# Appendix A

# Appendix A
# Estimated Tunneling Cost Breakdown

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# Estimated Tunneling Cost Breakdown

## A.1 Explanation of Tunneling Cost Spread Sheets

***Shaft Costs.*** Shaft costs were derived from an estimate for the 3,215 deep intake shaft at the Mt. Hope Pump Storage Project. This 1993 cost estimate was then modified for California labor rates and efficiency and updated to 1996 dollars. An example of how the shaft cost can be derived from the spread sheet can be shown for Contract 3A-C. The mobilization cost for the shaft is shown on R5 (Column R, Line 5) as $13,440,000. This is for a shaft which will have two separate tunnel headings driven from it. If only a single heading is driven from the shaft, a mobilization cost of $12,600,000 is used. The shaft depth is shown on E3, the daily shaft excavation and lining rate is shown on F3 (4 feet per day), and the shaft construction duration is shown on D46 (576 days). To derive the shaft cost the construction duration (D46) is multiplied times the daily indirect costs shown on Q54, plus the shaft depth (E3) times the direct cost shown on Q6 ($7,500 per foot) generated from the Mt. Hope project, plus the mobilization cost shown on R5.

Example: (576 X $11,114) + (2,302 X $7,500) + $13,440,000 = $37,106,664/ft or $16,119/ft

***Portal Costs.*** A lump sum cost of $500,000 was used to develop a tunnel portal. An example of the portal costs in the spread sheet can be shown for Contract 3A-H. The number of portals per contract (1 or 2) is shown on E2. The portal unit cost is shown on Q3 and the total portal cost is shown on R3.

***Full and Partial Lining Total Contract Costs.*** Full and partial lining total contract costs (R59) were calculated using the shaft cost and portal cost as well as cost associated with tunnel development. The details are shown in the spreadsheets that follow as well as discussed below.

***Full and Partial Total Tunnel Cost.*** Full and partial total tunnel cost is defined as the full or partial lining total contract costs minus the shaft and portal costs.

***Water, Power and Muck Disposal.*** The availability of water, power and muck disposal for each shaft or portal is shown in Table 11-15 in Section 11.0. The procedure used to make these determinations is discussed in Subsection 11.2.3. An example of a tunnel contract requiring remote muck disposal is shown on Contract 3A-F. A code of 1 is used if remote muck disposal is required and a code of 2 is used if it is not. This code is shown on J45. The cost per cubic yard for remote tunnel muck disposal, above the costs for handling the muck for onsite disposal, is shown on Q20 ($10 per yard) and the total cost is shown on R20.

Similar to the muck disposal, a code of 1 is used if a water well is required at the shaft or portal site to provide construction water. A code of 2 is used if water is available near the site An example of this is shown on Contract 3A-D. The code for the water well is shown on J46 and the cost of the well ($35,000) is shown on R32.

The cost for onsite power generation can also be shown on Contract 3A-D. The cost for power generation, above the amount to purchase power, was estimated to be $0.25 per kWh as shown on Q55. The total cost for onsite generated power is shown on R55. If power is available near the shaft or portal, a lump sum cost for the power company to construct power lines to the site and provide the hookup is shown on R33.

IMPERIAL IRRIGATION DISTRICT TRANSFER STUDY

INDEX OF ESTIMATE


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IMPERIAL IRRIGATION DISTRICT TRANSFER STUDY

CONCEPTUAL TUNNEL ESTIMATES

## BASIS OF ESTIMATES ----------

Summary tables and profiles received by fax 2-23-96. Profiles with geologic conditions received 3-2-96. Utility availability received by fax 3-6-96.

## ESTIMATING METHOD

The work was divided into logical construction contracts and costs were estimated for each contract. The four alternate alignments include 21 construction contracts.

One complete, "contractor-type" estimate was prepared for:

excavation of a 20,000 ft. long tunnel from a portal
concrete lining from a portal
steel lining, for 3 thicknesses) from a portal

Shafts costs were derived from a Frontier-Kemper 1993 estimate for the 3,215 ft. deep Intake Shaft at the Mt. Hope Pumped Storage Project. Development costs, for installation of muck hoisting facilities at the base of the shaft, were also from this estimate. These costs were modified for California labor rates and efficiency.

Costs of the following were based on previous experience:

375 ft. deep shaft
generated power
off-site muck disposal

The $10 million Direct Cost for the lake tap is the "back-of-the-envelope" cost currently being used for a future tap of Lake Mead.

All costs (Direct, Plant & Equipment, and Indirect) were separated into Fixed Costs and Variable Costs. Fixed Costs are generally incurred one time per contract. Variable Costs are incurred per foot of tunnel or shaft, or per working day.

A duration of construction was calculated for each contract; costs that vary by duration were calculated directly from this schedule.

Delays to construction due to the following conditions were estimated and the cost of the delay was added to the basic tunnel costs:

one tunnel driven from a shallow shaft
one tunnel driven from a deep shaft
two tunnels driven from a deepshaft
down minor grade

down 3% grade
up 2 or 3% grade
up 5% grade
spot rock bolts
pattern rock bolts
sets @ 4 ft. oc
heavy sets @ 4 ft. oc
heavy sets @ 2 ft. oc
medium water inflow
high water inflow
probe for water
grout water
high temperature
on-site generated power

Copies of the tunnel and shaft estimates are enclosed. Duration of delays, delay assumptions, and the basic TBM production rate calculation are enclosed. Scratch sheets of the delay estimates are on file.

The estimated cost for each construction contract is calculated and totaled on a single sheet. The estimated cost for all tunnels of each alternate alignment is summarized on the first estimate sheet.

**DIMENSIONS**

The tunnel minimum lined diameter is 9.5 ft. Length is from about 10,000 to 38,000 ft., with half the tunnels about 20,000 ft. long. The deep shafts are from 1,000 to 3,400 ft. deep.

Tunnel length, access (shaft or portal), and grade, as well as shaft depth, is summarized on each estimate sheet.

**GEOTECHNICAL**

The tunnels are in hard rock. Adverse geologic conditions are summarized on each estimate sheet.

For estimate purposes the geotechnical conditions were simplified:

| | | GPM | |
|---|---|---|---|
| | | Flush Flow | Long Term Flow |
| Water Inflow | Low | 100 | 100 |
| | Medium | 700 | 500 |
| | High | 2,500 | 2,000 |

Larger inflows were assumed to be probed for and grouted off.

Pumping Capacity Provided

| | |
|---|---|
| Upgrade Headings | 5 x Flush Flow |
| Downgrage Headings | 10 x Flush Flow |
| Shafts, for each heading | 3 x Long Term Flow |

## CONSTRUCTION METHODS AND EQUIPMENT

### Work Shafts

The 375 ft. deep shaft is sunk using a crane for material handling and muck removal. The deep shafts are constructed using hoists, headframes and Galloway staging and, for safety, are lined during excavation, within 100 ft. of the shaft bottom.

All shafts are excavated, with drilling and blasting methods, to 29 ft. diameter and lined to 26 ft. diameter.

### Tunnels

All tunnels are excavated with a new, 1,700 HP, 12 ft., tunnel boring machine, fully equipped for installation of rock support, for probe drilling, and the expeditiously handle all adverse geotechnical conditions encountered.

Muck removal is with muck cars from the TBM conveyor. At shafts it is hoisted to the surface for disposal.

Initial tunnel support is:

- spot bolts - two, 6 ft. rock bolts at 100 ft. OC with steel channel between them
- pattern bolts - two, 6 ft. rock bolts at 4 ft. OC with welded wire fabric and shotcrete
- light steel sets - 4WF13# ribs @ 4 ft. OC with steel mesh lagging
- heavy steel sets - 6WF20# ribs @ 2 or 4 ft. OC with steel mesh lagging

Sections with final lining are cast-in-place concrete or steel liner backfilled with concrete. Steel liner thickness is either 0.5, 1.0 or 1.75 inches thick.

## COSTS

Costs are based on current prices.

Labor costs are based on the current San Diego County Union Labor agreement. All underground work is scheduled three eight-hour shifts a day, five days a week, plus a maintenance shift on Saturdays. Labor cost of $ 630 per shift includes:

Normal overtime
Travel time
Fringe benefits
Subsistence
Social Security tax
Federal and State unemployment insurance
Workman's Compensation insurance
6% incidental overtime
Small tools at 9% of labor
Contractor markup at 50% of labor

PRICES

Assumed prices, FOB job, include:

| | | | |
|---|---|---|---|
| Electric Power, from Power Co. | $ | .10 | per KWH |
| Electric Power, generated | add | .25 | per KWH |
| Diesel Fuel | | 1.00 | per gallon |
| Steel Sets | | .55 | per # |
| Distant Offsite Muck Disposal | add | 10.00 | per SCY |
| Rebar and Accessories | | .27 | per # |
| Concrete | | 80.00 | per CY |
| Steel Lining | | .80 | per # |
| Sales Tax | | 7.75 | percent |

Permanent materials, job materials, parts and supplies prices include freight and sales tax.

P. E. Sperry
March 12, 1996

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | A | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | DOWN | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,330 | 154 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | 20,330 | 4 | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 20,330 | 14 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 20,330 | 7 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | 20,330 | 40 | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 5,730 | 14 | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 80 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 87.2 | 233 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 110 | FPD | 5,000 | 45 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 45 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 279 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 170 | | | | | | | | |
| 46 | SINK SHAFT | | | - | | | | | | | | |
| 47 | DEVELOP | | | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | | | | | | |
| 52 | TUN EX & LINING | | | 279 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 554 | 2.2 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 4 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 2 |
| DEPRECIATION ADJUST. | | 1.00 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| DOWN | 0 | |
| MED | HIGH | rate of inflow |
| 3,720 | 4,770 | $/WD |
| 1.0165 | 0 | length factor |
| 3,781 | - | factored $/WD |
| FROM SHAFT | | |
| 17,100 | 17,100 | $/WD |
| | DAYS | 289 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | 500,000 |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 9,636,132 |
| | | SHAFT OPERATION, $/WD | | - | - |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 10,165 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | 1,053,983 |
| | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 851,827 |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| | | PLACE STEEL LINING, $/ft. | | 1,084 | 5,420,000 |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 17,892,107 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | WATER WELL, ETC. | | | --- | - |
| | POWER CO SETUP, LS/tun | | | 318,000 | 318,000 |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 745,220 |
| | DEWATER | | | | 330,000 |
| | CRANES, LS/tun | | | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 432,013 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 300,000 |
| | CARS, LS/tun | | | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | | | - | - |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | - |
| | | | TOTAL PLANT & EQUIPMENT | | 9,332,233 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 4,042,492 |
| | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| | | | TOTAL INDIRECT COSTS | --- | 4,304,792 |
| SUB TOTAL | | | | --- | 31,529,132 |
| BOND | | | | 0.49% | 154,000 |
| TOTAL ESTIMATED COST | | | | --- | 31,683,132 |
| | | | | TUNNEL | 1,558 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | B | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 2,868 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,330 | 154 | 18,810 | 141 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 20,330 | 53 | 18,610 | 49 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 18,810 | 4 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 16,330 | 11 | - | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | 4,910 | 8 | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | 4,000 | 49 | 13,700 | 169 | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 20,330 | 11 | 18,810 | 10 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 20,330 | 29 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | - | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | 18,810 | 142 | |
| 33 | | PROBE WATER | | | | PW | 3.33 | 2,000 | 7 | 18,610 | 62 | |
| 34 | | GROUT WATER | | | 1 | GW | 36.11 | - | - | 1,861 | 67 | |
| 35 | | HIGH TEMPERATURE | | | 2 | HT | 2.47 | 20,330 | 50 | 18,610 | 46 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | - | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 210 | | 557 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 55.9 | 364 | 26.7 | 698 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 4,000 | 30 | 18,610 | 138 | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 30 | | 138 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 393 | | 836 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 8 | | |
| 45 | MOBILIZATION | | | 80 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | 717 | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 90 | | | DEPRECIATION ADJUST. | | | 0.99 | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 836 | | | UP | DOWN | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | MED | HIGH | rate of inflow | | | |
| 54 | | | TOTAL | 1,853 | 7.4 | | 1,460 | 9,800 | $/WD | | | |
| 55 | | | | | | | 1.0165 | 0.9305 | length factor | | | |
| 56 | | | | | | | 1,484 | 9,119 | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | 8,620 | | $/WD | | | |
| 59 | | | | | | | | DAYS | 866 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | | SHAFT | | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | | CONSTRUCTION, $/ft. | | 7,500 | 21,510,000 |
| | | TUNNEL EXCAVATION | | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 43,851,648 |
| | | | SHAFT OPERATION, $/WD | | 2,900 | 2,744,403 |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 8,165 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | 49,100 |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | 3,097,500 |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | 8,210,486 |
| | | | PUMP WATER FROM SHAFT, $/WD | | 8,620 | 7,467,902 |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | 206,100 |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | 334,980 |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 1,631,586 |
| | | TUNNEL LINING | | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 1,137,340 |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | 8,433,530 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | 2 | 50,400 |
| | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | | PLACE STEEL LINING, $/ft. | | | - |
| | | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | | 112,713,140 |
| | PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | | WATER WELL, ETC. | | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | | 318,000 | 445,200 |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,431,960 |
| | | DEWATER | | | | 1,730,000 |
| | | CRANES, LS/tun | | | 113,000 | 146,900 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 827,475 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | | CARS, LS/tun | | | 384,000 | 768,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | | ADD TO GROUT WATER | | | 160,000 | 160,000 |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,935,000 |
| | | STEEL LINING, LS/tun | | | - | - |
| | | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (196,927) |
| | | | TOTAL PLANT & EQUIPMENT | | | 19,495,758 |
| | INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 19,486,687 |
| | | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| | | | TOTAL INDIRECT COSTS | | --- | 19,827,677 |
| | SUB TOTAL | | | | --- | 152,036,575 |
| | BOND | | | | 0.49% | ,000 |
| | TOTAL ESTIMATED COST | | | | --- | ,575 |
| | | | | | $/FOOT | 1,924 |

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 3A | | CONTRACT | | C | | |
| 2 | PORTALS, ea. | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | 2,302 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | DOWN | WD | UP | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 18,610 | 141 | 19,930 | 151 | |
| 14 | DELAYS | | DELAY | CODE | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | - | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | 2 headings | H3 | 2.62 | 18,610 | 49 | 19,930 | 52 | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | 19,930 | 4 | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | - | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | - | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | - | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | - | - | - | - | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | 18,410 | 32 | 10,600 | 18 | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | - | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | - | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | 200 | 5 | 9,330 | 229 | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | from shaft | CS | 0.52 | 18,610 | 10 | 19,930 | 10 | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | downgrade | MD | 1.96 | - | - | - | - | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | 18,610 | 78 | - | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | 19,930 | 152 | |
| 33 | PROBE WATER | | | PW | 3.33 | 18,610 | 62 | 19,930 | 66 | |
| 34 | GROUT WATER | | 2 | GW | 36.11 | 1,861 | 67 | 1,993 | 72 | |
| 35 | HIGH TEMPERATURE | | 2 | HT | 2.47 | 18,610 | 46 | 19,930 | 49 | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | - | - | 1 | 0 | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 348 | | 654 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 38.1 | 489 | 24.8 | 804 | |
| 39 | CONCRETE LINING, ft. | 1 | 2 | 134.4 | FPD | 18,610 | 138 | 19,930 | 148 | |
| 40 | STEEL LINING, ft. | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 138 | | 148 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 627 | | 953 | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | | LOCOMOTIVES, ea. | | 8 | | |
| 45 | MOBILIZATION | 80 | | | | REMOTE MUCK DISPOSAL | | 2 | | |
| 46 | SINK SHAFT | 576 | | | | DRILL WELL | | 1 | | |
| 47 | DEVELOP | 90 | | | | DEPRECIATION ADJUST. | | 0.99 | | |
| 48 | ERECT TBM # 1 | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | 40 | | | | PUMP WATER | | | | |
| 50 | REMOVE TBM # 1 | 15 | | | | FROM TUNNELS | | | | |
| 51 | REMOVE TBM # 2 | 15 | | | | Heading 1 | Heading 2 | | | |
| 52 | TUN EX & LINING | 953 | | | | DOWN | UP | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | HIGH | HIGH | rate of inflow | | |
| 54 | TOTAL | 1,828 | 7.3 | | | 9,800 | 4,770 | $/WD | | |
| 55 | | | | | | 0.9305 | 0.9965 | length factor | | |
| 56 | | | | | | 9,119 | 4,753 | factored $/WD | | |
| 57 | | | | | | FROM SHAFT | | | | |
| 58 | | | | | | 17,100 | 17,100 | $/WD | | |
| 59 | | | | | | | DAYS | 983 | | |
| 60 | | | | | | | | | | |

| | M N O P | Q | R |
|---|---|---|---|
| | COST ESTIMATE | UNIT COST | ITEM COST |
| | DIRECT COSTS | --- | --- |
| | PORTAL EXCAVATION, $/ea. | 500,000 | - |
| | SHAFT | --- | --- |
| | MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| | CONSTRUCTION, $/ft. | 7,500 | 17,265,000 |
| | TUNNEL EXCAVATION | --- | --- |
| | STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| | LABOR & JOB MATLS, $/WD | 41,308 | 53,410,977 |
| | SHAFT OPERATION, $/WD | 2,900 | 3,081,464 |
| | SPOT BOLT MATERIALS, $/ft. | 0.50 | - |
| | PATTERN BOLT MATERIALS, $/ft. | 10 | 290,100 |
| | STEEL SETS @ 4', $/ft. | 115 | - |
| | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | 3,335,500 |
| | PUMP WATER FROM TUNNELS | | 10,247,026 |
| | PUMP WATER FROM SHAFT, $/WD | 34,200 | 33,604,025 |
| | PROBE WATER MATERIALS, $/ft. | 10 | 385,400 |
| | GROUT WATER MATERIALS, $/ft. | 180 | 693,720 |
| | REMOTE MUCK DISPOSAL, $/CY | 10 | - |
| | TUNNEL LINING | --- | --- |
| | PURCHASE & ERECT FORMS, LS/tun | 598,600 | 1,137,340 |
| | PLACE CONCRETE LINING, $/ft. | 373 | 14,375,420 |
| | REMOVE FORMS & TRAVELER, LS/tun | 2 | 50,400 |
| | MOB FOR STEEL LINING, LS/tun | - | - |
| | PLACE STEEL LINING, $/ft. | | - |
| | LAKE TAP, LS $/ea subcontract | | |
| | TOTAL DIRECT COSTS | | 151,856,372 |
| | PLANT & EQUIPMENT | --- | --- |
| | BUILDINGS & YARD, LS/tun | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | 285,000 | 430,350 |
| | WATER WELL, ETC. | --- | 35,000 |
| | POWER CO SETUP, LS/tun | 318,000 | 445,200 |
| | AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 1,418,360 |
| | DEWATER | | 3,470,000 |
| | CRANES, LS/tun | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | 21.25 | 818,975 |
| | LOCOMOTIVES, $/ea. | 75,000 | 600,000 |
| | CARS, LS/tun | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | 425,000 | 935,000 |
| | ADD TO GROUT WATER | 160,000 | 320,000 |
| | CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,935,000 |
| | STEEL LINING, LS/tun | - | - |
| | GENERAL, LS/tun | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | (215,706) |
| | TOTAL PLANT & EQUIPMENT | | 21,354,879 |
| | INDIRECT COSTS | --- | --- |
| | MOBILIZATION & DEMOB, LS | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | 11,114 | 19,205,813 |
| | JOB SITE GENERATED POWER, $/KWH | - | - |
| | TOTAL INDIRECT COSTS | --- | 19,546,803 |
| | SUB TOTAL | --- | 192,758,053 |
| | BOND | 0.49% | 945,000 |
| | TOTAL ESTIMATED COST | --- | 193,703,053 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | D | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 2,594 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 19,930 | 151 | 20,065 | 152 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 19,930 | 52 | 20,065 | 53 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 20,065 | 4 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 11,200 | 8 | 20,065 | 14 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | 200 | 0 | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | 8,530 | 209 | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 19,930 | 10 | 20,065 | 10 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 20,065 | 39 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | 19,930 | 83 | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | 19,930 | 66 | - | - | |
| 34 | | GROUT WATER | | | 1 | GW | 36.11 | 1,993 | 72 | - | - | |
| 35 | | HIGH TEMPERATURE | | | 2 | HT | 2.47 | 19,930 | 49 | 20,065 | 50 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 551 | | 170 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 28.4 | 701 | 62.3 | 322 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 8,530 | 63 | - | - | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 63 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 765 | | 322 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 649 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 765 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 1,713 | 6.8 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | |
|---|---|
| LOCOMOTIVES, ea. | 8 |
| REMOTE MUCK DISPOSAL | 2 |
| DRILL WELL | 1 |
| DEPRECIATION ADJUST. | 1.00 |

| PUMP WATER FROM TUNNELS | Heading 1 | Heading 2 | |
|---|---|---|---|
| | UP | DOWN | |
| | HIGH | MED | rate of inflow |
| | 4,770 | 3,720 | $/WD |
| | 0.9965 | 1.00325 | length factor |
| | 4,753 | 3,732 | factored $/WD |
| FROM SHAFT | | | |
| | 17,100 | 8,620 | $/WD |
| | | DAYS | 79[illegible] |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | 500,000 | - |
| | | SHAFT | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| | | | CONSTRUCTION, $/ft. | 7,500 | 19,455,000 |
| | | TUNNEL EXCAVATION | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| | | | LABOR & JOB MATLS, $/WD | 41,308 | 42,271,540 |
| | | | SHAFT OPERATION, $/WD | 2,900 | 2,536,979 |
| | | | SPOT BOLT MATERIALS, $/ft. | 0.50 | 15,633 |
| | | | PATTERN BOLT MATERIALS, $/ft. | 10 | 2,000 |
| | | | STEEL SETS @ 4', $/ft. | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | 2,985,500 |
| | | | PUMP WATER FROM TUNNELS | | 4,837,055 |
| | | | PUMP WATER FROM SHAFT, $/WD | 25,720 | 20,442,781 |
| | | | PROBE WATER MATERIALS, $/ft. | 10 | 199,300 |
| | | | GROUT WATER MATERIALS, $/ft. | 180 | 358,740 |
| | | | REMOTE MUCK DISPOSAL, $/CY | 10 | - |
| | | TUNNEL LINING | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| | | | PLACE CONCRETE LINING, $/ft. | 373 | 3,181,690 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| | | | MOB FOR STEEL LINING, LS/tun | - | - |
| | | | PLACE STEEL LINING, $/ft. | | - |
| | | LAKE TAP, LS $/ea subcontract | | | |
| | | | TOTAL DIRECT COSTS | | 110,890,019 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | 618,000 | 710,700 |
| | | BASE UTILITIES, LS/tun | | 285,000 | 430,350 |
| | | WATER WELL, ETC. | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | 34 | 1,467,830 |
| | | DEWATER | | | 3,220,000 |
| | | CRANES, LS/tun | | 113,000 | 146,900 |
| | | HAUL, RUBBER, LS/tun | | 21,000 | 23,100 |
| | | RAIL & SWITCHES, $/ft. | | 21.25 | 849,894 |
| | | LOCOMOTIVES, $/ea. | | 75,000 | 600,000 |
| | | CARS, LS/tun | | 384,000 | 768,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | 142,000 | 213,000 |
| | | DRILLS, LS/tunnel | | 38,000 | 76,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | 42,000 | 84,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | 4,800,000 | 8,736,000 |
| | | ADD TO WORK FROM SHAFT | | 425,000 | 935,000 |
| | | ADD TO GROUT WATER | | 160,000 | 160,000 |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | 1,100,000 | 1,209,000 |
| | | STEEL LINING, LS/tun | | - | - |
| | | GENERAL, LS/tun | | 300,000 | 405,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | - |
| | | | TOTAL PLANT & EQUIPMENT | | 20,069,774 |
| INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | 262,300 | 340,990 |
| | | VARIABLE, $/WD and /tun | | 11,114 | 17,930,443 |
| | | JOB SITE GENERATED POWER, $/KWH | | 0.25 | 5,729,500 |
| | | | TOTAL INDIRECT COSTS | --- | 24,000,933 |
| SUB TOTAL | | | | --- | 154,960,726 |
| BOND | | | | 0.49% | 59,000 |
| TOTAL ESTIMATED COST | | | | --- | ,9,726 |
| | | | | $/FOOT | 3,893 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | E | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 1,007 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,065 | 152 | 20,195 | 153 | |
| 14 | DELAYS | | | | DELAY | CODE | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 20,065 | 53 | 20,195 | 53 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 20,195 | 4 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 20,065 | 14 | 20,195 | 14 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 20,065 | 10 | 20,195 | 10 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 20,065 | 28 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 13,000 | 25 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 9,065 | 22 | - | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 128 | | 107 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 71.8 | 279 | 77.7 | 260 | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | - | - | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | - | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 279 | | 260 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 8 | | |
| 45 | MOBILIZATION | | | 80 | | | REMOTE MUCK DISPOSAL | | | 2 | | |
| 46 | SINK SHAFT | | | 252 | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 90 | | | DEPRECIATION ADJUST. | | | 1.00 | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 279 | | | UP | DOWN | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | MED | MED | rate of inflow | | | |
| 54 | | | TOTAL | 831 | 3.3 | | 1,460 | 3,720 | $/WD | | | |
| 55 | | | | | | | 1.00325 | 1.00975 | length factor | | | |
| 56 | | | | | | | 1,465 | 3,756 | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | 8,620 | 8,620 | $/WD | | | |
| 59 | | | | | | | | DAYS | 309 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | | SHAFT | | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | | CONSTRUCTION, $/ft. | | 7,500 | 7,552,500 |
| | | TUNNEL EXCAVATION | | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 22,280,492 |
| | | | SHAFT OPERATION, $/WD | | 2,900 | 1,128,978 |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 20,130 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | 1,386,008 |
| | | | PUMP WATER FROM SHAFT, $/WD | | 17,240 | 5,332,382 |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | | TUNNEL LINING | | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | | PLACE STEEL LINING, $/ft. | | 1,084 | - |
| | | LAKE TAP, LS $/ea subcontract | | | | |
| | | | | TOTAL DIRECT COSTS | | 51,680,490 |
| | PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | | WATER WELL, ETC. | | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,422,840 |
| | | DEWATER | | | | 1,240,000 |
| | | CRANES, LS/tun | | | 113,000 | 146,900 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 855,525 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | | CARS, LS/tun | | | 384,000 | 768,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | | ADD TO GROUT WATER | | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | | STEEL LINING, LS/tun | | | - | - |
| | | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | - |
| | | | | TOTAL PLANT & EQUIPMENT | | 16,790,415 |
| | INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 8,124,922 |
| | | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 2,952,250 |
| | | | | TOTAL INDIRECT COSTS | --- | 11,418,162 |
| | SUB TOTAL | | | | --- | 79,889,067 |
| | BOND | | | | 0.49% | 391,000 |
| | TOTAL ESTIMATED COST | | | | --- | 80,280,067 |
| | | | | | $/FOOT | 1.994 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | F | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 375 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,195 | 153 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | 20,195 | 14 | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 20,195 | 14 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | | - | |
| 28 | | | | | from shaft | CS | 0.52 | 20,195 | 10 | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 38 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 105.7 | 191 | | - | |
| 39 | CONCRETE LINING, ft. | | | 2 | 1 | 134.4 | FPD | 1,000 | 7 | | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 110 | FPD | 5,000 | 45 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 53 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 244 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 94 | | | | | | | | |
| 47 | DEVELOP | | | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | | | | | | |
| 52 | TUN EX & LINING | | | 244 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 553 | 2.2 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 4 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 2 |
| DEPRECIATION ADJUST. | | 1.00 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | 0 | |
| LOW | | rate of inflow |
| 260 | | $/WD |
| 1.00975 | 0 | length factor |
| 263 | - | factored $/WD |
| FROM SHAFT | | |
| 6,360 | | $/WD |
| | DAYS | 25[illegible] |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 470,000 |
| | | CONSTRUCTION, $/ft. | | 8,200 | 3,075,000 |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 7,893,383 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 867,045 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 10,098 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | 64,054 |
| | | PUMP WATER FROM SHAFT, $/WD | | 6,360 | 1,647,120 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 846,171 |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | 250,000 | 250,000 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 373,000 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 1 | 25,200 |
| | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| | | PLACE STEEL LINING, $/ft. | | 1,084 | 5,420,000 |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 21,361,069 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | WATER WELL, ETC. | | | --- | - |
| | POWER CO SETUP, LS/tun | | | 318,000 | 318,000 |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 686,630 |
| | DEWATER | | | | 160,000 |
| | CRANES, LS/tun | | | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 429,144 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 300,000 |
| | CARS, LS/tun | | | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 425,000 |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,209,000 |
| | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | - |
| | | | TOTAL PLANT & EQUIPMENT | | 10,625,774 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 5,031,653 |
| | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| | | | TOTAL INDIRECT COSTS | --- | 5,293,953 |
| SUB TOTAL | | | | --- | 37,280,796 |
| BOND | | | | 0.49% | 13,000 |
| TOTAL ESTIMATED COST | | | | --- | 33,796 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | G | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,860 | 158 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 20,860 | 15 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 20,860 | 7 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 22 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 116.2 | 179 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 110 | FPD | 11,100 | 101 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 101 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 280 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 5 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 1.04 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 280 | | | UP | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 555 | 2.2 | | 260 | | $/WD | | | |
| 55 | | | | | | | 1.043 | 0 | length factor | | | |
| 56 | | | | | | | 271 | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 290 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| 1 | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| 2 | DIRECT COSTS | | | | --- | --- |
| 3 | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 500,000 |
| 4 | | SHAFT | | | --- | --- |
| 5 | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| 6 | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| 7 | | TUNNEL EXCAVATION | | | --- | --- |
| 8 | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| 9 | | | LABOR & JOB MATLS, $/WD | | 41,308 | 7,414,107 |
| 10 | | | SHAFT OPERATION, $/WD | | - | - |
| 11 | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 10,430 |
| 12 | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| 13 | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| 14 | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| 15 | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| 16 | | | PUMP WATER FROM TUNNELS | | | 76,037 |
| 17 | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| 18 | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| 19 | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| 20 | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 874,034 |
| 21 | | TUNNEL LINING | | | --- | --- |
| 22 | | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| 23 | | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| 24 | | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| 25 | | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| 26 | | | PLACE STEEL LINING, $/ft. | | 1084 | 12,032,400 |
| 27 | | LAKE TAP, LS $/ea subcontract | | | | |
| 28 | | | | TOTAL DIRECT COSTS | | 21,327,008 |
| 29 | PLANT & EQUIPMENT | | | | --- | --- |
| 30 | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| 31 | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| 32 | | WATER WELL, ETC. | | | --- | - |
| 33 | | POWER CO SETUP, LS/tun | | | 318,000 | 318,000 |
| 34 | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 709,240 |
| 35 | | DEWATER | | | | 150,000 |
| 36 | | CRANES, LS/tun | | | 113,000 | 113,000 |
| 37 | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| 38 | | RAIL & SWITCHES, $/ft. | | | 21.25 | 443,275 |
| 39 | | LOCOMOTIVES, $/ea. | | | 75,000 | 375,000 |
| 40 | | CARS, LS/tun | | | 384,000 | 384,000 |
| 41 | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| 42 | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| 43 | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| 44 | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| 45 | | ADD TO WORK FROM SHAFT | | | - | - |
| 46 | | ADD TO GROUT WATER | | | 160,000 | - |
| 47 | | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| 48 | | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| 49 | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| 50 | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 368,101 |
| 51 | | | | TOTAL PLANT & EQUIPMENT | | 9,570,616 |
| 52 | INDIRECT COSTS | | | | --- | --- |
| 53 | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| 54 | | VARIABLE, $/WD and /tun | | | 11,114 | 4,060,974 |
| 55 | | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| 56 | | | | TOTAL INDIRECT COSTS | --- | 4,323,274 |
| 57 | SUB TOTAL | | | | --- | 35,220,897 |
| 58 | BOND | | | | 0.49% | 173,000 |
| 59 | TOTAL ESTIMATED COST | | | | --- | 35,393,897 |
| 60 | | | | | $/FOOT | 1,697 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | H | | |
| 2 | PORTALS, ea. | | | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP 2% | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 11,300 | 85 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | 11,300 | 1 | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 11,300 | 8 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 11,300 | 4 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 13 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 114.7 | 99 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 110 | FPD | 3,700 | 34 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 34 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 132 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 3 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 0.91 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 132 | | | UP 2% | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 407 | 1.6 | | - | | $/WD | | | |
| 55 | | | | | | | 0.565 | 0 | length factor | | | |
| 56 | | | | | | | - | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 142 | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 1,000,000 |
| | | SHAFT | | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | | TUNNEL EXCAVATION | | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 4,070,426 |
| | | | SHAFT OPERATION, $/WD | | - | - |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 5,650 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | - |
| | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 473,470 |
| | | TUNNEL LINING | | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| | | | PLACE STEEL LINING, $/ft. | | 1084 | 4,010,800 |
| | | LAKE TAP, LS $/ea subcontracl | | | | |
| | | | TOTAL DIRECT COSTS | | | 9,980,346 |
| | PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | | WATER WELL, ETC. | | | --- | - |
| | | POWER CO SETUP, LS/tun | | | 318,000 | 318,000 |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 384,200 |
| | | DEWATER | | | | - |
| | | CRANES, LS/tun | | | 113,000 | 113,000 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 240,125 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 225,000 |
| | | CARS, LS/tun | | | 384,000 | 384,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | | ADD TO WORK FROM SHAFT | | | - | - |
| | | ADD TO GROUT WATER | | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (753,689) |
| | | | TOTAL PLANT & EQUIPMENT | | | 7,620,636 |
| | INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 2,413,681 |
| | | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| | | | TOTAL INDIRECT COSTS | | --- | 2,675,981 |
| | SUB TOTAL | | | | --- | 5,962 |
| | BOND | | | | 0.49% | 1,000 |
| | TOTAL ESTIMATED COST | | | | --- | 75,962 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3B | | CONTRACT | | A | | |
| 2 | PORTALS, ea. | | | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP 5.2% | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 9,600 | 73 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | 9,600 | 4 | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 9,600 | 7 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 9,600 | 3 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 14 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 110.6 | 87 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 86 | FPD | 9,600 | 112 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 112 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 198 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 3 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 0.91 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 198 | | | UP 5.2% | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 473 | 1.9 | | - | | $/WD | | | |
| 55 | | | | | | | 0.48 | 0 | length factor | | | |
| 56 | | | | | | | - | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 208 | | | |
| 60 | | | | | | | | | | | | |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | 1,000,000 |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 3,587,104 |
| | | SHAFT OPERATION, $/WD | | - | - |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 4,800 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | - |
| | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 402,240 |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | PLACE CONCRETE LINING, $/ft. | | - | - |
| | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| | | PLACE STEEL LINING, $/ft. | | 1.725 | 16,560,000 |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 21,974,144 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 326,400 |
| | DEWATER | | | | - |
| | CRANES, LS/tun | | | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 204,000 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 225,000 |
| | CARS, LS/tun | | | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | | | - | - |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (719,766) |
| | | | TOTAL PLANT & EQUIPMENT | | 7,277,634 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 3,150,440 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 992,131 |
| | | | TOTAL INDIRECT COSTS | --- | 4,404,871 |
| SUB TOTAL | | | | --- | 33,656,649 |
| BOND | | | | 0.49% | 165,000 |
| TOTAL ESTIMATED COST | | | | --- | 33,821,649 |
| | | | | $/FOOT | 3,523 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3B | | CONTRACT | | B | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | DOWN | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 22,600 | 171 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | | - | |
| 16 | | | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | | DOWN MINOR GRADE | | | DM | 0.22 | - | - | | - | |
| 19 | | | DOWN 3% GRADE | | | D3 | 0.50 | 22,600 | 11 | | - | |
| 20 | | | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | | - | |
| 21 | | | UP 5% GRADE | | | U5 | 0.44 | - | - | | - | |
| 22 | | | SPOT BOLTS | | | SB | 0.70 | 22,600 | 16 | | - | |
| 23 | | | PATTERN BOLTS | | | PB | 1.72 | - | - | | - | |
| 24 | | | SETS @ 4' OC | | | S1 | 6.25 | - | - | | - | |
| 25 | | | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | | - | |
| 26 | | | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | | - | |
| 27 | | | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 22,600 | 8 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | 22,600 | 44 | | - | |
| 31 | | | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | | PROBE WATER | | | PW | 3.33 | - | - | | - | |
| 34 | | | GROUT WATER | - | | GW | 36.11 | - | - | | - | |
| 35 | | | HIGH TEMPERATURE | | 1 | HT | 2.47 | 14,200 | 35 | | - | |
| 36 | | | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 114 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 79.3 | 285 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | | |
| 40 | STEEL LINING, ft. | | | | 1 | 110 | FPD | 1,000 | 9 | | | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 9 | | | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 294 | | | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 170 | | | | | | | | |
| 46 | SINK SHAFT | | | - | | | | | | | | |
| 47 | DEVELOP | | | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | | | | | | |
| 52 | TUN EX & LINING | | | 294 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 569 | 2.3 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 4 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 0.96 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| DOWN | 0 | |
| MED | | rate of inflow |
| 3,720 | | $/WD |
| 1.13 | 0 | length factor |
| 4,204 | - | factored $/WD |
| FROM SHAFT | | |
| | | $/WD |
| | DAYS | 304 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | | | PORTAL EXCAVATION, $/ea. | 500,000 | 500,000 |
| | | | SHAFT | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | --- | - |
| | | | CONSTRUCTION, $/ft. | 7,500 | - |
| | | | TUNNEL EXCAVATION | --- | --- |
| | | | STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| | | | LABOR & JOB MATLS, $/WD | 41,308 | 11,774,727 |
| | | | SHAFT OPERATION, $/WD | - | - |
| | | | SPOT BOLT MATERIALS, $/ft. | 0.50 | 11,300 |
| | | | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | 1,236,439 |
| | | | PUMP WATER FROM SHAFT, $/WD | - | - |
| | | | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | 10 | 946,940 |
| | | | TUNNEL LINING | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | - | - |
| | | | PLACE CONCRETE LINING, $/ft. | - | - |
| | | | REMOVE FORMS & TRAVELER, LS/tun | - | - |
| | | | MOB FOR STEEL LINING, LS/tun | 1 | 150,000 |
| | | | PLACE STEEL LINING, $/ft. | 1,084 | 1,084,000 |
| | | | LAKE TAP, LS $/ea subcontract | | |
| | | | TOTAL DIRECT COSTS | | 15,973,405 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | | | BUILDINGS & YARD, LS/tun | 618,000 | 618,000 |
| | | | BASE UTILITIES, LS/tun | 285,000 | 285,000 |
| | | | WATER WELL, ETC. | --- | 35,000 |
| | | | POWER CO SETUP, LS/tun | - | - |
| | | | AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 822,400 |
| | | | DEWATER | | 1,250,000 |
| | | | CRANES, LS/tun | 113,000 | 113,000 |
| | | | HAUL, RUBBER, LS/tun | 21,000 | 21,000 |
| | | | RAIL & SWITCHES, $/ft. | 21.25 | 480,250 |
| | | | LOCOMOTIVES, $/ea. | 75,000 | 300,000 |
| | | | CARS, LS/tun | 384,000 | 384,000 |
| | | | SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 142,000 |
| | | | DRILLS, LS/tunnel | 38,000 | 38,000 |
| | | | TUNNEL MUCKERS, LS/tunnel | 42,000 | 42,000 |
| | | | TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 4,800,000 |
| | | | ADD TO WORK FROM SHAFT | - | - |
| | | | ADD TO GROUT WATER | 160,000 | - |
| | | | CONCRETE LINING, LS/tun + SHOTCRETE | - | 109,000 |
| | | | STEEL LINING, LS/tun | 355,000 | 355,000 |
| | | | GENERAL, LS/tun | 300,000 | 300,000 |
| | | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | (403,786) |
| | | | TOTAL PLANT & EQUIPMENT | | 9,690,864 |
| INDIRECT COSTS | | | | --- | --- |
| | | | MOBILIZATION & DEMOB, LS | 262,300 | 262,300 |
| | | | VARIABLE, $/WD and /tun | 11,114 | 4,213,740 |
| | | | JOB SITE GENERATED POWER, $/KWH | 0.25 | 1,326,983 |
| | | | TOTAL INDIRECT COSTS | --- | 203,023 |
| SUB TOTAL | | | | --- | 7,293 |
| BOND | | | | 0.49% | 34,000 |
| TOTAL ESTIMATED COST | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3B | | CONTRACT | | C | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 1,485 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 22,600 | 171 | 20,600 | 156 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | 22,600 | 31 | 20,600 | 28 | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | - | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | - | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | 20,600 | 10 | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | 22,600 | 3 | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 22,600 | 16 | 20,600 | 14 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 22,600 | 12 | 20,600 | 11 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 22,600 | 32 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 20,600 | 40 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 7,000 | 17 | - | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 110 | | 104 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 80.4 | 281 | 79.3 | 260 | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | - | - | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | 5,500 | 64 | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | - | | 64 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 281 | | 324 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 8 | | |
| 45 | MOBILIZATION | | | 80 | | | REMOTE MUCK DISPOSAL | | | 2 | | |
| 46 | SINK SHAFT | | | 371 | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 90 | | | DEPRECIATION ADJUST. | | | 0.96 | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 324 | | | UP | DOWN | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | MED | MED | rate of inflow | | | |
| 54 | | | TOTAL | 995 | 3.9 | | 1,460 | 3,720 | $/WD | | | |
| 55 | | | | | | | 1.13 | 1.03 | length factor | | | |
| 56 | | | | | | | 1,650 | 3,832 | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | 8,620 | 8,620 | $/WD | | | |
| 59 | | | | | | | | DAYS | 354 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | | SHAFT | | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | | CONSTRUCTION, $/ft. | | 7,500 | 11,137,500 |
| | | TUNNEL EXCAVATION | | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 22,342,298 |
| | | | SHAFT OPERATION, $/WD | | 2,900 | 1,257,798 |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 21,600 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | 1,704,139 |
| | | | PUMP WATER FROM SHAFT, $/WD | | 17,240 | 6,098,190 |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | | TUNNEL LINING | | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | | PLACE STEEL LINING, $/ft. | | 1,725 | 9,487,500 |
| | | LAKE TAP, LS $/ea subcontract | | | | |
| | | | | TOTAL DIRECT COSTS | | 66,029,025 |
| | PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | | WATER WELL, ETC. | | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,522,800 |
| | | DEWATER | | | | 450,000 |
| | | CRANES, LS/tun | | | 113,000 | 146,900 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 918,000 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | | CARS, LS/tun | | | 384,000 | 768,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | | ADD TO GROUT WATER | | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | | STEEL LINING, LS/tun | | | - | - |
| | | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (646,514) |
| | | | | TOTAL PLANT & EQUIPMENT | | 15,516,336 |
| | INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 9,946,734 |
| | | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 3,788,750 |
| | | | | TOTAL INDIRECT COSTS | --- | 14,076,474 |
| | SUB TOTAL | | | | --- | 95,621,834 |
| | BOND | | | | 0.49% | 469,000 |
| | TOTAL ESTIMATED COST | | | | --- | 96,090,834 |
| | | | | | $/FOOT | 2,224 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3B | | CONTRACT | | D | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 1,315 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,600 | 156 | 21,100 | 159 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | - | - | |
| 16 | | | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 20,600 | 54 | 21,100 | 55 | |
| 18 | | | DOWN MINOR GRADE | | | DM | 0.22 | - | - | 21,100 | 5 | |
| 19 | | | DOWN 3% GRADE | | | D3 | 0.50 | - | - | - | - | |
| 20 | | | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | - | - | |
| 21 | | | UP 5% GRADE | | | U5 | 0.44 | - | - | - | - | |
| 22 | | | SPOT BOLTS | | | SB | 0.70 | 20,600 | 14 | 21,100 | 15 | |
| 23 | | | PATTERN BOLTS | | | PB | 1.72 | - | - | - | - | |
| 24 | | | SETS @ 4' OC | | | S1 | 6.25 | - | - | - | - | |
| 25 | | | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | - | - | |
| 26 | | | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | - | - | |
| 27 | | | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 20,600 | 7 | 21,100 | 7 | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | - | - | |
| 29 | | | MED WATER INFLOW | | upgrade | MU | 1.40 | 20,600 | 29 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 21,100 | 41 | |
| 31 | | | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | | PROBE WATER | | | PW | 3.33 | - | - | - | - | |
| 34 | | | GROUT WATER | | - | GW | 36.11 | - | - | - | - | |
| 35 | | | HIGH TEMPERATURE | | - | HT | 2.47 | - | - | - | - | |
| 36 | | | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 104 | | 123 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 79.2 | 260 | 74.6 | 283 | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | - | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 86 | FPD | 3,500 | 41 | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 41 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 301 | | 283 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 329 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 301 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 930 | 3.7 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 7 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.12 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| MED | MED | rate of inflow |
| 1,460 | 3,720 | $/WD |
| 1.03 | 1.055 | length factor |
| 1,504 | 3,925 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 8,620 | $/WD |
| | DAYS | 331 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | 500,000 | - |
| | | SHAFT | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| | | | CONSTRUCTION, $/ft. | 7,500 | 9,862,500 |
| | | TUNNEL EXCAVATION | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| | | | LABOR & JOB MATLS, $/WD | 41,308 | 22,429,868 |
| | | | SHAFT OPERATION, $/WD | 2,900 | 1,191,594 |
| | | | SPOT BOLT MATERIALS, $/ft. | 0.50 | 20,850 |
| | | | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | 1,562,339 |
| | | | PUMP WATER FROM SHAFT, $/WD | 17,240 | 5,704,622 |
| | | | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | 10 | 1,747,230 |
| | | TUNNEL LINING | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | - | - |
| | | | PLACE CONCRETE LINING, $/ft. | 373 | - |
| | | | REMOVE FORMS & TRAVELER, LS/tun | - | - |
| | | | MOB FOR STEEL LINING, LS/tun | 1 | 150,000 |
| | | | PLACE STEEL LINING, $/ft. | 1,725 | 6,037,500 |
| | | LAKE TAP, LS $/ea subcontract | | | |
| | | | TOTAL DIRECT COSTS | | 62,686,503 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | 618,000 | 710,700 |
| | | BASE UTILITIES, LS/tun | | 285,000 | 430,350 |
| | | WATER WELL, ETC. | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | 34 | 1,417,800 |
| | | DEWATER | | | |
| | | CRANES, LS/tun | | 113,000 | 146,900 |
| | | HAUL, RUBBER, LS/tun | | 21,000 | 23,100 |
| | | RAIL & SWITCHES, $/ft. | | 21.25 | 886,125 |
| | | LOCOMOTIVES, $/ea. | | 75,000 | 525,000 |
| | | CARS, LS/tun | | 384,000 | 768,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | 142,000 | 213,000 |
| | | DRILLS, LS/tunnel | | 38,000 | 76,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | 42,000 | 84,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | 4,800,000 | 8,736,000 |
| | | ADD TO WORK FROM SHAFT | | 425,000 | 935,000 |
| | | ADD TO GROUT WATER | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | - | 109,000 |
| | | STEEL LINING, LS/tun | | 355,000 | 355,000 |
| | | GENERAL, LS/tun | | 300,000 | 405,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | 1,902,717 |
| | | | TOTAL PLANT & EQUIPMENT | | 17,758,692 |
| INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | 262,300 | 340,990 |
| | | VARIABLE, $/WD and /tun | | 11,114 | 9,220,669 |
| | | JOB SITE GENERATED POWER, $/KWH | | 0.25 | 3,491,250 |
| | | | TOTAL INDIRECT COSTS | --- | 13,052,909 |
| SUB TOTAL | | | | --- | 93,498,105 |
| BOND | | | | 0.49% | 8,000 |
| TOTAL ESTIMATED COST | | | | --- | 3,105 |
| | | | | $/FOOT | 2,253 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3B | | CONTRACT | | E | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 21,100 | 159 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 21,100 | 15 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 21,100 | 7 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 21,100 | 30 | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 52 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 99.9 | 211 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | 5,000 | 58 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 58 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 269 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 8 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 1.14 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 269 | | | UP | 0 | | | | |
| 53 | LAKE TAP | | | 75 | | | MED | | rate of inflow | | | |
| 54 | CLEANUP & MOVEOUT | | | 20 | YEARS | | - | | $/WD | | | |
| 55 | | | TOTAL | 619 | 2.5 | | 1.055 | 0 | length factor | | | |
| 56 | | | | | | | - | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 354 | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| 1 | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| 2 | DIRECT COSTS | | | | --- | --- |
| 3 | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 500,000 |
| 4 | | SHAFT | | | --- | --- |
| 5 | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| 6 | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| 7 | | TUNNEL EXCAVATION | | | --- | --- |
| 8 | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| 9 | | | LABOR & JOB MATLS, $/WD | | 41,308 | 8,721,388 |
| 10 | | | SHAFT OPERATION, $/WD | | - | - |
| 11 | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 10,550 |
| 12 | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| 13 | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| 14 | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| 15 | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| 16 | | | PUMP WATER FROM TUNNELS | | | - |
| 17 | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| 18 | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| 19 | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| 20 | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 884,090 |
| 21 | | TUNNEL LINING | | | --- | --- |
| 22 | | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| 23 | | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| 24 | | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| 25 | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| 26 | | | PLACE STEEL LINING, $/ft. | | 1,725 | 8,625,000 |
| 27 | | LAKE TAP, LS $/ea subcontract | | | | 10,000,000 |
| 28 | | | | TOTAL DIRECT COSTS | | 29,011,028 |
| 29 | PLANT & EQUIPMENT | | | | --- | --- |
| 30 | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| 31 | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| 32 | | WATER WELL, ETC. | | | --- | - |
| 33 | | POWER CO SETUP, LS/tun | | | - | - |
| 34 | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 717,400 |
| 35 | | DEWATER | | | | 300,000 |
| 36 | | CRANES, LS/tun | | | 113,000 | 113,000 |
| 37 | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| 38 | | RAIL & SWITCHES, $/ft. | | | 21.25 | 448,375 |
| 39 | | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| 40 | | CARS, LS/tun | | | 384,000 | 384,000 |
| 41 | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| 42 | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| 43 | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| 44 | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| 45 | | ADD TO WORK FROM SHAFT | | | - | - |
| 46 | | ADD TO GROUT WATER | | | 160,000 | - |
| 47 | | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| 48 | | STEEL LINING, LS/tun | | | - | - |
| 49 | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| 50 | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 1,248,489 |
| 51 | | | | TOTAL PLANT & EQUIPMENT | | 10,166,264 |
| 52 | INDIRECT COSTS | | | | --- | --- |
| 53 | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| 54 | | VARIABLE, $/WD and /tun | | | 11,114 | 4,770,910 |
| 55 | | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 1,239,946 |
| 56 | | | | TOTAL INDIRECT COSTS | --- | 6,273,156 |
| 57 | SUB TOTAL | | | | --- | 45,450,447 |
| 58 | BOND | | | | 0.49% | 223,000 |
| 59 | TOTAL ESTIMATED COST | | | | --- | 45,673,447 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | A | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | DOWN | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 18,750 | 142 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | 18,750 | 4 | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 18,750 | 13 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 18,750 | 6 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | 18,750 | 37 | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 750 | 2 | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 62 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 91.9 | 204 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | - | 110 | FPD | 3,000 | 27 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 27 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 231 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 4 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 1.00 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 231 | | | DOWN | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | MED | | rate of inflow | | | |
| 54 | | | TOTAL | 506 | 2.0 | | 3,720 | | $/WD | | | |
| 55 | | | | | | | 0.9375 | 0 | length factor | | | |
| 56 | | | | | | | 3,488 | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 241 | | | |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | 500,000 |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 8,424,277 |
| | | SHAFT OPERATION, $/WD | | - | - |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 9,375 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | 806,348 |
| | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 785,625 |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | 1,084 | 3,252,000 |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 14,047,625 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 691,500 |
| | DEWATER | | | | 330,000 |
| | CRANES, LS/tun | | | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 398,438 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 300,000 |
| | CARS, LS/tun | | | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | | | - | - |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | - |
| | | | TOTAL PLANT & EQUIPMENT | | 8,606,938 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 3,514,368 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 1,106,738 |
| | | | TOTAL INDIRECT COSTS | --- | 4 883,406 |
| SUB TOTAL | | | | --- | 7,968 |
| BOND | | | | 0.49% | .5,000 |
| TOTAL ESTIMATED COST | | | | --- | 672 968 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | B | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 3,440 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 18,750 | 142 | 22,170 | 168 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 18,750 | 49 | 22,170 | 58 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 22,170 | 5 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 18,750 | 13 | 21,570 | 15 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | 400 | 1 | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | 200 | 5 | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 18,750 | 10 | 22,170 | 12 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 18,750 | 26 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | - | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | 22,170 | 169 | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 2 | HT | 2.47 | 18,750 | 46 | 22,170 | 55 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 145 | | 319 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 65.5 | 286 | 45.5 | 487 | |
| 39 | CONCRETE LINING, ft. | | | 2 | 1 | 50 | FPD | - | - | 200 | 4 | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | - | | 4 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 286 | | 491 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 860 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 491 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 1,651 | 6.6 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 9 |
| REMOTE MUCK DISPOSAL | | 2 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.02 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| MED | HIGH | rate of inflow |
| 1,460 | 9,800 | $/WD |
| 0.9375 | 1.1085 | length factor |
| 1,369 | 10,863 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 17,100 | $/WD |
| | DAYS | 521 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | CONSTRUCTION, $/ft. | | 7,500 | 25,800,000 |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 31,943,804 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 1,742,624 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 20,160 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | 4,000 |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | 70,000 |
| | | PUMP WATER FROM TUNNELS | | | 5,724,860 |
| | | PUMP WATER FROM SHAFT, $/WD | | 25,720 | 13,397,671 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | 250,000 | 250,000 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 74,600 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 1 | 25,200 |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | | - |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 93,032,920 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,499,280 |
| | DEWATER | | | | 4,510,000 |
| | CRANES, LS/tun | | | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 869,550 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 675,000 |
| | CARS, LS/tun | | | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,209,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 426,518 |
| | | | TOTAL PLANT & EQUIPMENT | | 21,752,398 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 17,236,756 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 7,210,000 |
| | | | TOTAL INDIRECT COSTS | --- | 24,787,746 |
| SUB TOTAL | | | | --- | 139,573,063 |
| BOND | | | | 0.49% | 684,000 |
| TOTAL ESTIMATED COST | | | | --- | 140,257,063 |

