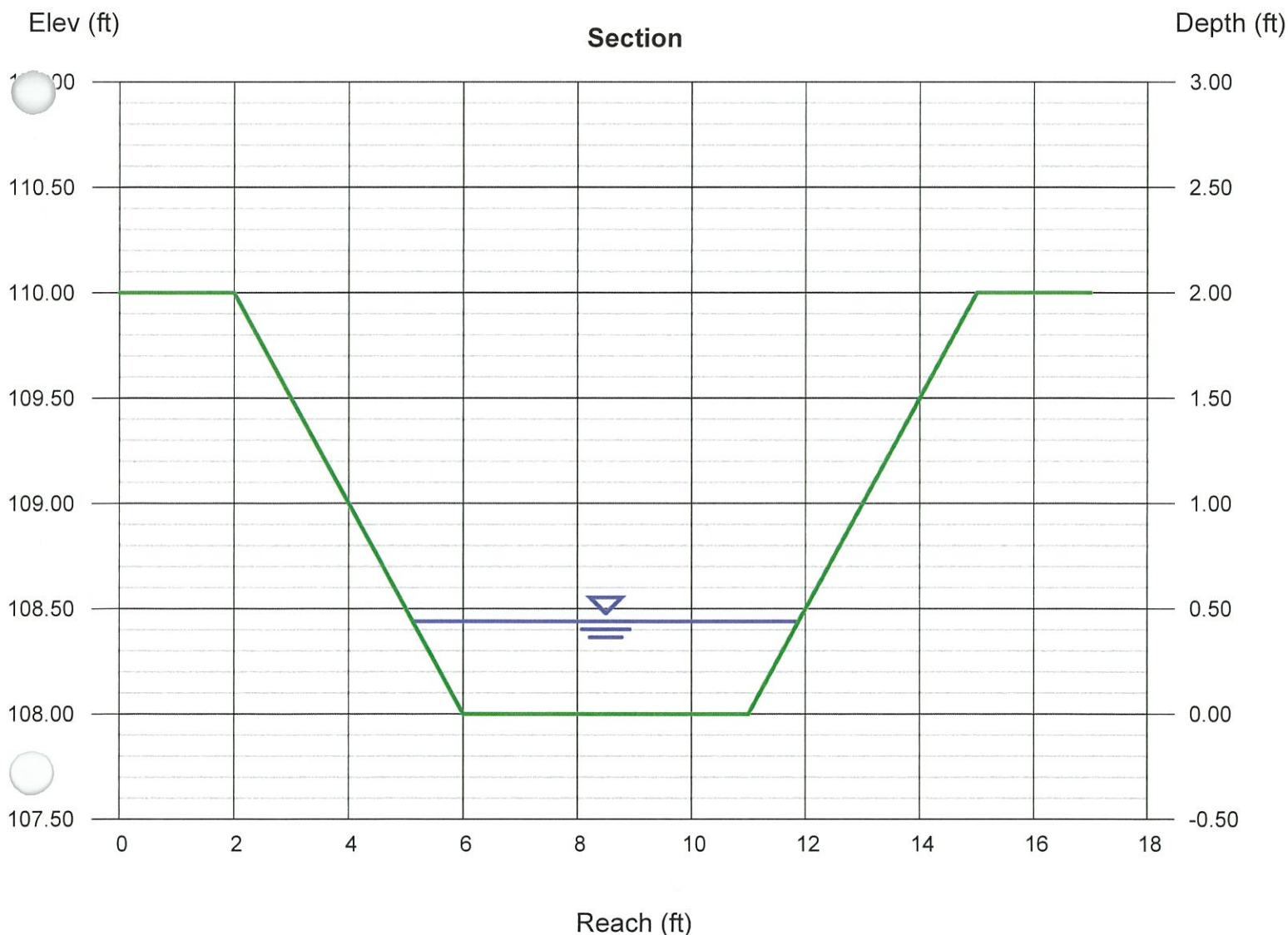
Bottom Width (ft) = 5.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 108.00  
Slope (%) = 25.00  
N-Value = 0.012

