# HYDRAULIC DATA FOR SHALLOW OPEN-CHANNEL FLOW IN A HIGH-GRADIENT FLUME WITH LARGE BED MATERIAL

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 89-4001

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By Fred J. Watts

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**U.S. GEOLOGICAL SURVEY**

**Water-Resources Investigations Report 89-4001**

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U.S. GEOLOGICAL SURVEY

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## METRIC CONVERSION FACTORS

Inch-pound units used in this report may be converted to metric (International System) units by using the following conversion factors:

| Multiply inch-pound unit | By | To obtain metric unit |
|---|---|---|
| foot (ft) | 0.3048 | meter (m) |
| foot (ft) | 304.8 | millimeter (mm) |
| foot per second (ft/s) | 0.3048 | meter per second (m/s) |
| cubic foot per second ($ft^3/s$) | 0.02832 | cubic meter per second ($m^3/s$) |
| pound (lb) | 0.4536 | kilogram (kg) |

# HYDRAULIC DATA FOR SHALLOW OPEN-CHANNEL FLOW IN A HIGH-GRADIENT FLUME WITH LARGE BED MATERIAL

by Fred J. Watts[1/]

## ABSTRACT

Hydraulic data for shallow open-channel flow in a high-gradient flume with large bed material are reported. The bed surface consists of natural rock having a particle-size range of 0.15 to 0.75 foot. Two different bed-surface configurations (roughness) were tested. The bed material was stable for all discharges. The flume wall was composed of smooth plastic and aluminum, and the test channel was 6 feet wide and 108 feet long. Longitudinal test slopes ranged from 0.008 to 0.018. Hydraulic data are reported for 103 runs with surface flows ranging from 0.7 to 32.1 cubic feet per second and for 11 runs with subsurface flows ranging from 0.1 to 0.7 cubic foot per second. Hydraulic data for all runs include water-surface elevation and average bed elevation at 10 cross sections and test discharge. Detailed velocity measurements at two or more cross sections are reported for selected runs. The bed-material data include shape and size properties of the rock, detailed topographic measurements of the bed surface for each of the two roughness that were tested, and 14 statistical parameters computed from the topographic measurements. The statistical parameters include the mean elevation of the bed, the skew of the elevations, the kurtosis of the elevations, and the standard deviation from the arithmetic mean elevation for each station.

## INTRODUCTION

A comprehensive set of hydraulic data for shallow open-channel flow in a high-gradient rough channel was collected in the Hydraulics Laboratory of the Gulf Coast Hydroscience Center, U.S. Geological Survey, National Space Technology Laboratories, NSTL, Mississippi. The objective of the data-collection program was to obtain sufficient data to: (1) further refine techniques for estimating Manning's n value given appropriate cross-section data and velocity data that can be conveniently collected in the field; (2) study the velocity profiles (vertical and transverse) as stage is systematically lowered; (3) evaluate various methods of estimating hydraulic radius of streams with large bed materials; and (4) determine the type and number of field measurements at a cross section that are required to adequately estimate the roughness of the section.

### Purpose and Scope

The purpose of this report is to present the hydraulic data collected in a convenient and usable format so that other engineers, scientists, and research personnel can have ready access and use of the data. The data also

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are available on magnetic tape from the Geological Survey. Contact the Office of Surface Water, 415 National Center, U.S. Geological Survey, Reston, Virginia 22092. The data were collected from January 1986 through July 1986.

Large rocks (intermediate axis ranging from 0.15 to 0.75 foot) were used for the bed of the 6-foot wide channel, and the sides of the channel were smooth plastic and aluminum. The 50-percent finer than sieve size of the surface material was 0.62 foot, the coefficient of gradation was 1.17, and the average Corey shape factor was 0.61. The rock was sized so that no bed material would move under the range of discharge and slope that were examined.

The bed surface for Series I tests was arranged so that it was very rough. The standard deviation of the point elevations of the bed at a cross section with reference to the mean of the point elevations averaged about 0.168 foot. A series of 56 sets of data were obtained with Series I roughness.

To extend the scope of testing, the surface material was then slightly rearranged. Larger rocks were moved slightly and placed in depressions. As a result of this minor moving of rock, the surface was generally smoothed. The averaged standard deviation of point elevations of the bed for Series II roughness tests was 0.133. That is, the standard deviation of the projections was reduced by 0.035 foot (21 percent). A series of 58 tests was conducted on the Series II roughness. The gradation and size of the surface material was the same for Series I and Series II roughness.

A major portion of this study was directed at the collection of data to be used for developing a methodology for characterizing the surface roughness of high-gradient rock bed channels. Because of this objective, detailed surface-elevation data were collected for both Series I and Series II roughness. Also, considerable time was spent obtaining representative dimensions of major, intermediate, and minor axes of the rock and gradation of surface material.

A comprehensive list of slopes, discharges, and other flow parameters for Series I tests is shown in table 1. Table 2 lists similar data for Series II tests.

## Acknowledgments

This data-collection project was performed while the author was on sabbatical leave from the University of Idaho and on a temporary assignment with the Geological Survey at the Gulf Coast Hydroscience Center, NSTL, Mississippi.

The development and construction of the test channel and data-collection equipment and the collection, management, and preliminary processing of data were performed by personnel from Computer Science Corporation (CSC)[1/], a private subcontractor who operated the hydraulics laboratory for the Geological Survey, and Geological Survey personnel. The financial support provided by the Geological Survey and the opportunity for the sabbatical leave and

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1/Reference to trade names, commercial products, manufacturers, or distributors in this manual is for identification purposes only and does not constitute an endorsement or a recommendation for use by the U.S. Geological Survey.

financial support provided by the University of Idaho are very much appreciated. The extraordinary cooperation and exchange of ideas, the industry of the engineering personnel and laboratory technicians, the quality of construction, and the care and attention shown to collecting and processing the data are very much appreciated.

## DESCRIPTION OF TEST FACILITY

### Test Channel

A 108-foot long test section of rock-lined channel bed with smooth side walls was constructed in a 6-foot wide by 250-foot long tilting flume (fig. 1). The slope of the flume could be varied from 0 to 1 percent. An objective of the experiment was to test on slopes up to 1.8 percent; and therefore it was necessary to build a wedge-shaped base with a longitudinal slope of 0.8 percent with respect to the floor of the flume.

Starting at Station (Sta) 0.33 (fig. 1), 3/4-inch thick vertical transverse impervious barriers, cut to appropriate height, were placed every 12 feet along the flume. A waterproof seal was constructed around the edges. A 1-inch diameter perforated PVC pipe piezometer extending the entire width of the flume was placed a few inches above the metal floor of the flume and 4 inches upstream of the impervious barrier. A 1-inch diameter pipe placed through the floor of the flume connected the piezometer to a hose leading to a water manometer. The centerline of the piezometer was carefully aligned perpendicular to the centerline of the flume. The test section (Sta) where all velocities were measured was directly above the piezometer. The purpose of the piezometers was to accurately and quickly measure water-surface elevation at the test sections.

After the piezometers were constructed, the space between the impervious barriers was carefully filled to grade with clean 3/8- to 3/4-inch gravel. The loose gravel provided an adjustable base for placement of the large size bed-surface material and clean subsurface voids for transmitting water pressure to the piezometer.

A layer of large element bed material averaging about 9-inches thick was carefully placed on the base material. Temporary screeds set to grade were constructed along each side of the flume floor to facilitate placement of the rock and assure a uniform surface grade. An appropriate number of rocks of each size were hand carried to the section and properly blended to obtain a uniform mixture of sizes.

### Approach Channel

Special flow straighteners and a ramp floor were constructed between the headbox and the test section to ensure a uniform approach velocity at Sta 0. Details of the flow straighteners and transition section are shown in figure 1. An examination of a detailed set of velocity profiles taken at Sta -4, -2, 0, 6, and 12 (Run 17 A, B, C, and D, table 1) for a discharge of 31.9 cubic feet per second ($ft^3/s$) shows that the approach velocity was uniform.

Table 1.--Data and flow parameters - Series I Roughness

[Sta, station; $ft^3/s$, cubic feet per second]

| Target slope[a/] | Run number | Discharge | | | Station, integrated discharge (Q), and energy coefficient (α) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Orifice ($ft^3/s$) | Subsurface ($ft^3/s$) | Surface ($ft^3/s$) | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α |
| 0.008 | 1 | 31.75 | 0.30 | 31.45 | 36 | 31.3 | 1.12 | 60 | 30.2 | 1.11 | 84 | 31.6 | 1.15 | | | | | | |
| " | 2 | 16.21 | " | 15.91 | 36 | 15.4 | 1.12 | 60 | 14.5 | 1.13 | 84 | 15.0 | 1.18 | | | | | | |
| " | 3 | 9.43 | " | 9.13 | | | | | | | | | | | | | | | |
| " | 3A | 23.26 | " | 22.96 | | | | | | | | | | | | | | | |
| " | 4 | 1.06 | " | 0.76 | | | | | | | | | | | | | | | |
| " | 5 | 4.58 | " | 4.28 | 36 | 4.2 | 1.21 | 60 | 3.5 | 1.13 | 84 | 3.8 | 1.42 | *b* | | | | | |
| " | 6 | 32.19 | " | 31.89 | 24 | 28.7 | 1.25 | 48 | 28.7 | 1.18 | 72 | 27.6 | 1.18 | 84 | 29.0 | 1.18 | | | |
| " | 7 | 16.63 | " | 16.33 | 24 | 14.6 | 1.31 | 48 | 15.6 | 1.15 | 72 | 14.8 | 1.15 | | | | | | |
| " | 8A | 4.56 | " | 4.26 | 24 | 3.9 | 1.51 | 48 | 3.9 | 1.24 | 72 | 3.3 | 1.33 | 84 | 3.9 | 1.53 | *b* | | |
| " | 8G | 23.68 | " | 23.38 | | | | | | | | | | | | | | | |
| " | 8I | 1.07 | | .77 | | | | | | | | | | | | | | | |
| " | 9 | 6.07 | " | 5.77 | | | | | | | | | | | | | | | |
| " | 9 | 7.99 | " | 7.69 | | | | | | | | | | | | | | | |
| " | 9 | 9.39 | " | 9.09 | | | | | | | | | | | | | | | |
| 0.008 | 9 | 11.99 | 0.30 | 11.69 | | | | | | | | | | | | | | | |
| 0.0105 | 11A | 4.49 | 0.33 | 4.16 | | | | | | | | | | | | | | | |
| " | 11B | 6.02 | " | 5.69 | | | | | | | | | | | | | | | |
| " | 11C | 8.01 | " | 7.68 | | | | | | | | | | | | | | | |
| " | 11D | 9.21 | " | 8.88 | | | | | | | | | | | | | | | |
| " | 11E | 12.03 | " | 11.70 | | | | | | | | | | | | | | | |
| " | 11F | 16.07 | " | 15.74 | | | | | | | | | | | | | | | |
| " | 11G | 23.83 | " | 23.50 | | | | | | | | | | | | | | | |
| " | 11H | 31.05 | " | 30.72 | | | | | | | | | | | | | | | |
| 0.0105 | 11I | 1.13 | 0.33 | 0.80 | | | | | | | | | | | | | | | |
| 0.0130 | 12 | 31.68 | 0.35 | 31.33 | 36 | 32.2 | 1.14 | 72 | 31.2 | 1.16 | | | | | | | | | |
| " | 13 | 16.12 | " | 15.77 | 36 | 18.5 | 1.17 | 72 | 16.2 | 1.10 | | | | | | | | | |
| " | 13C | 4.68 | " | 4.33 | 36 | 3.9 | 1.29 | 72 | 4.0 | 1.38 | *b* | | | | | | | | |
| " | 14A | 5.99 | " | 5.64 | | | | | | | | | | | | | | | |
| " | 14B | 8.04 | " | 7.69 | | | | | | | | | | | | | | | |
| " | 14C | 9.36 | " | 9.01 | | | | | | | | | | | | | | | |
| " | 14D | 12.10 | " | 11.75 | | | | | | | | | | | | | | | |
| " | 14E | 24.21 | " | 23.86 | | | | | | | | | | | | | | | |
| 0.0103 | 14I | 1.13 | 0.35 | 0.78 | | | | | | | | | | | | | | | |

Footnotes at end of table.

Table 1.--Data and flow parameters - Series I Roughness--Continued

[Sta, station; $ft^3/s$, cubic feet per second]

| Target slope[a] | Run number | Discharge | | | Station, integrated discharge (Q), and energy coefficient (α) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Orifice ($ft^3/s$) | Subsurface ($ft^3/s$) | Surface ($ft^3/s$) | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α |
| 0.0155 | 15A | 4.50 | 0.38 | 4.12 | | | | | | | | | | | | | | | |
| " | 15B | 6.03 | " | 5.65 | | | | | | | | | | | | | | | |
| " | 15C | 8.05 | " | 7.67 | | | | | | | | | | | | | | | |
| " | 15D | 9.71 | " | 9.33 | | | | | | | | | | | | | | | |
| " | 15E | 12.14 | " | 11.76 | | | | | | | | | | | | | | | |
| " | 15F | 16.08 | " | 15.70 | | | | | | | | | | | | | | | |
| " | 15G | 23.94 | " | 23.56 | | | | | | | | | | | | | | | |
| " | 15H | 31.51 | " | 31.13 | | | | | | | | | | | | | | | |
| 0.0155 | 15I | 1.13 | 0.38 | 0.75 | | | | | | | | | | | | | | | |
| 0.018 | 16A | 4.60 | 0.40 | 4.20 | 36 | 4.6 | 1.18 | 72 | 3.7 | 1.38 | *b* | | | | | | | | |
| " | 16B | 6.04 | " | 5.64 | | | | | | | | | | | | | | | |
| " | 16C | 8.05 | " | 7.65 | | | | | | | | | | | | | | | |
| " | 16D | 9.82 | " | 9.42 | | | | | | | | | | | | | | | |
| " | 16E | 12.13 | " | 11.73 | | | | | | | | | | | | | | | |
| " | 16F | 16.21 | " | 15.81 | 36 | 15.5 | 1.19 | 72 | 15.5 | 1.12 | | | | | | | | | |
| " | 16G | 23.73 | " | 23.33 | | | | | | | | | | | | | | | |
| " | 16H | 32.05 | " | 31.65 | 0 | 26.9 | 1.06 | 36 | 33.1 | 1.15 | 48 | 34.4 | 1.20 | 60 | 31.8 | 1.15 | 72 | 28.8 | 1.20 |
| 0.018 | 16I | 1.13 | 0.40 | 0.73 | | | | | | | | | | | | | | | |
| Subsurface Flow Determination | | | | | | | | | | | | | | | | | | | |
| 0.008 | 10A | 0.19 | | | | | | | | | | | | | | | | | |
| 0.008 | 10B | .27 | | | | | | | | | | | | | | | | | |
| 0.008 | 10C | .48 | | | | | | | | | | | | | | | | | |
| Boundary Layer Development at Entrance of Test Section | | | | | | | | | | | | | | | | | | | |
| 0.008 | 17ABC | 31.87 | | | -4 | 28.3 | 1.07 | -2 | 27.9 | | 0 | 26.3 | | | | | | | |
| 0.008 | 17D | 31.97 | | | | | | | | | | | | 6 | 28.6 | | 12 | 29.5 | *b,c* |

[a] Target slope refers to the approximate longitudinal slope of the channel.

[b] Values obtained by hand computations ~ values are approximate.

[c] Data for Runs A, B, and C shown on same line; see Appendix III B for additional details.

Table 2.--Data and flow parameters - Series II Roughness

[Sta, station; $ft^3/s$, cubic feet per second]

| Target slope[a/] | Run number | Discharge | | | Station, integrated discharge (Q), and energy coefficient (α) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Orifice ($ft^3/s$) | Subsurface ($ft^3/s$) | Surface ($ft^3/s$) | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α |
| 0.008 | 20A | 0.98 | 0.30 | 0.68 | | | | | | | | | | | | | | |
| " | 20B | 2.20 | " | 1.90 | | | | | | | | | | | | | | |
| " | 20C | 4.55 | " | 4.25 | | | | | | | | | | | | | | |
| " | 20D | 5.99 | " | 5.69 | | | | | | | | | | | | | | |
| " | 20E | 8.03 | " | 7.73 | | | | | | | | | | | | | | |
| " | 20F | 9.39 | " | 9.09 | | | | | | | | | | | | | | |
| " | 20G | 12.12 | " | 11.82 | | | | | | | | | | | | | | |
| " | 20H | 16.52 | " | 16.22 | | | | | | | | | | | | | | |
| " | 20I | 24.00 | " | 23.70 | | | | | | | | | | | | | | |
| 0.008 | 20J | 32.14 | 0.30 | 31.84 | | | | | | | | | | | | | | |
| 0.0105 | 21A | 1.00 | 0.33 | 0.67 | | | | | | | | | | | | | | |
| " | 21B | 2.21 | " | 1.88 | | | | | | | | | | | | | | |
| " | 21C | 4.53 | " | 4.20 | | | | | | | | | | | | | | |
| " | 21D | 6.07 | " | 5.74 | | | | | | | | | | | | | | |
| " | 21E | 8.02 | " | 7.69 | | | | | | | | | | | | | | |
| " | 21F | 9.42 | " | 9.09 | | | | | | | | | | | | | | |
| " | 21G | 12.16 | " | 11.83 | | | | | | | | | | | | | | |
| " | 21H | 16.42 | " | 16.09 | | | | | | | | | | | | | | |
| " | 21I | 23.96 | " | 23.63 | | | | | | | | | | | | | | |
| 0.0105 | 21J | 32.34 | 0.33 | 32.01 | | | | | | | | | | | | | | |
| 0.0130 | 22A | 1.02 | 0.35 | 0.67 | | | | | | | | | | | | | | |
| " | 22B | 2.21 | " | 1.86 | | | | | | | | | | | | | | |
| " | 22C | 4.47 | " | 4.12 | | | | | | | | | | | | | | |
| " | 22D | 6.05 | " | 5.70 | | | | | | | | | | | | | | |
| " | 22E | 7.99 | " | 7.64 | | | | | | | | | | | | | | |
| " | 22F | 9.50 | " | 9.15 | | | | | | | | | | | | | | |
| " | 22G | 12.05 | " | 11.70 | | | | | | | | | | | | | | |
| " | 22H | 16.50 | " | 16.15 | | | | | | | | | | | | | | |
| " | 22I | 23.44 | " | 23.09 | | | | | | | | | | | | | | |
| 0.0130 | 22J | 32.12 | 0.35 | 31.77 | | | | | | | | | | | | | | |

Footnotes at end of table.

Table 2.--Data and flow parameters - Series I Roughness--Continued

[Sta, station; $ft^3/s$, cubic feet per second]

| Target slope[a] | Run number | Discharge | | | Station, integrated discharge (Q), and energy coefficient (α) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Orifice ($ft^3/s$) | Subsurface ($ft^3/s$) | Surface ($ft^3/s$) | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α | Sta | Q ($ft^3/s$) | α |
| 0.0155 | 23A | 1.00 | 0.38 | 0.62 | | | | | | | | | | | | | | |
| " | 23B | 2.21 | " | 1.83 | | | | | | | | | | | | | | |
| " | 23C | 4.57 | " | 4.19 | | | | | | | | | | | | | | |
| " | 23D | 6.20 | " | 5.82 | | | | | | | | | | | | | | |
| " | 23E | 8.05 | " | 7.67 | | | | | | | | | | | | | | |
| " | 23F | 9.09 | " | 8.71 | | | | | | | | | | | | | | |
| " | 23G | 12.21 | " | 11.83 | | | | | | | | | | | | | | |
| " | 23H | 16.27 | " | 15.89 | | | | | | | | | | | | | | |
| " | 23I | 24.07 | " | 23.69 | | | | | | | | | | | | | | |
| 0.0155 | 23J | 32.14 | 0.38 | 31.76 | | | | | | | | | | | | | | |
| 0.018 | 24A | 1.00 | 0.40 | 0.60 | | | | | | | | | | | | | | |
| " | 24B | 2.21 | " | 1.81 | | | | | | | | | | | | | | |
| " | 24C | 4.52 | " | 4.12 | 36 | 4.0 | 1.27 | 72 | 3.8 | 1.12 | *b* | | | | | | | |
| " | 24D | 5.98 | " | 5.58 | | | | | | | | | | | | | | |
| " | 24E | 7.99 | " | 7.59 | | | | | | | | | | | | | | |
| " | 24F | 9.30 | " | 8.90 | | | | | | | | | | | | | | |
| " | 24G | 12.13 | " | 11.73 | | | | | | | | | | | | | | |
| " | 24H | 16.62 | " | 16.22 | 36 | 15.7 | 1.14 | 72 | 16.0 | 1.14 | | | | | | | | |
| " | 24I | 23.83 | " | 23.43 | | | | | | | | | | | | | | |
| 0.018 | 24J | 32.19 | 0.40 | 31.79 | 36 | 31.0 | 1.16 | 72 | 30.5 | 1.11 | | | | | | | | |
| Subsurface Flow Determination | | | | | | | | | | | | | | | | | | |
| 0.008 | 25A | 0.11 | | | | | | | | | | | | | | | | |
| " | 25B | .27 | | | | | | | | | | | | | | | | |
| " | 25C | .35 | | | | | | | | | | | | | | | | |
| 0.008 | 25D | .68 | | | | | | | | | | | | | | | | |
| 0.018 | 24K | 0.22 | | | | | | | | | | | | | | | | |
| " | 24L | .38 | | | | | | | | | | | | | | | | |
| " | 24M | .53 | | | | | | | | | | | | | | | | |
| 0.018 | 24N | .68 | | | | | | | | | | | | | | | | |

[a] Target slope refers to the approximate longitudinal slope of the channel.

[b] Values obtained by hand computations ~ values are approximate.

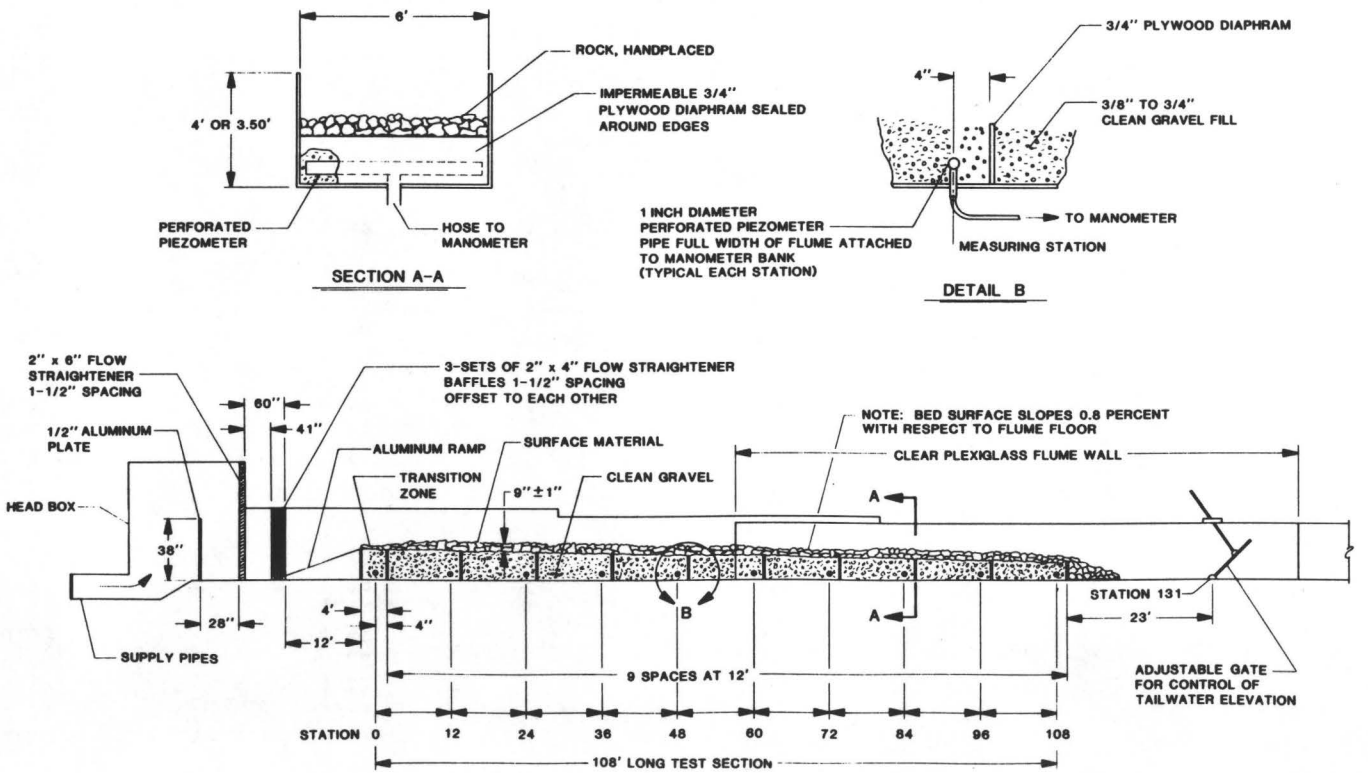


Figure 1.--Centerline section of test reach in the tilting flume.

## Tailwater Control

An adjustable gate, hinged at the bottom, at Sta 131 was used for control of tailwater elevation. After the flow had stabilized, the operator could see the longitudinal water-surface profile for the entire test reach displayed on the water manometers. The elevation of the tailgate could readily be adjusted so that the projected slope of the upstream water elevations displayed on the manometers coincide with the water-surface elevation of the well for Sta 96. The water manometers and point gages are shown in figure 2.

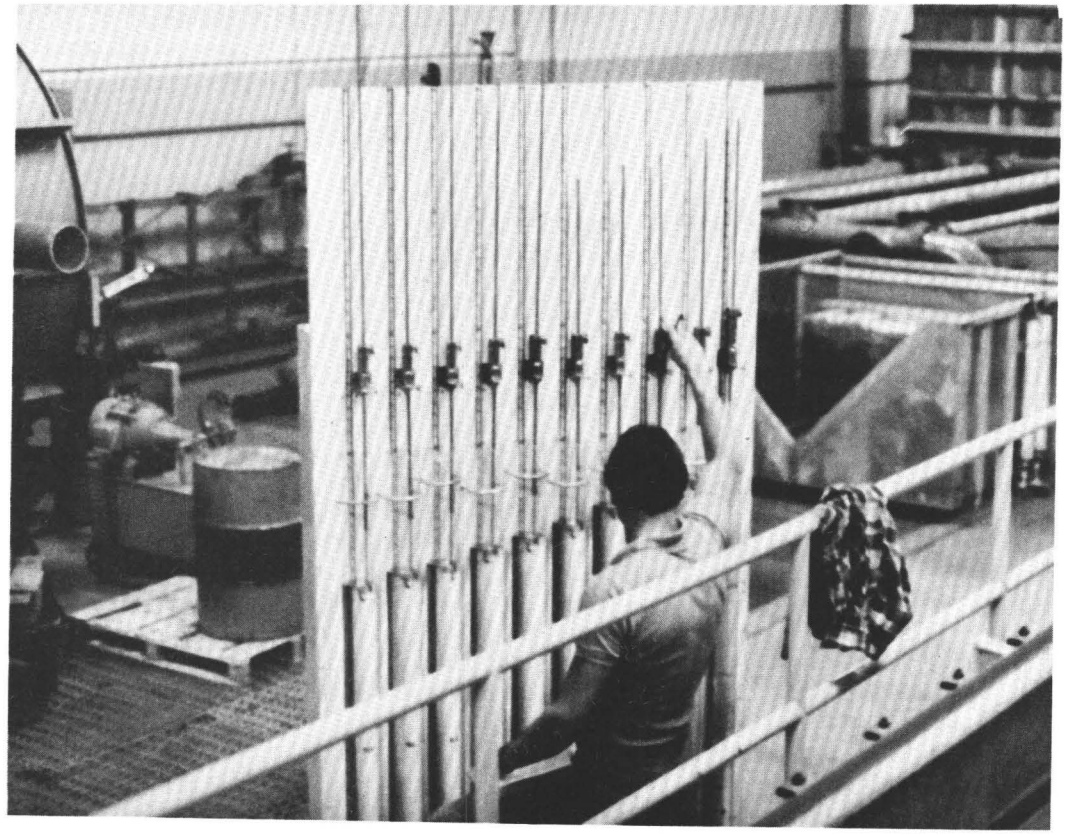

Figure 2.--Water manometers and point gages.

## Water Delivery System

Water was delivered to the head box of the flume through one or more of three parallel pipes connected to a constant head tank. The pipes were 16 inches, 18 inches, and 24 inches in diameter. Each pipe was equipped with an orifice meter, manometer, and appropriate valves. Discharge above 3.0 $ft^3/s$ was measured with sharp-edged plate orifice meters (henceforth referred to as orifice or orifice meter) coupled to water manometers. Discharges ranging from 1 to 3 $ft^3/s$ were routed through a 6-inch pipe with an orifice meter and a mercury manometer. For discharge less than 1 $ft^3/s$, all water at the brink of the flume was collected and routed to a $30^o$ V-notch sharp-crested weir. Test discharges ranged from 0.1 to 32.0 $ft^3/s$.

During flume operation, water in the tail box was continuously pumped back into the overflow constant head tank. Because the flow was driven by a constant head tank, the system was very stable; and once flow was established, the discharge remained constant without surges. After a few preliminary runs, the specified target discharge was easily obtained by opening appropriate valves the proper number of turns as determined from previous runs with similar discharges.

## Instrumentation

An instrument carriage and data-collection-processing-transmission system were developed for this project by Computer Science Corporation personnel and the Geological Survey laboratory manager. The data-collection-processing system was built around a microcomputer.

A rigid precision-surface horizontal track extending the full width of the flume was constructed on the front of a sturdy 6-foot by 6-foot wheeled instrument cart that ran on rails attached to the top of sidewalls of the flume (fig. 3). A wheeled instrument mount, with a geared vertical translator and a length of round instrument mounting rod projecting below the translator, was attached to the track. The rod, used as an instrument mount and also as a point gage, will henceforth be referred to as the "probe." The probe mount was gear-driven transversely and vertically by manual operation of wheel cranks.

The horizontal location (x coordinate) and the vertical location (y coordinate) of the probe were each monitored with a displacement transducer. A transducer was attached to a fixed surface on the side of the cart and a thin stainless steel cable that reeled out of the transducer was attached to the movable probe mount. An electrical signal proportional to the horizontal extension of the cable from the transducer was routed to the computer.

At each station the left wall of the flume (looking upstream) was established as the O X coordinate datum. Prior to collecting a set of data, the probe was positioned at the wall and the transducer was zeroed and scaled. The operator could manipulate the driving wheel for the mount and monitor the x coordinate of the probe on the computer screen. There was a horizontal scale on the track the full width of the flume and a pointer on the mount so the x coordinate also could be visually checked.

The vertical position of the probe was monitored with a similar system with the y coordinate appearing on the computer screen. A vertical scale was attached to the translator and a pointer attached to the mount so that the y coordinate could be visually checked. The range of the vertical transducer was scaled using this vertical scale.

The elevation of the probe tip was determined by moving the probe carriage to the side of the flume and lowering the probe tip till it rested on top of a short piece of a aluminum angle (henceforth referred to as the flume clip) permanently attached to the flume wall slightly above the water surface (fig. 4). For each setting of the flume, the elevation of the flume clip on each side of the flume at each station was determined by differential leveling.

The probe was well built and it could be quickly placed anywhere in the cross section with a horizontal or vertical tolerance of ± 0.01 foot.

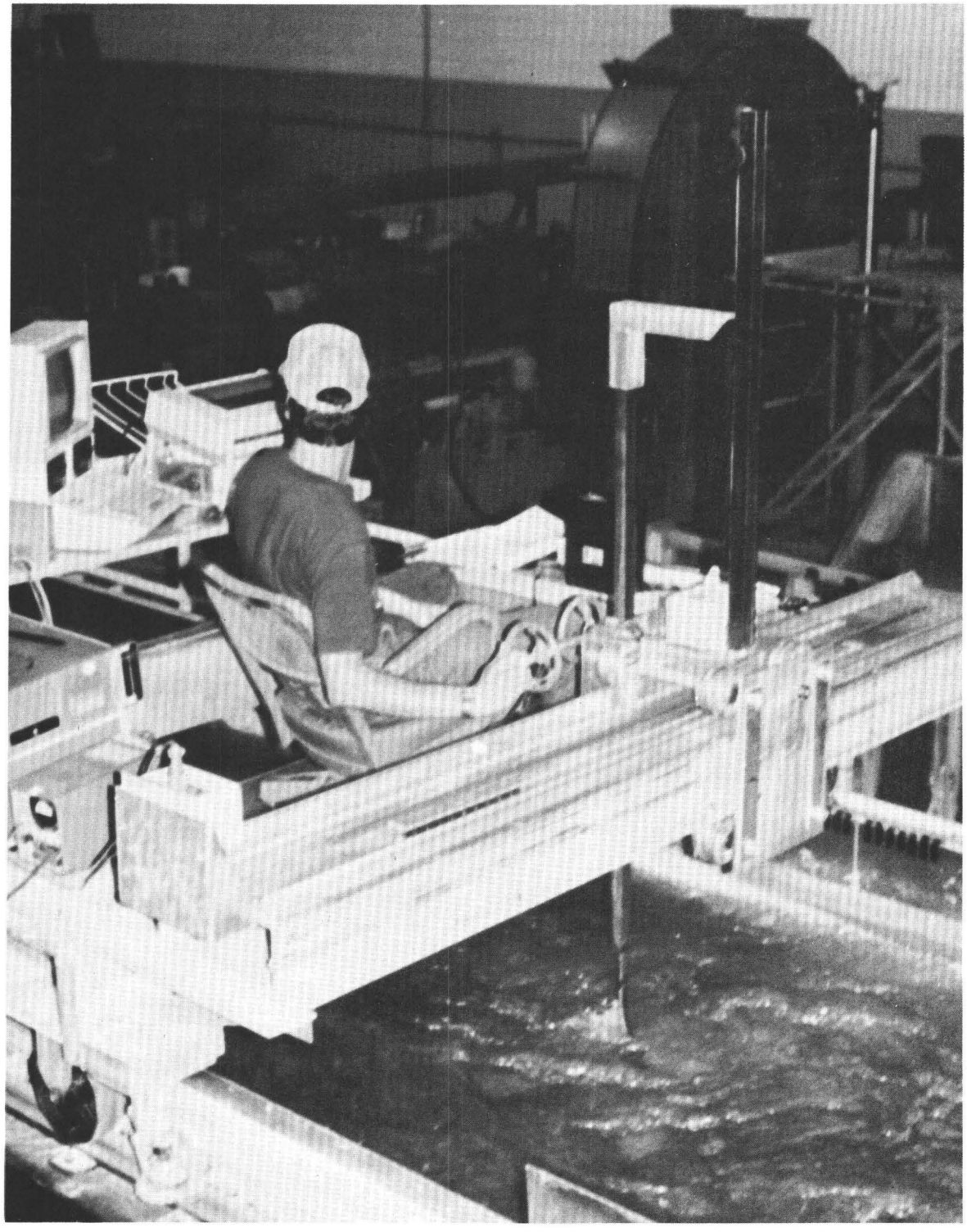

Figure 3.--Instrument carriage, probe, and data acquisition system.

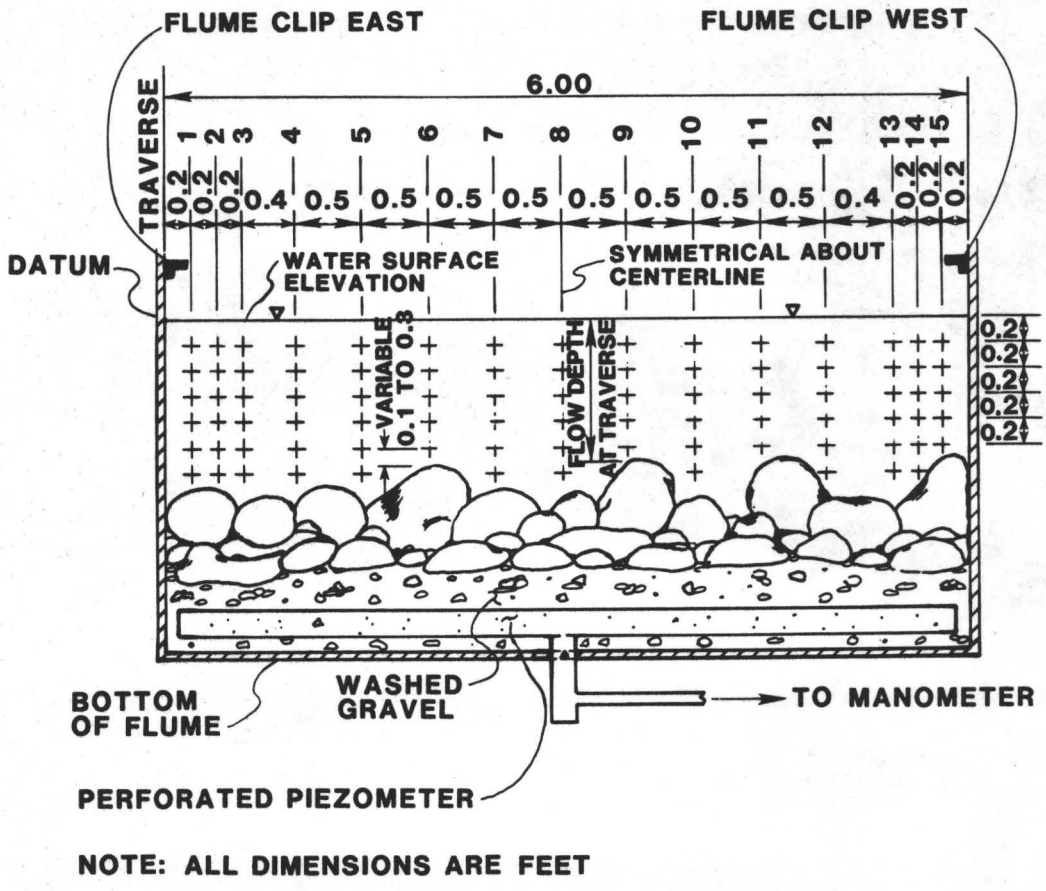


Figure 4.--Cross section at test stations showing flume clips, datum, locations of vertical traverses, and points where velocities were measured.

The bottom of the probe was used as a point gage for determining elevations of the bed. A vertical axis current meter was rigidly attached to the bottom of the probe and used for all velocity measurements. The meter, a Price pygmy current meter with a solid polymer bucket wheel equipped with an optic counting head, is shown in figure 5.

The system was configured so that when data were collected, the signal associated with the x coordinate, the y coordinate, the number of meter revolutions, and the associated increment of the time were each recorded in response to a command by the operator. All data appeared continuously on the computer screen so the operator could determine when a measurement was complete.

A program was developed to convert the data set stored on the diskette to x coordinate, y coordinate, and velocity. These data and additional run data, such as station, time data were taken, manometer column readings, orifice discharge, water temperature, and flow depth at each velocity traverse, were then properly formatted and printed out.

Figure 5.--Probe and pygmy current meter near bed of test channel.

## MEASURING TECHNIQUES

### Rock Properties

The stream rounded sandstone that was used for the bed was carefully sorted into six size categories. Each rock was hand placed through a series of square openings ("sieves") with inside dimensions of 0.75, 0.65, 0.55, 0.45, 0.35, 0.25, and 0.15 foot. Each rock of a given size category (passed 0.75 foot sieve, retained on 0.65 foot sieve, as an example) was washed and painted a specific color. The clean rock was dipped into a thin mixture of paint so that the surface of the rock was completely covered and easily identifiable but did not have a slick glossy coat and thus a different surface roughness.

After the bed surface was constructed, 180 rocks (30 of each size) were randomly selected from the surface layer between Sta 24 and 84. The maximum, intermediate, and minor axis of each rock was carefully measured with calipers. The submerged and dry weight of each rock was determined, then the rock was replaced in its original orientation and location.

The axis length was measured along three mutually perpendicular axis that intersect near the centroid of the rock. The largest dimension of the rock is defined as the length of the major axis. The length of the minor axis is the minimum length axis intercept perpendicular to the major axis. The length of the intermediate axis is the length of the axis intercept perpendicular to the minor axis and major axis. The length of the intermediate axis was considered to be the "sieve size" of the rock.

The size of each rock was identified by its color and therefore it was very easy to determine the as-built distribution of bed-surface material. A 6-foot long by 4-foot wide frame strung with string forming a 6-inch by 6-inch grid was placed on the bed and a color photograph was obtained. For Series I tests the frame was photographed at Sta 0, 12, 24, 36, 48, 60, 66, 72, 84, 96, and 108, both before tests and after all tests were completed. The surface for Series II runs was photographed before and after testing at Sta 12, 24, 36, 48, 60, 66, 72, 84, and 96. Later, the color slides were projected on a screen and the number of rocks of each specified color that appeared at the intersection of a grid were tabulated. Knowing the average weight of rocks of each color category, the size-frequency distributions of the as-built surface was determined.

The size-frequency distribution of surface material for Series I and Series II runs were, for all practical purposes, identical.

## Bed Elevations

With references to the cross section shown in figure 6, it is difficult to define the "average" elevation of the bed. For this study a series of point elevations were obtained at grid points in a rectangular sample area of the flume. The sampled area extended from 0.7 foot upstream of the test section to a point 0.7 foot downstream of the test section and covered the full width of the flume. The grid points were spaced at 0.1 foot centers both longitudinally and transversely. For example, the sample area for station 72 included a traverse at Sta 71.3 and one at Sta 72.7 with an additional 13 traverses spaced at 0.1 foot centers between.

The probe described in an earlier section was used to obtain the 885 data points at each station. It required about 2 1/2 hours to position the carriage, zero the probe, and obtain and record the 885 data points. For Series I runs, full sets of data were taken at Sta 12, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, and 96 and partial sets of data at Sta 0.7 and 106. For Series II runs, full sets of data were taken at Sta 12, 24, 36, 42, 48, 54, 60, 66, 72, 84, and 96. The x and y coordinates of the probe were recorded to 0.002 foot. True coordinates of the points are within $\pm$ 0.01 foot.

There was some operator subjectivity concerning the placement of the probe tip. If the probe happened to pass through a small gap between two large rocks and came to rest on the gravel underlayer, an unrealistic low elevation would be recorded. The underlying void under natural conditions would be filled with gravel, sand, and silt. The probe operator was directed to stop the probe in the small gap between rocks at an elevation where the bed would occur under natural conditions, as an example, at the midheight of two spherically shaped adjoining rocks.

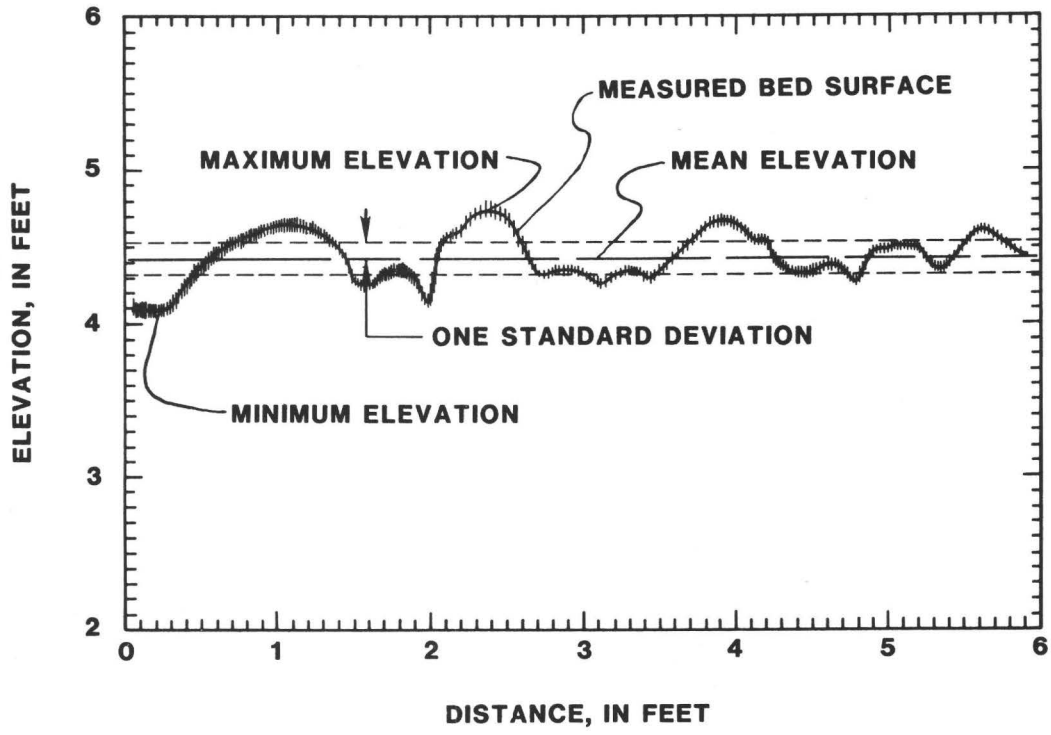


Figure 6.--Typical cross section at test section showing mean elevation, minimum elevation, maximum elevation, and one standard deviation.

## Water-Surface Elevations

Water-surface elevations for all runs were obtained from point gage readings of the water surface in the 4-inch diameter lucite water manometer, attached to a piezometer buried in the bed at the measuring station (fig. 2). The vernier of the point gage was read to 0.001 foot. The reading procedure was as follows:

1. After flow had stabilized, the point of the hook gage at each of the 10 manometers was set as quickly as possible to the water surface.

2. The vernier of the point gage was read, recorded, and the point was moved away from the water surface. This was repeated for each of the 10 manometers.

3. Steps 1 and 2 above were repeated five times; that is, five sets of independent water-surface elevations were obtained.

As a minimum, the above procedure was repeated three times; once at the beginning of the run, once midway through the run, and once at the end of the run. When velocities were measured at more than two cross sections, additional water-surface data sets were obtained.

Despite the very rough water surface, once flow was established, there was very little fluctuation in measured water-surface elevations. The dissipation of turbulence by the porous media surrounding the piezometer, coupled with the damping associated with the long 5/8-inch hose connected to the 4-inch diameter manometer, resulted in very stable time-averaged water-surface elevations.

## Discharge

Target values of discharge for most runs were established as 32, 24, 16, 12, 9, 8, 6, 4.5, and 1 $ft^3/s$. In the interest of expediency, no attempt was made to exactly hit these target discharges. On the basis of recorded valve settings from preliminary experiments, the operator could quickly position the valves such that we were near the target discharge for each run.

Actual surface discharge for each test run was obtained from orifice or weir readings with appropriate adjustment for the subsurface flow (column 4, tables 1 and 2) through a portion of the 9-inch thick layer of coarse bed material. With reference to figure 6, subsurface flow was assumed to be any flow below the mean elevation of the bed at a cross section. Runs 10A through 10C, 25A through 25D, and 24K through 24N were specifically for the purpose of determining the surface elevation of subsurface flow for a range of very small discharges and the maximum and minimum slope. These data were used for interpolating appropriate subsurface flow rates as a function of slope.

Discharge for all flows greater than about 1 $ft^3/s$ was obtained by reading manometers attached to an orifice meter. The manometers were read 10 times and the readings averaged. The discharge was then obtained from a calibration chart. This procedure was repeated each time a set of water-surface elevations was obtained. A minimum of three sets of manometer readings were obtained for each run.

For discharges less than 1 $ft^3/s$, all water at the brink of the flume was routed into a small stilling basin and measured with a $30^\circ$ V-notch sharp-crested weir. The number and frequency of point gage readings were as described above for the orifice manometer readings.

## Velocity

A series of point velocities were obtained for selected stations for target discharges of 32, 16, and 4.5 $ft^3/s$ for target slopes (henceforth referred to as slope) of 0.008, 0.013, and 0.018 for Series I roughness. Velocity profiles were obtained for similar discharges for a slope of 0.018 for Series II roughness.

A typical cross section showing the location of points where velocities were measured is shown in figure 4. For all runs the water-surface elevation (as determined by manometer readings for the station) was the reference horizontal datum. At each vertical traverse the first point velocity was measured 0.2 foot below the surface and from this point to near the bottom, every 0.2 foot. The meter was never placed closer than 0.1 foot to the bed, thus the unsampled depth ranged from 0.1 to 0.3 foot.

The measuring procedure was as follows:

1. The bed elevation at each of the 15 vertical traverses at the station had been previously determined (by measurement with the probe) and stored in the computer.

2. The water-surface elevation (determined from manometer readings) was entered into the computer.

3. The probe was appropriately zeroed and scaled, and the current meter was then attached.

4. The meter was positioned at the appropriate coordinates, and the x coordinate, y coordinate, increment of time, and number of revolutions of the meter during the increment of time were measured electronically and recorded. The computer was programmed to compute the lowest sampling point (see fig. 4) elevation at a traverse and display the information to the operator and thus prevent lowering the meter into the rocks.

The runs and stations where velocity profiles were obtained are shown in tables 1 and 2.

## FLUME CHANNEL AND HYDRAULIC DATA

A description and analysis of the physical properties of the bed material, the bed elevation data, the computed statistical parameters associated with the bed elevation measurements, flume-clip elevations and procedure for determining bed elevations for the various longitudinal slopes, and the procedure used for measuring velocity within the cross section are presented under the heading Flume-Channel Data. Velocity measurements, orifice discharges, water-surface elevations, and discharges and energy coefficients obtained by integration of velocity data are presented and discussed under the heading Hydraulic Data.

### Flume-Channel Data

#### Rock Properties

The size category and the color and average rock weight for each size category are shown in table 3.

The gradation of the as-built surface and the design gradation are shown in figure 7. The gradation of the as-built surface layer differed from the mixture placed in the flume. To minimize subsurface flow, the larger voids between rocks were filled with small rocks in the subsurface region. As a result, a larger portion of smaller material was placed in the unmeasured subsurface layer.

The lengths of the major axis, intermediate axis, and minor axis as measured with a caliper are shown for each rock for each rock size group in Appendix I A. The computed Corey shape factors (shape factor), defined as the minor axis/$\sqrt{\text{major axis x intermediate axis}}$, also are shown. The average value of axis length and shape factor and associated standard deviations also are shown for each sample of 30 rocks in a size category. The arithmetic average of the Corey shape factor for the six size categories is 0.61. With

Table 3.--Size categories and rock weight

[ft, foot; lb, pound]

| Size passed (ft) | Size retained on (ft) | Color | Average weight (lb) |
|---|---|---|---|
| 0.75 | 0.65 | orange | 29.5 |
| 0.65 | 0.55 | green | 21.4 |
| 0.55 | 0.45 | white | 14.7 |
| 0.45 | 0.35 | yellow | 7.7 |
| 0.35 | 0.25 | blue | 3.2 |
| 0.25 | 0.15 | red | 1.6 |

reference to figure 7, $D_{50}$ of the surface material was 0.62 foot, $D_{84}$ = 0.68 foot, and $D_{16}$ = 0.52 foot. The gradation coefficient defined as $G = 1/2 \left(\frac{D_{84}}{D_{50}} + \frac{D_{50}}{D_{16}}\right)$ was 1.17. The specific gravity of the material ranged from 2.44 to 2.57 with an average of 2.49.

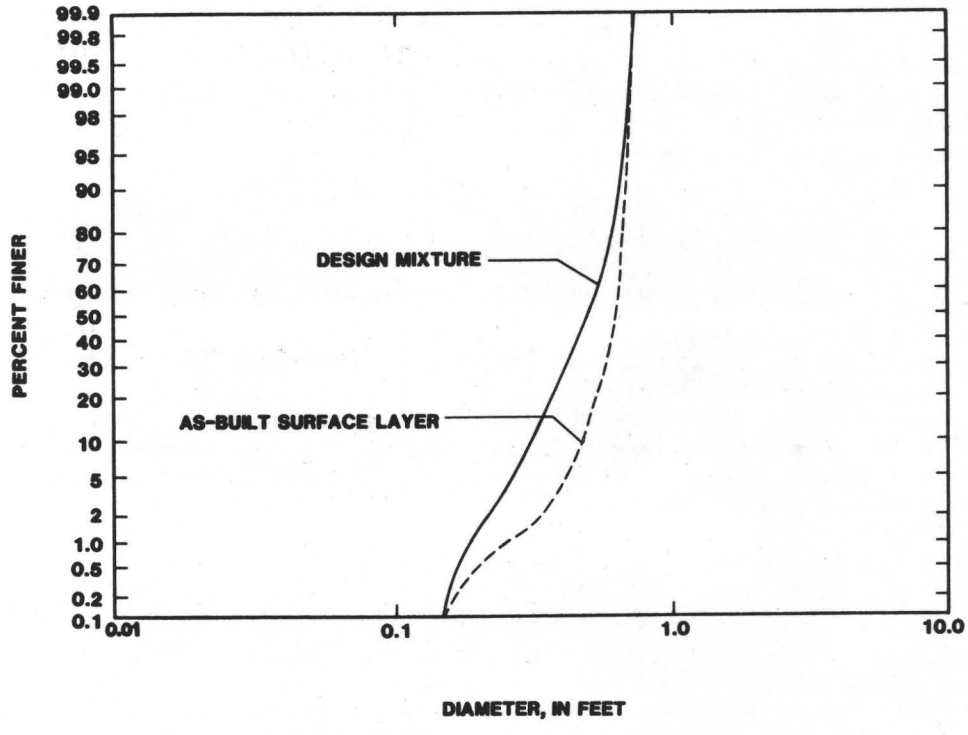


Figure 7.--Gradation curves: design mixture and as-build surface layer.

## Bed Elevation Data

The bed elevation data for Series I and for Series II are presented in Appendix II A. The station shown is the station of the cross section, X-coor. is the horizontal coordinate of the point referenced to the left wall looking upstream, and elevation is the elevation of the probe tip resting on the bed.

## Bed Elevations and Statistical Parameters

For each station the following statistical values were computer from the 885 data points at the station.

YM = The arithmetic mean elevation = $\sum_{0}^{885} Y_i/885$,

YV = The variance of elevations = $\sum_{0}^{885} (Y_i - YM)^2/885$,

YS = The skew of the elevations = $\sum_{0}^{885} (Y_i - YM)^3/885$,

YM4 = The kurtosis of elevations = $\sum_{0}^{885} (Y_i - YM)^4/885$,

SDYV = The standard deviation of YM [SDYV = $\sqrt{YV}$],

CSY = The coefficient of skew of YM [CSY = YS/(SDYV)(YV)],

dYMAX = ELYMAX - YM,

ELYMAX = The maximum point elevation at the station,

XMAX = x coordinate of ELYMAX referenced to left side of section,

ZMAX = z (longitudinal) coordinate of ELYMAX referenced to the upstream traverse for the station,

dYMIN = YM - ELYMIN,

ELYMIN = The minimum point elevation at the station,

XMIN = x coordinate of ELYMIN referenced to left side of section, and

ZMIN = z coordinate of ELYMIN referenced to the upstream traverse for the station.

The above information is presented in Appendix II B. YM is the average elevation of the bed at the station for the given bed roughness referenced to clip elevations obtained when the flume slope was set to 0.008, Series I roughness.

There were other types of information extracted from the bed elevation data. The bed was divided into three longitudinal strips. The statistical values of bed roughness for each of the strips were computed. The purpose of this analysis was to determine the uniformity of the bed roughness and to ensure that there was not bias in roughness or height of bed, that is, that one side of the bed was built consistently higher or rougher than the center strip or the other side. The results of this analysis are shown in figure 8 for Roughness I and figure 9 for Roughness II. Considering the small differences in magnitude of the various parameters from strip to strip, the large difference in elevation between maximum and minimum elevation at each station, and the pattern displayed in figures 8 and 9, the distribution of roughness was remarkably uniform throughout the test section.

## Flume Clip Elevations

The flume clip elevations shown in Appendix II C are used to obtain bed elevation at a test station for all slopes other than 0.008, Series I roughness. Bed elevation (YM) at each test station with the slope of the flume at 0.008 is given in Appendix II B. Bed elevation for a test station for any of the other slopes are computed by using YM and the increment of change in elevation of the appropriate flume clips associated with the change in slope. As an example, with the flume set at a slope of 0.008, roughness 1, YM for Sta 72 is 4.414 feet (Appendix II B) and the average value of flume clip elevations, East Stations, is 6.256 feet (Appendix II C). To obtain the bed elevation at Sta 72, for a slope of 0.0155, Series I roughness, the average of clip elevations at Sta 72, East Stations, is 5.609 feet (Appendix II C). This value is subtracted from 6.256 feet indicating a change in elevation of the clip of -0.647 foot. The elevation of the bed at Sta 72 with a slope of 0.0155 is 4.414 feet - 0.647 foot = 3.767 feet.

## Average Bed Elevation at Vertical Velocity Traverses

The elevation of a narrow, short (0.2 foot wide by 0.8 foot long) strip of bed, the "footprint" for the meter, at each vertical where a velocity traverse was obtained also was computed from the bed elevation data. The mean of the 27 point elevations (fig. 10) was considered to be the bed elevation for computation of the increment of area associated with the lowest point velocity at that vertical traverse.

There were two reasons why the "footprint" elevation was used (rather than the average elevation of the bed one half way to each adjacent vertical) for computing the depth of the vertical. If the measurement had been made in the field, the meter would have been lowered to the bed and the computed flow depth would be the distance from the water surface to the point on the bed where the foot of the meter assembly rested. The "footprint" size approximates the outline of the meter and therefore would more closely simulate a field measurement. The second reason was that because of the large variation of the height of the top of the rocks, the average elevation of the bed one half way to each adjacent vertical was, in a few cases, above the elevation where the velocity was measured. This presented a computation dilemma. The selection of the "footprint" elevation eliminated this problem. The footprint elevation for each velocity traverse is shown in Appendix II D. Note that the elevations shown are for a slope of 0.008, Series I roughness, only. Footprint elevations for other slopes must be computed using the flume clip elevations for appropriate slope settings and the procedure described in the first paragraph under Flume Clip Elevations.

| Station | ← 2.0 feet → | ↓ Flow ← 2.0 feet → | ← 2.0 feet → |
|---|---|---|---|
| | 4.942 ⊕ | 4.906 | 4.903 |
| | 5.276 ✲ | 5.232 | 5.258 |
| 1.2 | 4.538 | 4.445 Δ | 4.538 |
| | 0.173 ❐ | 0.144 | 0.128 |
| | 4.840 | 4.838 | 4.863 ⊕ |
| 12 | 5.154 | 5.090 | 5.242 ✲ |
| | 4.368 | 4.352 Δ | 4.447 |
| | 0.156 ❐ | 0.140 | 0.155 |
| | 4.770 | 4.787 ⊕ | 4.774 |
| 24 | 5.085 | 5.073 | 5.109 ✲ |
| | 4.231 Δ | 4.364 | 4.388 |
| | 0.179 ❐ | 0.159 | 0.152 |
| | 4.738 ⊕ | 4.610 | 4.738 ⊕ |
| 30 | 5.109 ✲ | 4.818 | 5.093 |
| | 4.399 | 4.302 Δ | 4.359 |
| | 0.146 | 0.129 | 0.153 ❐ |
| | 4.767 ⊕ | 4.647 | 4.704 |
| 36 | 5.083 ✲ | 5.032 | 5.032 |
| | 4.320 | 4.306 | 4.234 Δ |
| | 0.169 | 0.163 | 0.185 ❐ |
| | 4.643 | 4.596 | 4.653 ⊕ |
| 42 | 4.966 | 4.908 | 5.037 ✲ |
| | 4.161 Δ | 4.226 | 4.254 |
| | 0.186 ❐ | 0.161 | 0.170 |
| | 4.567 | 4.595 | 4.645 ⊕ |
| 48 | 4.834 | 4.917 | 4.928 ✲ |
| | 4.172 | 4.096 Δ | 4.297 |
| | 0.164 | 0.179 ❐ | 0.146 |
| | 4.474 | 4.530 | 4.555 ⊕ |
| 54 | 4.757 | 4.832 ✲ | 4.773 |
| | 4.067 | 4.063 Δ | 4.172 |
| | 0.163 ❐ | 0.163 | 0.123 |
| | 4.481 | 4.563 ⊕ | 4.556 |
| 60 | 4.755 | 4.878 | 4.906 ✲ |
| | 3.971 Δ | 4.130 | 4.003 |
| | 0.167 | 0.130 | 0.178 ❐ |
| | 4.390 ⊕ | 4.322 | 4.363 |
| 66 | 4.703 | 4.626 | 4.729 ✲ |
| | 3.937 Δ | 3.993 | 3.945 |
| | 0.172 ❐ | 0.157 | 0.157 |
| | 4.434 ⊕ | 4.392 | 4.415 |
| 72 | 4.888 ✲ | 4.779 | 4.812 |
| | 3.943 Δ | 3.961 | 3.994 |
| | 0.187 ❐ | 0.176 | 0.162 |
| | 4.276 | 4.297 | 4.319 ⊕ |
| 78 | 4.546 | 4.725 ✲ | 4.632 |
| | 3.943 Δ | 3.944 | 3.997 |
| | 0.125 | 0.164 ❐ | 0.160 |
| | 4.272 | 4.316 ⊕ | 4.268 |
| 84 | 4.618 | 4.638 | 4.700 ✲ |
| | 3.947 Δ | 3.949 | 3.870 |
| | 0.178 | 0.177 | 0.190 ❐ |
| | 4.130 | 4.125 | 4.137 ⊕ |
| 96 | 4.481 | 4.453 | 4.564 ✲ |
| | 3.832 Δ | 3.832 Δ | 3.832 Δ |
| | 0.162 | 0.164 | 0.167 ❐ |
| | 3.934 | 3.903 | 3.955 ⊕ |
| 107 | 4.318 | 4.197 | 4.389 ✲ |
| | 3.576 | 3.543 Δ | 3.545 |
| | 0.133 | 0.155 | 0.181 ❐ |

EXPLANATION

⊕ Maximum value of mean elevation (feet)

✲ Maximum point elevation (feet)

Δ Minimum point elevation (feet)

❐ Maximum value of standard deviation (roughness) (feet)

Symbols are typical for each station.

Figure 8.--Plan view of bed showing mean elevation maximum elevation, minimum elevation, and standard deviation (roughness) for 2-foot wide longitudinal strips at each station (Roughness I).

| Station | ← 2.0 feet → | ↓ Flow ← 2.0 feet → | ← 2.0 feet → |
|---|---|---|---|
| | 4.858 ⊕ | 4.844 | 4.798 |
| 12 | 5.056 | 5.097 ✲ | 5.080 |
| | 4.504 | 4.480 | 4.415 Δ |
| | 0.139 ❐ | 0.130 | 0.128 |
| | 4.740 | 4.801 ⊕ | 4.745 |
| 24 | 5.012 | 5.103 ✲ | 5.079 |
| | 4.364 Δ | 4.395 | 4.431 |
| | 0.161 ❐ | 0.146 | 0.132 |
| | 4.685 | 4.701 ⊕ | 4.669 |
| 36 | 4.916 | 4.922 | 4.946 ✲ |
| | 4.387 | 4.331 Δ | 4.331 Δ |
| | 0.120 | 0.137 | 0.152 ❐ |
| | 4.645 ⊕ | 4.653 | 4.679 ⊕ |
| 42 | 4.883 | 4.946 | 4.950 ✲ |
| | 4.227 Δ | 4.349 | 4.353 |
| | 0.118 | 0.138 | 0.139 ❐ |
| | 4.539 | 4.542 | 4.602 ⊕ |
| 48 | 4.811 | 4.772 | 4.863 ✲ |
| | 4.199 Δ | 4.240 | 4.272 |
| | 0.116 | 0.135 | 0.146 ❐ |
| | 4.502 | 4.448 | 4.518 ⊕ |
| 54 | 4.678 | 4.670 | 4.734 ✲ |
| | 4.128 | 4.146 | 4.087 Δ |
| | 0.129 ❐ | 0.118 | 0.120 |
| | 4.452 | 4.495 | 4.534 ⊕ |
| 60 | 4.665 | 4.679 | 4.784 ✲ |
| | 4.072 Δ | 4.147 | 4.181 |
| | 0.126 | 0.103 | 0.137 ❐ |
| | 4.437 ⊕ | 4.361 | 4.389 |
| 66 | 4.665 ✲ | 4.625 | 4.633 |
| | 4.087 | 4.028 | 4.008 Δ |
| | 0.124 | 0.133 ❐ | 0.125 |
| | 4.338 | 4.287 | 4.374 ⊕ |
| 72 | 4.538 | 4.494 | 4.660 ✲ |
| | 3.961 | 3.853 Δ | 3.904 |
| | 0.115 | 0.147 | 0.151 ❐ |
| | 4.226 ⊕ | 4.179 | 4.217 |
| 84 | 4.416 | 4.466 ✲ | 4.445 |
| | 3.846 | 3.796 Δ | 3.889 |
| | 0.116 | 0.152 ❐ | 0.131 |
| | 4.109 | 4.136 | 4.169 ⊕ |
| 96 | 4.353 | 4.369 | 4.458 ✲ |
| | 3.865 | 3.849 Δ | 3.869 |
| | 0.111 | 0.128 | 0.159 ❐ |

EXPLANATION

⊕ Maximum value of mean elevation (feet)

✲ Maximum point elevation (feet)

Δ Minimum point elevation (feet)

❐ Maximum value of standard deviation (roughness) (feet)

Symbols are typical for each station.

Figure 9.--Plan view of bed showing mean elevation, maximum elevation, minimum elevation, and standard deviation (roughness) for 2-foot wide longitudinal strips at each station (Roughness II).

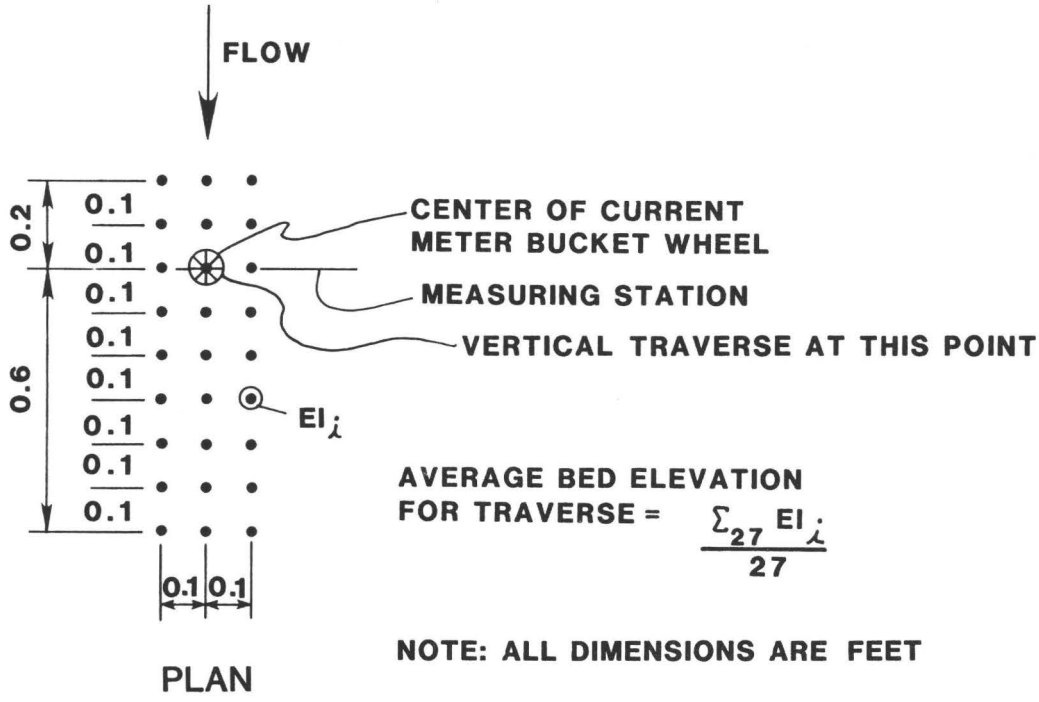


Figure 10.--Plan view showing footprint area under meter and location of meter axis.

## Hydraulic Data

### Velocity Measurements

All velocity traverse data are presented in Appendix III A. Velocity traverse data were obtained for target discharges of 32, 16, and 4.5 $ft^3/s$ for selected slopes. Run number, calibration equation for the meter, target slope, roughness series, station, and water temperature are presented at the top of each data set. HT is the approximate flow depth at the traverse as determined by sounding with the probe. Horiz is the horizontal distance from the left wall looking upstream, vert is the elevation of the point velocity, and velo is the measured point velocity. The location where point velocities were measured is shown on figure 4.

The velocity data were used to examine the variation in the energy coefficient, alpha ($\alpha$), from section to section, for a check of flow continuity from section to section, to determine the accuracy of flow measurements with shallow depths and large roughness, and for the larger flows, to obtain data for the computations of boundary shears for refinement of sidewall correction factors. Some of the velocity traverse data are unsatisfactory. This will be discussed in the Integrated Discharge and Alpha Values section.

### Orifice Discharges and Water-Surface Elevations

The arithmetic average of orifice discharges, the standard deviation of the discharges, and the number of sets of discharge measurements are shown for each run in Appendix III B. Also, the arithmetic average and the standard

deviation of the water-surface elevation at each station is shown. The number of blocks indicates the number of times the water-surface elevation was measured during the run.

The quality of the orifice discharge measurements and the measured water-surface elevation are judged to be excellent. Standard deviation of discharge measurements were small, generally less than 0.002 $ft^3/s$. Standard deviation of the water-surface elevations generally averaged less than 0.003 foot.

## Integrated Discharges and Alpha Values

The integrated discharge (Q), the average velocity (VAVE), momentum coefficient ($\beta$), and energy coefficient ($\alpha$) for the entire cross section were computed for each cross section where velocity profile data were obtained.

The various parameters were computed as follows:

Discharge for the section = $Q = \Sigma_n V_n (\Delta A_n)$.

$\Delta A_n$ is the increment of area associated with $V_n$ as defined in figure 11.

$V_n$ is the point velocity, see figure 11 for location.

Average velocity for the section: $VAVE = Q/\Sigma_n(\Delta A_n)$.

The momentum coefficient for the section: beta $(\beta) = \dfrac{\Sigma_n V^2_n (\Delta A_n)}{(VAVE)^2 A}$.

The energy coefficient for the section: alpha $(\alpha) = \dfrac{\Sigma_n V^3_n (\Delta A_n)}{(VAVE)^3 A}$.

Area of the section = $A = \Sigma_n \Delta A_n$ .

The orifice discharge, the station where velocities were measured, integrated discharges, and alpha values are summarized in tables 1 and 2. The reader is referred to these tables for side-by-side comparison of parameters.

It was anticipated that integrated discharges for the Q = 4.5 $ft^3/s$ runs (Run 5, 8A, 13C, 16A, and 24C) would vary substantially from the orifice discharges. At 4.5 $ft^3/s$ there were a few rocks protruding through the water surface and there were many vertical traverses where flow depth was less than 0.3 foot and therefore no point velocities were obtained. Additionally, the wheel of the pygmy meter was fixed in the horizontal plane. In cases where there was large rock immediately upstream or downstream of the measuring traverse, there was obviously a substantial vertical component (pitch) of velocity. It is known that output from a wheel cup meter must be adjusted when there is a substantial pitch to the velocity impinging on the wheel. Though we had initially planned to develop a probe to measure pitch angles at some of the points where it was severe, time and budget limitations precluded the development and use of the pitch probe and therefore no measured pitch angles were available for correcting meter output.

Also, because the major purpose of the study was a roughness study with uniform relative roughness throughout the reach, there was no "smoothing of the bed" by removal or rearrangement of large material and preparation of a "measuring section" as may occur where field measurements are obtained. Thus, the accuracy of measured discharge in the flume cannot be directly compared to results obtained in the field.

As noted in tables 1 and 2, because of the absence of velocity data in certain vertical traverses, it was necessary to examine the data, prorate the area where velocities were not measured to the nearest measured point velocity, and perform the computations by hand. Most integrated discharge for the 4.5 $ft^3/s$ flow values are consistently less than those obtained using orifice measurements.

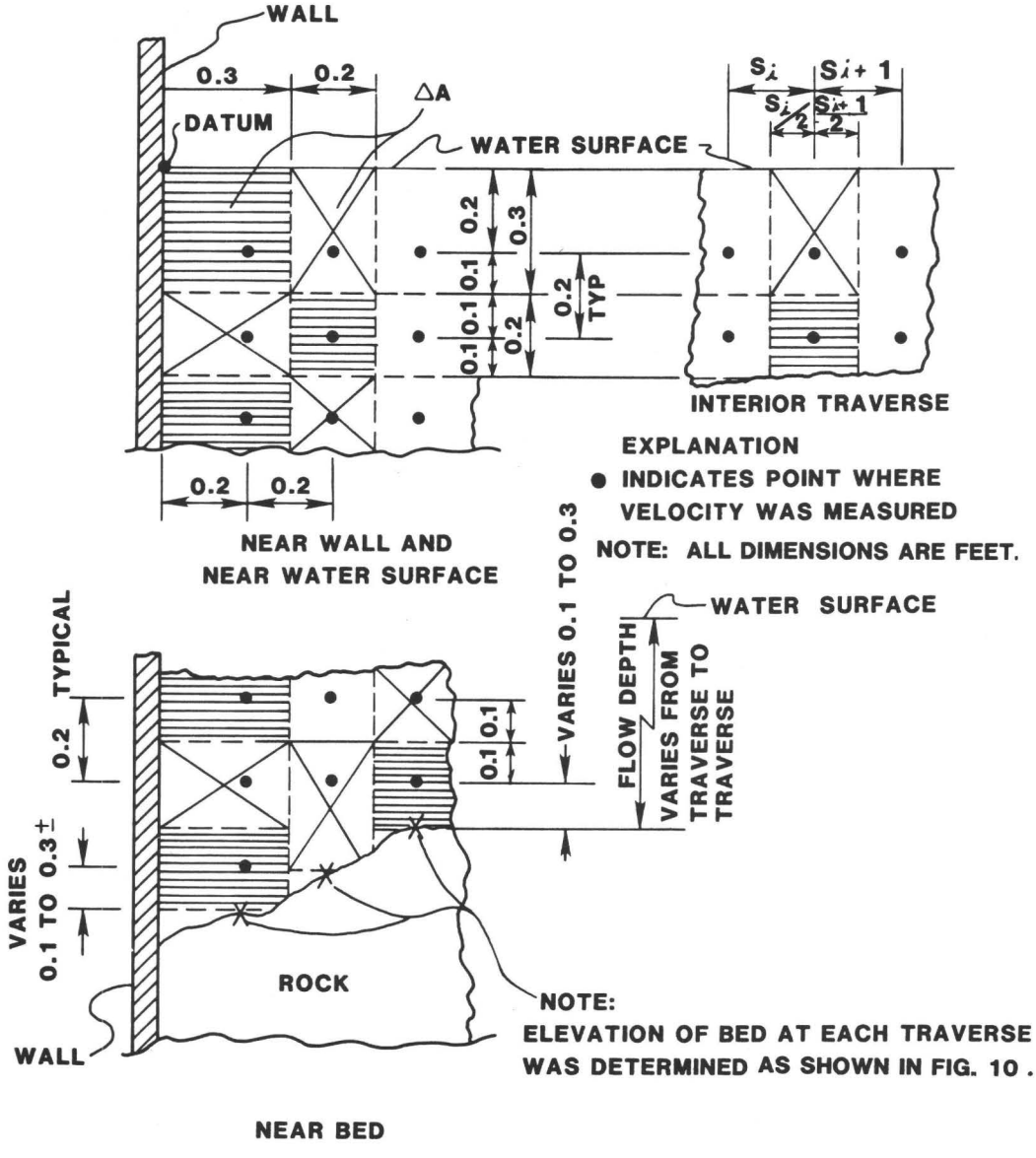


Figure 11.--Incremental areas associated with point velocities that were used for computing integrated discharges.

The integrated discharges for Runs 1, 12, 16F, 24H, and 24J are all within a reasonable range of the orifice discharge corrected for subsurface flow. The integrated discharges for Runs 2, 6, 7, 13, 16F, 16H, and 17ABC are substantially different from the orifice discharges. Data from Runs 1 and 6 were examined in detail. The mean flow depths for Run 6 were a few hundreds of a foot larger than the mean flow depths for Run 1, consistent with the slight differences in discharges. There were no apparent variation in water-surface elevation and orifice discharge taken before and after each set of velocity measurements at a station. The flow areas used to compute the integrated discharges appear to be reasonable.

Several vertical-velocity profiles from Run 6 were superimposed on plotted velocity profile at the same traverse for Run 1. All profiles were very similar in shape but the magnitude of the velocity vectors for Run 6 were consistently smaller (the plotted points were displaced in proportion to the ratio of integrated discharge). This indicated a problem with the system used to measure velocities. Data for Run 6 could be corrected by applying a constant multiplier (the average integrated discharge for Run 1 divided by the average integrated discharge for Run 6) to each point velocity. The integrated discharges for Run 16H cannot reasonably be adjusted in this manner.

All data were processed and discharges were integrated in a preliminary manner within a day or two of when they were collected so we were immediately aware of the problem. A different meter was tried for ensuing runs and also both meters were recalibrated (meters were calibrated several times throughout the experiment including after the final set of measurements). No significant change in calibration of either meter was detectable throughout the period when data were collected.

Because of the uncertainties associated with the velocity measurements, the fact that velocity data were not needed for the computing roughness values (the main objective of the study), and because of time and money constraints, the velocity data-collection program for Series II runs was substantially curtailed. The velocity traverses where integrated discharges are within ± 5 percent of orifice discharges will be utilized as planned.

The computed alpha values (correction coefficient for nonuniform velocity) are generally similar from section to section for discharges of 32 and 16.5 $ft^3/s$. For all stations between 36 and 84, the flow depth is essentially constant for each run and therefore there was very little variation in average velocity from station to station.

## SUMMARY

Hydraulic data for 103 runs in a shallow, high-gradient open-channel flume with large bed material have been presented. The bed surface was natural rock ranging in size from 0.15 to 0.75 foot. Tests were conducted for two arrangements of the same rock, one having a standard deviation of bed elevation of 0.168 foot, and the other having a standard deviation of 0.133 foot. The bed material was stable for all flows that ranged from 0.7 to 32.1 $ft^3/s$ and for all bed slopes that ranged from 0.008 to 0.018.