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 5A | | CONTRACT | | C | | |
| 2 | PORTALS, ea. | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | 3,030 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 22,170 | 168 | 17,425 | 132 | |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | - | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | 2 headings | H3 | 2.62 | 22,170 | 58 | 17,425 | 46 | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | 17,425 | 4 | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | - | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | - | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | - | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 20,970 | 15 | 17,425 | 12 | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | 800 | 1 | - | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | - | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | - | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | 400 | 10 | - | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | | - | - | - | |
| 28 | | | from shaft | CS | 0.52 | 22,170 | 12 | 17,425 | 9 | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | downgrade | MD | 1.96 | - | - | 17,425 | 34 | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | 22,170 | 93 | - | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | - | - | |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | - | - | |
| 35 | HIGH TEMPERATURE | | 2 | HT | 2.47 | 22,170 | 55 | 17,425 | 43 | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 243 | | 148 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 54.0 | 411 | 62.3 | 280 | |
| 39 | CONCRETE LINING, ft. | 2 | 1 | 70 | FPD | 400 | 6 | - | - | |
| 40 | STEEL LINING, ft. | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 6 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 416 | | 280 | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | | LOCOMOTIVES, ea. | | 9 | | |
| 45 | MOBILIZATION | 80 | | | | REMOTE MUCK DISPOSAL | | 1 | | |
| 46 | SINK SHAFT | 758 | | | | DRILL WELL | | 1 | | |
| 47 | DEVELOP | 90 | | | | DEPRECIATION ADJUST. | | 1.00 | | |
| 48 | ERECT TBM # 1 | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | 40 | | | | PUMP WATER | | | | |
| 50 | REMOVE TBM # 1 | 15 | | | | FROM TUNNELS | | | | |
| 51 | REMOVE TBM # 2 | 15 | | | | Heading 1 | Heading 2 | | | |
| 52 | TUN EX & LINING | 416 | | | | UP | DOWN | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | HIGH | MED | rate of inflow | | |
| 54 | TOTAL | 1,474 | 5.8 | | | 4,770 | 3,720 | $/WD | | |
| 55 | | | | | | 1.1085 | 0.87125 | length factor | | |
| 56 | | | | | | 5,288 | 3,241 | factored $/WD | | |
| 57 | | | | | | FROM SHAFT | | | | |
| 58 | | | | | | 17,100 | 8,620 | $/WD | | |
| 59 | | | | | | | DAYS | 446 | | |

| M N O P | Q | R |
|---|---|---|
| COST ESTIMATE | UNIT COST | ITEM COST |
| DIRECT COSTS | --- | --- |
| PORTAL EXCAVATION, $/ea. | 500,000 | - |
| SHAFT | --- | --- |
| MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| CONSTRUCTION, $/ft. | 7,500 | 22,725,000 |
| TUNNEL EXCAVATION | --- | --- |
| STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| LABOR & JOB MATLS, $/WD | 41,308 | 28,508,336 |
| SHAFT OPERATION, $/WD | 2,900 | 1,526,111 |
| SPOT BOLT MATERIALS, $/ft. | 0.50 | 19,198 |
| PATTERN BOLT MATERIALS, $/ft. | 10 | 8,000 |
| STEEL SETS @ 4', $/ft. | 115 | - |
| HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | 140,000 |
| PUMP WATER FROM TUNNELS | | 3,107,145 |
| PUMP WATER FROM SHAFT, $/WD | 25,720 | 11,477,426 |
| PROBE WATER MATERIALS, $/ft. | 10 | - |
| GROUT WATER MATERIALS, $/ft. | 180 | - |
| REMOTE MUCK DISPOSAL, $/CY | 10 | 1,659,031 |
| TUNNEL LINING | --- | --- |
| PURCHASE & ERECT FORMS, LS/tun | 250,000 | 250,000 |
| PLACE CONCRETE LINING, $/ft. | 373 | 149,200 |
| REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| MOB FOR STEEL LINING, LS/tun | - | - |
| PLACE STEEL LINING, $/ft. | | - |
| LAKE TAP, LS $/ea subcontract | | |
| TOTAL DIRECT COSTS | | 83,574,646 |
| PLANT & EQUIPMENT | --- | --- |
| BUILDINGS & YARD, LS/tun | 618,000 | 710,700 |
| BASE UTILITIES, LS/tun | 285,000 | 430,350 |
| WATER WELL, ETC. | --- | 35,000 |
| POWER CO SETUP, LS/tun | - | - |
| AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 1,454,230 |
| DEWATER | | 3,870,000 |
| CRANES, LS/tun | 113,000 | 146,900 |
| HAUL, RUBBER, LS/tun | 21,000 | 23,100 |
| RAIL & SWITCHES, $/ft. | 21.25 | 841,394 |
| LOCOMOTIVES, $/ea. | 75,000 | 675,000 |
| CARS, LS/tun | 384,000 | 768,000 |
| SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 213,000 |
| DRILLS, LS/tunnel | 38,000 | 76,000 |
| TUNNEL MUCKERS, LS/tunnel | 42,000 | 84,000 |
| TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 8,736,000 |
| ADD TO WORK FROM SHAFT | 425,000 | 935,000 |
| ADD TO GROUT WATER | 160,000 | - |
| CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,209,000 |
| STEEL LINING, LS/tun | - | - |
| GENERAL, LS/tun | 300,000 | 405,000 |
| DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | - |
| TOTAL PLANT & EQUIPMENT | | 20,612,674 |
| INDIRECT COSTS | --- | --- |
| MOBILIZATION & DEMOB, LS | 262,300 | 340,990 |
| VARIABLE, $/WD and /tun | 11,114 | 15,267,804 |
| JOB SITE GENERATED POWER, $/KWH | 0.25 | 6,492,500 |
| TOTAL INDIRECT COSTS | --- | 22,101,294 |
| SUB TOTAL | --- | 18,614 |
| BOND | 0.49% | 19,000 |
| TOTAL ESTIMATED COST | --- | 126,907,614 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | D | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 2,730 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 17,425 | 132 | 15,975 | 121 | |
| 14 | DELAYS | | | | DELAY | CODE | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 17,425 | 46 | 15,975 | 42 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 15,975 | 3 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 17,025 | 12 | 15,975 | 11 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | 400 | 10 | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 17,425 | 9 | 15,975 | 8 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 15,975 | 31 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | 17,425 | 73 | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 17,425 | 43 | 15,975 | 39 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | - | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 192 | | 136 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 53.8 | 324 | 62.3 | 256 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 2,000 | 15 | - | - | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 15 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 339 | | 256 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 683 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 339 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 1,321 | 5.2 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |

| | |
|---|---|
| LOCOMOTIVES, ea. | 8 |
| REMOTE MUCK DISPOSAL | 2 |
| DRILL WELL | 1 |
| DEPRECIATION ADJUST. | 0.97 |

| PUMP WATER FROM TUNNELS | | |
|---|---|---|
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| MED | MED | rate of inflow |
| 1,460 | 3,720 | $/WD |
| 0.87125 | 0.79875 | length factor |
| 1,272 | 2,971 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 8,620 | $/WD |
| | DAYS | 369 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | 500,000 | - |
| | | SHAFT | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| | | | CONSTRUCTION, $/ft. | 7,500 | 20,475,000 |
| | | TUNNEL EXCAVATION | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| | | | LABOR & JOB MATLS, $/WD | 41,308 | 23,975,353 |
| | | | SHAFT OPERATION, $/WD | 2,900 | 1,301,935 |
| | | | SPOT BOLT MATERIALS, $/ft. | 0.50 | 16,500 |
| | | | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | 140,000 |
| | | | PUMP WATER FROM TUNNELS | | 1,192,827 |
| | | | PUMP WATER FROM SHAFT, $/WD | 17,240 | 6,360,579 |
| | | | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | 10 | - |
| | | TUNNEL LINING | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | 598,600 | 1,137,340 |
| | | | PLACE CONCRETE LINING, $/ft. | 373 | 746,000 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | 2 | 50,400 |
| | | | MOB FOR STEEL LINING, LS/tun | - | - |
| | | | PLACE STEEL LINING, $/ft. | | - |
| | | LAKE TAP, LS $/ea subcontract | | | |
| | | | TOTAL DIRECT COSTS | | 69,375,934 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | 618,000 | 710,700 |
| | | BASE UTILITIES, LS/tun | | 285,000 | 430,350 |
| | | WATER WELL, ETC. | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | 318,000 | 445,200 |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | 34 | 1,189,600 |
| | | DEWATER | | | 940,000 |
| | | CRANES, LS/tun | | 113,000 | 146,900 |
| | | HAUL, RUBBER, LS/tun | | 21,000 | 23,100 |
| | | RAIL & SWITCHES, $/ft. | | 21.25 | 709,750 |
| | | LOCOMOTIVES, $/ea. | | 75,000 | 600,000 |
| | | CARS, LS/tun | | 384,000 | 768,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | 142,000 | 213,000 |
| | | DRILLS, LS/tunnel | | 38,000 | 76,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | 42,000 | 84,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | 4,800,000 | 8,736,000 |
| | | ADD TO WORK FROM SHAFT | | 425,000 | 935,000 |
| | | ADD TO GROUT WATER | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | 1,100,000 | 1,935,000 |
| | | STEEL LINING, LS/tun | | | - |
| | | GENERAL, LS/tun | | 300,000 | 405,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | (551,478) |
| | | | TOTAL PLANT & EQUIPMENT | | 17,831,122 |
| INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | 262,300 | 340,990 |
| | | VARIABLE, $/WD and /tun | | 11,114 | 13,575,119 |
| | | JOB SITE GENERATED POWER, $/KWH | | - | - |
| | | | TOTAL INDIRECT COSTS | --- | 13,916,109 |
| SUB TOTAL | | | | --- | 101,123,165 |
| BOND | | | | 0.49% | 496,000 |
| TOTAL ESTIMATED COST | | | | --- | 101,619,165 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | E | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 1,750 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 15,975 | 121 | 15,050 | 114 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | 15,975 | 22 | 15,050 | 21 | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | - | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | - | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 15,975 | 11 | 15,050 | 11 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 15,975 | 8 | 15,050 | 8 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 15,050 | 29 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | 15,975 | 67 | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 15,975 | 39 | 15,050 | 37 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 148 | | 106 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 59.5 | 268 | 68.6 | 219 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 2,000 | 15 | - | - | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 15 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 283 | | 219 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 438 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 283 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 1,021 | 4.1 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 8 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.02 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| MED | MED | rate of inflow |
| 1,460 | 3,720 | $/WD |
| 0.79875 | 0.7525 | length factor |
| 1,166 | 2,799 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 8,620 | $/WD |
| | DAYS | 313 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | CONSTRUCTION, $/ft. | | 7,500 | 13,125,000 |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 20,154,855 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 1,140,670 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 15,513 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | 944,760 |
| | | PUMP WATER FROM SHAFT, $/WD | | 17,240 | 5,401,886 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 1,299,948 |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 1,137,340 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 746,000 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 2 | 50,400 |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | | - |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 57,996,372 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,108,850 |
| | DEWATER | | | | 850,000 |
| | CRANES, LS/tun | | | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 659,281 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | CARS, LS/tun | | | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,935,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 354,324 |
| | | | TOTAL PLANT & EQUIPMENT | | 18,070,505 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 10,234,154 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 4,252,500 |
| | | | TOTAL INDIRECT COSTS | --- | [illegible] |
| SUB TOTAL | | | | --- | [illegible] |
| BOND | | | | 0.49% | [illegible] |
| TOTAL ESTIMATED COST | | | | | [illegible] |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | F | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 15,050 | 114 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 15,050 | 11 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 15,050 | 5 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 16 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 116.2 | 129 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | - | 110 | FPD | 3,000 | 27 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 27 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 157 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 4 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 1.12 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 157 | | | UP | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 432 | 1.7 | | 260 | | $/WD | | | |
| 55 | | | | | | | 0.7525 | 0 | length factor | | | |
| 56 | | | | | | | 196 | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 167 | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 500,000 |
| | | SHAFT | | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | | TUNNEL EXCAVATION | | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 5,349,107 |
| | | | SHAFT OPERATION, $/WD | | - | - |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 7,525 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | 30,671 |
| | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 630,595 |
| | | TUNNEL LINING | | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | | PLACE STEEL LINING, $/ft. | | 1,084 | 3,252,000 |
| | | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | | 10,039,898 |
| | PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | | WATER WELL, ETC. | | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 565,700 |
| | | DEWATER | | | | 210,000 |
| | | CRANES, LS/tun | | | 113,000 | 113,000 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 319,813 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 300,000 |
| | | CARS, LS/tun | | | 384,000 | 384,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | | ADD TO WORK FROM SHAFT | | | - | - |
| | | ADD TO GROUT WATER | | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | | STEEL LINING, LS/tun | | | - | - |
| | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 993,902 |
| | | | TOTAL PLANT & EQUIPMENT | | | 9,276,414 |
| | INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 2,686,987 |
| | | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 846,181 |
| | | | TOTAL INDIRECT COSTS | | --- | 3,795,468 |
| | SUB TOTAL | | | | --- | 23,111,780 |
| | BOND | | | | 0.49% | 113,000 |
| | TOTAL ESTIMATED COST | | | | --- | 23,224,780 |

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 5A | | CONTRACT | | F | | |
| 2 | PORTALS, ea. | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 18,200 | 138 | | - | |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | | - | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 18,200 | 13 | | - | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 18,200 | 6 | | - | |
| 28 | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | | - | |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | | - | |
| 35 | HIGH TEMPERATURE | | 1 | HT | 2.47 | - | - | | - | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 19 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 116.2 | 157 | | - | |
| 39 | CONCRETE LINING, ft. | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | - | 110 | FPD | 6,000 | 55 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 55 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 211 | | - | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | LOCOMOTIVES, ea. | | | 4 | | |
| 45 | MOBILIZATION | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | 60 | | | DEPRECIATION ADJUST. | | | 1.12 | | |
| 48 | ERECT TBM # 1 | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | 211 | | | UP | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | TOTAL | 486 | 1.9 | | - | | $/WD | | | |
| 55 | | | | | 0.91 | 0 | length factor | | | |
| 56 | | | | | - | - | factored $/WD | | | |
| 57 | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | $/WD | | | |
| 59 | | | | | | DAYS | 221 | | | |
| 60 | | | | | | | | | | |

| | M N O P | Q | R |
|---|---|---|---|
| | COST ESTIMATE | UNIT COST | ITEM COST |
| | DIRECT COSTS | --- | --- |
| | PORTAL EXCAVATION, $/ea. | 500,000 | 1,000,000 |
| | SHAFT | --- | --- |
| | MOB, DEMOB & DEVELOP, LS/shaft | --- | - |
| | CONSTRUCTION, $/ft. | 7,500 | - |
| | TUNNEL EXCAVATION | --- | --- |
| | STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| | LABOR & JOB MATLS, $/WD | 41,308 | 6,468,687 |
| | SHAFT OPERATION, $/WD | - | - |
| | SPOT BOLT MATERIALS, $/ft. | 0.50 | 9,100 |
| | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | STEEL SETS @ 4', $/ft. | 115 | - |
| | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| | PUMP WATER FROM TUNNELS | | - |
| | PUMP WATER FROM SHAFT, $/WD | - | - |
| | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | REMOTE MUCK DISPOSAL, $/CY | 10 | 762,580 |
| | TUNNEL LINING | --- | --- |
| | PURCHASE & ERECT FORMS, LS/tun | - | - |
| | PLACE CONCRETE LINING, $/ft. | 373 | - |
| | REMOVE FORMS & TRAVELER, LS/tun | - | - |
| | MOB FOR STEEL LINING, LS/tun | - | - |
| | PLACE STEEL LINING, $/ft. | 1,084 | 6,504,000 |
| | LAKE TAP, LS $/ea subcontract | | |
| | TOTAL DIRECT COSTS | | 15,014,367 |
| | PLANT & EQUIPMENT | --- | --- |
| | BUILDINGS & YARD, LS/tun | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | 285,000 | 285,000 |
| | WATER WELL, ETC. | --- | - |
| | POWER CO SETUP, LS/tun | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 672,800 |
| | DEWATER | | 210,000 |
| | CRANES, LS/tun | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | 21.25 | 386,750 |
| | LOCOMOTIVES, $/ea. | 75,000 | 300,000 |
| | CARS, LS/tun | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | - | - |
| | ADD TO GROUT WATER | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | - | 109,000 |
| | STEEL LINING, LS/tun | - | - |
| | GENERAL, LS/tun | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | 1,010,586 |
| | TOTAL PLANT & EQUIPMENT | | 9,432,136 |
| | INDIRECT COSTS | --- | --- |
| | MOBILIZATION & DEMOB, LS | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | 11,114 | 3,291,321 |
| | JOB SITE GENERATED POWER, $/KWH | 0.25 | 1,036,497 |
| | TOTAL INDIRECT COSTS | --- | 4,590,118 |
| | SUB TOTAL | --- | 6,621 |
| | BOND | 0.49% | 2,000 |
| | TOTAL ESTIMATED COST | --- | 178,621 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | F | | |
| 2 | PORTALS, ea. | | | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 18,700 | 141 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 18,700 | 13 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 18,700 | 6 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 20 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 116.2 | 161 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | - | 110 | FPD | 6,000 | 55 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 55 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 215 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 4 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 1.12 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 215 | | | UP | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 490 | 1.9 | | - | | $/WD | | | |
| 55 | | | | | | | 0.935 | 0 | length factor | | | |
| 56 | | | | | | | - | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 225 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| 1 | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| 2 | DIRECT COSTS | | | | --- | --- |
| 3 | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 1,000,000 |
| 4 | | SHAFT | | | --- | --- |
| 5 | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| 6 | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| 7 | | TUNNEL EXCAVATION | | | --- | --- |
| 8 | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| 9 | | | LABOR & JOB MATLS, $/WD | | 41,308 | 6,646,398 |
| 10 | | | SHAFT OPERATION, $/WD | | - | - |
| 11 | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 9,350 |
| 12 | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| 13 | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| 14 | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| 15 | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| 16 | | | PUMP WATER FROM TUNNELS | | | - |
| 17 | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| 18 | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| 19 | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| 20 | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 783,530 |
| 21 | | TUNNEL LINING | | | --- | --- |
| 22 | | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| 23 | | | PLACE CONCRETE LINING, $/ft. | | 373 | - |
| 24 | | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| 25 | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| 26 | | | PLACE STEEL LINING, $/ft. | | 1,084 | 6,504,000 |
| 27 | | LAKE TAP, LS $/ea subcontract | | | | |
| 28 | | | | TOTAL DIRECT COSTS | | 15,213,278 |
| 29 | PLANT & EQUIPMENT | | | | --- | --- |
| 30 | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| 31 | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| 32 | | WATER WELL, ETC. | | | --- | - |
| 33 | | POWER CO SETUP, LS/tun | | | - | - |
| 34 | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 689,800 |
| 35 | | DEWATER | | | | 210,000 |
| 36 | | CRANES, LS/tun | | | 113,000 | 113,000 |
| 37 | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| 38 | | RAIL & SWITCHES, $/ft. | | | 21.25 | 397,375 |
| 39 | | LOCOMOTIVES, $/ea. | | | 75,000 | 300,000 |
| 40 | | CARS, LS/tun | | | 384,000 | 384,000 |
| 41 | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| 42 | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| 43 | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| 44 | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| 45 | | ADD TO WORK FROM SHAFT | | | - | - |
| 46 | | ADD TO GROUT WATER | | | 160,000 | - |
| 47 | | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| 48 | | STEEL LINING, LS/tun | | | - | - |
| 49 | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| 50 | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 1,013,901 |
| 51 | | | | TOTAL PLANT & EQUIPMENT | | 9,463,076 |
| 52 | INDIRECT COSTS | | | | --- | --- |
| 53 | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| 54 | | VARIABLE, $/WD and /tun | | | 11,114 | 3,339,135 |
| 55 | | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 1,051,554 |
| 56 | | | | TOTAL INDIRECT COSTS | --- | 4,652,989 |
| 57 | SUB TOTAL | | | | --- | 29,329,343 |
| 58 | BOND | | | | 0.49% | 144,000 |
| 59 | TOTAL ESTIMATED COST | | | | --- | 29,473,343 |
| 60 | | | | | $/FOOT | 1,576 |

| CORRIDOR | 3A | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTRACT | | | A | B | | C | | D | | E | | F | G | H |
| PORTALS, ea. | | | 1 | 0 | | 0 | | 0 | | 0 | | 0 | 1 | 2 |
| SHAFT DEPTH, ft. | | | 0 | | 2,868 | 2,302 | | 2,594 | | 1007 | | 375 | - | - |
| HEADINGS | | | 1 | 2 | | 2 | | 2 | | 2 | | 1 | 1 | 1 |
| GRADE | | CODE | DOWN | UP | DOWN | UP | DOWN | UP | DOWN | UP | DOWN | UP | UP | UP 2% |
| ft. | | | 20,330 | 20,330 | 18,610 | 18,610 | 19,930 | 19,930 | 20,065 | 20,065 | 20,195 | 20,195 | 20,860 | 11,300 |
| DELAYS | | | - | - | - | - | - | - | - | - | - | - | - | - |
| FROM SHALLOW SHAFT | | H1 | - | - | - | - | - | - | - | - | - | 20,195 | - | - |
| FROM DEEP SHAFT | 1 heading | H2 | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2 headings | H3 | - | 20,330 | 18,610 | 18,610 | 19,930 | 19,930 | 20,065 | 20,065 | 20,195 | - | - | - |
| DOWN MINOR GRADE | | DM | 20,330 | - | 18,610 | - | 19,930 | - | 20,065 | - | 20,195 | - | - | - |
| DOWN 3% GRADE | | D3 | - | - | - | - | - | - | - | - | - | - | - | - |
| UP 2 TO 3% GRADE | | U3 | - | - | - | - | - | - | - | - | - | - | - | 11,300 |
| UP 5% GRADE | | U5 | - | - | - | - | - | - | - | - | - | - | - | - |
| SPOT BOLTS | | SB | 20,330 | 16,330 | - | - | - | 11,200 | 20,065 | 20,065 | 20,195 | 20,195 | 20,860 | 11,300 |
| PATTERN BOLTS | | PB | - | - | 4,910 | 18,410 | 10,600 | 200 | - | - | - | - | - | - |
| SETS @ 4' OC | | S1 | - | - | - | - | - | - | - | - | - | - | - | - |
| HV SETS @ 4' OC | | S2 | - | 4,000 | 13,700 | - | - | - | - | - | - | - | - | - |
| HV SETS @ 2' OC | | S3 | - | - | - | 200 | 9,330 | 8,530 | - | - | - | - | - | - |
| CALIFORNIA SWITCH | from portal | CP | 20,330 | - | - | - | - | - | - | - | - | - | 20,860 | 11,300 |
| | from shaft | CS | - | 20,330 | 18,610 | 18,610 | 19,930 | 19,930 | 20,065 | 20,065 | 20,195 | 20,195 | - | - |
| MEDIUM WATER INFLOW | upgrade | MU | - | 20,330 | - | - | - | - | - | 20,065 | - | - | - | - |
| | downgrade | MD | 20,330 | - | - | - | - | - | 20,065 | - | 13,000 | - | - | - |
| HIGH WATER INFLOW | upgrade | HU | - | - | - | 18,610 | - | 19,930 | - | - | - | - | - | - |
| | downgrade | HD | - | - | 18,610 | - | 19,930 | - | - | - | - | - | - | - |
| PROBE DRILL | | PW | - | 2,000 | 18,610 | 18,610 | 19,930 | 19,930 | - | - | - | - | - | - |
| GROUT WATER | | GW | - | - | 1,861 | 1,861 | 1,993 | 1,993 | - | - | - | - | - | - |
| HIGH TEMPERATURE | | HT | 5,730 | 20,330 | 18,610 | 18,610 | 19,930 | 19,930 | 20,065 | 9,065 | - | - | - | - |
| REMOTE POWER GENERATION | | RP | - | - | - | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - |
| | | | | | | | | | | | | | | |
| REMOTE MUCK DISPOSAL | | | Yes | Yes | | No | | No | | No | | Yes | Yes | Yes |
| DRILL WELL | | | No | Yes | | Yes | | Yes | | Yes | | No | No | No |
| CONCRETE LINING, ft. | | | - | 4,000 | 18,610 | 18,610 | 19,930 | 8,530 | - | - | - | 1,000 | - | - |
| STEEL LINING, ft. | 0.50" thick | | 5,000 | - | - | - | - | - | - | - | - | 5,000 | 11,100 | 3,700 |
| UNLINED, ft. | | | 15,330 | 16,330 | - | - | - | 11,400 | 20,065 | 20,065 | 20,195 | 14,195 | 9,760 | 7,600 |

| CORRIDOR | 3B | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CONTRACT | | | A | B | C | C | D | D | E |
| PORTALS, ea. | | | 2 | 1 | 0 | | 0 | | 1 + TAP |
| SHAFT DEPTH, ft. | | | 0 | 0 | 1,485 | | 1315 | | 0 |
| HEADINGS | | | 1 | 1 | 1 | | 1 | | 1 |
| GRADE | | CODE | UP 5.2% | DOWN | UP | DOWN | UP | DOWN | UP |
| ft. | | | 9,600 | 22,600 | 22,600 | 20,600 | 20,600 | 21,100 | 21,100 |
| DELAYS | | | - | - | - | - | - | - | - |
| FROM SHALLOW SHAFT | | H1 | - | - | - | - | - | - | - |
| FROM DEEP SHAFT | 1 heading | H2 | - | - | 22,600 | 20,600 | - | - | - |
| | 2 headings | H3 | - | - | - | - | 20,600 | 21,100 | - |
| DOWN MINOR GRADE | | DM | - | - | - | - | - | 21,100 | - |
| DOWN 3% GRADE | | D3 | - | 22,600 | - | 20,600 | - | - | - |
| UP 2 TO 3% GRADE | | U3 | - | - | 22,600 | - | - | - | - |
| UP 5% GRADE | | U5 | 9,600 | - | - | - | - | - | - |
| SPOT BOLTS | | SB | 9,600 | 22,600 | 22,600 | 20,600 | 20,600 | 21,100 | 21,100 |
| PATTERN BOLTS | | PB | - | - | - | - | - | - | - |
| SETS @ 4' OC | | S1 | - | - | - | - | - | - | - |
| HV SETS @ 4' OC | | S2 | - | - | - | - | - | - | - |
| HV SETS @ 2' OC | | S3 | - | - | - | - | - | - | - |
| CALIFORNIA SWITCH | from portal | CP | 9,600 | 22,600 | - | - | 20,600 | 21,100 | 21,100 |
| | from shaft | CS | - | - | 22,600 | 20,600 | - | - | - |
| MEDIUM WATER INFLOW | upgrade | MU | - | - | 22,600 | - | 20,600 | - | 21,100 |
| | downgrade | MD | - | 22,600 | - | 20,600 | - | 21,100 | - |
| HIGH WATER INFLOW | upgrade | HU | - | - | - | - | - | - | - |
| | downgrade | HD | - | - | - | - | - | - | - |
| PROBE DRILL | | PW | - | - | - | - | - | - | - |
| GROUT WATER | | GW | - | - | - | - | - | - | - |
| HIGH TEMPERATURE | | HT | - | 14,200 | 7,000 | - | - | - | - |
| REMOTE POWER GENERATION | | RP | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | |
| REMOTE MUCK DISPOSAL | | | Yes | Yes | No | | Yes | | Yes |
| DRILL WELL | | | Yes | Yes | Yes | | No | | No |
| CONCRETE LINING, ft. | | | - | - | - | - | - | - | - |
| STEEL LINING, ft. | | | 9,600 | 1,000 | - | 5,500 | 3,500 | - | 5,000 |
| UNLINED, ft. | | | - | 21,600 | 22,600 | 15,100 | 17,100 | 21,100 | 16,100 |

IID

TO - 5A

PES 8/28/96

| CORRIDOR | 5A | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONTRACT | | | A | B | | C | | D | D | E | E | F | G | H |
| PORTALS, ea. | | | 1 | 0 | | 0 | | 0 | | 0 | | 1 | 2 | 2 |
| SHAFT DEPTH, ft. | | | 0 | 3440 | | 3030 | | 2730 | | 1750 | | 0 | 0 | 0 |
| HEADINGS | | | 1 | 2 | | 2 | | 1 | | 1 | | 1 | 1 | 1 |
| GRADE | | CODE | DOWN | UP | DOWN | UP | DOWN | UP | DOWN | UP | DOWN | UP | UP | UP |
| ft. | | | 18,750 | 18,750 | 22,170 | 22,170 | 17,425 | 17,425 | 15,975 | 15,975 | 15,050 | 15,050 | 18,200 | 18,700 |
| DELAYS | | | - | - | - | - | - | - | - | - | - | - | - | - |
| FROM SHALLOW SHAFT | | H1 | - | - | - | - | - | - | - | - | - | - | - | - |
| FROM DEEP SHAFT | 1 heading | H2 | - | - | - | - | - | - | - | - | - | - | - | - |
| | 2 headings | H3 | - | 18,750 | 22,170 | 22,170 | 17,425 | 17,425 | 15,975 | 15,975 | 15,050 | - | - | - |
| DOWN MINOR GRADE | | DM | 18,750 | - | 22,170 | - | 17,425 | - | 15,975 | - | - | - | - | - |
| DOWN 3% GRADE | | D3 | - | - | - | - | - | - | - | - | - | - | - | - |
| UP 2 TO 3% GRADE | | U3 | - | - | - | - | - | - | - | - | - | - | - | - |
| UP 5% GRADE | | U5 | - | - | - | - | - | - | - | - | - | - | - | - |
| SPOT BOLTS | | SB | 18,750 | 18,750 | 21,570 | 20,970 | 17,425 | 17,025 | 15,975 | 15,975 | 15,050 | 15,050 | 18,200 | 18,700 |
| PATTERN BOLTS | | PB | - | - | 400 | 800 | - | - | - | - | - | - | - | - |
| SETS @ 4' OC | | S1 | - | - | - | - | - | - | - | - | - | - | - | - |
| HV SETS @ 4' OC | | S2 | - | - | - | - | - | - | - | - | - | - | - | - |
| HV SETS @ 2' OC | | S3 | - | - | 200 | 400 | - | 400 | - | - | - | - | - | - |
| CALIFORNIA SWITCH | from portal | CP | 18,750 | - | - | - | - | - | - | - | - | 15,050 | 18,200 | 18,700 |
| | from shaft | CS | - | 18,750 | 22,170 | 22,170 | 17,425 | 17,425 | 15,975 | 15,975 | 15,050 | - | - | - |
| MEDIUM WATER INFLOW | upgrade | MU | - | 18,750 | - | - | - | - | - | - | - | - | - | - |
| | downgrade | MD | 18,750 | - | - | - | 17,425 | - | 15,975 | - | 15,050 | - | - | - |
| HIGH WATER INFLOW | upgrade | HU | - | - | - | 22,170 | - | 17,425 | - | 15,975 | - | - | - | - |
| | downgrade | HD | - | - | 22,170 | - | - | - | - | - | - | - | - | - |
| PROBE DRILL | | PW | - | - | - | - | - | - | - | - | - | - | - | - |
| GROUT WATER | | GW | - | - | - | - | - | - | - | - | - | - | - | - |
| HIGH TEMPERATURE | | HT | 750 | 18,750 | 22,170 | 22,170 | 17,425 | 17,425 | 15,975 | 15,975 | 15,050 | - | - | - |
| REMOTE POWER GENERATION | | RP | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 1 | 1 | 1 | 1 |
| REMOTE MUCK DISPOSAL | | | Yes | No | | Yes | | No | No | Yes | Yes | Yes | Yes | Yes |
| DRILL WELL | | | Yes | Yes | | Yes | | Yes | Yes | Yes | Yes | No | No | No |
| CONCRETE LINING, ft. | | | - | - | 200 | 400 | - | 2,000 | - | 2,000 | - | - | - | - |
| STEEL LINING, ft. | | | 3,000 | - | - | - | - | - | - | - | - | 3,000 | 6,000 | 6,000 |
| UNLINED, ft. | | | 15,750 | 18,750 | 21,970 | 21,770 | 17,425 | 15,425 | 15,975 | 13,975 | 15,050 | 12,050 | 12,200 | 12,700 |

| DURATION OF DELAYS | | CODE | FPD | | |
|---|---|---|---|---|---|
| | | | INCLUDING | DELAY | DURATION |
| | | | DELAY | WD/1000 FT | INCREASE |
| FROM SHAFTS | | | -- | -- | -- |
| SHALLOW SHAFT | | H1 | 121.3 | 0.69 | 9.1% |
| DEEP SHAFT | 1 heading | H2 | 111.9 | 1.38 | 18.2% |
| | 2 headings | H3 | 98.2 | 2.62 | 34.7% |
| DOWN MINOR GRADE | | DM | 128.6 | 0.22 | 2.9% |
| DOWN 3% GRADE | | D3 | 124.1 | 0.50 | 6.6% |
| UP 2 to 3% GRADE | | U3 | 130.3 | 0.12 | 1.5% |
| UP 5 % GRADE | | U5 | 125.0 | 0.44 | 5.8% |
| SPOT BOLTS | | SB | 121.1 | 0.70 | 9.2% |
| PATTERN BOLTS | | PB | 107.8 | 1.72 | 22.7% |
| SETS @ 4' OC | | S1 | 72.4 | 6.25 | 82.7% |
| HV SETS @ 4' OC | | S2 | 50.3 | 12.32 | 163.0% |
| HV SETS @ 2' OC | | S3 | 31.2 | 24.49 | 324.0% |
| CALIFORNIA SWITCH | from portal | CP | 126.5 | 0.35 | 4.6% |
| | from shaft | CS | 123.8 | 0.52 | 6.9% |
| MEDIUM WATER INFLOW | upgrade | MU | 111.6 | 1.40 | 18.5% |
| | downgrade | MD | 105.1 | 1.96 | 25.9% |
| HIGH WATER INFLOW | upgrade | HU | 85.2 | 4.18 | 55.3% |
| | downgrade | HD | 65.8 | 7.64 | 101.1% |
| PROBE WATER | | PW | 91.8 | 3.33 | 44.1% |
| GROUT WATER | | GW | 22.9 | 36.11 | 477.7% |
| HIGH TEMPERATURE | | HT | 99.7 | 2.47 | 32.7% |
| REMOTE POWER GENERATION | | RP | 131.1 | 0.07 | 0.9% |
| | | | | | |
| BASED ON UNDELAYED PRODUCTION | | B | 132.3 | | |
| PRODUCTION RATES BASED ON 20,000 FT TUNNEL | | | | | |

## DELAYS TO PRODUCTION

| | | CODE | GEOTECH | RAIL HAULAGE | HOISTING | VENT | POWER | CUTTERS CHECK | CUTTERS CHANGE | ADDL EQ REP | OTHER SH CH | OTHER LUNCH | OTHER STARTUP | OTHER SURVEY | OTHER ERECT CAL SW | OTHER MISC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FROM SHAFTS | | | | | | | | | | | | | | | | |
| SHALLOW SHAFT | | H1 | | | 30 min/WD | 20 FT/ea | | | | | | | + 7WD | | | |
| DEEP SHAFT | 1 heading | H2 | | | 60 min/WD | 20 FT/ea | | | | | | | + 15WD | | | |
| | 2 headings | H3 | | | 90 min/WD | 20 FT/ea | | | | | | | + 20WD | | | |
| DOWN MINOR GRADE | | DM | | 15 min/WD | | | | | +.1 hr/ea | | | | | | | |
| DOWN 3% GRADE | | D3 | | 30 min/WD | | | | + 10 min/sh | +.2 hr/ea | | | | + 1 WD | | | |
| UP 2 to 3% GRADE | | U3 | | 10 min/WD | | | | | | | | | + 1 WD | | | |
| UP 5 % GRADE | | U5 | | 60 min/WD | | | | | | | | | + 1 WD | | | |
| SPOT BOLTS | | SB | 8 min/ea | | | | | | | | | | + 1 WD | | | |
| PATTERN BOLTS | | PB | 8 min/row | | | | | | | | | | + 2 WD | | | |
| SETS @ 4' OC | | S1 | 0.5 hr/ea | | | | | | | | | | + 4 WD | | | |
| HV SETS @ 4' OC | | S2 | 1 hr/ea | | | | | | | | | | + 5 WD | | | |
| HV SETS @ 2' OC | | S3 | 1 hr/ea | | | | | | | | | | + 8 WD | | | |
| CALIFORNIA SWITCH | from portal | CP | | | | | | | | | | | | | 2 wd/ea | |
| | from shaft | CS | | | | | | | | | | | | | 3 wd/ea | |
| MEDIUM WATER INFLO | upgrade | MU | 30 min/WD | | | | | + 10 min/sh | +.1 hr/ea | 25% | 30 min/sh | 30 min/WD | + 2 WD | 3 hours | | + 2 hrs |
| | downgrade | MD | 60 min/WD | | | | | + 20 min/sh | +.2 hr/ea | 25% | 30 min/sh | 30 min/WD | + 3 WD | 3 hours | | + 2 hrs |
| HIGH WATER INFLOW | upgrade | HU | 120 min/WD | | | | | + 20 min/sh | +.2 hr/ea | 50% | 40 min/sh | 60 min/WD | + 5 WD | 5 hours | | + 10 hrs |
| | downgrade | HD | 240 min/WD | | | | | + 30 min/sh | +.3 hr/ea | 50% | 45 min/sh | 90 min/WD | + 10 WD | 5 hours | | + 20 hrs |
| PROBE IN WATER | | PW | 5 hr/WD | | | | | + 10 min/sh | +.1 hr/ea | 5% | 30 min/sh | 30 min/WD | + 3 WD | | | |
| GROUT WATER | | GW | 16 hr/WD | | | | | + 10 min/sh | +.1 hr/ea | 5% | 30 min/sh | 30 min/WD | + 10 WD | | | |
| HIGH TEMPERATURE | | HT | | | | | | + 15 min/sh | +.4 hr/ea | 10% | 30 min/sh | | + 5 WD | 5 hours | | + 20 hrs |
| REMOTE POWER GENERATION | | RP | | | | | 8 hr/ea 1/30 WD | | | | | | | | | |

