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Hydraulic Survey and Scour Assessment of Bridge 524, Tanana River at Big Delta, Alaska

Scientific Investigations Report 2006–5282

U.S. Department of the Interior
U.S. Geological Survey

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Conversion Factors, Datum, and Abbreviations and Acronyms

Conversion Factors

Multiply	By	To obtain
cubic foot per second (ft^3/s)	0.02832	cubic meter per second
foot (ft)	0.3048	meter
foot per second (ft/s)	0.3048	meter per second
inch (in.)	2.54	centimeter
inch (in.)	25.4	millimeter
mile (mi)	1.609	kilometer
pounds per square foot (lb/ft^2)	0.04788	kilopascal
square foot (ft^2)	929.0	square centimeter
square mile (mi^2)	2.590	square kilometer

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

$$°C = (°F - 32)/1.8$$

Vertical Datum

Sea level: In this report, “sea level” refers to the National Geodetic Vertical Datum of 1929—A geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviations and Acronyms

Abbreviations and Acronyms	Meaning
ADOT&PF	Alaska Department of Transportation and Public Facilities
USGS	U.S. Geological Survey
WSPRO	Computer model for water-surface profile

Hydraulic Survey and Scour Assessment of Bridge 524, Tanana River at Big Delta, Alaska

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Abstract

Bathymetric and hydraulic data were collected August 26–28, 1996, on the Tanana River at Big Delta, Alaska, at the Richardson Highway bridge and Trans-Alaska Pipeline crossing. Erosion along the right (north) bank of the river between the bridge and the pipeline crossing prompted the data collection. A water-surface profile hydraulic model for the 100- and 500-year recurrence-interval floods was developed using surveyed information. The Delta River enters the Tanana immediately downstream of the highway bridge, causing backwater that extends upstream of the bridge. Four scenarios were considered to simulate the influence of the backwater on flow through the bridge. Contraction and pier scour were computed from model results. Computed values of pier scour were large, but the scour during a flood may actually be less because of mitigating factors. No bank erosion was observed at the time of the survey, a low-flow period. Erosion is likely to occur during intermediate or high flows, but the actual erosion processes are unknown at this time.

Introduction

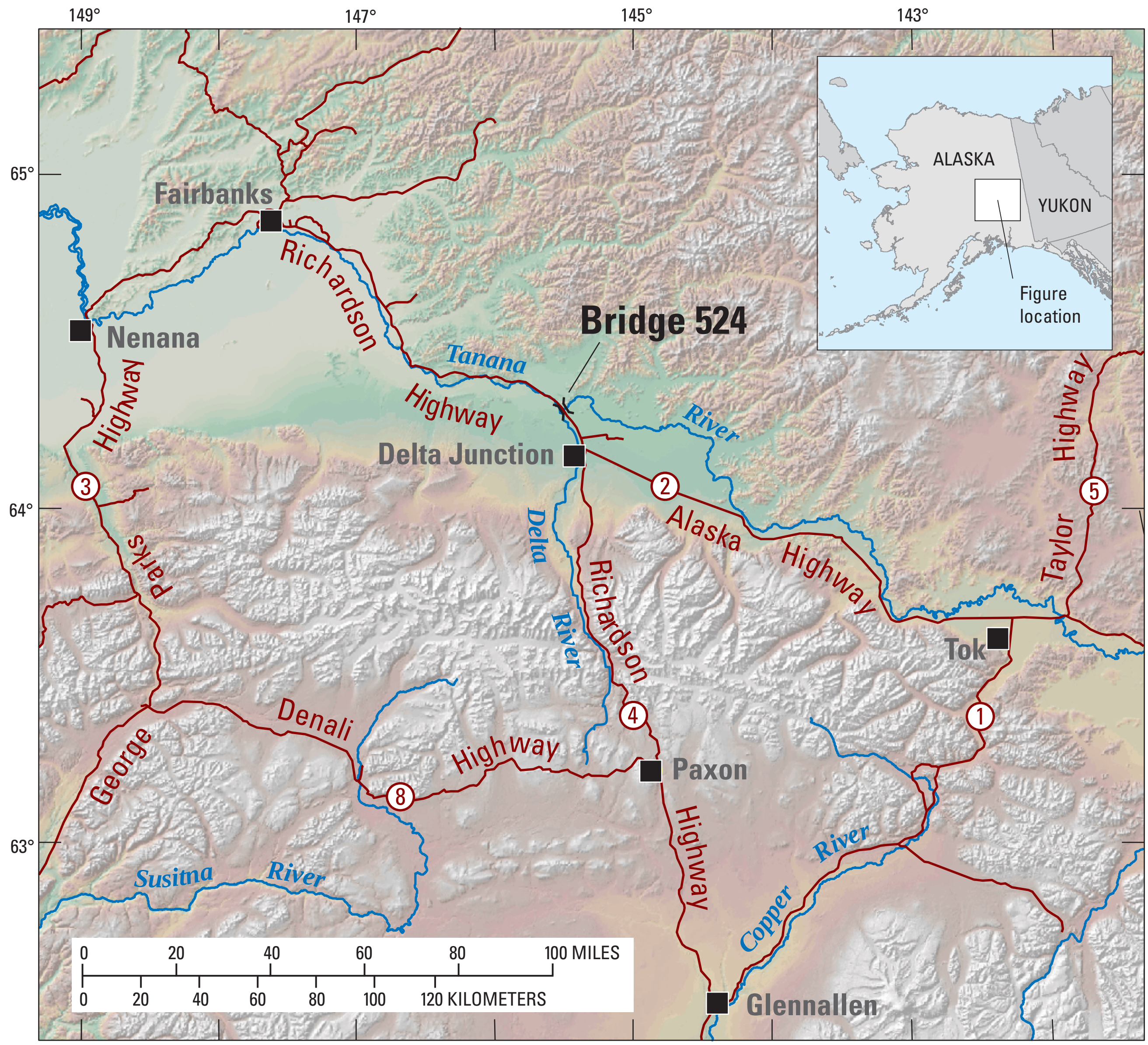
Alaska Department of Transportation and Public Facilities' (ADOT&PF) bridge 524 crosses the Tanana River, a major tributary of the Yukon River, at milepost 275.4 on the Richardson Highway (fig. 1). The Delta River flows into the Tanana immediately downstream of the highway bridge, and the Trans-Alaska Pipeline crosses the river about 500 ft upstream (fig. 2). Backwater on the Tanana River from the confluence with the Delta River can extend upstream of bridge 524. The extent of backwater and its effects on river hydraulics through the bridge depends on the discharge in both rivers. The ADOT&PF commissioned the U.S. Geological Survey (USGS) to complete a bathymetric and hydraulic survey of the Tanana River at Big Delta, Alaska, simulate the river hydraulics, and investigate streambed-scour problems at the site.

The USGS initially identified a potential streambed-scour problem at bridge 524 in 1975 (Norman, 1975). Norman (1975) was able to observe the site at high flows, and some findings are contained in the analysis in section, "Scour Computations." Potential scour was investigated again for a statewide scour assessment (Heinrichs and others, 2001). Pier-scour computations from this preliminary study for the 100-year recurrence-interval flood were more than 35 ft. In the spring of 1996, the right (north) bank of the river began to erode substantially. About 10 ft of the bank had sloughed into the river by mid-April 1996, and the concern was that the continued erosion could affect both the highway bridge and the pipeline crossing. Hydraulic data and computations were needed to design a proposed protective dike on the north bank.

Background

The Tanana River is a glacier-fed river that carries large sediment loads. The basin area upstream of the bridge is 13,500 mi^2 with an average elevation of 3,440 ft. Six percent of the basin is glaciated; 2 percent is lakes, ponds, and swamps; and 50 percent is forest. Mean annual precipitation is 22 in. and mean January minimum temperature is -14°F (Jones and Fahl, 1994.)

A slough of the Tanana branches off the main channel approximately 8,000 ft upstream of the bridge and then reenters approximately 500 ft upstream of the bridge. The Delta River enters the Tanana River immediately downstream of the bridge on river left. The Delta River has formed a braided delta at this confluence and forces the majority of the flow in the Tanana River towards its right bank, thus accelerating flow and exacerbating streambed scour. The confluence with the Delta River also creates backwater that propagates upstream through the bridge reach. The shape of the delta and extent of backwater are constantly changing and influencing the hydraulics at the bridge.



Base from U.S. Geological Survey digital data, 1:63,360
Universal Transverse Mercator projection

Figure 1. Location of the Tanana River at Big Delta study unit, Alaska.

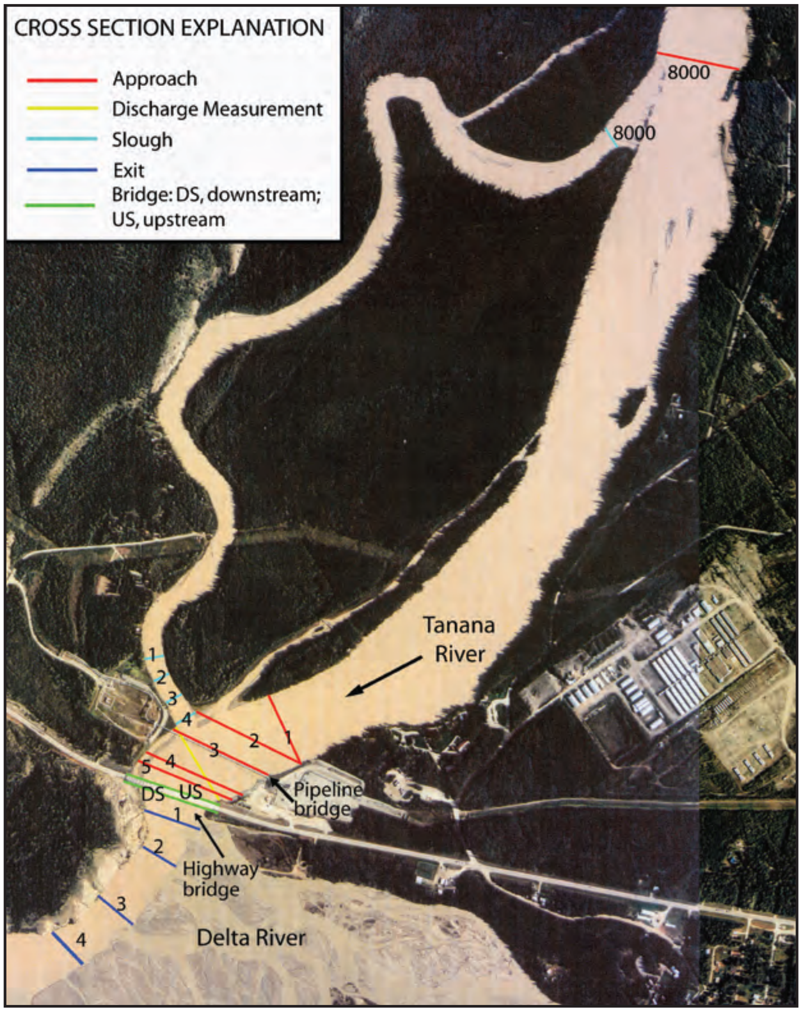


Figure 2. Surveyed cross sections at the Tanana River at Big Delta, Alaska. Cross sections are referred to in text by name and corresponding number in the figure.

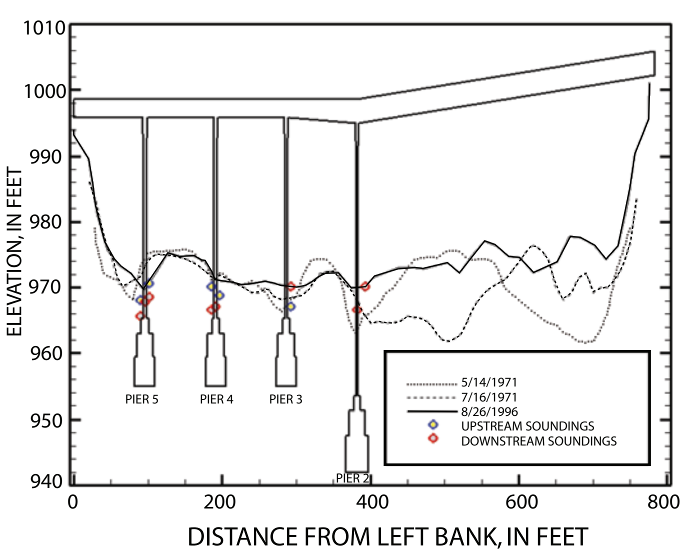


Figure 3. Upstream cross sections and pier soundings at bridge 524, Tanana River at Big Delta, Alaska. Pier soundings were made on August 26, 1996.

Bridge 524 was constructed in 1966. It consists of a 399-ft, steel-through truss span and 4 steel-girder spans, each about 95 ft long (fig. 3). The piers are not aligned directly with the flow, therefore the river strikes them at an angle. This “angle of attack” of the flow at the piers has the potential to increase the local scour at the piers significantly and is discussed in the Scour Computations section.

Purpose and Scope

This report presents the results of a field survey of the Tanana River at Big Delta, Alaska, water-surface profile hydraulic-model computations, and bridge-scour computations. Some interpretation is made of the scour results, and erosion processes are considered. The report’s primary purposes are to present the actual observations made during the field survey and the hydraulic and scour results that follow from the observations. These observations and computations are intended to support the planning and design efforts of all parties who have an interest in this reach of the Tanana River. The Tanana and Delta Rivers are very dynamic; therefore, the survey, hydraulic models, and scour computations are representative of the conditions during the time of the survey.

Bathymetric and hydraulic data were collected during August 26-28, 1996, by the USGS as a cooperative effort with ADOT&PF. Eighteen channel cross sections were surveyed, velocity profiles and discharge were measured, soundings were made at the piers, and bed material was sampled. Cross-sectional and other surveyed data were used as input to the step-backwater water-surface profile (WSPRO) model (Shearman, 1990). Using this model, the water-surface profiles for the 100- and 500-year recurrence-interval floods were computed, and potential scour at the bridge was calculated.

Data Collection

A total station was used to survey points on the bank, road, and bridge, and to locate the ends of the cross sections measured in the river channel. Distance across the channel was measured using a microwave-frequency distance meter and depths were measured with a fathometer or sounding weight.

All surveyed points and channel soundings were referenced to a single arbitrary coordinate system. The origin of this system is (Easting, Northing)=(10,000 ft, 10,000 ft) at the center of the south end of the bridge. The system was aligned with north using the bridge azimuth listed on the as-built plans (S36°26’52”E). The elevation was referenced to a brass cap listed on the plans as 998.94 ft (location E=9,986.6, N=9,991.4).

Eighteen river cross sections were surveyed. Four of these cross sections were located downstream of the bridge, one each at the upstream and downstream sides of the bridge, five upstream of the bridge, and four in the slough near its mouth. The remaining two cross sections were about 8,000 ft upstream—one across the mouth at the head of the slough and the other across the main channel just upstream of the head of the slough (fig. 2).

The two sections surveyed about 8,000 ft upstream were made only to evaluate channel capacity at the head of the slough and the main channel, as well as to document existing conditions. These sections were not referenced to the same coordinate system as the other surveyed points and channel soundings.

Two discharge measurements were made on August 26, 1996—one measuring the full flow of the Tanana River just upstream of the bridge (21,500 ft^3/s), and the second measuring the flow in the slough (2,570 ft^3/s). Depth soundings were made around the piers (fig. 3). Debris obstructed some areas around the piers, making some soundings unfeasible. Sounding elevations indicated the downstream left end of the pier 5 footing was exposed.

Water velocity was measured at several locations using a current meter (fig. 4*A-F*). The current was extremely slow along the right bank upstream of the bridge abutment and downstream of the mouth of the slough—the section of bank that was eroding at the time of this study. At the time of the survey, a silt bar was forming 50–100 ft off the bank in this reach. The velocity profile measured near the right bank several hundred feet downstream of the bridge had the largest average velocity (6.5 ft/s) (fig. 4*A-F*). Water velocity along the right bank of cross section Slough 4 was too slow to be measured

Bed material was sampled under the bridge and in the channel about 700 ft upstream of the bridge (table 1). A sieve analysis was not performed because the samples were too small to give a statistically valid distribution. Norman (1975) also sampled the bed material under the bridge in the scour hole on the left side of pier 5 and found a median diameter (D_{50}) of 30 mm (coarse gravel) and a 90th percentile diameter (D_{90}) of 50 mm (very coarse gravel). He suggested that the streambed material probably is generally coarser at the other scour holes under the bridge that had swifter, deeper flow. He also sampled the bed upstream of the bridge and found a D_{50} of 14 mm (medium gravel) and D_{90} of 58 mm (very coarse gravel).

Table 1. Bed material samples, Tanana River at Big Delta, Alaska.

[Sieve analysis not performed; this data to be used only as an estimate of material size. Sizes were measured along the B-axis using calipers. (B-axis is the mid-length axis—the one that limits the passage through a sieve.)]

Location	Material
Bridge cross section	
Right one-half of Span 1 (abutment 1 to pier 2)	Gravel and cobble (largest clast: 65 millimeters)
Left one-half of Span 1 (abutment 1 to pier 2)	Sand
Span 2 (pier 2 to pier 3)	Sand and gravel (largest clast: 35 millimeters)
Span 3 (pier 3 to pier 4)	Small amount of sand and one 40-millimeter piece of gravel
Span 4 (pier 4 to pier 5)	Obtained no sample - bed is armored
Span 5 (pier 5 to abutment 6)	Obtained no sample - bed is armored
Approach cross section	
Right one-third of channel	Sand and gravel (largest clast: 40 millimeters)
Middle one-third of channel	Gravel and cobble (largest clast: 70 millimeters)
Left one-third of channel	Small amount of fine gravel (~3 millimeters) and one piece of coarse gravel (55 millimeters)

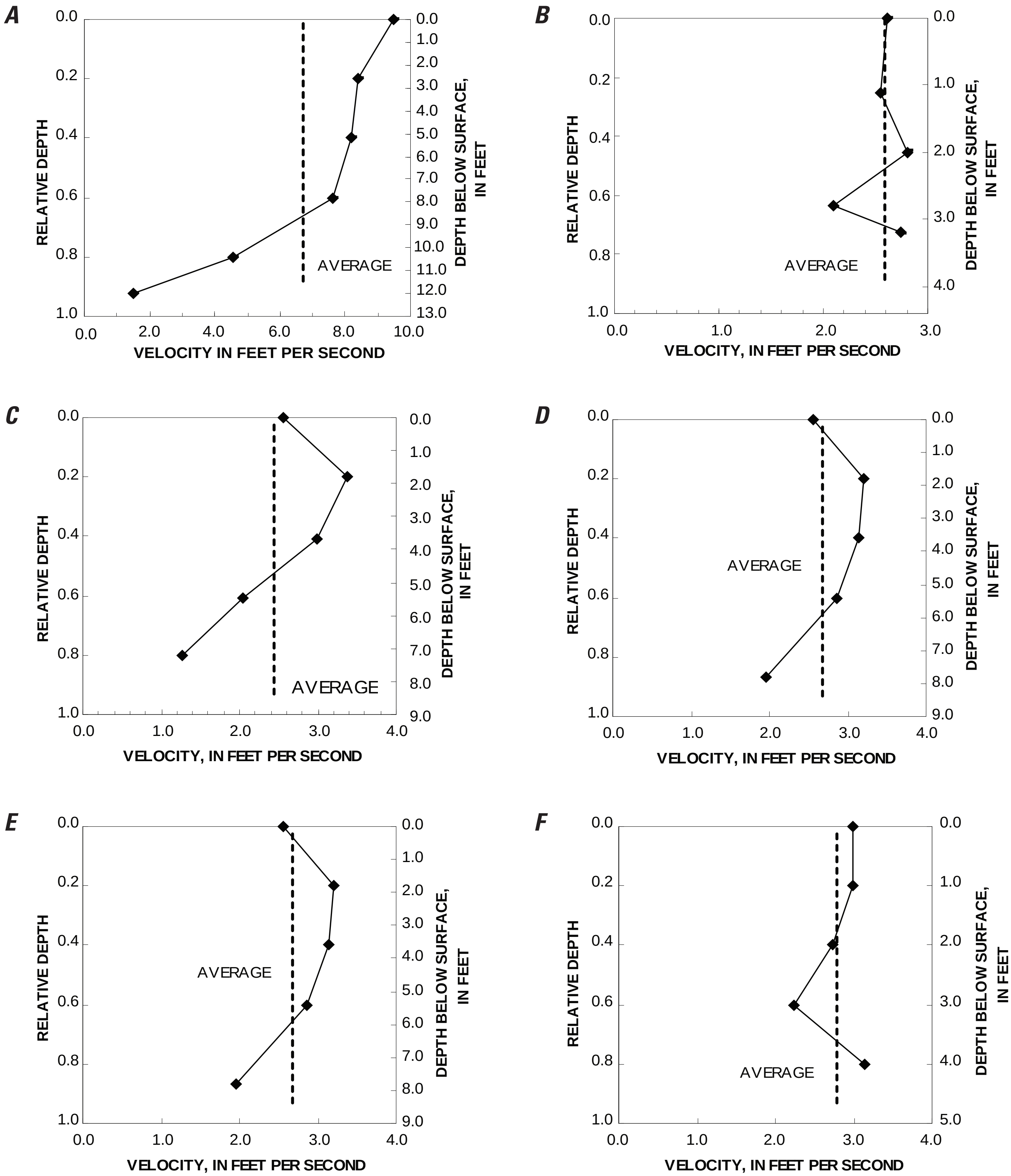


Figure 4. Depth-velocity profiles (*A*) near bluff downstream of bridge, (*B*) at cross section Slough 1, 10 feet from right edge of water, (*C*) at cross section Slough 1, 20 feet from right edge of water, (*D*) at cross section Slough 2, 10 feet from right edge of water, (*E*) at cross section Slough 3, 10 feet from right edge of water, and (*F*) at cross section Slough 4, 10 feet from right edge of water, Tanana River at Big Delta.

Computation of Water-Surface Profiles

The magnitudes of the 100- and 500-year recurrence-interval discharges were computed for both the Tanana River at the bridge and for the Delta River. The discharges for the Tanana River were computed as a weighted average of: (1) flood-frequency analysis of discharge data from 1948 to 1957 by use of techniques described in the Interagency Advisory Committee on Water Data Bulletin 17B (1982), and (2) from regression equations based on basin characteristics developed by Jones and Fahl (1994). The recurrence-interval discharges for the Delta River were computed entirely from a regression of basin characteristics because limited discharge information was available. The computed 100- and 500-year recurrence-interval discharges for the Tanana River at the bridge are 86,700 and 95,600 ft^3/s, respectively, and 36,300 and 41,300 ft^3/s, respectively, for the mouth of the Delta River.

Two WSPRO models were created using some of the surveyed cross sections—the first was for the main channel through the bridge and the second was for the slough. Surveyed cross sections used to generate the model of the main channel were: Exits 2, 3, and 4, the upstream bridge section, the discharge measurement section, and the approach section upstream of the mouth of the slough (cross section Approach 8000) (fig. 2).

Measured discharge in the slough during the field survey was 12 percent of the total discharge in the Tanana. This percentage likely varies with discharge, but was used in the models of the high discharges because it was the only available observation. The volume and distribution of the flow entering from the Delta River affected the WSPRO computations upstream on the Tanana River. These results in turn affected the scour computations at the bridge. Four scenarios were modeled to account for a range of backwater effects on the Tanana River:

- Scenario 1: 18 percent of the Delta River flow enters upstream of Exit 2, 47 percent upstream of Exit 3, 65 percent upstream of Exit 4, and the remainder enters downstream of Exit 4. This scenario represents hydraulic conditions at the time of the field survey.
- Scenario 2: 100 percent of the Delta River flow enters upstream of Exit 2. This scenario would create the most backwater in the Tanana River through the bridge, and hence the highest water surface and lowest velocities upstream.
- Scenario 3: 100 percent of the Delta River flow enters between Exit 3 and Exit 4. This scenario would create moderately high backwater.
- Scenario 4: no flow entering, and therefore, no backwater caused by the Delta River, resulting in the lowest water surface and highest velocities. This is a worst-case scenario, because the Delta River will contribute some flow for all likely scenarios.

For each scenario, a corresponding model was run in the slough, using the water surface in the main channel at the mouth of the slough to start the profile computations. The model was calibrated using the discharge measurement of 21,500 ft^3/s and influence from the Delta River described by Scenario 1. Discharge of the Delta River was not measured. A discharge of 9,150 ft^3/s was estimated for the Delta River at the time of the discharge measurement of the Tanana by applying the ratio (43 percent) of the calculated 500-year recurrence interval flows for the Delta and Tanana Rivers. The surveyed water surface at the cross section Exit 4 was used as the initial water surface for profile computations and resulted in good agreement between modeled and observed water-surface elevations (table 2).

An important input parameter to WSPRO is the initial water surface at the farthest downstream cross section (Exit 4). The WSPRO model determined the initial water surface at the downstream-most section by solving the Manning's equation for depth, given user-defined energy slope, discharge, and geometry at cross section Exit 4. Roughness values were calibrated from measured discharge (21,500 ft^3/s) by matching the modeled water surface to the observed water surface. The energy slope (0.0005) was computed from the calibrated model, when water surfaces were within 0.6 ft (table 2 and appendix A).

Model results for all four scenarios for both the 100- and 500-year flood flows indicate there would be a significant ponding upstream of bridge 524. Downstream, the braided channel of the Delta River would be submerged for nearly 0.5 mile up the delta. Upstream, the banks would be under several feet of water and the downstream end of the island formed by the slough would be submerged. The Richardson Highway would be submerged about 1,000 ft south of the end of the bridge, but the model indicates a very low water-surface slope, so the flow over the road would be minor. The water-surface elevations are summarized in table 2, and the output from the WSPRO model runs is attached in appendix A.

Table 2. Water-surface profiles computed with WSPRO, Tanana River at Big Delta, Alaska.

[**Abbreviations:** ft^3/s, cubic foot per second; DS, downstream; Q mmt, discharge measurement]

Test Case A Surveyed water surface at Exit 4; for measured discharge			Test Case B Water surface computed using friction slope at Exit 4; for measured discharge		
Cross section	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**	**Cross section**	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**
Exit 4	27,400	979.7	Exit 4	27,400	980.3
Exit 3	25,800	979.9	Exit 3	25,800	980.5
Exit 2	23,100	980.6	Exit 2	23,100	981.1
Bridge (DS)	21,500	980.9	Bridge (DS)	21,500	981.2
Q mmt	21,500	981.1	Q mmt	21,500	981.5
Approach 1	18,900	981.5	Approach 1	18,900	981.5
Case 1: 100-year flood			Case 1: 500-year flood		
Cross section	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**	**Cross section**	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**
Exit 4	110,000	991.3	Exit 4	122,000	992.1
Exit 3	104,000	991.6	Exit 3	115,000	992.3
Exit 2	93,200	992.3	Exit 2	103,000	993.0
Bridge (DS)	86,700	992.1	Bridge (DS)	95,600	992.8
Q mmt	86,700	992.6	Q mmt	95,600	993.3
Approach 1	76,300	992.9	Approach 1	84,200	993.7
Case 2: 100-year flood			Case 2: 500-year flood		
Cross section	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**	**Cross section**	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**
Exit 4	123,000	992.1	Exit 4	136,900	992.1
Exit 3	123,000	992.3	Exit 3	136,900	993.1
Exit 2	123,000	993.0	Exit 2	136,900	993.7
Bridge (DS)	86,700	993.0	Bridge (DS)	95,600	993.7
Q mmt	86,700	993.4	Q mmt	95,600	994.1
Approach 1	76,300	993.7	Approach 1	84,200	994.5
Case 3: 100-year flood			Case 3: 500-year flood		
Cross section	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**	**Cross section**	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**
Exit 4	123,000	992.1	Exit 4	136,900	992.9
Exit 3	86,700	992.7	Exit 3	95,600	993.5
Exit 2	86,700	993.0	Exit 2	95,600	993.8
Bridge (DS)	86,700	992.8	Bridge (DS)	95,600	993.5
Q mmt	86,700	993.2	Q mmt	95,600	994.0
Approach 1	76,300	993.5	Approach 1	84,200	994.3
Case 4: 100-year flood			Case 4: 500-year flood		
Cross section	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**	**Cross section**	**Discharge (ft^3/s)**	**Water-surface elevation (ft)**
Exit 4	86,700	989.6	Exit 4	95,600	990.3
Exit 3	86,700	989.8	Exit 3	95,600	990.5
Exit 2	86,700	990.6	Exit 2	95,600	991.3
Bridge (DS)	86,700	990.5	Bridge (DS)	95,600	991.1
Q mmt	86,700	991.0	Q mmt	95,600	991.7
Approach 1	76,300	991.4	Approach 1	84,200	992.2

Scour Computations

Pier scour was calculated according to procedures outlined in HEC–18 (Richardson and Davis, 1995) for the 100- and 500-year floods for all four scenarios described in tables 3–6. The USGS scour-evaluation procedure is outlined in detail by Heinrichs and others (2001) and summarized here. Flow at the bridge was divided into 20 stream tubes of equal conveyance by using an option in the WSPRO model program. The highest-velocity stream tube was selected and assumed to be directed at the widest pier. This assumption provides the maximum estimate of pier scour. This worst-case analysis is useful for screening purposes, whereas actual scour events may have mitigating factors that would reduce the actual scour.

The HEC–18 pier-scour equation (Richardson and Davis, 1995) is recommended for both live-bed and clear-water sediment-transport conditions and is relatively sensitive to changes in pier geometry and angle of attack. Scour was computed using model results from the 100-year recurrence-interval discharge and a 35º angle of attack over a range of water-surface elevations from 985.0 to 993.5 ft. A range of starting water-surface elevations was used in the model to evaluate this variable's effect on pier-scour computations. Computed pier scour varied in magnitude from 43.3 to 35.9 ft (fig. 5, table 7) or about 20 percent for the range of starting water-surface elevations. The reference surface for these computations was the streambed elevation determined from the as-built survey plans. Of the four scenarios considered to represent the input from the Delta River, Scenario 4, with no modeled backwater and consequently higher flow velocities at the bridge, resulted in the greatest computed pier scour (tables 3–6). Because the pier-scour values computed at the Tanana River at Big Delta are large, the bridge may be in need of scour countermeasures. Therefore, the factors that may mitigate the actual scour at piers must be considered.

Mitigating factors that affect scour depths include reduced effective pier length, reduced angle of attack, and bed armor. If the entire length of the pier is not subject to the flow attacking from an angle, the length used for the scour computations must be reduced to an "effective length" or the scour may be over-predicted significantly (Richardson and Davis, 1995). The angle of attack may differ across the width of the bridge and be lower at some piers. The bed may be armored, resulting in a possible reduction of pier scour by as much as 30 percent (Richardson and Davis, 1995). At bridge 524, all three factors may apply, but caution is needed applying field observations made at relatively low flow (21,500 ft^3/s) to 100- and 500-year recurrence-interval floods.

An important factor for pier-scour computations is pier alignment relative to the flow direction. The piers at bridge 524 are as much as 35º misaligned with the flow. Applying the pier-scour computation equations using this angle, without considering possible mitigating factors, increases computed scour by a factor of 3.2 more than the scour computed for a 0º angle of attack. This 35º angle of attack was observed at higher flows by Norman (1975) and confirmed by the August 1996 survey. Considering effective flow length, at the time of this survey, only the front 50 percent of the pier was subject to this angle of attack. The vortex near the nose deflected the flow that otherwise would have struck at an angle farther back on the pier, and the flow was aligned with the pier from the midpoint back.

During the field survey, the angle of attack was the full 35º at the left piers, but it decreased to the right with an angle of about 20º at pier 2, the largest pier. At higher flows, this situation is different. A discharge measurement of 51,600 ft^3/s made on August 13, 1971, indicates the angle of attack of the flow near all the piers was approximately 32º. Norman (1975) found that at high stages, the angle of attack varies between 35º and 40º.