## APPENDIX I

A. Rock properties. All dimensions are in feet.

ROCK SIZE/SHAPE DATA - size 0.75-0.65, rough=1

| A MAJOR | X I INTER | S MINOR | SHAPE FACT. | A MAJOR | X I INTER | S MINOR | SHAPE FACT. |
|---|---|---|---|---|---|---|---|
| 0.855 | 0.773 | 0.573 | 0.705 | 0.971 | 0.751 | 0.478 | 0.560 |
| 0.783 | 0.681 | 0.530 | 0.726 | 0.968 | 0.805 | 0.542 | 0.614 |
| 0.841 | 0.728 | 0.389 | 0.497 | 1.133 | 0.727 | 0.469 | 0.517 |
| 0.907 | 0.806 | 0.338 | 0.395 | 0.969 | 0.645 | 0.560 | 0.708 |
| 0.993 | 0.684 | 0.399 | 0.484 | 1.046 | 0.758 | 0.632 | 0.710 |
| 0.893 | 0.730 | 0.389 | 0.482 | 0.955 | 0.855 | 0.468 | 0.518 |
| 0.929 | 0.785 | 0.477 | 0.559 | 0.888 | 0.666 | 0.635 | 0.826 |
| 0.785 | 0.647 | 0.526 | 0.738 | 0.834 | 0.618 | 0.576 | 0.802 |
| 1.185 | 0.750 | 0.466 | 0.494 | 1.028 | 0.785 | 0.343 | 0.382 |
| 1.135 | 0.792 | 0.454 | 0.479 | 0.775 | 0.630 | 0.476 | 0.681 |
| 0.822 | 0.723 | 0.684 | 0.887 | 0.735 | 0.702 | 0.577 | 0.803 |
| 0.906 | 0.832 | 0.541 | 0.623 | 0.655 | 0.695 | 0.542 | 0.803 |
| 0.904 | 0.735 | 0.426 | 0.523 | 0.899 | 0.725 | 0.632 | 0.783 |
| 1.016 | 0.591 | 0.572 | 0.738 | 0.965 | 0.788 | 0.398 | 0.456 |
| 0.953 | 0.745 | 0.507 | 0.602 | 0.976 | 0.745 | 0.604 | 0.708 |

| ROCK PARAMETER - 30 SAMPLES | AVERAGE | STD. DEVIATION |
|---|---|---|
| MAJOR AXIS LENGTH | 0.923 | 0.1171 |
| INTERMEDIATE AXIS LENGTH | 0.730 | 0.0636 |
| MINOR AXIS LENGTH | 0.507 | 0.0890 |
| SHAPE FACTOR | 0.627 | 0.1383 |

ROCK SIZE/SHAPE DATA - size 0.65-0.55, rough=1

| A MAJOR | X I INTER | S MINOR | SHAPE FACT. | A MAJOR | X I INTER | S MINOR | SHAPE FACT. |
|---|---|---|---|---|---|---|---|
| 0.800 | 0.722 | 0.490 | 0.645 | 0.920 | 0.784 | 0.324 | 0.381 |
| 0.707 | 0.685 | 0.473 | 0.680 | 0.935 | 0.694 | 0.403 | 0.500 |
| 0.865 | 0.681 | 0.371 | 0.483 | 0.715 | 0.658 | 0.359 | 0.523 |
| 0.811 | 0.716 | 0.650 | 0.853 | 0.865 | 0.684 | 0.388 | 0.504 |
| 0.868 | 0.694 | 0.385 | 0.496 | 0.981 | 0.681 | 0.459 | 0.562 |
| 0.904 | 0.675 | 0.484 | 0.620 | 1.005 | 0.779 | 0.420 | 0.475 |
| 0.847 | 0.698 | 0.369 | 0.480 | 1.062 | 0.680 | 0.465 | 0.547 |
| 0.818 | 0.712 | 0.308 | 0.404 | 0.845 | 0.698 | 0.319 | 0.415 |
| 1.087 | 0.700 | 0.463 | 0.531 | 0.811 | 0.680 | 0.578 | 0.778 |
| 0.714 | 0.641 | 0.392 | 0.579 | 0.704 | 0.674 | 0.235 | 0.341 |
| 0.868 | 0.720 | 0.620 | 0.784 | 0.909 | 0.692 | 0.265 | 0.334 |
| 0.993 | 0.597 | 0.382 | 0.496 | 1.108 | 0.853 | 0.397 | 0.408 |
| 0.731 | 0.731 | 0.330 | 0.451 | 1.028 | 0.701 | 0.378 | 0.445 |
| 0.960 | 0.633 | 0.552 | 0.708 | 1.063 | 0.723 | 0.311 | 0.355 |
| 0.729 | 0.677 | 0.527 | 0.750 | 0.878 | 0.869 | 0.330 | 0.378 |

| ROCK PARAMETER - 30 SAMPLES | AVERAGE | STD. DEVIATION |
|---|---|---|
| MAJOR AXIS LENGTH | 0.884 | 0.1179 |
| INTERMEDIATE AXIS LENGTH | 0.704 | 0.0553 |
| MINOR AXIS LENGTH | 0.414 | 0.0995 |
| SHAPE FACTOR | 0.530 | 0.1387 |

ROCK SIZE/SHAPE DATA - size 0.55-0.45, rough=1

| A MAJOR | X I INTER | S MINOR | SHAPE FACT. | A MAJOR | X I INTER | S MINOR | SHAPE FACT. |
|---|---|---|---|---|---|---|---|
| 0.640 | 0.600 | 0.425 | 0.686 | 0.824 | 0.538 | 0.460 | 0.691 |
| 0.618 | 0.551 | 0.258 | 0.442 | 0.756 | 0.528 | 0.365 | 0.578 |
| 0.565 | 0.495 | 0.377 | 0.713 | 0.734 | 0.488 | 0.478 | 0.799 |
| 0.638 | 0.627 | 0.389 | 0.615 | 0.934 | 0.522 | 0.455 | 0.652 |
| 0.730 | 0.676 | 0.373 | 0.531 | 0.758 | 0.550 | 0.528 | 0.818 |
| 1.000 | 0.595 | 0.374 | 0.485 | 0.767 | 0.496 | 0.461 | 0.747 |
| 0.823 | 0.655 | 0.458 | 0.624 | 0.930 | 0.633 | 0.268 | 0.349 |
| 0.727 | 0.587 | 0.423 | 0.648 | 0.672 | 0.509 | 0.300 | 0.513 |
| 0.688 | 0.497 | 0.328 | 0.561 | 0.747 | 0.521 | 0.521 | 0.835 |
| 0.564 | 0.521 | 0.401 | 0.740 | 0.788 | 0.549 | 0.321 | 0.488 |
| 0.739 | 0.563 | 0.326 | 0.505 | 0.693 | 0.601 | 0.483 | 0.748 |
| 0.869 | 0.559 | 0.509 | 0.730 | 0.810 | 0.568 | 0.453 | 0.668 |
| 0.770 | 0.632 | 0.449 | 0.644 | 0.879 | 0.649 | 0.355 | 0.470 |
| 0.816 | 0.602 | 0.388 | 0.554 | 0.689 | 0.528 | 0.478 | 0.793 |
| 0.740 | 0.740 | 0.393 | 0.531 | 0.714 | 0.553 | 0.481 | 0.765 |

| ROCK PARAMETER - 30 SAMPLES | AVERAGE | STD. DEVIATION |
|---|---|---|
| MAJOR AXIS LENGTH | 0.754 | 0.1017 |
| INTERMEDIATE AXIS LENGTH | 0.571 | 0.0602 |
| MINOR AXIS LENGTH | 0.409 | 0.0721 |
| SHAPE FACTOR | 0.631 | 0.1238 |

ROCK SIZE/SHAPE DATA - size 0.45-0.35, rough=1

| A MAJOR | X I INTER | S MINOR | SHAPE FACT. | A MAJOR | X I INTER | S MINOR | SHAPE FACT. |
|---|---|---|---|---|---|---|---|
| 0.789 | 0.435 | 0.405 | 0.691 | 0.490 | 0.475 | 0.266 | 0.551 |
| 0.451 | 0.425 | 0.347 | 0.793 | 0.645 | 0.507 | 0.348 | 0.609 |
| 0.745 | 0.463 | 0.310 | 0.528 | 0.622 | 0.463 | 0.252 | 0.470 |
| 0.696 | 0.402 | 0.397 | 0.751 | 0.651 | 0.528 | 0.220 | 0.375 |
| 0.568 | 0.370 | 0.346 | 0.755 | 0.576 | 0.441 | 0.331 | 0.657 |
| 0.560 | 0.359 | 0.301 | 0.671 | 0.485 | 0.390 | 0.281 | 0.646 |
| 0.767 | 0.495 | 0.372 | 0.604 | 0.573 | 0.552 | 0.299 | 0.532 |
| 0.645 | 0.445 | 0.365 | 0.681 | 0.615 | 0.451 | 0.330 | 0.627 |
| 0.581 | 0.505 | 0.254 | 0.469 | 0.766 | 0.475 | 0.259 | 0.429 |
| 0.511 | 0.421 | 0.274 | 0.591 | 0.799 | 0.462 | 0.351 | 0.578 |
| 0.582 | 0.376 | 0.303 | 0.648 | 0.676 | 0.523 | 0.366 | 0.616 |
| 0.602 | 0.467 | 0.342 | 0.645 | 0.574 | 0.490 | 0.273 | 0.515 |
| 0.576 | 0.458 | 0.455 | 0.886 | 0.590 | 0.416 | 0.391 | 0.789 |
| 0.731 | 0.521 | 0.253 | 0.410 | 0.673 | 0.578 | 0.287 | 0.460 |
| 0.475 | 0.387 | 0.368 | 0.858 | 0.482 | 0.448 | 0.345 | 0.742 |

| ROCK PARAMETER - 30 SAMPLES | AVERAGE | STD. DEVIATION |
|---|---|---|
| MAJOR AXIS LENGTH | 0.617 | 0.0965 |
| INTERMEDIATE AXIS LENGTH | 0.458 | 0.0537 |
| MINOR AXIS LENGTH | 0.323 | 0.0542 |
| SHAPE FACTOR | 0.619 | 0.1288 |

ROCK SIZE/SHAPE DATA - size 0.35-0.25, rough=1

| A MAJOR | X I INTER | S MINOR | SHAPE FACT. | A MAJOR | X I INTER | S MINOR | SHAPE FACT. |
|---|---|---|---|---|---|---|---|
| 0.496 | 0.359 | 0.359 | 0.851 | 0.312 | 0.285 | 0.216 | 0.724 |
| 0.438 | 0.322 | 0.321 | 0.855 | 0.363 | 0.306 | 0.132 | 0.396 |
| 0.411 | 0.342 | 0.275 | 0.733 | 0.446 | 0.381 | 0.234 | 0.568 |
| 0.439 | 0.318 | 0.241 | 0.645 | 0.488 | 0.292 | 0.252 | 0.668 |
| 0.532 | 0.463 | 0.230 | 0.463 | 0.434 | 0.361 | 0.259 | 0.654 |
| 0.467 | 0.278 | 0.206 | 0.572 | 0.508 | 0.378 | 0.245 | 0.559 |
| 0.452 | 0.334 | 0.225 | 0.579 | 0.605 | 0.334 | 0.314 | 0.699 |
| 0.599 | 0.347 | 0.347 | 0.761 | 0.397 | 0.322 | 0.158 | 0.442 |
| 0.465 | 0.374 | 0.325 | 0.779 | 0.543 | 0.290 | 0.227 | 0.572 |
| 0.347 | 0.292 | 0.145 | 0.456 | 0.381 | 0.328 | 0.325 | 0.919 |
| 0.393 | 0.336 | 0.173 | 0.476 | 0.377 | 0.340 | 0.251 | 0.701 |
| 0.487 | 0.320 | 0.317 | 0.803 | 0.392 | 0.342 | 0.190 | 0.519 |
| 0.451 | 0.355 | 0.277 | 0.692 | 0.403 | 0.388 | 0.161 | 0.407 |
| 0.490 | 0.398 | 0.214 | 0.485 | 0.402 | 0.328 | 0.273 | 0.752 |
| 0.446 | 0.361 | 0.243 | 0.606 | 0.368 | 0.331 | 0.245 | |

| ROCK PARAMETER - 30 SAMPLES | AVERAGE | STD. DEVIATION |
|---|---|---|
| MAJOR AXIS LENGTH | 0.444 | 0.0686 |
| INTERMEDIATE AXIS LENGTH | 0.340 | 0.0382 |
| MINOR AXIS LENGTH | 0.246 | 0.0591 |
| SHAPE FACTOR | 0.635 | 0.1392 |

ROCK SIZE/SHAPE DATA - size 0.25-0.15, rough=1

| A MAJOR | X I INTER | S MINOR | SHAPE FACT. | A MAJOR | X I INTER | S MINOR | SHAPE FACT. |
|---|---|---|---|---|---|---|---|
| 0.344 | 0.229 | 0.229 | 0.816 | 0.398 | 0.273 | 0.239 | 0.725 |
| 0.489 | 0.246 | 0.246 | 0.709 | 0.417 | 0.228 | 0.188 | 0.610 |
| 0.432 | 0.242 | 0.200 | 0.619 | 0.242 | 0.167 | 0.119 | 0.592 |
| 0.330 | 0.244 | 0.189 | 0.666 | 0.359 | 0.215 | 0.178 | 0.641 |
| 0.360 | 0.270 | 0.118 | 0.378 | 0.492 | 0.202 | 0.130 | 0.412 |
| 0.503 | 0.282 | 0.160 | 0.425 | 0.319 | 0.319 | 0.166 | 0.520 |
| 0.292 | 0.292 | 0.167 | 0.572 | 0.524 | 0.242 | 0.190 | 0.534 |
| 0.283 | 0.259 | 0.178 | 0.657 | 0.481 | 0.237 | 0.237 | 0.702 |
| 0.255 | 0.180 | 0.179 | 0.836 | 0.404 | 0.252 | 0.188 | 0.589 |
| 0.347 | 0.275 | 0.184 | 0.596 | 0.318 | 0.233 | 0.232 | 0.852 |
| 0.385 | 0.288 | 0.179 | 0.538 | 0.406 | 0.262 | 0.152 | 0.466 |
| 0.322 | 0.250 | 0.137 | 0.483 | 0.338 | 0.303 | 0.117 | 0.366 |
| 0.352 | 0.288 | 0.196 | 0.616 | 0.306 | 0.272 | 0.200 | 0.693 |
| 0.421 | 0.248 | 0.233 | 0.721 | 0.315 | 0.312 | 0.142 | 0.453 |
| 0.299 | 0.261 | 0.164 | 0.587 | 0.300 | 0.262 | 0.208 | 0.742 |

| ROCK PARAMETER - 30 SAMPLES | AVERAGE | STD. DEVIATION |
|---|---|---|
| MAJOR AXIS LENGTH | 0.368 | 0.0746 |
| INTERMEDIATE AXIS LENGTH | 0.254 | 0.0346 |
| MINOR AXIS LENGTH | 0.182 | 0.0366 |
| SHAPE FACTOR | 0.604 | 0.1286 |

# APPENDIX II

A. Bed elevation data, Roughness 1 and Roughness 2.

The left column is the x coordinate (distance from left wall looking upstream) and the column headings are stations along the centerline of the flume. All dimensions are in feet.