### Highlighted

Depth (ft) = 0.44  
Q (cfs) = 81.50  
Area (sqft) = 2.59  
Velocity (ft/s) = 31.50  
Wetted Perim (ft) = 6.97  
Crit Depth, Yc (ft) = 1.62  
Top Width (ft) = 6.76  
EGL (ft) = 15.87

### Calculations

Compute by: Known Q  
Known Q (cfs) = 81.50



# Channel Report

## DWNCHUTE 7 (GEOMEMBRANE) - Q25

### Trapezoidal

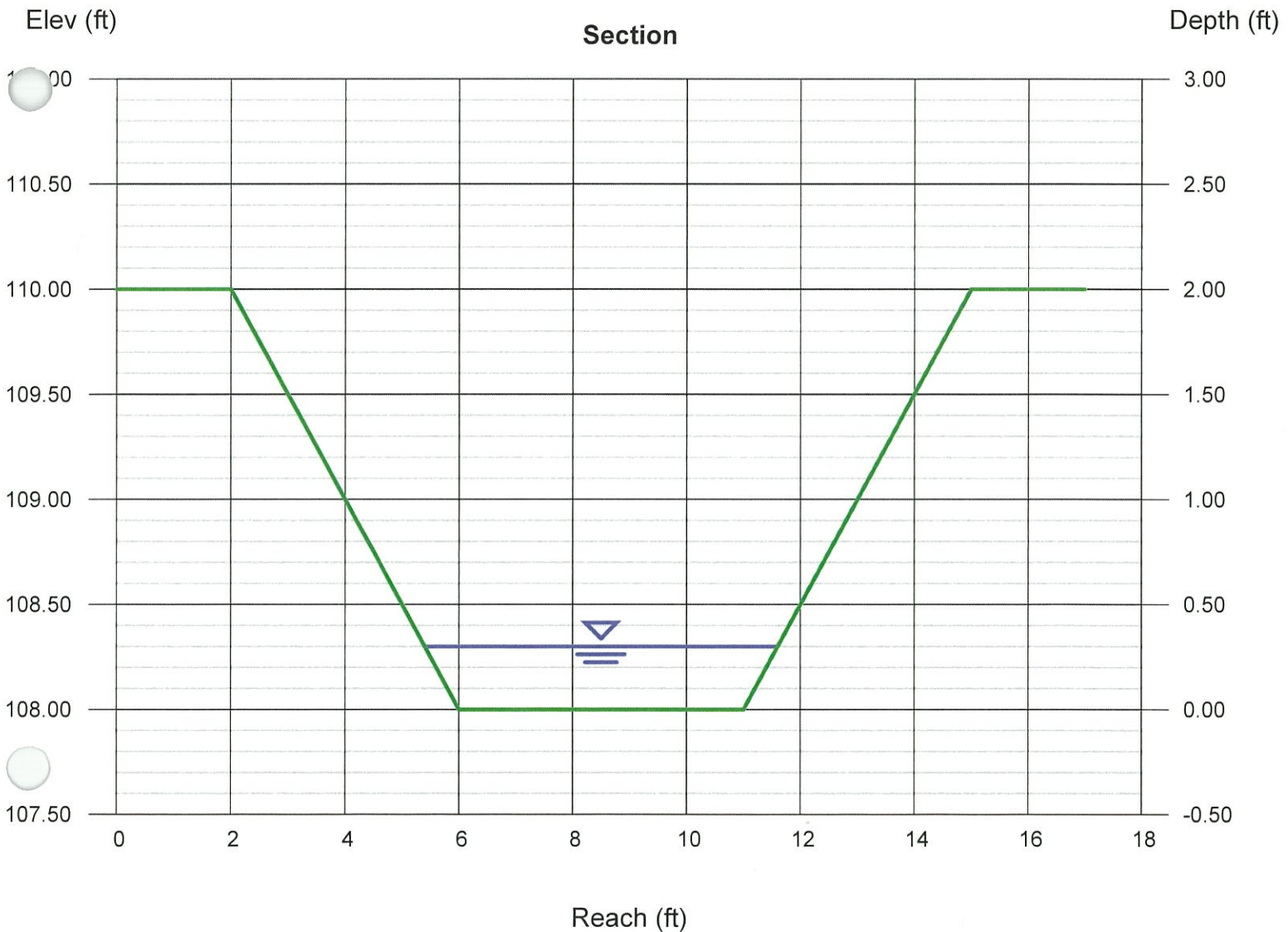
Bottom Width (ft) = 5.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 2.00  
Invert Elev (ft) = 108.00  
Slope (%) = 25.00  
N-Value = 0.012

