BSDMS Summary Report

6 Tanana River at S.R. 3 at Nenana, AK

Site Location:

Site ID: 6

Site Name: Tanana River at S.R. 3 at Nenana, AK

County: Town of Nenana

Nearest City: Nenana

State: AK

Latitude: 645000

Longitude: 1484000

USGS Station ID:

Route Number: 3

Route Class: State

Service Level: Mainline

Route Direction: NA

Highway Mile Point:

Stream Name: Tanana River

River Mile:

Contact:
U.S. Geological Survey, Water Resources Division
218 E Street, Skyline Building
Anchorage, AK 99501

Publication:
U.S. Geological Survey
Water-Resources Investigations 32-75
Scour at Selected Bridge Sites in Alaska
By Vernon W. Norman
November 1975

Site Description:

This study site is located at bridge 202, which crosses the Tanana River at the town of Nenana on the Anchorage-Fairbanks Highway. The principal bridge consists of two 500-ft overhead-truss spans supported in the center by a single pier. Not all of the flow of the Tanana River passes beneath this main bridge because a bridged side channel conveys water at high flows. The drainage area of the Tanana River upstream from Nenana is approximately 25,600 square miles, a small part of which is covered by glaciers.
The Nenana River enters the Tanana River about 200 ft downstream from the bridge. Upstream and downstream from the site, the Tanana River exhibits a meandering pattern. About 1 mile upstream from the bridge, a rock bluff resists a northward migration of the river and forces it into a channel extending in a west-southwestward direction. About 2,000 ft downstream from the bridge, the river again turns to the north around the western end of low-lying hills. The bridge is located at a crossover of the river channel. Crossovers on a meandering channel usually are characterized by scouring during low and medium flow and filling during high flows. At the bridge, the left or south bank has been stabilized by vertical bulkheads which form a loading dock for commercial rail and barge operations. Particle-size analyses of streambed material show that it is comprised of sand and gravel.
Streamflow-gaging records have been maintained at Nenana since 1962. The mean-annual and 50-year floods are approximately 84,000 cfs and 168,000 cfs, respectively.
The measurements included in this study were made in 1967. The maximum

discharge was 174,000 cfs.

Elevation Reference

Datum: Gage

MSL (ft):

Description of Reference Elevation:

Stream Data

Drainage Area (sq mi):	25600	**Floodplain Width:**	Narrow
Slope in Vicinity(ft/ft):	0.00015	**Natural Levees:**	Concave
Flow Impact:	Straight	**Apparent Incision:**	Apparent
Channel Evolution	Restabilization	**Channel Boundary:**	Non-alluvial
Armoring:	Partial	**Banks Tree Cover:**	High
Debris Frequency:	Unknown	**Sinuosity:**	Unknown
Debris Effect:	Unknown	**Braiding:**	Generally
Stream Size:	Unknown	**Anabranching:**	Generally
Flow Habit:	Unknown	**Bars:**	Wide
Bed Material:	Unknown	**Stream Width Variability:**	Wider
Valley Setting:	None		

Roughness Data

Manning's n Values

	Left Overbank	Channel	Right Overbank
High:			
Typical			
Low:			

BSDMS Summary Report

6 Tanana River at S.R. 3 at Nenana, AK

Bed Material

Measurement Number	Yr	Mo	Dy	Sampler	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)	SP	Shape	Cohesion
1	1967	7	28	Unknown	0.32	0.3	0.18	0.13	2.65		Unknown
2	1967	7	28	Unknown	19	14	9	6	2.65		Unknown
3	1967	7	28	Unknown	23	19	15	12	2.65		Unknown

Bed Material Comments

Measurement No: 1

Sample collected 1000 ft upstream in the left half of the channel. Only the D90=0.28 and D50=0.18 were reported with the data. The D95, D84, and D16 were computed from the provided data. The D84 was interpolated from the D90 and D50 using a log-probability interpolation. Sigma was computed as D84/D50. D95 and D16 were computed from the equation D50 * Sigma^(standard normal deviate of 95 or 16).

Measurement No: 2

Sample collected 1000 ft upstream in the right half of the channel. Only the D90=16 and D50=9 were reported with the data. The D95, D84, and D16 were computed from the provided data. The D84 was interpolated from the D90 and D50 using a log-probability interpolation. Sigma was computed as D84/D50. D95 and D16 were computed from the equation D50 * Sigma^(standard normal deviate of 95 or 16).

Measurement No: 3

Sample collected 50 ft upstream from pier. Only the D90=21 and D50=15 were reported with the data. The D95, D84, and D16 were computed from the provided data. The D84 was interpolated from the D90 and D50 using a log-probability interpolation. Sigma was computed as D84/D50. D95 and D16 were computed from the equation D50 * Sigma^(standard normal deviate of 95 or 16).

Bridge Data

Structure No: 202

Length(ft): 1000

Width(ft):

Number of Spans: 2

Vertical Configuration: Unknown

Low Chord Elev (ft):

Upper Chord Elev (ft):

Overtopping Elev (ft):

BSDMS Summary Report

6 Tanana River at S.R. 3 at Nenana, AK

Skew (degrees): 10

Guide Banks: Unknown

Waterway Classification: Main

Year Built:

Avg Daily Traffic:

Plans on File: No

Parallel Bridges No

Upstream/Downstream: N/A

Continuous Abutment: No

Distance Between Centerlines:

Distance Between Pier Faces:

Bridge Description:

This bridge consists of two 500-ft overhead-truss spans supported in the center by a single pier. At high flows the pier is approximately parallel with the direction of the current at the water surface, but at low flows, the pier is skewed at an angle of 10 degrees to the flow. Not all of the flow of the Tanana River passes beneath this main bridge because a bridged side channel conveys water at high flows.