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.635 | 4.651 | 4.592 | 4.788 | 4.812 | 5.032 | 5.199 | 5.213 | 5.189 | 5.155 | 4.824 | 4.913 | 4.939 | 4.943 | 4.929 |
| 0.2 | 4.675 | 4.675 | 4.738 | 4.895 | 5.155 | 5.260 | 5.262 | 5.232 | 5.215 | 5.199 | 5.151 | 4.937 | 4.949 | 4.951 | 4.947 |
| 0.3 | 4.546 | 4.772 | 4.873 | 4.911 | 5.238 | 5.276 | 5.270 | 5.248 | 5.226 | 5.213 | 5.167 | 4.933 | 4.941 | 4.937 | 4.949 |
| 0.4 | 4.538 | 4.853 | 4.893 | 4.893 | 5.203 | 5.272 | 5.264 | 5.252 | 5.228 | 5.199 | 5.103 | 4.925 | 4.929 | 4.937 | 4.998 |
| 0.5 | 4.562 | 4.820 | 4.871 | 4.865 | 5.165 | 5.256 | 5.248 | 5.228 | 5.191 | 5.026 | 4.933 | 4.953 | 4.949 | 4.949 | 5.060 |
| 0.6 | 4.554 | 4.748 | 4.834 | 4.836 | 5.103 | 5.191 | 5.161 | 5.119 | 4.836 | 4.919 | 4.941 | 4.965 | 4.965 | 4.945 | 5.125 |
| 0.7 | 4.594 | 4.550 | 4.756 | 4.740 | 4.609 | 5.098 | 4.800 | 4.772 | 4.889 | 4.947 | 4.969 | 4.927 | 4.907 | 5.058 | 5.173 |
| 0.8 | 4.647 | 4.641 | 4.544 | 4.546 | 4.588 | 4.796 | 4.790 | 4.921 | 4.973 | 4.949 | 4.951 | 4.953 | 4.885 | 5.062 | 5.159 |
| 0.9 | 4.653 | 4.643 | 5.080 | 5.030 | 4.969 | 4.911 | 4.756 | 4.947 | 4.992 | 4.986 | 4.723 | 4.885 | 4.905 | 4.998 | 5.135 |
| 1.0 | 4.651 | 5.119 | 5.125 | 5.094 | 5.022 | 4.957 | 4.903 | 4.953 | 4.990 | 4.986 | 4.917 | 4.909 | 4.937 | 4.897 | 5.002 |
| 1.1 | 4.647 | 5.111 | 5.121 | 5.101 | 5.054 | 5.002 | 4.943 | 4.937 | 4.969 | 4.951 | 4.933 | 4.905 | 4.941 | 4.961 | 4.726 |
| 1.2 | 4.623 | 5.036 | 5.109 | 5.098 | 5.062 | 5.010 | 4.961 | 4.909 | 4.915 | 4.921 | 4.921 | 4.883 | 4.965 | 4.994 | 4.857 |
| 1.3 | 4.538 | 5.062 | 5.094 | 5.098 | 5.080 | 5.022 | 4.973 | 4.844 | 4.885 | 4.899 | 4.820 | 4.857 | 4.961 | 4.996 | 4.969 |
| 1.4 | 4.558 | 4.554 | 5.072 | 5.084 | 5.070 | 5.030 | 4.961 | 4.723 | 4.820 | 4.758 | 4.655 | 4.732 | 4.939 | 4.963 | 4.933 |
| 1.5 | 4.818 | 4.796 | 4.661 | 4.746 | 4.913 | 4.945 | 4.919 | 4.562 | 4.627 | 4.699 | 4.798 | 4.877 | 4.901 | 4.957 | 5.034 |
| 1.6 | 4.869 | 4.840 | 4.810 | 4.824 | 4.941 | 4.965 | 4.919 | 4.804 | 4.776 | 4.760 | 4.949 | 5.022 | 5.080 | 5.111 | 5.135 |
| 1.7 | 4.909 | 4.893 | 4.861 | 4.869 | 4.933 | 4.957 | 4.909 | 4.830 | 4.792 | 4.927 | 5.038 | 5.105 | 5.163 | 5.183 | 5.189 |
| 1.8 | 4.957 | 4.931 | 4.909 | 4.889 | 4.921 | 4.941 | 4.897 | 4.840 | 4.798 | 4.978 | 5.111 | 5.165 | 5.189 | 5.191 | 5.187 |
| 1.9 | 4.969 | 4.982 | 4.959 | 4.879 | 4.901 | 4.913 | 4.848 | 4.846 | 4.822 | 5.022 | 5.135 | 5.171 | 5.175 | 5.171 | 5.153 |
| 2.0 | 4.820 | 4.969 | 4.982 | 4.613 | 4.619 | 4.857 | 4.941 | 4.973 | 4.832 | 4.796 | 5.092 | 5.123 | 5.127 | 5.123 | 5.098 |
| 2.1 | 4.594 | 4.776 | 4.885 | 4.594 | 4.655 | 4.877 | 4.961 | 4.990 | 4.921 | 4.788 | 4.996 | 5.046 | 5.030 | 4.978 | 4.911 |
| 2.2 | 4.679 | 4.657 | 4.764 | 4.933 | 5.086 | 5.135 | 5.092 | 5.058 | 4.917 | 4.445 | 4.695 | 4.836 | 4.832 | 4.800 | 4.728 |
| 2.3 | 4.691 | 4.673 | 4.621 | 5.034 | 5.159 | 5.211 | 5.207 | 5.086 | 4.840 | 4.840 | 4.848 | 4.846 | 4.838 | 4.802 | 4.784 |
| 2.4 | 4.691 | 4.679 | 4.726 | 5.098 | 5.169 | 5.228 | 5.232 | 5.064 | 4.865 | 4.877 | 4.873 | 4.861 | 4.853 | 4.853 | 4.836 |
| 2.5 | 4.784 | 4.824 | 4.990 | 5.086 | 5.135 | 5.191 | 5.226 | 5.086 | 4.957 | 4.905 | 4.893 | 4.875 | 4.873 | 4.865 | 4.863 |
| 2.6 | 4.901 | 4.919 | 4.982 | 5.058 | 5.103 | 5.155 | 5.199 | 5.125 | 4.909 | 4.923 | 4.913 | 4.893 | 4.885 | 4.879 | 4.873 |
| 2.7 | 4.984 | 4.998 | 4.913 | 5.020 | 5.070 | 5.123 | 5.167 | 5.151 | 4.893 | 4.931 | 4.927 | 4.909 | 4.897 | 4.893 | 4.877 |
| 2.8 | 5.014 | 4.994 | 4.532 | 4.925 | 5.022 | 5.064 | 5.082 | 4.788 | 4.873 | 4.929 | 4.929 | 4.917 | 4.905 | 4.897 | 4.699 |
| 2.9 | 4.992 | 4.931 | 4.542 | 4.590 | 4.588 | 4.715 | 4.772 | 4.784 | 4.772 | 4.905 | 4.921 | 4.909 | 4.889 | 4.853 | 4.812 |
| 3.0 | 4.861 | 4.800 | 4.865 | 4.877 | 4.861 | 4.705 | 4.728 | 4.758 | 4.760 | 4.760 | 4.663 | 4.740 | 4.824 | 4.961 | 4.994 |
| 3.1 | 4.473 | 4.873 | 4.913 | 4.909 | 4.913 | 4.901 | 4.885 | 4.820 | 4.570 | 4.580 | 4.629 | 4.728 | 4.947 | 5.022 | 5.034 |
| 3.2 | 4.804 | 4.877 | 4.917 | 4.915 | 4.917 | 4.913 | 4.901 | 4.857 | 4.588 | 4.857 | 4.848 | 4.760 | 4.992 | 5.024 | 5.046 |
| 3.3 | 4.726 | 4.788 | 4.836 | 4.877 | 4.893 | 4.903 | 4.885 | 4.832 | 4.905 | 4.917 | 4.905 | 4.853 | 4.965 | 5.014 | 5.058 |
| 3.4 | 4.800 | 4.861 | 4.919 | 4.947 | 4.657 | 4.726 | 4.925 | 4.933 | 4.921 | 4.943 | 4.935 | 4.909 | 4.873 | 5.002 | 5.058 |
| 3.5 | 4.824 | 4.893 | 4.949 | 5.002 | 5.034 | 4.723 | 4.959 | 4.903 | 4.949 | 4.965 | 4.965 | 4.937 | 4.897 | 4.726 | 5.048 |
| 3.6 | 4.844 | 4.915 | 4.969 | 5.026 | 5.068 | 5.078 | 4.978 | 4.984 | 4.957 | 4.949 | 4.969 | 4.945 | 4.901 | 4.728 | 4.705 |
| 3.7 | 4.873 | 4.941 | 5.004 | 5.062 | 5.101 | 5.123 | 5.046 | 4.986 | 4.967 | 4.957 | 4.957 | 4.945 | 4.913 | 4.728 | 4.723 |
| 3.8 | 4.893 | 4.967 | 5.034 | 5.092 | 5.119 | 5.147 | 5.066 | 4.971 | 4.982 | 4.969 | 4.963 | 4.953 | 4.842 | 4.728 | 4.730 |
| 3.9 | 4.905 | 4.990 | 5.070 | 5.127 | 5.177 | 5.153 | 5.090 | 4.927 | 4.994 | 4.994 | 4.986 | 4.961 | 4.869 | 4.728 | 4.740 |
| 4.0 | 4.921 | 5.002 | 5.086 | 5.151 | 5.191 | 5.159 | 5.054 | 4.990 | 5.018 | 5.016 | 4.963 | 4.879 | 4.800 | 4.740 | 4.750 |
| 4.1 | 4.921 | 5.014 | 5.078 | 5.062 | 5.078 | 5.054 | 4.836 | 4.758 | 5.006 | 4.969 | 4.877 | 4.723 | 4.744 | 4.752 | 4.764 |
| 4.2 | 4.808 | 4.836 | 4.877 | 4.893 | 4.840 | 4.830 | 4.861 | 4.756 | 4.982 | 4.885 | 4.550 | 4.734 | 4.752 | 4.764 | 4.774 |
| 4.3 | 4.861 | 4.883 | 4.919 | 4.949 | 4.933 | 4.796 | 4.812 | 4.788 | 4.913 | 4.909 | 4.836 | 4.740 | 4.760 | 4.774 | 4.782 |
| 4.4 | 4.889 | 4.925 | 4.965 | 4.986 | 4.969 | 4.909 | 4.857 | 4.832 | 4.927 | 4.925 | 4.853 | 4.748 | 4.764 | 4.772 | 4.760 |
| 4.5 | 4.885 | 4.949 | 4.965 | 5.002 | 4.996 | 4.937 | 4.917 | 4.861 | 4.887 | 4.889 | 4.800 | 4.728 | 4.732 | 4.772 | 4.788 |
| 4.6 | 4.803 | 4.953 | 4.984 | 5.002 | 4.990 | 4.877 | 4.921 | 4.889 | 4.728 | 4.647 | 4.816 | 4.855 | 4.879 | 4.885 | 4.889 |
| 4.7 | 4.842 | 4.901 | 4.965 | 4.941 | 4.877 | 4.949 | 4.992 | 5.022 | 4.990 | 4.905 | 4.943 | 4.961 | 4.969 | 4.959 | 4.945 |
| 4.8 | 4.901 | 4.933 | 4.949 | 4.887 | 4.907 | 4.969 | 5.022 | 5.030 | 5.030 | 4.949 | 5.002 | 5.014 | 5.008 | 5.002 | 4.982 |
| 4.9 | 4.893 | 4.929 | 4.935 | 4.808 | 4.873 | 4.935 | 5.006 | 5.022 | 4.990 | 4.949 | 5.006 | 5.022 | 5.026 | 5.014 | 4.998 |
| 5.0 | 4.760 | 4.937 | 4.824 | 4.708 | 4.853 | 4.913 | 4.969 | 4.978 | 4.857 | 4.788 | 4.969 | 5.098 | 5.163 | 5.238 | 4.990 |
| 5.1 | 4.982 | 5.014 | 5.006 | 4.901 | 4.812 | 4.873 | 4.909 | 4.857 | 4.623 | 4.732 | 4.814 | 5.159 | 5.258 | 5.254 | 5.181 |
| 5.2 | 4.988 | 5.006 | 5.006 | 4.988 | 4.917 | 4.792 | 4.804 | 4.721 | 4.873 | 4.897 | 4.861 | 5.119 | 5.193 | 5.246 | 5.215 |
| 5.3 | 4.955 | 4.957 | 4.957 | 4.961 | 4.941 | 4.853 | 4.625 | 4.542 | 4.949 | 4.945 | 4.925 | 4.893 | 5.072 | 5.111 | 5.125 |
| 5.4 | 4.905 | 4.917 | 4.921 | 4.917 | 4.901 | 4.802 | 4.840 | 4.788 | 4.973 | 4.980 | 4.957 | 4.913 | 4.877 | 4.961 | 4.957 |
| 5.5 | 4.619 | 4.653 | 4.857 | 4.871 | 4.824 | 4.933 | 4.969 | 4.893 | 4.994 | 4.992 | 4.976 | 4.929 | 4.899 | 4.728 | 4.889 |
| 5.6 | 4.552 | 4.562 | 4.730 | 4.881 | 4.933 | 4.917 | 4.919 | 4.786 | 5.006 | 5.010 | 5.006 | 4.953 | 4.929 | 4.859 | 4.953 |
| 5.7 | 4.643 | 4.538 | 4.871 | 4.929 | 4.879 | 4.836 | 4.810 | 4.603 | 5.026 | 5.042 | 5.042 | 5.014 | 4.965 | 4.877 | 4.971 |
| 5.8 | 4.631 | 4.627 | 4.764 | 4.861 | 4.804 | 4.885 | 4.867 | 4.802 | 5.018 | 5.042 | 5.046 | 5.018 | 4.969 | 4.851 | 4.994 |
| 5.9 | 4.645 | 4.625 | 4.580 | 4.711 | 4.865 | 4.913 | 4.869 | 4.804 | 4.978 | 5.002 | 4.992 | 4.963 | 4.917 | 4.740 | 4.969 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 11.3 | 11.4 | 11.5 | 11.6 | 11.7 | 11.8 | 11.9 | 12.0 | 12.1 | 12.2 | 12.3 | 12.4 | 12.5 | 12.6 | 12.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.667 | 4.728 | 4.615 | 4.834 | 4.881 | 4.899 | 4.854 | 4.773 | 4.733 | 4.840 | 4.850 | 4.745 | 4.619 | 4.435 | 4.648 |
| 0.2 | 4.816 | 4.792 | 4.929 | 4.969 | 4.967 | 4.937 | 4.846 | 4.765 | 4.805 | 4.943 | 4.951 | 4.838 | 4.726 | 4.658 | 4.676 |
| 0.3 | 4.788 | 4.945 | 5.016 | 5.030 | 5.004 | 4.923 | 4.816 | 4.735 | 4.874 | 4.975 | 5.016 | 4.935 | 4.830 | 4.720 | 4.741 |
| 0.4 | 4.770 | 4.992 | 5.058 | 5.054 | 4.994 | 4.897 | 4.793 | 4.718 | 4.870 | 4.955 | 5.008 | 5.000 | 4.899 | 4.769 | 4.781 |
| 0.5 | 4.744 | 4.929 | 5.060 | 5.048 | 4.965 | 4.877 | 4.765 | 4.668 | 4.510 | 4.899 | 4.955 | 4.919 | 4.749 | 4.771 | 4.793 |
| 0.6 | 5.012 | 4.844 | 5.030 | 5.014 | 4.933 | 4.840 | 4.733 | 4.765 | 4.704 | 4.627 | 4.546 | 4.510 | 4.652 | 4.722 | 4.733 |
| 0.7 | 5.030 | 4.988 | 4.945 | 4.933 | 4.752 | 4.836 | 4.878 | 4.866 | 4.818 | 4.720 | 4.639 | 4.625 | 4.575 | 4.542 | 4.579 |
| 0.8 | 5.034 | 5.004 | 4.961 | 4.893 | 4.808 | 4.897 | 4.919 | 4.931 | 4.919 | 4.801 | 4.781 | 4.686 | 4.571 | 4.621 | 4.668 |
| 0.9 | 5.040 | 5.002 | 4.967 | 4.935 | 4.832 | 4.865 | 4.915 | 4.935 | 4.899 | 4.858 | 4.749 | 4.660 | 4.583 | 4.672 | 4.684 |
| 1.0 | 5.046 | 5.014 | 4.971 | 4.935 | 4.820 | 4.760 | 4.866 | 4.894 | 4.876 | 4.830 | 4.726 | 4.639 | 4.603 | 4.672 | 4.678 |
| 1.1 | 5.046 | 5.018 | 4.980 | 4.943 | 4.574 | 4.647 | 4.777 | 4.830 | 4.834 | 4.789 | 4.720 | 4.613 | 4.591 | 4.656 | 4.652 |
| 1.2 | 5.050 | 5.022 | 4.978 | 4.671 | 4.679 | 4.756 | 5.034 | 5.081 | 5.008 | 4.878 | 4.660 | 4.429 | 4.573 | 4.617 | 4.611 |
| 1.3 | 4.897 | 4.967 | 4.945 | 4.927 | 4.663 | 4.895 | 5.097 | 5.135 | 5.093 | 5.018 | 4.868 | 4.724 | 4.538 | 4.575 | 4.558 |
| 1.4 | 4.762 | 4.933 | 4.953 | 4.945 | 4.913 | 4.953 | 5.129 | 5.154 | 5.129 | 5.073 | 4.986 | 4.854 | 4.664 | 4.514 | 4.494 |
| 1.5 | 4.695 | 4.883 | 4.953 | 4.945 | 4.921 | 5.030 | 5.107 | 5.105 | 5.105 | 5.065 | 4.998 | 4.927 | 4.783 | 4.684 | 4.589 |
| 1.6 | 4.990 | 4.953 | 4.917 | 4.943 | 4.919 | 4.986 | 5.058 | 5.028 | 4.996 | 4.955 | 4.909 | 4.897 | 4.757 | 4.807 | 4.787 |
| 1.7 | 4.978 | 4.986 | 4.980 | 4.903 | 4.919 | 4.772 | 4.822 | 4.886 | 4.830 | 4.809 | 4.856 | 4.818 | 4.779 | 4.846 | 4.836 |
| 1.8 | 4.947 | 4.955 | 4.953 | 4.933 | 4.840 | 4.824 | 4.769 | 4.923 | 4.959 | 4.838 | 4.368 | 4.569 | 4.826 | 4.862 | 4.846 |
| 1.9 | 4.941 | 4.933 | 4.913 | 4.875 | 4.510 | 4.788 | 4.791 | 5.008 | 5.016 | 4.975 | 4.465 | 4.558 | 4.805 | 4.834 | 4.777 |
| 2.0 | 4.885 | 4.861 | 4.840 | 5.026 | 4.971 | 4.851 | 4.951 | 5.018 | 5.004 | 4.959 | 4.473 | 4.560 | 4.595 | 4.781 | 4.818 |
| 2.1 | 4.832 | 4.816 | 5.026 | 5.066 | 5.070 | 4.984 | 5.020 | 5.016 | 4.969 | 4.927 | 4.834 | 4.352 | 4.530 | 4.753 | 4.785 |
| 2.2 | 4.857 | 4.840 | 5.028 | 5.046 | 5.058 | 5.016 | 5.022 | 4.996 | 4.947 | 4.911 | 4.720 | 4.739 | 4.656 | 4.700 | 4.793 |
| 2.3 | 4.853 | 4.840 | 4.982 | 5.002 | 4.986 | 5.034 | 5.016 | 4.984 | 4.941 | 4.886 | 4.781 | 4.781 | 4.660 | 4.779 | 4.842 |
| 2.4 | 4.842 | 4.820 | 4.778 | 4.869 | 5.034 | 5.034 | 5.020 | 4.992 | 4.931 | 4.785 | 4.801 | 4.801 | 4.637 | 4.836 | 4.899 |
| 2.5 | 4.820 | 4.764 | 4.927 | 5.050 | 5.046 | 5.040 | 5.026 | 4.984 | 4.789 | 4.805 | 4.816 | 4.809 | 4.615 | 4.842 | 4.917 |
| 2.6 | 4.748 | 4.538 | 5.044 | 5.058 | 5.042 | 5.030 | 5.006 | 4.797 | 4.814 | 4.834 | 4.850 | 4.830 | 4.753 | 4.842 | 4.899 |
| 2.7 | 4.596 | 4.851 | 5.034 | 5.030 | 5.016 | 4.998 | 4.587 | 4.814 | 4.846 | 4.856 | 4.866 | 4.844 | 4.781 | 4.850 | 4.921 |
| 2.8 | 4.667 | 4.647 | 4.768 | 4.784 | 4.518 | 4.510 | 4.546 | 4.852 | 4.868 | 4.862 | 4.838 | 4.785 | 4.795 | 4.899 | 4.953 |
| 2.9 | 5.034 | 4.695 | 4.681 | 4.663 | 4.728 | 4.752 | 4.745 | 4.753 | 4.797 | 4.676 | 4.741 | 4.733 | 4.720 | 4.834 | 4.911 |
| 3.0 | 5.062 | 4.695 | 4.659 | 4.768 | 4.792 | 4.808 | 4.807 | 4.814 | 4.814 | 4.842 | 4.749 | 4.741 | 4.720 | 4.676 | 4.631 |
| 3.1 | 5.034 | 4.619 | 4.824 | 4.748 | 4.836 | 4.873 | 4.899 | 4.919 | 4.903 | 4.870 | 4.805 | 4.745 | 4.720 | 4.672 | 4.623 |
| 3.2 | 4.711 | 4.891 | 4.905 | 4.913 | 4.853 | 4.853 | 4.907 | 4.927 | 4.915 | 4.874 | 4.811 | 4.741 | 4.720 | 4.668 | 4.607 |
| 3.3 | 4.770 | 4.953 | 4.969 | 4.994 | 4.996 | 4.933 | 4.838 | 4.886 | 4.907 | 4.840 | 4.698 | 4.722 | 4.686 | 4.627 | 4.621 |
| 3.4 | 4.806 | 5.006 | 5.022 | 5.022 | 5.014 | 5.006 | 4.724 | 4.700 | 4.664 | 4.615 | 4.429 | 4.449 | 4.445 | 4.518 | 4.639 |
| 3.5 | 4.816 | 4.756 | 5.026 | 5.024 | 5.016 | 5.014 | 4.722 | 4.684 | 4.660 | 4.619 | 4.696 | 4.710 | 4.733 | 4.724 | 4.631 |
| 3.6 | 4.792 | 4.927 | 4.976 | 5.026 | 5.026 | 5.014 | 4.716 | 4.684 | 4.757 | 4.773 | 4.777 | 4.781 | 4.781 | 4.769 | 4.767 |
| 3.7 | 4.933 | 5.006 | 4.973 | 4.953 | 4.973 | 4.744 | 4.814 | 4.672 | 4.816 | 4.830 | 4.807 | 4.805 | 4.809 | 4.803 | 4.799 |
| 3.8 | 5.034 | 5.058 | 5.034 | 4.998 | 4.925 | 4.881 | 4.899 | 4.814 | 4.834 | 4.846 | 4.858 | 4.842 | 4.832 | 4.826 | 4.818 |
| 3.9 | 5.074 | 5.090 | 5.066 | 5.014 | 4.919 | 4.917 | 4.939 | 4.874 | 4.854 | 4.870 | 4.880 | 4.874 | 4.864 | 4.870 | 4.868 |
| 4.0 | 5.092 | 5.092 | 5.062 | 4.965 | 4.885 | 4.967 | 4.943 | 4.894 | 4.781 | 4.818 | 4.866 | 4.882 | 4.903 | 4.909 | 4.890 |
| 4.1 | 5.082 | 5.078 | 4.990 | 4.903 | 4.929 | 4.949 | 4.911 | 4.870 | 4.741 | 4.793 | 4.830 | 4.797 | 4.781 | 4.534 | 4.518 |
| 4.2 | 4.792 | 4.990 | 4.917 | 4.576 | 4.889 | 4.877 | 4.846 | 4.805 | 4.789 | 4.838 | 4.856 | 4.830 | 4.747 | 4.536 | 4.611 |
| 4.3 | 4.820 | 4.808 | 4.768 | 4.782 | 4.558 | 4.649 | 4.676 | 4.765 | 4.809 | 4.850 | 4.814 | 4.828 | 4.722 | 4.882 | 4.919 |
| 4.4 | 4.796 | 4.728 | 4.822 | 4.828 | 4.631 | 4.711 | 4.652 | 4.595 | 4.830 | 4.858 | 4.769 | 4.753 | 4.652 | 4.890 | 4.919 |
| 4.5 | 4.653 | 4.609 | 4.772 | 4.760 | 4.703 | 4.804 | 4.619 | 4.666 | 4.724 | 4.789 | 4.793 | 4.777 | 4.834 | 4.890 | 4.927 |
| 4.6 | 4.550 | 4.534 | 4.683 | 4.675 | 4.877 | 4.863 | 4.807 | 4.733 | 4.751 | 4.814 | 4.834 | 4.803 | 4.700 | 4.899 | 4.919 |
| 4.7 | 5.082 | 4.663 | 4.707 | 4.711 | 4.889 | 4.919 | 4.870 | 4.724 | 4.773 | 4.789 | 4.826 | 4.805 | 4.731 | 4.785 | 4.903 |
| 4.8 | 5.111 | 4.788 | 4.786 | 4.772 | 4.764 | 4.901 | 4.858 | 4.660 | 4.781 | 4.807 | 4.801 | 4.801 | 4.733 | 4.781 | 4.797 |
| 4.9 | 5.131 | 4.832 | 4.812 | 4.824 | 4.796 | 4.742 | 4.619 | 4.984 | 5.040 | 5.026 | 4.935 | 4.771 | 4.793 | 4.828 | 4.850 |
| 5.0 | 5.153 | 4.840 | 4.867 | 4.869 | 4.820 | 4.736 | 4.917 | 5.014 | 5.067 | 5.056 | 5.000 | 4.882 | 4.809 | 4.870 | 4.894 |
| 5.1 | 5.143 | 4.885 | 4.889 | 4.881 | 4.820 | 4.707 | 4.909 | 4.992 | 5.073 | 5.065 | 5.012 | 4.943 | 4.850 | 4.785 | 4.907 |
| 5.2 | 5.064 | 4.865 | 4.885 | 4.899 | 4.836 | 4.707 | 4.882 | 4.990 | 5.065 | 5.069 | 5.016 | 4.953 | 4.874 | 4.814 | 4.743 |
| 5.3 | 4.879 | 4.877 | 4.897 | 4.885 | 4.469 | 4.447 | 4.846 | 4.975 | 5.048 | 5.069 | 5.024 | 4.971 | 4.899 | 4.842 | 4.757 |
| 5.4 | 4.760 | 4.803 | 4.905 | 4.851 | 4.822 | 4.709 | 4.830 | 4.953 | 5.028 | 5.062 | 5.036 | 4.984 | 4.919 | 4.858 | 5.077 |
| 5.5 | 5.062 | 5.098 | 5.151 | 5.131 | 5.096 | 4.978 | 4.921 | 4.894 | 4.998 | 5.040 | 5.032 | 4.980 | 4.907 | 4.826 | 5.150 |
| 5.6 | 5.123 | 5.175 | 5.163 | 5.175 | 5.123 | 5.046 | 4.959 | 4.826 | 4.931 | 4.996 | 4.984 | 4.874 | 4.753 | 4.660 | 5.154 |
| 5.7 | 5.213 | 5.228 | 5.199 | 5.133 | 5.066 | 5.004 | 4.911 | 4.757 | 4.852 | 4.899 | 4.785 | 4.680 | 4.599 | 4.724 | 4.868 |
| 5.8 | 5.223 | 5.242 | 5.159 | 5.111 | 5.002 | 4.937 | 4.858 | 4.625 | 4.720 | 4.722 | 4.627 | 4.680 | 4.645 | 4.737 | 4.704 |
| 5.9 | 5.183 | 5.175 | 5.115 | 5.014 | 4.941 | 4.857 | 4.828 | 4.652 | 4.544 | 4.502 | 4.635 | 4.761 | 4.700 | 4.735 | 4.712 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 23.3 | 23.4 | 23.5 | 23.6 | 23.7 | 23.8 | 23.9 | 24.0 | 24.1 | 24.2 | 24.3 | 24.4 | 24.5 | 24.6 | 24.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.718 | 4.722 | 4.696 | 4.656 | 4.599 | 4.482 | 4.488 | 4.502 | 4.538 | 4.666 | 4.696 | 4.702 | 4.665 | 4.617 | 4.550 |
| 0.2 | 4.688 | 4.684 | 4.635 | 4.589 | 4.692 | 4.540 | 4.494 | 4.502 | 4.583 | 4.684 | 4.761 | 4.763 | 4.679 | 4.609 | 4.750 |
| 0.3 | 4.749 | 4.728 | 4.409 | 4.686 | 4.696 | 4.676 | 4.477 | 4.469 | 4.676 | 4.834 | 4.816 | 4.731 | 4.633 | 4.536 | 4.750 |
| 0.4 | 4.747 | 4.743 | 4.731 | 4.660 | 4.680 | 4.546 | 4.469 | 4.643 | 4.850 | 4.866 | 4.785 | 4.696 | 4.663 | 4.625 | 4.631 |
| 0.5 | 4.737 | 4.741 | 4.731 | 4.722 | 4.599 | 4.684 | 4.619 | 4.471 | 4.761 | 4.720 | 4.698 | 4.767 | 4.778 | 4.734 | 4.633 |
| 0.6 | 4.550 | 4.741 | 4.739 | 4.726 | 5.036 | 5.030 | 5.006 | 4.534 | 4.502 | 4.617 | 4.722 | 4.818 | 4.786 | 4.730 | 4.649 |
| 0.7 | 4.522 | 4.508 | 4.621 | 5.044 | 5.077 | 5.073 | 5.046 | 4.969 | 4.892 | 4.660 | 4.769 | 4.830 | 4.794 | 4.730 | 4.659 |
| 0.8 | 4.486 | 4.469 | 4.984 | 5.048 | 5.085 | 5.077 | 5.050 | 4.971 | 4.907 | 4.834 | 4.793 | 4.822 | 4.776 | 4.710 | 4.633 |
| 0.9 | 4.425 | 4.397 | 4.951 | 5.028 | 5.073 | 5.052 | 5.036 | 4.988 | 4.931 | 4.854 | 4.801 | 4.807 | 4.740 | 4.679 | 4.750 |
| 1.0 | 4.494 | 4.498 | 4.947 | 5.024 | 5.062 | 5.054 | 5.028 | 4.977 | 4.939 | 4.864 | 4.773 | 4.7o7 | 4.697 | 4.756 | 4.818 |
| 1.1 | 5.008 | 4.512 | 4.874 | 4.965 | 5.052 | 5.062 | 5.028 | 4.980 | 4.939 | 4.870 | 4.720 | 4.696 | 4.645 | 4.810 | 4.875 |
| 1.2 | 5.028 | 5.020 | 4.506 | 4.923 | 4.988 | 5.052 | 5.040 | 4.975 | 4.939 | 4.878 | 4.652 | 4.637 | 4.570 | 4.435 | 4.827 |
| 1.3 | 5.018 | 5.030 | 4.720 | 4.866 | 4.917 | 5.004 | 5.028 | 4.971 | 4.947 | 4.445 | 4.471 | 4.451 | 4.633 | 4.633 | 4.732 |
| 1.4 | 5.004 | 5.016 | 4.947 | 4.793 | 4.826 | 4.943 | 4.996 | 4.975 | 4.4o1 | 4.530 | 4.502 | 4.477 | 4.661 | 4.661 | 4.881 |
| 1.5 | 4.984 | 5.002 | 5.004 | 4.765 | 4.745 | 4.538 | 4.706 | 4.716 | 4.633 | 4.542 | 4.536 | 4.500 | 4.677 | 4.952 | 4.982 |
| 1.6 | 4.963 | 4.984 | 4.996 | 4.927 | 4.747 | 4.674 | 4.785 | 4.785 | 4.724 | 4.443 | 4.336 | 4.231 | 4.415 | 5.008 | 5.012 |
| 1.7 | 4.947 | 4.963 | 4.971 | 4.842 | 4.502 | 4.694 | 4.818 | 4.818 | 4.769 | 4.680 | 4.380 | 4.637 | 4.939 | 5.002 | 5.006 |
| 1.8 | 4.874 | 4.915 | 4.907 | 4.830 | 4.765 | 4.789 | 4.826 | 4.818 | 4.771 | 4.674 | 4.656 | 4.846 | 4.891 | 4.968 | 4.986 |
| 1.9 | 4.777 | 4.834 | 4.797 | 4.814 | 4.737 | 4.767 | 4.805 | 4.791 | 4.793 | 4.801 | 4.650 | 4.868 | 4.883 | 4.907 | 4.972 |
| 2.0 | 4.720 | 4.731 | 4.761 | 4.753 | 4.518 | 4.765 | 4.814 | 4.834 | 4.874 | 4.886 | 4.872 | 4.834 | 4.869 | 4.905 | 4.962 |
| 2.1 | 4.882 | 4.830 | 4.789 | 4.534 | 4.733 | 4.797 | 4.826 | 4.836 | 4.842 | 4.858 | 4.868 | 4.633 | 4.843 | 4.907 | 4.923 |
| 2.2 | 4.969 | 4.947 | 4.925 | 4.860 | 4.724 | 4.739 | 4.753 | 4.767 | 4.781 | 4.793 | 4.801 | 4.652 | 4.611 | 4.597 | 4.774 |
| 2.3 | 4.996 | 4.980 | 4.957 | 4.939 | 4.899 | 4.672 | 4.684 | 4.692 | 4.722 | 4.720 | 4.720 | 4.595 | 4.593 | 4.774 | 4.869 |
| 2.4 | 5.000 | 4.984 | 4.957 | 4.939 | 4.923 | 4.571 | 4.593 | 4.571 | 4.oo5 | 4.648 | 4.522 | 4.571 | 4.810 | 4.827 | 4.871 |
| 2.5 | 4.980 | 4.961 | 4.943 | 4.937 | 4.911 | 4.538 | 4.550 | 4.587 | 4.615 | 4.599 | 4.882 | 4.949 | 5.022 | 4.956 | 4.806 |
| 2.6 | 4.937 | 4.933 | 4.939 | 4.913 | 4.814 | 4.585 | 4.621 | 4.449 | 4.599 | 4.935 | 5.038 | 5.073 | 5.066 | 5.008 | 4.935 |
| 2.7 | 4.818 | 4.846 | 4.848 | 4.627 | 4.629 | 4.599 | 4.609 | 4.520 | 4.583 | 4.963 | 5.028 | 5.060 | 5.068 | 5.032 | 4.984 |
| 2.8 | 4.591 | 4.818 | 4.846 | 4.882 | 4.623 | 4.599 | 4.534 | 4.656 | 4.556 | 4.980 | 5.022 | 5.042 | 5.024 | 4.994 | 4.962 |
| 2.9 | 4.874 | 4.882 | 4.915 | 4.931 | 4.888 | 4.565 | 4.773 | 4.720 | 4.648 | 4.939 | 4.998 | 5.002 | 4.966 | 4.923 | 4.891 |
| 3.0 | 4.935 | 4.947 | 4.973 | 4.975 | 4.890 | 4.720 | 4.765 | 4.745 | 4.680 | 4.899 | 4.927 | 4.931 | 4.883 | 4.843 | 4.810 |
| 3.1 | 4.992 | 5.006 | 4.988 | 4.882 | 4.504 | 4.589 | 4.702 | 4.688 | 4.664 | 4.613 | 4.818 | 4.846 | 4.806 | 4.758 | 4.744 |
| 3.2 | 5.034 | 5.010 | 4.858 | 4.722 | 4.834 | 4.931 | 4.923 | 4.874 | 4.603 | 4.480 | 4.591 | 4.720 | 4.665 | 4.631 | 4.772 |
| 3.3 | 4.996 | 4.874 | 4.668 | 4.656 | 4.923 | 4.955 | 4.931 | 4.890 | 4.846 | 4.773 | 4.639 | 4.633 | 4.617 | 4.770 | 4.792 |
| 3.4 | 4.856 | 4.733 | 4.708 | 4.672 | 4.953 | 4.963 | 4.935 | 4.866 | 4.818 | 4.771 | 4.607 | 4.364 | 4.649 | 4.790 | 4.820 |
| 3.5 | 4.741 | 4.739 | 4.678 | 4.619 | 4.953 | 4.963 | 4.923 | 4.894 | 4.856 | 4.769 | 4.720 | 4.417 | 4.423 | 4.387 | 4.825 |
| 3.6 | 4.720 | 4.684 | 4.619 | 4.698 | 4.971 | 4.996 | 4.988 | 4.937 | 4.882 | 4.326 | 4.777 | 4.726 | 4.649 | 4.649 | 4.641 |
| 3.7 | 4.652 | 4.623 | 4.558 | 4.842 | 4.949 | 4.980 | 4.977 | 4.923 | 4.862 | 4.793 | 4.751 | 4.720 | 4.649 | 4.631 | 4.677 |
| 3.8 | 4.785 | 4.469 | 4.447 | 4.409 | 4.850 | 4.899 | 4.915 | 4.874 | 4.818 | 4.759 | 4.720 | 4.686 | 4.708 | 4.486 | 4.599 |
| 3.9 | 4.899 | 4.789 | 4.455 | 4.486 | 4.469 | 4.690 | 4.722 | 4.745 | 4.807 | 4.846 | 4.834 | 4.850 | 4.875 | 4.863 | 4.450 |
| 4.0 | 4.951 | 4.856 | 4.409 | 4.455 | 4.733 | 4.783 | 4.809 | 4.801 | 4.892 | 4.945 | 4.943 | 4.965 | 4.945 | 4.903 | 4.851 |
| 4.1 | 5.024 | 4.939 | 4.854 | 4.692 | 4.737 | 4.783 | 4.818 | 4.818 | 4.909 | 4.996 | 5.004 | 4.980 | 4.935 | 4.887 | 4.827 |
| 4.2 | 5.077 | 5.016 | 4.937 | 4.688 | 4.728 | 4.777 | 4.818 | 4.866 | 4.818 | 4.980 | 4.980 | 4.943 | 4.889 | 4.837 | 4.706 |
| 4.3 | 5.109 | 5.036 | 4.639 | 4.686 | 4.728 | 4.775 | 4.793 | 4.785 | 4.688 | 4.913 | 4.913 | 4.899 | 4.857 | 4.772 | 4.829 |
| 4.4 | 5.101 | 4.633 | 4.631 | 4.680 | 4.724 | 4.739 | 4.733 | 4.688 | 4.656 | 4.773 | 4.850 | 4.848 | 4.772 | 4.841 | 4.881 |
| 4.5 | 4.680 | 4.753 | 4.591 | 4.656 | 4.680 | 4.664 | 4.625 | 4.591 | 4.560 | 4.666 | 4.672 | 4.664 | 4.758 | 4.861 | 4.869 |
| 4.6 | 4.765 | 4.801 | 4.757 | 4.562 | 4.599 | 4.575 | 4.554 | 4.534 | 4.627 | 4.664 | 4.672 | 4.670 | 4.778 | 4.883 | 4.859 |
| 4.7 | 4.801 | 4.801 | 4.745 | 4.656 | 4.388 | 4.441 | 4.844 | 4.975 | 5.020 | 5.028 | 4.977 | 4.680 | 4.810 | 4.889 | 4.873 |
| 4.8 | 4.789 | 4.765 | 4.680 | 4.603 | 4.575 | 4.818 | 4.971 | 5.040 | 5.069 | 5.038 | 4.882 | 4.827 | 4.867 | 4.855 | |
| 4.9 | 4.745 | 4.676 | 4.591 | 4.494 | 4.720 | 4.890 | 4.992 | 5.058 | 5.073 | 5.075 | 5.028 | 4.935 | 4.730 | 4.732 | 4.754 |
| 5.0 | 4.666 | 4.579 | 4.502 | 4.465 | 4.722 | 4.882 | 4.984 | 5.044 | 5.054 | 5.044 | 5.004 | 4.931 | 4.629 | 4.633 | 4.641 |
| 5.1 | 4.575 | 4.684 | 4.773 | 4.795 | 4.749 | 4.824 | 4.931 | 5.010 | 5.024 | 4.996 | 4.953 | 4.858 | 4.633 | 4.647 | 4.649 |
| 5.2 | 4.660 | 4.751 | 4.805 | 4.809 | 4.781 | 4.672 | 4.850 | 4.923 | 4.939 | 4.911 | 4.864 | 4.603 | 4.631 | 4.653 | 4.663 |
| 5.3 | 4.674 | 4.767 | 4.797 | 4.773 | 4.745 | 4.652 | 4.591 | 4.502 | 4.801 | 4.706 | 4.765 | 4.785 | 4.564 | 4.641 | 4.649 |
| 5.4 | 4.486 | 4.753 | 4.785 | 4.753 | 4.712 | 4.623 | 4.648 | 4.502 | 4.722 | 4.785 | 4.846 | 4.868 | 4.780 | 4.581 | 4.581 |
| 5.5 | 4.623 | 4.587 | 4.724 | 4.737 | 4.688 | 4.658 | 4.682 | 4.720 | 4.818 | 4.882 | 4.927 | 4.911 | 4.802 | 4.552 | 4.585 |
| 5.6 | 4.706 | 4.674 | 4.627 | 4.542 | 4.662 | 4.704 | 4.686 | 4.834 | 4.907 | 4.963 | 4.963 | 4.917 | 4.827 | 4.663 | 4.728 |
| 5.7 | 4.741 | 4.694 | 4.652 | 4.589 | 4.656 | 4.692 | 4.615 | 4.907 | 4.980 | 4.996 | 4.980 | 4.899 | 4.732 | 4.792 | 4.839 |
| 5.8 | 4.664 | 4.621 | 4.583 | 4.599 | 4.619 | 4.567 | 4.623 | 4.923 | 4.988 | 5.000 | 4.947 | 4.866 | 4.730 | 4.806 | 4.885 |
| 5.9 | 4.409 | 4.603 | 4.599 | 4.599 | 4.619 | 4.569 | 4.571 | 4.846 | 4.888 | 4.947 | 4.899 | 4.457 | 4.599 | 4.790 | 4.871 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 29.3 | 29.4 | 29.5 | 29.6 | 29.7 | 29.8 | 29.9 | 30.0 | 30.1 | 30.2 | 30.3 | 30.4 | 30.5 | 30.6 | 30.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.552 | 4.625 | 4.653 | 4.657 | 4.560 | 4.558 | 4.572 | 4.578 | 4.556 | 4.544 | 4.542 | 4.532 | 4.514 | 4.730 | 4.804 |
| 0.2 | 4.794 | 4.641 | 4.639 | 4.706 | 4.609 | 4.637 | 4.927 | 4.960 | 4.869 | 4.552 | 4.558 | 4.556 | 4.732 | 4.804 | 4.869 |
| 0.3 | 4.859 | 4.679 | 4.697 | 4.718 | 4.625 | 4.915 | 4.962 | 4.960 | 4.960 | 4.540 | 4.528 | 4.556 | 4.810 | 4.883 | 4.893 |
| 0.4 | 5.109 | 4.673 | 4.697 | 4.677 | 4.883 | 4.913 | 4.943 | 4.980 | 4.984 | 4.956 | 4.589 | 4.818 | 4.885 | 4.895 | 4.881 |
| 0.5 | 4.889 | 4.681 | 4.689 | 4.576 | 4.845 | 4.883 | 4.907 | 4.964 | 4.976 | 4.951 | 4.895 | 4.885 | 4.895 | 4.879 | 4.871 |
| 0.6 | 4.601 | 4.665 | 4.675 | 4.556 | 4.818 | 4.865 | 4.901 | 4.931 | 4.947 | 4.915 | 4.837 | 4.873 | 4.873 | 4.867 | 4.861 |
| 0.7 | 4.609 | 4.613 | 4.627 | 4.506 | 4.774 | 4.859 | 4.881 | 4.901 | 4.905 | 4.875 | 4.770 | 4.851 | 4.851 | 4.859 | 4.847 |
| 0.8 | 4.768 | 4.778 | 4.746 | 4.691 | 4.625 | 4.802 | 4.855 | 4.881 | 4.867 | 4.814 | 4.524 | 4.814 | 4.851 | 4.861 | 4.835 |
| 0.9 | 4.718 | 4.762 | 4.762 | 4.730 | 4.679 | 4.625 | 4.818 | 4.857 | 4.802 | 4.542 | 4.508 | 4.399 | 4.802 | 4.818 | 4.786 |
| 1.0 | 4.746 | 4.677 | 4.818 | 4.851 | 4.831 | 4.786 | 4.766 | 4.802 | 4.542 | 4.560 | 4.542 | 4.542 | 4.578 | 4.576 | 4.556 |
| 1.1 | 4.770 | 4.722 | 4.899 | 4.923 | 4.923 | 4.877 | 4.828 | 4.740 | 4.687 | 4.560 | 4.546 | 4.657 | 4.685 | 4.673 | 4.633 |
| 1.2 | 4.770 | 4.782 | 4.899 | 4.923 | 4.931 | 4.931 | 4.931 | 4.905 | 4.831 | 4.750 | 4.681 | 4.750 | 4.754 | 4.746 | 4.726 |
| 1.3 | 4.576 | 4.748 | 4.861 | 4.869 | 4.883 | 4.899 | 4.917 | 4.931 | 4.915 | 4.879 | 4.770 | 4.786 | 4.794 | 4.786 | 4.770 |
| 1.4 | 4.851 | 4.826 | 4.778 | 4.818 | 4.831 | 4.851 | 4.867 | 4.891 | 4.893 | 4.861 | 4.762 | 4.802 | 4.814 | 4.810 | 4.802 |
| 1.5 | 4.915 | 4.897 | 4.810 | 4.657 | 4.770 | 4.794 | 4.808 | 4.831 | 4.831 | 4.812 | 4.730 | 4.806 | 4.820 | 4.818 | 4.816 |
| 1.6 | 4.939 | 4.911 | 4.818 | 4.617 | 4.488 | 4.728 | 4.754 | 4.770 | 4.740 | 4.726 | 4.512 | 4.770 | 4.826 | 4.831 | 4.828 |
| 1.7 | 4.935 | 4.883 | 4.661 | 4.484 | 4.431 | 4.528 | 4.617 | 4.661 | 4.589 | 4.445 | 4.431 | 4.625 | 4.802 | 4.828 | 4.818 |
| 1.8 | 4.889 | 4.710 | 4.544 | 4.560 | 4.536 | 4.593 | 4.637 | 4.667 | 4.657 | 4.429 | 4.431 | 4.611 | 4.653 | 4.768 | 4.770 |
| 1.9 | 4.740 | 4.576 | 4.617 | 4.605 | 4.593 | 4.576 | 4.617 | 4.643 | 4.641 | 4.443 | 4.441 | 4.447 | 4.623 | 4.633 | 4.556 |
| 2.0 | 4.540 | 4.621 | 4.641 | 4.633 | 4.619 | 4.611 | 4.601 | 4.625 | 4.415 | 4.449 | 4.445 | 4.453 | 4.472 | 4.453 | 4.550 |
| 2.1 | 4.550 | 4.639 | 4.663 | 4.673 | 4.651 | 4.641 | 4.623 | 4.478 | 4.439 | 4.460 | 4.542 | 4.462 | 4.429 | 4.460 | 4.522 |
| 2.2 | 4.532 | 4.653 | 4.681 | 4.697 | 4.681 | 4.669 | 4.655 | 4.512 | 4.427 | 4.576 | 4.607 | 4.601 | 4.337 | 4.544 | 4.538 |
| 2.3 | 4.492 | 4.621 | 4.681 | 4.699 | 4.697 | 4.681 | 4.669 | 4.494 | 4.589 | 4.613 | 4.633 | 4.623 | 4.562 | 4.558 | 4.540 |
| 2.4 | 4.357 | 4.401 | 4.359 | 4.393 | 4.722 | 4.736 | 4.722 | 4.671 | 4.597 | 4.635 | 4.641 | 4.383 | 4.359 | 4.558 | 4.542 |
| 2.5 | 4.302 | 4.343 | 4.415 | 4.641 | 4.768 | 4.766 | 4.744 | 4.699 | 4.673 | 4.447 | 4.421 | 4.345 | 4.369 | 4.409 | 4.524 |
| 2.6 | 4.621 | 4.595 | 4.560 | 4.722 | 4.790 | 4.786 | 4.770 | 4.722 | 4.689 | 4.576 | 4.393 | 4.345 | 4.365 | 4.701 | 4.726 |
| 2.7 | 4.689 | 4.649 | 4.609 | 4.754 | 4.794 | 4.786 | 4.782 | 4.718 | 4.683 | 4.407 | 4.302 | 4.345 | 4.689 | 4.758 | 4.794 |
| 2.8 | 4.742 | 4.722 | 4.671 | 4.738 | 4.786 | 4.770 | 4.754 | 4.706 | 4.566 | 4.429 | 4.363 | 4.345 | 4.687 | 4.770 | 4.802 |
| 2.9 | 4.762 | 4.722 | 4.697 | 4.637 | 4.740 | 4.740 | 4.722 | 4.619 | 4.383 | 4.395 | 4.480 | 4.496 | 4.671 | 4.754 | 4.784 |
| 3.0 | 4.774 | 4.742 | 4.706 | 4.649 | 4.603 | 4.435 | 4.625 | 4.706 | 4.649 | 4.431 | 4.476 | 4.506 | 4.576 | 4.663 | 4.625 |
| 3.1 | 4.794 | 4.762 | 4.730 | 4.665 | 4.609 | 4.524 | 4.653 | 4.728 | 4.671 | 4.558 | 4.464 | 4.504 | 4.488 | 4.373 | 4.526 |
| 3.2 | 4.818 | 4.784 | 4.742 | 4.665 | 4.597 | 4.429 | 4.625 | 4.706 | 4.728 | 4.576 | 4.443 | 4.443 | 4.347 | 4.361 | 4.675 |
| 3.3 | 4.812 | 4.685 | 4.611 | 4.431 | 4.407 | 4.466 | 4.576 | 4.667 | 4.728 | 4.671 | 4.508 | 4.593 | 4.671 | 4.706 | 4.750 |
| 3.4 | 4.514 | 4.520 | 4.504 | 4.468 | 4.472 | 4.361 | 4.504 | 4.631 | 4.677 | 4.722 | 4.508 | 4.625 | 4.689 | 4.730 | 4.742 |
| 3.5 | 4.593 | 4.556 | 4.544 | 4.568 | 4.554 | 4.367 | 4.482 | 4.536 | 4.576 | 4.625 | 4.536 | 4.623 | 4.685 | 4.706 | 4.738 |
| 3.6 | 4.633 | 4.621 | 4.601 | 4.585 | 4.576 | 4.387 | 4.383 | 4.677 | 4.732 | 4.754 | 4.728 | 4.605 | 4.679 | 4.701 | 4.734 |
| 3.7 | 4.663 | 4.649 | 4.633 | 4.593 | 4.576 | 4.655 | 4.683 | 4.718 | 4.766 | 4.786 | 4.754 | 4.653 | 4.687 | 4.687 | 4.706 |
| 3.8 | 4.687 | 4.665 | 4.657 | 4.633 | 4.627 | 4.673 | 4.701 | 4.748 | 4.770 | 4.792 | 4.796 | 4.782 | 4.528 | 4.524 | 4.443 |
| 3.9 | 4.697 | 4.697 | 4.677 | 4.657 | 4.641 | 4.681 | 4.706 | 4.752 | 4.762 | 4.762 | 4.754 | 4.750 | 4.528 | 4.381 | 4.413 |
| 4.0 | 4.722 | 4.722 | 4.701 | 4.673 | 4.615 | 4.657 | 4.673 | 4.726 | 4.730 | 4.726 | 4.734 | 4.732 | 4.601 | 4.730 | 4.681 |
| 4.1 | 4.649 | 4.706 | 4.699 | 4.669 | 4.593 | 4.623 | 4.649 | 4.726 | 4.730 | 4.732 | 4.742 | 4.730 | 4.637 | 4.814 | 4.881 |
| 4.2 | 4.746 | 4.472 | 4.556 | 4.544 | 4.560 | 4.625 | 4.653 | 4.669 | 4.695 | 4.728 | 4.728 | 4.631 | 4.689 | 4.859 | 5.022 |
| 4.3 | 4.786 | 4.701 | 4.583 | 4.597 | 4.522 | 4.576 | 4.601 | 4.583 | 4.639 | 4.629 | 4.651 | 4.617 | 4.800 | 4.925 | 5.042 |
| 4.4 | 4.784 | 4.681 | 4.585 | 4.609 | 4.770 | 4.734 | 4.730 | 4.718 | 4.599 | 4.617 | 4.603 | 4.722 | 4.909 | 4.960 | 5.024 |
| 4.5 | 4.657 | 4.536 | 4.544 | 4.689 | 4.851 | 4.756 | 4.742 | 4.786 | 4.708 | 4.476 | 4.570 | 4.726 | 4.913 | 4.982 | 4.992 |
| 4.6 | 4.659 | 4.609 | 4.488 | 4.786 | 4.786 | 4.843 | 4.807 | 4.831 | 4.814 | 4.730 | 4.673 | 4.657 | 4.907 | 4.947 | 4.945 |
| 4.7 | 4.722 | 4.591 | 4.460 | 4.748 | 4.740 | 4.798 | 4.871 | 4.835 | 4.796 | 4.728 | 4.732 | 4.750 | 4.730 | 4.826 | 4.875 |
| 4.8 | 4.782 | 4.494 | 4.514 | 4.480 | 4.722 | 4.770 | 4.831 | 4.818 | 4.770 | 4.722 | 4.669 | 4.706 | 4.740 | 4.730 | 4.528 |
| 4.9 | 4.810 | 4.564 | 4.496 | 4.484 | 4.508 | 4.653 | 4.689 | 4.653 | 4.617 | 4.496 | 4.794 | 4.851 | 4.867 | 4.867 | 4.760 |
| 5.0 | 4.843 | 4.818 | 4.411 | 4.379 | 4.359 | 4.722 | 4.831 | 4.772 | 4.951 | 4.976 | 4.988 | 4.982 | 4.978 | 4.956 | 4.788 |
| 5.1 | 4.869 | 4.828 | 4.480 | 4.383 | 4.770 | 4.824 | 4.845 | 4.770 | 5.010 | 5.050 | 5.074 | 5.083 | 5.044 | 4.964 | 4.754 |
| 5.2 | 4.889 | 4.831 | 4.520 | 4.443 | 4.802 | 4.814 | 4.835 | 4.748 | 5.028 | 5.068 | 5.093 | 5.093 | 5.042 | 4.897 | 4.635 |
| 5.3 | 4.907 | 4.818 | 4.552 | 4.554 | 4.615 | 4.794 | 4.800 | 4.752 | 4.976 | 4.998 | 5.044 | 5.072 | 5.010 | 4.820 | 4.494 |
| 5.4 | 4.921 | 4.794 | 4.814 | 4.802 | 4.770 | 4.478 | 4.462 | 4.429 | 4.742 | 4.875 | 4.929 | 4.988 | 4.915 | 4.732 | 4.812 |
| 5.5 | 4.933 | 4.859 | 4.875 | 4.851 | 4.810 | 4.722 | 4.542 | 4.464 | 4.411 | 4.492 | 4.768 | 4.831 | 4.778 | 4.621 | 4.804 |
| 5.6 | 4.639 | 4.869 | 4.883 | 4.875 | 4.835 | 4.754 | 4.568 | 4.494 | 4.439 | 4.591 | 4.609 | 4.607 | 4.460 | 4.603 | 4.734 |
| 5.7 | 4.722 | 4.859 | 4.879 | 4.875 | 4.847 | 4.782 | 4.589 | 4.516 | 4.647 | 4.701 | 4.728 | 4.742 | 4.740 | 4.728 | 4.730 |
| 5.8 | 4.722 | 4.843 | 4.867 | 4.861 | 4.820 | 4.740 | 4.593 | 4.524 | 4.683 | 4.730 | 4.756 | 4.784 | 4.800 | 4.812 | 4.802 |
| 5.9 | 4.653 | 4.786 | 4.824 | 4.814 | 4.752 | 4.593 | 4.574 | 4.574 | 4.542 | 4.673 | 4.736 | 4.774 | 4.812 | 4.818 | 4.810 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 35.3 | 35.4 | 35.5 | 35.6 | 35.7 | 35.8 | 35.9 | 36.0 | 36.1 | 36.2 | 36.3 | 36.4 | 36.5 | 36.6 | 36.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.597 | 4.617 | 4.665 | 4.714 | 4.663 | 4.639 | 4.708 | 4.720 | 4.716 | 4.730 | 4.734 | 4.738 | 4.728 | 4.492 | 4.627 |
| 0.2 | 4.587 | 4.625 | 4.665 | 4.695 | 4.587 | 4.679 | 4.714 | 4.730 | 4.740 | 4.752 | 4.756 | 4.756 | 4.754 | 4.609 | 4.627 |
| 0.3 | 4.762 | 4.786 | 4.685 | 4.512 | 4.423 | 4.691 | 4.722 | 4.750 | 4.758 | 4.762 | 4.770 | 4.768 | 4.758 | 4.647 | 4.633 |
| 0.4 | 4.857 | 4.899 | 4.851 | 4.732 | 4.421 | 4.665 | 4.732 | 4.756 | 4.760 | 4.774 | 4.774 | 4.744 | 4.631 | 4.923 | 4.935 |
| 0.5 | 4.903 | 4.952 | 4.964 | 4.899 | 4.744 | 4.498 | 4.623 | 4.663 | 4.730 | 4.734 | 4.681 | 4.732 | 4.710 | 4.972 | 4.972 |
| 0.6 | 4.931 | 4.986 | 5.018 | 5.018 | 4.952 | 4.546 | 4.583 | 4.579 | 4.536 | 4.679 | 4.742 | 4.738 | 4.726 | 4.990 | 5.008 |
| 0.7 | 4.952 | 4.992 | 5.032 | 5.048 | 5.012 | 4.885 | 4.577 | 4.570 | 4.550 | 4.633 | 4.677 | 4.708 | 4.859 | 4.921 | 4.950 |
| 0.8 | 4.956 | 5.000 | 5.034 | 5.048 | 5.000 | 4.810 | 4.619 | 4.861 | 4.913 | 4.891 | 4.857 | 4.649 | 4.790 | 4.839 | 4.895 |
| 0.9 | 4.956 | 4.996 | 5.012 | 5.008 | 4.839 | 4.958 | 5.028 | 5.008 | 4.968 | 4.935 | 4.899 | 4.825 | 4.693 | 4.790 | 4.827 |
| 1.0 | 4.891 | 4.907 | 4.820 | 4.679 | 4.907 | 5.050 | 5.068 | 5.036 | 5.000 | 4.943 | 4.899 | 4.839 | 4.617 | 4.710 | 4.740 |
| 1.1 | 4.361 | 4.322 | 4.343 | 4.552 | 4.585 | 5.083 | 5.081 | 5.032 | 4.980 | 4.925 | 4.877 | 4.806 | 4.550 | 4.631 | 4.669 |
| 1.2 | 4.744 | 4.740 | 4.728 | 4.704 | 4.435 | 5.079 | 5.052 | 5.004 | 4.956 | 4.887 | 4.839 | 4.728 | 4.450 | 4.518 | 4.536 |
| 1.3 | 4.825 | 4.806 | 4.792 | 4.762 | 4.683 | 5.004 | 5.018 | 4.964 | 4.921 | 4.843 | 4.742 | 4.441 | 4.492 | 4.514 | 4.502 |
| 1.4 | 4.857 | 4.827 | 4.794 | 4.750 | 4.631 | 4.456 | 4.899 | 4.871 | 4.572 | 4.820 | 4.843 | 4.798 | 4.762 | 4.804 | 4.804 |
| 1.5 | 4.835 | 4.794 | 4.758 | 4.681 | 4.514 | 4.443 | 4.704 | 4.700 | 4.621 | 4.907 | 4.907 | 4.901 | 4.881 | 4.857 | 4.851 |
| 1.6 | 4.768 | 4.738 | 4.691 | 4.585 | 4.320 | 4.605 | 4.710 | 4.710 | 4.681 | 4.933 | 4.923 | 4.903 | 4.889 | 4.871 | 4.857 |
| 1.7 | 4.677 | 4.649 | 4.597 | 4.437 | 4.476 | 4.617 | 4.681 | 4.693 | 4.691 | 4.941 | 4.933 | 4.907 | 4.893 | 4.877 | 4.871 |
| 1.8 | 4.512 | 4.355 | 4.423 | 4.486 | 4.629 | 4.631 | 4.625 | 4.643 | 4.621 | 4.947 | 4.937 | 4.921 | 4.903 | 4.887 | 4.879 |
| 1.9 | 4.500 | 4.417 | 4.568 | 4.641 | 4.706 | 4.762 | 4.695 | 4.405 | 4.863 | 4.950 | 4.939 | 4.927 | 4.909 | 4.897 | 4.883 |
| 2.0 | 4.734 | 4.454 | 4.613 | 4.663 | 4.714 | 4.798 | 4.798 | 4.546 | 4.921 | 4.950 | 4.947 | 4.937 | 4.919 | 4.905 | 4.889 |
| 2.1 | 4.762 | 4.693 | 4.617 | 4.667 | 4.732 | 4.822 | 4.855 | 4.645 | 4.919 | 4.954 | 4.954 | 4.939 | 4.923 | 4.907 | 4.895 |
| 2.2 | 4.754 | 4.730 | 4.641 | 4.681 | 4.758 | 4.843 | 4.893 | 4.762 | 4.907 | 4.935 | 4.939 | 4.921 | 4.903 | 4.887 | 4.857 |
| 2.3 | 4.748 | 4.730 | 4.665 | 4.697 | 4.770 | 4.855 | 4.903 | 4.845 | 4.625 | 4.843 | 4.516 | 4.581 | 4.591 | 4.585 | 4.585 |
| 2.4 | 4.738 | 4.697 | 4.661 | 4.661 | 4.762 | 4.776 | 4.633 | 4.631 | 4.498 | 4.452 | 4.516 | 4.552 | 4.585 | 4.587 | 4.585 |
| 2.5 | 4.714 | 4.661 | 4.532 | 4.532 | 4.492 | 4.740 | 4.889 | 4.806 | 4.647 | 4.665 | 4.746 | 4.792 | 4.835 | 4.585 | 4.581 |
| 2.6 | 4.645 | 4.564 | 4.579 | 4.544 | 4.952 | 5.004 | 4.976 | 4.883 | 4.693 | 4.762 | 4.810 | 4.839 | 4.843 | 4.550 | 4.532 |
| 2.7 | 4.484 | 4.568 | 4.585 | 4.554 | 5.000 | 5.030 | 5.016 | 4.889 | 4.756 | 4.649 | 4.726 | 4.734 | 4.617 | 4.488 | 4.472 |
| 2.8 | 4.601 | 4.677 | 4.730 | 4.877 | 4.974 | 5.032 | 5.016 | 4.885 | 4.732 | 4.456 | 4.609 | 4.536 | 4.516 | 4.516 | 4.502 |
| 2.9 | 4.744 | 4.774 | 4.810 | 4.752 | 4.966 | 5.012 | 4.966 | 4.758 | 4.540 | 4.585 | 4.597 | 4.544 | 4.508 | 4.512 | 4.490 |
| 3.0 | 4.798 | 4.841 | 4.839 | 4.486 | 4.891 | 4.907 | 4.758 | 4.552 | 4.587 | 4.619 | 4.609 | 4.599 | 4.470 | 4.476 | 4.450 |
| 3.1 | 4.778 | 4.814 | 4.794 | 4.441 | 4.500 | 4.468 | 4.476 | 4.558 | 4.581 | 4.613 | 4.611 | 4.601 | 4.556 | 4.452 | 4.437 |
| 3.2 | 4.730 | 4.750 | 4.456 | 4.494 | 4.534 | 4.518 | 4.447 | 4.548 | 4.564 | 4.585 | 4.601 | 4.605 | 4.568 | 4.490 | 4.597 |
| 3.3 | 4.423 | 4.387 | 4.369 | 4.452 | 4.512 | 4.522 | 4.306 | 4.516 | 4.552 | 4.562 | 4.585 | 4.601 | 4.556 | 4.621 | 4.651 |
| 3.4 | 4.516 | 4.520 | 4.500 | 4.494 | 4.456 | 4.502 | 4.452 | 4.496 | 4.536 | 4.568 | 4.585 | 4.512 | 4.607 | 4.607 | 4.633 |
| 3.5 | 4.558 | 4.585 | 4.550 | 4.530 | 4.520 | 4.514 | 4.542 | 4.343 | 4.508 | 4.532 | 4.548 | 4.564 | 4.502 | 4.575 | 4.585 |
| 3.6 | 4.661 | 4.633 | 4.593 | 4.581 | 4.583 | 4.585 | 4.322 | 4.339 | 4.339 | 4.474 | 4.484 | 4.325 | 4.419 | 4.504 | 4.355 |
| 3.7 | 4.649 | 4.679 | 4.645 | 4.645 | 4.637 | 4.645 | 4.587 | 4.550 | 4.490 | 4.452 | 4.405 | 4.351 | 4.456 | 4.454 | 4.419 |
| 3.8 | 4.639 | 4.661 | 4.661 | 4.708 | 4.695 | 4.655 | 4.841 | 4.841 | 4.822 | 4.762 | 4.572 | 4.597 | 4.601 | 4.566 | 4.383 |
| 3.9 | 4.575 | 4.625 | 4.661 | 4.697 | 4.883 | 4.903 | 4.907 | 4.889 | 4.871 | 4.827 | 4.772 | 4.548 | 4.550 | 4.544 | 4.599 |
| 4.0 | 4.502 | 4.452 | 4.421 | 4.859 | 4.919 | 4.939 | 4.939 | 4.923 | 4.905 | 4.879 | 4.829 | 4.502 | 4.494 | 4.494 | 4.645 |
| 4.1 | 4.641 | 4.347 | 4.234 | 4.879 | 4.931 | 4.966 | 4.970 | 4.960 | 4.943 | 4.907 | 4.857 | 4.778 | 4.450 | 4.504 | 4.500 |
| 4.2 | 4.536 | 4.373 | 4.357 | 4.923 | 4.908 | 5.000 | 5.004 | 4.984 | 4.908 | 4.931 | 4.883 | 4.786 | 4.552 | 4.617 | 4.599 |
| 4.3 | 4.585 | 4.419 | 4.415 | 4.972 | 5.006 | 5.028 | 5.018 | 5.004 | 4.986 | 4.952 | 4.891 | 4.792 | 4.621 | 4.673 | 4.651 |
| 4.4 | 4.601 | 4.613 | 4.617 | 4.994 | 5.030 | 5.032 | 5.018 | 5.000 | 4.980 | 4.939 | 4.877 | 4.752 | 4.659 | 4.730 | 4.693 |
| 4.5 | 4.784 | 4.794 | 4.609 | 4.984 | 5.020 | 5.010 | 4.972 | 4.954 | 4.933 | 4.891 | 4.827 | 4.621 | 4.734 | 4.758 | 4.714 |
| 4.6 | 4.925 | 4.889 | 4.744 | 4.581 | 4.956 | 4.919 | 4.877 | 4.843 | 4.822 | 4.790 | 4.566 | 4.669 | 4.778 | 4.810 | 4.738 |
| 4.7 | 4.956 | 4.919 | 4.804 | 4.538 | 4.732 | 4.810 | 4.641 | 4.597 | 4.373 | 4.427 | 4.601 | 4.693 | 4.820 | 4.827 | 4.762 |
| 4.8 | 4.958 | 4.929 | 4.833 | 4.774 | 4.774 | 4.734 | 4.679 | 4.631 | 4.579 | 4.407 | 4.589 | 4.708 | 4.810 | 4.822 | 4.778 |
| 4.9 | 4.935 | 4.917 | 4.839 | 4.790 | 4.802 | 4.774 | 4.718 | 4.581 | 4.419 | 4.484 | 4.452 | 4.710 | 4.804 | 4.806 | 4.750 |
| 5.0 | 4.907 | 4.887 | 4.804 | 4.740 | 4.810 | 4.810 | 4.629 | 4.409 | 4.454 | 4.470 | 4.407 | 4.454 | 4.758 | 4.710 | 4.649 |
| 5.1 | 4.871 | 4.837 | 4.405 | 4.681 | 4.746 | 4.770 | 4.387 | 4.339 | 4.339 | 4.506 | 4.518 | 4.522 | 4.528 | 4.504 | 4.768 |
| 5.2 | 4.419 | 4.419 | 4.322 | 4.375 | 4.675 | 4.740 | 4.748 | 4.748 | 4.746 | 4.536 | 4.544 | 4.536 | 4.536 | 4.536 | 4.825 |
| 5.3 | 4.423 | 4.419 | 4.238 | 4.706 | 4.762 | 4.762 | 4.770 | 4.770 | 4.778 | 4.766 | 4.552 | 4.550 | 4.546 | 4.542 | 4.857 |
| 5.4 | 4.423 | 4.516 | 4.516 | 4.774 | 4.782 | 4.778 | 4.790 | 4.792 | 4.794 | 4.798 | 4.554 | 4.560 | 4.552 | 4.758 | 4.887 |
| 5.5 | 4.435 | 4.518 | 4.577 | 4.794 | 4.810 | 4.802 | 4.810 | 4.818 | 4.822 | 4.822 | 4.774 | 4.566 | 4.554 | 4.468 | 4.839 |
| 5.6 | 4.387 | 4.500 | 4.550 | 4.810 | 4.818 | 4.831 | 4.839 | 4.839 | 4.835 | 4.822 | 4.774 | 4.566 | 4.532 | 4.581 | 4.629 |
| 5.7 | 4.355 | 4.401 | 4.566 | 4.810 | 4.839 | 4.843 | 4.843 | 4.849 | 4.810 | 4.804 | 4.548 | 4.532 | 4.452 | 4.550 | 4.609 |
| 5.8 | 4.577 | 4.637 | 4.681 | 4.679 | 4.841 | 4.853 | 4.839 | 4.822 | 4.778 | 4.631 | 4.581 | 4.387 | 4.423 | 4.502 | 4.552 |
| 5.9 | 4.661 | 4.730 | 4.758 | 4.720 | 4.522 | 4.822 | 4.839 | 4.762 | 4.621 | 4.627 | 4.568 | 4.439 | 4.431 | 4.403 | 4.476 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 41.3 | 41.4 | 41.5 | 41.6 | 41.7 | 41.8 | 41.9 | 42.0 | 42.1 | 42.2 | 42.3 | 42.4 | 42.5 | 42.6 | 42.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.790 | 4.734 | 4.623 | 4.464 | 4.353 | 4.377 | 4.566 | 4.657 | 4.588 | 4.440 | 4.373 | 4.173 | 4.359 | 4.161 | 4.434 |
| 0.2 | 4.831 | 4.349 | 4.806 | 4.673 | 4.353 | 4.570 | 4.723 | 4.721 | 4.586 | 4.487 | 4.296 | 4.394 | 4.392 | 4.422 | 4.424 |
| 0.3 | 4.851 | 4.857 | 4.826 | 4.754 | 4.637 | 4.798 | 4.841 | 4.719 | 4.568 | 4.467 | 4.436 | 4.458 | 4.626 | 4.732 | 4.889 |
| 0.4 | 4.871 | 4.867 | 4.828 | 4.748 | 4.782 | 4.891 | 4.889 | 4.966 | 4.562 | 4.477 | 4.428 | 4.663 | 4.845 | 4.932 | 4.936 |
| 0.5 | 4.881 | 4.859 | 4.754 | 4.758 | 4.875 | 4.937 | 4.902 | 4.802 | 4.570 | 4.408 | 4.630 | 4.784 | 4.940 | 4.950 | 4.930 |
| 0.6 | 4.879 | 4.782 | 4.728 | 4.849 | 4.958 | 4.951 | 4.889 | 4.768 | 4.501 | 4.438 | 4.499 | 4.732 | 4.885 | 4.940 | 4.906 |
| 0.7 | 4.831 | 4.726 | 4.786 | 4.931 | 4.958 | 4.933 | 4.867 | 4.715 | 4.311 | 4.438 | 4.505 | 4.782 | 4.932 | 4.926 | 4.904 |
| 0.8 | 4.746 | 4.635 | 4.742 | 4.899 | 4.927 | 4.895 | 4.780 | 4.440 | 4.365 | 4.387 | 4.339 | 4.851 | 4.906 | 4.906 | 4.887 |
| 0.9 | 4.536 | 4.484 | 4.415 | 4.351 | 4.831 | 4.802 | 4.614 | 4.270 | 4.373 | 4.400 | 4.371 | 4.420 | 4.841 | 4.855 | 4.857 |
| 1.0 | 4.542 | 4.512 | 4.462 | 4.393 | 4.302 | 4.300 | 4.335 | 4.414 | 4.505 | 4.517 | 4.564 | 4.608 | 4.606 | 4.792 | 4.813 |
| 1.1 | 4.544 | 4.504 | 4.447 | 4.407 | 4.292 | 4.296 | 4.450 | 4.537 | 4.598 | 4.634 | 4.691 | 4.726 | 4.756 | 4.748 | 4.719 |
| 1.2 | 4.536 | 4.488 | 4.474 | 4.407 | 4.296 | 4.282 | 4.489 | 4.553 | 4.610 | 4.667 | 4.723 | 4.764 | 4.792 | 4.792 | 4.723 |
| 1.3 | 4.532 | 4.784 | 4.732 | 4.603 | 4.306 | 4.290 | 4.470 | 4.557 | 4.612 | 4.673 | 4.728 | 4.770 | 4.796 | 4.776 | 4.634 |
| 1.4 | 4.526 | 4.802 | 4.828 | 4.814 | 4.754 | 4.623 | 4.562 | 4.541 | 4.582 | 4.675 | 4.728 | 4.762 | 4.764 | 4.570 | 4.614 |
| 1.5 | 4.601 | 4.764 | 4.786 | 4.770 | 4.750 | 4.730 | 4.659 | 4.553 | 4.505 | 4.566 | 4.693 | 4.685 | 4.505 | 4.582 | 4.570 |
| 1.6 | 4.673 | 4.623 | 4.736 | 4.730 | 4.701 | 4.667 | 4.626 | 4.549 | 4.371 | 4.422 | 4.311 | 4.481 | 4.699 | 4.726 | 4.695 |
| 1.7 | 4.728 | 4.710 | 4.653 | 4.661 | 4.633 | 4.605 | 4.568 | 4.487 | 4.306 | 4.440 | 4.468 | 4.634 | 4.813 | 4.829 | 4.813 |
| 1.8 | 4.750 | 4.742 | 4.722 | 4.605 | 4.574 | 4.542 | 4.503 | 4.553 | 4.647 | 4.659 | 4.349 | 4.582 | 4.831 | 4.898 | 4.922 |
| 1.9 | 4.762 | 4.766 | 4.730 | 4.524 | 4.500 | 4.472 | 4.422 | 4.618 | 4.634 | 4.647 | 4.616 | 4.432 | 4.806 | 4.916 | 4.924 |
| 2.0 | 4.770 | 4.766 | 4.613 | 4.429 | 4.433 | 4.411 | 4.424 | 4.582 | 4.588 | 4.602 | 4.566 | 4.357 | 4.582 | 4.889 | 4.918 |
| 2.1 | 4.754 | 4.730 | 4.369 | 4.250 | 4.280 | 4.250 | 4.477 | 4.519 | 4.539 | 4.541 | 4.258 | 4.306 | 4.420 | 4.788 | 4.875 |
| 2.2 | 4.730 | 4.367 | 4.375 | 4.423 | 4.266 | 4.246 | 4.452 | 4.468 | 4.416 | 4.365 | 4.226 | 4.402 | 4.505 | 4.466 | 4.468 |
| 2.3 | 4.427 | 4.439 | 4.445 | 4.476 | 4.441 | 4.359 | 4.505 | 4.509 | 4.485 | 4.464 | 4.406 | 4.485 | 4.539 | 4.535 | 4.521 |
| 2.4 | 4.443 | 4.480 | 4.508 | 4.512 | 4.480 | 4.316 | 4.521 | 4.566 | 4.562 | 4.505 | 4.454 | 4.594 | 4.505 | 4.519 | 4.535 |
| 2.5 | 4.462 | 4.494 | 4.524 | 4.524 | 4.488 | 4.347 | 4.517 | 4.553 | 4.533 | 4.721 | 4.760 | 4.748 | 4.699 | 4.610 | 4.472 |
| 2.6 | 4.476 | 4.510 | 4.542 | 4.536 | 4.484 | 4.343 | 4.499 | 4.519 | 4.689 | 4.772 | 4.809 | 4.825 | 4.792 | 4.661 | 4.562 |
| 2.7 | 4.488 | 4.512 | 4.538 | 4.522 | 4.564 | 4.639 | 4.638 | 4.630 | 4.736 | 4.792 | 4.825 | 4.859 | 4.861 | 4.744 | 4.596 |
| 2.8 | 4.464 | 4.506 | 4.466 | 4.439 | 4.605 | 4.653 | 4.665 | 4.667 | 4.723 | 4.766 | 4.811 | 4.853 | 4.871 | 4.871 | 4.837 |
| 2.9 | 4.318 | 4.302 | 4.367 | 4.494 | 4.576 | 4.619 | 4.649 | 4.649 | 4.691 | 4.744 | 4.792 | 4.831 | 4.859 | 4.867 | 4.861 |
| 3.0 | 4.347 | 4.331 | 4.558 | 4.619 | 4.593 | 4.593 | 4.608 | 4.570 | 4.651 | 4.699 | 4.760 | 4.813 | 4.847 | 4.861 | 4.845 |
| 3.1 | 4.357 | 4.560 | 4.623 | 4.625 | 4.605 | 4.528 | 4.499 | 4.470 | 4.628 | 4.681 | 4.740 | 4.792 | 4.829 | 4.855 | 4.843 |
| 3.2 | 4.730 | 4.540 | 4.572 | 4.564 | 4.512 | 4.443 | 4.377 | 4.343 | 4.535 | 4.663 | 4.723 | 4.762 | 4.794 | 4.813 | 4.796 |
| 3.3 | 4.786 | 4.770 | 4.484 | 4.472 | 4.734 | 4.814 | 4.768 | 4.505 | 4.501 | 4.584 | 4.665 | 4.699 | 4.736 | 4.602 | 4.616 |
| 3.4 | 4.766 | 4.770 | 4.730 | 4.538 | 4.831 | 4.895 | 4.892 | 4.859 | 4.740 | 4.487 | 4.499 | 4.602 | 4.570 | 4.422 | 4.523 |
| 3.5 | 4.734 | 4.738 | 4.742 | 4.673 | 4.798 | 4.893 | 4.908 | 4.908 | 4.875 | 4.764 | 4.454 | 4.505 | 4.468 | 4.440 | 4.517 |
| 3.6 | 4.701 | 4.732 | 4.706 | 4.679 | 4.701 | 4.784 | 4.841 | 4.875 | 4.865 | 4.809 | 4.444 | 4.521 | 4.501 | 4.616 | 4.452 |
| 3.7 | 4.641 | 4.546 | 4.397 | 4.357 | 4.623 | 4.687 | 4.726 | 4.772 | 4.798 | 4.764 | 4.420 | 4.456 | 4.647 | 4.649 | 4.626 |
| 3.8 | 4.609 | 4.554 | 4.435 | 4.435 | 4.314 | 4.619 | 4.643 | 4.723 | 4.728 | 4.721 | 4.286 | 4.616 | 4.653 | 4.634 | 4.616 |
| 3.9 | 4.605 | 4.562 | 4.528 | 4.478 | 4.345 | 4.494 | 4.592 | 4.616 | 4.618 | 4.347 | 4.339 | 4.616 | 4.647 | 4.630 | 4.608 |
| 4.0 | 4.607 | 4.558 | 4.538 | 4.443 | 4.355 | 4.558 | 4.564 | 4.560 | 4.545 | 4.529 | 4.452 | 4.564 | 4.647 | 4.632 | 4.608 |
| 4.1 | 4.593 | 4.689 | 4.806 | 4.810 | 4.738 | 4.603 | 4.586 | 4.570 | 4.566 | 4.553 | 4.505 | 4.517 | 4.628 | 4.630 | 4.600 |
| 4.2 | 4.879 | 4.857 | 4.835 | 4.826 | 4.782 | 4.621 | 4.616 | 4.610 | 4.592 | 4.560 | 4.501 | 4.402 | 4.602 | 4.614 | 4.600 |
| 4.3 | 4.881 | 4.853 | 4.816 | 4.798 | 4.750 | 4.615 | 4.630 | 4.630 | 4.590 | 4.497 | 4.596 | 4.549 | 4.497 | 4.553 | 4.553 |
| 4.4 | 4.849 | 4.814 | 4.782 | 4.754 | 4.671 | 4.540 | 4.560 | 4.598 | 4.742 | 4.730 | 4.665 | 4.612 | 4.545 | 4.468 | 4.394 |
| 4.5 | 4.833 | 4.784 | 4.742 | 4.687 | 4.593 | 4.544 | 4.434 | 4.859 | 4.841 | 4.778 | 4.699 | 4.649 | 4.582 | 4.521 | 4.616 |
| 4.6 | 4.814 | 4.782 | 4.732 | 4.462 | 4.574 | 4.569 | 4.780 | 4.922 | 4.889 | 4.825 | 4.756 | 4.681 | 4.628 | 4.628 | 4.693 |
| 4.7 | 4.790 | 4.748 | 4.415 | 4.443 | 4.443 | 4.476 | 4.760 | 4.900 | 4.894 | 4.857 | 4.794 | 4.711 | 4.647 | 4.776 | 4.736 |
| 4.8 | 4.613 | 4.593 | 4.572 | 4.427 | 4.486 | 4.508 | 4.501 | 4.776 | 4.896 | 4.857 | 4.806 | 4.728 | 4.875 | 4.865 | 4.780 |
| 4.9 | 4.641 | 4.623 | 4.593 | 4.556 | 4.445 | 4.526 | 4.519 | 4.726 | 4.843 | 4.873 | 4.796 | 4.950 | 4.942 | 4.894 | 4.859 |
| 5.0 | 4.631 | 4.635 | 4.609 | 4.542 | 4.318 | 4.558 | 4.545 | 4.523 | 4.746 | 4.794 | 4.958 | 4.995 | 4.983 | 4.938 | 4.887 |
| 5.1 | 4.599 | 4.603 | 4.552 | 4.447 | 4.282 | 4.560 | 4.566 | 4.553 | 4.371 | 4.940 | 5.001 | 5.003 | 5.019 | 4.987 | 4.918 |
| 5.2 | 4.669 | 4.661 | 4.693 | 4.254 | 4.264 | 4.534 | 4.537 | 4.531 | 4.345 | 4.875 | 5.003 | 5.037 | 5.035 | 4.997 | 4.732 |
| 5.3 | 4.770 | 4.312 | 4.800 | 4.754 | 4.439 | 4.429 | 4.436 | 4.402 | 4.258 | 4.744 | 4.938 | 5.011 | 5.005 | 4.748 | 4.367 |
| 5.4 | 4.861 | 4.869 | 4.857 | 4.818 | 4.496 | 4.480 | 4.519 | 4.517 | 4.276 | 4.466 | 4.778 | 4.889 | 4.713 | 4.699 | 4.353 |
| 5.5 | 4.911 | 4.895 | 4.863 | 4.824 | 4.512 | 4.589 | 4.586 | 4.529 | 4.345 | 4.521 | 4.557 | 4.582 | 4.590 | 4.570 | 4.355 |
| 5.6 | 4.935 | 4.887 | 4.835 | 4.786 | 4.558 | 4.605 | 4.596 | 4.562 | 4.464 | 4.537 | 4.566 | 4.602 | 4.618 | 4.630 | 4.582 |
| 5.7 | 4.915 | 4.867 | 4.806 | 4.542 | 4.589 | 4.597 | 4.570 | 4.549 | 4.450 | 4.551 | 4.566 | 4.598 | 4.630 | 4.634 | 4.634 |
| 5.8 | 4.891 | 4.835 | 4.458 | 4.542 | 4.589 | 4.583 | 4.564 | 4.493 | 4.470 | 4.543 | 4.566 | 4.598 | 4.626 | 4.649 | 4.647 |
| 5.9 | 4.851 | 4.552 | 4.357 | 4.494 | 4.560 | 4.576 | 4.483 | 4.355 | 4.422 | 4.519 | 4.562 | 4.594 | 4.620 | 4.634 | 4.634 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 47.3 | 47.4 | 47.5 | 47.6 | 47.7 | 47.8 | 47.9 | 48.0 | 48.1 | 48.2 | 48.3 | 48.4 | 48.5 | 48.6 | 48.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.709 | 4.753 | 4.773 | 4.789 | 4.360 | 4.356 | 4.489 | 4.515 | 4.580 | 4.592 | 4.596 | 4.580 | 4.547 | 4.253 | 4.207 |
| 0.2 | 4.713 | 4.765 | 4.773 | 4.811 | 4.757 | 4.370 | 4.477 | 4.513 | 4.563 | 4.596 | 4.602 | 4.580 | 4.563 | 4.555 | 4.515 |
| 0.3 | 4.725 | 4.765 | 4.773 | 4.765 | 4.707 | 4.192 | 4.420 | 4.497 | 4.547 | 4.580 | 4.602 | 4.604 | 4.578 | 4.549 | 4.531 |
| 0.4 | 4.678 | 4.636 | 4.584 | 4.511 | 4.507 | 4.527 | 4.354 | 4.448 | 4.515 | 4.561 | 4.606 | 4.618 | 4.586 | 4.559 | 4.517 |
| 0.5 | 4.551 | 4.475 | 4.348 | 4.543 | 4.608 | 4.644 | 4.628 | 4.362 | 4.493 | 4.535 | 4.596 | 4.614 | 4.563 | 4.499 | 4.428 |
| 0.6 | 4.483 | 4.338 | 4.509 | 4.580 | 4.648 | 4.682 | 4.672 | 4.297 | 4.376 | 4.499 | 4.580 | 4.598 | 4.553 | 4.483 | 4.596 |
| 0.7 | 4.553 | 4.370 | 4.531 | 4.616 | 4.688 | 4.725 | 4.676 | 4.515 | 4.388 | 4.386 | 4.467 | 4.549 | 4.511 | 4.442 | 4.555 |
| 0.8 | 4.612 | 4.563 | 4.563 | 4.646 | 4.725 | 4.741 | 4.676 | 4.251 | 4.479 | 4.491 | 4.467 | 4.416 | 4.299 | 4.172 | 4.467 |
| 0.9 | 4.672 | 4.630 | 4.596 | 4.692 | 4.765 | 4.763 | 4.670 | 4.241 | 4.567 | 4.575 | 4.531 | 4.491 | 4.176 | 4.257 | 4.362 |
| 1.0 | 4.733 | 4.672 | 4.616 | 4.741 | 4.791 | 4.777 | 4.670 | 4.507 | 4.565 | 4.580 | 4.531 | 4.483 | 4.225 | 4.491 | 4.515 |
| 1.1 | 4.741 | 4.668 | 4.660 | 4.787 | 4.817 | 4.777 | 4.672 | 4.555 | 4.531 | 4.561 | 4.580 | 4.630 | 4.467 | 4.519 | 4.571 |
| 1.2 | 4.670 | 4.582 | 4.725 | 4.807 | 4.832 | 4.785 | 4.660 | 4.612 | 4.644 | 4.636 | 4.606 | 4.698 | 4.644 | 4.539 | 4.547 |
| 1.3 | 4.507 | 4.616 | 4.749 | 4.811 | 4.834 | 4.787 | 4.664 | 4.700 | 4.703 | 4.721 | 4.745 | 4.725 | 4.644 | 4.580 | 4.471 |
| 1.4 | 4.676 | 4.628 | 4.731 | 4.799 | 4.821 | 4.797 | 4.707 | 4.733 | 4.747 | 4.763 | 4.777 | 4.739 | 4.644 | 4.563 | 4.491 |
| 1.5 | 4.739 | 4.709 | 4.612 | 4.741 | 4.773 | 4.725 | 4.709 | 4.755 | 4.773 | 4.789 | 4.803 | 4.709 | 4.616 | 4.515 | 4.656 |
| 1.6 | 4.783 | 4.765 | 4.612 | 4.485 | 4.257 | 4.317 | 4.350 | 4.743 | 4.773 | 4.789 | 4.789 | 4.672 | 4.569 | 4.483 | 4.608 |
| 1.7 | 4.821 | 4.797 | 4.692 | 4.323 | 4.370 | 4.388 | 4.362 | 4.225 | 4.196 | 4.547 | 4.636 | 4.640 | 4.499 | 4.479 | 4.362 |
| 1.8 | 4.834 | 4.807 | 4.642 | 4.235 | 4.386 | 4.356 | 4.249 | 4.253 | 4.229 | 4.209 | 4.269 | 4.523 | 4.547 | 4.547 | 4.525 |
| 1.9 | 4.830 | 4.805 | 4.420 | 4.390 | 4.368 | 4.319 | 4.249 | 4.273 | 4.253 | 4.231 | 4.233 | 4.547 | 4.563 | 4.580 | 4.575 |
| 2.0 | 4.809 | 4.771 | 4.420 | 4.426 | 4.382 | 4.334 | 4.257 | 4.289 | 4.257 | 4.249 | 4.386 | 4.563 | 4.580 | 4.590 | 4.596 |
| 2.1 | 4.765 | 4.688 | 4.499 | 4.515 | 4.402 | 4.289 | 4.281 | 4.301 | 4.273 | 4.257 | 4.531 | 4.563 | 4.580 | 4.596 | 4.596 |
| 2.2 | 4.656 | 4.757 | 4.725 | 4.636 | 4.563 | 4.273 | 4.483 | 4.644 | 4.531 | 4.291 | 4.539 | 4.563 | 4.578 | 4.600 | 4.592 |
| 2.3 | 4.755 | 4.805 | 4.781 | 4.747 | 4.694 | 4.354 | 4.644 | 4.773 | 4.672 | 4.563 | 4.519 | 4.559 | 4.575 | 4.580 | 4.580 |
| 2.4 | 4.775 | 4.803 | 4.789 | 4.733 | 4.707 | 4.652 | 4.805 | 4.850 | 4.789 | 4.672 | 4.571 | 4.531 | 4.563 | 4.563 | 4.555 |
| 2.5 | 4.765 | 4.797 | 4.789 | 4.743 | 4.694 | 4.668 | 4.803 | 4.870 | 4.866 | 4.771 | 4.640 | 4.402 | 4.499 | 4.499 | 4.297 |
| 2.6 | 4.741 | 4.771 | 4.773 | 4.725 | 4.676 | 4.644 | 4.705 | 4.830 | 4.842 | 4.795 | 4.690 | 4.388 | 4.366 | 4.338 | 4.557 |
| 2.7 | 4.692 | 4.753 | 4.761 | 4.719 | 4.660 | 4.620 | 4.555 | 4.725 | 4.813 | 4.817 | 4.757 | 4.378 | 4.350 | 4.311 | 4.618 |
| 2.8 | 4.636 | 4.709 | 4.733 | 4.678 | 4.636 | 4.588 | 4.539 | 4.622 | 4.725 | 4.789 | 4.785 | 4.305 | 4.315 | 4.305 | 4.624 |
| 2.9 | 4.440 | 4.636 | 4.672 | 4.660 | 4.596 | 4.563 | 4.457 | 4.293 | 4.628 | 4.721 | 4.751 | 4.434 | 4.410 | 4.321 | 4.580 |
| 3.0 | 4.644 | 4.628 | 4.580 | 4.511 | 4.386 | 4.241 | 4.285 | 4.241 | 4.313 | 4.580 | 4.475 | 4.467 | 4.459 | 4.450 | 4.382 |
| 3.1 | 4.692 | 4.676 | 4.636 | 4.545 | 4.428 | 4.096 | 4.176 | 4.229 | 4.287 | 4.338 | 4.483 | 4.483 | 4.467 | 4.450 | 4.563 |
| 3.2 | 4.721 | 4.692 | 4.618 | 4.563 | 4.450 | 4.475 | 4.495 | 4.491 | 4.273 | 4.241 | 4.491 | 4.489 | 4.485 | 4.551 | 4.620 |
| 3.3 | 4.709 | 4.678 | 4.636 | 4.563 | 4.410 | 4.515 | 4.515 | 4.515 | 4.434 | 4.346 | 4.499 | 4.499 | 4.493 | 4.551 | 4.644 |
| 3.4 | 4.700 | 4.638 | 4.580 | 4.386 | 4.513 | 4.515 | 4.908 | 4.950 | 4.938 | 4.902 | 4.836 | 4.519 | 4.412 | 4.378 | 4.596 |
| 3.5 | 4.636 | 4.541 | 4.336 | 4.467 | 4.529 | 4.745 | 4.872 | 4.971 | 4.963 | 4.936 | 4.882 | 4.644 | 4.410 | 4.442 | 4.450 |
| 3.6 | 4.610 | 4.614 | 4.231 | 4.483 | 4.515 | 4.692 | 4.832 | 4.959 | 4.944 | 4.928 | 4.882 | 4.628 | 4.442 | 4.455 | 4.463 |
| 3.7 | 4.664 | 4.692 | 4.709 | 4.676 | 4.495 | 4.499 | 4.749 | 4.930 | 4.930 | 4.902 | 4.864 | 4.366 | 4.430 | 4.467 | 4.471 |
| 3.8 | 4.646 | 4.676 | 4.723 | 4.725 | 4.648 | 4.418 | 4.678 | 4.902 | 4.896 | 4.880 | 4.838 | 4.382 | 4.354 | 4.450 | 4.475 |
| 3.9 | 4.628 | 4.664 | 4.692 | 4.733 | 4.709 | 4.450 | 4.646 | 4.870 | 4.866 | 4.854 | 4.791 | 4.575 | 4.465 | 4.477 | 4.499 |
| 4.0 | 4.592 | 4.650 | 4.688 | 4.725 | 4.725 | 4.446 | 4.672 | 4.817 | 4.836 | 4.805 | 4.725 | 4.450 | 4.507 | 4.553 | 4.547 |
| 4.1 | 4.529 | 4.644 | 4.684 | 4.725 | 4.721 | 4.515 | 4.678 | 4.733 | 4.747 | 4.668 | 4.420 | 4.356 | 4.531 | 4.608 | 4.606 |
| 4.2 | 4.539 | 4.606 | 4.648 | 4.692 | 4.668 | 4.499 | 4.499 | 4.509 | 4.602 | 4.559 | 4.499 | 4.436 | 4.531 | 4.624 | 4.630 |
| 4.3 | 4.515 | 4.438 | 4.612 | 4.628 | 4.446 | 4.479 | 4.467 | 4.618 | 4.628 | 4.606 | 4.563 | 4.499 | 4.531 | 4.624 | 4.644 |
| 4.4 | 4.394 | 4.356 | 4.346 | 4.297 | 4.352 | 4.751 | 4.757 | 4.763 | 4.725 | 4.547 | 4.511 | 4.471 | 4.455 | 4.596 | 4.644 |
| 4.5 | 4.604 | 4.402 | 4.640 | 4.725 | 4.771 | 4.803 | 4.789 | 4.789 | 4.773 | 4.743 | 4.402 | 4.338 | 4.321 | 4.584 | 4.644 |
| 4.6 | 4.668 | 4.644 | 4.700 | 4.799 | 4.801 | 4.805 | 4.805 | 4.805 | 4.789 | 4.765 | 4.455 | 4.432 | 4.321 | 4.563 | 4.620 |
| 4.7 | 4.688 | 4.700 | 4.737 | 4.809 | 4.813 | 4.815 | 4.817 | 4.805 | 4.789 | 4.773 | 4.668 | 4.531 | 4.511 | 4.378 | 4.531 |
| 4.8 | 4.662 | 4.721 | 4.749 | 4.821 | 4.811 | 4.805 | 4.805 | 4.799 | 4.785 | 4.759 | 4.580 | 4.580 | 4.580 | 4.495 | 4.430 |
| 4.9 | 4.636 | 4.743 | 4.773 | 4.797 | 4.789 | 4.757 | 4.682 | 4.672 | 4.686 | 4.640 | 4.666 | 4.644 | 4.674 | 4.686 | 4.495 |
| 5.0 | 4.402 | 4.707 | 4.723 | 4.733 | 4.668 | 4.551 | 4.370 | 4.360 | 4.668 | 4.725 | 4.725 | 4.749 | 4.797 | 4.797 | 4.725 |
| 5.1 | 4.378 | 4.380 | 4.660 | 4.725 | 4.755 | 4.713 | 4.400 | 4.515 | 4.725 | 4.799 | 4.838 | 4.862 | 4.882 | 4.854 | 4.805 |
| 5.2 | 4.338 | 4.608 | 4.672 | 4.692 | 4.725 | 4.727 | 4.596 | 4.414 | 4.769 | 4.848 | 4.894 | 4.914 | 4.926 | 4.888 | 4.836 |
| 5.3 | 4.338 | 4.555 | 4.614 | 4.644 | 4.644 | 4.652 | 4.450 | 4.416 | 4.773 | 4.870 | 4.908 | 4.926 | 4.928 | 4.892 | 4.830 |
| 5.4 | 4.450 | 4.475 | 4.563 | 4.596 | 4.575 | 4.412 | 4.453 | 4.410 | 4.731 | 4.850 | 4.902 | 4.928 | 4.902 | 4.878 | 4.823 |
| 5.5 | 4.604 | 4.668 | 4.709 | 4.737 | 4.418 | 4.362 | 4.499 | 4.491 | 4.515 | 4.799 | 4.870 | 4.890 | 4.884 | 4.842 | 4.773 |
| 5.6 | 4.620 | 4.678 | 4.725 | 4.757 | 4.757 | 4.549 | 4.551 | 4.491 | 4.580 | 4.644 | 4.612 | 4.781 | 4.779 | 4.725 | 4.580 |
| 5.7 | 4.580 | 4.646 | 4.688 | 4.743 | 4.789 | 4.739 | 4.517 | 4.475 | 4.618 | 4.680 | 4.709 | 4.680 | 4.648 | 4.596 | 4.604 |
| 5.8 | 4.523 | 4.596 | 4.628 | 4.707 | 4.765 | 4.725 | 4.515 | 4.422 | 4.668 | 4.737 | 4.729 | 4.709 | 4.676 | 4.628 | 4.604 |