Bed armoring also occurs to some extent at the bridge site. Bed material sampled during the field survey showed the left half of the channel through the bridge was substantially armored, and the right portion of the channel consisted of sand and gravel. A pipe dredge consisting of a 20-pound cylinder with an 8-inch-diameter opening surrounded by teeth to rip material from the bed was not able to drag up a sample from the armored sections of the bed. The quantitative formulas presented by Richardson and Davis (1995) apply a bed armor correction factor (K_4) for median particle diameters coarser than 2 mm. Norman (1975) found a D_{50} of 30 mm on the left side of pier 5, but could not sample at other piers.

The depths observed at the time of the survey at a flow of 21,500 ft^3/s also can be used to check the validity of the scour computations. The average bed elevation for the cross section on the upstream side of the bridge was 973 ft. The channel was deepest on the left side of pier 5. Soundings at the upstream end of the pier found an average bed elevation of 967 ft, indicating about 6 ft of pier scour. The effects of various combinations of mitigating factors are shown in table 8. A 35º angle of attack with a 50-percent effective pier length and maximum armoring (30-percent scour reduction) gives a computed pier scour of 11.4 ft—an over-estimate of 5.4 ft compared to the observation.

Additional observations at higher flows would give more information about present conclusions. Although it is unlikely the information about the angle of attack would change substantially from Norman's (1975) result, it would be possible to get a better estimate of the effective pier length and better description of the flow pattern through the bridge.

Table 3. Bridge-scour computations, Scenario 1, Tanana River at Big Delta, Alaska, Bridge 524.

[Flow from the Delta River is added in proportion to channel width above the exit section. Exit 2: 18 percent; Exit 3: 45 percent; Exit 4: 65 percent. The remaining 35 percent of the flow enters downstream of Exit 4. **Abbreviations:** ft, foot; ft/ft, foot per foot; lbs/ft², pounds per square foot; ft/s, foot per second; ft³/s, cubic foot per second; ft/s², foot per second squared; s, second; deg, degree; g, gravity (32.2 ft/s²)]

LIVE-BED CONTRACTION SCOUR

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{\frac{6}{7}} \left(\frac{W_1}{W_2}\right)^{K_1}$$

$$y_{cs} = y_2 - y_1 = \text{(average scour depth)}$$

Computed floods: total discharge (ft³/s)	*Q*	100 Year 86,700	500 Year 95,600
Hydraulic radius of approach section (ft)	R	16.66	17.29
Friction slope (ft/ft)	S	.001	.001
Average shear stress at bed (lbs/ft²)	$\tau=\rho g RS$	.52	.54
Shear velocity (ft/s)	$V^*=(\tau/\rho)^{1/2}$	.52	.53
Fall velocity of bed material (ft/s)	w	2.60	2.60
Ratio	V^*/w	.20	.20
Exponent determined from mode of bed material transport	$k_1=f(V^*/w)$	.59	.59
Discharge in main channel of approach section (ft³/s)	Q_1	86,700	95,600
Percentage of total discharge		100	100
Discharge in main channel of contracted (bridge) section (ft³/s)	Q_2	86,700	95,600
Percentage of total discharge		100	100
Width of main channel of approach section (ft)	W_1	666	666
Width of main channel of contracted (bridge) section (ft)	W_2	603	608
Average depth of main channel of approach section (ft)	y_1	20.2	21.1
Average depth in contracted (bridge) section (ft)	y_2	21.4	22.2
CONTRACTION SCOUR (ft)	***Ycs***	**1.2**	**1.1**

PIER SCOUR

$$\frac{y_{ps}}{y_1} = 2.0 K_1 K_2 K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr^{0.43}$$

		100 Year	500 Year
Speed of maximum velocity stream tube (ft/s)	v_1	8.77	9.39
Depth of maximum velocity stream tube (ft/s)	y_1	18.4	18.4
Froude number of maximum velocity stream tube	$Fr=v_1/(gy_1)^{1/2}$	.37	.39
Pier shape		round nose	
Pier shape correction factor	K_1	1.0	1.0
Angle of attack (deg)	AA	35	35
Pier width (ft)	a	5.0	5.0
Pier length (ft)	L	47	47
Ratio	L/a	9	9
Angle of attack correction factor	$K_2=f(AA,L/a)$	3.3	3.3
Bed condition (dunes) correction factor	K_3	1.1	1.1
PIER SCOUR (ft)	***Yps***	**36.4**	**37.9**

TOTAL SCOUR

$$T_s = y_{cs} + y_{ps}$$

		100 Year	500 Year
Contraction scour (ft)	*Ycs*	1.2	1.1
Pier scour (ft)	*Yps*	36.4	37.9
TOTAL SCOUR (ft)	$\boldsymbol{T_s}$	37.6	39.0

Table 4. Bridge-scour computations, Scenario 2, Tanana River at Big Delta, Alaska, Bridge 524.

[Entire flow from the Delta River is added above the farthest upstream exit section. This creates the most backwater. Exit 2: 100 percent, Exit 3: 0 percent, Exit 4: 0 percent. **Abbreviations:** ft, foot; ft/ft, foot per foot; lbs/ft², pounds per square foot; ft/s, foot per second; ft³/s, cubic foot per second; ft/s², foot per second squared; s, second; deg, degree; g, gravity (32.2 ft/s²)]

LIVE-BED CONTRACTION SCOUR

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{\frac{6}{7}} \left(\frac{W_1}{W_2}\right)^{K_1}$$

$$y_{cs} = y_2 - y_1 = \text{(average scour depth)}$$

Computed floods: total discharge (ft³/s)	Q	100 Year 86,700	500 Year 95,600
Hydraulic radius of approach section (ft)	R	17.37	18.04
Friction slope (ft/ft)	S	.001	.001
Average shear stress at bed (lbs/ft²)	$\tau=\rho gRS$	.54	.56
Shear velocity (ft/s)	$V^*=(\tau/\rho)^{1/2}$	.53	.54
Fall velocity of bed material (ft/s)	w	2.60	2.60
Ratio	V^*/w	.20	.21
Exponent determined from mode of bed material transport	$k_1=f(V^*/w)$	.59	.59
Discharge in main channel of approach section (ft³/s)	Q_1	86,700	95,600
Percentage of total discharge		100	100
Discharge in main channel of contracted (bridge) section (ft³/s)	Q_2	86,700	95,600
Percentage of total discharge		100	100
Width of main channel of approach section (ft)	W_1	666	666
Width of main channel of contracted (bridge) section (ft)	W_2	610	612
Average depth of main channel of approach section (ft)	y_1	21.2	22.1
Average depth in contracted (bridge) section (ft)	y_2	22.3	23.2
CONTRACTION SCOUR (ft)	***Ycs***	**1.1**	**1.1**

PIER SCOUR

$$\frac{y_{ps}}{y_1} = 2.0 K_1 K_2 K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr^{0.43}$$

		100 Year	500 Year
Speed of maximum velocity stream tube (ft/s)	v_1	8.41	8.92
Depth of maximum velocity stream tube (ft/s)	y_1	18.6	18.8
Froude number of maximum velocity stream tube	$Fr=v_1/(gy_1)^{1/2}$	.34	.36
Pier shape		round nose	
Pier shape correction factor	K_1	1.0	1.0
Angle of attack (deg)	AA	35	35
Pier width (ft)	a	5.0	5.0
Pier length (ft)	L	47	47
Ratio	L/a	9	9
Angle of attack correction factor	$K_2=f(AA,L/a)$	3.3	3.3
Bed condition (dunes) correction factor	K_3	1.1	1.1
PIER SCOUR (ft)	***Yps***	**35.9**	**36.9**

TOTAL SCOUR

$$T_s = y_{cs} + y_{ps}$$

		100 Year	500 Year
Contraction scour (ft)	*Ycs*	1.1	1.1
Pier scour (ft)	*Yps*	35.9	36.9
TOTAL SCOUR (ft)	***Ts***	**37.0**	**38.0**

Table 5. Bridge scour computations, Scenario 3, Tanana River at Big Delta, Alaska, Bridge 524.

[Entire flow from the Delta River is added in above the farthest downstream exit section. Exit 2: 0 percent; Exit 3: 0 percent; Exit 4: 100 percent. **Abbreviations:** ft, foot; ft/ft, foot per foot; lbs/ft², pounds per square foot; ft/s, foot per second; ft³/s, cubic foot per second; ft/s², foot per second squared; s, second; deg, degree; g, gravity (32.2 ft/s²)]

LIVE-BED CONTRACTION SCOUR

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{\frac{6}{7}} \left(\frac{W_1}{W_2}\right)^{K_1}$$

$$y_{cs} = y_2 - y_1 = \text{(average scour depth)}$$

		100 Year	500 Year
Computed floods: total discharge (ft³/s)	***Q***	**86,700**	**95,600**
Hydraulic radius of approach section (ft)	R	17.21	17.86
Friction slope (ft/ft)	S	.001	.001
Average shear stress at bed (lbs/ft²)	$\tau=\rho g RS$	.54	.56
Shear velocity (ft/s)	$V^*=(\tau/\rho)^{1/2}$	.53	.54
Fall velocity of bed material (ft/s)	w	2.60	2.60
Ratio	V^*/w	.20	.21
Exponent determined from mode of bed material transport	$k_1 = f(V^*/w)$	.59	.59
Discharge in main channel of approach section (ft³/s)	Q_1	86,700	95,600
Percentage of total discharge		100	100
Discharge in main channel of contracted (bridge) section (ft³/s)	Q_2	86,700	95,600
Percentage of total discharge		100	100
Width of main channel of approach section (ft)	W_1	666	666
Width of main channel of contracted (bridge) section (ft)	W_2	608	612
Average depth of main channel of approach section (ft)	y_1	21.0	21.9
Average depth in contracted (bridge) section (ft)	y_2	22.1	23.0
CONTRACTION SCOUR (ft)	***Ycs***	**1.1**	**1.1**

PIER SCOUR

$$\frac{y_{ps}}{y_1} = 2.0 K_1 K_2 K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr^{0.43}$$

		100 Year	500 Year
Speed of maximum velocity stream tube (ft/s)	v_1	8.52	9.01
Depth of maximum velocity stream tube (ft/s)	y_1	18.4	18.6
Froude number of maximum velocity stream tube	$Fr=v_1/(gy_1)^{1/2}$	.35	.37
Pier shape		round nose	
Pier shape correction factor	K_1	1.0	1.0
Angle of attack (deg)	AA	35	35
Pier width (ft)	a	5.0	5.0
Pier length (ft)	L	47	47
Ratio	L/a	9	9
Angle of attack correction factor	$K_2=f(AA,L/a)$	3.3	3.3
Bed condition (dunes) correction factor	K_3	1.1	1.1
PIER SCOUR (ft)	***Yps***	**36.2**	**37.2**

TOTAL SCOUR

$$T_s = y_{cs} + y_{ps}$$

		100 Year	500 Year
Contraction scour (ft)	*Ycs*	1.1	1.1
Pier scour (ft)	*Yps*	36.2	37.2
TOTAL SCOUR (ft)	***Ts***	**37.3**	**38.3**

Table 6. Bridge-scour computations, Scenario 4, Tanana River at Big Delta, Alaska, Bridge 524.

[No flow from the Delta River is added to the exit sections. No backwater—worst case assumption for pier scour. Exit 2: 0 percent; Exit 3: 0 percent; Exit 4: 0 percent. **Abbreviations:** ft, foot; ft/ft, foot per foot; lbs/ft^2, pounds per square foot; ft/s, foot per second; ft^3/s, cubic foot per second; ft/s^2, foot per second squared; s, second; deg, degree; g, gravity (32.2 ft/s^2)]

LIVE-BED CONTRACTION SCOUR

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{\frac{6}{7}} \left(\frac{W_1}{W_2}\right)^{K_1}$$

$$y_{cs} = y_2 - y_1 = \text{(average scour depth)}$$

Computed floods: total discharge (ft³/s)	Q	100 Year 86,700	500 Year 95,600
Hydraulic radius of approach section (ft)	R	15.29	15.88
Friction slope (ft/ft)	S	.001	.001
Average shear stress at bed (lbs/ft^2)	$\tau=\rho gRS$	.48	.50
Shear velocity (ft/s)	$V^*=(\tau/\rho)^{1/2}$	.50	.51
Fall velocity of bed material (ft/s)	w	2.60	2.60
Ratio	V^*/w	.19	.19
Exponent determined from mode of bed material transport	$k_1=f(V^*/w)$	.59	.59
Discharge in main channel of approach section (ft^3/s)	Q_1	86,700	95,600
Percentage of total discharge		100	100
Discharge in main channel of contracted (bridge) section (ft^3/s)	Q_2	86,700	95,600
Percentage of total discharge		100	100
Width of main channel of approach section (ft)	W_1	666	666
Width of main channel of contracted (bridge) section (ft)	W_2	591	595
Average depth of main channel of approach section (ft)	y_1	18.3	19.2
Average depth in contracted (bridge) section (ft)	y_2	19.7	20.5
CONTRACTION SCOUR (ft)	Y_{cs}	**1.3**	**1.3**

PIER SCOUR

$$\frac{y_{ps}}{y_1} = 2.0K_1K_2K_3\left(\frac{a}{y_1}\right)^{0.65} Fr^{0.43}$$

		100 Year	500 Year
Speed of maximum velocity stream tube (ft/s)	v_1	9.64	10.26
Depth of maximum velocity stream tube (ft/s)	y_1	16.1	16.6
Froude number of maximum velocity stream tube	$Fr=v_1/(gy_1)^{1/2}$	.42	.44
Pier shape		round nose	
Pier shape correction factor	K_1	1.0	1.0
Angle of attack (deg)	AA	35	35
Pier width (ft)	a	5.0	5.0
Pier length (ft)	L	47	47
Ratio	L/a	9	9
Angle of attack correction factor	$K_2=f(AA,L/a)$	3.3	3.3
Bed condition (dunes) correction factor	K_3	1.1	1.1
Submerged low steel multiplier	$f(Fr\text{approach})$		
PIER SCOUR (ft)	Y_{ps}	**37.5**	**38.7**

TOTAL SCOUR

$$T_s = y_{cs} + y_{ps}$$

		100 Year	500 Year
Contraction scour (ft)	Y_{cs}	1.3	1.3
Pier scour (ft)	Y_{ps}	37.5	38.7
TOTAL SCOUR (ft)	T_s	38.8	**40.0**

Table 7. Estimated pier-scour depths for the 100-year-flood discharge computed from model output with starting water-surface elevations from 985.0 to 993.5 feet at the Tanana River at Big Delta, Alaska.

[**Abbreviations:** ft, foot; ft/s, foot per second]

Water-surface elevation (ft)	Average velocity of entire section (ft/s)	Stream tube depth (ft)	Stream tube velocity (ft/s)	Froude number	Pier scour for 35° angle of attack (ft)
985.0	12.6	12.1	14.8	0.8	43.3
985.5	12.1	12.5	13.9	.7	42.4
986.0	11.6	12.9	13.5	.7	42.0
986.5	11.2	13.2	12.9	.6	41.4
987.0	10.8	13.6	12.4	.6	40.8
987.5	10.4	14.1	11.9	.6	40.4
988.0	10.0	14.4	11.4	.5	39.7
988.5	9.7	14.8	11.0	.5	39.3
989.0	9.4	15.2	10.6	.5	38.8
989.5	9.1	15.7	10.3	.5	38.5
990.0	8.8	16.1	10.0	.4	38.1
990.5	8.5	16.1	9.6	.4	37.5
991.0	8.3	16.5	9.4	.4	37.2
991.5	8.0	16.9	9.1	.4	36.8
992.0	7.8	17.8	8.9	.4	36.7
992.5	7.6	18.4	8.8	.4	36.4
993.0	7.4	18.4	8.5	.4	36.2
993.5	7.2	18.6	8.4	.3	35.9

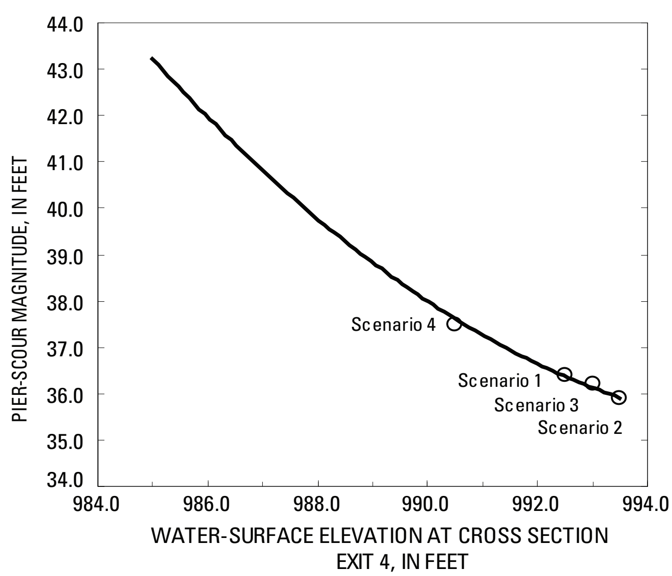


Figure 5. Estimated pier-scour magnitudes for the 100-year-flood discharge computed from model output with starting water-surface elevations from 985.0 to 993.5 feet at the Tanana River at Big Delta, Alaska.

Table 8. Pier-scour computations for discharge measurements, Tanana River at Big Delta, Alaska, August 26, 1996.

[Assessment of effective pier length, angle of attack, and bed armor factors; Bridge 524: Tanana River at Big Delta. **Abbreviations:** ft^3/s, cubic foot per second; ft, foot; ft/s, foot per second. (pier-scour equation is presented in tables 3–6)]

Discharge (ft^3/s)	21,500	Froude number, *Fr*	0.35
Stream tube depth, y^1 (ft)	8.7	Pier shape factor, K_1	1
Stream tube velocity (ft/s)	5.79	Bed condition factor, K_3	1.1

Pier No.	Pier length, L (ft)	Effective pier length (percent)	Effective pier length, (ft)	Pier width, a (ft)	Effective length/width ratio	Angle of attack (degrees)	Angle of attack factor, K_2	Bed armor correction factor, K_4	Pier scour (ft)
2	47	100	47.0	5.0	9.4	35	3.3	1.0	27.9
2	47	50	23.5	5.0	4.7	35	2.3	1.0	19.2
2	47	33	15.5	5.0	3.1	35	1.9	1.0	15.8
2	47	100	47.0	5.0	9.4	35	3.3	.7	19.5
2	47	50	23.5	5.0	4.7	35	2.3	.7	13.5
2	47	33	15.5	5.0	3.1	35	1.9	.7	11.1
2	47	100	47.0	5.0	9.4	25	2.8	1.0	23.8
2	47	50	23.5	5.0	4.7	25	2.0	1.0	17.0
2	47	33	15.5	5.0	3.1	25	1.7	1.0	14.3
2	47	100	47.0	5.0	9.4	25	2.8	.7	16.7
2	47	50	23.5	5.0	4.7	25	2.0	.7	11.9
2	47	33	15.5	5.0	3.1	25	1.7	.7	10.0
2	47	100	47.0	5.0	9.4	15	2.2	1.0	18.8
2	47	50	23.5	5.0	4.7	15	1.7	1.0	14.1
2	47	33	15.5	5.0	3.1	15	1.4	1.0	12.3
2	47	100	47.0	5.0	9.4	15	2.2	.7	13.2
2	47	50	23.5	5.0	4.7	15	1.7	.7	9.9
2	47	33	15.5	5.0	3.1	15	1.4	.7	8.6
3-5	36	100	36.0	4.0	9.0	35	3.2	1.0	23.5
3-5	36	50	18.0	4.0	4.5	35	2.2	1.0	16.3
3-5	36	33	11.9	4.0	3.0	35	1.8	1.0	13.4
3-5	36	100	36.0	4.0	9.0	35	3.2	.7	16.5
3-5	36	50	18.0	4.0	4.5	35	2.2	.7	11.4
3-5	36	33	11.9	4.0	3.0	35	1.8	.7	9.4
3-5	36	100	36.0	4.0	9.0	25	2.7	1.0	20.1
3-5	36	50	18.0	4.0	4.5	25	2.0	1.0	14.4
3-5	36	33	11.9	4.0	3.0	25	1.7	1.0	12.1
3-5	36	100	36.0	4.0	9.0	25	2.7	.7	14.1
3-5	36	50	18.0	4.0	4.5	25	2.0	.7	10.1
3-5	36	33	11.9	4.0	3.0	25	1.7	.7	8.5
3-5	36	100	36.0	4.0	9.0	15	2.2	1.0	16.0
3-5	36	50	18.0	4.0	4.5	15	1.6	1.0	12.0
3-5	36	33	11.9	4.0	3.0	15	1.4	1.0	10.5
3-5	36	100	36.0	4.0	9.0	15	2.2	.7	11.2
3-5	36	50	18.0	4.0	4.5	15	1.6	.7	8.4
3-5	36	33	11.9	4.0	3.0	15	1.4	.7	7.4

Channel Changes and Bank Erosion

Scour and fill occurs seasonally on the Tanana River. At higher flows, the sand- and silt-size material is scoured from the bed and transported in suspension as well as bedload. If the flow declines and velocities decrease in parts of the channel, the fine material may drop out and be deposited. This seasonal change may explain the bar that has formed adjacent to the right bank—high flow washes out the bar and the flow pattern changes along the right bank—causing lateral erosion. The bar re-forms as the flow declines.

Documenting long-term channel change through comparisons of surveyed cross sections was difficult because of the dynamic nature of the river and the fact that these survey data only captured pieces of the change over time. The data collected for this study and the hydraulic model represent the conditions at the time of the August 1996 field survey. Substantial changes in channel geometry have occurred in this river system and may occur regularly. Norman (1975) surveyed four cross sections in 1971—upstream and downstream sides of the bridge and a section near the 1996 cross section Exit 1. Direct comparison between cross sections used in this study and Norman (1975) are complicated further by the fact that the pipeline crossing and its associated revetment that encroaches on the channel had not been constructed in 1971. Norman's cross sections measured at the bridge at varying discharges indicated substantial changes in the bed over a few months (fig. 3). The delta formed by the Delta River probably is in a constant state of flux (note the changes in fig. 6). It is likely the channel downstream of the bridge is constantly changing shape as the flow and sediment-transport rates change in both the Tanana and Delta Rivers. This is not unusual on rivers carrying large amounts of fine sediment and has been observed at other sites on the Tanana River with comparable channel changes occurring in as little as a week (Burrows and others, 1981).

The cause of the accelerated lateral erosion on the right bank is unknown. Two effects appear to occur at varying flows. First, as mentioned previously, as the flow decreases, the bar re-forms. Although this bar may buffer the bank from direct attack, the main channel also shifts to the left as the flow decreases, thereby lowering the velocities directed to the right bank. Second, at higher flows, an eddy forms on the right bank upstream from the bridge and reverse flow occurs on the right bank and through the bridge. This was observed during the 1971 high-flow measurement of 51,600 ft^3/s and during a discharge measurement from the bridge of 49,500 ft^3/s on August 19, 1967—the 100-year flood flow is 86,700 ft^3/s. The bank erosion that prompted this study occurred during early spring and continued into the early part of summer, a period of intermediate flows. The morphology of the Delta River's delta at this time is unknown. Changes in its shape and extent could influence the velocities along the right bank upstream from the bridge. The bar that protects the right bank easily could be eroded if the flow of the Tanana were directed at it. There were no observations of these intermediate flows in 1996.

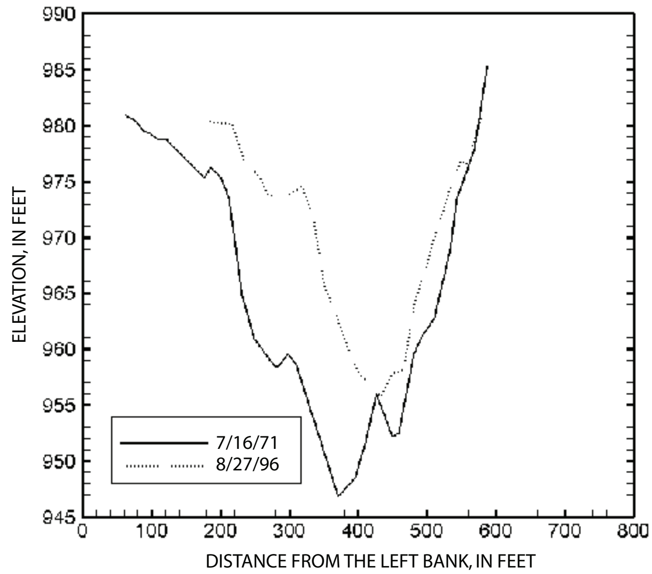


Figure 6. Channel changes at cross section Exit 1 from 1971 to 1996, Tanana River at Big Delta, Alaska. See figure 2 for cross-section location.

At the time of the August 1996 survey, velocities along the right bank were very slow. One goal of the survey was to determine what maximum velocities might be expected—a velocity of 9.5 ft/s was measured at the rock bluff downstream of the bridge. During a discharge measurement of 51,600 ft^3/s made at the bridge on August 13, 1971, the highest velocity measured was 9.9 ft/s at 20 percent of the total depth near pier 3.

Conclusions

Hydraulic conditions at bridge 524 are complex because the Delta River enters immediately downstream of the bridge. The varying discharge and shape of the delta formed by the Delta River affect the flow of the Tanana River as it passes through the bridge. A water-surface profile model was developed and calibrated to the relatively low flow observed at the time of the field survey. However, given the complications and variations of the channel at different discharges, the model results should be considered an estimate.

Computed pier scour varied from 43.3 to 35.9 ft. Possible mitigating factors, such as effective pier length and bed armoring, reduced the computed pier-scour magnitude to 11.4 ft. Maximum observed pier scour during the field survey at a relatively low flow was 6.0 ft.

The cause of the accelerated lateral erosion on the right bank is unknown. At the time of the field survey, a bar had formed between the main channel and the right bank. The erosion occurred at flows higher than those observed. The circumstances at the time of active erosion are uncertain—erosion may occur at an intermediate flow or higher flows. At higher flows an eddy has been observed under the right side of the bridge. The extent and shape of the delta downstream of the bridge, as well as the discharge of the Delta River, affect the flow and channel configuration of the Tanana River upstream of the bridge.

Both the pier-scour computations and the determination of the bank-erosion process would benefit from observations at higher flows. Previous work by Norman (1975) lacks detailed observations of high flow at the piers. Hydraulic data gathered at a high flow, and/or a period of active bank erosion, would be useful for understanding and attempting to predict both of these processes.

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Appendix A. Water-Surface Profile Model Data Files

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T1        Bridge No. 524, Tanana River at Big Delta
T2        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
T3        WSPRO Profiles (WSPRO ver. V082195)
*
WS        979.7 * * * * * * * * 100
SK        * 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005
*         SK back-calc'd from 8/26/96 Qmmt as .0005
*         **********************************************************************
XS   XIT4 -1699
GR        -6020, 1020  -6000, 1000  -76.1, 982.6  -6.9, 981
GR        0, 979.7  13.1, 978.3  42.7, 977.6  75.5, 965.7
GR        108.3, 962.2  141.1, 962.7  173.9, 962.7  206.7, 962.9
GR        239.5, 963.8  272.3, 965.9  311.7, 966.1  341.2, 979.7
GR        346.2, 984.7  348.2, 1004.7
N         0.035    0.030
SA               0
*         **********************************************************************
XS   XIT3 -1249
GR        -6020, 1020  -6000, 1000  -81.8, 983.1  -12.6, 981.5
GR        -3.1, 980.1  0, 979.2  22.7, 979  39.1, 972.6
GR        55.5, 969.4  71.9, 968.2  88.4, 967.7  104.8, 967.9
GR        121.2, 969.1  137.6, 968.8  154, 968.2  170.4, 967.3
GR        186.8, 966.5  203.2, 965.5  219.6, 964.3  236, 962.5
GR        252.4, 959.3  268.8, 958.6  285.2, 966.5  301.6, 975.1
GR        324.3, 979.3  326.8, 980.2  330.5, 984.3  333.5, 987.3
GR        335.5, 1007.3
N         0.035    0.030
SA               0
*         **********************************************************************
XS   XIT2 -612
GR        -6020, 1020  -6000, 1000  -79.2, 982.1  -10, 980.5
GR        0, 980.1  9.5, 976.6  25.4, 975.4  41.3, 975.7
GR        57.2, 975.9  73.1, 976.1  89, 977.7  104.8, 977.2
GR        120.7, 977.3  130.3, 977.7  152.5, 968.5  168.4, 967.2
GR        200.2, 959.9  216, 955.8  231.9, 950.7  247.8, 948.9
GR        263.7, 948.7  279.6, 957.7  285.9, 961.2  295.5, 965.5
GR        311.4, 968.3  320.9, 971.2  336.8, 979.5  342.1, 981.7
GR        352.5, 987.5  354.5, 1007.5
N         0.035    0.030
SA               0
*         **********************************************************************
*                SKEW
XS   BRDG -280  35
GR        -31.6, 993.9  -31.5, 993.1  -12.5, 989.8  0, 981.1
GR        13.1, 975.6  29.5, 973.3  45.9, 972.1  62.3, 969.6
GR        78.7, 972.1  95.1, 975.4  111.6, 974.8  128, 974.9
GR        144.4, 974.1  160.8, 971.1  177.2, 970.9  193.6, 970.4
GR        210, 970.7  226.4, 971  242.8, 970.5  259.2, 970.3
GR        275.6, 970  292, 971.2  308.4, 972.5  324.8, 972.4
GR        341.2, 970.1  357.6, 970  374, 971.6  390.4, 972.4
GR        406.8, 973.1  423.2, 973.1  439.7, 972.8  456.1, 973.4
GR        472.5, 973.8  488.9, 972.3  505.3, 975  521.7, 977.1
GR        538.1, 976.4  554.5, 974.8  570.9, 974.6  587.3, 972.3
GR        620.1, 973.9  636.5, 977.8  652.9, 977.6  669.3, 976.5
GR        685.7, 974.3  702.1, 976.4  712, 981.1  716.3, 983.4
GR        725.2, 990.4  743.2, 995.6  744.2, 1001.2
*         -31.6, 993.9
*         CD        3, 30, 1.5, 998.6
N         0.030
*         **********************************************************************
*         measurement section
XS   APPR 0
GR        -52.1, 998.4  -19, 989.1  0, 981.1  9.8, 975.1
GR        42.7, 970.6  75.5, 972  108.3, 970.6  141.1, 969.9
GR        164, 970.4  187, 970.4  210, 970.2  233, 972.7
GR        255.9, 972.2  278.9, 972.9  311.7, 974.1  344.5, 975.4
GR        377.3, 976.3  420, 977.6  469.2, 977.6  518.4, 976.6
GR        551.2, 968.6  616.8, 969.6  666, 981.1  675.6, 987.9
GR        741.2, 988.3  761.2, 988.3  773.2, 1000.3
N         0.030
*         **********************************************************************
XS   APP1 740
GR        20.1, 998.7  -19.6, 986.7  -9.6, 986.7  0, 981.5
GR        10.3, 976.4  26.7, 973.4  43.1, 973.2  59.5, 973.4
GR        75.9, 973.7  92.3, 973.6  108.7, 973.7  125.1, 973.7
GR        141.6, 974.3  158, 974.3  174.4, 974.2  190.8, 973.9
GR        207.2, 973.5  223.6, 973.5  240, 973.6  256.4, 974.8
GR        272.8, 974.4  289.2, 974  305.6, 973.8  322, 973.9
GR        338.4, 974.2  354.8, 974.8  371.2, 975.6  387.6, 975.8
GR        404, 976  420.4, 976.4  436.8, 976.7  453.2, 977.1
GR        469.7, 977.6  486.1, 977  502.5, 977.3  518.9, 977.2
GR        535.3, 977.6  551.7, 977.5  561.5, 978.4  594.8, 981.4
GR        601.3, 982.3  603.9, 986.3  1603.9, 986.3  1613.9, 996.3
N         0.030     0.10
SA             604
*         **********************************************************************
Q    XIT4  27400 27400 110000 123000 123000  86700 122000 136900 136900  95600
Q    XIT3  25800 25800 104000 123000  86700  86700 115000 136900  95600  95600
Q    XIT2  23100 23100  93200 123000  86700  86700 103000 136900  95600  95600
Q    BRDG  21500 21500  86700  86700  86700  86700  95600  95600  95600  95600
Q    APP1  18900 18900  76300  76300  76300  76300  84200  84200  84200  84200
*
HP 1 BRDG  980.87 * 980.87 21500
HP 2 BRDG  980.87 * * 21500
HP 1 APPR  981.12 * 981.12 21500
HP 2 APPR  981.12 * * 21500
*
HP 1 BRDG  981.32 * 981.32 21500
HP 2 BRDG  981.32 * * 21500
HP 1 APPR  981.53 * 981.53 21500
HP 2 APPR  981.53 * * 21500
*
HP 1 BRDG  992.14 * 992.14 86700
HP 2 BRDG  992.14 * * 86700
HP 1 APPR  992.56 * 992.56 86700
HP 2 APPR  992.56 * * 86700
*
HP 1 BRDG  993.00 * 993.00 86700
HP 2 BRDG  993.00 * * 86700
HP 1 APPR  993.38 * 993.38 86700
HP 2 APPR  993.38 * * 86700
*
HP 1 BRDG  992.81 * 992.81 86700
HP 2 BRDG  992.81 * * 86700
HP 1 APPR  993.20 * 993.20 86700
HP 2 APPR  993.20 * * 86700
*
HP 1 BRDG  990.48 * 990.48 86700
HP 2 BRDG  990.48 * * 86700
HP 1 APPR  991.01 * 991.01 86700
HP 2 APPR  991.01 * * 86700
*
HP 1 BRDG  992.81 * 992.81 95600
HP 2 BRDG  992.81 * * 95600
HP 1 APPR  993.28 * 993.28 95600
HP 2 APPR  993.28 * * 95600
*
HP 1 BRDG  993.71 * 993.71 95600
HP 2 BRDG  993.71 * * 95600
HP 1 APPR  994.13 * 994.13 95600
HP 2 APPR  994.13 * * 95600
*
```

