Appendix J

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _____
SHEET NO _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

COST SUMMARY

AUDENRIED TUNNEL	$ 2,600,000
WLT #1	$ 775,000
WLT #2	$ 535,000
WLT #0	1,300,000
WLT #3 *	1,100,000
	$ 6,310,000

* includes cost of drum installation near CC-2

Annual Costs

REPLACEMENT & MAINT.	534,114
CAPITAL AMORTIZATION	759,724
	1,293,838

ESTIMATED ANNUAL BENEFITS

Stream oriented benefits (ref EPA
1973 Report) Assume Construction
1985 & benefits increase @ 12%/yr.

$$BENEFITS = 315125 (1+.12)^{12} = \$ 1,227,700$$

WATER SUPPLY VALUE
   Assume 20 mgd @ 10¢/1000 gal   730,000

   1,957,700

COST/BENEFIT RATIO = 1.5

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA COST ESTIMATE_

SHEET NO. _1_ OF _10_

CALCULATED BY _WEH_ DATE _3/82_

CHECKED BY_____ DATE____

SCALE____

AUDENRIED TUNNEL

CONCRETE

AIRLOCK TOWER

REQ'D FLOW = 150 CFS

ALLOWABLE VELOCITY ≈ 4 FPS

∴ REQ'D. AREA ≈ 38 SF

CALL 6'×6' w/ 1' WALLS

HEIGHT = 52'

$$CONC. = \left[(2\times6)+(2\times8)\right] 52 \times \frac{1}{27} \times \#375 = \boxed{\#20,200}$$

FLUME FROM AIRLOCK TOWER TO FLOW DIVIDE

CAPACITY ≈ 150 CFS @ 4FPS (MAX)

ASSUME 8'W × 6'H CONC. CHANNEL W/ 1' WALLS & SLAB

LENGTH = 65'

$$CONC. = (10+6+6)(65) \times \frac{1}{27} \times \#250 = \boxed{\#13,200}$$

FLUME FROM FLOW DIVIDE TO DOWNFLOW UNITS

CAPACITY ≈ 35 CFS @ 4FPS (MAX)

ASSUME 5'W × 3'H CONC. CHANNEL W/ 1' WALLS & SLAB

LENGTH = 185'

$$CONC. = (7+3+3)(185) \times \frac{1}{27} \times \#250 = \boxed{\#22,300}$$

FLUME FROM DOWNFLOW UNITS TO DRUMS #1

5'W × 3'H CONC. CHANNEL W/ 1' WALLS & SLAB

LENGTH = 205'

$$CONC. = (7+3+3)(205) \times \frac{1}{27} \times \#250 = \boxed{\#24,700}$$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA COST ESTIMATE_
SHEET NO. _2_ OF _10_
CALCULATED BY _WEH_ DATE
CHECKED BY DATE
SCALE

AUDENRIED TUNNEL (CONT.)

FLUME FROM FLOW DIVIDE TO AUXILIARY DRUMS
5'W × 3'H CONC CHANNEL W/ 1' WALLS & SLAB
LENGTH = 110'

$$CONC. = (7+3+3)(110) \times \frac{1}{27} \times \$250 = \boxed{\$13,200}$$

EMERGENCY BYPASS
REQ'D. CAPACITY ≈ 100 CFS @ 4 FPS (MAX)
ASSUME 8'W × 4'H CONC. CHANNEL W/ 1' WALLS & SLAB
LENGTH = 80'

$$CONC. = (10+4+4)(80) \times \frac{1}{27} \times \$250 = \boxed{\$13,300}$$

MINE PORTAL RETAINING WALLS
BACKWALL ≈ 12'W × 28'H × 18"T
WINGWALLS ≈ 14'H(AVG) × 56'L × 18"T EACH

$$CONC. = \left[(12 \times 28) + (2 \times 14 \times 56)\right] \times 1.5 \times \frac{1}{27} \times \$375 = \boxed{\$39,700}$$

OUTLET FROM POOL No. 1
CAPACITY = 150 CFS
ASSUME 8' × 8' BOX CULVERT W/ 1' WALLS, DECK & SLAB
LENGTH = 50'
WINGWALLS = 5'H(AVG) × 20'L × 1'T

$$CONC = \left[((2 \times 8) + (2 \times 10)) \times 50 + (4 \times 5 \times 20)\right] \times \frac{1}{27} \times \$250 = \boxed{\$20,400}$$

GEO-TECHNICAL SERVICES
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OUTLET FROM POOL No. 2

  8' x 8' x 1' BOX CULVERT w/ 1' WALLS, DECK & SLAB

  LENGTH = 30'

