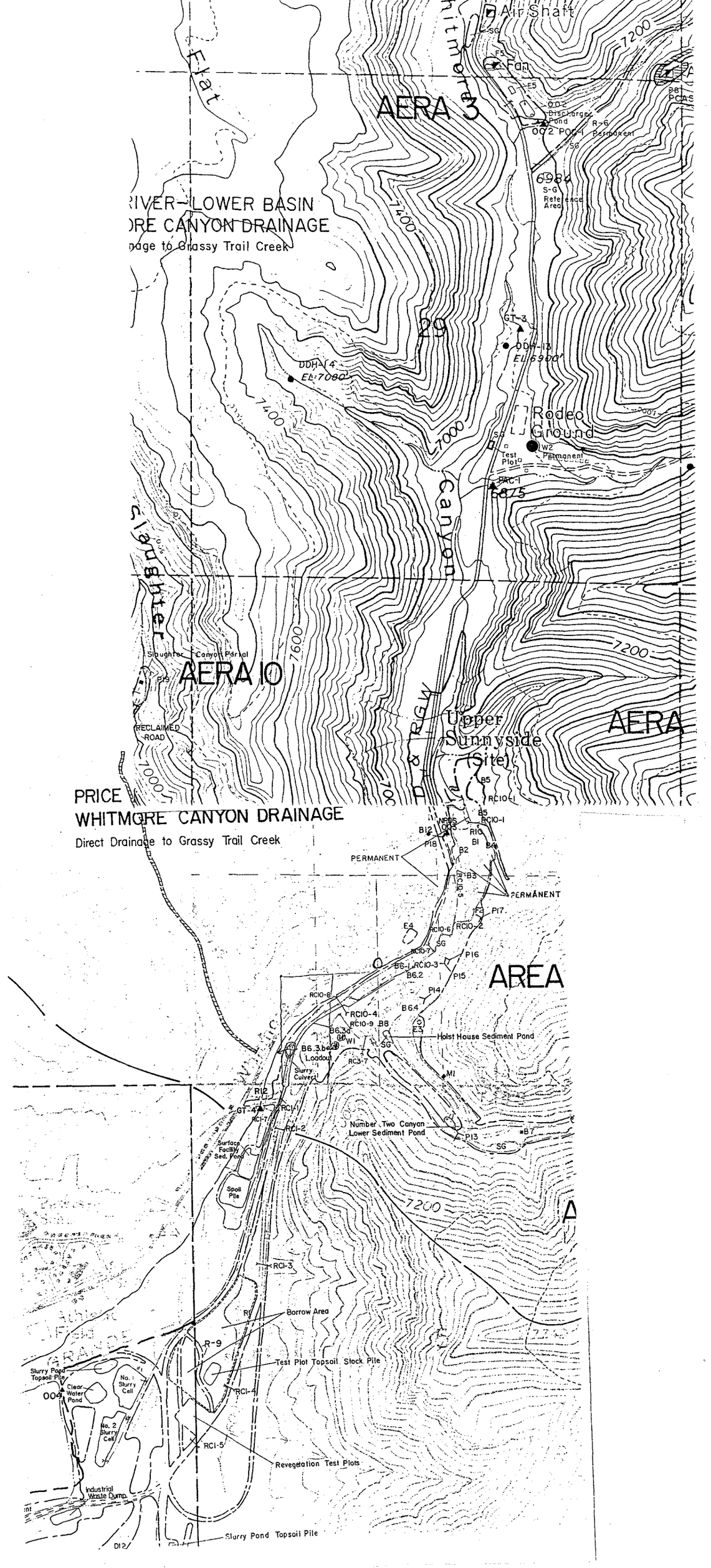
New file

Back-up
Calculation

Summyside


Air Shaft
Fan
AERA 3
Flat
Whitmore
7200
7400
7600
7000
002 Discharge Pond
002 PCC-1
R-6 Permanent
6980
S-G Reference Area
RIVER-LOWER BASIN
ORE CANYON DRAINAGE
nage to Grassy Trail Creek
29
GT-3
DDH-12
EL 6900'
DDH-14
EL 7080'
Rodeo Ground
W2 Permanent
Test Plot
RAC-1
6875
Canyon
Slaughter
Slaughter Canyon Portal
AERA 10
RECLAIMED ROAD
Upper Sunnyside (Site)
AERA
PRICE
WHITMORE CANYON DRAINAGE
Direct Drainage to Grassy Trail Creek
PERMANENT
PERMANENT
AREA
Hoist House Sediment Pond
B6.3b
Loadout
Slurry Culvert
Number Two Canyon Lower Sediment Pond
Surface Facility Sed. Pond
Spoil Pile
Borrow Area
Test Plot Topsoil Stock Pile
Slurry Pond Topsoil Pile
Clear Water Pond
No. 1 Slurry Cell
No. 2 Slurry Cell
Revegetation Test Plots
Industrial Waste Dump
Slurry Pond Topsoil Pile

Railcut Pond

(PAP) 10_y-24h = 71.69 cfs 25_y-24h Q = 90.09 cfs

Evaluate upsized spillway to accomodate a pre-determined event based on geometry of spillway.

Trap Q
crest

SS = 3:1
BW = 4.0
n = .04
S_o = .005
Q = 71.69
* D = 2.18
V = 3.12

18
1.12
2.16

Face

SS = 3:1
BW = 1.5
n = .04
S_o = .5
Q = 71.69
* D = .94
V = 17.6

18
.49
12.27

- Crest of embankment must be 1.0 feet above water in pond with emergency spillway flowing at design depth. Crest of emergency spillway must be 1.0 feet above crest of principle spillway.

- Evaluate drop inlet spillway for maximum Q. Using stage discharge, drop inlet will pass 108 cfs when water elevation reaches crest of emergency spillway. Open channel spillway will pass 18 cfs (Chow, 4:1 SS, 5' BW, 1.0' Head). Combined flow is 126 cfs, 25_y-24h event is 90 cfs.

- If you had to add fill on the dam to meet freeboard requirements, the dam has 2:1 slopes, H = 11.0', TW = 20' then add 1.0' on embankment crest, H = 12.0', TW = 16' $\frac{H+35}{5} = \frac{12+35}{5}$ then, regulatory dam width would be 9.4', actual width 16'

