Appendix B

Calculations

Surface Water Discharge Calculations

PROJECT NO. 5704-05 SHEET 1 OF 2
PROJECT NAME DEP STREAM STUDY SUBJECT SURFACE WATER
PREPARED BY RDB DATE 8/31/01 DISCHARGE CALCULATIONS
CHECKED BY CRY DATE 9/21/01 MINED SEGMENT

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$Q = V \cdot A$

WHERE: Q = DISCHARGE VOLUME (ft^3/s)

V = VELOCITY (ft/s) - FIELD MEASURED

A = CROSS SECTIONAL AREA OF WETTED CHANNEL (ft^2)

* SURFACE WATER VELOCITY, WATER DEPTH AND WIDTH OF WETTED CHANNEL MEASUREMENTS PERFORMED ON AUGUST 9, 2001.

TRANSECT

A-A' $A = 72\ ft^2$
$V = <0.1\ ft/s$
$Q = <0.1\ ft/s \cdot 72\ ft^2$
$Q = <7.2\ ft^3/s$

B-B' $A = 5.5\ ft^2$
$V = 1.05\ ft/s$
$Q = 1.05\ ft/s \cdot 5.5\ ft^2$
$Q = 5.8\ ft^3/s$

C-C' $A = 6.5\ ft^2$
$V = 0.46\ ft/s$
$Q = 0.46\ ft/s \cdot 6.5\ ft^2$
$Q = 3.0\ ft^3/s$

D-D' $A = 15.5\ ft^2$
$V = <0.1\ ft/s$
$Q = <0.1\ ft/s \cdot 15.5\ ft^2$
$Q = <1.6\ ft^3/s$

E-E' $A = 5.5\ ft^2$
$V = 5'/2.5\ MIN = 2'/MIN = 0.03\ ft/s$
$Q = 0.03\ ft/s \cdot 5.5\ ft^2$
$Q = 0.2\ ft^3/s$

F-F' $A = 3.5\ ft^2$
$V = 0.70\ ft/s$
$Q = 0.70\ ft/s \cdot 3.5\ ft^2$
$Q = 2.5\ ft^3/s$

PROJECT NO. 5904-05 SHEET 2 OF 2
PROJECT NAME DEP STREAM STUDY SUBJECT SURFACE WATER
PREPARED BY RDB DATE 3/31/01 DISCHARGE CALCULATIONS
CHECKED BY CRY DATE 8/21/01 UNMINED SEGMENT

Earth Sciences Consultants, Inc.

TRANSECT

G-G' $A = 17.0 ft^2$
$V = 2ft/17s = 0.1176 ft/s$
$Q = 0.1176 ft/s \cdot 17.0 ft^2$
$Q = 2.0 ft^3/s$

H-H' $A = 1.5 ft^2$
$V = 1.68 ft/s$
$Q = 1.68 ft/s \cdot 1.5 ft^2$
$Q = 2.5 ft^3/s$

I-I' $A = 1.5 ft^2$
$V = 1.13 ft/s$
$Q = 1.13 ft/s \cdot 1.5 ft^2$
$Q = 1.7 ft^3/s$

J-J' $A = 8.0 ft^2$
$V = 0.46 ft/s$
$Q = 0.46 ft/s \cdot 8.0 ft^2$
$Q = 3.7 ft^3/s$

K-K' $A = 2.5 ft^2$
$V = 6ft/28s = 0.2143 ft/s$
$Q = 0.2143 ft/s \cdot 2.5$
$Q = 0.5 ft^3/s$

L-L' $A = 1.5 ft^2$
$V = 1.42 ft/s$
$Q = 1.42 ft/s \cdot 1.5 ft^2$
$Q = 2.1 ft^3/s$

M-M' $A = 0.15 ft^2$
$V = 1ft/0.5s = 0.7 ft/s$
$Q = 0.7 ft/s \cdot 0.15 ft^2$
$Q = 0.02 ft^3/s$

TRIBUTARY ** TO ROBINSON FORK

Width/Depth Ration Calculations

PROJECT NO. 5904-05 SHEET 1 OF 2

PROJECT NAME BMR STREAM STUDY SUBJECT WIDTH/DEPTH RATIO CALCULATIONS; ROBINSON FORK; MINED SEGMENT RIFFLE TRANSECTS

PREPARED BY ROB DATE 3/28/01

CHECKED BY CRY DATE 3/31/01

Earth Sciences Consultants, Inc.