### Highlighted

Depth (ft) = 0.30  
Q (cfs) = 40.70  
Area (sqft) = 1.68  
Velocity (ft/s) = 24.23  
Wetted Perim (ft) = 6.34  
Crit Depth, Yc (ft) = 1.10  
Top Width (ft) = 6.20  
EGL (ft) = 9.42

### Calculations

Compute by: Known Q  
Known Q (cfs) = 40.70



# **HYDRAFLOW EXPRESS**

## **ADD-ON BERM**

HAWTHORN PARK RDF

# Channel Report

## ADD-ON BERM - Q25

### Triangular

Side Slopes (z:1) = 4.00, 2.00  
Total Depth (ft) = 2.00

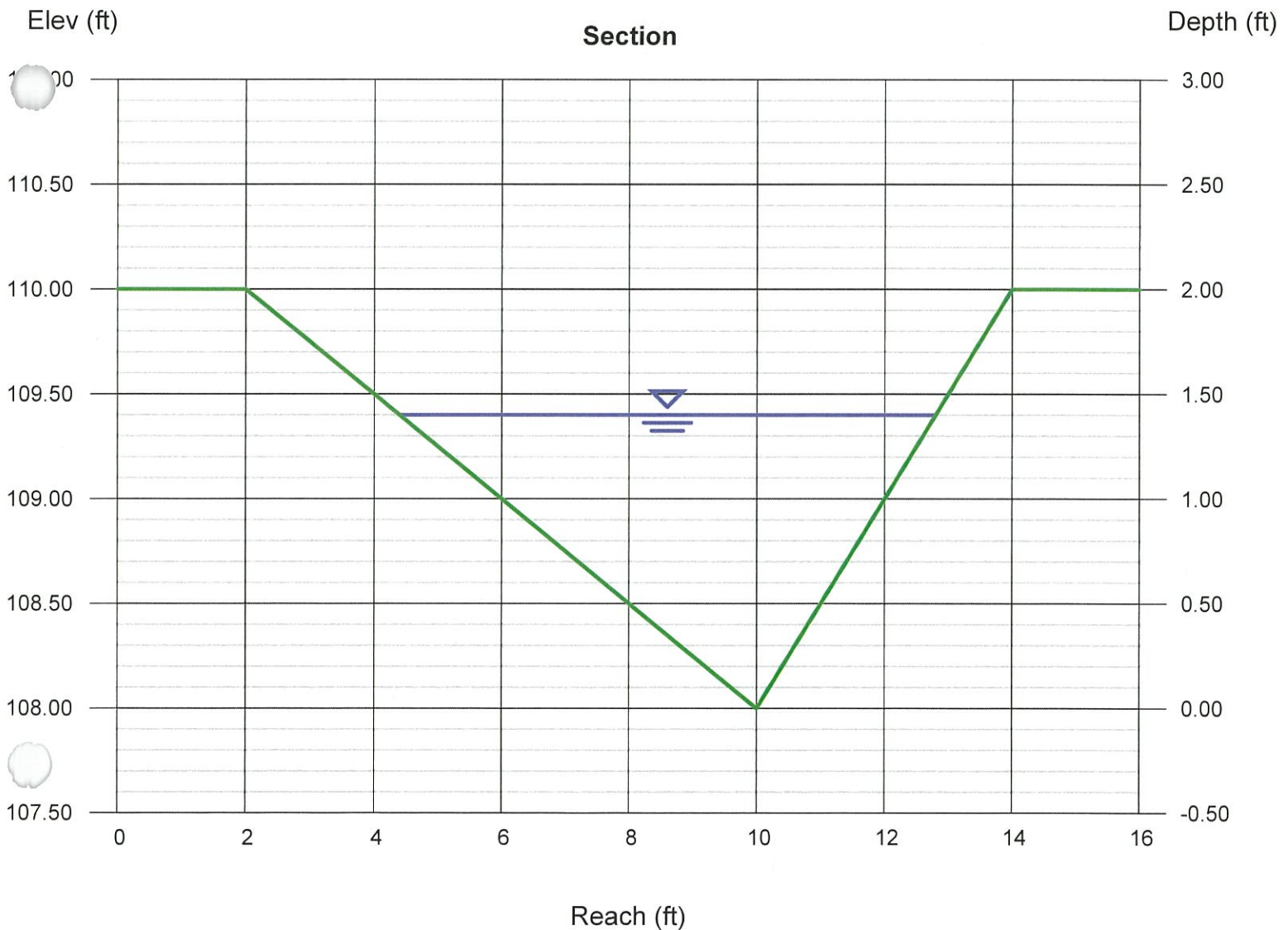
Invert Elev (ft) = 108.00  
Slope (%) = 2.00  
N-Value = 0.035