| 5.9 | 4.507 | 4.511 | 4.573 | 4.616 | 4.668 | 4.499 | 4.450 | 4.414 | 4.721 | 4.725 | 4.700 | 4.672 | 4.644 | 4.608 | 4.539 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 53.3 | 53.4 | 53.5 | 53.6 | 53.7 | 53.8 | 53.9 | 54.0 | 54.1 | 54.2 | 54.3 | 54.4 | 54.5 | 54.6 | 54.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.463 | 4.426 | 4.414 | 4.186 | 4.217 | 4.309 | 4.301 | 4.366 | 4.315 | 4.342 | 4.511 | 4.571 | 4.569 | 4.545 | 4.509 |
| 0.2 | 4.507 | 4.495 | 4.479 | 4.344 | 4.338 | 4.342 | 4.358 | 4.370 | 4.497 | 4.594 | 4.638 | 4.642 | 4.614 | 4.561 | 4.515 |
| 0.3 | 4.499 | 4.507 | 4.499 | 4.342 | 4.350 | 4.418 | 4.412 | 4.559 | 4.660 | 4.690 | 4.704 | 4.684 | 4.636 | 4.579 | 4.529 |
| 0.4 | 4.434 | 4.467 | 4.481 | 4.317 | 4.317 | 4.428 | 4.465 | 4.672 | 4.727 | 4.739 | 4.733 | 4.696 | 4.640 | 4.577 | 4.531 |
| 0.5 | 4.390 | 4.418 | 4.426 | 4.241 | 4.321 | 4.374 | 4.448 | 4.704 | 4.749 | 4.753 | 4.725 | 4.680 | 4.616 | 4.317 | 4.436 |
| 0.6 | 4.547 | 4.346 | 4.344 | 4.219 | 4.172 | 4.142 | 4.219 | 4.686 | 4.733 | 4.725 | 4.690 | 4.644 | 4.334 | 4.317 | 4.483 |
| 0.7 | 4.563 | 4.531 | 4.257 | 4.253 | 4.217 | 4.128 | 4.497 | 4.479 | 4.688 | 4.672 | 4.638 | 4.338 | 4.334 | 4.317 | 4.481 |
| 0.8 | 4.567 | 4.551 | 4.505 | 4.317 | 4.467 | 4.575 | 4.660 | 4.579 | 4.446 | 4.344 | 4.305 | 4.321 | 4.321 | 4.317 | 4.360 |
| 0.9 | 4.575 | 4.547 | 4.491 | 4.327 | 4.644 | 4.709 | 4.741 | 4.672 | 4.539 | 4.424 | 4.317 | 4.301 | 4.317 | 4.317 | 4.217 |
| 1.0 | 4.559 | 4.527 | 4.273 | 4.467 | 4.638 | 4.700 | 4.757 | 4.745 | 4.628 | 4.499 | 4.386 | 4.277 | 4.289 | 4.279 | 4.239 |
| 1.1 | 4.511 | 4.479 | 4.122 | 4.223 | 4.561 | 4.672 | 4.753 | 4.757 | 4.688 | 4.563 | 4.461 | 4.368 | 4.249 | 4.368 | 4.430 |
| 1.2 | 4.606 | 4.628 | 4.622 | 4.547 | 4.475 | 4.573 | 4.725 | 4.743 | 4.702 | 4.612 | 4.513 | 4.418 | 4.172 | 4.444 | 4.463 |
| 1.3 | 4.642 | 4.668 | 4.656 | 4.569 | 4.398 | 4.483 | 4.594 | 4.686 | 4.678 | 4.630 | 4.559 | 4.450 | 4.360 | 4.467 | 4.483 |
| 1.4 | 4.660 | 4.686 | 4.666 | 4.515 | 4.350 | 4.410 | 4.487 | 4.608 | 4.628 | 4.606 | 4.561 | 4.483 | 4.386 | 4.454 | 4.491 |
| 1.5 | 4.676 | 4.690 | 4.640 | 4.467 | 4.154 | 4.239 | 4.400 | 4.483 | 4.559 | 4.551 | 4.527 | 4.487 | 4.412 | 4.434 | 4.495 |
| 1.6 | 4.690 | 4.690 | 4.579 | 4.414 | 4.188 | 4.253 | 4.229 | 4.400 | 4.487 | 4.507 | 4.481 | 4.450 | 4.402 | 4.370 | 4.442 |
| 1.7 | 4.694 | 4.676 | 4.531 | 4.088 | 4.221 | 4.253 | 4.239 | 4.207 | 4.392 | 4.446 | 4.432 | 4.386 | 4.342 | 4.297 | 4.313 |
| 1.8 | 4.692 | 4.628 | 4.481 | 4.067 | 4.156 | 4.209 | 4.192 | 4.559 | 4.608 | 4.624 | 4.592 | 4.346 | 4.186 | 4.283 | 4.305 |
| 1.9 | 4.684 | 4.596 | 4.434 | 4.317 | 4.190 | 4.142 | 4.515 | 4.573 | 4.604 | 4.636 | 4.640 | 4.559 | 4.446 | 4.154 | 4.257 |
| 2.0 | 4.668 | 4.579 | 4.497 | 4.414 | 4.190 | 4.172 | 4.527 | 4.547 | 4.569 | 4.594 | 4.626 | 4.561 | 4.432 | 4.287 | 4.638 |
| 2.1 | 4.628 | 4.555 | 4.577 | 4.660 | 4.192 | 4.430 | 4.537 | 4.549 | 4.559 | 4.571 | 4.579 | 4.547 | 4.321 | 4.596 | 4.709 |
| 2.2 | 4.563 | 4.543 | 4.676 | 4.690 | 4.142 | 4.420 | 4.515 | 4.553 | 4.567 | 4.563 | 4.563 | 4.533 | 4.317 | 4.638 | 4.741 |
| 2.3 | 4.495 | 4.656 | 4.678 | 4.654 | 4.515 | 4.749 | 4.773 | 4.765 | 4.559 | 4.559 | 4.561 | 4.515 | 4.321 | 4.414 | 4.751 |
| 2.4 | 4.531 | 4.579 | 4.598 | 4.656 | 4.739 | 4.773 | 4.797 | 4.781 | 4.700 | 4.507 | 4.531 | 4.509 | 4.382 | 4.209 | 4.737 |
| 2.5 | 4.398 | 4.354 | 4.592 | 4.668 | 4.709 | 4.743 | 4.769 | 4.769 | 4.704 | 4.553 | 4.465 | 4.463 | 4.317 | 4.235 | 4.188 |
| 2.6 | 4.422 | 4.219 | 4.561 | 4.602 | 4.652 | 4.686 | 4.709 | 4.709 | 4.692 | 4.624 | 4.301 | 4.406 | 4.444 | 4.426 | 4.174 |
| 2.7 | 4.473 | 4.209 | 4.209 | 4.527 | 4.561 | 4.579 | 4.600 | 4.610 | 4.620 | 4.612 | 4.497 | 4.444 | 4.483 | 4.479 | 4.346 |
| 2.8 | 4.491 | 4.467 | 4.172 | 4.063 | 4.450 | 4.483 | 4.511 | 4.529 | 4.545 | 4.543 | 4.386 | 4.450 | 4.511 | 4.497 | 4.446 |
| 2.9 | 4.499 | 4.402 | 4.063 | 4.063 | 4.418 | 4.454 | 4.467 | 4.382 | 4.279 | 4.229 | 4.338 | 4.452 | 4.477 | 4.481 | 4.430 |
| 3.0 | 4.507 | 4.305 | 4.283 | 4.204 | 4.446 | 4.481 | 4.471 | 4.432 | 4.368 | 4.315 | 4.688 | 4.696 | 4.656 | 4.628 | 4.573 |
| 3.1 | 4.368 | 4.362 | 4.342 | 4.297 | 4.446 | 4.465 | 4.446 | 4.414 | 4.773 | 4.767 | 4.741 | 4.725 | 4.700 | 4.666 | 4.624 |
| 3.2 | 4.394 | 4.384 | 4.368 | 4.332 | 4.432 | 4.446 | 4.422 | 4.801 | 4.832 | 4.799 | 4.753 | 4.709 | 4.676 | 4.642 | 4.612 |
| 3.3 | 4.398 | 4.386 | 4.370 | 4.338 | 4.414 | 4.434 | 4.704 | 4.817 | 4.832 | 4.787 | 4.739 | 4.692 | 4.658 | 4.626 | 4.594 |
| 3.4 | 4.398 | 4.382 | 4.370 | 4.323 | 4.368 | 4.416 | 4.388 | 4.767 | 4.789 | 4.757 | 4.709 | 4.676 | 4.644 | 4.622 | 4.588 |
| 3.5 | 4.398 | 4.370 | 4.396 | 4.545 | 4.257 | 4.382 | 4.368 | 4.338 | 4.690 | 4.688 | 4.674 | 4.654 | 4.628 | 4.608 | 4.575 |
| 3.6 | 4.660 | 4.670 | 4.690 | 4.690 | 4.640 | 4.303 | 4.323 | 4.527 | 4.640 | 4.618 | 4.515 | 4.557 | 4.577 | 4.559 | 4.511 |
| 3.7 | 4.688 | 4.690 | 4.757 | 4.757 | 4.725 | 4.590 | 4.209 | 4.594 | 4.652 | 4.646 | 4.604 | 4.507 | 4.414 | 4.334 | 4.305 |
| 3.8 | 4.680 | 4.668 | 4.765 | 4.757 | 4.692 | 4.640 | 4.463 | 4.446 | 4.567 | 4.616 | 4.616 | 4.563 | 4.475 | 4.378 | 4.368 |
| 3.9 | 4.644 | 4.690 | 4.747 | 4.709 | 4.680 | 4.640 | 4.463 | 4.440 | 4.354 | 4.515 | 4.545 | 4.547 | 4.505 | 4.410 | 4.374 |
| 4.0 | 4.608 | 4.698 | 4.721 | 4.686 | 4.658 | 4.620 | 4.513 | 4.402 | 4.402 | 4.418 | 4.414 | 4.467 | 4.483 | 4.424 | 4.626 |
| 4.1 | 4.634 | 4.692 | 4.688 | 4.644 | 4.616 | 4.582 | 4.531 | 4.402 | 4.424 | 4.442 | 4.426 | 4.368 | 4.561 | 4.608 | 4.660 |
| 4.2 | 4.644 | 4.670 | 4.640 | 4.604 | 4.579 | 4.553 | 4.515 | 4.422 | 4.432 | 4.430 | 4.418 | 4.354 | 4.579 | 4.602 | 4.658 |
| 4.3 | 4.620 | 4.628 | 4.608 | 4.575 | 4.549 | 4.529 | 4.499 | 4.398 | 4.404 | 4.495 | 4.382 | 4.321 | 4.533 | 4.610 | 4.656 |
| 4.4 | 4.495 | 4.579 | 4.575 | 4.545 | 4.515 | 4.497 | 4.467 | 4.533 | 4.658 | 4.674 | 4.632 | 4.267 | 4.495 | 4.541 | 4.628 |
| 4.5 | 4.531 | 4.515 | 4.511 | 4.511 | 4.487 | 4.450 | 4.626 | 4.696 | 4.741 | 4.771 | 4.765 | 4.739 | 4.769 | 4.680 | 4.545 |
| 4.6 | 4.539 | 4.545 | 4.539 | 4.436 | 4.418 | 4.545 | 4.624 | 4.674 | 4.711 | 4.745 | 4.763 | 4.773 | 4.765 | 4.709 | 4.505 |
| 4.7 | 4.499 | 4.555 | 4.531 | 4.356 | 4.219 | 4.525 | 4.592 | 4.644 | 4.690 | 4.721 | 4.735 | 4.743 | 4.719 | 4.658 | 4.475 |
| 4.8 | 4.539 | 4.479 | 4.372 | 4.241 | 4.253 | 4.338 | 4.545 | 4.612 | 4.614 | 4.690 | 4.692 | 4.684 | 4.656 | 4.579 | 4.450 |
| 4.9 | 4.547 | 4.350 | 4.418 | 4.418 | 4.398 | 4.354 | 4.263 | 4.549 | 4.559 | 4.559 | 4.628 | 4.626 | 4.596 | 4.493 | 4.553 |
| 5.0 | 4.507 | 4.515 | 4.515 | 4.499 | 4.465 | 4.426 | 4.350 | 4.172 | 4.535 | 4.590 | 4.511 | 4.231 | 4.515 | 4.616 | 4.592 |
| 5.1 | 4.604 | 4.604 | 4.575 | 4.547 | 4.515 | 4.487 | 4.418 | 4.416 | 4.563 | 4.612 | 4.636 | 4.644 | 4.563 | 4.622 | 4.610 |
| 5.2 | 4.664 | 4.658 | 4.628 | 4.596 | 4.561 | 4.531 | 4.483 | 4.465 | 4.539 | 4.584 | 4.638 | 4.672 | 4.642 | 4.563 | 4.592 |
| 5.3 | 4.704 | 4.692 | 4.668 | 4.636 | 4.606 | 4.571 | 4.513 | 4.446 | 4.515 | 4.561 | 4.614 | 4.636 | 4.646 | 4.612 | 4.727 |
| 5.4 | 4.731 | 4.731 | 4.723 | 4.682 | 4.652 | 4.610 | 4.543 | 4.446 | 4.497 | 4.541 | 4.579 | 4.632 | 4.644 | 4.692 | 4.759 |
| 5.5 | 4.741 | 4.749 | 4.745 | 4.713 | 4.684 | 4.628 | 4.531 | 4.432 | 4.348 | 4.499 | 4.545 | 4.594 | 4.596 | 4.729 | 4.751 |
| 5.6 | 4.727 | 4.749 | 4.749 | 4.729 | 4.692 | 4.622 | 4.507 | 4.400 | 4.446 | 4.432 | 4.400 | 4.499 | 4.317 | 4.676 | 4.704 |
| 5.7 | 4.698 | 4.745 | 4.737 | 4.717 | 4.664 | 4.386 | 4.467 | 4.483 | 4.507 | 4.467 | 4.420 | 4.382 | 4.450 | 4.467 | 4.640 |
| 5.8 | 4.654 | 4.739 | 4.739 | 4.688 | 4.368 | 4.430 | 4.497 | 4.489 | 4.511 | 4.497 | 4.444 | 4.416 | 4.481 | 4.487 | 4.400 |
| 5.9 | 4.620 | 4.690 | 4.676 | 4.338 | 4.374 | 4.414 | 4.372 | 4.430 | 4.418 | 4.483 | 4.465 | 4.434 | 4.340 | 4.418 | 4.368 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 59.3 | 59.4 | 59.5 | 59.6 | 59.7 | 59.8 | 59.9 | 60.0 | 60.1 | 60.2 | 60.3 | 60.4 | 60.5 | 60.6 | 60.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.243 | 4.213 | 4.106 | 4.307 | 4.676 | 4.709 | 4.694 | 4.676 | 4.563 | 4.192 | 4.144 | 4.338 | 4.418 | 4.483 | 4.537 |
| 0.2 | 4.418 | 4.321 | 4.174 | 4.342 | 4.676 | 4.725 | 4.721 | 4.678 | 4.646 | 4.563 | 4.249 | 4.362 | 4.410 | 4.467 | 4.521 |
| 0.3 | 4.463 | 4.370 | 4.176 | 4.418 | 4.678 | 4.725 | 4.719 | 4.688 | 4.672 | 4.594 | 4.259 | 4.350 | 4.402 | 4.450 | 4.501 |
| 0.4 | 4.539 | 4.428 | 4.297 | 4.592 | 4.709 | 4.723 | 4.694 | 4.674 | 4.644 | 4.527 | 4.249 | 4.338 | 4.386 | 4.436 | 4.499 |
| 0.5 | 4.596 | 4.519 | 4.360 | 4.475 | 4.660 | 4.692 | 4.660 | 4.614 | 4.547 | 4.253 | 4.231 | 4.497 | 4.507 | 4.499 | 4.378 |
| 0.6 | 4.644 | 4.592 | 4.450 | 4.164 | 4.192 | 4.162 | 4.305 | 4.253 | 4.469 | 4.499 | 4.507 | 4.515 | 4.531 | 4.535 | 4.531 |
| 0.7 | 4.660 | 4.628 | 4.067 | 4.128 | 4.203 | 4.338 | 4.362 | 4.348 | 4.515 | 4.539 | 4.531 | 4.531 | 4.541 | 4.553 | 4.563 |
| 0.8 | 4.636 | 4.612 | 4.321 | 3.989 | 4.263 | 4.338 | 4.362 | 4.346 | 4.503 | 4.551 | 4.515 | 4.553 | 4.563 | 4.551 | 4.547 |
| 0.9 | 4.531 | 4.539 | 4.398 | 4.402 | 4.255 | 4.267 | 4.291 | 4.297 | 4.402 | 4.448 | 4.527 | 4.493 | 4.612 | 4.616 | 4.580 |
| 1.0 | 4.370 | 4.455 | 4.467 | 4.408 | 4.205 | 4.209 | 4.473 | 4.495 | 4.418 | 4.261 | 4.372 | 4.628 | 4.692 | 4.654 | 4.634 |
| 1.1 | 4.444 | 4.491 | 4.461 | 4.374 | 4.213 | 4.491 | 4.549 | 4.571 | 4.547 | 4.188 | 4.664 | 4.725 | 4.725 | 4.660 | 4.676 |
| 1.2 | 4.434 | 4.467 | 4.392 | 4.192 | 4.485 | 4.549 | 4.580 | 4.580 | 4.531 | 4.483 | 4.684 | 4.725 | 4.733 | 4.666 | 4.709 |
| 1.3 | 4.297 | 4.209 | 4.164 | 4.446 | 4.535 | 4.571 | 4.584 | 4.545 | 4.499 | 4.612 | 4.698 | 4.731 | 4.741 | 4.755 | 4.749 |
| 1.4 | 4.463 | 4.231 | 4.176 | 4.483 | 4.543 | 4.571 | 4.547 | 4.507 | 4.461 | 4.616 | 4.682 | 4.725 | 4.733 | 4.741 | 4.733 |
| 1.5 | 4.580 | 4.477 | 4.344 | 4.450 | 4.513 | 4.531 | 4.501 | 4.450 | 4.418 | 4.551 | 4.644 | 4.686 | 4.703 | 4.725 | 4.694 |
| 1.6 | 4.628 | 4.616 | 4.475 | 4.414 | 4.469 | 4.487 | 4.467 | 4.430 | 4.370 | 4.491 | 4.610 | 4.644 | 4.668 | 4.654 | 4.660 |
| 1.7 | 4.644 | 4.646 | 4.582 | 4.467 | 4.390 | 4.420 | 4.410 | 4.386 | 4.325 | 4.434 | 4.515 | 4.596 | 4.620 | 4.628 | 4.612 |
| 1.8 | 4.660 | 4.660 | 4.644 | 4.584 | 4.281 | 4.350 | 4.370 | 4.334 | 4.257 | 4.055 | 4.475 | 4.531 | 4.571 | 4.571 | 4.531 |
| 1.9 | 4.652 | 4.660 | 4.644 | 4.596 | 4.489 | 4.273 | 4.273 | 4.203 | 4.080 | 4.019 | 4.378 | 4.418 | 4.450 | 4.467 | 4.418 |
| 2.0 | 4.628 | 4.640 | 4.628 | 4.592 | 4.467 | 4.313 | 4.338 | 4.360 | 4.338 | 3.971 | 4.382 | 4.402 | 4.388 | 4.360 | 4.152 |
| 2.1 | 4.612 | 4.620 | 4.612 | 4.563 | 4.467 | 4.305 | 4.338 | 4.366 | 4.362 | 4.154 | 4.450 | 4.467 | 4.479 | 4.473 | 4.418 |
| 2.2 | 4.592 | 4.596 | 4.563 | 4.499 | 4.257 | 4.297 | 4.321 | 4.354 | 4.346 | 4.434 | 4.467 | 4.489 | 4.499 | 4.499 | 4.467 |
| 2.3 | 4.555 | 4.547 | 4.511 | 4.442 | 4.545 | 4.551 | 4.491 | 4.321 | 4.340 | 4.455 | 4.481 | 4.499 | 4.515 | 4.515 | 4.511 |
| 2.4 | 4.499 | 4.475 | 4.297 | 4.382 | 4.539 | 4.553 | 4.531 | 4.487 | 4.130 | 4.461 | 4.491 | 4.505 | 4.515 | 4.531 | 4.543 |
| 2.5 | 4.596 | 4.596 | 4.580 | 4.426 | 4.519 | 4.547 | 4.545 | 4.491 | 4.422 | 4.402 | 4.485 | 4.507 | 4.519 | 4.541 | 4.553 |
| 2.6 | 4.692 | 4.662 | 4.628 | 4.571 | 4.465 | 4.489 | 4.491 | 4.450 | 4.402 | 4.563 | 4.600 | 4.499 | 4.521 | 4.545 | 4.555 |
| 2.7 | 4.725 | 4.666 | 4.624 | 4.580 | 4.531 | 4.388 | 4.422 | 4.416 | 4.604 | 4.703 | 4.692 | 4.636 | 4.507 | 4.529 | 4.533 |
| 2.8 | 4.692 | 4.644 | 4.610 | 4.567 | 4.517 | 4.457 | 4.338 | 4.620 | 4.733 | 4.753 | 4.725 | 4.660 | 4.453 | 4.463 | 4.442 |
| 2.9 | 4.676 | 4.628 | 4.592 | 4.549 | 4.507 | 4.457 | 4.606 | 4.751 | 4.789 | 4.773 | 4.727 | 4.652 | 4.555 | 4.660 | 4.676 |
| 3.0 | 4.654 | 4.612 | 4.569 | 4.531 | 4.491 | 4.624 | 4.757 | 4.811 | 4.805 | 4.765 | 4.707 | 4.616 | 4.596 | 4.709 | 4.676 |
| 3.1 | 4.612 | 4.571 | 4.545 | 4.515 | 4.475 | 4.753 | 4.834 | 4.834 | 4.805 | 4.739 | 4.676 | 4.513 | 4.628 | 4.741 | 4.709 |
| 3.2 | 4.533 | 4.501 | 4.495 | 4.477 | 4.757 | 4.854 | 4.866 | 4.838 | 4.773 | 4.725 | 4.644 | 4.519 | 4.654 | 4.757 | 4.757 |
| 3.3 | 4.479 | 4.509 | 4.495 | 4.467 | 4.821 | 4.878 | 4.870 | 4.821 | 4.757 | 4.686 | 4.616 | 4.537 | 4.644 | 4.741 | 4.785 |
| 3.4 | 4.545 | 4.533 | 4.515 | 4.505 | 4.773 | 4.838 | 4.844 | 4.795 | 4.737 | 4.664 | 4.563 | 4.531 | 4.628 | 4.698 | 4.751 |
| 3.5 | 4.571 | 4.571 | 4.561 | 4.527 | 4.515 | 4.493 | 4.620 | 4.749 | 4.723 | 4.636 | 4.450 | 4.547 | 4.600 | 4.644 | 4.676 |
| 3.6 | 4.604 | 4.600 | 4.584 | 4.563 | 4.539 | 4.507 | 4.491 | 4.584 | 4.620 | 4.571 | 4.547 | 4.499 | 4.338 | 4.247 | 4.178 |
| 3.7 | 4.618 | 4.614 | 4.596 | 4.571 | 4.547 | 4.515 | 4.491 | 4.434 | 4.563 | 4.620 | 4.612 | 4.571 | 4.507 | 4.432 | 4.487 |
| 3.8 | 4.622 | 4.612 | 4.592 | 4.555 | 4.515 | 4.483 | 4.446 | 4.217 | 4.440 | 4.575 | 4.632 | 4.618 | 4.434 | 4.531 | 4.539 |
| 3.9 | 4.608 | 4.573 | 4.531 | 4.491 | 4.426 | 4.509 | 4.547 | 4.586 | 4.557 | 4.537 | 4.531 | 4.442 | 4.519 | 4.547 | 4.539 |
| 4.0 | 4.557 | 4.491 | 4.436 | 4.402 | 4.364 | 4.507 | 4.563 | 4.580 | 4.594 | 4.580 | 4.555 | 4.336 | 4.541 | 4.545 | 4.541 |
| 4.1 | 4.241 | 4.418 | 4.344 | 4.491 | 4.334 | 4.497 | 4.515 | 4.563 | 4.561 | 4.563 | 4.497 | 4.495 | 4.539 | 4.539 | 4.539 |
| 4.2 | 4.241 | 4.184 | 4.400 | 4.594 | 4.596 | 4.549 | 4.509 | 4.531 | 4.547 | 4.481 | 4.519 | 4.475 | 4.531 | 4.531 | 4.533 |
| 4.3 | 4.247 | 4.370 | 4.582 | 4.608 | 4.596 | 4.569 | 4.515 | 4.299 | 4.578 | 4.644 | 4.676 | 4.692 | 4.515 | 4.519 | 4.531 |
| 4.4 | 4.338 | 4.499 | 4.580 | 4.606 | 4.596 | 4.531 | 4.489 | 4.285 | 4.670 | 4.725 | 4.757 | 4.783 | 4.741 | 4.511 | 4.511 |
| 4.5 | 4.275 | 4.495 | 4.543 | 4.543 | 4.521 | 4.455 | 4.261 | 4.692 | 4.753 | 4.789 | 4.821 | 4.838 | 4.821 | 4.338 | 4.370 |
| 4.6 | 4.057 | 4.160 | 4.217 | 4.291 | 4.467 | 4.463 | 4.692 | 4.771 | 4.821 | 4.854 | 4.882 | 4.882 | 4.848 | 4.215 | 4.580 |
| 4.7 | 4.003 | 4.313 | 4.499 | 4.537 | 4.543 | 4.527 | 4.757 | 4.830 | 4.870 | 4.894 | 4.902 | 4.882 | 4.858 | 4.628 | 4.604 |
| 4.8 | 4.493 | 4.555 | 4.586 | 4.580 | 4.571 | 4.555 | 4.823 | 4.886 | 4.902 | 4.902 | 4.878 | 4.830 | 4.805 | 4.640 | 4.628 |
| 4.9 | 4.539 | 4.596 | 4.612 | 4.596 | 4.590 | 4.563 | 4.821 | 4.902 | 4.906 | 4.882 | 4.795 | 4.757 | 4.729 | 4.571 | 4.624 |
| 5.0 | 4.434 | 4.596 | 4.612 | 4.602 | 4.575 | 4.509 | 4.795 | 4.884 | 4.884 | 4.309 | 4.747 | 4.686 | 4.467 | 4.386 | 4.602 |
| 5.1 | 4.440 | 4.515 | 4.547 | 4.535 | 4.434 | 4.434 | 4.438 | 4.406 | 4.301 | 4.515 | 4.539 | 4.410 | 4.273 | 4.114 | 4.495 |
| 5.2 | 4.487 | 4.487 | 4.434 | 4.511 | 4.511 | 4.507 | 4.513 | 4.497 | 4.481 | 4.390 | 4.491 | 4.311 | 4.289 | 4.039 | 4.477 |
| 5.3 | 4.467 | 4.463 | 4.563 | 4.580 | 4.590 | 4.580 | 4.578 | 4.571 | 4.565 | 4.559 | 4.515 | 4.194 | 4.200 | 4.313 | 4.547 |
| 5.4 | 4.394 | 4.398 | 4.624 | 4.644 | 4.644 | 4.644 | 4.646 | 4.652 | 4.644 | 4.638 | 4.612 | 4.213 | 4.211 | 4.446 | 4.563 |
| 5.5 | 4.428 | 4.563 | 4.686 | 4.725 | 4.725 | 4.709 | 4.725 | 4.725 | 4.725 | 4.700 | 4.676 | 4.588 | 4.321 | 4.529 | 4.565 |
| 5.6 | 4.497 | 4.483 | 4.698 | 4.755 | 4.757 | 4.757 | 4.775 | 4.779 | 4.769 | 4.741 | 4.703 | 4.620 | 4.515 | 4.575 | 4.559 |
| 5.7 | 4.477 | 4.467 | 4.656 | 4.753 | 4.763 | 4.773 | 4.789 | 4.789 | 4.765 | 4.725 | 4.668 | 4.580 | 4.569 | 4.586 | 4.535 |
| 5.8 | 4.467 | 4.311 | 4.533 | 4.656 | 4.590 | 4.547 | 4.733 | 4.725 | 4.676 | 4.614 | 4.571 | 4.515 | 4.563 | 4.563 | 4.515 |
| 5.9 | 4.257 | 4.225 | 4.128 | 4.273 | 4.273 | 4.321 | 4.354 | 4.668 | 4.160 | 4.515 | 4.257 | 4.483 | 4.509 | 4.501 | 4.467 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 65.3 | 65.4 | 65.5 | 65.6 | 65.7 | 65.8 | 65.9 | 66.0 | 66.1 | 66.2 | 66.3 | 66.4 | 66.5 | 66.6 | 66.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.418 | 4.418 | 4.418 | 4.380 | 4.376 | 4.346 | 4.215 | 4.128 | 4.112 | 4.078 | 4.372 | 4.434 | 4.455 | 4.465 | 4.423 |
| 0.2 | 4.473 | 4.499 | 4.491 | 4.463 | 4.434 | 4.378 | 4.338 | 4.144 | 4.120 | 4.418 | 4.463 | 4.499 | 4.519 | 4.526 | 4.488 |
| 0.3 | 4.434 | 4.453 | 4.489 | 4.483 | 4.434 | 4.378 | 4.370 | 4.152 | 4.432 | 4.467 | 4.507 | 4.539 | 4.563 | 4.565 | 4.544 |
| 0.4 | 4.338 | 4.364 | 4.362 | 4.547 | 4.547 | 4.499 | 4.273 | 4.154 | 4.467 | 4.507 | 4.541 | 4.563 | 4.571 | 4.577 | 4.552 |
| 0.5 | 4.217 | 4.491 | 4.604 | 4.618 | 4.602 | 4.543 | 4.487 | 4.334 | 4.491 | 4.519 | 4.549 | 4.565 | 4.571 | 4.565 | 4.532 |
| 0.6 | 4.283 | 4.531 | 4.600 | 4.620 | 4.602 | 4.563 | 4.499 | 4.354 | 4.475 | 4.511 | 4.535 | 4.547 | 4.547 | 4.526 | 4.441 |
| 0.7 | 4.422 | 4.509 | 4.537 | 4.555 | 4.563 | 4.509 | 4.426 | 4.112 | 4.418 | 4.455 | 4.483 | 4.495 | 4.481 | 4.435 | 4.354 |
| 0.8 | 4.418 | 4.469 | 4.485 | 4.491 | 4.475 | 4.418 | 4.261 | 4.136 | 4.229 | 4.313 | 4.305 | 4.273 | 4.273 | 4.188 | 4.060 |
| 0.9 | 4.346 | 4.418 | 4.434 | 4.426 | 4.380 | 4.303 | 4.156 | 4.150 | 4.253 | 3.995 | 4.120 | 4.118 | 4.023 | 4.196 | 4.050 |
| 1.0 | 4.249 | 4.338 | 4.352 | 4.475 | 4.305 | 4.370 | 4.338 | 4.251 | 4.114 | 4.152 | 4.144 | 4.261 | 4.338 | 4.358 | 4.229 |
| 1.1 | 4.313 | 4.571 | 4.592 | 4.580 | 4.580 | 4.563 | 4.374 | 4.267 | 4.088 | 4.148 | 4.338 | 4.366 | 4.418 | 4.423 | 4.273 |
| 1.2 | 4.321 | 4.636 | 4.644 | 4.628 | 4.634 | 4.636 | 4.573 | 4.233 | 4.067 | 4.368 | 4.434 | 4.489 | 4.503 | 4.455 | 4.277 |
| 1.3 | 4.330 | 4.666 | 4.684 | 4.676 | 4.678 | 4.676 | 4.636 | 4.499 | 4.426 | 4.491 | 4.523 | 4.555 | 4.531 | 4.447 | 4.289 |
| 1.4 | 4.325 | 4.660 | 4.692 | 4.703 | 4.694 | 4.676 | 4.610 | 4.491 | 4.463 | 4.523 | 4.561 | 4.561 | 4.521 | 4.439 | 4.307 |
| 1.5 | 4.338 | 4.531 | 4.644 | 4.686 | 4.676 | 4.644 | 4.523 | 4.386 | 4.418 | 4.455 | 4.491 | 4.499 | 4.479 | 4.407 | 4.285 |
| 1.6 | 4.325 | 4.233 | 4.517 | 4.614 | 4.620 | 4.515 | 4.386 | 4.176 | 4.338 | 4.362 | 4.354 | 4.368 | 4.388 | 4.350 | 4.245 |
| 1.7 | 4.301 | 4.194 | 4.394 | 4.491 | 4.497 | 4.368 | 4.192 | 4.176 | 4.152 | 4.289 | 4.281 | 4.263 | 4.257 | 4.196 | 4.158 |
| 1.8 | 4.235 | 3.942 | 4.031 | 4.321 | 4.273 | 4.406 | 4.418 | 4.436 | 4.455 | 4.338 | 4.182 | 4.160 | 4.102 | 3.937 | 4.137 |
| 1.9 | 4.176 | 4.233 | 4.251 | 4.233 | 4.015 | 4.450 | 4.448 | 4.471 | 4.495 | 4.475 | 3.987 | 3.971 | 3.979 | 3.941 | 4.002 |
| 2.0 | 4.188 | 4.233 | 4.261 | 4.265 | 4.231 | 4.475 | 4.509 | 4.497 | 4.519 | 4.442 | 3.987 | 4.176 | 4.219 | 4.220 | 4.176 |
| 2.1 | 4.346 | 4.378 | 4.241 | 4.255 | 4.414 | 4.491 | 4.539 | 4.571 | 4.555 | 4.338 | 4.128 | 4.257 | 4.261 | 4.261 | 4.241 |
| 2.2 | 4.382 | 4.450 | 4.402 | 4.233 | 4.465 | 4.511 | 4.563 | 4.610 | 4.582 | 4.426 | 4.194 | 4.281 | 4.491 | 4.520 | 4.510 |
| 2.3 | 4.370 | 4.450 | 4.481 | 4.448 | 4.467 | 4.523 | 4.596 | 4.626 | 4.604 | 4.511 | 4.047 | 4.426 | 4.588 | 4.609 | 4.583 |
| 2.4 | 4.344 | 4.412 | 4.434 | 4.378 | 4.168 | 4.517 | 4.596 | 4.620 | 4.557 | 4.515 | 4.033 | 4.499 | 4.618 | 4.609 | 4.573 |
| 2.5 | 4.301 | 4.370 | 4.370 | 4.297 | 4.144 | 4.146 | 4.533 | 4.551 | 4.547 | 4.408 | 3.993 | 4.515 | 4.624 | 4.619 | 4.569 |
| 2.6 | 4.261 | 4.332 | 4.305 | 4.108 | 4.120 | 4.124 | 4.138 | 4.305 | 4.378 | 4.334 | 4.055 | 4.533 | 4.602 | 4.597 | 4.552 |
| 2.7 | 4.285 | 4.249 | 4.071 | 4.051 | 4.055 | 4.051 | 4.035 | 4.241 | 4.267 | 4.275 | 4.259 | 4.517 | 4.539 | 4.514 | 4.473 |
| 2.8 | 4.291 | 4.273 | 4.209 | 4.067 | 4.233 | 4.217 | 4.047 | 4.301 | 4.297 | 4.321 | 4.311 | 4.408 | 4.450 | 4.423 | 4.372 |
| 2.9 | 4.305 | 4.281 | 4.233 | 4.273 | 4.273 | 4.261 | 4.198 | 4.325 | 4.342 | 4.342 | 4.321 | 4.303 | 4.243 | 4.123 | 4.253 |
| 3.0 | 4.321 | 4.273 | 4.257 | 4.285 | 4.283 | 4.273 | 4.241 | 4.338 | 4.362 | 4.346 | 4.325 | 4.307 | 4.257 | 4.123 | 4.309 |
| 3.1 | 4.311 | 4.249 | 4.273 | 4.281 | 4.273 | 4.261 | 4.241 | 4.315 | 4.362 | 4.354 | 4.338 | 4.315 | 4.249 | 4.020 | 4.342 |
| 3.2 | 4.273 | 4.273 | 4.265 | 4.273 | 4.271 | 4.241 | 4.184 | 4.209 | 4.265 | 4.338 | 4.338 | 4.273 | 4.096 | 4.006 | 4.342 |
| 3.3 | 4.281 | 4.289 | 4.281 | 4.126 | 4.229 | 4.249 | 4.245 | 4.241 | 4.231 | 4.144 | 4.128 | 4.075 | 4.067 | 4.073 | 4.340 |
| 3.4 | 4.273 | 4.285 | 4.275 | 4.402 | 4.493 | 4.563 | 4.219 | 4.213 | 4.209 | 4.031 | 4.100 | 4.047 | 4.073 | 4.115 | 4.269 |
| 3.5 | 4.174 | 4.231 | 4.209 | 4.402 | 4.499 | 4.580 | 4.555 | 4.323 | 4.346 | 4.287 | 4.255 | 4.221 | 4.172 | 4.113 | 4.115 |
| 3.6 | 4.192 | 4.263 | 4.305 | 4.402 | 4.515 | 4.580 | 4.563 | 4.313 | 4.301 | 4.311 | 4.311 | 4.265 | 4.223 | 4.099 | 4.107 |
| 3.7 | 4.231 | 4.273 | 4.281 | 4.402 | 4.515 | 4.580 | 4.571 | 4.531 | 4.120 | 4.338 | 4.321 | 4.277 | 4.239 | 4.067 | 4.099 |
| 3.8 | 4.257 | 4.241 | 4.213 | 4.356 | 4.531 | 4.596 | 4.582 | 4.557 | 4.078 | 4.338 | 4.338 | 4.297 | 4.257 | 4.220 | 4.099 |
| 3.9 | 4.209 | 4.209 | 4.184 | 4.368 | 4.531 | 4.612 | 4.596 | 4.555 | 4.031 | 4.305 | 4.370 | 4.330 | 4.281 | 4.241 | 4.190 |
| 4.0 | 4.267 | 4.065 | 4.007 | 4.348 | 4.507 | 4.612 | 4.596 | 4.467 | 4.017 | 4.063 | 4.370 | 4.354 | 4.301 | 4.259 | 4.216 |
| 4.1 | 4.338 | 4.297 | 4.249 | 4.305 | 4.434 | 4.533 | 4.233 | 4.094 | 4.239 | 4.055 | 4.336 | 4.338 | 4.295 | 4.168 | 4.198 |
| 4.2 | 4.334 | 4.305 | 4.257 | 4.205 | 4.257 | 4.281 | 4.289 | 4.237 | 4.237 | 4.249 | 4.132 | 4.192 | 4.241 | 4.301 | 4.338 |
| 4.3 | 4.321 | 4.297 | 4.263 | 4.200 | 4.277 | 4.291 | 4.289 | 4.273 | 4.209 | 4.233 | 4.402 | 4.442 | 4.418 | 4.368 | 4.324 |
| 4.4 | 4.313 | 4.297 | 4.269 | 4.338 | 4.366 | 4.372 | 4.271 | 4.261 | 4.235 | 4.467 | 4.499 | 4.511 | 4.493 | 4.447 | 4.358 |
| 4.5 | 4.299 | 4.362 | 4.392 | 4.428 | 4.428 | 4.434 | 4.426 | 4.225 | 4.459 | 4.515 | 4.531 | 4.523 | 4.503 | 4.486 | 4.433 |
| 4.6 | 4.338 | 4.394 | 4.416 | 4.438 | 4.442 | 4.450 | 4.453 | 4.434 | 4.469 | 4.521 | 4.517 | 4.503 | 4.487 | 4.480 | 4.492 |
| 4.7 | 4.273 | 4.404 | 4.428 | 4.446 | 4.459 | 4.465 | 4.467 | 4.459 | 4.479 | 4.507 | 4.499 | 4.483 | 4.465 | 4.447 | 4.500 |
| 4.8 | 4.338 | 4.410 | 4.434 | 4.450 | 4.467 | 4.475 | 4.475 | 4.455 | 4.432 | 4.475 | 4.469 | 4.450 | 4.434 | 4.415 | 4.107 |
| 4.9 | 4.338 | 4.338 | 4.426 | 4.450 | 4.459 | 4.467 | 4.467 | 4.430 | 4.338 | 4.426 | 4.424 | 4.386 | 4.360 | 4.342 | 4.056 |
| 5.0 | 4.273 | 4.305 | 4.219 | 4.346 | 4.410 | 4.438 | 4.442 | 4.120 | 4.257 | 4.273 | 4.323 | 4.289 | 4.080 | 4.063 | 4.034 |
| 5.1 | 4.213 | 4.144 | 4.338 | 4.410 | 4.354 | 4.289 | 4.192 | 4.325 | 4.346 | 4.338 | 4.338 | 4.273 | 4.005 | 3.945 | 4.146 |
| 5.2 | 4.160 | 4.160 | 4.209 | 4.346 | 4.338 | 4.259 | 4.410 | 4.428 | 4.418 | 4.402 | 4.386 | 4.338 | 4.015 | 3.992 | 4.277 |
| 5.3 | 4.241 | 4.257 | 4.253 | 4.196 | 4.142 | 4.499 | 4.499 | 4.493 | 4.469 | 4.457 | 4.442 | 4.356 | 4.035 | 4.184 | 4.362 |
| 5.4 | 4.257 | 4.273 | 4.287 | 4.271 | 4.578 | 4.580 | 4.555 | 4.551 | 4.541 | 4.519 | 4.487 | 4.366 | 4.047 | 4.342 | 4.465 |
| 5.5 | 4.241 | 4.271 | 4.289 | 4.537 | 4.636 | 4.636 | 4.628 | 4.614 | 4.596 | 4.580 | 4.489 | 4.120 | 4.047 | 4.401 | 4.401 |
| 5.6 | 4.235 | 4.261 | 4.285 | 4.541 | 4.636 | 4.682 | 4.676 | 4.668 | 4.660 | 4.596 | 4.096 | 4.112 | 4.047 | 4.350 | 4.411 |
| 5.7 | 4.235 | 4.257 | 4.273 | 4.527 | 4.636 | 4.713 | 4.729 | 4.721 | 4.666 | 4.334 | 4.003 | 4.338 | 4.378 | 4.340 | 4.350 |
| 5.8 | 4.227 | 4.241 | 4.245 | 4.481 | 4.571 | 4.608 | 4.725 | 4.717 | 4.402 | 4.360 | 4.426 | 4.455 | 4.467 | 4.455 | 4.309 |
| 5.9 | 4.192 | 4.209 | 4.196 | 4.055 | 4.489 | 4.578 | 4.652 | 4.622 | 4.104 | 4.380 | 4.430 | 4.434 | 4.434 | 4.447 | 4.403 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 71.3 | 71.4 | 71.5 | 71.6 | 71.7 | 71.8 | 71.9 | 72.0 | 72.1 | 72.2 | 72.3 | 72.4 | 72.5 | 72.6 | 72.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.052 | 4.196 | 4.558 | 4.629 | 4.633 | 4.609 | 4.577 | 4.532 | 4.496 | 4.407 | 4.277 | 4.002 | 3.994 | 4.245 | 4.277 |
| 0.2 | 4.050 | 4.229 | 4.605 | 4.650 | 4.650 | 4.617 | 4.579 | 4.524 | 4.504 | 4.419 | 4.309 | 4.200 | 4.196 | 4.247 | 4.277 |
| 0.3 | 4.048 | 4.455 | 4.607 | 4.629 | 4.621 | 4.599 | 4.567 | 4.518 | 4.496 | 4.415 | 4.340 | 4.245 | 4.257 | 4.206 | 4.253 |
| 0.4 | 4.180 | 4.471 | 4.554 | 4.560 | 4.552 | 4.552 | 4.542 | 4.504 | 4.484 | 4.403 | 4.338 | 4.245 | 4.257 | 4.164 | 4.154 |
| 0.5 | 4.366 | 4.342 | 4.251 | 4.378 | 4.473 | 4.500 | 4.504 | 4.473 | 4.449 | 4.384 | 4.307 | 4.212 | 4.148 | 4.277 | 4.261 |
| 0.6 | 4.484 | 4.390 | 4.293 | 4.164 | 4.342 | 4.366 | 4.350 | 4.362 | 4.358 | 4.342 | 4.277 | 4.034 | 4.293 | 4.358 | 4.330 |
| 0.7 | 4.544 | 4.441 | 4.342 | 4.233 | 4.245 | 4.275 | 4.277 | 4.342 | 4.390 | 4.224 | 4.050 | 4.071 | 4.340 | 4.374 | 4.366 |
| 0.8 | 4.595 | 4.488 | 4.388 | 4.277 | 4.231 | 4.289 | 4.358 | 4.390 | 4.467 | 4.520 | 4.512 | 4.437 | 4.328 | 4.352 | 4.368 |
| 0.9 | 4.641 | 4.540 | 4.439 | 4.332 | 4.226 | 4.237 | 4.342 | 4.421 | 4.496 | 4.536 | 4.500 | 4.415 | 4.312 | 4.326 | 4.376 |
| 1.0 | 4.672 | 4.585 | 4.490 | 4.368 | 4.263 | 4.164 | 4.348 | 4.437 | 4.502 | 4.536 | 4.488 | 4.403 | 4.309 | 4.318 | 4.362 |
| 1.1 | 4.668 | 4.617 | 4.526 | 4.407 | 4.309 | 3.986 | 4.346 | 4.757 | 4.731 | 4.666 | 4.662 | 4.629 | 4.585 | 4.536 | 4.512 |
| 1.2 | 4.641 | 4.617 | 4.558 | 4.447 | 4.299 | 3.943 | 4.342 | 4.848 | 4.844 | 4.814 | 4.771 | 4.741 | 4.731 | 4.674 | 4.629 |
| 1.3 | 4.581 | 4.585 | 4.536 | 4.378 | 4.067 | 3.947 | 4.131 | 4.884 | 4.888 | 4.876 | 4.834 | 4.793 | 4.747 | 4.726 | 4.650 |
| 1.4 | 4.518 | 4.520 | 4.382 | 4.231 | 4.069 | 4.067 | 4.131 | 4.828 | 4.844 | 4.826 | 4.781 | 4.757 | 4.729 | 4.650 | 4.605 |
| 1.5 | 4.253 | 4.123 | 4.115 | 4.447 | 4.471 | 4.471 | 4.063 | 4.601 | 4.747 | 4.747 | 4.731 | 4.692 | 4.635 | 4.585 | 4.540 |
| 1.6 | 4.261 | 4.392 | 4.439 | 4.471 | 4.500 | 4.516 | 4.500 | 4.342 | 4.666 | 4.666 | 4.646 | 4.611 | 4.567 | 4.516 | 4.471 |
| 1.7 | 4.346 | 4.390 | 4.423 | 4.455 | 4.488 | 4.504 | 4.504 | 4.439 | 4.148 | 4.597 | 4.569 | 4.536 | 4.494 | 4.439 | 4.386 |
| 1.8 | 4.338 | 4.368 | 4.407 | 4.439 | 4.463 | 4.482 | 4.488 | 4.423 | 4.350 | 4.342 | 4.143 | 4.342 | 4.386 | 4.451 | 4.496 |
| 1.9 | 4.301 | 4.354 | 4.390 | 4.423 | 4.439 | 4.449 | 4.455 | 4.407 | 4.407 | 4.471 | 4.354 | 4.307 | 4.403 | 4.488 | 4.542 |
| 2.0 | 4.119 | 4.320 | 4.366 | 4.388 | 4.390 | 4.399 | 4.407 | 4.346 | 4.463 | 4.625 | 4.641 | 4.524 | 4.390 | 4.492 | 4.563 |
| 2.1 | 4.611 | 4.544 | 4.374 | 4.342 | 4.356 | 4.356 | 4.350 | 4.390 | 4.520 | 4.664 | 4.666 | 4.662 | 4.581 | 4.431 | 4.522 |
| 2.2 | 4.662 | 4.650 | 4.593 | 4.439 | 4.265 | 4.261 | 4.103 | 4.423 | 4.565 | 4.674 | 4.682 | 4.660 | 4.536 | 4.370 | 4.423 |
| 2.3 | 4.779 | 4.765 | 4.731 | 4.639 | 4.455 | 4.079 | 4.067 | 4.407 | 4.550 | 4.633 | 4.650 | 4.629 | 4.482 | 4.366 | 4.245 |
| 2.4 | 4.779 | 4.779 | 4.771 | 4.726 | 4.619 | 4.455 | 4.164 | 4.261 | 4.447 | 4.571 | 4.597 | 4.569 | 4.459 | 4.050 | 4.229 |
| 2.5 | 4.729 | 4.739 | 4.747 | 4.682 | 4.633 | 4.342 | 4.188 | 4.261 | 4.293 | 4.299 | 4.366 | 4.455 | 4.038 | 4.261 | 4.277 |
| 2.6 | 4.520 | 4.552 | 4.587 | 4.455 | 4.326 | 4.109 | 4.180 | 4.245 | 4.285 | 4.324 | 4.301 | 4.261 | 4.239 | 4.301 | 4.326 |
| 2.7 | 4.318 | 4.257 | 4.026 | 4.342 | 4.348 | 4.119 | 4.166 | 4.241 | 4.273 | 4.318 | 4.322 | 4.309 | 4.261 | 4.277 | 4.342 |
| 2.8 | 4.358 | 4.295 | 4.054 | 4.309 | 4.352 | 4.089 | 4.164 | 4.208 | 4.243 | 4.289 | 4.309 | 4.305 | 4.265 | 4.212 | 4.277 |
| 2.9 | 4.358 | 4.297 | 4.030 | 4.275 | 4.328 | 4.182 | 4.200 | 4.135 | 4.164 | 4.251 | 4.269 | 4.261 | 4.241 | 4.229 | 4.196 |
| 3.0 | 4.324 | 4.229 | 4.261 | 4.275 | 4.277 | 4.277 | 4.265 | 4.216 | 4.026 | 4.190 | 4.277 | 4.279 | 4.340 | 4.342 | 4.277 |
| 3.1 | 4.263 | 4.326 | 4.322 | 4.328 | 4.326 | 4.326 | 4.320 | 4.309 | 4.245 | 4.342 | 4.372 | 4.390 | 4.390 | 4.407 | 4.374 |
| 3.2 | 4.346 | 4.366 | 4.368 | 4.372 | 4.374 | 4.388 | 4.378 | 4.376 | 4.326 | 4.382 | 4.433 | 4.449 | 4.453 | 4.469 | 4.439 |
| 3.3 | 4.360 | 4.372 | 4.374 | 4.390 | 4.403 | 4.415 | 4.419 | 4.407 | 4.352 | 4.423 | 4.480 | 4.492 | 4.498 | 4.516 | 4.496 |
| 3.4 | 4.326 | 4.352 | 4.358 | 4.366 | 4.390 | 4.413 | 4.415 | 4.390 | 4.338 | 4.435 | 4.520 | 4.536 | 4.542 | 4.556 | 4.536 |
| 3.5 | 4.374 | 4.164 | 4.162 | 4.226 | 4.301 | 4.352 | 4.356 | 4.109 | 4.063 | 4.455 | 4.552 | 4.585 | 4.585 | 4.601 | 4.569 |
| 3.6 | 4.480 | 4.265 | 4.160 | 4.235 | 4.241 | 4.180 | 4.253 | 4.220 | 3.986 | 4.121 | 4.587 | 4.629 | 4.646 | 4.650 | 4.605 |
| 3.7 | 4.581 | 4.407 | 4.210 | 4.172 | 4.164 | 4.374 | 4.388 | 4.344 | 4.305 | 4.295 | 4.617 | 4.682 | 4.708 | 4.690 | 4.625 |
| 3.8 | 4.696 | 4.552 | 4.374 | 4.160 | 3.961 | 4.439 | 4.451 | 4.437 | 4.411 | 4.390 | 4.569 | 4.731 | 4.731 | 4.698 | 4.617 |
| 3.9 | 4.739 | 4.662 | 4.504 | 4.322 | 4.368 | 4.429 | 4.437 | 4.423 | 4.415 | 4.386 | 4.350 | 4.650 | 4.698 | 4.664 | 4.583 |
| 4.0 | 4.692 | 4.666 | 4.585 | 4.439 | 4.342 | 4.390 | 4.390 | 4.380 | 4.374 | 4.370 | 4.301 | 4.307 | 4.342 | 4.342 | 4.309 |
| 4.1 | 4.597 | 4.619 | 4.556 | 4.488 | 4.261 | 4.342 | 4.342 | 4.342 | 4.342 | 4.342 | 4.115 | 4.186 | 4.419 | 4.277 | 4.237 |
| 4.2 | 4.589 | 4.552 | 4.399 | 4.403 | 4.105 | 4.305 | 4.293 | 4.455 | 4.305 | 4.301 | 4.247 | 4.413 | 4.484 | 4.496 | 4.429 |
| 4.3 | 4.380 | 4.467 | 4.512 | 4.496 | 4.431 | 4.346 | 4.488 | 4.548 | 4.508 | 4.182 | 4.342 | 4.471 | 4.516 | 4.480 | 4.439 |
| 4.4 | 4.338 | 4.473 | 4.528 | 4.552 | 4.540 | 4.552 | 4.589 | 4.633 | 4.575 | 4.233 | 4.445 | 4.536 | 4.516 | 4.482 | 4.439 |
| 4.5 | 4.372 | 4.449 | 4.504 | 4.544 | 4.536 | 4.633 | 4.674 | 4.682 | 4.601 | 4.342 | 4.504 | 4.544 | 4.520 | 4.488 | 4.455 |
| 4.6 | 4.403 | 4.423 | 4.471 | 4.516 | 4.471 | 4.601 | 4.682 | 4.698 | 4.650 | 4.423 | 4.542 | 4.552 | 4.520 | 4.502 | 4.471 |
| 4.7 | 4.380 | 4.390 | 4.423 | 4.457 | 4.374 | 4.548 | 4.629 | 4.666 | 4.643 | 4.439 | 4.524 | 4.548 | 4.536 | 4.520 | 4.496 |
| 4.8 | 4.271 | 4.569 | 4.589 | 4.500 | 4.390 | 4.245 | 4.569 | 4.577 | 4.585 | 4.293 | 4.382 | 4.439 | 4.439 | 4.439 | 4.455 |
| 4.9 | 4.524 | 4.583 | 4.627 | 4.595 | 4.512 | 4.455 | 4.342 | 4.309 | 4.196 | 4.520 | 4.439 | 4.380 | 4.342 | 4.143 | 4.131 |
| 5.0 | 4.536 | 4.585 | 4.619 | 4.569 | 4.532 | 4.496 | 4.439 | 4.536 | 4.579 | 4.569 | 4.455 | 4.380 | 4.340 | 4.277 | 4.099 |
| 5.1 | 4.534 | 4.589 | 4.569 | 4.475 | 4.439 | 4.407 | 4.488 | 4.504 | 4.536 | 4.565 | 4.469 | 4.374 | 4.307 | 4.348 | 4.411 |
| 5.2 | 4.522 | 4.488 | 4.382 | 4.342 | 4.326 | 4.417 | 4.471 | 4.504 | 4.520 | 4.506 | 4.437 | 4.342 | 4.374 | 4.431 | 4.534 |
| 5.3 | 4.382 | 4.180 | 4.148 | 3.994 | 4.261 | 4.342 | 4.407 | 4.455 | 4.180 | 4.220 | 4.358 | 4.407 | 4.455 | 4.504 | 4.609 |
| 5.4 | 4.380 | 4.307 | 4.067 | 4.083 | 4.067 | 4.220 | 4.309 | 4.374 | 4.360 | 4.326 | 4.350 | 4.471 | 4.536 | 4.629 | 4.690 |
| 5.5 | 4.589 | 4.488 | 4.050 | 4.099 | 4.083 | 4.407 | 4.435 | 4.421 | 4.392 | 4.374 | 4.358 | 4.471 | 4.595 | 4.704 | 4.771 |
| 5.6 | 4.678 | 4.552 | 4.000 | 4.020 | 4.028 | 4.437 | 4.459 | 4.455 | 4.425 | 4.405 | 4.390 | 4.342 | 4.581 | 4.729 | 4.812 |
| 5.7 | 4.617 | 4.492 | 4.083 | 4.095 | 4.089 | 4.366 | 4.465 | 4.455 | 4.439 | 4.407 | 4.397 | 4.342 | 4.261 | 4.660 | 4.803 |
| 5.8 | 4.546 | 4.435 | 4.099 | 4.131 | 4.164 | 4.166 | 4.407 | 4.431 | 4.415 | 4.382 | 4.245 | 4.216 | 4.131 | 4.148 | 4.672 |
| 5.9 | 4.471 | 4.040 | 4.083 | 4.148 | 4.180 | 4.180 | 4.342 | 4.342 | 4.069 | 4.156 | 4.247 | 4.196 | 4.131 | 4.135 | 4.301 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 77.3 | 77.4 | 77.5 | 77.6 | 77.7 | 77.8 | 77.9 | 78.0 | 78.1 | 78.2 | 78.3 | 78.4 | 78.5 | 78.6 | 78.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.530 | 4.471 | 4.214 | 4.180 | 4.164 | 4.148 | 3.979 | 4.124 | 4.237 | 4.287 | 4.301 | 4.277 | 4.229 | 4.265 | 4.279 |
| 0.2 | 4.534 | 4.471 | 4.224 | 4.261 | 4.245 | 4.200 | 4.059 | 4.184 | 4.289 | 4.346 | 4.366 | 4.358 | 4.281 | 4.257 | 4.229 |
| 0.3 | 4.536 | 4.459 | 4.212 | 4.245 | 4.229 | 4.196 | 4.124 | 4.136 | 4.245 | 4.342 | 4.364 | 4.358 | 4.311 | 4.176 | 4.019 |
| 0.4 | 4.502 | 4.374 | 4.148 | 4.180 | 4.196 | 4.192 | 4.132 | 4.096 | 4.180 | 4.277 | 4.338 | 4.342 | 4.311 | 4.200 | 4.019 |
| 0.5 | 4.407 | 4.261 | 4.002 | 4.131 | 4.152 | 4.162 | 4.100 | 4.065 | 4.116 | 4.217 | 4.285 | 4.293 | 4.336 | 4.194 | 4.128 |
| 0.6 | 4.277 | 4.156 | 4.148 | 4.164 | 4.176 | 4.245 | 4.152 | 4.019 | 4.084 | 4.164 | 4.213 | 4.231 | 4.243 | 4.378 | 4.412 |
| 0.7 | 4.139 | 4.131 | 4.277 | 4.314 | 4.342 | 4.309 | 4.301 | 4.071 | 4.059 | 4.037 | 4.061 | 4.067 | 4.356 | 4.410 | 4.450 |
| 0.8 | 4.046 | 4.164 | 4.342 | 4.358 | 4.374 | 4.362 | 4.366 | 4.098 | 4.104 | 4.069 | 4.160 | 4.150 | 4.374 | 4.434 | 4.471 |
| 0.9 | 4.058 | 4.123 | 4.382 | 4.390 | 4.420 | 4.459 | 4.471 | 4.108 | 4.156 | 4.229 | 4.259 | 4.233 | 4.386 | 4.454 | 4.495 |
| 1.0 | 4.285 | 4.340 | 4.390 | 4.407 | 4.422 | 4.454 | 4.471 | 4.465 | 4.164 | 4.265 | 4.293 | 4.261 | 4.374 | 4.471 | 4.517 |
| 1.1 | 4.301 | 4.326 | 4.388 | 4.433 | 4.471 | 4.499 | 4.495 | 4.477 | 4.104 | 4.275 | 4.340 | 4.297 | 4.243 | 4.402 | 4.485 |
| 1.2 | 4.269 | 4.303 | 4.364 | 4.407 | 4.454 | 4.483 | 4.481 | 4.454 | 4.366 | 4.277 | 4.342 | 4.309 | 4.265 | 4.229 | 4.174 |
| 1.3 | 4.218 | 4.285 | 4.326 | 4.366 | 4.406 | 4.422 | 4.420 | 4.386 | 4.100 | 4.261 | 4.261 | 4.249 | 4.196 | 4.202 | 4.176 |
| 1.4 | 4.156 | 4.241 | 4.285 | 4.314 | 4.340 | 4.342 | 4.340 | 4.106 | 4.051 | 4.162 | 4.138 | 4.136 | 4.096 | 4.112 | 4.071 |
| 1.5 | 4.392 | 4.139 | 4.188 | 4.212 | 4.261 | 4.225 | 4.213 | 4.188 | 4.071 | 4.180 | 4.221 | 4.213 | 4.180 | 4.051 | 3.991 |
| 1.6 | 4.451 | 4.299 | 3.943 | 4.245 | 4.245 | 4.277 | 4.253 | 4.219 | 4.200 | 4.249 | 4.289 | 4.277 | 4.249 | 4.209 | 4.116 |
| 1.7 | 4.496 | 4.366 | 4.214 | 4.255 | 4.307 | 4.323 | 4.338 | 4.283 | 4.237 | 4.287 | 4.334 | 4.340 | 4.305 | 4.277 | 4.088 |
| 1.8 | 4.536 | 4.407 | 4.247 | 4.285 | 4.309 | 4.342 | 4.342 | 4.342 | 4.233 | 4.285 | 4.346 | 4.362 | 4.358 | 4.342 | 4.192 |
| 1.9 | 4.546 | 4.459 | 4.307 | 4.245 | 4.317 | 4.342 | 4.366 | 4.366 | 4.293 | 4.305 | 4.370 | 4.390 | 4.386 | 4.364 | 4.277 |
| 2.0 | 4.520 | 4.488 | 4.366 | 4.206 | 4.283 | 4.362 | 4.368 | 4.362 | 4.342 | 4.245 | 4.342 | 4.372 | 4.346 | 4.356 | 4.180 |
| 2.1 | 4.451 | 4.459 | 4.407 | 4.285 | 4.192 | 4.301 | 4.368 | 4.342 | 4.184 | 4.124 | 4.144 | 4.263 | 4.340 | 4.338 | 4.118 |
| 2.2 | 4.342 | 4.390 | 4.372 | 4.322 | 4.196 | 4.164 | 4.340 | 4.200 | 4.136 | 4.184 | 4.281 | 4.317 | 4.237 | 4.192 | 4.007 |
| 2.3 | 4.198 | 4.261 | 4.326 | 4.322 | 4.255 | 4.140 | 4.110 | 4.154 | 4.134 | 4.299 | 4.342 | 4.358 | 4.350 | 4.313 | 4.198 |
| 2.4 | 4.071 | 4.131 | 4.212 | 4.277 | 4.251 | 4.168 | 4.128 | 4.164 | 4.200 | 4.293 | 4.340 | 4.338 | 4.342 | 4.281 | 3.950 |
| 2.5 | 4.397 | 4.040 | 4.115 | 4.204 | 4.196 | 4.229 | 4.336 | 4.436 | 4.444 | 4.346 | 4.229 | 4.245 | 4.245 | 4.200 | 3.944 |
| 2.6 | 4.403 | 4.277 | 4.050 | 4.133 | 4.148 | 4.188 | 4.446 | 4.517 | 4.519 | 4.438 | 4.146 | 4.122 | 4.184 | 4.168 | 4.116 |
| 2.7 | 4.374 | 4.277 | 4.020 | 4.026 | 4.156 | 4.414 | 4.503 | 4.565 | 4.575 | 4.495 | 4.327 | 4.213 | 4.198 | 4.176 | 4.148 |
| 2.8 | 4.342 | 4.083 | 4.018 | 4.018 | 4.299 | 4.495 | 4.551 | 4.602 | 4.608 | 4.463 | 4.340 | 4.215 | 4.192 | 4.164 | 4.136 |
| 2.9 | 4.170 | 4.172 | 4.164 | 4.115 | 4.454 | 4.535 | 4.588 | 4.640 | 4.634 | 4.438 | 4.338 | 4.196 | 4.162 | 4.132 | 4.116 |
| 3.0 | 4.235 | 4.224 | 4.218 | 4.206 | 4.515 | 4.579 | 4.626 | 4.668 | 4.636 | 4.422 | 4.174 | 4.168 | 4.136 | 4.108 | 4.082 |
| 3.1 | 4.251 | 4.237 | 4.229 | 4.212 | 4.543 | 4.610 | 4.656 | 4.725 | 4.588 | 4.428 | 4.100 | 4.132 | 4.116 | 4.084 | 4.039 |
| 3.2 | 4.245 | 4.231 | 4.220 | 4.196 | 4.567 | 4.608 | 4.658 | 4.662 | 4.559 | 4.414 | 4.007 | 4.084 | 4.084 | 4.057 | 4.039 |
| 3.3 | 4.237 | 4.220 | 4.210 | 4.180 | 4.527 | 4.575 | 4.577 | 4.485 | 4.477 | 4.067 | 4.013 | 4.084 | 4.209 | 4.227 | 4.106 |
| 3.4 | 4.196 | 4.196 | 4.196 | 4.364 | 4.376 | 4.406 | 4.406 | 4.356 | 4.172 | 4.114 | 4.096 | 4.069 | 4.198 | 4.241 | 4.055 |
| 3.5 | 4.239 | 4.034 | 4.067 | 4.390 | 4.406 | 4.422 | 4.422 | 4.390 | 4.213 | 4.136 | 4.164 | 4.307 | 4.213 | 4.229 | 4.184 |
| 3.6 | 4.265 | 4.034 | 3.986 | 4.372 | 4.390 | 4.402 | 4.408 | 4.374 | 4.471 | 4.454 | 4.424 | 4.374 | 4.307 | 4.180 | 4.217 |
| 3.7 | 4.303 | 4.309 | 4.253 | 4.342 | 4.376 | 4.376 | 4.374 | 4.501 | 4.551 | 4.519 | 4.454 | 4.394 | 4.325 | 4.253 | 4.200 |
| 3.8 | 4.366 | 4.368 | 4.366 | 4.277 | 4.350 | 4.366 | 4.344 | 4.543 | 4.567 | 4.549 | 4.471 | 4.406 | 4.338 | 4.313 | 4.438 |
| 3.9 | 4.390 | 4.401 | 4.415 | 4.415 | 4.273 | 4.287 | 4.275 | 4.519 | 4.551 | 4.567 | 4.471 | 4.406 | 4.342 | 4.370 | 4.497 |
| 4.0 | 4.415 | 4.425 | 4.445 | 4.463 | 4.454 | 4.196 | 4.221 | 4.354 | 4.543 | 4.557 | 4.473 | 4.406 | 4.342 | 4.342 | 4.438 |
| 4.1 | 4.433 | 4.445 | 4.463 | 4.496 | 4.505 | 4.495 | 4.196 | 4.342 | 4.499 | 4.519 | 4.426 | 4.404 | 4.301 | 4.261 | 4.344 |
| 4.2 | 4.455 | 4.471 | 4.496 | 4.512 | 4.535 | 4.547 | 4.511 | 4.368 | 4.265 | 4.164 | 4.200 | 4.166 | 4.277 | 4.293 | 4.245 |
| 4.3 | 4.486 | 4.506 | 4.528 | 4.550 | 4.563 | 4.577 | 4.551 | 4.336 | 4.168 | 4.124 | 4.067 | 4.047 | 4.217 | 4.253 | 4.180 |
| 4.4 | 4.488 | 4.536 | 4.560 | 4.583 | 4.600 | 4.610 | 4.537 | 4.251 | 4.190 | 4.190 | 4.132 | 4.207 | 4.071 | 4.055 | 4.180 |
| 4.5 | 4.301 | 4.514 | 4.550 | 4.585 | 4.608 | 4.604 | 4.342 | 4.217 | 4.213 | 4.200 | 4.144 | 4.229 | 4.152 | 4.098 | 4.184 |
| 4.6 | 4.342 | 4.291 | 4.439 | 4.504 | 4.539 | 4.483 | 4.342 | 4.192 | 4.200 | 4.188 | 4.071 | 4.211 | 4.154 | 4.114 | 4.211 |
| 4.7 | 4.348 | 4.277 | 4.018 | 4.194 | 4.382 | 4.297 | 4.338 | 4.116 | 4.152 | 4.136 | 4.152 | 4.156 | 4.152 | 4.096 | 4.198 |
| 4.8 | 4.326 | 4.212 | 4.099 | 4.180 | 4.180 | 4.334 | 4.338 | 4.221 | 4.253 | 4.265 | 4.231 | 4.235 | 4.079 | 4.071 | 4.207 |
| 4.9 | 4.285 | 4.107 | 4.083 | 4.148 | 4.140 | 4.338 | 4.340 | 4.309 | 4.321 | 4.342 | 4.271 | 4.241 | 4.100 | 4.031 | 4.061 |
| 5.0 | 4.261 | 4.247 | 4.198 | 4.042 | 4.104 | 4.342 | 4.223 | 4.342 | 4.342 | 4.311 | 4.269 | 4.154 | 4.184 | 3.987 | 4.132 |
| 5.1 | 4.309 | 4.291 | 4.251 | 4.180 | 4.180 | 4.100 | 4.495 | 4.551 | 4.551 | 4.531 | 4.132 | 4.227 | 4.233 | 4.180 | 4.116 |
| 5.2 | 4.338 | 4.301 | 4.261 | 4.212 | 4.209 | 4.511 | 4.588 | 4.610 | 4.606 | 4.584 | 4.493 | 4.277 | 4.247 | 4.192 | 4.148 |
| 5.3 | 4.342 | 4.307 | 4.275 | 4.208 | 4.469 | 4.575 | 4.624 | 4.632 | 4.624 | 4.602 | 4.499 | 4.293 | 4.257 | 4.200 | 4.148 |
| 5.4 | 4.362 | 4.318 | 4.261 | 4.277 | 4.519 | 4.584 | 4.624 | 4.630 | 4.616 | 4.584 | 4.340 | 4.299 | 4.259 | 4.200 | 4.156 |
| 5.5 | 4.350 | 4.301 | 4.206 | 4.415 | 4.519 | 4.575 | 4.608 | 4.616 | 4.596 | 4.515 | 4.340 | 4.305 | 4.255 | 4.192 | 4.033 |
| 5.6 | 4.316 | 4.265 | 4.247 | 4.419 | 4.499 | 4.537 | 4.559 | 4.567 | 4.531 | 4.366 | 4.362 | 4.311 | 4.261 | 4.192 | 3.977 |
| 5.7 | 4.263 | 4.067 | 4.285 | 4.382 | 4.438 | 4.454 | 4.471 | 4.479 | 4.390 | 4.384 | 4.366 | 4.329 | 4.265 | 4.342 | 4.047 |
| 5.8 | 4.180 | 4.028 | 4.239 | 4.307 | 4.342 | 4.354 | 4.350 | 4.301 | 4.265 | 4.374 | 4.372 | 4.329 | 4.342 | 4.386 | 4.329 |
| 5.9 | 4.123 | 4.115 | 4.016 | 4.194 | 4.241 | 4.245 | 4.225 | 4.104 | 4.172 | 4.253 | 4.340 | 4.233 | 4.342 | 4.390 | 4.354 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 83.3 | 83.4 | 83.5 | 83.6 | 83.7 | 83.8 | 83.9 | 84.0 | 84.1 | 84.2 | 84.3 | 84.4 | 84.5 | 84.6 | 84.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.188 | 4.227 | 4.360 | 4.358 | 4.394 | 4.442 | 4.491 | 4.565 | 4.547 | 4.569 | 4.561 | 4.541 | 4.483 | 4.166 | 4.247 |
| 0.2 | 4.196 | 4.233 | 4.225 | 4.358 | 4.438 | 4.517 | 4.555 | 4.584 | 4.592 | 4.606 | 4.594 | 4.566 | 4.531 | 4.368 | 4.279 |
| 0.3 | 4.180 | 4.233 | 4.225 | 4.422 | 4.485 | 4.523 | 4.563 | 4.588 | 4.604 | 4.618 | 4.600 | 4.572 | 4.545 | 4.251 | 4.287 |
| 0.4 | 4.176 | 4.200 | 4.200 | 4.426 | 4.491 | 4.523 | 4.553 | 4.579 | 4.592 | 4.614 | 4.594 | 4.570 | 4.535 | 4.233 | 4.253 |
| 0.5 | 3.991 | 4.136 | 4.142 | 4.426 | 4.487 | 4.519 | 4.543 | 4.563 | 4.577 | 4.584 | 4.561 | 4.537 | 4.497 | 4.235 | 4.174 |
| 0.6 | 4.116 | 4.057 | 4.019 | 4.424 | 4.485 | 4.503 | 4.519 | 4.529 | 4.535 | 4.523 | 4.505 | 4.473 | 4.408 | 3.989 | 4.209 |
| 0.7 | 4.128 | 4.116 | 4.096 | 4.394 | 4.454 | 4.459 | 4.454 | 4.432 | 4.394 | 4.364 | 4.305 | 4.275 | 3.993 | 3.991 | 4.166 |
| 0.8 | 4.106 | 4.098 | 4.071 | 4.065 | 4.342 | 4.364 | 4.289 | 4.164 | 4.200 | 4.202 | 4.199 | 4.189 | 4.021 | 4.021 | 4.057 |
| 0.9 | 4.088 | 4.071 | 4.057 | 4.039 | 4.019 | 4.007 | 4.092 | 4.196 | 4.221 | 4.249 | 4.243 | 4.223 | 4.023 | 4.045 | 4.005 |
| 1.0 | 4.067 | 4.051 | 4.037 | 4.007 | 3.997 | 3.985 | 4.051 | 4.116 | 4.098 | 4.265 | 4.251 | 4.239 | 3.981 | 3.965 | 4.037 |
| 1.1 | 4.293 | 4.259 | 4.257 | 3.991 | 3.969 | 4.079 | 4.204 | 4.152 | 4.094 | 4.144 | 4.235 | 4.213 | 4.090 | 4.168 | 4.263 |
| 1.2 | 4.342 | 4.342 | 4.329 | 4.281 | 4.090 | 4.106 | 4.233 | 4.180 | 4.136 | 4.088 | 3.947 | 4.074 | 4.231 | 4.328 | 4.368 |
| 1.3 | 4.374 | 4.364 | 4.346 | 4.315 | 4.130 | 4.116 | 4.249 | 4.235 | 4.136 | 4.098 | 3.989 | 4.005 | 4.211 | 4.352 | 4.376 |
| 1.4 | 4.394 | 4.374 | 4.354 | 4.338 | 4.176 | 4.120 | 4.229 | 4.180 | 4.102 | 4.031 | 4.168 | 3.989 | 4.118 | 4.295 | 4.352 |
| 1.5 | 4.374 | 4.378 | 4.362 | 4.334 | 4.213 | 4.084 | 4.120 | 4.257 | 4.374 | 4.390 | 4.457 | 4.436 | 3.989 | 4.197 | 4.263 |
| 1.6 | 4.263 | 4.293 | 4.245 | 4.285 | 4.198 | 4.071 | 4.071 | 4.338 | 4.420 | 4.521 | 4.503 | 4.489 | 3.969 | 4.168 | 4.249 |
| 1.7 | 4.112 | 4.106 | 4.164 | 4.207 | 4.168 | 4.082 | 4.088 | 4.342 | 4.394 | 4.467 | 4.465 | 4.477 | 4.158 | 4.291 | 4.352 |
| 1.8 | 4.017 | 3.971 | 4.136 | 4.174 | 4.136 | 4.039 | 4.108 | 4.342 | 4.378 | 4.404 | 4.422 | 4.408 | 4.267 | 4.386 | 4.374 |
| 1.9 | 4.410 | 4.112 | 4.204 | 4.265 | 4.277 | 4.182 | 4.055 | 4.196 | 4.309 | 4.376 | 4.328 | 4.146 | 4.295 | 4.352 | 4.360 |
| 2.0 | 4.515 | 4.483 | 4.416 | 4.277 | 4.253 | 4.190 | 4.100 | 4.082 | 4.114 | 4.219 | 4.142 | 4.118 | 4.118 | 4.184 | 4.263 |
| 2.1 | 4.553 | 4.499 | 4.416 | 4.263 | 4.152 | 4.120 | 4.084 | 4.491 | 4.376 | 4.200 | 4.110 | 4.144 | 4.078 | 4.352 | 4.376 |
| 2.2 | 4.582 | 4.499 | 4.215 | 4.196 | 4.073 | 4.519 | 4.571 | 4.582 | 4.571 | 4.547 | 4.039 | 4.094 | 4.045 | 4.352 | 4.376 |
| 2.3 | 4.582 | 4.467 | 4.168 | 4.138 | 4.471 | 4.531 | 4.555 | 4.563 | 4.555 | 4.539 | 4.489 | 3.965 | 4.201 | 4.303 | 4.307 |
| 2.4 | 4.557 | 4.459 | 4.144 | 4.396 | 4.489 | 4.501 | 4.511 | 4.529 | 4.535 | 4.535 | 4.505 | 4.045 | 4.215 | 4.249 | 4.235 |
| 2.5 | 4.507 | 4.148 | 4.084 | 4.422 | 4.454 | 4.459 | 4.467 | 4.487 | 4.491 | 4.493 | 4.481 | 4.424 | 4.172 | 4.182 | 4.152 |
| 2.6 | 4.487 | 4.001 | 4.160 | 4.410 | 4.418 | 4.422 | 4.426 | 4.442 | 4.459 | 4.457 | 4.441 | 4.432 | 4.078 | 4.106 | 4.082 |
| 2.7 | 4.071 | 4.088 | 4.162 | 4.378 | 4.378 | 4.394 | 4.394 | 4.416 | 4.426 | 4.426 | 4.410 | 4.406 | 4.322 | 3.981 | 4.247 |
| 2.8 | 4.235 | 4.194 | 4.029 | 4.340 | 4.346 | 4.358 | 4.364 | 4.374 | 4.390 | 4.394 | 4.376 | 4.348 | 4.126 | 4.239 | 4.283 |
| 2.9 | 4.336 | 4.340 | 4.334 | 4.277 | 4.293 | 4.293 | 4.305 | 4.200 | 4.136 | 4.174 | 4.174 | 4.182 | 4.154 | 4.247 | 4.287 |
| 3.0 | 4.342 | 4.342 | 4.342 | 4.241 | 4.077 | 3.991 | 4.021 | 4.112 | 4.136 | 4.150 | 4.142 | 4.160 | 4.160 | 4.199 | 4.277 |
| 3.1 | 4.346 | 4.346 | 4.342 | 4.267 | 4.079 | 4.116 | 4.110 | 4.084 | 4.065 | 4.110 | 4.110 | 4.126 | 4.134 | 4.122 | 4.241 |
| 3.2 | 4.346 | 4.346 | 4.334 | 4.273 | 4.164 | 4.406 | 4.297 | 4.233 | 4.132 | 4.003 | 4.035 | 4.066 | 4.094 | 4.098 | 4.061 |
| 3.3 | 4.344 | 4.342 | 4.332 | 4.299 | 4.158 | 4.402 | 4.424 | 4.374 | 4.265 | 4.116 | 3.997 | 4.035 | 4.061 | 4.076 | 4.045 |
| 3.4 | 4.348 | 4.354 | 4.346 | 4.321 | 4.291 | 4.519 | 4.543 | 4.501 | 4.410 | 4.291 | 4.150 | 4.005 | 4.037 | 4.051 | 4.021 |
| 3.5 | 4.348 | 4.356 | 4.352 | 4.313 | 4.503 | 4.567 | 4.598 | 4.575 | 4.535 | 4.469 | 4.309 | 3.949 | 4.182 | 4.170 | 4.174 |
| 3.6 | 4.338 | 4.338 | 4.342 | 4.342 | 4.547 | 4.582 | 4.616 | 4.630 | 4.616 | 4.555 | 4.449 | 4.287 | 4.265 | 4.271 | 4.263 |
| 3.7 | 4.243 | 4.217 | 4.148 | 4.180 | 4.523 | 4.567 | 4.600 | 4.630 | 4.638 | 4.618 | 4.537 | 4.418 | 4.279 | 4.358 | 4.368 |
| 3.8 | 4.152 | 4.071 | 4.071 | 4.176 | 4.491 | 4.555 | 4.573 | 4.604 | 4.624 | 4.626 | 4.561 | 4.473 | 4.184 | 4.352 | 4.414 |
| 3.9 | 3.995 | 4.446 | 4.450 | 4.471 | 4.420 | 4.495 | 4.539 | 4.551 | 4.575 | 4.577 | 4.529 | 4.447 | 4.094 | 4.330 | 4.408 |
| 4.0 | 4.537 | 4.535 | 4.519 | 4.503 | 4.471 | 4.442 | 4.436 | 4.438 | 4.461 | 4.471 | 4.465 | 3.999 | 3.989 | 4.211 | 4.295 |
| 4.1 | 4.551 | 4.559 | 4.547 | 4.533 | 4.495 | 4.469 | 4.285 | 4.231 | 4.309 | 4.098 | 4.104 | 4.277 | 4.328 | 4.332 | 4.328 |
| 4.2 | 4.571 | 4.584 | 4.569 | 4.555 | 4.515 | 4.487 | 4.340 | 4.247 | 4.229 | 4.132 | 4.263 | 4.316 | 4.340 | 4.352 | 4.354 |
| 4.3 | 4.584 | 4.598 | 4.586 | 4.567 | 4.523 | 4.491 | 4.184 | 4.182 | 4.204 | 4.180 | 4.287 | 4.311 | 4.328 | 4.338 | 4.344 |
| 4.4 | 4.592 | 4.612 | 4.600 | 4.571 | 4.527 | 4.471 | 4.227 | 4.233 | 4.213 | 4.172 | 4.269 | 4.287 | 4.299 | 4.311 | 4.316 |
| 4.5 | 4.588 | 4.622 | 4.612 | 4.584 | 4.459 | 4.406 | 4.261 | 4.243 | 4.207 | 4.176 | 4.150 | 4.257 | 4.271 | 4.279 | 4.289 |
| 4.6 | 4.521 | 4.610 | 4.598 | 4.535 | 4.422 | 4.227 | 4.229 | 4.237 | 4.200 | 4.194 | 4.156 | 4.136 | 4.239 | 4.251 | 4.263 |
| 4.7 | 4.231 | 4.535 | 4.551 | 4.471 | 4.039 | 4.071 | 4.158 | 4.227 | 4.227 | 4.194 | 4.162 | 4.134 | 4.102 | 4.176 | 4.231 |
| 4.8 | 4.229 | 4.362 | 4.438 | 4.384 | 3.942 | 3.991 | 4.071 | 4.132 | 4.196 | 4.200 | 4.166 | 4.140 | 4.096 | 4.223 | 4.207 |
| 4.9 | 3.954 | 4.098 | 4.130 | 4.196 | 4.225 | 4.233 | 4.217 | 4.051 | 4.102 | 4.168 | 4.158 | 4.140 | 4.102 | 4.263 | 4.251 |
| 5.0 | 3.975 | 4.112 | 4.152 | 4.194 | 4.221 | 4.245 | 4.227 | 4.180 | 4.003 | 4.015 | 4.094 | 4.096 | 4.053 | 4.235 | 4.263 |
| 5.1 | 4.329 | 4.098 | 4.136 | 4.176 | 4.200 | 4.241 | 4.227 | 4.196 | 4.134 | 3.942 | 4.110 | 4.231 | 4.223 | 4.166 | 4.249 |
| 5.2 | 4.442 | 4.084 | 4.120 | 4.164 | 4.198 | 4.227 | 4.241 | 4.184 | 4.126 | 4.063 | 4.231 | 4.279 | 4.223 | 4.118 | 4.189 |
| 5.3 | 4.519 | 4.473 | 4.112 | 4.148 | 4.180 | 4.209 | 4.233 | 4.152 | 4.104 | 4.031 | 4.259 | 4.241 | 4.483 | 4.390 | 4.021 |
| 5.4 | 4.598 | 4.584 | 4.100 | 4.134 | 4.164 | 4.200 | 4.217 | 4.114 | 4.055 | 4.065 | 3.973 | 4.602 | 4.616 | 4.566 | 4.380 |
| 5.5 | 4.700 | 4.634 | 4.555 | 4.122 | 4.162 | 4.192 | 4.200 | 4.077 | 3.977 | 3.989 | 4.602 | 4.626 | 4.614 | 4.557 | 4.408 |
| 5.6 | 4.624 | 4.616 | 4.559 | 4.116 | 4.152 | 4.176 | 4.180 | 4.039 | 4.023 | 4.051 | 4.586 | 4.596 | 4.553 | 4.453 | 4.255 |
| 5.7 | 4.511 | 4.493 | 4.477 | 4.092 | 4.130 | 4.144 | 4.138 | 3.870 | 4.063 | 4.071 | 4.535 | 4.521 | 4.436 | 4.287 | 4.126 |
| 5.8 | 4.390 | 4.404 | 4.192 | 4.061 | 4.088 | 4.079 | 4.047 | 3.934 | 3.987 | 4.037 | 4.457 | 4.416 | 4.303 | 4.134 | 3.989 |
| 5.9 | 4.295 | 4.110 | 4.136 | 3.942 | 3.942 | 3.977 | 3.975 | 3.942 | 3.959 | 4.055 | 4.311 | 4.267 | 4.088 | 4.019 | 3.928 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 95.3 | 95.4 | 95.5 | 95.6 | 95.7 | 95.8 | 95.9 | 96.0 | 96.1 | 96.2 | 96.3 | 96.4 | 96.5 | 96.6 | 96.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 3.908 | 4.239 | 4.408 | 4.457 | 4.481 | 4.477 | 4.457 | 4.396 | 4.259 | 3.834 | 4.199 | 4.263 | 4.281 | 4.295 | 4.299 |
| 0.2 | 3.965 | 4.189 | 4.376 | 4.432 | 4.457 | 4.471 | 4.465 | 4.432 | 4.380 | 4.110 | 4.227 | 4.267 | 4.295 | 4.311 | 4.316 |
| 0.3 | 3.973 | 4.134 | 4.297 | 4.366 | 4.396 | 4.424 | 4.424 | 4.408 | 4.376 | 4.070 | 4.201 | 4.263 | 4.291 | 4.311 | 4.318 |
| 0.4 | 3.987 | 3.947 | 4.162 | 4.263 | 4.322 | 4.342 | 4.352 | 4.332 | 4.328 | 4.231 | 4.158 | 4.239 | 4.275 | 4.295 | 4.303 |
| 0.5 | 3.981 | 3.955 | 3.949 | 4.082 | 4.182 | 4.239 | 4.263 | 4.263 | 4.239 | 4.154 | 4.021 | 4.142 | 4.199 | 4.229 | 4.227 |
| 0.6 | 4.070 | 4.041 | 4.021 | 4.015 | 3.961 | 4.086 | 4.150 | 4.166 | 4.114 | 3.920 | 3.834 | 3.840 | 4.134 | 4.191 | 4.213 |
| 0.7 | 4.118 | 4.176 | 4.082 | 4.045 | 4.021 | 3.928 | 4.150 | 4.110 | 4.021 | 3.836 | 3.832 | 3.836 | 4.231 | 4.229 | 4.227 |
| 0.8 | 4.124 | 4.180 | 4.138 | 4.068 | 4.005 | 4.102 | 4.221 | 4.205 | 4.150 | 4.049 | 3.981 | 3.908 | 4.235 | 4.231 | 4.227 |
| 0.9 | 4.124 | 4.122 | 4.094 | 4.037 | 3.971 | 4.182 | 4.199 | 4.186 | 4.174 | 4.152 | 4.110 | 4.049 | 4.235 | 4.231 | 4.219 |
| 1.0 | 4.057 | 4.037 | 4.009 | 3.969 | 3.930 | 4.158 | 4.158 | 4.148 | 4.142 | 4.126 | 4.106 | 3.844 | 4.191 | 4.213 | 4.199 |
| 1.1 | 4.199 | 4.170 | 3.924 | 3.989 | 4.021 | 4.102 | 4.118 | 4.110 | 4.104 | 4.086 | 3.834 | 3.834 | 3.832 | 4.146 | 4.051 |
| 1.2 | 4.207 | 4.184 | 4.122 | 4.027 | 4.068 | 4.082 | 4.037 | 4.070 | 4.094 | 4.215 | 4.225 | 4.191 | 4.102 | 3.834 | 4.013 |
| 1.3 | 4.199 | 4.166 | 4.114 | 4.013 | 4.070 | 4.088 | 4.320 | 4.352 | 4.336 | 4.311 | 4.279 | 4.225 | 4.150 | 3.834 | 4.021 |
| 1.4 | 4.168 | 4.122 | 4.061 | 3.928 | 4.043 | 4.080 | 4.384 | 4.390 | 4.360 | 4.322 | 4.279 | 4.227 | 4.168 | 4.057 | 4.037 |
| 1.5 | 4.138 | 4.082 | 4.001 | 3.932 | 4.009 | 4.053 | 4.376 | 4.384 | 4.360 | 4.311 | 4.263 | 4.203 | 4.150 | 4.057 | 4.039 |
| 1.6 | 4.096 | 4.037 | 3.949 | 3.928 | 3.989 | 4.001 | 4.324 | 4.360 | 4.336 | 4.287 | 4.231 | 4.170 | 4.118 | 4.027 | 3.834 |
| 1.7 | 4.053 | 4.011 | 3.878 | 3.836 | 3.928 | 3.941 | 4.166 | 4.311 | 4.295 | 4.251 | 4.199 | 4.144 | 4.086 | 3.844 | 3.832 |
| 1.8 | 4.013 | 3.957 | 3.868 | 3.906 | 3.876 | 3.834 | 3.876 | 4.247 | 4.251 | 4.221 | 4.166 | 4.114 | 4.029 | 3.908 | 3.832 |
| 1.9 | 4.271 | 4.223 | 3.928 | 3.928 | 3.932 | 3.836 | 3.884 | 4.031 | 4.126 | 4.160 | 4.134 | 4.074 | 3.930 | 3.834 | 4.247 |
| 2.0 | 4.328 | 4.303 | 4.237 | 3.965 | 3.951 | 3.886 | 3.900 | 3.836 | 3.836 | 4.021 | 4.053 | 3.928 | 3.934 | 4.247 | 4.299 |
| 2.1 | 4.350 | 4.360 | 4.316 | 3.957 | 3.936 | 3.892 | 3.900 | 3.993 | 3.967 | 3.938 | 3.860 | 3.834 | 4.195 | 4.271 | 4.311 |
| 2.2 | 4.366 | 4.372 | 4.328 | 3.943 | 3.957 | 3.876 | 4.090 | 4.082 | 4.053 | 4.009 | 3.957 | 4.047 | 4.166 | 4.239 | 4.289 |
| 2.3 | 4.372 | 4.344 | 4.207 | 4.017 | 4.031 | 3.949 | 4.176 | 4.170 | 4.126 | 4.074 | 4.021 | 3.953 | 4.102 | 4.180 | 4.235 |
| 2.4 | 4.322 | 4.164 | 4.178 | 4.174 | 4.150 | 3.989 | 4.205 | 4.231 | 4.215 | 4.174 | 4.118 | 4.045 | 3.999 | 4.118 | 4.182 |
| 2.5 | 4.098 | 4.166 | 4.186 | 4.166 | 4.134 | 4.108 | 4.134 | 4.201 | 4.231 | 4.223 | 4.182 | 4.132 | 4.057 | 4.021 | 4.102 |
| 2.6 | 4.035 | 4.102 | 4.166 | 4.142 | 4.080 | 4.053 | 4.094 | 4.150 | 4.170 | 4.182 | 4.174 | 4.142 | 3.983 | 3.836 | 4.005 |
| 2.7 | 3.928 | 4.005 | 4.106 | 4.090 | 3.981 | 3.938 | 4.033 | 4.086 | 4.110 | 4.118 | 4.122 | 4.057 | 3.928 | 4.090 | 4.124 |
| 2.8 | 4.150 | 4.136 | 4.080 | 3.930 | 3.963 | 3.981 | 3.989 | 3.973 | 4.057 | 4.053 | 4.023 | 3.965 | 3.840 | 4.118 | 4.166 |
| 2.9 | 4.182 | 4.180 | 4.118 | 3.930 | 3.941 | 3.965 | 3.973 | 3.973 | 3.963 | 3.928 | 3.836 | 3.834 | 4.134 | 4.100 | 4.134 |
| 3.0 | 4.193 | 4.176 | 4.118 | 3.928 | 3.928 | 3.928 | 3.941 | 3.949 | 3.932 | 3.870 | 4.051 | 4.279 | 4.328 | 4.301 | 4.047 |
| 3.1 | 4.182 | 4.158 | 4.223 | 4.223 | 4.094 | 3.930 | 3.928 | 3.928 | 3.876 | 4.132 | 4.354 | 4.392 | 4.376 | 4.340 | 4.186 |
| 3.2 | 4.148 | 4.259 | 4.358 | 4.328 | 4.279 | 4.182 | 3.836 | 3.834 | 3.965 | 4.041 | 4.261 | 4.424 | 4.422 | 4.380 | 4.166 |
| 3.3 | 4.021 | 4.275 | 4.408 | 4.376 | 4.287 | 4.219 | 4.108 | 3.836 | 4.072 | 4.134 | 4.182 | 4.150 | 4.420 | 4.432 | 4.186 |
| 3.4 | 3.928 | 4.328 | 4.424 | 4.368 | 4.301 | 4.223 | 4.102 | 3.836 | 4.106 | 4.172 | 4.146 | 4.186 | 4.263 | 4.453 | 4.422 |
| 3.5 | 4.199 | 4.388 | 4.428 | 4.360 | 4.303 | 4.237 | 4.094 | 3.834 | 4.005 | 4.142 | 4.003 | 3.957 | 4.271 | 4.392 | 4.436 |
| 3.6 | 4.263 | 4.414 | 4.426 | 4.356 | 4.311 | 4.227 | 4.090 | 3.834 | 3.834 | 3.832 | 4.207 | 4.263 | 3.836 | 4.122 | 4.215 |
| 3.7 | 3.860 | 4.390 | 4.412 | 4.360 | 4.291 | 4.150 | 4.070 | 3.834 | 3.834 | 4.112 | 4.249 | 4.332 | 4.326 | 4.132 | 4.215 |
| 3.8 | 3.836 | 3.834 | 3.892 | 4.247 | 4.223 | 4.110 | 4.029 | 3.832 | 3.836 | 4.140 | 4.263 | 4.348 | 4.376 | 4.344 | 4.193 |
| 3.9 | 3.928 | 3.860 | 4.051 | 4.118 | 4.098 | 4.078 | 4.070 | 4.007 | 3.993 | 4.134 | 4.239 | 4.328 | 4.362 | 4.328 | 4.263 |
| 4.0 | 4.158 | 4.174 | 4.182 | 4.182 | 4.166 | 4.150 | 4.142 | 4.110 | 4.090 | 4.110 | 4.207 | 4.263 | 4.293 | 4.231 | 4.182 |
| 4.1 | 4.231 | 4.251 | 4.247 | 4.247 | 4.247 | 4.231 | 4.219 | 4.184 | 4.166 | 4.140 | 4.158 | 4.199 | 4.154 | 4.134 | 3.926 |
| 4.2 | 4.287 | 4.303 | 4.316 | 4.307 | 4.295 | 4.279 | 4.255 | 4.229 | 4.199 | 4.160 | 4.059 | 4.037 | 3.993 | 4.025 | 4.005 |
| 4.3 | 4.328 | 4.332 | 4.328 | 4.311 | 4.295 | 4.263 | 4.239 | 4.205 | 4.176 | 4.118 | 3.967 | 4.039 | 4.074 | 3.981 | 3.963 |
| 4.4 | 4.328 | 4.311 | 4.295 | 4.251 | 4.223 | 4.199 | 4.158 | 4.118 | 4.094 | 3.983 | 3.967 | 4.023 | 4.066 | 3.977 | 3.836 |
| 4.5 | 4.263 | 4.253 | 4.213 | 4.168 | 4.150 | 4.112 | 4.078 | 4.021 | 4.047 | 4.039 | 3.930 | 3.993 | 4.027 | 4.154 | 4.352 |
| 4.6 | 4.094 | 4.150 | 4.118 | 4.090 | 4.057 | 4.021 | 3.928 | 4.078 | 4.136 | 4.102 | 4.005 | 3.981 | 4.182 | 4.348 | 4.489 |
| 4.7 | 4.122 | 3.864 | 3.836 | 3.866 | 3.836 | 3.834 | 4.096 | 4.174 | 4.174 | 4.122 | 4.039 | 4.219 | 4.368 | 4.497 | 4.557 |
| 4.8 | 4.199 | 4.037 | 3.866 | 3.930 | 3.930 | 4.023 | 4.053 | 4.094 | 4.102 | 4.102 | 4.207 | 4.364 | 4.467 | 4.529 | 4.564 |
| 4.9 | 4.229 | 4.122 | 3.930 | 3.930 | 3.928 | 3.872 | 3.969 | 3.989 | 4.045 | 4.199 | 4.311 | 4.408 | 4.445 | 4.481 | 4.509 |
| 5.0 | 4.247 | 4.142 | 3.949 | 3.928 | 3.930 | 3.844 | 3.834 | 4.053 | 4.184 | 4.267 | 4.328 | 4.376 | 4.380 | 4.416 | 4.455 |
| 5.1 | 4.295 | 4.376 | 4.380 | 4.340 | 4.247 | 4.074 | 3.836 | 4.158 | 4.217 | 4.241 | 4.271 | 4.311 | 4.328 | 4.362 | 4.392 |
| 5.2 | 4.303 | 4.416 | 4.426 | 4.392 | 4.376 | 4.263 | 4.178 | 4.142 | 4.174 | 4.178 | 4.215 | 4.247 | 4.263 | 4.295 | 4.328 |
| 5.3 | 4.251 | 4.416 | 4.473 | 4.449 | 4.420 | 4.328 | 4.203 | 4.053 | 4.100 | 4.122 | 4.148 | 4.174 | 4.199 | 4.217 | 4.160 |
| 5.4 | 3.981 | 4.402 | 4.465 | 4.461 | 4.408 | 4.261 | 4.128 | 3.836 | 3.836 | 4.003 | 4.049 | 4.078 | 4.118 | 4.140 | 4.158 |
| 5.5 | 3.928 | 3.951 | 4.370 | 4.380 | 4.332 | 4.221 | 4.037 | 3.834 | 3.832 | 4.017 | 4.037 | 4.080 | 4.134 | 4.160 | 4.174 |
| 5.6 | 3.961 | 3.997 | 3.989 | 3.963 | 4.138 | 4.045 | 3.894 | 3.834 | 3.836 | 4.013 | 4.041 | 4.092 | 4.132 | 4.150 | 4.166 |
| 5.7 | 4.021 | 4.035 | 4.021 | 3.993 | 3.973 | 3.945 | 3.928 | 3.832 | 3.856 | 4.021 | 4.045 | 4.094 | 4.122 | 4.148 | 4.154 |
| 5.8 | 3.842 | 4.029 | 4.041 | 4.021 | 4.005 | 3.971 | 3.834 | 3.834 | 3.894 | 4.013 | 4.047 | 4.086 | 4.112 | 4.138 | 4.150 |
| 5.9 | 3.870 | 4.023 | 4.023 | 4.037 | 4.017 | 3.959 | 4.019 | 3.965 | 3.932 | 3.957 | 4.049 | 4.070 | 4.086 | 4.114 | 4.116 |