  WINGWALLS = 5'H (AVG) x 20'L. x 1'T

$$\text{CONC.} = \Big[((2\times8)+(2\times10))\times30 + (4\times5\times20)\Big]\times\tfrac{1}{27}\times \#250 = \boxed{\#13,700}$$

AUX. DRUM INSTALLATIONS (2 EA)

  SLAB = 15'W x 25'L x 1'T

  BACKWALL = 25'L x 3'H x 1'T

  DIVIDING/END WALLS = 15'L. x 8'H x 1'T. (3 EA)

$$\text{CONC.} = \Big[(15\times25)+(25\times3)+(3\times15\times8)\Big]\times2\times\tfrac{1}{27}\times \#250 = \boxed{\#15,000}$$

MAIN DRUM INSTALLATIONS (3 EA)

  SLAB = 15'W x 50'L x 1'T

  BACKWALL = 50'L. x 3'H x 1'T

  DIVIDING/END WALLS = 15'L. x 8'H. x 1'T. (5 EA)

$$\text{CONC.} = \Big[(15\times50)+(50\times3)+(5\times15\times8)\Big]\times3\times\tfrac{1}{27}\times \#250 = \boxed{\#41,700}$$

SPLASH PADS @ DRUM INSTALLATIONS

  @ DRUMS #1   50'L x 15'W x 1'T

  @ DRUMS #2   50'L x 10'W x 1'T

  @ DRUMS #3   50'L x 10'W x 1'T

  @ AUX. DRUMS   15'L x 15'W x 1'T

$$\text{CONC.} = \Big[50(15+10+10) + 15(15)\Big]\times\tfrac{1}{27}\times \#250 = \boxed{\#18,300}$$

FORM 204   Available from [NEBS] INC Townsend. Mass 01470

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GEO-TECHNICAL SERVICES
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DOWNFLOW UNITS

6 UNITS @ 70'L × 15'W ⟹ STONE AREA = 6 × 70 × 12 ≈ 5000 SF

SLAB = 15'W × 70'L × 1'T (6 EA)

WALLS = 6'H × 70'L × 1'T (18 EA)

ENDWALLS = 6'H × 15'L × 1'T (12 EA)

$$\text{CONC} = [(6 \times 15 \times 70) + (18 \times 6 \times 70) + (12 \times 6 \times 15)] \times \tfrac{1}{27} \times \$250 = \boxed{\$138,300}$$

RETAINING WALLS @ AUX. DRUMS & PARKING AREA

30'L × 10'H × 1'T

25'L × 10'H × 1'T

25'L × 10'H × 1'T

$$\text{CONC.} = 10(30 + 25 + 25) \times \tfrac{1}{27} \times \$250 = \boxed{\$7400}$$

FLUME TO DRUMS #2 & DRUMS #3

130'L × 5'W × 3'H × 1'T

$$[(130 \times 7) + (2 \times 130 \times 3)] \times \tfrac{1}{27} @ \$250 = \boxed{\$15,700}$$

ENDWALLS @ INLET TO 48"∅ RCP (2 REQ'D.)

$$2 \times 7 \times 6 \times 1 \times \tfrac{1}{27}$$

$$4 \times 7 \times 3 \times 1 \times \tfrac{1}{27}$$

$$\text{CONC.} = 6 \text{ CY} @ \$250 = \boxed{\$1500}$$

$$\boxed{\text{SUB-TOTAL CONC.} = \$418,600}$$

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EARTHWORK

SETTLING LAGOON

EXCAVATION = 17,800 CY @ #   #2.50 = #44,500

ROLLED EMBANKMENT = 250 C.Y. @   #2.00 = #500

MINE PORTAL AREA

ROLLED EMBANKMENT = 28,100 CY @ #2.00 = #56,200

EXCAVATION = 200 C.Y. @ #2.50 = #500

Pool No. 1 EMBANKMENT

ROLLED EMBANKMENT = 3500 CY @ #3.00 = #10,500

EXCAVATION = 200 CY @ #2.50 = #500

Pool No. 2 EMBANKMENT

ROLLED EMBANKMENT = 1200 CY @ #3.00 = #3600

EXCAVATION = 150 CY @ #2.50 = #400

FORM 204 Available from NEBS INC. Townsend. Mass 01470

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GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA COST ESTIMATE_

SHEET NO. _6_ OF _10_

CALCULATED BY _WEH_ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

LIMESTONE STORAGE AREA

EXCAVATION = 900 CY @ $2.50 = $2300

DOWNFLOW UNITS

EXCAVATION $70 \times 220 \times 6 \times 1/27$ = 3400 CY @ $3.00 = $10,200

COMPACTED BACKFILL = $3400 - (6 \times 70 \times 15 \times 6 \times 1/27)$ = 2000 CY @ $6.50