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | | | | | | | | | | | | | HOURS | TOTAL HOURS | |
| 6 | PRODUCTION | | | | | | | | | | | | | | |
| 7 | | MOLING | | | 19,900 feet at | | | | | | 15.8 FPH | | 1259 | | 34.9% |
| 8 | | RESET | | | 5.0 ft/stroke at | | | 3,980 strokes | | | 2 min/stroke | | 133 | | 3.7% |
| 9 | | | | | | | | | TOTAL PRODUCTION TIME | | | | | 1,392 | 38.6% |
| 10 | GEOTECHNICAL DELAYS | | | | | | | | | | | | | | |
| 11 | | SPOT BOLTS & CHANNELS | | | | | | | | | | | | | |
| 12 | X | BAD GROUND | | | | | | | | | | | | | |
| 13 | X | WATER INFLOW | | | | | | | | | | | | | |
| 14 | OPERATION DELAYS | | | | | | | | TOTAL GEOTECHNICAL DELAYS | | | | | 0 | 0.0% |
| 15 | | HAULAGE | | | | | | | | | | | | | |
| 16 | | | LAY RAIL | | 1.0 hour every | | | 1,000 feet | | | | | 20 | | |
| 17 | | | TRAIN CHANGE | | 5 min/change | | | 1 stroke/train | | | | | 332 | | |
| 18 | | | WAIT FOR TRAINS | | 50 min/WD | | | | | | | | 125 | | |
| 19 | | | DERAILMENTS | | 30 min/day | | | | | | | | 75 | | |
| 20 | X | | DUE TO GRADE | | | | | | | | | | | 552 | 15.3% |
| 21 | | | | | | | | | | | | | | | |
| 22 | X | HOISTING | | | | | | | | | | | | | |
| 23 | | VENTILATION | | | 6 min/section | | | | | 30 ft/section | | | 66 | 66 | 1.8% |
| 24 | X | | INSTALL COOLERS | | | | | | | | | | | | |
| 25 | | POWER | ADD CABLE | | 4 hrs/1,000 feet of tunnel | | | | | 80% on work days | | | 60 | | |
| 26 | | | FAILURES | | 4 hrs/outage | | 1 outage per | | | 50 WD | | | 12 | 73 | 2.0% |
| 27 | | CUTTER CHANGES | | | 51 feet/change | | 12.9 changes/wk x | | | 50% on work days | | | 254 | | |
| 28 | | | CHECK | | 20 min/shift | | | | | 80% delay TBM | | | 120 | 374 | 10.4% |
| 29 | | EQUIPMENT REPAIR | | | | | | | | | | | | | |
| 30 | | | TBM | | 40 % of moling | | | | | | | 504 | | | |
| 31 | | | TRAILING GEAR | | 0.5 min/tunnel foot | | | | | | | 166 | | | |
| 32 | | | MUCK CONVEYOR | | 0.2 min/tunnel foot | | | | | | | 66 | | | |
| 33 | | | OTHER | | 2.0 % of moling | | | | | | | 25 | 761 | | |
| 34 | | | ADDITIONAL DELAY | | 3 % of total equip repair | | | | | | | | 23 | 784 | 21.7% |
| 35 | | OTHER | | | | | | | | | | | | | |
| 36 | | | SHIFT CHANGE | | 20 min/shift | | | | | | | | 150 | | |
| 37 | | | LUNCH | | 15 min/working day (mechanic operates TBM during lunch) | | | | | | | | 15 | | |
| 38 | | | STARTUP | | 6 working days | | | | | | | | 144 | | |
| 39 | | | SURVEY | | 1 hours per | | | 1,000 feet | | | | | 20 | | |
| 40 | | | CURVES | | 0 feet in curve | | | 4.0 hours per day in curve | | | | | 0 | | |
| 41 | X | | ERECT CALIF SWITCH | | 3 WD/ea | | | each | | | | | 0 | | |
| 42 | | | MISC | | 2 hours per | | | 1,000 feet | | | | | 40 | 369 | 10.2% |
| 43 | | | | | | | | TOTAL OPERATION DELAYS | | | | | | 2,217 | 61.4% |
| 44 | | | | | | | | TOTAL DELAY TIME | | | | | | 2,217 | 61.4% |
| 45 | X = DELAYS TO BE CALCULATED SEPARATELY | | | | | | | | | | | | | | |
| 46 | | AND ADDED TO ESTIMATE AS WORKING DAYS | | | | | | TOTAL TIME REQUIRED | | | | | | 3,610 | 100.0% |
| 47 | | | | | | | | | | | | | | | |

| R | S | T | U | V | W |
|---|---|---|---|---|---|
| NOTES | | | | | |
| ACCESS VIA | | PORTAL/SHAFT | | | |
| TUNNEL BORING MACHINE | | HARD ROCK -- ROBBINS | | | |
| | | NEW | | | |
| TBM THRUST OFF | | SIDES | | | |
| EXCAVATED DIAMETER | | 12.00 FEET | | | |
| STROKE | | 5 FEET | | | |
| HORSEPOWER | | 1,700 | | | |
| CUTTER SIZE | | 17 INCH | | | |
| TYPE | | FRONT LOADING | | | |
| CHANGE hrs/ea | | 1.3 | | | |
| INITIAL SUPPORTS | | SPOT BOLTS | | | |
| MUCK REMOVAL SYSTEM | | MUCK CARS | | | |
| SCHEDULED HOURS | 24 | hours per working day | | | |
| SCHEDULED DAYS | 5.0 | days per week | | | |
| | 21.7 | days per month | | | |
| ELAPSED TIME | 150.4 | working days | | | |
| | 6.95 | months | | | |
| PRODUCTION | 132.3 | feet per working day | | | |
| ========== | ========== | | | | |
| MOLING TIME | 9.3 | hours per working day | | | |
| TBM AVAILABILITY | 75.7 | percent | | | |
| TBM REPAIR TIME | 14.0 | percent | | | |
| TBM UTILIZATION | 38.6 | percent | | | |

## INPUT

| | | |
|---|---|---|
| Award | | APR 1996 |
| Midpoint of Construction | | 1999 |
| BLS Index, P&E | 10-93 | 138 |
| EO | 1-95 | 143 |
| Diesel Fuel Cost | | $0.90 /gal |
| Power Cost | | $0.10 /KWH |
| Tire Index | | 2.14 |
| Sales Tax Rate | | 7.75 % |
| Tunnel Length | | 20,000 feet |

| | | |
|---|---|---|
| Location | Urban | |
| | Rural | XX |
| | Remote | |
| Access Via Portal | | XX |
| Shaft | | |
| Method of Tunnel Excav | | |
| Drill & Shoot | | |
| Tunnel Boring Machine | | XX |
| Roadheader | | |
| Tunnel Digging Machine | | |
| Shield | | |
| Hand Mine | | |
| Excavation Width, feet | | 12.0 |
| Excavation Will Be Very Wet | | |
| | Somewhat Wet | XX |
| | Dry | |
| Initial Support | | |
| Rock Bolts | | |
| Steel Sets | | |
| Shotcrete | | |
| Ribs & Lagging | | |
| Liner Plate | | |
| Precast Segments | | |
| Final Lining | | |
| None | | |
| Full Circle Concrete | | XX |
| Invert then Arch Concrete | | |
| Pipe + r | Concr Bkf | |
| Steel L | r Concr Bkf | |

06:47

## LABOR COST CALCULATION

| HOURS OF WORK & HOURS OF PAY | | HOURLY LABOR WORK | HOURLY LABOR PAY | SALARIED LABOR |
|---|---|---|---|---|
| STRAIGHT TIME | | 8.00 | 8.00 | |
| OVERTIME | NORMAL | | 0.00 | |
| | LUNCH | 0.50 | 0.75 | |
| | TRAVEL | 0.75 | 1.13 | |
| | OTHER | | | |
| | | ====== | ====== | |
| TOTALS (straight time basis) | | 9.25 | 9.88 | |

| COST PER SHIFT CALCULATION | MINER | HEAVY DUTY MECHANIC | |
|---|---|---|---|
| WAGES, TUNNEL | 18.32 | 25.67 | |
| TUNNEL DIFFERENTIAL | | | |
| FRINGE BENEFITS | 7.64 | 9.88 | |
| SUBSISTANCE | | 2.75 | |
| PAID HOLIDAYS | | | |
| | ====== | ====== | |
| TOTALS | 25.96 | 38.30 | |
| AVERAGE WAGE W/O FRINGES | | $23.37 | $23.37 |
| AVERAGE WAGE + FRINGES | | $32.13 | |

| INSURANCE & TAXES | HOURLY | SALARIED MULTIPLIER | | |
|---|---|---|---|---|
| FICA | 7.65% | 90% | 1.79 | 1.61 |
| UNEMPLOYMENT INSURANCE | 0.64% | 50% | 0.15 | 0.08 |
| WORKMAN'S COMP | 16.00% | 50% | 3.74 | 1.87 |
| | ======== | | | |
| TOTAL INSURANCE & TAXES | 24.29% | | | |

| | | | |
|---|---|---|---|
| TOTAL WAGES, INSURANCE & TAXES | | $37.81 | $26.92 |
| ADD INCIDENTAL OVERTIME | 6 percent | 40.08 | |
| ADD ADD CONTRACTOR MARKUP | 50 percent | 60.11 | 40.39 |
| ADD SMALL TOOLS | 9 percent | 3.61 | |
| TOTAL | | 63.72 | |
| COST PER SHIFT | | $629.24 | 215.39 |
| ROUNDED, COST PER MAN-SHIFT | | $630 | $220 |

03/07/96

## SMALL TOOLS & EXPENDABLES CALCULATION

| | % RANGE | % USE |
|---|---|---|
| PROTECTIVE CLOTHING | 1 - 2 | 1.0 |
| HAND TOOLS & SUPPLIES | 3 - 5 | 4.0 |
| SMALL EQUIPMENT | 2 - 4 | 3.0 |
| ELECTRICAL SUPPLIES | .5 - 2 | 1.0 |
| | | ==== |
| TOTAL | | 9.0 |

SMALL TOOLS AND EXPENDABLES GUIDELINES

| | percent of direct labor | |
|---|---|---|
| PROTECTIVE CLOTHING | 1.0 | dry work |
| | 2.0 | wet work |
| HAND TOOLS & SUPPLIES | 3.0 | low theft; little hand labor |
| | 5.0 | high theft; much hand labor |
| SMALL EQUIPMENT | 2.0 | little equip not covered in P & E |
| | 4.0 | much not covered |
| ELECTRICAL SUPPLIES | 0.5 | no vandalism; no blasting |
| | 2.0 | vandalism and blasting |

## UNEMPLOYMENT INSURANCE RATE CALCULATION

| CALENDAR YEAR | 1996 | 1997 | 1998 | 1999 | TOTALS |
|---|---|---|---|---|---|
| SCHEDULED MONTHS OF WORK | 5 | 12 | 12 | 12 | 41.00 |
| MONTHS OF AVERAGE EMPLOYMENT | 4 | 11 | 11.5 | 11.5 | 38.00 |
| YEARS OF AVERAGE EMPLOYMENT | 0.33 | 0.92 | 0.96 | 0.96 | 3.17 |

| | | |
|---|---|---|
| CALENDAR YEARS OF EMPLOYMENT | 4 | YEARS |
| AVERAGE EMPLOYMENT PER CALENDAR YEAR | 0.79 | YEARS |
| | 1,954 | HOURS |

| | | | |
|---|---|---|---|
| AVERAGE WAGE PER CALENDAR YEAR | | | $45,675 |
| FEDERAL RATE | 0.8 PERCENT | $7,000 BASE = | $56 |
| STATE RATE | 3.4 PERCENT | $7,000 BASE = | $238 |
| TOTAL AVERAGE UNEMPLOYMENT INSURANCE | | | $294 |
| UNEMPLOYMENT INSURANCE RATE | | | 0.64% |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| SHIFTER | 1.0 | | | 1.0 |
| PUMP OPERATOR | 1.0 | | | 1.0 |
| AGITATOR TENDER | 1.0 | | | 1.0 |
| NOZZLEMAN | 1.0 | | | 1.0 |
| VIBRATORMEN | 2.0 | | | 2.0 |
| CONCRETE LABOR | 1.0 | | | 1.0 |
| WELDER | 1.0 | | | 1.0 |
| CLEANUP LABOR | 1.0 | | | 1.0 |
| LOAD AGITATORS | 2.0 | | | 2.0 |
| HEADING MECHANIC | 1.0 | | | 1.0 |
| MOTORMAN | 2.0 | | | 2.0 |
| BRAKEMAN | 1.0 | | | 1.0 |
| TOTALS PER DAY | 15.0 | | | 15.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 16.4 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LABOR COST PER DAY | | | | $10,350 |

| EQUIPMENT OPERATION DESCRIPTION | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | PER REPAIR MAN-HOURS UNIT | LABOR TOTAL | DAY PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| VENT FANS | 1.0 | | 1.0 | 8.0 | 1.0 | 8.0 | 0.015 | 0.1 | 5.73 | 46 |
| CONCRETE PUMP | 1.0 | | 1.0 | 4.4 | 1.0 | 4.4 | 0.120 | 0.5 | 32.18 | 140 |
| AGITATORS | 6.0 | 2.0 | 4.0 | 4.4 | 1.0 | 17.4 | 0.210 | 3.7 | 6.96 | 121 |
| WET BELT | 1.0 | | 1.0 | 4.4 | 1.0 | 4.4 | 0.025 | 0.1 | 1.24 | 5 |
| VIBRATORS | 5.0 | 2.0 | 3.0 | 4.4 | 1.0 | 13.1 | 0.020 | 0.3 | 0.40 | 5 |
| WELDER | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | 0.005 | 0.0 | 1.64 | 2 |
| LOCOMOTIVE | 6.0 | 2.0 | 4.0 | 6.4 | 1.0 | 25.4 | 0.267 | 6.8 | 13.98 | 355 |
| TOTALS | | | | | | | | 11.5 | | $680 |

REMARKS & CALCULATIONS

| | |
|---|---|
| LENGTH OF PIPE LINED TUNNEL | 10,000 TF |
| EXCAVATED DIAMETER | 12.00 FT |
| DIAMETER OUTSIDE PIPE LINER | 9.70 FT |
| BACKFILL PER FOOT OF TUNNEL | 1.45 CY |
| MAXIMUM PRODUCTION (see steel liner) | 120 FPD |
| OVERALL PRODUCTION (see steel liner) | 110 FPD |

SCHEDULE

DAY SHIFT
- MOVE PLACING EQUIPMENT IN
- BUILD 360 DEGREE EXPANDED METAL BULKHEAD
- PLACE CONCRETE 120 LF = 174 CY
  AT 40 CY/HR = 4.4 HR
- CLEANUP & MOVE BACKFILL EQUIP OUT
- WELD PIPE

SWING & GRAVEYARD SHIFTS
- PLACE & WELD PIPE

SUPPLIES

| | | |
|---|---|---|
| BULKHEAD MATLS | $100 /PLACEMENT | 9,091 |
| SLICKLINE | $0.25 /CY | 3,631 |
| SLICKLINE RETAINERS | $50 /EA | 1,100 |
| | TOTAL | $13,822 |
| | $/TF | 1.40 |
| WALKWAYS ON CANS | | 30.00 |
| | $/TF | $31.40 |

| B | C | D | E | F |
|---|---|---|---|---|
| ==== | | | | |
| CREW | | | | |
| ==== | NUMBER OF MEN | | | |
| CLASSIFICATION | DAY | SW | GY | TOT |
| SHIFTER | 1.0 | 1.0 | 1.0 | 3.0 |
| PUMP OPERATOR | 1.0 | | | 1.0 |
| AGITATOR TENDER | 1.0 | | | 1.0 |
| NOZZLEMAN | 1.0 | | | 1.0 |
| VIBRATORMEN | 3.0 | | | 3.0 |
| CONCRETE LABOR | 2.0 | | | 2.0 |
| FINISHER 4MAN | | | 1.0 | 1.0 |
| FINISHERS | | | 1.0 | 1.0 |
| CLEANUP LABOR | | 4.0 | | 4.0 |
| BOBCAT OPERATOR | | 1.0 | | 1.0 |
| JUMBO OPERATOR | | | 1.0 | 1.0 |
| FORM LABORERS | | 4.0 | 7.0 | 11.0 |
| HEADING MECH | 1.0 | 1.0 | 1.0 | 3.0 |
| MOTORMAN | 2.5 | 1.0 | | 3.5 |
| BRAKEMAN | 1.0 | | | 1.0 |
| LOAD AGITATORS | 2.0 | | | 2.0 |
| TOTALS PER DAY | 15.5 | 12.0 | 12.0 | 39.5 |
| TOTAL MAN-SHIFTS PER DAY | | | | 41.9 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LABOR COST PER DAY | | | | $26,410 |

| G | I | J | K | L | N | O | P | Q | R | S |
|---|---|---|---|---|---|---|---|---|---|---|
| ========== | | | | HR | SH | HR | -------- PER | | DAY | --------- |
| EQUIPMENT OPERATION | | | | OPR | OPR | OPR | REPAIR LABOR | | PARTS & SUPP | |
| ========== | UNITS | | | PER | PER | PER | MAN-HOURS | | DOLLARS | |
| DESCRIPTION | TOT | SPA | USE | SH | DAY | DAY | UNIT | TOTAL | UNIT | TOTAL |
| VENT FANS | 1.0 | | 1.0 | 8.0 | 3.0 | 24 | 0.015 | 0.4 | 5.73 | 138 |
| CONCRETE PUMP | 1.0 | | 1.0 | 6.6 | 1.0 | 6.6 | 0.250 | 1.6 | 42.56 | 280 |
| AGITATORS | 10.0 | 2.5 | 7.5 | 6.6 | 1.0 | 49.3 | 0.210 | 10.3 | 6.96 | 343 |
| WET BELT | 1.0 | | 1.0 | 6.6 | 1.0 | 6.6 | 0.025 | 0.2 | 1.24 | 8 |
| VIBRATORS, INT | 5.0 | 2.0 | 3.0 | 6.6 | 1.0 | 19.7 | 0.020 | 0.4 | 0.32 | 6 |
| VIBRATORS, EXT | 6.0 | 2.0 | 4.0 | 6.6 | 1.0 | 26.3 | 0.015 | 0.4 | 0.25 | 7 |
| FLAT CAR | | | 1.0 | 1.0 | 1.0 | 1.0 | 0.015 | 0.0 | 0.60 | 1 |
| MUCK CARS | | | 2.0 | 1.0 | 2.0 | 4.0 | 0.030 | 0.1 | 0.82 | 3 |
| BOBCAT | | | 1.0 | 3.0 | 1.0 | 3.0 | 0.180 | 0.5 | 2.90 | 9 |
| FORM JUMBO | | | 1.0 | 3.0 | 2.0 | 6.0 | | | 8.21 | 49 |
| WELDER | | | 1.0 | 1.0 | 3.0 | 3.0 | 0.005 | 0.0 | 1.36 | 4 |
| LOCO | 4.0 | 1.0 | 2.5 | 7.0 | 1.0 | 17.5 | 0.267 | 4.7 | 13.98 | 245 |
| LOCO | 4.0 | 3.0 | 1.0 | 2.0 | 2.0 | 4.0 | 0.178 | 0.7 | 10.02 | 40 |
| | | | | | | TOTALS | | 19.4 | | $1,130 |

| V | W | X | Y | Z | AA | AB | AC |
|---|---|---|---|---|---|---|---|
| ========== | | | | | | | |
| REMARKS & CALCULATIONS | | | | | | | |
| ========== | | | | | | | |
| LENGTH OF FORMED TUNNEL: | | | | | | 20,000 | TF |
| EXCAVATED DIAMETER: | | | | | | 12.00 | FT |
| LINED DIAMETER: | | | | | | 9.50 | FT |
| CONCRETE PER FOOT OF TUNNEL: | | | | | | 1.56 | CY |
| REBAR PER FOOT OF TUNNEL: | | | | | | none | |
| PRODUCTION: | | 7 PANELS | 30 FEET | | | 210 | FPD |
| | | | PLACING EFFICIENCY | | | 0.80 | |
| | | | HAULAGE EFFICIENCY | | | 0.80 | |
| | | | OVERALL PRODUCTION | | | 134.4 | FPD |
| SCHEDULE ---------- | | | | | | | |
| DAY SHIFT | | | | | | | |
| BUILD 3' BULKHEAD AT INVERT | | | | | | | |
| PLACE CONCRETE AT | | 210 FPD = | | | | 328 | CY |
| | | AT | 50 CY/HR = | | | 6.6 | HR |
| SWING SHIFT | | | | | | | |
| CLEANUP & MOVE CONCRETE EQUIP OUT | | | | | | | |
| CLEAN INVERT | | | | | | 210 | TF |
| PREPARE SETS FOR CONCRETE | | | | | | | |
| START MOVE & SET FORMS | | | 4.5 HOURS | | | 90 | LF |
| GRAVEYARD SHIFT | | | | | | | |
| FINISH MOVE & SET FORMS | | | 6.0 HOURS | | | 120 | LF |
| MOVE CONCRETE EQUIPMENT IN | | | | | | | |
| SUPPLIES ---------- | | | | | | | |
| FORM JUMBO, DIESEL | | | | | | $80,000 | |
| FORMS: | PREVIOUS SLOPE, READY TO STRIP | | | | | 30 | FT |
| | FULLY PLACED | | | | | 180 | FT |
| | NEW SLOPE | | | | | 30 | FT |
| | | | | TOTAL | | 240 | FT |
| = | 7,163 SF AT | | $40 /SF = | | | 286,513 | |
| TWO EXTRA INVERT PANELS AT | | | $34 /SF = | | | 10,147 | |
| EXTRA FORM HARDWEAR | | | | | | 13,300 | |
| FREIGHT | | 8 LOADS | 1,500 MILES | | | 48,000 | |
| +SALES TAX | 438,441 | 7.75% = | | | | $472,420 | |
| | | | | | | ========= | |
| BULKHEAD MATERIAL AT | | | $100 /EA = | | | 14,881 | |
| SLICKLINE AT | | | 0.25 /CY = | | | 7,821 | |
| FORM OIL | 596,903 SF @ | | $0.03 /SF = | | | 17,907 | |
| CURING CMPD | 596,903 SF @ | | $0.02 /SF = | | | 11,938 | |
| TOTAL EXPENDABLE MATERIALS (incl ST) | | | | | | $56,600 | |
| | | | | | | ======= | |

| B | C | D | E | F | I | J | K | L | N | O | P | Q | R | S | V | W | X | Y | Z | AA | AB | AC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ==== | | | | | ========== | | | | HR | SH | HR | -------- PER | DAY | --------- | ========== | | | | | | | |
| CREW | | | | | EQUIPMENT OPERATION | | | | OPR | OPR | OPR | REPAIR LABOR | PARTS & SUPP | | REMARKS & CALCULATIONS | | | | | | | |
| ==== | NUMBER OF MEN | | | | ========== | UNITS | | | PER | PER | PER | MAN-HOURS | DOLLARS | | ========== | | | | | | | |
| CLASSIFICATION | DAY | SW | GY | TOT | DESCRIPTION | TOT | SPA | USE | SH | DAY | DAY | UNIT TOTAL | UNIT | TOTAL | | | | | | | | |
| OPERATOR | 1.0 | 1.0 | 1.0 | 3.0 | HOIST | 1.0 | | 1.0 | 2.0 | 3.0 | 6.0 | 0.300 1.8 | 56.00 | 336 | | | | | | | | |
| OILER | 1.0 | 1.0 | 1.0 | 3.0 | | | | | | | | | | | | | | | | | | |
| TOPMAN | 1.0 | 1.0 | 1.0 | 3.0 | | | | | | | | | | | | | | | | | | |
| BOTTOMMAN | 2.0 | 2.0 | 2.0 | 6.0 | | | | | | | | | | | | | | | | | | |
| | ========== | | | | | | | | | | | | | | | | | | | | | |
| TOTALS PER DAY | 5.0 | 5.0 | 5.0 | 15.0 | | | | | | | | ====== | | ======= | | | | | | | | |
| TOTAL MAN-SHIFTS PER DAY | | | | 15.2 | | | | | | | TOTALS | 1.8 | | $340 | | | | | | | | |
| COST PER MAN-SHIFT | | | | $630 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | TOTAL COST | | | $9,930 /WD | | | | |
| TOTAL LABOR COST PER DAY | | | | $9,590 | | | | | | | | | | | | | | | | | | |
| CREW & EQUIPMENT OPERATION | | | | 06:51 | 03/07/96 | | | | | | SHAFT OPERATION | | | | | | | | | | | |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| FOREMAN | | 1.0 | 1.0 | 2.0 |
| RIGGERS | 2.0 | | | 2.0 |
| MOTORMAN | | 1.0 | 1.0 | 2.0 |
| BRAKEMAN | | 1.0 | 1.0 | 2.0 |
| IRONWORKERS | | 2.0 | 2.0 | 4.0 |
| HEADING MECHANIC | | 2.0 | 2.0 | 4.0 |
| MINERS | | 4.0 | 4.0 | 8.0 |
| WELDERS | 1.2 | 1.2 | 1.2 | 3.6 |
| HELPER | 1.0 | 1.0 | 1.0 | 3.0 |
| WELDING INSPECTOR | 1.0 | 1.0 | 1.0 | 3.0 |
| CRANE OPERATOR | 1.0 | 1.0 | 1.0 | 3.0 |
| OILER | 1.0 | 1.0 | 1.0 | 3.0 |
| TOTALS PER DAY | 7.2 | 16.2 | 16.2 | 39.6 |
| TOTAL MAN-SHIFTS PER DAY | | | | 40.4 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LABOR COST PER DAY | | | | $25,470 |

| EQUIPMENT OPERATION DESCRIPTION | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR LABOR MAN-HOURS UNIT | TOTAL | PARTS & SUPP DOLLARS UNIT | TOTAL | REMARKS & CALCULATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VENT FAN | 1.0 | | 1.0 | 8.0 | 4.2 | 33.6 | 0.020 | 0.7 | 7.05 | 237 | CONCR BKF IS PLACED ON DAY SHIFT |
| LOCOMOTIVE | 2.0 | 1.0 | 1.0 | 3.0 | 3.0 | 9.0 | 0.267 | 2.4 | 13.24 | 119 | UNLOAD PIPE; DELIVERED AT NIGHT |
| | | | | | | | | | | | MOVE CANS INTO TUNNEL, SET, FIT & ALIGN PIPE |
| | | | | | | | | | | | ATTACH SKATES TO CANS & FINISH SPUD HOLES |
| | | | | | | | | | | | SHIM RAIL TO GRADE, BLOCK PIPE, FILL SPUD HOLES |
| WELDERS | 5.0 | 3.8 | 1.2 | 7.5 | 3.0 | 27.0 | 0.005 | 0.1 | 1.50 | 41 | WELD JOINT BETWEEN PIPE SECTION 35 LF/MAN-SH |
| COMPRESSOR | 2.0 | 1.0 | 1.0 | 7.5 | 3.0 | 22.5 | 0.056 | 1.3 | 11.58 | 261 | |
| ULTRASONIC INSPECTION | | | | | | | | | | | |
| CRANE, 100 T | 1.0 | | 1.0 | 2.0 | 3.0 | 6.0 | 0.360 | 2.2 | 34.65 | 208 | |
| | | | | | | TOTALS | | 6.6 | | $860 | |

| | |
|---|---|
| LENGTH OF CANS | 30 LF |
| INSIDE DIAMETER OF INITIAL SUPPORT | 12.00 FT |
| INSIDE DIAMETER OF CANS | 9.625 FT |
| WELD CIRCUMFERENCE | 30.2 LF |
| STEEL THICKNESS | 0.5 IN |
| STEEL WEIGHT | 20.4 #/SF |
| PRODUCTION | 4.0 CANS PER DAY |
| | 120 FPD |
| AVE | 6,200 FT INTERVAL |
| | 0.92 EFFICIENCY |
| | 110 FPD |
| TOTAL LENGTH OF STEEL LINING | 6,200 FT |
| TOTAL WEIGHT | 1,921 TONS |
| MAN-HOURS | 323 /DAY |
| STARTUP DELAY | 5 WD |
| CLOSURE DELAY | 0 WD |
| DURATION | 61.2 DAYS |
| MAN-HOURS | 19,781 TOTAL |
| PRODUCTION | 10.3 MAN-HOURS/TON |
| | 3.2 MAN-HOURS/TF |

JOB MATERIALS FOR ALL WELDED STEEL PIPE

| | EA | FT OC | $/EA | $/TF |
|---|---|---|---|---|
| Skates | 2 | 20 | $150 | 15.00 |
| Blocking | 6 | 8 | 12 | 9.00 |
| Spud Nuts | 8 | 8 | 10 | 10.00 |
| Spuds | 500 | | 50 | 4.03 |
| Miscellaneous | | | | 3.04 |
| | | | | 41.07 |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| FOREMAN | | 1.0 | 1.0 | 2.0 |
| RIGGERS | 2.0 | | | 2.0 |
| MOTORMAN | | 1.0 | 1.0 | 2.0 |
| BRAKEMAN | | 1.0 | 1.0 | 2.0 |
| IRONWORKERS | | 3.0 | 3.0 | 6.0 |
| HEADING MECHANIC | | 2.0 | 2.0 | 4.0 |
| MINERS | | 4.0 | 4.0 | 8.0 |
| WELDERS | 3.0 | 3.0 | 3.0 | 9.0 |
| HELPER | 1.0 | 1.0 | 1.0 | 3.0 |
| WELDING INSPECTOR | 1.0 | 1.0 | 1.0 | 3.0 |
| CRANE OPERATOR | 1.0 | 1.0 | 1.0 | 3.0 |
| OILER | 1.0 | 1.0 | 1.0 | 3.0 |
| TOTALS PER DAY | 9.0 | 19.0 | 19.0 | 47.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 47.9 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LABOR COST PER DAY | | | | $30,150 |

| EQUIPMENT OPERATION DESCRIPTION | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | PER REPAIR LABOR MAN-HOURS UNIT | TOTAL | DAY PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| VENT FAN | 1.0 | | 1.0 | 8.0 | 4.2 | 33.6 | 0.020 | 0.7 | 7.05 | 237 |
| LOCOMOTIVE | 2.0 | 1.0 | 1.0 | 3.0 | 3.0 | 9.0 | 0.267 | 2.4 | 13.24 | 119 |
| WELDERS | 5.0 | 2.0 | 3.0 | 7.5 | 3.0 | 67.5 | 0.005 | 0.3 | 1.50 | 101 |
| COMPRESSOR | 2.0 | 1.0 | 1.0 | 7.5 | 3.0 | 22.5 | 0.056 | 1.3 | 11.58 | 261 |
| ULTRASONIC INSPECTION | | | | | | | | | | |
| CRANE, 100 T | 1.0 | | 1.0 | 2.0 | 3.0 | 6.0 | 0.360 | 2.2 | 34.65 | 208 |
| | | | | | | TOTALS | | 6.8 | | $930 |

| JOB MATERIALS FOR ALL WELDED STEEL PIPE | EA | FT OC | $/EA | $/TF |
|---|---|---|---|---|
| Skates | 2 | 20 | $150 | 15.00 |
| Blocking | 6 | 8 | 12 | 9.00 |
| Spud Nuts | 8 | 8 | 10 | 10.00 |
| Spuds | 500 | | 75 | 3.91 |
| Miscellaneous | | | | 3.04 |
| | | | | 40.95 |

REMARKS & CALCULATIONS

CONCR BKF IS PLACED ON DAY SHIFT

UNLOAD PIPE; DELIVERED AT NIGHT

MOVE CANS INTO TUNNEL, SET, FIT & ALIGN PIPE
ATTACH SKATES TO CANS & FINISH SPUD HOLES

SHIM RAIL TO GRADE, BLOCK PIPE, FILL SPUD HOLES

WELD JOINT BETWEEN PIPE SECTION 10 LF/MAN-SH

| | |
|---|---|
| LENGTH OF CANS | 30 LF |
| INSIDE DIAMETER OF INITIAL SUPPORT | 12.00 FT |
| INSIDE DIAMETER OF CANS | 9.625 FT |
| WELD CIRCUMFERENCE | 30.2 LF |
| STEEL THICKNESS | 1.00 IN |
| STEEL WEIGHT | 40.8 #/SF |

| | |
|---|---|
| PRODUCTION | 3.0 CANS PER DAY |
| | 90 FPD |
| | 9,600 FT INTERVAL |
| | 0.95 EFFICIENCY |
| | 86 FPD |
| TOTAL LENGTH OF STEEL LINING | 9,600 FT |
| TOTAL WEIGHT | 5,973 TONS |
| MAN-HOURS | 383 /DAY |
| STARTUP DELAY | 5 WD |
| CLOSURE DELAY | 0 WD |
| DURATION | 117.3 DAYS |
| MAN-HOURS | 44,899 TOTAL |
| PRODUCTION | 7.5 MAN-HOURS/TON |
| | 4.7 MAN-HOURS/TF |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| FOREMAN | | 1.0 | 1.0 | 2.0 |
| RIGGERS | 2.0 | | | 2.0 |
| MOTORMAN | | 1.0 | 1.0 | 2.0 |
| BRAKEMAN | | 1.0 | 1.0 | 2.0 |
| IRONWORKERS | | 4.0 | 4.0 | 8.0 |
| HEADING MECHANIC | | 2.0 | 2.0 | 4.0 |
| MINERS | | 4.0 | 4.0 | 8.0 |
| WELDERS | 4.2 | 4.2 | 4.2 | 12.6 |
| HELPER | 1.0 | 1.0 | 1.0 | 3.0 |
| WELDING INSPECTOR | 1.0 | 1.0 | 1.0 | 3.0 |
| CRANE OPERATOR | 1.0 | 1.0 | 1.0 | 3.0 |
| OILER | 1.0 | 1.0 | 1.0 | 3.0 |
| TOTALS PER DAY | 10.2 | 21.2 | 21.2 | 52.6 |
| TOTAL MAN-SHIFTS PER DAY | | | | 53.5 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LABOR COST PER DAY | | | | $33,690 |

| EQUIPMENT OPERATION DESCRIPTION | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR MAN-HOURS UNIT | LABOR TOTAL | PARTS & SUPP DOLLARS UNIT | TOTAL | REMARKS & CALCULATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VENT FAN | 1.0 | | 1.0 | 8.0 | 4.2 | 33.6 | 0.020 | 0.7 | 7.05 | 237 | CONCR BKF IS PLACED ON DAY SHIFT |
| LOCOMOTIVE | 2.0 | 1.0 | 1.0 | 3.0 | 3.0 | 9.0 | 0.267 | 2.4 | 13.24 | 119 | UNLOAD PIPE; DELIVERED AT NIGHT |
| | | | | | | | | | | | MOVE CANS INTO TUNNEL, SET, FIT & ALIGN PIPE |
| | | | | | | | | | | | ATTACH SKATES TO CANS & FINISH SPUD HOLES |
| | | | | | | | | | | | SHIM RAIL TO GRADE, BLOCK PIPE, FILL SPUD HOLES |
| WELDERS | 5.0 | 0.8 | 4.2 | 7.5 | 3.0 | 94.5 | 0.005 | 0.5 | 1.50 | 142 | WELD JOINT BETWEEN PIPE SECTIO 3 LF/MAN-SH |
| COMPRESSOR | 2.0 | 1.0 | 1.0 | 7.5 | 3.0 | 22.5 | 0.056 | 1.3 | 11.58 | 261 | |
| ULTRASONIC INSPECTION | | | | | | | | | | | |
| CRANE, 100 T | 1.0 | | 1.0 | 2.0 | 3.0 | 6.0 | 0.360 | 2.2 | 34.65 | 208 | |
| | | | | | | TOTALS | | 7.0 | | $970 | |

| | |
|---|---|
| LENGTH OF CANS | 20 LF |
| INSIDE DIAMETER OF INITIAL SUPPORT | 12.00 FT |
| INSIDE DIAMETER OF CANS | 9.625 FT |
| WELD CIRCUMFERENCE | 30.2 LF |
| STEEL THICKNESS | 1.75 IN |
| STEEL WEIGHT | 71.4 #/SF |

| PRODUCTION | |
|---|---|
| | 1.25 CANS PER DAY |
| | 25 FPD |
| | 27,500 FT INTERVAL |
| | 0.97 EFFICIENCY |
| | 24 FPD |

| JOB MATERIALS FOR ALL WELDED STEEL PIPE | EA | FT OC | $/EA | $/TF |
|---|---|---|---|---|
| Skates | 2 | 20 | $150 | 15.00 |
| Blocking | 6 | 8 | 12 | 9.00 |
| Spud Nuts | 8 | 8 | 11 | 11.00 |
| Spuds | 1000 | | 75 | 2.73 |
| Miscellaneous | | | | 3.04 |
| | | | | 40.77 |

| | |
|---|---|
| TOTAL LENGTH OF STEEL LINING | 27,500 FT |
| TOTAL WEIGHT | 30,136 TONS |
| MAN-HOURS | 428 /DAY |
| STARTUP DELAY | 5 WD |
| CLOSURE DELAY | 0 WD |
| DURATION | 1139.0 DAYS |
| MAN-HOURS | 487,236 TOTAL |
| PRODUCTION | 16.2 MAN-HOURS/TON |
| | 17 7 MAN-HOURS/TF |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| SHIFTER | 1.0 | 1.0 | 1.0 | 3.0 |
| MOLE OPERATOR | 1.0 | 1.0 | 1.0 | 3.0 |
| MOLE MECHANIC | 1.0 | 1.0 | 1.0 | 3.0 |
| GREASER | 1.0 | | | 1.0 |
| CUTTER REBUILD | 1.0 | 1.0 | | 2.0 |
| MINERS | 3.0 | 3.0 | 3.0 | 9.0 |
| CAR MOVER OPR | 1.0 | 1.0 | 1.0 | 3.0 |
| REAR MINER | 1.0 | 1.0 | 1.0 | 3.0 |
| MOTORMEN | 3.0 | 3.0 | 3.0 | 9.0 |
| BRAKEMEN | 3.0 | 3.0 | 3.0 | 9.0 |
| BULL GANG 4MAN | 1.0 | | | 1.0 |
| BULL GANG LABOR | 2.0 | | | 2.0 |
| TOTALS PER DAY | 19.0 | 15.0 | 14.0 | 48.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 50.4 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LABOR COST PER DAY | | | | $31,770 |

| EQUIPMENT OPERATION DESCRIPTION | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | PER DAY REPAIR LABOR MAN-HOURS UNIT | TOTAL | PARTS & SUPP DOLLARS UNIT | TOTAL | REMARKS & CALCULATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VENT FAN | 8.0 | 4.0 | 4.0 | 8.0 | 3.0 | 96.0 | 0.015 | 1.4 | 5.73 | 550 | |
| SCRUBBER | 1.0 | | 1.0 | 4.0 | 3.0 | 12.0 | 0.025 | 0.3 | 1.74 | 21 | |
| WELDER | 1.0 | | 1.0 | 1.0 | 3.0 | 3.0 | 0.005 | 0.0 | 1.50 | 5 | |
| DRILLS, HAND HELD | 3.0 | 2.0 | 1.0 | 0.2 | 3.0 | 0.6 | 0.060 | 0.0 | 2.14 | 1 | INSTALL BOLTS AND ALL UTILITIES |
| CAR MOVER | 1.0 | | 1.0 | 4.0 | 3.0 | 12.0 | 0.100 | 1.2 | 9.33 | 112 | |
| LOCO, 10T | 3.0 | | 3.0 | 4.0 | 3.0 | 36.0 | 0.267 | 9.6 | 13.98 | 503 | |
| FLAT CARS | 3.0 | | 3.0 | 1.0 | 3.0 | 9.0 | 0.015 | 0.1 | 0.68 | 6 | |
| MAN CAR | 1.0 | | 1.0 | 0.5 | 3.0 | 1.5 | 0.040 | 0.1 | 0.81 | 1 | |
| MUCK CARS | 16.0 | 1.0 | 15.0 | 2.0 | 3.0 | 90.0 | 0.070 | 6.3 | 1.43 | 129 | |
| DUMP | 1.0 | | 1.0 | 2.0 | 3.0 | 6.0 | 0.050 | 0.3 | 0.93 | 6 | |
| | | | | | | TOTALS | | 19.4 | | $1,330 | |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| WEEKDAYS | | | | |
| PUMPMAN | 0.5 | 0.5 | 0.5 | 1.5 |
| TOTALS PER DAY | 0.5 | 0.5 | 0.5 | 1.5 |
| REPAIR LABOR MAN-SHIFTS | | | | 0.2 |
| TOTAL MAN-SHIFTS PER DAY | | | | 1.7 |
| COST PER MAN-SHIFT | | | | $630 |
| COST PER WEEKDAY | | | | 1,051 |
| COST PER 5 WEEKDAYS | | | | 5,254 |
| WEEKENDS | | | | |
| PUMPMAN | 1.0 | 1.0 | 1.0 | 3.0 |
| LABORER | | | | |
| ELECTRICIAN | 1.0 | 1.0 | 1.0 | 3.0 |
| HOIST OPR | 1.0 | 1.0 | 1.0 | 3.0 |
| OILER | 1.0 | 1.0 | 1.0 | 3.0 |
| TOTALS PER DAY | 4.0 | 4.0 | 4.0 | 12.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 12.0 |
| COST PER MAN-SHIFT | | | 1.5 | $945 |
| COST PER WEEKEND DAY | | | | 11,340 |
| COST PER 2 WEEKEND DAYS | | | | 22,680 |
| TOTAL LABOR COST PER WEEK | | | | 27,934 |
| PER AVERAGE WEEKDAY | | | | 5,587 |

| EQUIPMENT OPERATION DESCRIPTION | HP | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR LABOR MAN-HOURS UNIT | TOTAL | PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PUMPS | 300 | 2.0 | 1.0 | 1.0 | 8.0 | 4.2 | 34 | 0.040 | 1.3 | 23.00 | 773 |
| TOTALS | | | | | | | | | 1.3 | | $770 |