```
HP 1 BRDG  993.52 * 993.52 95600
HP 2 BRDG  993.52 * * 95600
HP 1 APPR  993.95 * 993.95 95600
HP 2 APPR  993.95 * * 95600
*
HP 1 BRDG  991.09 * 991.09 95600
HP 2 BRDG  991.09 * * 95600
HP 1 APPR  991.69 * 991.69 95600
HP 2 APPR  991.69 * * 95600
*
EX
ER
```

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1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          *** RUN DATE & TIME: 10-23-96  11:39

  T1         Bridge No. 524, Tanana River at Big Delta
  T2         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
  T3         WSPRO Profiles (WSPRO ver. V082195)
  *
  WS         979.7 * * * * * * * * 100
  SK         * 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005
  *          SK back-calc'd from 8/26/96 Qmmt as .0005
  *          ********************************************************************
***
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

*** START PROCESSING CROSS SECTION - "XIT4 "
  XS    XIT4 -1699
  GR         -6020, 1020  -6000, 1000  -76.1, 982.6  -6.9, 981
  GR         0, 979.7  13.1, 978.3  42.7, 977.6  75.5, 965.7
  GR         108.3, 962.2  141.1, 962.7  173.9, 962.7  206.7, 962.9
  GR         239.5, 963.8  272.3, 965.9  311.7, 966.1  341.2, 979.7
  GR         346.2, 984.7  348.2, 1004.7
  N          0.035    0.030
  SA               0
  *          ********************************************************************
***

*** FINISH PROCESSING CROSS SECTION - "XIT4 "
*** CROSS SECTION "XIT4 " WRITTEN TO DISK, RECORD NO. =  1

--- DATA SUMMARY FOR SECID "XIT4 " AT SRD =  -1699.  ERR-CODE =       0

     SKEW     IHFNO    VSLOPE         EK        CK
      0.0        0. *********       0.50      0.00

X-Y COORDINATE PAIRS   (NGP =  18):
       X       Y            X       Y            X       Y            X       Y
  -6020.0 1020.00    -6000.0 1000.00        -76.1  982.60         -6.9  981.00
      0.0  979.70        13.1  978.30         42.7  977.60         75.5  965.70
    108.3  962.20       141.1  962.70        173.9  962.70        206.7  962.90
    239.5  963.80       272.3  965.90        311.7  966.10        341.2  979.70
    346.2  984.70       348.2 1004.70

 X-Y MAX-MIN POINTS:
     XMIN       Y            X    YMIN         XMAX       Y            X    YMAX
  -6020.0 1020.00       108.3  962.20        348.2 1004.70     -6020.0 1020.00

SUBAREA BREAKPOINTS (NSA =  2):
        0.

ROUGHNESS COEFFICIENTS (NSA =  2):
     0.035   0.030
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

*** START PROCESSING CROSS SECTION - "XIT3 "
  XS    XIT3 -1249
  GR         -6020, 1020  -6000, 1000  -81.8, 983.1  -12.6, 981.5
  GR         -3.1, 980.1  0, 979.2  22.7, 979  39.1, 972.6
  GR         55.5, 969.4  71.9, 968.2  88.4, 967.7  104.8, 967.9
  GR         121.2, 969.1  137.6, 968.8  154, 968.2  170.4, 967.3
  GR         186.8, 966.5  203.2, 965.5  219.6, 964.3  236, 962.5
  GR         252.4, 959.3  268.8, 958.6  285.2, 966.5  301.6, 975.1
  GR         324.3, 979.3  326.8, 980.2  330.5, 984.3  333.5, 987.3
  GR         335.5, 1007.3
  N          0.035    0.030
  SA               0
  *          ********************************************************************
***

*** FINISH PROCESSING CROSS SECTION - "XIT3 "
*** CROSS SECTION "XIT3 " WRITTEN TO DISK, RECORD NO. =  2

--- DATA SUMMARY FOR SECID "XIT3 " AT SRD =  -1249.  ERR-CODE =       0

     SKEW     IHFNO    VSLOPE         EK        CK
      0.0        0. *********       0.50      0.00

X-Y COORDINATE PAIRS   (NGP =  29):
       X       Y            X       Y            X       Y            X       Y
  -6020.0 1020.00    -6000.0 1000.00        -81.8  983.10        -12.6  981.50
     -3.1  980.10         0.0  979.20         22.7  979.00         39.1  972.60
     55.5  969.40        71.9  968.20         88.4  967.70        104.8  967.90
    121.2  969.10       137.6  968.80        154.0  968.20        170.4  967.30
    186.8  966.50       203.2  965.50        219.6  964.30        236.0  962.50
    252.4  959.30       268.8  958.60        285.2  966.50        301.6  975.10
    324.3  979.30       326.8  980.20        330.5  984.30        333.5  987.30
    335.5 1007.30

 X-Y MAX-MIN POINTS:
     XMIN       Y            X    YMIN         XMAX       Y            X    YMAX
  -6020.0 1020.00       268.8  958.60        335.5 1007.30     -6020.0 1020.00

SUBAREA BREAKPOINTS (NSA =  2):
        0.

ROUGHNESS COEFFICIENTS (NSA =  2):
     0.035   0.030
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

*** START PROCESSING CROSS SECTION - "XIT2 "
  XS    XIT2 -612
  GR         -6020, 1020  -6000, 1000  -79.2, 982.1  -10, 980.5
  GR         0, 980.1  9.5, 976.6  25.4, 975.4  41.3, 975.7
  GR         57.2, 975.9  73.1, 976.1  89, 977.7  104.8, 977.2
  GR         120.7, 977.3  130.3, 977.7  152.5, 968.5  168.4, 967.2
  GR         200.2, 959.9  216, 955.8  231.9, 950.7  247.8, 948.9
  GR         263.7, 948.7  279.6, 957.7  285.9, 961.2  295.5, 965.5
  GR         311.4, 968.3  320.9, 971.2  336.8, 979.5  342.1, 981.7
  GR         352.5, 987.5  354.5, 1007.5
```

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 N          0.035    0.030
 SA           0
 *          *****************************************************************
***
 *                SKEW

*** FINISH PROCESSING CROSS SECTION - "XIT2 "
*** CROSS SECTION "XIT2 " WRITTEN TO DISK, RECORD NO. =  3

--- DATA SUMMARY FOR SECID "XIT2 " AT SRD =    -612.   ERR-CODE =       0

     SKEW     IHFNO    VSLOPE        EK        CK
      0.0        0. *********      0.50      0.00

X-Y COORDINATE PAIRS   (NGP =  30):
       X       Y          X       Y          X       Y          X       Y
 -6020.0 1020.00    -6000.0 1000.00      -79.2  982.10      -10.0  980.50
     0.0  980.10        9.5  976.60       25.4  975.40       41.3  975.70
    57.2  975.90       73.1  976.10       89.0  977.70      104.8  977.20
   120.7  977.30      130.3  977.70      152.5  968.50      168.4  967.20
   200.2  959.90      216.0  955.80      231.9  950.70      247.8  948.90
   263.7  948.70      279.6  957.70      285.9  961.20      295.5  965.50
   311.4  968.30      320.9  971.20      336.8  979.50      342.1  981.70
   352.5  987.50      354.5 1007.50

 X Y MAX-MIN POINTS:
    XMIN       Y          X    YMIN       XMAX       Y          X    YMAX
 -6020.0 1020.00      263.7  948.70      354.5 1007.50    -6020.0 1020.00

SUBAREA BREAKPOINTS (NSA =  2):
          0.

ROUGHNESS COEFFICIENTS (NSA =  2):
        0.035   0.030
1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

*** START PROCESSING CROSS SECTION - "BRDG "
 XS   BRDG -280  35
 GR         -31.6, 993.9  -31.5, 993.1  -12.5, 989.8  0, 981.1
 GR         13.1, 975.6  29.5, 973.3  45.9, 972.1  62.3, 969.6
 GR         78.7, 972.1  95.1, 975.4  111.6, 974.8  128, 974.9
 GR         144.4, 974.1  160.8, 971.1  177.2, 970.9  193.6, 970.4
 GR         210, 970.7  226.4, 971  242.8, 970.5  259.2, 970.3
 GR         275.6, 970  292, 971.2  308.4, 972.5  324.8, 972.4
 GR         341.2, 970.1  357.6, 970  374, 971.6  390.4, 972.4
 GR         406.8, 973.1  423.2, 973.1  439.7, 972.8  456.1, 973.4
 GR         472.5, 973.8  488.9, 972.3  505.3, 975  521.7, 977.1
 GR         538.1, 976.4  554.5, 974.8  570.9, 974.6  587.3, 972.3
 GR         620.1, 973.9  636.5, 977.8  652.9, 977.6  669.3, 976.5
 GR         685.7, 974.3  702.1, 976.4  712, 981.1  716.3, 983.4
 GR         725.2, 990.4  743.2, 995.6  744.2, 1001.2
 *          -31.6, 993.9
 *          CD        3, 30, 1.5, 998.6
 N          0.030
 *          *****************************************************************
***
 *          measurement section

*** FINISH PROCESSING CROSS SECTION - "BRDG "
```

```
*** CROSS SECTION "BRDG " WRITTEN TO DISK, RECORD NO. =  4

--- DATA SUMMARY FOR SECID "BRDG " AT SRD =    -280.   ERR-CODE =       0

     SKEW     IHFNO    VSLOPE        EK        CK
     35.0        0. *********      0.50      0.00

X-Y COORDINATE PAIRS   (NGP =  51):
       X       Y          X       Y          X       Y          X       Y
    31.6  993.90      -31.5  993.10      -12.5  989.80        0.0  981.10
    13.1  975.60       29.5  973.30       45.9  972.10       62.3  969.60
    78.7  972.10       95.1  975.40      111.6  974.80      128.0  974.90
   144.4  974.10      160.8  971.10      177.2  970.90      193.6  970.40
   210.0  970.70      226.4  971.00      242.8  970.50      259.2  970.30
   275.6  970.00      292.0  971.20      308.4  972.50      324.8  972.40
   341.2  970.10      357.6  970.00      374.0  971.60      390.4  972.40
   406.8  973.10      423.2  973.10      439.7  972.80      456.1  973.40
   472.5  973.80      488.9  972.30      505.3  975.00      521.7  977.10
   538.1  976.40      554.5  974.80      570.9  974.60      587.3  972.30
   620.1  973.90      636.5  977.80      652.9  977.60      669.3  976.50
   685.7  974.30      702.1  976.40      712.0  981.10      716.3  983.40
   725.2  990.40      743.2  995.60      744.2 1001.20

 X-Y MAX-MIN POINTS:
    XMIN       Y          X    YMIN       XMAX       Y          X    YMAX
   -31.6  993.90       62.3  969.60      744.2 1001.20      744.2 1001.20

ROUGHNESS COEFFICIENTS (NSA =  1):
        0.030
1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

*** START PROCESSING CROSS SECTION - "APPR "
 XS   APPR 0
 GR         -52.1, 998.4  -19, 989.1  0, 981.1  9.8, 975.1
 GR         42.7, 970.6  75.5, 972  108.3, 970.6  141.1, 969.9
 GR         164, 970.4  187, 970.4  210, 970.2  233, 972.7
 GR         255.9, 972.2  278.9, 972.9  311.7, 974.1  344.5, 975.4
 GR         377.3, 976.3  420, 977.6  469.2, 977.6  518.4, 976.6
 GR         551.2, 968.6  616.8, 969.6  666, 981.1  675.6, 987.9
 GR         741.2, 988.3  761.2, 988.3  773.2, 1000.3
 N          0.030
 *          *****************************************************************
***

*** FINISH PROCESSING CROSS SECTION - "APPR "
*** CROSS SECTION "APPR " WRITTEN TO DISK, RECORD NO. =  5

--- DATA SUMMARY FOR SECID "APPR " AT SRD =       0.   ERR-CODE =       0

     SKEW     IHFNO    VSLOPE        EK        CK
      0.0        0. *********      0.50      0.00

X-Y COORDINATE PAIRS   (NGP =  27):
       X       Y          X       Y          X       Y          X       Y
   -52.1  998.40      -19.0  989.10        0.0  981.10        9.8  975.10
    42.7  970.60       75.5  972.00      108.3  970.60      141.1  969.90
   164.0  970.40      187.0  970.40      210.0  970.20      233.0  972.70
   255.9  972.20      278.9  972.90      311.7  974.10      344.5  975.40
   377.3  976.30      420.0  977.60      469.2  977.60      518.4  976.60
```

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     551.2  968.60      616.8  969.60      666.0  981.10      675.6  987.90
     741.2  988.30      761.2  988.30      773.2 1000.30

  X-Y MAX-MIN POINTS:
      XMIN       Y          X     YMIN      XMAX       Y          X     YMAX
     -52.1  998.40      551.2  968.60      773.2 1000.30      773.2 1000.30

 ROUGHNESS COEFFICIENTS (NSA =  1):
        0.030
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

 *** START PROCESSING CROSS SECTION - "APP1 "
   XS    APP1 740
   GR         -20.1, 998.7  -19.6, 986.7  -9.6, 986.7  0, 981.5
   GR         10.3, 976.4  26.7, 973.4  43.1, 973.2  59.5, 973.4
   GR         75.9, 973.7  92.3, 973.6  108.7, 973.7  125.1, 973.7
   GR         141.6, 974.3  158, 974.3  174.4, 974.2  190.8, 973.9
   GR         207.2, 973.5  223.6, 973.5  240, 973.6  256.4, 974.8
   GR         272.8, 974.4  289.2, 974  305.6, 973.8  322, 973.9
   GR         338.4, 974.2  354.8, 974.8  371.2, 975.6  387.6, 975.8
   GR         404, 976  420.4, 976.4  436.8, 976.7  453.2, 977.1
   GR         469.7, 977.6  486.1, 977  502.5, 977.3  518.9, 977.2
   GR         535.3, 977.6  551.7, 977.5  561.5, 978.4  594.8, 981.4
   GR         601.3, 982.3  603.9, 986.3  1603.9, 986.3  1613.9, 996.3
   N          0.030     0.10
   SA                604
   *          ********************************************************************
 ***
   Q     XIT4  27400 27400 110000 123000 123000  86700 122000 136900 136900  9560
 0

 *** FINISH PROCESSING CROSS SECTION - "APP1 "
 *** CROSS SECTION "APP1 " WRITTEN TO DISK, RECORD NO. =  6

 --- DATA SUMMARY FOR SECID "APP1 " AT SRD =      740.  ERR-CODE =       0

      SKEW     IHFNO     VSLOPE          EK          CK
       0.0         0.  *********       0.50        0.00

 X-Y COORDINATE PAIRS  (NGP =  44):
         X       Y          X       Y          X       Y          X       Y
     -20.1  998.70      -19.6  986.70       -9.6  986.70        0.0  981.50
      10.3  976.40       26.7  973.40       43.1  973.20       59.5  973.40
      75.9  973.70       92.3  973.60      108.7  973.70      125.1  973.70
     141.6  974.30      158.0  974.30      174.4  974.20      190.8  973.90
     207.2  973.50      223.6  973.50      240.0  973.60      256.4  974.80
     272.8  974.40      289.2  974.00      305.6  973.80      322.0  973.90
     338.4  974.20      354.8  974.80      371.2  975.60      387.6  975.80
     404.0  976.00      420.4  976.40      436.8  976.70      453.2  977.10
     469.7  977.60      486.1  977.00      502.5  977.30      518.9  977.20
     535.3  977.60      551.7  977.50      561.5  978.40      594.8  981.40
     601.3  982.30      603.9  986.30     1603.9  986.30     1613.9  996.30

  X-Y MAX-MIN POINTS:
      XMIN       Y          X     YMIN      XMAX       Y          X     YMAX
     -20.1  998.70       43.1  973.20     1613.9  996.30      -20.1  998.70

 SUBAREA BREAKPOINTS (NSA =  2):
        604.
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 ROUGHNESS COEFFICIENTS (NSA =  2):
         0.030   0.100
 *** Q-DATA FOR SEC-ID, ISEQ =    XIT4     1
   Q     XIT3  25800 25800 104000 123000  86700  86700 115000 136900  95600  9560
 0
 *** Q-DATA FOR SEC-ID, ISEQ =    XIT3     2
   Q     XIT2  23100 23100  93200 123000  86700  86700 103000 136900  95600  9560
 0
 *** Q-DATA FOR SEC-ID, ISEQ =    XIT2     3
   Q     BRDG  21500 21500  86700  86700  86700  86700  95600  95600  95600  9560
 0
 *** Q-DATA FOR SEC-ID, ISEQ =    BRDG     4
   Q     APP1  18900 18900  76300  76300  76300  76300  84200  84200  84200  8420
 0
 *** Q-DATA FOR SEC-ID, ISEQ =    APP1     6
   *
   HP 1 BRDG   980.87 * 980.87 21500
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39
     CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

      WSEL  SA#     AREA         K   TOPW   WETP  ALPH     LEW     REW       QCR
              1     4442    848643    582    589                            69604
    980.87          4442    848643    582    589  1.00       1     712     69604
1
   HP 2 BRDG   980.87 * * 21500
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39


     VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

          WSEL      LEW     REW    AREA        K        Q      VEL
        980.87      0.5   711.5  4441.6  848643.    21500.    4.84

 X STA.        0.5       50.0        73.0       118.0       159.5       183.3
  A(I)             253.6       195.4       248.9       235.4       193.2
  V(I)              4.24        5.50        4.32        4.57        5.56

 X STA.      183.3      205.5       228.6       250.9       272.2       294.9
  A(I)             188.3       189.6       187.1       185.7       191.0
  V(I)              5.71        5.67        5.75        5.79        5.63

 X STA.      294.9      324.2       348.4       371.0       400.7       436.0
  A(I)             207.0       197.2       193.6       212.3       226.3
  V(I)              5.19        5.45        5.55        5.06        4.75

 X STA.      436.0      473.7       519.3       582.1       618.8       711.5
  A(I)             233.5       252.0       281.5       236.2       333.9
  V(I)              4.60        4.27        3.82        4.55        3.22
1
   HP 1 APPR   981.12 * 981.12 21500
```

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1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10 23 96  11:39
     CROSS-SECTION PROPERTIES:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

      WSEL  SA#    AREA        K    TOPW   WETP  ALPH    LEW     REW      QCR
             1     5200   1011614    666    671                          82440
   981.12          5200   1011614    666    671  1.00      0     666    82440
1
  HP 2 APPR  981.12 * * 21500
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39


     VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

        WSEL     LEW    REW    AREA        K        Q     VEL
      981.12     0.0   666.0  5199.7 1011614.   21500.   4.13

 X STA.        0.0      41.2      63.9      88.6     110.9     130.7
  A(I)            286.4     228.9     231.7     226.0     214.0
  V(I)             3.75      4.70      4.64      4.76      5.02

 X STA.      130.7     149.8     169.7     190.1     210.3     234.8
  A(I)            212.4     215.6     217.9     219.5     233.9
  V(I)             5.06      4.99      4.93      4.90      4.60

 X STA.      234.8     263.4     295.9     339.1     457.3     544.4
  A(I)            249.9     265.3     292.9     513.8     439.9
  V(I)             4.30      4.05      3.67      2.09      2.44

 X STA.      544.4     561.0     577.8     595.4     614.6     666.0
  A(I)            201.1     205.0     210.9     225.7     308.7
  V(I)             5.35      5.24      5.10      4.76      3.48
1
  *
  HP 1 BRDG  981.32 * 981.32 21500
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39
     CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

      WSEL  SA#    AREA        K    TOPW   WETP  ALPH    LEW     REW      QCR
             1     4704    932049    584    590                          75769
   981.32          4704    932049    584    590  1.00      0     712    75769
1
  HP 2 BRDG  981.32 * * 21500
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
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V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39


     VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

        WSEL     LEW    REW    AREA        K        Q     VEL
      981.32    -0.3   712.4  4704.1  932049.   21500.   4.57

 X STA.       -0.3      50.3      73.5     117.3     158.8     183.2
  A(I)            274.5     205.8     257.0     249.2     206.7
  V(I)             3.92      5.22      4.18      4.31      5.20

 X STA.      183.2     206.0     229.6     252.4     274.0     297.6
  A(I)            201.3     202.9     200.7     195.6     204.5
  V(I)             5.34      5.30      5.36      5.50      5.26

 X STA.      297.6     327.2     351.0     374.4     405.6     440.1
  A(I)            218.9     207.4     205.6     229.2     234.5
  V(I)             4.91      5.18      5.23      4.69      4.58

 X STA.      440.1     478.2     531.1     585.0     621.7     712.4
  A(I)            247.6     282.7     282.0     247.2     350.8
  V(I)             4.34      3.80      3.81      4.35      3.06
1
  HP 1 APPR  981.53 * 981.53 21500
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39
     CROSS-SECTION PROPERTIES:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

      WSEL  SA#    AREA        K    TOPW   WETP  ALPH    LEW     REW      QCR
             1     5473   1099890    668    672                          88923
   981.53          5473   1099890    668    672  1.00      0     667    88923
1
  HP 2 APPR  981.53 * * 21500
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39


     VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

        WSEL     LEW    REW    AREA        K        Q     VEL
      981.53    -1.0   666.6  5473.1 1099890.   21500.   3.93

 X STA.       -1.0      41.3      64.5      89.8     112.0     132.0
  A(I)            303.9     243.7     248.1     235.8     223.6
  V(I)             3.54      4.41      4.33      4.56      4.81
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 X STA.       132.0       151.7       172.0       192.6       213.1       239.6
  A(I)             227.6       227.0       229.4       231.1       255.4
  V(I)              4.72        4.74        4.69        4.65        4.21

 X STA.       239.6       268.4       301.1       347.4       462.2       542.7
  A(I)             263.7       274.6       321.1       530.0       437.4
  V(I)              4.08        3.91        3.35        2.03        2.46

 X STA.       542.7       560.2       577.0       595.1       614.9       666.6
  A(I)             217.3       212.9       223.9       239.7       327.0
  V(I)              4.95        5.05        4.80        4.48        3.29
1
  *
  HP 1 BRDG  992.14 * 992.14 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39
      CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

      WSEL  SA#      AREA          K   TOPW   WETP  ALPH    LEW    REW      QCR
              1     11173    3758631    620    634                        269102
    992.14          11173    3758631    620    634  1.00    -25    731    269102
1
  HP 2 BRDG  992.14 * * 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23 96  11:39


      VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

          WSEL      LEW      REW     AREA         K         Q     VEL
        992.14    -26.0    731.2  11173.4  3758631.    86700.    7.76

 X STA.       -26.0        46.5        78.7       118.1       156.3       185.6
  A(I)             738.1       562.3       569.5       563.9       507.2
  V(I)              5.87        7.71        7.61        7.69        8.55

 X STA.       185.6       214.0       242.3       270.3       298.7       330.8
  A(I)             501.1       494.3       500.6       498.2       523.6
  V(I)              8.65        8.77        8.66        8.70        8.28

 X STA.       330.8       358.9       388.8       422.4       456.9       492.2
  A(I)             501.6       507.8       530.4       539.7       546.3
  V(I)              8.64        8.54        8.17        8.03        7.93

 X STA.       492.2       535.4       577.8       613.1       660.8       731.2
  A(I)             583.0       593.9       555.1       614.1       742.8
  V(I)              7.44        7.30        7.81        7.06        5.84
1
  HP 1 APPR  992.56 * 992.56 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
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          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39
      CROSS-SECTION PROPERTIES:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

      WSEL  SA#      AREA          K   TOPW   WETP  ALPH    LEW    REW      QCR
              1     13446    4355061    797    807                        313438
    992.56          13446    4355061    797    807  1.00    -30    765    313438
1
  HP 2 APPR  992.56 * * 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39


      VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

          WSEL      LEW      REW     AREA         K         Q     VEL
        992.56    -31.3    765.5  13446.0  4355061.    86700.    6.45

 X STA.       -31.3        38.3        67.4        96.6       122.6       148.3
  A(I)             857.9       625.4       610.2       570.7       577.6
  V(I)              5.05        6.93        7.10        7.60        7.51

 X STA.       148.3       173.7       199.4       226.1       256.0       286.9
  A(I)             566.8       568.9       581.9       603.4       614.5
  V(I)              7.65        7.62        7.45        7.18        7.05

 X STA.       286.9       320.8       359.2       402.6       451.4       499.6
  A(I)             635.1       667.1       700.0       735.1       730.2
  V(I)              6.83        6.50        6.19        5.90        5.94

 X STA.       499.6       539.0       565.7       593.2       623.4       765.5
  A(I)             676.6       619.3       647.4       693.2      1164.6
  V(I)              6.41        7.00        6.70        6.25        3.72
1
  *
  HP 1 BRDG  993.00 * 993.00 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
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          Bridge No. 524, Tanana River at Big Delta
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          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39
      CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

      WSEL  SA#      AREA          K   TOPW   WETP  ALPH    LEW    REW      QCR
              1     11710    4035520    627    641                        287204
    993.00          11710    4035520    627    641  1.00    -30    734    287204
1
  HP 2 BRDG  993.00 * * 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
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        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39


   VELOCITY DISTRIBUTION:   ISEQ =  4;   SECID = BRDG ;   SRD =     -280.

        WSEL      LEW      REW     AREA           K          Q      VEL
      993.00    -30.9    734.2 11709.6 4035520.     86700.    7.40

 X STA.      -30.9        47.1        78.3       118.0       156.5       186.0
  A(I)            801.1       567.4       602.4       595.2       531.9
  V(I)             5.41        7.64        7.20        7.28        8.15

 X STA.      186.0       214.5       243.5       271.2       300.3       332.2
  A(I)            524.7       526.6       515.4       529.0       542.7
  V(I)             8.26        8.23        8.41        8.19        7.99

 X STA.      332.2       360.0       390.4       424.2       458.8       494.3
  A(I)            516.4       536.6       555.3       565.6       574.1
  V(I)             8.40        8.08        7.81        7.66        7.55

 X STA.      494.3       537.6       579.0       614.3       662.0       734.2
  A(I)            610.0       613.2       579.4       643.9       778.7
  V(I)             7.11        7.07        7.48        6.73        5.57
1
  HP 1 APPR   993.38 * 993.38 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
   CROSS-SECTION PROPERTIES:   ISEQ =  5;   SECID = APPR ;   SRD =        0.

     WSEL   SA#      AREA         K     TOPW    WETP   ALPH     LEW     REW       QCR
              1     14101   4698050      801     812                            335827
   993.38           14101   4698050      801     812   1.00     -33     766    335827
1
  HP 2 APPR   993.38 * * 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39


   VELOCITY DISTRIBUTION:   ISEQ =  5;   SECID = APPR ;   SRD =        0.

        WSEL      LEW      REW     AREA           K          Q      VEL
      993.38    -34.2    766.3 14100.9 4698050.     86700.    6.15

 X STA.      -34.2        38.1        67.7        97.3       123.7       149.8
  A(I)            911.5       659.3       644.4       602.0       608.2
  V(I)             4.76        6.58        6.73        7.20        7.13

 X STA.      149.8       175.6       201.7       228.8       259.2       290.6
  A(I)            596.2       599.4       608.5       637.4       646.3
  V(I)             7.27        7.23        7.12        6.80        6.71

 X STA.      290.6       324.9       363.9       407.8       455.5       502.8
  A(I)            667.0       702.5       739.3       754.6       757.0
  V(I)             6.50        6.17        5.86        5.74        5.73

 X STA.      502.8       540.9       568.0       595.4       626.9       766.3
  A(I)            699.2       656.3       665.9       741.3      1204.6
  V(I)             6.20        6.61        6.51        5.85        3.60
1
  *
  HP 1 BRDG   992.81 * 992.81 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
   CROSS-SECTION PROPERTIES:   ISEQ =  4;   SECID = BRDG ;   SRD =     -280.

     WSEL   SA#      AREA         K     TOPW    WETP   ALPH     LEW     REW       QCR
              1     11591   3973580      625     639                            283164
   992.81           11591   3973580      625     639   1.00     -29     734    283164
1
  HP 2 BRDG   992.81 * * 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
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        Bridge No. 524, Tanana River at Big Delta
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   VELOCITY DISTRIBUTION:   ISEQ =  4;   SECID = BRDG ;   SRD =     -280.

        WSEL      LEW      REW     AREA           K          Q      VEL
      992.81    -29.8    733.5 11590.6 3973580.     86700.    7.48

 X STA.      -29.8        46.4        78.8       118.3       155.8       186.0
  A(I)            777.8       581.8       593.0       573.3       539.6
  V(I)             5.57        7.45        7.31        7.56        8.03

 X STA.      186.0       214.5       243.3       271.0       299.9       331.7
  A(I)            518.4       520.1       509.1       523.0       535.5
  V(I)             8.36        8.34        8.52        8.29        8.10

 X STA.      331.7       359.9       389.9       423.6       458.2       493.7
  A(I)            519.6       524.0       549.9       560.0       568.1
  V(I)             8.34        8.27        7.88        7.74        7.63

 X STA.      493.7       538.0       578.5       613.7       661.3       733.5
  A(I)            618.1       592.1       573.8       637.9       775.6
  V(I)             7.01        7.32        7.56        6.80        5.59
1
  HP 1 APPR   993.20 * 993.20 86700
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
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   CROSS-SECTION PROPERTIES:  ISEQ =  5;   SECID = APPR ;  SRD =         0.

     WSEL   SA#     AREA        K    TOPW    WETP  ALPH    LEW     REW      QCR
              1    13957  4621846     800     811                         330865
   993.20          13957  4621846     800     811  1.00    -33     766    330865
1
  HP 2 APPR  993.20 * * 86700
1
 WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

           Bridge No. 524, Tanana River at Big Delta
           Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
           WSPRO Profiles (WSPRO ver. V082195)
               *** RUN DATE & TIME: 10-23-96  11:39


   VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =         0.