Railcut Pond

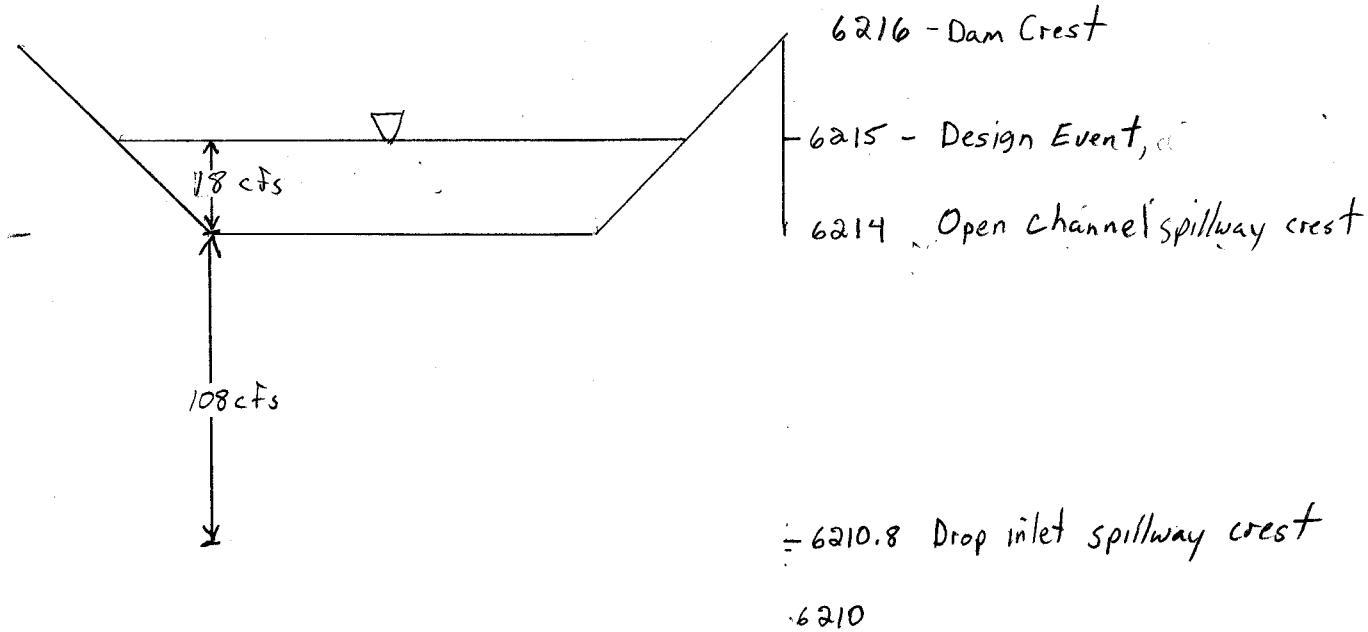
Stage Discharge

Riser Ht. = 5.8'
Barrel Length = 74.8 - Pg 170+17 (MRP)
10y/24h Q = 71.69 cfs
10y/24h V_w = 132,000 ft^3
5yr Sediment V_s = 43,301 ft^3
Barrel Dia = 4'
Total Ht = 5.8'
Ke = 1.0
Kb = .5
Kc = .0182

Orifice Coeff C' = .6

Head	Weir	Orifice	Pipe
.5	35.14	42.78	99.99
1.0	70.25	60.51	106.21
1.405		71.72	
1.4		71.59	
1.5	111.20	74.11	112.08
2.0	157.46	85.57	
2.5		95.67	
3.0		104.8	
3.2		108.24	130.08

NATIONAL 42-381 50 SHEETS 5 SQUARE 42-382 100 SHEETS 5 SQUARE 42-389 200 SHEETS 5 SQUARE Made in U.S.A.



NATIONAL Made in U.S.A.
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE

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1                                     HEC-1 INPUT                                          PAGE  1

      LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        1         ID        SUNNYSIDE MINES, 2ND WHITMORE MINE WATER POND
        2         ID        RUNOFF FROM SURROUNDING AREA COMPUATION
        3         ID        100 YEAR 24 HOUR STORM EVENT
        4         ID        DARIN WORDEN,  DOGM
                  *DIAGRAM
        5         IO        1       2
        6         IT      30 29JUL89    1200     100

        7         KK   TSOIL
        8         KM        SCS RUNOFF COMPUTATION
        9         KM        TYPE II DISTRIBUTION
       10         BA    .003
       11         PB     2.8
       12         PI   .0148   .0302   .0459   .0624   .0795   .0972   .1159   .1352   .1554   .1770
       13         PI   .1994   .2232   .2484   .2755   .3049   .3368   .3718   .4108   .4550   .5062
       14         PI   .5718   .6583   .7932   1.857   2.058   2.163   2.237   2.295   2.346   2.391
       15         PI   2.429   2.464   2.496   2.525   2.552   2.578   2.601   2.624   2.645   2.665
       16         PI   2.685   2.703   2.721   2.738   2.754   2.770   2.785   2.800
       17         LS       0      99     .32
       18         UD   .0140
       19         ZZ
1
           SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    7      TSOIL

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1                                            ****
                      FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
         U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                             ****



                      SUNNYSIDE MINES, 2ND WHITMORE MINE WATER POND
                      RUNOFF FROM SURROUNDING AREA COMPUATION
                      100 YEAR 24 HOUR STORM EVENT
                      DARIN WORDEN,  DOGM

   5 IO        OUTPUT CONTROL VARIABLES
                    IPRNT          1  PRINT CONTROL
                    IPLOT          2  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT        HYDROGRAPH TIME DATA
                     NMIN         30  MINUTES IN COMPUTATION INTERVAL
                    IDATE    29JUL89  STARTING DATE
                    ITIME       1200  STARTING TIME
                       NQ        100  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE    31JUL89  ENDING DATE
                   NDTIME       1330  ENDING TIME

                 COMPUTATION INTERVAL     .50 HOURS
                      TOTAL TIME BASE   49.50 HOURS

        ENGLISH UNITS


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
   7 KK   *    TSOIL   *
          *            *
          **************
                        SCS RUNOFF COMPUTATION
                        TYPE II DISTRIBUTION

             SUBBASIN RUNOFF DATA

   10 BA        SUBBASIN CHARACTERISTICS
                     TAREA        .00  SUBBASIN AREA

                PRECIPITATION DATA

   11 PB             STORM       2.80  BASIN TOTAL PRECIPITATION

   12 PI          INCREMENTAL PRECIPITATION PATTERN
                     .01      .03      .05      .06      .08      .10      .12      .14      .16      .18
                     .20      .22      .25      .28      .30      .34      .37      .41      .45      .51
                     .57      .66      .79     1.86     2.06     2.16     2.24     2.30     2.35     2.39
                    2.43     2.46     2.50     2.52     2.55     2.58     2.60     2.62     2.65     2.67
                    2.69     2.70     2.72     2.74     2.75     2.77     2.78     2.80

   17 LS        SCS LOSS RATE
                    STRTL        .02  INITIAL ABSTRACTION
                   CRVNBR      99.00  CURVE NUMBER
                    RTIMP        .32  PERCENT IMPERVIOUS AREA

   18 UD        SCS DIMENSIONLESS UNITGRAPH
                     TLAG        .01  LAG

                                              ***

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

                                          UNIT HYDROGRAPH
                                      5 END-OF-PERIOD ORDINATES
             3.        1.        0.        0.        0.