REMARKS & CALCULATIONS

TOTAL COST PER DAY $6,360

FOR 1,000 FT SHAFT

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| WEEKDAYS | | | | |
| PUMPMAN | 1.0 | 1.0 | 1.0 | 3.0 |
| TOTALS PER DAY | 1.0 | 1.0 | 1.0 | 3.0 |
| REPAIR LABOR MAN-SHIFTS | | | | 0.4 |
| TOTAL MAN-SHIFTS PER DAY | | | | 3.4 |
| COST PER MAN-SHIFT | | | | $630 |
| COST PER WEEKDAY | | | | 2,155 |
| COST PER 5 WEEKDAYS | | | | 10,773 |
| WEEKENDS | | | | |
| PUMPMAN | 1.0 | 1.0 | 1.0 | 3.0 |
| LABORER | | | | |
| ELECTRICIAN | 1.0 | 1.0 | 1.0 | 3.0 |
| HOIST OPR | 1.0 | 1.0 | 1.0 | 3.0 |
| OILER | 1.0 | 1.0 | 1.0 | 3.0 |
| TOTALS PER DAY | 4.0 | 4.0 | 4.0 | 12.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 12.0 |
| COST PER MAN-SHIFT | | | 1.5 | $945 |
| COST PER WEEKEND DAY | | | | 11,340 |
| COST PER 2 WEEKEND DAYS | | | | 22,680 |
| TOTAL LABOR COST PER WEEK | | | | 33,453 |
| PER AVERAGE WEEKDAY | | | | 6,691 |

| EQUIPMENT OPERATION DESCRIPTION | HP | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | PER DAY REPAIR LABOR MAN-HOURS UNIT | TOTAL | PARTS & SUPP DOLLARS UNIT | TOTAL | REMARKS & CALCULATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUMPS | 300 | 4.0 | 1.5 | 2.5 | 8.0 | 4.2 | 84 | 0.040 | 3.4 | 23.00 | 1932 | |
| TOTALS | | | | | | | | | 3.4 | | $1,930 | TOTAL COST PER DAY $8,620 |
| | | | | | | | | | | | | FOR 1,000 FT SHAFT |

| 4 | B | C | D | E | F | I | J | K | L | N | O | P | Q | R | S | | VW | X | Y | Z | AA | AB | AC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | ==== | | | | | ========== | | | | HR | SH | HR | -------- PER | | DAY --------- | | ========== | | | | | | |
| 6 | CREW | | | | | EQUIPMENT OPERATION | | | | OPR | OPR | OPR | REPAIR LABOR | | PARTS & SUPP | | REMARKS & CALCULATIONS | | | | | | |
| 7 | ==== | NUMBER OF MEN | | | | ========== | | UNITS | | PER | PER | PER | MAN-HOURS | | DOLLARS | | ========== | | | | | | |
| 8 | CLASSIFICATION | DAY | SW | GY | TOT | DESCRIPTION | HP | TOT | SPA | USE | SH | DAY | DAY | UNIT | TOTAL | UNIT | TOTAL | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | WEEKDAYS | | | | | | | | | | | | | | | | | | | | | | |
| 12 | PUMPMAN | 2.0 | 2.0 | 2.0 | 6.0 | PUMPS | 300 | 15.0 | 5.0 | 10.0 | 8.0 | 4.2 | 336 | 0.040 | 13.4 | 23.00 | 7728 | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | ========== | | | | | | | | | | | | | | | | | | | | | |
| 17 | TOTALS PER DAY | 2.0 | 2.0 | 2.0 | 6.0 | | | | | | | | | | | | | | | | | | |
| 18 | REPAIR LABOR MAN-SHIFTS | | | | 1.7 | | | | | | | | | | | | | | | | | | |
| 19 | TOTAL MAN-SHIFTS PER DAY | | | | 7.7 | | | | | | | | | | | | | | | | | | |
| 20 | COST PER MAN-SHIFT | | | | $630 | | | | | | | | | | | | | | | | | | |
| 21 | COST PER WEEKDAY | | | | 4,838 | | | | | | | | | | | | | | | | | | |
| 22 | COST PER 5 WEEKDAYS | | | | 24,192 | | | | | | | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | WEEKENDS | | | | | | | | | | | | | | | | | | | | | | |
| 26 | PUMPMAN | 1.0 | 1.0 | 1.0 | 3.0 | | | | | | | | | | | | | | | | | | |
| 27 | LABORER | | | | | | | | | | | | | | | | | | | | | | |
| 28 | ELECTRICIAN | 1.0 | 1.0 | 1.0 | 3.0 | | | | | | | | | | | | | | | | | | |
| 29 | HOIST OPR | 1.0 | 1.0 | 1.0 | 3.0 | | | | | | | | | | | | | | | | | | |
| 30 | OILER | 1.0 | 1.0 | 1.0 | 3.0 | | | | | | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | | ========== | | | | | | | | | | | | | | | | | | | | | |
| 33 | TOTALS PER DAY | 4.0 | 4.0 | 4.0 | 12.0 | | | | | | | | | | | | | | | | | | |
| 34 | TOTAL MAN-SHIFTS PER DAY | | | | 12.0 | | | | | | | | | | | | | | | | | | |
| 35 | COST PER MAN-SHIFT | | | 1.5 | $945 | | | | | | | | | | | | | | | | | | |
| 36 | COST PER WEEKEND DAY | | | | 11,340 | | | | | | | | | | | | | | | | | | |
| 37 | COST PER 2 WEEKEND DAYS | | | | 22,680 | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | ====== | | ======== | TOTAL COST PER DAY | | | $17,100 | | | |
| 44 | | | | | | | | | | | | TOTALS | | 13.4 | | $7,730 | | | | | | | |
| 45 | TOTAL LABOR COST PER WEEK | | | | 46,872 | | | | | | | | | | | | FOR 1,000 FT SHAFT | | | | | | |
| 46 | PER AVERAGE WEEKDAY | | | | 9,374 | | | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | | | | | | | | |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| PUMPMAN | | | | |
| TOTALS PER DAY | | | | |
| TOTAL MAN-SHIFTS PER DAY | | | | 0.2 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LABOR COST PER DAY | | | | $110 |

| EQUIPMENT OPERATION DESCRIPTION | HP | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR LABOR MAN-HOURS UNIT | TOTAL | PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PUMP | 5 | 5.0 | 1.0 | 4.0 | 8.0 | 4.2 | 134 | 0.010 | 1.3 | 1.08 | 145 |
| TOTALS | | | | | | | | | 1.3 | | $150 |

REMARKS & CALCULATIONS

TOTAL COST PER DAY $260

FOR 20,000 FT TUNNEL

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| PUMPMAN | 1.0 | | | 1.0 |
| TOTALS PER DAY | 1.0 | | | 1.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 1.4 |
| COST PER MAN-SHIFT | | | | $630 |
| TOTAL LA' ST PER DAY | | | | $910 |

| EQUIPMENT OPERATION DESCRIPTION | HP | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR LABOR MAN-HOURS UNIT | TOTAL | PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PUMPS | 13 | 5.0 | 1.0 | 4.0 | 8.0 | 4.2 | 134 | 0.015 | 2.0 | 1.73 | 233 |
| | 30 | 2.0 | 1.0 | 1.0 | 8.0 | 4.2 | 34 | 0.020 | 0.7 | 3.45 | 116 |
| | 75 | 1.0 | | 1.0 | 8.0 | 4.2 | 34 | 0.025 | 0.8 | 5.98 | 201 |
| TOTALS | | | | | | | | | 3.5 | | $550 |

REMARKS & CALCULATIONS

TOTAL COST PER DAY $1,460

FOR 20,000 FT TUNNEL

| 4 | B | C | D | E | F | I | J | K | L | N | O | P | Q | R | S | V | W | X | Y | Z | AA | AB | AC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | ==== | | | | | ========== | | | | HR | SH | HR | -------- PER | | DAY --------- | | ========== | | | | | | |
| 6 | CREW | | | | | EQUIPMENT OPERATION | | | | OPR | OPR | OPR | REPAIR LABOR | | PARTS & SUPP | | REMARKS & CALCULATIONS | | | | | | |
| 7 | ==== | NUMBER OF MEN | | | | ========== | | UNITS | | PER | PER | PER | MAN-HOURS | | DOLLARS | | ========== | | | | | | |
| 8 | CLASSIFICATION | DAY | SW | GY | TOT | DESCRIPTION | HP | TOT | SPA | USE | SH | DAY | DAY | UNIT | TOTAL | UNIT | TOTAL | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | WEEKDAYS | | | | | | | | | | | | | | | | | | | | | | |
| 12 | PUMPMAN | 1.0 | 1.0 | | 2.0 | PUMPS | 13 | 9.0 | 2.0 | 7.0 | 8.0 | 4.2 | 235 | 0.015 | 3.5 | 1.73 | 407 | | | | | | |
| 13 | | | | | | | 30 | 7.0 | 2.0 | 5.0 | 8.0 | 4.2 | 168 | 0.020 | 3.4 | 3.45 | 580 | | | | | | |
| 14 | | | | | | | 75 | 3.0 | 1.0 | 2.0 | 8.0 | 4.2 | 67 | 0.025 | 1.7 | 5.98 | 402 | | | | | | |
| 15 | | | | | | | 90 | 3.0 | 1.0 | 2.0 | 8.0 | 4.2 | 67 | 0.030 | 2.0 | 7.89 | 530 | | | | | | |
| 16 | | ========== | | | | | | | | | | | | | | | | | | | | | |
| 17 | TOTALS PER DAY | 1.0 | 1.0 | | 2.0 | | | | | | | | | | | | | | | | | | |
| 18 | REPAIR LABOR MAN-SHIFTS | | | | 1.3 | | | | | | | | | | | | | | | | | | |
| 19 | TOTAL MAN-SHIFTS PER DAY | | | | 3.3 | | | | | | | | | | | | | | | | | | |
| 20 | COST PER MAN-SHIFT | | | | $630 | | | | | | | | | | | | | | | | | | |
| 21 | COST PER WEEKDAY | | | | 2,093 | | | | | | | | | | | | | | | | | | |
| 22 | COST PER 5 WEEKDAYS | | | | 10,467 | | | | | | | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | WEEKENDS | | | | | | | | | | | | | | | | | | | | | | |
| 26 | PUMPMAN | 1.0 | | | 1.0 | | | | | | | | | | | | | | | | | | |
| 27 | LABORER | 1.0 | | | 1.0 | | | | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | | ========== | | | | | | | | | | | | | | | | | | | | | |
| 31 | TOTALS PER DAY | 2.0 | | | 2.0 | | | | | | | | | | | | | | | | | | |
| 32 | TOTAL MAN-SHIFTS PER DAY | | | | 2.0 | | | | | | | | | | | | | | | | | | |
| 33 | COST PER MAN-SHIFT | | | 1.5 | $945 | | | | | | | | | | | | | | | | | | |
| 34 | COST PER WEEKEND DAY | | | | 1,890 | | | | | | | | | | | | | | | | | | |
| 35 | COST PER 2 WEEKEND DAYS | | | | 3,780 | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | ====== | ======= | | TOTAL COST PER DAY | | $4,770 | | | | |
| 44 | | | | | | | | | | | | TOTALS | | 10.6 | $1,920 | | | | | | | | |
| 45 | TOTAL LABOR COST | | | | 14,247 | | | | | | | | | | | | FOR 20,000 FT TUNNEL | | | | | | |
| 46 | PER AVERAGE WEEKDAY | | | | 2,849 | | | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | | | | | | | | |
| 48 | CREW & EQUIPMENT OPERATION | | | | 17.21 | | | | | | | | | | | | | | | | | | |

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| WEEKDAYS | | | | |
| PUMPMAN | | | | |
| TOTALS PER DAY | | | | |
| REPAIR LABOR MAN-SHIFTS | | | | 0.1 |
| TOTAL MAN-SHIFTS PER DAY | | | | 0.1 |
| COST PER MAN-SHIFT | | | | $630 |
| COST PER WEEKDAY | | | | 93 |
| COST PER 5 WEEKDAYS | | | | 463 |
| WEEKENDS | | | | |
| PUMPMAN | 2.0 | 2.0 | 2.0 | 6.0 |
| TOTALS PER DAY | 2.0 | 2.0 | 2.0 | 6.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 6.0 |
| COST PER MAN-SHIFT | | | 1.5 | $945 |
| COST PER WEEKEND DAY | | | | 5,670 |
| COST PER 2 WEEKEND DAYS | | | | 11,340 |
| TOTAL LABOR COST | | | | 11,803 |
| PER AVERAGE WEEKDAY | | | | 2,361 |

| EQUIPMENT OPERATION DESCRIPTION | HP | UNITS TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR LABOR MAN-HOURS UNIT | TOTAL | PER DAY PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PUMPS | 5 | 5.0 | 3.0 | 2.0 | 8.0 | 4.2 | 67 | 0.010 | 0.7 | 1.08 | 73 |
| | 13 | 3.0 | 2.0 | 1.0 | 8.0 | 4.2 | 34 | 0.015 | 0.5 | 1.73 | 58 |
| TOTALS | | | | | | | | | 1.2 | | $130 |

REMARKS & CALCULATIONS

TOTAL COST PER DAY $2,490

FOR 20,000 FT TUNNEL

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| WEEKDAYS | | | | |
| PUMPMAN | 1.0 | | | 1.0 |
| TOTALS PER DAY | 1.0 | | | 1.0 |
| REPAIR LABOR MAN-SHIFTS | | | | 0.5 |
| TOTAL MAN-SHIFTS PER DAY | | | | 1.5 |
| COST PER MAN-SHIFT | | | | $630 |
| COST PER WEEKDAY | | | | 934 |
| COST PER 5 WEEKDAYS | | | | 4,671 |
| WEEKENDS | | | | |
| PUMPMAN | 1.0 | 1.0 | 1.0 | 3.0 |
| LABORER | 1.0 | 1.0 | 1.0 | 3.0 |
| ELECTRICIAN | | | | |
| TOTALS PER DAY | 2.0 | 2.0 | 2.0 | 6.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 6.0 |
| COST PER MAN-SHIFT | | | 1.5 | $945 |
| COST PER WEEKEND DAY | | | | 5,670 |
| COST PER 2 WEEKEND DAYS | | | | 11,340 |
| TOTAL LABOR COST | | | | 16,011 |
| PER AVERAGE WEEKDAY | | | | 3,202 |

| EQUIPMENT OPERATION DESCRIPTION | UNITS HP | TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR LABOR MAN-HOURS UNIT | TOTAL | PER DAY PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PUMPS | 13 | 10.0 | 5.0 | 5.0 | 8.0 | 4.2 | 168 | 0.015 | 2.5 | 1.73 | 291 |
| | 30 | 4.0 | 2.0 | 2.0 | 8.0 | 4.2 | 67 | 0.020 | 1.3 | 3.45 | 232 |
| | 75 | 2.0 | 2.0 | | 8.0 | 4.2 | | 0.025 | | 5.98 | |
| TOTALS | | | | | | | | | 3.9 | | $520 |

REMARKS & CALCULATIONS

TOTAL COST PER DAY $3,720

FOR 20,000 FT TUNNEL

| CREW CLASSIFICATION | NUMBER OF MEN DAY | SW | GY | TOT |
|---|---|---|---|---|
| WEEKDAYS | | | | |
| PUMPMAN | 2.0 | 1.0 | 1.0 | 4.0 |
| TOTALS PER DAY | 2.0 | 1.0 | 1.0 | 4.0 |
| REPAIR LABOR MAN-SHIFTS | | | | 1.7 |
| TOTAL MAN-SHIFTS PER DAY | | | | 5.7 |
| COST PER MAN-SHIFT | | | | $630 |
| COST PER WEEKDAY | | | | 3,605 |
| COST PER 5 WEEKDAYS | | | | 18,024 |
| WEEKENDS | | | | |
| PUMPMAN | 1.0 | 1.0 | 1.0 | 3.0 |
| LABORER | 1.0 | 1.0 | 1.0 | 3.0 |
| ELECTRICIAN | 1.0 | 1.0 | 1.0 | 3.0 |
| TOTALS PER DAY | 3.0 | 3.0 | 3.0 | 9.0 |
| TOTAL MAN-SHIFTS PER DAY | | | | 9.0 |
| COST PER MAN-SHIFT | | | 1.5 | $945 |
| COST PER WEEKEND DAY | | | | 8,505 |
| COST PER 2 WEEKEND DAYS | | | | 17,010 |
| TOTAL LABOR COST | | | | 35,034 |
| PER AVERA EKDAY | | | | 7,007 |

| EQUIPMENT OPERATION DESCRIPTION | UNITS HP | TOT | SPA | USE | HR OPR PER SH | SH OPR PER DAY | HR OPR PER DAY | REPAIR LABOR MAN-HOURS UNIT | TOTAL | PER DAY PARTS & SUPP DOLLARS UNIT | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PUMPS | 13 | 11.0 | 6.0 | 5.0 | 8.0 | 4.2 | 168 | 0.015 | 2.5 | 1.73 | 291 |
| | 30 | 13.0 | 7.0 | 6.0 | 8.0 | 4.2 | 202 | 0.020 | 4.0 | 3.45 | 696 |
| | 75 | 11.0 | 6.0 | 5.0 | 8.0 | 4.2 | 168 | 0.025 | 4.2 | 5.98 | 1005 |
| | 90 | 7.0 | 4.0 | 3.0 | 8.0 | 4.2 | 101 | 0.030 | 3.0 | 7.89 | 795 |
| TOTALS | | | | | | | | | 13.8 | | $2,790 |

REMARKS & CALCULATIONS

ASSUMED AVERAGE INFLOW OVER DURATION OF CONSTRUCTION

| | GPM | MGPD |
|---|---|---|
| LOW | 200 | 0.29 |
| MED | 1,100 | 1.58 |
| HIGH | 6,000 | 8.64 |

| | |
|---|---|
| TOTAL COST PER DAY | $9,800 |
| TOTAL COST PER MIL GAL | 1,130 |
| FOR 20,000 FT TUNNEL | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SHAFT COSTS | | | | | | | | | | |
| | BASED ON MT. HOPE INTAKE SHAFT (11-93) | | | | | | | | | |
| | INPUT | LABOR COST | | | 78.75 | $/MH | | | | |
| | | LABOR EFFICIENCY | | | 2.00 | (more efficient and smaller crew than New York) | | | | |
| | | ESCALATION | | | 1.00 | (costs today in CA = costs 2 years ago in NY) | | | | |
| | | TOTAL SHAFT DEPTH | | | 3,215 | FT | | | | |
| | | ADDITIONAL SHAFT | | | 200 | FT (below tunnel invert for muck loading facilities) | | | | |
| | | MAN-HRS | LABOR | EO | OWNER | MATLS | PERM MATL | SUB | TOTAL | NOTES |
| MOBILIZATION | | | $K | $K | $K | $K | $K | $K | $K | |
| | MOB HOIST, ETC | 19,600 | 772 | 32 | 68 | 7,212 | | 61 | 8,145 | |
| | DEMOB HOIST, ETC. | 16,800 | 662 | 26 | 32 | 167 | 106 | 7 | 1,000 | PM from CWS |
| | TOTALS | | 1,433 | 58 | 100 | 7,379 | 106 | 68 | 9,144 | |
| SHAFT CONSTRUCTION | | | | | | | | | | |
| | SERVICE CREW | 209,700 | 8,257 | | | 492 | | | 8,749 | |
| | GENL SHAFT SUPP | 76,000 | 2,993 | 150 | 560 | 233 | | | 3,936 | .5 OF M-H |
| | EXCAV | 137,400 | 5,410 | 298 | 225 | 1,550 | 116 | 2 | 7,601 | |
| | LINING | 24,700 | 973 | 16 | 14 | 237 | 2,004 | | 3,244 | |
| | LINING DRAIN HOLES | 1,160 | 46 | 1 | 1 | 3 | 18 | | 69 | |
| | PUMP STATIONS | 5,300 | 209 | 5 | 7 | 120 | 18 | | 359 | |
| | TOTALS | | 17,886 | 470 | 807 | 2,635 | 2,156 | 2 | 23,956 | |
| | TOTAL $/VF | | 5,563 | 146 | 251 | 820 | 671 | 1 | 7,451 | |
| DEVELOP AT BOTTOM OF SHAFT | | | | | | | | | | |
| | SINK ADDL SHAFT | | 1,113 | 29 | 50 | 164 | 134 | 0 | 1,490 | |
| | EX LOADING POCKET | 8,400 | 331 | 27 | 44 | 76 | | 6 | 484 | |
| | INSTALL LOAD POCK | 13,600 | 536 | 12 | 12 | 578 | 116 | | 1,254 | |
| | EX LOADING STATION | 1,750 | 69 | 5 | 6 | 13 | 6 | 1 | 100 | |
| | TEMP BOLTS | 8,400 | 331 | 38 | 35 | 282 | | | 686 | |
| | LINE LOAD STA | 6,700 | 264 | 1 | | 60 | 64 | | 389 | |
| | FURNISH SHAFT | 2,900 | 114 | 5 | 9 | 1,296 | | 7 | 1,431 | |
| | TEMP WWF | 3,650 | 144 | 3 | 3 | 117 | | | 267 | |
| | SHOTCRETE | 2,370 | 93 | 2 | 3 | 6 | 44 | | 148 | |
| | BACKFILL EXTENSION | 4,300 | 169 | 49 | 134 | 47 | | | 399 | |
| | TOTALS | | 1,184 | 103 | 190 | 1,821 | 114 | 8 | 3,420 | |
| USE FOR ESTIMATE | | | | | | | | | | |
| | MOBILIZATION AND DEVELOP AT BOTTOM | | | | FIXED COST | | 12,600,000 | LS | | |
| | SHAFT CONSTRUCTION | | | | VARIABLE COST | | 7,500 | /VF | | |

4C

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | TAKEOFF | EXCAV DIA. | SHAPE | LENGTH | CY/TF | CY | PURCHASE PERMANENT MATERIAL | | | | | | | | | | | |
| 5 | BLASTED | 15.00 FT | D | 200 | 7.44 | 1,488 | BLASTED TUNNEL | | | | | | QUANTITY | | UNIT $ | XTRA | COST | |
| 6 | TBM | 12.00 FT | CIR | 19,800 | 4.19 | 82,970 | STEEL SETS, 4" | 13 # | *EA | 38.6 | LF/EA | 2,206 # | | $0.50 | 25 | $1,379 | | |
| 7 | | | | ======== | | ======== | TIMBER LAGGING | 4 in | *SETS | 118 | LF/EA | 0 MBF | | $500.00 | 10 | 259 | | |
| 8 | | TUNNEL TOTAL | | 20,000 | | 84,458 | | | | | | | | | TOTAL | $1,638 | | |
| 9 | INITIAL SUPPORTS | | | | | | | | | | | | | | | | | |
| 10 | TBM | BOLTS 19,800 TF @ | | 0.5 EA/TF | 9,900 EA | | | | | | | | | | | | | |
| 11 | D&S | SETS 16 TF @ | | 4 FT OC = | 4 EA | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | |
| 18 | f: Drilling and blasting supplies | | | $14.15 /CY | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | |
| 21 | b: TBM cutters | | | $4.52 /CY | | | | | | | | | | | | $/WD | 41,308 | |
| 22 | a: TBM operation: | Parts: $3.00 /CY | | HP:1,690 | Penetration rate: 15.7 fph | Power: 0.10 /KWH | | | | | | | | | | $/TF | 312 | |
| 23 | B C D E F G H I J K L M N | | | | | | P Q | S T | V W | Y Z | AB AC | AE AF | | | | | | |
| 24 | | | | PRODUCTION CREW | UN | | LABOR | EQUIP MAINT | EXPEND MATLS | PERM MATERIALS | SUBS & INVOICE | TOTAL DIRECT COST | | | | | | |
| 25 | DESCRIPTION | | TAKEOFF UNIT | UNIT | QUANTITY | | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ | | | | | | |
| 26 | | | | | | | | | | | | | | | | | | |
| 27 | EXCAV & SUPPORT STARTER TUNNEL | | 200 TF | 12 FPD DS3 | 16.7 WD | | 14550 242,500 | 478 7,967 | f 21,053 | 1,638 | | 273,157 | | | | | | |
| 28 | | | | | | | | | | | | ========== | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | |
| 40 | EXCAVATE TBM TUNNEL | | 19,800 TF | 132.3 FPD TBM | 149.7 WD | | 31770 4,754,694 | 1330 199,048 | | | | 4,953,741 | | | | | | |
| 41 | TBM OPERATION | | | | | | | a 408,760 | b 375,024 | | | 783,784 | | | | | | |
| 42 | SUNDAY MAINTENANCE | | | SMSS | 24.9 WD | | 13360 333,243 | 280 6,984 | | | | 340,227 | | | | | | |
| 43 | REMOVE FANLINE & PRELIM CLEANUP | | 19,800 TF | 2,500 FPD FRP | 7.9 WD | | 12470 98,762 | 706 5,592 | | | | 104,354 | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | | | | | | |
| 49 | | | | | | | | | | | | | | | | | | |
| 50 | | | | | | | ========== | ========= | ========== | ========== | ========= | ========== | | | | | | |
| 51 | TOTALS | | | | | | 5 '99 | 620,383 | 375,024 | | | 182,106 | | | | | | |
| 52 | | | | | | | | | | | | | | | | | | |
| 53 | DIRECT COST 07:03 03/07/96 | | | | | | TUNNEL EXCAVATION | | | | BID ITEM # | EX | PAGE 47 | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 TAKEOFF | EXCAV DIA. | SHAPE | LENGTH | CY/TF | CY | PURCHASE PERMANENT MATERIAL | |
| 5 BLASTED | 15.00 FT | D | 200 | 7.44 | 1,488 | | |
| 6 TBM | 12.00 FT | CIR | 19,800 | 4.19 | 82,970 | | |
| 7 | | | ======== | | ======== | | |
| 8 | TUNNEL TOTAL | | 20,000 | | 84,458 | | |

9 INITIAL SUPPORTS
10 TBM BOLTS 19,800 TF @ 0.5 EA/TF 9,900 EA
11 D&S SETS 16 TF @ 4 FT OC = 4 EA
12
13 FINAL LINING 9.50 FT DIAMETER
14 PLAIN CONCR 20,000 TF

PURCHASE TUNNEL LINING MATERIALS

| | | | | | |
|---|---|---|---|---|---|
| 15 CONCRETE, TBM TUNNEL | 1.56 CY/TF | 31,283 CY | $80.00 | 4 | 2,602,704 |
| 16 ADDITIONAL CONCRETE, BLASTED TUNNEL | 3.25 CY/TF | 650 CY | $80.00 | 50 | $77,970 |
| 17 | | | | TOTAL | 2,680,674 |

18
19
21
22

| 23 B C D E F G | H I J K L M N | P Q | S T | V W | Y Z | AB AC | AE AF |
|---|---|---|---|---|---|---|---|
| 24 | PRODUCTION CREW UN | LABOR | EQUIP MAINT | EXPEND MATLS | PERM MATERIALS | SUBS & INVOICE | TOTAL DIRECT COST |
| 25 DESCRIPTION | TAKEOFF UNIT UNIT QUANTITY | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ | UNIT TOTAL $ |
| 26 | | | | | | | |
| 27 PURCHASE & ERECT FORMS AND TRAVELER | ERST 10.0 WD | 12100 121,000 | 519 5,190 | 472,420 | | | 598,610 |
| 28 | | | | | | | ========== |
| 30 | | | | | | | |
| 31 REMOVE FORMS & TRAVELER | ERST 2.0 WD | 12100 24,200 | 519 1,038 | | | | 25,238 |
| 32 | | | | | | | ========== |
| 34 | | | | | | | |
| 35 | | | | | | | |
| 36 | | | | | | | |
| 37 | | | | | | | |
| 38 PLACE FULL CIRCLE CONCRETE LINING | 20,000 TF 134.4 FPD CONCR 148.8 WD | 26410 3,930,060 | 1130 168,155 | 56,600 | 2,680,674 | | 6,835,489 |
| 39 LOW PRESSURE BACKFILL GROUT | 20,000 TF 1,000 FPD BGLT 20.0 WD | 21040 420,800 | 270 5,400 | 1019 20,380 | 290 5,800 | | 452,380 |
| 40 TUNNEL CLEANUP | 20,000 TF 1,500 FPD CUP 13.3 WD | 12100 161,333 | 717 9,560 | | | | 170,893 |
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | | | | | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | ========== | ========= | ========== | ========== | ========= | ========== |
| 51 TOTALS | | 4,512,193 | 183,115 | 76,980 | 2,686,474 | | 373 7,458,762 |
| 52 | | | | | | | |

4 TAKEOFF

5 WELDED STEEL PIPE 6,200 LF, AVERAGE LENGTH OF 4 SECTIONS

6

7 ID STEEL PIPE 9.625 FT

8 PIPE THICKNESS 0.042 FT

9 OD STEEL PIPE 9.708 FT

10 EXCAV DIA 12.000 FT

11

12

13

14

15

16

17

18

| | PURCHASE PERMANENT MATERIALS | | | QUANTITY | UNIT $ | XTRA % | COST $/1' |
|---|---|---|---|---|---|---|---|
| b | CONCRETE | 1 LF | 1.45 CY/TF | 1.45 CY/TF | $80.00 | 5 | $1' |
| d | STEEL LINER SUPPLY | 0.500 " TH. | 20.4 #/SF | 620 #/TF | $0.80 | 0 | 49 |

19 a: Forms

| 20 B | C | D | E | F | G | H | I | J | K | L | M | N | P | Q | S | T | V | W | Y | Z | AB | AC | AE | AI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | | | | PRODUCTION | | CREW | | | | LABOR | | EQUIP MAINT | | EXPEND MATLS | | PERM MATERIALS | | SUBS & INVOICE | | TOTAL DIRECT COS | |
| 22 DESCRIPTION | | | DELAY DAYS | | TAKEOFF | UNIT | | UNIT | | QUANTITY | | | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL |
| 23 | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 STEEL LINER | | | | 5 WD | 6,200 | TF | 110 | FPD | SL-LT | 61.4 | WD | | 25470 | 1,562,932 | 860 | 52,773 | 41 | 254,200 | d | 3,072,829 | | | | 4,942,734 |
| 26 | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 BACKFILL STEEL LINER | | | | | | | | | | 56.4 | WD | | 10350 | 583,364 | 680 | 38,327 | 31.4 | 194,680 | b | 753,949 | | | | 1,570,320 |
| 28 | | | | | | | | | | | | | | | | | | | | | | | | |
| 29 CONTACT GROUT STEEL LINING | | | | | 6,200 | TF | 500 | FPD | BGHP | 12.4 | WD | | 11660 | 144,584 | 540 | 6,696 | 55 | 682 | 180 | 2,232 | | | | 154,194 |
| 30 | | | | | | | | | | | | | | | | | | | | | | | | |
| 31 FINAL TUNNEL CLEANUP | | | | | 6,200 | TF | 1500 | FPD | CUP | 4.1 | WD | | 12100 | 50,013 | 717 | 2,964 | | | | | | | | 52,977 |
| 32 | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | | | | | | | | | | | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | ========== | | ======== | | ========= | | ========== | | ========== | | ========== |
| 46 TOTALS | | | | | | | | | | | | | | 2,340,893 | | 100,760 | | 449,562 | | 3,829,010 | | | 1,094 | 6,720,22 |

47

4 TAKEOFF
5 WELDED STEEL PIPE 9,600 LF
6
7 ID STEEL PIPE 9.625 FT
8 PIPE THICKNESS 0.083 FT
9 OD STEEL PIPE 9.792 FT
10 EXCAV DIA 12.000 FT

| PURCHASE PERMANENT MATERIALS | | | | QUANTITY | UNIT $ | XTRA % | COST $/1 |
|---|---|---|---|---|---|---|---|
| b CONCRETE | 1 LF | 1.40 CY/TF | 1.40 CY/TF | | $80.00 | 5 | $11 |
| d STEEL LINER SUPPLY | 1.000 " TH. | 40.8 #/SF | 1,244 #/TF | | $0.80 | 0 | 9 |

11
12
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14
15
16
17
18
19 a: Forms

| 20 B C D E | F | G | H | I | J | K | L | M N | P | Q | S | T | V | W | Y | Z | AB | AC | AE | A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | PRODUCTION | | CREW | | | LABOR | | EQUIP MAINT | | EXPEND MATLS | | PERM MATERIALS | | SUBS & INVOICE | | TOTAL DIRECT COS | |
| 22 DESCRIPTION | DELAY DAYS | | TAKEOFF | UNIT | UNIT | | QUANTITY | | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL |
| 23 | | | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | |
| 25 STEEL LINER | 5 WD | | 9,600 TF | | 86 FPD | | SL-MED | 116.6 WD | 30150 | 3,516,331 | 930 | 108,464 | 41 | 393,600 | d | 9,556,876 | | | | 13,575,27 |
| 26 | | | | | | | | | | | | | | | | | | | | |
| 27 BACKFILL STEEL LINER | | | | | | | | 111.6 WD | 10350 | 1,155,349 | 680 | 75,907 | 31.4 | 301,440 | b | 1,129,272 | | | | 2,661,96 |
| 28 | | | | | | | | | | | | | | | | | | | | |
| 29 CONTACT GROUT STEEL LINING | | | 9,600 TF | | 500 FPD | | BGHP | 19.2 WD | 11660 | 223,872 | 540 | 10,368 | 55 | 1,056 | 180 | 3,456 | | | | 238,75 |
| 30 | | | | | | | | | | | | | | | | | | | | |
| 31 FINAL TUNNEL CLEANUP | | | 9,600 TF | | 1500 FPD | | CUP | 6.4 WD | 12100 | 77,440 | 717 | 4,589 | | | | | | | | 82,02 |
| 32 | | | | | | | | | | | | | | | | | | | | |
| 33 | | | | | | | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | ========== | | ======== | | ========= | | ========== | | ========== | | ========= |
| 45 | | | | | | | | | | 4,972,992 | | 199,328 | | 696,096 | | 10,689,604 | | | 1,725 | 16,558,02 |
| 46 TOTALS | | | | | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | | | | | |

4 TAKEOFF

5 WELDED STEEL PIPE 27,500 LF

6

7 ID STEEL PIPE 9.625 FT

8 PIPE THICKNESS 0.146 FT

9 OD STEEL PIPE 9.917 FT

10 EXCAV DIA 12.000 FT

| PURCHASE PERMANENT MATERIALS | | | | QUANTITY | UNIT $ | XTRA % | COST $/I |
|---|---|---|---|---|---|---|---|
| b CONCRETE | 1 LF | 1.33 CY/TF | 1.33 CY/TF | $80.00 | 5 | $11 |
| d STEEL LINER SUPPLY | 1.750 " TH. | 71.4 #/SF | 2,192 #/TF | $0.80 | 0 | 1,7 |

19 a: Forms

| 20 B | C | D | E | F | G | H | I | J | K | L | M | N | P | Q | S | T | V | W | Y | Z | AB | AC | AE | / |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | | | | PRODUCTION | | CREW | | | | LABOR | | EQUIP MAINT | | EXPEND MATLS | | PERM MATERIALS | | SUBS & INVOI | | TOTAL DIRECT CO | |
| 22 DESCRIPTION | | | DELAY DAYS | | | TAKEOFF | UNIT | | UNIT | | QUANTITY | | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL $ | UNIT | TOTAL |
| 25 STEEL LINER | | | | 5 WD | | 27,500 TF | | 24 FPD | SL-HVY | | 1,151 WD | | 33690 | 38,771,575 | 860 | 989,717 | 41 | 1,127,500 | d | 48,217,243 | | | | 89,106,03 |
| 27 BACKFILL STEEL LINER | | | | | | | | | | | 1,146 WD | | 10350 | 11,859,375 | 680 | 779,167 | 31.4 | 863,500 | b | 3,069,292 | | | | 16,571,33 |
| 29 CONTACT GROUT STEEL LINING | | | | | | 27,500 TF | | 500 FPD | BGHP | | 55.0 WD | | 11660 | 641,300 | 540 | 29,700 | 55 | 3,025 | 180 | 9,900 | | | | 683,92 |
| 31 FINAL TUNNEL CLEANUP | | | | | | 27,500 TF | | 1500 FPD | CUP | | 18.3 WD | | 12100 | 221,833 | 717 | 13,145 | | | | | | | | 234,97 |
| 45 | | | | | | | | | | | | | | ========== | | ========== | | ========== | | ========== | | ======== | | ========== |
| 46 TOTALS | | | | | | | | | | | | | | 51,494,083 | | 1,811,728 | | 1,994,025 | | 51,296,435 | | | 3,876 | 106,596,27 |

| B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|
| | DESCRIPTION | DURATION | | | | | | | |
| OVERHEAD LABOR | | CODE | EACH | MONTHS | MAN-MONTHS | RATE | COST | DTC | VEH | MOVE IN |
| SUPERVISION | | | | | | | | | | |
| | PROJECT MANAGER | A | 1.0 | 5.0 | 5.0 | 7854 | 39,270 | 1 | 1 | 1 |
| | GENERAL SUPT | C | 1.0 | 4.0 | 4.0 | 6930 | 27,720 | 1 | 1 | 1 |
| | TUNNEL SUPT | D | | 2.5 | | 6468 | | | | |
| | EXCAVATION WALKERS | F | | | | 6006 | | - | - | 2 |
| | CONCRETE WALKERS | G | | | | 6006 | | 1 | - | |
| | EQUIPMENT SUPT | C | 1.0 | 2.5 | 2.5 | 6468 | 16,170 | 1 | 1 | 1 |
| | SHAFT SUPT | H | | | | 6006 | | - | | |
| | EXCAVATION SUPT | | | | | 6006 | | - | | |
| | ELECTRICIAL SUPT | C | | 1.0 | | 6930 | | 1 | | |
| | CONCRETE SUPT | | | | | 6006 | | | | |
| | TOTALS | | 3.0 | ---- | 11.5 | ---- | 83,160 | 5 | 3 | 5 |
| ENGINEERING | | | | | | | | | | |
| | PROJECT ENGINEER | B | 1.0 | 5.0 | 5.0 | 6468 | 32,340 | 1 | 1 | 1 |
| | OFFICE ENGINEER | B | | 5.0 | | 4158 | | | - | |
| | COST ENGINEER | B | | 5.0 | | 4158 | | | - | |
| | TUNNEL ENGINEER | E | | | | 4620 | | | | 1 |
| | DRAFTSMAN | D | | 2.5 | | 2310 | | | - | - |
| | FIELD ENGINEER | D | | 2.5 | | 5544 | | | | |
| | PARTY CHIEF | D | | 2.5 | | 4620 | | | | |
| | INSTRUMENTMAN | D | | 2.5 | | 4620 | | - | - | |
| | RODMAN | D | | 2.5 | | 3234 | | - | - | |
| | SAFETY ENGINEER | D | | 2.5 | | 4620 | | | | 1 |
| | FIRST AID PERSONS | E | | | | 2310 | | - | - | - |
| | TOTALS | | 1.0 | ---- | 5.0 | ---- | 32,340 | 1 | 1 | 3 |
| ADMINISTRATIVE | | | | | | | | | | |
| | OFFICE MANAGER | B | 1.0 | 5.0 | 5.0 | 5544 | 27,720 | 1 | 1 | 1 |
| | PURCHASING AGENT | D | | 2.5 | | 4158 | | | - | |
| | ACCOUNTANT | D | | | | 3234 | | | - | |
| | PAYMASTER/TIMEKEEPER | D | | 2.5 | | 3234 | | | - | - |
| | CLERK | D | | | | 2310 | | | - | - |
| | SECRETARY | C | | 1.0 | | 1386 | | | - | - |
| | WAREHOUSEMAN | D | | | | 4620 | | | - | - |
| | GUARDS, FULL TIME | C | | 1.0 | | 1386 | | - | - | - |
| | GUARDS, WEEKEND | C | | 1.0 | | 572 | | - | - | - |
| | TOTALS | | 1.0 | ---- | 5.0 | ---- | 27,720 | 1 | 1 | 1 |
| OVERHEAD LABOR TOTALS | | | 5.0 | ---- | 21.5 | ---- | 143,220 | 7 | 5 | 9 |

| | | | |
|---|---|---|---|
| INPUT DATA | Hourly Labor Cost | $630 | /shift |
| | Salaried Labor Cost | $220 | /shift |
| | Lighted Tunnel Length | 19,900 | feet |
| | Small tools | | % |
| | Power cost | 0.10 | /KWH |
| | Scheduled work days per month | 21 | ea |
| | Total Labor Cost | | $ million |
| | Contract Amount | 15.0 | $ million |
| | Plant & Equipment Ave Value | | $ million |
| | | CRITICAL PATH | |
| SCHEDULE DURATIONS | Pre Mobilization | | months |
| | Mobilization | 4.00 | months |
| | Shaft Construction | 0.00 | months |
| | Tunnel Excavation | | months |
| | Tunnel Lining | | months |
| | Finish & Moveout | 1.00 | months |
| | Total Project Duration | 5.00 | months |

(Approximate Total Indirect Cost per WD during construction: $6,078 )

| INDIRECT COST SUMMARY | O | P | Q | R | S | T |
|---|---|---|---|---|---|---|
| TOTAL OVERHEAD LABOR | | | | | $143,220 | |
| OVERHEAD EXPENSE | | | | | | |
| MOVE IN | 9 EA | AT $ | 8,000 | $72,000 | | |
| MAINTAIN SUPERVISION | 9 EA | @ | 1,000 | 9,000 | | |
| VEHICLE OPERATION | 22 MO | @ $/MO | 150 | 3,225 | | |
| GENERAL OPERATIONS | LABOR | | | 6,681 | | |
| | EXPENSE | | | 288 | | |
| MISCELLANEOUS EXPENSE | | | | | 20,350 | |
| INSURANCE, TAXES AND BOND | | | | | 9,000 | |
| TOTAL INDIRECT COST | | | | | $172,570 | |

| CONSOLIDATED INDIRECT COST | |
|---|---|
| LABOR | $151,997 |
| EQUIPMENT MAINTENANCE | |
| EXPENDABLE MATERIALS | 20,350 |
| INVOICE | 90,000 |
| TOTAL INDIRECT COST | $262,347 |

| 4 AB | AC | AD | AE | AF | AG | AH | AI | AJ | AK |
|---|---|---|---|---|---|---|---|---|---|
| 5 CREW | | | | | | RATE | MONTHS | | |
| 6 | DURATION | NUMBER OF MEN | | | | PER | | MAN- | LABOR |
| 7 CLASSIFICATION | CODE | DAY | SW | GY | TOTAL | SHIFT | | MONTHS | COST |
| 8 | | | | | | | | | |
| 9 GENERAL OPERATIONS DIRECT LABOR ---------- | | | | | | | | | |
| 10 BIT GRINDER | F | | | | | | | | |
| 11 GEN CARP FOREMAN | | | | | | | 3.0 | | |
| 12 COMPRESSOR OPR | E | | | | | | | | |
| 13 | | | | | | | | | |
| 14 SHAFT OPERATION | | | | | | | ---- | | |
| 15 TOPMAN | E | | | | | | | | |
| 16 HOIST OPERATOR | E | | | | | | | | |
| 17 OILER | E | | | | | | | | |
| 18 BOTTOMMAN | E | | | | | | | | |
| 19 | | | | | | | | | |
| 20 DRYHOUSEMAN | E | 0.5 | | | 0.5 | | | | |
| 21 OUTSIDE CREW | | | | | | | ---- | | |
| 22 LABOR FOREMAN | D | 1.0 | | | 1.0 | | | | |
| 23 LABORERS | D | 1.5 | | | 1.5 | | | | |
| 24 UTILITY OPR | D | | | | | | | | |
| 25 TEAMSTER | D | | | | | | | | |
| 26 | | | | | | | | | |
| 27 MECHANICS | | | | | | | ---- | | |
| 28 UNION MSTR MECH | C | 0.5 | | | 0.5 | | 1.0 | 0.5 | 6,615 |
| 29 SMALL TOOL MECH | D | 0.5 | | | 0.5 | | | | |
| 30 | | | | | | | | | |
| 31 OILER | E | | | | | | | | |
| 32 | | | | | | | | | |
| 33 ELECTRICIANS | | | | | | | ---- | | |
| 34 FOREMAN | C | | | | | | 5.0 | | |
| 35 OUTSIDE | C | | | | | | 1.0 | | |
| 36 TUNNEL EXCAV | F | 2.0 | | | 2.0 | | | | |
| 37 OVERTIME | E | 2.0 Men/Sun @ 2 time | | | | | | - | |
| 38 TUNNEL LINING | G | 1.0 | | | 1.0 | | | | |
| 39 | | | | | | | | | |
| 40 | | | | | | | | | |
| 41 TOTALS PER DAY | | 7.0 | | | 7.0 | | | | ---------- |
| 42 | | TOTAL GENERAL OPERATIONS DIRECT LABOR | | | | | | 0.5 | 6,615 |
| 43 | | TOTAL GENERAL OPERATIONS REPAIR LABOR | | | | | | | 66 |
| 44 | | | | | | | | | ========== |
| 45 TOTAL GENERAL OPERATIONS LABOR | | | | | | | | | $6,681 |
| 46 | | | | | | | | | ========== |
| 47 | | | | | | | | | |

| AL | AM | AN | AO | AP | AR | AS | AT | AU | AV | AW | AX |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 EQUIPMENT OPERATION | | | | | HR | SH | HR | | | | |
| 6 | | | UNITS | | OPR | OPR | OPR | REPAIR LABOR | | PARTS & SUPPLIES | |
| 7 DESCRIPTION | | TOT | SPA | USE | PER | PER | PER | MAN-HOURS | | DOLLARS | |
| 8 | | | | | SH | DAY | DAY | UNIT | TOTAL | UNIT | TOTAL |
| 9 | | | | | | | | | | | |
| 10 BIT GRINDER | | | | | | | | 0.010 | | 1.65 | |
| 11 | | | | | | | | | | | |
| 12 COMPRESSOR, 900 CFM | | 2.0 | 1.0 | 1.0 | 7.0 | 3.0 | 21.0 | 0.056 | | 11.56 | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 16 CRANE, CRAWLER, 100T | | | | | 3.0 | 3.0 | | 0.360 | | 29.60 | |
| 17 | | | | | | | | | | | |
| 18 MAN ELEVATOR | | | | | 1.0 | 3.0 | | 0.150 | | 4.90 | |
| 19 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| 21 | | | | | | | | | | | |
| 22 DISCH WATER TREATMENT | | | | | 8.0 | 3.0 | | 0.015 | | 2.00 | |
| 23 | | | | | | | | | | | |
| 24 CRANE, HYD., 15 T | | 1.0 | | 1.0 | 0.5 | 1.0 | 0.5 | 0.270 | | 17.36 | |
| 25 FLAT BED TRUCK | | | | | 4.0 | 1.0 | | 0.050 | | 9.35 | |
| 26 | | | | | | | | | | | |
| 27 | | | | | | | | | | | |
| 28 ELECTRIC WELDERS | | 3.0 | 1.0 | 2.0 | 4.0 | 1.0 | 8.0 | 0.005 | 1 | 1.50 | 252 |
| 29 DIESEL WELDERS | | 1.0 | | 1.0 | 0.5 | 1.0 | 0.5 | 0.041 | | 3.43 | .36 |
| 30 | | | | | | | | | | | |
| 31 PUMP, SUB, 1 HP | | | | | 1.0 | 3.0 | | 0.005 | | 0.30 | |
| 32 PUMP, SUB, 13 HP | | | | | 1.0 | 3.0 | | 0.015 | | 1.45 | |
| 33 SMALL TOOL PARTS & SUPPLIES | | | | | | | | | | | |
| 34 | | | | | | | | | ========= | | |
| 35 TOTAL MAN-HOURS | | | | | | | | | 1 | | |
| 36 TOTAL GENERAL OPERATIONS REPAIR LABOR | | | | | | | | | $66 | | |
| 37 | (CHECK: ERR MECHANIC FOR DURATION OF TUNNEL CONSTRUCTION) | | | | | | | | | | |
| 38 | | | | | | | | | | | |
| 39 TOTAL PARTS & SUPPLIES | | | | | | | | | | | 288 |
| 40 | | | | | | | | | | | |
| 41 EXPENDABLE MATERIALS | | | | | | | | | | | |
| 42 JANITORAL SUPPLIES | $80 PER MONTH | | | | | | | | | | |
| 43 SMALL TOOLS & EXPENDABLES | % OF TOTAL GENERAL OPERATIONS LABOR | | | | | | | | | | |
| 44 | | | | | | | | | | | ========== |
| 45 TOTAL GENERAL OPERATION EXPENSE | | | | | | | | | | | $288 |
| 46 | | | | | | | | | | | ---------- |

| BZ DESCRIPTION | CB DURATION CODE | CB QUANTITY | CC UNITS | CE COST PER UNIT | CF COST |
|---|---|---|---|---|---|
| SUPPLIES | | | | | |
| OFFICE | B | 5.0 | MONTHS | 600 | 3,000 |
| ENGINEERING | B | 5.0 | MONTHS | 500 | 2,500 |
| SAFETY & FIRST AID | D | | MONTHS | 800 | |
| FACILITY MAINTENANCE | D | | MONTHS | 200 | |
| TOTAL SUPPLIES | | | | | 5,500 |
| SERVICES | | | | | |
| AUDIT | | | LS * | | 0 |
| CONSULTANTS | | | LS * | | |
| SCHEDULING | | | LS * | | 0 |
| DISPUTES REVIEW BOARD | | 5 | MTNGS * | 5,000 | |
| GARBAGE DISPOSAL | B | 5.0 | MONTHS * | 0 | 0 |
| HEAT | % 30 | 5.0 | MONTHS * | 600 | 900 |
| HOME OFFICE CHARGE | C | 1.0 | MONTHS | 2,300 | 2,300 |
| LEGAL | | | LS | | |
| TUNNEL LIGHTING | | 35,104 | KWH | 0.10 | |
| PORTAL LIGHT/MISC PWR | EA 1 | | KWH | 0.10 | |
| PHOTOGRAPHY | E | | MONTHS | 50 | |
| PHYSICAL EXAMINATIONS | | 2 | EACH * | 150 | |
| POSTAGE & COURIER DELIV | B | 5.0 | MONTHS | 230 | 1,150 |
| SURVEYING | | 5.0 | DAYS * | 3,000 | |
| TELEPHONE | B | 5.0 | MONTHS | 1,100 | 5,500 |
| TRAVEL | | 5 | TRIPS | 1,000 | 5,000 |
| WATER, CHLORINE & ICE | D | | MONTHS | 100 | |
| TOTAL SERVICES | | | | | 14,850 |
| FEES | | | | | |
| DONATIONS | | 1.0 | YEAR | 1,500 | |
| LICENSES, AUTOMOTIVE | | 6 | EACH/YR * | 300 | |
| LICENSES, OTHER | | | LS | | |
| PERMITS | | | LS | | |
| TOTAL FEES | | | | | |
| TOTAL MISCELLANEOUS JOB EXPENSE | | | | | $20,350 |

| CI DESCRIPTION | CK BASIS | CL QUANTITY | CN UNITS | CO COST PER UNIT | CR COST |
|---|---|---|---|---|---|
| INSURANCE | | | | | |
| AUTOMOTIVE | 1.0 YEARS | 6 | Vehicles * | 1,500 | |
| BUILDER'S RISK | CONTR AMT | 15,000,000 | /$100 | 0.75 | |
| CONTRACTURAL LIABILITY | PAYROLL | 151,997 | /$100 | 6.00 | |
| DEDUCTIBLE | - | - | LS | | 0 |
| EQUIPMENT TRANSPORTATION | - | - | LS * | | |
| FIDELITY & FORGERY | - | - | LS | | |
| MEDICAL - SALARIED EMPLOYEES | - | 22 | MAN-MO * | 400 | 9,000 |
| PLANT & EQUIPMENT | 1.0 AVE VALUE | | /$100/YR | 1.00 | |
| PROFESSIONAL LIABILITY INSURANCE | | | | | |
| RAILROAD | - | - | LS * | | 0 |
| UMBRELLA (EXCESS GENERAL LIABILITY) | | | YEARS | 50,000 | |
| TOTAL INSURANCE | | | | | 9,000 |
| TAXES | | | | | |
| PLANT & EQUIPMENT | 0.5 AVE VALUE | | /$100/YR * | 1.00 | |
| INVENTORY | | - | | | |
| GROSS RECEIPTS | CONTR AMT | 15,000,000 | Percent * | | |
| TOTAL TAXES | | | | | |
| BONDS | | | | | |
| LABOR & MATERIAL | | | * | | 0 |
| PERFORMANCE | CONTR AMT | 15,000,000 | | | |
| TOTAL BONDS | | | | | 0 |
| TOTAL INSURANCE, TAXES AND BOND | | | | | $9,000 |