### Calculations

Compute by: Known Q  
Known Q (cfs) = 26.50

### Highlighted

Depth (ft) = 1.40  
Q (cfs) = 26.50  
Area (sqft) = 5.88  
Velocity (ft/s) = 4.51  
Wetted Perim (ft) = 8.90  
Crit Depth, Yc (ft) = 1.38  
Top Width (ft) = 8.40  
EGL (ft) = 1.72





**HYDRAFLOW EXPRESS**  
**EXISTING PERIMETER DITCHES**

HAWTHORN PARK RDF

# Channel Report

## Re-Development North Ditch (Q25)

### Trapezoidal

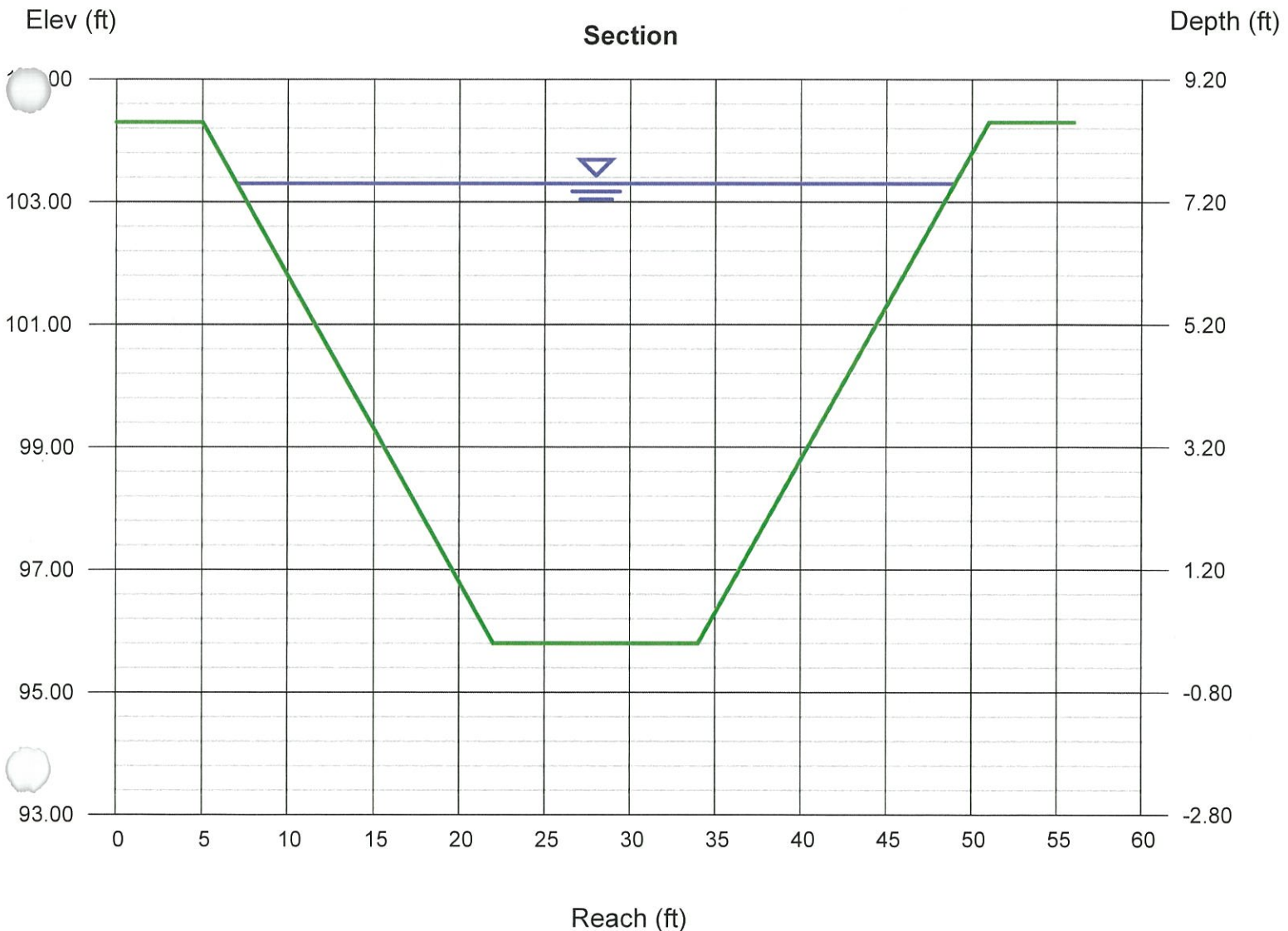
Bottom Width (ft) = 12.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 8.50  
Invert Elev (ft) = 95.80  
Slope (%) = 0.03  
N-Value = 0.035