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                                     HYDROGRAPH AT STATION    TSOIL

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DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
29 JUL 1200	1	.00	.00	.00	0.	*	30 JUL 1300	51	.00	.00	.00	0.
29 JUL 1230	2	.00	.00	.00	0.	*	30 JUL 1330	52	.00	.00	.00	0.
29 JUL 1300	3	.00	.00	.00	0.	*	30 JUL 1400	53	.00	.00	.00	0.
29 JUL 1330	4	.00	.00	.00	0.	*	30 JUL 1430	54	.00	.00	.00	0.
29 JUL 1400	5	.00	.00	.00	0.	*	30 JUL 1500	55	.00	.00	.00	0.
29 JUL 1430	6	.00	.00	.00	0.	*	30 JUL 1530	56	.00	.00	.00	0.
29 JUL 1500	7	.00	.00	.00	0.	*	30 JUL 1600	57	.00	.00	.00	0.
29 JUL 1530	8	.00	.00	.00	0.	*	30 JUL 1630	58	.00	.00	.00	0.
29 JUL 1600	9	.01	.01	.00	0.	*	30 JUL 1700	59	.00	.00	.00	0.
29 JUL 1630	10	.01	.01	.00	0.	*	30 JUL 1730	60	.00	.00	.00	0.
29 JUL 1700	11	.01	.01	.00	0.	*	30 JUL 1800	61	.00	.00	.00	0.
29 JUL 1730	12	.01	.01	.00	0.	*	30 JUL 1830	62	.00	.00	.00	0.
29 JUL 1800	13	.01	.01	.00	0.	*	30 JUL 1900	63	.00	.00	.00	0.
29 JUL 1830	14	.01	.01	.00	0.	*	30 JUL 1930	64	.00	.00	.00	0.
29 JUL 1900	15	.01	.01	.01	0.	*	30 JUL 2000	65	.00	.00	.00	0.
29 JUL 1930	16	.01	.00	.01	0.	*	30 JUL 2030	66	.00	.00	.00	0.
29 JUL 2000	17	.01	.00	.01	0.	*	30 JUL 2100	67	.00	.00	.00	0.
29 JUL 2030	18	.02	.00	.01	0.	*	30 JUL 2130	68	.00	.00	.00	0.
29 JUL 2100	19	.02	.00	.01	0.	*	30 JUL 2200	69	.00	.00	.00	0.
29 JUL 2130	20	.02	.00	.01	0.	*	30 JUL 2230	70	.00	.00	.00	0.
29 JUL 2200	21	.02	.00	.02	0.	*	30 JUL 2300	71	.00	.00	.00	0.
29 JUL 2230	22	.02	.00	.02	0.	*	30 JUL 2330	72	.00	.00	.00	0.
29 JUL 2300	23	.03	.00	.02	0.	*	31 JUL 0000	73	.00	.00	.00	0.
29 JUL 2330	24	.03	.00	.03	0.	*	31 JUL 0030	74	.00	.00	.00	0.
30 JUL 0000	25	.08	.01	.07	0.	*	31 JUL 0100	75	.00	.00	.00	0.
30 JUL 0030	26	.08	.00	.08	0.	*	31 JUL 0130	76	.00	.00	.00	0.
30 JUL 0100	27	.09	.00	.08	0.	*	31 JUL 0200	77	.00	.00	.00	0.
30 JUL 0130	28	.09	.00	.09	0.	*	31 JUL 0230	78	.00	.00	.00	0.
30 JUL 0200	29	.09	.00	.09	0.	*	31 JUL 0300	79	.00	.00	.00	0.
30 JUL 0230	30	.09	.00	.09	0.	*	31 JUL 0330	80	.00	.00	.00	0.
30 JUL 0300	31	.10	.00	.10	0.	*	31 JUL 0400	81	.00	.00	.00	0.
30 JUL 0330	32	.10	.00	.10	0.	*	31 JUL 0430	82	.00	.00	.00	0.
30 JUL 0400	33	.10	.00	.10	0.	*	31 JUL 0500	83	.00	.00	.00	0.
30 JUL 0430	34	.10	.00	.10	0.	*	31 JUL 0530	84	.00	.00	.00	0.
30 JUL 0500	35	.10	.00	.10	0.	*	31 JUL 0600	85	.00	.00	.00	0.
30 JUL 0530	36	.10	.00	.10	0.	*	31 JUL 0630	86	.00	.00	.00	0.
30 JUL 0600	37	.10	.00	.10	0.	*	31 JUL 0700	87	.00	.00	.00	0.
30 JUL 0630	38	.11	.00	.10	0.	*	31 JUL 0730	88	.00	.00	.00	0.
30 JUL 0700	39	.11	.00	.11	0.	*	31 JUL 0800	89	.00	.00	.00	0.
30 JUL 0730	40	.11	.00	.11	0.	*	31 JUL 0830	90	.00	.00	.00	0.
30 JUL 0800	41	.11	.00	.11	0.	*	31 JUL 0900	91	.00	.00	.00	0.
30 JUL 0830	42	.11	.00	.11	0.	*	31 JUL 0930	92	.00	.00	.00	0.
30 JUL 0900	43	.11	.00	.11	0.	*	31 JUL 1000	93	.00	.00	.00	0.
30 JUL 0930	44	.11	.00	.11	0.	*	31 JUL 1030	94	.00	.00	.00	0.
30 JUL 1000	45	.11	.00	.11	0.	*	31 JUL 1100	95	.00	.00	.00	0.
30 JUL 1030	46	.11	.00	.11	0.	*	31 JUL 1130	96	.00	.00	.00	0.
30 JUL 1100	47	.11	.00	.11	0.	*	31 JUL 1200	97	.00	.00	.00	0.
30 JUL 1130	48	.11	.00	.11	0.	*	31 JUL 1230	98	.00	.00	.00	0.
30 JUL 1200	49	.11	.00	.11	0.	*	31 JUL 1300	99	.00	.00	.00	0.
30 JUL 1230	50	.00	.00	.00	0.	*	31 JUL 1330	100	.00	.00	.00	0.

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*****************************************************************************************************************

    TOTAL RAINFALL =    2.80, TOTAL LOSS =     .12, TOTAL EXCESS =    2.68

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR     49.50-HR
 +  (CFS)       (HR)
                           (CFS)
 +       0.    24.00                 0.          0.          0.          0.
                        (INCHES)  1.305       2.683       2.683       2.683
                         (AC-FT)     0.          0.          0.          0.