        WSEL     LEW     REW    AREA         K         Q     VEL
      993.20   -33.6   766.1 13956.9 4621846.    86700.   6.21

 X STA.      -33.6      38.4      67.8      96.4     123.6      149.6
  A(I)           905.3     650.9     617.0     613.8     600.6
  V(I)            4.79      6.66      7.03      7.06      7.22

 X STA.      149.6     175.3     201.2     228.2     258.5      289.7
  A(I)           588.9     591.9     601.8     629.0     638.5
  V(I)            7.36      7.32      7.20      6.89      6.79

 X STA.      289.7     324.0     362.7     406.6     454.1      502.2
  A(I)           659.7     694.4     730.4     743.9     762.1
  V(I)            6.57      6.24      5.94      5.83      5.69

 X STA.      502.2     540.4     567.5     595.0     626.5      766.1
  A(I)           690.4     651.2     662.1     737.8    1187.6
  V(I)            6.28      6.66      6.55      5.88      3.65
1
  *
  HP 1 BRDG  990.48 * 990.48 86700
1
 WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

           Bridge No. 524, Tanana River at Big Delta
           Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
           WSPRO Profiles (WSPRO ver. V082195)
               *** RUN DATE & TIME: 10-23-96  11:39
   CROSS-SECTION PROPERTIES:  ISEQ =  4;   SECID = BRDG ;  SRD =      -280.

     WSEL   SA#     AREA        K    TOPW    WETP  ALPH    LEW     REW      QCR
              1    10154  3249306     608     621                         235526
   990.48          10154  3249306     608     621  1.00    -15     725    235526
1
  HP 2 BRDG  990.48 * * 86700
1
 WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER SURFACE  PROFILE  COMPUTATIONS

           Bridge No. 524, Tanana River at Big Delta
           Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
           WSPRO Profiles (WSPRO ver. V082195)
               *** RUN DATE & TIME: 10-23-96  11:39
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   VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =      -280.

        WSEL     LEW     REW    AREA         K         Q     VEL
      990.48   -16.4   725.5 10154.1 3249306.    86700.   8.54

 X STA.       16.4      46.8      76.4     115.7     154.6      184.4
  A(I)           650.1     479.4     519.8     517.1     472.7
  V(I)            6.67      9.04      8.34      8.38      9.17

 X STA.      184.4     212.4     240.3     267.6     295.8      327.7
  A(I)           456.9     449.7     450.3     459.9     476.9
  V(I)            9.49      9.64      9.63      9.43      9.09

 X STA.      327.7     355.3     384.6     418.7     452.9      488.8
  A(I)           449.9     465.0     494.4     490.1     503.9
  V(I)            9.64      9.32      8.77      8.84      8.60

 X STA.      488.8     532.9     575.5     610.9     660.2      725.5
  A(I)           546.1     532.2     507.9     574.1     657.8
  V(I)            7.94      8.15      8.53      7.55      6.59
1
  HP 1 APPR  991.01 * 991.01 86700
1
 WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

           Bridge No. 524, Tanana River at Big Delta
           Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
           WSPRO Profiles (WSPRO ver. V082195)
               *** RUN DATE & TIME: 10-23-96  11:39
   CROSS-SECTION PROPERTIES:  ISEQ =  5;   SECID = APPR ;  SRD =         0.

     WSEL   SA#     AREA        K    TOPW    WETP  ALPH    LEW     REW      QCR
              1    12217  3736266     790     799                         272656
   991.01          12217  3736266     790     799  1.00    -25     764    272656
1
  HP 2 APPR  991.01 * * 86700
1
 WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

           Bridge No. 524, Tanana River at Big Delta
           Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
           WSPRO Profiles (WSPRO ver. V082195)
               *** RUN DATE & TIME: 10-23-96  11:39


   VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =         0.

        WSEL     LEW     REW    AREA         K         Q     VEL
      991.01   -25.8   763.9 12216.5 3736266.    86700.   7.10

 X STA.      -25.8      38.5      66.6      94.8     120.7      144.8
  A(I)           757.4     561.5     545.4     525.9     504.0
  V(I)            5.72      7.72      7.95      8.24      8.60

 X STA.      144.8     169.4     194.6     219.6     249.2      278.8
  A(I)           511.3     520.1     514.2     554.7     548.4
  V(I)            8.48      8.34      8.43      7.81      7.90

 X STA.      278.8     311.6     348.7     392.1     441.7      491.6
  A(I)           573.9     600.9     645.7     677.5     673.8
  V(I)            7.55      7.21      6.71      6.40      6.43
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 X STA.       491.6      534.5      561.0      587.5      618.0      763.9
  A(I)             643.5      558.3      585.2      658.8     1056.1
  V(I)              6.74       7.76       7.41       6.58       4.10
1
  *
 HP 1 BRDG  992.81 * 992.81 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39
    CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

      WSEL  SA#      AREA          K   TOPW   WETP  ALPH     LEW     REW      QCR
              1     11591    3973580    625    639                         283164
   992.81           11591    3973580    625    639  1.00     -29     734   283164
1
  HP 2 BRDG  992.81 * * 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39


    VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

         WSEL      LEW      REW     AREA         K        Q     VEL
       992.81    -29.8    733.5  11590.6  3973580.    95600.   8.25

 X STA.      -29.8       46.4       78.8      118.3      155.8      186.0
  A(I)             777.8      581.8      593.0      573.3      539.6
  V(I)              6.15       8.22       8.06       8.34       8.86

 X STA.      186.0      214.5      243.3      271.0      299.9      331.7
  A(I)             518.4      520.1      509.1      523.0      535.5
  V(I)              9.22       9.19       9.39       9.14       8.93

 X STA.      331.7      359.9      389.9      423.6      458.2      493.7
  A(I)             519.6      524.0      549.9      560.0      568.1
  V(I)              9.20       9.12       8.69       8.54       8.41

 X STA.      493.7      538.0      578.5      613.7      661.3      733.5
  A(I)             618.1      592.1      573.8      637.9      775.6
  V(I)              7.73       8.07       8.33       7.49       6.16
1
  HP 1 APPR  993.28 * 993.28 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39
    CROSS-SECTION PROPERTIES:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

      WSEL  SA#      AREA          K   TOPW   WETP  ALPH     LEW     REW      QCR
              1     14021    4655660    800    811                         333067
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    993.28          14021    4655660    800    811  1.00     -33     766   333067
1
  HP 2 APPR  993.28 * * 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39


    VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

         WSEL      LEW      REW     AREA         K        Q     VEL
       993.28    -33.9    766.2  14020.9  4655660.    95600.   6.82

 X STA.      -33.9       38.3       67.9       96.5      123.8      149.2
  A(I)             909.3      655.1      621.1      617.8      589.4
  V(I)              5.26       7.30       7.70       7.74       8.11

 X STA.      149.2      175.6      201.6      228.7      259.0      290.4
  A(I)             608.1      595.6      604.7      633.1      642.1
  V(I)              7.86       8.03       7.90       7.55       7.44

 X STA.      290.4      324.6      363.5      407.4      454.9      502.1
  A(I)             662.5      697.5      733.9      748.4      750.2
  V(I)              7.22       6.85       6.51       6.39       6.37

 X STA.      502.1      541.3      567.3      595.2      626.8      766.2
  A(I)             715.2      626.7      677.9      738.7     1193.6
  V(I)              6.68       7.63       7.05       6.47       4.00
1
  *
  HP 1 BRDG  993.71 * 993.71 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39
    CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

      WSEL  SA#      AREA          K   TOPW   WETP  ALPH     LEW     REW      QCR
              1     12156    4280591    629    644                         303155
    993.71          12156    4280591    629    644  1.00     -31     737   303155
1
  HP 2 BRDG  993.71 * * 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39


    VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

         WSEL      LEW      REW     AREA         K        Q     VEL
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       993.71   -31.6   736.7 12155.6 4280591.   95600.   7.86

 X STA.      -31.6       46.6       77.8      117.6      155.3      185.8
  A(I)           838.0      586.6      627.7      603.2      564.7
  V(I)            5.70       8.15       7.61       7.92       8.46

 X STA.      185.8      214.4      242.9      271.5      300.5      332.3
  A(I)           542.5      535.7      548.7      543.3      558.9
  V(I)            8.81       8.92       8.71       8.80       8.55

 X STA.      332.3      360.5      391.6      424.8      459.6      494.5
  A(I)           542.3      563.0      565.5      588.9      584.8
  V(I)            8.81       8.49       8.45       8.12       8.17

 X STA.      494.5      538.9      579.4      614.7      662.4      736.7
  A(I)           649.6      625.1      600.5      671.3      815.2
  V(I)            7.36       7.65       7.96       7.12       5.86
1
  HP 1 APPR   994.13 * 994.13 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
    CROSS-SECTION PROPERTIES:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

     WSEL  SA#     AREA         K  TOPW  WETP  ALPH    LEW    REW      QCR
             1    14703   5021081   804   815                       356787
   994.13         14703   5021081   804   815  1.00    -36    767  356787
1
  HP 2 APPR   994.13 * * 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39


    VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

        WSEL     LEW     REW    AREA        K        Q     VEL
      994.13   -36.9   767.0 14702.6 5021081.   95600.    6.50

 X STA.      -36.9       38.0       67.9       97.9      124.7      151.1
  A(I)           964.3      689.8      675.2      630.1      635.7
  V(I)            4.96       6.93       7.08       7.59       7.52

 X STA.      151.1      177.2      203.6      231.7      262.2      293.6
  A(I)           622.9      626.9      647.3      661.1      667.4
  V(I)            7.67       7.62       7.38       7.23       7.16

 X STA.      293.6      328.5      368.1      411.3      459.2      505.6
  A(I)           699.8      738.6      754.2      792.3      779.8
  V(I)            6.83       6.47       6.34       6.03       6.13

 X STA.      505.6      542.5      569.4      597.3      630.2      767.0
  A(I)           716.8      675.9      698.1      788.2     1238.2
  V(I)            6.67       7.07       6.85       6.06       3.86
1
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 *
  HP 1 BRDG   993.52 * 993.52 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
    CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

     WSEL  SA#     AREA         K  TOPW  WETP  ALPH    LEW    REW      QCR
             1    12036   4214003   629   643                       298828
   993.52         12036   4214003   629   643  1.00    -31    736  298828
1
  HP 2 BRDG   993.52 * * 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39


    VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =     -280.

        WSEL     LEW     REW    AREA        K        Q     VEL
      993.52   -31.6   736.0 12036.1 4214003.   95600.    7.94

 X STA.      -31.6       46.6       77.9      117.6      155.4      185.8
  A(I)           826.4      581.9      621.5      597.6      560.1
  V(I)            5.78       8.22       7.69       8.00       8.53

 X STA.      185.8      214.4      243.0      271.6      300.1      332.4
  A(I)           538.1      531.4      544.3      530.3      562.5
  V(I)            8.88       9.00       8.78       9.01       8.50

 X STA.      332.4      360.7      390.8      424.7      459.5      494.3
  A(I)           539.2      542.6      571.7      582.5      578.3
  V(I)            8.87       8.81       8.36       8.21       8.27

 X STA.      494.3      538.6      579.0      614.3      661.9      736.0
  A(I)           642.2      616.9      594.1      663.9      810.8
  V(I)            7.44       7.75       8.05       7.20       5.90
1
  HP 1 APPR   993.95 * 993.95 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
    CROSS-SECTION PROPERTIES:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

     WSEL  SA#     AREA         K  TOPW  WETP  ALPH    LEW    REW      QCR
             1    14558   4942749   803   815                       351715
   993.95         14558   4942749   803   815  1.00    -35    767  351715
1
  HP 2 APPR   993.95 * * 95600
1
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WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39


  VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

       WSEL     LEW     REW    AREA          K        Q      VEL
     993.95   -36.3   766.9 14558.0 4942749.    95600.    6.57

 X STA.       -36.3      38.4      68.2      97.2     124.8      150.4
  A(I)           959.7     682.0     647.6     643.6     613.1
  V(I)            4.98      7.01      7.38      7.43      7.00

 X STA.       150.4     177.2     203.5     230.8     261.5      293.1
  A(I)           632.2     619.9     625.4     660.5     667.5
  V(I)            7.56      7.71      7.64      7.24      7.16

 X STA.       293.1     327.6     366.8     410.9     458.8      505.2
  A(I)           686.3     724.3     763.9     784.3     771.7
  V(I)            6.97      6.60      6.26      6.09      6.19

 X STA.       505.2     542.2     569.1     597.0     629.9      766.9
  A(I)           708.6     670.9     693.6     783.7    1219.3
  V(I)            6.75      7.13      6.89      6.10      3.92
1
  *
  HP 1 BRDG  991.09 * 991.09 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
   CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = BRDG ;  SRD =    -280.

     WSEL  SA#     AREA         K   TOPW   WETP  ALPH    LEW    REW       QCR
             1    10526   3432618    612    626                        247655
   991.09         10526   3432618    612    626  1.00    -19    728    247655
1
  HP 2 BRDG  991.09 * * 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39


   VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = BRDG ;  SRD =    -280.

       WSEL     LEW     REW    AREA          K        Q      VEL
     991.09   -19.9   727.6 10526.3 3432618.    95600.    9.08

 X STA.       -19.9      46.9      77.7     117.0     155.1      185.0
  A(I)           684.0     513.5     536.1     526.5     490.4
```

```
  V(I)             6.99      9.31      8.92      9.08      9.75

 X STA.       185.0     213.1     241.2     268.6     296.9      329.0
  A(I)           473.0     466.0     466.5     474.9     494.8
  V(I)           10.11     10.26     10.25     10.06      9.66

 X STA.       329.0     356.6     386.0     420.2     454.5      489.7
  A(I)           466.8     478.4     511.6     508.2     512.0
  V(I)           10.24      9.99      9.34      9.41      9.34

 X STA.       489.7     533.6     576.1     611.4     660.6      727.6
  A(I)           563.8     553.6     524.5     595.6     686.1
  V(I)            8.48      8.64      9.11      8.03      6.97
1
  HP 1 APPR  991.69 * 991.69 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39
   CROSS-SECTION PROPERTIES:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

     WSEL  SA#     AREA         K   TOPW   WETP  ALPH    LEW    REW       QCR
             1    12755   4002940    793    803                        290297
   991.69         12755   4002940    793    803  1.00    -27    765    290297
1
  HP 2 APPR  991.69 * * 95600
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39


   VELOCITY DISTRIBUTION:  ISEQ =  5;  SECID = APPR ;  SRD =        0.

       WSEL     LEW     REW    AREA          K        Q      VEL
     991.69   -28.2   764.6 12754.6 4002940.    95600.    7.50

 X STA.       -28.2      38.5      67.0      95.6     121.1      146.3
  A(I)           802.5     588.6     572.9     536.4     544.0
  V(I)            5.96      8.12      8.34      8.91      8.79

 X STA.       146.3     171.8     196.8     222.9     252.5      282.2
  A(I)           546.0     533.1     549.6     573.7     568.1
  V(I)            8.75      8.97      8.70      8.33      8.41

 X STA.       282.2     316.0     354.2     397.3     445.9      494.9
  A(I)           608.6     637.3     665.4     692.5     697.4
  V(I)            7.85      7.50      7.18      6.90      6.85

 X STA.       494.9     536.7     563.0     590.1     620.5      764.6
  A(I)           665.1     581.0     614.2     675.1    1102.9
  V(I)            7.19      8.23      7.78      7.08      4.33
1
  *
  EX

 +++ BEGINNING PROFILE CALCULATIONS --  10
```

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1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q MMT

```
          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

  XSID:CODE   SRDL    LEW     AREA    VHD     HF     EGL     CRWS       Q    WSEL
        SRD   FLEN    REW        K   ALPH     HO     ERR      FR#     VEL

 XIT4 :XS   ******      0     4283   0.64  *****  980.34   971.24   27400  979.70
      -1698 ******    341  1136965   1.00  ***** *******     0.32    6.40

 XIT3 :XS      450     -2     3686   0.76   0.31  980.71 *******   25800  979.94
      -1248    450    326   909351   1.00   0.06    0.00     0.37    7.00

 XIT2 :XS      637    -15     4372   0.43   0.36  981.07 *******   23100  980.63
       -611    637    340  1163778   1.00   0.00    0.00     0.27    5.28

 BRDG :XS      332      1     4440   0.36   0.17  981.23 *******   21500  980.87
       -279    332    712   848222   1.00   0.00    0.00     0.31    4.84

 APPR :XS      280      0     5197   0.27   0.15  981.38 *******   21500  981.12
          0    280    666  1010645   1.00   0.00    0.00     0.26    4.14

  ===135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                               "APP1 "      KRATIO =  0.61

 APP1 :XS      740      0     3682   0.41   0.49  981.94 *******   18900  981.53
        740    740    596   614566   1.00   0.07    0.00     0.36    5.13
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q MMT

```
          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

  XSID:CODE   SRDL    LEW     AREA    VHD     HF     EGL     CRWS       Q    WSEL
        SRD   FLEN    REW        K   ALPH     HO     ERR      FR#     VEL

 XIT4 :XS   ******     -2     4483   0.58  *****  980.86   971.24   27400  980.28
      -1698 ******    342  1224603   1.00  ***** *******     0.30    6.11

 XIT3 :XS      450     -5     3867   0.69   0.26  981.19 *******   25800  980.49
      -1248    450    327   981922   1.00   0.06    0.00     0.35    6.67

 XIT2 :XS      637    -35     4541   0.40   0.31  981.50 *******   23100  981.09
       -611    637    341  1232120   1.01   0.00    0.00     0.26    5.09

 BRDG :XS      332      0     4702   0.33   0.14  981.64 *******   21500  981.32
       -279    332    712   931321   1.00   0.00    0.00     0.28    4.57

 APPR :XS      280      0     5470   0.24   0.13  981.77 *******   21500  981.53
          0    280    667  1099022   1.00   0.00    0.00     0.24    3.93

  ===135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                               "APP1 "      KRATIO =  0.61

 APP1 :XS      740      0     3887   0.37   0.41  982.24 *******   18900  981.87
        740    740    598   670143   1.00   0.06    0.00     0.34    4.86
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
```

```
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q100
CASE 1

```
          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

  XSID:CODE   SRDL    LEW     AREA    VHD     HF     EGL     CRWS       Q    WSEL
        SRD   FLEN    REW        K   ALPH     HO     ERR      FR#     VEL

 XIT4 :XS   ******  -3041    21950   0.89  *****  992.20   982.12  110000  991.31
      -1698 ******    347  4914634   2.27  ***** *******     0.52    5.01

 XIT3 :XS      450  -3050    20910   0.88   0.24  992.45 *******  104000  991.58
      -1248    450    334  4437324   2.28   0.00    0.02     0.53    4.97

 XIT2 :XS      637  -3444    26431   0.42   0.25  992.70 *******   93200  992.27
       -611    637    353  5666420   2.19   0.00    0.00     0.35    3.53

  ===135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                               "BRDG "      KRATIO =  0.66

 BRDG :XS      332    -25    11176   0.94   0.13  993.08 *******   86700  992.14
       -279    332    731  3759850   1.00   0.26    0.00     0.32    7.76

 APPR :XS      280    -30    13447   0.65   0.13  993.21 *******   86700  992.56
          0    280    765  4355640   1.00   0.00    0.00     0.28    6.45

 APP1 :XS      740    -19    17318   0.60   0.29  993.50 *******   76300  992.91
        740    740   1611  3833467   1.98   0.00    0.00     0.34    4.41
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q100
CASE 2

```
          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

  XSID:CODE   SRDL    LEW     AREA    VHD     HF     EGL     CRWS       Q    WSEL
        SRD   FLEN    REW        K   ALPH     HO     ERR      FR#     VEL

 XIT4 :XS   ******  -3312    24746   0.88  *****  992.99   986.37  123000  992.11
      -1698 ******    347  5496068   2.29  ***** *******     0.51    4.97

 XIT3 :XS      450  -3304    23452   0.98   0.25  993.28 *******  123000  992.30
      -1248    450    334  4949024   2.28   0.05    0.00     0.55    5.24

 XIT2 :XS      637  -3679    29221   0.60   0.31  993.59 *******  123000  992.99
       -611    637    353  6274092   2.18   0.00    0.00     0.41    4.21

  ===135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                               "BRDG "      KRATIO =  0.64

 BRDG :XS      332    -30    11712   0.85   0.14  993.86 *******   86700  993.00
       -279    332    734  4036897   1.00   0.13    0.00     0.30    7.40

 APPR :XS      280    -33    14100   0.59   0.11  993.97 *******   86700  993.38
          0    280    766  4697582   1.00   0.00    0.00     0.26    6.15

 APP1 :XS      740    -19    18593   0.53   0.25  994.22 *******   76300  993.69
        740    740   1611  4170463   2.02   0.00    0.00     0.30    4.10
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q 100 CASE 3

```
         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

 XSID:CODE   SRDL    LEW     AREA    VHD    HF     EGL    CRWS       Q    WSEL
       SRD   FLEN    REW        K   ALPH    HO     ERR     FR#     VEL

 XIT4 :XS  ******  -3312    24746   0.88 *****  992.99  986.37  123000  992.11
     -1698 ******    347  5496068   2.29 ***** *******    0.51    4.97

 XIT3 :XS     450  -3453    25035   0.43  0.17  993.15 *******   86700  992.73
     -1248    450    334  5274406   2.28  0.00    0.00    0.36    3.46

 XIT2 :XS     637  -3684    29272   0.30  0.14  993.30 *******   86700  993.00
      -611    637    353  6285391   2.18  0.00    0.00    0.29    2.96

 ===135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                     "BRDG "     KRATIO =  0.63

 BRDG :XS     332    -29    11592   0.87  0.10  993.68 *******   86700  992.81
      -279    332    734  3974415   1.00  0.29    0.00    0.31    7.48

 APPR :XS     280    -33    13954   0.60  0.11  993.80 *******   86700  993.20
         0    280    766  4620227   1.00  0.00    0.00    0.26    6.21

 APP1 :XS     740    -19    18307   0.54  0.26  994.06 *******   76300  993.51
       740    740   1611  4093808   2.01  0.00    0.00    0.31    4.17
1
 WSPRO            FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195               MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q 100 CASE 4

```
         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

 XSID:CODE   SRDL    LEW     AREA    VHD    HF     EGL    CRWS       Q    WSEL
       SRD   FLEN    REW        K   ALPH    HO     ERR     FR#     VEL

 XIT4 :XS  ******  -2470    16744   0.90 *****  990.53  979.78   86700  989.64
     -1698 ******    347  3873708   2.15 ***** *******    0.55    5.18

 XIT3 :XS     450  -2430    15463   1.06  0.26  990.87 *******   86700  989.81
     -1248    450    334  3387028   2.17  0.08    0.00    0.62    5.61

 XIT2 :XS     637  -2880    20443   0.61  0.32  991.18 *******   86700  990.57
      -611    637    353  4415498   2.18  0.00    0.00    0.44    4.24

 BRDG :XS     332    -15    10156   1.13  0.17  991.62 *******   86700  990.48
      -279    332    725  3250174   1.00  0.26    0.00    0.37    8.54

 APPR :XS     280    -25    12213   0.78  0.17  991.79 *******   86700  991.01
         0    280    764  3734661   1.00  0.00    0.00    0.32    7.10

 APP1 :XS     740    -19    14923   0.76  0.41  992.20 *******   76300  991.44
       740    740   1609  3235554   1.88  0.00    0.00    0.41    5.11
1
 WSPRO            FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195               MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39
```

Q 500 CASE 1

```
 XSID:CODE   SRDL    LEW     AREA    VHD    HF     EGL    CRWS       Q    WSEL
       SRD   FLEN    REW        K   ALPH    HO     ERR     FR#     VEL

 XIT4 :XS  ******  -3292    24534   0.88 *****  992.93  986.21  122000  992.05
     -1698 ******    347  5451509   2.29 ***** *******    0.51    4.97

 XIT3 :XS     450  -3313    23548   0.85  0.23  993.18 *******  115000  992.33
     -1248    450    334  4968584   2.28  0.00    0.01    0.51    4.88

 XIT2 :XS     637  -3683    29262   0.42  0.24  993.42 *******  103000  993.00
      -611    637    353  6283107   2.18  0.00    0.00    0.34    3.52

 ===135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                     "BRDG "     KRATIO =  0.63

 BRDG :XS     332    -29    11589   1.06  0.13  993.87 *******   95600  992.81
      -279    332    734  3972986   1.00  0.32    0.00    0.34    8.25

 APPR :XS     280    -33    14022   0.72  0.14  994.00 *******   95600  993.28
         0    280    766  4656358   1.00  0.00    0.00    0.29    6.82

 APP1 :XS     740    -19    18557   0.65  0.31  994.31 *******   84200  993.67
       740    740   1611  4160843   2.02  0.00    0.00    0.34    4.54
1
 WSPRO            FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195               MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q 500 CASE 2

```
         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

 XSID:CODE   SRDL    LEW     AREA    VHD    HF     EGL    CRWS       Q    WSEL
       SRD   FLEN    REW        K   ALPH    HO     ERR     FR#     VEL

 XIT4 :XS  ******  -3573    27658   0.87 *****  993.75  987.73  136900  992.87
     -1698 ******    347  6118127   2.29 ***** *******    0.50    4.95

 XIT3 :XS     450  -3575    26380   0.95  0.25  994.03 *******  136900  993.08
     -1248    450    334  5554993   2.27  0.04    0.00    0.53    5.19

 XIT2 :XS     637  -3928    32340   0.60  0.31  994.34 *******  136900  993.74
      -611    637    353  6970841   2.15  0.00    0.00    0.40    4.23

 ---135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                     "BRDG "     KRATIO =  0.61

 BRDG :XS     332    -31    12153   0.96  0.15  994.67 *******   95600  993.71
      -279    332    737  4278981   1.00  0.18    0.00    0.32    7.87

 APPR :XS     280    -36    14702   0.66  0.12  994.79 *******   95600  994.13
         0    280    767  5020626   1.00  0.00    0.00    0.27    6.50

 APP1 :XS     740    -19    19876   0.57  0.26  995.05 *******   84200  994.47
       740    740   1612  4522265   2.06  0.00    0.00    0.31    4.24
1
 WSPRO            FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195               MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

 XSID:CODE   SRDL    LEW     AREA    VHD    HF     EGL    CRWS       Q    WSEL
       SRD   FLEN    REW        K   ALPH    HO     ERR     FR#     VEL
```

Q500 CASE 3

```
 XIT4 :XS    ******  -3573     27658  0.87 *****  993.75  987.73  136900  992.87
      -1698  ******    347   6118127  2.29 ***** *******    0.50    4.95

 XIT3 :XS       450  -3725     28079  0.41  0.17  993.91 *******   95600  993.51
      -1248     450    334   5914379  2.26  0.00    0.00    0.34    3.40

 XIT2 :XS       637  -3935     32442  0.29  0.14  994.05 *******   95600  993.76
       -611     637    353   6993931  2.15  0.00    0.00    0.28    2.95

  ===135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
                                "BRDG "      KRATIO =   0.60

 BRDG :XS       332    -31     12035  0.98  0.10  994.50 *******   95600  993.52
       -279     332    736   4213300  1.00  0.35    0.00    0.32    7.94

 APPR :XS       280    -35     14559  0.67  0.12  994.62 *******   95600  993.95
          0     280    767   4943306  1.00  0.00    0.00    0.27    6.57

 APP1 :XS       740    -19     19598  0.59  0.27  994.89 *******   84200  994.30
        740     740   1612   4445036  2.05  0.00    0.00    0.31    4.30
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
```

Q500 CASE 4

```
           Bridge No. 524, Tanana River at Big Delta
           Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
           WSPRO Profiles (WSPRO ver. V082195)
              *** RUN DATE & TIME: 10-23-96   11:39

  XSID:CODE   SRDL    LEW      AREA   VHD    HF     EGL    CRWS       Q    WSEL
        SRD   FLEN    REW         K  ALPH    HO     ERR     FR#     VEL

 XIT4 :XS    ******  -2707     18783  0.89 *****  991.22  980.64   95600  990.33
      -1698  ******    347   4274985  2.21 ***** *******    0.54    5.09

 XIT3 :XS       450  -2675     17489  1.03  0.26  991.54 *******   95600  990.51
      -1248     450    334   3770147  2.23  0.07    0.00    0.60    5.47

 XIT2 :XS       637  -3105     22717  0.61  0.32  991.86 *******   95600  991.25
       -611     637    353   4881807  2.20  0.00    0.00    0.43    4.21

 BRDG :XS       332    -19     10528  1.28  0.18  992.37 *******   95600  991.09
       -279     332    728   3433266  1.00  0.34    0.00    0.39    9.08

 APPR :XS       280    -27     12751  0.87  0.19  992.56 *******   95600  991.69
          0     280    765   4001385  1.00  0.00    0.00    0.33    7.50

 APP1 :XS       740    -19     16108  0.82  0.42  992.98 *******   84200  992.16
        740     740   1610   3525446  1.93  0.00    0.00    0.41    5.23
  ER