TRANSECT B-B'

- WIDTH/DEPTH RATIO = W_{bkf} / d_{bkf} WHERE: W_{bkf} = BANKFULL WIDTH

d_{bkf} = BANKFULL MEAN DEPTH

$W_{bkf} = 32'$

$d_{bkf} = A / W_{bkf} = 129 ft^2 / 32 ft = 4.03 ft$

WIDTH/DEPTH RATIO = $32' / 4.03' = \boxed{7.9}$

TRANSECT F-F'

- WIDTH/DEPTH RATIO = W_{bkf} / d_{bkf} WHERE: W_{bkf} = BANKFULL WIDTH

d_{bkf} = BANKFULL MEAN DEPTH

$W_{bkf} = 49'$

$d_{bkf} = A / W_{bkf} = 161.5 ft^2 / 49 ft = 3.30 ft$

WIDTH/DEPTH RATIO = $49' / 3.30' = \boxed{14.9}$

PROJECT NO. 5904-05 SHEET 2 OF 2
PROJECT NAME BMR STREAM STUDY SUBJECT WIDTH/DEPTH RATIO
PREPARED BY RDB DATE 8/28/01 CALCULATIONS; ROBINSON FORK;
CHECKED BY CRY DATE 8/31/01 UNMINED SEGMENT RIFFLE TRANSECTS

Earth Sciences Consultants, Inc.

TRANSECT I-I'

- WIDTH/DEPTH RATIO = W_{bkf}/d_{bkf} WHERE: W_{bkf} = BANKFULL WIDTH

d_{bkf} = BANKFULL MEAN DEPTH

$W_{bkf} = 32'$

$d_{bkf} = A/W_{bkf} = 96\ ft^2/32\ ft = 3.0'$

WIDTH/DEPTH RATIO = $32'/3.0' =$ **10.7**

TRANSECT L-L'

- WIDTH/DEPTH RATIO = W_{bkf}/d_{bkf} WHERE: W_{bkf} = BANKFULL WIDTH

d_{bkf} = BANKFULL MEAN DEPTH

$W_{bkf} = 22'$

$d_{bkf} = A/W_{bkf} = 65.5\ ft^2/22\ ft = 3.0$

WIDTH/DEPTH RATIO = $22'/3.0' =$ **7.4**

Sinuosity Calculations

PROJECT NO. 5904-05 SHEET 1 OF 1
PROJECT NAME DEP STREAM STUDY SUBJECT SINUOSITY CALCULATIONS; MINED AND UNMINED STUDY SEGMENTS
PREPARED BY RDB DATE 8/24/01
CHECKED BY CRY DATE 8/31/01

Earth Sciences Consultants, Inc.

MINED STUDY SEGMENT

$K = \frac{SL}{VL}$

WHERE: K = CHANNEL SINUOSITY
SL = STREAM LENGTH
VL = VALLEY LENGTH

$K = \frac{2068'}{1,980'} = 1.04$

UNMINED STUDY SEGMENT

$K = \frac{SL}{VL}$

WHERE: K = CHANNEL SINUOSITY
SL = STREAM LENGTH
VL = VALLEY LENGTH

$K = \frac{3,011'}{2,440'} = 1.23$

Entrenchment Ratio Calculations

PROJECT NO. 5904-05 SHEET 1 OF 2

PROJECT NAME BMR STREAM STUDY SUBJECT ENTRENCHMENT RATIO CALCULATIONS; ROBINSON FORK; MINED SEGMENT RIFFLE TRANSECTS

PREPARED BY RDB DATE 8/18/01

CHECKED BY CRY DATE 9/31/01

Earth Sciences Consultants, Inc.