BED ELEVATIONS - ROUGHNESS 1

| X COOR. | STATION 106.6 | 106.7 | 106.8 | 106.9 | 107.0 | 107.1 | 107.2 | 107.3 | 107.4 | 107.5 | 107.6 | 107.7 | 107.8 | 107.9 | 108.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 3.919 | 3.857 | 4.018 | 3.914 | 3.731 | 3.976 | 4.014 | 4.047 | 4.087 | 4.126 | 4.147 | 4.151 | 4.105 | 3.754 | 3.793 |
| 0.2 | 4.014 | 3.933 | 4.048 | 3.964 | 3.872 | 3.947 | 3.962 | 4.026 | 4.057 | 4.093 | 4.126 | 4.160 | 4.114 | 3.760 | 3.803 |
| 0.3 | 4.034 | 3.970 | 4.000 | 3.930 | 3.930 | 3.905 | 3.945 | 3.993 | 4.026 | 4.059 | 4.093 | 4.120 | 4.128 | 3.814 | 3.810 |
| 0.4 | 4.004 | 3.935 | 3.970 | 3.907 | 3.876 | 3.862 | 3.905 | 3.947 | 3.993 | 4.039 | 4.064 | 4.091 | 4.076 | 3.776 | 3.803 |
| 0.5 | 3.911 | 3.903 | 4.129 | 4.059 | 4.059 | 3.976 | 3.947 | 3.897 | 3.859 | 3.959 | 3.999 | 3.868 | 3.601 | 3.760 | 3.807 |
| 0.6 | 3.984 | 4.117 | 4.163 | 4.118 | 4.099 | 4.005 | 3.997 | 3.941 | 3.901 | 3.959 | 3.955 | 3.907 | 3.609 | 3.762 | 3.810 |
| 0.7 | 4.030 | 4.145 | 4.193 | 4.155 | 4.109 | 3.962 | 3.976 | 3.928 | 3.893 | 3.993 | 3.980 | 3.907 | 3.843 | 3.764 | 3.805 |
| 0.8 | 4.062 | 4.179 | 4.226 | 4.193 | 4.114 | 3.951 | 3.824 | 3.762 | 3.859 | 3.980 | 3.968 | 3.893 | 3.843 | 3.760 | 3.791 |
| 0.9 | 4.068 | 4.244 | 4.278 | 4.214 | 4.130 | 3.964 | 3.903 | 3.907 | 3.878 | 3.832 | 3.910 | 3.887 | 3.828 | 3.760 | 3.744 |
| 1.0 | 4.062 | 4.052 | 4.262 | 4.168 | 4.128 | 3.947 | 3.935 | 3.914 | 3.895 | 3.882 | 3.859 | 3.687 | 3.619 | 3.760 | 3.666 |
| 1.1 | 4.175 | 3.954 | 3.984 | 3.930 | 3.930 | 3.930 | 3.914 | 3.910 | 3.918 | 3.928 | 3.910 | 3.832 | 3.721 | 3.762 | 3.859 |
| 1.2 | 4.286 | 4.204 | 3.855 | 3.914 | 3.922 | 3.920 | 3.901 | 3.926 | 3.943 | 3.939 | 3.905 | 3.859 | 3.945 | 3.782 | 3.916 |
| 1.3 | 4.310 | 4.244 | 3.855 | 3.943 | 3.947 | 3.947 | 3.930 | 3.930 | 3.914 | 3.878 | 3.945 | 4.014 | 4.020 | 3.943 | 3.930 |
| 1.4 | 4.318 | 4.230 | 3.855 | 3.907 | 3.947 | 3.926 | 3.874 | 3.805 | 3.733 | 3.837 | 3.959 | 3.995 | 4.016 | 3.964 | 3.887 |
| 1.5 | 4.292 | 4.210 | 3.855 | 3.826 | 3.845 | 3.718 | 3.744 | 3.707 | 3.624 | 3.830 | 3.943 | 3.982 | 3.995 | 3.947 | 3.841 |
| 1.6 | 4.230 | 3.857 | 3.909 | 3.901 | 3.947 | 3.822 | 3.814 | 3.774 | 3.764 | 3.576 | 3.910 | 3.964 | 3.939 | 3.760 | 3.799 |
| 1.7 | 3.964 | 3.891 | 4.000 | 3.964 | 3.964 | 3.843 | 3.839 | 3.797 | 3.807 | 3.859 | 3.872 | 3.880 | 3.885 | 3.843 | 3.764 |
| 1.8 | 3.968 | 3.929 | 4.004 | 3.932 | 3.826 | 3.843 | 3.847 | 3.843 | 3.843 | 3.862 | 3.893 | 3.895 | 3.899 | 3.895 | 3.810 |
| 1.9 | 3.988 | 4.018 | 3.994 | 3.891 | 3.810 | 3.847 | 3.847 | 3.859 | 3.843 | 3.795 | 3.895 | 3.895 | 3.895 | 3.897 | 3.814 |
| 2.0 | 4.000 | 4.081 | 4.062 | 3.895 | 3.793 | 3.847 | 3.853 | 3.862 | 3.843 | 3.797 | 3.776 | 3.876 | 3.882 | 3.876 | 3.839 |
| 2.1 | 3.887 | 3.970 | 3.980 | 3.876 | 3.793 | 3.847 | 3.859 | 3.859 | 3.847 | 3.826 | 3.778 | 3.760 | 3.661 | 3.635 | 3.845 |
| 2.2 | 3.921 | 3.986 | 4.032 | 3.930 | 3.810 | 3.847 | 3.862 | 3.859 | 3.843 | 3.837 | 3.778 | 3.760 | 3.707 | 3.631 | 3.562 |
| 2.3 | 3.887 | 4.020 | 4.038 | 3.905 | 3.814 | 3.843 | 3.859 | 3.603 | 3.816 | 3.822 | 3.780 | 3.764 | 3.705 | 3.550 | 3.696 |
| 2.4 | 4.048 | 4.018 | 3.986 | 3.797 | 3.701 | 3.710 | 3.752 | 3.764 | 3.691 | 3.801 | 3.778 | 3.744 | 3.687 | 3.582 | 3.739 |
| 2.5 | 4.050 | 3.956 | 3.895 | 3.741 | 3.760 | 3.874 | 3.901 | 3.912 | 3.887 | 3.762 | 3.707 | 3.687 | 3.595 | 3.543 | 3.764 |
| 2.6 | 4.050 | 3.871 | 4.026 | 3.976 | 3.885 | 3.949 | 3.974 | 3.995 | 4.007 | 3.976 | 3.707 | 3.726 | 3.705 | 3.597 | 3.774 |
| 2.7 | 4.060 | 3.988 | 4.072 | 3.978 | 3.945 | 3.993 | 4.016 | 4.041 | 4.074 | 4.085 | 4.045 | 3.760 | 3.744 | 3.687 | 3.803 |
| 2.8 | 4.048 | 4.036 | 4.068 | 3.974 | 3.995 | 4.059 | 4.082 | 4.109 | 4.128 | 4.147 | 4.095 | 3.770 | 3.762 | 3.702 | 3.830 |
| 2.9 | 4.020 | 4.028 | 4.062 | 3.957 | 4.026 | 4.109 | 4.162 | 4.178 | 4.180 | 4.164 | 3.764 | 3.772 | 3.760 | 3.676 | 3.843 |
| 3.0 | 3.947 | 3.988 | 4.032 | 3.928 | 3.614 | 4.139 | 4.176 | 4.197 | 4.191 | 4.114 | 3.754 | 3.764 | 3.749 | 3.668 | 3.862 |
| 3.1 | 3.855 | 3.923 | 4.000 | 3.910 | 3.760 | 4.130 | 4.180 | 4.191 | 4.128 | 4.032 | 3.739 | 3.744 | 3.739 | 3.585 | 3.826 |
| 3.2 | 3.972 | 3.907 | 3.855 | 3.749 | 3.862 | 3.918 | 4.141 | 4.105 | 4.026 | 3.642 | 3.655 | 3.632 | 3.564 | 3.571 | 3.764 |
| 3.3 | 4.026 | 3.972 | 3.913 | 3.791 | 3.893 | 3.899 | 3.880 | 3.782 | 3.760 | 3.795 | 3.614 | 3.661 | 3.839 | 3.839 | 3.839 |
| 3.4 | 4.068 | 4.026 | 3.976 | 3.814 | 3.797 | 3.762 | 3.712 | 3.749 | 3.807 | 3.868 | 3.780 | 3.826 | 3.905 | 3.914 | 3.947 |
| 3.5 | 4.089 | 4.052 | 4.000 | 3.980 | 4.091 | 4.132 | 4.155 | 4.162 | 4.068 | 3.880 | 3.876 | 3.830 | 3.903 | 3.926 | 3.939 |
| 3.6 | 4.081 | 4.036 | 3.972 | 4.028 | 4.124 | 4.151 | 4.176 | 4.193 | 4.059 | 3.939 | 3.935 | 3.778 | 3.887 | 3.907 | 3.916 |
| 3.7 | 3.998 | 4.016 | 4.004 | 4.074 | 4.112 | 4.141 | 4.162 | 4.180 | 4.062 | 3.955 | 3.937 | 3.843 | 3.843 | 3.893 | 3.899 |
| 3.8 | 3.998 | 4.026 | 4.004 | 4.051 | 4.093 | 4.116 | 4.143 | 4.162 | 4.030 | 3.980 | 3.993 | 3.887 | 3.826 | 3.862 | 3.885 |
| 3.9 | 3.992 | 4.018 | 3.996 | 3.882 | 3.843 | 3.666 | 3.841 | 3.926 | 3.964 | 3.993 | 3.997 | 3.914 | 3.820 | 3.859 | 3.878 |
| 4.0 | 4.280 | 4.274 | 4.244 | 4.128 | 3.687 | 3.691 | 3.624 | 3.816 | 3.864 | 3.895 | 3.893 | 3.895 | 3.818 | 3.893 | 3.914 |
| 4.1 | 4.343 | 4.322 | 4.296 | 4.195 | 4.160 | 3.760 | 3.793 | 3.862 | 3.764 | 3.776 | 3.795 | 3.760 | 3.843 | 3.910 | 3.926 |
| 4.2 | 4.371 | 4.355 | 4.331 | 4.241 | 4.228 | 4.130 | 3.895 | 3.959 | 3.926 | 3.728 | 3.824 | 3.812 | 3.834 | 3.893 | 3.910 |
| 4.3 | 4.389 | 4.387 | 4.373 | 4.287 | 4.272 | 4.224 | 4.014 | 4.028 | 3.987 | 3.864 | 3.797 | 3.843 | 3.776 | 3.864 | 3.885 |
| 4.4 | 4.367 | 4.387 | 4.385 | 4.297 | 4.280 | 4.207 | 4.020 | 4.062 | 4.043 | 3.955 | 3.862 | 3.764 | 3.752 | 3.797 | 3.855 |
| 4.5 | 4.236 | 4.375 | 4.371 | 4.291 | 4.264 | 4.162 | 3.964 | 4.049 | 4.053 | 3.993 | 3.914 | 3.814 | 3.810 | 3.797 | 3.764 |
| 4.6 | 4.212 | 4.347 | 4.361 | 4.226 | 4.130 | 3.776 | 3.885 | 4.009 | 4.032 | 4.014 | 3.955 | 3.839 | 3.826 | 3.864 | 3.876 |
| 4.7 | 4.123 | 4.304 | 4.262 | 4.097 | 3.666 | 3.739 | 3.795 | 3.905 | 3.980 | 3.976 | 3.876 | 3.776 | 3.822 | 3.907 | 3.893 |
| 4.8 | 4.175 | 4.145 | 4.141 | 3.715 | 3.707 | 3.696 | 3.644 | 3.760 | 3.878 | 3.864 | 3.728 | 3.744 | 3.895 | 3.914 | 3.907 |
| 4.9 | 4.189 | 4.000 | 3.984 | 3.859 | 3.760 | 3.545 | 3.764 | 3.743 | 3.738 | 3.718 | 3.676 | 3.603 | 3.914 | 3.926 | 3.903 |
| 5.0 | 4.020 | 4.018 | 4.004 | 3.893 | 3.814 | 3.739 | 3.843 | 3.839 | 3.834 | 3.807 | 3.776 | 3.733 | 3.928 | 3.928 | 3.907 |
| 5.1 | 4.028 | 4.016 | 4.008 | 3.897 | 3.843 | 4.059 | 4.089 | 3.912 | 3.859 | 3.834 | 3.748 | 3.660 | 3.928 | 3.926 | 3.910 |
| 5.2 | 4.034 | 4.020 | 4.018 | 3.893 | 4.009 | 4.114 | 4.147 | 4.064 | 3.830 | 3.603 | 3.710 | 3.749 | 3.928 | 3.926 | 3.922 |
| 5.3 | 3.954 | 4.020 | 4.016 | 3.893 | 4.028 | 4.160 | 4.162 | 4.076 | 3.874 | 3.897 | 3.764 | 3.696 | 3.928 | 3.932 | 3.928 |
| 5.4 | 3.905 | 3.958 | 3.952 | 3.818 | 4.076 | 4.199 | 4.180 | 4.107 | 3.916 | 3.976 | 3.993 | 3.947 | 3.928 | 3.941 | 3.939 |
| 5.5 | 3.855 | 3.855 | 3.998 | 3.849 | 4.095 | 4.222 | 4.176 | 4.055 | 3.959 | 4.022 | 4.039 | 4.022 | 3.910 | 3.937 | 3.935 |
| 5.6 | 4.052 | 4.145 | 4.022 | 3.851 | 4.097 | 4.197 | 4.137 | 3.962 | 3.993 | 4.043 | 4.064 | 4.043 | 3.878 | 3.914 | 3.907 |
| 5.7 | 4.230 | 4.193 | 4.115 | 3.939 | 3.891 | 4.059 | 3.916 | 3.945 | 3.914 | 3.982 | 4.039 | 3.978 | 3.780 | 3.847 | 3.834 |
| 5.8 | 4.157 | 4.097 | 4.064 | 3.922 | 3.876 | 3.760 | 3.826 | 3.876 | 3.901 | 3.914 | 3.910 | 3.608 | 3.682 | 3.764 | 3.762 |
| 5.9 | 3.998 | 3.937 | 3.933 | 3.793 | 3.776 | 3.760 | 3.764 | 3.793 | 3.797 | 3.797 | 3.760 | 3.762 | 3.760 | 3.760 | 3.762 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 11.3 | 11.4 | 11.5 | 11.6 | 11.7 | 11.8 | 11.9 | 12.0 | 12.1 | 12.2 | 12.3 | 12.4 | 12.5 | 12.6 | 12.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.974 | 4.972 | 4.955 | 4.935 | 4.778 | 4.843 | 4.875 | 4.859 | 4.822 | 4.810 | 4.802 | 4.778 | 4.697 | 4.996 | 5.020 |
| 0.2 | 5.004 | 4.992 | 4.984 | 4.968 | 4.875 | 4.891 | 4.887 | 4.875 | 4.859 | 4.859 | 4.843 | 4.830 | 4.933 | 5.008 | 5.020 |
| 0.3 | 5.032 | 5.024 | 5.008 | 4.984 | 4.919 | 4.923 | 4.927 | 4.911 | 4.903 | 4.895 | 4.885 | 4.877 | 4.730 | 4.970 | 4.955 |
| 0.4 | 5.048 | 5.044 | 5.022 | 4.980 | 4.913 | 4.923 | 4.939 | 4.947 | 4.939 | 4.931 | 4.919 | 4.899 | 4.794 | 4.774 | 4.786 |
| 0.5 | 5.038 | 5.052 | 5.044 | 4.949 | 4.859 | 4.891 | 4.897 | 4.931 | 4.931 | 4.927 | 4.909 | 4.867 | 4.754 | 4.778 | 4.802 |
| 0.6 | 5.016 | 4.867 | 4.633 | 4.641 | 4.627 | 4.637 | 4.734 | 4.758 | 4.712 | 4.625 | 4.560 | 4.518 | 4.665 | 4.730 | 4.738 |
| 0.7 | 5.036 | 4.988 | 4.899 | 4.607 | 4.734 | 4.834 | 4.883 | 4.891 | 4.818 | 4.714 | 4.649 | 4.633 | 4.576 | 4.544 | 4.597 |
| 0.8 | 5.040 | 5.006 | 4.972 | 4.891 | 4.806 | 4.899 | 4.925 | 4.939 | 4.927 | 4.810 | 4.786 | 4.689 | 4.568 | 4.647 | 4.681 |
| 0.9 | 5.050 | 5.008 | 4.972 | 4.931 | 4.810 | 4.869 | 4.925 | 4.947 | 4.907 | 4.867 | 4.760 | 4.657 | 4.601 | 4.689 | 4.697 |
| 1.0 | 5.052 | 5.016 | 4.980 | 4.931 | 4.834 | 4.774 | 4.875 | 4.907 | 4.883 | 4.820 | 4.732 | 4.633 | 4.625 | 4.685 | 4.689 |
| 1.1 | 5.056 | 5.020 | 4.984 | 4.939 | 4.568 | 4.661 | 4.786 | 4.843 | 4.843 | 4.790 | 4.730 | 4.617 | 4.617 | 4.665 | 4.661 |
| 1.2 | 5.054 | 5.024 | 4.988 | 4.665 | 4.633 | 4.734 | 4.697 | 4.758 | 4.867 | 4.885 | 4.883 | 4.798 | 4.597 | 4.629 | 4.617 |
| 1.3 | 4.887 | 4.951 | 4.923 | 4.871 | 4.790 | 4.730 | 4.748 | 4.891 | 4.923 | 4.907 | 4.919 | 4.923 | 4.548 | 4.582 | 4.752 |
| 1.4 | 4.774 | 4.580 | 4.929 | 4.947 | 4.947 | 4.947 | 4.931 | 4.734 | 4.923 | 4.923 | 4.923 | 4.943 | 4.947 | 4.520 | 4.794 |
| 1.5 | 4.697 | 4.552 | 4.891 | 4.927 | 4.933 | 4.931 | 4.925 | 4.635 | 4.927 | 4.925 | 4.939 | 4.957 | 4.972 | 4.972 | 4.794 |
| 1.6 | 5.004 | 5.024 | 4.937 | 4.871 | 4.907 | 4.907 | 4.907 | 4.597 | 4.955 | 4.951 | 4.972 | 4.980 | 4.992 | 4.996 | 4.794 |
| 1.7 | 5.028 | 5.006 | 5.004 | 4.972 | 4.629 | 4.738 | 4.820 | 4.762 | 4.931 | 4.984 | 4.984 | 4.992 | 5.008 | 5.016 | 5.010 |
| 1.8 | 4.964 | 4.968 | 4.962 | 4.927 | 4.851 | 4.818 | 4.778 | 4.939 | 4.972 | 4.996 | 5.036 | 5.028 | 5.028 | 5.026 | 4.949 |
| 1.9 | 4.923 | 4.923 | 4.903 | 4.859 | 4.923 | 4.853 | 4.802 | 5.020 | 5.024 | 4.984 | 5.004 | 5.008 | 4.927 | 4.818 | 4.576 |
| 2.0 | 4.834 | 4.818 | 4.790 | 5.008 | 5.012 | 4.947 | 4.988 | 5.028 | 5.012 | 4.964 | 4.568 | 4.566 | 4.593 | 4.597 | 4.504 |
| 2.1 | 4.843 | 4.826 | 4.788 | 4.996 | 5.020 | 4.974 | 5.028 | 5.020 | 4.976 | 4.933 | 4.839 | 4.502 | 4.532 | 4.593 | 4.859 |
| 2.2 | 4.863 | 4.843 | 4.818 | 4.939 | 4.968 | 5.020 | 5.028 | 5.004 | 4.955 | 4.919 | 4.730 | 4.742 | 4.657 | 4.697 | 4.859 |
| 2.3 | 4.855 | 4.841 | 4.812 | 4.851 | 4.968 | 5.036 | 5.024 | 4.988 | 4.951 | 4.875 | 4.790 | 4.782 | 4.665 | 4.818 | 4.875 |
| 2.4 | 4.843 | 4.818 | 4.788 | 4.830 | 5.036 | 5.036 | 5.028 | 4.996 | 4.939 | 4.794 | 4.810 | 4.810 | 4.649 | 4.834 | 4.907 |
| 2.5 | 4.818 | 4.790 | 4.568 | 5.052 | 5.048 | 5.044 | 5.036 | 4.984 | 4.790 | 4.812 | 4.820 | 4.816 | 4.625 | 4.863 | 4.923 |
| 2.6 | 4.754 | 4.552 | 5.032 | 5.060 | 5.040 | 5.032 | 5.010 | 4.794 | 4.816 | 4.839 | 4.851 | 4.826 | 4.564 | 4.826 | 4.891 |
| 2.7 | 4.599 | 4.843 | 5.030 | 5.036 | 5.016 | 4.996 | 4.591 | 4.830 | 4.843 | 4.859 | 4.867 | 4.843 | 4.480 | 4.810 | 4.859 |
| 2.8 | 4.665 | 4.649 | 4.734 | 4.786 | 4.818 | 4.826 | 4.480 | 4.867 | 4.861 | 4.855 | 4.834 | 4.794 | 4.673 | 4.796 | 4.867 |
| 2.9 | 4.705 | 4.697 | 4.681 | 4.665 | 4.931 | 4.955 | 4.899 | 4.839 | 4.802 | 4.689 | 4.746 | 4.738 | 4.714 | 4.794 | 4.853 |
| 3.0 | 4.697 | 4.871 | 4.875 | 4.962 | 4.996 | 4.996 | 4.540 | 4.568 | 4.800 | 4.675 | 4.754 | 4.754 | 4.726 | 4.689 | 4.647 |
| 3.1 | 4.617 | 4.891 | 4.931 | 4.959 | 4.931 | 4.931 | 4.883 | 4.887 | 4.927 | 4.893 | 4.746 | 4.754 | 4.728 | 4.681 | 4.633 |
| 3.2 | 4.730 | 4.859 | 4.907 | 4.895 | 4.798 | 4.915 | 4.921 | 4.927 | 4.929 | 4.927 | 4.931 | 4.746 | 4.718 | 4.679 | 4.623 |
| 3.3 | 4.770 | 4.754 | 4.730 | 4.536 | 4.730 | 4.887 | 4.955 | 4.972 | 4.988 | 4.996 | 4.984 | 4.955 | 4.675 | 4.625 | 4.639 |
| 3.4 | 4.808 | 4.774 | 4.937 | 4.734 | 4.758 | 4.754 | 4.907 | 4.964 | 5.008 | 5.012 | 4.974 | 4.931 | 4.766 | 4.667 | 4.657 |
| 3.5 | 4.818 | 5.032 | 5.044 | 5.030 | 4.980 | 4.754 | 4.730 | 4.867 | 4.939 | 4.996 | 4.955 | 4.891 | 4.806 | 4.794 | 4.667 |
| 3.6 | 4.984 | 5.052 | 5.089 | 5.097 | 5.064 | 4.746 | 4.714 | 4.736 | 4.822 | 4.826 | 4.826 | 4.818 | 4.818 | 4.810 | 4.806 |
| 3.7 | 4.750 | 5.032 | 5.052 | 5.093 | 5.052 | 4.939 | 4.705 | 4.826 | 4.847 | 4.843 | 4.830 | 4.824 | 4.826 | 4.810 | 4.816 |
| 3.8 | 4.665 | 5.004 | 5.036 | 5.046 | 4.988 | 4.927 | 4.689 | 4.826 | 4.843 | 4.855 | 4.849 | 4.834 | 4.824 | 4.826 | 4.826 |
| 3.9 | 4.689 | 4.947 | 4.996 | 4.984 | 4.899 | 4.786 | 4.834 | 4.778 | 4.832 | 4.851 | 4.857 | 4.843 | 4.843 | 4.855 | 4.834 |
| 4.0 | 4.730 | 4.734 | 4.911 | 4.899 | 4.867 | 4.901 | 4.879 | 4.814 | 4.657 | 4.786 | 4.816 | 4.834 | 4.857 | 4.847 | 4.826 |
| 4.1 | 4.750 | 4.754 | 4.738 | 4.826 | 4.891 | 4.907 | 4.899 | 4.855 | 4.641 | 4.764 | 4.834 | 4.834 | 4.802 | 4.415 | 4.542 |
| 4.2 | 4.790 | 4.790 | 4.774 | 4.796 | 4.867 | 4.907 | 4.907 | 4.867 | 4.714 | 4.806 | 4.859 | 4.834 | 4.810 | 4.504 | 4.625 |
| 4.3 | 4.810 | 4.794 | 4.746 | 4.643 | 4.792 | 4.895 | 4.834 | 4.625 | 4.750 | 4.818 | 4.834 | 4.810 | 4.754 | 4.879 | 4.907 |
| 4.4 | 4.762 | 4.693 | 4.633 | 4.568 | 4.639 | 4.714 | 4.657 | 4.601 | 4.730 | 4.834 | 4.748 | 4.730 | 4.625 | 4.907 | 4.927 |
| 4.5 | 4.754 | 4.774 | 4.714 | 4.629 | 4.695 | 4.693 | 4.625 | 4.657 | 4.709 | 4.744 | 4.762 | 4.754 | 4.695 | 4.925 | 4.931 |
| 4.6 | 4.746 | 4.738 | 4.730 | 4.633 | 4.665 | 4.649 | 4.730 | 4.693 | 4.730 | 4.810 | 4.810 | 4.788 | 4.665 | 4.929 | 4.933 |
| 4.7 | 4.532 | 4.734 | 4.714 | 4.716 | 4.681 | 4.625 | 4.673 | 4.722 | 4.750 | 4.794 | 4.822 | 4.794 | 4.697 | 4.859 | 4.935 |
| 4.8 | 4.736 | 4.802 | 4.786 | 4.774 | 4.738 | 4.697 | 4.593 | 4.697 | 4.748 | 4.770 | 4.794 | 4.794 | 4.730 | 4.732 | 4.899 |
| 4.9 | 4.774 | 4.826 | 4.834 | 4.826 | 4.790 | 4.730 | 4.617 | 4.544 | 4.736 | 4.774 | 4.770 | 4.764 | 4.730 | 4.778 | 4.834 |
| 5.0 | 4.818 | 4.851 | 4.877 | 4.859 | 4.802 | 4.730 | 4.609 | 4.730 | 4.826 | 4.863 | 4.828 | 4.627 | 4.762 | 4.816 | 4.867 |
| 5.1 | 4.869 | 4.879 | 4.871 | 4.867 | 4.794 | 4.673 | 4.766 | 4.834 | 4.877 | 4.939 | 4.911 | 4.834 | 4.762 | 4.859 | 4.907 |
| 5.2 | 4.869 | 4.867 | 4.899 | 4.881 | 4.778 | 4.758 | 4.839 | 4.899 | 4.955 | 4.980 | 4.947 | 4.859 | 4.619 | 4.512 | 4.877 |
| 5.3 | 4.879 | 4.887 | 4.895 | 4.591 | 4.740 | 4.849 | 4.907 | 4.972 | 5.008 | 5.020 | 4.955 | 4.881 | 4.808 | 4.478 | 4.512 |
| 5.4 | 4.522 | 4.526 | 4.494 | 4.802 | 4.367 | 4.931 | 4.955 | 5.012 | 5.060 | 5.052 | 4.972 | 4.907 | 4.834 | 4.520 | 4.508 |
| 5.5 | 4.897 | 4.931 | 4.897 | 4.839 | 4.899 | 4.955 | 5.004 | 5.052 | 5.080 | 5.080 | 5.020 | 4.947 | 4.883 | 4.794 | 4.464 |
| 5.6 | 4.895 | 4.959 | 4.947 | 4.818 | 4.897 | 4.951 | 5.006 | 5.048 | 5.068 | 5.076 | 5.052 | 4.996 | 4.897 | 4.697 | 4.609 |
| 5.7 | 4.887 | 4.955 | 4.955 | 4.762 | 4.762 | 4.859 | 4.931 | 4.978 | 5.004 | 5.006 | 4.998 | 4.972 | 4.887 | 4.738 | 4.697 |
| 5.8 | 4.889 | 4.955 | 4.935 | 4.758 | 4.552 | 4.633 | 4.754 | 4.818 | 4.859 | 4.871 | 4.875 | 4.855 | 4.649 | 4.762 | 4.732 |
| 5.9 | 4.887 | 4.935 | 4.899 | 4.732 | 4.552 | 4.544 | 4.754 | 4.689 | 4.601 | 4.689 | 4.665 | 4.762 | 4.699 | 4.750 | 4.738 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 23.3 | 23.4 | 23.5 | 23.6 | 23.7 | 23.8 | 23.9 | 24.0 | 24.1 | 24.2 | 24.3 | 24.4 | 24.5 | 24.6 | 24.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.686 | 4.696 | 4.680 | 4.648 | 4.565 | 4.465 | 4.490 | 4.510 | 4.510 | 4.613 | 4.627 | 4.631 | 4.617 | 4.579 | 4.510 |
| 0.2 | 4.656 | 4.650 | 4.615 | 4.589 | 4.692 | 4.670 | 4.498 | 4.510 | 4.563 | 4.672 | 4.720 | 4.716 | 4.648 | 4.573 | 4.708 |
| 0.3 | 4.735 | 4.725 | 4.615 | 4.670 | 4.684 | 4.613 | 4.482 | 4.469 | 4.571 | 4.640 | 4.737 | 4.704 | 4.605 | 4.514 | 4.741 |
| 0.4 | 4.745 | 4.729 | 4.688 | 4.637 | 4.635 | 4.603 | 4.559 | 4.465 | 4.680 | 4.812 | 4.769 | 4.660 | 4.451 | 4.465 | 4.623 |
| 0.5 | 4.745 | 4.745 | 4.714 | 4.672 | 4.575 | 4.692 | 4.640 | 4.455 | 4.785 | 4.803 | 4.725 | 4.769 | 4.779 | 4.745 | 4.627 |
| 0.6 | 4.550 | 4.729 | 4.720 | 4.662 | 4.660 | 4.826 | 4.858 | 4.895 | 4.919 | 4.575 | 4.729 | 4.818 | 4.803 | 4.743 | 4.640 |
| 0.7 | 4.522 | 4.593 | 4.595 | 4.816 | 4.874 | 4.929 | 4.963 | 4.980 | 4.984 | 4.951 | 4.911 | 4.826 | 4.801 | 4.733 | 4.656 |
| 0.8 | 4.486 | 4.605 | 4.789 | 4.870 | 4.984 | 5.002 | 4.992 | 4.984 | 5.002 | 4.984 | 4.919 | 4.822 | 4.785 | 4.723 | 4.627 |
| 0.9 | 4.893 | 4.605 | 4.927 | 4.980 | 5.012 | 5.008 | 4.992 | 4.992 | 4.998 | 4.978 | 4.905 | 4.806 | 4.749 | 4.672 | 4.595 |
| 1.0 | 4.955 | 4.943 | 5.004 | 5.004 | 5.004 | 4.996 | 4.984 | 4.984 | 4.967 | 4.949 | 4.767 | 4.773 | 4.692 | 4.627 | 4.753 |
| 1.1 | 4.963 | 4.963 | 4.688 | 4.988 | 4.980 | 4.978 | 4.967 | 4.959 | 4.935 | 4.903 | 4.716 | 4.692 | 4.642 | 4.546 | 4.862 |
| 1.2 | 4.963 | 4.959 | 4.858 | 4.996 | 4.974 | 4.957 | 4.935 | 4.929 | 4.915 | 4.850 | 4.635 | 4.644 | 4.563 | 4.393 | 4.834 |
| 1.3 | 4.963 | 4.955 | 4.850 | 4.854 | 4.947 | 4.939 | 4.935 | 4.915 | 4.496 | 4.524 | 4.465 | 4.451 | 4.563 | 4.640 | 4.727 |
| 1.4 | 4.957 | 4.951 | 4.915 | 4.801 | 4.640 | 4.611 | 4.595 | 4.542 | 4.492 | 4.530 | 4.498 | 4.591 | 4.672 | 4.660 | 4.652 |
| 1.5 | 4.953 | 4.947 | 4.895 | 4.834 | 4.631 | 4.575 | 4.498 | 4.678 | 4.433 | 4.542 | 4.534 | 4.506 | 4.652 | 4.652 | 4.961 |
| 1.6 | 4.945 | 4.939 | 4.834 | 4.729 | 4.619 | 4.745 | 4.789 | 4.757 | 4.708 | 4.482 | 4.476 | 4.364 | 4.627 | 4.931 | 4.984 |
| 1.7 | 4.891 | 4.785 | 4.745 | 4.629 | 4.599 | 4.769 | 4.830 | 4.822 | 4.769 | 4.666 | 4.577 | 4.635 | 4.854 | 4.913 | 4.976 |
| 1.8 | 4.785 | 4.785 | 4.729 | 4.482 | 4.476 | 4.727 | 4.826 | 4.838 | 4.797 | 4.688 | 4.640 | 4.656 | 4.854 | 4.862 | 4.943 |
| 1.9 | 4.779 | 4.745 | 4.664 | 4.526 | 4.498 | 4.611 | 4.806 | 4.822 | 4.773 | 4.559 | 4.652 | 4.668 | 4.850 | 4.850 | 4.886 |
| 2.0 | 4.801 | 4.773 | 4.725 | 4.522 | 4.522 | 4.530 | 4.729 | 4.765 | 4.749 | 4.787 | 4.793 | 4.656 | 4.818 | 4.830 | 4.878 |
| 2.1 | 4.943 | 4.907 | 4.870 | 4.785 | 4.544 | 4.538 | 4.725 | 4.749 | 4.761 | 4.789 | 4.806 | 4.688 | 4.615 | 4.789 | 4.866 |
| 2.2 | 4.996 | 4.976 | 4.947 | 4.903 | 4.793 | 4.696 | 4.733 | 4.753 | 4.771 | 4.797 | 4.801 | 4.741 | 4.603 | 4.587 | 4.735 |
| 2.3 | 5.012 | 4.996 | 4.959 | 4.927 | 4.882 | 4.708 | 4.729 | 4.749 | 4.773 | 4.795 | 4.799 | 4.757 | 4.591 | 4.567 | 4.797 |
| 2.4 | 5.004 | 4.988 | 4.947 | 4.913 | 4.886 | 4.704 | 4.733 | 4.753 | 4.767 | 4.797 | 4.810 | 4.559 | 4.579 | 4.559 | 4.806 |
| 2.5 | 4.972 | 4.955 | 4.935 | 4.913 | 4.834 | 4.522 | 4.559 | 4.579 | 4.605 | 4.591 | 4.563 | 4.508 | 4.528 | 4.395 | 4.749 |
| 2.6 | 4.891 | 4.891 | 4.895 | 4.838 | 4.656 | 4.563 | 4.579 | 4.607 | 4.579 | 4.899 | 4.951 | 4.933 | 4.886 | 4.854 | 4.678 |
| 2.7 | 4.753 | 4.739 | 4.858 | 4.846 | 4.654 | 4.625 | 4.601 | 4.595 | 4.850 | 4.976 | 5.016 | 4.992 | 4.957 | 4.915 | 4.818 |
| 2.8 | 4.931 | 4.921 | 4.895 | 4.872 | 4.623 | 4.607 | 4.565 | 4.621 | 4.939 | 5.022 | 5.028 | 5.012 | 4.980 | 4.925 | 4.834 |
| 2.9 | 4.957 | 4.929 | 4.915 | 4.927 | 4.870 | 4.557 | 4.733 | 4.735 | 4.996 | 5.016 | 5.016 | 4.994 | 4.947 | 4.886 | 4.787 |
| 3.0 | 4.959 | 4.931 | 4.923 | 4.919 | 4.534 | 4.542 | 4.749 | 4.729 | 4.943 | 4.982 | 4.959 | 4.945 | 4.895 | 4.830 | 4.739 |
| 3.1 | 4.965 | 4.939 | 4.929 | 4.830 | 4.532 | 4.579 | 4.605 | 4.664 | 4.595 | 4.909 | 4.905 | 4.882 | 4.832 | 4.773 | 4.640 |
| 3.2 | 4.972 | 4.927 | 4.765 | 4.741 | 4.536 | 4.846 | 4.838 | 4.595 | 4.550 | 4.575 | 4.818 | 4.822 | 4.771 | 4.725 | 4.753 |
| 3.3 | 4.854 | 4.672 | 4.664 | 4.753 | 4.878 | 4.911 | 4.899 | 4.862 | 4.822 | 4.769 | 4.623 | 4.635 | 4.668 | 4.769 | 4.785 |
| 3.4 | 4.733 | 4.737 | 4.708 | 4.725 | 4.905 | 4.917 | 4.882 | 4.846 | 4.806 | 4.773 | 4.615 | 4.482 | 4.627 | 4.785 | 4.814 |
| 3.5 | 4.745 | 4.739 | 4.672 | 4.613 | 4.919 | 4.931 | 4.899 | 4.864 | 4.801 | 4.741 | 4.587 | 4.506 | 4.474 | 4.561 | 4.838 |
| 3.6 | 4.939 | 4.884 | 4.623 | 4.510 | 4.923 | 4.931 | 4.923 | 4.911 | 4.870 | 4.822 | 4.783 | 4.741 | 4.676 | 4.575 | 4.686 |
| 3.7 | 5.026 | 5.044 | 5.018 | 4.729 | 4.935 | 4.963 | 4.963 | 4.919 | 4.872 | 4.808 | 4.769 | 4.729 | 4.822 | 4.870 | 4.662 |
| 3.8 | 5.028 | 5.069 | 5.093 | 4.982 | 4.862 | 4.893 | 4.915 | 4.886 | 4.838 | 4.781 | 4.886 | 4.925 | 4.919 | 4.903 | 4.725 |
| 3.9 | 5.028 | 5.069 | 5.103 | 5.077 | 4.899 | 4.668 | 4.725 | 4.741 | 4.753 | 4.822 | 4.899 | 4.911 | 4.886 | 4.862 | 4.830 |
| 4.0 | 5.006 | 5.052 | 5.079 | 5.044 | 4.725 | 4.765 | 4.797 | 4.793 | 4.664 | 4.838 | 4.862 | 4.854 | 4.834 | 4.818 | 4.769 |
| 4.1 | 4.761 | 4.919 | 4.617 | 4.684 | 4.725 | 4.765 | 4.806 | 4.806 | 4.688 | 4.563 | 4.814 | 4.806 | 4.789 | 4.773 | 4.737 |
| 4.2 | 4.812 | 4.759 | 4.627 | 4.682 | 4.723 | 4.761 | 4.801 | 4.806 | 4.692 | 4.559 | 4.486 | 4.520 | 4.729 | 4.698 | 4.646 |
| 4.3 | 4.874 | 4.810 | 4.629 | 4.682 | 4.725 | 4.765 | 4.781 | 4.769 | 4.692 | 4.579 | 4.504 | 4.735 | 4.542 | 4.672 | 4.718 |
| 4.4 | 4.899 | 4.785 | 4.621 | 4.680 | 4.720 | 4.729 | 4.725 | 4.672 | 4.640 | 4.670 | 4.765 | 4.785 | 4.542 | 4.785 | 4.836 |
| 4.5 | 4.640 | 4.729 | 4.605 | 4.656 | 4.676 | 4.660 | 4.623 | 4.591 | 4.559 | 4.676 | 4.725 | 4.785 | 4.743 | 4.850 | 4.848 |
| 4.6 | 4.729 | 4.785 | 4.749 | 4.542 | 4.591 | 4.575 | 4.554 | 4.530 | 4.498 | 4.635 | 4.684 | 4.769 | 4.789 | 4.846 | 4.846 |
| 4.7 | 4.785 | 4.789 | 4.745 | 4.640 | 4.431 | 4.652 | 4.799 | 4.935 | 4.967 | 4.972 | 4.947 | 4.789 | 4.814 | 4.862 | 4.850 |
| 4.8 | 4.777 | 4.769 | 4.692 | 4.599 | 4.623 | 4.773 | 4.897 | 4.967 | 5.004 | 5.000 | 4.982 | 4.895 | 4.836 | 4.872 | 4.868 |
| 4.9 | 4.745 | 4.696 | 4.599 | 4.518 | 4.698 | 4.832 | 4.925 | 4.982 | 5.012 | 5.004 | 4.978 | 4.886 | 4.765 | 4.803 | 4.830 |
| 5.0 | 4.729 | 4.615 | 4.540 | 4.486 | 4.676 | 4.820 | 4.903 | 4.967 | 5.002 | 4.980 | 4.941 | 4.860 | 4.613 | 4.644 | 4.702 |
| 5.1 | 4.607 | 4.656 | 4.765 | 4.799 | 4.753 | 4.787 | 4.870 | 4.935 | 4.955 | 4.929 | 4.884 | 4.785 | 4.623 | 4.635 | 4.640 |
| 5.2 | 4.631 | 4.729 | 4.801 | 4.801 | 4.777 | 4.688 | 4.743 | 4.858 | 4.878 | 4.834 | 4.801 | 4.534 | 4.619 | 4.644 | 4.652 |
| 5.3 | 4.664 | 4.749 | 4.801 | 4.777 | 4.753 | 4.678 | 4.579 | 4.542 | 4.692 | 4.729 | 4.789 | 4.729 | 4.563 | 4.633 | 4.648 |
| 5.4 | 4.478 | 4.729 | 4.789 | 4.769 | 4.741 | 4.660 | 4.627 | 4.526 | 4.692 | 4.854 | 4.893 | 4.840 | 4.469 | 4.575 | 4.603 |
| 5.5 | 4.619 | 4.591 | 4.710 | 4.749 | 4.716 | 4.627 | 4.646 | 4.727 | 4.854 | 4.935 | 4.931 | 4.870 | 4.627 | 4.660 | 4.696 |
| 5.6 | 4.729 | 4.674 | 4.631 | 4.563 | 4.627 | 4.654 | 4.670 | 4.878 | 4.963 | 4.967 | 4.943 | 4.895 | 4.670 | 4.708 | 4.769 |
| 5.7 | 4.745 | 4.704 | 4.656 | 4.579 | 4.627 | 4.670 | 4.822 | 4.963 | 4.990 | 4.967 | 4.931 | 4.850 | 4.725 | 4.757 | 4.814 |
| 5.8 | 4.672 | 4.631 | 4.589 | 4.559 | 4.571 | 4.546 | 4.848 | 4.967 | 4.984 | 4.951 | 4.909 | 4.729 | 4.753 | 4.785 | 4.818 |
| 5.9 | 4.559 | 4.591 | 4.567 | 4.563 | 4.563 | 4.526 | 4.587 | 4.945 | 4.951 | 4.919 | 4.668 | 4.720 | 4.704 | 4.727 | 4.757 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 35.3 | 35.4 | 35.5 | 35.6 | 35.7 | 35.8 | 35.9 | 36.0 | 36.1 | 36.2 | 36.3 | 36.4 | 36.5 | 36.6 | 36.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.586 | 4.598 | 4.638 | 4.703 | 4.632 | 4.606 | 4.667 | 4.679 | 4.683 | 4.687 | 4.695 | 4.687 | 4.671 | 4.396 | 4.626 |
| 0.2 | 4.574 | 4.606 | 4.649 | 4.679 | 4.557 | 4.626 | 4.665 | 4.681 | 4.687 | 4.693 | 4.693 | 4.693 | 4.687 | 4.598 | 4.610 |
| 0.3 | 4.468 | 4.505 | 4.634 | 4.651 | 4.412 | 4.630 | 4.663 | 4.675 | 4.685 | 4.687 | 4.689 | 4.687 | 4.687 | 4.598 | 4.622 |
| 0.4 | 4.602 | 4.626 | 4.647 | 4.663 | 4.412 | 4.598 | 4.651 | 4.671 | 4.679 | 4.683 | 4.687 | 4.677 | 4.564 | 4.804 | 4.784 |
| 0.5 | 4.598 | 4.624 | 4.655 | 4.659 | 4.655 | 4.493 | 4.574 | 4.634 | 4.655 | 4.649 | 4.675 | 4.679 | 4.817 | 4.873 | 4.898 |
| 0.6 | 4.598 | 4.618 | 4.630 | 4.655 | 4.614 | 4.541 | 4.566 | 4.549 | 4.501 | 4.634 | 4.683 | 4.683 | 4.831 | 4.883 | 4.912 |
| 0.7 | 4.594 | 4.610 | 4.614 | 4.600 | 4.509 | 4.541 | 4.727 | 4.549 | 4.517 | 4.598 | 4.638 | 4.671 | 4.770 | 4.825 | 4.867 |
| 0.8 | 4.687 | 4.434 | 4.541 | 4.551 | 4.665 | 4.802 | 4.833 | 4.829 | 4.808 | 4.744 | 4.634 | 4.602 | 4.719 | 4.764 | 4.835 |
| 0.9 | 4.703 | 4.647 | 4.521 | 4.545 | 4.817 | 4.847 | 4.871 | 4.889 | 4.873 | 4.857 | 4.800 | 4.566 | 4.651 | 4.740 | 4.784 |
| 1.0 | 4.703 | 4.606 | 4.541 | 4.470 | 4.833 | 4.865 | 4.881 | 4.900 | 4.906 | 4.889 | 4.843 | 4.760 | 4.592 | 4.679 | 4.719 |
| 1.1 | 4.659 | 4.493 | 4.549 | 4.574 | 4.808 | 4.865 | 4.873 | 4.885 | 4.898 | 4.893 | 4.851 | 4.736 | 4.535 | 4.614 | 4.667 |
| 1.2 | 4.665 | 4.651 | 4.634 | 4.566 | 4.719 | 4.819 | 4.825 | 4.833 | 4.837 | 4.849 | 4.819 | 4.671 | 4.444 | 4.509 | 4.566 |
| 1.3 | 4.776 | 4.744 | 4.736 | 4.695 | 4.466 | 4.501 | 4.768 | 4.768 | 4.776 | 4.780 | 4.760 | 4.602 | 4.410 | 4.442 | 4.452 |
| 1.4 | 4.800 | 4.780 | 4.758 | 4.727 | 4.655 | 4.503 | 4.638 | 4.566 | 4.687 | 4.638 | 4.671 | 4.703 | 4.727 | 4.719 | 4.610 |
| 1.5 | 4.784 | 4.768 | 4.738 | 4.687 | 4.598 | 4.501 | 4.667 | 4.667 | 4.614 | 4.549 | 4.721 | 4.740 | 4.760 | 4.778 | 4.796 |
| 1.6 | 4.744 | 4.730 | 4.699 | 4.622 | 4.503 | 4.521 | 4.693 | 4.677 | 4.638 | 4.719 | 4.746 | 4.766 | 4.784 | 4.804 | 4.829 |
| 1.7 | 4.687 | 4.679 | 4.630 | 4.539 | 4.460 | 4.586 | 4.667 | 4.663 | 4.630 | 4.748 | 4.770 | 4.790 | 4.808 | 4.833 | 4.855 |
| 1.8 | 4.606 | 4.574 | 4.533 | 4.436 | 4.614 | 4.602 | 4.566 | 4.602 | 4.719 | 4.774 | 4.802 | 4.819 | 4.841 | 4.865 | 4.887 |
| 1.9 | 4.481 | 4.387 | 4.543 | 4.618 | 4.687 | 4.748 | 4.663 | 4.679 | 4.774 | 4.800 | 4.831 | 4.851 | 4.873 | 4.889 | 4.906 |
| 2.0 | 4.667 | 4.444 | 4.598 | 4.651 | 4.699 | 4.784 | 4.776 | 4.723 | 4.786 | 4.825 | 4.857 | 4.881 | 4.898 | 4.916 | 4.914 |
| 2.1 | 4.719 | 4.541 | 4.606 | 4.651 | 4.715 | 4.808 | 4.833 | 4.655 | 4.760 | 4.808 | 4.849 | 4.889 | 4.914 | 4.922 | 4.887 |
| 2.2 | 4.725 | 4.719 | 4.622 | 4.667 | 4.732 | 4.817 | 4.877 | 4.748 | 4.493 | 4.485 | 4.695 | 4.780 | 4.841 | 4.881 | 4.806 |
| 2.3 | 4.727 | 4.719 | 4.653 | 4.683 | 4.748 | 4.841 | 4.889 | 4.841 | 4.578 | 4.485 | 4.493 | 4.557 | 4.574 | 4.572 | 4.570 |
| 2.4 | 4.732 | 4.709 | 4.649 | 4.651 | 4.744 | 4.788 | 4.725 | 4.725 | 4.687 | 4.727 | 4.788 | 4.537 | 4.574 | 4.574 | 4.574 |
| 2.5 | 4.732 | 4.693 | 4.416 | 4.331 | 4.675 | 4.752 | 4.768 | 4.796 | 4.837 | 4.857 | 4.879 | 4.853 | 4.541 | 4.574 | 4.570 |
| 2.6 | 4.719 | 4.440 | 4.424 | 4.742 | 4.794 | 4.833 | 4.865 | 4.877 | 4.893 | 4.898 | 4.889 | 4.839 | 4.525 | 4.537 | 4.525 |
| 2.7 | 4.464 | 4.440 | 4.410 | 4.817 | 4.861 | 4.881 | 4.893 | 4.896 | 4.896 | 4.889 | 4.879 | 4.833 | 4.468 | 4.468 | 4.679 |
| 2.8 | 4.711 | 4.422 | 4.396 | 4.833 | 4.871 | 4.881 | 4.881 | 4.873 | 4.859 | 4.849 | 4.833 | 4.817 | 4.505 | 4.501 | 4.543 |
| 2.9 | 4.768 | 4.764 | 4.505 | 4.813 | 4.853 | 4.865 | 4.849 | 4.833 | 4.815 | 4.796 | 4.776 | 4.760 | 4.495 | 4.501 | 4.468 |
| 3.0 | 4.768 | 4.766 | 4.764 | 4.744 | 4.800 | 4.817 | 4.810 | 4.764 | 4.736 | 4.703 | 4.727 | 4.630 | 4.452 | 4.462 | 4.428 |
| 3.1 | 4.772 | 4.764 | 4.758 | 4.748 | 4.719 | 4.725 | 4.725 | 4.800 | 4.829 | 4.829 | 4.808 | 4.774 | 4.509 | 4.436 | 4.420 |
| 3.2 | 4.760 | 4.752 | 4.740 | 4.732 | 4.719 | 4.758 | 4.831 | 4.845 | 4.841 | 4.833 | 4.825 | 4.810 | 4.719 | 4.396 | 4.379 |
| 3.3 | 4.723 | 4.738 | 4.723 | 4.723 | 4.521 | 4.780 | 4.839 | 4.845 | 4.833 | 4.821 | 4.813 | 4.802 | 4.784 | 4.586 | 4.655 |
| 3.4 | 4.517 | 4.703 | 4.541 | 4.521 | 4.503 | 4.768 | 4.817 | 4.831 | 4.817 | 4.808 | 4.796 | 4.792 | 4.784 | 4.687 | 4.655 |
| 3.5 | 4.541 | 4.574 | 4.574 | 4.541 | 4.545 | 4.738 | 4.758 | 4.768 | 4.796 | 4.796 | 4.786 | 4.780 | 4.768 | 4.566 | 4.602 |
| 3.6 | 4.634 | 4.614 | 4.610 | 4.582 | 4.590 | 4.606 | 4.723 | 4.719 | 4.732 | 4.756 | 4.768 | 4.758 | 4.719 | 4.501 | 4.509 |
| 3.7 | 4.632 | 4.649 | 4.655 | 4.630 | 4.630 | 4.647 | 4.588 | 4.687 | 4.721 | 4.725 | 4.721 | 4.533 | 4.574 | 4.440 | 4.396 |
| 3.8 | 4.614 | 4.622 | 4.655 | 4.679 | 4.671 | 4.647 | 4.825 | 4.849 | 4.841 | 4.821 | 4.748 | 4.572 | 4.574 | 4.541 | 4.590 |
| 3.9 | 4.561 | 4.574 | 4.638 | 4.667 | 4.810 | 4.857 | 4.877 | 4.881 | 4.877 | 4.863 | 4.833 | 4.529 | 4.525 | 4.517 | 4.634 |
| 4.0 | 4.756 | 4.744 | 4.638 | 4.730 | 4.833 | 4.881 | 4.898 | 4.906 | 4.902 | 4.893 | 4.873 | 4.808 | 4.485 | 4.468 | 4.598 |
| 4.1 | 4.768 | 4.770 | 4.719 | 4.754 | 4.833 | 4.893 | 4.914 | 4.926 | 4.922 | 4.914 | 4.889 | 4.843 | 4.444 | 4.515 | 4.499 |
| 4.2 | 4.756 | 4.778 | 4.754 | 4.796 | 4.865 | 4.914 | 4.938 | 4.940 | 4.938 | 4.926 | 4.896 | 4.835 | 4.559 | 4.600 | 4.533 |
| 4.3 | 4.748 | 4.768 | 4.778 | 4.833 | 4.885 | 4.924 | 4.938 | 4.946 | 4.944 | 4.930 | 4.889 | 4.825 | 4.622 | 4.655 | 4.622 |
| 4.4 | 4.752 | 4.772 | 4.780 | 4.841 | 4.902 | 4.922 | 4.930 | 4.938 | 4.932 | 4.910 | 4.873 | 4.784 | 4.636 | 4.703 | 4.655 |
| 4.5 | 4.748 | 4.760 | 4.744 | 4.833 | 4.881 | 4.879 | 4.881 | 4.889 | 4.881 | 4.855 | 4.815 | 4.630 | 4.703 | 4.725 | 4.669 |
| 4.6 | 4.460 | 4.533 | 4.600 | 4.644 | 4.796 | 4.780 | 4.764 | 4.764 | 4.748 | 4.732 | 4.523 | 4.673 | 4.776 | 4.736 | 4.695 |
| 4.7 | 4.404 | 4.640 | 4.521 | 4.580 | 4.590 | 4.525 | 4.622 | 4.723 | 4.699 | 4.655 | 4.545 | 4.732 | 4.796 | 4.752 | 4.705 |
| 4.8 | 4.695 | 4.687 | 4.557 | 4.495 | 4.537 | 4.568 | 4.679 | 4.723 | 4.703 | 4.675 | 4.566 | 4.748 | 4.778 | 4.780 | 4.711 |
| 4.9 | 4.689 | 4.671 | 4.553 | 4.331 | 4.396 | 4.636 | 4.742 | 4.719 | 4.697 | 4.671 | 4.539 | 4.695 | 4.768 | 4.752 | 4.727 |
| 5.0 | 4.699 | 4.683 | 4.622 | 4.363 | 4.428 | 4.732 | 4.758 | 4.719 | 4.703 | 4.663 | 4.428 | 4.671 | 4.703 | 4.734 | 4.798 |
| 5.1 | 4.695 | 4.671 | 4.638 | 4.440 | 4.539 | 4.744 | 4.754 | 4.687 | 4.703 | 4.667 | 4.509 | 4.515 | 4.699 | 4.788 | 4.833 |
| 5.2 | 4.683 | 4.647 | 4.632 | 4.525 | 4.590 | 4.590 | 4.566 | 4.501 | 4.590 | 4.525 | 4.533 | 4.525 | 4.772 | 4.817 | 4.881 |
| 5.3 | 4.663 | 4.622 | 4.606 | 4.523 | 4.594 | 4.667 | 4.687 | 4.626 | 4.525 | 4.537 | 4.541 | 4.539 | 4.800 | 4.865 | 4.930 |
| 5.4 | 4.493 | 4.493 | 4.493 | 4.485 | 4.551 | 4.638 | 4.703 | 4.723 | 4.539 | 4.541 | 4.549 | 4.549 | 4.752 | 4.877 | 4.938 |
| 5.5 | 4.808 | 4.800 | 4.651 | 4.539 | 4.509 | 4.590 | 4.663 | 4.610 | 4.549 | 4.551 | 4.557 | 4.557 | 4.545 | 4.606 | 4.881 |
| 5.6 | 4.784 | 4.788 | 4.786 | 4.557 | 4.549 | 4.472 | 4.590 | 4.509 | 4.549 | 4.557 | 4.553 | 4.549 | 4.509 | 4.570 | 4.614 |
| 5.7 | 4.750 | 4.764 | 4.776 | 4.541 | 4.557 | 4.474 | 4.363 | 4.460 | 4.517 | 4.533 | 4.541 | 4.521 | 4.444 | 4.541 | 4.602 |
| 5.8 | 4.723 | 4.721 | 4.734 | 4.476 | 4.462 | 4.396 | 4.493 | 4.404 | 4.361 | 4.428 | 4.460 | 4.387 | 4.412 | 4.489 | 4.541 |
| 5.9 | 4.703 | 4.721 | 4.719 | 4.363 | 4.363 | 4.511 | 4.541 | 4.557 | 4.553 | 4.509 | 4.396 | 4.428 | 4.420 | 4.383 | 4.466 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 41.3 | 41.4 | 41.5 | 41.6 | 41.7 | 41.8 | 41.9 | 42.0 | 42.1 | 42.2 | 42.3 | 42.4 | 42.5 | 42.6 | 42.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.819 | 4.800 | 4.659 | 4.450 | 4.430 | 4.677 | 4.653 | 4.598 | 4.525 | 4.361 | 4.454 | 4.661 | 4.721 | 4.725 | 4.725 |
| 0.2 | 4.851 | 4.835 | 4.774 | 4.578 | 4.701 | 4.701 | 4.661 | 4.620 | 4.570 | 4.361 | 4.527 | 4.634 | 4.721 | 4.721 | 4.721 |
| 0.3 | 4.875 | 4.851 | 4.774 | 4.566 | 4.764 | 4.717 | 4.669 | 4.620 | 4.566 | 4.436 | 4.691 | 4.709 | 4.697 | 4.693 | 4.697 |
| 0.4 | 4.883 | 4.804 | 4.725 | 4.693 | 4.819 | 4.725 | 4.677 | 4.614 | 4.566 | 4.436 | 4.669 | 4.689 | 4.693 | 4.689 | 4.685 |
| 0.5 | 4.841 | 4.772 | 4.638 | 4.800 | 4.849 | 4.804 | 4.725 | 4.661 | 4.535 | 4.436 | 4.630 | 4.661 | 4.677 | 4.673 | 4.673 |
| 0.6 | 4.804 | 4.732 | 4.598 | 4.827 | 4.855 | 4.817 | 4.772 | 4.653 | 4.440 | 4.519 | 4.598 | 4.638 | 4.647 | 4.653 | 4.655 |
| 0.7 | 4.764 | 4.699 | 4.616 | 4.859 | 4.851 | 4.812 | 4.758 | 4.600 | 4.553 | 4.594 | 4.580 | 4.606 | 4.624 | 4.630 | 4.626 |
| 0.8 | 4.630 | 4.472 | 4.675 | 4.851 | 4.843 | 4.810 | 4.756 | 4.547 | 4.553 | 4.630 | 4.644 | 4.630 | 4.614 | 4.393 | 4.371 |
| 0.9 | 4.566 | 4.533 | 4.677 | 4.819 | 4.819 | 4.772 | 4.691 | 4.497 | 4.499 | 4.614 | 4.665 | 4.665 | 4.665 | 4.653 | 4.369 |
| 1.0 | 4.578 | 4.553 | 4.519 | 4.622 | 4.758 | 4.701 | 4.592 | 4.460 | 4.487 | 4.535 | 4.661 | 4.713 | 4.715 | 4.701 | 4.371 |
| 1.1 | 4.574 | 4.551 | 4.509 | 4.483 | 4.452 | 4.479 | 4.551 | 4.574 | 4.566 | 4.549 | 4.586 | 4.689 | 4.665 | 4.653 | 4.653 |
| 1.2 | 4.551 | 4.519 | 4.517 | 4.478 | 4.452 | 4.521 | 4.566 | 4.614 | 4.638 | 4.638 | 4.630 | 4.598 | 4.479 | 4.622 | 4.677 |
| 1.3 | 4.543 | 4.519 | 4.503 | 4.383 | 4.452 | 4.503 | 4.564 | 4.614 | 4.661 | 4.699 | 4.713 | 4.719 | 4.689 | 4.644 | 4.669 |
| 1.4 | 4.535 | 4.515 | 4.294 | 4.345 | 4.606 | 4.501 | 4.559 | 4.616 | 4.661 | 4.709 | 4.740 | 4.752 | 4.756 | 4.620 | 4.649 |
| 1.5 | 4.590 | 4.495 | 4.227 | 4.653 | 4.715 | 4.685 | 4.511 | 4.622 | 4.661 | 4.707 | 4.740 | 4.756 | 4.756 | 4.531 | 4.614 |
| 1.6 | 4.661 | 4.622 | 4.278 | 4.705 | 4.734 | 4.732 | 4.638 | 4.468 | 4.653 | 4.693 | 4.717 | 4.663 | 4.630 | 4.584 | 4.535 |
| 1.7 | 4.691 | 4.693 | 4.266 | 4.715 | 4.736 | 4.740 | 4.693 | 4.468 | 4.630 | 4.511 | 4.622 | 4.677 | 4.687 | 4.622 | 4.582 |
| 1.8 | 4.725 | 4.725 | 4.679 | 4.709 | 4.728 | 4.740 | 4.715 | 4.649 | 4.681 | 4.606 | 4.701 | 4.736 | 4.780 | 4.756 | 4.606 |
| 1.9 | 4.732 | 4.732 | 4.701 | 4.701 | 4.725 | 4.748 | 4.717 | 4.657 | 4.679 | 4.685 | 4.756 | 4.796 | 4.804 | 4.760 | 4.665 |
| 2.0 | 4.728 | 4.732 | 4.685 | 4.697 | 4.728 | 4.756 | 4.723 | 4.649 | 4.677 | 4.685 | 4.796 | 4.847 | 4.827 | 4.778 | 4.693 |
| 2.1 | 4.725 | 4.723 | 4.614 | 4.691 | 4.740 | 4.758 | 4.717 | 4.626 | 4.677 | 4.685 | 4.758 | 4.847 | 4.851 | 4.804 | 4.661 |
| 2.2 | 4.701 | 4.644 | 4.353 | 4.693 | 4.748 | 4.756 | 4.701 | 4.614 | 4.665 | 4.416 | 4.470 | 4.535 | 4.780 | 4.701 | 4.503 |
| 2.3 | 4.424 | 4.416 | 4.420 | 4.671 | 4.742 | 4.740 | 4.551 | 4.559 | 4.570 | 4.517 | 4.460 | 4.507 | 4.578 | 4.566 | 4.551 |
| 2.4 | 4.460 | 4.487 | 4.525 | 4.535 | 4.685 | 4.653 | 4.570 | 4.606 | 4.598 | 4.547 | 4.472 | 4.543 | 4.511 | 4.553 | 4.566 |
| 2.5 | 4.485 | 4.519 | 4.559 | 4.566 | 4.543 | 4.428 | 4.564 | 4.582 | 4.566 | 4.572 | 4.693 | 4.732 | 4.717 | 4.610 | 4.499 |
| 2.6 | 4.521 | 4.551 | 4.582 | 4.582 | 4.543 | 4.400 | 4.545 | 4.574 | 4.594 | 4.717 | 4.762 | 4.796 | 4.804 | 4.693 | 4.566 |
| 2.7 | 4.547 | 4.574 | 4.592 | 4.562 | 4.596 | 4.061 | 4.677 | 4.677 | 4.598 | 4.734 | 4.788 | 4.831 | 4.859 | 4.851 | 4.626 |
| 2.8 | 4.549 | 4.578 | 4.566 | 4.551 | 4.624 | 4.677 | 4.693 | 4.699 | 4.669 | 4.742 | 4.804 | 4.847 | 4.883 | 4.895 | 4.873 |
| 2.9 | 4.349 | 4.511 | 4.383 | 4.408 | 4.598 | 4.638 | 4.677 | 4.673 | 4.693 | 4.756 | 4.817 | 4.863 | 4.906 | 4.914 | 4.908 |
| 3.0 | 4.557 | 4.590 | 4.606 | 4.590 | 4.578 | 4.620 | 4.638 | 4.604 | 4.713 | 4.774 | 4.829 | 4.879 | 4.930 | 4.942 | 4.918 |
| 3.1 | 4.614 | 4.630 | 4.645 | 4.638 | 4.630 | 4.551 | 4.535 | 4.503 | 4.717 | 4.788 | 4.843 | 4.898 | 4.934 | 4.946 | 4.926 |
| 3.2 | 4.701 | 4.669 | 4.653 | 4.638 | 4.638 | 4.398 | 4.400 | 4.436 | 4.693 | 4.788 | 4.839 | 4.881 | 4.883 | 4.920 | 4.883 |
| 3.3 | 4.756 | 4.748 | 4.645 | 4.638 | 4.770 | 4.819 | 4.760 | 4.551 | 4.545 | 4.754 | 4.819 | 4.847 | 4.788 | 4.808 | 4.790 |
| 3.4 | 4.736 | 4.732 | 4.705 | 4.693 | 4.843 | 4.891 | 4.900 | 4.812 | 4.566 | 4.521 | 4.448 | 4.424 | 4.454 | 4.529 | 4.543 |
| 3.5 | 4.713 | 4.701 | 4.693 | 4.539 | 4.817 | 4.891 | 4.910 | 4.902 | 4.869 | 4.511 | 4.495 | 4.529 | 4.448 | 4.535 | 4.535 |
| 3.6 | 4.689 | 4.683 | 4.669 | 4.626 | 4.705 | 4.800 | 4.855 | 4.875 | 4.867 | 4.788 | 4.472 | 4.531 | 4.527 | 4.551 | 4.503 |
| 3.7 | 4.638 | 4.622 | 4.598 | 4.551 | 4.645 | 4.709 | 4.760 | 4.819 | 4.831 | 4.776 | 4.424 | 4.476 | 4.594 | 4.582 | 4.574 |
| 3.8 | 4.649 | 4.630 | 4.582 | 4.476 | 4.584 | 4.645 | 4.701 | 4.762 | 4.776 | 4.685 | 4.377 | 4.446 | 4.626 | 4.610 | 4.590 |
| 3.9 | 4.630 | 4.618 | 4.598 | 4.503 | 4.472 | 4.598 | 4.644 | 4.693 | 4.693 | 4.418 | 4.404 | 4.547 | 4.649 | 4.642 | 4.614 |
| 4.0 | 4.622 | 4.614 | 4.574 | 4.470 | 4.472 | 4.598 | 4.614 | 4.604 | 4.594 | 4.582 | 4.483 | 4.499 | 4.669 | 4.669 | 4.644 |
| 4.1 | 4.604 | 4.582 | 4.543 | 4.353 | 4.472 | 4.632 | 4.630 | 4.618 | 4.612 | 4.598 | 4.551 | 4.535 | 4.677 | 4.689 | 4.665 |
| 4.2 | 4.661 | 4.740 | 4.835 | 4.851 | 4.819 | 4.651 | 4.653 | 4.645 | 4.630 | 4.598 | 4.543 | 4.440 | 4.659 | 4.693 | 4.679 |
| 4.3 | 4.895 | 4.883 | 4.867 | 4.379 | 4.859 | 4.642 | 4.661 | 4.661 | 4.620 | 4.539 | 4.657 | 4.614 | 4.562 | 4.479 | 4.590 |
| 4.4 | 4.871 | 4.863 | 4.851 | 4.851 | 4.835 | 4.551 | 4.598 | 4.614 | 4.804 | 4.776 | 4.701 | 4.649 | 4.588 | 4.511 | 4.448 |
| 4.5 | 4.843 | 4.827 | 4.817 | 4.819 | 4.788 | 4.582 | 4.474 | 4.889 | 4.875 | 4.815 | 4.756 | 4.691 | 4.626 | 4.574 | 4.468 |
| 4.6 | 4.835 | 4.796 | 4.772 | 4.752 | 4.598 | 4.614 | 4.756 | 4.922 | 4.914 | 4.851 | 4.780 | 4.721 | 4.661 | 4.701 | 4.833 |
| 4.7 | 4.819 | 4.788 | 4.709 | 4.476 | 4.547 | 4.507 | 4.533 | 4.883 | 4.910 | 4.867 | 4.800 | 4.740 | 4.669 | 4.831 | 4.861 |
| 4.8 | 4.756 | 4.701 | 4.564 | 4.456 | 4.645 | 4.543 | 4.543 | 4.772 | 4.900 | 4.863 | 4.817 | 4.752 | 4.831 | 4.851 | 4.879 |
| 4.9 | 4.663 | 4.661 | 4.642 | 4.594 | 4.634 | 4.564 | 4.562 | 4.709 | 4.819 | 4.863 | 4.784 | 4.815 | 4.847 | 4.875 | 4.902 |
| 5.0 | 4.669 | 4.677 | 4.653 | 4.624 | 4.598 | 4.586 | 4.590 | 4.574 | 4.740 | 4.440 | 4.808 | 4.835 | 4.873 | 4.902 | 4.922 |
| 5.1 | 4.638 | 4.661 | 4.649 | 4.606 | 4.460 | 4.590 | 4.610 | 4.598 | 4.444 | 4.424 | 4.823 | 4.863 | 4.898 | 4.930 | 4.950 |
| 5.2 | 4.717 | 4.725 | 4.723 | 4.452 | 4.462 | 4.566 | 4.562 | 4.564 | 4.478 | 4.483 | 4.847 | 4.863 | 4.918 | 4.942 | 4.946 |
| 5.3 | 4.804 | 4.839 | 4.819 | 4.788 | 4.491 | 4.462 | 4.479 | 4.620 | 4.555 | 4.472 | 4.762 | 4.835 | 4.887 | 4.883 | 4.833 |
| 5.4 | 4.883 | 4.898 | 4.863 | 4.851 | 4.541 | 4.535 | 4.594 | 4.645 | 4.645 | 4.487 | 4.446 | 4.693 | 4.713 | 4.630 | 4.483 |
| 5.5 | 4.930 | 4.920 | 4.895 | 4.863 | 4.543 | 4.622 | 4.626 | 4.582 | 4.614 | 4.551 | 4.592 | 4.606 | 4.614 | 4.598 | 4.483 |
| 5.6 | 4.946 | 4.912 | 4.861 | 4.819 | 4.590 | 4.638 | 4.630 | 4.590 | 4.549 | 4.576 | 4.602 | 4.628 | 4.649 | 4.661 | 4.614 |
| 5.7 | 4.928 | 4.883 | 4.827 | 4.562 | 4.616 | 4.626 | 4.614 | 4.551 | 4.501 | 4.562 | 4.606 | 4.628 | 4.661 | 4.675 | 4.669 |
| 5.8 | 4.885 | 4.843 | 4.574 | 4.568 | 4.614 | 4.614 | 4.606 | 4.535 | 4.478 | 4.582 | 4.608 | 4.628 | 4.661 | 4.677 | 4.673 |
| 5.9 | 4.841 | 4.614 | 4.574 | 4.503 | 4.588 | 4.610 | 4.527 | 4.438 | 4.416 | 4.566 | 4.604 | 4.630 | 4.661 | 4.673 | 4.669 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 47.3 | 47.4 | 47.5 | 47.6 | 47.7 | 47.8 | 47.9 | 48.0 | 48.1 | 48.2 | 48.3 | 48.4 | 48.5 | 48.6 | 48.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.706 | 4.750 | 4.811 | 4.795 | 4.485 | 4.204 | 4.442 | 4.495 | 4.544 | 4.580 | 4.588 | 4.576 | 4.542 | 4.248 | 4.463 |
| 0.2 | 4.722 | 4.758 | 4.782 | 4.740 | 4.657 | 4.220 | 4.426 | 4.491 | 4.527 | 4.576 | 4.592 | 4.584 | 4.558 | 4.540 | 4.511 |
| 0.3 | 4.697 | 4.722 | 4.639 | 4.552 | 4.446 | 4.199 | 4.337 | 4.422 | 4.519 | 4.560 | 4.588 | 4.588 | 4.562 | 4.542 | 4.523 |
| 0.4 | 4.623 | 4.560 | 4.495 | 4.604 | 4.592 | 4.546 | 4.365 | 4.367 | 4.483 | 4.540 | 4.572 | 4.602 | 4.578 | 4.525 | 4.511 |
| 0.5 | 4.507 | 4.434 | 4.610 | 4.649 | 4.633 | 4.600 | 4.560 | 4.293 | 4.438 | 4.507 | 4.564 | 4.602 | 4.560 | 4.491 | 4.438 |
| 0.6 | 4.420 | 4.596 | 4.651 | 4.665 | 4.641 | 4.618 | 4.576 | 4.295 | 4.303 | 4.463 | 4.540 | 4.584 | 4.540 | 4.479 | 4.527 |
| 0.7 | 4.538 | 4.598 | 4.667 | 4.665 | 4.649 | 4.625 | 4.596 | 4.289 | 4.301 | 4.295 | 4.380 | 4.535 | 4.511 | 4.430 | 4.527 |
| 0.8 | 4.588 | 4.533 | 4.669 | 4.669 | 4.657 | 4.639 | 4.608 | 4.246 | 4.303 | 4.297 | 4.434 | 4.475 | 4.450 | 4.398 | 4.471 |
| 0.9 | 4.641 | 4.560 | 4.671 | 4.673 | 4.665 | 4.653 | 4.623 | 4.201 | 4.303 | 4.469 | 4.507 | 4.523 | 4.521 | 4.463 | 4.428 |
| 1.0 | 4.697 | 4.433 | 4.669 | 4.677 | 4.641 | 4.669 | 4.637 | 4.572 | 4.552 | 4.491 | 4.544 | 4.568 | 4.519 | 4.469 | 4.264 |
| 1.1 | 4.706 | 4.475 | 4.669 | 4.677 | 4.665 | 4.681 | 4.651 | 4.623 | 4.584 | 4.519 | 4.556 | 4.584 | 4.410 | 4.313 | 4.297 |
| 1.2 | 4.669 | 4.475 | 4.667 | 4.687 | 4.689 | 4.689 | 4.653 | 4.641 | 4.608 | 4.550 | 4.489 | 4.378 | 4.463 | 4.495 | 4.471 |
| 1.3 | 4.479 | 4.463 | 4.629 | 4.685 | 4.691 | 4.685 | 4.637 | 4.588 | 4.598 | 4.552 | 4.475 | 4.370 | 4.515 | 4.544 | 4.507 |
| 1.4 | 4.556 | 4.544 | 4.560 | 4.665 | 4.667 | 4.657 | 4.602 | 4.578 | 4.641 | 4.610 | 4.584 | 4.527 | 4.479 | 4.527 | 4.505 |
| 1.5 | 4.618 | 4.608 | 4.394 | 4.556 | 4.552 | 4.580 | 4.515 | 4.633 | 4.661 | 4.641 | 4.621 | 4.584 | 4.511 | 4.430 | 4.600 |
| 1.6 | 4.683 | 4.629 | 4.394 | 4.337 | 4.343 | 4.481 | 4.540 | 4.649 | 4.669 | 4.637 | 4.612 | 4.560 | 4.495 | 4.461 | 4.523 |
| 1.7 | 4.685 | 4.548 | 4.394 | 4.343 | 4.341 | 4.507 | 4.560 | 4.653 | 4.681 | 4.637 | 4.588 | 4.521 | 4.507 | 4.535 | 4.491 |
| 1.8 | 4.655 | 4.333 | 4.365 | 4.394 | 4.430 | 4.513 | 4.570 | 4.641 | 4.673 | 4.621 | 4.560 | 4.505 | 4.558 | 4.572 | 4.576 |
| 1.9 | 4.578 | 4.335 | 4.382 | 4.414 | 4.380 | 4.511 | 4.572 | 4.618 | 4.663 | 4.608 | 4.550 | 4.503 | 4.568 | 4.588 | 4.602 |
| 2.0 | 4.507 | 4.333 | 4.390 | 4.426 | 4.394 | 4.463 | 4.527 | 4.576 | 4.430 | 4.444 | 4.430 | 4.511 | 4.558 | 4.584 | 4.600 |
| 2.1 | 4.398 | 4.349 | 4.398 | 4.665 | 4.657 | 4.357 | 4.305 | 4.402 | 4.446 | 4.475 | 4.428 | 4.503 | 4.540 | 4.562 | 4.584 |
| 2.2 | 4.398 | 4.463 | 4.718 | 4.728 | 4.704 | 4.629 | 4.305 | 4.394 | 4.442 | 4.463 | 4.410 | 4.483 | 4.511 | 4.544 | 4.558 |
| 2.3 | 4.378 | 4.669 | 4.738 | 4.738 | 4.722 | 4.625 | 4.560 | 4.479 | 4.448 | 4.335 | 4.414 | 4.448 | 4.491 | 4.517 | 4.531 |
| 2.4 | 4.378 | 4.675 | 4.742 | 4.746 | 4.726 | 4.641 | 4.576 | 4.459 | 4.438 | 4.535 | 4.540 | 4.540 | 4.446 | 4.475 | 4.491 |
| 2.5 | 4.378 | 4.681 | 4.742 | 4.746 | 4.726 | 4.629 | 4.574 | 4.430 | 4.533 | 4.556 | 4.574 | 4.584 | 4.372 | 4.335 | 4.301 |
| 2.6 | 4.378 | 4.673 | 4.742 | 4.754 | 4.722 | 4.621 | 4.562 | 4.554 | 4.600 | 4.608 | 4.608 | 4.608 | 4.365 | 4.327 | 4.301 |
| 2.7 | 4.378 | 4.661 | 4.722 | 4.738 | 4.722 | 4.596 | 4.540 | 4.592 | 4.621 | 4.621 | 4.639 | 4.633 | 4.347 | 4.313 | 4.560 |
| 2.8 | 4.378 | 4.471 | 4.673 | 4.693 | 4.661 | 4.576 | 4.521 | 4.608 | 4.621 | 4.637 | 4.657 | 4.665 | 4.317 | 4.301 | 4.576 |
| 2.9 | 4.374 | 4.349 | 4.507 | 4.527 | 4.552 | 4.535 | 4.450 | 4.612 | 4.625 | 4.641 | 4.665 | 4.657 | 4.406 | 4.343 | 4.540 |
| 3.0 | 4.612 | 4.623 | 4.604 | 4.535 | 4.475 | 4.240 | 4.337 | 4.596 | 4.637 | 4.604 | 4.495 | 4.471 | 4.463 | 4.450 | 4.382 |
| 3.1 | 4.653 | 4.665 | 4.625 | 4.572 | 4.511 | 4.414 | 4.317 | 4.280 | 4.361 | 4.414 | 4.481 | 4.481 | 4.471 | 4.457 | 4.390 |
| 3.2 | 4.673 | 4.671 | 4.641 | 4.604 | 4.531 | 4.426 | 4.487 | 4.487 | 4.365 | 4.382 | 4.491 | 4.491 | 4.483 | 4.465 | 4.434 |
| 3.3 | 4.677 | 4.657 | 4.641 | 4.586 | 4.491 | 4.503 | 4.513 | 4.505 | 4.438 | 4.430 | 4.495 | 4.507 | 4.489 | 4.479 | 4.440 |
| 3.4 | 4.665 | 4.623 | 4.560 | 4.438 | 4.475 | 4.519 | 4.503 | 4.483 | 4.430 | 4.430 | 4.505 | 4.523 | 4.414 | 4.365 | 4.392 |
| 3.5 | 4.608 | 4.544 | 4.442 | 4.390 | 4.515 | 4.527 | 4.515 | 4.459 | 4.414 | 4.491 | 4.738 | 4.750 | 4.754 | 4.738 | 4.450 |
| 3.6 | 4.548 | 4.426 | 4.289 | 4.428 | 4.509 | 4.527 | 4.519 | 4.625 | 4.726 | 4.746 | 4.754 | 4.766 | 4.766 | 4.754 | 4.738 |
| 3.7 | 4.402 | 4.284 | 4.289 | 4.339 | 4.481 | 4.507 | 4.610 | 4.655 | 4.750 | 4.762 | 4.768 | 4.772 | 4.770 | 4.760 | 4.748 |
| 3.8 | 4.414 | 4.284 | 4.361 | 4.412 | 4.446 | 4.430 | 4.629 | 4.665 | 4.754 | 4.762 | 4.766 | 4.766 | 4.766 | 4.756 | 4.742 |
| 3.9 | 4.475 | 4.337 | 4.388 | 4.434 | 4.455 | 4.463 | 4.633 | 4.683 | 4.742 | 4.738 | 4.738 | 4.738 | 4.734 | 4.722 | 4.724 |
| 4.0 | 4.511 | 4.398 | 4.382 | 4.442 | 4.459 | 4.446 | 4.616 | 4.671 | 4.689 | 4.665 | 4.568 | 4.414 | 4.505 | 4.538 | 4.544 |
| 4.1 | 4.542 | 4.438 | 4.363 | 4.442 | 4.485 | 4.517 | 4.511 | 4.398 | 4.531 | 4.487 | 4.422 | 4.349 | 4.505 | 4.588 | 4.596 |
| 4.2 | 4.550 | 4.493 | 4.337 | 4.414 | 4.467 | 4.495 | 4.503 | 4.461 | 4.586 | 4.556 | 4.503 | 4.440 | 4.511 | 4.612 | 4.618 |
| 4.3 | 4.511 | 4.463 | 4.301 | 4.363 | 4.428 | 4.473 | 4.471 | 4.592 | 4.633 | 4.600 | 4.560 | 4.495 | 4.495 | 4.600 | 4.627 |
| 4.4 | 4.394 | 4.361 | 4.341 | 4.394 | 4.398 | 4.353 | 4.511 | 4.616 | 4.588 | 4.552 | 4.511 | 4.479 | 4.361 | 4.550 | 4.625 |
| 4.5 | 4.671 | 4.410 | 4.408 | 4.398 | 4.446 | 4.426 | 4.479 | 4.625 | 4.625 | 4.430 | 4.394 | 4.341 | 4.347 | 4.540 | 4.592 |
| 4.6 | 4.726 | 4.394 | 4.394 | 4.418 | 4.446 | 4.424 | 4.701 | 4.754 | 4.754 | 4.724 | 4.641 | 4.272 | 4.380 | 4.483 | 4.576 |
| 4.7 | 4.724 | 4.398 | 4.394 | 4.426 | 4.459 | 4.659 | 4.754 | 4.797 | 4.791 | 4.756 | 4.722 | 4.671 | 4.625 | 4.422 | 4.495 |
| 4.8 | 4.701 | 4.414 | 4.402 | 4.442 | 4.463 | 4.685 | 4.764 | 4.803 | 4.758 | 4.738 | 4.738 | 4.738 | 4.738 | 4.689 | 4.459 |
| 4.9 | 4.657 | 4.418 | 4.414 | 4.552 | 4.426 | 4.637 | 4.730 | 4.799 | 4.811 | 4.778 | 4.756 | 4.750 | 4.770 | 4.750 | 4.724 |
| 5.0 | 4.578 | 4.406 | 4.600 | 4.621 | 4.592 | 4.525 | 4.669 | 4.754 | 4.807 | 4.795 | 4.778 | 4.770 | 4.795 | 4.778 | 4.726 |
| 5.1 | 4.378 | 4.544 | 4.592 | 4.637 | 4.633 | 4.556 | 4.584 | 4.730 | 4.787 | 4.803 | 4.799 | 4.803 | 4.803 | 4.782 | 4.726 |
| 5.2 | 4.487 | 4.491 | 4.553 | 4.623 | 4.647 | 4.594 | 4.390 | 4.645 | 4.754 | 4.789 | 4.809 | 4.815 | 4.807 | 4.766 | 4.726 |
| 5.3 | 4.576 | 4.394 | 4.511 | 4.588 | 4.635 | 4.610 | 4.420 | 4.430 | 4.651 | 4.730 | 4.776 | 4.797 | 4.782 | 4.732 | 4.641 |
| 5.4 | 4.576 | 4.398 | 4.426 | 4.746 | 4.734 | 4.730 | 4.432 | 4.430 | 4.406 | 4.535 | 4.704 | 4.722 | 4.706 | 4.724 | 4.540 |
| 5.5 | 4.572 | 4.762 | 4.799 | 4.809 | 4.782 | 4.776 | 4.746 | 4.430 | 4.586 | 4.610 | 4.570 | 4.531 | 4.489 | 4.459 | 4.503 |
| 5.6 | 4.734 | 4.815 | 4.829 | 4.831 | 4.817 | 4.782 | 4.766 | 4.740 | 4.600 | 4.657 | 4.625 | 4.584 | 4.544 | 4.475 | 4.548 |
| 5.7 | 4.778 | 4.835 | 4.835 | 4.831 | 4.819 | 4.782 | 4.754 | 4.726 | 4.576 | 4.665 | 4.673 | 4.645 | 4.600 | 4.531 | 4.592 |
| 5.8 | 4.811 | 4.845 | 4.847 | 4.859 | 4.789 | 4.787 | 4.744 | 4.722 | 4.576 | 4.669 | 4.683 | 4.637 | 4.568 | 4.503 | 4.608 |
| 5.9 | 4.809 | 4.847 | 4.861 | 4.863 | 4.809 | 4.766 | 4.750 | 4.560 | 4.572 | 4.657 | 4.621 | 4.544 | 4.463 | 4.473 | 4.576 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 53.3 | 53.4 | 53.5 | 53.6 | 53.7 | 53.8 | 53.9 | 54.0 | 54.1 | 54.2 | 54.3 | 54.4 | 54.5 | 54.6 | 54.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.485 | 4.485 | 4.485 | 4.477 | 4.262 | 4.423 | 4.439 | 4.509 | 4.539 | 4.527 | 4.461 | 4.326 | 4.465 | 4.485 | 4.495 |
| 0.2 | 4.483 | 4.489 | 4.489 | 4.477 | 4.413 | 4.443 | 4.479 | 4.519 | 4.577 | 4.609 | 4.465 | 4.497 | 4.509 | 4.519 | 4.541 |
| 0.3 | 4.487 | 4.493 | 4.489 | 4.481 | 4.421 | 4.469 | 4.517 | 4.565 | 4.607 | 4.630 | 4.469 | 4.521 | 4.549 | 4.565 | 4.581 |
| 0.4 | 4.481 | 4.489 | 4.493 | 4.489 | 4.421 | 4.475 | 4.519 | 4.591 | 4.636 | 4.622 | 4.499 | 4.541 | 4.573 | 4.597 | 4.613 |
| 0.5 | 4.481 | 4.487 | 4.469 | 4.252 | 4.260 | 4.461 | 4.533 | 4.597 | 4.638 | 4.620 | 4.485 | 4.344 | 4.545 | 4.581 | 4.587 |
| 0.6 | 4.477 | 4.373 | 4.332 | 4.188 | 4.405 | 4.469 | 4.549 | 4.413 | 4.344 | 4.533 | 4.324 | 4.340 | 4.332 | 4.316 | 4.348 |
| 0.7 | 4.340 | 4.212 | 4.236 | 4.236 | 4.477 | 4.581 | 4.589 | 4.589 | 4.421 | 4.282 | 4.322 | 4.338 | 4.334 | 4.320 | 4.344 |
| 0.8 | 4.375 | 4.212 | 4.316 | 4.276 | 4.533 | 4.605 | 4.603 | 4.605 | 4.611 | 4.485 | 4.308 | 4.326 | 4.324 | 4.308 | 4.210 |
| 0.9 | 4.387 | 4.405 | 4.336 | 4.318 | 4.553 | 4.626 | 4.617 | 4.613 | 4.613 | 4.622 | 4.577 | 4.306 | 4.322 | 4.300 | 4.214 |
| 1.0 | 4.340 | 4.405 | 4.340 | 4.310 | 4.609 | 4.646 | 4.638 | 4.628 | 4.626 | 4.630 | 4.626 | 4.509 | 4.296 | 4.284 | 4.244 |
| 1.1 | 4.306 | 4.360 | 4.128 | 4.212 | 4.379 | 4.646 | 4.646 | 4.642 | 4.632 | 4.630 | 4.634 | 4.581 | 4.469 | 4.340 | 4.373 |
| 1.2 | 4.597 | 4.615 | 4.605 | 4.525 | 4.377 | 4.624 | 4.654 | 4.652 | 4.646 | 4.636 | 4.638 | 4.611 | 4.505 | 4.427 | 4.461 |
| 1.3 | 4.630 | 4.654 | 4.646 | 4.585 | 4.493 | 4.340 | 4.638 | 4.662 | 4.662 | 4.644 | 4.640 | 4.630 | 4.549 | 4.465 | 4.487 |
| 1.4 | 4.652 | 4.674 | 4.658 | 4.531 | 4.577 | 4.569 | 4.417 | 4.662 | 4.670 | 4.660 | 4.646 | 4.638 | 4.589 | 4.469 | 4.497 |
| 1.5 | 4.666 | 4.678 | 4.620 | 4.481 | 4.595 | 4.605 | 4.581 | 4.605 | 4.662 | 4.658 | 4.648 | 4.630 | 4.533 | 4.445 | 4.499 |
| 1.6 | 4.672 | 4.670 | 4.541 | 4.583 | 4.609 | 4.620 | 4.607 | 4.605 | 4.581 | 4.613 | 4.605 | 4.244 | 4.232 | 4.385 | 4.451 |
| 1.7 | 4.670 | 4.615 | 4.473 | 4.605 | 4.620 | 4.622 | 4.622 | 4.622 | 4.605 | 4.328 | 4.276 | 4.244 | 4.232 | 4.344 | 4.589 |
| 1.8 | 4.658 | 4.539 | 4.565 | 4.597 | 4.622 | 4.613 | 4.609 | 4.517 | 4.577 | 4.537 | 4.383 | 4.244 | 4.232 | 4.581 | 4.613 |
| 1.9 | 4.630 | 4.477 | 4.531 | 4.583 | 4.581 | 4.549 | 4.493 | 4.595 | 4.630 | 4.654 | 4.630 | 4.581 | 4.477 | 4.589 | 4.599 |
| 2.0 | 4.591 | 4.425 | 4.340 | 4.324 | 4.387 | 4.409 | 4.507 | 4.565 | 4.595 | 4.638 | 4.648 | 4.571 | 4.453 | 4.589 | 4.597 |
| 2.1 | 4.549 | 4.417 | 4.469 | 4.501 | 4.212 | 4.228 | 4.509 | 4.527 | 4.549 | 4.575 | 4.609 | 4.541 | 4.364 | 4.585 | 4.587 |
| 2.2 | 4.356 | 4.453 | 4.517 | 4.555 | 4.519 | 4.373 | 4.493 | 4.517 | 4.531 | 4.543 | 4.559 | 4.517 | 4.346 | 4.569 | 4.579 |
| 2.3 | 4.348 | 4.511 | 4.565 | 4.557 | 4.517 | 4.469 | 4.401 | 4.501 | 4.517 | 4.525 | 4.533 | 4.501 | 4.362 | 4.571 | 4.565 |
| 2.4 | 4.429 | 4.543 | 4.565 | 4.545 | 4.515 | 4.477 | 4.421 | 4.437 | 4.477 | 4.469 | 4.501 | 4.467 | 4.373 | 4.557 | 4.561 |
| 2.5 | 4.356 | 4.541 | 4.549 | 4.527 | 4.501 | 4.469 | 4.413 | 4.146 | 4.212 | 4.268 | 4.443 | 4.433 | 4.332 | 4.501 | 4.529 |
| 2.6 | 4.346 | 4.525 | 4.523 | 4.501 | 4.469 | 4.453 | 4.391 | 4.148 | 4.212 | 4.344 | 4.346 | 4.389 | 4.435 | 4.348 | 4.409 |
| 2.7 | 4.471 | 4.503 | 4.503 | 4.483 | 4.445 | 4.429 | 4.362 | 4.196 | 4.212 | 4.284 | 4.379 | 4.453 | 4.477 | 4.469 | 4.342 |
| 2.8 | 4.509 | 4.477 | 4.477 | 4.437 | 4.413 | 4.379 | 4.342 | 4.188 | 4.228 | 4.212 | 4.397 | 4.437 | 4.501 | 4.493 | 4.431 |
| 2.9 | 4.573 | 4.407 | 4.437 | 4.397 | 4.407 | 4.451 | 4.471 | 4.407 | 4.276 | 4.222 | 4.358 | 4.455 | 4.471 | 4.475 | 4.419 |
| 3.0 | 4.539 | 4.302 | 4.284 | 4.212 | 4.445 | 4.485 | 4.483 | 4.443 | 4.381 | 4.308 | 4.292 | 4.348 | 4.421 | 4.409 | 4.389 |
| 3.1 | 4.368 | 4.364 | 4.348 | 4.304 | 4.443 | 4.469 | 4.455 | 4.421 | 4.389 | 4.354 | 4.316 | 4.284 | 4.389 | 4.485 | 4.459 |
| 3.2 | 4.393 | 4.389 | 4.373 | 4.340 | 4.429 | 4.453 | 4.437 | 4.401 | 4.364 | 4.332 | 4.453 | 4.497 | 4.557 | 4.545 | 4.511 |
| 3.3 | 4.401 | 4.389 | 4.375 | 4.348 | 4.405 | 4.443 | 4.421 | 4.387 | 4.348 | 4.316 | 4.597 | 4.622 | 4.609 | 4.581 | 4.549 |
| 3.4 | 4.401 | 4.389 | 4.373 | 4.338 | 4.266 | 4.425 | 4.405 | 4.368 | 4.332 | 4.300 | 4.603 | 4.630 | 4.622 | 4.599 | 4.577 |
| 3.5 | 4.397 | 4.381 | 4.348 | 4.340 | 4.260 | 4.389 | 4.377 | 4.348 | 4.316 | 4.276 | 4.581 | 4.622 | 4.622 | 4.613 | 4.597 |
| 3.6 | 4.381 | 4.533 | 4.662 | 4.652 | 4.549 | 4.300 | 4.340 | 4.316 | 4.228 | 4.254 | 4.346 | 4.605 | 4.615 | 4.613 | 4.605 |
| 3.7 | 4.632 | 4.662 | 4.670 | 4.670 | 4.630 | 4.188 | 4.196 | 4.381 | 4.344 | 4.276 | 4.344 | 4.593 | 4.613 | 4.622 | 4.605 |
| 3.8 | 4.642 | 4.646 | 4.646 | 4.654 | 4.646 | 4.352 | 4.445 | 4.453 | 4.389 | 4.300 | 4.352 | 4.573 | 4.617 | 4.622 | 4.581 |
| 3.9 | 4.615 | 4.626 | 4.636 | 4.638 | 4.613 | 4.525 | 4.453 | 4.449 | 4.373 | 4.276 | 4.326 | 4.541 | 4.613 | 4.622 | 4.405 |
| 4.0 | 4.593 | 4.605 | 4.620 | 4.613 | 4.613 | 4.557 | 4.373 | 4.413 | 4.352 | 4.260 | 4.276 | 4.324 | 4.453 | 4.605 | 4.626 |
| 4.1 | 4.565 | 4.583 | 4.597 | 4.605 | 4.597 | 4.557 | 4.403 | 4.445 | 4.461 | 4.485 | 4.087 | 4.276 | 4.547 | 4.630 | 4.640 |
| 4.2 | 4.509 | 4.573 | 4.591 | 4.597 | 4.589 | 4.525 | 4.421 | 4.509 | 4.523 | 4.529 | 4.539 | 4.105 | 4.533 | 4.605 | 4.630 |
| 4.3 | 4.389 | 4.537 | 4.581 | 4.587 | 4.581 | 4.511 | 4.467 | 4.541 | 4.561 | 4.573 | 4.557 | 4.567 | 4.493 | 4.603 | 4.642 |
| 4.4 | 4.499 | 4.539 | 4.525 | 4.581 | 4.567 | 4.485 | 4.469 | 4.519 | 4.565 | 4.601 | 4.597 | 4.605 | 4.389 | 4.501 | 4.626 |
| 4.5 | 4.527 | 4.593 | 4.549 | 4.557 | 4.549 | 4.449 | 4.501 | 4.597 | 4.613 | 4.613 | 4.615 | 4.615 | 4.344 | 4.413 | 4.533 |
| 4.6 | 4.553 | 4.615 | 4.630 | 4.565 | 4.469 | 4.421 | 4.533 | 4.581 | 4.622 | 4.626 | 4.630 | 4.533 | 4.210 | 4.377 | 4.467 |
| 4.7 | 4.497 | 4.607 | 4.630 | 4.489 | 4.364 | 4.272 | 4.523 | 4.573 | 4.605 | 4.630 | 4.636 | 4.549 | 4.208 | 4.232 | 4.344 |
| 4.8 | 4.541 | 4.565 | 4.541 | 4.397 | 4.260 | 4.272 | 4.260 | 4.537 | 4.559 | 4.605 | 4.613 | 4.541 | 4.212 | 4.421 | 4.501 |
| 4.9 | 4.549 | 4.308 | 4.469 | 4.421 | 4.399 | 4.348 | 4.260 | 4.258 | 4.453 | 4.533 | 4.537 | 4.258 | 4.485 | 4.605 | 4.563 |
| 5.0 | 4.503 | 4.501 | 4.521 | 4.501 | 4.469 | 4.429 | 4.373 | 4.260 | 4.533 | 4.573 | 4.244 | 4.493 | 4.607 | 4.630 | 4.581 |
| 5.1 | 4.593 | 4.597 | 4.581 | 4.549 | 4.517 | 4.477 | 4.421 | 4.389 | 4.565 | 4.605 | 4.630 | 4.638 | 4.517 | 4.620 | 4.597 |
| 5.2 | 4.662 | 4.650 | 4.628 | 4.593 | 4.555 | 4.517 | 4.453 | 4.455 | 4.533 | 4.581 | 4.628 | 4.654 | 4.630 | 4.557 | 4.553 |
| 5.3 | 4.702 | 4.692 | 4.662 | 4.630 | 4.589 | 4.549 | 4.497 | 4.429 | 4.505 | 4.549 | 4.597 | 4.638 | 4.638 | 4.597 | 4.533 |
| 5.4 | 4.726 | 4.718 | 4.694 | 4.662 | 4.630 | 4.585 | 4.517 | 4.429 | 4.481 | 4.517 | 4.565 | 4.597 | 4.630 | 4.589 | 4.469 |
| 5.5 | 4.728 | 4.734 | 4.722 | 4.690 | 4.658 | 4.611 | 4.531 | 4.421 | 4.326 | 4.485 | 4.519 | 4.557 | 4.577 | 4.485 | 4.292 |
| 5.6 | 4.726 | 4.734 | 4.732 | 4.710 | 4.670 | 4.605 | 4.509 | 4.387 | 4.429 | 4.433 | 4.401 | 4.364 | 4.344 | 4.212 | 4.348 |
| 5.7 | 4.682 | 4.726 | 4.726 | 4.702 | 4.644 | 4.421 | 4.453 | 4.485 | 4.499 | 4.469 | 4.417 | 4.377 | 4.346 | 4.421 | 4.425 |
| 5.8 | 4.630 | 4.726 | 4.710 | 4.668 | 4.501 | 4.425 | 4.493 | 4.489 | 4.509 | 4.497 | 4.441 | 4.413 | 4.445 | 4.475 | 4.413 |
| 5.9 | 4.597 | 4.674 | 4.658 | 4.405 | 4.501 | 4.409 | 4.395 | 4.429 | 4.433 | 4.487 | 4.469 | 4.437 | 4.356 | 4.411 | 4.381 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 59.3 | 59.4 | 59.5 | 59.6 | 59.7 | 59.8 | 59.9 | 60.0 | 60.1 | 60.2 | 60.3 | 60.4 | 60.5 | 60.6 | 60.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.544 | 4.496 | 4.423 | 4.306 | 4.484 | 4.423 | 4.355 | 4.294 | 4.302 | 4.318 | 4.298 | 4.189 | 4.431 | 4.464 | 4.447 |
| 0.2 | 4.534 | 4.494 | 4.435 | 4.383 | 4.512 | 4.472 | 4.367 | 4.310 | 4.359 | 4.375 | 4.351 | 4.391 | 4.439 | 4.451 | 4.460 |
| 0.3 | 4.512 | 4.464 | 4.401 | 4.464 | 4.528 | 4.504 | 4.427 | 4.318 | 4.363 | 4.399 | 4.379 | 4.375 | 4.419 | 4.439 | 4.464 |
| 0.4 | 4.504 | 4.439 | 4.367 | 4.445 | 4.528 | 4.512 | 4.445 | 4.318 | 4.365 | 4.415 | 4.377 | 4.286 | 4.399 | 4.427 | 4.464 |
| 0.5 | 4.494 | 4.423 | 4.339 | 4.411 | 4.470 | 4.544 | 4.570 | 4.560 | 4.369 | 4.419 | 4.391 | 4.288 | 4.205 | 4.415 | 4.476 |
| 0.6 | 4.488 | 4.415 | 4.447 | 4.504 | 4.544 | 4.568 | 4.589 | 4.601 | 4.585 | 4.383 | 4.351 | 4.464 | 4.407 | 4.238 | 4.472 |
| 0.7 | 4.439 | 4.177 | 4.534 | 4.560 | 4.564 | 4.597 | 4.617 | 4.625 | 4.617 | 4.524 | 4.455 | 4.524 | 4.528 | 4.544 | 4.439 |
| 0.8 | 4.203 | 4.214 | 4.570 | 4.589 | 4.601 | 4.617 | 4.627 | 4.641 | 4.633 | 4.560 | 4.510 | 4.544 | 4.556 | 4.560 | 4.544 |
| 0.9 | 4.254 | 4.286 | 4.580 | 4.597 | 4.617 | 4.625 | 4.633 | 4.653 | 4.623 | 4.504 | 4.532 | 4.568 | 4.576 | 4.578 | 4.585 |
| 1.0 | 4.266 | 4.300 | 4.589 | 4.609 | 4.621 | 4.639 | 4.647 | 4.665 | 4.649 | 4.246 | 4.552 | 4.593 | 4.611 | 4.589 | 4.593 |
| 1.1 | 4.286 | 4.326 | 4.583 | 4.605 | 4.621 | 4.637 | 4.605 | 4.449 | 4.260 | 4.230 | 4.197 | 4.601 | 4.599 | 4.578 | 4.576 |
| 1.2 | 4.294 | 4.351 | 4.383 | 4.544 | 4.556 | 4.462 | 4.472 | 4.488 | 4.472 | 4.205 | 4.141 | 4.205 | 4.341 | 4.347 | 4.230 |
| 1.3 | 4.218 | 4.270 | 4.343 | 4.201 | 4.399 | 4.464 | 4.480 | 4.496 | 4.500 | 4.205 | 4.133 | 4.343 | 4.371 | 4.411 | 4.391 |
| 1.4 | 4.439 | 4.423 | 4.171 | 4.203 | 4.419 | 4.464 | 4.488 | 4.504 | 4.514 | 4.512 | 4.133 | 4.347 | 4.373 | 4.417 | 4.431 |
| 1.5 | 4.576 | 4.538 | 4.423 | 4.201 | 4.431 | 4.455 | 4.480 | 4.512 | 4.526 | 4.536 | 4.141 | 4.343 | 4.383 | 4.425 | 4.439 |
| 1.6 | 4.625 | 4.613 | 4.512 | 4.419 | 4.383 | 4.455 | 4.488 | 4.518 | 4.528 | 4.542 | 4.528 | 4.341 | 4.395 | 4.472 | 4.455 |
| 1.7 | 4.633 | 4.649 | 4.585 | 4.496 | 4.335 | 4.425 | 4.464 | 4.500 | 4.536 | 4.550 | 4.528 | 4.341 | 4.431 | 4.470 | 4.472 |
| 1.8 | 4.641 | 4.657 | 4.653 | 4.593 | 4.476 | 4.343 | 4.423 | 4.488 | 4.520 | 4.514 | 4.504 | 4.367 | 4.423 | 4.460 | 4.455 |
| 1.9 | 4.635 | 4.657 | 4.643 | 4.613 | 4.536 | 4.302 | 4.302 | 4.377 | 4.439 | 4.480 | 4.441 | 4.072 | 4.355 | 4.427 | 4.365 |
| 2.0 | 4.613 | 4.633 | 4.625 | 4.597 | 4.508 | 4.308 | 4.335 | 4.359 | 4.355 | 4.181 | 4.288 | 4.367 | 4.357 | 4.399 | 4.439 |
| 2.1 | 4.580 | 4.609 | 4.603 | 4.576 | 4.480 | 4.294 | 4.318 | 4.351 | 4.351 | 4.306 | 4.399 | 4.423 | 4.437 | 4.464 | 4.484 |
| 2.2 | 4.546 | 4.564 | 4.552 | 4.532 | 4.252 | 4.516 | 4.310 | 4.330 | 4.335 | 4.403 | 4.431 | 4.453 | 4.480 | 4.492 | 4.504 |
| 2.3 | 4.508 | 4.508 | 4.486 | 4.367 | 4.343 | 4.556 | 4.574 | 4.500 | 4.341 | 4.423 | 4.447 | 4.474 | 4.496 | 4.506 | 4.520 |
| 2.4 | 4.435 | 4.419 | 4.312 | 4.347 | 4.409 | 4.556 | 4.568 | 4.528 | 4.480 | 4.431 | 4.462 | 4.486 | 4.496 | 4.514 | 4.528 |
| 2.5 | 4.554 | 4.558 | 4.532 | 4.427 | 4.480 | 4.540 | 4.554 | 4.540 | 4.488 | 4.415 | 4.468 | 4.492 | 4.504 | 4.512 | 4.520 |
| 2.6 | 4.637 | 4.605 | 4.566 | 4.524 | 4.429 | 4.466 | 4.496 | 4.484 | 4.439 | 4.367 | 4.439 | 4.464 | 4.439 | 4.435 | 4.464 |
| 2.7 | 4.643 | 4.609 | 4.568 | 4.528 | 4.484 | 4.367 | 4.407 | 4.423 | 4.504 | 4.528 | 4.536 | 4.441 | 4.181 | 4.149 | 4.284 |
| 2.8 | 4.641 | 4.601 | 4.560 | 4.520 | 4.480 | 4.431 | 4.339 | 4.512 | 4.576 | 4.560 | 4.560 | 4.468 | 4.183 | 4.149 | 4.480 |
| 2.9 | 4.635 | 4.593 | 4.554 | 4.514 | 4.472 | 4.431 | 4.480 | 4.558 | 4.617 | 4.593 | 4.597 | 4.480 | 4.181 | 4.496 | 4.536 |
| 3.0 | 4.623 | 4.576 | 4.544 | 4.512 | 4.468 | 4.429 | 4.524 | 4.593 | 4.633 | 4.633 | 4.601 | 4.512 | 4.498 | 4.552 | 4.550 |
| 3.1 | 4.589 | 4.544 | 4.512 | 4.496 | 4.464 | 4.423 | 4.560 | 4.617 | 4.633 | 4.595 | 4.556 | 4.504 | 4.564 | 4.568 | 4.544 |
| 3.2 | 4.512 | 4.464 | 4.451 | 4.447 | 4.425 | 4.383 | 4.568 | 4.617 | 4.625 | 4.560 | 4.512 | 4.576 | 4.585 | 4.564 | 4.528 |
| 3.3 | 4.480 | 4.512 | 4.494 | 4.470 | 4.431 | 4.383 | 4.278 | 4.589 | 4.576 | 4.534 | 4.576 | 4.603 | 4.591 | 4.556 | 4.520 |
| 3.4 | 4.552 | 4.542 | 4.524 | 4.504 | 4.480 | 4.455 | 4.431 | 4.238 | 4.276 | 4.528 | 4.599 | 4.611 | 4.589 | 4.552 | 4.512 |
| 3.5 | 4.583 | 4.576 | 4.566 | 4.528 | 4.502 | 4.482 | 4.455 | 4.383 | 4.278 | 4.447 | 4.544 | 4.585 | 4.576 | 4.544 | 4.504 |
| 3.6 | 4.609 | 4.609 | 4.593 | 4.568 | 4.536 | 4.496 | 4.472 | 4.379 | 4.278 | 4.205 | 4.254 | 4.337 | 4.455 | 4.524 | 4.455 |
| 3.7 | 4.625 | 4.621 | 4.601 | 4.574 | 4.542 | 4.508 | 4.472 | 4.147 | 4.278 | 4.560 | 4.558 | 4.335 | 4.337 | 4.393 | 4.532 |
| 3.8 | 4.625 | 4.621 | 4.593 | 4.552 | 4.508 | 4.464 | 4.425 | 4.423 | 4.609 | 4.649 | 4.637 | 4.576 | 4.343 | 4.568 | 4.593 |
| 3.9 | 4.609 | 4.601 | 4.542 | 4.494 | 4.419 | 4.387 | 4.504 | 4.625 | 4.679 | 4.677 | 4.661 | 4.631 | 4.528 | 4.607 | 4.603 |
| 4.0 | 4.520 | 4.520 | 4.447 | 4.403 | 4.359 | 4.605 | 4.679 | 4.722 | 4.714 | 4.697 | 4.665 | 4.627 | 4.568 | 4.611 | 4.605 |
| 4.1 | 4.407 | 4.415 | 4.355 | 4.544 | 4.524 | 4.669 | 4.738 | 4.738 | 4.722 | 4.701 | 4.669 | 4.633 | 4.556 | 4.609 | 4.601 |
| 4.2 | 4.568 | 4.544 | 4.609 | 4.607 | 4.560 | 4.697 | 4.740 | 4.740 | 4.722 | 4.695 | 4.665 | 4.609 | 4.544 | 4.603 | 4.593 |
| 4.3 | 4.593 | 4.464 | 4.621 | 4.617 | 4.580 | 4.439 | 4.740 | 4.734 | 4.718 | 4.687 | 4.657 | 4.506 | 4.339 | 4.528 | 4.585 |
| 4.4 | 4.625 | 4.443 | 4.597 | 4.613 | 4.566 | 4.395 | 4.722 | 4.730 | 4.705 | 4.685 | 4.625 | 4.375 | 4.375 | 4.189 | 4.564 |
| 4.5 | 4.623 | 4.411 | 4.544 | 4.589 | 4.520 | 4.381 | 4.615 | 4.722 | 4.703 | 4.665 | 4.312 | 4.415 | 4.399 | 4.205 | 4.250 |
| 4.6 | 4.609 | 4.367 | 4.488 | 4.520 | 4.494 | 4.512 | 4.254 | 4.627 | 4.617 | 4.562 | 4.320 | 4.367 | 4.464 | 4.437 | 4.449 |
| 4.7 | 4.613 | 4.258 | 4.476 | 4.536 | 4.560 | 4.556 | 4.512 | 4.250 | 4.385 | 4.472 | 4.276 | 4.399 | 4.496 | 4.516 | 4.492 |
| 4.8 | 4.512 | 4.524 | 4.568 | 4.576 | 4.589 | 4.593 | 4.542 | 4.395 | 4.520 | 4.552 | 4.556 | 4.496 | 4.464 | 4.506 | 4.492 |
| 4.9 | 4.343 | 4.552 | 4.593 | 4.609 | 4.609 | 4.593 | 4.528 | 4.468 | 4.558 | 4.585 | 4.576 | 4.528 | 4.383 | 4.455 | 4.464 |
| 5.0 | 4.226 | 4.536 | 4.570 | 4.580 | 4.580 | 4.522 | 4.415 | 4.437 | 4.472 | 4.484 | 4.502 | 4.496 | 4.341 | 4.385 | 4.415 |
| 5.1 | 4.445 | 4.447 | 4.496 | 4.500 | 4.431 | 4.455 | 4.464 | 4.427 | 4.335 | 4.347 | 4.341 | 4.339 | 4.298 | 4.318 | 4.341 |
| 5.2 | 4.438 | 4.488 | 4.355 | 4.504 | 4.512 | 4.528 | 4.528 | 4.524 | 4.508 | 4.431 | 4.330 | 4.339 | 4.290 | 4.246 | 4.419 |
| 5.3 | 4.468 | 4.462 | 4.542 | 4.570 | 4.578 | 4.576 | 4.576 | 4.576 | 4.576 | 4.572 | 4.528 | 4.205 | 4.181 | 4.205 | 4.544 |
| 5.4 | 4.387 | 4.385 | 4.593 | 4.625 | 4.633 | 4.641 | 4.641 | 4.641 | 4.641 | 4.641 | 4.617 | 4.205 | 4.193 | 4.427 | 4.568 |
| 5.5 | 4.431 | 4.544 | 4.647 | 4.689 | 4.683 | 4.697 | 4.722 | 4.705 | 4.722 | 4.697 | 4.677 | 4.593 | 4.205 | 4.512 | 4.572 |
| 5.6 | 4.496 | 4.447 | 4.681 | 4.722 | 4.728 | 4.740 | 4.758 | 4.768 | 4.760 | 4.738 | 4.726 | 4.637 | 4.498 | 4.576 | 4.562 |
| 5.7 | 4.480 | 4.423 | 4.625 | 4.730 | 4.740 | 4.754 | 4.774 | 4.784 | 4.766 | 4.740 | 4.691 | 4.601 | 4.560 | 4.589 | 4.540 |
| 5.8 | 4.455 | 4.343 | 4.524 | 4.669 | 4.722 | 4.728 | 4.740 | 4.730 | 4.697 | 4.637 | 4.583 | 4.530 | 4.556 | 4.556 | 4.524 |
| 5.9 | 4.302 | 4.335 | 4.278 | 4.351 | 4.399 | 4.361 | 4.689 | 4.689 | 4.570 | 4.516 | 4.472 | 4.464 | 4.496 | 4.496 | 4.476 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 65.3 | 65.4 | 65.5 | 65.6 | 65.7 | 65.8 | 65.9 | 66.0 | 66.1 | 66.2 | 66.3 | 66.4 | 66.5 | 66.6 | 66.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.427 | 4.413 | 4.417 | 4.395 | 4.383 | 4.365 | 4.205 | 4.137 | 4.117 | 4.087 | 4.399 | 4.447 | 4.466 | 4.478 | 4.431 |
| 0.2 | 4.460 | 4.492 | 4.492 | 4.474 | 4.439 | 4.383 | 4.343 | 4.151 | 4.125 | 4.415 | 4.464 | 4.506 | 4.528 | 4.534 | 4.506 |
| 0.3 | 4.413 | 4.423 | 4.458 | 4.460 | 4.431 | 4.391 | 4.375 | 4.304 | 4.415 | 4.476 | 4.508 | 4.542 | 4.564 | 4.568 | 4.544 |
| 0.4 | 4.157 | 4.341 | 4.343 | 4.564 | 4.560 | 4.512 | 4.250 | 4.173 | 4.464 | 4.508 | 4.542 | 4.564 | 4.576 | 4.572 | 4.556 |
| 0.5 | 4.205 | 4.189 | 4.605 | 4.619 | 4.605 | 4.554 | 4.488 | 4.173 | 4.476 | 4.516 | 4.544 | 4.560 | 4.572 | 4.558 | 4.528 |
| 0.6 | 4.337 | 4.520 | 4.593 | 4.609 | 4.603 | 4.560 | 4.480 | 4.343 | 4.447 | 4.502 | 4.526 | 4.540 | 4.544 | 4.514 | 4.427 |
| 0.7 | 4.339 | 4.504 | 4.538 | 4.544 | 4.544 | 4.512 | 4.405 | 4.121 | 4.363 | 4.441 | 4.447 | 4.466 | 4.447 | 4.405 | 4.345 |
| 0.8 | 4.415 | 4.464 | 4.480 | 4.480 | 4.462 | 4.413 | 4.214 | 4.151 | 4.246 | 4.383 | 4.464 | 4.488 | 4.464 | 4.411 | 4.302 |
| 0.9 | 4.341 | 4.411 | 4.431 | 4.419 | 4.379 | 4.302 | 4.205 | 4.167 | 4.343 | 4.411 | 4.490 | 4.518 | 4.508 | 4.447 | 4.345 |
| 1.0 | 4.270 | 4.306 | 4.347 | 4.304 | 4.137 | 4.367 | 4.359 | 4.270 | 4.373 | 4.415 | 4.472 | 4.524 | 4.528 | 4.482 | 4.383 |
| 1.1 | 4.316 | 4.296 | 4.216 | 4.133 | 4.343 | 4.395 | 4.367 | 4.270 | 4.385 | 4.423 | 4.464 | 4.524 | 4.542 | 4.508 | 4.427 |
| 1.2 | 4.318 | 4.314 | 4.367 | 4.474 | 4.476 | 4.472 | 4.447 | 4.250 | 4.391 | 4.447 | 4.472 | 4.520 | 4.542 | 4.526 | 4.460 |
| 1.3 | 4.318 | 4.320 | 4.512 | 4.540 | 4.540 | 4.532 | 4.520 | 4.460 | 4.399 | 4.458 | 4.474 | 4.494 | 4.518 | 4.520 | 4.462 |
| 1.4 | 4.318 | 4.528 | 4.585 | 4.605 | 4.601 | 4.593 | 4.560 | 4.516 | 4.447 | 4.439 | 4.464 | 4.464 | 4.476 | 4.476 | 4.201 |
| 1.5 | 4.326 | 4.524 | 4.611 | 4.649 | 4.657 | 4.647 | 4.607 | 4.536 | 4.447 | 4.187 | 4.439 | 4.460 | 4.439 | 4.189 | 4.203 |
| 1.6 | 4.324 | 4.464 | 4.599 | 4.641 | 4.665 | 4.637 | 4.572 | 4.504 | 4.169 | 4.167 | 4.341 | 4.460 | 4.494 | 4.496 | 4.510 |
| 1.7 | 4.294 | 4.343 | 4.506 | 4.619 | 4.639 | 4.576 | 4.464 | 4.335 | 4.169 | 4.262 | 4.445 | 4.496 | 4.528 | 4.542 | 4.544 |
| 1.8 | 4.234 | 4.119 | 4.415 | 4.556 | 4.585 | 4.522 | 4.405 | 4.427 | 4.447 | 4.375 | 4.462 | 4.512 | 4.556 | 4.560 | 4.564 |
| 1.9 | 4.544 | 4.203 | 4.266 | 4.464 | 4.470 | 4.435 | 4.435 | 4.447 | 4.472 | 4.415 | 4.464 | 4.512 | 4.558 | 4.572 | 4.572 |
| 2.0 | 4.558 | 4.544 | 4.528 | 4.274 | 4.262 | 4.464 | 4.496 | 4.522 | 4.512 | 4.476 | 4.415 | 4.486 | 4.528 | 4.548 | 4.556 |
| 2.1 | 4.556 | 4.546 | 4.532 | 4.254 | 4.246 | 4.480 | 4.524 | 4.556 | 4.576 | 4.522 | 4.341 | 4.254 | 4.254 | 4.377 | 4.492 |
| 2.2 | 4.554 | 4.544 | 4.528 | 4.234 | 4.232 | 4.492 | 4.538 | 4.580 | 4.621 | 4.574 | 4.470 | 4.270 | 4.270 | 4.492 | 4.506 |
| 2.3 | 4.552 | 4.540 | 4.524 | 4.337 | 4.341 | 4.492 | 4.544 | 4.601 | 4.625 | 4.607 | 4.522 | 4.250 | 4.544 | 4.589 | 4.572 |
| 2.4 | 4.528 | 4.526 | 4.363 | 4.373 | 4.351 | 4.395 | 4.522 | 4.587 | 4.613 | 4.589 | 4.520 | 4.421 | 4.593 | 4.601 | 4.574 |
| 2.5 | 4.234 | 4.379 | 4.385 | 4.397 | 4.383 | 4.250 | 4.205 | 4.397 | 4.441 | 4.441 | 4.423 | 4.431 | 4.593 | 4.589 | 4.544 |
| 2.6 | 4.274 | 4.391 | 4.411 | 4.419 | 4.419 | 4.302 | 4.205 | 4.058 | 4.028 | 4.117 | 4.141 | 4.460 | 4.562 | 4.568 | 4.534 |
| 2.7 | 4.290 | 4.266 | 4.353 | 4.401 | 4.417 | 4.337 | 4.298 | 4.363 | 4.369 | 4.208 | 4.141 | 4.447 | 4.496 | 4.476 | 4.447 |
| 2.8 | 4.290 | 4.278 | 4.250 | 4.278 | 4.343 | 4.052 | 4.357 | 4.383 | 4.409 | 4.401 | 4.375 | 4.339 | 4.395 | 4.373 | 4.343 |
| 2.9 | 4.302 | 4.284 | 4.246 | 4.036 | 4.070 | 4.326 | 4.379 | 4.399 | 4.399 | 4.401 | 4.399 | 4.385 | 4.341 | 4.139 | 4.218 |
| 3.0 | 4.318 | 4.278 | 4.252 | 4.038 | 4.302 | 4.335 | 4.379 | 4.383 | 4.389 | 4.391 | 4.391 | 4.383 | 4.343 | 4.137 | 4.347 |
| 3.1 | 4.298 | 4.250 | 4.060 | 4.038 | 4.248 | 4.318 | 4.361 | 4.367 | 4.373 | 4.373 | 4.371 | 4.363 | 4.298 | 4.246 | 4.365 |
| 3.2 | 4.266 | 4.085 | 4.101 | 4.060 | 4.135 | 4.141 | 4.339 | 4.341 | 4.339 | 4.339 | 4.318 | 4.109 | 4.185 | 4.246 | 4.379 |
| 3.3 | 4.353 | 4.343 | 4.133 | 4.060 | 4.191 | 4.216 | 4.232 | 4.238 | 4.234 | 4.310 | 4.339 | 4.109 | 4.173 | 4.234 | 4.363 |
| 3.4 | 4.389 | 4.391 | 4.365 | 4.093 | 4.419 | 4.423 | 4.425 | 4.361 | 4.218 | 4.359 | 4.383 | 4.349 | 4.171 | 4.133 | 4.298 |
| 3.5 | 4.411 | 4.415 | 4.397 | 4.343 | 4.411 | 4.415 | 4.439 | 4.445 | 4.411 | 4.391 | 4.399 | 4.397 | 4.345 | 4.133 | 4.117 |
| 3.6 | 4.429 | 4.423 | 4.413 | 4.373 | 4.383 | 4.399 | 4.415 | 4.437 | 4.431 | 4.415 | 4.417 | 4.435 | 4.423 | 4.125 | 4.103 |
| 3.7 | 4.431 | 4.419 | 4.395 | 4.367 | 4.363 | 4.381 | 4.395 | 4.409 | 4.411 | 4.431 | 4.443 | 4.464 | 4.462 | 4.411 | 4.105 |
| 3.8 | 4.423 | 4.395 | 4.359 | 4.337 | 4.351 | 4.363 | 4.375 | 4.383 | 4.359 | 4.443 | 4.464 | 4.472 | 4.478 | 4.476 | 4.101 |
| 3.9 | 4.379 | 4.359 | 4.318 | 4.282 | 4.335 | 4.347 | 4.367 | 4.377 | 4.117 | 4.429 | 4.462 | 4.472 | 4.490 | 4.480 | 4.298 |
| 4.0 | 4.286 | 4.250 | 4.218 | 4.024 | 4.286 | 4.302 | 4.345 | 4.339 | 4.107 | 4.399 | 4.460 | 4.447 | 4.480 | 4.464 | 4.335 |
| 4.1 | 4.324 | 4.294 | 4.250 | 4.199 | 4.008 | 4.218 | 4.238 | 4.205 | 4.246 | 4.218 | 4.431 | 4.443 | 4.447 | 4.425 | 4.078 |
| 4.2 | 4.324 | 4.302 | 4.258 | 4.218 | 4.250 | 4.278 | 4.286 | 4.254 | 4.222 | 4.254 | 4.415 | 4.470 | 4.490 | 4.464 | 4.377 |
| 4.3 | 4.316 | 4.298 | 4.268 | 4.218 | 4.266 | 4.282 | 4.282 | 4.276 | 4.230 | 4.415 | 4.522 | 4.530 | 4.524 | 4.496 | 4.433 |
| 4.4 | 4.314 | 4.294 | 4.266 | 4.395 | 4.367 | 4.365 | 4.363 | 4.258 | 4.363 | 4.508 | 4.538 | 4.536 | 4.518 | 4.496 | 4.460 |
| 4.5 | 4.298 | 4.357 | 4.395 | 4.403 | 4.415 | 4.409 | 4.383 | 4.353 | 4.343 | 4.508 | 4.512 | 4.508 | 4.490 | 4.476 | 4.441 |
| 4.6 | 4.270 | 4.353 | 4.383 | 4.391 | 4.399 | 4.399 | 4.385 | 4.363 | 4.339 | 4.480 | 4.484 | 4.470 | 4.451 | 4.433 | 4.433 |
| 4.7 | 4.278 | 4.339 | 4.361 | 4.367 | 4.377 | 4.367 | 4.363 | 4.343 | 4.224 | 4.425 | 4.441 | 4.427 | 4.411 | 4.391 | 4.449 |
| 4.8 | 4.314 | 4.314 | 4.343 | 4.343 | 4.343 | 4.351 | 4.343 | 4.341 | 4.109 | 4.339 | 4.359 | 4.345 | 4.298 | 4.282 | 4.439 |
| 4.9 | 4.294 | 4.318 | 4.246 | 4.302 | 4.314 | 4.314 | 4.298 | 4.264 | 4.093 | 4.143 | 4.270 | 4.359 | 4.395 | 4.381 | 4.345 |
| 5.0 | 4.250 | 4.282 | 4.153 | 4.181 | 4.205 | 4.248 | 4.214 | 4.066 | 4.343 | 4.415 | 4.449 | 4.441 | 4.419 | 4.385 | 4.363 |
| 5.1 | 4.532 | 4.460 | 4.234 | 4.335 | 4.349 | 4.320 | 4.181 | 4.482 | 4.508 | 4.500 | 4.476 | 4.447 | 4.425 | 4.395 | 4.357 |
| 5.2 | 4.609 | 4.560 | 4.141 | 4.371 | 4.351 | 4.290 | 4.508 | 4.556 | 4.544 | 4.506 | 4.480 | 4.458 | 4.423 | 4.391 | 4.343 |
| 5.3 | 4.605 | 4.560 | 4.256 | 4.212 | 4.278 | 4.423 | 4.536 | 4.568 | 4.544 | 4.512 | 4.480 | 4.455 | 4.413 | 4.379 | 4.205 |
| 5.4 | 4.546 | 4.270 | 4.490 | 4.528 | 4.496 | 4.401 | 4.508 | 4.556 | 4.540 | 4.512 | 4.480 | 4.447 | 4.415 | 4.306 | 4.371 |
| 5.5 | 4.466 | 4.556 | 4.601 | 4.589 | 4.538 | 4.484 | 4.490 | 4.548 | 4.536 | 4.508 | 4.484 | 4.439 | 4.169 | 4.119 | 4.415 |
| 5.6 | 4.578 | 4.633 | 4.621 | 4.605 | 4.540 | 4.480 | 4.379 | 4.516 | 4.528 | 4.504 | 4.437 | 4.222 | 4.165 | 4.117 | 4.383 |
| 5.7 | 4.621 | 4.621 | 4.621 | 4.601 | 4.528 | 4.472 | 4.282 | 4.395 | 4.447 | 4.462 | 4.423 | 4.280 | 4.272 | 4.262 | 4.254 |
| 5.8 | 4.601 | 4.605 | 4.595 | 4.544 | 4.520 | 4.462 | 4.536 | 4.595 | 4.548 | 4.502 | 4.447 | 4.383 | 4.306 | 4.314 | 4.314 |
| 5.9 | 4.302 | 4.556 | 4.556 | 4.512 | 4.482 | 4.409 | 4.625 | 4.619 | 4.568 | 4.524 | 4.472 | 4.407 | 4.298 | 4.316 | 4.314 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 71.3 | 71.4 | 71.5 | 71.6 | 71.7 | 71.8 | 71.9 | 72.0 | 72.1 | 72.2 | 72.3 | 72.4 | 72.5 | 72.6 | 72.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.126 | 4.085 | 4.416 | 4.416 | 4.441 | 4.433 | 4.441 | 4.427 | 4.392 | 4.335 | 4.238 | 4.148 | 4.197 | 4.083 | 4.242 |
| 0.2 | 4.059 | 4.345 | 4.416 | 4.416 | 4.441 | 4.433 | 4.433 | 4.433 | 4.404 | 4.368 | 4.311 | 4.197 | 4.193 | 4.148 | 4.234 |
| 0.3 | 4.061 | 4.327 | 4.372 | 4.372 | 4.425 | 4.427 | 4.431 | 4.431 | 4.400 | 4.372 | 4.333 | 4.262 | 4.193 | 4.002 | 4.193 |
| 0.4 | 4.421 | 4.404 | 4.290 | 4.290 | 4.392 | 4.423 | 4.425 | 4.425 | 4.396 | 4.368 | 4.335 | 4.256 | 4.262 | 4.156 | 4.158 |
| 0.5 | 4.457 | 4.437 | 4.400 | 4.398 | 4.327 | 4.384 | 4.408 | 4.408 | 4.392 | 4.360 | 4.327 | 4.254 | 4.236 | 4.278 | 4.262 |
| 0.6 | 4.465 | 4.439 | 4.416 | 4.416 | 4.177 | 4.246 | 4.327 | 4.335 | 4.355 | 4.345 | 4.311 | 4.030 | 4.197 | 4.351 | 4.335 |
| 0.7 | 4.467 | 4.441 | 4.421 | 4.421 | 4.331 | 3.986 | 4.099 | 4.140 | 4.270 | 4.246 | 4.197 | 4.030 | 4.292 | 4.360 | 4.331 |
| 0.8 | 4.471 | 4.445 | 4.429 | 4.429 | 4.378 | 4.327 | 4.099 | 4.169 | 4.392 | 4.449 | 4.360 | 4.091 | 4.305 | 4.280 | 4.327 |
| 0.9 | 4.486 | 4.457 | 4.439 | 4.439 | 4.392 | 4.370 | 4.327 | 4.327 | 4.459 | 4.538 | 4.538 | 4.502 | 4.392 | 4.303 | 4.327 |
| 1.0 | 4.494 | 4.473 | 4.453 | 4.449 | 4.408 | 4.384 | 4.331 | 4.347 | 4.482 | 4.538 | 4.508 | 4.465 | 4.400 | 4.295 | 4.327 |
| 1.1 | 4.498 | 4.482 | 4.457 | 4.459 | 4.416 | 4.368 | 4.303 | 4.374 | 4.482 | 4.522 | 4.506 | 4.457 | 4.358 | 4.295 | 4.317 |
| 1.2 | 4.484 | 4.477 | 4.465 | 4.465 | 4.404 | 4.311 | 4.116 | 4.366 | 4.473 | 4.496 | 4.465 | 4.423 | 4.295 | 4.282 | 4.262 |
| 1.3 | 4.355 | 4.433 | 4.441 | 4.441 | 4.343 | 4.049 | 4.116 | 4.368 | 4.441 | 4.441 | 4.425 | 4.382 | 4.177 | 4.295 | 4.262 |
| 1.4 | 4.299 | 4.225 | 4.329 | 4.331 | 4.124 | 4.303 | 4.345 | 4.313 | 4.327 | 4.404 | 4.384 | 4.345 | 4.376 | 4.368 | 4.362 |
| 1.5 | 4.335 | 4.266 | 4.164 | 4.169 | 4.360 | 4.388 | 4.392 | 4.384 | 4.368 | 4.323 | 4.067 | 4.360 | 4.433 | 4.441 | 4.433 |
| 1.6 | 4.355 | 4.288 | 4.175 | 4.181 | 4.408 | 4.404 | 4.406 | 4.394 | 4.386 | 4.368 | 4.317 | 4.416 | 4.433 | 4.441 | 4.441 |
| 1.7 | 4.360 | 4.290 | 4.164 | 4.156 | 4.408 | 4.416 | 4.408 | 4.394 | 4.392 | 4.378 | 4.360 | 4.372 | 4.376 | 4.384 | 4.392 |
| 1.8 | 4.335 | 4.246 | 3.961 | 4.063 | 4.335 | 4.419 | 4.414 | 4.400 | 4.400 | 4.392 | 4.376 | 4.299 | 4.229 | 4.270 | 4.317 |
| 1.9 | 4.295 | 4.270 | 3.961 | 4.004 | 4.191 | 4.392 | 4.416 | 4.394 | 4.406 | 4.400 | 4.382 | 4.266 | 4.246 | 4.262 | 4.248 |
| 2.0 | 4.404 | 4.400 | 4.368 | 4.360 | 4.236 | 4.303 | 4.421 | 4.416 | 4.410 | 4.398 | 4.351 | 4.205 | 4.225 | 4.242 | 4.248 |
| 2.1 | 4.449 | 4.461 | 4.441 | 4.441 | 4.351 | 4.266 | 4.408 | 4.423 | 4.412 | 4.384 | 4.315 | 4.181 | 4.201 | 4.219 | 4.225 |
| 2.2 | 4.453 | 4.490 | 4.482 | 4.482 | 4.400 | 4.345 | 4.331 | 4.392 | 4.376 | 4.112 | 4.116 | 4.156 | 4.181 | 4.197 | 4.197 |
| 2.3 | 4.475 | 4.494 | 4.494 | 4.494 | 4.457 | 4.382 | 4.225 | 4.075 | 4.063 | 4.057 | 4.053 | 4.132 | 4.152 | 4.262 | 4.264 |
| 2.4 | 4.465 | 4.477 | 4.490 | 4.490 | 4.457 | 4.384 | 4.213 | 4.148 | 4.164 | 4.142 | 3.982 | 3.963 | 4.229 | 4.345 | 4.343 |
| 2.5 | 4.443 | 4.465 | 4.465 | 4.465 | 4.441 | 4.360 | 4.124 | 4.164 | 4.183 | 4.201 | 4.164 | 3.965 | 4.327 | 4.355 | 4.351 |
| 2.6 | 4.376 | 4.437 | 4.437 | 4.433 | 4.370 | 4.380 | 4.392 | 4.360 | 4.197 | 4.213 | 4.217 | 4.175 | 4.282 | 4.343 | 4.351 |
| 2.7 | 4.329 | 4.266 | 4.181 | 4.213 | 4.376 | 4.394 | 4.400 | 4.400 | 4.368 | 4.213 | 4.219 | 4.197 | 4.164 | 4.343 | 4.360 |
| 2.8 | 4.351 | 4.295 | 4.083 | 4.205 | 4.376 | 4.392 | 4.394 | 4.400 | 4.388 | 4.205 | 4.215 | 4.197 | 4.148 | 4.331 | 4.360 |
| 2.9 | 4.347 | 4.295 | 4.311 | 4.303 | 4.368 | 4.376 | 4.388 | 4.390 | 4.392 | 4.331 | 4.132 | 3.937 | 4.016 | 4.329 | 4.360 |
| 3.0 | 4.327 | 4.225 | 4.282 | 4.278 | 4.358 | 4.368 | 4.376 | 4.372 | 4.376 | 4.061 | 3.935 | 3.916 | 4.016 | 4.295 | 4.362 |
| 3.1 | 4.234 | 4.295 | 4.327 | 4.327 | 4.351 | 4.360 | 4.364 | 4.360 | 4.360 | 4.059 | 3.933 | 4.116 | 4.148 | 4.075 | 4.252 |
| 3.2 | 3.994 | 4.286 | 4.327 | 4.311 | 4.335 | 4.345 | 4.343 | 4.335 | 4.099 | 4.433 | 4.455 | 4.437 | 4.173 | 4.156 | 4.142 |
| 3.3 | 3.969 | 4.002 | 3.937 | 3.973 | 4.124 | 4.140 | 4.156 | 4.156 | 4.429 | 4.457 | 4.469 | 4.465 | 4.465 | 4.400 | 4.140 |
| 3.4 | 4.091 | 4.018 | 3.937 | 3.975 | 4.164 | 4.181 | 4.181 | 4.171 | 4.410 | 4.457 | 4.473 | 4.473 | 4.482 | 4.482 | 4.404 |
| 3.5 | 4.347 | 4.229 | 3.872 | 3.971 | 4.205 | 4.207 | 4.195 | 4.116 | 4.421 | 4.449 | 4.465 | 4.469 | 4.469 | 4.467 | 4.461 |
| 3.6 | 4.343 | 4.295 | 3.853 | 3.971 | 4.209 | 4.181 | 4.189 | 4.164 | 4.140 | 4.425 | 4.457 | 4.463 | 4.465 | 4.437 | 4.408 |
| 3.7 | 4.347 | 4.295 | 4.219 | 4.197 | 4.140 | 4.360 | 4.360 | 4.327 | 4.327 | 4.327 | 4.392 | 4.439 | 4.427 | 4.368 | 4.295 |
| 3.8 | 4.355 | 4.311 | 4.270 | 4.270 | 4.327 | 4.416 | 4.416 | 4.392 | 4.376 | 4.343 | 4.014 | 4.331 | 4.333 | 4.278 | 4.173 |
| 3.9 | 4.368 | 4.327 | 4.284 | 4.284 | 4.360 | 4.404 | 4.469 | 4.471 | 4.435 | 4.335 | 3.986 | 4.238 | 4.246 | 4.262 | 4.262 |
| 4.0 | 4.376 | 4.339 | 4.290 | 4.290 | 4.331 | 4.506 | 4.583 | 4.587 | 4.571 | 4.488 | 4.425 | 4.197 | 4.295 | 4.305 | 4.286 |
| 4.1 | 4.384 | 4.337 | 4.295 | 4.290 | 4.067 | 4.408 | 4.571 | 4.616 | 4.620 | 4.593 | 4.482 | 4.030 | 4.384 | 4.408 | 4.164 |
| 4.2 | 4.372 | 4.325 | 4.260 | 4.262 | 4.368 | 4.295 | 4.473 | 4.579 | 4.608 | 4.587 | 4.435 | 4.372 | 4.473 | 4.486 | 4.425 |
| 4.3 | 4.240 | 4.112 | 4.229 | 4.246 | 4.412 | 4.351 | 4.423 | 4.512 | 4.555 | 4.522 | 4.331 | 4.451 | 4.506 | 4.473 | 4.429 |
| 4.4 | 4.099 | 4.335 | 4.447 | 4.441 | 4.421 | 4.376 | 4.140 | 4.437 | 4.490 | 4.433 | 4.425 | 4.522 | 4.506 | 4.475 | 4.437 |
| 4.5 | 4.160 | 4.311 | 4.449 | 4.441 | 4.433 | 4.384 | 4.327 | 4.295 | 4.388 | 4.333 | 4.490 | 4.538 | 4.514 | 4.482 | 4.453 |
| 4.6 | 4.160 | 4.201 | 4.360 | 4.351 | 4.441 | 4.386 | 4.343 | 4.349 | 4.286 | 4.360 | 4.522 | 4.551 | 4.522 | 4.498 | 4.473 |
| 4.7 | 4.215 | 4.221 | 4.274 | 4.236 | 4.400 | 4.333 | 4.368 | 4.376 | 4.297 | 4.388 | 4.506 | 4.538 | 4.534 | 4.518 | 4.492 |
| 4.8 | 4.238 | 4.266 | 4.244 | 4.246 | 4.327 | 3.904 | 4.351 | 4.364 | 4.329 | 4.118 | 4.327 | 4.376 | 4.331 | 4.392 | 4.406 |
| 4.9 | 4.238 | 4.280 | 4.270 | 4.270 | 3.937 | 3.941 | 4.270 | 4.295 | 4.197 | 4.514 | 4.433 | 4.368 | 4.307 | 4.040 | 4.089 |
| 5.0 | 4.240 | 4.270 | 4.266 | 4.262 | 3.961 | 3.953 | 4.327 | 4.506 | 4.555 | 4.555 | 4.443 | 4.360 | 4.311 | 4.038 | 4.067 |
| 5.1 | 4.229 | 4.254 | 4.240 | 4.240 | 3.971 | 4.378 | 4.457 | 4.473 | 4.522 | 4.545 | 4.445 | 4.364 | 4.059 | 4.034 | 4.091 |
| 5.2 | 4.211 | 4.215 | 4.327 | 4.327 | 4.439 | 4.378 | 4.441 | 4.482 | 4.498 | 4.482 | 4.392 | 4.173 | 4.099 | 4.433 | 4.408 |
| 5.3 | 4.162 | 4.156 | 4.490 | 4.490 | 4.522 | 4.524 | 4.368 | 4.427 | 4.132 | 4.162 | 4.205 | 4.205 | 4.400 | 4.482 | 4.441 |
| 5.4 | 4.386 | 4.329 | 4.506 | 4.506 | 4.616 | 4.538 | 4.327 | 4.049 | 4.132 | 4.042 | 4.221 | 4.221 | 4.488 | 4.520 | 4.482 |
| 5.5 | 4.603 | 4.518 | 4.528 | 4.526 | 4.624 | 4.528 | 4.362 | 4.392 | 4.398 | 4.351 | 4.232 | 4.459 | 4.542 | 4.547 | 4.516 |
| 5.6 | 4.660 | 4.547 | 4.542 | 4.545 | 4.636 | 4.522 | 4.494 | 4.508 | 4.522 | 4.518 | 4.482 | 4.463 | 4.520 | 4.538 | 4.538 |
| 5.7 | 4.603 | 4.463 | 4.532 | 4.534 | 4.636 | 4.425 | 4.506 | 4.522 | 4.522 | 4.522 | 4.506 | 4.335 | 4.402 | 4.439 | 4.494 |
| 5.8 | 4.547 | 4.408 | 4.380 | 4.368 | 4.459 | 4.236 | 4.465 | 4.473 | 4.475 | 4.475 | 4.475 | 4.374 | 4.229 | 4.295 | 4.368 |
| 5.9 | 4.471 | 4.197 | 4.229 | 4.223 | 4.311 | 4.238 | 4.425 | 4.449 | 4.408 | 4.416 | 4.439 | 4.376 | 4.067 | 4.091 | 4.130 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 83.3 | 83.4 | 83.5 | 83.6 | 83.7 | 83.8 | 83.9 | 84.0 | 84.1 | 84.2 | 84.3 | 84.4 | 84.5 | 84.6 | 84.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 4.185 | 4.193 | 3.928 | 3.970 | 4.102 | 4.201 | 4.259 | 4.319 | 4.311 | 4.325 | 4.342 | 4.313 | 4.242 | 4.077 | 4.209 |
| 0.2 | 4.273 | 4.276 | 4.234 | 4.119 | 4.205 | 4.259 | 4.300 | 4.342 | 4.364 | 4.383 | 4.391 | 4.364 | 4.325 | 4.133 | 4.236 |
| 0.3 | 4.261 | 4.236 | 4.197 | 4.168 | 4.247 | 4.292 | 4.325 | 4.366 | 4.391 | 4.408 | 4.408 | 4.395 | 4.356 | 4.090 | 4.234 |
| 0.4 | 4.242 | 4.193 | 4.143 | 4.216 | 4.276 | 4.313 | 4.342 | 4.379 | 4.397 | 4.416 | 4.408 | 4.399 | 4.329 | 4.106 | 4.127 |
| 0.5 | 4.201 | 4.152 | 4.085 | 4.255 | 4.300 | 4.325 | 4.342 | 4.371 | 4.383 | 4.393 | 4.391 | 4.383 | 4.294 | 4.152 | 4.119 |
| 0.6 | 4.063 | 4.052 | 4.028 | 4.259 | 4.292 | 4.309 | 4.313 | 4.313 | 4.313 | 4.311 | 4.325 | 4.309 | 4.249 | 4.116 | 4.135 |
| 0.7 | 4.069 | 4.057 | 4.038 | 4.193 | 4.234 | 4.242 | 4.234 | 4.222 | 4.214 | 4.207 | 4.209 | 4.238 | 4.276 | 4.294 | 4.311 |
| 0.8 | 4.048 | 4.034 | 4.255 | 4.300 | 4.300 | 4.321 | 4.327 | 4.292 | 4.201 | 4.267 | 4.290 | 4.313 | 4.325 | 4.342 | 4.354 |
| 0.9 | 4.028 | 4.011 | 4.296 | 4.304 | 4.317 | 4.333 | 4.346 | 4.329 | 4.253 | 4.313 | 4.333 | 4.350 | 4.362 | 4.366 | 4.366 |
| 1.0 | 4.003 | 3.995 | 4.292 | 4.325 | 4.338 | 4.344 | 4.352 | 4.329 | 4.242 | 4.333 | 4.358 | 4.371 | 4.379 | 4.375 | 4.364 |
| 1.1 | 4.251 | 4.247 | 4.232 | 4.290 | 4.342 | 4.358 | 4.354 | 4.300 | 4.135 | 4.335 | 4.358 | 4.366 | 4.375 | 4.366 | 4.251 |
| 1.2 | 4.292 | 4.288 | 4.271 | 4.249 | 4.294 | 4.342 | 4.329 | 4.110 | 4.127 | 4.298 | 4.338 | 4.348 | 4.342 | 4.271 | 4.304 |
| 1.3 | 4.325 | 4.311 | 4.288 | 4.267 | 4.125 | 3.945 | 4.119 | 4.209 | 4.205 | 4.077 | 4.102 | 4.085 | 4.137 | 4.300 | 4.309 |
| 1.4 | 4.344 | 4.325 | 4.294 | 4.276 | 4.185 | 3.961 | 4.216 | 4.300 | 4.304 | 4.255 | 4.160 | 4.096 | 4.119 | 4.259 | 4.267 |
| 1.5 | 4.313 | 4.311 | 4.300 | 4.276 | 4.189 | 4.011 | 4.176 | 4.311 | 4.304 | 4.242 | 4.172 | 4.069 | 4.160 | 4.106 | 4.209 |
| 1.6 | 4.176 | 4.185 | 4.209 | 4.209 | 4.187 | 4.036 | 4.131 | 4.292 | 4.292 | 4.209 | 4.156 | 4.094 | 4.061 | 4.075 | 4.209 |
| 1.7 | 4.156 | 4.019 | 4.057 | 4.077 | 4.119 | 4.034 | 4.193 | 4.251 | 4.234 | 4.193 | 4.143 | 4.026 | 4.160 | 4.209 | 4.317 |
| 1.8 | 4.189 | 3.846 | 4.077 | 4.135 | 4.110 | 3.990 | 3.928 | 4.201 | 4.191 | 4.168 | 4.116 | 4.102 | 4.226 | 4.333 | 4.346 |
| 1.9 | 4.201 | 4.013 | 4.145 | 4.218 | 4.234 | 4.187 | 3.928 | 4.139 | 4.135 | 4.119 | 4.050 | 4.048 | 4.234 | 4.294 | 4.323 |
| 2.0 | 4.238 | 4.127 | 4.152 | 4.222 | 4.209 | 4.139 | 3.928 | 4.028 | 4.019 | 4.032 | 4.098 | 4.085 | 4.069 | 4.127 | 4.199 |
| 2.1 | 4.259 | 4.160 | 4.127 | 4.209 | 4.108 | 4.052 | 3.995 | 4.061 | 4.050 | 3.928 | 4.028 | 4.102 | 4.085 | 4.003 | 4.317 |
| 2.2 | 4.276 | 4.176 | 4.110 | 4.226 | 4.290 | 4.300 | 4.286 | 4.209 | 4.185 | 3.928 | 4.102 | 4.036 | 4.112 | 4.278 | 4.333 |
| 2.3 | 4.300 | 4.193 | 4.193 | 4.311 | 4.333 | 4.375 | 4.375 | 4.333 | 4.300 | 4.255 | 4.168 | 4.069 | 4.094 | 4.271 | 4.276 |
| 2.4 | 4.309 | 4.201 | 4.292 | 4.358 | 4.391 | 4.443 | 4.449 | 4.416 | 4.395 | 4.379 | 4.350 | 4.284 | 4.135 | 4.226 | 4.205 |
| 2.5 | 4.325 | 4.193 | 4.309 | 4.399 | 4.449 | 4.455 | 4.453 | 4.441 | 4.424 | 4.391 | 4.350 | 4.325 | 4.218 | 4.170 | 4.127 |
| 2.6 | 4.185 | 3.968 | 4.119 | 4.416 | 4.449 | 4.433 | 4.420 | 4.408 | 4.389 | 4.350 | 4.323 | 4.296 | 4.197 | 4.090 | 4.046 |
| 2.7 | 4.276 | 3.957 | 3.813 | 4.391 | 4.424 | 4.408 | 4.397 | 4.366 | 4.342 | 4.300 | 4.282 | 4.247 | 4.036 | 3.928 | 4.127 |
| 2.8 | 4.371 | 4.300 | 3.974 | 4.094 | 4.385 | 4.364 | 4.342 | 4.313 | 4.292 | 4.251 | 4.209 | 4.143 | 4.116 | 4.077 | 4.160 |
| 2.9 | 4.383 | 4.296 | 4.011 | 3.949 | 4.325 | 4.317 | 4.284 | 4.251 | 4.218 | 4.104 | 4.123 | 4.143 | 4.135 | 4.106 | 4.135 |
| 3.0 | 4.333 | 4.218 | 4.048 | 3.986 | 4.226 | 4.259 | 4.226 | 4.050 | 4.052 | 4.079 | 4.098 | 4.119 | 4.127 | 4.114 | 4.052 |
| 3.1 | 4.319 | 4.077 | 4.061 | 4.011 | 3.912 | 3.902 | 3.945 | 4.003 | 3.978 | 3.995 | 4.028 | 4.069 | 4.085 | 4.092 | 4.052 |
| 3.2 | 4.255 | 4.065 | 4.061 | 3.978 | 3.912 | 3.939 | 4.061 | 4.054 | 4.028 | 3.920 | 3.972 | 4.011 | 4.046 | 4.061 | 4.036 |
| 3.3 | 4.234 | 4.026 | 4.028 | 3.978 | 4.013 | 4.094 | 4.106 | 4.112 | 4.100 | 3.992 | 3.893 | 3.986 | 4.013 | 4.036 | 4.094 |
| 3.4 | 4.061 | 3.928 | 3.966 | 3.933 | 4.108 | 4.149 | 4.135 | 4.135 | 4.127 | 4.069 | 3.945 | 4.255 | 4.226 | 4.226 | 4.112 |
| 3.5 | 4.164 | 4.135 | 3.860 | 4.069 | 4.143 | 4.176 | 4.152 | 4.160 | 4.127 | 4.185 | 4.294 | 4.333 | 4.350 | 4.441 | 4.317 |
| 3.6 | 4.168 | 4.135 | 4.026 | 4.028 | 4.135 | 4.172 | 4.156 | 4.160 | 4.141 | 4.296 | 4.342 | 4.424 | 4.464 | 4.466 | 4.395 |
| 3.7 | 4.119 | 4.019 | 4.028 | 3.920 | 4.094 | 4.147 | 4.137 | 4.145 | 4.135 | 4.329 | 4.416 | 4.424 | 4.424 | 4.408 | 4.358 |
| 3.8 | 3.914 | 4.011 | 4.193 | 4.257 | 4.234 | 4.110 | 4.094 | 4.102 | 4.085 | 4.292 | 4.290 | 4.313 | 4.325 | 4.331 | 4.100 |
| 3.9 | 4.414 | 4.416 | 4.203 | 4.267 | 4.255 | 3.813 | 3.796 | 3.945 | 3.995 | 4.201 | 4.197 | 4.226 | 4.234 | 4.226 | 4.185 |
| 4.0 | 4.435 | 4.445 | 4.160 | 4.232 | 4.317 | 4.309 | 4.267 | 4.110 | 4.079 | 4.048 | 3.995 | 4.003 | 4.214 | 4.247 | 4.247 |
| 4.1 | 4.416 | 4.428 | 4.170 | 4.342 | 4.373 | 4.373 | 4.358 | 4.300 | 4.259 | 4.143 | 4.085 | 4.036 | 4.255 | 4.276 | 4.267 |
| 4.2 | 4.408 | 4.404 | 4.296 | 4.362 | 4.375 | 4.375 | 4.366 | 4.342 | 4.325 | 4.296 | 4.259 | 4.193 | 4.292 | 4.309 | 4.288 |
| 4.3 | 4.358 | 4.383 | 4.315 | 4.346 | 4.360 | 4.358 | 4.358 | 4.342 | 4.325 | 4.317 | 4.309 | 4.259 | 4.309 | 4.321 | 4.309 |
| 4.4 | 4.342 | 4.342 | 4.298 | 4.342 | 4.358 | 4.358 | 4.344 | 4.325 | 4.315 | 4.300 | 4.304 | 4.273 | 4.263 | 4.313 | 4.321 |
| 4.5 | 4.131 | 3.945 | 3.982 | 4.300 | 4.333 | 4.333 | 4.325 | 4.309 | 4.292 | 4.290 | 4.290 | 4.259 | 4.185 | 4.300 | 4.325 |
| 4.6 | 4.185 | 4.073 | 3.982 | 4.197 | 4.276 | 4.292 | 4.292 | 4.284 | 4.292 | 4.261 | 4.259 | 4.226 | 4.094 | 4.296 | 4.356 |
| 4.7 | 4.201 | 4.185 | 3.978 | 3.895 | 3.955 | 4.209 | 4.226 | 4.226 | 4.234 | 4.226 | 4.209 | 4.168 | 4.069 | 4.110 | 4.360 |
| 4.8 | 4.214 | 4.110 | 4.021 | 4.085 | 4.052 | 3.924 | 4.160 | 4.180 | 4.185 | 4.189 | 4.164 | 4.044 | 4.069 | 4.036 | 4.292 |
| 4.9 | 4.358 | 4.356 | 4.057 | 4.110 | 4.143 | 4.156 | 4.127 | 4.100 | 4.127 | 4.123 | 4.077 | 4.112 | 4.141 | 4.127 | 4.104 |
| 5.0 | 4.399 | 4.397 | 4.338 | 4.106 | 4.135 | 4.168 | 4.147 | 4.102 | 3.953 | 3.895 | 3.920 | 4.069 | 4.154 | 4.185 | 4.172 |
| 5.1 | 4.408 | 4.416 | 4.375 | 4.292 | 4.131 | 4.168 | 4.168 | 4.127 | 4.077 | 3.889 | 3.945 | 3.937 | 4.100 | 4.178 | 4.176 |
| 5.2 | 4.414 | 4.428 | 4.397 | 4.292 | 4.125 | 4.156 | 4.176 | 4.110 | 4.061 | 3.920 | 4.139 | 4.154 | 4.127 | 4.011 | 4.044 |
| 5.3 | 4.416 | 4.439 | 4.412 | 4.325 | 4.108 | 4.143 | 4.166 | 4.090 | 4.094 | 4.143 | 4.156 | 4.176 | 4.193 | 4.028 | 4.044 |
| 5.4 | 4.408 | 4.441 | 4.426 | 4.356 | 4.102 | 4.141 | 4.156 | 4.069 | 4.102 | 4.131 | 4.143 | 4.176 | 4.259 | 4.259 | 4.164 |
| 5.5 | 4.399 | 4.437 | 4.433 | 4.383 | 4.094 | 4.135 | 4.141 | 4.052 | 4.183 | 4.209 | 4.209 | 4.247 | 4.267 | 4.271 | 4.253 |
| 5.6 | 4.387 | 4.428 | 4.433 | 4.397 | 4.090 | 4.119 | 4.119 | 4.160 | 4.193 | 4.211 | 4.224 | 4.251 | 4.267 | 4.273 | 4.276 |
| 5.7 | 4.373 | 4.416 | 4.433 | 4.395 | 4.065 | 4.094 | 4.085 | 4.149 | 4.180 | 4.207 | 4.224 | 4.245 | 4.267 | 4.278 | 4.276 |
| 5.8 | 4.344 | 4.377 | 4.408 | 4.383 | 4.028 | 4.036 | 3.995 | 4.127 | 4.160 | 4.185 | 4.209 | 4.242 | 4.267 | 4.284 | 4.276 |
| 5.9 | 4.201 | 4.292 | 4.236 | 4.123 | 3.895 | 3.914 | 3.895 | 4.108 | 4.139 | 4.168 | 4.191 | 4.222 | 4.251 | 4.269 | 4.267 |