= $13,000

ROADS & PARKING AREAS

EXCAVATION = 500 CY @ $2.50 = $1250

BACKFILL AROUND STRUCTURES

COMPACTED BACKFILL

$(12 \times 28 \times 2 \times 1/27)$	PORTAL
$(2 \times 14 \times 56 \times 2 \times 1/27)$	"
$(2 \times 55 \times 3 \times 2 \times 1/27)$	AUX. DRUM
$(3 \times 80 \times 3 \times 2 \times 1/27)$	MAIN DRUM
$(2 \times 50 \times 9 \times 2 \times 1/27)$	BOX CULV.
$(2 \times 30 \times 9 \times 2 \times 1/27)$	" "
$(4 \times 5 \times 20 \times 2 \times 1/27)$	WINGS
$(4 \times 5 \times 20 \times 2 \times 1/27)$	"
$(2 \times 65 \times 6 \times 2 \times 1/27)$	FLUME
$(2 \times 500 \times 3 \times 3/2 \times 1/27)$	"
$(2 \times 80 \times 4 \times 3/2 \times 1/27)$	BYPASS

SUB-TOTAL E'WORK = $147,650

= 645 CY @ $6.50 = $4200

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RIPRAP LINING

$(160 \times 95 \times 1/9)$
$(140 \times 55 \times 1/9)$
$(125 \times 45 \times 1/9)$

$= 3200 \text{ SY} @ \#30 = \boxed{\#96,000}$

PIPE TO DRUMS #2 & DRUMS #3

ASSUME 48" RCP
CALL TOTAL LENGTH $= 120' @ \#65 = \boxed{\#7800}$

ROAD & PARKING SURFACE

$10' \times 100' \times 1/9$
$10' \times 560 \times 1/9$
$10' \times 800 \times 1/9$
$160 \times 40 \times 1/9$
$10 \times 120 \times 1/9$
$15 \times 260 \times 1/9$
$10 \times 75 \times 1/9$
$80 \times 60 \times 1/9$
$15 \times 120 \times 1/9$
$30 \times 180 \times 1/9$
$20 \times 40 \times 1/9$
$15 \times 10,000 \times 1/9$

$= 21,100 \text{ SY} @ \#10 = \boxed{\#211,000}$

GEO-TECHNICAL SERVICES
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JOB _CATAWISSA COST ESTIMATE_

SHEET NO. _8_ OF _10_

CALCULATED BY _WEH_ DATE _____

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SCALE _____

SLIDE GATE IN AIRLOCK TOWER = L.S. = $20,000

SLIDE GATES @ POOL OUTLETS (8'x8') 2 EA @ $10,000 = $20,000

SLIDE GATES IN FLUMES
  1 EA 6'x8' @ $5000 = $5000
  4 EA 3'x5' @ $2000 = $8000

6"⌀ PVC IN DOWNFLOW UNITS

$(6 \times 70 \times 6) + (6 \times 7 \times 25) = 3600$ LF @ $18 = $64,800

SETTLING LAGOON DRAIN SYSTEM

  ASSUME 6"⌀ PVC @ 6' O.C. FULL LENGTH = 180'
  $((70/6) + 1) \times 180 = 2280$ L.F. @ $18 = $41,000

  PIPE TO TREATMENT BLDG.
  ASSUME 18"⌀ x 250' @ $50 = $12,500

  SLUDGE PUMP = L.S. @ $35,000

  FLOATING WEIR = L.S. @ $10,000

SUB-TOTAL $1,097,350

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REVOLVING DRUMS (16 REQ'D.)
    (INCL. WATER WHEEL & STONE GRINDER)
      WATER WHEEL @ #8000
      STONE GRINDER @ #5000

      CALL #20,000 EA = [# 320,000]

MINE PORTAL REHABILITATION

    ASSUME 200 L.F. @ #1000/FT = [#200,000]

SLUDGE TREATMENT FACILITIES

    REF: QUOTATION FOR RAPID SLUDGE DEWATERING SYSTEM
      BY U.S. ENVIRONMENTAL PRODUCTS, INC.
      @ RAUSCH CREEK TREATMENT PLANT

          CALL [#200,000]

BUILDINGS

    CALL 3000 SF OVER SLUDE TREATMENT
      200 SF LAB
      100 SF OFFICE
      200 SF STORAGE
      500 SF GARAGE

      TOTAL BUILDING = 4000 SF @ #30 [= #120,000]