Calculate total labor cost

| | |
|---|---|
| Labor Cost | |
| Direct | |
| Indirect | 151,997 |
| Plant & Equipment | |
| Total Labor Cost | 151,997 |

| 50 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 51 | B | C | | D | E | F | G | H | I | J | K |
| 52 | | DESCRIPTION | DURATION | | MONTHS | MAN- | RATE | COST | DTC | VEH | MOVE |
| 53 | OVERHEAD LABOR | | CODE | EACH | | MONTHS | | | | | IN |
| 54 | SUPERVISION ---------- | | | | | | | | | | |
| 55 | | PROJECT MANAGER | A | 1.0 | 15.8 | 15.8 | 7854 | 124,093 | 1 | 1 | 1 |
| 56 | | GENERAL SUPT | C | 1.0 | 15.8 | 15.8 | 6930 | 109,494 | 1 | 1 | 1 |
| 57 | | TUNNEL SUPT | D | 1.0 | 15.8 | 15.8 | 6468 | 102,194 | 1 | 1 | 1 |
| 58 | | EXCAVATION WALKERS | F | 3.0 | 7.2 | 21.6 | 6006 | 129,730 | - | - | 2 |
| 59 | | CONCRETE WALKERS | G | 3.0 | 8.6 | 25.8 | 6006 | 154,955 | 1 | - | |
| 60 | | EQUIPMENT SUPT | C | 1.0 | 15.8 | 15.8 | 6468 | 102,194 | 1 | 1 | 1 |
| 61 | | SHAFT SUPT | H | | | | 6006 | | - | | |
| 62 | | EXCAVATION SUPT | | | | | 6006 | | - | | |
| 63 | | ELECTRICIAL SUPT | C | | 15.8 | | 6930 | | 1 | 1 | |
| 64 | | CONCRETE SUPT | | | | | 6006 | | | | |
| 65 | | TOTALS | | 10.0 | ---- | 110.6 | ---- | 722,660 | 6 | 5 | 6 |
| 66 | ENGINEERING ---------- | | | | | | | | | | |
| 67 | | PROJECT ENGINEER | B | 1.0 | 15.8 | 15.8 | 6468 | 102,194 | 1 | 1 | 1 |
| 68 | | OFFICE ENGINEER | B | 1.0 | 15.8 | 15.8 | 4158 | 65,696 | 1 | - | |
| 69 | | COST ENGINEER | B | | 15.8 | | 4158 | | | - | |
| 70 | | TUNNEL ENGINEER | E | 1.0 | 15.8 | 15.8 | 4620 | 72,996 | 1 | 1 | 1 |
| 71 | | DRAFTSMAN | D | | 15.8 | | 2310 | | | - | - |
| 72 | | FIELD ENGINEER | D | | 15.8 | | 5544 | | | | |
| 73 | | PARTY CHIEF | D | 1.0 | 15.8 | 15.8 | 4620 | 72,996 | | | |
| 74 | | INSTRUMENTMAN | D | 1.0 | 15.8 | 15.8 | 4620 | 72,996 | - | - | |
| 75 | | ROOMAN | D | | 15.8 | | 3234 | | - | - | |
| 76 | | SAFETY ENGINEER | D | 1.0 | 15.8 | 15.8 | 4620 | 72,996 | 1 | | 1 |
| 77 | | FIRST AID PERSONS | E | 3.0 | 15.8 | 47.4 | 2310 | 109,494 | - | - | - |
| 78 | | TOTALS | | 9.0 | ---- | 142.2 | ---- | 569,369 | 4 | 2 | 3 |
| 79 | ADMINISTRATIVE ---------- | | | | | | | | | | |
| 80 | | OFFICE MANAGER | B | 1.0 | 15.8 | 15.8 | 5544 | 87,595 | 1 | 1 | 1 |
| 81 | | PURCHASING AGENT | D | 1.0 | 15.8 | 15.8 | 4158 | 65,696 | 1 | - | |
| 82 | | ACCOUNTANT | D | | 15.8 | | 3234 | | | - | |
| 83 | | PAYMASTER/TIMEKEEPER | D | | 15.8 | | 3234 | | | - | - |
| 84 | | CLERK | D | 1.0 | 15.8 | 15.8 | 2310 | 36,498 | 1 | - | - |
| 85 | | SECRETARY | C | | 15.8 | | 1386 | | | - | - |
| 86 | | WAREHOUSEMAN | D | 1.0 | 15.8 | 15.8 | 4620 | 72,996 | 1 | - | - |
| 87 | | GUARDS, FULL TIME | C | | 15.8 | | 1386 | | - | - | - |
| 88 | | GUARDS, WEEKEND | C | 2.0 | 15.8 | 31.6 | 572 | 18,061 | - | - | - |
| 89 | | TOTALS | | 6.0 | ---- | 94.8 | ---- | 280,847 | 4 | 1 | 1 |
| 90 | | | | ------ | | ------- | | ---------- | | | |
| 91 | OVERHEAD LABOR TOTALS | | | 25.0 | ---- | 347.6 | ---- | 1,572,876 | 14 | 8 | 10 |
| 92 | | | | | | | | | | | |
| 93 | | | | | | | | | | | |

| 50 | INPUT DATA | Hourly Labor Cost | $630 /shift |
|---|---|---|---|
| 51 | | Salaried Labor Cost | $220 /shift |
| 52 | | Lighted Tunnel Length | 19,900 feet |
| 53 | | Small tools | % |
| 54 | | Power cost | 0.10 /KWH |
| 55 | | Scheduled work days per month | 21 ea |
| 56 | | Total Labor Cost | 13.7 $ million |
| 57 | | Contract Amount | 27.4 $ million |
| 58 | | Plant & Equipment Ave Value | 6.20 $ million |
| 59 | | | |
| 60 | | | CRITICAL PATH |
| 61 | SCHEDULE DURATIONS | Pre Mobilization | months |
| 62 | | Mobilization | months |
| 63 | | Shaft Construction | 0.00 months |
| 64 | | Tunnel Excavation | 7.20 months |
| 65 | | Tunnel Lining | 8.60 months |
| 66 | | Finish & Moveout | months |
| 67 | | | ---------- |
| 68 | | Total Project Duration | 15.80 months |
| 69 | | | |

70 (Approximate Total Indirect Cost per WD during construction: $11,114 ) ←

| 71 | | O | P | Q | R | S | T |
|---|---|---|---|---|---|---|---|
| 72 | INDIRECT COST SUMMARY ---------- | | | | | | |
| 73 | TOTAL OVERHEAD LABOR | | | | | $1,572,876 | |
| 74 | OVERHEAD EXPENSE | | | | | | |
| 75 | MOVE IN | 10 EA | AT $ | 8,000 | $80,000 | | |
| 76 | MAINTAIN SUPERVISION | 10 EA | @ | 1,000 | 10,000 | | |
| 77 | VEHICLE OPERATION | 126 MO | @ $/MO | 150 | 18,960 | 108,960 | |
| 78 | GENERAL OPERATIONS | LABOR | | | 1,544,769 | | |
| 79 | | EXPENSE | | | 172,856 | 1,717,625 | |
| 80 | MISCELLANEOUS EXPENSE | | | | | 298,277 | |
| 81 | INSURANCE, TAXES AND BOND | | | | | 1,280,500 | |
| 82 | | | | | | ---------- | |
| 83 | TOTAL INDIRECT COST | | | | | $4,978,239 | |
| 84 | | | | | | ========== | |
| 85 | CONSOLIDATED INDIRECT COST ---------- | | | | | | |
| 86 | | LABOR | | | | $3,129,969 | |
| 87 | | EQUIPMENT MAINTENANCE | | | | 178,228 | |
| 88 | | EXPENDABLE MATERIALS | | | | 299,541 | |
| 89 | | INVOICE | | | | 1,370,500 | |
| 90 | | | | | | ---------- | |
| 91 | | TOTAL INDIRECT COST | | | | $4,978,239 | |
| | | | | | | ========== | |

| 4 AB | AC | AD | AE | AF | AG | AH | AI | AJ | AK |
|---|---|---|---|---|---|---|---|---|---|
| 5 CREW | | | | | | RATE | MONTHS | | |
| 6 | DURATION | NUMBER OF MEN | | | | PER | | MAN- | LABOR |
| 7 CLASSIFICATION | CODE | DAY | SW | GY | TOTAL | SHIFT | | MONTHS | COST |
| 8 | | | | | | | | | |
| 9 GENERAL OPERATIONS DIRECT LABOR | | | | | | | | | |
| 10 BIT GRINDER | F | | | | | | 7.2 | | |
| 11 GEN CARP FOREMAN | | | | | | | 3.0 | | |
| 12 COMPRESSOR OPR | E | | | | | | 15.8 | | |
| 13 | | | | | | | | | |
| 14 SHAFT OPERATION | | | | | | | ---- | | |
| 15 TOPMAN | E | | | | | | 15.8 | | |
| 16 HOIST OPERATOR | E | | | | | | 15.8 | | |
| 17 OILER | E | | | | | | 15.8 | | |
| 18 BOTTOMMAN | E | | | | | | 15.8 | | |
| 19 | | | | | | | | | |
| 20 DRYHOUSEMAN | E | 0.5 | | | 0.5 | | 15.8 | 7.9 | 104,517 |
| 21 OUTSIDE CREW | | | | | | | ---- | | |
| 22 LABOR FOREMAN | D | 1.0 | | | 1.0 | | 15.8 | 15.8 | 209,034 |
| 23 LABORERS | D | 1.5 | | | 1.5 | | 15.8 | 23.7 | 313,551 |
| 24 UTILITY OPR | D | | | | | | 15.8 | | |
| 25 TEAMSTER | D | | | | | | 15.8 | | |
| 26 | | | | | | | | | |
| 27 MECHANICS | | | | | | | ---- | | |
| 28 UNION MSTR MECH | C | 0.5 | | | 0.5 | | 15.8 | 7.9 | 104,517 |
| 29 SMALL TOOL MECH | D | 0.5 | | | 0.5 | | 15.8 | 7.9 | 104,517 |
| 30 | | | | | | | | | |
| 31 OILER | E | | | | | | 15.8 | | |
| 32 | | | | | | | | | |
| 33 ELECTRICIANS | | | | | | | ---- | | |
| 34 FOREMAN | C | 1.0 | | | 1.0 | | 15.8 | 15.8 | 209,034 |
| 35 OUTSIDE | C | | | | | | 15.8 | | |
| 36 TUNNEL EXCAV | F | 2.0 | | | 2.0 | | 7.2 | 14.4 | 190,512 |
| 37 OVERTIME | E | 2.0 Men/Sun @ 2 time | | | | | 15.8 | - | 159,473 |
| 38 TUNNEL LINING | G | 1.0 | | | 1.0 | | 8.6 | 8.6 | 113,778 |
| 39 | | | | | | | | | |
| 40 | | | | | | | | | |
| 41 TOTALS PER DAY | | 8.0 | | | 8.0 | | | | ---------- |
| 42 | TOTAL GENERAL OPERATIONS DIRECT LABOR | | | | | | | 102.0 | 1,508,933 |
| 43 | TOTAL GENERAL OPERATIONS REPAIR LABOR | | | | | | | | 35,836 |
| 44 | | | | | | | | | ========== |
| 45 TOTAL GENERAL OPERATIONS LABOR | | | | | | | | | $1,544,769 |
| 46 | | | | | | | | | ========== |
| 47 | | | | | | | | | |
| 48 INDIRECT COST | | | | | | 09:56 | 03/07/96 | | |

| AL AM | AN | AO | AP | AR | AS | AT | AU | AV | AW | AX |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 EQUIPMENT OPERATION | | | | HR | SH | HR | | | | |
| 6 | | UNITS | | OPR | OPR | OPR | REPAIR LABOR | | PARTS & SUPPLIES | |
| 7 DESCRIPTION | TOT | SPA | USE | PER | PER | PER | MAN-HOURS | | DOLLARS | |
| 8 | | | | SH | DAY | DAY | UNIT | TOTAL | UNIT | TOTAL |
| 9 | | | | | | | | | | |
| 10 BIT GRINDER | | | | | | | 0.010 | | 1.65 | |
| 11 | | | | | | | | | | |
| 12 COMPRESSOR, 900 CFM | 2.0 | 1.0 | 1.0 | 7.0 | 3.0 | 21.0 | 0.056 | 390 | 11.56 | 80,548 |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 16 CRANE, CRAWLER, 100T | | | | 3.0 | 3.0 | | 0.360 | | 29.60 | |
| 17 | | | | | | | | | | |
| 18 MAN ELEVATOR | | | | 1.0 | 3.0 | | 0.150 | | 4.90 | |
| 19 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 21 | | | | | | | | | | |
| 22 DISCH WATER TREATMENT | | | | 8.0 | 3.0 | | 0.015 | | 2.00 | |
| 23 | | | | | | | | | | |
| 24 CRANE, HYD., 15 T | 1.0 | | 1.0 | 0.5 | 1.0 | 0.5 | 0.270 | 45 | 17.36 | 2,880 |
| 25 FLAT BED TRUCK | | | | 4.0 | 1.0 | | 0.050 | | 9.35 | |
| 26 | | | | | | | | | | |
| 27 | | | | | | | | | | |
| 28 ELECTRIC WELDERS | 3.0 | 1.0 | 2.0 | 4.0 | 1.0 | 8.0 | 0.005 | 13 | 1.50 | 3,982 |
| 29 DIESEL WELDERS | 1.0 | | 1.0 | 0.5 | 1.0 | 0.5 | 0.041 | 7 | 3.43 | 569 |
| 30 | | | | | | | | | | |
| 31 PUMP, SUB, 1 HP | | | | 1.0 | 3.0 | | 0.005 | | 0.30 | |
| 32 PUMP, SUB, 13 HP | | | | 1.0 | 3.0 | | 0.015 | | 1.45 | |
| 33 SMALL TOOL PARTS & SUPPLIES | | | | | | | | | | 83,614 |
| 34 | | | | | | | | ========= | | |
| 35 TOTAL MAN-HOURS | | | | | | | | 455 | | |
| 36 TOTAL GENERAL OPERATIONS REPAIR LABOR | | | | | | | | $35,836 | | |
| 37 (CHECK: 0.17 MECHANIC FOR DURATION OF TUNNEL CONSTRUCTION) | | | | | | | | | | |
| 38 | | | | | | | | | | |
| 39 TOTAL PARTS & SUPPLIES | | | | | | | | | | 171,592 |
| 40 | | | | | | | | | | |
| 41 EXPENDABLE MATERIALS | | | | | | | | | | |
| 42 JANITORAL SUPPLIES | | $80 | PER MONTH | | | | | | 1,264 | |
| 43 SMALL TOOLS & EXPENDABLES | | | % OF TOTAL GENERAL OPERATIONS LABOR | | | | | | | 1,264 |
| 44 | | | | | | | | | | ========== |
| 45 TOTAL GENERAL OPERATION EXPENSE | | | | | | | | | | $172,856 |
| 46 | | | | | | | | | | ========== |

| BZ DESCRIPTION | CB DURATION CODE | CB QUANTITY | CC UNITS | CE COST PER UNIT | CF COST |
|---|---|---|---|---|---|
| SUPPLIES | | | | | |
| OFFICE | B | 15.8 | MONTHS | 1100 | 17,380 |
| ENGINEERING | B | 15.8 | MONTHS | 800 | 12,640 |
| SAFETY & FIRST AID | D | 15.8 | MONTHS | 1400 | 22,120 |
| FACILITY MAINTENANCE | D | 15.8 | MONTHS | 300 | 4,740 |
| TOTAL SUPPLIES | | | | | 56,880 |
| SERVICES | | | | | |
| AUDIT | | | LS * | | 0 |
| CONSULTANTS | | | LS * | | 50,000 |
| SCHEDULING | | | LS * | | 0 |
| DISPUTES REVIEW BOARD | | 5 | MTNGS * | 5,000 | 25,000 |
| GARBAGE DISPOSAL | B | 15.8 | MONTHS * | 0 | 0 |
| HEAT | % 30 | 15.8 | MONTHS * | 600 | 2,844 |
| HOME OFFICE CHARGE | C | 15.8 | MONTHS | 4,100 | 64,780 |
| LEGAL | | | LS | | |
| TUNNEL LIGHTING | | 219,983 | KWH | 0.10 | 21,998 |
| PORTAL LIGHT/MISC PWR | EA 1 | 26,070 | KWH | 0.10 | 2,607 |
| PHOTOGRAPHY | E | 15.8 | MONTHS | 50 | 790 |
| PHYSICAL EXAMINATIONS | | 2 | EACH * | 150 | 300 |
| POSTAGE & COURIER DELIV | B | 15.8 | MONTHS | 410 | 6,478 |
| SURVEYING | | 5.0 | DAYS * | 3,000 | 15,000 |
| TELEPHONE | B | 15.8 | MONTHS | 1,900 | 30,020 |
| TRAVEL | | 5 | TRIPS | 1,000 | 5,000 |
| WATER, CHLORINE & ICE | D | 15.8 | MONTHS | 100 | 1,580 |
| TOTAL SERVICES | | | | | 226,397 |
| FEES | | | | | |
| DONATIONS | | 2.0 | YEAR | 2,700 | 5,400 |
| LICENSES, AUTOMOTIVE | | 9 | EACH/YR * | 300 | 3,600 |
| LICENSES, OTHER | | | LS | | 2,000 |
| PERMITS | | | LS | | 4,000 |
| TOTAL FEES | | | | | 15,000 |
| TOTAL MISCELLANEOUS JOB EXPENSE | | | | | $298,277 |

| CI DESCRIPTION | CK BASIS | CL QUANTITY | CN UNITS | CO COST PER UNIT | CR COST |
|---|---|---|---|---|---|
| INSURANCE | | | | | |
| AUTOMOTIVE | 2.0 YEARS | 9 | Vehicles * | 1,500 | 27,000 |
| BUILDER'S RISK | CONTR AMT | 27,400,000 | /$100 | 0.75 | 205,500 |
| CONTRACTURAL LIABILITY | PAYROLL | 13,669,969 | /$100 | 5.00 | 683,000 |
| DEDUCTIBLE | - | - | LS | | 0 |
| EQUIPMENT TRANSPORTATION | - | - | LS * | | 30,000 |
| FIDELITY & FORGERY | - | - | LS | | 8,000 |
| MEDICAL - SALARIED EMPLOYEES | - | 348 | MAN-MO * | 400 | 139,000 |
| PLANT & EQUIPMENT | 1.0 AVE VALUE | 6,200,000 | /$100/YR | 1.00 | 82,000 |
| PROFESSIONAL LIABILITY INSURANCE | | | | | 15,000 |
| RAILROAD | - | - | LS * | | 0 |
| UMBRELLA (EXCESS GENERAL LIABILITY) | | 1 | YEARS | 50,000 | 50,000 |
| TOTAL INSURANCE | | | | | 1,239,500 |
| TAXES | | | | | |
| PLANT & EQUIPMENT | 0.5 AVE VALUE | 6,200,000 | /$100/YR * | 1.00 | 41,000 |
| INVENTORY | | - | | | |
| GROSS RECEIPTS | CONTR AMT | 27,400,000 | Percent * | | |
| TOTAL TAXES | | | | | 41,000 |
| BONDS | | | | | |
| LABOR & MATERIAL | | | * | | 0 |
| PERFORMANCE | CONTR AMT | 27,400,000 | | | |
| TOTAL BONDS | | | | | 0 |
| TOTAL INSURANCE, TAXES AND BOND | | | | | $1,280,500 |

Calculate total labor cost

| | |
|---|---|
| Labor Cost | |
| Direct | 10,000,000 |
| Indirect | 3,129,969 |
| Plant & Equipment | 540,000 |
| Total Labor Cost | 13,669,969 |

690 SU

691 INPUT DATA

| | | | | |
|---|---|---|---|---|
| 692 | Location of project site ---------- | SAN DIEGO | Hourly Labor Cost | $630 /man-shift |
| 693 | Urban (1), rural (2), or remote (3) ----- | 2 | BLS Index | 138.0 |
| 694 | Material to be Excavated ---------- | HARD ROCK | Sales Tax Rate | 7.75 % |
| 695 | Method of tunnel excavation ---------- | TBM | | |
| 696 | Tunnel access via portal (1) or shaft (2) | 1 | Purchase Factor, New | 0.87 |
| 697 | Tunnel should be wet (1) or dry (2) ----- | 1 | Purchase Factor, Used | 0.60 |
| 698 | Excavated Diameter | 12.00 feet | Purchase Factor, Owned | 0.40 |
| 699 | Lined Diameter | 9.50 feet | Salvage multiplier | 0.79 |
| 700 | Tunnel Length | 20,000 feet | Freight in | $4.00 /load-mile |
| 701 | Work Area Setups | 1 each | Freight out | $600 /load |

702

703

704

CONSOLIDATED TOTALS

| | | |
|---|---|---|
| EQUIPMENT OWNERSHIP | | $6,371,751 |
| LABOR | | 540,986 |
| EQUIPMENT MAINTENANCE | 5 | 39,043 |
| EXPENDABLE MATERIALS | 20 | 156,171 |
| SUBCONTRACTS & INVOICE | 75 | 1,669,651 |
| TOTAL PLANT & EQUIPMENT COST | | $8,777,602 |

AVERAGE VALUE OF PLANT & EQUIPMENT $6,242,123

OVERALL SALVAGE PERCENT OF PURCHASE 32

705

706 D E F G H I J K L M N O P Q R S T U

707 SALVAGE FREIGHT ASSEMBLE DISASSEMBLE SALES FREIGHT

708 DESCRIPTION SHEET # PURCHASE DEPRECIATE RENT IN LABOR OTHER LABOR OTHER TAX JOB CHARGE

709

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 710 BUILDINGS & YARD | 2 | 134,189 | 49,516 | 84,673 | 9,147 | 700 | 135,450 | 259,539 | 21,743 | 90,502 | 11,883 | 4,200 | 617,837 |
| 712 UTILITIES | 4 | 1,155,175 | 278,553 | 876,623 | 2,303 | 12,800 | 87,507 | 323,333 | 27,698 | 61,183 | 91,867 | 9,600 | 1,492,912 |
| 714 HOISTING AND CRANES | 5 | 116,709 | 46,100 | 70,609 | 18,752 | 4,400 | 5,166 | 255 | 2,129 | 115 | 10,527 | 1,000 | 112,953 |
| 716 HAUL - RUBBER | 6 | 24,469 | 5,799 | 18,670 | | | | | | | 1,896 | | 20,567 |
| 718 HAUL - RAIL | 7 | 1,313,043 | 532,910 | 780,133 | | 124,000 | 55,440 | 7,097 | 14,490 | 1,051 | 102,392 | 23,400 | 1,108,004 |
| 720 SURFACE EXCAVATION EQUIPMENT | 8 | 201,401 | 79,553 | 121,848 | | 4,000 | | | | | 15,609 | 600 | 142,056 |
| 722 ROCK DRILLS AND EQUIPMENT | 9 | 41,652 | 8,136 | 33,516 | | 800 | | | | | 3,191 | 600 | 38,108 |
| 724 TUNNEL & SHAFT MUCKERS | 10 | 19,601 | 7,742 | 11,858 | 16,808 | 4,000 | 1,260 | 657 | 630 | 66 | 2,878 | 3,900 | 42,057 |
| 726 TUNNEL & SHAFT MACHINES | 11 | 5,946,914 | 1,933,451 | 4,013,463 | | 80,000 | 144,270 | 33,385 | 43,313 | 3,279 | 461,790 | 12,000 | 4,791,500 |
| 728 CONCRETE & SHOTCRETE | 12 | 120,035 | 32,194 | 87,841 | | 12,000 | | | | | 9,303 | | 109,144 |
| 730 GENERAL PLANT & EQUIPMENT | 13 | 354,810 | 82,293 | 272,517 | | 100 | 1,890 | 394 | | | 26,963 | 600 | 302,464 |
| 732 TOTAL PLANT AND EQUIPMENT COST | | 9,427,998 | 3,056,247 | 6,371,751 | 47,011 | 242,800 | 430,983 | 624,660 | 110,003 | 156,196 | 738,299 | 55,900 | 8,777,602 |

733

734 PLANT & EQUIPMENT 09:49 03/07/96 PLANT & EQUIPMENT SUMMARY BASE ESTIMATE 1 PAGE 58

| 102 BU | | D E | F G | H I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 103 | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 104 DESCRIPTION | | NOTES | SIZE | QUANTITY | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 105 SITEWORK | | | | | | | | | | | | | | | | |
| 106 CLEAR & GRUBB | (26) | SL | 1 QUAL | 5 A | | | | | | | 6,571 | | | | | 6,571 |
| 107 | | | | | | | | | | | | | | | | |
| 108 | | | | | | | | | | | | | | | | |
| 109 SITE GRADING | | S | | 5,000 CY | | | | | | | 16,429 | | | | | 16,429 |
| 110 FENCING | (27) | SL | 2 QUAL | 4,000 LF | | | | | | | 36,800 | 7,360 | | | | 44,160 |
| 111 | | | | | | | | | | | | | | | | |
| 112 ACCESS ROADS | (34) | SL | 3 QUAL | 10,000 LF | | | | | | | 65,714 | | | | | 65,714 |
| 113 SURFACING | | S | | 5,000 SY | | | | | | | 12,683 | | | | | 12,683 |
| 114 SIGNS & BARRICADES | (37) | AL | 5 QUAL | 1 LS | | | | | | 819 | 296 | 246 | | 23 | | 1,383 |
| 115 STAIRWAYS & LADDERS | | A | | VF | | | | | | | | | | | | |
| 116 RESTORATION | (38) | SL | 1 QUAL | 3,000 KSF | | | | | | | | | 89,187 | | | 89,187 |
| 117 SURFACE RAILROAD | | A | | 2,000 LF | | | | | | 100,800 | 5,257 | | | 407 | | 106,465 |
| 118 | | | | | | | | | | | | | | | | |
| 119 OFFICES | | | | | | | | | | | | | | | | |
| 120 JOB | | CA 1 | | 2,800 SF | 80,040 | 31,616 | 48,424 | | | 3,528 | 1,840 | 1,764 | | 6,346 | | 61,902 |
| 121 FIELD | | A | 1 SETUPS | SF | | | | | | | | | | | | |
| 122 OWNER'S | | A 3 | | 400 SF | 5,257 | 2,077 | 3,181 | | | 504 | 263 | 252 | | 20 | | 4,220 |
| 123 FIRST AID | | A 2 | | 400 SF | 7,886 | 3,115 | 4,771 | | | 504 | 263 | 151 | | 632 | | 6,320 |
| 124 | | | | | | | | | | | | | | | | |
| 125 SHOPS | | | | | | | | | | | | | | | | |
| 126 EQUIPMENT | | S | | 3,000 SF | | | | | | | 78,857 | | | | | 78,857 |
| 127 CARPENTER | | A | | 200 SF | | | | | | 2,520 | 2,629 | 504 | | 204 | | 5,856 |
| 128 ELECTRICAL | | A 2 | | 2 VAN | 6,309 | 1,994 | 4,315 | | | 2,520 | 1,314 | 756 | | 591 | | 9,496 |
| 129 CUTTER | | A 2 | | 1 VAN | 3,154 | 997 | 2,158 | | | 1,260 | 657 | 378 | | 295 | | 4,748 |
| 130 | | | | | | | | | | | | | | | | |
| 131 STORAGE | | | | | | | | | | | | | | | | |
| 132 WAREHOUSE | | CS | | 1,100 SF | | | | | | | 21,686 | | | | | 21,686 |
| 133 CEMENT, SACK | | A 2 | | 1 VAN | 3,154 | 748 | 2,407 | | | 1,260 | 526 | 378 | | 285 | | 4,856 |
| 134 POWDER & CAPS | | RA | | 1.0 LS | | | | 2,287 | | 12,600 | 1,314 | 6,300 | 657 | 330 | | 23,488 |
| 135 FUEL | | A | | 1.0 LS | | | | | | 6,300 | 5,257 | 2,520 | 657 | 458 | | 15,193 |
| 136 OFFSITE YARD | | R | | 12 MO | | | | 6,861 | | | | | | | | 6,861 |
| 137 | | | | | | | | | | | | | | | | |
| 138 | | | | | | | | | | | | | | | | |
| 139 MISCELLANEOUS | | | | | | | | | | | | | | | | |
| 140 CHANGEHOUSE | | A 2 | 1 SETUPS | 90 MAN | 28,389 | 8,971 | 19,418 | | | 2,835 | 1,183 | 1,134 | | 2,292 | | 26,861 |
| 141 LIVING TRAILERS | | A 2 | | SF | | | | | | | | | | | | |
| 142 FREIGHT, LOCAL | | C | | 7.0 LOADS | | | | | 700 | | | | | | 4,200 | 4,900 |
| 143 | | | | | | | | | | | | | | | | |
| 144 | | | | TOTALS | 134,189 | 49,516 | 94,673 | 9,147 | 700 | 135,450 | 259,539 | 21,743 | 90,502 | 11,883 | 4,200 | 617,837 |
| 145 | | | | | | | | | | | | | | | | |

| 151 UO | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 152 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 153 DESCRIPTION | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 154 SANITARY | | | | | | | | | | | | | | | | | | |
| 155 HOOK TO CITY SEWER | S | | | | | LF | | | | | | | | | | | | |
| 156 SEPTIC TANKS | S | | | | 1 | LS | | | | | | | 6,571 | | 2,629 | | | 9,200 |
| 157 TILE FIELDS | S | | | | 1 | LS | | | | | | | 5,257 | | 2,103 | | | 7,360 |
| 158 SEWER LINES | S | | | | | LF | | | | | | | | | | | | |
| 159 TREATMENT PLANT | Q | | GPM | | | LS | | | | | | | | | | | | |
| 160 PORTABLE TOILETS | R | | | | 24 | MO | | | | 2,303 | | | | | | 178 | | 2,481 |
| 161 TOTAL SANITARY | | | | | | | | | | 2,303 | | | 11,829 | | 4,731 | 178 | | 19,041 |
| 162 WATER SUPPLY | | | | | | | | | | | | | | | | | | |
| 163 CONNECT TO MAIN | S | | | | 1,000 | LF | | | | | | | 6,571 | 986 | | | | 7,557 |
| 164 WELLS | S | | | | | LF | | | | | | | | | | | | |
| 165 PUMPS & TANKS | S | | | | | LS | | | | | | | | | | | | |
| 166 SURFACE LINE (1) | L | 2 | 2 | IN | 1,000 | LF | 1,609 | | 1,609 | | | 1,890 | 33 | 567 | | 127 | | 4,226 |
| 167 INSULATION (1) | NAL | | 2 | IN | 1,000 | LF | | | | | | 5,040 | 1,393 | | | 108 | | 6,541 |
| 168 TUNNEL LINE (1) | L | 2 | 3 | IN | 20,200 | LF | 42,053 | 6,644 | 35,409 | | | | | | | 3,259 | | 38,668 |
| 169 VALVES | C | | | | 1 | LS | 4,366 | 690 | 3,676 | | | | | | | 338 | | 4,015 |
| 170 ICE MACHINE | A | 1 | | | 1 | EA | 1,599 | 253 | 1,346 | | | 315 | 66 | 63 | | 129 | | 1,919 |
| 171 TOTAL WATER SUPPLY | | | | | | | 49,626 | 7,587 | 42,040 | | | 7,245 | 8,063 | 1,616 | | 3,962 | | 62,925 |
| 172 COMMUNICATIONS | | | | | | | | | | | | | | | | | | |
| 173 COMMERCIAL PHONE LINE | S | | | | 5,000 | LF | | | | | | | 6,571 | | | | | 6,571 |
| 174 JOB PHONES | | 1 | | | 7 | EA | 2,881 | 455 | 2,426 | | | | | | | 223 | | 2,649 |
| 175 JOB PHONE LINE | | 1 | | | 20,800 | LF | 3,805 | | 3,805 | | | | | | | 295 | | 4,100 |
| 176 TOTAL COMMUNICATIONS | | | | | | | 6,687 | 455 | 6,232 | | | | 6,571 | | | 518 | | 13,321 |
| 177 VENTILATION | | | | | | | | | | | | | | | | | | |
| 178 FANS (2) | L | 1 | | HP | | EA | | | | | | | | | | | | |
| 179 FANS (2) | L | 1 | 75 | HP | 8 | EA | 57,629 | 18,211 | 39,418 | | | | | | | 4,466 | | 43,884 |
| 180 FANS, SCAVENGER (2) | L | 2 | 10 | HP | | EA | | | | | | | | | | | | |
| 181 ACCESSORIES (2) | L | 1 | 75 | HP | 7 | EA | 3,202 | 759 | 2,443 | | | | | | | 248 | | 2,691 |
| 182 STARTERS (2) | L | 2 | 75 | HP | 8 | EA | 14,194 | 6,728 | 7,466 | | | | | | | 1,100 | | 8,566 |
| 183 FANLINE & COUPLINGS (3) | L | 1 | 36 | IN | 20,200 | LF | 254,070 | | 254,070 | | | | | | | 19,690 | | 273,760 |
| 184 CASETTE (21B) | L | 3 | 30 | IN | | EA | | | | | | | | | | | | |
| 185 BAGLINE (21A) | L | 1 | 36 | IN | | LF | | | | | | | | | | | | |
| 186 BAGLINE (21A) | L | 1 | 18 | IN | | LF | | | | | | | | | | | | |
| 187 BULKHEADS | NA | | | | 200 | SF | | | | | | 7,560 | 1,577 | 1,260 | | 122 | | 10,519 |
| 188 DOORS | A | 1 | 6'w x 8'h | | 1 | EA | 6,861 | | 6,861 | | | 6,300 | 1,314 | 1,260 | | 634 | | 16,368 |
| 189 TOTAL VENTILATION | | | | | | | 335,955 | 25,698 | 310,258 | | | 13,860 | 2,891 | 2,520 | | 26,261 | | 355,790 |
| 190 INSTALL ALL SHAFT UTILITIES | A | | | | | VF | | | | | | 3,780 | 131 | 1,512 | 39 | 13 | | 5,476 |
| 191 FREIGHT, REGIONAL | C | | | | 8 | LOADS | | | | | 6,400 | | | | | | 4,800 | 11,200 |
| 192 | | | | | | | | | | | | | | | | | | |
| 193 | | | | | TOTALS | | 392,268 | 33,740 | 358,529 | 2,303 | 6,400 | 21,105 | 29,355 | 4,136 | 4,731 | 30,919 | 4,800 | 462,277 |
| 194 | | | | | | | | | | | | | | | | | | |

| 200 UT | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 201 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 202 DESCRIPTION | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 203 ELECTRICAL | | | | | | | | | | | | | | | | | | |
| 204 POWER COMPANY LINE | QS | | | | 5,000 | LF | | | | | | | 204,000 | | 33,000 | | | 237,000 |
| 205 SUBSTATION | QS | | | | 1.0 | LS | | | | | | | 63,000 | | 17,700 | | | 80,700 |
| 206 SURFACE SUBSTATION | | | | | | | | | | | | | | | | | | |
| 207 TRANSFORMERS (23) | L | 1 | 5000 | KW | 1.0 | EA | 72,036 | 39,836 | 32,200 | | | 19,845 | 2,826 | 7,938 | 848 | 5,867 | | 69,524 |
| 208 DISTRIBUTE/LIGHT (36) | NAL | | 4 | QAL | 1.0 | LOT | | | | | | 25,200 | 7,886 | 7,560 | 1,577 | 733 | | 42,956 |
| 209 GENERATORS (22) | AL | 1 | 500 | KW | | MO | | | | | | | | | | | | |
| 210 UNDERGROUND, 15KV | | | | | | | | | | | | | | | | | | |
| 211 MAIN POWER CABLE (4) | C | 1 | 4 | /0 | 19,000 | LF | 154,249 | 85,299 | 68,949 | | | | | | | 11,954 | | 80,903 |
| 212 TRAILING CABLE | | 1 | 2 | /0 | 1,500 | LF | 22,640 | 12,520 | 10,120 | | | | | | | 1,755 | | 11,875 |
| 213 TRANSFORMERS, LIGHTING | C | 1 | 25 | KVA | 8 | EA | 6,678 | 3,165 | 3,512 | | | | | | | 518 | | 4,030 |
| 214 TRANSFORMERS, FANS (23) | CL | 1 | | KVA | 8 | EA | | | | | | | | | | | | |
| 215 DISCONNECTS | C | 1 | | | 8 | EA | 27,909 | 13,229 | 14,680 | | | | | | | 2,163 | | 16,843 |
| 216 LIGHT LINE | C | 1 | | | 20,200 | LF | 86,846 | 13,722 | 73,124 | | | | | | | 6,731 | | 79,855 |
| 217 TOTAL ELECTRICAL | | | | | | | 370,357 | 167,771 | 202,586 | | | 45,045 | 277,711 | 15,498 | 53,125 | 29,721 | | 623,686 |
| 218 COMPRESSED AIR | | | | | | | | | | | | | | | | | | |
| 219 STATIONARY COMPRESSOR (5) | L | 2 | 900 | CFM | 2 | EA | 104,722 | 49,638 | 55,084 | | | 5,040 | 6,966 | 2,016 | 2,786 | 8,872 | | 80,764 |
| 220 PORTABLE COMPRESSOR (6) | RL | | 600 | CFM | | MO | | | | | | | | | | | | |
| 221 FREIGHT, STATE | | | | | | RT | | | | | | | | | | | | |
| 222 COMPRESSOR HOUSE & PIPING | S | | 400 | SF | 1 | EA | | | | | | | 7,886 | | | | | 7,886 |
| 223 SURFACE LINE (1) | L | 3 | 4 | IN | 600 | LF | 1,328 | | 1,328 | | | 3,402 | 35 | 945 | 8 | 3 | | 5,722 |
| 224 TUNNEL LINE (1) | CL | 1 | 4 | IN | 20,200 | LF | 97,239 | 23,046 | 74,194 | | | | | | | 7,536 | | 81,730 |
| 225 VALVES | F | | | | 1 | LS | 9,857 | 2,336 | 7,521 | | | | | | | 764 | | 8,285 |
| 226 TANNER TANK | | 1 | | | 1 | EA | 3,192 | 757 | 2,436 | | | 315 | 66 | 63 | 7 | 253 | | 3,139 |
| 227 TOTAL COMPRESSED AIR | | | | | | | 216,339 | 75,777 | 140,562 | | | 8,757 | 14,953 | 3,024 | 2,801 | 17,428 | | 187,525 |
| 228 DEWATERING | | | | | | | | | | | | | | | | | | |
| 229 PUMPS, SUBMER, ELECT (15) | L | 1 | 1 | HP | 3 | EA | 3,756 | 593 | 3,163 | | | | | | | 291 | | 3,454 |
| 230 (15) | L | 1 | 5 | HP | 2 | EA | 4,254 | 672 | 3,581 | | | | | | | 330 | | 3,911 |
| 231 (15) | L | 1 | 16 | HP | | EA | | | | | | | | | | | | |
| 232 TUNNEL DISCHARGE LINE (1) | CL | 1 | 6 | IN | 19,900 | LF | 140,621 | | 140,621 | | | | | | | 10,898 | | 151,519 |
| 233 SHAFT DISCHARGE LINE (1) | L | 1 | 6 | IN | | LF | | | | | | | | | | | | |
| 234 SURFACE DISCH LINE (1) | L | 1 | 8 | IN | 1,000 | LF | 10,211 | | 10,211 | | | | | | | 791 | | 11,002 |
| 235 VALVES | F | | | | 1 | LS | 15,083 | | 15,083 | | | | | | | 1,169 | | 16,252 |
| 236 SHAFT SUMP | A | | | | | EA | | | | | | | | | | | | |
| 237 SETTLING BASIN/OIL SKIM | NA | | 1 | SETUPS | 1.0 | EA | 2,287 | | 2,287 | | | 12,600 | 1,314 | 5,040 | 526 | 320 | | 22,087 |
| 238 WIERS & RECORDERS | NA | | 1 | SETUPS | | EA | | | | | | | | | | | | |
| 239 TOTAL DEWATERING | | | | | | | 176,212 | 1,266 | 174,946 | | | 12,600 | 1,314 | 5,040 | 526 | 13,799 | | 208,225 |
| 240 FREIGHT, REGIONAL | C | | | | 8.0 | LOADS | | | | | 6,400 | | | | | | 4,800 | 11,200 |
| 241 | | | | | | | | | | | | | | | | | | |
| 242 UTILITY TOTALS | | | | | | | 1,155,175 | 278,553 | 876,623 | 2,303 | 12,800 | 87,507 | 323,333 | 27,698 | 61,183 | 91,867 | 9,600 | 1,492,912 |
| 243 | | | | | | | | | | | | | | | | | | |