### Highlighted

Depth (ft) = 7.50  
Q (cfs) = 402.60  
Area (sqft) = 202.50  
Velocity (ft/s) = 1.99  
Wetted Perim (ft) = 45.54  
Crit Depth, Yc (ft) = 2.79  
Top Width (ft) = 42.00  
EGL (ft) = 7.56

### Calculations

Compute by: Known Q  
Known Q (cfs) = 402.60



# Channel Report

## e-Development North Ditch (Q100)

### Trapezoidal

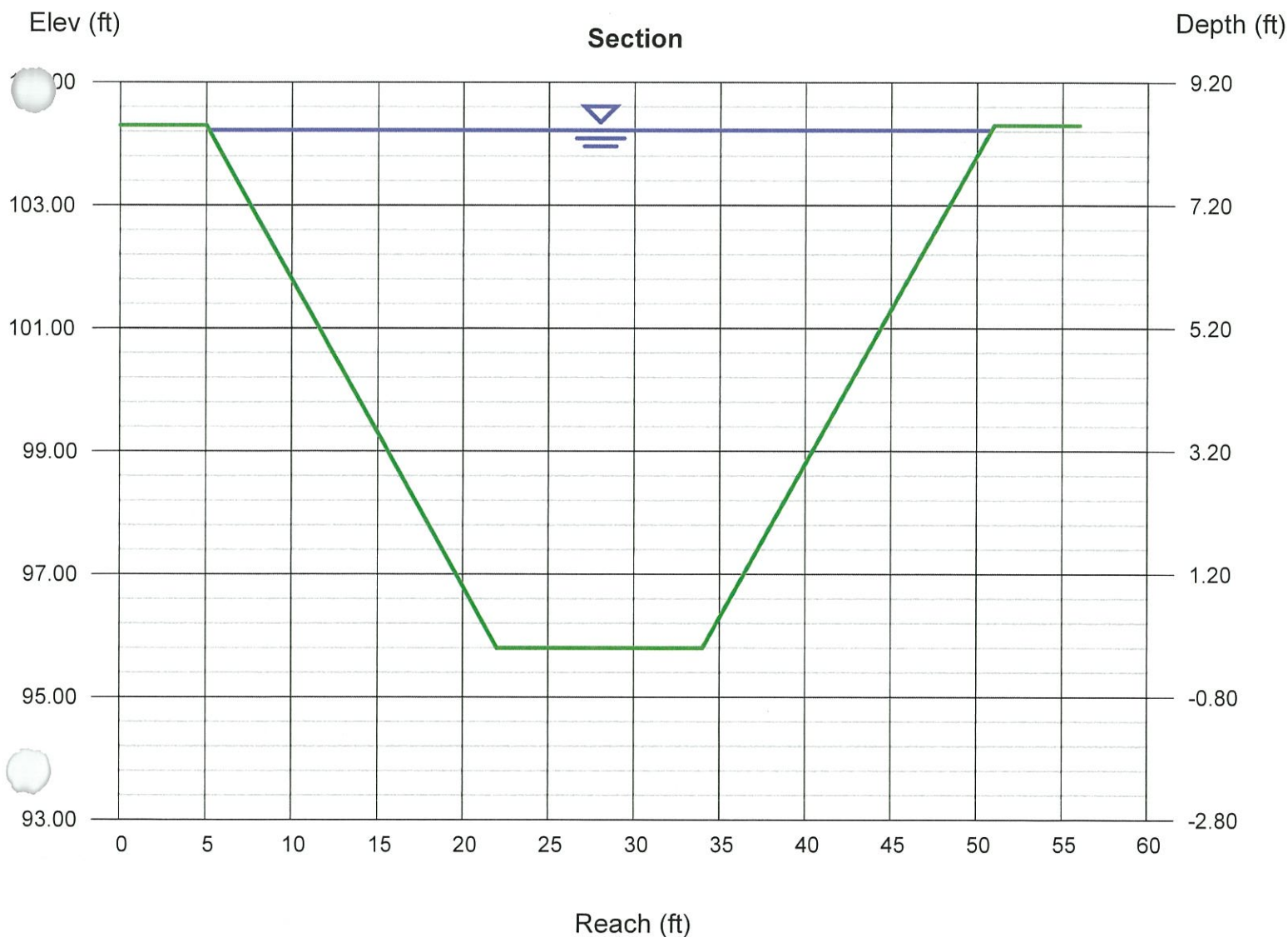
Bottom Width (ft) = 12.00  
Side Slopes (z:1) = 2.00, 2.00  
Total Depth (ft) = 8.50  
Invert Elev (ft) = 95.80  
Slope (%) = 0.03  
N-Value = 0.035

### Highlighted

Depth (ft) = 8.42  
Q (cfs) = 514.10  
Area (sqft) = 242.84  
Velocity (ft/s) = 2.12  
Wetted Perim (ft) = 49.66  
Crit Depth, Yc (ft) = 3.20  
Top Width (ft) = 45.68  
EGL (ft) = 8.49