                    CUMULATIVE AREA =      .00 SQ MI

1                                             STATION    TSOIL

                    (O) OUTFLOW
        .00       .05       .10       .15       .20       .25       .30       .35       .40       .45       .00       .00       .00
                                                                                                  (L) PRECIP,   (X) EXCESS
        .00       .00       .00       .00       .00       .00       .00       .00       .00       .12       .08       .04       .00
DAHRMN PER
291200  10---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
291230  20         .         .         .         .         .         .         .         .         .         .         .         .
291300  30         .         .         .         .         .         .         .         .         .         .         .         .
291330  40         .         .         .         .         .         .         .         .         .         .         .         .
291400  50         .         .         .         .         .         .         .         .         .         .         .        L.
291430  60         .         .         .         .         .         .         .         .         .         .         .        L.
291500  70         .         .         .         .         .         .         .         .         .         .         .        L.
291530  80         .         .         .         .         .         .         .         .         .         .         .        L.
291600  90         .         .         .         .         .         .         .         .         .         .         .        L.
291630 100         .         .         .         .         .         .         .         .         .         .         .       LL.
291700 11.0. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . LL.
291730 12. 0       .         .         .         .         .         .         .         .         .         .         .       LX.
291800 13.  0      .         .         .         .         .         .         .         .         .         .         .       LX.
291830 14.  0      .         .         .         .         .         .         .         .         .         .         .      LLX.
291900 15.   0     .         .         .         .         .         .         .         .         .         .         .      LXX.
291930 16.     0   .         .         .         .         .         .         .         .         .         .         .      LXX.
292000 17.      0  .         .         .         .         .         .         .         .         .         .         .      LXX.
292030 18.       0 .         .         .         .         .         .         .         .         .         .         .     LXXX.
292100 19.        0.         .         .         .         .         .         .         .         .         .         .     LXXX.
292130 20.         .0        .         .         .         .         .         .         .         .         .         .    LXXXX.
292200 21. . . . . . .0. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .LXXXX.
292230 22.         .   0     .         .         .         .         .         .         .         .         .         .   LXXXXX.
292300 23.         .     0   .         .         .         .         .         .         .         .         .         .  LXXXXXX.
292330 24.         .         .0        .         .         .         .         .         .         .         .         . LXXXXXXX.
300000 25.         .         .         .         .         .    0    .         .         .         .        .LLXXXXXXXXXXXXXXXXX.
300030 26.         .         .         .         .         .         .   0 .   .         .         .       LXXXXXXXXXXXXXXXXXXXX.
300100 27.         .         .         .         .         .         .       . 0       .         .      LXXXXXXXXXXXXXXXXXXXXX.
300130 28.         .         .         .         .         .         .       .    0    .         .     LXXXXXXXXXXXXXXXXXXXXXX.
300200 29.         .         .         .         .         .         .       .       0 .         .     XXXXXXXXXXXXXXXXXXXXXXX.
300230 30.         .         .         .         .         .         .       . 0       .         .    LXXXXXXXXXXXXXXXXXXXXXXXX.
300300 31. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 0 . . . . . . . . . XXXXXXXXXXXXXXXXXXXXXXXX.
300330 32.         .         .         .         .         .         .         .  0      .         .   LXXXXXXXXXXXXXXXXXXXXXXXXX.
300400 33.         .         .         .         .         .         .         .   0     .         .   XXXXXXXXXXXXXXXXXXXXXXXXX.
300430 34.         .         .         .         .         .         .         .    0    .         .   XXXXXXXXXXXXXXXXXXXXXXXXX.
300500 35.         .         .         .         .         .         .         .     0   .         .  LXXXXXXXXXXXXXXXXXXXXXXXXXX.
300530 36.         .         .         .         .         .         .         .        0.         .  XXXXXXXXXXXXXXXXXXXXXXXXXX.
300600 37.         .         .         .         .         .         .         .         0         .  XXXXXXXXXXXXXXXXXXXXXXXXXX.
300630 38.         .         .         .         .         .         .         .         .0        .  XXXXXXXXXXXXXXXXXXXXXXXXXX.
300700 39.         .         .         .         .         .         .         .         . 0       . LXXXXXXXXXXXXXXXXXXXXXXXXXXX.
300730 40.         .         .         .         .         .         .         .         . 0       . XXXXXXXXXXXXXXXXXXXXXXXXXXX.
300800 41. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .0. . . .XXXXXXXXXXXXXXXXXXXXXXXXXXXX.
300830 42.         .         .         .         .         .         .         .         .   0     . XXXXXXXXXXXXXXXXXXXXXXXXXXXX.
300900 43.         .         .         .         .         .         .         .         .   0     . XXXXXXXXXXXXXXXXXXXXXXXXXXXX.
300930 44.         .         .         .         .         .         .         .         .    0    .LXXXXXXXXXXXXXXXXXXXXXXXXXXXX.
301000 45.         .         .         .         .         .         .         .         .     0   .XXXXXXXXXXXXXXXXXXXXXXXXXXXXX.
301030 46.         .         .         .         .         .         .         .         .     0   .XXXXXXXXXXXXXXXXXXXXXXXXXXXXX.
301100 47.         .         .         .         .         .         .         .         .      0  .XXXXXXXXXXXXXXXXXXXXXXXXXXXXX.
301130 48.         .         .         .         .         .         .         .         .      0  .XXXXXXXXXXXXXXXXXXXXXXXXXXXXX.
301200 49.         .         .         .         .         .         .         .         .       0 .XXXXXXXXXXXXXXXXXXXXXXXXXXXXX.
301230 50.         .         .    0    .         .         .         .         .         .         .         .         .
301300 51. . 0 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
301330 52.0        .         .         .         .         .         .         .         .         .         .         .
301400 530         .         .         .         .         .         .         .         .         .         .         .
301430 540         .         .         .         .         .         .         .         .         .         .         .
301500 550         .         .         .         .         .         .         .         .         .         .         .
301530 560         .         .         .         .         .         .         .         .         .         .         .
301600 570         .         .         .         .         .         .         .         .         .         .         .
301630 580         .         .         .         .         .         .         .         .         .         .         .
301700 590         .         .         .         .         .         .         .         .         .         .         .
301730 600         .         .         .         .         .         .         .         .         .         .         .
301800 610 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
301830 620         .         .         .         .         .         .         .         .         .         .         .
301900 630         .         .         .         .         .         .         .         .         .         .         .
301930 640         .         .         .         .         .         .         .         .         .         .         .
302000 650         .         .         .         .         .         .         .         .         .         .         .
302030 660         .         .         .         .         .         .         .         .         .         .         .
302100 670         .         .         .         .         .         .         .         .         .         .         .
302130 680         .         .         .         .         .         .         .         .         .         .         .
302200 690         .         .         .         .         .         .         .         .         .         .         .
302230 700         .         .         .         .         .         .         .         .         .         .         .
302300 710 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
302330 720         .         .         .         .         .         .         .         .         .         .         .
310000 730         .         .         .         .         .         .         .         .         .         .         .
310030 740         .         .         .         .         .         .         .         .         .         .         .
310100 750         .         .         .         .         .         .         .         .         .         .         .
310130 760         .         .         .         .         .         .         .         .         .         .         .
310200 770         .         .         .         .         .         .         .         .         .         .         .
310230 780         .         .         .         .         .         .         .         .         .         .         .
310300 790         .         .         .         .         .         .         .         .         .         .         .
310330 800         .         .         .         .         .         .         .         .         .         .         .
310400 810 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
310430 820         .         .         .         .         .         .         .         .         .         .         .
310500 830         .         .         .         .         .         .         .         .         .         .         .
310530 840         .         .         .         .         .         .         .         .         .         .         .
310600 850         .         .         .         .         .         .         .         .         .         .         .
310630 860         .         .         .         .         .         .         .         .         .         .         .
310700 870         .         .         .         .         .         .         .         .         .         .         .
310730 880         .         .         .         .         .         .         .         .         .         .         .
310800 890         .         .         .         .         .         .         .         .         .         .         .
310830 900         .         .         .         .         .         .         .         .         .         .         .
310900 910 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
310930 920         .         .         .         .         .         .         .         .         .         .         .
311000 930         .         .         .         .         .         .         .         .         .         .         .
311030 940         .         .         .         .         .         .         .         .         .         .         .
311100 950         .         .         .         .         .         .         .         .         .         .         .
311130 960         .         .         .         .         .         .         .         .         .         .         .
311200 970         .         .         .         .         .         .         .         .         .         .         .
311230 980         .         .         .         .         .         .         .         .         .         .         .
311300 990         .         .         .         .         .         .         .         .         .         .         .
311330 1000--------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
1
1
                                          RUNOFF SUMMARY
                                    FLOW IN CUBIC FEET PER SECOND
                                  TIME IN HOURS,  AREA IN SQUARE MILES