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GENERAL SITE WORK

CLEARING & GRUBBING	12 Ac @ $1200 =	$14,400
SEEDING & FERTILIZING	9 Ac @ $1500 =	$13,500
PERIMETER FENCE	2500 LF @ $12	$30,000
LIGHTING & POWER DISTRIBUTION = LS =		$15,000

CALL $75,000

SUB-TOTAL = $2,012,350

25% CONTINGENCY $503,000

2,515,350

CALL TOTAL $2,600,000

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA CREEK COST ESTIMATE_
SHEET NO. _1_ OF _4_
CALCULATED BY _WEH_ DATE _3/82_
CHECKED BY_____ DATE_____
SCALE_____

WATER LEVEL TUNNEL No #1

CONCRETE

MINE PORTAL TREATMENT
EXIST. OPENING APPROX. 10'W × 5'H
NEW CONC BOX ≈ 25'L × 15'W × 10'H

$$\left.\begin{array}{ll} CONC. = & H'WALL & (20 \times 12 \times 2) - (10 \times 5 \times 2) \\ & S'DWALLS & (2 \times 25 \times 10) \\ & E'WALL & (15 \times 10) \\ & TOP & (17 \times 20) \\ & BOT & (17 \times 25) \end{array}\right\} \times \frac{1}{27} \times \#250 = \boxed{\#16,600}$$

FLUME TO DRUMS #1
3'W × 2'H × 1'T × 90'L

$$CONC = \left[(5 \times 90) + (2 \times 90 \times 2')\right] \times \tfrac{1}{27} \times \#250 = \boxed{\#7500}$$

FLUME FROM STREAM DIVERSION TO END OF PROJECT
60 CFS @ 4 FPS ≈ 15 SF
CALL 8'W × 3'H × 1'T
LENGTH ≈ 650'

$$CONC = \left[(650 \times 10) + (2 \times 650 \times 3)\right] \times \tfrac{1}{27} \times \#250 = \boxed{\#96,300}$$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA COST ESTIMATE_

SHEET NO _2_ OF _4_

CALCULATED BY _WEH_ DATE____

CHECKED BY____ DATE____

SCALE____

DRUM INSTALLATION #1
25'L × 15'W × 10'H × 1'T

$$CONC = [(16 \times 27) + (55 \times 10)] \times \frac{1}{27} \times \#250 = \boxed{\#9100}$$

DRUM INSTALLATIONS #2 & #3
50'× 20'W × 10'H × 1'T

$$CONC \quad [(21 \times 52) + (90 \times 10)] \times 2 \times \frac{1}{27} \times \#250 = \boxed{\#36,900}$$

DIVERSION STRUCTURE
30'L × 8'D × 3'W × $\frac{1}{27}$ × #300 = $\boxed{\#8000}$

$$\boxed{SUB-TOTAL \ CONC = \#174,400}$$

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EARTHWORK

ROCK EXC. @ PORTAL

   ALLOW 50 CY @ #50 = $\boxed{\#2500}$

DIVERSION FLUME

EXC = 650 × 12 × 4 × 1/27 × #3.00 = $\boxed{\#3500}$

DIVERSION STRUCTURE

EXC = 35 × 5 × 4 × 1/27 × #3.00 = $\boxed{\#100}$

DRUM INSTALLATIONS

EXC = 31 × 21 × 8 × 1/27
   2 × 56 × 26 × 8 × 1/27 } × #3.00 = $\boxed{\#3200}$

COMPACTED BACKFILL

  2 × 650 × 4
  (55 + 90 + 90) × 8 } × 1/27 × #6.50 $\boxed{\#1800}$
  2 × 35 × 4

SLIDE GATE @ MINE PORTAL   ALLOW $\boxed{\#20,000}$

MISC. FLOW CONTROL DEVICES   ALLOW $\boxed{\#15,000}$

REVOLVING DRUMS (12 REQ'D.)

    12 @ #20,000 = $\boxed{\#240,000}$

GEO-TECHNICAL SERVICES
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SERVICE ROAD

$$
\left.
\begin{array}{l}
860 \times 15 \\
800 \times 15 \\
120 \times 15 \\
110 \times 15 \\
50 \times 50 \\
50 \times 60 \\
60 \times 80
\end{array}
\right\}
\times \frac{1}{9} \times \#15 = \boxed{\#64,400}
$$

MAINTENANCE BUILDING (INCL LAB, OFFICE, STORAGE, GARAGE)