### Calculations

Compute by: Known Q  
Known Q (cfs) = 514.10



# Channel Report

## 0 e-Development East Ditch (Q25)

### Trapezoidal

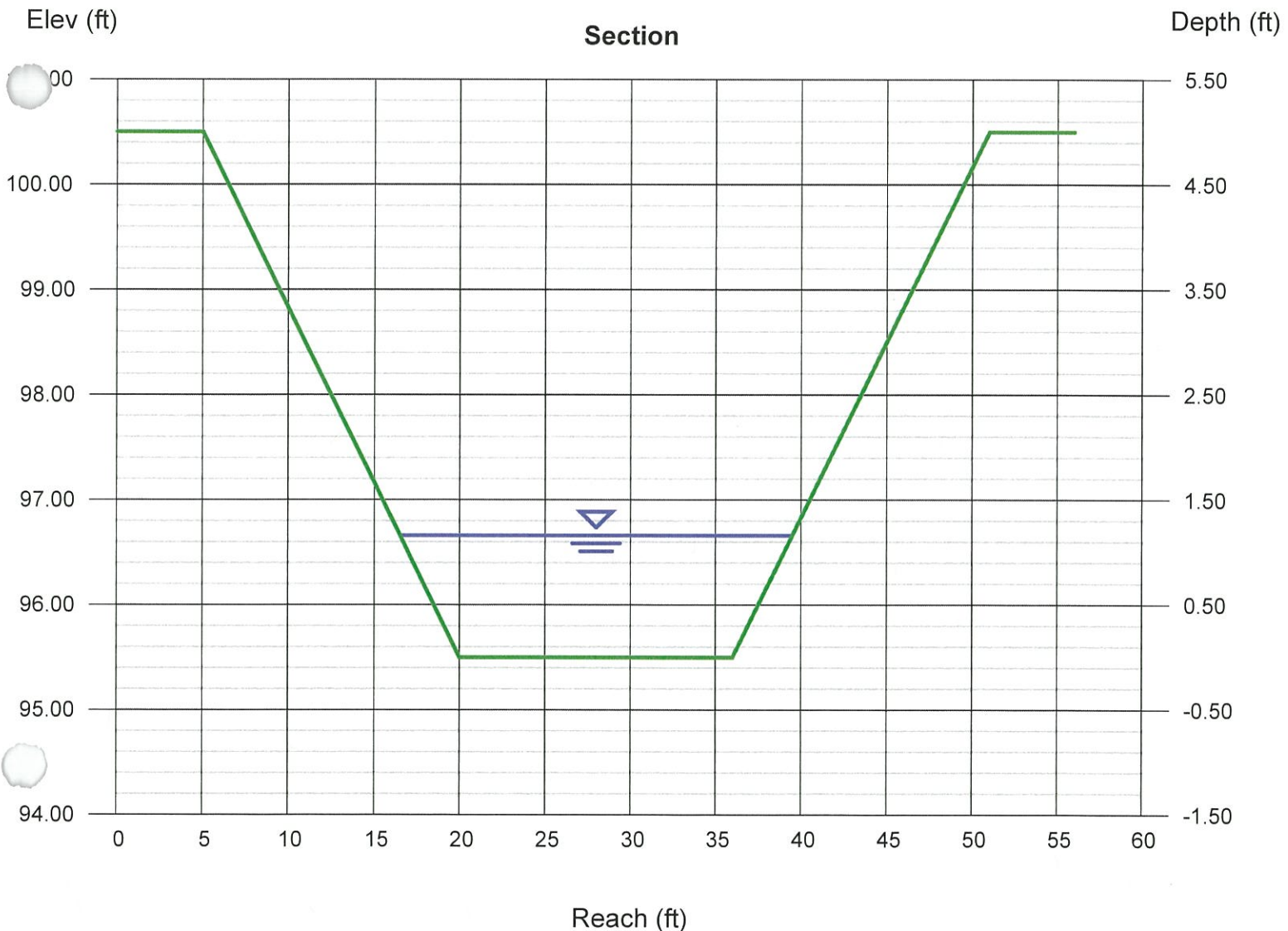
Bottom Width (ft) = 16.00  
Side Slopes (z:1) = 3.00, 3.00  
Total Depth (ft) = 5.00  
Invert Elev (ft) = 95.50  
Slope (%) = 0.42  
N-Value = 0.035

### Highlighted

Depth (ft) = 1.16  
Q (cfs) = 60.10  
Area (sqft) = 22.60  
Velocity (ft/s) = 2.66  
Wetted Perim (ft) = 23.34  
Crit Depth, Yc (ft) = 0.73  
Top Width (ft) = 22.96  
EGL (ft) = 1.27

### Calculations

Compute by: Known Q  
Known Q (cfs) = 60.10





# Channel Report

## Channel Development East Ditch (Q100)

### Trapezoidal

Bottom Width (ft) = 16.00  
Side Slopes (z:1) = 3.00, 3.00  
Total Depth (ft) = 5.00  
Invert Elev (ft) = 95.50  
Slope (%) = 0.42  
N-Value = 0.035

### Highlighted

Depth (ft) = 1.30  
Q (cfs) = 74.30  
Area (sqft) = 25.87  
Velocity (ft/s) = 2.87  
Wetted Perim (ft) = 24.22  
Crit Depth, Yc (ft) = 0.83  
Top Width (ft) = 23.80  
EGL (ft) = 1.43

### Calculations

Compute by: Known Q  
Known Q (cfs) = 74.30