1 NORMAL  END  OF  WSPRO  EXECUTION.
```

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1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
            *** RUN DATE & TIME: 10-23-96  11:39


"MINIMUM BED ELEVATION IN BRIDGE SECTION:"
    X       YMIN
  62.3    969.60


"CROSS-SECTION PROPERTIES:"
SECID    WSEL      Q
BRDG   980.87   21500

 SA#     AREA          K    TOPW    WETP  ALPH     LEW      REW
   1     4442     848643     582     589
TOTAL    4442     848643     582     589  1.00       1      712
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW      REW     AREA          K          Q      VEL
BRDG    980.87      0.5    711.5   4441.6   848643.     21500.     4.84

TUBE#    LEFT    RIGHT    WIDTH     AREA    HYDEPTH    VELOCITY
   1      0.5     50.0    49.45    253.6       5.1       4.24
   2     50.0     73.0    22.96    195.4       8.5       5.50
   3     73.0    118.0    45.09    248.9       5.5       4.32
   4    118.0    159.5    41.46    235.4       5.7       4.57
   5    159.5    183.3    23.81    193.2       8.1       5.56
   6    183.3    205.5    22.24    188.3       8.5       5.71
   7    205.5    228.6    23.04    189.6       8.2       5.67
   8    228.6    250.9    22.29    187.1       8.4       5.75
   9    250.9    272.2    21.34    185.7       8.7       5.79
  10    272.2    294.9    22.72    191.0       8.4       5.63
  11    294.9    324.2    29.24    207.0       7.1       5.19
  12    324.2    348.4    24.23    197.2       8.1       5.45
  13    348.4    371.0    22.57    193.6       8.6       5.55
  14    371.0    400.7    29.75    212.3       7.1       5.06
  15    400.7    436.0    35.26    226.3       6.4       4.75
  16    436.0    473.7    37.71    233.5       6.2       4.60
  17    473.7    519.3    45.57    252.0       5.5       4.27
  18    519.3    582.1    62.81    281.5       4.5       3.82
  19    582.1    618.8    36.68    236.2       6.4       4.55
  20    618.8    711.5    92.75    333.9       3.6       3.22

"HIGHEST VELOCITY STREAM TUBE"
   9    250.9    272.2    21.34    185.7       8.7       5.79

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
   9    250.9    272.2    21.34    185.7       8.7       5.79


"CROSS-SECTION PROPERTIES:"
SECID    WSEL      Q
APPR   981.12   21500

 SA#     AREA          K    TOPW    WETP  ALPH     LEW      REW
   1     5200    1011614     666     671
TOTAL    5200    1011614     666     671  1.00       0      666
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW      REW     AREA          K          Q      VEL
APPR    981.12      0.0    666.0   5199.7  1011614.     21500.     4.13

TUBE#    LEFT    RIGHT    WIDTH     AREA    HYDEPTH    VELOCITY
   1      0.0     41.2    41.28    286.4       6.9       3.75
   2     41.2     63.9    22.68    228.9      10.1       4.70
   3     63.9     88.6    24.69    231.7       9.4       4.64
   4     88.6    110.9    22.27    226.0      10.2       4.76
   5    110.9    130.7    19.84    214.0      10.8       5.02
   6    130.7    149.8    19.10    212.4      11.1       5.06
   7    149.8    169.7    19.91    215.6      10.8       4.99
   8    169.7    190.1    20.33    217.9      10.7       4.93
   9    190.1    210.3    20.26    219.5      10.8       4.90
  10    210.3    234.8    24.45    233.9       9.6       4.60
  11    234.8    263.4    28.66    249.9       8.7       4.30
  12    263.4    295.9    32.48    265.3       8.2       4.05
  13    295.9    339.1    43.20    292.9       6.8       3.67
  14    339.1    457.3   118.24    513.8       4.3       2.09
  15    457.3    544.4    87.09    439.9       5.1       2.44
  16    544.4    561.0    16.57    201.1      12.1       5.35
  17    561.0    577.8    16.75    205.0      12.2       5.24
  18    577.8    595.4    17.61    210.9      12.0       5.10
  19    595.4    614.6    19.29    225.7      11.7       4.76
  20    614.6    666.0    51.38    308.7       6.0       3.48

"HIGHEST VELOCITY STREAM TUBE"
  16    544.4    561.0    16.57    201.1      12.1       5.35

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  17    561.0    577.8    16.75    205.0      12.2       5.24


"CROSS-SECTION PROPERTIES:"
SECID    WSEL      Q
BRDG   981.32   21500

 SA#     AREA          K    TOPW    WETP  ALPH     LEW      REW
   1     4704     932049     584     590
TOTAL    4704     932049     584     590  1.00       0      712
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW      REW     AREA          K          Q      VEL
BRDG    981.32     -0.3    712.4   4704.1   932049.     21500.     4.57

TUBE#    LEFT    RIGHT    WIDTH     AREA    HYDEPTH    VELOCITY
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```
  1     -0.3    50.3   50.62   274.5     5.4     3.92
  2     50.3    73.5   23.18   205.8     8.9     5.22
  3     73.5   117.3   43.77   257.0     5.9     4.18
  4    117.3   158.8   41.56   249.2     6.0     4.31
  5    158.8   183.2   24.39   206.7     8.5     5.20
  6    183.2   206.0   22.79   201.3     8.8     5.34
  7    206.0   229.6   23.61   202.9     8.6     5.30
  8    229.6   252.4   22.84   200.7     8.8     5.36
  9    252.4   274.0   21.51   195.6     9.1     5.50
 10    274.0   297.6   23.63   204.5     8.7     5.26
 11    297.6   327.2   29.61   218.9     7.4     4.91
 12    327.2   351.0   23.77   207.4     8.7     5.18
 13    351.0   374.4   23.39   205.6     8.8     5.23
 14    374.4   405.6   31.21   229.2     7.3     4.69
 15    405.6   440.1   34.51   234.5     6.8     4.58
 16    440.1   478.2   38.09   247.6     6.5     4.34
 17    478.2   531.1   52.90   282.7     5.3     3.80
 18    531.1   585.0   53.88   282.0     5.2     3.81
 19    585.0   621.7   36.71   247.2     6.7     4.35
 20    621.7   712.4   90.74   350.8     3.9     3.06

"HIGHEST VELOCITY STREAM TUBE"
  9    252.4   274.0   21.51   195.6     9.1     5.50

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  9    252.4   274.0   21.51   195.6     9.1     5.50


"CROSS-SECTION PROPERTIES:"
SECID    WSEL        Q
APPR   981.53    21500

 SA#     AREA          K    TOPW    WETP  ALPH     LEW     REW
  1      5473    1099890     668     672
TOTAL    5473    1099890     668     672  1.00       0     667
1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
              *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW      REW     AREA         K         Q     VEL
APPR    981.53     -1.0    666.6   5473.1  1099890.    21500.    3.93

TUBE#    LEFT    RIGHT   WIDTH    AREA   HYDEPTH   VELOCITY
  1      -1.0     41.3   42.29   303.9     7.2       3.54
  2      41.3     64.5   23.24   243.7    10.5       4.41
  3      64.5     89.8   25.30   248.1     9.8       4.33
  4      89.8    112.0   22.23   235.8    10.6       4.56
  5     112.0    132.0   19.93   223.6    11.2       4.81
  6     132.0    151.7   19.75   227.6    11.5       4.72
  7     151.7    172.0   20.25   227.0    11.2       4.74
  8     172.0    192.6   20.60   229.4    11.1       4.69
  9     192.6    213.1   20.56   231.1    11.2       4.65
 10     213.1    239.6   26.44   255.4     9.7       4.21
 11     239.6    268.4   28.83   263.7     9.1       4.08
 12     268.4    301.1   32.67   274.6     8.4       3.91
 13     301.1    347.4   46.33   321.1     6.9       3.35
 14     347.4    462.2  114.79   530.0     4.6       2.03
 15     462.2    542.7   80.52   437.4     5.4       2.46
 16     542.7    560.2   17.54   217.3    12.4       4.95
 17     560.2    577.0   16.81   212.9    12.7       5.05
 18     577.0    595.1   18.05   223.9    12.4       4.80
 19     595.1    614.9   19.79   239.7    12.1       4.48
 20     614.9    666.6   51.71   327.0     6.3       3.29

"HIGHEST VELOCITY STREAM TUBE"
 17     560.2    577.0   16.81   212.9    12.7       5.05

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
 17     560.2    577.0   16.81   212.9    12.7       5.05


"CROSS-SECTION PROPERTIES:"
SECID    WSEL        Q
BRDG   992.14    86700

 SA#     AREA          K    TOPW    WETP  ALPH     LEW     REW
  1     11173    3758631     620     634
TOTAL   11173    3758631     620     634  1.00     -25     731
1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
              *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW      REW     AREA         K         Q     VEL
BRDG    992.14    -26.0    731.2  11173.4  3758631.    86700.    7.76

TUBE#    LEFT    RIGHT   WIDTH    AREA   HYDEPTH   VELOCITY
  1     -26.0     46.5   72.47   738.1    10.2       5.87
  2      46.5     78.7   32.21   562.3    17.5       7.71
  3      78.7    118.1   39.39   569.5    14.5       7.61
  4     118.1    156.3   38.22   563.9    14.8       7.69
  5     156.3    185.6   29.31   507.2    17.3       8.55
  6     185.6    214.0   28.36   501.1    17.7       8.65
  7     214.0    242.3   28.29   494.3    17.5       8.77
  8     242.3    270.3   28.01   500.6    17.9       8.66
  9     270.3    298.7   28.37   498.2    17.6       8.70
 10     298.7    330.8   32.15   523.6    16.3       8.28
 11     330.8    358.9   28.09   501.6    17.9       8.64
 12     358.9    388.8   29.90   507.8    17.0       8.54
 13     388.8    422.4   33.64   530.4    15.8       8.17
 14     422.4    456.9   34.48   539.7    15.6       8.03
 15     456.9    492.2   35.31   546.3    15.5       7.93
 16     492.2    535.4   43.15   583.0    13.5       7.44
 17     535.4    577.8   42.46   593.9    14.0       7.30
 18     577.8    613.1   35.29   555.1    15.7       7.81
 19     613.1    660.8   47.70   614.1    12.9       7.06
 20     660.8    731.2   70.38   742.8    10.6       5.84

"HIGHEST VELOCITY STREAM TUBE"
  7     214.0    242.3   28.29   494.3    17.5       8.77

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  8     242.3    270.3   28.01   500.6    17.9       8.66


"CROSS-SECTION PROPERTIES:"
SECID    WSEL        Q
APPR   992.56    86700

 SA#     AREA          K    TOPW    WETP  ALPH     LEW     REW
  1     13446    4355061     797     807
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TOTAL   13446   4355061    797    807  1.00    -30    765
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL     LEW      REW     AREA          K          Q      VEL
APPR    992.56   -31.3    765.5 13446.0 4355061.    86700.    6.45

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
   1    -31.3     38.3    69.62    857.9     12.3       5.05
   2     38.3     67.4    29.14    625.4     21.5       6.93
   3     67.4     96.6    29.15    610.2     20.9       7.10
   4     96.6    122.6    26.02    570.7     21.9       7.60
   5    122.6    148.3    25.67    577.6     22.5       7.51
   6    148.3    173.7    25.45    566.8     22.3       7.65
   7    173.7    199.4    25.64    568.9     22.2       7.62
   8    199.4    226.1    26.67    581.9     21.8       7.45
   9    226.1    256.0    29.96    603.4     20.1       7.18
  10    256.0    286.9    30.91    614.5     19.9       7.05
  11    286.9    320.8    33.88    635.1     18.7       6.83
  12    320.8    359.2    38.40    667.1     17.4       6.50
  13    359.2    402.6    43.37    700.0     16.1       6.19
  14    402.6    451.4    48.83    735.1     15.1       5.90
  15    451.4    499.6    48.18    730.2     15.2       5.94
  16    499.6    539.0    39.38    676.6     17.2       6.41
  17    539.0    565.7    26.67    619.3     23.2       7.00
  18    565.7    593.2    27.51    647.4     23.5       6.70
  19    593.2    623.4    30.23    693.2     22.9       6.25
  20    623.4    765.5   142.06   1164.6      8.2       3.72

"HIGHEST VELOCITY STREAM TUBE"
   6    148.3    173.7    25.45    566.8     22.3       7.65

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  18    565.7    593.2    27.51    647.4     23.5       6.70


"CROSS-SECTION PROPERTIES:"
SECID     WSEL       Q
BRDG    993.00   86700

  SA#     AREA         K    TOPW    WETP  ALPH    LEW     REW
   1     11710   4035520     627     641
TOTAL    11710   4035520     627     641  1.00    -30     734
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL     LEW      REW     AREA          K          Q      VEL
BRDG    993.00   -30.9    734.2 11709.6 4035520.    86700.    7.40

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
   1    -30.9     47.1    78.02    801.1     10.3       5.41
   2     47.1     78.3    31.18    567.4     18.2       7.64
   3     78.3    118.0    39.68    602.4     15.2       7.20
   4    118.0    156.5    38.50    595.2     15.5       7.28
   5    156.5    186.0    29.52    531.9     18.0       8.15
   6    186.0    214.5    28.56    524.7     18.4       8.26
   7    214.5    243.5    28.96    526.6     18.2       8.23
   8    243.5    271.2    27.72    515.4     18.6       8.41
   9    271.2    300.3    29.07    529.0     18.2       8.19
  10    300.3    332.2    31.93    542.7     17.0       7.99
  11    332.2    360.0    27.74    516.4     18.6       8.40
  12    360.0    390.4    30.47    536.6     17.6       8.08
  13    390.4    424.2    33.78    555.3     16.4       7.81
  14    424.2    458.8    34.62    565.6     16.3       7.66
  15    458.8    494.3    35.45    574.1     16.2       7.55
  16    494.3    537.6    43.32    610.0     14.1       7.11
  17    537.6    579.0    41.46    613.2     14.8       7.07
  18    579.0    614.3    35.26    579.4     16.4       7.48
  19    614.3    662.0    47.66    643.9     13.5       6.73
  20    662.0    734.2    72.23    778.7     10.8       5.57

"HIGHEST VELOCITY STREAM TUBE"
   8    243.5    271.2    27.72    515.4     18.6       8.41

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  11    332.2    360.0    27.74    516.4     18.6       8.40


"CROSS-SECTION PROPERTIES:"
SECID     WSEL       Q
APPR    993.38   86700

  SA#     AREA         K    TOPW    WETP  ALPH    LEW     REW
   1     14101   4698050     801     812
TOTAL    14101   4698050     801     812  1.00    -33     766
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION   U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
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"VELOCITY DISTRIBUTION:"
SECID     WSEL     LEW      REW     AREA          K          Q      VEL
APPR    993.38   -34.2    766.3 14100.9 4698050.    86700.    6.15

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
   1    -34.2     38.1    72.32    911.5     12.6       4.76
   2     38.1     67.7    29.59    659.3     22.3       6.58
   3     67.7     97.3    29.60    644.4     21.8       6.73
   4     97.3    123.7    26.43    602.0     22.8       7.20
   5    123.7    149.8    26.07    608.2     23.3       7.13
   6    149.8    175.6    25.85    596.2     23.1       7.27
   7    175.6    201.7    26.04    599.4     23.0       7.23
   8    201.7    228.8    27.09    608.5     22.5       7.12
   9    228.8    259.2    30.43    637.4     20.9       6.80
  10    259.2    290.6    31.39    646.3     20.6       6.71
  11    290.6    324.9    34.35    667.0     19.4       6.50
  12    324.9    363.9    38.94    702.5     18.0       6.17
  13    363.9    407.8    43.97    739.3     16.8       5.86
  14    407.8    455.5    47.68    754.6     15.8       5.74
  15    455.5    502.8    47.25    757.0     16.0       5.73
  16    502.8    540.9    38.14    699.2     18.3       6.20
  17    540.9    568.0    27.09    656.3     24.2       6.61
  18    568.0    595.4    27.38    665.9     24.3       6.51
  19    595.4    626.9    31.53    741.3     23.5       5.85
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 20    626.9   766.3  139.36  1204.6      8.6       3.60

"HIGHEST VELOCITY STREAM TUBE"
  6    149.8   175.6   25.85   596.2     23.1       7.27

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
 18    568.0   595.4   27.38   665.9     24.3       6.51


"CROSS-SECTION PROPERTIES:"
SECID    WSEL      Q
BRDG   992.81   86700

 SA#     AREA         K   TOPW   WETP  ALPH    LEW    REW
  1     11591   3973580    625    639
TOTAL   11591   3973580    625    639  1.00    -29    734
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW     REW     AREA         K        Q     VEL
BRDG    992.81    -29.8   733.5 11590.6 3973580.   86700.    7.48

TUBE#   LEFT   RIGHT   WIDTH    AREA   HYDEPTH   VELOCITY
  1    -29.8    46.4   76.27   777.8     10.2      5.57
  2     46.4    78.8   32.32   581.8     18.0      7.45
  3     78.8   118.3   39.53   593.0     15.0      7.31
  4    118.3   155.8   37.52   573.3     15.3      7.56
  5    155.8   186.0   30.24   539.6     17.8      8.03
  6    186.0   214.5   28.45   518.4     18.2      8.36
  7    214.5   243.3   28.85   520.1     18.0      8.34
  8    243.3   271.0   27.62   509.1     18.4      8.52
  9    271.0   299.9   28.96   523.0     18.1      8.29
 10    299.9   331.7   31.81   535.5     16.8      8.10
 11    331.7   359.9   28.18   519.6     18.4      8.34
 12    359.9   389.9   29.99   524.0     17.5      8.27
 13    389.9   423.6   33.75   549.9     16.3      7.88
 14    423.6   458.2   34.59   560.0     16.2      7.74
 15    458.2   493.7   35.42   568.1     16.0      7.63
 16    493.7   538.0   44.31   618.1     13.9      7.01
 17    538.0   578.5   40.48   592.1     14.6      7.32
 18    578.5   613.7   35.25   573.8     16.3      7.56
 19    613.7   661.3   47.64   637.9     13.4      6.80
 20    661.3   733.5   72.20   775.6     10.7      5.59

"HIGHEST VELOCITY STREAM TUBE"
  8    243.3   271.0   27.62   509.1     18.4      8.52

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
 11    331.7   359.9   28.18   519.6     18.4      8.34


"CROSS-SECTION PROPERTIES:"
SECID    WSEL      Q
APPR   993.20   86700

 SA#     AREA         K   TOPW   WETP  ALPH    LEW    REW
  1     13957   4621846    800    811
TOTAL   13957   4621846    800    811  1.00    -33    766
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW     REW     AREA         K        Q     VEL
APPR    993.20    -33.6   766.1 13956.9 4621846.   86700.    6.21

TUBE#   LEFT   RIGHT   WIDTH    AREA   HYDEPTH   VELOCITY
  1    -33.6    38.4   71.99   905.3     12.6      4.79
  2     38.4    67.8   29.45   650.9     22.1      6.66
  3     67.8    96.4   28.60   617.0     21.6      7.03
  4     96.4   123.6   27.18   613.8     22.6      7.06
  5    123.6   149.6   25.95   600.6     23.1      7.22
  6    149.6   175.3   25.73   588.9     22.9      7.36
  7    175.3   201.2   25.92   591.9     22.8      7.32
  8    201.2   228.2   26.96   601.8     22.3      7.20
  9    228.2   258.5   30.28   629.0     20.8      6.89
 10    258.5   289.7   31.25   638.5     20.4      6.79
 11    289.7   324.0   34.23   659.7     19.3      6.57
 12    324.0   362.7   38.80   694.4     17.9      6.24
 13    362.7   406.6   43.82   730.4     16.7      5.94
 14    406.6   454.1   47.51   743.9     15.7      5.83
 15    454.1   502.2   48.14   762.1     15.8      5.69
 16    502.2   540.4   38.19   690.4     18.1      6.28
 17    540.4   567.5   27.13   651.2     24.0      6.66
 18    567.5   595.0   27.42   662.1     24.1      6.55
 19    595.0   626.5   31.58   737.8     23.4      5.88
 20    626.5   766.1  139.56  1187.6      8.5      3.65

"HIGHEST VELOCITY STREAM TUBE"
  6    149.6   175.3   25.73   588.9     22.9      7.36

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
 18    567.5   595.0   27.42   662.1     24.1      6.55


"CROSS-SECTION PROPERTIES:"
SECID    WSEL      Q
BRDG   990.48   86700

 SA#     AREA         K   TOPW   WETP  ALPH    LEW    REW
  1     10154   3249306    608    621
TOTAL   10154   3249306    608    621  1.00    -15    725
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW     REW     AREA         K        Q     VEL
BRDG    990.48    -16.4   725.5 10154.1 3249306.   86700.    8.54

TUBE#   LEFT   RIGHT   WIDTH    AREA   HYDEPTH   VELOCITY
  1    -16.4    46.8   63.18   650.1     10.3      6.67
  2     46.8    76.4   29.63   479.4     16.2      9.04
  3     76.4   115.7   39.27   519.8     13.2      8.34
  4    115.7   154.6   38.93   517.1     13.3      8.38
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  5    154.6   184.4   29.76   472.7      15.9       9.17
  6    184.4   212.4   28.00   456.9      16.3       9.49
  7    212.4   240.3   27.94   449.7      16.1       9.64
  8    240.3   267.6   27.32   450.3      16.5       9.63
  9    267.6   295.8   28.17   459.9      16.3       9.43
 10    295.8   327.7   31.93   476.9      14.9       9.09
 11    327.7   355.3   27.54   449.9      16.3       9.64
 12    355.3   384.6   29.32   465.0      15.9       9.32
 13    384.6   418.7   34.12   494.4      14.5       8.77
 14    418.7   452.9   34.24   490.1      14.3       8.84
 15    452.9   488.8   35.87   503.9      14.0       8.60
 16    488.8   532.9   44.08   546.1      12.4       7.94
 17    532.9   575.5   42.58   532.2      12.5       8.15
 18    575.5   610.9   35.39   507.9      14.4       8.53
 19    610.9   660.2   49.35   574.1      11.6       7.55
 20    660.2   725.5   65.26   657.8      10.1       6.59

"HIGHEST VELOCITY STREAM TUBE"
  7    212.4   240.3   27.94   449.7      16.1       9.64

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  8    240.3   267.6   27.32   450.3      16.5       9.63


"CROSS-SECTION PROPERTIES:"
SECID    WSEL       Q
APPR   991.01   86700

 SA#     AREA          K   TOPW    WETP  ALPH     LEW     REW
  1     12217   3736266     790     799
TOTAL   12217   3736266     790     799  1.00     -25     764
1
WSPRO           FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW      REW     AREA         K          Q      VEL
APPR    991.01    -25.8    763.9  12216.5  3736266.     86700.    7.10

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
  1     -25.8     38.5    64.26    757.4      11.8       5.72
  2      38.5     66.6    28.17    561.5      19.9       7.72
  3      66.6     94.8    28.18    545.4      19.4       7.95
  4      94.8    120.7    25.88    525.9      20.3       8.24
  5     120.7    144.8    24.09    504.0      20.9       8.60
  6     144.8    169.4    24.61    511.3      20.8       8.48
  7     169.4    194.6    25.22    520.1      20.6       8.34
  8     194.6    219.6    25.00    514.2      20.6       8.43
  9     219.6    249.2    29.61    554.7      18.7       7.81
 10     249.2    278.8    29.61    548.4      18.5       7.90
 11     278.8    311.6    32.77    573.9      17.5       7.55
 12     311.6    348.7    37.14    600.9      16.2       7.21
 13     348.7    392.1    43.36    645.7      14.9       6.71
 14     392.1    441.7    49.63    677.5      13.6       6.40
 15     441.7    491.6    49.87    673.8      13.5       6.43
 16     491.6    534.5    42.95    643.5      15.0       6.74
 17     534.5    561.0    26.45    558.3      21.1       7.76
 18     561.0    587.5    26.53    585.2      22.1       7.41
 19     587.5    618.0    30.47    658.8      21.6       6.58
 20     618.0    763.9   145.90   1056.1       7.2       4.10
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"HIGHEST VELOCITY STREAM TUBE"
  5    120.7   144.8   24.09   504.0      20.9       8.60

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  18   561.0   587.5   26.53   585.2      22.1       7.41


"CROSS-SECTION PROPERTIES:"
SECID    WSEL       Q
BRDG   992.81   95600

 SA#     AREA          K   TOPW    WETP  ALPH     LEW     REW
  1     11591   3973580     625     639
TOTAL   11591   3973580     625     639  1.00     -29     734
1
WSPRO           FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID     WSEL      LEW      REW     AREA         K          Q      VEL
BRDG    992.81    -29.8    733.5  11590.6  3973580.     95600.    8.25

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
  1     -29.8     46.4    76.27    777.8      10.2       6.15
  2      46.4     78.8    32.32    581.8      18.0       8.22
  3      78.8    118.3    39.53    593.0      15.0       8.06
  4     118.3    155.8    37.52    573.3      15.3       8.34
  5     155.8    186.0    30.24    539.6      17.8       8.86
  6     186.0    214.5    28.45    518.4      18.2       9.22
  7     214.5    243.3    28.85    520.1      18.0       9.19
  8     243.3    271.0    27.62    509.1      18.4       9.39
  9     271.0    299.9    28.96    523.0      18.1       9.14
 10     299.9    331.7    31.81    535.5      16.8       8.93
 11     331.7    359.9    28.18    519.6      18.4       9.20
 12     359.9    389.9    29.99    524.0      17.5       9.12
 13     389.9    423.6    33.75    549.9      16.3       8.69
 14     423.6    458.2    34.59    560.0      16.2       8.54
 15     458.2    493.7    35.42    568.1      16.0       8.41
 16     493.7    538.0    44.31    618.1      13.9       7.73
 17     538.0    578.5    40.48    592.1      14.6       8.07
 18     578.5    613.7    35.25    573.8      16.3       8.33
 19     613.7    661.3    47.64    637.9      13.4       7.49
 20     661.3    733.5    72.20    775.6      10.7       6.16

"HIGHEST VELOCITY STREAM TUBE"
  8    243.3   271.0   27.62   509.1      18.4       9.39

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  11   331.7   359.9   28.18   519.6      18.4       9.20


"CROSS-SECTION PROPERTIES:"
SECID    WSEL       Q
APPR   993.28   95600

 SA#     AREA          K   TOPW    WETP  ALPH     LEW     REW
  1     14021   4655660     800     811
TOTAL   14021   4655660     800     811  1.00     -33     766
1
WSPRO           FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195              MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS
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Bridge No. 524, Tanana River at Big Delta
Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
WSPRO Profiles (WSPRO ver. V082195)
*** RUN DATE & TIME: 10-23-96 11:39

"VELOCITY DISTRIBUTION:"

SECID	WSEL	LEW	REW	AREA	K	Q	VEL
APPR	993.28	-33.9	766.2	14020.9	4655660.	95600.	6.82

TUBE#	LEFT	RIGHT	WIDTH	AREA	HYDEPTH	VELOCITY
1	-33.9	38.3	72.19	909.3	12.6	5.26
2	38.3	67.9	29.54	655.1	22.2	7.30
3	67.9	96.5	28.68	621.1	21.7	7.70
4	96.5	123.8	27.26	617.8	22.7	7.74
5	123.8	149.2	25.38	589.4	23.2	8.11
6	149.2	175.6	26.47	608.1	23.0	7.86
7	175.6	201.6	25.99	595.6	22.9	8.03
8	201.6	228.7	27.03	604.7	22.4	7.90
9	228.7	259.0	30.37	633.1	20.8	7.55
10	259.0	290.4	31.33	642.1	20.5	7.44
11	290.4	324.6	34.28	662.5	19.3	7.22
12	324.6	363.5	38.85	697.5	18.0	6.85
13	363.5	407.4	43.88	733.9	16.7	6.51
14	407.4	454.9	47.57	748.4	15.7	6.39
15	454.9	502.1	47.14	750.2	15.9	6.37
16	502.1	541.3	39.21	715.2	18.2	6.68
17	541.3	567.3	25.96	626.7	24.1	7.63
18	567.3	595.2	27.99	677.9	24.2	7.05
19	595.2	626.8	31.54	738.7	23.4	6.47
20	626.8	766.2	139.40	1193.6	8.6	4.00

"HIGHEST VELOCITY STREAM TUBE"

5	123.8	149.2	25.38	589.4	23.2	8.11

"LARGEST HYDRAULIC DEPTH STREAM TUBE"

18	567.3	595.2	27.99	677.9	24.2	7.05

"CROSS-SECTION PROPERTIES:"

SECID	WSEL	Q
BRDG	993.71	95600

SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW
1	12156	4280591	629	644			
TOTAL	12156	4280591	629	644	1.00	-31	737

1
WSPRO FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195 MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Bridge No. 524, Tanana River at Big Delta
Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
WSPRO Profiles (WSPRO ver. V082195)
*** RUN DATE & TIME: 10-23-96 11:39

"VELOCITY DISTRIBUTION:"

SECID	WSEL	LEW	REW	AREA	K	Q	VEL
BRDG	993.71	-31.6	736.7	12155.6	4280591.	95600.	7.86

TUBE#	LEFT	RIGHT	WIDTH	AREA	HYDEPTH	VELOCITY
1	-31.6	46.6	78.17	838.0	10.7	5.70
2	46.6	77.8	31.25	586.6	18.8	8.15
3	77.8	117.6	39.76	627.7	15.8	7.61
4	117.6	155.3	37.74	603.2	16.0	7.92
5	155.3	185.8	30.41	564.7	18.6	8.46
6	185.8	214.4	28.62	542.5	19.0	8.81
7	214.4	242.9	28.56	535.7	18.8	8.92
8	242.9	271.5	28.62	548.7	19.2	8.71
9	271.5	300.5	28.94	543.3	18.8	8.80
10	300.5	332.3	31.79	558.9	17.6	8.55
11	332.3	360.5	28.25	542.3	19.2	8.81
12	360.5	391.6	31.03	563.0	18.1	8.49
13	391.6	424.8	33.25	565.5	17.0	8.45
14	424.8	459.6	34.82	588.9	16.9	8.12
15	459.6	494.5	34.85	584.8	16.8	8.17
16	494.5	538.9	44.38	649.6	14.6	7.36
17	538.9	579.4	40.54	625.1	15.4	7.65
18	579.4	614.7	35.30	600.5	17.0	7.96
19	614.7	662.4	47.71	671.3	14.1	7.12
20	662.4	736.7	74.24	815.2	11.0	5.86

"HIGHEST VELOCITY STREAM TUBE"

7	214.4	242.9	28.56	535.7	18.8	8.92

"LARGEST HYDRAULIC DEPTH STREAM TUBE"

11	332.3	360.5	28.25	542.3	19.2	8.81

"CROSS-SECTION PROPERTIES:"

SECID	WSEL	Q
APPR	994.13	95600

SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW
1	14703	5021081	804	815			
TOTAL	14703	5021081	804	815	1.00	-36	767

1
WSPRO FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195 MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Bridge No. 524, Tanana River at Big Delta
Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
WSPRO Profiles (WSPRO ver. V082195)
*** RUN DATE & TIME: 10-23-96 11:39

"VELOCITY DISTRIBUTION:"

SECID	WSEL	LEW	REW	AREA	K	Q	VEL
APPR	994.13	-36.9	767.0	14702.6	5021081.	95600.	6.50

TUBE#	LEFT	RIGHT	WIDTH	AREA	HYDEPTH	VELOCITY
1	-36.9	38.0	74.88	964.3	12.9	4.96
2	38.0	67.9	29.96	689.8	23.0	6.93
3	67.9	97.9	29.97	675.2	22.5	7.08
4	97.9	124.7	26.76	630.1	23.6	7.59
5	124.7	151.1	26.40	635.7	24.1	7.52
6	151.1	177.2	26.17	622.9	23.8	7.67
7	177.2	203.6	26.37	626.9	23.8	7.62
8	203.6	231.7	28.13	647.3	23.0	7.38
9	231.7	262.2	30.46	661.1	21.7	7.23
10	262.2	293.6	31.43	667.4	21.2	7.16
11	293.6	328.5	34.92	699.8	20.0	6.83
12	328.5	368.1	39.57	738.6	18.7	6.47
13	368.1	411.3	43.22	754.2	17.4	6.34
14	411.3	459.2	47.86	792.3	16.6	6.03
15	459.2	505.6	46.36	779.8	16.8	6.13
16	505.6	542.5	36.94	716.8	19.4	6.67
17	542.5	569.4	26.94	675.9	25.1	7.07
18	569.4	597.3	27.88	698.1	25.0	6.85
19	597.3	630.2	32.87	788.2	24.0	6.06
20	630.2	767.0	136.84	1238.2	9.0	3.86

"HIGHEST VELOCITY STREAM TUBE"

6	151.1	177.2	26.17	622.9	23.8	7.67

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"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  17     542.5    569.4    26.94    675.9       25.1        7.07

"CROSS-SECTION PROPERTIES:"
SECID     WSEL        Q
BRDG    993.52     95600

 SA#      AREA          K     TOPW     WETP  ALPH      LEW      REW
   1     12036    4214003      629      643
TOTAL    12036    4214003      629      643  1.00      -31      736
1
WSPRO             FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195                MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
              *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID      WSEL      LEW      REW    AREA           K          Q     VEL
BRDG     993.52    -31.6    736.0 12036.1 4214003.     95600.    7.94

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
   1    -31.6     46.6    78.18    826.4      10.6       5.78
   2     46.6     77.9    31.25    581.9      18.6       8.22
   3     77.9    117.6    39.76    621.5      15.6       7.69
   4    117.6    155.4    37.74    597.6      15.8       8.00
   5    155.4    185.8    30.42    560.1      18.4       8.53
   6    185.8    214.4    28.62    538.1      18.8       8.88
   7    214.4    243.0    28.56    531.4      18.6       9.00
   8    243.0    271.6    28.63    544.3      19.0       8.78
   9    271.6    300.1    28.47    530.3      18.6       9.01
  10    300.1    332.4    32.27    562.5      17.4       8.50
  11    332.4    360.7    28.31    539.2      19.0       8.87
  12    360.7    390.8    30.14    542.6      18.0       8.81
  13    390.8    424.7    33.91    571.7      16.9       8.36
  14    424.7    459.5    34.76    582.5      16.8       8.21
  15    459.5    494.3    34.78    578.3      16.6       8.27
  16    494.3    538.6    44.30    642.2      14.5       7.44
  17    538.6    579.0    40.47    616.9      15.2       7.75
  18    579.0    614.3    35.24    594.1      16.9       8.05
  19    614.3    661.9    47.63    663.9      13.9       7.20
  20    661.9    736.0    74.11    810.8      10.9       5.90

"HIGHEST VELOCITY STREAM TUBE"
   9    271.6    300.1    28.47    530.3      18.6       9.01

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  11    332.4    360.7    28.31    539.2      19.0       8.87


"CROSS-SECTION PROPERTIES:"
SECID     WSEL        Q
APPR    993.95     95600

 SA#      AREA          K     TOPW     WETP  ALPH      LEW      REW
   1     14558    4942749      803      815
TOTAL    14558    4942749      803      815  1.00      -35      767
1
WSPRO             FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195                MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
              *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID      WSEL      LEW      REW    AREA           K          Q     VEL
APPR     993.95    -36.3    766.9 14558.0 4942749.     95600.    6.57

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
   1    -36.3     38.4    74.63    959.7      12.9       4.98
   2     38.4     68.2    29.86    682.0      22.8       7.01
   3     68.2     97.2    28.99    647.6      22.3       7.38
   4     97.2    124.8    27.55    643.6      23.4       7.43
   5    124.8    150.4    25.65    613.1      23.9       7.80
   6    150.4    177.2    26.76    632.2      23.6       7.56
   7    177.2    203.5    26.27    619.9      23.6       7.71
   8    203.5    230.8    27.33    625.4      22.9       7.64
   9    230.8    261.5    30.69    660.5      21.5       7.24
  10    261.5    293.1    31.67    667.5      21.1       7.16
  11    293.1    327.6    34.51    686.3      19.9       6.97
  12    327.6    366.8    39.11    724.3      18.5       6.60
  13    366.8    410.9    44.17    763.9      17.3       6.26
  14    410.9    458.8    47.89    784.3      16.4       6.09
  15    458.8    505.2    46.39    771.7      16.6       6.19
  16    505.2    542.2    36.97    708.6      19.2       6.75
  17    542.2    569.1    26.95    670.9      24.9       7.13
  18    569.1    597.0    27.90    693.6      24.9       6.89
  19    597.0    629.9    32.89    783.7      23.8       6.10
  20    629.9    766.9   136.93   1219.3       8.9       3.92

"HIGHEST VELOCITY STREAM TUBE"
   5    124.8    150.4    25.65    613.1      23.9       7.80

"LARGEST HYDRAULIC DEPTH STREAM TUBE"
  17    542.2    569.1    26.95    670.9      24.9       7.13


"CROSS-SECTION PROPERTIES:"
SECID     WSEL        Q
BRDG    991.09     95600

 SA#      AREA          K     TOPW     WETP  ALPH      LEW      REW
   1     10526    3432618      612      626
TOTAL    10526    3432618      612      626  1.00      -19      728
1
WSPRO             FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195                MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
              *** RUN DATE & TIME: 10-23-96  11:39

"VELOCITY DISTRIBUTION:"
SECID      WSEL      LEW      REW    AREA           K          Q     VEL
BRDG     991.09    -19.9    727.6 10526.3 3432618.     95600.    9.08

TUBE#    LEFT    RIGHT    WIDTH     AREA   HYDEPTH    VELOCITY
   1    -19.9     46.9    66.79    684.0      10.2       6.99
   2     46.9     77.7    30.86    513.5      16.6       9.31
   3     77.7    117.0    39.26    536.1      13.7       8.92
   4    117.0    155.1    38.10    526.5      13.8       9.08
   5    155.1    185.0    29.89    490.4      16.4       9.75
   6    185.0    213.1    28.13    473.0      16.8      10.11
   7    213.1    241.2    28.07    466.0      16.6      10.26
   8    241.2    268.6    27.45    466.5      17.0      10.25
```