ALLOW 2000 SF @ $^\#30$ = $\boxed{\#60,000}$

GENERAL SITE WORK

CLEARING/GRUBBING & SEEDING/FERT. 5 Ac @ $^\#2700$ = $\boxed{\#13,500}$

LIGHTING/FENCING ETC.   ALLOW $\boxed{\#20,000}$

$$
\begin{array}{l}
\text{SUB-TOTAL} = \#618,400 \\
25\% \text{ CONTINGENCY} = \underline{154,600} \\
\phantom{25\% \text{ CONTINGENCY} =} \#773,000
\end{array}
$$

CALL TOTAL = $\#775,000$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB **CATAWISSA COST ESTIMATE**
SHEET NO. _1_ OF _5_
CALCULATED BY _WEH_ DATE _3/82_
CHECKED BY _3/82_ DATE _____
SCALE _____

WATER LEVEL TUNNEL #2

CONCRETE

AIRLOCK TOWER
  REQ'D FLOW = 50 CFS
  ALLOWABLE VELOCITY ≈ 4 FPS
  ∴ REQ'D AREA ≈ 13 SF
  CALL 4'x4' w/ 1' T. WALLS
  HEIGHT = 25'±

$$CONC. = \left[(2\times6)+(2\times4)\right] \times 25 \times \frac{1}{27} \times \$375 = \boxed{\$7000}$$

FLUME FROM AIRLOCK TOWER TO DOWNFLOW BEDS
  REQ'D FOR 10 CFS MAX @ 4FPS
  CALL 3'W x 2'D w/ 1' WALLS & SLAB
  LENGTH = 60'

$$CONC. = (5+2+2) \times 60 \times \frac{1}{27} \times \$250 = \boxed{\$5000}$$

DOWNFLOW BEDS
  REQ'D 400 SF
  40'L x 10'W x 5'H w/ 1' T. WALLS

$$CONC. \left[(12\times42)+(2\times42\times5)+(2\times10\times5)\right] \times \frac{1}{27} \times \$250 = \boxed{\$9500}$$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA COST ESTIMATE_

SHEET NO. _2_ OF _5_

CALCULATED BY _WEH_ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

DRUM INSTALLATION
$15'W \times 15'L \times 15'H$ WALLS

$$CONC. = \left[(15 \times 15) + (3 \times 15 \times 15)\right] \times \tfrac{1}{27} \times \$250 = \boxed{\$8300}$$

FLUME FROM DRUM TO STREAM
$3'W \times 2'H \times 100'L$

$$CONC. = (5 + 2 + 2) \times 100 \times \tfrac{1}{27} \times \$250 = \boxed{\$8300}$$

$$\boxed{SUB\text{-}TOTAL\ CONC. = \$38,100}$$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA COST ESTIMATE_

SHEET NO. _3_ OF _5_

CALCULATED BY _WEH_ DATE ___

CHECKED BY ___ DATE ___

SCALE ___

<u>BACKWASH PIPE TO LAGOON</u>

   ASSUME 36" ⌀ CONC PIPE × 150' L × $46 = $\boxed{\$6900}$

<u>SLUDGE PIPE TO AUDENRIED</u>

   2" ⌀ PVC PIPE × 2500' L @ $9.00 = $\boxed{\$22,500}$

<u>EARTHWORK</u>

  @ AIRLOCK TOWER

     EXCAVATION = $14 \times 14 \times 25 \times \frac{1}{27} \times \$30 = \boxed{\$5400}$

     COMPACTED BACKFILL = $\left[(14 \times 14) - (5 \times 5)\right] \times 20 \times \frac{1}{27} \times \$5 = \boxed{\$600}$

  @ FLUME TO BEDS

     EXCAVATION = $7 \times 3 \times 60 \times \frac{1}{27} \times \$3.00 = \boxed{\$200}$

     COMPACTED BACKFILL = $\boxed{\$100}$

  @ DOWNFLOW BEDS

     EXCAVATION = $40 \times 14 \times 6 \times \frac{1}{27} \times \$3.00 = \boxed{\$400}$

     COMPACTED BACKFILL = $\boxed{\$100}$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA CREEK COST ESTIMATE_

SHEET NO. _4_ OF _5_

CALCULATED BY _WEH_ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

@ BACKWASH PIPE

$$\text{EXCAVATION} = 150 \times 5 \times 6 \times 1/27 \times \$3.00 = \boxed{\$500}$$

$$\text{COMPACTED BACKFILL} = \left[(5 \times 6) - \left(\pi\left(\tfrac{3}{6}\right)^2\right)\right] \times 150 \times 1/27 \times \$2.50$$

$$= \boxed{\$300}$$

@ SLUDGE PIPE

$$\text{EXCAVATION} = 2500 \, LF \times 3'D \times 3/2 \, W \times 1/27 \times \$3.00 = \boxed{\$1250}$$