BED ELEVATIONS - ROUGHNESS 2

| X COOR. | STATION 95.3 | 95.4 | 95.5 | 95.6 | 95.7 | 95.8 | 95.9 | 96.0 | 96.1 | 96.2 | 96.3 | 96.4 | 96.5 | 96.6 | 96.7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 3.927 | 3.885 | 3.980 | 3.865 | 3.945 | 4.042 | 4.111 | 4.103 | 4.095 | 4.030 | 3.933 | 4.159 | 4.238 | 4.284 | 4.312 |
| 0.2 | 3.982 | 3.941 | 3.976 | 3.865 | 4.006 | 4.099 | 4.149 | 4.135 | 4.119 | 4.097 | 4.058 | 4.163 | 4.240 | 4.284 | 4.320 |
| 0.3 | 3.990 | 3.958 | 3.982 | 3.865 | 4.052 | 4.143 | 4.171 | 4.151 | 4.135 | 4.111 | 4.079 | 4.107 | 4.220 | 4.278 | 4.316 |
| 0.4 | 3.998 | 3.960 | 3.954 | 3.865 | 4.103 | 4.161 | 4.187 | 4.167 | 4.149 | 4.125 | 4.095 | 4.062 | 4.159 | 4.248 | 4.290 |
| 0.5 | 3.990 | 3.962 | 3.974 | 3.865 | 4.119 | 4.171 | 4.191 | 4.183 | 4.163 | 4.135 | 4.111 | 4.083 | 3.978 | 4.038 | 4.079 |
| 0.6 | 4.002 | 4.010 | 4.022 | 4.006 | 4.115 | 4.161 | 4.189 | 4.181 | 4.173 | 4.151 | 4.123 | 4.099 | 4.030 | 4.171 | 4.179 |
| 0.7 | 4.135 | 4.111 | 4.038 | 4.026 | 4.079 | 4.127 | 4.161 | 4.171 | 4.167 | 4.155 | 4.127 | 4.095 | 4.117 | 4.208 | 4.204 |
| 0.8 | 4.171 | 4.167 | 4.103 | 4.038 | 3.974 | 4.079 | 4.127 | 4.151 | 4.151 | 4.143 | 4.127 | 4.079 | 4.171 | 4.224 | 4.214 |
| 0.9 | 4.143 | 4.119 | 4.062 | 3.994 | 3.948 | 4.026 | 4.091 | 4.119 | 4.123 | 4.121 | 4.107 | 4.058 | 4.010 | 4.222 | 4.218 |
| 1.0 | 4.087 | 4.040 | 3.998 | 3.950 | 3.945 | 3.960 | 3.974 | 4.068 | 4.079 | 4.079 | 4.058 | 4.010 | 3.901 | 4.173 | 4.206 |
| 1.1 | 4.179 | 4.139 | 3.945 | 3.994 | 4.054 | 4.062 | 3.943 | 3.950 | 3.950 | 3.974 | 3.941 | 3.943 | 3.978 | 3.982 | 4.091 |
| 1.2 | 4.200 | 4.187 | 4.119 | 4.038 | 4.087 | 4.093 | 4.058 | 3.945 | 3.913 | 4.014 | 4.073 | 4.087 | 4.095 | 4.077 | 4.193 |
| 1.3 | 4.191 | 4.175 | 4.129 | 3.998 | 4.079 | 4.093 | 4.073 | 3.986 | 4.002 | 4.101 | 4.123 | 4.125 | 4.135 | 4.135 | 4.191 |
| 1.4 | 4.173 | 4.147 | 4.097 | 3.945 | 4.010 | 4.075 | 4.062 | 3.982 | 4.079 | 4.135 | 4.151 | 4.159 | 4.161 | 4.171 | 4.171 |
| 1.5 | 4.143 | 4.111 | 4.046 | 3.945 | 4.272 | 4.282 | 4.208 | 3.935 | 4.133 | 4.159 | 4.179 | 4.185 | 4.191 | 4.200 | 4.208 |
| 1.6 | 4.111 | 4.062 | 3.984 | 4.329 | 4.300 | 4.304 | 4.262 | 4.183 | 4.171 | 4.191 | 4.208 | 4.214 | 4.220 | 4.224 | 4.230 |
| 1.7 | 4.075 | 4.042 | 3.948 | 4.312 | 4.320 | 4.318 | 4.270 | 4.183 | 4.191 | 4.218 | 4.232 | 4.236 | 4.240 | 4.238 | 4.232 |
| 1.8 | 4.038 | 3.978 | 3.945 | 4.353 | 4.337 | 4.329 | 4.274 | 4.181 | 4.191 | 4.222 | 4.236 | 4.240 | 4.236 | 4.208 | 4.145 |
| 1.9 | 3.998 | 3.950 | 3.939 | 4.349 | 4.351 | 4.337 | 4.276 | 4.183 | 4.018 | 4.042 | 4.103 | 4.175 | 4.143 | 4.079 | 4.226 |
| 2.0 | 3.925 | 3.941 | 3.974 | 4.284 | 4.280 | 4.280 | 4.256 | 4.145 | 3.943 | 3.978 | 4.000 | 3.950 | 3.945 | 4.151 | 4.258 |
| 2.1 | 3.857 | 3.945 | 3.982 | 4.119 | 4.143 | 4.119 | 4.046 | 4.038 | 4.034 | 4.004 | 3.945 | 3.950 | 4.050 | 4.179 | 4.256 |
| 2.2 | 3.901 | 3.950 | 3.978 | 4.000 | 4.006 | 3.966 | 4.103 | 4.103 | 4.083 | 4.062 | 4.026 | 3.990 | 4.006 | 4.111 | 4.204 |
| 2.3 | 3.974 | 3.945 | 3.968 | 4.010 | 4.038 | 4.030 | 4.159 | 4.177 | 4.155 | 4.123 | 4.079 | 4.046 | 4.022 | 4.008 | 4.119 |
| 2.4 | 3.968 | 4.111 | 4.161 | 4.179 | 4.175 | 4.167 | 4.107 | 4.208 | 4.216 | 4.195 | 4.159 | 4.131 | 4.101 | 4.010 | 4.010 |
| 2.5 | 4.095 | 4.208 | 4.232 | 4.238 | 4.232 | 4.208 | 4.062 | 4.113 | 4.198 | 4.224 | 4.208 | 4.187 | 4.127 | 3.945 | 3.943 |
| 2.6 | 4.062 | 4.062 | 4.206 | 4.191 | 4.175 | 4.079 | 3.966 | 4.064 | 4.107 | 4.167 | 4.171 | 4.159 | 4.030 | 3.950 | 4.022 |
| 2.7 | 4.004 | 3.998 | 4.119 | 4.111 | 3.972 | 3.941 | 3.966 | 3.982 | 4.044 | 4.091 | 4.105 | 4.056 | 3.998 | 3.948 | 4.139 |
| 2.8 | 4.143 | 4.141 | 4.050 | 3.970 | 3.970 | 3.982 | 3.994 | 3.984 | 3.962 | 3.966 | 3.982 | 3.950 | 3.950 | 4.030 | 4.153 |
| 2.9 | 4.173 | 4.179 | 4.143 | 4.024 | 3.948 | 3.962 | 3.976 | 3.980 | 3.968 | 3.945 | 3.948 | 3.849 | 3.950 | 3.994 | 4.087 |
| 3.0 | 4.200 | 4.191 | 4.151 | 4.046 | 3.941 | 3.933 | 3.941 | 3.950 | 3.945 | 3.950 | 4.030 | 4.062 | 4.179 | 4.111 | 4.014 |
| 3.1 | 4.193 | 4.175 | 4.119 | 4.060 | 3.893 | 3.901 | 3.945 | 3.945 | 4.280 | 4.341 | 4.369 | 4.365 | 4.347 | 4.337 | 4.208 |
| 3.2 | 4.155 | 4.127 | 4.191 | 4.232 | 4.246 | 4.232 | 4.046 | 4.224 | 4.333 | 4.361 | 4.357 | 4.361 | 4.357 | 4.335 | 4.232 |
| 3.3 | 4.056 | 4.232 | 4.278 | 4.294 | 4.308 | 4.296 | 4.220 | 4.208 | 4.272 | 4.333 | 4.337 | 4.349 | 4.335 | 4.312 | 4.064 |
| 3.4 | 4.111 | 4.280 | 4.288 | 4.300 | 4.316 | 4.316 | 4.288 | 4.131 | 4.246 | 4.248 | 4.312 | 4.300 | 4.304 | 4.280 | 4.030 |
| 3.5 | 4.083 | 4.280 | 4.292 | 4.304 | 4.320 | 4.320 | 4.292 | 4.216 | 4.167 | 4.238 | 4.312 | 4.292 | 4.208 | 4.077 | 4.185 |
| 3.6 | 4.103 | 4.272 | 4.284 | 4.304 | 4.320 | 4.304 | 4.284 | 4.272 | 4.193 | 4.232 | 4.115 | 4.137 | 4.159 | 4.107 | 4.224 |
| 3.7 | 4.089 | 4.264 | 4.280 | 4.302 | 4.304 | 4.296 | 4.272 | 4.272 | 4.210 | 4.191 | 4.216 | 4.228 | 4.240 | 4.220 | 4.222 |
| 3.8 | 4.038 | 4.248 | 4.272 | 4.282 | 4.268 | 4.256 | 4.248 | 4.216 | 4.119 | 4.248 | 4.272 | 4.268 | 4.280 | 4.264 | 4.195 |
| 3.9 | 3.945 | 4.014 | 4.123 | 4.111 | 4.105 | 4.101 | 4.068 | 4.012 | 4.000 | 4.280 | 4.292 | 4.292 | 4.288 | 4.240 | 4.143 |
| 4.0 | 3.982 | 4.200 | 4.191 | 4.191 | 4.179 | 4.163 | 4.151 | 4.127 | 4.095 | 4.282 | 4.280 | 4.250 | 4.212 | 4.179 | 4.062 |
| 4.1 | 4.248 | 4.264 | 4.254 | 4.256 | 4.248 | 4.248 | 4.228 | 4.204 | 4.181 | 4.193 | 4.202 | 4.185 | 4.167 | 3.994 | 3.994 |
| 4.2 | 4.296 | 4.316 | 4.320 | 4.316 | 4.304 | 4.292 | 4.264 | 4.236 | 4.208 | 4.159 | 4.058 | 4.042 | 3.990 | 4.010 | 4.020 |
| 4.3 | 4.335 | 4.341 | 4.337 | 4.320 | 4.300 | 4.282 | 4.248 | 4.208 | 4.177 | 4.111 | 3.990 | 4.046 | 4.083 | 3.974 | 3.948 |
| 4.4 | 4.329 | 4.325 | 4.304 | 4.272 | 4.232 | 4.216 | 4.175 | 4.125 | 4.079 | 3.970 | 3.978 | 4.024 | 4.062 | 4.022 | 3.945 |
| 4.5 | 4.268 | 4.272 | 4.228 | 4.179 | 4.139 | 4.127 | 4.073 | 4.026 | 3.982 | 4.054 | 3.945 | 3.998 | 4.030 | 4.337 | 4.385 |
| 4.6 | 3.917 | 4.155 | 4.123 | 4.107 | 4.062 | 4.034 | 3.869 | 3.986 | 4.143 | 4.111 | 3.992 | 3.941 | 4.365 | 4.417 | 4.419 |
| 4.7 | 4.208 | 4.139 | 3.945 | 3.941 | 3.917 | 3.899 | 4.038 | 4.151 | 4.171 | 4.139 | 4.038 | 4.296 | 4.429 | 4.429 | 4.413 |
| 4.8 | 4.238 | 4.206 | 4.095 | 3.943 | 3.929 | 3.945 | 4.042 | 4.046 | 4.042 | 4.077 | 4.155 | 4.401 | 4.437 | 4.427 | 4.413 |
| 4.9 | 4.264 | 4.232 | 4.064 | 3.945 | 3.917 | 3.901 | 3.945 | 3.954 | 3.945 | 3.966 | 4.357 | 4.443 | 4.443 | 4.433 | 4.415 |
| 5.0 | 4.268 | 4.236 | 4.042 | 3.943 | 4.151 | 4.224 | 4.143 | 3.948 | 4.010 | 4.272 | 4.433 | 4.445 | 4.441 | 4.429 | 4.407 |
| 5.1 | 4.224 | 4.068 | 3.994 | 4.191 | 4.264 | 4.300 | 4.228 | 4.159 | 4.204 | 4.393 | 4.443 | 4.439 | 4.435 | 4.425 | 4.401 |
| 5.2 | 4.079 | 4.010 | 4.183 | 4.264 | 4.320 | 4.337 | 4.272 | 4.191 | 4.339 | 4.450 | 4.441 | 4.437 | 4.433 | 4.421 | 4.401 |
| 5.3 | 4.054 | 4.070 | 4.240 | 4.337 | 4.385 | 4.347 | 4.268 | 4.193 | 4.401 | 4.458 | 4.452 | 4.441 | 4.425 | 4.401 | 4.369 |
| 5.4 | 3.950 | 4.208 | 4.320 | 4.337 | 4.381 | 4.357 | 4.260 | 4.113 | 4.395 | 4.445 | 4.441 | 4.387 | 4.345 | 4.151 | 4.175 |
| 5.5 | 3.978 | 4.268 | 4.296 | 4.304 | 4.333 | 4.341 | 4.107 | 3.968 | 4.288 | 4.353 | 4.038 | 4.077 | 4.137 | 4.163 | 4.183 |
| 5.6 | 3.976 | 4.256 | 4.264 | 4.272 | 4.272 | 4.193 | 3.941 | 3.966 | 4.030 | 4.004 | 4.042 | 4.083 | 4.129 | 4.159 | 4.175 |
| 5.7 | 3.945 | 4.026 | 4.038 | 4.022 | 3.994 | 3.974 | 4.068 | 3.945 | 3.950 | 3.998 | 4.046 | 4.087 | 4.123 | 4.151 | 4.167 |
| 5.8 | 3.925 | 3.945 | 4.036 | 4.046 | 4.030 | 4.014 | 4.070 | 3.945 | 4.062 | 3.996 | 4.050 | 4.087 | 4.111 | 4.139 | 4.159 |
| 5.9 | 3.877 | 3.998 | 3.982 | 3.974 | 3.986 | 3.925 | 4.010 | 3.970 | 4.073 | 3.974 | 4.046 | 4.070 | 4.087 | 4.111 | 4.089 |

B. Bed elevation parameter YM (and 13 other statistical parameters described in the body of the report) at all stations for Roughness 1 and Roughness 2. The data shown are for the flume set at the slope of 0.008, Series I roughness. All dimensions are in feet.

YM = the arithmetic mean elevation,

YV = the variance of elevations,

YS = the skew of the elevations,

YM4 = the kurtosis of elevations,

SDYV = the standard deviation of YM,

CSY = the coefficient of skew of YM,

dYMAX = ELYMAX - YM,

ELYMAX = the maximum point elevation at the station,

XMAX = x coordinate of ELYMAX referenced to left side of section,

ZMAX = z (longitudinal) coordinate of ELYMAX referenced to the upstream traverse for the station,

dYMIN = YM - ELYMIN,

ELYMIN = the minimum point elevation at the station,

XMIN = x coordinate of ELYMIN referenced to left side of section, and

ZMIN = z coordinate of ELYMIN referenced to the upstream traverse for the station.

```
 BEDLEVEL PARAMETERS:  Station=  1  Region=all    Roughness=1
==========================================================================
    YM      =  4.917  !  CSY     =  0.201  !  dYMIN   = -0.472
    YV      =  0.023  !  dYMAX   =  0.358  !  ELYMIN =  4.445
    YS      =  0.001  !  ELYMAX  =  5.276  !  XMIN   =  2.200
    YM4     =  1.463  !  XMAX    =  0.300  !  ZMIN   =  1.200
    SDYV    =  0.151  !  ZMAX    =  0.800  !

 BEDLEVEL PARAMETERS:  Station= 12  Region=all    Roughness=1
==========================================================================
    YM      =  4.847  !  CSY     =  0.236  !  dYMIN   = -0.495
    YV      =  0.023  !  dYMAX   =  0.394  !  ELYMIN =  4.352
    YS      =  0.001  !  ELYMAX  =  5.242  !  XMIN   =  2.100
    YM4     =  1.345  !  XMAX    =  5.800  !  ZMIN   = 12.400
    SDYV    =  0.151  !  ZMAX    = 11.400  !

 BEDLEVEL PARAMETERS:  Station= 24  Region=all    Roughness=1
==========================================================================
    YM      =  4.777  !  CSY     =  0.210  !  dYMIN   = -0.547
    YV      =  0.027  !  dYMAX   =  0.332  !  ELYMIN =  4.231
    YS      =  0.001  !  ELYMAX  =  5.109  !  XMIN   =  1.600
    YM4     =  1.520  !  XMAX    =  4.300  !  ZMIN   = 24.400
    SDYV    =  0.164  !  ZMAX    = 23.300  !

 BEDLEVEL PARAMETERS:  Station= 30  Region=all    Roughness=1
==========================================================================
    YM      =  4.697  !  CSY     =  0.115  !  dYMIN   = -0.394
    YV      =  0.024  !  dYMAX   =  0.412  !  ELYMIN =  4.302
    YS      =  0.000  !  ELYMAX  =  5.109  !  XMIN   =  2.500
    YM4     =  1.348  !  XMAX    =  0.400  !  ZMIN   = 29.300
    SDYV    =  0.155  !  ZMAX    = 29.300  !

 BEDLEVEL PARAMETERS:  Station= 36  Region=all    Roughness=1
==========================================================================
    YM      =  4.707  !  CSY     =  0.064  !  dYMIN   = -0.473
    YV      =  0.032  !  dYMAX   =  0.376  !  ELYMIN =  4.234
    YS      =  0.000  !  ELYMAX  =  5.083  !  XMIN   =  4.100
    YM4     =  1.946  !  XMAX    =  1.100  !  ZMIN   = 35.500
    SDYV    =  0.179  !  ZMAX    = 35.800  !

 BEDLEVEL PARAMETERS:  Station= 42  Region=all    Roughness=1
==========================================================================
    YM      =  4.631  !  CSY     = -0.005  !  dYMIN   = -0.471
    YV      =  0.030  !  dYMAX   =  0.406  !  ELYMIN =  4.161
    YS      =  0.000  !  ELYMAX  =  5.037  !  XMIN   =  0.100
    YM4     =  1.888  !  XMAX    =  5.200  !  ZMIN   = 42.600
    SDYV    =  0.174  !  ZMAX    = 42.400  !

 BEDLEVEL PARAMETERS:  Station= 48  Region=all    Roughness=1
==========================================================================
    YM      =  4.602  !  CSY     =  0.319  !  dYMIN   = -0.507
    YV      =  0.028  !  dYMAX   =  0.368  !  ELYMIN =  4.096
    YS      =  0.001  !  ELYMAX  =  4.971  !  XMIN   =  3.100
    YM4     =  1.763  !  XMAX    =  3.500  !  ZMIN   = 47.800
    SDYV    =  0.166  !  ZMAX    = 48.000  !

 BEDLEVEL PARAMETERS:  Station= 54  Region=all    Roughness=1
==========================================================================
    YM      =  4.520  !  CSY     =  0.426  !  dYMIN   = -0.456
    YV      =  0.024  !  dYMAX   =  0.312  !  ELYMIN =  4.063
    YS      =  0.002  !  ELYMAX  =  4.832  !  XMIN   =  2.900
    YM4     =  1.316  !  XMAX    =  3.200  !  ZMIN   = 53.500
    SDYV    =  0.154  !  ZMAX    = 54.100  !
```

BEDLEVEL PARAMETERS: Station= 60 Region=all Roughness=1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.533 | CSY | = | 0.400 | dYMIN | = -0.563 |
| YV | = | 0.027 | dYMAX | = | 0.373 | ELYMIN | = 3.971 |
| YS | = | 0.002 | ELYMAX | = | 4.906 | XMIN | = 2.000 |
| YM4 | = | 2.183 | XMAX | = | 4.900 | ZMIN | = 60.200 |
| SDYV | = | 0.164 | ZMAX | = | 60.100 | | |

BEDLEVEL PARAMETERS: Station= 66 Region=all Roughness=1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.359 | CSY | = | 0.162 | dYMIN | = -0.422 |
| YV | = | 0.027 | dYMAX | = | 0.370 | ELYMIN | = 3.937 |
| YS | = | 0.001 | ELYMAX | = | 4.729 | XMIN | = 1.800 |
| YM4 | = | 1.595 | XMAX | = | 5.700 | ZMIN | = 66.600 |
| SDYV | = | 0.164 | ZMAX | = | 65.900 | | |

BEDLEVEL PARAMETERS: Station= 72 Region=all Roughness=1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.414 | CSY | = | 0.051 | dYMIN | = -0.471 |
| YV | = | 0.031 | dYMAX | = | 0.474 | ELYMIN | = 3.943 |
| YS | = | 0.000 | ELYMAX | = | 4.888 | XMIN | = 1.200 |
| YM4 | = | 2.397 | XMAX | = | 1.300 | ZMIN | = 71.800 |
| SDYV | = | 0.176 | ZMAX | = | 72.100 | | |

BEDLEVEL PARAMETERS: Station= 78 Region=all Roughness=1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.297 | CSY | = | -0.251 | dYMIN | = -0.354 |
| YV | = | 0.023 | dYMAX | = | 0.427 | ELYMIN | = 3.943 |
| YS | = | -0.001 | ELYMAX | = | 4.725 | XMIN | = 1.600 |
| YM4 | = | 1.162 | XMAX | = | 3.100 | ZMIN | = 77.500 |
| SDYV | = | 0.152 | ZMAX | = | 78.000 | | |

BEDLEVEL PARAMETERS: Station= 84 Region=all Roughness=1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.285 | CSY | = | -0.156 | dYMIN | = -0.415 |
| YV | = | 0.034 | dYMAX | = | 0.415 | ELYMIN | = 3.870 |
| YS | = | -0.001 | ELYMAX | = | 4.700 | XMIN | = 5.700 |
| YM4 | = | 1.963 | XMAX | = | 5.500 | ZMIN | = 84.000 |
| SDYV | = | 0.183 | ZMAX | = | 83.300 | | |

BEDLEVEL PARAMETERS: Station= 96 Region=all Roughness=1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.131 | CSY | = | -0.049 | dYMIN | = -0.299 |
| YV | = | 0.027 | dYMAX | = | 0.433 | ELYMIN | = 3.832 |
| YS | = | 0.000 | ELYMAX | = | 4.564 | XMIN | = 3.800 |
| YM4 | = | 1.508 | XMAX | = | 4.800 | ZMIN | = 96.000 |
| SDYV | = | 0.164 | ZMAX | = | 96.700 | | |

BEDLEVEL PARAMETERS: Station=107 Region=all Roughness=1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 3.931 | CSY | = | -0.379 | dYMIN | = -0.389 |
| YV | = | 0.025 | dYMAX | = | 0.458 | ELYMIN | = 3.543 |
| YS | = | -0.002 | ELYMAX | = | 4.389 | XMIN | = 2.500 |
| YM4 | = | 1.755 | XMAX | = | 4.300 | ZMIN | =107.600 |
| SDYV | = | 0.159 | ZMAX | = | 106.300 | | |

BEDLEVEL PARAMETERS: Station= 12 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.833 | CSY | = | 0.418 | dYMIN | = -0.418 |
| YV | = | 0.C18 | dYMAX | = | 0.263 | ELYMIN | = 4.415 |
| YS | = | 0.C01 | ELYMAX | = | 5.097 | XMIN | = 4.100 |
| YM4 | = | 0.759 | XMAX | = | 3.600 | ZMIN | = 12.600 |
| SDYV | = | 0.135 | ZMAX | = | 11.600 | | |

BEDLEVEL PARAMETERS: Station= 24 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.761 | CSY | = | 0.069 | dYMIN | = -0.397 |
| YV | = | 0.C22 | dYMAX | = | 0.342 | ELYMIN | = 4.364 |
| YS | = | 0.C00 | ELYMAX | = | 5.103 | XMIN | = 1.600 |
| YM4 | = | 0.941 | XMAX | = | 3.900 | ZMIN | = 24.400 |
| SDYV | = | 0.149 | ZMAX | = | 23.500 | | |

BEDLEVEL PARAMETERS: Station= 36 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.685 | CSY | = | 0.219 | dYMIN | = -0.354 |
| YV | = | 0.C19 | dYMAX | = | 0.262 | ELYMIN | = 4.331 |
| YS | = | 0.C01 | ELYMAX | = | 4.946 | XMIN | = 2.500 |
| YM4 | = | 0.706 | XMAX | = | 4.300 | ZMIN | = 35.600 |
| SDYV | = | 0.137 | ZMAX | = | 36.000 | | |

BEDLEVEL PARAMETERS: Station= 42 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.659 | CSY | = | -0.017 | dYMIN | = -0.433 |
| YV | = | 0.C18 | dYMAX | = | 0.291 | ELYMIN | = 4.227 |
| YS | = | 0.C00 | ELYMAX | = | 4.950 | XMIN | = 1.500 |
| YM4 | = | 0.721 | XMAX | = | 5.100 | ZMIN | = 41.500 |
| SDYV | = | 0.133 | ZMAX | = | 42.700 | | |

BEDLEVEL PARAMETERS: Station= 48 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.561 | CSY | = | 0.037 | dYMIN | = -0.362 |
| YV | = | 0.C19 | dYMAX | = | 0.302 | ELYMIN | = 4.199 |
| YS | = | 0.000 | ELYMAX | = | 4.863 | XMIN | = 0.300 |
| YM4 | = | 0.719 | XMAX | = | 5.900 | ZMIN | = 47.800 |
| SDYV | = | 0.136 | ZMAX | = | 47.600 | | |

BEDLEVEL PARAMETERS: Station= 54 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.490 | CSY | = | 0.502 | dYMIN | = -0.403 |
| YV | = | 0.C16 | dYMAX | = | 0.244 | ELYMIN | = 4.087 |
| YS | = | 0.C01 | ELYMAX | = | 4.734 | XMIN | = 4.100 |
| YM4 | = | 0.570 | XMAX | = | 5.500 | ZMIN | = 54.300 |
| SDYV | = | 0.126 | ZMAX | = | 53.400 | | |

BEDLEVEL PARAMETERS: Station= 60 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.494 | CSY | = | 0.461 | dYMIN | = -0.421 |
| YV | = | 0.C16 | dYMAX | = | 0.290 | ELYMIN | = 4.072 |
| YS | = | 0.C01 | ELYMAX | = | 4.784 | XMIN | = 1.900 |
| YM4 | = | 0.714 | XMAX | = | 5.700 | ZMIN | = 60.400 |
| SDYV | = | 0.127 | ZMAX | = | 60.000 | | |

BEDLEVEL PARAMETERS: Station= 66 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.397 | CSY | = | 0.498 | dYMIN | = -0.389 |
| YV | = | 0.C17 | dYMAX | = | 0.269 | ELYMIN | = 4.008 |
| YS | = | 0.C01 | ELYMAX | = | 4.665 | XMIN | = 4.100 |
| YM4 | = | 0.737 | XMAX | = | 1.600 | ZMIN | = 65.700 |
| SDYV | = | 0.131 | ZMAX | = | 65.700 | | |

BEDLEVEL PARAMETERS: Station= 72 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.334 | CSY | = | 0.735 | dYMIN | = -0.480 |
| YV | = | 0.020 | dYMAX | = | 0.327 | ELYMIN | = 3.853 |
| YS | = | 0.002 | ELYMAX | = | 4.660 | XMIN | = 3.600 |
| YM4 | = | 1.218 | XMAX | = | 5.600 | ZMIN | = 71.500 |
| SDYV | = | 0.143 | ZMAX | = | 71.300 | | |

BEDLEVEL PARAMETERS: Station= 84 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.203 | CSY | = | 0.354 | dYMIN | = -0.412 |
| YV | = | 0.018 | dYMAX | = | 0.258 | ELYMIN | = 3.796 |
| YS | = | 0.001 | ELYMAX | = | 4.466 | XMIN | = 3.900 |
| YM4 | = | 0.718 | XMAX | = | 3.600 | ZMIN | = 83.900 |
| SDYV | = | 0.135 | ZMAX | = | 84.600 | | |

BEDLEVEL PARAMETERS: Station= 96 Region=all Roughness=2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| YM | = | 4.138 | CSY | = | -0.206 | dYMIN | = -0.290 |
| YV | = | 0.019 | dYMAX | = | 0.319 | ELYMIN | = 3.849 |
| YS | = | -0.001 | ELYMAX | = | 4.458 | XMIN | = 2.900 |
| YM4 | = | 0.700 | XMAX | = | 5.300 | ZMIN | = 96.400 |
| SDYV | = | 0.137 | ZMAX | = | 96.200 | | |

APPENDIX II

C. Flume clip elevations (east and west) at each station for Roughness 1 and Roughness 2 for all slopes. All dimensions are in feet.