| 249 NO | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 250 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 251 DESCRIPTION | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 252 HOISTS | | | | | | | | | | | | | | | | | | |
| 253 SHAFT | Q | | | | | EA | | | | | | | | | | | | |
| 254 HOIST HOUSE | Q | | | | | EA | | | | | | | | | | | | |
| 255 WINCHES | Q | | | | | EA | | | | | | | | | | | | |
| 256 TUGGERS, 2000# | | 2 | | | | EA | | | | | | | | | | | | |
| 257 | | | | | | | | | | | | | | | | | | |
| 258 ALIMAC MAN HOIST | A | 2 | | | | EA | | | | | | | | | | | | |
| 259 ALIMAC RAIL | A | 2 | | | | LF | | | | | | | | | | | | |
| 260 | | | | | | | | | | | | | | | | | | |
| 261 | | | | | | | | | | | | | | | | | | |
| 262 FREIGHT, MILWAUKEE | Q | | | | | LOADS | | | | | | | | | | | | |
| 263 TOTAL HOISTS | | | | | | | | | | | | | | | | | | |
| 264 SHAFT EQUIPMENT | | | | | | | | | | | | | | | | | | |
| 265 HEAD FRAME | Q | | | | | LBS | | | | | | | | | | | | |
| 266 STEEL & GUIDES | Q | | | | | FT | | | | | | | | | | | | |
| 267 CABLE & FITTINGS | Q | | | | | LS | | | | | | | | | | | | |
| 268 SHEAVES | Q | | | | | LS | | | | | | | | | | | | |
| 269 SKIP & SCROLLS | Q | | | | | LS | | | | | | | | | | | | |
| 270 AUTOMATIC CONTROLS | Q | | | | | LS | | | | | | | | | | | | |
| 271 COUNTERWEIGHT | Q | | | | | LS | | | | | | | | | | | | |
| 272 FOUNDATION | Q | | | | | LS | | | | | | | | | | | | |
| 273 MUCK HOPPER | Q | | | | | CY | | | | | | | | | | | | |
| 274 BULKHEAD | Q | | | | | LS | | | | | | | | | | | | |
| 275 BUCKETS | Q | | | CY | | EA | | | | | | | | | | | | |
| 276 | | | | | | | | | | | | | | | | | | |
| 277 | | | | | | | | | | | | | | | | | | |
| 278 FREIGHT, MILWAUKEE | | | | | | LOADS | | | | | | | | | | | | |
| 279 TOTAL SHAFT EQUIPMENT | | | | | | | | | | | | | | | | | | |
| 280 CRANES | | | | | | | | | | | | | | | | | | |
| 281 YARD CRANE | | 2 | 15 | T | 1 | EA | 116,709 | 46,100 | 70,609 | | 4,000 | 630 | 66 | 315 | 39 | 9,053 | 600 | 85,312 |
| 282 | | 2 | 25 | T | | MO | | | | | | | | | | | | |
| 283 TRUCK CRANE (25) | RL | | 100 | T | 2 | MO | | | | 18,752 | | 4,536 | 189 | 1,814 | 76 | 1,474 | | 26,841 |
| 284 MOVE IN, STATE | C | | 2 | EA | 2 | LOADS | | | | | 400 | | | | | | 400 | 800 |
| 285 CRAWLER CRANE (24) | ORL | | 120 | T | | MO | | | | | | | | | | | | |
| 286 MOVE IN, PREVIOUS JOB | C | | 1 | EA | | LOADS | | | | | | | | | | | | |
| 287 SETUP | | | 1 | SETUPS | | | | | | | | | | | | | | |
| 288 | | | | | | | | | | | | | | | | | | |
| 289 TOTAL CRANES | | | | | | | 116,709 | 46,100 | 70,609 | 18,752 | 4,400 | 5,166 | 255 | 2,129 | 115 | 10,527 | 1,000 | 112,953 |
| 290 | | | | | | | | | | | | | | | | | | |
| 291 | | | | | TOTALS | | 116,709 | 46,100 | 70,609 | 18,752 | 4,400 | 5,166 | 255 | 2,129 | 115 | 10,527 | 1,000 | 112,953 |
| 292 | | | | | | | | | | | | | | | | | | |

| 298 RU | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 299 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 300 DESCRIPTION | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 301 OFF HIGHWAY | | | | | | | | | | | | | | | | | | |
| 302 REAR DUMP | Q | | | | | EA | | | | | | | | | | | | |
| 303 WATER | Q | | | | | EA | | | | | | | | | | | | |
| 304 FREIGHT, STATE | Q | | | | | LOADS | | | | | | | | | | | | |
| 305 TOTAL OFF HIGHWAY | | | | | | | | | | | | | | | | | | |
| 306 HIGHWAY | | | | | | | | | | | | | | | | | | |
| 307 FLAT BED, GAS | | 1 | 2.5 | T | 1 | EA | 24,469 | 5,799 | 18,670 | | | | | | | 1,896 | | 20,567 |
| 308 FLAT BED, DIESEL | | 1 | 2.5 | T | | EA | | | | | | | | | | | | |
| 309 FUEL | | 1 | | | | EA | | | | | | | | | | | | |
| 310 MECHANIC | | 1 | | | | EA | | | | | | | | | | | | |
| 311 POWDER | | 1 | | | | EA | | | | | | | | | | | | |
| 312 TRACTOR & LOW BED | | 2 | | | | EA | | | | | | | | | | | | |
| 313 WATER | | 2 | | | | EA | | | | | | | | | | | | |
| 314 MANHAUL BUS, 25 MAN | | 2 | | | | EA | | | | | | | | | | | | |
| 315 SCRUBBER, 100-150 HP | N | | | | | EA | | | | | | | | | | | | |
| 316 FREIGHT, STATE | Q | | | | | LOADS | | | | | | | | | | | | |
| 317 TOTAL HIGHWAY | | | | | | | 24,469 | 5,799 | 18,670 | | | | | | | 1,896 | | 20,567 |
| 318 CONVEYOR | | | | | | | | | | | | | | | | | | |
| 319 TUNNEL CONVEYOR | | | 1 | SETUPS | | | | | | LOCATION | | | | | | | | |
| 320 HEAD SECTION & DRIVE | | 2 | 150 | HP | | EA | | | | SURF | | | | | | | | |
| 321 STORAGE & TAKEUP UNIT | | 2 | 1500 | FT BELT | | EA | | | | SURF | | | | | | | | |
| 322 STRUCTURE, RIGID | | 2 | | | | LF | | | | UNDG | | | | | | | | |
| 323 KNEE BRACE CONV SUPPORTS | | 2 | 10 | $/EA | | LF | | | | UNDG | | ----- | ---- | | | | | |
| 324 BOOSTER DRIVE SUPPORTS | | 2 | 1,500 | $/EA | | EA | | | | UNDG | | ----- | ---- | | | | | |
| 325 BOOSTER DRIVES | | 2 | 150 | HP | | EA | | | | UNDG | | ----- | ---- | | | | | |
| 326 ADVANCING TAIL & DECK | N | | | | | EA | | | | UNDG | | | | | | | | |
| 327 TRANSFER CONVEYOR | N | | | | | EA | | | | UNDG | | | | | | | | |
| 328 SAFETY PULL-CORD SYSTEM | N | | | | | LF | | | | UNDG | | | | | | | | |
| 329 WARNING HORNS | N | | | | | EA | | | | UNDG | | | | | | | | |
| 330 BELTING | C | 2 | 24 | IN | | LF | | | | UNDG | | | | | | | | |
| 331 ADIT CONVEYOR | N | | 150 | LF | | EA | | | | UNDG | | | | | | | | |
| 332 VERTICAL CONVEYOR | | 2 | 200 | VF | | EA | | | | UNDG | | | | | | | | |
| 333 SURFACE CONVEYOR | | 2 | 300 | LF | | EA | | | | SURF | | | | | | | | |
| 334 STACKING CONVEYOR | | 2 | 100 | LF | | EA | | | | SURF | | | | | | | | |
| 335 FEEDER-BREAKER | | 2 | | | | EA | | | | | | | | | | | | |
| 336 | | | | | | | | | | | | | | | | | | |
| 337 FREIGHT, CLEVELAND | C | | | | | LOADS | | | | | | | | | | | | |
| 338 TOTAL CONVEYOR | | | | | | | | | | | | | | | | | | |
| 339 | | | | | | | | | | | | | | | | | | |
| 340 | | | | | TOTALS | | 24,469 | 5,799 | 18,670 | | | | | | | 1,896 | | 20,567 |
| 341 | | | | | | | | | | | | | | | | | | |

| 347 RA | | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 348 | | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 349 DESCRIPTION | | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 350 RAIL & SWITCHES | | | | | | | | | | | | | | | | | | | |
| 351 RAIL | | C | 2 | 70 | LB | 520 | T | 174,274 | 82,606 | 91,668 | | | | | | | 13,506 | | 105,175 |
| 352 TIES, STEEL | | C | 1 | 4 | FT OC | 5,300 | EA | 84,842 | 33,513 | 51,330 | | | | | | | 6,575 | | 57,905 |
| 353 SPLICE BARS | | C | 2 | | | 1,400 | PR | 14,352 | 6,803 | 7,549 | | | | | | | 1,112 | | 8,661 |
| 354 TRACK BOLTS | | CN | | | | 5,600 | EA | 8,836 | | 8,836 | | | | | | | 685 | | 9,521 |
| 355 SWITCHES | | | 2 | | | 5 | EA | 7,097 | 3,364 | 3,733 | | | | | | | 550 | | 4,283 |
| 356 SWITCH TIES | (21) | CNL | | 24 | IN | 2.0 | MBF | 789 | | 789 | | | | | | | 61 | | 850 |
| 357 CALIF SWITCH, ENDS | (20) | L | 1 | 24 | IN | 2 | PR | 82,327 | 32,519 | 49,808 | | | 37,800 | 2,629 | 11,340 | 394 | 6,615 | | 108,585 |
| 358 CALIF SWITCH, PANEL | (20) | CL | 1 | 24 | IN | 10 | EA | 80,040 | 31,616 | 48,424 | | | | | | | 6,203 | | 54,627 |
| 359 HYDRAULIC CAR MOVER | | NA | | 24 | IN | | EA | | | | | | | | | | | | |
| 360 CAR PASSER | | | 3 | 24 | IN | | EA | | | | | | | | | | | | |
| 361 SHAFT BOTTOM SETUP | (19) | AL | | | | | EA | | | | | | | | | | | | |
| 362 WALKWAY | | N | | | | | LF | | | | | | | | | | | | |
| 363 FREIGHT, DENVER | | | | | | 25.0 | LOADS | | | | | 60,000 | | | | | | 15,000 | 75,000 |
| 364 TOTAL RAIL & SWITCHES | | | | | | | | 452,558 | 190,421 | 262,137 | | 60,000 | 37,800 | 2,629 | 11,340 | 394 | 35,307 | 15,000 | 424,607 |
| 365 LOCOMOTIVES | | | | | | | | | | | | | | | | | | | |
| 366 DIESEL | (8) | L | 1 | 10 | T | 4 | EA | 404,774 | 159,886 | 244,888 | | | 5,040 | 526 | | | 31,411 | | 281,865 |
| 367 DIESEL | (8) | L | 2 | 8 | T | | EA | | | | | | | | | | | | |
| 368 DIESEL | (8) | RENT | | 8 | T | | MO | | | | | | | | | | | | |
| 369 BATTERY | | | 2 | | T | | EA | | | | | | | | | | | | |
| 370 BATTERIES | | N | | | | | EA | | | | | | | | | | | | |
| 371 CHARGERS | | | 2 | | | | EA | | | | | | | | | | | | |
| 372 FREIGHT, CLEVELAND | | | | | | 2.0 | LOADS | | | | | 16,000 | | | | | | 1,200 | 17,200 |
| 373 TOTAL LOCOMOTIVES | | | | | | | | 404,774 | 159,886 | 244,888 | | 16,000 | 5,040 | 526 | | | 31,411 | 1,200 | 299,065 |
| 374 CARS | | | | | | | | | | | | | | | | | | | |
| 375 MUCK, SIDE DUMP | (9) | L | 3 | 5 | CY | | EA | | | | | | | | | | | | |
| 376 ROTARY | (10) | L | 2 | 15 | CY | | EA | | | | | | | | | | | | |
| 377 LIFT OFF | (11) | L | 1 | 10 | CY | 16 | EA | 354,920 | 140,193 | 214,727 | | | | | | | 27,506 | | 242,233 |
| 378 DUMP, SIDE | | A | 1 | | | 1 | EA | 22,869 | 9,033 | 13,835 | | | 12,600 | 3,943 | 3,150 | 657 | 2,129 | | 36,314 |
| 379 ROTARY | (17) | LA | 2 | 15 | CY | | EA | | | | | | | | | | | | |
| 380 POWDER | | | 2 | | | | EA | | | | | | | | | | | | |
| 381 FLAT | (12) | L | 2 | 24 | IN | 3 | EA | 32,883 | 15,587 | 17,297 | | | | | | | 2,548 | | 19,845 |
| 382 FANLINE | | | 2 | | | 1 | EA | 23,657 | 9,345 | 14,313 | | | | | | | 1,833 | | 16,146 |
| 383 MANTRIP | (13) | L | 1 | 15 | MAN | 1 | EA | 21,382 | 8,446 | 12,936 | | | | | | | 1,657 | | 14,593 |
| 384 SEGMENT | | | 2 | | | | EA | | | | | | | | | | | | |
| 385 BRAKEMAN | | | 2 | | | | EA | | | | | | | | | | | | |
| 386 FREIGHT, PREVIOUS JOB | | C | | | | 12.0 | LOADS | | | | | 48,000 | | | | | | 7,200 | 55,200 |
| 387 TOTAL CARS | | | | | | | | 455,711 | 182,604 | 273,108 | | 48,000 | 12,600 | 3,943 | 3,150 | 657 | 35,674 | 7,200 | 384,332 |
| 388 | | | | | | | | | | | | | | | | | | | |
| 389 | | | | | | TOTALS | | 1,313,043 | 532,910 | 780,133 | | 124,000 | 55,440 | 7,097 | 14,490 | 1,051 | 102,392 | 23,400 | 1,108,004 |

| 396 EX | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 397 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 398 DESCRIPTION | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 399 EXCAVATORS | | | | | | | | | | | | | | | | | | |
| 400 SHOVEL | Q | | | | | MO | | | | | | | | | | | | |
| 401 BACKHOE | Q | | | | | EA | | | | | | | | | | | | |
| 402 CLAMSHELL | Q | | | | | MO | | | | | | | | | | | | |
| 403 DRAGLINE | Q | | | | | MO | | | | | | | | | | | | |
| 404 GRADALL | Q | | | | | MO | | | | | | | | | | | | |
| 405 MATS | Q | | | | | LS | | | | | | | | | | | | |
| 406 | | | | | | | | | | | | | | | | | | |
| 407 | | | | | | | | | | | | | | | | | | |
| 408 TOTAL EXCAVATORS | | | | | | | | | | | | | | | | | | |
| 409 EARTHMOVERS | | | | | | | | | | | | | | | | | | |
| 410 TRACTOR, D-4 | | 2 | 95 | HP | | EA | | | | | | | | | | | | |
| 411 D-6 | | 2 | 165 | HP | | EA | | | | | | | | | | | | |
| 412 D-7 | | 2 | 215 | HP | | EA | | | | | | | | | | | | |
| 413 D-8 | | 2 | 285 | HP | | EA | | | | | | | | | | | | |
| 414 | | | | | | | | | | | | | | | | | | |
| 415 LOADER, 950 | RENT | | 3.25 | CY | | MO | | | | | | | | | | | | |
| 416 966 | | 3 | 4.25 | CY | | EA | | | | | | | | | | | | |
| 417 980 | | 2 | 4.70 | CY | 1 | EA | 201,401 | 79,553 | 121,848 | | | | | | | 15,609 | | 137,456 |
| 418 988 | | 2 | 7.00 | CY | | EA | | | | | | | | | | | | |
| 419 | | | | | | | | | | | | | | | | | | |
| 420 GRADER, CAT12 | | 2 | | | | EA | | | | | | | | | | | | |
| 421 | | | | | | | | | | | | | | | | | | |
| 422 SCRAPERS | Q | | | | | EA | | | | | | | | | | | | |
| 423 | | | | | | | | | | | | | | | | | | |
| 424 | | | | | | | | | | | | | | | | | | |
| 425 TOTAL EARTHMOVERS | | | | | | | 201,401 | 79,553 | 121,848 | | | | | | | 15,609 | | 137,456 |
| 426 COMPACTORS | | | | | | | | | | | | | | | | | | |
| 427 SELF-PROPELLED, PNEUMATIC | R | | 15 | TON | | MO | | | | | | | | | | | | |
| 428 TOWED, 10,000# | R | | 35 | HP | | MO | | | | | | | | | | | | |
| 429 WALK BEHIND, 1200# | R | | 10 | HP | | MO | | | | | | | | | | | | |
| 430 PLATE VIBRATORS | R | | 300 | # | | MO | | | | | | | | | | | | |
| 431 RAMMERS | R | | 120 | # | | MO | | | | | | | | | | | | |
| 432 TAMPERS | R | | 35 | # | | MO | | | | | | | | | | | | |
| 433 | | | | | | | | | | | | | | | | | | |
| 434 | | | | | | | | | | | | | | | | | | |
| 435 TOTAL COMPACTORS | | | | | | | | | | | | | | | | | | |
| 436 FREIGHT, PREVIOUS JOB | C | | | | 1.0 | LOADS | | | | | 4,000 | | | | | | 600 | 4,600 |
| 437 | | | | | | | | | | | | | | | | | | |
| 438 | | | | | TOTALS | | 201,401 | 79,553 | ,848 | | 4,000 | | | | | 15,609 | [illegible] | 142,056 |
| 439 | | | | | | | | | | | | | | | | | | |

| 445 DR | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 446 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 447 DESCRIPTION | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 448 DRILLS | | | | | | | | | | | | | | | | | | |
| 449 DRIFTERS, PNEUMATIC | | 2 | PR-55 | | | EA | | | | | | | | | | | | |
| 450 HYDRAULIC | | 2 | 75 HP | | | EA | | | | | | | | | | | | |
| 451 JACKLEGS | | 2 | | | 4 | EA | 9,463 | 2,243 | 7,220 | | | | | | | 733 | | 7,954 |
| 452 STOPERS | | 2 | | | 5 | EA | 12,617 | 2,990 | 9,627 | | | | | | | 978 | | 10,605 |
| 453 SINKERS | | 2 | | | 1 | EA | 1,262 | 299 | 963 | | | | | | | 98 | | 1,060 |
| 454 AIR TRACK, ATD-3100B | | 1 | PR-55 | | | EA | | | | | | | | | | | | |
| 455 AIR TRACK | R | | 1 | RT | | MO | | | | | | | | | | | | |
| 456 DIAMOND | | 2 | | | | EA | | | | | | | | | | | | |
| 457 DIAMOND | R | | 1 | RT | | MO | | | | | | | | | | | | |
| 458 FEEDS & MOUNTS | | | | | | | | | | | | | | | | | | |
| 459 FEEDS & EXTNS, TELESCOPIC | | 2 | 14 | FT | | EA | | | | | | | | | | | | |
| 460 ROLLOVER PARALLEL BOOMS | | 2 | HD105 | | | EA | | | | | | | | | | | | |
| 461 ROLLOVR PARALEL EXTN BOOM | | 2 | HD148 | | | EA | | | | | | | | | | | | |
| 462 BOOM & BASKET | | 2 | | | | EA | | | | | | | | | | | | |
| 463 | | | | | | | | | | | | | | | | | | |
| 464 AIR-HYDRAULIC PUMPS | | 2 | 1 per 2 booms | | | EA | | | | | | | | | | | | |
| 465 ELEC-HYD POWER PACK | | 2 | 75 | HP | | EA | | | | | | | | | | | | |
| 466 CABLE REEL, 300 FT | | 2 | | | | EA | | | | | | | | | | | | |
| 467 WATER BOOSTER PUMP | | 1 | | | | EA | | | | | | | | | | | | |
| 468 | | | | | | | | | | | | | | | | | | |
| 469 JUMBOS | | | | | | | | | | | | | | | | | | |
| 470 TUNNEL | Q | | | | | EA | | | | | | | | | | | | |
| 471 | Q | | | | | | | | | | | | | | | | | |
| 472 SHAFT | Q | | | | | EA | | | | | | | | | | | | |
| 473 MISCELLANEOUS | | | | | | | | | | | | | | | | | | |
| 474 SPADERS | | 1 | | | 2 | EA | 1,601 | 253 | 1,348 | | | | | | | 124 | | 1,472 |
| 475 BREAKERS, AIR | | 3 | | | 1 | EA | 473 | 75 | 398 | | | | | | | | | 398 |
| 476 HYDRAULIC | Q | | | | | EA | | | | | | | | | | | | |
| 477 IMPACT WRENCHES | | 1 | | | 6 | EA | 14,407 | 2,276 | 12,131 | | | | | | | 1,117 | | 13,247 |
| 478 TENSIONERS | Q | | | | | EA | | | | | | | | | | | | |
| 479 PRILL POTS | | 1 | | | | EA | | | | | | | | | | | | |
| 480 BIT GRINDER | | 2 | | | | EA | | | | | | | | | | | | |
| 481 SAWS | | 1 | | | 1 | EA | 1,829 | | 1,829 | | | | | | | 142 | | 1,971 |
| 482 BLASTING MATS | R | | | | | LS | | | | | | | | | | | | |
| 483 | | | | | | | | | | | | | | | | | | |
| 484 | | | | | | | | | | | | | | | | | | |
| 485 FREIGHT, REGIONAL | | | | | 1.0 | LOADS | | | | | 800 | | | | | | 600 | 1,400 |
| 486 | | | | | | | | | | | | | | | | | | |
| 487 | | | | | TOTALS | | 41,652 | 8,136 | 33,516 | | 800 | | | | | 3,191 | 600 | 38,108 |
| 488 | | | | | | | | | | | | | | | | | | |

| 494 MU | | D E | F G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 495 | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 496 DESCRIPTION | | NOTES | SIZE | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 497 LOAD-HAUL-DUMP UNITS | | | | | | | | | | | | | | | | | |
| 498 PURCHASE | (14) | L 2 | 1.0 CY | | EA | | | | | | | | | | | | |
| 499 | (14) | L 2 | 2.0 CY | | EA | | | | | | | | | | | | |
| 500 | (14) | L 2 | 3.5 CY | | EA | | | | | | | | | | | | |
| 501 | (14) | L 2 | 5.0 CY | | EA | | | | | | | | | | | | |
| 502 | (14) | L 1 | 8.0 CY | | EA | | | | | | | | | | | | |
| 503 RENTAL START CH | (14) | RL | 3.5 CY | 2 | MO | | | | 16,808 | | | | | | 1,303 | | 18,111 |
| 504 CLEANUP | (14) | RL | 1.0 CY | | MO | | | | | | | | | | | | |
| 505 FRT, PORTLAND | | | | 1 | RT | | | | | 3,600 | | | | | | 3,600 | 7,200 |
| 506 RUBBER | | | | | | | | | | | | | | | | | |
| 507 BOBCAT, 741 | | 1 | | 1 | EA | 19,601 | 7,742 | 11,858 | | | 1,260 | 657 | 630 | 66 | 1,575 | | 16,046 |
| 508 BACKHOE ATTACHMENTS | | 1 | | | EA | | | | | | | | | | | | |
| 509 | | | | | | | | | | | | | | | | | |
| 510 | | | | | | | | | | | | | | | | | |
| 511 CRAWLER | | | | | | | | | | | | | | | | | |
| 512 CAT 931, 70HP | | 2 | 1.1 CY | | EA | | | | | | | | | | | | |
| 513 CAT 935, 80HP | | 2 | 1.3 CY | | EA | | | | | | | | | | | | |
| 514 CAT 963, 150HP | | 2 | 2.6 CY | | EA | | | | | | | | | | | | |
| 515 CAT 973, 210HP | | 2 | 3.8 CY | | EA | | | | | | | | | | | | |
| 516 EIMCO 630 | | 2 | 10 CF | | EA | | | | | | | | | | | | |
| 517 | | | | | | | | | | | | | | | | | |
| 518 RAIL | | | | | | | | | | | | | | | | | |
| 519 EIMCO 12B 6.7' HEADROOM | | 2 | 5 CF | | EA | | | | | | | | | | | | |
| 520 EIMCO 22 8.0' HEADROOM | | 2 | 9 CF | | EA | | | | | | | | | | | | |
| 521 EIMCO 26 9.4' HEADROOM | | 2 | 12 CF | | EA | | | | | | | | | | | | |
| 522 MITSUI 55 6.1' HEADROOM | | 2 | 11 CF | | EA | | | | | | | | | | | | |
| 523 MITSUI 85 8.0' HEADROOM | | 2 | 14 CF | | EA | | | | | | | | | | | | |
| 524 CONWAY 75 9.6' HEADROOM | | 1 | 20 CF | | EA | | | | | | | | | | | | |
| 525 | | | | | | | | | | | | | | | | | |
| 526 SHAFT | | | | | | | | | | | | | | | | | |
| 527 | | | | | | | | | | | | | | | | | |
| 528 | | | | | | | | | | | | | | | | | |
| 529 | | | | | | | | | | | | | | | | | |
| 530 MISCELLANEOUS | | | | | | | | | | | | | | | | | |
| 531 SLUSHERS, 20 HP | | 2 | | | EA | | | | | | | | | | | | |
| 532 | | | | | | | | | | | | | | | | | |
| 533 | | | | | | | | | | | | | | | | | |
| 534 FREIGHT, REGIONAL | | | | 0.5 | LOADS | | | | | 400 | | | | | | 300 | 700 |
| 535 | | | | | | | | | | | | | | | | | |
| 536 | | | | TOTALS | | 19,601 | 7,742 | 11,858 | 16,808 | 4,000 | 1,260 | 657 | 630 | 66 | 2,878 | 3,900 | 42,057 |
| 537 | | | | | | | | | | | | | | | | | |

538 PLANT & EQUIPMENT 09:49 03/07/96 TUNNEL & SHAFT MUCKERS 10

| 543 TB | D E | F G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 544 | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 545 DESCRIPTION | NOTES | SIZE | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 546 SHIELD | | | | | | | | | | | | | | | | |
| 547 | Q | FT | | EA | | | | | | | | | | | | |
| 548 | | | | | | | | | | | | | | | | |
| 549 TOTAL SHIELD | | | | | | | | | | | | | | | | |
| 550 TUNNEL BORING MACHINE | | | | | | | | | | | | | | | | |
| 551 TBM (16) | QAL | 12.0 FT | 1 | EA | 4,000,000 | 1,580,000 | 2,420,000 | | | 91,350 | 4,074 | 27,405 | 1,630 | 310,442 | | 2,854,901 |
| 552 SPARE PARTS STOCK | F | | 1 | LS | 480,000 | 37,920 | 442,080 | | | | | | | 37,200 | | 479,280 |
| 553 MOVE DOLLY | F | | 1 | EA | 36,000 | 8,532 | 27,468 | | | | | | | 2,790 | | 30,258 |
| 554 FIELD SERVICE | A | | 50 | DAY | | | | | | | 25,000 | | | | | 25,000 |
| 555 | | | | | | | | | | | | | | | | |
| 556 TOTAL TUNNEL BORING MACHINE | | | | | 4,516,000 | 1,626,452 | 2,889,548 | | | 91,350 | 29,074 | 27,405 | 1,630 | 350,432 | | 3,389,439 |
| 557 TUNNEL DIGGING MACHINE | | | | | | | | | | | | | | | | |
| 558 TUNNEL DIGGING MACHINE | Q | FT | | EA | | | | | | | | | | | | |
| 559 SPARE PARTS STOCK | F | | | LS | | | | | | | | | | | | |
| 560 | | | | | | | | | | | | | | | | |
| 561 TOTAL TUNNEL DIGGING MACHINE | | | | | | | | | | | | | | | | |
| 562 ROADHEADER | | | | | | | | | | | | | | | | |
| 563 ROADHEADER | Q | | | EA | | | | | | | | | | | | |
| 564 SPARE PARTS STOCK | F | | | LS | | | | | | | | | | | | |
| 565 | | | | | | | | | | | | | | | | |
| 566 TOTAL ROADHEADER | | | | | | | | | | | | | | | | |
| 567 TRAILING EQUIPMENT | | | | | | | | | | | | | | | | |
| 568 TRL GEAR (18) | QL | 12.0 FT | 1.0 | EA | 1,000,000 | 237,000 | 763,000 | | | 44,100 | 2,629 | 13,230 | 1,051 | 77,785 | | 901,795 |
| 569 | | | | | | | | | | | | | | | | |
| 570 | | | | | | | | | | | | | | | | |
| 571 TOTAL TRAILING EQUIPMENT | | | | | 1,000,000 | 237,000 | 763,000 | | | 44,100 | 2,629 | 13,230 | 1,051 | 77,785 | | 901,795 |
| 572 SUPPORT EQUIPMENT | | | | | | | | | | | | | | | | |
| 573 RIB ERECTOR & EXPANDER | F | | 1 | LS | 60,000 | 4,740 | 55,260 | | | 3,780 | 394 | 1,260 | 197 | 4,696 | | 65,587 |
| 574 ROCK BOLT PLATFORMS | F | | 1 | LS | 52,000 | | 52,000 | | | 2,520 | 263 | 630 | 164 | 4,063 | | 59,640 |
| 575 PROBE DRILL | 1 | | 1 | EA | 182,949 | 28,906 | 154,043 | | | 1,890 | 368 | 630 | 105 | 14,215 | | 171,251 |
| 576 SCRUBBER, 10,000 CFM | 1 | | 1 | LS | 80,040 | 18,969 | 61,071 | | | 630 | 591 | 158 | 131 | 6,259 | | 68,840 |
| 577 WELDER | N | | 1 | LS | 1,829 | 289 | 1,540 | | | | 66 | | | 147 | | 1,753 |
| 578 METHANE DETECTOR | 1 | | | LS | | | | | | | | | | | | |
| 579 ZED GUIDANCE SYSTEM | 2 | | | LS | | | | | | | | | | | | |
| 580 CUTTER REBUILD EQUIPMENT | 2 | | 1 | LS | 54,096 | 17,094 | 37,002 | | | | | | | 4,192 | | 41,194 |
| 581 | | | | | | | | | | | | | | | | |
| 582 TOTAL SUPPORT EQUIPMENT | | | | | 430,914 | 69,999 | 360,915 | | | 8,820 | 1,682 | 2,678 | 598 | 33,573 | | 408,266 |
| 583 FREIGHT, SEATTLE | C | | 20.0 | LOADS | | | | | 80,000 | | | | | | 12,000 | 92,000 |
| 584 | | | | | | | | | | | | | | | | |
| 585 | | | TOTALS | | 5,946,914 | 1,933,451 | 4,013,463 | | 80,000 | 144,270 | 33,385 | 43,313 | 3,279 | 461,790 | 12,000 | 4,791,500 |
| 586 | | | | | | | | | | | | | | | | |

| 592 CO | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 593 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 594 DESCRIPTION | NOTES | | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 595 SAND BLAST POT & GUN | | 1 | | | | EA | | | | | | | | | | | | |
| 596 CONCRETE PUMP | | 1 | | | | EA | | | | | | | | | | | | |
| 597 HOPPER | A | | | | | EA | | | | | | | | | | | | |
| 598 WET BELT | | 1 | | | | EA | | | | | | | | | | | | |
| 599 DROP LINE & REMIX POT | A | | | | | EA | | | | | | | | | | | | |
| 600 SNORKEL | Q | | | | | EA | | | | | | | | | | | | |
| 601 BATCH PLANT | | 1 | | | | EA | | | | | | | | | | | | |
| 602 TRANSIT MIX TRUCKS | | 1 | | | | EA | | | | | | | | | | | | |
| 603 SCRUBBERS, 300HP | NA | | | | | EA | | | | | | | | | | | | |
| 604 AGITATOR CARS, 6 CY | | 1 | | | | EA | | | | | | | | | | | | |
| 605 6 CY | R | | 11 | EA | | MO | | | | | | | | | | | | |
| 606 LOADING DOCK | A | | | | | LS | | | | | | | | | | | | |
| 607 | | | | | | | | | | | | | | | | | | |
| 608 REBAR JUMBO (7) | AL | | 12.0 | 'DIA | | EA | | | | | | | | | | | | |
| 609 VIBRATORS, INTERNAL | | 1 | | | | EA | | | | | | | | | | | | |
| 610 EXTERNAL | | 1 | | | | EA | | | | | | | | | | | | |
| 611 FINISHING JUMBO (7) | AL | | 9.5 | 'DIA | | EA | | | | | | | | | | | | |
| 612 | | | | | | | | | | | | | | | | | | |
| 613 GROUT JUMBO (7) | AL | | 9.5 | 'DIA | | EA | | | | | | | | | | | | |
| 614 MATERIALS TRAM | R | | | | | MO | | | | | | | | | | | | |
| 615 MIXER & PUMP (35) | L | 1 | 1.0 | QUAL | | EA | | | | | | | | | | | | |
| 616 | | | | | | | | | | | | | | | | | | |
| 617 PIPE PLACER | A | 1 | | | | EA | | | | | | | | | | | | |
| 618 PIPE DOLLIES | A | 1 | | | | PR | | | | | | | | | | | | |
| 619 | | | | | | | | | | | | | | | | | | |
| 620 SHOTCRETE GUN | | 1 | | | 1 | EA | 62,774 | 14,877 | 47,897 | | | | | | | 4,865 | | 52,762 |
| 621 HOSE, 60 FT | N | | | | 1 | EA | 770 | | 770 | | | | | | | 60 | | 829 |
| 622 MATERIALS PIPE & FTTINGS | N | | | | 1 | FT | 6 | | 6 | | | | | | | 0 | | 7 |
| 623 SPARE PARTS STOCK | N | | | | 1 | EA | 3,430 | | 3,430 | | | | | | | 266 | | 3,696 |
| 624 | | | | | | | | | | | | | | | | | | |
| 625 REMOTE CONTRL SPRAY BOOM TRK | | 1 | | | | EA | | | | | | | | | | | | |
| 626 | | | | | | | | | | | | | | | | | | |
| 627 BATCH PLANT | | 1 | | | 1 | EA | 46,080 | 14,561 | 31,519 | | | | | | | 3,571 | | 35,090 |
| 628 ADDITIVE FEEDER | | 1 | | | 1 | EA | 3,087 | 1,219 | 1,868 | | | | | | | 239 | | 2,107 |
| 629 WIRE FIBER FEEDER | | 1 | | | 1 | EA | 3,888 | 1,536 | 2,352 | | | | | | | 301 | | 2,653 |
| 630 MICRO SILICA SILO & AUGER | | 1 | | | | EA | | | | | | | | | | | | |
| 631 | | | | | | | | | | | | | | | | | | |
| 632 FREIGHT, PREVIOUS JOB | C | | | | 3.0 | LOADS | | | | | 12,000 | | | | | | | 12,000 |
| 633 | | | | | | | | | | | | | | | | | | |
| 634 | | | | | TOTALS | | 120,035 | 32,194 | 87,841 | | 12,000 | | | | | 9,303 | | 109,144 |
| 635 | | | | | | | | | | | | | | | | | | |

| 641 GE | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 642 | | | | | | UNIT | | SALVAGE | | | FREIGHT | ASSEMBLE | | DISASSEMBLE | | SALES | FREIGHT | |
| 643 DESCRIPTION | | NOTES | SIZE | | QUANTITY | | PURCHASE | | DEPRECIATE | RENT | IN | LABOR | OTHER | LABOR | OTHER | TAX | | JOB CHARGE |
| 644 VEHICLES | | | | | | | | | | | | | | | | | | |
| 645 SEDAN | | 1 | | | 1 | EA | 19,210 | 4,553 | 14,657 | | | | | | | 1,489 | | 16,146 |
| 646 PICKUPS, 3/4 T, GAS | | 1 | | | 7 | EA | 96,048 | 22,763 | 73,285 | | | | | | | 7,444 | | 80,728 |
| 647 DIESEL | | 1 | | | | EA | | | | | | | | | | | | |
| 648 AMBULANCE | | 2 | | | 1 | EA | 19,714 | 4,672 | 15,042 | | | | | | | 1,528 | | 16,570 |
| 649 MISCELLANEOUS EQUIPMENT | | | | | | | | | | | | | | | | | | |
| 650 MECHANIC SHOP TOOLS (28) | L | 1 | 1.0 | LOT | 5 | QAL | 114,343 | 27,099 | 87,244 | | | | | | | 8,862 | | 96,105 |
| 651 WELDER, DIESEL | | 3 | | | 1 | EA | 1,201 | 285 | 917 | | | | | | | | | 917 |
| 652 ELECTRIC | | 1 | | | 3 | EA | 7,060 | 1,673 | 5,386 | | | | | | | 547 | | 5,934 |
| 653 STEAM CLEANER | | 3 | | | 1 | EA | 1,314 | 311 | 1,003 | | | | | | | | | 1,003 |
| 654 CARPENTER SHOP (29) | L | 1 | 1.0 | LOT | 2 | QAL | 3,430 | 813 | 2,617 | | | | | | | 266 | | 2,883 |
| 655 FIRE FIGHTING (30) | L | 1 | 1.0 | LOT | 5 | QAL | 5,717 | 903 | 4,814 | | | | | | | 443 | | 5,257 |
| 656 SAFETY (31) | L | 1 | 1.0 | LOT | 5 | QAL | 11,434 | 1,807 | 9,628 | | | | | | | 886 | | 10,514 |
| 657 LIGHTENING DETECTOR | | 2 | | | | EA | | | | | | | | | | | | |
| 658 VIBRATION MONITOR | | 2 | | | | LOT | | | | | | | | | | | | |
| 659 ENGINEERING EQUIPMENT | | | | | | | | | | | | | | | | | | |
| 660 TRANSITS | | 3 | | | 2 | EA | 3,154 | 1,246 | 1,908 | | | | | | | | | 1,908 |
| 661 LEVELS | | 3 | | | 2 | EA | 1,577 | 623 | 954 | | | | | | | | | 954 |
| 662 LASERS | | 1 | | | 3 | EA | 26,070 | 6,179 | 19,892 | | | | | | | 2,020 | | 21,912 |
| 663 LASER STANDS | A | | | | 3 | EA | | | | | | 1,890 | 394 | | | 31 | | 2,315 |
| 664 DRAFTING TABLE | | 2 | | | | EA | | | | | | | | | | | | |
| 665 OFFICE | | | | | | | | | | | | | | | | | | |
| 666 COMPUTER | | 1 | | | 7 | EA | 24,012 | 5,691 | 18,321 | | | | | | | 1,861 | | 20,182 |
| 667 PRINTER | | 1 | | | 2 | EA | 2,630 | 623 | 2,007 | | | | | | | 204 | | 2,210 |
| 668 PLOTTER | | 3 | | | | EA | | | | | | | | | | | | |
| 669 CALCULATOR | | 3 | | | 2 | EA | 48 | | 48 | | | | | | | | | 48 |
| 670 COPIER | | 1 | | | 1 | EA | 2,573 | 610 | 1,963 | | | | | | | 199 | | 2,162 |
| 671 BLUEPRINT MACHINE | | 1 | | | | EA | | | | | | | | | | | | |
| 672 DESK, TABLE, CHAIR | | 2 | | | 14 | SET | 3,588 | 850 | 2,738 | | | | | | | 278 | | 3,016 |
| 673 DESK TELEPHONES | | 1 | | | 14 | EA | 800 | 190 | 611 | | | | | | | 62 | | 673 |
| 674 CELLULAR TELEPHONES | | 1 | | | | EA | | | | | | | | | | | | |
| 675 PAGERS | | 1 | | | | EA | | | | | | | | | | | | |
| 676 FAX MACHINE | | 1 | | | 1 | EA | 2,287 | 542 | 1,745 | | | | | | | 177 | | 1,922 |
| 677 FILING CABINET | | 1 | | | 14 | EA | 2,881 | 228 | 2,654 | | | | | | | 223 | | 2,877 |
| 678 MISC FURNISHINGS (32) | L | 1 | 1.0 | LOT | 3 | QAL | 3,430 | 271 | 3,159 | | | | | | | 266 | | 3,425 |
| 679 OWNER OFFICE EQUIP (33) | L | 1 | 1.0 | LOT | 3 | QAL | 2,287 | 361 | 1,926 | | | | | | | 177 | | 2,103 |
| 680 | | | | | | | | | | | | | | | | | | |
| 681 FREIGHT, STATE | | | | | 1.0 | LOADS | | | | | 100 | | | | | | 600 | 700 |
| 682 | | | | | | | | | | | | | | | | | | |
| 683 | | | | | TOTALS | | 354,810 | 82,293 | 272,517 | | 100 | 1,890 | 394 | | | 26,963 | 600 | 302,464 |
| 684 | | | | | | | | | | | | | | | | | | |

IID TRANSFER STUDY

3A-AL

P. E. Sperry 8/27/96

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 3A | | CONTRACT | | AL | | |
| 2 | PORTALS, ea. | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | DOWN | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 20,330 | 154 | | - | |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | 20,330 | 4 | | - | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 20,330 | 14 | | - | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 20,330 | 7 | | - | |
| 28 | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | downgrade | MD | 1.96 | 20,330 | 40 | | - | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | | - | |
| 34 | GROUT WATER | - | | GW | 36.11 | - | - | | - | |
| 35 | HIGH TEMPERATURE | 1 | | HT | 2.47 | 5,730 | 14 | | - | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | - | - | | - | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 80 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 87.2 | 233 | | - | |
| 39 | CONCRETE LINING, ft. | 1 | 1 | 134.4 | FPD | 15,330 | 114 | | - | |
| 40 | STEEL LINING, ft. | | 1 | 110 | FPD | 5,000 | 45 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 160 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 393 | | - | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | | | | | | |
| 45 | MOBILIZATION | 170 | | | | | | | | |
| 46 | SINK SHAFT | - | | | | | | | | |
| 47 | DEVELOP | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | 10 | | | | | | | | |
| 51 | REMOVE TBM # 2 | - | | | | | | | | |
| 52 | TUN EX & LINING | 393 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | | | | | |
| 54 | TOTAL | 668 | 2.6 | | | | | | | |
| 66 | | | | | | | | | | |
| 56 | | | | | | | | | | |
| 57 | | | | | | | | | | |
| 58 | | | | | | | | | | |
| 59 | | | | | | | | | | |
| 60 | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 4 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 2 |
| DEPRECIATION ADJUST. | | 1.00 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| DOWN | 0 | |
| MED | HIGH | rate of inflow |
| 3,720 | 4,770 | $/WD |
| 1.0165 | 0 | length factor |
| 3,781 | - | factored $/WD |
| FROM SHAFT | | |
| 17,100 | 17,100 | $/WD |
| | DAYS | 403 |

| M N O P | Q | R |
|---|---|---|
| COST ESTIMATE | UNIT COST | ITEM COST |
| DIRECT COSTS | — | — |
| PORTAL EXCAVATION, $/ea. | 500,000 | 500,000 |
| SHAFT | — | — |
| MOB, DEMOB & DEVELOP, LS/shaft | — | - |
| CONSTRUCTION, $/ft. | 7,500 | - |
| TUNNEL EXCAVATION | — | — |
| STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| LABOR & JOB MATLS, $/WD | 41,308 | 9,636,132 |
| SHAFT OPERATION, $/WD | - | - |
| SPOT BOLT MATERIALS, $/ft. | 0.50 | 10,165 |
| PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| STEEL SETS @ 4', $/ft. | 115 | - |
| HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| PUMP WATER FROM TUNNELS | | 1,485,297 |
| PUMP WATER FROM SHAFT, $/WD | - | - |
| PROBE WATER MATERIALS, $/ft. | 10 | - |
| GROUT WATER MATERIALS, $/ft. | 180 | - |
| REMOTE MUCK DISPOSAL, $/CY | 10 | 851,827 |
| TUNNEL LINING | — | — |
| PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| PLACE CONCRETE LINING, $/ft. | 373 | 5,718,090 |
| REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| MOB FOR STEEL LINING, LS/tun | 1 | 150,000 |
| PLACE STEEL LINING, $/ft. | 1,084 | 5,420,000 |
| LAKE TAP, LS $/ea subcontract | | |
| TOTAL DIRECT COSTS | | 24,665,310 |
| PLANT & EQUIPMENT | — | — |
| BUILDINGS & YARD, LS/tun | 618,000 | 618,000 |
| BASE UTILITIES, LS/tun | 285,000 | 285,000 |
| WATER WELL, ETC. | — | - |
| POWER CO SETUP, LS/tun | 318,000 | 318,000 |
| AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 745,220 |
| DEWATER | | 330,000 |
| CRANES, LS/tun | 113,000 | 113,000 |
| HAUL, RUBBER, LS/tun | 21,000 | 21,000 |
| RAIL & SWITCHES, $/ft. | 21.25 | 432,013 |
| LOCOMOTIVES, $/ea. | 75,000 | 300,000 |
| CARS, LS/tun | 384,000 | 384,000 |
| SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 142,000 |
| DRILLS, LS/tunnel | 38,000 | 38,000 |
| TUNNEL MUCKERS, LS/tunnel | 42,000 | 42,000 |
| TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 4,800,000 |
| ADD TO WORK FROM SHAFT | - | - |
| ADD TO GROUT WATER | 160,000 | - |
| CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,209,000 |
| STEEL LINING, LS/tun | 355,000 | 355,000 |
| GENERAL, LS/tun | 300,000 | 300,000 |
| DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | - |
| TOTAL PLANT & EQUIPMENT | | 10,432,233 |
| INDIRECT COSTS | — | — |
| MOBILIZATION & DEMOB, LS | 262,300 | 262,300 |
| VARIABLE, $/WD and /tun | 11,114 | 5,310,183 |
| JOB SITE GENERATED POWER, $/KWH | - | - |
| TOTAL INDIRECT COSTS | — | 5,572,483 |
| SUB TOTAL | — | 126 |
| BOND | 0.49% | 300 |
| TOTAL ESTIMATED COST | — | 40,869,026 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | BL | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 2,868 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,330 | 154 | 18,610 | 141 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 20,330 | 53 | 18,610 | 49 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 18,610 | 4 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 16,330 | 11 | - | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | 4,910 | 8 | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | 4,000 | 49 | 13,700 | 169 | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 20,330 | 11 | 18,610 | 10 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 20,330 | 29 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | - | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | 18,610 | 142 | |
| 33 | | PROBE WATER | | | | PW | 3.33 | 2,000 | 7 | 18,610 | 62 | |
| 34 | | GROUT WATER | | | 1 | GW | 36.11 | - | - | 1,861 | 67 | |
| 35 | | HIGH TEMPERATURE | | | 2 | HT | 2.47 | 20,330 | 50 | 18,610 | 46 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | - | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 210 | | 557 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 55.9 | 364 | 26.7 | 698 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 20,330 | 151 | 18,610 | 138 | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 151 | | 138 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 515 | | 836 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 8 | | |
| 45 | MOBILIZATION | | | 80 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | 717 | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 90 | | | DEPRECIATION ADJUST. | | | 0.99 | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 836 | | | UP | DOWN | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | MED | HIGH | rate of inflow | | | |
| 54 | | | TOTAL | 1,853 | 7.4 | | 1,480 | 9,800 | $/WD | | | |
| 55 | | | | | | | 1.0165 | 0.9305 | length factor | | | |
| 56 | | | | | | | 1,484 | 9,119 | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | 8,620 | | $/WD | | | |
| 59 | | | | | | | | DAYS | 866 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | — | — |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | | SHAFT | | | — | — |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | — | 13,440,000 |
| | | | CONSTRUCTION, $/ft. | | 7,500 | 21,510,000 |
| | | TUNNEL EXCAVATION | | | — | — |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 43,851,648 |
| | | | SHAFT OPERATION, $/WD | | 2,900 | 2,744,403 |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 8,165 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | 49,100 |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | 3,097,500 |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | 8,390,808 |
| | | | PUMP WATER FROM SHAFT, $/WD | | 8,620 | 7,467,902 |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | 206,100 |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | 334,980 |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 1,631,586 |
| | | TUNNEL LINING | | | — | — |
| | | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 1,137,340 |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | 14,524,620 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | 2 | 50,400 |
| | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | | PLACE STEEL LINING, $/ft. | | | - |
| | | LAKE TAP, LS $/ea subcontract | | | | |
| | | | | TOTAL DIRECT COSTS | | 118,984,552 |
| | PLANT & EQUIPMENT | | | | — | — |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | | WATER WELL, ETC. | | | — | 35,000 |
| | | POWER CO SETUP, LS/tun | | | 318,000 | 445,200 |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,431,960 |
| | | DEWATER | | | | 1,730,000 |
| | | CRANES, LS/tun | | | 113,000 | 146,900 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 827,475 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | | CARS, LS/tun | | | 384,000 | 768,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | | ADD TO GROUT WATER | | | 160,000 | 160,000 |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,935,000 |
| | | STEEL LINING, LS/tun | | | - | - |
| | | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (196,927) |
| | | | | TOTAL PLANT & EQUIPMENT | | 19,495,758 |
| | INDIRECT COSTS | | | | — | — |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 19,486,687 |
| | | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| | | | | TOTAL INDIRECT COSTS | — | 19,827,677 |
| | SUB TOTAL | | | | — | 158,307,987 |
| | BOND | | | | 0.49% | 776,000 |
| | TOTAL ESTIMATED COST | | | | — | 159,083,987 |
| | | | | | $/FOOT | 4,085 |