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    9    268.6   296.9   28.31   474.9     16.8      10.06
   10    296.9   329.0   32.08   494.8     15.4       9.66
   11    329.0   356.6   27.61   466.8     16.9      10.24
   12    356.6   386.0   29.39   478.4     16.3       9.99
   13    386.0   420.2   34.20   511.6     15.0       9.34
   14    420.2   454.5   34.32   508.2     14.8       9.41
   15    454.5   489.7   35.15   512.0     14.6       9.34
   16    489.7   533.6   43.96   563.8     12.8       8.48
   17    533.6   576.1   42.47   553.6     13.0       8.64
   18    576.1   611.4   35.30   524.5     14.9       9.11
   19    611.4   660.6   49.23   595.6     12.1       8.03
   20    660.6   727.6   66.95   686.1     10.2       6.97

 "HIGHEST VELOCITY STREAM TUBE"
    7    213.1   241.2   28.07   466.0     16.6      10.26

 "LARGEST HYDRAULIC DEPTH STREAM TUBE"
    8    241.2   268.6   27.45   466.5     17.0      10.25


 "CROSS-SECTION PROPERTIES:"
 SECID    WSEL       Q
 APPR   991.69    95600

  SA#     AREA          K   TOPW    WETP  ALPH    LEW    REW
   1     12755    4002940    793     803
 TOTAL   12755    4002940    793     803  1.00    -27    765
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
              *** RUN DATE & TIME: 10-23-96  11:39

 "VELOCITY DISTRIBUTION:"
 SECID     WSEL      LEW     REW    AREA        K         Q       VEL
 APPR    991.69    -28.2   764.6 12754.6 4002940.    95600.   7.50

 TUBE#   LEFT   RIGHT   WIDTH    AREA  HYDEPTH   VELOCITY
    1   -28.2    38.5   66.70   802.5    12.0       5.96
    2    38.5    67.0   28.57   588.6    20.6       8.12
    3    67.0    95.6   28.58   572.9    20.0       8.34
    4    95.6   121.1   25.51   536.4    21.0       8.91
    5   121.1   146.3   25.17   544.0    21.6       8.79
    6   146.3   171.8   25.49   546.0    21.4       8.75
    7   171.8   196.8   25.02   533.1    21.3       8.97
    8   196.8   222.9   26.03   549.6    21.1       8.70
    9   222.9   252.5   29.70   573.7    19.3       8.33
   10   252.5   282.2   29.70   568.1    19.1       8.41
   11   282.2   316.0   33.72   608.6    18.0       7.85
   12   316.0   354.2   38.21   637.3    16.7       7.50
   13   354.2   397.3   43.16   665.4    15.4       7.18
   14   397.3   445.9   48.59   692.5    14.3       6.90
   15   445.9   494.9   49.02   697.4    14.2       6.85
   16   494.9   536.7   41.74   665.1    15.9       7.19
   17   536.7   563.0   26.32   581.0    22.1       8.23
   18   563.0   590.1   27.05   614.2    22.7       7.78
   19   590.1   620.5   30.39   675.1    22.2       7.08
   20   620.5   764.6  144.14  1102.9     7.7       4.33

 "HIGHEST VELOCITY STREAM TUBE"
    7   171.8   196.8   25.02   533.1    21.3       8.97

 "LARGEST HYDRAULIC DEPTH STREAM TUBE"
   18   563.0   590.1   27.05   614.2    22.7       7.78
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T1        Bridge No. 524, Tanana River ** Slough_** at Big Delta
T2        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
T3        WSPRO Profiles (WSPRO ver. V082195)
*
Q         2570   10400  10400  10400  10400  11400  11400  11400  11400
WS        981.1  992.6  993.4  993.2  991.0  993.3  994.1  994.0  991.7
*
*         ********************************************************************
XS   SLG4 0
GR        -324.6, 1001.4  -309.6, 986.4  -109.6, 986.4  -46.6, 985.7
GR        -34.8, 983.9  0, 981  6.6, 977.6  19.7, 974.9
GR        29.5, 972.5  36.1, 972.9  45.9, 972.6  52.5, 972.3
GR        65.6, 972.6  72.2, 972.6  85.3, 972.5  88.6, 972.3
GR        101.7, 971.9  111.6, 971.7  118.1, 972.2  124.7, 973
GR        134.5, 973.9  137.8, 975.5  144.4, 975.9  150.9, 981
GR        205.8, 986  211.2, 987.1  247.3, 988.3  267.3, 988.3
GR        279.3, 1000.3
N         0.10      0.030      0.035
SA             -110        205
*         ********************************************************************
XS   SLG3 204
GR        -228.3, 999.7  -213.3, 984.7  -13.3, 984.7  0, 981.1
GR        5.2, 979.1  15, 978.1  21.6, 977.1  28.1, 975.7
GR        34.7, 975.2  41.3, 973.9  54.4, 972  60.9, 971.3
GR        67.5, 970.9  74.1, 970.9  80.6, 970.3  87.2, 969.8
GR        93.7, 969.6  100.3, 969.1  106.9, 969  113.4, 969.3
GR        120, 975.6  129.8, 979  131.7, 981  137.9, 985.7
GR        173.4, 999.9
N         0.10      0.030
SA             -21
*         ********************************************************************
XS   SLG2 402
GR        -226, 1001.1  -211, 986.1  -11, 986.1  -6.7, 984.6
GR        0, 980.8  3.3, 979  29.5, 974.1  45.9, 973.6
GR        62.3, 972.6  78.7, 970.2  95.1, 969.3  111.6, 969.4
GR        128, 977.1  132.6, 980.8  137.9, 986.2  237.9, 986.2
GR        252.9, 1001.2
N         0.10      0.030      0.050
SA             -11        138
*         ********************************************************************
XS   SLG1 595
GR        -250.3, 1001.2  -235.3, 986.2  -35.3, 986.2  -27.7, 985.5
GR        -18.2, 982.9  0, 980.8  8.2, 978.8  14.8, 976.3
GR        21.3, 975.7  27.9, 975.1  34.5, 974.5  41, 973.9
GR        47.6, 973  54.1, 972.8  60.7, 972  67.3, 971.6
GR        73.8, 970.9  80.4, 970.4  87, 970.4  93.5, 970.4
GR        100.1, 971.1  106.6, 971.5  113.2, 973  119.8, 974.5
GR        126.3, 976.6  139.5, 980.8  143.4, 988.4  243.4, 988.4
GR        258.4, 1003.4
N         0.10      0.030      0.10
SA             -35        147
*         ********************************************************************
EX
ER
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1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          *** RUN DATE & TIME: 10-31-96  08:41

   T1        Bridge No. 524, Tanana River **_Slough_** at Big Delta
   T2        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
   T3        WSPRO Profiles (WSPRO ver. V082195)
   *
   Q         2570   10400  10400  10400  10400  11400  11400  11400  11400
 *** Q-DATA FOR SEC-ID, ISEQ =          1
   WS        981.1  992.6  993.4  993.2  991.0  993.3  994.1  994.0  991.7
   *
   *         ******************************************************************
***
1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River **_Slough_** at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-31-96  08:41

 *** START PROCESSING CROSS SECTION - "SLG4 "
  XS    SLG4 0
  GR         -324.6, 1001.4  -309.6, 986.4  -109.6, 986.4  -46.6, 985.7
  GR         -34.8, 983.9  0, 981  6.6, 977.6  19.7, 974.9
  GR         29.5, 972.5  36.1, 972.9  45.9, 972.6  52.5, 972.3
  GR         65.6, 972.6  72.2, 972.6  85.3, 972.5  88.6, 972.3
  GR         101.7, 971.9  111.6, 971.7  118.1, 972.2  124.7, 973
  GR         134.5, 973.9  137.8, 975.5  144.4, 975.9  150.9, 981
  GR         205.8, 986  211.2, 987.1  247.3, 988.3  267.3, 988.3
  GR         279.3, 1000.3
  N          0.10      0.030      0.035
  SA              -110        205
  *          ******************************************************************
***

 *** FINISH PROCESSING CROSS SECTION - "SLG4 "
 *** CROSS SECTION "SLG4 " WRITTEN TO DISK, RECORD NO. =  1

 --- DATA SUMMARY FOR SECID "SLG4 " AT SRD =       0.  ERR-CODE =       0

      SKEW     IHFNO    VSLOPE        EK        CK
       0.0        0. *********       0.50      0.00

 X-Y COORDINATE PAIRS   (NGP =  29):
        X      Y           X      Y           X      Y           X      Y
    -324.6 1001.40     -309.6  986.40     -109.6  986.40      -46.6  985.70
     -34.8  983.90        0.0  981.00        6.6  977.60       19.7  974.90
      29.5  972.50       36.1  972.90       45.9  972.60       52.5  972.30
      65.6  972.60       72.2  972.60       85.3  972.50       88.6  972.30
     101.7  971.90      111.6  971.70      118.1  972.20      124.7  973.00
     134.5  973.90      137.8  975.50      144.4  975.90      150.9  981.00
     205.8  986.00      211.2  987.10      247.3  988.30      267.3  988.30
     279.3 1000.30

  X Y MAX-MIN POINTS:
      XMIN      Y           X   YMIN        XMAX      Y           X   YMAX
    -324.6 1001.40      111.6 971.70       279.3 1000.30     -324.6 1001.40

 SUBAREA BREAKPOINTS (NSA =  3):
       -110.    205.
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ROUGHNESS COEFFICIENTS (NSA =  3):
      0.100   0.030   0.035
1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River **_Slough_** at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-31-96  08:41

 *** START PROCESSING CROSS SECTION - "SLG3 "
  XS    SLG3 204
  GR         -228.3, 999.7  -213.3, 984.7  -13.3, 984.7  0, 981.1
  GR         5.2, 979.1  15, 978.1  21.6, 977.1  28.1, 975.7
  GR         34.7, 975.2  41.3, 973.9  54.4, 972  60.9, 971.3
  GR         67.5, 970.9  74.1, 970.9  80.6, 970.3  87.2, 969.8
  GR         93.7, 969.6  100.3, 969.1  106.9, 969  113.4, 969.3
  GR         120, 975.6  129.8, 979  131.7, 981  137.9, 985.7
  GR         173.4, 999.9
  N          0.10      0.030
  SA              -21
  *          ******************************************************************
***

 *** FINISH PROCESSING CROSS SECTION - "SLG3 "
 *** CROSS SECTION "SLG3 " WRITTEN TO DISK, RECORD NO. =  2

 --- DATA SUMMARY FOR SECID "SLG3 " AT SRD =     204.  ERR-CODE =       0

      SKEW     IHFNO    VSLOPE        EK        CK
       0.0        0. *********       0.50      0.00

 X-Y COORDINATE PAIRS   (NGP =  25):
        X      Y           X      Y           X      Y           X      Y
    -228.3  999.70     -213.3  984.70      -13.3  984.70        0.0  981.10
       5.2  979.10       15.0  978.10       21.6  977.10       28.1  975.70
      34.7  975.20       41.3  973.90       54.4  972.00       60.9  971.30
      67.5  970.90       74.1  970.90       80.6  970.30       87.2  969.80
      93.7  969.60      100.3  969.10      106.9  969.00      113.4  969.30
     120.0  975.60      129.8  979.00      131.7  981.00      137.9  985.70
     173.4  999.90

  X-Y MAX-MIN POINTS:
      XMIN      Y           X   YMIN        XMAX      Y           X   YMAX
    -228.3  999.70      106.9 969.00       173.4  999.90      173.4  999.90

 SUBAREA BREAKPOINTS (NSA =  2):
       -21.

 ROUGHNESS COEFFICIENTS (NSA =  2):
      0.100   0.030
1
WSPRO         FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River **_Slough_** at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-31-96  08:41

 *** START PROCESSING CROSS SECTION - "SLG2 "
  XS    SLG2 402
  GR         -226, 1001.1  -211, 986.1  -11, 986.1  -6.7, 984.6
  GR         0, 980.8  3.3, 979  29.5, 974.1  45.9, 973.6
  GR         62.3, 972.6  78.7, 970.2  95.1, 969.3  111.6, 969.4
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 GR        128, 977.1  132.6, 980.8  137.9, 986.2  237.9, 986.2
 GR        252.9, 1001.2
 N         0.10     0.030     0.050
 SA             -11        138
 *         ********************************************************************
***

*** FINISH PROCESSING CROSS SECTION - "SLG2 "
*** CROSS SECTION "SLG2 " WRITTEN TO DISK, RECORD NO. =  3

--- DATA SUMMARY FOR SECID "SLG2 " AT SRD -    402.  ERR-CODE =        0

     SKEW     IHFNO    VSLOPE         EK        CK
      0.0        0.  *********       0.50      0.00

X-Y COORDINATE PAIRS   (NGP =  17):
       X       Y            X       Y            X       Y            X       Y
  -226.0 1001.10       -211.0  986.10         11.0  986.10         -6.7  984.60
     0.0  980.80          3.3  979.00         29.5  974.10         45.9  973.60
    62.3  972.60         78.7  970.20         95.1  969.30        111.6  969.40
   128.0  977.10        132.6  980.80        137.9  986.20        237.9  986.20
   252.9 1001.20

 X-Y MAX-MIN POINTS:
    XMIN       Y            X    YMIN         XMAX       Y            X    YMAX
   226.0 1001.10         95.1  969.30        252.9 1001.20        252.9 1001.20

SUBAREA BREAKPOINTS (NSA =  3):
      -11.     138.

ROUGHNESS COEFFICIENTS (NSA =  3):
      0.100    0.030    0.050
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River **_Slough ** at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-31-96  08:41

*** START PROCESSING CROSS SECTION - "SLG1 "
 XS    SLG1 595
 GR          -250.3, 1001.2  -235.3, 986.2  -35.3, 986.2  -27.7, 985.5
 GR          -18.2, 982.9  0, 980.8  8.2, 978.8  14.8, 976.3
 GR          21.3, 975.7  27.9, 975.1  34.5, 974.5  41, 973.9
 GR          47.6, 973  54.1, 972.8  60.7, 972  67.3, 971.6
 GR          73.8, 970.9  80.4, 970.4  87, 970.4  93.5, 970.4
 GR          100.1, 971.1  106.6, 971.5  113.2, 973  119.8, 974.5
 GR          126.3, 976.6  139.5, 980.8  143.4, 988.4  243.4, 988.4
 GR          258.4, 1003.4
 N           0.10      0.030      0.10
 SA               -35        147
 *           ********************************************************************
***
 EX

*** FINISH PROCESSING CROSS SECTION - "SLG1 "
*** CROSS SECTION "SLG1 " WRITTEN TO DISK, RECORD NO. =  4

--- DATA SUMMARY FOR SECID "SLG1 " AT SRD =    595.  ERR-CODE -        0

     SKEW     IHFNO    VSLOPE         EK        CK
      0.0        0.  *********       0.50      0.00

X Y COORDINATE PAIRS   (NGP =  29):
       X       Y            X       Y            X       Y            X       Y
  -250.3 1001.20       -235.3  986.20        -35.3  986.20        -27.7  985.50
   -18.2  982.90          0.0  980.80          8.2  978.80         14.8  976.30
    21.3  975.70         27.9  975.10         34.5  974.50         41.0  973.90
    47.6  973.00         54.1  972.80         60.7  972.00         67.3  971.60
    73.8  970.90         80.4  970.40         87.0  970.40         93.5  970.40
   100.1  971.10        106.6  971.50        113.2  973.00        119.8  974.50
   126.3  976.60        139.5  980.80        143.4  988.40        243.4  988.40
   258.4 1003.40

 X-Y MAX-MIN POINTS:
    XMIN       Y            X    YMIN         XMAX       Y            X    YMAX
  -250.3 1001.20         80.4  970.40        258.4 1003.40        258.4 1003.40

SUBAREA BREAKPOINTS (NSA =  3):
     -35.     147.

ROUGHNESS COEFFICIENTS (NSA =  3):
      0.100    0.030    0.100

+++ BEGINNING PROFILE CALCULATIONS --    9
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River **_Slough_** at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-31-96  08:41

 XSID:CODE   SRDL    LEW     AREA    VHD     HF     EGL    CRWS        Q     WSEL
       SRD   FLEN    REW        K   ALPH     HO     ERR     FR#      VEL

SLG4 :XS   ******      0     1127   0.08  *****  981.18  975.09     2570   981.10
         0 ******    152   208403   1.00  ***** *******    0.15     2.28

SLG3 :XS      204      0     1015   0.10   0.03  981.22 *******     2570   981.12
       204    204    132   191581   1.00   0.01    0.00    0.16     2.53

SLG2 :XS      198      0     1060   0.09   0.03  981.26 *******     2570   981.17
       402    198    133   204910   1.00   0.00    0.00    0.15     2.42

SLG1 :XS      193     -2     1008   0.10   0.03  981.30 *******     2570   981.20
       595    193    140   181672   1.00   0.00    0.00    0.17     2.55
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

        Bridge No. 524, Tanana River **_Slough_** at Big Delta
        Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
        WSPRO Profiles (WSPRO ver. V082195)
           *** RUN DATE & TIME: 10-31-96  08:41

 XSID:CODE   SRDL    LEW     AREA    VHD     HF     EGL    CRWS        Q     WSEL
       SRD   FLEN    REW        K   ALPH     HO     ERR     FR#      VEL

SLG4 :XS   ******   -315     5784   0.07  *****  992.67  978.78    10400   992.60
         0 ******    272  1268698   1.49  ***** *******    0.12     1.80

SLG3 :XS      204   -220     4375   0.16   0.02  992.73 *******    10400   992.58
       204    204    155   956249   1.79   0.04    0.00    0.16     2.38

SLG2 :XS      198   -217     4706   0.15   0.02  992.76 *******    10400   992.61
       402    198    244  1040136   2.00   0.00    0.00    0.17     2.21

SLG1 :XS      193   -241     4700   0.15   0.02  992.78 *******    10400   992.63
```

```
      595    193    248 1008270  1.94  0.00    0.00    0.18    2.21
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River **_Slough_** at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-31 96  08:41

 XSID:CODE   SRDL     LEW     AREA    VHD     HF     EGL    CRWS       Q    WSEL
       SRD   FLEN     REW        K   ALPH     HO     ERR     FR#     VEL

SLG4 :XS   ******    -316     6254   0.06 *****  993.46  978.78   10400  993.40
         0 ******     272  1411964   1.51 ***** *******    0.11    1.66

SLG3 :XS      204    -221     4677   0.14  0.02  993.52 *******   10400  993.38
      204     204     157  1038230   1.81  0.04    0.00    0.15    2.22

SLG2 :XS      198    -217     5075   0.13  0.02  993.54 *******   10400  993.40
      402     198     245  1135506   2.03  0.00    0.00    0.16    2.05

SLG1 :XS      193    -242     5089   0.13  0.02  993.55 *******   10400  993.42
      595     193     248  1103786   2.00  0.00    0.00    0.16    2.04
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River **_Slough_** at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-31-96  08:41

 XSID:CODE   SRDL     LEW     AREA    VHD     HF     EGL    CRWS       Q    WSEL
       SRD   FLEN     REW        K   ALPH     HO     ERR     FR#     VEL

SLG4 :XS   ******    -315     6137   0.07 *****  993.27  978.78   10400  993.20
         0 ******     272  1375513   1.50 ***** *******    0.11    1.69

SLG3 :XS      204    -221     4601   0.14  0.02  993.32 *******   10400  993.18
      204     204     157  1017427   1.81  0.04    0.00    0.15    2.26

SLG2 :XS      198    -217     4982   0.14  0.02  993.34 *******   10400  993.20
      402     198     245  1111263   2.03  0.00    0.00    0.16    2.09

SLG1 :XS      193    -241     4992   0.13  0.02  993.36 *******   10400  993.23
      595     193     248  1079493   1.99  0.00    0.00    0.16    2.08
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River **_Slough_** at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-31-96  08:41

 XSID:CODE   SRDL     LEW     AREA    VHD     HF     EGL    CRWS       Q    WSEL
       SRD   FLEN     REW        K   ALPH     HO     ERR     FR#     VEL

SLG4 :XS   ******    -313     4847   0.10 *****  991.10  978.78   10400  991.00
         0 ******     270  1003044   1.44 ***** *******    0.16    2.15

SLG3 :XS      204    -219     3777   0.20  0.03  991.18 *******   10400  990.98
      204     204     151   802193   1.73  0.05    0.00    0.20    2.75

SLG2 :XS      198    -215     3973   0.20  0.03  991.21 *******   10400  991.01
      402     198     243   862365   1.90  0.00    0.00    0.22    2.62

SLG1 :XS      193    -239     3930   0.19  0.03  991.25 *******   10400  991.05
      595     193     246   830640   1.79  0.00    0.00    0.22    2.65
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River **_Slough_** at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-31-96  08:41

 XSID:CODE   SRDL     LEW     AREA    VHD     HF     EGL    CRWS       Q    WSEL
       SRD   FLEN     REW        K   ALPH     HO     ERR     FR#     VEL

SLG4 :XS   ******    -315     6195   0.08 *****  993.38  979.14   11400  993.30
         0 ******     272  1393681   1.50 ***** *******    0.12    1.84

SLG3 :XS      204    -221     4637   0.17  0.02  993.44 *******   11400  993.27
      204     204     157  1027315   1.81  0.05    0.00    0.17    2.46

SLG2 :XS      198    -217     5029   0.16  0.02  993.47 *******   11400  993.30
      402     198     245  1123427   2.03  0.00    0.00    0.17    2.27

SLG1 :XS      193    -241     5043   0.16  0.02  993.49 *******   11400  993.33
      595     193     248  1092220   1.99  0.00    0.00    0.18    2.26
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River **_Slough_** at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-31-96  08:41

 XSID:CODE   SRDL     LEW     AREA    VHD     HF     EGL    CRWS       Q    WSEL
       SRD   FLEN     REW        K   ALPH     HO     ERR     FR#     VEL

SLG4 :XS   ******    -316     6667   0.07 *****  994.17  979.14   11400  994.10
         0 ******     273  1542799   1.52 ***** *******    0.11    1.71

SLG3 :XS      204    -222     4942   0.15  0.02  994.23 *******   11400  994.07
      204     204     159  1112120   1.82  0.04    0.00    0.15    2.31

SLG2 :XS      198    -218     5399   0.14  0.02  994.24 *******   11400  994.10
      402     198     246  1222368   2.06  0.00    0.00    0.16    2.11

SLG1 :XS      193    -242     5433   0.14  0.02  994.26 *******   11400  994.12
      595     193     249  1191313   2.04  0.00    0.00    0.16    2.10
1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V082195            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         Bridge No. 524, Tanana River **_Slough_** at Big Delta
         Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
         WSPRO Profiles (WSPRO ver. V082195)
            *** RUN DATE & TIME: 10-31-96  08:41

 XSID:CODE   SRDL     LEW     AREA    VHD     HF     EGL    CRWS       Q    WSEL
       SRD   FLEN     REW        K   ALPH     HO     ERR     FR#     VEL

SLG4 :XS   ******    -316     6608   0.07 *****  994.07  979.14   11400  994.00
         0 ******     273  1523803   1.52 ***** *******    0.11    1.73

SLG3 :XS      204    -222     4904   0.15  0.02  994.13 *******   11400  993.97
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       204      204      159  1101346  1.82  0.04     0.00     0.15      2.32

 SLG2  :XS      198     -218     5353  0.15  0.02   994.15 *******     11400   994.00
       402      198      246  1209776  2.06  0.00     0.00     0.16      2.13

 SLG1  :XS      193     -242     5384  0.14  0.02   994.17 *******     11400   994.02
       595      193      249  1178694  2.04  0.00     0.00     0.16      2.12
1
 WSPRO              FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V082195                 MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          Bridge No. 524, Tanana River **_Slough_** at Big Delta
          Hydraulic Survey; model run by Tom Heinrichs USGS 10/96
          WSPRO Profiles (WSPRO ver. V082195)
             *** RUN DATE & TIME: 10-31-96  08:41

  XSID:CODE    SRDL     LEW      AREA   VHD    HF      EGL     CRWS        Q     WSEL
        SRD    FLEN     REW         K  ALPH    HO      ERR      FR#      VEL

 SLG4  :XS   ******     -314     5256  0.11 *****   991.81   979.14    11400   991.70
         0 ******      271  1115773  1.46 ***** *******     0.15      2.17

 SLG3  :XS      204     -219     4035  0.22  0.03   991.89 *******     11400   991.67
       204      204      153   867482  1.76  0.06     0.00     0.20      2.82

 SLG2  :XS      198     -216     4293  0.21  0.03   991.92 *******     11400   991.71
       402      198      243   938180  1.95  0.00     0.00     0.21      2.66

 SLG1  :XS      193     -240     4270  0.21  0.03   991.96 *******     11400   991.75
       595      193      247   907066  1.86  0.00     0.00     0.22      2.67
   ER

1  NORMAL   END   OF   WSPRO   EXECUTION.
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Appendix B. Survey Data

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Table B1. Cross section Approach 1 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-20.1	998.7	extended up
–	–	-19.6	986.7	estimated overbank
10,753.1	9,894.0	-9.6	986.7	rebar
10,751.3	9,903.4	0.0	981.5	left edge of water
10,753.6	9,913.5	10.3	976.4	channel sounding
10,757.3	9,929.5	26.7	973.4	channel sounding
10,761.0	9,945.5	43.1	973.2	channel sounding
10,764.6	9,961.5	59.5	973.4	channel sounding
10,768.3	9,977.5	75.9	973.7	channel sounding
10,772.0	9,993.4	92.3	973.6	channel sounding
10,775.7	10,009.4	108.7	973.7	channel sounding
10,779.3	10,025.4	125.1	973.7	channel sounding
10,783.0	10,041.4	141.6	974.3	channel sounding
10,786.7	10,057.4	158.0	974.3	channel sounding
10,790.4	10,073.4	174.4	974.2	channel sounding
10,794.0	10,089.4	190.8	973.9	channel sounding
10,797.7	10,105.4	207.2	973.5	channel sounding
10,801.4	10,121.3	223.6	973.5	channel sounding
10,805.1	10,137.3	240.0	973.6	channel sounding
10,808.7	10,153.3	256.4	974.8	channel sounding
10,812.4	10,169.3	272.8	974.4	channel sounding
10,816.1	10,185.3	289.2	974.0	channel sounding
10,819.8	10,201.3	305.6	973.8	channel sounding
10,823.4	10,217.3	322.0	973.9	channel sounding
10,827.1	10,233.3	338.4	974.2	channel sounding
10,830.8	10,249.3	354.8	974.8	channel sounding
10,834.5	10,265.2	371.2	975.6	channel sounding
10,838.1	10,281.2	387.6	975.8	channel sounding
10,841.8	10,297.2	404.0	976.0	channel sounding
10,845.5	10,313.2	420.4	976.4	channel sounding
10,849.2	10,329.2	436.8	976.7	channel sounding
10,852.8	10,345.2	453.2	977.1	channel sounding
10,856.5	10,361.2	469.7	977.6	channel sounding
10,860.2	10,377.2	486.1	977.0	channel sounding
10,863.8	10,393.1	502.5	977.3	channel sounding
10,867.5	10,409.1	518.9	977.2	channel sounding
10,871.2	10,425.1	535.3	977.6	channel sounding
10,874.9	10,441.1	551.7	977.5	channel sounding
10,877.1	10,450.7	561.5	978.4	channel sounding
10,888.3	10,482.3	594.8	981.4	right edge of water
10,889.4	10,488.7	601.3	982.3	toe of bank
10,890.3	10,491.1	603.9	986.3	rebar
–	–	1,603.9	986.3	estimated overbank
–	–	1,613.9	996.3	extended up

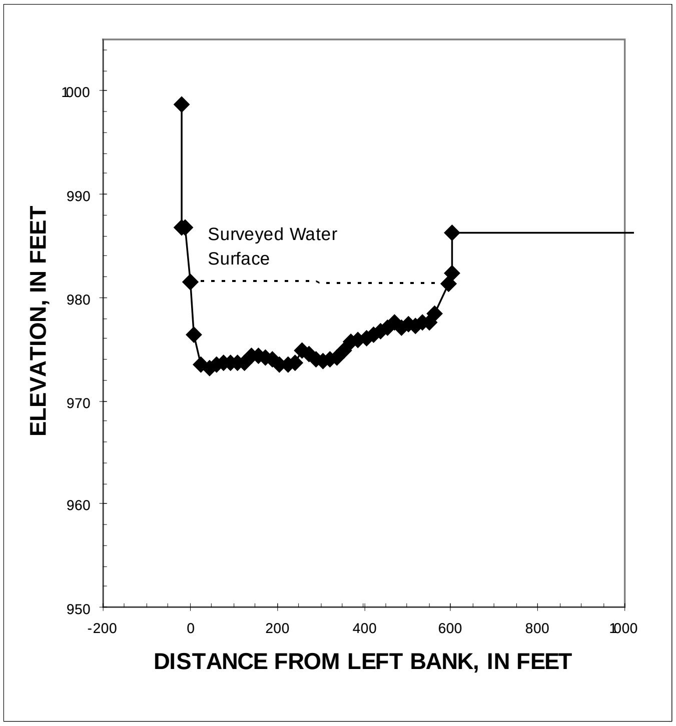


Table B2. Cross section Approach 2 at the Tanana River at Big Delta.