                                     PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM    TIME OF
         OPERATION        STATION    FLOW    PEAK                                            AREA      STAGE    MAX STAGE
 +                                                      6-HOUR      24-HOUR      72-HOUR

         HYDROGRAPH AT
 +                         TSOIL       0.   24.00          0.          0.          0.          .00
1                                                    HEC-1 INPUT                                          PAGE  1

          LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             1
             2
  *** WARNING *** ZZ-CARD MISSING
             3
             4           ZZ
1                                                  ****
                          FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
              U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                                   ****



  ERROR 1      CARD NO.    1

      IT         HYDROGRAPH TIME DATA
                       NMIN         30  MINUTES IN COMPUTATION INTERVAL
                      IDATE    29JUL89  STARTING DATE
                      ITIME       1200  STARTING TIME
                         NQ        100  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE    31JUL89  ENDING DATE
                     NDTIME       1330  ENDING TIME

                   COMPUTATION INTERVAL     .50 HOURS
                        TOTAL TIME BASE   49.50 HOURS

          ENGLISH UNITS

  ERROR 1      CARD NO.    2

  ERROR 1      CARD NO.    3

               SUBBASIN RUNOFF DATA

    0 BA         SUBBASIN CHARACTERISTICS
                      TAREA        .00  SUBBASIN AREA

                 PRECIPITATION DATA

    0 PB              STORM        .00  BASIN TOTAL PRECIPITATION

    0 PI           INCREMENTAL PRECIPITATION PATTERN


    0 UD         SCS DIMENSIONLESS UNITGRAPH
                      TLAG        .01  LAG

                                                 ***

  WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG
```

Contributing area for surface AD to Pond

Planimeter program Date: 07-28-1989 Time: 07:34:58

Planimeter program Date: 07-28-1989 Time: 07:36:24

Region 1 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER
ACRES:	1.820	1.820		
SQ. MILES:	0.003	0.003	MILES:	0.233
SQ. YARDS:	8,807.964	8,807.964	YARDS:	409.735
SQ. FEET:	79,271.672	79,271.672	FEET:	1,229.204
SQ. METERS:	7,364.580	7,364.580	METERS:	374.643
SQ.IN(map):	31.709	24.584	INCH (map):	24.584

```
C:
CD \STORM
STORM
CD\
CLS
```

Contours of Pond starting in bottom

Planimeter program Date: 07-27-1989 Time: 07:05:17

Region 1 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER
ACRES:	0.098	0.098		
SQ. MILES:	0.000	0.000	MILES:	0.062
SQ. YARDS:	474.222	474.222	YARDS:	109.291
SQ. FEET:	4,267.998	4,267.998	FEET:	327.874
SQ. METERS:	396.510	396.510	METERS:	99.931
SQ.IN(map):	1.707	6.557	INCH (map):	6.557

Region 2 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER
ACRES:	0.190	0.288		
SQ. MILES:	0.000	0.000	MILES:	0.078
SQ. YARDS:	920.378	1,394.600	YARDS:	136.944
SQ. FEET:	8,283.400	12,551.398	FEET:	410.833
SQ. METERS:	769.553	1,166.063	METERS:	125.216
SQ.IN(map):	3.313	14.774	INCH (map):	8.217

Region 3 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER
ACRES:	0.302	0.590		
SQ. MILES:	0.000	0.001	MILES:	0.092
SQ. YARDS:	1,461.180	2,855.780	YARDS:	162.618
SQ. FEET:	13,150.620	25,702.020	FEET:	487.853
SQ. METERS:	1,221.733	2,387.796	METERS:	148.690
SQ.IN(map):	5.260	24.531	INCH (map):	9.757

Region 4 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER
ACRES:	0.426	1.016		
SQ. MILES:	0.001	0.002	MILES:	0.109
SQ. YARDS:	2,061.899	4,917.679	YARDS:	192.103
SQ. FEET:	18,557.088	44,259.109	FEET:	576.308
SQ. METERS:	1,724.010	4,111.806	METERS:	175.650
SQ.IN(map):	7.423	36.057	INCH (map):	11.526

Region 5 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER
ACRES:	0.575	1.591		
SQ. MILES:	0.001	0.002	MILES:	0.123
SQ. YARDS:	2,784.892	7,702.570	YARDS:	217.054
SQ. FEET:	25,064.023	69,323.133	FEET:	651.161
SQ. METERS:	2,328.524	6,440.330	METERS:	198.464
SQ.IN(map):	10.026	49.081	INCH (map):	13.023

OUTPUT SUMMARY