IID TRANSFER STUDY

3A-CL

P. E. Sperry 8/27/96

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | CL | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 2,302 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | DOWN | WD | UP | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 18,610 | 141 | 19,930 | 151 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | 1 heading | | H2 | 1.38 | - | - | - | - | |
| 17 | | | | 2 headings | | H3 | 2.62 | 18,610 | 49 | 19,930 | 52 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 19,930 | 4 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | - | - | - | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | 18,410 | 32 | 10,600 | 18 | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | 200 | 5 | 9,330 | 229 | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 18,610 | 10 | 19,930 | 10 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | - | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | 18,610 | 78 | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | 19,930 | 152 | |
| 33 | | PROBE WATER | | | | PW | 3.33 | 18,610 | 62 | 19,930 | 66 | |
| 34 | | GROUT WATER | | | 2 | GW | 36.11 | 1,861 | 67 | 1,993 | 72 | |
| 35 | | HIGH TEMPERATURE | | | 2 | HT | 2.47 | 18,610 | 46 | 19,930 | 49 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 348 | | 654 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 38.1 | 489 | 24.8 | 804 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 18,610 | 138 | 19,930 | 148 | |
| 40 | STEEL LINING, ft. | | | | - | 66 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 138 | | 148 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 627 | | 953 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 576 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 953 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 1,828 | 7.3 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 8 |
| REMOTE MUCK DISPOSAL | | 2 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 0.99 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| DOWN | UP | |
| HIGH | HIGH | rate of inflow |
| 9,800 | 4,770 | $/WD |
| 0.9305 | 0.9965 | length factor |
| 9,119 | 4,753 | factored $/WD |
| FROM SHAFT | | |
| 17,100 | 17,100 | $/WD |
| | DAYS | 983 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | CONSTRUCTION, $/ft. | | 7,500 | 17,265,000 |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 53,410,977 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 3,081,464 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | - |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | 290,100 |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | 3,335,500 |
| | | PUMP WATER FROM TUNNELS | | | 10,247,026 |
| | | PUMP WATER FROM SHAFT, $/WD | | 34,200 | 33,604,025 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | 385,400 |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | 693,720 |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 1,137,340 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 14,375,420 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 2 | 50,400 |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | | - |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | TOTAL DIRECT COSTS | | | 151,856,372 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | 318,000 | 445,200 |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,418,360 |
| | DEWATER | | | | 3,470,000 |
| | CRANES, LS/tun | | | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 818,975 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | CARS, LS/tun | | | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | ADD TO GROUT WATER | | | 160,000 | 320,000 |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,935,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (215,706) |
| | | TOTAL PLANT & EQUIPMENT | | | 21,354,879 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 19,205,813 |
| | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| | | TOTAL INDIRECT COSTS | | --- | 19,546,803 |
| SUB TOTAL | | | | --- | [illegible]8,053 |
| BOND | | | | 0.49% | [illegible],000 |
| TOTAL ESTIMATED COST | | | | --- | [illegible]3,053 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | DL | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 2,594 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 19,930 | 151 | 20,065 | 152 | |
| 14 | DELAYS | | | | DELAY | CODE | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 19,930 | 52 | 20,065 | 53 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 20,065 | 4 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 11,200 | 8 | 20,065 | 14 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | 200 | 0 | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | 8,530 | 209 | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 19,930 | 10 | 20,065 | 10 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | | - | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 20,065 | 39 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | 19,930 | 83 | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | 19,930 | 66 | - | - | |
| 34 | | GROUT WATER | | | 1 | GW | 36.11 | 1,993 | 72 | - | - | |
| 35 | | HIGH TEMPERATURE | | | 2 | HT | 2.47 | 19,930 | 49 | 20,065 | 50 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 551 | | 170 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 28.4 | 701 | 62.3 | 322 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 19,930 | 148 | 20,065 | 149 | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 148 | | 149 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 850 | | 471 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 8 | | |
| 45 | MOBILIZATION | | | 80 | | | REMOTE MUCK DISPOSAL | | | 2 | | |
| 46 | SINK SHAFT | | | 649 | | | DRILL WELL | | | 1 | | |
| 47 | DEVELOP | | | 90 | | | DEPRECIATION ADJUST. | | | 1.00 | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 850 | | | UP | DOWN | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | HIGH | MED | rate of inflow | | | |
| 54 | | | TOTAL | 1,798 | 7.1 | | 4,770 | 3,720 | $/WD | | | |
| 55 | | | | | | | 0.9965 | 1.00325 | length factor | | | |
| 56 | | | | | | | 4,753 | 3,732 | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | 17,100 | 8,620 | $/WD | | | |
| 59 | | | | | | | | DAYS | 880 | | | |
| 60 | | | | | | | | | | | | |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | CONSTRUCTION, $/ft. | | 7,500 | 19,455,000 |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 42,271,540 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 2,782,961 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 15,633 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | 2,000 |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | 2,985,500 |
| | | PUMP WATER FROM TUNNELS | | | 5,797,413 |
| | | PUMP WATER FROM SHAFT, $/WD | | 25,720 | 22,624,389 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | 199,300 |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | 358,740 |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 1,137,340 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 14,918,135 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 2 | 50,400 |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | | - |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 126,578,351 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,467,830 |
| | DEWATER | | | | 3,220,000 |
| | CRANES, LS/tun | | | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 849,894 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | CARS, LS/tun | | | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | ADD TO GROUT WATER | | | 160,000 | 160,000 |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,935,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | - |
| | | | TOTAL PLANT & EQUIPMENT | | 20,795,774 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 18,873,149 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 5,729,500 |
| | | | TOTAL INDIRECT COSTS | --- | 24,943,639 |
| SUB TOTAL | | | | --- | 172,317,763 |
| BOND | | | | 0.49% | 844,000 |
| TOTAL ESTIMATED COST | | | | --- | 173,161,763 |
| | | | | $/FOOT | 4,330 |

IID TRANSFER STUDY

3A-EL

P. E. Sperry 8/27/96

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | EL | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 1,007 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,065 | 152 | 20,195 | 153 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | 20,065 | 53 | 20,195 | 53 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 20,195 | 4 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 20,065 | 14 | 20,195 | 14 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 20,065 | 10 | 20,195 | 10 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 20,065 | 28 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 13,000 | 25 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 9,065 | 22 | - | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 128 | | 107 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 71.8 | 279 | 77.7 | 260 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 20,065 | 149 | 20,195 | 150 | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 149 | | 150 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 429 | | 410 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 252 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 429 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 980 | 3.9 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 8 |
| REMOTE MUCK DISPOSAL | | 2 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.00 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 UP | Heading 2 DOWN | |
| MED | MED | rate of inflow |
| 1,480 | 3,720 | $/WD |
| 1.00325 | 1.00975 | length factor |
| 1,465 | 3,756 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 8,620 | $/WD |
| | DAYS | 45 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | CONSTRUCTION, $/ft. | | 7,500 | 7,552,500 |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 22,280,492 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 1,561,929 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 20,130 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | 2,169,103 |
| | | PUMP WATER FROM SHAFT, $/WD | | 17,240 | 7,906,196 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 1,137,340 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 15,016,980 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 2 | 50,400 |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | 1,084 | - |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 71,675,069 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,422,840 |
| | DEWATER | | | | 1,240,000 |
| | CRANES, LS/tun | | | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 855,525 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | CARS, LS/tun | | | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,935,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | - |
| | | | TOTAL PLANT & EQUIPMENT | | 18,616,415 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 9,784,166 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 2,952,250 |
| | | | TOTAL INDIRECT COSTS | --- | 13,077,406 |
| SUB TOTAL | | | | --- | 368,890 |
| BOND | | | | 0.49% | 17,000 |
| TOTAL ESTIMATED COST | | | | --- | 75,890 |
| | | | | $/FOOT | 2,580 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | FL | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 375 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 20,195 | 153 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | 20,195 | 14 | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 20,195 | 14 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | | - | |
| 28 | | | | | from shaft | CS | 0.52 | 20,195 | 10 | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 38 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 105.7 | 191 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 15,195 | 113 | | - | |
| 40 | STEEL LINING, ft. | | | 1 | 1 | 110 | FPD | 5,000 | 45 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 159 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 350 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 4 | | |
| 45 | MOBILIZATION | | | 80 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | 94 | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 1.00 | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 350 | | | UP | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 658 | 2.6 | | 260 | | $/WD | | | |
| 55 | | | | | | | 1.00975 | 0 | length factor | | | |
| 56 | | | | | | | 263 | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | 6,360 | | $/WD | | | |
| 59 | | | | | | | | DAYS | 365 | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| 1 | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| 2 | DIRECT COSTS | | | | --- | --- |
| 3 | | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| 4 | | SHAFT | | | --- | --- |
| 5 | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 470,000 |
| 6 | | | CONSTRUCTION, $/ft. | | 8,200 | 3,075,000 |
| 7 | | TUNNEL EXCAVATION | | | --- | --- |
| 8 | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| 9 | | | LABOR & JOB MATLS, $/WD | | 41,308 | 7,893,383 |
| 10 | | | SHAFT OPERATION, $/WD | | 2,900 | 1,173,336 |
| 11 | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 10,098 |
| 12 | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| 13 | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| 14 | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| 15 | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| 16 | | | PUMP WATER FROM TUNNELS | | | 91,782 |
| 17 | | | PUMP WATER FROM SHAFT, $/WD | | 6,360 | 2,318,847 |
| 18 | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| 19 | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| 20 | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 846,171 |
| 21 | | TUNNEL LINING | | | --- | --- |
| 22 | | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 598,600 |
| 23 | | | PLACE CONCRETE LINING, $/ft. | | 373 | 5,667,735 |
| 24 | | | REMOVE FORMS & TRAVELER, LS/tun | | 1 | 25,200 |
| 25 | | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| 26 | | | PLACE STEEL LINING, $/ft. | | 1,084 | 5,420,000 |
| 27 | | LAKE TAP, LS $/ea subcontract | | | | |
| 28 | | | | TOTAL DIRECT COSTS | | 28,010,151 |
| 29 | PLANT & EQUIPMENT | | | | --- | --- |
| 30 | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| 31 | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| 32 | | WATER WELL, ETC. | | | --- | - |
| 33 | | POWER CO SETUP, LS/tun | | | 318,000 | 318,000 |
| 34 | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 686,630 |
| 35 | | DEWATER | | | | 160,000 |
| 36 | | CRANES, LS/tun | | | 113,000 | 113,000 |
| 37 | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| 38 | | RAIL & SWITCHES, $/ft. | | | 21.25 | 429,144 |
| 39 | | LOCOMOTIVES, $/ea. | | | 75,000 | 300,000 |
| 40 | | CARS, LS/tun | | | 384,000 | 384,000 |
| 41 | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| 42 | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| 43 | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| 44 | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| 45 | | ADD TO WORK FROM SHAFT | | | 425,000 | 425,000 |
| 46 | | ADD TO GROUT WATER | | | 160,000 | - |
| 47 | | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,209,000 |
| 48 | | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| 49 | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| 50 | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | - |
| 51 | | | | TOTAL PLANT & EQUIPMENT | | 10,625,774 |
| 52 | INDIRECT COSTS | | | | --- | --- |
| 53 | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| 54 | | VARIABLE, $/WD and /tun | | | 11,114 | 6,205,487 |
| 55 | | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| 56 | | | | TOTAL INDIRECT COSTS | --- | 6,467,787 |
| 57 | SUB TOTAL | | | | --- | 45,103,712 |
| 58 | BOND | | | | 0.49% | 221,000 |
| 59 | TOTAL ESTIMATED COST | | | | --- | 45,324,712 |

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 3A | | CONTRACT | | GL | | |
| 2 | PORTALS, ea. | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 20,860 | 158 | | - | |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | | - | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 20,860 | 15 | | - | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 20,860 | 7 | | - | |
| 28 | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | | - | |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | | - | |
| 35 | HIGH TEMPERATURE | | - | HT | 2.47 | - | - | | - | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | - | - | | - | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 22 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 116.2 | 179 | | - | |
| 39 | CONCRETE LINING, ft. | 1 | 1 | 134.4 | FPD | 9,760 | 73 | | - | |
| 40 | STEEL LINING, ft. | | 1 | 110 | FPD | 11,100 | 101 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 174 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 353 | | - | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | LOCOMOTIVES, ea. | | | 5 | | |
| 45 | MOBILIZATION | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | 60 | | | DEPRECIATION ADJUST. | | | 1.04 | | |
| 48 | ERECT TBM # 1 | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | 353 | | | UP | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | TOTAL | 628 | 2.5 | | 260 | | $/WD | | | |
| 55 | | | | | 1.043 | 0 | length factor | | | |
| 56 | | | | | 271 | - | factored $/WD | | | |
| 57 | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | $/WD | | | |
| 59 | | | | | | DAYS | 363 | | | |
| 60 | | | | | | | | | | |

| | M N O P | Q | R |
|---|---|---|---|
| | COST ESTIMATE | UNIT COST | ITEM COST |
| | DIRECT COSTS | --- | --- |
| | PORTAL EXCAVATION, $/ea. | 500,000 | 500,000 |
| | SHAFT | --- | --- |
| | MOB, DEMOB & DEVELOP, LS/shaft | --- | - |
| | CONSTRUCTION, $/ft. | 7,500 | - |
| | TUNNEL EXCAVATION | --- | --- |
| | STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| | LABOR & JOB MATLS, $/WD | 41,308 | 7,414,107 |
| | SHAFT OPERATION, $/WD | - | - |
| | SPOT BOLT MATERIALS, $/ft. | 0.50 | 10,430 |
| | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | STEEL SETS @ 4', $/ft. | 115 | - |
| | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| | PUMP WATER FROM TUNNELS | | 95,730 |
| | PUMP WATER FROM SHAFT, $/WD | - | - |
| | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | REMOTE MUCK DISPOSAL, $/CY | 10 | 874,034 |
| | TUNNEL LINING | --- | --- |
| | PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| | PLACE CONCRETE LINING, $/ft. | 373 | 3,640,480 |
| | REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| | MOB FOR STEEL LINING, LS/tun | 1 | 150,000 |
| | PLACE STEEL LINING, $/ft. | 1,084 | 12,032,400 |
| | LAKE TAP, LS $/ea subcontract | | |
| | TOTAL DIRECT COSTS | | 25,610,981 |
| | PLANT & EQUIPMENT | --- | --- |
| | BUILDINGS & YARD, LS/tun | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | 285,000 | 285,000 |
| | WATER WELL, ETC. | --- | - |
| | POWER CO SETUP, LS/tun | 318,000 | 318,000 |
| | AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 709,240 |
| | DEWATER | | 150,000 |
| | CRANES, LS/tun | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | 21.25 | 443,275 |
| | LOCOMOTIVES, $/ea. | 75,000 | 375,000 |
| | CARS, LS/tun | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | - | - |
| | ADD TO GROUT WATER | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,209,000 |
| | STEEL LINING, LS/tun | 355,000 | 355,000 |
| | GENERAL, LS/tun | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | 412,101 |
| | TOTAL PLANT & EQUIPMENT | | 10,714,616 |
| | INDIRECT COSTS | --- | --- |
| | MOBILIZATION & DEMOB, LS | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | 11,114 | 4,868,062 |
| | JOB SITE GENERATED POWER, $/KWH | - | - |
| | TOTAL INDIRECT COSTS | --- | 5,130,362 |
| | SUB TOTAL | --- | 41,455,958 |
| | BOND | 0.49% | 203,000 |
| | TOTAL ESTIMATED COST | --- | 1,958 |
| | | $/FOOT | 1,997 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3A | | CONTRACT | | HL | | |
| 2 | PORTALS, ea. | | | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP 2% | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 11,300 | 85 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | 11,300 | 1 | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 11,300 | 8 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 11,300 | 4 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 13 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 114.7 | 99 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 7,600 | 57 | | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 110 | FPD | 3,700 | 34 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 90 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 189 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 3 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 0.91 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 189 | | | UP 2% | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 464 | 1.8 | | - | | $/WD | | | |
| 55 | | | | | | | 0.565 | 0 | length factor | | | |
| 56 | | | | | | | - | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 199 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| 1 | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| 2 | DIRECT COSTS | | | | --- | --- |
| 3 | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 1,000,000 |
| 4 | | SHAFT | | | --- | --- |
| 5 | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| 6 | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| 7 | | TUNNEL EXCAVATION | | | --- | --- |
| 8 | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| 9 | | | LABOR & JOB MATLS, $/WD | | 41,308 | 4,070,426 |
| 10 | | | SHAFT OPERATION, $/WD | | - | - |
| 11 | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 5,650 |
| 12 | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| 13 | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| 14 | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| 15 | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| 16 | | | PUMP WATER FROM TUNNELS | | | - |
| 17 | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| 18 | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| 19 | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| 20 | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 473,470 |
| 21 | | TUNNEL LINING | | | --- | --- |
| 22 | | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 598,600 |
| 23 | | | PLACE CONCRETE LINING, $/ft. | | 373 | 2,834,800 |
| 24 | | | REMOVE FORMS & TRAVELER, LS/tun | | 1 | 25,200 |
| 25 | | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| 26 | | | PLACE STEEL LINING, $/ft. | | 1,084 | 4,010,800 |
| 27 | | LAKE TAP, LS $/ea subcontract | | | | |
| 28 | | | | TOTAL DIRECT COSTS | | 13,438,946 |
| 29 | PLANT & EQUIPMENT | | | | --- | --- |
| 30 | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| 31 | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| 32 | | WATER WELL, ETC. | | | --- | - |
| 33 | | POWER CO SETUP, LS/tun | | | 318,000 | 318,000 |
| 34 | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 384,200 |
| 35 | | DEWATER | | | | - |
| 36 | | CRANES, LS/tun | | | 113,000 | 113,000 |
| 37 | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| 38 | | RAIL & SWITCHES, $/ft. | | | 21.25 | 240,125 |
| 39 | | LOCOMOTIVES, $/ea. | | | 75,000 | 225,000 |
| 40 | | CARS, LS/tun | | | 384,000 | 384,000 |
| 41 | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| 42 | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| 43 | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| 44 | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| 45 | | ADD TO WORK FROM SHAFT | | | - | - |
| 46 | | ADD TO GROUT WATER | | | 160,000 | - |
| 47 | | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,209,000 |
| 48 | | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| 49 | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| 50 | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (852,689) |
| 51 | | | | TOTAL PLANT & EQUIPMENT | | 8,621,636 |
| 52 | INDIRECT COSTS | | | | --- | --- |
| 53 | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| 54 | | VARIABLE, $/WD and /tun | | | 11,114 | 3,042,151 |
| 55 | | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| 56 | | | | TOTAL INDIRECT COSTS | --- | 3,304,451 |
| 57 | SUB TOTAL | | | | --- | 25,365,033 |
| 58 | BOND | | | | 0.49% | 124,000 |
| 59 | TOTAL ESTIMATED COST | | | | --- | 25,489,033 |
| 60 | | | | | $/FOOT | 2,256 |

IID TRANSFER STUDY

3B-AL

P. E. Sperry 9/27/96

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3B | | CONTRACT | | AL | | |
| 2 | PORTALS, ea. | | | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP 5.2% | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 9,600 | 73 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | 9,600 | 4 | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 9,600 | 7 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 26 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 9,600 | 3 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | - | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 14 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 110.6 | 87 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | - | 134.4 | FPD | - | - | | - | |
| 40 | STEEL LINING, ft. | | | | 1 | 86 | FPD | 9,600 | 112 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 112 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 198 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 170 | | | | | | | | |
| 46 | SINK SHAFT | | | - | | | | | | | | |
| 47 | DEVELOP | | | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | | | | | | |
| 52 | TUN EX & LINING | | | 198 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 473 | 1.9 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 3 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 0.91 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP 5.2% | 0 | |
| LOW | | rate of inflow |
| - | | $/WD |
| 0.48 | 0 | length factor |
| - | - | factored $/WD |
| FROM SHAFT | | |
| | | $/WD |
| | DAYS | 208 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | 1,000,000 |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 3,587,104 |
| | | SHAFT OPERATION, $/WD | | - | - |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 4,800 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | - |
| | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 402,240 |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | - | - |
| | | PLACE CONCRETE LINING, $/ft. | | - | - |
| | | REMOVE FORMS & TRAVELER, LS/tun | | - | - |
| | | MOB FOR STEEL LINING, LS/tun | | 1 | 150,000 |
| | | PLACE STEEL LINING, $/ft. | | 1,725 | 16,560,000 |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 21,974,144 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 326,400 |
| | DEWATER | | | | - |
| | CRANES, LS/tun | | | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 204,000 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 225,000 |
| | CARS, LS/tun | | | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | | | - | - |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | - | 109,000 |
| | STEEL LINING, LS/tun | | | 355,000 | 355,000 |
| | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (719,766) |
| | | | TOTAL PLANT & EQUIPMENT | | 7,277,634 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 3,150,440 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 992,131 |
| | | | TOTAL INDIRECT COSTS | --- | 4,404,871 |
| SUB TOTAL | | | | --- | 33 656,649 |
| BOND | | | | 0.49% | ,000 |
| TOTAL ESTIMATED COST | | | | --- | ,649 |
| | | | | $/FOOT | 3,523 |

IID TRANSFER STUDY

3B-BL

P. E. Sperry 8/27/96

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 3B | | CONTRACT | | BL | | |
| 2 | PORTALS, ea. | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | DOWN | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 22,600 | 171 | | - | |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | | - | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | 22,600 | 11 | | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 22,600 | 16 | | - | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 22,600 | 8 | | - | |
| 28 | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | downgrade | MD | 1.96 | 22,600 | 44 | | - | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | | - | |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | | - | |
| 35 | HIGH TEMPERATURE | | 1 | HT | 2.47 | 14,200 | 35 | | - | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 114 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 79.3 | 285 | | - | |
| 39 | CONCRETE LINING, ft. | 1 | 1 | 134.4 | FPD | 21,600 | 161 | | - | |
| 40 | STEEL LINING, ft. | | 1 | 110 | FPD | 1,000 | 9 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 170 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 455 | | - | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | | | | | | |
| 45 | MOBILIZATION | 170 | | | | | | | | |
| 46 | SINK SHAFT | - | | | | | | | | |
| 47 | DEVELOP | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | 10 | | | | | | | | |
| 51 | REMOVE TBM # 2 | - | | | | | | | | |
| 52 | TUN EX & LINING | 455 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | | | | | |
| 54 | TOTAL | 730 | 2.9 | | | | | | | |
| 55 | | | | | | | | | | |
| 56 | | | | | | | | | | |
| 57 | | | | | | | | | | |
| 58 | | | | | | | | | | |
| 59 | | | | | | | | | | |
| 60 | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 4 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 0.96 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| DOWN | 0 | |
| MED | | rate of inflow |
| 3,720 | | $/WD |
| 1.13 | 0 | length factor |
| 4,204 | - | factored $/WD |
| FROM SHAFT | | |
| | | $/WD |
| | DAYS | 465 |

| M N O P | Q | R |
|---|---|---|
| COST ESTIMATE | UNIT COST | ITEM COST |
| DIRECT COSTS | — | — |
| PORTAL EXCAVATION, $/ea. | 500,000 | 500,000 |
| SHAFT | — | — |
| MOB, DEMOB & DEVELOP, LS/shaft | — | - |
| CONSTRUCTION, $/ft. | 7,500 | - |
| TUNNEL EXCAVATION | — | — |
| STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| LABOR & JOB MATLS, $/WD | 41,308 | 11,774,727 |
| SHAFT OPERATION, $/WD | - | - |
| SPOT BOLT MATERIALS, $/ft. | 0.50 | 11,300 |
| PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| STEEL SETS @ 4', $/ft. | 115 | - |
| HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| PUMP WATER FROM TUNNELS | | 1,912,017 |
| PUMP WATER FROM SHAFT, $/WD | - | - |
| PROBE WATER MATERIALS, $/ft. | 10 | - |
| GROUT WATER MATERIALS, $/ft. | 180 | - |
| REMOTE MUCK DISPOSAL, $/CY | 10 | 946,940 |
| TUNNEL LINING | — | — |
| PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| PLACE CONCRETE LINING, $/ft. | 373 | 8,056,800 |
| REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| MOB FOR STEEL LINING, LS/tun | 1 | 150,000 |
| PLACE STEEL LINING, $/ft. | 1,084 | 1,084,000 |
| LAKE TAP, LS $/ea subcontract | | |
| TOTAL DIRECT COSTS | | 25,329,584 |
| PLANT & EQUIPMENT | — | — |
| BUILDINGS & YARD, LS/tun | 618,000 | 618,000 |
| BASE UTILITIES, LS/tun | 285,000 | 285,000 |
| WATER WELL, ETC. | — | 35,000 |
| POWER CO SETUP, LS/tun | - | - |
| AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 822,400 |
| DEWATER | | 1,250,000 |
| CRANES, LS/tun | 113,000 | 113,000 |
| HAUL, RUBBER, LS/tun | 21,000 | 21,000 |
| RAIL & SWITCHES, $/ft. | 21.25 | 480,250 |
| LOCOMOTIVES, $/ea. | 75,000 | 300,000 |
| CARS, LS/tun | 384,000 | 384,000 |
| SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 142,000 |
| DRILLS, LS/tunnel | 38,000 | 38,000 |
| TUNNEL MUCKERS, LS/tunnel | 42,000 | 42,000 |
| TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 4,800,000 |
| ADD TO WORK FROM SHAFT | - | - |
| ADD TO GROUT WATER | 160,000 | - |
| CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,209,000 |
| STEEL LINING, LS/tun | 355,000 | 355,000 |
| GENERAL, LS/tun | 300,000 | 300,000 |
| DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | (447,786) |
| TOTAL PLANT & EQUIPMENT | | 10,746,864 |
| INDIRECT COSTS | — | — |
| MOBILIZATION & DEMOB, LS | 262,300 | 262,300 |
| VARIABLE, $/WD and /tun | 11,114 | 5,999,919 |
| JOB SITE GENERATED POWER, $/KWH | 0.25 | 1,889,483 |
| TOTAL INDIRECT COSTS | — | 8,151,702 |
| SUB TOTAL | — | 44,228,150 |
| BOND | 0.49% | 217,000 |
| TOTAL ESTIMATED COST | — | 44,445,150 |

IID TRANSFER STUDY

3B-CL

P. E. Sperry 8/27/96

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 3B | | CONTRACT | | CL | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 1,485 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 22,600 | 171 | 20,600 | 156 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | 22,600 | 31 | 20,600 | 28 | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | - | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | - | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | 20,600 | 10 | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | 22,600 | 3 | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 22,600 | 16 | 20,600 | 14 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 22,600 | 12 | 20,600 | 11 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | 22,600 | 32 | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 20,600 | 40 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 7,000 | 17 | - | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 110 | | 104 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 80.4 | 281 | 79.3 | 260 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 22,600 | 168 | 15,100 | 112 | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | 5,500 | 64 | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 168 | | 176 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 449 | | 436 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 371 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 449 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 1,121 | 4.4 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| LOCOMOTIVES, ea. | | 8 | |
| REMOTE MUCK DISPOSAL | | 2 | |
| DRILL WELL | | 1 | |
| DEPRECIATION ADJUST. | | 0.96 | |
| PUMP WATER | | | |
| FROM TUNNELS | | | |
| Heading 1 | Heading 2 | | |
| UP | DOWN | | |
| MED | MED | rate of inflow | |
| 1,460 | 3,720 | $/WD | |
| 1.13 | 1.03 | length factor | |
| 1,650 | 3,832 | factored $/WD | |
| FROM SHAFT | | | |
| 8,620 | 8,620 | $/WD | |
| | DAYS | 479 | |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | SHAFT | | | --- | --- |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | 13,440,000 |
| | | CONSTRUCTION, $/ft. | | 7,500 | 11,137,500 |
| | TUNNEL EXCAVATION | | | --- | --- |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 22,342,298 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 1,621,842 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 21,600 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | PUMP WATER FROM TUNNELS | | | 2,412,045 |
| | | PUMP WATER FROM SHAFT, $/WD | | 17,240 | 8,262,372 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | TUNNEL LINING | | | --- | --- |
| | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 598,600 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 14,062,100 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 1 | 25,200 |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | 1,725 | 9,487,500 |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 83,951,057 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | WATER WELL, ETC. | | | --- | 35,000 |
| | POWER CO SETUP, LS/tun | | | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,522,800 |
| | DEWATER | | | | 450,000 |
| | CRANES, LS/tun | | | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 918,000 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | CARS, LS/tun | | | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,209,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (690,514) |
| | | | TOTAL PLANT & EQUIPMENT | | 16,572,336 |
| INDIRECT COSTS | | | | --- | --- |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 11,341,903 |
| | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 3,788,750 |
| | | | TOTAL INDIRECT COSTS | --- | 15,471,643 |
| SUB TOTAL | | | | --- | 1[illegible] 036 |
| BOND | | | | 0.49% | [illegible]000 |
| TOTAL ESTIMATED COST | | | | --- | 11[illegible] [illegible]036 |

IID TRANSFER STUDY

3B-DL

P. E. Sperry 8/27/96

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 3B | | CONTRACT | | DL | | |
| 2 | PORTALS, ea. | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | 1,315 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 20,600 | 156 | 21,100 | 159 | |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | - | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | 2 headings | H3 | 2.62 | 20,600 | 54 | 21,100 | 55 | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | 21,100 | 5 | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | - | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | - | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | - | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 20,600 | 14 | 21,100 | 15 | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | - | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | - | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | - | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | - | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 20,600 | 7 | 21,100 | 7 | |
| 28 | | | from shaft | CS | 0.52 | - | - | - | - | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | 20,600 | 29 | - | - | |
| 30 | | | downgrade | MD | 1.96 | - | - | 21,100 | 41 | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | - | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | - | - | |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | - | - | |
| 35 | HIGH TEMPERATURE | | - | HT | 2.47 | - | - | - | - | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 104 | | 123 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 79.2 | 260 | 74.6 | 283 | |
| 39 | CONCRETE LINING, ft. | 1 | 1 | 134.4 | FPD | 17,100 | 127 | 21,100 | 157 | |
| 40 | STEEL LINING, ft. | | 1 | 86 | FPD | 3,500 | 41 | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 168 | | 157 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 428 | | 440 | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | | | | | | |
| 45 | MOBILIZATION | 80 | | | | | | | | |
| 46 | SINK SHAFT | 329 | | | | | | | | |
| 47 | DEVELOP | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | 15 | | | | | | | | |
| 52 | TUN EX & LINING | 440 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | | | | | |
| 54 | TOTAL | 1,069 | 4.2 | | | | | | | |
| 55 | | | | | | | | | | |
| 56 | | | | | | | | | | |
| 57 | | | | | | | | | | |
| 58 | | | | | | | | | | |
| 59 | | | | | | | | | | |
| 60 | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 7 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.12 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| MED | MED | rate of inflow |
| 1,460 | 3,720 | $/WD |
| 1.03 | 1.055 | length factor |
| 1,504 | 3,925 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 8,620 | $/WD |
| | DAYS | 470 |

| M N O P | Q | R |
|---|---|---|
| COST ESTIMATE | UNIT COST | ITEM COST |
| DIRECT COSTS | --- | --- |
| PORTAL EXCAVATION, $/ea. | 500,000 | - |
| SHAFT | --- | --- |
| MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| CONSTRUCTION, $/ft. | 7,500 | 9,862,500 |
| TUNNEL EXCAVATION | --- | --- |
| STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| LABOR & JOB MATLS, $/WD | 41,308 | 22,429,868 |
| SHAFT OPERATION, $/WD | 2,900 | 1,594,385 |
| SPOT BOLT MATERIALS, $/ft. | 0.50 | 20,850 |
| PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| STEEL SETS @ 4', $/ft. | 115 | - |
| HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| PUMP WATER FROM TUNNELS | | 2,369,809 |
| PUMP WATER FROM SHAFT, $/WD | 17,240 | 8,099,147 |
| PROBE WATER MATERIALS, $/ft. | 10 | - |
| GROUT WATER MATERIALS, $/ft. | 180 | - |
| REMOTE MUCK DISPOSAL, $/CY | 10 | 1,747,230 |
| TUNNEL LINING | --- | --- |
| PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| PLACE CONCRETE LINING, $/ft. | 373 | 14,248,600 |
| REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| MOB FOR STEEL LINING, LS/tun | 1 | 150,000 |
| PLACE STEEL LINING, $/ft. | 1,725 | 6,037,500 |
| LAKE TAP, LS $/ea subcontract | | |
| TOTAL DIRECT COSTS | | 81,163,690 |
| PLANT & EQUIPMENT | --- | --- |
| BUILDINGS & YARD, LS/tun | 618,000 | 710,700 |
| BASE UTILITIES, LS/tun | 285,000 | 430,350 |
| WATER WELL, ETC. | --- | 35,000 |
| POWER CO SETUP, LS/tun | - | - |
| AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 1,417,800 |
| DEWATER | | |
| CRANES, LS/tun | 113,000 | 146,900 |
| HAUL, RUBBER, LS/tun | 21,000 | 23,100 |
| RAIL & SWITCHES, $/ft. | 21.25 | 886,125 |
| LOCOMOTIVES, $/ea. | 75,000 | 525,000 |
| CARS, LS/tun | 384,000 | 768,000 |
| SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 213,000 |
| DRILLS, LS/tunnel | 38,000 | 76,000 |
| TUNNEL MUCKERS, LS/tunnel | 42,000 | 84,000 |
| TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 8,736,000 |
| ADD TO WORK FROM SHAFT | 425,000 | 935,000 |
| ADD TO GROUT WATER | 160,000 | - |
| CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,209,000 |
| STEEL LINING, LS/tun | 355,000 | 355,000 |
| GENERAL, LS/tun | 300,000 | 405,000 |
| DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | 2,034,717 |
| TOTAL PLANT & EQUIPMENT | | 18,990,692 |
| INDIRECT COSTS | --- | --- |
| MOBILIZATION & DEMOB, LS | 262,300 | 340,990 |
| VARIABLE, $/WD and /tun | 11,114 | 10,764,332 |
| JOB SITE GENERATED POWER, $/KWH | 0.25 | 3,491,250 |
| TOTAL INDIRECT COSTS | --- | 14,596,572 |
| SUB TOTAL | --- | 114,750,954 |
| BOND | 0.49% | 562,000 |
| TOTAL ESTIMATED COST | --- | 115,312,954 |

IID TRANSFER STUDY

3B-EL

P. E. Sperry 8/27/96

| | A B C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 3B | | CONTRACT | | EL | |
| 2 | PORTALS, ea. | | 1 | PRODUCTION | | | | | |
| 3 | SHAFT DEPTH, ft. | | - | 4 | FPD | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | | |
| 12 | TUNNEL GRADE | | | | | UP | WD | | WD |
| 13 | TUNNEL LENGTH, ft. | | | | | 21,100 | 159 | | - |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | | - |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | | - |
| 17 | | | 2 headings | H3 | 2.62 | - | - | | - |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | | - |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | | - |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | | - |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | | - |
| 22 | SPOT BOLTS | | | SB | 0.70 | 21,100 | 15 | | - |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | | - |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | | - |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | | - |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | | - |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | 21,100 | 7 | | - |
| 28 | | | from shaft | CS | 0.52 | - | - | | - |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | 21,100 | 30 | | - |
| 30 | | | downgrade | MD | 1.96 | - | - | | - |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | | - |
| 32 | | | downgrade | HD | 7.64 | - | - | | - |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | | - |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | | - |
| 35 | HIGH TEMPERATURE | | - | HT | 2.47 | - | - | | - |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | | - |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 52 | | - |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 99.9 | 211 | | - |
| 39 | CONCRETE LINING, ft. | 1 | 1 | 134.4 | FPD | 16,100 | 120 | | - |
| 40 | STEEL LINING, ft. | | - | 86 | FPD | 5,000 | 58 | | - |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 178 | | - |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 389 | | - |
| 43 | | | | | | | | | |
| 44 | DURATION | WD | | | | | | | |
| 45 | MOBILIZATION | 170 | | | | | | | |
| 46 | SINK SHAFT | - | | | | | | | |
| 47 | DEVELOP | 60 | | | | | | | |
| 48 | ERECT TBM # 1 | 15 | | | | | | | |
| 49 | ERECT TBM # 2 | - | | | | | | | |
| 50 | REMOVE TBM # 1 | 10 | | | | | | | |
| 51 | REMOVE TBM # 2 | - | | | | | | | |
| 52 | TUN EX & LINING | 389 | | | | | | | |
| 53 | LAKE TAP | 75 | | | | | | | |
| 64 | CLEANUP & MOVEOUT | 20 | YEARS | | | | | | |
| 55 | TOTAL | 739 | 2.9 | | | | | | |
| 56 | | | | | | | | | |
| 57 | | | | | | | | | |
| 58 | | | | | | | | | |
| 59 | | | | | | | | | |
| 60 | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 8 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 2 |
| DEPRECIATION ADJUST. | | 1.14 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | 0 | |
| MED | | rate of inflow |
| - | | $/WD |
| 1.055 | 0 | length factor |
| - | - | factored $/WD |
| FROM SHAFT | | |
| | | $/WD |
| | DAYS | 474 |

| | M N O P | Q | R |
|---|---|---|---|
| | COST ESTIMATE | UNIT COST | ITEM COST |
| | DIRECT COSTS | --- | --- |
| | PORTAL EXCAVATION, $/ea. | 500,000 | 500,000 |
| | SHAFT | --- | --- |
| | MOB, DEMOB & DEVELOP, LS/shaft | --- | - |
| | CONSTRUCTION, $/ft. | 7,500 | - |
| | TUNNEL EXCAVATION | --- | --- |
| | STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| | LABOR & JOB MATLS, $/WD | 41,308 | 8,721,388 |
| | SHAFT OPERATION, $/WD | - | - |
| | SPOT BOLT MATERIALS, $/ft. | 0.50 | 10,550 |
| | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | STEEL SETS @ 4', $/ft. | 115 | - |
| | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| | PUMP WATER FROM TUNNELS | | - |
| | PUMP WATER FROM SHAFT, $/WD | - | - |
| | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | REMOTE MUCK DISPOSAL, $/CY | 10 | 884,090 |
| | TUNNEL LINING | --- | --- |
| | PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| | PLACE CONCRETE LINING, $/ft. | 373 | 6,005,300 |
| | REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| | MOB FOR STEEL LINING, LS/tun | - | - |
| | PLACE STEEL LINING, $/ft. | 1,725 | 8,625,000 |
| | LAKE TAP, LS $/ea subcontract | | 10,000,000 |
| | TOTAL DIRECT COSTS | | 35,640,128 |
| | PLANT & EQUIPMENT | --- | --- |
| | BUILDINGS & YARD, LS/tun | 618,000 | 618,000 |
| | BASE UTILITIES, LS/tun | 285,000 | 285,000 |
| | WATER WELL, ETC. | --- | - |
| | POWER CO SETUP, LS/tun | - | - |
| | AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 717,400 |
| | DEWATER | | 300,000 |
| | CRANES, LS/tun | 113,000 | 113,000 |
| | HAUL, RUBBER, LS/tun | 21,000 | 21,000 |
| | RAIL & SWITCHES, $/ft. | 21.25 | 448,375 |
| | LOCOMOTIVES, $/ea. | 75,000 | 600,000 |
| | CARS, LS/tun | 384,000 | 384,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 142,000 |
| | DRILLS, LS/tunnel | 38,000 | 38,000 |
| | TUNNEL MUCKERS, LS/tunnel | 42,000 | 42,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 4,800,000 |
| | ADD TO WORK FROM SHAFT | - | - |
| | ADD TO GROUT WATER | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,209,000 |
| | STEEL LINING, LS/tun | - | - |
| | GENERAL, LS/tun | 300,000 | 300,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | 1,402,489 |
| | TOTAL PLANT & EQUIPMENT | | 11,420,264 |
| | INDIRECT COSTS | --- | --- |
| | MOBILIZATION & DEMOB, LS | 262,300 | 262,300 |
| | VARIABLE, $/WD and /tun | 11,114 | 6,102,274 |
| | JOB SITE GENERATED POWER, $/KWH | 0.25 | 1,659,217 |
| | TOTAL INDIRECT COSTS | --- | 8,023,791 |
| | SUB TOTAL | --- | [illegible],182 |
| | BOND | 0.49% | [illegible],000 |
| | TOTAL ESTIMATED COST | --- | [illegible]4,182 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | AL | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | DOWN | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 18,750 | 142 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | 18,750 | 4 | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 18,750 | 13 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 18,750 | 6 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | 18,750 | 37 | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 750 | 2 | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 62 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 91.9 | 204 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 15,750 | 117 | | - | |
| 40 | STEEL LINING, ft. | | | | - | 110 | FPD | 3,000 | 27 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 144 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 348 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 170 | | | | | | | | |
| 46 | SINK SHAFT | | | - | | | | | | | | |
| 47 | DEVELOP | | | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | | | | | | |
| 52 | TUN EX & LINING | | | 348 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 623 | 2.5 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 4 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.00 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| DOWN | 0 | |
| MED | | rate of inflow |
| 3,720 | | $/WD |
| 0.9375 | 0 | length factor |
| 3,488 | - | factored $/WD |
| FROM SHAFT | | |
| | | $/WD |
| | DAYS | 358 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | 500,000 | 500,000 |
| | | SHAFT | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | --- | - |
| | | | CONSTRUCTION, $/ft. | 7,500 | - |
| | | TUNNEL EXCAVATION | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| | | | LABOR & JOB MATLS, $/WD | 41,308 | 8,424,277 |
| | | | SHAFT OPERATION, $/WD | - | - |
| | | | SPOT BOLT MATERIALS, $/ft. | 0.50 | 9,375 |
| | | | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | 1,215,039 |
| | | | PUMP WATER FROM SHAFT, $/WD | - | - |
| | | | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | 10 | 785,625 |
| | | TUNNEL LINING | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| | | | PLACE CONCRETE LINING, $/ft. | 373 | 5,874,750 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| | | | MOB FOR STEEL LINING, LS/tun | - | - |
| | | | PLACE STEEL LINING, $/ft. | 1,084 | 3,252,000 |
| | | LAKE TAP, LS $/ea subcontract | | | |
| | | | TOTAL DIRECT COSTS | | 20,954,867 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | 618,000 | 618,000 |
| | | BASE UTILITIES, LS/tun | | 285,000 | 285,000 |
| | | WATER WELL, ETC. | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | 34 | 691,500 |
| | | DEWATER | | | 330,000 |
| | | CRANES, LS/tun | | 113,000 | 113,000 |
| | | HAUL, RUBBER, LS/tun | | 21,000 | 21,000 |
| | | RAIL & SWITCHES, $/ft. | | 21.25 | 398,438 |
| | | LOCOMOTIVES, $/ea. | | 75,000 | 300,000 |
| | | CARS, LS/tun | | 384,000 | 384,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | 142,000 | 142,000 |
| | | DRILLS, LS/tunnel | | 38,000 | 38,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | 42,000 | 42,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | 4,800,000 | 4,800,000 |
| | | ADD TO WORK FROM SHAFT | | - | - |
| | | ADD TO GROUT WATER | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | 1,100,000 | 1,209,000 |
| | | STEEL LINING, LS/tun | | - | - |
| | | GENERAL, LS/tun | | 300,000 | 300,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | - |
| | | | TOTAL PLANT & EQUIPMENT | | 9,706,938 |
| INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | 262,300 | 262,300 |
| | | VARIABLE, $/WD and /tun | | 11,114 | 4,816,790 |
| | | JOB SITE GENERATED POWER, $/KWH | | 0.25 | 1,516,894 |
| | | | TOTAL INDIRECT COSTS | --- | 6,595,984 |
| SUB TOTAL | | | | --- | 37,257,788 |
| BOND | | | | 0.49% | 183,000 |
| TOTAL ESTIMATED COST | | | | --- | 37,440,788 |