[Points surveyed Aug. 27, 1996. See Figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
10,753.1	9,894.0	-9.1	987.2	bank
10,751.3	9,903.4	.0	981.5	left edge of water
10,747.6	9,909.9	7.4	976.2	channel sounding
10,739.5	9,924.1	23.8	974.5	channel sounding
10,731.3	9,938.4	40.2	973.4	channel sounding
10,723.2	9,952.6	56.7	973.3	channel sounding
10,715.0	9,966.8	73.1	973.4	channel sounding
10,706.9	9,981.1	89.5	973.5	channel sounding
10,698.7	9,995.3	105.9	973.6	channel sounding
10,690.6	10,009.6	122.3	973.5	channel sounding
10,682.4	10,023.8	138.7	973.4	channel sounding
10,674.3	10,038.0	155.1	973.4	channel sounding
10,666.1	10,052.3	171.5	973.4	channel sounding
10,658.0	10,066.5	187.9	973.3	channel sounding
10,649.8	10,080.7	204.3	972.9	channel sounding
10,641.6	10,095.0	220.7	972.9	channel sounding
10,633.5	10,109.2	237.1	972.9	channel sounding
10,625.3	10,123.4	253.5	973.3	channel sounding
10,617.2	10,137.7	269.9	973.9	channel sounding
10,609.0	10,151.9	286.3	974.1	channel sounding
10,600.9	10,166.2	302.7	974.1	channel sounding
10,592.7	10,180.4	319.1	973.5	channel sounding
10,584.6	10,194.6	335.5	972.9	channel sounding
10,576.4	10,208.9	351.9	972.6	channel sounding
10,568.3	10,223.1	368.3	972.8	channel sounding
10,560.1	10,237.3	384.8	973.3	channel sounding
10,552.0	10,251.6	401.2	973.1	channel sounding
10,543.8	10,265.8	417.6	973.4	channel sounding
10,535.7	10,280.1	434.0	974.7	channel sounding
10,527.5	10,294.3	450.4	975.5	channel sounding
10,519.4	10,308.5	466.8	975.8	channel sounding
10,511.2	10,322.8	483.2	976.0	channel sounding
10,503.1	10,337.0	499.6	976.5	channel sounding
10,494.9	10,351.2	516.0	976.7	channel sounding
10,486.8	10,365.5	532.4	977.1	channel sounding
10,478.6	10,379.7	548.8	977.2	channel sounding
10,470.5	10,393.9	565.2	977.7	channel sounding
10,462.3	10,408.2	581.6	977.8	channel sounding
10,454.2	10,422.4	598.0	978.2	channel sounding
10,446.0	10,436.7	614.4	978.7	channel sounding
10,437.9	10,450.9	630.8	978.0	channel sounding
10,429.7	10,465.1	647.2	978.4	channel sounding
10,421.6	10,479.4	663.6	978.0	channel sounding
10,413.4	10,493.6	680.0	978.5	channel sounding
10,405.3	10,507.8	696.4	978.9	channel sounding
10,397.1	10,522.1	712.9	978.4	channel sounding
10,393.8	10,527.8	719.4	978.4	channel sounding
10,372.6	10,584.6	779.3	981.0	right edge of water
10,357.8	10,615.9	813.7	982.0	bank
10,346.9	10,643.1	842.8	980.9	bank
10,325.4	10,675.3	881.5	980.9	bank
10,319.2	10,701.7	907.5	983.9	bank

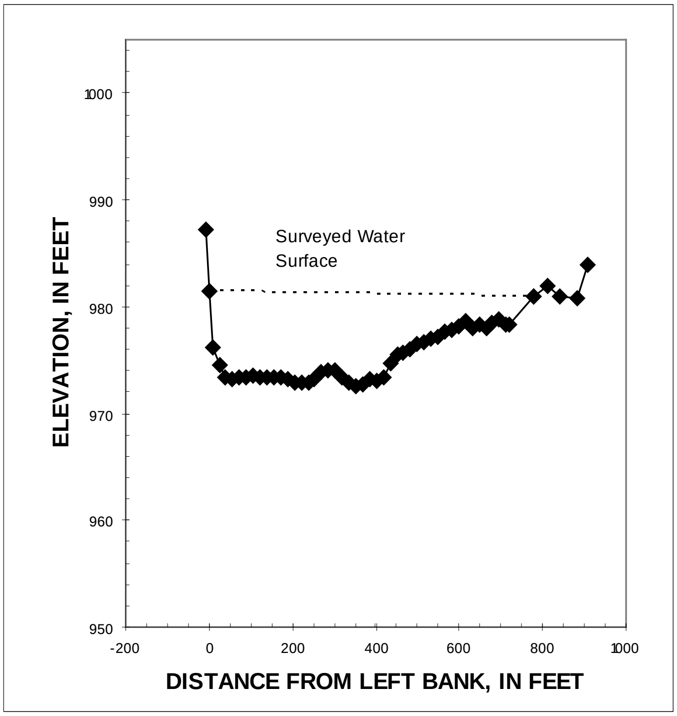


Table B3. Cross section Approach 3 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, feet]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
10,499.7	9,929.0	-63.6	987.1	bank
10,480.6	9,964.6	-23.2	986.8	rebar
10,477.3	9,989.5	.0	981.1	left edge of water
10,467.5	10,006.6	19.7	978.4	channel sounding
10,459.4	10,020.8	36.1	976.2	channel sounding
10,451.2	10,035.0	52.5	974.9	channel sounding
10,443.1	10,049.3	68.9	973.9	channel sounding
10,434.9	10,063.5	85.3	972.9	channel sounding
10,426.8	10,077.7	101.7	972.5	channel sounding
10,418.6	10,092.0	118.1	971.7	channel sounding
10,410.5	10,106.2	134.5	971.0	channel sounding
10,402.3	10,120.4	150.9	970.3	channel sounding
10,394.2	10,134.7	167.3	970.3	channel sounding
10,386.0	10,148.9	183.7	970.5	channel sounding
10,377.9	10,163.2	200.1	970.8	channel sounding
10,369.7	10,177.4	216.5	970.9	channel sounding
10,353.4	10,205.9	249.4	970.9	channel sounding
10,345.2	10,220.1	265.8	971.0	channel sounding
10,337.1	10,234.3	282.2	971.0	channel sounding
10,328.9	10,248.6	298.6	971.3	channel sounding
10,320.8	10,262.8	315.0	971.5	channel sounding
10,312.6	10,277.0	331.4	972.0	channel sounding
10,304.5	10,291.3	347.8	973.1	channel sounding
10,296.3	10,305.5	364.2	974.0	channel sounding
10,288.2	10,319.8	380.6	975.0	channel sounding
10,280.0	10,334.0	397.0	975.4	channel sounding
10,271.9	10,348.2	413.4	976.1	channel sounding
10,263.7	10,362.5	429.8	976.9	channel sounding
10,255.6	10,376.7	446.2	977.1	channel sounding
10,247.4	10,390.9	462.6	976.9	channel sounding
10,239.3	10,405.2	479.0	977.5	channel sounding
10,231.1	10,419.4	495.4	978.0	channel sounding
10,223.0	10,433.7	511.8	978.2	channel sounding
10,214.8	10,447.9	528.2	978.6	channel sounding
10,206.7	10,462.1	544.6	979.1	channel sounding
10,182.2	10,504.8	593.9	978.3	channel sounding
10,174.1	10,519.1	610.3	978.8	channel sounding
10,165.9	10,533.3	626.7	978.8	channel sounding
10,157.8	10,547.5	643.1	978.0	channel sounding
10,149.6	10,561.8	659.5	978.7	channel sounding
10,141.5	10,576.0	675.9	979.1	channel sounding
10,133.3	10,590.3	692.3	978.9	channel sounding
10,125.2	10,604.5	708.7	978.0	channel sounding
10,117.0	10,618.7	725.1	972.7	channel sounding
10,108.9	10,633.0	741.5	969.1	channel sounding
10,100.7	10,647.2	757.9	969.0	channel sounding
10,092.6	10,661.4	774.3	972.0	channel sounding
10,084.4	10,675.7	790.7	976.3	channel sounding
10,079.5	10,684.2	800.6	980.1	channel sounding
10,048.5	10,714.5	842.3	980.9	right edge of water
10,047.4	10,720.0	847.6	982.1	toe of bank
10,047.0	10,721.8	849.4	986.5	rebar
10,044.6	10,726.7	854.8	987.1	bank
10,026.5	10,758.0	890.9	988.3	bank

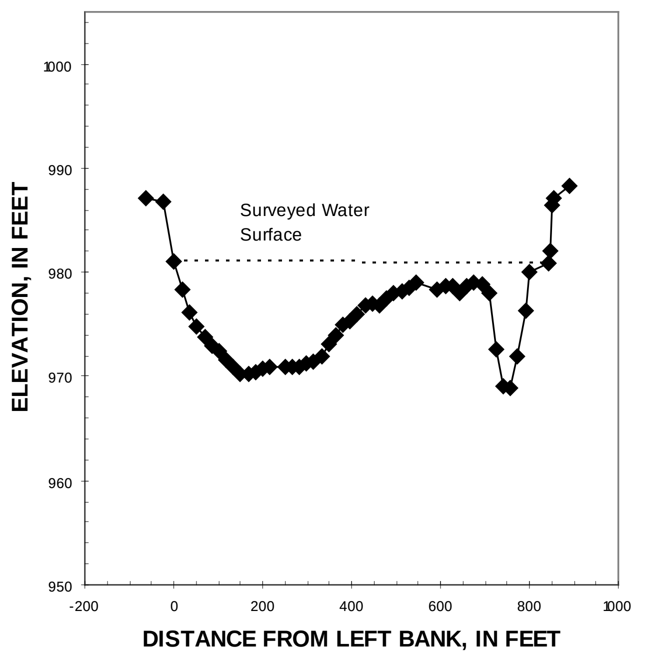


Table B4. Cross section Approach 4 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
10,171.1	9,803.9	-2,15.9	995.5	road shoulder
10,190.3	9,815.9	-1,93.3	988.6	base road embank
10,221.0	9,893.1	-1,10.2	989.4	parking lot
10,206.1	9,952.5	-49.0	989.7	bank
10,205.9	9,955.3	-46.5	986.8	bank
10,206.7	9,957.2	-45.3	987.5	rebar
10,207.4	9,959.9	-43.3	984.4	toe of bank
10,202.3	10,007.0	.0	980.9	left edge of water
10,167.3	10,021.2	29.9	978.4	channel sounding
10,159.0	10,035.4	46.3	976.6	channel sounding
10,150.8	10,049.5	62.7	975.5	channel sounding
10,142.5	10,063.7	79.1	973.9	channel sounding
10,142.5	10,063.7	79.1	973.9	channel sounding
10,134.2	10,077.9	95.5	972.7	channel sounding
10,126.0	10,092.1	111.9	972.1	channel sounding
10,117.7	10,106.2	128.3	971.9	channel sounding
10,109.4	10,120.4	144.7	971.6	channel sounding
10,101.2	10,134.6	161.1	971.3	channel sounding
10,092.9	10,148.8	177.5	971.5	channel sounding
10,084.7	10,162.9	193.9	971.3	channel sounding
10,076.4	10,177.1	210.3	970.7	channel sounding
10,068.1	10,191.3	226.8	970.5	channel sounding
10,059.9	10,205.4	243.2	970.7	channel sounding
10,051.6	10,219.6	259.6	971.1	channel sounding
10,043.3	10,233.8	276.0	971.3	channel sounding
10,035.1	10,248.0	292.4	971.1	channel sounding
10,026.8	10,262.1	308.8	971.2	channel sounding
10,018.6	10,276.3	325.2	971.1	channel sounding
10,010.3	10,290.5	341.6	971.2	channel sounding
10,002.0	10,304.6	358.0	971.6	channel sounding
9,993.8	10,318.8	374.4	972.6	channel sounding
9,985.5	10,333.0	390.8	973.3	channel sounding
9,977.2	10,347.2	407.2	974.2	channel sounding
9,969.0	10,361.3	423.6	974.8	channel sounding
9,960.7	10,375.5	440.0	973.5	channel sounding
9,952.5	10,389.7	456.4	974.9	channel sounding
9,944.2	10,403.9	472.8	975.2	channel sounding
9,935.9	10,418.0	489.2	975.5	channel sounding
9,927.7	10,432.2	505.6	976.2	channel sounding
9,919.4	10,446.4	522.0	977.0	channel sounding
9,911.1	10,460.5	538.4	977.2	channel sounding
9,902.9	10,474.7	554.9	976.8	channel sounding
9,894.6	10,488.9	571.3	975.9	channel sounding
9,886.4	10,503.1	587.7	975.1	channel sounding
9,869.8	10,531.4	620.5	974.9	channel sounding
9,853.3	10,559.7	653.3	973.9	channel sounding
9,845.0	10,573.9	669.7	973.7	channel sounding
9,836.8	10,588.1	686.1	974.9	channel sounding
9,828.5	10,602.3	702.5	975.5	channel sounding
9,820.3	10,616.4	718.9	975.9	channel sounding
9,807.0	10,639.1	745.1	980.1	channel sounding
9,774.0	10,695.8	810.8	979.9	channel sounding
9,770.3	10,702.1	818.0	980.9	right edge of water
9,768.5	10,706.3	822.6	982.9	bank
9,767.8	10,707.0	823.6	985.3	bank
9,767.8	10,709.9	826.1	985.9	rebar
9,735.5	10,773.9	897.6	988.0	on gravel pad

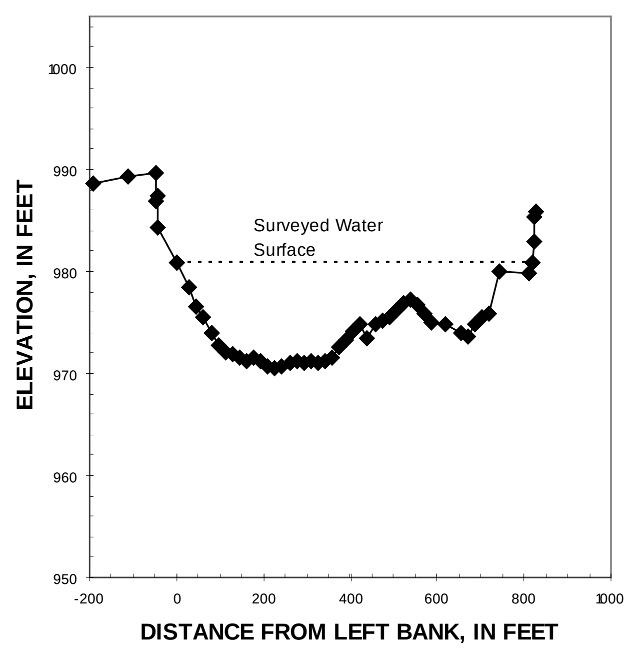


Table B5. Cross section Approach 5 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
10,136.9	9,963.9	-39.8	984.7	toe of bank
10,137.1	9,968.8	-35.9	984.6	rebar
10,134.3	10,010.1	.0	980.9	left edge of water
10,110.6	10,011.2	14.1	978.6	channel sounding
10,097.9	10,030.3	37.0	975.4	channel sounding
10,088.8	10,044.0	53.4	974.0	channel sounding
10,070.7	10,071.4	86.2	972.0	channel sounding
10,052.6	10,098.7	119.0	971.3	channel sounding
10,043.5	10,112.4	135.5	973.3	channel sounding
10,034.5	10,126.1	151.9	973.6	channel sounding
10,016.3	10,153.4	184.7	973.3	channel sounding
10,007.3	10,167.1	201.1	971.8	channel sounding
9,998.2	10,180.8	217.5	970.6	channel sounding
9,989.2	10,194.4	233.9	970.6	channel sounding
9,980.1	10,208.1	250.3	970.9	channel sounding
9,971.0	10,221.8	266.7	971.1	channel sounding
9,962.0	10,235.5	283.1	970.9	channel sounding
9,952.9	10,249.1	299.5	971.3	channel sounding
9,943.8	10,262.8	315.9	971.0	channel sounding
9,934.8	10,276.5	332.3	971.1	channel sounding
9,916.7	10,303.8	365.1	972.5	channel sounding
9,907.6	10,317.5	381.5	974.8	channel sounding
9,898.5	10,331.2	397.9	973.7	channel sounding
9,889.5	10,344.9	414.3	974.4	channel sounding
9,880.4	10,358.5	430.7	974.9	channel sounding
9,871.3	10,372.2	447.1	975.2	channel sounding
9,862.3	10,385.9	463.6	972.6	channel sounding
9,853.2	10,399.6	480.0	974.4	channel sounding
9,844.2	10,413.2	496.4	974.9	channel sounding
9,835.1	10,426.9	512.8	975.7	channel sounding
9,826.0	10,440.6	529.2	975.9	channel sounding
9,817.0	10,454.3	545.6	976.2	channel sounding
9,807.9	10,467.9	562.0	974.9	channel sounding
9,798.8	10,481.6	578.4	975.7	channel sounding
9,789.8	10,495.3	594.8	977.6	channel sounding
9,780.7	10,509.0	611.2	975.6	channel sounding
9,771.7	10,522.6	627.6	974.3	channel sounding
9,762.6	10,536.3	644.0	973.6	channel sounding
9,753.5	10,550.0	660.4	973.3	channel sounding
9,744.5	10,563.7	676.8	974.9	channel sounding
9,735.4	10,577.3	693.2	975.5	channel sounding
9,726.3	10,591.0	709.6	975.7	channel sounding
9,717.3	10,604.7	726.0	978.1	channel sounding
9,699.2	10,632.0	758.8	975.4	channel sounding
9,681.0	10,659.4	791.7	975.1	channel sounding
9,669.5	10,676.8	812.5	981.0	right edge of water
9,664.3	10,681.9	819.7	983.4	toe of bank
9,664.2	10,682.9	820.5	985.4	bank
9,657.9	10,691.9	831.6	985.5	bank

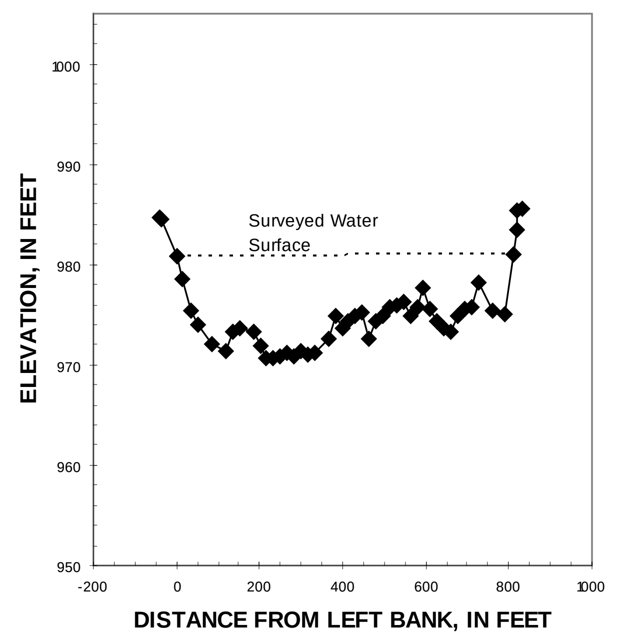


Table B6. Cross section Discharge Measurement at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-52.1	998.4	bank
10,029.6	10,038.301	-19.0	989.6	rebar
10,031.1	10,057.3	.0	981.1	left edge of water
10,031.9	10,067.1	9.8	975.1	channel sounding
10,034.6	10,099.8	42.7	970.6	channel sounding
10,037.3	10,132.5	75.5	972.0	channel sounding
10,039.9	10,165.2	108.3	970.6	channel sounding
10,042.6	10,197.9	141.1	969.9	channel sounding
10,044.5	10,220.8	164.0	970.4	channel sounding
10,046.4	10,243.7	187.0	970.4	channel sounding
10,048.2	10,266.5	210.0	970.2	channel sounding
10,050.1	10,289.4	233.0	972.7	channel sounding
10,052.0	10,312.3	255.9	972.2	channel sounding
10,053.8	10,335.2	278.9	972.9	channel sounding
10,056.5	10,367.9	311.7	974.1	channel sounding
10,059.2	10,400.6	344.5	975.4	channel sounding
10,061.9	10,433.3	377.3	976.3	channel sounding
10,065.3	10,475.8	420.0	977.6	channel sounding
10,069.3	10,524.9	469.2	977.6	channel sounding
10,073.4	10,573.9	518.4	976.6	channel sounding
10,076.0	10,606.6	551.2	968.6	channel sounding
10,081.4	10,672.0	616.8	969.6	channel sounding
10,085.4	10,721.1	666.0	981.1	right edge of water
10,086.2	10,730.6	675.6	988.4	rebar
–	–	741.2	988.3	estimated overbank
–	–	761.2	988.3	estimated overbank
–	–	773.2	999	extended up

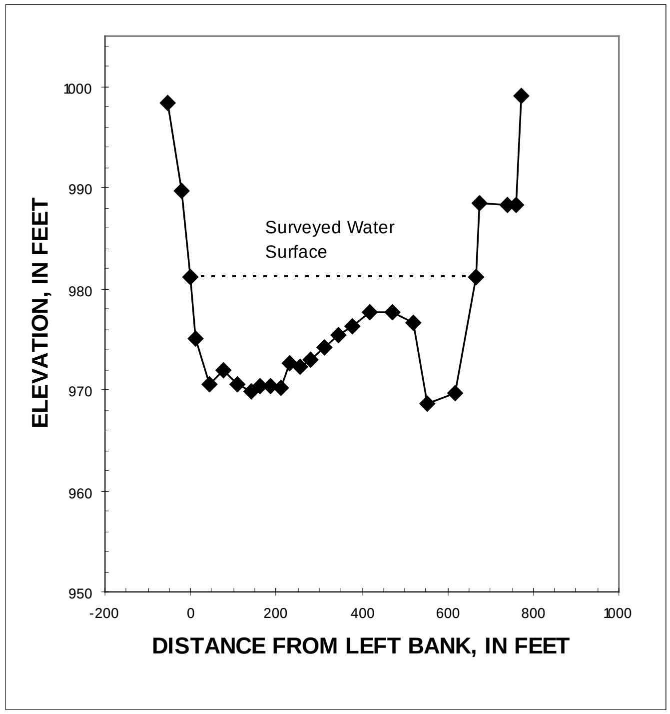


Table B7. Cross section Upstream Side Bridge at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-31.6	993.9	low steel
10,016.7	10,014.7	-31.5	993.1	bank
10,006.2	10,030.6	-12.5	989.8	bank
9,997.3	10,039.5	.0	981.1	left edge of water
9,989.5	10,050.1	13.1	975.6	channel sounding
9,979.7	10,063.3	29.5	973.3	channel sounding
9,970.0	10,076.5	45.9	972.1	channel sounding
9,960.2	10,089.7	62.3	969.6	channel sounding
9,950.5	10,102.9	78.7	972.1	channel sounding
9,940.7	10,116.1	95.1	975.4	channel sounding
9,931.0	10,129.3	111.6	974.8	channel sounding
9,921.3	10,142.5	128.0	974.9	channel sounding
9,911.5	10,155.7	144.4	974.1	channel sounding
9,901.8	10,168.9	160.8	971.1	channel sounding
9,892.0	10,182.1	177.2	970.9	channel sounding
9,882.3	10,195.2	193.6	970.4	channel sounding
9,872.5	10,208.4	210.0	970.7	channel sounding
9,862.8	10,221.6	226.4	971.0	channel sounding
9,853.0	10,234.8	242.8	970.5	channel sounding
9,843.3	10,248.0	259.2	970.3	channel sounding
9,833.5	10,261.2	275.6	970.0	channel sounding
9,823.8	10,274.4	292.0	971.2	channel sounding
9,814.0	10,287.6	308.4	972.5	channel sounding
9,804.3	10,300.8	324.8	972.4	channel sounding
9,794.6	10,314.0	341.2	970.1	channel sounding
9,784.8	10,327.2	357.6	970.0	channel sounding
9,775.1	10,340.4	374.0	971.6	channel sounding
9,765.3	10,353.6	390.4	972.4	channel sounding
9,755.6	10,366.8	406.8	973.1	channel sounding
9,745.8	10,380.0	423.2	973.1	channel sounding
9,736.1	10,393.2	439.7	972.8	channel sounding
9,726.3	10,406.4	456.1	973.4	channel sounding
9,716.6	10,419.6	472.5	973.8	channel sounding
9,706.8	10,432.8	488.9	972.3	channel sounding
9,697.1	10,446.0	505.3	975.0	channel sounding
9,687.4	10,459.2	521.7	977.1	channel sounding
9,677.6	10,472.4	538.1	976.4	channel sounding
9,667.9	10,485.6	554.5	974.8	channel sounding
9,658.1	10,498.8	570.9	974.6	channel sounding
9,648.4	10,512.0	587.3	972.3	channel sounding
9,628.9	10,538.3	620.1	973.9	channel sounding
9,619.1	10,551.5	636.5	977.8	channel sounding
9,609.4	10,564.7	652.9	977.6	channel sounding
9,599.6	10,577.9	669.3	976.5	channel sounding
9,589.9	10,591.1	685.7	974.3	channel sounding
9,580.1	10,604.3	702.1	976.4	channel sounding
9,574.3	10,612.2	712.0	981.1	right edge of water
9,571.3	10,615.4	716.3	983.4	bank
9,563.7	10,620.9	725.2	990.4	bank
9,554.2	10,636.2	743.2	995.6	bank
9,553.6	10,637.0	744.2	1,001.2	low steel

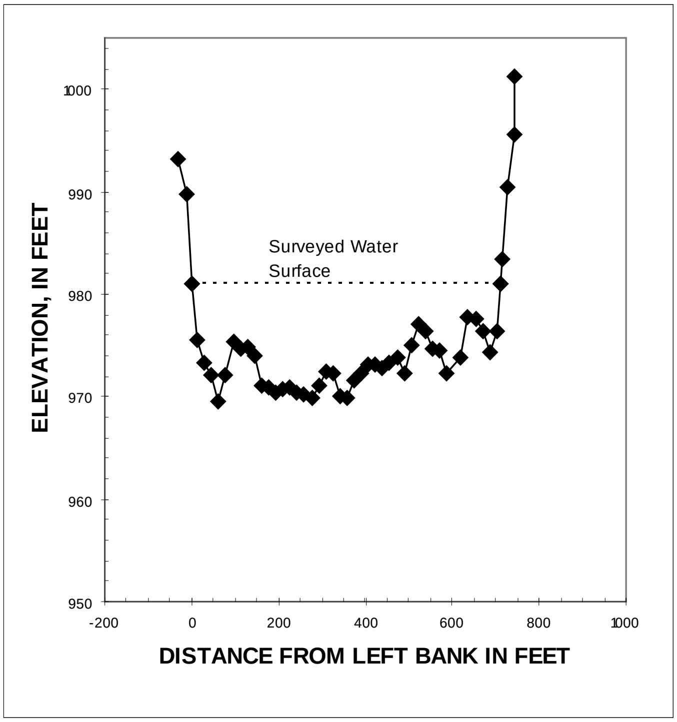


Table B8. Cross section Downstream Side Bridge at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
9,979.7	10,001.4	–	993.9	low steel
9,984.5	9,990.9	-33.1	993.1	bank
9,974.1	10,006.9	-14.1	989.8	bank
9,965.4	10,018.0	.0	980.8	left edge of water
9,942.7	10,049.8	39.1	972.8	channel sounding
9,931.0	10,065.6	58.8	967.1	channel sounding
9,927.1	10,070.9	65.3	968.2	channel sounding
9,913.4	10,089.4	88.3	971.8	channel sounding
9,903.7	10,102.6	104.7	973.5	channel sounding
9,893.9	10,115.7	121.1	975.4	channel sounding
9,884.2	10,128.9	137.5	973.2	channel sounding
9,878.3	10,136.9	147.3	971.8	channel sounding
9,872.5	10,144.8	157.2	968.7	channel sounding
9,858.8	10,163.3	180.1	968.9	channel sounding
9,845.2	10,181.7	203.1	963.6	channel sounding
9,835.4	10,194.9	219.5	964.3	channel sounding
9,825.7	10,208.1	235.9	965.8	channel sounding
9,821.8	10,213.4	242.5	965.0	channel sounding
9,810.1	10,229.2	262.2	964.4	channel sounding
9,806.2	10,234.5	268.7	966.8	channel sounding
9,796.5	10,247.7	285.1	971.9	channel sounding
9,786.7	10,260.9	301.5	972.6	channel sounding
9,777.0	10,274.1	318.0	973.9	channel sounding
9,755.5	10,303.1	354.0	963.3	channel sounding
9,753.6	10,305.8	357.3	973.6	channel sounding
9,738.0	10,326.9	383.6	974.8	channel sounding
9,728.2	10,340.1	400.0	972.5	channel sounding
9,718.5	10,353.3	416.4	972.2	channel sounding
9,708.8	10,366.5	432.8	971.1	channel sounding
9,699.0	10,379.7	449.2	971.3	channel sounding
9,689.3	10,392.9	465.6	971.3	channel sounding
9,679.5	10,406.1	482.0	972.1	channel sounding
9,669.8	10,419.3	498.4	972.7	channel sounding
9,660.0	10,432.5	514.8	971.0	channel sounding
9,650.3	10,445.7	531.2	974.3	channel sounding
9,640.5	10,458.8	547.6	973.8	channel sounding
9,630.8	10,472.0	564.0	972.7	channel sounding
9,621.0	10,485.2	580.4	969.5	channel sounding
9,611.3	10,498.4	596.8	964.8	channel sounding
9,601.5	10,511.6	613.2	964.4	channel sounding
9,591.8	10,524.8	629.6	964.8	channel sounding
9,582.1	10,538.0	646.1	971.9	channel sounding
9,574.4	10,548.3	658.9	981.1	right edge of water
9,563.8	10,557.4	672.4	988.3	bank
9,554.3	10,570.8	688.9	993.0	bank
9,522.1	10,613.6	742.5	998.9	bank