```
---------------------------------------------------------------
        RUNOFF DEPTH =  2.6692 IN
        INITIAL ABSTRACTION =  0.0202 IN
           PEAK FLOW =      3.90 CFS      ( 2.1259 IPH)
              AT T =  12.50 HRS
---------------------------------------------------------------
```

INPUT SUMMARY
FOR W.S.: whitmore pond

STORM: WATERSHED:

DISTRIBUTION =SCS TYPE 2

CURVE NUMBER = 99.00

PRECIP.DEPTH = 2.80 IN

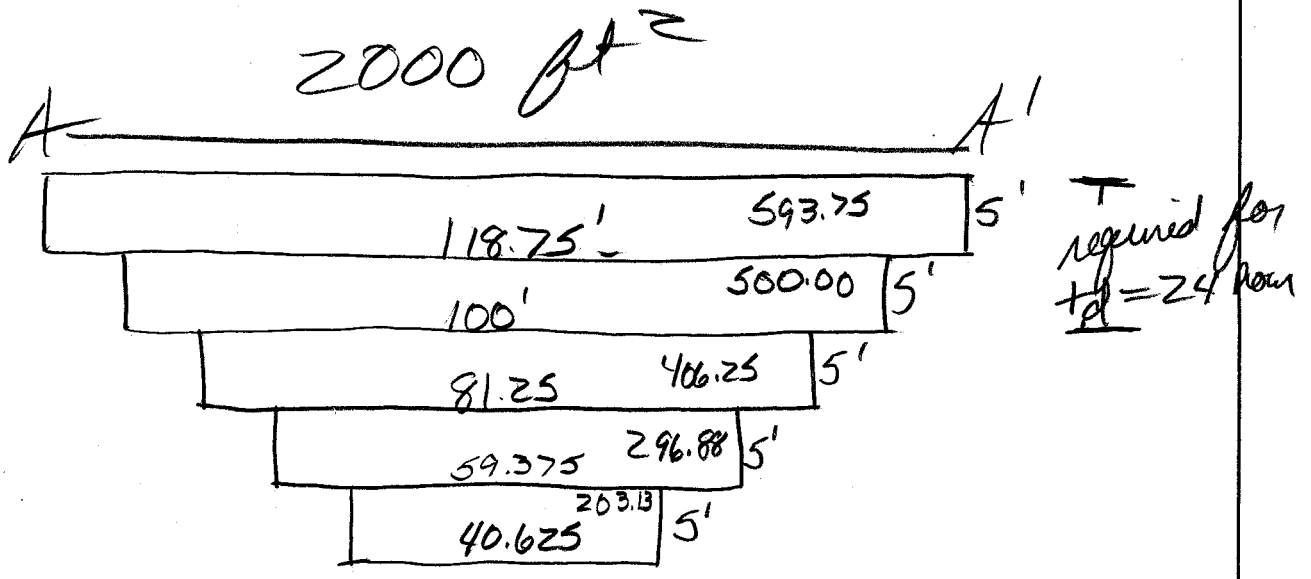
TIME OF CONC. = 0.0140 HR

DURATION = 24.00 HR

AREA = 1.82 AC

NUMBER OF LINES = 12873

D = 0.0019 HR


2000 ft²
A
A'
118.75'
593.75
5'
100'
500.00
5'
81.25
406.25
5'
59.375
296.88
5'
40.625
203.13
5'
required for
td = 24 hour

Decant must pass 6 cfs

Page 581 BW H Fig 7A.2B'

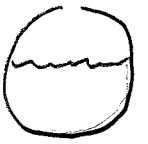
Headwater depth must be 3 feet minimum

Calculated Index is in control regime ⇒ indicates outlet control

If use 24" ⇒ 1.3' headwater is needed.

$\boxed{\text{Use 24" Decant}}$

Outlet Velocity.

6 cfs  $n = 0.024$

assumed 1/2 full

$$V = \frac{1.49}{n} R^{2/3} S^{1/2} \qquad R = \frac{2(12)}{3} = 8$$

$$= \frac{1.49}{0.024}(8)^{2/3}(0.006)^{1/2}$$

$$(62.08)(4.03)(0.08) = 20 \text{ ft/sec}$$

$$V = \sqrt{\frac{2500 \times H \times D}{L \times 13.9}} = \sqrt{\frac{2500 \times 1.3 \times 2}{200 \times 13.9}}$$

$$= 1.53 \text{ ft/sec}$$ assume exit velocity

10year 24hour Type III distribution

2.8" precip - NOAA Atlas 2

Time	Precip
0	0
.5	0.0148
1	0.0302
1.5	0.0459
2	0.0624
2.5	0.0795
3	0.0972
3.5	0.1159
4	0.1352
4.5	0.1554
5	0.1770
5.5	0.1994
6	0.2232
6.5	0.2484
7	0.2755
7.5	0.3049
8	0.3368
8.5	0.3718
9	0.4108
9.5	0.4550
10	0.5062
10.5	0.5718
11	0.6583
11.5	0.7932
12	1.858
12.5	2.058
13	2.163
13.5	2.237
14	2.295
14.5	2.346
15	2.391
15.5	2.429
16	2.464
16.5	2.496
17	2.525
17.5	2.552
18	2.578
18.5	2.601
19	2.624
19.5	2.645
20	2.665
20.5	2.685
21	2.703
21.5	2.721
22	2.738
22.5	2.754
23	2.770
23.5	2.785
24	2.800

SCS lag time

$$t_c = \frac{L^{0.8}(S+1)^{0.7}}{1900\,Y^{0.5}}$$

$L = 325$ ft

$Y = 14\%$

$$S = \frac{1000}{CN} - 10 = 0.00001$$

$$t_c = \frac{(325)^{0.8}(0.00001+1)^{0.7}}{1900\,(14)^{0.5}}$$

$= 0.014$ hours

Peak Program Peak

3.9 cfs

Hec 1 peak - 0.50 cfs

18" decant needs to pass 6 cfs

No cleanout - they will clean when prove can't meet effluent limitations

Will take all cleanout material to the Industrial Waste site for disposal?

Retention time - minimum 24 hours UMC 817.46C

Cross sectional area (A-A') 15 ≥ 9.5 ft²
Flow length - inlet to outlet 190 ft
Design flow 2 cfs
* Retention time seconds = (area)(flow length/design flow)
= 40.36 hours

Use header on inflow to spread flow out

$\frac{ft}{ft^3/ac} \cdot \frac{ac}{ft^3}$ $\frac{ac}{ft^2}$

1 year sediment = 126,207 lbs

= 63.10 tons

$$\frac{(63.10\ tons)(2000\ lbs/ton)}{(43560\ ft^2/acre)(63.2\ lbs/ft^3)}$$

= 0.0458 acre-ft sediment in 1 year = 1996.95 ft^3

4268 ft^2 in bottom of pond

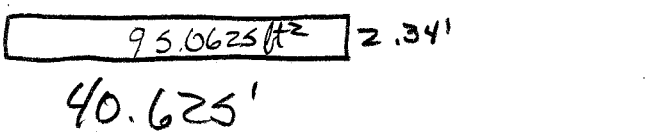
$$\frac{1996.95\ ft^3}{4268\ ft^2} = 0.468\ feet$$

2 year sediment = $\frac{3993.90\ ft^3}{4268\ ft^2}$ = 0.94 feet

5 year sediment = $\frac{9984.75\ ft^3}{4268\ ft^2}$ = 2.34 feet

after pond has filled with this amount of sediment, the X-sectional area at A—A' is

Area = 1529-5-95 = 1434 ft^2



Detention time = (1434)(190'/2cfs) = 37.8 hours

10 year sediment = $\frac{19969.5\ ft^3}{4268}$ = 4.7 feet

X-sectional area used up = 200 ft^2

1529.5 - 200 = 1329.5

Detention time = (1329.5)(190'/2cfs) = 35 hours

X-sectional area where Detention time will be 24 hours or less

$$(X)\frac{(190')}{2cfs} = 86{,}400$$

$$X = 909\ ft^2$$

60% cleanout is at 9' accumulation.

Sediment marker at 9'
Must clean at this point or when can no longer meet effluent limitations.

Assumed particles are always submerged

All TSS incoming is silt particles size
All Oil and grease is silt particles size

100% silt

$W = (1.00)(70) = 70.0$ lbs/ft^3 sediment

1 year sediment from addition of TSS and O+G
1 year Flow from 2cfs average

$$2 \frac{ft^3}{sec} \cdot \frac{60 sec}{min} \cdot \frac{60 min}{hour} \cdot \frac{24 hour}{day} \cdot \frac{365 day}{year}$$