@ LAGOON

$$\text{EXCAVATION} = \left[\tfrac{1}{2}(200 + 5600)\right] \times 10 \times 1/27 \times \$3.00 = \boxed{\$3300}$$

SERVICE ROAD

L = 400' ±   W = 15' ±

ASSUME $15/SY COMPLETE

$$400 \times 15 \times 1/9 \times \$15 = \boxed{\$10,000}$$

NOTE: MAIN SERVICE ROAD INCLUDED W/ AUDENRIED

GENERAL GRADING

PER WLT #3 ESTIMATE

ALLOW 60 HRS @ $120 = $\boxed{\$7200}$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB _CATAWISSA CREEK COST ESTIMATE_

SHEET NO. _5_ OF _5_

CALCULATED BY _WEH_ DATE ____

CHECKED BY ____ DATE ____

SCALE ____

SETTLING LAGOON DRAIN SYSTEM

    PER WLT #3 ESTIMATE   ALLOW $75,000

SLIDE GATE IN AIRLOCK TOWER

    ALLOW $20,000

MISC. FLOW CONTROL DEVICES ALLOW $10,000

REVOLVING DRUM (1 REQ'D.) CALL $20,000

MINE PORTAL REHABILITATION

    ASSUME 200 LF @ $1000/FT = $200,000

GENERAL SITE WORK

    3 Ac± @ $2700/Ac = $8100

    SUB-TOTAL = $429,950
25% CONTINGENCY = 107,500
    $537,450

   CALL TOTAL $535,000

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

ONEIDA TUNNEL

CONCRETE

AIRLOCK TOWER

REQ'D. CAPACITY $\approx$ 30 cfs @ 4 FPS $\approx$ 8 SF

CALL 4'×4'× 3½'T × 50'H

$$CONC = [(2 \times 7) + (2 \times 4)] \times \tfrac{3}{2} \times 50 \times \tfrac{1}{27} \times \$375 = \boxed{\$22,900}$$

84" ∅ RCP

185 LF @ $200 = $\boxed{\$37,000}$

24" ∅ RCP

550 LF @ $18.50 = $\boxed{\$10,200}$

DOWNFLOW BEDS

4 @ 50'L × 12'W × 7'D × 1'T

$$CONC. = [(50 \times 14) + (2 \times 50 \times 7) + (2 \times 14 \times 8)] \times 4 \times \tfrac{1}{27} \times \$250 = \boxed{\$60,100}$$

DRUM INSTALLATIONS (2 REQ'D.)

$$CONC = [(20 \times 15) + (50 \times 8)] \times 2 \times \tfrac{1}{27} \times \$250 = \boxed{\$13,000}$$

SLUDGE PIPE TO LAGOON

48" ∅ RCP × 150 LF = $65 = $\boxed{\$9750}$

FORM 204

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

CONC. SILLS IN AERATION CHANNEL
ASSUME 15'L x 2'H x 1'W   (APPROX 25 REQ'D.)

$$CONC = 25 \times 15 \times 2 \times \frac{1}{27} \times \$250 = \boxed{\$6900}$$

FLUMES TO DRUMS.
APPROX. 150 LF x 4'W x 2'H x 1'T

$$CONC. = 150(6+2+2) \times \frac{1}{27} \times \$250 = \boxed{\$13,900}$$

EARTHWORK

ROLLED EMBANKMENT (FILLING EXIST. RAVINE)
$$30,000 \ CY @ \$2.00 = \boxed{\$60,000}$$

$$EXCAVATION = 10,000 \ CY @ \$3.00 = \boxed{\$30,000}$$

$$COMPACTED \ BACKFILL = 400 \ CY @ \$6.50 = \boxed{\$2600}$$

ROAD SURFACE

$$\left.\begin{array}{l} 300 \times 15 \\ 530 \times 15 \\ 30 \times 15 \\ 30 \times 15 \\ 70 \times 30 \\ 20 \times 30 \end{array}\right\} \times \frac{1}{9} \times \$15.00 = \boxed{\$26,800}$$

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

SLIDE GATE IN AIRLOCK TOWER   ALLOW $20,000

MISC. FLOW CONTROL DEVICES   ALLOW $12,000

PVC PIPING @ DOWNFLOW BEDS

800 LF @ $16 = $12,800

REVOLVING DRUMS (4 REQ'D.)