TRANSECT B-B'

1) MAXIMUM DEPTH (RELATIVE ELEVATION) = 8.70'

2) BANKFULL STAGE (RELATIVE ELEVATION) = 4.60'

3) MAXIMUM DEPTH = MAXIMUM DEPTH (RELATIVE ELEVATION) − BANKFULL STAGE (RELATIVE ELEVATION) = 8.70' − 4.60' = 4.10' 2 × MAXIMUM DEPTH = 8.20'

4) FLOOD-PRONE AREA LOCATION ROD READING = MAXIMUM DEPTH (RELATIVE ELEVATION) − 2x MAXIMUM DEPTH = 8.70' − 8.20' = 0.50'

5) DISTANCE BETWEEN FLOOD-PRONE AREAS = 141'

6) DISTANCE BETWEEN BANKFULL STAGE LOCATIONS = 32'

7) ENTRENCHMENT RATIO = $\frac{\text{FLOOD-PRONE AREA WIDTH}}{\text{BANKFULL WIDTH}} = \frac{141'}{32'} = 4.4$

TRANSECT F-F'

1) MAXIMUM DEPTH (RELATIVE ELEVATION) = 8.98'

2) BANKFULL STAGE (RELATIVE ELEVATION) = 4.80'

3) MAXIMUM DEPTH = MAXIMUM DEPTH (RELATIVE ELEVATION) − BANKFULL STAGE (RELATIVE ELEVATION) = 8.98' − 4.80' = 4.18' 2x MAXIMUM DEPTH = 8.36'

4) FLOOD-PRONE AREA LOCATION ROD READING = MAXIMUM DEPTH (RELATIVE ELEVATION) − 2x MAXIMUM DEPTH = 8.98' − 8.36' = 0.62'

5) DISTANCE BETWEEN FLOOD-PRONE AREAS = 380'

6) DISTANCE BETWEEN BANKFULL STAGE LOCATIONS = 49'

7) ENTRENCHMENT RATIO = $\frac{\text{FLOOD-PRONE AREA WIDTH}}{\text{BANKFULL WIDTH}} = \frac{380'}{49'} = 7.8$

PROJECT NO. 5904-05 SHEET 2 OF 2
PROJECT NAME BMR STREAM STUDY SUBJECT ENTRENCHMENT RATIO
PREPARED BY RDB DATE 8/18/01 CALCULATIONS; ROBINSON FORK;
CHECKED BY CRY DATE 8/31/01 UNMINED SEGMENT RIFFLE TRANSECTS

Earth Sciences Consultants, Inc.

TRANSECT I-I'

1) MAXIMUM DEPTH (RELATIVE ELEVATION) = 8.54'

2) BANKFULL STAGE (RELATIVE ELEVATION) = 4.80'

3) MAXIMUM DEPTH = MAXIMUM DEPTH (RELATIVE ELEVATION) − BANKFULL STAGE (RELATIVE ELEVATION) = 8.54' − 4.80' = 3.74' 2 × MAXIMUM DEPTH = 7.48'

4) FLOOD-PRONE AREA LOCATION ROD READING = MAXIMUM DEPTH (RELATIVE ELEVATION) − 2 × MAXIMUM DEPTH = 8.54' − 7.48' = 1.06'

5) DISTANCE BETWEEN FLOOD-PRONE AREAS = 160'

6) DISTANCE BETWEEN BANKFULL STAGE LOCATIONS = 32'

7) ENTRENCHMENT RATIO = $\frac{\text{FLOOD-PRONE AREA WIDTH}}{\text{BANKFULL WIDTH}} = \frac{160'}{32'} = \boxed{5.0}$

TRANSECT L-L'

1) MAXIMUM DEPTH (RELATIVE ELEVATION) = 8.17'

2) BANKFULL STAGE (RELATIVE ELEVATION) = 4.70'

3) MAXIMUM DEPTH = MAXIMUM DEPTH (RELATIVE ELEVATION) − BANKFULL STAGE (RELATIVE ELEVATION) = 8.17' − 4.70' = 3.47' 2 × MAXIMUM DEPTH = 6.94'