$$= 63{,}072{,}000 \frac{ft^3}{year}$$

change liters to ft^3

1 ft^3 = 28.317 liters

$$27.4 \frac{mg}{l} TSS \cdot 28.317 \frac{liter}{ft^3} = 775.89 \frac{mg}{ft^3} TSS$$

$$4.26 \frac{mg}{l} O+G \cdot 28.317 \frac{l}{ft^3} = 120.63 \frac{mg}{ft^3} O+G$$

$$484 \frac{g}{lbs} \cdot 1000 \frac{mg}{g} = 448{,}000 \frac{mg}{lbs}$$

$$120.63 \frac{mg}{ft^3} \cdot \frac{1}{448{,}000 \frac{mg}{lbs}} = 0.000269 \frac{lbs}{ft^3} O+G$$

$$775.89 \frac{mg}{ft^3} \cdot \frac{1}{448{,}000 \frac{mg}{lbs}} = 0.001732 \frac{lbs}{ft^3} TSS$$

$$0.000269 + 0.001732 = 0.002001 \frac{lbs}{ft^3} \text{ Sediment}$$

1 year sediment $= (63{,}072{,}000)(0.002001) = 126207$ lbs sediment

Contributing sediment - fines from mine - silt
Topsoil pile -
Floccalated Oil

1. Fines from mine taken as Worste case in line Total suspended plus total settable solids from 002 inline samples.
No settleable solid data available - all is TSS

9 + 卌 卌 卌 卌 卌 卌 卌 卌 卌 卌 |||

62 ⟌ 1648 = **27.4 mg/l TSS**
Average inline Value

2. Oil and grease accumulation - assume 100% is floccalated out - Taken as average inflow value again - same as above. Total accumulation settles out

10 + 卌 卌 卌 卌 卌 ||

37 ⟌ 157.8 = 4.26 mg/l Oil and grease

3. Sediment From ~~Top soil pile and pond sides~~ only surface sediment will be from berm around sides of pond itself - not substantial - No worry

Inflow = 2 cfs = 900 gpm

Total Pond Volume = ~~21340~~ + 41417 + 65753 + 92785 + 125320 = 325,275 ft³

Calculate Detention time

1. Empty
2. 1/4 full sediment
3. 1/2 full sediment

Alternative Treatment – not serious

Dugout pond with excavated material used as berm

Will scarify before placing embankment material in compacted 6 inch horizontal lifts using rubber tired loader

Embankment crest width is 15 feet
H+3 515 – H = embankment ht from upstream toe – 5 ft
UMC 817.46 (I))

Interior pond slopes are 2:1 > UMC 817.46 (M)
Downstream slopes are 3:1

5% excess ht to allow for settling UMC 817.46 (K)

Excess excavated material will be stored south of pond embankment. Side slopes 3:1

12 inches topsoil will be removed from all areas (affected) prior to construction. All stored in topsoil pile above the pond. Topsoil pile will have berm around it and sideslopes not exceeding 3:1
Both topsoil and waste material will be mulched, fertilized and seeded during the first normal seeding period

Sediment control from area (affected) will be by 2' high berm around everything

Contributing runoff will be from topsoil pile and pond.
Area = 1.52 acres
Type II, 100-year 24-hour, CN = 100, Amount = 2.66"
look at UMC 817.46 i
Total Volume = 14,677 ft³
Increase ht from mine water design = 0.7'
Pond still has 1 ft required freeboard 817.46 j

Designed to operate with 3' freeboard at Q of 2 cfs (900 gpm)
No emergency spillway
Principle = 18" at 0.6% slope, n = 0.024
Velocity during 100 year event = 2.8 ft/sec (this is + mine H₂O)
Outfall will be rip rap + wet grute – No #'s

Acid Base Potential

262-7299
Rex Henderson

% Sulfur x 31.24

1 gram

tons / tons soil

tons / 1000 tons soil

7/21/88 Sunnyside

Borrow Area Pond

- NPDES permit
- add .1 foot to elevation diff between primary & emergency spillways.

do = riprap size, n?

Shed II - CN = 80 Roughness Coeff. .3

S_o = 10, Hyd Len 1982 Area = 16.6ac

Tc Kents .28, Kirpich .186, USBR, .185, Hathaway .37

used average of 4 = .25

~~Shed II~~ Tc .52 .199 .28 .52

Shed I Σ contours 334-15.3, Area - 70.4 ac

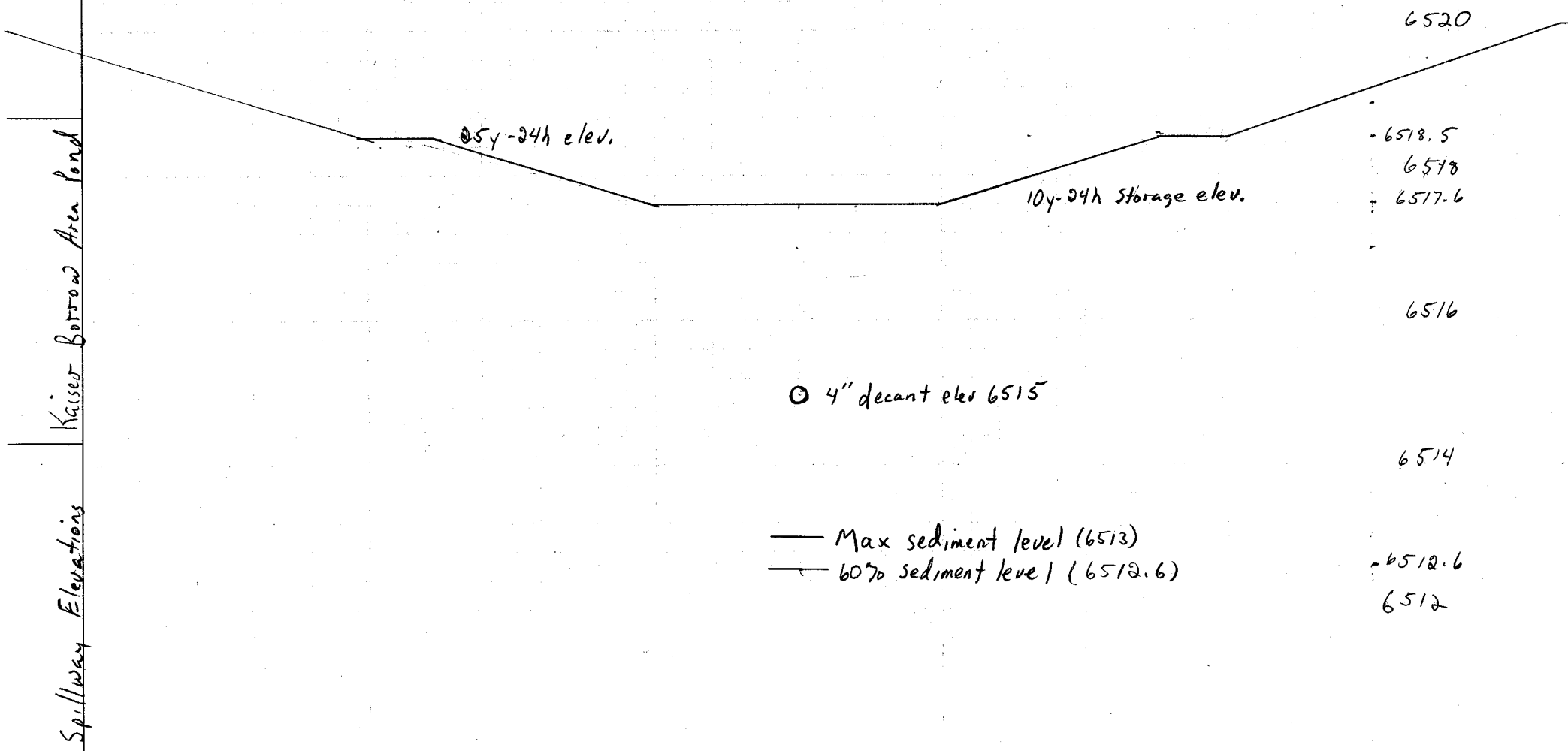
Hyd. Len 2800.0 ft.

Tc Kts .31, Kirp .099, Hath .399, USBR .14 → ave = .24

65 75
200
1275

Spillway Elevations | Kaiser Borrow Area Pond

7/22/88



NATIONAL 42-381 50 SHEETS 5 SQUARE 42-382 100 SHEETS 5 SQUARE 42-389 200 SHEETS 5 SQUARE Made in U.S.A.

Contour Elevation	Interval	Area f^2	Ave Area	Vol.
6512		38,500		
	3		43,153	129,459
6515		47,806		
	2		50,990	101,980
6517		54,174		

Σ 231,439 A. Pond Vol to spillway crest

10y-24h Vol from Area I is $.1832 \text{ in} \times \frac{1 f}{12 \text{ in}} \times 70.4 ac \times \frac{43,560 f^2}{ac}$