# FLUME CLIP ELEVATION DATA

| SLOPE | EAST STATIONS 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | WEST STATIONS 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | ROUGHNESS 1 | | | | | | | | | | | | |
| 0.0080 | | | | | | | | | | | | | | | | | | | | |
| before | 6.288 | 6.271 | 6.262 | 6.266 | 6.241 | 6.269 | 6.256 | 6.251 | 6.129 | 6.122 | 6.275 | 6.270 | 6.263 | 6.268 | 6.262 | 6.262 | 6.272 | 6.268 | 6.145 | 6.148 |
| after | 6.288 | 6.273 | 6.262 | 6.268 | 6.239 | 6.269 | 6.257 | 6.251 | 6.129 | 6.130 | 6.275 | 6.270 | 6.264 | 6.268 | 6.263 | 6.262 | 6.272 | 6.268 | 6.141 | 6.150 |
| 0.0105 | | | | | | | | | | | | | | | | | | | | |
| before | 6.225 | 6.171 | 6.120 | 6.084 | 6.019 | 6.000 | 5.950 | 5.908 | 5.743 | 5.700 | 6.214 | 6.166 | 6.122 | 6.081 | 6.040 | 5.997 | 5.970 | 5.925 | 5.761 | 5.725 |
| after | 6.225 | 5.170 | 6.118 | 6.085 | 6.015 | 6.003 | 5.951 | 5.908 | 5.743 | 5.703 | 6.212 | 6.165 | 6.120 | 6.083 | 6.038 | 5.997 | 5.965 | 5.922 | 5.760 | 5.724 |
| 0.0130 | | | | | | | | | | | | | | | | | | | | |
| befre | | | | | | | | incorrect | data | ommitted | | | | | | | | | | |
| after | 6.205 | 6.131 | 6.064 | 6.011 | 5.928 | 5.899 | 5.828 | 5.769 | 5.588 | 5.530 | 6.190 | 6.128 | 6.067 | 6.010 | 5.947 | 5.892 | 5.845 | 5.784 | 5.597 | 5.533 |
| 0.0155 | | | | | | | | | | | | | | | | | | | | |
| before | 6.159 | 6.058 | 5.960 | 5.880 | 5.768 | 5.708 | 5.610 | 5.520 | 5.308 | 5.228 | 6.143 | 6.053 | 5.962 | 5.880 | 5.790 | 5.702 | 5.627 | 5.535 | 5.330 | 5.245 |
| after | 6.159 | 6.058 | 5.960 | 5.881 | 5.768 | 5.707 | 5.609 | 5.516 | 5.311 | 5.225 | 6.140 | 6.055 | 5.962 | 5.879 | 5.789 | 5.704 | 5.627 | 5.536 | 5.330 | 5.249 |
| 0.0180 | | | | | | | | | | | | | | | | | | | | |
| before | 6.129 | 6.005 | 5.886 | 5.787 | 5.649 | 5.571 | 5.450 | 5.340 | 5.111 | 4.999 | 6.115 | 6.000 | 5.888 | 5.784 | 5.672 | 5.565 | 5.465 | 5.358 | 5.129 | 5.020 |
| after | 6.128 | 6.007 | 5.887 | 5.786 | 5.650 | 5.571 | 5.452 | 5.341 | 5.109 | 5.000 | 6.115 | 6.000 | 5.890 | 5.787 | 5.673 | 5.564 | 5.469 | 5.360 | 5.131 | 5.026 |
| | | | | | | | | ROUGHNESS 2 | | | | | | | | | | | | |
| 0.0080 | | | | | | | | | | | | | | | | | | | | |
| before | 6.287 | 6.274 | 6.263 | 6.270 | 6.244 | 6.270 | 6.262 | 6.259 | 6.135 | 6.135 | 6.276 | 6.266 | 6.265 | 6.271 | 6.265 | 6.264 | 6.277 | 6.272 | 6.151 | 6.152 |
| after | 6.286 | 6.268 | 6.259 | 6.267 | 6.242 | 6.271 | 6.261 | 6.258 | 6.134 | 6.136 | 6.273 | 6.266 | 6.264 | 6.267 | 6.265 | 6.262 | 6.273 | 6.270 | 6.148 | 6.151 |
| 0.0105 | | | | | | | | | | | | | | | | | | | | |
| before | 6.247 | 6.203 | 6.167 | 6.148 | 6.098 | 6.103 | 6.066 | 6.037 | 5.887 | 5.863 | 6.234 | 6.199 | 6.172 | 6.152 | 6.123 | 6.095 | 6.081 | 6.049 | 5.902 | 5.878 |
| after | 6.245 | 6.202 | 6.166 | 6.152 | 6.098 | 6.102 | 6.065 | 6.037 | 5.887 | 5.863 | 6 230 | 6.199 | 6.172 | 6.147 | 6.116 | 6.092 | 6.081 | 6.048 | 5.902 | 5.880 |
| 0.0130 | | | | | | | | | | | | | | | | | | | | |
| before | 6.200 | 6.126 | 6.059 | 6.012 | 5.927 | 5.903 | 5.832 | 5.776 | 5.595 | 5.537 | 6.184 | 6.117 | 6.065 | 6.009 | 5.947 | 5.895 | 5.849 | 5.788 | 5.612 | 5.558 |
| after | 6.201 | 6.127 | 6.062 | 6.014 | 5.930 | 5.902 | 5.836 | 5.778 | 5.597 | 5.541 | 6.187 | 6.114 | 6.065 | 6.013 | 5.951 | 5.892 | 5.849 | 5.791 | 5.614 | 5.558 |
| 0.0155 | | | | | | | | | | | | | | | | | | | | |
| before | 6.154 | 6.049 | 5.955 | 5.877 | 5.763 | 5.760 | 5.609 | 5.518 | 5.306 | 5.222 | 6.141 | 6.047 | 5.957 | 5.878 | 5.786 | 5.693 | 5.621 | 5.532 | 5.324 | 5.241 |
| after | 6.155 | 6.049 | 5.953 | 5.876 | 5.761 | 5.702 | 5.609 | 5.512 | 5.306 | 5.222 | 6.140 | 6.047 | 5.958 | 5.872 | 5.784 | 5.697 | 5.620 | 5.532 | 5.323 | 5.241 |
| 0.0180 | | | | | | | | | | | | | | | | | | | | |
| before | 6.121 | 5.996 | 5.878 | 5.782 | 5.646 | 5.571 | 5.455 | 5.344 | 5.114 | 5.009 | 6.109 | 5.991 | 5.825 | 5.781 | 5.669 | 5.558 | 5.464 | 5.356 | 5.131 | 5.025 |
| after | 6.118 | 5.997 | 5.879 | 5.783 | 5.649 | 5.566 | 5.454 | 5.342 | 5.114 | 5.010 | 6.107 | 5.991 | 5.881 | 5.778 | 5.668 | 5.561 | 5.469 | 5.357 | 5.131 | 5.027 |

NOTE: The following experimental runs were made out of sequence and thus have their own sets of clip elevations.

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RUN 11I | 6.231 | 6.183 | 6.129 | 6.100 | 6.027 | 6.019 | 5.968 | 5.932 | 5.768 | 5.724 | 6.219 | 6.178 | 6.131 | 6.097 | 6.049 | 6.014 | 5.985 | 5.948 | 5.786 | 5.747 |
| RUN 14I | 6.204 | 6.125 | 6.057 | 6.004 | 5.919 | 5.887 | 5.813 | 5.755 | 5.581 | 5.529 | 6.189 | 6.122 | 6.060 | 6.003 | 5.938 | 5.880 | 5.830 | 5.770 | 5.590 | 5.532 |
| RUN 15I | 6.162 | 6.057 | 5.960 | 5.881 | 5.765 | 5.706 | 5.611 | 5.517 | 5.307 | 5.210 | 6.145 | 6.053 | 5.962 | 5.880 | 5.787 | 5.701 | 5.628 | 5.538 | 5.327 | 5.230 |

## APPENDIX II

D. Average bed elevation ("footprint") at vertical velocity traverses (15 traverses each station; 27 point elevations were averaged at each traverse, see figure 10), Roughness 1 and Roughness 2. The data shown are for the flume set at slope of 0.008, Roughness 1. All dimensions are in feet.

trav = vertical traverse, and

elev = footprint elevation associated with vertical traverse number.

AVERAGE BED ELEVATIONS AT: STATION 1.2 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.103 | 4 | 4.929 | 7 | 4.980 | 10 | 4.927 | 13 | 4.901 |
| 2 | 5.113 | 5 | 4.861 | 8 | 4.796 | 11 | 4.837 | 14 | 4.923 |
| 3 | 5.005 | 6 | 4.983 | 9 | 4.916 | 12 | 4.978 | 15 | 4.922 |

AVERAGE BED ELEVATIONS AT: STATION 12.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.816 | 4 | 4.758 | 7 | 4.864 | 10 | 4.856 | 13 | 4.929 |
| 2 | 4.846 | 5 | 4.950 | 8 | 4.782 | 11 | 4.771 | 14 | 4.882 |
| 3 | 4.731 | 6 | 4.808 | 9 | 4.710 | 12 | 4.905 | 15 | 4.740 |

AVERAGE BED ELEVATIONS AT: STATION 24.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.623 | 4 | 4.870 | 7 | 4.733 | 10 | 4.865 | 13 | 4.715 |
| 2 | 4.675 | 5 | 4.645 | 8 | 4.793 | 11 | 4.701 | 14 | 4.815 |
| 3 | 4.768 | 6 | 4.827 | 9 | 4.761 | 12 | 4.911 | 15 | 4.800 |

AVERAGE BED ELEVATIONS AT: STATION 30.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.698 | 4 | 4.671 | 7 | 4.575 | 10 | 4.695 | 13 | 4.757 |
| 2 | 4.863 | 5 | 4.795 | 8 | 4.566 | 11 | 4.762 | 14 | 4.627 |
| 3 | 4.889 | 6 | 4.523 | 9 | 4.601 | 12 | 4.863 | 15 | 4.692 |

AVERAGE BED ELEVATIONS AT: STATION 36.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.715 | 4 | 4.897 | 7 | 4.715 | 10 | 4.780 | 13 | 4.698 |
| 2 | 4.731 | 5 | 4.777 | 8 | 4.612 | 11 | 4.843 | 14 | 4.714 |
| 3 | 4.698 | 6 | 4.851 | 9 | 4.489 | 12 | 4.565 | 15 | 4.650 |

AVERAGE BED ELEVATIONS AT: STATION 42.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.517 | 4 | 4.556 | 7 | 4.590 | 10 | 4.560 | 13 | 4.599 |
| 2 | 4.713 | 5 | 4.598 | 8 | 4.708 | 11 | 4.669 | 14 | 4.563 |
| 3 | 4.738 | 6 | 4.543 | 9 | 4.683 | 12 | 4.782 | 15 | 4.556 |

AVERAGE BED ELEVATIONS AT: STATION 48.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.515 | 4 | 4.533 | 7 | 4.652 | 10 | 4.632 | 13 | 4.720 |
| 2 | 4.529 | 5 | 4.680 | 8 | 4.411 | 11 | 4.624 | 14 | 4.650 |
| 3 | 4.531 | 6 | 4.386 | 9 | 4.740 | 12 | 4.683 | 15 | 4.626 |

AVERAGE BED ELEVATIONS AT: STATION 54.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.511 | 4 | 4.510 | 7 | 4.563 | 10 | 4.478 | 13 | 4.564 |
| 2 | 4.607 | 5 | 4.455 | 8 | 4.518 | 11 | 4.641 | 14 | 4.490 |
| 3 | 4.517 | 6 | 4.492 | 9 | 4.571 | 12 | 4.501 | 15 | 4.446 |

AVERAGE BED ELEVATIONS AT: STATION 60.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.515 | 4 | 4.492 | 7 | 4.490 | 10 | 4.531 | 13 | 4.536 |
| 2 | 4.520 | 5 | 4.578 | 8 | 4.699 | 11 | 4.655 | 14 | 4.673 |
| 3 | 4.464 | 6 | 4.326 | 9 | 4.599 | 12 | 4.612 | 15 | 4.575 |

AVERAGE BED ELEVATIONS AT: STATION 66.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.370 | 4 | 4.245 | 7 | 4.428 | 10 | 4.320 | 13 | 4.427 |
| 2 | 4.472 | 5 | 4.459 | 8 | 4.277 | 11 | 4.444 | 14 | 4.452 |
| 3 | 4.481 | 6 | 4.321 | 9 | 4.274 | 12 | 4.295 | 15 | 4.481 |

AVERAGE BED ELEVATIONS AT: STATION 72.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.384 | 4 | 4.444 | 7 | 4.308 | 10 | 4.384 | 13 | 4.410 |
| 2 | 4.385 | 5 | 4.589 | 8 | 4.268 | 11 | 4.545 | 14 | 4.451 |
| 3 | 4.309 | 6 | 4.468 | 9 | 4.410 | 12 | 4.415 | 15 | 4.301 |

AVERAGE BED ELEVATIONS AT: STATION 78.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.238 | 4 | 4.337 | 7 | 4.285 | 10 | 4.395 | 13 | 4.461 |
| 2 | 4.225 | 5 | 4.194 | 8 | 4.393 | 11 | 4.237 | 14 | 4.414 |
| 3 | 4.191 | 6 | 4.321 | 9 | 4.294 | 12 | 4.276 | 15 | 4.328 |

AVERAGE BED ELEVATIONS AT: STATION 84.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.524 | 4 | 4.134 | 7 | 4.390 | 10 | 4.351 | 13 | 4.272 |
| 2 | 4.529 | 5 | 4.225 | 8 | 4.145 | 11 | 4.244 | 14 | 4.280 |
| 3 | 4.417 | 6 | 4.202 | 9 | 4.375 | 12 | 4.150 | 15 | 4.150 |

AVERAGE BED ELEVATIONS AT: STATION 96.0 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.303 | 4 | 4.103 | 7 | 4.117 | 10 | 4.175 | 13 | 4.087 |
| 2 | 4.262 | 5 | 4.233 | 8 | 4.057 | 11 | 4.065 | 14 | 4.014 |
| 3 | 4.087 | 6 | 3.982 | 9 | 4.099 | 12 | 4.193 | 15 | 4.003 |

AVERAGE BED ELEVATIONS AT: STATION 107.3 / ROUGHNESS 1

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.028 | 4 | 3.859 | 7 | 3.778 | 10 | 3.838 | 13 | 4.001 |
| 2 | 3.952 | 5 | 3.849 | 8 | 3.962 | 11 | 3.934 | 14 | 4.001 |
| 3 | 3.894 | 6 | 3.832 | 9 | 3.936 | 12 | 3.817 | 15 | 3.839 |

AVERAGE BED ELEVATIONS AT: STATION 12.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.870 | 4 | 4.767 | 7 | 4.861 | 10 | 4.808 | 13 | 4.924 |
| 2 | 4.888 | 5 | 4.898 | 8 | 4.782 | 11 | 4.738 | 14 | 4.962 |
| 3 | 4.754 | 6 | 4.855 | 9 | 4.846 | 12 | 4.766 | 15 | 4.800 |

AVERAGE BED ELEVATIONS AT: STATION 24.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.591 | 4 | 4.858 | 7 | 4.665 | 10 | 4.789 | 13 | 4.702 |
| 2 | 4.637 | 5 | 4.598 | 8 | 4.822 | 11 | 4.682 | 14 | 4.811 |
| 3 | 4.801 | 6 | 4.730 | 9 | 4.753 | 12 | 4.864 | 15 | 4.811 |

AVERAGE BED ELEVATIONS AT: STATION 36.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.659 | 4 | 4.798 | 7 | 4.746 | 10 | 4.783 | 13 | 4.626 |
| 2 | 4.669 | 5 | 4.674 | 8 | 4.712 | 11 | 4.792 | 14 | 4.536 |
| 3 | 4.658 | 6 | 4.815 | 9 | 4.746 | 12 | 4.681 | 15 | 4.464 |

AVERAGE BED ELEVATIONS AT: STATION 42.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.618 | 4 | 4.615 | 7 | 4.608 | 10 | 4.598 | 13 | 4.620 |
| 2 | 4.643 | 5 | 4.654 | 8 | 4.762 | 11 | 4.703 | 14 | 4.606 |
| 3 | 4.641 | 6 | 4.743 | 9 | 4.663 | 12 | 4.717 | 15 | 4.591 |

AVERAGE BED ELEVATIONS AT: STATION 48.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.483 | 4 | 4.526 | 7 | 4.522 | 10 | 4.578 | 13 | 4.612 |
| 2 | 4.500 | 5 | 4.574 | 8 | 4.478 | 11 | 4.513 | 14 | 4.627 |
| 3 | 4.480 | 6 | 4.508 | 9 | 4.583 | 12 | 4.744 | 15 | 4.639 |

AVERAGE BED ELEVATIONS AT: STATION 54.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.507 | 4 | 4.544 | 7 | 4.387 | 10 | 4.433 | 13 | 4.534 |
| 2 | 4.546 | 5 | 4.562 | 8 | 4.397 | 11 | 4.519 | 14 | 4.448 |
| 3 | 4.452 | 6 | 4.543 | 9 | 4.446 | 12 | 4.472 | 15 | 4.441 |

AVERAGE BED ELEVATIONS AT: STATION 60.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.378 | 4 | 4.542 | 7 | 4.484 | 10 | 4.638 | 13 | 4.525 |
| 2 | 4.405 | 5 | 4.438 | 8 | 4.534 | 11 | 4.496 | 14 | 4.666 |
| 3 | 4.481 | 6 | 4.351 | 9 | 4.443 | 12 | 4.446 | 15 | 4.621 |

AVERAGE BED ELEVATIONS AT: STATION 66.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.381 | 4 | 4.410 | 7 | 4.409 | 10 | 4.361 | 13 | 4.454 |
| 2 | 4.472 | 5 | 4.453 | 8 | 4.347 | 11 | 4.434 | 14 | 4.386 |
| 3 | 4.463 | 6 | 4.468 | 9 | 4.359 | 12 | 4.342 | 15 | 4.431 |

AVERAGE BED ELEVATIONS AT: STATION 72.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.313 | 4 | 4.414 | 7 | 4.221 | 10 | 4.404 | 13 | 4.343 |
| 2 | 4.331 | 5 | 4.366 | 8 | 4.214 | 11 | 4.421 | 14 | 4.465 |
| 3 | 4.265 | 6 | 4.331 | 9 | 4.351 | 12 | 4.322 | 15 | 4.392 |

AVERAGE BED ELEVATIONS AT: STATION 84.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.307 | 4 | 4.334 | 7 | 4.341 | 10 | 4.148 | 13 | 4.161 |
| 2 | 4.339 | 5 | 4.169 | 8 | 4.107 | 11 | 4.284 | 14 | 4.195 |
| 3 | 4.286 | 6 | 4.073 | 9 | 4.226 | 12 | 4.084 | 15 | 4.163 |

AVERAGE BED ELEVATIONS AT: STATION 96.0 / ROUGHNESS 2

| trav | elev | trav | elev | trav | elev | trav | elev | trav | elev |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.138 | 4 | 4.033 | 7 | 4.121 | 10 | 4.182 | 13 | 4.287 |
| 2 | 4.141 | 5 | 4.164 | 8 | 4.056 | 11 | 4.077 | 14 | 4.087 |
| 3 | 4.136 | 6 | 4.088 | 9 | 4.235 | 12 | 4.250 | 15 | 4.040 |

## APPENDIX III

A. Velocity measurements, in feet per second, all traverses, all stations, both Roughness 1 and Roughness 2. See tables 1 and 2 for run number and stations where velocity data were obtained.

V = computed velocity using meter equation,

R = number of revolutions per second,

HT = approximate flow depth,

Horiz = the horizontal distance from the left wall looking upstream,

Vert = elevation of point velocity, and

Velo = measured velocity.

RUN NUMBER: 1
METER EQUATION: V = 1.027R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 64 F ############

| HT=1.25 | | HT=1.23 | | HT=1.26 | | HT=0.93 | | HT=1.09 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.82 | 3.24 | 5.82 | 3.68 | 5.82 | 3.88 | 5.82 | 4.28 | 5.82 | 4.51 |
| 5.62 | 3.55 | 5.62 | 4.16 | 5.62 | 4.43 | 5.62 | 4.71 | 5.62 | 4.50 |
| 5.42 | 3.41 | 5.43 | 4.20 | 5.42 | 4.60 | 5.42 | 4.73 | 5.42 | 4.21 |
| 5.22 | 3.34 | 5.22 | 3.97 | 5.23 | 4.40 | 5.22 | 4.61 | 5.22 | 3.60 |
| 5.02 | 3.13 | 5.02 | 3.56 | 5.02 | 2.64 | | | | |

| HT=1.06 | | HT=1.13 | | HT=1.18 | | HT=1.44 | | HT=1.05 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.82 | 4.15 | 5.82 | 4.05 | 5.82 | 4.54 | 5.82 | 5.61 | 5.82 | 5.15 |
| 5.62 | 3.91 | 5.62 | 4.21 | 5.62 | 4.79 | 5.62 | 5.39 | 5.62 | 5.26 |
| 5.42 | 3.43 | 5.42 | 4.19 | 5.42 | 4.81 | 5.42 | 5.16 | 5.42 | 5.19 |
| 5.22 | 2.77 | 5.22 | 3.54 | 5.22 | 4.66 | 5.22 | 4.97 | 5.23 | 4.90 |
| | | 5.02 | 3.29 | 5.02 | 3.90 | 5.02 | 4.37 | | |
| | | | | | | 4.82 | 3.02 | | |

| HT=1.01 | | HT=1.40 | | HT=1.19 | | HT=1.15 | | HT=1.15 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.81 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.82 | 4.72 | 5.82 | 4.30 | 5.82 | 3.48 | 5.82 | 3.09 | 5.82 | 2.63 |
| 5.62 | 4.90 | 5.62 | 4.39 | 5.62 | 3.83 | 5.62 | 3.47 | 5.62 | 2.90 |
| 5.42 | 4.86 | 5.42 | 4.36 | 5.42 | 3.86 | 5.42 | 3.70 | 5.42 | 3.18 |
| 5.22 | 4.31 | 5.22 | 3.72 | 5.22 | 3.53 | 5.23 | 3.61 | 5.22 | 3.30 |
| | | 5.02 | 3.15 | 5.02 | 2.55 | 5.02 | 2.78 | 5.02 | 2.97 |
| | | 4.82 | 2.27 | | | | | | |

############ STATION = 60 TEMPERATURE = 64 F ############

| HT=1.04 | | HT=1.06 | | HT=1.23 | | HT=1.09 | | HT=1.06 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.58 | 3.04 | 5.58 | 3.39 | 5.58 | 3.92 | 5.58 | 4.37 | 5.58 | 4.59 |
| 5.38 | 2.96 | 5.38 | 3.82 | 5.38 | 4.43 | 5.38 | 4.72 | 5.38 | 4.65 |
| 5.18 | 2.99 | 5.18 | 3.83 | 5.18 | 4.48 | 5.18 | 4.63 | 5.18 | 4.49 |
| 4.98 | 2.98 | 4.98 | 3.80 | 4.98 | 4.38 | 4.98 | 4.22 | 4.98 | 4.03 |
| | | | | 4.78 | 3.98 | | | | |

| HT=1.33 | | HT=1.24 | | HT=0.92 | | HT=0.99 | | HT=1.15 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.58 | 4.49 | 5.58 | 4.47 | 5.58 | 4.89 | 5.58 | 5.23 | 5.58 | 5.50 |
| 5.38 | 4.14 | 5.38 | 4.14 | 5.38 | 4.81 | 5.38 | 5.36 | 5.38 | 5.40 |
| 5.18 | 3.49 | 5.18 | 3.65 | 5.18 | 4.50 | 5.18 | 5.00 | 5.18 | 4.94 |
| 4.98 | 2.19 | 4.98 | 3.41 | 4.98 | 4.25 | 4.97 | 4.14 | 4.98 | 4.21 |
| 4.78 | 1.87 | 4.78 | 3.11 | | | | | 4.78 | 3.61 |
| 4.58 | 1.63 | | | | | | | | |

| HT=0.91 | | HT=0.85 | | HT=1.06 | | HT=0.95 | | HT=1.00 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.58 | 4.84 | 5.58 | 4.23 | 5.58 | 4.01 | 5.57 | 3.74 | 5.58 | 3.55 |
| 5.38 | 4.98 | 5.38 | 4.60 | 5.37 | 4.34 | 5.38 | 4.17 | 5.38 | 3.74 |
| 5.18 | 5.02 | 5.18 | 4.55 | 5.18 | 4.23 | 5.18 | 4.09 | 5.18 | 3.55 |
| 4.98 | 4.45 | | | 4.98 | 3.76 | 4.97 | 3.63 | 4.98 | 2.88 |

RUN NUMBER: 1
METER EQUATION: V = 1.027R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 84 TEMPERATURE = 64 F ############

| HT=0.92 | | HT=0.93 | | HT=0.99 | | HT=1.26 | | HT=1.04 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.34 | 3.56 | 5.34 | 4.04 | 5.34 | 4.39 | 5.34 | 4.56 | 5.34 | 5.07 |
| 5.14 | 3.63 | 5.14 | 4.39 | 5.14 | 4.63 | 5.14 | 4.77 | 5.14 | 5.09 |
| 4.94 | 3.25 | 4.94 | 3.98 | 4.94 | 4.49 | 4.94 | 4.63 | 4.94 | 4.74 |
| 4.74 | 2.26 | 4.74 | 2.47 | 4.74 | 3.76 | 4.74 | 4.28 | 4.74 | 4.52 |
| | | | | | | 4.54 | 3.53 | | |

| HT=1.37 | | HT=1.02 | | HT=1.36 | | HT=0.91 | | HT=1.03 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.34 | 4.84 | 5.34 | 4.82 | 5.34 | 5.48 | 5.34 | 5.61 | 5.35 | 5.68 |
| 5.14 | 4.55 | 5.14 | 4.45 | 5.14 | 5.20 | 5.14 | 5.64 | 5.14 | 5.50 |
| 4.94 | 4.13 | 4.94 | 3.67 | 4.94 | 4.42 | 4.94 | 5.26 | 4.94 | 5.23 |
| 4.74 | 3.71 | 4.74 | 2.80 | 4.74 | 3.93 | 4.74 | 4.92 | 4.74 | 4.47 |
| 4.54 | 3.11 | | | 4.54 | 3.52 | | | | |
| 4.34 | 1.77 | | | 4.34 | 2.49 | | | | |

| HT=1.25 | | HT=1.31 | | HT=0.90 | | HT=0.93 | | HT=1.07 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.01 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.81 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.34 | 5.08 | 5.34 | 4.78 | 5.34 | 4.26 | 5.34 | 3.93 | 5.34 | 3.26 |
| 5.14 | 5.29 | 5.14 | 4.93 | 5.14 | 4.52 | 5.14 | 4.08 | 5.14 | 3.33 |
| 4.94 | 4.93 | 4.94 | 4.75 | 4.94 | 4.29 | 4.94 | 4.12 | 4.94 | 3.42 |
| 4.74 | 3.88 | 4.74 | 4.23 | 4.74 | 3.99 | 4.74 | 3.48 | 4.74 | 3.07 |
| 4.54 | 2.03 | 4.54 | 3.76 | | | | | | |
| | | 4.33 | 2.82 | | | | | | |

RUN NUMBER: 2 SLOPE = 0.0080
METER EQUATION: V = 1.027R + 0.074 ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 64 F ############

| HT=0.84 | | HT=0.82 | | HT=0.86 | | HT=0.53 | | HT=0.69 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.21 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.42 | 1.86 | 5.42 | 2.10 | 5.42 | 2.64 | 5.41 | 3.15 | 5.42 | 3.25 |
| 5.22 | 2.23 | 5.22 | 2.58 | 5.22 | 2.89 | 5.22 | 3.49 | 5.22 | 3.05 |
| 5.02 | 2.12 | 5.02 | 2.38 | 5.02 | 1.98 | | | | |

| HT=0.66 | | HT=0.72 | | HT=0.77 | | HT=1.03 | | HT=0.65 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=2.99 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.42 | 3.06 | 5.41 | 3.03 | 5.42 | 3.46 | 5.42 | 3.70 | 5.41 | 3.62 |
| 5.21 | 2.55 | 5.22 | 2.72 | 5.22 | 3.39 | 5.22 | 3.67 | 5.22 | 3.67 |
| | | 5.02 | 2.56 | 5.02 | 3.10 | 5.02 | 3.26 | | |
| | | | | | | 4.82 | 2.42 | | |

| HT=0.61 | | HT=0.99 | | HT=0.78 | | HT=0.74 | | HT=0.74 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.49 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.42 | 3.51 | 5.41 | 3.00 | 5.41 | 2.62 | 5.41 | 2.17 | 5.42 | 1.80 |
| 5.22 | 3.35 | 5.22 | 2.73 | 5.22 | 2.71 | 5.22 | 2.56 | 5.22 | 2.40 |
| | | 5.02 | 2.38 | 5.02 | 2.23 | 5.02 | 2.31 | 5.02 | 2.15 |
| | | 4.81 | 1.72 | | | | | | |

############ STATION = 60 TEMPERATURE = 64 F ############

| HT=0.65 | | HT=0.66 | | HT=0.83 | | HT=0.70 | | HT=0.67 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.18 | 1.61 | 5.18 | 1.75 | 5.18 | 2.07 | 5.18 | 3.18 | 5.18 | 3.42 |
| 4.98 | 2.17 | 4.98 | 2.34 | 4.98 | 2.64 | 4.98 | 3.17 | 4.98 | 3.25 |
| | | | | 4.78 | 2.77 | | | | |

| HT=0.93 | | HT=0.85 | | HT=0.53 | | HT=0.59 | | HT=0.75 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.51 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.18 | 2.73 | 5.19 | 3.16 | 5.18 | 3.59 | 5.18 | 3.71 | 5.18 | 3.64 |
| 4.98 | 1.80 | 4.98 | 2.90 | 4.98 | 3.47 | 4.98 | 3.20 | 4.98 | 3.04 |
| 4.78 | 1.38 | 4.78 | 2.48 | | | | | 4.78 | 2.64 |
| 4.58 | 1.48 | | | | | | | | |

| HT=0.51 | | HT=0.45 | | HT=0.66 | | HT=0.55 | | HT=0.60 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.01 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.18 | 3.68 | 5.19 | 3.54 | 5.18 | 3.08 | 5.18 | 3.01 | 5.19 | 2.74 |
| 4.98 | 3.30 | | | 4.98 | 3.19 | 4.98 | 3.02 | 4.98 | 2.64 |

RUN NUMBER: 2
METER EQUATION: V = 1.027R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 84 TEMPERATURE = 64 F ############

| HT=0.51 | | HT=0.51 | | HT=0.57 | | HT=0.85 | | HT=0.62 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.93 | 2.08 | 4.93 | 2.11 | 4.93 | 2.70 | 4.93 | 3.19 | 4.93 | 3.73 |
| 4.73 | 1.64 | 4.73 | 1.42 | 4.73 | 2.45 | 4.73 | 3.25 | 4.73 | 3.66 |
| | | | | | | 4.53 | 2.52 | | |

| HT=0.95 | | HT=0.61 | | HT=0.94 | | HT=0.49 | | HT=0.62 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=1.99 | | HORIZ=2.50 | | HORIZ=2.99 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.93 | 3.58 | 4.93 | 3.31 | 4.93 | 3.84 | 4.93 | 4.01 | 4.93 | 3.61 |
| 4.73 | 3.2666 | 4.72 | 2.51 | | | | | 4.73 | 3.17 |
| 4.53 | 2.89 | | | 4.53 | 2.97 | | | | |
| 4.33 | 1.48 | | | 4.32 | 1.95 | | | | |

| HT=0.84 | | HT=0.90 | | HT=0.49 | | HT=0.51 | | HT=0.66 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.01 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.93 | 3.31 | 4.93 | 3.81 | 4.92 | 3.33 | 4.93 | 2.84 | 4.92 | 2.24 |
| 4.73 | 2.67 | 4.73 | 3.69 | | | 4.73 | 2.93 | 4.73 | 2.55 |
| 4.52 | 0.92 | 4.52 | 3.19 | | | | | | |

RUN NUMBER: 5 SLOPE = 0.0080
METER EQUATION: V = 1.022R + 0.074 ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 65 F ############

| HT=0.40 | HT=0.40 | HT=0.40 | HT=0.20 | HT=0.20 |
|---|---|---|---|---|
| HORIZ=0.20 | HORIZ=0.40 | HORIZ=0.60 | HORIZ=1.25 | HORIZ=1.50 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 5.02 1.24 | 5.02 1.31 | 5.02 1.00 | 5.02 1.87 | 5.02 1.47 |
| 4.82 1.30 | 4.82 1.17 | 4.82 0.69 | | |

| HT=0.20 | HT=0.20 | HT=0.20 | HT=0.20 | HT=0.20 |
|---|---|---|---|---|
| HORIZ=1.75 | HORIZ=0.00 | HORIZ=2.25 | HORIZ=2.50 | HORIZ=2.75 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 5.02 1.29 | 5.02 1.64 | 5.02 1.71 | 5.02 1.88 | 5.02 2.01 |

| HT=0.40 | HT=0.60 | HT=0.60 | HT=0.40 | HT=0.20 |
|---|---|---|---|---|
| HORIZ=0.00 | HORIZ=3.25 | HORIZ=3.50 | HORIZ=3.75 | HORIZ=4.00 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 5.02 2.23 | 5.02 2.39 | 5.02 2.19 | 5.02 2.22 | 5.02 2.24 |
| 4.92 1.43 | 4.82 2.10 | 4.82 1.74 | 4.92 2.18 | |
| | 4.67 1.47 | 4.62 1.22 | | |

| HT=0.20 | HT=0.40 | HT=0.60 | HT=0.40 | HT=0.40 |
|---|---|---|---|---|
| HORIZ=4.50 | HORIZ=4.75 | HORIZ=0.00 | HORIZ=5.40 | HORIZ=5.60 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 5.02 1.79 | 5.02 1.54 | 5.02 1.51 | 5.02 1.84 | 5.02 1.78 |
| | 4.82 0.99 | 4.82 1.21 | 4.92 1.57 | 4.92 1.74 |
| | | 4.72 0.80 | | |

| HT=0.40 | HT= |
|---|---|
| HORIZ=5.80 | HORIZ= |
| VERT VELO | |
| 5.02 1.42 | |
| 4.92 1.53 | |

############ STATION = 60 TEMPERATURE = 65 F ############

| HT=0.20 | HT=0.20 | HT=0.40 | HT=0.40 | HT=0.20 |
|---|---|---|---|---|
| HORIZ=0.20 | HORIZ=0.40 | HORIZ=0.60 | HORIZ=0.00 | HORIZ=1.25 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 4.81 1.26 | 4.81 1.16 | 4.81 1.53 | 4.81 1.64 | 4.81 1.75 |
| | | 4.61 1.47 | 4.71 1.64 | |

| HT=0.20 | HT=0.40 | HT=0.60 | HT=0.60 | HT=0.40 |
|---|---|---|---|---|
| HORIZ=1.50 | HORIZ=1.75 | HORIZ=0.00 | HORIZ=2.25 | HORIZ=2.50 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 4.81 1.71 | 4.81 1.62 | 4.81 0.86 | 4.81 0.68 | 4.81 1.27 |
| | 4.61 1.52 | 4.61 1.26 | 4.61 1.09 | 4.61 1.67 |
| | | 4.51 0.99 | 4.51 0.32 | |

| HT=0.20 | HT=0.20 | HT=0.40 | HT=0.40 | HT=0.40 |
|---|---|---|---|---|
| HORIZ=2.75 | HORIZ=3.50 | HORIZ=3.75 | HORIZ=0.00 | HORIZ=4.25 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 4.81 1.67 | 4.81 1.16 | 4.81 1.39 | 4.81 1.24 | 4.81 1.60 |
| | | 4.71 1.32 | 4.71 1.23 | 4.71 1.51 |

| HT=0.40 | HT=0.20 | HT=0.20 | HT= |
|---|---|---|---|
| HORIZ=5.20 | HORIZ=5.40 | HORIZ=5.80 | HORIZ= |
| VERT VELO | VERT VELO | VERT VELO | |
| 4.81 1.77 | 4.81 1.84 | 4.81 1.77 | |
| 4.61 1.62 | | | |

RUN NUMBER: 5
METER EQUATION: V = 1.022R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 84 TEMPERATURE = 65 F ############

| HT=0.20 HORIZ=0.60 | | HT=0.40 HORIZ=0.80 | | HT=0.40 HORIZ=0.00 | | HT=0.40 HORIZ=1.25 | | HT=0.20 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.57 | 0.83 | 4.57 | 0.99 | 4.57 | 1.09 | 4.57 | 0.99 | 4.57 | 2.05 |
| | | 4.47 | 1.04 | 4.37 | 1.25 | 4.37 | 1.84 | | |

| HT=0.40 HORIZ=1.75 | | HT=0.60 HORIZ=0.00 | | HT=0.20 HORIZ=2.50 | | HT=0.40 HORIZ=2.75 | | HT=0.60 HORIZ=0.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.57 | 2.13 | 4.57 | 1.92 | 4.57 | 0.93 | 4.57 | 1.52 | 4.57 | 2.06 |
| 4.47 | 1.78 | 4.37 | 2.03 | | | 4.47 | 1.92 | 4.37 | 1.57 |
| | | 4.27 | 1.57 | | | | | 4.27 | 1.13 |

| HT=0.40 HORIZ=3.25 | | HT=0.20 HORIZ=0.00 | | HT=0.40 HORIZ=4.25 | | HT=0.40 HORIZ=4.50 | | HT=0.60 HORIZ=4.75 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.57 | 2.44 | 4.57 | 1.91 | 4.57 | 1.91 | 4.57 | 0.52 | 4.57 | 0.94 |
| 4.47 | 2.63 | | | 4.37 | 0.84 | 4.37 | 0.61 | 4.37 | 0.62 |
| | | | | | | | | 4.27 | 0.45 |

| HT=0.40 HORIZ=0.00 | | HT=0.40 HORIZ=5.20 | | HT=0.20 HORIZ=5.80 | | HT= HORIZ= | |
|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | | |
| 4.57 | 2.04 | 4.57 | 2.39 | 4.57 | 1.44 | | |
| 4.37 | 1.96 | 4.37 | 2.26 | | | | |

RUN NUMBER: 6
METER EQUATION: V = 1.027R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 24 TEMPERATURE = 65 F ############

| HT=1.34 HORIZ=0.20 | | HT=1.25 HORIZ=0.40 | | HT=1.19 HORIZ=0.60 | | HT=1.12 HORIZ=1.00 | | HT=1.36 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.94 | 3.12 | 5.94 | 3.66 | 5.94 | 3.93 | 5.94 | 4.02 | 5.94 | 4.47 |
| 5.74 | 3.21 | 5.74 | 3.91 | 5.74 | 4.32 | 5.74 | 4.39 | 5.74 | 4.64 |
| 5.54 | 2.95 | 5.54 | 3.69 | 5.54 | 4.39 | 5.54 | 4.59 | 5.54 | 4.18 |
| 5.34 | 2.24 | 5.34 | 3.16 | 5.34 | 4.00 | 5.34 | 4.37 | 5.34 | 3.46 |
| 5.14 | 1.30 | 5.14 | 2.50 | 5.14 | 3.50 | 5.14 | 3.91 | 5.14 | 2.67 |
| 4.93 | 0.71 | | | | | | | 4.94 | 0.67 |

| HT=1.23 HORIZ=2.01 | | HT=1.10 HORIZ=2.50 | | HT=1.18 HORIZ=3.00 | | HT=1.20 HORIZ=3.50 | | HT=1.12 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.94 | 4.39 | 5.94 | 4.29 | 5.94 | 4.51 | 5.94 | 4.73 | 5.93 | 4.62 |
| 5.74 | 4.23 | 5.74 | 4.22 | 5.74 | 4.74 | 5.74 | 4.85 | 5.74 | 4.76 |
| 5.54 | 3.45 | 5.54 | 3.51 | 5.54 | 4.40 | 5.54 | 4.47 | 5.54 | 4.28 |
| 5.34 | 2.92 | 5.34 | 2.65 | 5.34 | 3.88 | 5.34 | 4.09 | | |
| 5.14 | 2.20 | | | 5.14 | 3.83 | 5.14 | 3.79 | 5.14 | 2.65 |

| HT=1.44 HORIZ=4.50 | | HT=1.04 HORIZ=5.01 | | HT=1.23 HORIZ=5.40 | | HT=1.14 HORIZ=5.60 | | HT=1.11 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.94 | 4.47 | 5.90 | 4.14 | 5.94 | 3.69 | 5.94 | 3.41 | 5.94 | 3.11 |
| 5.74 | 4.80 | 5.74 | 4.29 | 5.74 | 3.93 | 5.73 | 3.64 | 5.74 | 3.30 |
| 5.54 | 4.45 | 5.54 | 4.34 | 5.54 | 3.64 | 5.54 | 3.58 | 5.54 | 3.25 |
| 5.34 | 4.19 | 5.34 | 3.93 | 5.34 | 2.59 | 5.33 | 2.74 | 5.34 | 2.79 |
| 5.14 | 2.02 | | | 5.14 | 1.59 | 5.14 | 1.63 | 5.14 | 2.00 |
| 4.94 | 1.25 | | | | | | | | |

############ STATION = 48 TEMPERATURE = 66 F ############

| HT=1.31 HORIZ=0.20 | | HT=1.29 HORIZ=0.40 | | HT=1.30 HORIZ=0.60 | | HT=1.31 HORIZ=1.00 | | HT=1.11 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.73 | 2.77 | 5.73 | 3.16 | 5.73 | 3.68 | 5.73 | 4.26 | 5.73 | 4.21 |
| 5.52 | 2.76 | 5.53 | 3.47 | 5.53 | 3.98 | 5.53 | 4.44 | 5.53 | 4.42 |
| 5.33 | 2.79 | 5.32 | 3.55 | 5.32 | 4.06 | 5.33 | 4.45 | 5.33 | 3.99 |
| 5.13 | 2.99 | 5.13 | 3.47 | 5.13 | 3.89 | 5.13 | 4.27 | 5.13 | 3.41 |
| 4.93 | 2.57 | 4.93 | 2.93 | 4.93 | 3.54 | 4.93 | 3.57 | 4.93 | 2.79 |
| 4.73 | 0.67 | | | | | 4.73 | 0.96 | | |

| HT=1.34 HORIZ=2.00 | | HT=1.02 HORIZ=2.50 | | HT=1.29 HORIZ=3.00 | | HT=0.90 HORIZ=3.50 | | HT=1.06 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.73 | 4.01 | 5.73 | 4.16 | 5.73 | 4.49 | 5.72 | 5.03 | 5.73 | 4.96 |
| 5.53 | 3.89 | 5.53 | 4.06 | 5.52 | 4.63 | 5.53 | 5.06 | 5.53 | 5.00 |
| 5.32 | 3.35 | 5.33 | 3.79 | 5.33 | 4.11 | 5.33 | 4.69 | 5.33 | 4.83 |
| 5.13 | 2.92 | 5.13 | 3.40 | 5.13 | 3.51 | 5.13 | 3.87 | 5.13 | 3.92 |
| 4.93 | 2.20 | | | 4.93 | 2.89 | | | | |
| 4.73 | 1.15 | | | | | | | | |

| HT=1.09 HORIZ=4.50 | | HT=1.13 HORIZ=5.00 | | HT=1.00 HORIZ=5.40 | | HT=1.25 HORIZ=5.60 | | HT=1.17 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.73 | 4.31 | 5.73 | 3.94 | 5.73 | 3.66 | 5.73 | 3.52 | 5.73 | 3.03 |
| 5.52 | 4.53 | 5.53 | 4.02 | 5.52 | 3.84 | 5.52 | 3.55 | 5.52 | 3.10 |
| 5.32 | 4.43 | 5.33 | 3.88 | 5.33 | 3.42 | 5.33 | 3.50 | 5.33 | 2.95 |
| 5.13 | 4.23 | 5.13 | 3.28 | 5.13 | 3.01 | 5.12 | 3.06 | 5.13 | 2.78 |
| | | 4.93 | 2.70 | | | 4.93 | 2.62 | 4.93 | 2.48 |

RUN NUMBER: 6
METER EQUATION: V = 1.027R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 72 TEMPERATURE = 67 F ############

| HT=1.21 HORIZ=0.20 | | HT=1.23 HORIZ=0.40 | | HT=1.33 HORIZ=0.61 | | HT=1.23 HORIZ=1.00 | | HT=0.95 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.57 | 3.27 | 5.57 | 3.38 | 5.57 | 3.53 | 5.57 | 3.77 | 5.57 | 4.01 |
| 5.37 | 3.19 | 5.37 | 3.81 | 5.37 | 4.06 | 5.37 | 4.03 | 5.37 | 4.08 |
| 5.17 | 3.02 | 5.17 | 3.88 | 5.17 | 4.02 | 5.17 | 4.09 | 5.17 | 3.91 |
| 4.97 | 2.83 | 4.97 | 3.55 | 4.97 | 3.93 | 4.97 | 4.03 | 4.98 | 3.49 |
| 4.77 | 2.50 | 4.77 | 3.17 | 4.77 | 3.51 | 4.77 | 2.17 | | |
| | | | | 4.57 | 2.45 | | | | |

| HT=1.10 HORIZ=2.00 | | HT=1.32 HORIZ=2.50 | | HT=1.42 HORIZ=3.00 | | HT=1.16 HORIZ=3.50 | | HT=1.35 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.57 | 4.11 | 5.57 | 3.94 | 5.57 | 4.28 | 5.57 | 4.69 | 5.57 | 4.66 |
| 5.37 | 3.73 | 5.37 | 3.62 | 5.37 | 4.33 | 5.37 | 4.65 | 5.37 | 4.71 |
| 5.17 | 3.44 | 5.17 | 3.49 | 5.17 | 3.88 | 5.17 | 4.52 | 5.17 | 4.57 |
| 4.98 | 2.96 | 4.98 | 3.01 | 4.97 | 3.37 | 4.97 | 4.26 | 4.97 | 4.17 |
| 4.77 | 2.58 | 4.77 | 2.26 | 4.77 | 2.86 | 4.77 | 3.76 | 4.77 | 3.03 |
| | | 4.57 | 0.71 | 4.57 | 2.53 | | | 4.57 | 1.12 |

| HT=1.04 HORIZ=4.50 | | HT=1.17 HORIZ=5.01 | | HT=1.27 HORIZ=5.40 | | HT=1.28 HORIZ=5.60 | | HT=1.30 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.57 | 4.13 | 5.57 | 3.66 | 5.57 | 3.31 | 5.57 | 3.03 | 5.57 | 2.84 |
| 5.37 | 4.27 | 5.37 | 3.84 | 5.37 | 3.71 | 5.37 | 3.41 | 5.37 | 3.22 |
| 5.17 | 4.03 | 5.17 | 3.55 | 5.17 | 3.74 | 5.17 | 3.70 | 5.17 | 3.24 |
| 4.97 | 3.50 | 4.97 | 2.87 | 4.97 | 3.56 | 4.97 | 3.27 | 4.97 | 2.91 |
| | | 4.77 | 1.99 | 4.77 | 3.20 | 4.77 | 2.53 | 4.77 | 2.07 |

############ STATION = 84 TEMPERATURE = 67 F ############

| HT=1.03 HORIZ=0.20 | | HT=1.04 HORIZ=0.40 | | HT=1.10 HORIZ=0.60 | | HT=1.37 HORIZ=1.00 | | HT=1.15 HORIZ=1.51 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.46 | 3.00 | 5.45 | 3.57 | 5.46 | 3.78 | 5.45 | 4.09 | 5.45 | 4.26 |
| 5.25 | 3.12 | 5.25 | 3.71 | 5.25 | 3.99 | 5.25 | 4.19 | 5.25 | 4.39 |
| 5.05 | 2.81 | 5.05 | 3.60 | 5.05 | 3.78 | 5.05 | 3.95 | 5.05 | 4.15 |
| 4.85 | 2.19 | 4.85 | 2.49 | 4.85 | 3.27 | 4.85 | 3.76 | 4.85 | 3.99 |
| | | | | | | 4.65 | 3.31 | 4.65 | 3.51 |
| | | | | | | 4.45 | 2.29 | | |

| HT=1.48 HORIZ=2.00 | | HT=1.13 HORIZ=2.50 | | HT=1.47 HORIZ=3.00 | | HT=1.02 HORIZ=3.50 | | HT=1.14 HORIZ=3.99 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.45 | 4.19 | 5.45 | 4.22 | 5.45 | 4.52 | 5.45 | 4.96 | 5.45 | 4.85 |
| 5.25 | 4.10 | 5.25 | 3.81 | 5.25 | 4.52 | 5.25 | 4.88 | 5.25 | 4.97 |
| 5.06 | 3.75 | 5.05 | 3.33 | 5.05 | 4.05 | 5.05 | 4.43 | 5.06 | 4.56 |
| 4.85 | 3.50 | 4.85 | 2.54 | 4.85 | 3.51 | 4.85 | 3.94 | 4.85 | 4.03 |
| 4.66 | 3.00 | 4.65 | 1.48 | 4.65 | 3.11 | | | 4.65 | 3.33 |
| 4.45 | 1.91 | | | 4.46 | 2.49 | | | | |

| HT=1.37 HORIZ=4.50 | | HT=1.42 HORIZ=5.01 | | HT=1.01 HORIZ=5.40 | | HT=1.04 HORIZ=5.60 | | HT=1.18 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.45 | 4.56 | 5.45 | 4.06 | 5.45 | 3.62 | 5.45 | 3.28 | 5.45 | 2.90 |
| 5.25 | 4.53 | 5.25 | 4.22 | 5.25 | 3.88 | 5.25 | 3.47 | 5.25 | 2.89 |
| 5.05 | 4.14 | 5.05 | 4.13 | 5.05 | 3.79 | 5.05 | 3.38 | 5.05 | 2.87 |
| 4.85 | 3.56 | 4.85 | 3.78 | 4.85 | 3.51 | 4.85 | 3.20 | 4.85 | 2.77 |
| 4.65 | 2.68 | 4.65 | 3.42 | | | | | 4.65 | 2.09 |
| 4.45 | 0.76 | 4.46 | 2.65 | | | | | | |

RUN NUMBER: 7
METER EQUATION: V = 1.027R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 24 TEMPERATURE = 64 F ############

| HT=0.92 | | HT=0.83 | | HT=0.77 | | HT=0.70 | | HT=0.94 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.01 | | HORIZ=1.51 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.52 | 1.79 | 5.52 | 2.29 | 5.52 | 2.75 | 5.52 | 3.30 | 5.52 | 3.51 |
| 5.33 | 1.59 | 5.32 | 2.22 | 5.33 | 2.96 | 5.33 | 3.44 | 5.32 | 3.06 |
| 5.13 | 0.92 | 5.13 | 1.97 | 5.12 | 2.78 | 5.12 | 3.11 | 5.12 | 2.42 |
| 4.93 | 0.56 | | | | | | | 4.92 | 0.41 |

| HT=0.82 | | HT=0.68 | | HT=0.76 | | HT=0.78 | | HT=0.71 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.01 | | HORIZ=3.51 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.52 | 3.36 | 5.52 | 2.93 | 5.52 | 3.60 | 5.52 | 3.47 | 5.52 | 3.48 |
| 5.33 | 2.93 | 5.32 | 2.08 | 5.33 | 3.49 | 5.32 | 3.25 | 5.32 | 3.29 |
| 5.12 | 2.15 | | | 5.12 | 3.06 | 5.12 | 3.05 | 5.12 | 2.14 |

| HT=1.02 | | HT=0.62 | | HT=0.82 | | HT=0.72 | | HT=0.70 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.51 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.61 | | HORIZ=5.81 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.32 | 3.41 | 5.52 | 3.02 | 5.52 | 2.63 | 5.52 | 2.55 | 5.52 | 2.37 |
| 5.33 | 3.51 | 5.32 | 2.87 | 5.32 | 1.90 | 5.32 | 2.13 | 5.32 | 2.45 |
| 5.12 | 1.58 | | | 5.12 | 1.02 | 5.12 | 1.29 | | |
| 4.93 | 1.18 | | | | | | | | |

############ STATION = 48 TEMPERATURE = 69 F ############

| HT=0.89 | | HT=0.87 | | HT=0.88 | | HT=0.89 | | HT=0.69 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.51 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.31 | 2.10 | 5.31 | 1.96 | 5.31 | 2.21 | 5.32 | 3.38 | 5.31 | 3.48 |
| 5.11 | 2.17 | 5.11 | 2.46 | 5.11 | 2.81 | 5.11 | 3.58 | 5.11 | 3.28 |
| 4.90 | 1.83 | 4.91 | 2.33 | 4.91 | 2.94 | 4.91 | 3.26 | | |

| HT=0.92 | | HT=0.60 | | HT=0.87 | | HT=0.49 | | HT=0.64 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.01 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.31 | 2.92 | 5.31 | 3.02 | 5.30 | 3.52 | 5.31 | 3.85 | 5.31 | 3.70 |
| 5.11 | 2.54 | 5.11 | 2.79 | 5.11 | 3.18 | | | 5.11 | 3.16 |
| 4.91 | 1.83 | | | 4.91 | 2.62 | | | | |
| 4.71 | 0.95 | | | | | | | | |

| HT=0.67 | | HT=0.71 | | HT=0.58 | | HT=0.84 | | HT=0.75 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.61 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.31 | 3.48 | 5.30 | 3.00 | 5.30 | 2.87 | 5.31 | 2.63 | 5.31 | 2.25 |
| 5.11 | 3.39 | 5.11 | 2.63 | 5.11 | 2.71 | 5.11 | 2.93 | 5.12 | 2.68 |
| | | 4.91 | 1.99 | | | 4.91 | 2.76 | 4.91 | 2.46 |

RUN NUMBER: 7
METER EQUATION: V = 1.027R + 0.074

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 72 TEMPERATURE = 69 F ############

| HT=0.78 | | HT=0.79 | | HT=0.89 | | HT=0.79 | | HT=0.51 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.21 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=0.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.13 | 2.21 | 5.12 | 2.49 | 5.13 | 2.62 | 5.13 | 3.17 | 5.13 | 3.26 |
| 4.93 | 2.10 | 4.93 | 2.71 | 4.93 | 2.94 | 4.93 | 3.20 | 4.93 | 2.91 |
| 4.73 | 2.14 | 4.73 | 2.61 | 4.73 | 2.80 | 4.73 | 1.22 | | |

| HT=0.66 | | HT=0.88 | | HT=0.98 | | HT=0.72 | | HT=0.91 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=0.00 | | HORIZ=3.50 | | HORIZ=4.01 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.14 | 3.00 | 5.14 | 3.05 | 5.13 | 3.27 | 5.14 | 3.64 | 5.12 | 3.66 |
| 4.93 | 2.59 | 4.93 | 2.60 | 4.93 | 2.96 | 4.93 | 3.54 | 4.93 | 3.37 |
| | | 4.73 | 1.91 | 4.73 | 2.43 | 4.73 | 3.11 | 4.73 | 2.55 |
| | | | | 4.53 | 2.05 | | | 4.53 | 1.03 |

| HT=0.60 | | HT=0.73 | | HT=0.83 | | HT=0.84 | | HT=0.86 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.49 | | HORIZ=5.01 | | HORIZ=5.40 | | HORIZ=5.56 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.14 | 3.32 | 5.14 | 3.18 | 5.14 | 2.82 | 5.14 | 2.68 | 5.13 | 2.45 |
| 4.93 | 2.70 | 4.93 | 2.69 | 4.93 | 3.11 | 4.93 | 2.99 | 4.93 | 2.45 |
| | | 4.73 | 2.03 | 4.73 | 3.10 | 4.73 | 2.38 | 4.73 | 1.77 |

RUN NUMBER: 8A
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 24 TEMPERATURE = 68 F ############

| HT=0.40 HORIZ=0.20 | | HT=0.40 HORIZ=0.40 | | HT=0.40 HORIZ=0.60 | | HT=0.20 HORIZ=0.00 | | HT=0.40 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.11 | 1.32 | 5.11 | 1.64 | 5.11 | 2.00 | 5.11 | 2.30 | 5.11 | 1.85 |
| 4.91 | 0.58 | 4.91 | 1.17 | 4.95 | 1.59 | | | 4.91 | 0.29 |

| HT=0.40 HORIZ=0.00 | | HT=0.20 HORIZ=2.50 | | HT=0.20 HORIZ=0.00 | | HT=0.20 HORIZ=3.50 | | HT=0.20 HORIZ=0.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.11 | 1.61 | 5.11 | 1.08 | 5.11 | 1.59 | 5.11 | 2.11 | 5.11 | 1.48 |
| 4.93 | 1.19 | | | | | | | | |

| HT=0.60 HORIZ=4.50 | | HT=0.20 HORIZ=5.00 | | HT=0.40 HORIZ=5.40 | | HT=0.20 HORIZ=5.60 | | HT=0.20 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.11 | 0.79 | 5.15 | 1.38 | 5.11 | 0.52 | 5.11 | 0.77 | 5.11 | 1.41 |
| 4.91 | 1.01 | | | 4.95 | 0.66 | | | | |
| 4.76 | 0.50 | | | | | | | | |

############ STATION = 48 TEMPERATURE = 68 F ############

| HT=0.40 HORIZ=0.20 | | HT=0.40 HORIZ=0.40 | | HT=0.40 HORIZ=0.60 | | HT=0.40 HORIZ=1.00 | | HT=0.20 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.91 | 1.45 | 4.91 | 1.47 | 4.91 | 1.70 | 4.91 | 1.97 | 4.91 | 1.66 |
| 4.71 | 0.44 | 4.71 | 1.54 | 4.71 | 1.89 | 4.71 | 0.44 | | |

| HT=0.40 HORIZ=2.00 | | HT=0.20 HORIZ=2.50 | | HT=0.40 HORIZ=3.00 | | HT=0.10 HORIZ=3.50 | | HT=0.20 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.91 | 1.41 | 4.94 | 1.78 | 4.91 | 1.48 | | | 4.92 | 1.52 |
| 4.71 | 0.77 | | | 4.71 | 0.59 | | | | |

| HT=0.20 HORIZ=4.50 | | HT=0.20 HORIZ=5.00 | | HT=0.20 HORIZ=5.40 | | HT=0.40 HORIZ=5.60 | | HT=0.20 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.91 | 1.83 | 4.91 | 1.60 | 4.95 | 1.61 | 4.91 | 1.68 | 4.91 | 1.38 |
| | | | | | | 4.71 | 1.84 | | |

RUN NUMBER: 8A
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 72 TEMPERATURE = 68 F ############

| HT=0.40 HORIZ=0.20 VERT | VELO | HT=0.20 HORIZ=0.40 VERT | VELO | HT=0.40 HORIZ=0.60 VERT | VELO | HT=0.20 HORIZ=1.00 VERT | VELO | HT=0.10 HORIZ=1.50 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.73 | 1.31 | 4.73 | 1.50 | 4.73 | 1.73 | 4.73 | 0.73 | | |
| 4.56 | 1.31 | | | 4.53 | 1.50 | | | | |

| HT=0.20 HORIZ=2.00 VERT | VELO | HT=0.40 HORIZ=2.50 VERT | VELO | HT=0.60 HORIZ=3.00 VERT | VELO | HT=0.20 HORIZ=3.50 VERT | VELO | HT=0.40 HORIZ=4.00 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.73 | 1.53 | 4.73 | 0.95 | 4.73 | 1.87 | 4.73 | 1.78 | 4.73 | 1.43 |
| | | 4.53 | 0.44 | 4.53 | 1.26 | | | 4.53 | 0.57 |
| | | | | 4.40 | 0.84 | | | | |

| HT=0.20 HORIZ=4.50 VERT | VELO | HT=0.20 HORIZ=5.00 VERT | VELO | HT=0.40 HORIZ=5.40 VERT | VELO | HT=0.40 HORIZ=5.60 VERT | VELO | HT=0.40 HORIZ=5.80 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.74 | 1.18 | 4.73 | 1.15 | 4.73 | 1.87 | 4.73 | 1.28 | 4.73 | 1.28 |
| | | | | 4.55 | 1.74 | 4.53 | 0.76 | 4.53 | 0.77 |

############ STATION = 84 TEMPERATURE = 68 F ############

| HT=0.10 HORIZ=0.20 VERT | VELO | HT=0.10 HORIZ=0.40 VERT | VELO | HT=0.20 HORIZ=0.60 VERT | VELO | HT=0.40 HORIZ=1.00 | | HT=0.20 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 4.62 | 0.58 | 4.62 | 0.73 | 4.62 | 1.84 |
| | | | | | | 4.42 | 0.91 | | |

| HT=0.60 HORIZ=2.00 VERT | VELO | HT=0.20 HORIZ=2.50 VERT | VELO | HT=0.60 HORIZ=3.00 VERT | VELO | HT=0.10 HORIZ=3.50 VERT | VELO | HT=0.20 HORIZ=4.00 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.62 | 1.87 | 4.62 | 0.70 | 4.62 | 2.01 | | | 4.62 | 1.64 |
| 4.42 | 1.75 | | | 4.42 | 1.57 | | | | |
| 4.22 | 0.68 | | | 4.25 | 0.78 | | | | |

| HT=0.40 HORIZ=4.50 VERT | VELO | HT=0.60 HORIZ=5.00 VERT | VELO | HT=0.20 HORIZ=5.40 VERT | VELO | HT=0.10 HORIZ=5.60 VERT | VELO | HT=0.20 HORIZ=5.80 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.62 | 0.95 | 4.62 | 1.83 | 4.62 | 1.37 | | | 4.62 | 1.19 |
| 4.42 | 0.47 | 4.42 | 1.86 | | | | | | |
| | | 4.27 | 1.60 | | | | | | |

RUN NUMBER: 12
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0130
ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 64 F ############

| HT=1.12 | | HT=1.11 | | HT=1.16 | | HT=0.86 | | HT=0.98 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.44 | 3.50 | 5.44 | 3.90 | 5.44 | 4.19 | 5.44 | 4.73 | 5.44 | 5.52 |
| 5.24 | 3.76 | 5.25 | 4.39 | 5.24 | 4.84 | 5.25 | 5.30 | 5.25 | 5.41 |
| 5.04 | 3.74 | 5.05 | 4.63 | 5.04 | 5.05 | 5.04 | 5.43 | 5.04 | 4.56 |
| 4.84 | 3.70 | 4.84 | 4.22 | 4.85 | 4.48 | | | 4.84 | 4.01 |
| 4.65 | 2.98 | 4.64 | 3.14 | 4.84 | 3.69 | | | | |

| HT=0.95 | | HT=1.01 | | HT=1.10 | | HT=1.36 | | HT=0.93 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.51 | | HORIZ=3.01 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.44 | 4.90 | 5.44 | 4.80 | 5.44 | 5.58 | 5.44 | 6.25 | 5.44 | 6.62 |
| 5.24 | 4.71 | 5.24 | 4.64 | 5.24 | 5.70 | 5.24 | 6.23 | 5.24 | 6.16 |
| 5.04 | 3.76 | 5.04 | 4.27 | 5.04 | 5.42 | 5.04 | 5.96 | 5.04 | 5.72 |
| 4.84 | 3.17 | 4.84 | 3.97 | 4.84 | 5.08 | 4.84 | 5.42 | 4.84 | 5.56 |
| | | | | | | 4.64 | 3.77 | | |
| | | | | | | 4.44 | 2.30 | | |

| HT=0.92 | | HT=1.20 | | HT=1.06 | | HT=1.01 | | HT=1.04 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.61 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.44 | 5.39 | 5.44 | 4.37 | 5.44 | 3.59 | 5.44 | 3.15 | 5.44 | 2.72 |
| 5.24 | 5.77 | 5.24 | 4.87 | 5.24 | 4.05 | 5.24 | 3.68 | 5.24 | 3.23 |
| 5.04 | 5.25 | 5.04 | 4.24 | 5.04 | 4.22 | 5.04 | 4.11 | 5.04 | 3.74 |
| 4.84 | 4.53 | 4.84 | 3.67 | 4.84 | 3.58 | 4.84 | 4.01 | 4.84 | 3.77 |
| | | 4.64 | 2.97 | | | | | | |

############ STATION = 72 TEMPERATURE = 66 F ############

| HT=1.02 | | HT=1.04 | | HT=1.14 | | HT=1.00 | | HT=0.79 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.51 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.94 | 3.76 | 4.94 | 3.99 | 4.94 | 4.24 | 4.95 | 4.64 | 4.95 | 5.14 |
| 4.74 | 3.96 | 4.74 | 4.64 | 4.74 | 4.87 | 4.74 | 5.17 | 4.74 | 5.16 |
| 4.55 | 3.68 | 4.54 | 4.63 | 4.54 | 5.12 | 4.54 | 5.13 | 4.54 | 4.78 |
| 4.35 | 3.39 | 4.35 | 4.48 | 4.34 | 4.77 | 4.34 | 3.56 | | |
| | | | | 4.15 | 3.48 | | | | |

| HT=0.98 | | HT=1.01 | | HT=1.25 | | HT=0.98 | | HT=1.16 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.51 | | HORIZ=3.01 | | HORIZ=3.51 | | HORIZ=4.01 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.94 | 4.67 | 4.94 | 4.88 | 4.95 | 5.42 | 4.94 | 6.58 | 4.95 | 6.67 |
| 4.74 | 4.70 | 4.74 | 4.53 | 4.74 | 5.28 | 4.74 | 6.16 | 4.74 | 6.26 |
| 4.54 | 3.98 | 4.54 | 4.18 | 4.54 | 4.86 | 4.54 | 5.64 | 4.54 | 5.71 |
| 4.34 | 3.39 | 4.34 | 3.57 | 4.34 | 4.02 | 4.34 | 5.21 | 4.35 | 4.50 |
| | | | | 4.14 | 3.51 | | | 4.14 | 1.86 |

| HT=0.89 | | HT=0.98 | | HT=1.08 | | HT=1.09 | | HT=1.11 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.51 | | HORIZ=5.01 | | HORIZ=5.41 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.95 | 5.55 | 4.95 | 4.70 | 4.94 | 3.93 | 4.94 | 3.67 | 4.95 | 3.42 |
| 4.74 | 5.25 | 4.74 | 4.80 | 4.75 | 4.51 | 4.75 | 4.38 | 4.74 | 4.00 |
| 4.54 | 4.64 | 4.55 | 4.04 | 4.55 | 4.70 | 4.55 | 4.53 | 4.55 | 3.90 |
| | | 4.34 | 3.07 | 4.34 | 4.52 | 4.35 | 3.84 | 4.35 | 3.19 |
| | | | | | | | | 4.15 | 1.08 |

RUN NUMBER: 13
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0130
ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 66 F ############

| HT=0.10 | | HT=0.73 | | HT=0.78 | | HT=0.48 | | HT=0.61 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.200 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| | | 5.07 | 2.72 | 5.07 | 3.22 | 5.07 | 3.87 | 5.07 | 3.59 |
| | | 4.87 | 3.08 | 4.87 | 3.37 | | | 4.86 | 3.30 |
| | | 4.66 | 2.50 | 4.66 | 1.57 | | | | |

| HT=0.57 | | HT=0.64 | | HT=0.72 | | HT=0.99 | | HT=0.55 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.07 | 3.23 | 5.06 | 3.62 | 5.06 | 4.52 | 5.07 | 4.48 | 5.06 | 4.53 |
| 4.87 | 2.66 | 4.87 | 3.37 | 4.86 | 4.43 | 4.87 | 4.29 | 4.86 | 4.34 |
| | | | | 4.66 | 1.35 | 4.66 | 3.33 | | |
| | | | | | | 4.46 | 2.12 | | |

| HT=0.54 | | HT=0.83 | | HT=0.68 | | HT=0.64 | | HT=0.67 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.07 | 4.40 | 5.07 | 3.71 | 5.06 | 3.39 | 5.06 | 2.61 | 5.06 | 1.98 |
| 4.87 | 4.01 | 4.87 | 3.09 | 4.87 | 3.34 | 4.87 | 3.28 | 4.87 | 2.96 |
| | | 4.66 | 2.58 | | | | | | |

############ STATION = 72 TEMPERATURE = 66 F ############

| HT=0.66 | | HT=0.68 | | HT=0.78 | | HT=0.64 | | HT=0.43 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.59 | 2.91 | 4.58 | 3.16 | 4.58 | 3.28 | 4.58 | 3.98 | 4.58 | 3.86 |
| 4.39 | 2.72 | 4.38 | 3.25 | 4.38 | 3.60 | 4.38 | 3.44 | | |
| | | | | 4.18 | 3.32 | | | | |

| HT=0.62 | | HT=0.65 | | HT=0.89 | | HT=0.61 | | HT=0.80 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.58 | 3.56 | 4.58 | 3.98 | 4.58 | 4.09 | 4.58 | 4.27 | 4.58 | 4.18 |
| 4.39 | 3.15 | 4.39 | 3.72 | 4.38 | 3.48 | 4.38 | 4.30 | 4.38 | 3.97 |
| | | | | 4.18 | 2.94 | | | 4.18 | 2.06 |

| HT=0.52 | | HT=0.61 | | HT=0.71 | | HT=0.73 | | HT=0.75 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.81 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.58 | 3.55 | 4.58 | 3.82 | 4.58 | 3.59 | 4.58 | 3.14 | 4.58 | 2.83 |
| 4.39 | 2.77 | 4.38 | 3.12 | 4.39 | 3.83 | 4.38 | 3.35 | 4.38 | 2.91 |
| | | | | 4.18 | 3.82 | 4.18 | 2.45 | 4.18 | 1.23 |

RUN NUMBER: 13C
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0130
ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 70 F ############

| HT=0.40 HORIZ=0.20 VERT | VELO | HT=0.40 HORIZ=0.40 VERT | VELO | HT=0.40 HORIZ=0.60 VERT | VELO | HT=0.10 HORIZ=1.00 VERT | VELO | HT=0.20 HORIZ=1.50 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.72 | 1.59 | 4.72 | 1.65 | 4.72 | 0.86 | | | 4.72 | 1.72 |
| 4.52 | 1.28 | 4.56 | 1.37 | 4.52 | 0.80 | | | | |

| HT=0.20 HORIZ=2.00 VERT | VELO | HT=0.20 HORIZ=2.50 VERT | VELO | HT=0.40 HORIZ=3.00 VERT | VELO | HT=0.60 HORIZ=3.50 VERT | VELO | HT=0.20 HORIZ=4.00 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.72 | 1.76 | 4.72 | 2.36 | 4.72 | 2.76 | 4.72 | 2.41 | 4.72 | 2.82 |
| | | | | 4.55 | 1.03 | 4.52 | 1.71 | | |
| | | | | | | 4.32 | 0.75 | | |

| HT=0.10 HORIZ=4.50 VERT | VELO | HT=0.40 HORIZ=5.00 VERT | VELO | HT=0.40 HORIZ=5.40 VERT | VELO | HT=0.20 HORIZ=5.60 VERT | VELO | HT=0.40 HORIZ=5.80 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| | | 4.72 | 1.87 | 4.72 | 2.12 | 4.72 | 2.00 | 4.72 | 1.66 |
| | | 4.52 | 1.33 | 4.62 | 1.81 | | | 4.62 | 1.62 |

############ STATION = 72 TEMPERATURE = 70 F ############

| HT=0.40 HORIZ=0.20 VERT | VELO | HT=0.40 HORIZ=0.40 VERT | VELO | HT=0.40 HORIZ=0.60 VERT | VELO | HT=0.40 HORIZ=0.00 VERT | VELO | HT=0.10 HORIZ=0.00 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.26 | 1.90 | 4.26 | 2.15 | 4.26 | 2.19 | 4.26 | 1.00 | | |
| 4.16 | 1.95 | 4.15 | 2.03 | 4.06 | 1.78 | 4.16 | 0.69 | | |

| HT=0.20 HORIZ=0.00 VERT | VELO | HT=0.40 HORIZ=2.50 VERT | VELO | HT=0.60 HORIZ=0.00 VERT | VELO | HT=0.20 HORIZ=3.50 VERT | VELO | HT=0.40 HORIZ=0.00 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| 4.26 | 1.83 | 4.26 | 1.68 | 4.26 | 1.72 | 4.26 | 2.20 | 4.26 | 1.66 |
| | | 4.16 | 1.20 | 4.06 | 1.60 | | | 4.06 | 0.65 |
| | | | | 3.96 | 1.27 | | | | |

| HT=0.10 HORIZ=**** VERT | VELO | HT=0.20 HORIZ=0.00 VERT | VELO | HT=0.40 HORIZ=5.40 VERT | VELO | HT=0.40 HORIZ=5.60 VERT | VELO | HT=0.40 HORIZ=5.80 VERT | VELO |
|---|---|---|---|---|---|---|---|---|---|
| | | 4.26 | 1.34 | 4.26 | 2.27 | 4.26 | 1.40 | 4.26 | 1.61 |
| | | | | 4.12 | 2.11 | 4.10 | 0.73 | 4.08 | 0.89 |

RUN NUMBER: 16A
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 70 F ############

| HT=0.40 | HT=0.40 | HT=0.40 | HT=0.10 | HT=0.10 |
|---|---|---|---|---|
| HORIZ=0.20 | HORIZ=0.40 | HORIZ=0.60 | HORIZ= ?? | HORIZ= ?? |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 4.42 1.77 | 4.42 1.97 | 4.42 0.55 | | |
| 4.32 1.73 | | 4.32 0.80 | | |

| HT=0.10 | HT=0.20 | HT=0.10 | HT=0.20 | HT=0.40 |
|---|---|---|---|---|
| HORIZ= ?? | HORIZ=2.25 | HORIZ= ?? | HORIZ=3.00 | HORIZ=3.50 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |

| HT=0.10 | HT=0.10 | HT=0.40 | HT=0.40 | HT=0.20 |
|---|---|---|---|---|
| HORIZ= ?? | HORIZ= ?? | HORIZ=4.75 | HORIZ=5.00 | HORIZ=5.40 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| | | 4.42 2.13 | 4.42 2.00 | 4.42 1.46 |
| | | 4.32 1.79 | 4.32 1.82 | |

| HT=0.20 | HT=0.20 | HT= |
|---|---|---|
| HORIZ=5.60 | HORIZ=5.80 | HORIZ= |
| VERT VELO | VERT VELO | |
| 4.42 1.92 | 4.42 1.80 | |

############ STATION = 72 TEMPERATURE = 70 F ############

| HT=0.20 | HT=0.20 | HT=0.40 | HT=0.20 | HT=0.10 |
|---|---|---|---|---|
| HORIZ=0.20 | HORIZ=0.40 | HORIZ=0.60 | HORIZ=1.00 | HORIZ=1.50 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 3.81 2.02 | 3.81 2.11 | 3.81 2.15 | 3.81 1.12 | |
| | | 3.71 1.84 | | |

| HT=0.20 | HT=0.20 | HT=0.60 | HT=0.20 | HT=0.40 |
|---|---|---|---|---|
| HORIZ=2.00 | HORIZ=2.50 | HORIZ=3.00 | HORIZ=3.50 | HORIZ=4.00 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| 3.81 1.52 | 3.81 2.18 | 3.81 1.93 | 3.81 1.95 | 3.81 0.72 |
| | | 3.61 1.60 | | 3.61 0.95 |
| | | 3.50 0.78 | | |

| HT=0.10 | HT=0.20 | HT=0.40 | HT=0.40 | HT=0.40 |
|---|---|---|---|---|
| HORIZ=4.50 | HORIZ=5.00 | HORIZ=5.40 | HORIZ=5.60 | HORIZ=5.80 |
| VERT VELO | VERT VELO | VERT VELO | VERT VELO | VERT VELO |
| | 3.81 0.82 | 3.81 2.34 | 3.81 1.13 | 3.81 0.95 |
| | | 3.71 2.20 | 3.71 0.91 | 3.71 1.06 |