IID TRANSFER STUDY

5A-BL

P. E. Sperry 8/27/96

| | A B C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 5A | | CONTRACT | | BL | |
| 2 | PORTALS, ea. | | - | PRODUCTION | | | | | |
| 3 | SHAFT DEPTH, ft. | | 3,440 | 4 | FPD | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | 2 | |
| 12 | TUNNEL GRADE | | | | | UP | WD | DOWN | WD |
| 13 | TUNNEL LENGTH, ft. | | | | | 18,750 | 142 | 22,170 | 168 |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | - | - |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | - | - |
| 17 | | | 2 headings | H3 | 2.62 | 18,750 | 49 | 22,170 | 58 |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | 22,170 | 5 |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | - | - |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | - | - |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | - | - |
| 22 | SPOT BOLTS | | | SB | 0.70 | 18,750 | 13 | 21,570 | 15 |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | 400 | 1 |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | - | - |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | - | - |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | 200 | 5 |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | - | - | - | - |
| 28 | | | from shaft | CS | 0.52 | 18,750 | 10 | 22,170 | 12 |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | 18,750 | 26 | - | - |
| 30 | | | downgrade | MD | 1.96 | - | - | - | - |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | - | - | - | - |
| 32 | | | downgrade | HD | 7.64 | - | - | 22,170 | 169 |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | - | - |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | - | - |
| 35 | HIGH TEMPERATURE | | 2 | HT | 2.47 | 18,750 | 46 | 22,170 | 55 |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | 1 | 0 |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 145 | | 319 |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 65.5 | 286 | 45.5 | 487 |
| 39 | CONCRETE LINING, ft. | 1 | 2 | 134.4 | FPD | 18,750 | 140 | 22,170 | 165 |
| 40 | STEEL LINING, ft. | | - | 86 | FPD | - | - | - | - |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 140 | | 165 |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 426 | | 652 |
| 43 | | | | | | | | | |
| 44 | DURATION | WD | | | | | | | |
| 45 | MOBILIZATION | 80 | | | | | | | |
| 46 | SINK SHAFT | 860 | | | | | | | |
| 47 | DEVELOP | 90 | | | | | | | |
| 48 | ERECT TBM # 1 | 40 | | | | | | | |
| 49 | ERECT TBM # 2 | 40 | | | | | | | |
| 50 | REMOVE TBM # 1 | 15 | | | | | | | |
| 51 | REMOVE TBM # 2 | 15 | | | | | | | |
| 52 | TUN EX & LINING | 652 | | | | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | | | | |
| 54 | TOTAL | 1,812 | 7.2 | | | | | | |
| 55 | | | | | | | | | |
| 56 | | | | | | | | | |
| 57 | | | | | | | | | |
| 58 | | | | | | | | | |
| 59 | | | | | | | | | |
| 60 | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 9 |
| REMOTE MUCK DISPOSAL | | 2 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.02 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| MED | HIGH | rate of inflow |
| 1,460 | 9,800 | $/WD |
| 0.9375 | 1.1085 | length factor |
| 1,369 | 10,863 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 17,100 | $/WD |
| | DAYS | 682 |

| M N O P | Q | R |
|---|---|---|
| COST ESTIMATE | UNIT COST | ITEM COST |
| DIRECT COSTS | — | — |
| PORTAL EXCAVATION, $/ea. | 500,000 | - |
| SHAFT | — | — |
| MOB, DEMOB & DEVELOP, LS/shaft | — | 13,440,000 |
| CONSTRUCTION, $/ft. | 7,500 | 25,800,000 |
| TUNNEL EXCAVATION | — | — |
| STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| LABOR & JOB MATLS, $/WD | 41,308 | 31,943,804 |
| SHAFT OPERATION, $/WD | 2,900 | 2,209,394 |
| SPOT BOLT MATERIALS, $/ft. | 0.50 | 20,160 |
| PATTERN BOLT MATERIALS, $/ft. | 10 | 4,000 |
| STEEL SETS @ 4', $/ft. | 115 | - |
| HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | 70,000 |
| PUMP WATER FROM TUNNELS | | 7,664,320 |
| PUMP WATER FROM SHAFT, $/WD | 25,720 | 17,537,443 |
| PROBE WATER MATERIALS, $/ft. | 10 | - |
| GROUT WATER MATERIALS, $/ft. | 180 | - |
| REMOTE MUCK DISPOSAL, $/CY | 10 | - |
| TUNNEL LINING | — | — |
| PURCHASE & ERECT FORMS, LS/tun | 598,600 | 1,137,340 |
| PLACE CONCRETE LINING, $/ft. | 373 | 15,263,160 |
| REMOVE FORMS & TRAVELER, LS/tun | 2 | 50,400 |
| MOB FOR STEEL LINING, LS/tun | - | - |
| PLACE STEEL LINING, $/ft. | | - |
| LAKE TAP, LS $/ea subcontract | | - |
| TOTAL DIRECT COSTS | | 115,680,021 |
| PLANT & EQUIPMENT | — | — |
| BUILDINGS & YARD, LS/tun | 618,000 | 710,700 |
| BASE UTILITIES, LS/tun | 285,000 | 430,350 |
| WATER WELL, ETC. | — | 35,000 |
| POWER CO SETUP, LS/tun | - | - |
| AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 1,499,280 |
| DEWATER | | 4,510,000 |
| CRANES, LS/tun | 113,000 | 146,900 |
| HAUL, RUBBER, LS/tun | 21,000 | 23,100 |
| RAIL & SWITCHES, $/ft. | 21.25 | 869,550 |
| LOCOMOTIVES, $/ea. | 75,000 | 675,000 |
| CARS, LS/tun | 384,000 | 768,000 |
| SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 213,000 |
| DRILLS, LS/tunnel | 38,000 | 76,000 |
| TUNNEL MUCKERS, LS/tunnel | 42,000 | 84,000 |
| TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 8,736,000 |
| ADD TO WORK FROM SHAFT | 425,000 | 935,000 |
| ADD TO GROUT WATER | 160,000 | - |
| CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,935,000 |
| STEEL LINING, LS/tun | - | - |
| GENERAL, LS/tun | 300,000 | 405,000 |
| DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | 441,038 |
| TOTAL PLANT & EQUIPMENT | | 22,492,918 |
| INDIRECT COSTS | — | — |
| MOBILIZATION & DEMOB, LS | 262,300 | 340,990 |
| VARIABLE, $/WD and /tun | 11,114 | 19,025,614 |
| JOB SITE GENERATED POWER, $/KWH | 0.25 | 7,210,000 |
| TOTAL INDIRECT COSTS | — | 76,604 |
| SUB TOTAL | — | 9,543 |
| BOND | 0.49% | 07,000 |
| TOTAL ESTIMATED COST | | 165,556,543 |

IID TRANSFER STUDY

5A-CL

P. E. Sperry 8/27/96

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 5A | | CONTRACT | | CL | | |
| 2 | PORTALS, ea. | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | 3,030 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 22,170 | 168 | 17,425 | 132 | |
| 14 | DELAYS | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | - | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | - | - | - | - | |
| 17 | | | 2 headings | H3 | 2.62 | 22,170 | 58 | 17,425 | 46 | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | 17,425 | 4 | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | - | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | - | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | - | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 20,970 | 15 | 17,425 | 12 | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | 800 | 1 | - | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | - | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | - | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | 400 | 10 | - | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | from shaft | CS | 0.52 | 22,170 | 12 | 17,425 | 9 | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | downgrade | MD | 1.96 | - | - | 17,425 | 34 | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | 22,170 | 93 | - | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | - | - | |
| 34 | GROUT WATER | - | | GW | 36.11 | - | - | - | - | |
| 35 | HIGH TEMPERATURE | 2 | | HT | 2.47 | 22,170 | 55 | 17,425 | 43 | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 243 | | 148 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 54.0 | 411 | 62.3 | 280 | |
| 39 | CONCRETE LINING, ft. | 1 | 2 | 134.4 | FPD | 22,170 | 165 | 17,425 | 130 | |
| 40 | STEEL LINING, ft. | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 165 | | 130 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 575 | | 409 | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | | | | | | |
| 45 | MOBILIZATION | 80 | | | | | | | | |
| 46 | SINK SHAFT | 758 | | | | | | | | |
| 47 | DEVELOP | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | 15 | | | | | | | | |
| 52 | TUN EX & LINING | 575 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | | | | | |
| 54 | TOTAL | 1,633 | 6.5 | | | | | | | |
| 55 | | | | | | | | | | |
| 56 | | | | | | | | | | |
| 57 | | | | | | | | | | |
| 58 | | | | | | | | | | |
| 59 | | | | | | | | | | |
| 60 | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 9 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.00 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| HIGH | MED | rate of inflow |
| 4,770 | 3,720 | $/WD |
| 1.1085 | 0.87125 | length factor |
| 5,288 | 3,241 | factored $/WD |
| FROM SHAFT | | |
| 17,100 | 8,620 | $/WD |
| | DAYS | 605 |

| M N O P | Q | R |
|---|---|---|
| COST ESTIMATE | UNIT COST | ITEM COST |
| DIRECT COSTS | --- | --- |
| PORTAL EXCAVATION, $/ea. | 500,000 | - |
| SHAFT | --- | --- |
| MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| CONSTRUCTION, $/ft. | 7,500 | 22,725,000 |
| TUNNEL EXCAVATION | --- | --- |
| STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| LABOR & JOB MATLS, $/WD | 41,308 | 28,508,336 |
| SHAFT OPERATION, $/WD | 2,900 | 1,987,910 |
| SPOT BOLT MATERIALS, $/ft. | 0.50 | 19,198 |
| PATTERN BOLT MATERIALS, $/ft. | 10 | 8,000 |
| STEEL SETS @ 4', $/ft. | 115 | - |
| HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | 140,000 |
| PUMP WATER FROM TUNNELS | | 4,369,342 |
| PUMP WATER FROM SHAFT, $/WD | 25,720 | 15,573,107 |
| PROBE WATER MATERIALS, $/ft. | 10 | - |
| GROUT WATER MATERIALS, $/ft. | 180 | - |
| REMOTE MUCK DISPOSAL, $/CY | 10 | 1,659,031 |
| TUNNEL LINING | --- | --- |
| PURCHASE & ERECT FORMS, LS/tun | 598,600 | 1,137,340 |
| PLACE CONCRETE LINING, $/ft. | 373 | 14,768,935 |
| REMOVE FORMS & TRAVELER, LS/tun | 2 | 50,400 |
| MOB FOR STEEL LINING, LS/tun | - | - |
| PLACE STEEL LINING, $/ft. | | - |
| LAKE TAP, LS $/ea subcontract | | |
| TOTAL DIRECT COSTS | | 104,926,598 |
| PLANT & EQUIPMENT | --- | --- |
| BUILDINGS & YARD, LS/tun | 618,000 | 710,700 |
| BASE UTILITIES, LS/tun | 285,000 | 430,350 |
| WATER WELL, ETC. | --- | 35,000 |
| POWER CO SETUP, LS/tun | - | - |
| AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 1,454,230 |
| DEWATER | | 3,870,000 |
| CRANES, LS/tun | 113,000 | 146,900 |
| HAUL, RUBBER, LS/tun | 21,000 | 23,100 |
| RAIL & SWITCHES, $/ft. | 21.25 | 841,394 |
| LOCOMOTIVES, $/ea. | 75,000 | 675,000 |
| CARS, LS/tun | 384,000 | 768,000 |
| SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 213,000 |
| DRILLS, LS/tunnel | 38,000 | 76,000 |
| TUNNEL MUCKERS, LS/tunnel | 42,000 | 84,000 |
| TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 8,736,000 |
| ADD TO WORK FROM SHAFT | 425,000 | 935,000 |
| ADD TO GROUT WATER | 160,000 | - |
| CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,935,000 |
| STEEL LINING, LS/tun | - | - |
| GENERAL, LS/tun | 300,000 | 405,000 |
| DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | - |
| TOTAL PLANT & EQUIPMENT | | 21,338,674 |
| INDIRECT COSTS | --- | --- |
| MOBILIZATION & DEMOB, LS | 262,300 | 340,990 |
| VARIABLE, $/WD and /tun | 11,114 | 17,037,609 |
| JOB SITE GENERATED POWER, $/KWH | 0.25 | 6,492,500 |
| TOTAL INDIRECT COSTS | --- | 23,871,099 |
| SUB TOTAL | --- | 150,136,371 |
| BOND | 0.49% | 736,000 |
| TOTAL ESTIMATED COST | --- | 150,872,371 |
| | $/FOOT | 3,810 |

IID TRANSFER STUDY

5A-DL

P. E. Sperry 8/27/96

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | DL | | |
| 2 | PORTALS, ea. | | | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | 2,730 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 17,425 | 132 | 15,975 | 121 | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | - | - | |
| 16 | | FROM DEEP SHAFT | | 1 heading | | H2 | 1.38 | - | - | - | - | |
| 17 | | | | 2 headings | | H3 | 2.62 | 17,425 | 46 | 15,975 | 42 | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | 15,975 | 3 | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | - | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | - | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | - | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 17,025 | 12 | 15,975 | 11 | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | - | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | - | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | - | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | 400 | 10 | - | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | | | from shaft | CS | 0.52 | 17,425 | 9 | 15,975 | 8 | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | 15,975 | 31 | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | 17,425 | 73 | - | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | - | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | - | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | 17,425 | 43 | 15,975 | 39 | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | - | - | - | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 192 | | 136 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 53.8 | 324 | 62.3 | 256 | |
| 39 | CONCRETE LINING, ft. | | | 1 | 2 | 134.4 | FPD | 17,425 | 130 | 15,975 | 119 | |
| 40 | STEEL LINING, ft. | | | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 130 | | 119 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 454 | | 375 | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 80 | | | | | | | | |
| 46 | SINK SHAFT | | | 683 | | | | | | | | |
| 47 | DEVELOP | | | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | 15 | | | | | | | | |
| 52 | TUN EX & LINING | | | 454 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 1,436 | 5.7 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| LOCOMOTIVES, ea. | | 8 | |
| REMOTE MUCK DISPOSAL | | 2 | |
| DRILL WELL | | 1 | |
| DEPRECIATION ADJUST. | | 0.97 | |
| PUMP WATER | | | |
| FROM TUNNELS | | | |
| Heading 1 | Heading 2 | | |
| UP | DOWN | | |
| MED | MED | rate of inflow | |
| 1,460 | 3,720 | $/WD | |
| 0.87125 | 0.79875 | length factor | |
| 1,272 | 2,971 | factored $/WD | |
| FROM SHAFT | | | |
| 8,620 | 8,620 | $/WD | |
| | DAYS | 484 | |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | — | — |
| | PORTAL EXCAVATION, $/ea. | | | 500,000 | - |
| | SHAFT | | | — | — |
| | | MOB, DEMOB & DEVELOP, LS/shaft | | — | 13,440,000 |
| | | CONSTRUCTION, $/ft. | | 7,500 | 20,475,000 |
| | TUNNEL EXCAVATION | | | — | — |
| | | STARTER TUNNEL, $/ea. | | 270,000 | 540,000 |
| | | LABOR & JOB MATLS, $/WD | | 41,308 | 23,975,353 |
| | | SHAFT OPERATION, $/WD | | 2,900 | 1,634,766 |
| | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 16,500 |
| | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | 140,000 |
| | | PUMP WATER FROM TUNNELS | | | 1,691,996 |
| | | PUMP WATER FROM SHAFT, $/WD | | 17,240 | 8,339,203 |
| | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | REMOTE MUCK DISPOSAL, $/CY | | 10 | - |
| | TUNNEL LINING | | | — | — |
| | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 1,137,340 |
| | | PLACE CONCRETE LINING, $/ft. | | 373 | 12,458,200 |
| | | REMOVE FORMS & TRAVELER, LS/tun | | 2 | 50,400 |
| | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | PLACE STEEL LINING, $/ft. | | | - |
| | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | 83,898,758 |
| PLANT & EQUIPMENT | | | | — | — |
| | BUILDINGS & YARD, LS/tun | | | 618,000 | 710,700 |
| | BASE UTILITIES, LS/tun | | | 285,000 | 430,350 |
| | WATER WELL, ETC. | | | — | 35,000 |
| | POWER CO SETUP, LS/tun | | | 318,000 | 445,200 |
| | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 1,189,600 |
| | DEWATER | | | | 940,000 |
| | CRANES, LS/tun | | | 113,000 | 146,900 |
| | HAUL, RUBBER, LS/tun | | | 21,000 | 23,100 |
| | RAIL & SWITCHES, $/ft. | | | 21.25 | 709,750 |
| | LOCOMOTIVES, $/ea. | | | 75,000 | 600,000 |
| | CARS, LS/tun | | | 384,000 | 768,000 |
| | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 213,000 |
| | DRILLS, LS/tunnel | | | 38,000 | 76,000 |
| | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 84,000 |
| | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 8,736,000 |
| | ADD TO WORK FROM SHAFT | | | 425,000 | 935,000 |
| | ADD TO GROUT WATER | | | 160,000 | - |
| | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,935,000 |
| | STEEL LINING, LS/tun | | | - | - |
| | GENERAL, LS/tun | | | 300,000 | 405,000 |
| | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | (551,478) |
| | | | TOTAL PLANT & EQUIPMENT | | 17,831,122 |
| INDIRECT COSTS | | | | — | — |
| | MOBILIZATION & DEMOB, LS | | | 262,300 | 340,990 |
| | VARIABLE, $/WD and /tun | | | 11,114 | 14,850,665 |
| | JOB SITE GENERATED POWER, $/KWH | | | - | - |
| | | | TOTAL INDIRECT COSTS | — | 15,191,655 |
| SUB TOTAL | | | | — | [illegible]1,535 |
| BOND | | | | 0.49% | [illegible],000 |
| TOTAL ESTIMATED COST | | | | — | [illegible]4,535 |
| | | | | $/COST | [illegible] |

| | A B C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | CORRIDOR | | 5A | | CONTRACT | | EL | | |
| 2 | PORTALS, ea. | | - | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | 1,750 | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | 1 HEADING | | 60 | WD | | | | | |
| 5 | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | 1 | | 2 | | |
| 12 | TUNNEL GRADE | | | | | UP | WD | DOWN | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | 15,975 | 121 | 15,050 | 114 | |
| 14 | DELAYS | | DELAY | CODE | WD/KFT | FT. | | FT. | | |
| 15 | FROM SHALLOW SHAFT | | | H1 | 0.69 | - | - | - | - | |
| 16 | FROM DEEP SHAFT | | 1 heading | H2 | 1.38 | 15,975 | 22 | 15,050 | 21 | |
| 17 | | | 2 headings | H3 | 2.62 | - | - | - | - | |
| 18 | DOWN MINOR GRADE | | | DM | 0.22 | - | - | - | - | |
| 19 | DOWN 3% GRADE | | | D3 | 0.50 | - | - | - | - | |
| 20 | UP 2 TO 3% GRADE | | | U3 | 0.12 | - | - | - | - | |
| 21 | UP 5% GRADE | | | U5 | 0.44 | - | - | - | - | |
| 22 | SPOT BOLTS | | | SB | 0.70 | 15,975 | 11 | 15,050 | 11 | |
| 23 | PATTERN BOLTS | | | PB | 1.72 | - | - | - | - | |
| 24 | SETS @ 4' OC | | | S1 | 6.25 | - | - | - | - | |
| 25 | HV SETS @ 4' OC | | | S2 | 12.32 | - | - | - | - | |
| 26 | HV SETS @ 2' OC | | | S3 | 24.49 | - | - | - | - | |
| 27 | CALIFORNIA SWITCH | | from portal | CP | 0.35 | - | - | - | - | |
| 28 | | | from shaft | CS | 0.52 | 15,975 | 8 | 15,050 | 8 | |
| 29 | MED WATER INFLOW | | upgrade | MU | 1.40 | - | - | - | - | |
| 30 | | | downgrade | MD | 1.96 | - | - | 15,050 | 29 | |
| 31 | HIGH WATER INFLOW | | upgrade | HU | 4.18 | 15,975 | 67 | - | - | |
| 32 | | | downgrade | HD | 7.64 | - | - | - | - | |
| 33 | PROBE WATER | | | PW | 3.33 | - | - | - | - | |
| 34 | GROUT WATER | | - | GW | 36.11 | - | - | - | - | |
| 35 | HIGH TEMPERATURE | | 1 | HT | 2.47 | 15,975 | 39 | 15,050 | 37 | |
| 36 | REMOTE POWER GENERATION | | | RP | 0.07 | 1 | 0 | 1 | 0 | |
| 37 | TOTAL WORKING DAYS OF DELAY | | | | | | 148 | | 106 | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | 59.5 | 268 | 68.6 | 219 | |
| 39 | CONCRETE LINING, ft. | 1 | 1 | 134.4 | FPD | 15,975 | 119 | 15,050 | 112 | |
| 40 | STEEL LINING, ft. | | - | 86 | FPD | - | - | - | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | 119 | | 112 | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | 387 | | 331 | |
| 43 | | | | | | | | | | |
| 44 | DURATION | WD | | | | | | | | |
| 45 | MOBILIZATION | 80 | | | | | | | | |
| 46 | SINK SHAFT | 438 | | | | | | | | |
| 47 | DEVELOP | 90 | | | | | | | | |
| 48 | ERECT TBM # 1 | 40 | | | | | | | | |
| 49 | ERECT TBM # 2 | 40 | | | | | | | | |
| 50 | REMOVE TBM # 1 | 15 | | | | | | | | |
| 51 | REMOVE TBM # 2 | 15 | | | | | | | | |
| 52 | TUN EX & LINING | 387 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | 20 | YEARS | | | | | | | |
| 54 | TOTAL | 1,125 | 4.5 | | | | | | | |
| 55 | | | | | | | | | | |
| 56 | | | | | | | | | | |
| 57 | | | | | | | | | | |
| 58 | | | | | | | | | | |
| 59 | | | | | | | | | | |
| 60 | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 8 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.02 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | DOWN | |
| MED | MED | rate of inflow |
| 1,460 | 3,720 | $/WD |
| 0.79875 | 0.7525 | length factor |
| 1,166 | 2,799 | factored $/WD |
| FROM SHAFT | | |
| 8,620 | 8,620 | $/WD |
| | DAYS | 417 |

| M N O P | Q | R |
|---|---|---|
| COST ESTIMATE | UNIT COST | ITEM COST |
| DIRECT COSTS | --- | --- |
| PORTAL EXCAVATION, $/ea. | 500,000 | - |
| SHAFT | --- | --- |
| MOB, DEMOB & DEVELOP, LS/shaft | --- | 13,440,000 |
| CONSTRUCTION, $/ft. | 7,500 | 13,125,000 |
| TUNNEL EXCAVATION | --- | --- |
| STARTER TUNNEL, $/ea. | 270,000 | 540,000 |
| LABOR & JOB MATLS, $/WD | 41,308 | 20,154,855 |
| SHAFT OPERATION, $/WD | 2,900 | 1,442,214 |
| SPOT BOLT MATERIALS, $/ft. | 0.50 | 15,513 |
| PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| STEEL SETS @ 4', $/ft. | 115 | - |
| HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| PUMP WATER FROM TUNNELS | | 1,379,483 |
| PUMP WATER FROM SHAFT, $/WD | 17,240 | 7,194,512 |
| PROBE WATER MATERIALS, $/ft. | 10 | - |
| GROUT WATER MATERIALS, $/ft. | 180 | - |
| REMOTE MUCK DISPOSAL, $/CY | 10 | 1,299,948 |
| TUNNEL LINING | --- | --- |
| PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| PLACE CONCRETE LINING, $/ft. | 373 | 11,572,325 |
| REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| MOB FOR STEEL LINING, LS/tun | - | - |
| PLACE STEEL LINING, $/ft. | | - |
| LAKE TAP, LS $/ea subcontract | | |
| TOTAL DIRECT COSTS | | 70,787,650 |
| PLANT & EQUIPMENT | --- | --- |
| BUILDINGS & YARD, LS/tun | 618,000 | 710,700 |
| BASE UTILITIES, LS/tun | 285,000 | 430,350 |
| WATER WELL, ETC. | --- | 35,000 |
| POWER CO SETUP, LS/tun | - | - |
| AIR, WATER & VENT, $/ft. + HI TEMP | 34 | 1,108,850 |
| DEWATER | | 850,000 |
| CRANES, LS/tun | 113,000 | 146,900 |
| HAUL, RUBBER, LS/tun | 21,000 | 23,100 |
| RAIL & SWITCHES, $/ft. | 21.25 | 659,281 |
| LOCOMOTIVES, $/ea. | 75,000 | 600,000 |
| CARS, LS/tun | 384,000 | 768,000 |
| SURFACE EXCAVATION EQUIP, LS/tun | 142,000 | 213,000 |
| DRILLS, LS/tunnel | 38,000 | 76,000 |
| TUNNEL MUCKERS, LS/tunnel | 42,000 | 84,000 |
| TUNNEL BORING MACHINE, LS/tunnel | 4,800,000 | 8,736,000 |
| ADD TO WORK FROM SHAFT | 425,000 | 935,000 |
| ADD TO GROUT WATER | 160,000 | - |
| CONCRETE LINING, LS/tun + SHOTCRETE | 1,100,000 | 1,209,000 |
| STEEL LINING, LS/tun | - | - |
| GENERAL, LS/tun | 300,000 | 405,000 |
| DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | 339,804 |
| TOTAL PLANT & EQUIPMENT | | 17,329,985 |
| INDIRECT COSTS | --- | --- |
| MOBILIZATION & DEMOB, LS | 262,300 | 340,990 |
| VARIABLE, $/WD and /tun | 11,114 | 11,389,795 |
| JOB SITE GENERATED POWER, $/KWH | 0.25 | 4,252,500 |
| TOTAL INDIRECT COSTS | --- | 15,983,285 |
| SUB TOTAL | --- | 104,100,920 |
| BOND | 0.49% | 510,000 |
| TOTAL ESTIMATED COST | --- | 104,610,920 |

IID TRANSFER STUDY

5A-FL

P. E. Sperry 8/27/96

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | FL | | |
| 2 | PORTALS, ea. | | | | 1 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 15,050 | 114 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 15,050 | 11 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 15,050 | 5 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 16 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 116.2 | 129 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 12,050 | 90 | | - | |
| 40 | STEEL LINING, ft. | | | | - | 110 | FPD | 3,000 | 27 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 117 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 246 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | | | | | |
| 45 | MOBILIZATION | | | 170 | | | | | | | | |
| 46 | SINK SHAFT | | | - | | | | | | | | |
| 47 | DEVELOP | | | 60 | | | | | | | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | | | | | | |
| 52 | TUN EX & LINING | | | 246 | | | | | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | | | | | |
| 54 | | | TOTAL | 521 | 2.1 | | | | | | | |
| 55 | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

| | | |
|---|---|---|
| LOCOMOTIVES, ea. | | 4 |
| REMOTE MUCK DISPOSAL | | 1 |
| DRILL WELL | | 1 |
| DEPRECIATION ADJUST. | | 1.12 |
| PUMP WATER | | |
| FROM TUNNELS | | |
| Heading 1 | Heading 2 | |
| UP | 0 | |
| LOW | | rate of inflow |
| 260 | | $/WD |
| 0.7525 | 0 | length factor |
| 196 | - | factored $/WD |
| FROM SHAFT | | |
| | | $/WD |
| | DAYS | 256 |

| M | N | O | P | Q | R |
|---|---|---|---|---|---|
| COST ESTIMATE | | | | UNIT COST | ITEM COST |
| DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | 500,000 | 500,000 |
| | | SHAFT | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | --- | - |
| | | | CONSTRUCTION, $/ft. | 7,500 | - |
| | | TUNNEL EXCAVATION | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | 270,000 | 270,000 |
| | | | LABOR & JOB MATLS, $/WD | 41,308 | 5,349,107 |
| | | | SHAFT OPERATION, $/WD | - | - |
| | | | SPOT BOLT MATERIALS, $/ft. | 0.50 | 7,525 |
| | | | PATTERN BOLT MATERIALS, $/ft. | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | 48,213 |
| | | | PUMP WATER FROM SHAFT, $/WD | - | - |
| | | | PROBE WATER MATERIALS, $/ft. | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | 10 | 630,595 |
| | | TUNNEL LINING | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | 598,600 | 598,600 |
| | | | PLACE CONCRETE LINING, $/ft. | 373 | 4,494,650 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | 1 | 25,200 |
| | | | MOB FOR STEEL LINING, LS/tun | - | - |
| | | | PLACE STEEL LINING, $/ft. | 1,084 | 3,252,000 |
| | | LAKE TAP, LS $/ea subcontract | | | |
| | | | TOTAL DIRECT COSTS | | 15,175,890 |
| PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | 618,000 | 618,000 |
| | | BASE UTILITIES, LS/tun | | 285,000 | 285,000 |
| | | WATER WELL, ETC. | | --- | 35,000 |
| | | POWER CO SETUP, LS/tun | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | 34 | 565,700 |
| | | DEWATER | | | 210,000 |
| | | CRANES, LS/tun | | 113,000 | 113,000 |
| | | HAUL, RUBBER, LS/tun | | 21,000 | 21,000 |
| | | RAIL & SWITCHES, $/ft. | | 21.25 | 319,813 |
| | | LOCOMOTIVES, $/ea. | | 75,000 | 300,000 |
| | | CARS, LS/tun | | 384,000 | 384,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | 142,000 | 142,000 |
| | | DRILLS, LS/tunnel | | 38,000 | 38,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | 42,000 | 42,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | 4,800,000 | 4,800,000 |
| | | ADD TO WORK FROM SHAFT | | - | - |
| | | ADD TO GROUT WATER | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | 1,100,000 | 1,209,000 |
| | | STEEL LINING, LS/tun | | - | - |
| | | GENERAL, LS/tun | | 300,000 | 300,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | 1,125,902 |
| | | | TOTAL PLANT & EQUIPMENT | | 10,508,414 |
| INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | 262,300 | 262,300 |
| | | VARIABLE, $/WD and /tun | | 11,114 | 3,683,443 |
| | | JOB SITE GENERATED POWER, $/KWH | | 0.25 | 1,159,983 |
| | | | TOTAL INDIRECT COSTS | --- | 5,105,726 |
| SUB TOTAL | | | | --- | 70,030 |
| BOND | | | | 0.49% | 51,000 |
| TOTAL ESTIMATED COST | | | | --- | 941,030 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | FL | | |
| 2 | PORTALS, ea. | | | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 18,200 | 138 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 18,200 | 13 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 18,200 | 6 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 19 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 116.2 | 157 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 12,200 | 91 | | - | |
| 40 | STEEL LINING, ft. | | | | - | 110 | FPD | 6,000 | 55 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 145 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 302 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | LOCOMOTIVES, ea. | | | 4 | | |
| 45 | MOBILIZATION | | | 170 | | | REMOTE MUCK DISPOSAL | | | 1 | | |
| 46 | SINK SHAFT | | | - | | | DRILL WELL | | | 2 | | |
| 47 | DEVELOP | | | 60 | | | DEPRECIATION ADJUST. | | | 1.12 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | PUMP WATER | | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | FROM TUNNELS | | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | Heading 1 | Heading 2 | | | | |
| 52 | TUN EX & LINING | | | 302 | | | UP | 0 | | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | LOW | | rate of inflow | | | |
| 54 | | | TOTAL | 577 | 2.3 | | - | | $/WD | | | |
| 55 | | | | | | | 0.91 | 0 | lenglh factor | | | |
| 56 | | | | | | | - | - | factored $/WD | | | |
| 57 | | | | | | | FROM SHAFT | | | | | |
| 58 | | | | | | | | | $/WD | | | |
| 59 | | | | | | | | DAYS | 312 | | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 1,000,000 |
| | | SHAFT | | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | | TUNNEL EXCAVATION | | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 6,468,687 |
| | | | SHAFT OPERATION, $/WD | | - | - |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 9,100 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | - |
| | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 762,580 |
| | | TUNNEL LINING | | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 598,600 |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | 4,550,600 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | 1 | 25,200 |
| | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | | PLACE STEEL LINING, $/ft. | | 1,084 | 6,504,000 |
| | | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | | 20,188,767 |
| | PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | | WATER WELL, ETC. | | | --- | - |
| | | POWER CO SETUP, LS/tun | | | | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 672,800 |
| | | DEWATER | | | | 210,000 |
| | | CRANES, LS/tun | | | 113,000 | 113,000 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 386,750 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 300,000 |
| | | CARS, LS/tun | | | 384,000 | 384,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | | ADD TO WORK FROM SHAFT | | | - | - |
| | | ADD TO GROUT WATER | | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,209,000 |
| | | STEEL LINING, LS/tun | | | - | - |
| | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 1,142,586 |
| | | | TOTAL PLANT & EQUIPMENT | | | 10,664,136 |
| | INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 4,300,181 |
| | | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 1,354,205 |
| | | | TOTAL INDIRECT COSTS | | --- | 5,916,686 |
| | SUB TOTAL | | | | --- | 36,769,589 |
| | BOND | | | | 0.49% | 180,000 |
| | TOTAL ESTIMATED COST | | | | --- | 36,949,589 |
| | | | | | $/FOOT | 2,030 |

IID TRANSFER STUDY

5A-HL

P. E. Sperry 8/27/96

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | INPUT | | | CORRIDOR | | 5A | | CONTRACT | | FL. | | |
| 2 | PORTALS, ea. | | | | 2 | PRODUCTION | | | | | | |
| 3 | SHAFT DEPTH, ft. | | | | - | 4 | FPD | | | | | |
| 4 | MOB & DEVELOPE | | | 1 HEADING | | 60 | WD | | | | | |
| 5 | | | | 2 HEADINGS | | 90 | WD | | | | | |
| 6 | ERECT TBM AT PORTAL | | | | | 15 | WD | | | | | |
| 7 | ERECT TBM AT BOTTOM OF SHAFT | | | | | 40 | WD | | | | | |
| 8 | REMOVE TBM VIA PORTAL | | | | | 10 | WD | | | | | |
| 9 | REMOVE TBM VIA SHAFT | | | | | 15 | WD | | | | | |
| 10 | TUNNEL PRODUCTION W/O DELAYS | | | | | 132.3 | FPD | | | | | |
| 11 | TUNNEL HEADING # | | | | | | | 1 | | | | |
| 12 | TUNNEL GRADE | | | | | | | UP | WD | | WD | |
| 13 | TUNNEL LENGTH, ft. | | | | | | | 18,700 | 141 | | - | |
| 14 | DELAYS | | | | DELAY CODE | | WD/KFT | FT. | | FT. | | |
| 15 | | FROM SHALLOW SHAFT | | | | H1 | 0.69 | - | - | | - | |
| 16 | | FROM DEEP SHAFT | | | 1 heading | H2 | 1.38 | - | - | | - | |
| 17 | | | | | 2 headings | H3 | 2.62 | - | - | | - | |
| 18 | | DOWN MINOR GRADE | | | | DM | 0.22 | - | - | | - | |
| 19 | | DOWN 3% GRADE | | | | D3 | 0.50 | - | - | | - | |
| 20 | | UP 2 TO 3% GRADE | | | | U3 | 0.12 | - | - | | - | |
| 21 | | UP 5% GRADE | | | | U5 | 0.44 | - | - | | - | |
| 22 | | SPOT BOLTS | | | | SB | 0.70 | 18,700 | 13 | | - | |
| 23 | | PATTERN BOLTS | | | | PB | 1.72 | - | - | | - | |
| 24 | | SETS @ 4' OC | | | | S1 | 6.25 | - | - | | - | |
| 25 | | HV SETS @ 4' OC | | | | S2 | 12.32 | - | - | | - | |
| 26 | | HV SETS @ 2' OC | | | | S3 | 24.49 | - | - | | - | |
| 27 | | CALIFORNIA SWITCH | | | from portal | CP | 0.35 | 18,700 | 6 | | - | |
| 28 | | | | | from shaft | CS | 0.52 | - | - | | - | |
| 29 | | MED WATER INFLOW | | | upgrade | MU | 1.40 | - | - | | - | |
| 30 | | | | | downgrade | MD | 1.96 | - | - | | - | |
| 31 | | HIGH WATER INFLOW | | | upgrade | HU | 4.18 | - | - | | - | |
| 32 | | | | | downgrade | HD | 7.64 | - | - | | - | |
| 33 | | PROBE WATER | | | | PW | 3.33 | - | - | | - | |
| 34 | | GROUT WATER | | | - | GW | 36.11 | - | - | | - | |
| 35 | | HIGH TEMPERATURE | | | 1 | HT | 2.47 | - | - | | - | |
| 36 | | REMOTE POWER GENERATION | | | | RP | 0.07 | 1 | 0 | | - | |
| 37 | | | TOTAL WORKING DAYS OF DELAY | | | | | | 20 | | - | |
| 38 | EXCAVATION, OVERALL FPD / TOTAL WORKING DAYS | | | | | | | 116.2 | 161 | | - | |
| 39 | CONCRETE LINING, ft. | | | 1 | 1 | 134.4 | FPD | 12,700 | 94 | | - | |
| 40 | STEEL LINING, ft. | | | | - | 110 | FPD | 6,000 | 55 | | - | |
| 41 | LINING, TOTAL WORKING DAYS | | | | | | | | 149 | | - | |
| 42 | TOTAL TUNNEL EXCAVATION AND LINING, WORKING DAYS | | | | | | | | 310 | | - | |
| 43 | | | | | | | | | | | | |
| 44 | DURATION | | | WD | | | | LOCOMOTIVES, ea. | | 7 | | |
| 45 | MOBILIZATION | | | 170 | | | | REMOTE MUCK DISPOSAL | | 1 | | |
| 46 | SINK SHAFT | | | - | | | | DRILL WELL | | 2 | | |
| 47 | DEVELOP | | | 60 | | | | DEPRECIATION ADJUST. | | 1.12 | | |
| 48 | ERECT TBM # 1 | | | 15 | | | | | | | | |
| 49 | ERECT TBM # 2 | | | - | | | | PUMP WATER | | | | |
| 50 | REMOVE TBM # 1 | | | 10 | | | | FROM TUNNELS | | | | |
| 51 | REMOVE TBM # 2 | | | - | | | | Heading 1 | Heading 2 | | | |
| 52 | TUN EX & LINING | | | 310 | | | | UP | 0 | | | |
| 53 | CLEANUP & MOVEOUT | | | 20 | YEARS | | | LOW | | rate of inflow | | |
| 54 | | | TOTAL | 585 | 2.3 | | | 260 | | $/WD | | |
| 55 | | | | | | | | 0.935 | 0 | length factor | | |
| 56 | | | | | | | | 243 | - | factored $/WD | | |
| 57 | | | | | | | | FROM SHAFT | | | | |
| 58 | | | | | | | | | | $/WD | | |
| 59 | | | | | | | | | DAYS | 320 | | |
| 60 | | | | | | | | | | | | |

| | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|
| | COST ESTIMATE | | | | UNIT COST | ITEM COST |
| | DIRECT COSTS | | | | --- | --- |
| | | PORTAL EXCAVATION, $/ea. | | | 500,000 | 1,000,000 |
| | | SHAFT | | | --- | --- |
| | | | MOB, DEMOB & DEVELOP, LS/shaft | | --- | - |
| | | | CONSTRUCTION, $/ft. | | 7,500 | - |
| | | TUNNEL EXCAVATION | | | --- | --- |
| | | | STARTER TUNNEL, $/ea. | | 270,000 | 270,000 |
| | | | LABOR & JOB MATLS, $/WD | | 41,308 | 6,646,398 |
| | | | SHAFT OPERATION, $/WD | | - | - |
| | | | SPOT BOLT MATERIALS, $/ft. | | 0.50 | 9,350 |
| | | | PATTERN BOLT MATERIALS, $/ft. | | 10 | - |
| | | | STEEL SETS @ 4', $/ft. | | 115 | - |
| | | | HEAVY STEEL SETS @ 4' OC, $/ft. | | 175 | - |
| | | | HEAVY STEEL SETS @ 2' OC, $/ft. | | 350 | - |
| | | | PUMP WATER FROM TUNNELS | | | 75,346 |
| | | | PUMP WATER FROM SHAFT, $/WD | | - | - |
| | | | PROBE WATER MATERIALS, $/ft. | | 10 | - |
| | | | GROUT WATER MATERIALS, $/ft. | | 180 | - |
| | | | REMOTE MUCK DISPOSAL, $/CY | | 10 | 783,530 |
| | | TUNNEL LINING | | | --- | --- |
| | | | PURCHASE & ERECT FORMS, LS/tun | | 598,600 | 598,600 |
| | | | PLACE CONCRETE LINING, $/ft. | | 373 | 4,737,100 |
| | | | REMOVE FORMS & TRAVELER, LS/tun | | 1 | 25,200 |
| | | | MOB FOR STEEL LINING, LS/tun | | - | - |
| | | | PLACE STEEL LINING, $/ft. | | 1,084 | 6,504,000 |
| | | LAKE TAP, LS $/ea subcontract | | | | |
| | | | TOTAL DIRECT COSTS | | | 20,649,524 |
| | PLANT & EQUIPMENT | | | | --- | --- |
| | | BUILDINGS & YARD, LS/tun | | | 618,000 | 618,000 |
| | | BASE UTILITIES, LS/tun | | | 285,000 | 285,000 |
| | | WATER WELL, ETC. | | | --- | - |
| | | POWER CO SETUP, LS/tun | | | - | - |
| | | AIR, WATER & VENT, $/ft. + HI TEMP | | | 34 | 689,800 |
| | | DEWATER | | | | 210,000 |
| | | CRANES, LS/tun | | | 113,000 | 113,000 |
| | | HAUL, RUBBER, LS/tun | | | 21,000 | 21,000 |
| | | RAIL & SWITCHES, $/ft. | | | 21.25 | 397,375 |
| | | LOCOMOTIVES, $/ea. | | | 75,000 | 525,000 |
| | | CARS, LS/tun | | | 384,000 | 384,000 |
| | | SURFACE EXCAVATION EQUIP, LS/tun | | | 142,000 | 142,000 |
| | | DRILLS, LS/tunnel | | | 38,000 | 38,000 |
| | | TUNNEL MUCKERS, LS/tunnel | | | 42,000 | 42,000 |
| | | TUNNEL BORING MACHINE, LS/tunnel | | | 4,800,000 | 4,800,000 |
| | | ADD TO WORK FROM SHAFT | | | - | - |
| | | ADD TO GROUT WATER | | | 160,000 | - |
| | | CONCRETE LINING, LS/tun + SHOTCRETE | | | 1,100,000 | 1,209,000 |
| | | STEEL LINING, LS/tun | | | - | - |
| | | GENERAL, LS/tun | | | 300,000 | 300,000 |
| | | DEPRECIATION ADJUSTMENT FOR TUNNEL LENGTH | | | | 1,172,901 |
| | | | TOTAL PLANT & EQUIPMENT | | | 10,947,076 |
| | INDIRECT COSTS | | | | --- | --- |
| | | MOBILIZATION & DEMOB, LS | | | 262,300 | 262,300 |
| | | VARIABLE, $/WD and /tun | | | 11,114 | 4,389,342 |
| | | JOB SITE GENERATED POWER, $/KWH | | | 0.25 | 1,382,283 |
| | | | TOTAL INDIRECT COSTS | | --- | 6,033,925 |
| | SUB TOTAL | | | | --- | [illegible] |
| | BOND | | | | 0.49% | [illegible] |
| | TOTAL ESTIMATED COST | | | | --- | 4,525 |
| | | | | | $/FOOT | [illegible] |