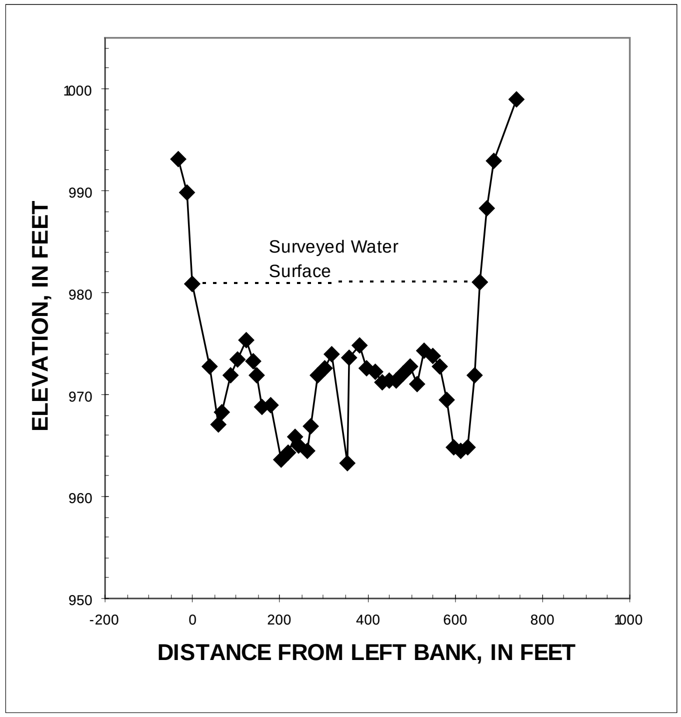


Table B9. Cross section Exit 1 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-6,020.0	1,020.0	extended up
–	–	-6,000.0	1,000.0	estimated delta
–	–	-84.0	982.8	estimated delta
9,725.6	9,963.9	-14.8	981.2	rebar
9,722.8	9,980.8	.0	980.3	left edge of water
9,696.0	9,999.7	31.6	980.1	channel sounding
9,683.5	10,014.8	51.3	976.5	channel sounding
9,673.1	10,027.5	67.7	975.7	channel sounding
9,662.6	10,040.1	84.1	973.8	channel sounding
9,652.2	10,052.8	100.5	973.5	channel sounding
9,641.7	10,065.4	116.9	973.9	channel sounding
9,631.3	10,078.1	133.3	974.6	channel sounding
9,620.8	10,090.7	149.7	971.9	channel sounding
9,610.4	10,103.3	166.1	965.7	channel sounding
9,599.9	10,116.0	182.5	963.2	channel sounding
9,589.5	10,128.6	198.9	960.2	channel sounding
9,579.0	10,141.3	215.3	957.8	channel sounding
9,558.1	10,166.6	248.1	955.8	channel sounding
9,547.7	10,179.2	264.5	957.8	channel sounding
9,537.2	10,191.9	280.9	958.2	channel sounding
9,526.8	10,204.5	297.3	964.2	channel sounding
9,516.3	10,217.2	313.7	967.3	channel sounding
9,505.9	10,229.8	330.2	970.9	channel sounding
9,495.4	10,242.5	346.6	973.8	channel sounding
9,485.0	10,255.1	363.0	976.8	channel sounding
9,478.7	10,262.7	372.8	976.6	channel sounding
9,467.9	10,280.6	393.4	980.6	right edge of water
9,463.8	10,280.6	396.1	982.5	rebar
9,449.4	10,285.2	408.8	994.4	bank
–	–	410.8	1,014.4	cliff face

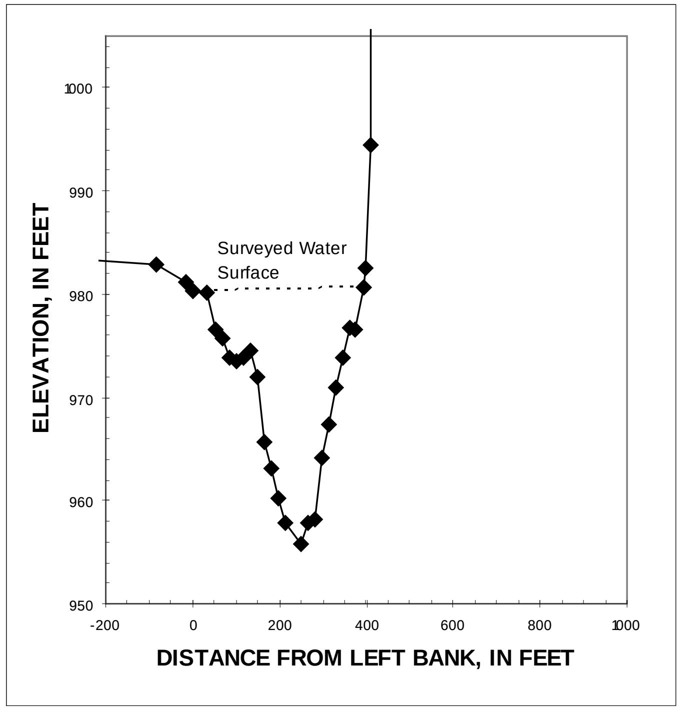


Table B10. Cross section Exit 2 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-6,020.0	1,020.0	extended up
–	–	-6,000.0	1,000.0	estimated delta
–	–	-84.0	982.8	estimated delta
9,474.6	9,803.0	-10.0	980.5	rebar
9,470.5	9,812.4	.0	980.1	left edge of water
9,470.2	9,822.1	9.5	976.6	channel sounding
9,466.6	9,837.5	25.4	975.4	channel sounding
9,463.0	9,853.0	41.3	975.7	channel sounding
9,459.4	9,868.5	57.2	975.9	channel sounding
9,455.8	9,884.0	73.1	976.1	channel sounding
9,452.2	9,899.4	89.0	977.7	channel sounding
9,448.6	9,914.9	104.8	977.2	channel sounding
9,445.0	9,930.4	120.7	977.3	channel sounding
9,442.9	9,939.7	130.3	977.7	channel sounding
9,437.8	9,961.3	152.5	968.5	channel sounding
9,434.2	9,976.8	168.4	967.2	channel sounding
9,427.0	10,007.7	200.2	959.9	channel sounding
9,423.4	10,023.2	216.0	955.8	channel sounding
9,419.8	10,038.7	231.9	950.7	channel sounding
9,416.2	10,054.2	247.8	948.9	channel sounding
9,412.7	10,069.6	263.7	948.7	channel sounding
9,409.1	10,085.1	279.6	957.7	channel sounding
9,407.6	10,091.3	285.9	961.2	channel sounding
9,405.5	10,100.6	295.5	965.5	channel sounding
9,401.9	10,116.1	311.4	968.3	channel sounding
9,399.7	10,125.3	320.9	971.2	channel sounding
9,396.1	10,140.8	336.8	979.5	right edge of water
9,394.9	10,146.0	342.1	981.7	rebar
9,386.5	10,154.7	352.5	987.5	bank
–	–	354.5	1,007.5	cliff face

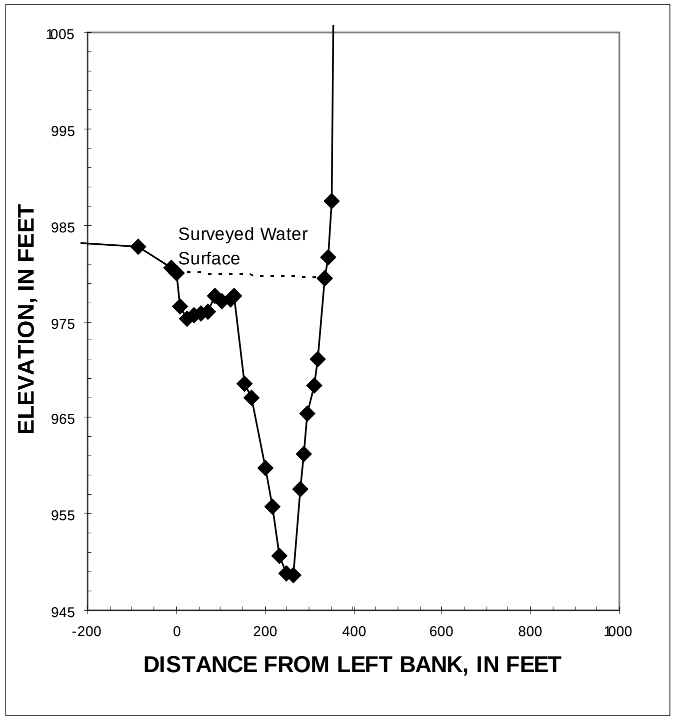


Table B11. Cross section Exit 3 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-6,020.0	1,020.0	extended up
–	–	-6,000.0	1,000.0	estimated delta
–	–	-81.8	983.1	estimated delta
9,474.6	9,803.0	-12.6	981.5	rebar
9,470.5	9,812.4	-3.1	980.1	toe of bank
9,470.2	9,822.1	.0	979.2	left edge of water
9,466.6	9,837.5	22.7	979.0	channel sounding
9,463.0	9,853.0	39.1	972.6	channel sounding
9,459.4	9,868.5	55.5	969.4	channel sounding
9,455.8	9,884.0	71.9	968.2	channel sounding
9,452.2	9,899.4	88.4	967.7	channel sounding
9,448.6	9,914.9	104.8	967.9	channel sounding
9,445.0	9,930.4	121.2	969.1	channel sounding
9,442.9	9,939.7	137.6	968.8	channel sounding
9,437.8	9,961.3	154.0	968.2	channel sounding
9,434.2	9,976.8	170.4	967.3	channel sounding
9,427.0	10,007.7	186.8	966.5	channel sounding
9,423.4	10,023.2	203.2	965.5	channel sounding
9,419.8	10,038.7	219.6	964.3	channel sounding
9,416.2	10,054.2	236.0	962.5	channel sounding
9,412.7	10,069.6	252.4	959.3	channel sounding
9,409.1	10,085.1	268.8	958.6	channel sounding
9,407.6	10,091.3	285.2	966.5	channel sounding
9,405.5	10,100.6	301.6	975.1	channel sounding
9,401.9	10,116.1	324.3	979.3	right edge of water
9,399.7	10,125.3	326.8	980.2	toe of bank
9,396.1	10,140.8	330.5	984.3	rebar
9,394.9	10,146.0	333.5	987.3	estimated bank
–	–	335.5	1,007.3	cliff face

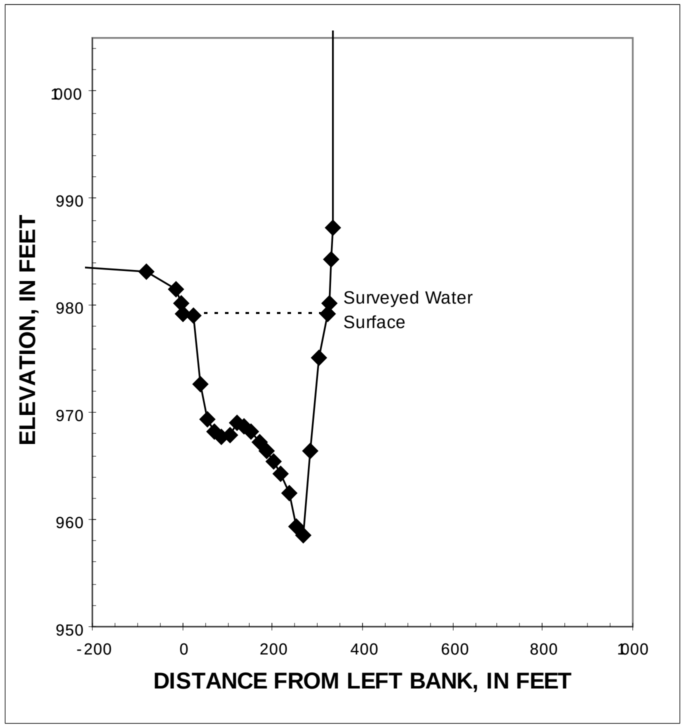


Table B12. Cross section Exit 4 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-6,020.0	1,020.0	extended up
–	–	-6,000.0	1,000.0	estimated delta
8,391.010	9,525.970	-76.1	982.6	delta
8,405.1	9,593.7	-6.9	981.0	rebar
8,406.4	9,600.5	.0	979.7	left edge of water
8,409.1	9,613.3	13.1	978.3	channel sounding
8,415.1	9,642.2	42.7	977.6	channel sounding
8,421.8	9,674.4	75.5	965.7	channel sounding
8,428.5	9,706.5	108.3	962.2	channel sounding
8,435.1	9,738.6	141.1	962.7	channel sounding
8,441.8	9,770.7	173.9	962.7	channel sounding
8,448.5	9,802.8	206.7	962.9	channel sounding
8,455.2	9,835.0	239.5	963.8	channel sounding
8,461.8	9,867.1	272.3	965.9	channel sounding
8,469.8	9,905.6	311.7	966.1	channel sounding
8,475.8	9,934.6	341.2	979.7	right edge of water
–	–	346.2	984.7	estimated bank
–	–	348.2	1,004.7	cliff face

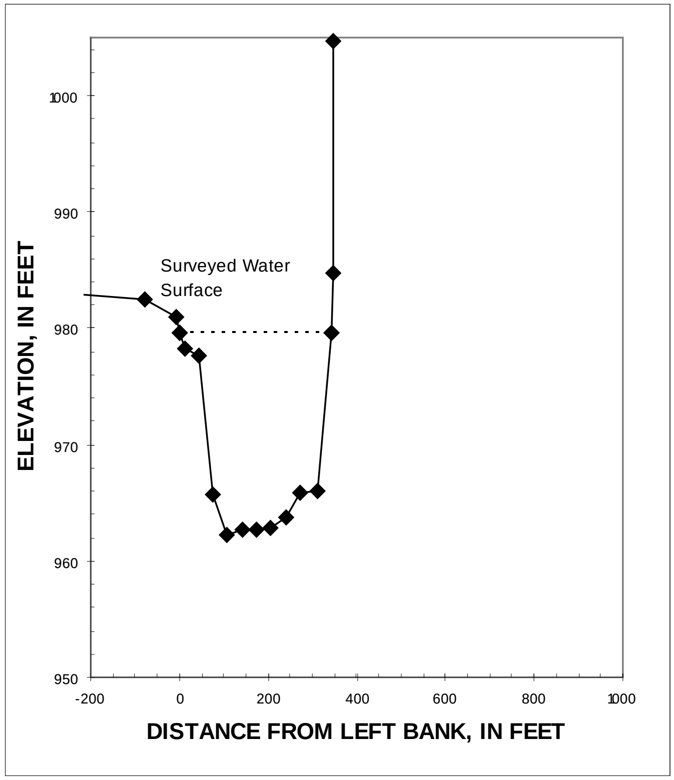


Table B13. Cross section Slough 1 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-2,50.3	1,001.2	estimated overbank
–	–	-2,35.3	986.2	estimated overbank
10,376.434	11,291.563	-35.3	986.2	bank
10,370.0	11,296.0	-27.7	985.5	rebar
10,361.8	11,301.0	-18.2	982.9	toe of bank
10,344.7	11,307.1	.0	980.8	left edge of water
10,337.1	11,310.4	8.2	978.8	channel sounding
10,331.1	11,313.0	14.8	976.3	channel sounding
10,325.1	11,315.6	21.3	975.7	channel sounding
10,319.0	11,318.2	27.9	975.1	channel sounding
10,313.0	11,320.7	34.5	974.5	channel sounding
10,307.0	11,323.3	41.0	973.9	channel sounding
10,301.0	11,325.9	47.6	973.0	channel sounding
10,294.9	11,328.5	54.1	972.8	channel sounding
10,288.9	11,331.1	60.7	972.0	channel sounding
10,282.9	11,333.7	67.3	971.6	channel sounding
10,276.8	11,336.3	73.8	970.9	channel sounding
10,270.8	11,338.9	80.4	970.4	channel sounding
10,264.8	11,341.5	87.0	970.4	channel sounding
10,258.8	11,344.1	93.5	970.4	channel sounding
10,252.7	11,346.7	100.1	971.1	channel sounding
10,246.7	11,349.2	106.6	971.5	channel sounding
10,240.7	11,351.8	113.2	973.0	channel sounding
10,234.6	11,354.4	119.8	974.5	channel sounding
10,228.6	11,357.0	126.3	976.6	channel sounding
10,216.6	11,362.2	139.5	980.8	right edge of water
10,212.8	11,363.5	143.4	988.4	rebar
–	–	243.4	988.4	estimated overbank
–	–	258.4	1,003.4	estimated overbank

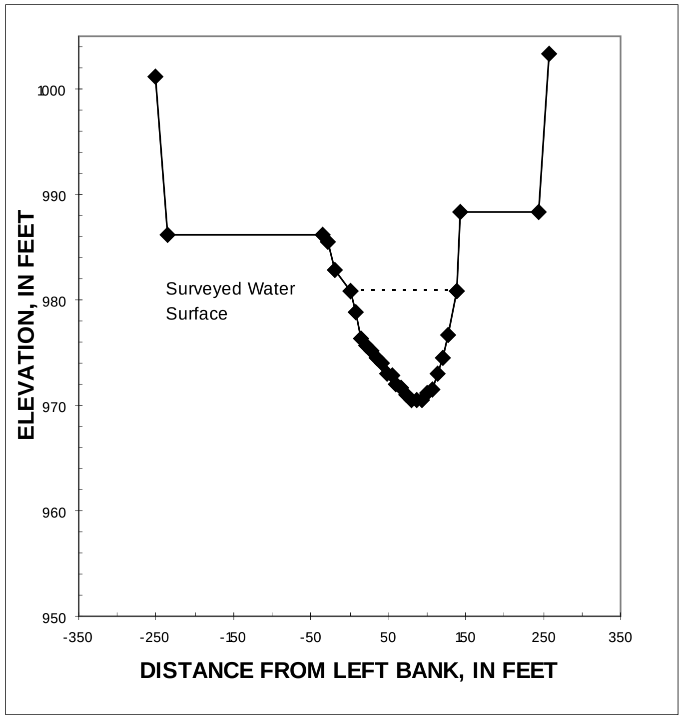


Table B14. Cross section Slough 2 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-2,26.0	1,001.1	estimated overbank
–	–	-2,11.0	986.1	estimated overbank
10,302.530	11,121.440	-11.0	986.1	bank
10,298.1	11,121.7	-6.7	984.6	rebar
10,291.5	11,121.9	.0	980.8	left edge of water
10,288.2	11,122.1	3.3	979.0	channel sounding
10,262.0	11,123.6	29.5	974.1	channel sounding
10,245.6	11,124.5	45.9	973.6	channel sounding
10,229.3	11,125.4	62.3	972.6	channel sounding
10,212.9	11,126.3	78.7	970.2	channel sounding
10,196.5	11,127.3	95.1	969.3	channel sounding
10,180.1	11,128.2	111.6	969.4	channel sounding
10,163.7	11,129.1	128.0	977.1	channel sounding
10,159.1	11,128.8	132.6	980.8	right edge of water
10,153.8	11,129.7	137.9	986.2	rebar
–	–	237.9	986.2	estimated overbank
–	–	252.9	1,001.2	estimated overbank

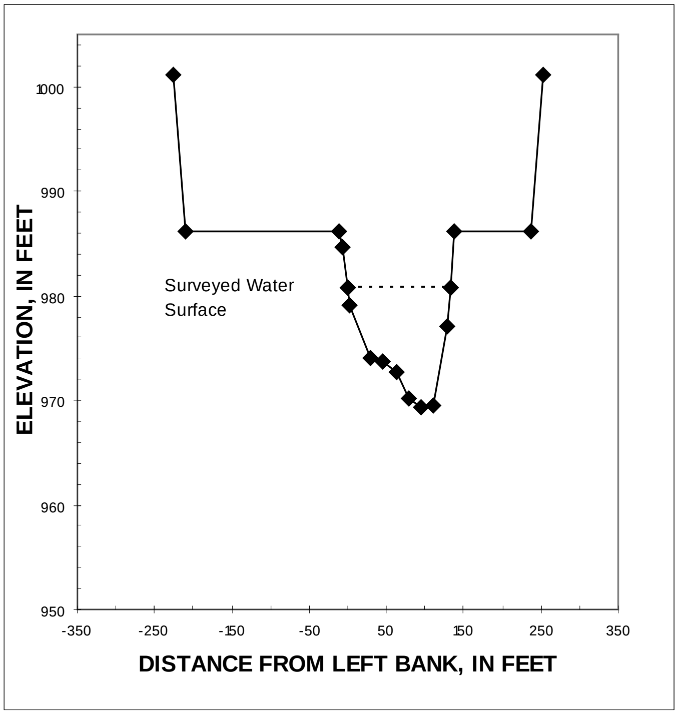


Table B15. Cross section Slough 3 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-2,28.3	999.7	estimated overbank
–	–	-2,13.3	984.7	estimated overbank
10,278.7	10,925.2	-13.3	984.7	rebar
10,265.4	10,925.3	.0	981.1	left edge of water
10,260.3	10,924.4	5.2	979.1	channel sounding
10,250.5	10,923.9	15.0	978.1	channel sounding
10,243.9	10,923.6	21.6	977.1	channel sounding
10,237.4	10,923.2	28.1	975.7	channel sounding
10,230.8	10,922.9	34.7	975.2	channel sounding
10,224.2	10,922.5	41.3	973.9	channel sounding
10,211.1	10,921.8	54.4	972.0	channel sounding
10,204.6	10,921.5	60.9	971.3	channel sounding
10,198.0	10,921.2	67.5	970.9	channel sounding
10,191.5	10,920.8	74.1	970.9	channel sounding
10,184.9	10,920.5	80.6	970.3	channel sounding
10,178.4	10,920.1	87.2	969.8	channel sounding
10,171.8	10,919.8	93.7	969.6	channel sounding
10,165.3	10,919.4	100.3	969.1	channel sounding
10,158.7	10,919.1	106.9	969.0	channel sounding
10,152.2	10,918.8	113.4	969.3	channel sounding
10,145.6	10,918.4	120.0	975.6	channel sounding
10,135.8	10,917.9	129.8	979.0	channel sounding
10,133.9	10,917.8	131.7	981.0	right edge of water
10,127.8	10,917.3	137.9	985.7	rebar
10,093.1	10,925.1	173.4	999.9	bank

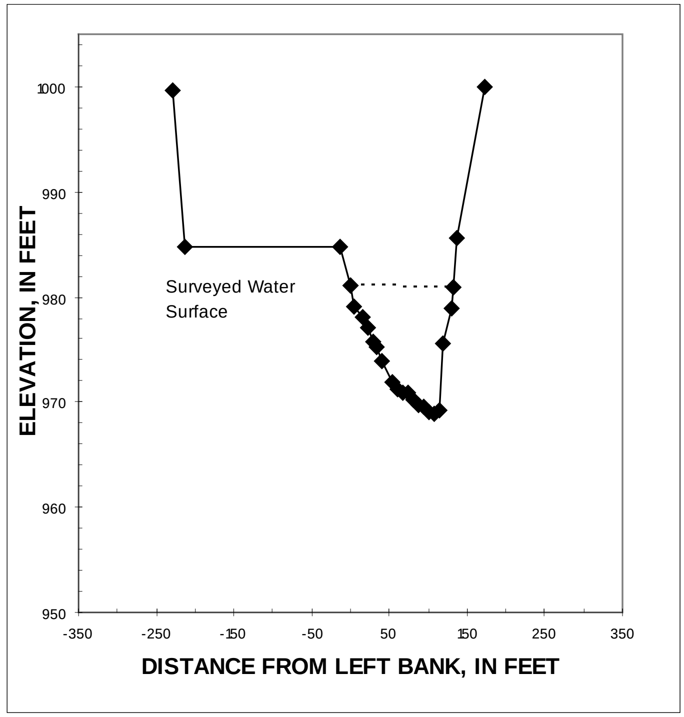


Table B16. Cross section Slough 4 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-324.6	1,001.4	estimated overbank
–	–	-309.6	986.4	estimated overbank
10,361.7	10,730.1	-109.6	986.4	bank
10,299.3	10,721.3	-46.6	985.7	rebar
10,287.5	10,721.8	-34.8	983.9	toe of bank
10,252.7	10,722.1	.0	981.0	left edge of water
10,246.2	10,722.2	6.6	977.6	channel sounding
10,233.1	10,722.2	19.7	974.9	channel sounding
10,223.2	10,722.2	29.5	972.5	channel sounding
10,216.7	10,722.2	36.1	972.9	channel sounding
10,206.8	10,722.2	45.9	972.6	channel sounding
10,200.2	10,722.3	52.5	972.3	channel sounding
10,187.1	10,722.3	65.6	972.6	channel sounding
10,180.6	10,722.3	72.2	972.6	channel sounding
10,167.4	10,722.3	85.3	972.5	channel sounding
10,164.2	10,722.3	88.6	972.3	channel sounding
10,151.0	10,722.4	101.7	971.9	channel sounding
10,141.2	10,722.4	111.6	971.7	channel sounding
10,134.6	10,722.4	118.1	972.2	channel sounding
10,128.1	10,722.4	124.7	973.0	channel sounding
10,118.2	10,722.4	134.5	973.9	channel sounding
10,114.9	10,722.4	137.8	975.5	channel sounding
10,108.4	10,722.5	144.4	975.9	right edge of water
10,101.8	10,722.5	150.9	981.0	right edge of water
10,047.0	10,721.8	205.8	986.0	rebar
10,044.6	10,726.7	211.2	987.1	bank
10,026.5	10,758.0	247.3	988.3	bank
–	–	267.3	988.3	estimated overbank
–	–	279.3	1,000.3	estimated overbank

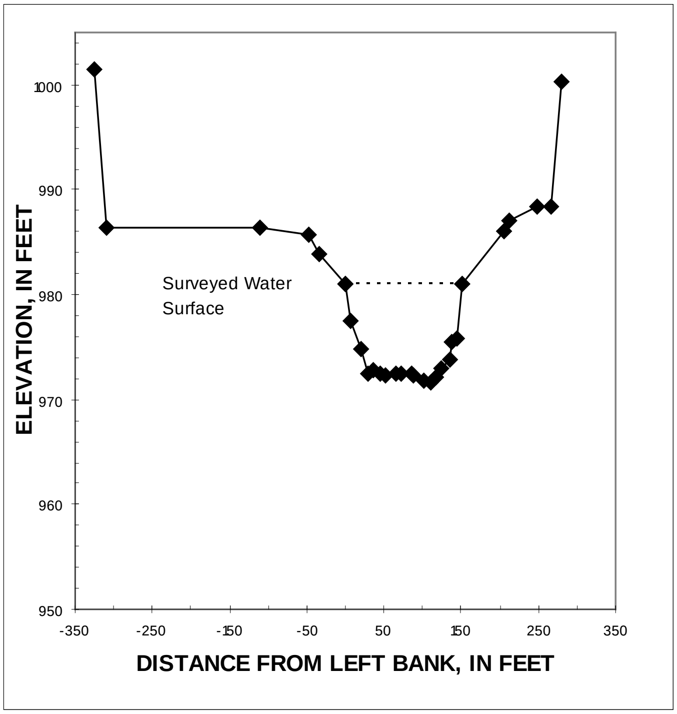


Table B17. Cross section Approach 8000 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-32.8	45.8	bank
–	–	0.0	40.3	left edge of water
–	–	16.4	37.3	channel sounding
–	–	32.8	32.8	channel sounding
–	–	49.2	34.0	channel sounding
–	–	65.6	34.2	channel sounding
–	–	82.0	37.6	channel sounding
–	–	98.4	36.8	channel sounding
–	–	114.8	35.7	channel sounding
–	–	131.2	34.6	channel sounding
–	–	147.6	31.6	channel sounding
–	–	164.0	32.5	channel sounding
–	–	180.4	29.6	channel sounding
–	–	196.8	30.0	channel sounding
–	–	213.2	31.7	channel sounding
–	–	229.6	31.5	channel sounding
–	–	246.0	31.9	channel sounding
–	–	262.4	31.8	channel sounding
–	–	278.8	31.5	channel sounding
–	–	295.2	31.4	channel sounding
–	–	311.6	31.7	channel sounding
–	–	328.0	31.7	channel sounding
–	–	344.4	31.7	channel sounding
–	–	360.8	31.5	channel sounding
–	–	377.2	31.6	channel sounding
–	–	393.6	31.5	channel sounding
–	–	410.0	31.4	channel sounding
–	–	426.4	31.1	channel sounding
–	–	442.8	31.2	channel sounding
–	–	459.2	31.1	channel sounding
–	–	475.6	31.5	channel sounding
–	–	492.0	32.3	channel sounding
–	–	508.4	33.1	channel sounding
–	–	524.8	33.7	channel sounding
–	–	541.2	34.1	channel sounding
–	–	557.6	34.6	channel sounding
–	–	574.0	35.0	channel sounding
–	–	590.4	35.3	channel sounding
–	–	606.8	34.2	channel sounding

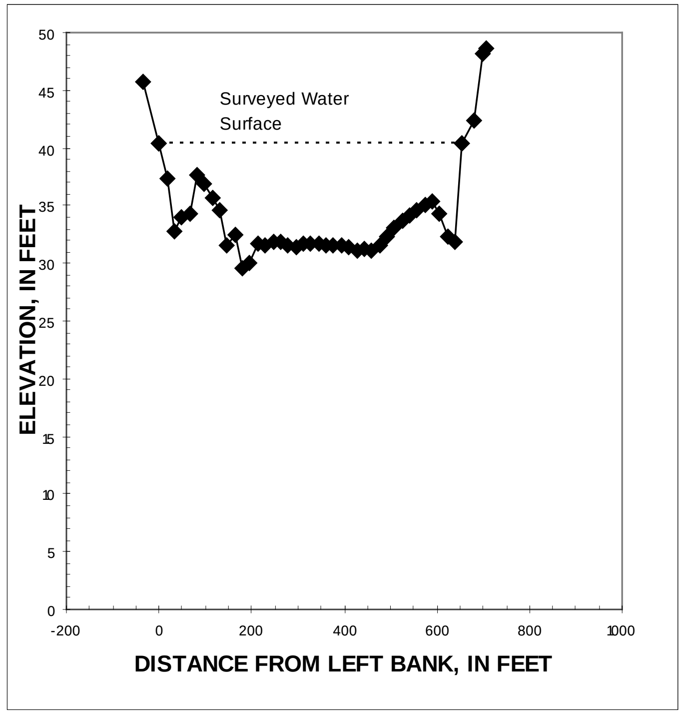
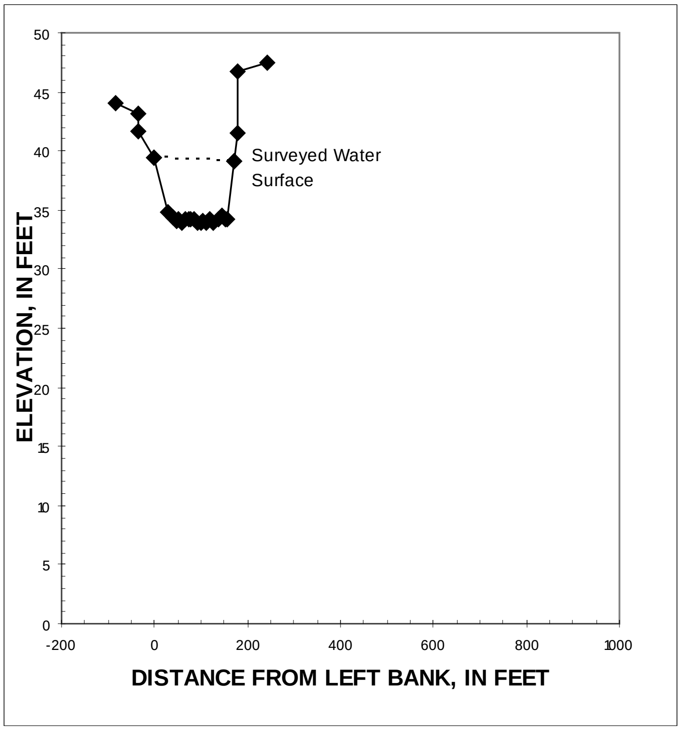


Table B18. Cross section Slough 8000 at the Tanana River at Big Delta.

[Points surveyed August 27, 1996. See figure 2 for location. See text for coordinate information; ft, foot]

Easting (ft)	Northing (ft)	Station (ft)	Elevation (ft)	Notes
–	–	-85.3	44.1	bank
–	–	-36.1	43.1	bank
–	–	-34.5	41.6	bank
–	–	.0	39.4	left edge of water
–	–	29.5	34.8	channel sounding
–	–	39.4	34.4	channel sounding
–	–	45.9	34.1	channel sounding
–	–	52.5	34.3	channel sounding
–	–	59.1	34.0	channel sounding
–	–	65.6	34.2	channel sounding
–	–	72.2	34.2	channel sounding
–	–	78.7	34.3	channel sounding
–	–	85.3	34.3	channel sounding
–	–	91.9	34.0	channel sounding
–	–	98.4	33.9	channel sounding
–	–	105.0	34.1	channel sounding
–	–	111.6	34.0	channel sounding
–	–	118.1	34.2	channel sounding
–	–	124.7	33.9	channel sounding
–	–	137.8	34.3	channel sounding
–	–	144.4	34.5	channel sounding
–	–	150.9	34.2	channel sounding
–	–	157.5	34.3	channel sounding
–	–	170.6	39.2	right edge of water
–	–	177.2	41.5	bank
–	–	180.5	46.8	bank
–	–	242.8	47.5	bank



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