RUN NUMBER: 16F
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 1

############ STATION = 36 TEMPERATURE = 69 F ############

| HT=0.69 | | HT=0.67 | | HT=0.72 | | HT=0.42 | | HT=0.57 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.79 | 2.48 | 4.79 | 2.73 | 4.79 | 3.42 | 4.79 | 4.16 | 4.79 | 3.52 |
| 4.60 | 2.76 | 4.59 | 3.07 | 4.59 | 3.53 | | | 4.59 | 3.31 |
| | | | | 4.39 | 1.65 | | | | |

| HT=0.52 | | HT=0.60 | | HT=0.74 | | HT=0.92 | | HT=0.49 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.49 | | HORIZ=4.01 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.79 | 3.60 | 4.79 | 4.04 | 4.79 | 4.99 | 4.79 | 4.84 | 4.79 | 4.43 |
| 4.59 | 2.70 | 4.59 | 3.77 | 4.59 | 4.81 | 4.59 | 4.89 | | |
| | | | | 4.40 | 1.26 | 4.39 | 3.61 | | |
| | | | | | | 4.19 | 2.32 | | |

| HT=0.50 | | HT=0.73 | | HT=0.61 | | HT=0.58 | | HT=0.62 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.01 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.79 | 3.96 | 4.79 | 3.67 | 4.79 | 3.84 | 4.79 | 3.16 | 4.79 | 2.16 |
| 4.59 | 3.56 | 4.59 | 3.22 | 4.59 | 3.71 | 4.59 | 3.66 | 4.59 | 3.38 |
| | | 4.39 | 2.62 | | | | | | |

############ STATION = 72 TEMPERATURE = 70 F ############

| HT=0.63 | | HT=0.65 | | HT=0.75 | | HT=0.63 | | HT=0.36 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.18 | 2.64 | 4.17 | 2.93 | 4.17 | 3.18 | 4.18 | 4.22 | 4.17 | 3.88 |
| 3.97 | 2.39 | 3.98 | 3.03 | 3.97 | 3.47 | 3.97 | 3.65 | | |
| | | | | 3.77 | 3.21 | | | | |

| HT=0.59 | | HT=0.60 | | HT=0.85 | | HT=0.58 | | HT=0.77 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.01 | | HORIZ=2.51 | | HORIZ=3.00 | | HORIZ=3.51 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.18 | 3.50 | 4.17 | 4.08 | 4.17 | 4.18 | 4.17 | 4.31 | 4.17 | 4.46 |
| 3.97 | 3.07 | 3.97 | 3.86 | 3.97 | 4.03 | 3.97 | 4.02 | 3.97 | 3.81 |
| | | | | 3.77 | 3.32 | | | 3.77 | 1.57 |

| HT=0.49 | | HT=0.58 | | HT=0.67 | | HT=0.68 | | HT=0.71 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.17 | 3.38 | 4.17 | 3.58 | 4.17 | 3.73 | 4.17 | 3.14 | 4.17 | 2.67 |
| | | 3.97 | 2.96 | 3.97 | 3.82 | 3.97 | 3.27 | 3.98 | 2.61 |
| | | | | | | | | 3.78 | 1.00 |

RUN NUMBER: 16H
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 1

############ STATION = 0 TEMPERATURE = 69 F ############

| HT=1.41 | | HT=1.36 | | HT=1.36 | | HT=1.53 | | HT=1.33 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.01 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.87 | 3.93 | 5.87 | 4.12 | 5.87 | 4.14 | 5.87 | 4.08 | 5.87 | 3.80 |
| 5.67 | 3.86 | 5.67 | 4.06 | 5.67 | 4.01 | 5.67 | 3.91 | 5.68 | 3.72 |
| 5.48 | 3.57 | 5.47 | 3.91 | 5.48 | 3.89 | 5.47 | 3.83 | 5.47 | 3.41 |
| 5.27 | 3.12 | 5.27 | 3.41 | 5.27 | 3.57 | 5.27 | 3.69 | 5.27 | 3.29 |
| 5.07 | 2.60 | 5.07 | 3.48 | 5.07 | 3.38 | 5.08 | 3.47 | 5.07 | 3.17 |
| 4.87 | 2.23 | 4.87 | 2.99 | 4.87 | 3.10 | 4.88 | 3.38 | 4.88 | 2.99 |
| | | | | | | 4.67 | 2.79 | | |

| HT=1.33 | | HT=1.43 | | HT=1.30 | | HT=1.40 | | HT=1.49 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.88 | 3.84 | 5.88 | 4.01 | 5.87 | 4.06 | 5.87 | 4.14 | 5.87 | 4.03 |
| 5.67 | 3.61 | 5.67 | 3.69 | 5.67 | 3.90 | 5.67 | 4.07 | 5.67 | 3.81 |
| 5.47 | 3.27 | 5.48 | 3.44 | 5.47 | 3.76 | 5.47 | 3.80 | 5.47 | 3.63 |
| 5.27 | 2.91 | 5.27 | 3.18 | 5.27 | 3.54 | 5.27 | 3.47 | 5.27 | 3.20 |
| 5.07 | 2.65 | 5.08 | 3.02 | 5.08 | 3.11 | 5.07 | 3.17 | 5.07 | 3.08 |
| 4.88 | 1.75 | 4.88 | 2.50 | | | 4.87 | 2.81 | 4.88 | 2.71 |

| HT=1.41 | | HT=1.53 | | HT=1.40 | | HT=1.41 | | HT=1.43 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.87 | 3.90 | 5.88 | 3.92 | 5.87 | 3.80 | 5.87 | 3.68 | 5.87 | 3.43 |
| 5.67 | 3.67 | 5.67 | 3.88 | 5.67 | 3.88 | 5.68 | 3.67 | 5.67 | 3.58 |
| 5.47 | 3.44 | 5.47 | 3.58 | 5.47 | 3.75 | 5.47 | 3.57 | 5.47 | 3.40 |
| 5.27 | 3.23 | 5.27 | 3.41 | 5.27 | 3.29 | 5.27 | 3.40 | 5.27 | 3.25 |
| 5.07 | 3.04 | 5.07 | 2.91 | 5.08 | 3.09 | 5.08 | 3.13 | 5.07 | 3.04 |
| 4.87 | 2.34 | 4.87 | 2.31 | 4.88 | 2.64 | 4.87 | 2.92 | 4.88 | 2.70 |
| | | 4.67 | 1.65 | | | | | | |

############ STATION = 36 TEMPERATURE = 70 F ############

| HT=1.05 | | HT=1.03 | | HT=1.08 | | HT=0.78 | | HT=0.93 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.15 | 3.57 | 5.15 | 4.04 | 5.15 | 4.27 | 5.15 | 4.82 | 5.15 | 5.66 |
| 4.95 | 3.98 | 4.95 | 4.67 | 4.95 | 5.06 | 4.95 | 5.45 | 4.95 | 5.17 |
| 4.75 | 3.82 | 4.75 | 4.75 | 4.75 | 5.21 | 4.75 | 5.68 | 4.75 | 4.78 |
| 4.55 | 3.74 | 4.55 | 4.11 | 4.55 | 3.93 | | | 4.55 | 4.13 |

| HT=0.88 | | HT=0.96 | | HT=1.10 | | HT=1.28 | | HT=0.85 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.15 | 5.31 | 5.15 | 5.32 | 5.15 | 6.66 | 5.15 | 7.63 | 5.15 | 7.72 |
| 4.95 | 4.60 | 4.95 | 4.85 | 4.95 | 5.95 | 4.95 | 6.66 | 4.95 | 6.51 |
| 4.75 | 3.85 | 4.75 | 4.35 | 4.75 | 5.67 | 4.75 | 6.38 | 4.75 | 5.98 |
| | | 4.55 | 3.99 | 4.55 | 5.44 | 4.55 | 5.67 | | |
| | | | | | | 4.35 | 3.28 | | |

| HT=0.86 | | HT=1.09 | | HT=0.97 | | HT=0.94 | | HT=0.97 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.15 | 6.44 | 5.15 | 5.11 | 5.15 | 4.06 | 5.15 | 3.50 | 5.15 | 3.00 |
| 4.95 | 5.95 | 4.95 | 5.26 | 4.95 | 4.60 | 4.95 | 4.34 | 4.95 | 3.64 |
| 4.75 | 5.26 | 4.75 | 4.44 | 4.75 | 4.64 | 4.75 | 4.71 | 4.75 | 4.24 |
| | | 4.55 | 3.89 | 4.55 | 3.85 | 4.55 | 4.13 | 4.55 | 4.28 |

RUN NUMBER: 16H
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 1

############ STATION = 48 TEMPERATURE = 70 F ############

| HT=1.06 | | HT=1.04 | | HT=1.01 | | HT=1.04 | | HT=0.91 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.90 | 3.33 | 4.90 | 3.37 | 4.90 | 3.88 | 4.90 | 6.23 | 4.90 | 6.01 |
| 4.71 | 3.86 | 4.71 | 4.12 | 4.71 | 4.66 | 4.70 | 6.01 | 4.71 | 5.92 |
| 4.50 | 4.01 | 4.50 | 4.68 | 4.50 | 5.31 | 4.50 | 6.11 | 4.51 | 5.59 |
| 4.31 | 3.09 | 4.30 | 4.31 | 4.31 | 5.24 | 4.31 | 5.39 | 4.30 | 4.73 |

| HT=1.12 | | HT=0.78 | | HT=1.00 | | HT=0.68 | | HT=0.80 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.01 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.90 | 5.65 | 4.90 | 5.71 | 4.90 | 7.05 | 4.90 | 8.00 | 4.90 | 7.96 |
| 4.70 | 4.77 | 4.70 | 5.11 | 4.70 | 5.95 | 4.70 | 6.91 | 4.70 | 6.83 |
| 4.50 | 4.44 | 4.50 | 4.39 | 4.51 | 4.83 | | | 4.50 | 5.96 |
| | | | | 4.30 | 3.82 | | | | |
| 4.10 | 1.49 | | | | | | | | |

| HT=0.89 | | HT=0.91 | | HT=0.76 | | HT=0.87 | | HT=0.92 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.90 | 7.14 | 4.90 | 6.12 | 4.90 | 5.08 | 4.90 | 4.64 | 4.90 | 4.23 |
| 4.71 | 6.29 | 4.70 | 5.45 | 4.70 | 5.30 | 4.70 | 5.12 | 4.70 | 4.42 |
| 4.50 | 5.75 | 4.50 | 5.05 | 4.50 | 4.82 | 4.50 | 4.95 | 4.50 | 4.20 |
| | | 4.30 | 4.08 | | | | | 4.30 | 3.75 |

############ STATION = 60 TEMPERATURE = 70 F ############

| HT=0.85 | | HT=0.84 | | HT=1.10 | | HT=1.07 | | HT=1.04 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.41 | | HORIZ=0.60 | | HORIZ=1.01 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.70 | 3.14 | 4.70 | 3.66 | 4.70 | 4.29 | 4.70 | 5.78 | 4.70 | 6.61 |
| 4.51 | 3.49 | 4.50 | 4.29 | 4.50 | 5.03 | 4.50 | 5.82 | 4.50 | 5.81 |
| 4.30 | 3.63 | 4.30 | 4.64 | 4.30 | 5.23 | 4.30 | 5.54 | 4.30 | 5.46 |
| | | | | 4.10 | 4.76 | 4.10 | 4.81 | 4.10 | 4.36 |

| HT=1.11 | | HT=1.03 | | HT=0.77 | | HT=0.85 | | HT=0.99 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.70 | 6.43 | 4.70 | 6.41 | 4.70 | 6.79 | 4.70 | 6.78 | 4.70 | 6.79 |
| 4.50 | 4.96 | 4.51 | 5.07 | 4.50 | 6.03 | 4.50 | 6.16 | 4.50 | 6.01 |
| 4.30 | 3.35 | 4.30 | 4.32 | 4.31 | 5.63 | 4.31 | 5.08 | 4.30 | 5.24 |
| 4.10 | 2.09 | 4.10 | 3.91 | | | | | 4.10 | 4.25 |
| 3.91 | 2.05 | | | | | | | | |

| HT=0.82 | | HT=0.70 | | HT=0.88 | | HT=0.80 | | HT=0.86 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.51 | | HORIZ=5.01 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.70 | 6.43 | 4.70 | 5.47 | 4.70 | 4.75 | 4.70 | 4.53 | 4.70 | 4.27 |
| 4.50 | 6.25 | 4.50 | 5.64 | 4.50 | 5.27 | 4.50 | 4.75 | 4.50 | 4.36 |
| 4.30 | 5.43 | | | 4.30 | 5.10 | 4.30 | 4.26 | 4.30 | 3.58 |

RUN NUMBER: 16H
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 1

############ STATION = 72 TEMPERATURE = 70 F ############

| HT=0.91 | | HT=1.00 | | HT=1.16 | | HT=1.03 | | HT=0.77 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.53 | 3.34 | 4.53 | 3.67 | 4.53 | 4.14 | 4.52 | 4.94 | 4.53 | 5.19 |
| 4.33 | 3.35 | 4.33 | 4.27 | 4.33 | 4.60 | 4.33 | 5.27 | 4.33 | 5.25 |
| 4.13 | 3.00 | 4.13 | 4.45 | 4.12 | 4.89 | 4.13 | 5.04 | 4.13 | 4.79 |
| 3.93 | 2.99 | 3.93 | 4.23 | 3.93 | 4.62 | 3.93 | 3.83 | | |
| | | | | 3.73 | 3.42 | | | | |

| HT=1.09 | | HT=1.24 | | HT=1.24 | | HT=1.19 | | HT=1.16 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.52 | 4.57 | 4.53 | 4.40 | 4.53 | 5.05 | 4.53 | 6.18 | 4.53 | 6.46 |
| 4.33 | 4.30 | 4.33 | 4.33 | 4.33 | 5.02 | 4.33 | 5.95 | 4.32 | 6.16 |
| 4.12 | 3.67 | 4.13 | 3.70 | 4.13 | 4.65 | 4.13 | 5.43 | 4.13 | 5.70 |
| 3.93 | 2.82 | 3.93 | 3.00 | 3.93 | 4.10 | 3.93 | 5.16 | 3.93 | 3.91 |
| | | 3.72 | 1.73 | 3.73 | 3.60 | 3.83 | 4.65 | 3.73 | 1.34 |

| HT=0.87 | | HT=0.97 | | HT=1.18 | | HT=1.10 | | HT=1.14 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.53 | 5.41 | 4.53 | 5.12 | 4.53 | 3.97 | 4.53 | 3.63 | 4.53 | 3.46 |
| 4.32 | 4.97 | 4.33 | 4.90 | 4.33 | 4.80 | 4.33 | 4.55 | 4.33 | 3.99 |
| 4.13 | 4.08 | 4.12 | 3.91 | 4.13 | 4.95 | 4.13 | 4.65 | 4.12 | 3.93 |
| | | 3.93 | 3.01 | 3.93 | 4.64 | 3.93 | 3.80 | 3.93 | 3.00 |
| | | | | 3.73 | 3.99 | | | 3.73 | 1.00 |

RUN NUMBER: 17ABC
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = -4 TEMPERATURE = 76 F ############

| HT=1.69 HORIZ=0.20 | | HT=1.72 HORIZ=0.40 | | HT=1.72 HORIZ=0.61 | | HT=1.72 HORIZ=1.00 | | HT=1.72 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 3.51 | 6.19 | 3.56 | 6.19 | 3.58 | 6.19 | 3.50 | 6.18 | 3.49 |
| 5.99 | 3.43 | 5.99 | 3.43 | 5.98 | 3.54 | 5.99 | 3.45 | 5.99 | 3.21 |
| 5.79 | 2.99 | 5.79 | 3.22 | 5.79 | 3.19 | 5.79 | 3.19 | 5.79 | 3.01 |
| 5.59 | 2.65 | 5.59 | 2.89 | 5.59 | 2.95 | 5.59 | 3.04 | 5.59 | 2.73 |
| 5.39 | 2.42 | 5.39 | 2.64 | 5.39 | 2.71 | 5.39 | 2.90 | 5.39 | 2.70 |
| 5.19 | 2.18 | 5.19 | 2.58 | 5.19 | 2.62 | 5.19 | 2.82 | 5.19 | 2.65 |
| 4.99 | 2.17 | 4.99 | 2.45 | 4.99 | 2.54 | 4.99 | 2.76 | 4.99 | 2.60 |

| HT=1.72 HORIZ=2.00 | | HT=1.72 HORIZ=2.50 | | HT=1.62 HORIZ=3.00 | | HT=1.65 HORIZ=3.50 | | HT=1.71 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 3.29 | 6.19 | 3.35 | 6.18 | 3.51 | 6.19 | 3.55 | 6.19 | 3.40 |
| 5.99 | 3.02 | 5.98 | 3.31 | 5.99 | 3.46 | 5.99 | 3.42 | 5.98 | 3.08 |
| 5.79 | 2.80 | 5.78 | 3.11 | 5.79 | 3.31 | 5.79 | 3.15 | 5.79 | 2.90 |
| 5.59 | 2.59 | 5.59 | 2.98 | 5.59 | 3.07 | 5.59 | 2.97 | 5.59 | 2.84 |
| 5.39 | 2.54 | 5.39 | 2.71 | 5.39 | 2.78 | 5.39 | 2.76 | 5.39 | 2.55 |
| 5.19 | 2.52 | 5.19 | 2.54 | 5.19 | 2.67 | 5.19 | 2.50 | 5.19 | 2.34 |
| 4.98 | 2.43 | 4.99 | 2.42 | 4.99 | 2.53 | 4.99 | 2.47 | 4.98 | 2.34 |

| HT=1.68 HORIZ=4.50 | | HT=1.68 HORIZ=5.00 | | HT=1.67 HORIZ=5.40 | | HT=1.61 HORIZ=5.60 | | HT=1.59 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.18 | 3.36 | 6.19 | 3.43 | 6.19 | 3.42 | 6.18 | 3.32 | 6.18 | 3.16 |
| 5.98 | 3.10 | 5.99 | 3.27 | 5.99 | 3.32 | 5.99 | 3.26 | 5.99 | 3.17 |
| 5.79 | 2.91 | 5.79 | 2.98 | 5.79 | 2.99 | 5.79 | 2.96 | 5.79 | 2.94 |
| 5.59 | 2.59 | 5.59 | 2.73 | 5.59 | 2.69 | 5.59 | 2.63 | 5.59 | 2.65 |
| 5.39 | 2.40 | 5.39 | 2.38 | 5.39 | 2.45 | 5.39 | 2.47 | 5.39 | 2.51 |
| 5.18 | 2.29 | 5.19 | 2.21 | 5.19 | 2.11 | 5.19 | 2.19 | 5.19 | 2.36 |
| 4.99 | 2.14 | 4.99 | 2.01 | 4.98 | 1.97 | 4.98 | 2.05 | 4.98 | 2.11 |

############ STATION = -2 TEMPERATURE = 76 F ############

| HT=1.22 HORIZ=0.21 | | HT=1.42 HORIZ=0.40 | | HT=1.63 HORIZ=0.60 | | HT=1.56 HORIZ=1.00 | | HT=1.70 HORIZ=1.51 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 3.47 | 6.19 | 3.58 | 6.18 | 3.43 | 6.19 | 3.29 | 6.19 | 3.22 |
| 5.98 | 3.23 | 5.98 | 3.39 | 5.96 | 3.36 | 5.99 | 3.26 | 5.99 | 3.06 |
| 5.79 | 3.10 | 5.79 | 3.14 | 5.77 | 3.16 | 5.79 | 3.13 | 5.79 | 2.84 |
| 5.59 | 2.58 | 5.59 | 2.75 | 5.58 | 3.00 | 5.59 | 2.99 | 5.59 | 2.78 |
| 5.39 | 2.47 | 5.39 | 5.39 2.93 | | | 5.39 | 2.88 | 5.39 | 2.71 |
| 5.19 | 2.20 | 5.19 | 2.48 | 5.19 | 2.71 | 5.19 | 2.78 | 5.19 | 2.80 |
| 4.98 | 2.25 | 4.98 | 2.42 | 4.99 | 2.62 | 4.99 | 2.86 | 4.99 | 2.55 |

| HT=1.68 HORIZ=2.00 | | HT=1.66 HORIZ=2.50 | | HT=1.66 HORIZ=3.00 | | HT=1.61 HORIZ=3.50 | | HT=1.74 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 3.10 | 6.19 | 3.25 | 6.19 | 3.37 | 6.18 | 3.42 | 6.19 | 3.20 |
| 5.99 | 2.96 | 5.98 | 3.10 | 5.99 | 3.31 | 5.98 | 3.38 | 5.99 | 3.09 |
| 5.79 | 2.76 | 5.79 | 3.01 | 5.79 | 3.16 | 5.78 | 3.15 | 5.79 | 2.96 |
| 5.59 | 2.63 | 5.59 | 2.83 | 5.59 | 2.97 | 5.59 | 2.91 | 5.59 | 2.65 |
| 5.39 | 2.55 | 5.39 | 2.60 | 5.39 | 2.77 | 5.39 | 2.76 | 5.38 | 2.52 |
| 5.19 | 2.51 | 5.19 | 2.49 | 5.19 | 2.59 | 5.19 | 2.59 | 5.19 | 2.47 |
| 4.99 | 2.47 | 4.98 | 2.43 | 4.98 | 2.51 | 4.98 | 2.50 | 4.99 | 2.39 |
| | | | | | | | | 4.79 | 1.94 |

| HT=1.72 HORIZ=4.50 | | HT=1.60 HORIZ=5.00 | | HT=1.78 HORIZ=5.40 | | HT=1.70 HORIZ=5.60 | | HT=1.77 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.18 | 3.22 | 6.19 | 3.25 | 6.18 | 3.29 | 6.19 | 3.23 | 6.18 | 3.11 |
| 5.98 | 3.05 | 5.99 | 3.19 | 5.99 | 3.24 | 5.98 | 3.16 | 5.99 | 3.04 |
| 5.78 | 2.81 | 5.79 | 2.92 | 5.78 | 2.91 | 5.79 | 2.88 | 5.79 | 3.01 |
| 5.58 | 2.55 | 5.59 | 2.68 | 5.59 | 2.61 | 5.59 | 2.70 | 5.58 | 2.72 |
| 5.39 | 2.42 | 5.39 | 2.51 | 5.38 | 2.50 | 5.38 | 2.59 | 5.39 | 2.52 |
| 5.19 | 2.27 | 5.19 | 2.30 | 5.19 | 2.33 | 5.19 | 2.39 | 5.19 | 2.45 |
| 4.98 | 1.98 | 4.99 | 2.18 | 4.98 | 2.20 | 4.99 | 2.25 | 4.99 | 2.29 |
| | | | | 4.78 | 1.68 | | | 4.78 | 1.79 |

RUN NUMBER: 17ABC
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 0 TEMPERATURE = 78 F ############

| HT=1.56 | | HT=1.52 | | HT=1.52 | | HT=1.69 | | HT=1.58 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.01 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 3.45 | 6.19 | 3.48 | 6.19 | 3.48 | 6.19 | 3.37 | 6.19 | 3.18 |
| 5.99 | 3.45 | 5.99 | 3.38 | 6.00 | 3.43 | 5.99 | 3.39 | 5.99 | 3.20 |
| 5.79 | 2.93 | 5.79 | 3.13 | 5.79 | 3.34 | 5.79 | 3.23 | 5.79 | 3.00 |
| 5.59 | 2.65 | 5.59 | 2.92 | 5.59 | 3.20 | 5.58 | 3.18 | 5.59 | 3.00 |
| 5.39 | 2.29 | 5.39 | 2.66 | 5.39 | 2.90 | 5.39 | 3.01 | 5.39 | 2.73 |
| 5.19 | 2.02 | 5.19 | 2.58 | 5.20 | 2.67 | 5.19 | 2.87 | 5.19 | 2.58 |
| 4.99 | 1.85 | 4.99 | 2.36 | 5.00 | 2.34 | 4.99 | 2.63 | 4.99 | 2.41 |

| HT=1.47 | | HT=1.59 | | HT=1.45 | | HT=1.50 | | HT=1.61 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 3.27 | 6.19 | 3.34 | 6.19 | 3.50 | 6.19 | 3.49 | 6.19 | 1.74 |
| 5.99 | 3.02 | 6.00 | 3.21 | 5.99 | 3.37 | 6.00 | 3.43 | 5.99 | 1.67 |
| 5.79 | 2.92 | 5.79 | 3.11 | 5.79 | 3.36 | 5.79 | 3.29 | 5.79 | 1.55 |
| 5.59 | 2.81 | 5.59 | 2.94 | 5.59 | 3.19 | 5.59 | 3.17 | 5.59 | 1.47 |
| 5.39 | 2.58 | 5.39 | 2.69 | 5.39 | 2.81 | 5.39 | 1.51 | 5.39 | 1.39 |
| 5.19 | 2.17 | 5.19 | 2.48 | 5.19 | 2.71 | 5.19 | 1.42 | 5.19 | 1.26 |
| | | 4.99 | 2.13 | | | 4.99 | 1.16 | 4.99 | 1.21 |

| HT=1.66 | | HT=1.69 | | HT=1.56 | | HT=1.57 | | HT=1.59 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.41 | | HORIZ=5.61 | | HORIZ=5.81 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 1.70 | 6.19 | 3.46 | 6.19 | 3.43 | 6.19 | 3.28 | 6.19 | 3.14 |
| 5.99 | 1.21 | 5.99 | 3.31 | 5.99 | 3.39 | 5.99 | 3.30 | 5.99 | 3.22 |
| 5.79 | 0.56 | 5.79 | 3.14 | 5.79 | 3.09 | 5.79 | 3.07 | 5.79 | 3.01 |
| 5.59 | 2.77 | 5.59 | 2.84 | 5.52 | 2.74 | 5.59 | 2.91 | 5.59 | 2.84 |
| 5.39 | 2.52 | 5.39 | 2.53 | 5.40 | 2.58 | 5.39 | 2.68 | 5.39 | 2.71 |
| 5.19 | 2.24 | 5.19 | 2.26 | 5.19 | 2.41 | 5.19 | 2.59 | 5.19 | 2.64 |
| 5.00 | 1.81 | 5.00 | 1.81 | 4.99 | 2.05 | 5.00 | 2.20 | 4.99 | 2.42 |

RUN NUMBER: 17D
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0080
ROUGHNESS: 1

############ STATION = 6 TEMPERATURE = 78 F ############

| HT=1.11 | | HT=1.13 | | HT=1.24 | | HT=1.27 | | HT=1.37 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.19 | 4.04 | 6.19 | 5.13 | 6.20 | 5.42 | 6.19 | 5.31 | 6.20 | 5.08 |
| 6.00 | 3.35 | 6.00 | 4.21 | 5.99 | 4.76 | 6.00 | 4.79 | 5.99 | 4.43 |
| 5.79 | 3.09 | 5.80 | 4.02 | 5.80 | 4.58 | 5.79 | 4.58 | 5.79 | 4.40 |
| 5.60 | 3.12 | 5.60 | 3.92 | 5.60 | 4.44 | 5.60 | 4.51 | 5.60 | 4.27 |
| 5.40 | 3.34 | 5.40 | 3.91 | 5.40 | 4.05 | 5.40 | 4.24 | 5.40 | 4.11 |
| | | | | 5.19 | 2.81 | 5.20 | 3.49 | 5.19 | 3.35 |
| | | | | | | | | 5.00 | 2.39 |

| HT=1.21 | | HT=1.27 | | HT=1.12 | | HT=1.16 | | HT=1.45 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.01 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.20 | 4.58 | 6.20 | 4.71 | 6.20 | 5.46 | 6.20 | 5.54 | 6.20 | 5.51 |
| 6.00 | 4.40 | 6.00 | 4.60 | 6.00 | 4.67 | 6.00 | 4.72 | 6.00 | 4.63 |
| 5.79 | 4.14 | 5.80 | 4.26 | 5.80 | 4.58 | 5.79 | 4.77 | 5.79 | 4.52 |
| 5.60 | 3.84 | 5.60 | 3.41 | 5.60 | 4.34 | 5.59 | 4.51 | 5.60 | 4.38 |
| 5.40 | 2.72 | 5.40 | 2.45 | 5.39 | 4.05 | 5.40 | 4.37 | 5.40 | 4.24 |
| 5.20 | 2.60 | 5.19 | 0.63 | | | 5.19 | 3.49 | 5.19 | 3.39 |
| | | | | | | | | 4.99 | 1.67 |

| HT=1.27 | | HT=1.17 | | HT=1.03 | | HT=1.04 | | HT=1.09 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=4.99 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 6.20 | 5.47 | 6.20 | 5.37 | 6.19 | 5.08 | 6.19 | 4.99 | 6.20 | 4.61 |
| 6.00 | 4.67 | 6.00 | 4.55 | 5.99 | 4.47 | 6.00 | 4.45 | 6.00 | 4.25 |
| 5.79 | 4.36 | 5.79 | 4.53 | 5.80 | 4.49 | 5.79 | 4.45 | 5.79 | 4.18 |
| 5.60 | 4.22 | 5.59 | 4.34 | 5.59 | 4.31 | 5.60 | 4.34 | 5.59 | 3.92 |
| 5.39 | 3.69 | 5.40 | 3.93 | 5.40 | 3.77 | 5.40 | 3.94 | 5.39 | 3.20 |
| 5.20 | 2.44 | 5.19 | 3.18 | | | | | | |

############ STATION = 12 TEMPERATURE = 78 F ############

| HT=1.19 | | HT=1.13 | | HT=1.28 | | HT=1.24 | | HT=1.01 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.97 | 3.49 | 5.97 | 3.87 | 5.97 | 4.13 | 5.97 | 4.75 | 5.98 | 4.77 |
| 5.77 | 3.70 | 5.77 | 4.12 | 5.77 | 4.42 | 5.77 | 4.84 | 5.77 | 4.76 |
| 5.58 | 3.41 | 5.57 | 4.05 | 5.58 | 4.40 | 5.58 | 4.77 | 5.57 | 4.59 |
| 5.37 | 3.05 | 5.37 | 3.66 | 5.37 | 3.85 | 5.37 | 4.31 | 5.37 | 4.30 |
| 5.17 | 2.37 | 5.18 | 2.48 | 5.17 | 2.69 | 5.17 | 3.13 | | |

| HT=1.09 | | HT=1.13 | | HT=1.26 | | HT=1.35 | | HT=1.26 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=1.99 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.98 | 4.63 | 5.97 | 4.44 | 5.97 | 4.74 | 5.97 | 4.89 | 5.97 | 4.90 |
| 5.77 | 4.33 | 5.77 | 4.42 | 5.77 | 4.47 | 5.77 | 4.80 | 5.77 | 4.75 |
| 5.57 | 4.02 | 5.57 | 3.91 | 5.57 | 4.10 | 5.57 | 4.58 | 5.57 | 4.59 |
| 5.37 | 3.86 | 5.37 | 3.11 | 5.37 | 3.49 | 5.37 | 4.38 | 5.37 | 4.26 |
| | | 5.17 | 2.73 | 5.17 | 2.96 | 5.17 | 3.39 | 5.17 | 3.62 |
| | | | | | | 4.97 | 1.96 | | |

| HT=1.34 | | HT=1.08 | | HT=1.08 | | HT=1.16 | | HT=1.32 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.51 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.97 | 4.78 | 5.97 | 4.75 | 5.97 | 4.38 | 5.97 | 3.91 | 5.97 | 3.11 |
| 5.77 | 4.74 | 5.77 | 4.72 | 5.77 | 4.56 | 5.77 | 4.27 | 5.77 | 3.54 |
| 5.57 | 4.49 | 5.57 | 4.35 | 5.57 | 4.49 | 5.57 | 4.13 | 5.58 | 3.67 |
| 5.37 | 3.82 | 5.37 | 4.03 | 5.37 | 3.78 | 5.37 | 3.77 | 5.37 | 3.32 |
| 5.17 | 3.23 | | | | | 5.17 | 2.79 | 5.17 | 2.27 |
| 4.97 | 2.68 | | | | | | | 4.97 | 0.69 |

RUN NUMBER: 24C
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 2

############ STATION = 36 TEMPERATURE = 82 F ############

| HT=0.32 | | HT=0.33 | | HT=0.33 | | HT=0.12 | | HT=0.28 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.42 | 1.45 | 4.42 | 1.66 | 4.42 | 2.04 | | | 4.42 | 1.69 |
| 4.32 | 0.98 | 4.32 | 1.84 | 4.32 | 2.08 | | | | |

| HT=0.16 | | HT=0.13 | | HT=0.23 | | HT=0.22 | | HT=0.10 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.01 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| | | | | 4.42 | 1.49 | 4.42 | 2.85 | | |

| HT=0.10 | | HT=0.28 | | HT=0.32 | | HT=0.44 | | HT=0.49 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.500 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| | | 4.42 | 1.45 | 4.42 | 2.42 | 4.42 | 2.24 | 4.42 | 1.93 |
| | | | | 4.32 | 2.41 | 4.32 | 2.15 | 4.32 | 1.24 |
| | | | | | | 4.22 | 1.95 | 4.22 | 0.68 |

############ STATION = 72 TEMPERATURE = 82 F ############

| HT=0.23 | | HT=0.24 | | HT=0.31 | | HT=0.15 | | HT=0.28 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.51 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 3.76 | 1.48 | 3.76 | 1.74 | 3.77 | 2.05 | | | 3.76 | 2.45 |
| | | | | 3.67 | 1.93 | | | 3.67 | 2.74 |

| HT=0.25 | | HT=0.36 | | HT=0.28 | | HT=0.22 | | HT=0.07 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.50 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 3.76 | 2.64 | 3.76 | 2.93 | 3.77 | 2.55 | 3.76 | 1.75 | | |
| | | | | 3.66 | 2.36 | | | | |

| HT=0.15 | | HT=0.13 | | HT=0.34 | | HT=0.15 | | HT=0.19 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| | | | | 3.76 | 2.45 | | | | |
| | | | | 3.66 | 1.28 | | | | |

RUN NUMBER: 24H
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 2

############ STATION = 36 TEMPERATURE = 81 F ############

| HT=0.70 | | HT=0.71 | | HT=0.71 | | HT=0.48 | | HT=0.65 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.61 | | HORIZ=1.00 | | HORIZ=1.51 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.75 | 2.15 | 4.75 | 2.17 | 4.75 | 3.10 | 4.75 | 4.37 | 4.75 | 3.55 |
| 4.56 | 2.61 | 4.55 | 2.88 | 4.55 | 3.53 | | | 4.55 | 3.06 |
| 4.35 | 2.73 | 4.35 | 3.05 | 4.35 | 3.65 | | | | |

| HT=0.54 | | HT=0.51 | | HT=0.61 | | HT=0.60 | | HT=0.48 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.51 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.75 | 2.99 | 4.76 | 4.01 | 4.75 | 5.35 | 4.75 | 5.25 | 4.75 | 4.38 |
| 4.55 | 2.32 | 4.55 | 3.93 | 4.55 | 4.27 | 4.55 | 4.90 | | |

| HT=0.48 | | HT=0.65 | | HT=0.70 | | HT=0.82 | | HT=0.86 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.75 | 3.25 | 4.75 | 3.92 | 4.75 | 4.06 | 4.75 | 3.46 | 4.76 | 3.39 |
| | | 4.55 | 3.17 | 4.56 | 4.32 | 4.55 | 4.13 | 4.55 | 3.88 |
| | | | | | | 4.35 | 3.94 | 4.36 | 3.16 |

############ STATION = 72 TEMPERATURE = 81 F ############

| HT=0.60 | | HT=0.60 | | HT=0.67 | | HT=0.52 | | HT=0.64 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=0.20 | | HORIZ=0.40 | | HORIZ=0.60 | | HORIZ=1.00 | | HORIZ=1.50 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.08 | 2.59 | 4.08 | 3.15 | 4.08 | 3.73 | 4.08 | 6.01 | 4.08 | 4.68 |
| 3.88 | 2.87 | 3.88 | 3.67 | 3.88 | 4.22 | 3.88 | 5.02 | 3.88 | 4.22 |

| HT=0.61 | | HT=0.72 | | HT=0.64 | | HT=0.58 | | HT=0.43 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=2.00 | | HORIZ=2.51 | | HORIZ=3.00 | | HORIZ=3.50 | | HORIZ=4.00 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.08 | 4.11 | 4.08 | 4.92 | 4.08 | 5.22 | 4.08 | 4.71 | 4.08 | 3.47 |
| 3.88 | 3.88 | 3.88 | 4.96 | 3.88 | 4.70 | 3.88 | 4.13 | | |
| | | 3.68 | 3.46 | | | | | | |

| HT=0.52 | | HT=0.49 | | HT=0.70 | | HT=0.51 | | HT=0.55 | |
|---|---|---|---|---|---|---|---|---|---|
| HORIZ=4.50 | | HORIZ=5.00 | | HORIZ=5.40 | | HORIZ=5.60 | | HORIZ=5.80 | |
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.08 | 2.99 | 4.08 | 4.30 | 4.08 | 4.18 | 4.08 | 3.78 | 4.08 | 3.49 |
| 3.88 | 1.61 | | | 3.88 | 4.32 | 3.88 | 4.02 | 3.88 | 3.61 |
| | | | | 3.68 | 2.01 | | | | |

RUN NUMBER: 24J
METER EQUATION: V = 1.060R + 0.073

SLOPE = 0.0180
ROUGHNESS: 2

############ STATION = 36 TEMPERATURE = 81 F ############

| HT=1.05 HORIZ=0.20 | | HT=1.06 HORIZ=0.40 | | HT=1.06 HORIZ=0.61 | | HT=0.82 HORIZ=1.00 | | HT=1.00 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.10 | 2.90 | 5.10 | 3.31 | 5.10 | 3.82 | 5.10 | 4.72 | 5.10 | 6.00 |
| 4.90 | 3.03 | 4.89 | 3.74 | 4.90 | 4.39 | 4.90 | 5.48 | 4.90 | 5.40 |
| 4.70 | 3.21 | 4.70 | 4.11 | 4.70 | 4.97 | 4.70 | 5.69 | 4.70 | 4.89 |
| 4.50 | 3.40 | 4.49 | 4.27 | 4.50 | 5.16 | | | 4.50 | 3.90 |

| HT=0.88 HORIZ=2.00 | | HT=0.86 HORIZ=2.50 | | HT=0.96 HORIZ=3.00 | | HT=0.95 HORIZ=3.50 | | HT=0.82 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.10 | 4.84 | 5.10 | 5.06 | 5.10 | 7.20 | 5.10 | 7.92 | 5.10 | 6.21 |
| 4.90 | 4.23 | 4.90 | 4.88 | 4.90 | 6.50 | 4.89 | 6.77 | 4.89 | 5.50 |
| 4.70 | 3.69 | 4.70 | 4.39 | 4.70 | 6.10 | 4.70 | 6.45 | 4.70 | 5.39 |
| | | | | 4.50 | 3.97 | 4.50 | 5.57 | | |

| HT=0.83 HORIZ=4.50 | | HT=1.00 HORIZ=5.00 | | HT=1.04 HORIZ=5.40 | | HT=1.17 HORIZ=5.60 | | HT=1.21 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 5.10 | 5.35 | 5.10 | 5.48 | 5.10 | 5.08 | 5.09 | 4.33 | 5.10 | 3.95 |
| 4.89 | 4.54 | 4.90 | 4.87 | 4.89 | 5.45 | 4.90 | 5.12 | 4.90 | 4.58 |
| 4.70 | 3.75 | 4.70 | 4.24 | 4.70 | 5.31 | 4.69 | 5.27 | 4.70 | 4.71 |
| | | 4.50 | 3.69 | 4.49 | 4.88 | 4.50 | 4.80 | 4.50 | 4.31 |
| | | | | | | 4.29 | 3.31 | 4.30 | 2.04 |

############ STATION = 72 TEMPERATURE = 81 F ############

| HT=0.92 HORIZ=0.20 | | HT=0.93 HORIZ=0.41 | | HT=1.00 HORIZ=0.60 | | HT=0.85 HORIZ=1.00 | | HT=0.97 HORIZ=1.50 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.41 | 3.56 | 4.41 | 4.06 | 4.41 | 4.65 | 4.41 | 6.62 | 4.41 | 6.32 |
| 4.20 | 3.21 | 4.21 | 4.52 | 4.21 | 5.12 | 4.21 | 6.11 | 4.21 | 5.44 |
| 4.01 | 2.93 | 4.01 | 4.43 | 4.01 | 5.40 | 4.01 | 5.98 | 4.01 | 4.97 |
| 3.81 | 2.66 | 3.81 | 3.98 | 3.81 | 4.76 | | | 3.81 | 4.71 |

| HT=0.94 HORIZ=2.00 | | HT=1.05 HORIZ=2.50 | | HT=0.97 HORIZ=3.00 | | HT=0.91 HORIZ=3.50 | | HT=0.76 HORIZ=4.00 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.41 | 5.59 | 4.41 | 6.30 | 4.41 | 6.74 | 4.41 | 6.39 | 4.41 | 5.69 |
| 4.21 | 5.10 | 4.21 | 5.80 | 4.20 | 6.31 | 4.20 | 5.93 | 4.20 | 4.92 |
| 4.01 | 4.42 | 4.01 | 5.48 | 4.01 | 5.92 | 4.01 | 5.15 | 4.01 | 4.12 |
| 3.81 | 3.46 | 3.81 | 4.78 | 3.81 | 4.82 | 3.81 | 3.66 | | |

| HT=0.85 HORIZ=4.50 | | HT=0.82 HORIZ=5.00 | | HT=1.03 HORIZ=5.40 | | HT=0.84 HORIZ=5.60 | | HT=0.88 HORIZ=5.80 | |
|---|---|---|---|---|---|---|---|---|---|
| VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO | VERT | VELO |
| 4.41 | 5.04 | 4.41 | 6.07 | 4.41 | 5.23 | 4.41 | 4.65 | 4.41 | 4.29 |
| 4.20 | 4.18 | 4.21 | 5.47 | 4.20 | 5.71 | 4.21 | 5.36 | 4.20 | 5.04 |
| 4.01 | 3.06 | 4.00 | 4.83 | 4.01 | 5.73 | 4.01 | 5.75 | 4.01 | 5.23 |
| | | | | 3.81 | 4.08 | | | | |

B. Orifice discharge, in cubic feet per second, standard deviation of orifice discharge measurements, in cubic feet per second, water-surface elevations, in feet, second row, each data set, and standard deviation, in feet, third row, each data set, of all water-surface elevations for all runs and all stations.

| | | FLUME STATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |
| RUN=1 SLOPE=0.0080 ROUGHNESS=1, Q:avg=31.750,std dev=0.0238 ( 4 MEAS.) | | | | | | | | | | |
| average (of 20 blocks) | 6.398 | 6.218 | 6.121 | 6.024 | 5.889 | 5.784 | 5.694 | 5.543 | 5.479 | 5.355 |
| standard deviation | 0.0027 | 0.0041 | 0.0038 | 0.0028 | 0.0029 | 0.0060 | 0.0074 | 0.0047 | 0.0046 | 0.0028 |
| RUN=2 SLOPE=0.0080 ROUGHNESS=1, Q:avg=16.216,std dev=0.0282 ( 4 MEAS.) | | | | | | | | | | |
| average (of 20 blocks) | 5.945 | 5.802 | 5.711 | 5.616 | 5.488 | 5.385 | 5.289 | 5.127 | 5.028 | 4.868 |
| standard deviation | 0.0015 | 0.0021 | 0.0019 | 0.0021 | 0.0023 | 0.0027 | 0.0028 | 0.0027 | 0.0019 | 0.0012 |
| RUN=3 SLOPE=0.0080 ROUGHNESS=1, Q:avg= 9.432,std dev=0.0051 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.692 | 5.572 | 5.480 | 5.380 | 5.264 | 5.163 | 5.070 | 4.910 | 4.807 | 4.649 |
| standard deviation | 0.0012 | 0.0015 | 0.0019 | 0.0013 | 0.0014 | 0.0017 | 0.0017 | 0.0014 | 0.0017 | 0.0022 |
| RUN=3.2 SLOPE=0.0080 ROUGHNESS=1, Q:avg=23.256,std dev=0.0052 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.167 | 6.004 | 5.910 | 5.812 | 5.682 | 5.575 | 5.480 | 5.321 | 5.236 | 5.093 |
| standard deviation | 0.0018 | 0.0024 | 0.0024 | 0.0017 | 0.0021 | 0.0027 | 0.0033 | 0.0022 | 0.0037 | 0.0031 |
| RUN=4 SLOPE=0.0080 ROUGHNESS=1, Q:avg= 1.063,std dev=0.0005 ( 3 MEAS.) | | | | | | | | | | |
| average (of 10 blocks) | 5.164 | 5.088 | 4.987 | 4.900 | 4.789 | 4.678 | 4.568 | 4.452 | 4.357 | 4.285 |
| standard deviation | 0.0005 | 0.0005 | 0.0003 | 0.0007 | 0.0006 | 0.0007 | 0.0003 | 0.0007 | 0.0004 | 0.0008 |
| RUN=5 SLOPE=0.0080 ROUGHNESS=1, Q:avg= 4.579,std dev=0.0050 ( 4 MEAS.) | | | | | | | | | | |
| average (of 20 blocks) | 5.453 | 5.356 | 5.262 | 5.171 | 5.060 | 4.959 | 4.863 | 4.717 | 4.608 | 4.482 |
| standard deviation | 0.0008 | 0.0006 | 0.0010 | 0.0005 | 0.0006 | 0.0012 | 0.0007 | 0.0015 | 0.0010 | 0.0034 |
| RUN=6 SLOPE=0.0080 ROUGHNESS=1, Q:avg=32.190,std dev=0.0345 ( 5 MEAS.) | | | | | | | | | | |
| average (of 25 blocks) | 6.410 | 6.233 | 6.139 | 6.048 | 5.929 | 5.838 | 5.770 | 5.659 | 5.619 | 5.549 |
| standard deviation | 0.0027 | 0.0037 | 0.0035 | 0.0050 | 0.0044 | 0.0050 | 0.0058 | 0.0052 | 0.0034 | 0.0028 |
| RUN=7 SLOPE=0.0080 ROUGHNESS=1, Q:avg=16.632,std dev=0.0084 ( 4 MEAS.) | | | | | | | | | | |
| average (of 20 blocks) | 5.958 | 5.815 | 5.724 | 5.631 | 5.510 | 5.413 | 5.331 | 5.208 | 5.147 | 5.069 |
| standard deviation | 0.0012 | 0.0019 | 0.0014 | 0.0021 | 0.0020 | 0.0023 | 0.0019 | 0.0021 | 0.0018 | 0.0016 |
| RUN=8A SLOPE=0.0080 ROUGHNESS=1, Q:avg= 4.560,std dev=0.0030 ( 5 MEAS.) | | | | | | | | | | |
| average (of 22 blocks) | 5.451 | 5.353 | 5.260 | 5.168 | 5.062 | 4.967 | 4.881 | 4.773 | 4.724 | 4.691 |
| standard deviation | 0.0004 | 0.0005 | 0.0008 | 0.0012 | 0.0009 | 0.0007 | 0.0011 | 0.0025 | 0.0007 | 0.0090 |
| RUN=8G SLOPE=0.0080 ROUGHNESS=1, Q:avg=23.682,std dev=0.0029 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.175 | 6.010 | 5.913 | 5.822 | 5.698 | 5.596 | 5.518 | 5.372 | 5.317 | 5.223 |
| standard deviation | 0.0020 | 0.0030 | 0.0019 | 0.0030 | 0.0042 | 0.0044 | 0.0031 | 0.0024 | 0.0034 | 0.0026 |
| RUN=8I SLOPE=0.0080 ROUGHNESS=1, Q:avg= 1.075,std dev=0.0028 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.166 | 5.088 | 4.987 | 4.900 | 4.792 | 4.682 | 4.578 | 4.471 | 4.407 | 4.381 |
| standard deviation | 0.0005 | 0.0005 | 0.0000 | 0.0005 | 0.0005 | 0.0000 | 0.0000 | 0.0009 | 0.0004 | 0.0003 |
| RUN=9A SLOPE=0.0080 ROUGHNESS=1, Q:avg= 6.071,std dev=0.0079 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.534 | 5.428 | 5.334 | 5.240 | 5.130 | 5.032 | 4.947 | 4.815 | 4.748 | 4.693 |
| standard deviation | 0.0006 | 0.0006 | 0.0004 | 0.0006 | 0.0013 | 0.0007 | 0.0014 | 0.0018 | 0.0013 | 0.0023 |
| RUN=9B SLOPE=0.0080 ROUGHNESS=1, Q:avg= 7.987,std dev=0.0025 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.625 | 5.512 | 5.417 | 5.322 | 5.210 | 5.110 | 5.019 | 4.885 | 4.814 | 4.744 |
| standard deviation | 0.0005 | 0.0006 | 0.0007 | 0.0009 | 0.0010 | 0.0009 | 0.0010 | 0.0008 | 0.0010 | 0.0012 |
| RUN=9C SLOPE=0.0080 ROUGHNESS=1, Q:avg= 9.386,std dev=0.0008 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.686 | 5.567 | 5.473 | 5.377 | 5.264 | 5.168 | 5.084 | 4.962 | 4.905 | 4.844 |
| standard deviation | 0.0003 | 0.0005 | 0.0008 | 0.0008 | 0.0007 | 0.0007 | 0.0012 | 0.0009 | 0.0009 | 0.0019 |
| RUN=9D SLOPE=0.0080 ROUGHNESS=1, Q:avg=11.993,std dev=0.0180 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.792 | 5.661 | 5.570 | 5.476 | 5.362 | 5.261 | 5.178 | 5.057 | 5.001 | 4.936 |
| standard deviation | 0.0004 | 0.0029 | 0.0006 | 0.0011 | 0.0007 | 0.0009 | 0.0009 | 0.0016 | 0.0024 | 0.0009 |
| RUN=10A SLOPE=0.0080 ROUGHNESS=1, Q:avg= 0.186,std dev=0.0000 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.821 | 4.731 | 4.609 | 4.516 | 4.419 | 4.317 | 4.226 | 4.104 | 3.962 | 3.639 |
| standard deviation | 0.0003 | 0.0006 | 0.0009 | 0.0008 | 0.0010 | 0.0005 | 0.0005 | 0.0009 | 0.0007 | 0.0009 |
| RUN=10B SLOPE=0.0080 ROUGHNESS=1, Q:avg= 0.265,std dev=0.0000 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.922 | 4.826 | 4.718 | 4.624 | 4.526 | 4.420 | 4.323 | 4.227 | 4.107 | 3.938 |
| standard deviation | 0.0015 | 0.0013 | 0.0017 | 0.0016 | 0.0013 | 0.0017 | 0.0028 | 0.0016 | 0.0017 | 0.0023 |
| RUN=10C SLOPE=0.0080 ROUGHNESS=1, Q:avg= 0.476,std dev=0.0009 ( 3 MEAS.) | | | | | | | | | | |
| average (of 9 blocks) | 5.046 | 4.969 | 4.861 | 4.772 | 4.676 | 4.561 | 4.448 | 4.344 | 4.230 | 4.001 |
| standard deviation | 0.0006 | 0.0009 | 0.0023 | 0.0006 | 0.0018 | 0.0015 | 0.0020 | 0.0018 | 0.0021 | 0.0021 |

| | | FLUME STATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |
| RUN=11A SLOPE=0.0105 ROUGHNESS=1, Q:avg= 4.492,std dev=0.0041 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.341 | 5.216 | 5.076 | 4.951 | 4.803 | 4.665 | 4.536 | 4.346 | 4.220 | 4.115 |
| standard deviation | 0.0011 | 0.0007 | 0.0006 | 0.0011 | 0.0009 | 0.0125 | 0.0013 | 0.0027 | 0.0021 | 0.0014 |
| RUN=11B SLOPE=0.0105 ROUGHNESS=1, Q:avg= 6.019,std dev=0.0048 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.418 | 5.282 | 5.143 | 5.017 | 4.866 | 4.724 | 4.601 | 4.405 | 4.270 | 4.126 |
| standard deviation | 0.0006 | 0.0004 | 0.0005 | 0.0005 | 0.0008 | 0.0005 | 0.0005 | 0.0009 | 0.0010 | 0.0028 |
| RUN=11C SLOPE=0.0105 ROUGHNESS=1, Q:avg= 8.015,std dev=0.0170 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.510 | 5.363 | 5.220 | 5.089 | 4.937 | 4.799 | 4.676 | 4.481 | 4.371 | 4.262 |
| standard deviation | 0.0005 | 0.0007 | 0.0009 | 0.0007 | 0.0011 | 0.0015 | 0.0015 | 0.0024 | 0.0036 | 0.0092 |
| RUN=11D SLOPE=0.0105 ROUGHNESS=1, Q:avg= 9.208,std dev=0.0005 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.560 | 5.405 | 5.264 | 5.133 | 4.983 | 4.841 | 4.722 | 4.523 | 4.409 | 4.289 |
| standard deviation | 0.0005 | 0.0007 | 0.0007 | 0.0006 | 0.0007 | 0.0013 | 0.0020 | 0.0019 | 0.0039 | 0.0070 |
| RUN=11E SLOPE=0.0105 ROUGHNESS=1, Q:avg=12.029,std dev=0.0210 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.666 | 5.499 | 5.362 | 5.234 | 5.073 | 4.931 | 4.805 | 4.606 | 4.501 | 4.367 |
| standard deviation | 0.0011 | 0.0013 | 0.0012 | 0.0011 | 0.0014 | 0.0017 | 0.0018 | 0.0021 | 0.0020 | 0.0019 |
| RUN=11F SLOPE=0.0105 ROUGHNESS=1, Q:avg=16.071,std dev=0.0124 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.803 | 5.618 | 5.485 | 5.358 | 5.191 | 5.051 | 4.927 | 4.719 | 4.620 | 4.475 |
| standard deviation | 0.0003 | 0.0011 | 0.0012 | 0.0013 | 0.0015 | 0.0019 | 0.0022 | 0.0032 | 0.0029 | 0.0013 |
| RUN=11G SLOPE=0.0105 ROUGHNESS=1, Q:avg=23.828,std dev=0.0029 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.033 | 5.819 | 5.680 | 5.563 | 5.390 | 5.251 | 5.131 | 4.920 | 4.829 | 4.679 |
| standard deviation | 0.0011 | 0.0024 | 0.0023 | 0.0031 | 0.0025 | 0.0034 | 0.0033 | 0.0036 | 0.0024 | 0.0016 |
| RUN=11H SLOPE=0.0105 ROUGHNESS=1, Q:avg=31.051,std dev=0.0114 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.222 | 5.992 | 5.850 | 5.729 | 5.553 | 5.411 | 5.294 | 5.085 | 5.001 | 4.848 |
| standard deviation | 0.0016 | 0.0024 | 0.0026 | 0.0036 | 0.0030 | 0.0030 | 0.0050 | 0.0052 | 0.0034 | 0.0029 |
| RUN=11I SLOPE=0.0105 ROUGHNESS=1, Q:avg= 1.127,std dev=0.0005 ( 3 MEAS.) | | | | | | | | | | |
| average (of 9 blocks) | 5.087 | 4.982 | 4.835 | 4.715 | 4.571 | 4.418 | 4.274 | 4.103 | 3.968 | 3.838 |
| standard deviation | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| RUN=12 SLOPE=0.0130 ROUGHNESS=1, Q:avg=31.680,std dev=0.0320 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.185 | 5.922 | 5.778 | 5.639 | 5.455 | 5.292 | 5.155 | 4.916 | 4.827 | 4.677 |
| standard deviation | 0.0012 | 0.0022 | 0.0032 | 0.0048 | 0.0032 | 0.0049 | 0.0103 | 0.0055 | 0.0061 | 0.0130 |
| RUN=13 SLOPE=0.0130 ROUGHNESS=1, Q:avg=16.123,std dev=0.0143 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.762 | 5.549 | 5.414 | 5.265 | 5.090 | 4.926 | 4.783 | 4.549 | 4.440 | 4.287 |
| standard deviation | 0.0020 | 0.0025 | 0.0033 | 0.0027 | 0.0024 | 0.0023 | 0.0032 | 0.0024 | 0.0020 | 0.0019 |
| RUN=13C SLOPE=0.0130 ROUGHNESS=1, Q:avg= 4.679,std dev=0.0005 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.315 | 5.164 | 5.022 | 4.872 | 4.711 | 4.552 | 4.409 | 4.198 | 4.061 | 3.953 |
| standard deviation | 0.0016 | 0.0022 | 0.0026 | 0.0009 | 0.0028 | 0.0024 | 0.0029 | 0.0023 | 0.0024 | 0.0032 |
| RUN=14A SLOPE=0.0130 ROUGHNESS=1, Q:avg= 5.988,std dev=0.0009 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.382 | 5.221 | 5.077 | 4.928 | 4.763 | 4.606 | 4.464 | 4.249 | 4.107 | 3.981 |
| standard deviation | 0.0013 | 0.0008 | 0.0019 | 0.0012 | 0.0013 | 0.0016 | 0.0017 | 0.0013 | 0.0020 | 0.0025 |
| RUN=14B SLOPE=0.0130 ROUGHNESS=1, Q:avg= 8.043,std dev=0.0022 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.470 | 5.297 | 5.148 | 4.997 | 4.833 | 4.675 | 4.537 | 4.316 | 4.185 | 4.053 |
| standard deviation | 0.0002 | 0.0007 | 0.0005 | 0.0009 | 0.0009 | 0.0011 | 0.0012 | 0.0015 | 0.0022 | 0.0080 |
| RUN=14C SLOPE=0.0130 ROUGHNESS=1, Q:avg= 9.359,std dev=0.0021 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.522 | 5.341 | 5.195 | 5.043 | 4.881 | 4.717 | 4.580 | 4.358 | 4.229 | 4.089 |
| standard deviation | 0.0005 | 0.0008 | 0.0007 | 0.0015 | 0.0007 | 0.0010 | 0.0011 | 0.0015 | 0.0037 | 0.0086 |
| RUN=14D SLOPE=0.0130 ROUGHNESS=1, Q:avg=12.103,std dev=0.0026 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.625 | 5.432 | 5.292 | 5.141 | 4.971 | 4.807 | 4.663 | 4.437 | 4.312 | 4.158 |
| standard deviation | 0.0005 | 0.0011 | 0.0006 | 0.0006 | 0.0007 | 0.0013 | 0.0015 | 0.0010 | 0.0011 | 0.0013 |
| RUN=14E SLOPE=0.0130 ROUGHNESS=1, Q:avg=24.211,std dev=0.0039 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.994 | 5.748 | 5.603 | 5.469 | 5.287 | 5.122 | 4.984 | 4.744 | 4.645 | 4.472 |
| standard deviation | 0.0010 | 0.0017 | 0.0017 | 0.0027 | 0.0023 | 0.0024 | 0.0036 | 0.0040 | 0.0034 | 0.0031 |
| RUN=14I SLOPE=0.0130 ROUGHNESS=1, Q:avg= 1.127,std dev=0.0005 ( 3 MEAS.) | | | | | | | | | | |
| average (of 9 blocks) | 5.043 | 4.920 | 4.750 | 4.609 | 4.445 | 4.274 | 4.108 | 3.916 | 3.760 | 3.581 |
| standard deviation | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

| | FLUME STATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |
| RUN=21E SLOPE=0.0105 ROUGHNESS=2, Q:avg= 8.023,std dev=0.0046 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.523 | 5.386 | 5.241 | 5.125 | 4.977 | 4.828 | 4.701 | 4.569 | 4.473 | 4.313 |
| standard deviation | 0.0007 | 0.0009 | 0.0007 | 0.0005 | 0.0028 | 0.0009 | 0.0012 | 0.0012 | 0.0011 | 0.0009 |
| RUN=21F SLOPE=0.0105 ROUGHNESS=2, Q:avg= 9.420,std dev=0.0108 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.582 | 5.440 | 5.291 | 5.177 | 5.027 | 4.879 | 4.750 | 4.609 | 4.515 | 4.312 |
| standard deviation | 0.0007 | 0.0007 | 0.0005 | 0.0015 | 0.0016 | 0.0020 | 0.0020 | 0.0014 | 0.0011 | 0.0010 |
| RUN=21G SLOPE=0.0105 ROUGHNESS=2, Q:avg=12.160,std dev=0.0302 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.687 | 5.532 | 5.385 | 5.272 | 5.119 | 4.967 | 4.849 | 4.709 | 4.623 | 4.483 |
| standard deviation | 0.0007 | 0.0015 | 0.0009 | 0.0011 | 0.0019 | 0.0013 | 0.0021 | 0.0016 | 0.0013 | 0.0014 |
| RUN=21H SLOPE=0.0105 ROUGHNESS=2, Q:avg=16.423,std dev=0.0028 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.831 | 5.658 | 5.506 | 5.397 | 5.242 | 5.087 | 4.970 | 4.832 | 4.748 | 4.600 |
| standard deviation | 0.0009 | 0.0017 | 0.0014 | 0.0015 | 0.0019 | 0.0017 | 0.0030 | 0.0029 | 0.0030 | 0.0020 |
| RUN=21I SLOPE=0.0105 ROUGHNESS=2, Q:avg=23.964,std dev=0.0090 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.053 | 5.852 | 5.693 | 5.591 | 5.423 | 5.266 | 5.162 | 5.034 | 4.952 | 4.819 |
| standard deviation | 0.0014 | 0.0026 | 0.0035 | 0.0041 | 0.0029 | 0.0051 | 0.0055 | 0.0042 | 0.0028 | 0.0029 |
| RUN=21J SLOPE=0.0105 ROUGHNESS=2, Q:avg=32.341,std dev=0.1256 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.258 | 6.039 | 5.868 | 5.765 | 5.589 | 5.431 | 5.335 | 5.209 | 5.132 | 4.984 |
| standard deviation | 0.0017 | 0.0025 | 0.0026 | 0.0016 | 0.0026 | 0.0033 | 0.0035 | 0.0036 | 0.0036 | 0.0031 |
| RUN=22A SLOPE=0.0130 ROUGHNESS=2, Q:avg= 1.023,std dev=0.0019 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.016 | 4.885 | 4.721 | 4.577 | 4.415 | 4.241 | 4.081 | 3.920 | 3.779 | 3.652 |
| standard deviation | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0007 | 0.0007 | 0.0008 | 0.0006 | 0.0007 | 0.0007 |
| RUN=22B SLOPE=0.0130 ROUGHNESS=2, Q:avg= 2.210,std dev=0.0031 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.151 | 5.016 | 4.854 | 4.711 | 4.533 | 4.360 | 4.202 | 4.035 | 3.902 | 3.735 |
| standard deviation | 0.0005 | 0.0012 | 0.0006 | 0.0009 | 0.0005 | 0.0005 | 0.0006 | 0.0007 | 0.0007 | 0.0006 |
| RUN=22C SLOPE=0.0130 ROUGHNESS=2, Q:avg= 4.471,std dev=0.0085 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.286 | 5.139 | 4.970 | 4.826 | 4.640 | 4.464 | 4.313 | 4.155 | 4.036 | 3.917 |
| standard deviation | 0.0006 | 0.0007 | 0.0007 | 0.0008 | 0.0007 | 0.0013 | 0.0014 | 0.0007 | 0.0010 | 0.0008 |
| RUN=22D SLOPE=0.0130 ROUGHNESS=2, Q:avg= 6.048,std dev=0.0041 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.360 | 5.205 | 5.030 | 4.890 | 4.704 | 4.525 | 4.376 | 4.215 | 4.107 | 3.987 |
| standard deviation | 0.0005 | 0.0006 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0008 | 0.0011 | 0.0009 | 0.0009 |
| RUN=22E SLOPE=0.0130 ROUGHNESS=2, Q:avg= 7.990,std dev=0.0079 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.446 | 5.280 | 5.102 | 4.960 | 4.773 | 4.594 | 4.446 | 4.288 | 4.186 | 4.067 |
| standard deviation | 0.0006 | 0.0007 | 0.0008 | 0.0007 | 0.0007 | 0.0011 | 0.0007 | 0.0030 | 0.0018 | 0.0023 |
| RUN=22F SLOPE=0.0130 ROUGHNESS=2, Q:avg= 9.505,std dev=0.0026 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.509 | 5.338 | 5.154 | 5.013 | 4.823 | 4.641 | 4.503 | 4.339 | 4.237 | 4.111 |
| standard deviation | 0.0007 | 0.0008 | 0.0009 | 0.0008 | 0.0008 | 0.0012 | 0.0006 | 0.0010 | 0.0014 | 0.0005 |
| RUN=22G SLOPE=0.0130 ROUGHNESS=2, Q:avg=12.048,std dev=0.0117 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.601 | 5.418 | 5.251 | 5.095 | 4.902 | 4.720 | 4.583 | 4.401 | 4.293 | 4.111 |
| standard deviation | 0.0014 | 0.0014 | 0.0014 | 0.0011 | 0.0015 | 0.0009 | 0.0022 | 0.0032 | 0.0029 | 0.0020 |
| RUN=22H SLOPE=0.0130 ROUGHNESS=2, Q:avg=16.505,std dev=0.0078 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.747 | 5.543 | 5.358 | 5.227 | 5.032 | 4.841 | 4.707 | 4.522 | 4.409 | 4.187 |
| standard deviation | 0.0007 | 0.0017 | 0.0013 | 0.0022 | 0.0024 | 0.0014 | 0.0026 | 0.0035 | 0.0026 | 0.0026 |
| RUN=22I SLOPE=0.0130 ROUGHNESS=2, Q:avg=23.436,std dev=0.0190 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.949 | 5.715 | 5.518 | 5.393 | 5.189 | 4.992 | 4.868 | 4.691 | 4.573 | 4.326 |
| standard deviation | 0.0020 | 0.0026 | 0.0019 | 0.0027 | 0.0024 | 0.0037 | 0.0052 | 0.0038 | 0.0034 | 0.0032 |
| RUN=22J SLOPE=0.0130 ROUGHNESS=2, Q:avg=32.117,std dev=0.0021 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.156 | 5.899 | 5.692 | 5.567 | 5.354 | 5.155 | 5.042 | 4.862 | 4.747 | 4.479 |
| standard deviation | 0.0032 | 0.0030 | 0.0092 | 0.0049 | 0.0058 | 0.0045 | 0.0051 | 0.0032 | 0.0038 | 0.0027 |
| RUN=23A SLOPE=0.0155 ROUGHNESS=2, Q:avg= 0.997,std dev=0.0014 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.951 | 4.793 | 4.596 | 4.423 | 4.239 | 4.032 | 3.830 | 3.648 | 3.476 | 3.316 |
| standard deviation | 0.0008 | 0.0009 | 0.0009 | 0.0018 | 0.0019 | 0.0007 | 0.0017 | 0.0017 | 0.0019 | 0.0013 |
| RUN=23B SLOPE=0.0155 ROUGHNESS=2, Q:avg= 2.209,std dev=0.0021 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.096 | 4.930 | 4.741 | 4.571 | 4.361 | 4.161 | 3.958 | 3.764 | 3.604 | 3.404 |
| standard deviation | 0.0008 | 0.0010 | 0.0015 | 0.0015 | 0.0010 | 0.0018 | 0.0020 | 0.0028 | 0.0010 | 0.0011 |

| | | FLUME STATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |
| RUN=23C SLOPE=0.0155 ROUGHNESS=2, Q:avg= 4.568,std dev=0.0169 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.228 | 5.051 | 4.858 | 4.685 | 4.471 | 4.262 | 4.068 | 3.878 | 3.725 | 3.498 |
| standard deviation | 0.0010 | 0.0010 | 0.0010 | 0.0011 | 0.0014 | 0.0015 | 0.0018 | 0.0016 | 0.0017 | 0.0008 |
| RUN=23D SLOPE=0.0155 ROUGHNESS=2, Q:avg= 6.198,std dev=0.0049 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.305 | 5.118 | 4.915 | 4.748 | 4.532 | 4.323 | 4.126 | 3.934 | 3.786 | 3.537 |
| standard deviation | 0.0009 | 0.0015 | 0.0013 | 0.0015 | 0.0007 | 0.0008 | 0.0010 | 0.0015 | 0.0018 | 0.0011 |
| RUN=23E SLOPE=0.0155 ROUGHNESS=2, Q:avg= 8.054,std dev=0.0037 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.384 | 5.189 | 4.983 | 4.815 | 4.594 | 4.387 | 4.196 | 3.995 | 3.866 | 3.705 |
| standard deviation | 0.0012 | 0.0009 | 0.0008 | 0.0012 | 0.0015 | 0.0010 | 0.0037 | 0.0017 | 0.0022 | 0.0037 |
| RUN=23F SLOPE=0.0155 ROUGHNESS=2, Q:avg= 9.088,std dev=0.0195 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.430 | 5.229 | 5.016 | 4.851 | 4.630 | 4.418 | 4.234 | 4.032 | 3.906 | 3.759 |
| standard deviation | 0.0010 | 0.0013 | 0.0013 | 0.0010 | 0.0013 | 0.0011 | 0.0029 | 0.0046 | 0.0018 | 0.0069 |
| RUN=23G SLOPE=0.0155 ROUGHNESS=2, Q:avg=12.211,std dev=0.0092 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.542 | 5.323 | 5.109 | 4.945 | 4.723 | 4.509 | 4.323 | 4.116 | 3.993 | 3.828 |
| standard deviation | 0.0008 | 0.0012 | 0.0010 | 0.0012 | 0.0013 | 0.0012 | 0.0022 | 0.0022 | 0.0021 | 0.0027 |
| RUN=23H SLOPE=0.0155 ROUGHNESS=2, Q:avg=16.274,std dev=0.0033 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.673 | 5.430 | 5.222 | 5.062 | 4.833 | 4.612 | 4.437 | 4.219 | 4.102 | 3.934 |
| standard deviation | 0.0008 | 0.0021 | 0.0013 | 0.0015 | 0.0018 | 0.0020 | 0.0022 | 0.0035 | 0.0018 | 0.0032 |
| RUN=23I SLOPE=0.0155 ROUGHNESS=2, Q:avg=24.068,std dev=0.0081 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.891 | 5.613 | 5.396 | 5.247 | 5.011 | 4.783 | 4.607 | 4.405 | 4.290 | 4.099 |
| standard deviation | 0.0011 | 0.0016 | 0.0020 | 0.0027 | 0.0050 | 0.0039 | 0.0044 | 0.0060 | 0.0021 | 0.0031 |
| RUN=23J SLOPE=0.0155 ROUGHNESS=2, Q:avg=32.140,std dev=0.0639 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.086 | 5.784 | 5.558 | 5.402 | 5.157 | 4.929 | 4.768 | 4.559 | 4.444 | 4.250 |
| standard deviation | 0.0011 | 0.0033 | 0.0018 | 0.0035 | 0.0053 | 0.0038 | 0.0069 | 0.0059 | 0.0055 | 0.0041 |
| RUN=24A SLOPE=0.0180 ROUGHNESS=2, Q:avg= 0.995,std dev=0.0033 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.905 | 4.735 | 4.506 | 4.410 | 4.124 | 3.897 | 3.677 | 3.466 | 3.269 | 3.112 |
| standard deviation | 0.0006 | 0.0007 | 0.0007 | 0.0010 | 0.0007 | 0.0007 | 0.0008 | 0.0010 | 0.0007 | 0.0007 |
| RUN=24B SLOPE=0.0180 ROUGHNESS=2, Q:avg= 2.211,std dev=0.0022 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.049 | 4.870 | 4.653 | 4.464 | 4.250 | 4.030 | 3.811 | 3.587 | 3.410 | 3.263 |
| standard deviation | 0.0007 | 0.0009 | 0.0010 | 0.0007 | 0.0010 | 0.0008 | 0.0015 | 0.0012 | 0.0011 | 0.0007 |
| RUN=24C SLOPE=0.0180 ROUGHNESS=2, Q:avg= 4.517,std dev=0.0042 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.183 | 4.993 | 4.771 | 4.574 | 4.348 | 4.129 | 3.916 | 3.699 | 3.519 | 3.301 |
| standard deviation | 0.0009 | 0.0011 | 0.0007 | 0.0011 | 0.0011 | 0.0012 | 0.0014 | 0.0011 | 0.0011 | 0.0009 |
| RUN=24D SLOPE=0.0180 ROUGHNESS=2, Q:avg= 5.982,std dev=0.0017 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.250 | 5.048 | 4.821 | 4.626 | 4.409 | 4.182 | 3.967 | 3.743 | 3.587 | 3.423 |
| standard deviation | 0.0010 | 0.0011 | 0.0009 | 0.0011 | 0.0009 | 0.0010 | 0.0009 | 0.0009 | 0.0013 | 0.0009 |
| RUN=24E SLOPE=0.0180 ROUGHNESS=2, Q:avg= 7.990,std dev=0.0026 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.336 | 5.123 | 4.891 | 4.700 | 4.471 | 4.250 | 4.038 | 3.814 | 3.654 | 3.479 |
| standard deviation | 0.0007 | 0.0009 | 0.0006 | 0.0007 | 0.0012 | 0.0014 | 0.0007 | 0.0012 | 0.0012 | 0.0022 |
| RUN=24F SLOPE=0.0180 ROUGHNESS=2, Q:avg= 9.297,std dev=0.0120 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.388 | 5.170 | 4.931 | 4.742 | 4.513 | 4.288 | 4.084 | 3.854 | 3.701 | 3.564 |
| standard deviation | 0.0008 | 0.0016 | 0.0010 | 0.0016 | 0.0010 | 0.0017 | 0.0015 | 0.0030 | 0.0040 | 0.0097 |
| RUN=24G SLOPE=0.0180 ROUGHNESS=2, Q:avg=12.131,std dev=0.0196 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.489 | 5.256 | 5.013 | 4.833 | 4.599 | 4.369 | 4.165 | 3.920 | 3.772 | 3.569 |
| standard deviation | 0.0007 | 0.0012 | 0.0006 | 0.0025 | 0.0017 | 0.0014 | 0.0012 | 0.0021 | 0.0029 | 0.0030 |
| RUN=24H SLOPE=0.0180 ROUGHNESS=2, Q:avg=16.616,std dev=0.0060 ( 2 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.630 | 5.372 | 5.138 | 4.952 | 4.710 | 4.472 | 4.280 | 4.033 | 3.875 | 3.641 |
| standard deviation | 0.0010 | 0.0012 | 0.0011 | 0.0017 | 0.0014 | 0.0029 | 0.0031 | 0.0037 | 0.0033 | 0.0048 |
| RUN=24I SLOPE=0.0180 ROUGHNESS=2, Q:avg=23.831,std dev=0.0099 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.830 | 5.535 | 5.292 | 5.131 | 4.880 | 4.634 | 4.439 | 4.192 | 4.047 | 3.821 |
| standard deviation | 0.0012 | 0.0020 | 0.0031 | 0.0036 | 0.0033 | 0.0032 | 0.0050 | 0.0052 | 0.0029 | 0.0043 |
| RUN=24J SLOPE=0.0180 ROUGHNESS=2, Q:avg=32.187,std dev=0.0091 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 6.028 | 5.703 | 5.455 | 5.295 | 5.032 | 4.786 | 4.612 | 4.351 | 4.222 | 3.929 |
| standard deviation | 0.0016 | 0.0036 | 0.0031 | 0.0046 | 0.0066 | 0.0046 | 0.0056 | 0.0046 | 0.0038 | 0.0057 |

| | FLUME STATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 |
| RUN=24K SLOPE=0.0180 ROUGHNESS=2, Q:avg= 0.223,std dev=0.0009 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.554 | 4.356 | 4.145 | 3.934 | 3.724 | 3.519 | 3.336 | 3.127 | 2.919 | 2.641 |
| standard deviation | 0.0005 | 0.0006 | 0.0005 | 0.0007 | 0.0005 | 0.0006 | 0.0007 | 0.0007 | 0.0007 | 0.0005 |
| RUN=24L SLOPE=0.0180 ROUGHNESS=2, Q:avg= 0.376,std dev=0.0000 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.730 | 4.533 | 4.327 | 4.118 | 3.929 | 3.701 | 3.507 | 3.311 | 3.078 | 2.702 |
| standard deviation | 0.0005 | 0.0007 | 0.0005 | 0.0007 | 0.0007 | 0.0008 | 0.0009 | 0.0007 | 0.0009 | 0.0008 |
| RUN=24M SLOPE=0.0180 ROUGHNESS=2, Q:avg= 0.535,std dev=0.0000 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.813 | 4.633 | 4.433 | 4.231 | 4.034 | 3.797 | 3.587 | 3.393 | 3.166 | 2.749 |
| standard deviation | 0.0008 | 0.0007 | 0.0007 | 0.0007 | 0.0005 | 0.0008 | 0.0007 | 0.0006 | 0.0006 | 0.0005 |
| RUN=24N SLOPE=0.0180 ROUGHNESS=2, Q:avg= 0.684,std dev=0.0000 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.854 | 4.682 | 4.467 | 4.270 | 4.080 | 3.842 | 3.626 | 3.427 | 3.210 | 2.926 |
| standard deviation | 0.0007 | 0.0006 | 0.0008 | 0.0007 | 0.0010 | 0.0009 | 0.0006 | 0.0010 | 0.0008 | 0.0009 |
| RUN=25A SLOPE=0.0080 ROUGHNESS=2, Q:avg= 0.110,std dev=0.0000 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.663 | 4.556 | 4.455 | 4.350 | 4.253 | 4.161 | 4.076 | 3.987 | 3.892 | 3.794 |
| standard deviation | 0.0007 | 0.0007 | 0.0006 | 0.0013 | 0.0009 | 0.0005 | 0.0007 | 0.0009 | 0.0009 | 0.0009 |
| RUN=25B SLOPE=0.0080 ROUGHNESS=2, Q:avg= 0.272,std dev=0.0009 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.933 | 4.842 | 4.733 | 4.630 | 4.538 | 4.434 | 4.333 | 4.241 | 4.108 | 3.940 |
| standard deviation | 0.0011 | 0.0007 | 0.0007 | 0.0007 | 0.0008 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0011 |
| RUN=25C SLOPE=0.0080 ROUGHNESS=2, Q:avg= 0.354,std dev=0.0000 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 4.991 | 4.905 | 4.793 | 4.697 | 4.604 | 4.495 | 4.390 | 4.298 | 4.159 | 3.956 |
| standard deviation | 0.0006 | 0.0007 | 0.0009 | 0.0008 | 0.0007 | 0.0007 | 0.0008 | 0.0009 | 0.0007 | 0.0007 |
| RUN=25D SLOPE=0.0080 ROUGHNESS=2, Q:avg= 0.680,std dev=0.0009 ( 3 MEAS.) | | | | | | | | | | |
| average (of 15 blocks) | 5.105 | 5.025 | 4.907 | 4.821 | 4.718 | 4.611 | 4.504 | 4.401 | 4.306 | 4.218 |
| standard deviation | 0.0010 | 0.0005 | 0.0005 | 0.0009 | 0.0007 | 0.0005 | 0.0009 | 0.0007 | 0.0005 | 0.0008 |



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