4 @ $20,000 = $80,000

SLUDGE LAGOON DRAIN SYSTEM

PER AUDENRIED   ALLOW $100,000

SLUDGE TREATMENT FACILITIES

PER AUDENRIED   ALLOW $200,000

BUILDINGS

LAB, OFFICE, STORAGE, GARAGE ETC   3000 SF @ $30 = $90,000

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Mine Portal Rehabilitation

Assume 200 LF @ $1000 = $200,000

General Site Work

4 Ac @ $2700 = $10,800

Lighting, Fencing Etc

Allow $20,000

$$
\begin{aligned}
\text{Sub-Total} &= \$1,038,750 \\
25\% \text{ Contingency} &= \underline{260,000} \\
&\quad\ \ \$1,298,750
\end{aligned}
$$

Call Total = $1,300,000

GEO-TECHNICAL SERVICES
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JOB _CATAWISSA COST ESTIMATE_
SHEET NO. _1_ OF _7_
CALCULATED BY _WEH_ DATE _3/82_
CHECKED BY_____ DATE_____
SCALE_____

WATER LEVEL TUNNEL #3

CONCRETE

AIRLOCK TOWER

REQ'D FLOW = 20 CFS
ALLOWABLE VELOCITY ≈ 4 FPS
∴ REQ'D AREA ≈ 5 SF ≈ 2'+ SQUARE
HOWEVER : MUST BE ACCESSIBLE
CALL 4' x 4' W/ 1' T. WALLS
HEIGHT = 20'

$$CONC = \left[(2\times4)+(2\times6)\right] \times 20 \times \frac{1}{27} \times \#375 = \boxed{\#5600}$$

FLUME FROM AIRLOCK TOWER TO DISTRIBUTION BOX

CAPACITY ≈ 20 CFS @ 4 FPS
ASSUME 5' W x 2' H CHANNEL W/ 1' WALLS & SLAB
LENGTH = 30'

$$CONC = \left[(30\times7)+(2\times30\times2)\right] \times \frac{1}{27} \times \#250 = \boxed{\#3100}$$

FLUME FROM DISTRIBUTION BOX TO DOWNFLOW UNITS

ASSUME 5' W x 2' H x 1' T. x 20' L (2 REQ'D.)

$$CONC. = \left[(40\times7)+(2\times40\times2)\right] \times \frac{1}{27} \times \#250 = \boxed{\#4100}$$

EMERGENCY BYPASS

$$CONC. \left[(70\times7)+(2\times70\times2)\right] \times \frac{1}{27} \times \#250 = \boxed{\#7100}$$

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LOW FLOW DIVERSION STRUCTURE
 ASSUME CONC. WEIR TYPE
 3' H + 4' BELOW GRD. = 7' H
 3' THICK × 50' L.

$$CONC. = 7 \times 3 \times 50 \times \frac{1}{27} \times \$300 = \boxed{\$ 11,700}$$

FLUME FROM LOW FLOW DIVERSION TO DISTR. BOX
 ASSUME 200' L × 2' W × 2' H w/ 1' T. WALLS & SLAB

$$CONC. = \left[(200 \times 4) + (2 \times 200 \times 2) \right] \times \frac{1}{27} \times \$250 = \boxed{\$ 14,800}$$

DOWNFLOW UNITS
 2 @ 290 L.F. EACH
 5' W × 4' H. w/ 1' T WALLS & SLAB

$$CONC. = \left[(580 \times 7) + (2 \times 580 \times 4) \right] \times \frac{1}{27} \times \$250 = \boxed{\$ 80,600}$$

FLUME FROM DOWNFLOW UNITS TO DRUM
 ASSUME 5' W × 2' H × 120' L.

$$CONC. = \left[(120 \times 7) + (2 \times 120 \times 2) \right] \times \frac{1}{27} \times \$250 = \boxed{\$ 12,200}$$

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JOB _CATAWISSA COST ESTIMATE_
SHEET NO. _3_ OF _7_
CALCULATED BY _WEH_ DATE_____
CHECKED BY_____ DATE_____
SCALE_____

DRUM INSTALLATION
15'W x 15'L w/ 8' WALLS

$$CONC = \left[(17 \times 16) + (3 \times 15 \times 8)\right] \times \frac{1}{27} \times \#250 = \boxed{\#5900}$$

DISTRIBUTION BOX
8'x8'x8'x1'T

$$CONC = \left[(2 \times 10 \times 10) + (2 \times 8 \times 10) + (2 \times 8 \times 8)\right] \times \frac{1}{27} \times \#250 = \boxed{\#4500}$$

$$\boxed{SUB\text{-}TOTAL\ CONC. = \#149,600}$$

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EARTHWORK

LOW FLOW DIVERSION STRUCTURE

$$EXCAVATION = 5 \times 55 \times 4 \times \frac{1}{27} \times \$3.00 = \boxed{\$200}$$

$$COMPACTED\ BACKFILL = \left[(5 \times 55 \times 4) - (3 \times 4 \times 50)\right] \times \frac{1}{27} \times \$6.50 = \boxed{\$200}$$