Abutment Data

Left Station: 0

Right Station: 0

Left Skew (deg): 0

Right Skew (deg) 0

Left Abutment Length (ft):

Right Abutment Length (ft)

Left Abutment to Channel Bank (ft):

Right Abutment to Channel Bank (ft):

Left Abutment Protection:

Right Abutment Protection

Contracted Opening Type: Unknown

BSDMS Summary Report

6 Tanana River at S.R. 3 at Nenana, AK

Embankment Skew (deg): 0

Embankment Slope (ft/ft):

Abutment Slope (ft/ft)

Wingwalls: No

Wingwall Angle (deg): 0

Pier Data

Pier ID	Bridge Station(ft)	Alignment	Highway Station	PierType	# Of Piles	Pile Spacing(ft)
1	600	0	0	Group	2	39.4

Pier ID	Pier Width(ft)	Pier Shape	Shape Factor	Length(ft)	Protection	Foundation
1	10	Sharp		48	Unknown	Piles

Pier ID	Top Elevation(ft)	Bottom Elevation(ft)	Foot or Pile Cap Width(ft)	Cap Shape	Pile Tip Elevation(ft)
1	-3	-30	14	Round	

Pier Description

Pier ID 1

This pier varies from a 14-ft-wide round-nosed stem at the foundation to two 6-ft-diameter columns supporting the pier cap. These are separated by a pointed 10-ft-wide stem with an extreme positive rake designed to resist ice forces. Pier is approx. parallel with high flows but skewed 10 deg. at low.

Pier Scour Data

Pier ID	Date	Time	USOrDS
1	8/17/67	0:00	Downstream

Pier ID	Scour Depth	Accuracy (ft)	Side Slope (ft/ft)	TopWidth (ft)	Apprch Vel (ft/s)	Apprch Depth(ft)	Effective Pier Width	Skew to Flow(deg)
1	6	0.5			8.5	22	10	0

PierID	Sediment Transport	Bed Material	BedForm	Trough (ft)	Crest (ft)	Sigma	Debris Effects
1	Live-bed	Non-cohesive	Dune			1.3	Moderate

BSDMS Summary Report

6 Tanana River at S.R. 3 at Nenana, AK

PierID	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)
1	23	19	15	12

Pier Scour Comments

Pier ID 1 **Time:** 0:00 **US/DS:** Downstream

Longitudinal profiles of the streambed beside the pier were obtained using the boat and fathometer. Debris on the pier nose prevented the boat from getting closer than 10 ft. A significant change in profile shape between two measurements on July 28 & 30 indicate a shift in angle of attack from < 5 deg to > 5.

Abutment Scour

ContractionScour

Stage and Discharge Data

Peak Discharge					Flow		Peak Stage					Stage	Water	Return
year	mo	dy	hr	mi	(cfs)	Qacc	year	mo	dy	hr	mi	(ft)	Temp (C)	Period(yr)
1967	10	11		0	19300	none	1967	10	11		0	4.1		
1967	8	17		0	156000	none	1967	8	17		0	18.4		100

1967	7	28	0	123000	none	1967	7	28	0	15	
1967	7	27	0	117000	none	1967	7	27	0	14.8	
1967	7	24	0	93900	none	1967	7	24	0	12.2	

Hydrograph

Hydrograph Number	Year	Month	Day	Hr	Min	Sec	Stage(ft)	Discharge (cfs)
1	1967	7	1	0	0	0	9.7	
1	1967	7	3	0	0	0	8.7	
1	1967	7	8	0	0	0	8.3	
1	1967	7	11	0	0	0	9.2	
1	1967	7	14	0	0	0	8.9	
1	1967	7	18	0	0	0	9.3	
1	1967	7	20	0	0	0	9.2	
1	1967	7	25	0	0	0	14	
1	1967	7	26	0	0	0	14.7	
1	1967	7	28	0	0	0	15	
1	1967	8	1	0	0	0	12.2	
1	1967	8	7	0	0	0	10.1	
1	1967	8	11	0	0	0	10.6	
1	1967	8	16	0	0	0	17.5	
1	1967	8	17	0	0	0	19	
1	1967	8	22	0	0	0	14	
1	1967	9	2	0	0	0	8.5	
1	1967	9	3	0	0	0	8.55	
1	1967	9	5	0	0	0	8.1	
1	1967	9	7	0	0	0	7.9	
1	1967	9	24	0	0	0	5.5	
1	1967	9	30	0	0	0	5.2	
2	1967	7	1	0	0	0		58000
2	1967	7	3	0	0	0		49000
2	1967	7	8	0	0	0		45000
2	1967	7	11	0	0	0		54000

2	1967	7	14	0	0	0	50000
2	1967	7	18	0	0	0	55000
2	1967	7	20	0	0	0	52500
2	1967	7	25	0	0	0	110000
2	1967	7	26	0	0	0	112000
2	1967	7	28	0	0	0	117000
2	1967	8	1	0	0	0	90000
2	1967	8	7	0	0	0	70000
2	1967	8	11	0	0	0	75000
2	1967	8	16	0	0	0	170000
2	1967	8	17	0	0	0	193000
2	1967	8	22	0	0	0	107000
2	1967	9	2	0	0	0	56000
2	1967	9	3	0	0	0	57000
2	1967	9	5	0	0	0	51000
2	1967	9	7	0	0	0	50000
2	1967	9	24	0	0	0	30000
2	1967	9	30	0	0	0	28000

Supporting Files