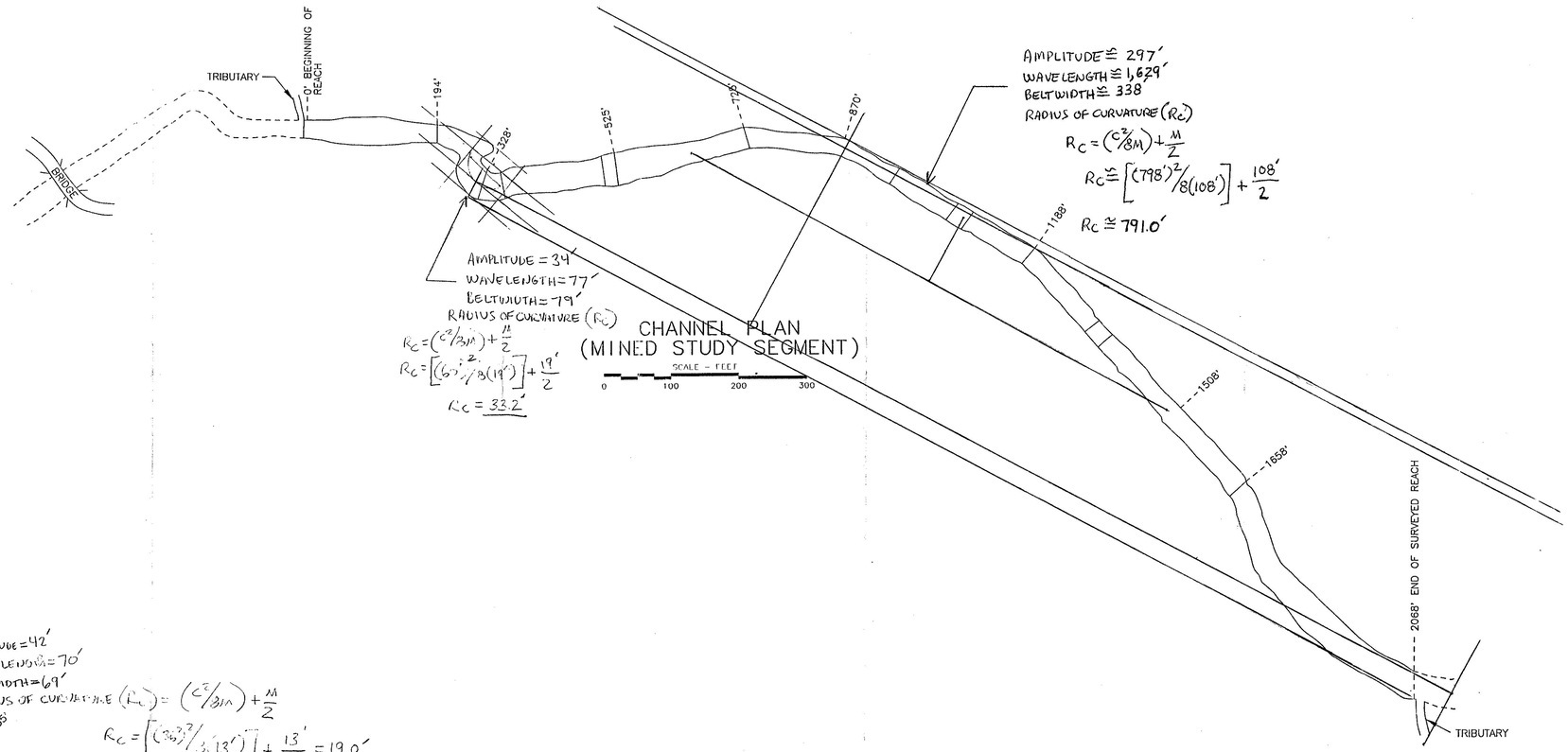
4) FLOOD-PRONE AREA LOCATION ROD READING = MAXIMUM DEPTH (RELATIVE ELEVATION) − 2 × MAXIMUM DEPTH = 8.17' − 6.94' = 1.23'

5) DISTANCE BETWEEN FLOOD-PRONE AREAS = 244'

6) DISTANCE BETWEEN BANKFULL STAGE LOCATIONS = 22'

7) ENTRENCHMENT RATIO = $\frac{\text{FLOOD-PRONE AREA WIDTH}}{\text{BANKFULL WIDTH}} = \frac{244'}{22'} = \boxed{11.1}$

Channel Geometry Measurements



FIGURE

CHANNEL GEOMETRY MEASUREMENTS
ROBINSON FORK
WEST FINLEY TWP, WASHINGTON COUNTY, PA

PREPARED FOR
PA BUREAU OF MINING AND RECLAMATIOI
HARRISBURG, PENNSYLVANIA

APPROVED	ROB 3/21/01
CHECKED	CRY 3/21/01
DRAWN	DEB 3\20\01

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