FLUMES

$$EXCAVATION = \left.\begin{array}{l} 200 \times 4 \times 2 \times \frac{1}{27} \\ 30 \times 7 \times 2 \times \frac{1}{27} \\ 40 \times 7 \times 2 \times \frac{1}{27} \\ 70 \times 9 \times 2 \times \frac{1}{27} \\ 120 \times 9 \times 2 \times \frac{1}{27} \end{array}\right\} \times \$3.00 = \boxed{\$700}$$

$$COMPACTED\ BACKFILL = (2 \times 460 \times 1 \times 2) \times \frac{1}{27} \times \$6.50 = \boxed{\$500}$$

DISTRIBUTION BOX

$$EXCAVATION\ (10 \times 10 \times 10)\ \frac{1}{27} \times \$3.00 = \boxed{\$100}$$

$$COMPACTED\ BACKFILL = 40 \times 9 \times \frac{1}{27} \times \$6.50 = \boxed{\$100}$$

GEO-TECHNICAL SERVICES
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JOB _CATAWISSA COST ESTIMATE_

SHEET NO. 5 OF 7

CALCULATED BY _WEH_ DATE

CHECKED BY DATE

SCALE

DOWNFLOW UNITS

EXCAVATION = $580 \times 9 \times 5 \times \frac{1}{27} \times \$3.00$ = $\boxed{\$2900}$

COMPACTED BACKFILL = $2 \times 580 \times 1 \times 5 \times \frac{1}{27} \times \$6.50$ = $\boxed{\$1400}$

DRUM INSTALLATION

EXCAVATION = $17 \times 17 \times 9 \times \frac{1}{27} \times \$3.00$ = $\boxed{\$300}$

COMPACTED BACKFILL = $\left[(8 \times 17)+(17 \times 2 \times 4)\right] \times \frac{1}{27} \times \$6.50$ = $\boxed{\$100}$

SLUDGE LAGOON

LAGOON EXCAVATION (CLEANING)
CALL $16,000$ SF $\times 2'D \times \frac{1}{27} \times \$3.00$ = $\boxed{\$3600}$

ROLLED EMBANKMENT = 2600 CY @ $\$3.00$ = $\boxed{\$7800}$

SLUDGE PIPE TO AUDENRIED

EXCAVATION = 5000 LF $\times 3'D \times \frac{3}{2}'W \times \frac{1}{27} \times \$3.00$ = $\boxed{\$2500}$

$2"\phi$ PVC PIPE = 5000 LF @ $\$9.00$ = $\boxed{\$45,000}$

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JOB _CATAWISSA COST ESTIMATE_
SHEET NO. _6_ OF _7_
CALCULATED BY _WEH_ DATE_____
CHECKED BY_____ DATE_____
SCALE_____

SERVICE ROAD TO AUDENRIED

$L = 5000' \pm$
$W = 15' \pm$
ASSUME E'WORK, GRADING & SURFACE MAT'L @ $15/SY

$$(5000 \times 15 \times 1/9) \times \$15 = \boxed{\$125,000}$$

RIPRAP $= 20' \times 60' \times 1/9 \times \$30/SY = \boxed{\$4000}$

GENERAL GRADING

PER MEANS CONSTRUCTION CATALOG
300 HP DOZER @ 70 C.Y./HR
COST $1.73/CY
∴ COST/HR = 70 × 1.73 = $120/HR

ALLOW 80 HRS @ $120 = $\boxed{\$9600}$

SETTLING LAGOON DRAIN SYSTEM

PUMPS, PIPES, FLOATING WEIRS ETC.

AUDENRIED SYSTM ≈ $100,000
WLT #3 MAY HAVE A SMALLER DRAIN SYSTEM
BUT REQUIRE MORE PUMPING POWER

ALLOW FOR SLUDGE HANDLING FACILITIES $\boxed{\$100,000}$

SUMMARY OF ANNUAL LIMESTONE USE

TREATMENT LOCATION	ANNUAL LIMESTONE USE (TONS)
WLT-A	4291.4
WLT-0	402.2
WLT-1	2931.8
WLT-2	179.5
WLT-3	181.2
CC-2	277.4

OVERALL TREATMENT : 8263.5 TONS

ANNUAL COST:

LIMESTONE SHIPPED TO THE
SITE @ $15.00/TON × 8300 TONS = $124,500