$= 46,817 f^3$

Area II $= 28,177$

$74,994 f^3$

Sediment Vol $84,594$

$\Sigma = 159,588$ B. Design Storm Volume + Sediment

A > B, therefore pond will contain design event.

Sediment Volume

$Sv = \frac{A \times Area \times 2000}{80 \text{ lbs/cu} f}$

Area I $A = 31.8 \times DR = 31.8 \times (.45) = 14.3$

II $A = 13.2 \times .55 = 7.3$

Sv Area I $= 25,185$

Area II $= 3013$

$28,198 \times 3 \text{ years} = 84,594 f^3$

Two stage open channel spillway

Assumptions: Evaluate each stage as a separate spillway

10 yr - 24 h stage p 275 Barf.

BW = 4.0

Total energy head at control section

$y_c = (q^2/g)^{1/3}$

$q = C_d h^{1.5}$ Chow (7-46

$= 3$ $C_d = 3$

$h = 1.0'$ - elev diff between two stages see pg 1 of review

$y_c = (\frac{q}{32.2})^{.33}$

$= .66$

$H_{ec,z} = \frac{(3b + 5z\,y_c)\,y_c}{2b + 4z\,y_c} = \frac{[3(4) + 5(3).66].66}{2(4) + 4(3).66} = \frac{14.45}{15.92} = .91$

$Q' = .544\, g^{1/2} (H_{ec,r})^{1.5}\, b$ (Barf p 275) (Flow thru rectangular spillway)

$Q' = 10.72$ cfs

$Q_z = Q'\left[\frac{1.5b + z\,H_{ec,z}}{6}\right] = 10.72\left[\frac{1.5(4) + 3(.91)}{6}\right] = 15.59$ cfs

<u>25 y - 24 h stage</u>

BW = 9.2'

$q = C_d h^{1.5}$ $C_d = 3$, $h = .5$

$= 1.06$

$y_c = .33$

$H_{ec,z} = \frac{[3(9.2) + 5(3)(.33)].33}{2(9.2) + 4(3).33} = \frac{10.74}{22.36} = .48$

$Q' = 9.4$ $Q_z = 9.4\left[\frac{1.5(9.2) + 3(.48)}{13.8}\right] = 10.38$ + Lower Stage Capacity

$= 10.38 + 15.59 = 25.98$ cfs

Planimeter program Date: 07-27-1988 Time: 15:03:38

Kaiser Borrow Pond - Area

Region 1 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.884	0.884			
SQ. MILES:	0.001	0.001	MILES:	0.177	0.177
SQ. YARDS:	4,277.799	4,277.799	YARDS:	311.260	311.260
SQ. FEET:	38,500.191	38,500.191	FEET:	933.779	933.779
SQ. METERS:	3,576.785	3,576.785	METERS:	284.602	284.602
SQ.IN(map):	15.400	18.676	INCH (map):	18.676	18.676

Region 2 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	1.097	1.981			
SQ. MILES:	0.002	0.003	MILES:	0.192	0.369
SQ. YARDS:	5,311.845	9,589.645	YARDS:	337.870	649.130
SQ. FEET:	47,806.605	86,306.797	FEET:	1,013.610	1,947.389
SQ. METERS:	4,441.379	8,018.164	METERS:	308.933	593.535
SQ.IN(map):	19.123	38.948	INCH (map):	20.272	38.948

Region 3 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	1.405	3.387			
SQ. MILES:	0.002	0.005	MILES:	0.215	0.584
SQ. YARDS:	6,801.695	16,391.340	YARDS:	379.130	1,028.259
SQ. FEET:	61,215.258	147,522.063	FEET:	1,137.390	3,084.778
SQ. METERS:	5,687.083	13,705.248	METERS:	346.659	940.195
SQ.IN(map):	24.486	61.696	INCH (map):	22.748	61.696

INPUT SUMMARY
FOR W.S.: KAISER BORROW AREA II POND

STORM: 10y-24h	WATERSHED:		
DISTRIBUTION = SCS TYPE 2	LAND SLOPE =	0.0000	%
	CURVE NUMBER =	80.00	
RAINFALL DEPTH = 1.84 IN	CHANNEL LENGTH =	0.00	FT
	TIME OF CONC. =	.2500	HR
STORM DURATION = 24.00 HR	WATERSHED AREA =	16.60	AC
NUMBER OF LINES = 736	TIME INCREMENT =	.0333	HR

OUTPUT SUMMARY

RUNOFF DEPTH =	.4676	IN	
INITIAL ABSTRACTION =	.5000	IN	
PEAK FLOW =	5.91	CFS	(.4130 IPH)
AT TIME =	12.59	HRS	

INPUT SUMMARY
FOR W.S.: KAISER 25Y-24. AREA II

STORM:	WATERSHED:		
DISTRIBUTION = SCS TYPE 2	LAND SLOPE =	0.0000	%
	CURVE NUMBER =	80.00	
RAINFALL DEPTH = 2.20 IN	CHANNEL LENGTH =	0.00	FT
	TIME OF CONC. =	.2500	HR
STORM DURATION = 24.00 HR	WATERSHED AREA =	16.60	AC
NUMBER OF LINES = 736	TIME INCREMENT =	.0333	HR

OUTPUT SUMMARY

RUNOFF DEPTH =	.6880	IN	
INITIAL ABSTRACTION =	.5000	IN	
PEAK FLOW =	10.48	CFS	(.6262 IPH)
AT TIME =	12.56	HRS	

INPUT SUMMARY
FOR W.S.: KAISER 10Y-24H AREA I

STORM:	WATERSHED:		
DISTRIBUTION = SCS TYPE 2	LAND SLOPE =	0.0000	%
	CURVE NUMBER =	70.00	
RAINFALL DEPTH = 1.84 IN	CHANNEL LENGTH =	0.00	FT
	TIME OF CONC. =	.2400	HR
STORM DURATION = 24.00 HR	WATERSHED AREA =	70.40	AC
NUMBER OF LINES = 765	TIME INCREMENT =	.0320	HR

OUTPUT SUMMARY

RUNOFF DEPTH =	.1832	IN	
INITIAL ABSTRACTION =	.8571	IN	
PEAK FLOW =	7.80	CFS	(.1099 IPH)
AT TIME =	12.63	HRS	

INPUT SUMMARY
FOR W.S.: KAISER ~~10~~ 25Y-24H AREA I

STORM:	WATERSHED:		
DISTRIBUTION = SCS TYPE 2	LAND SLOPE =	0.0000	%
	CURVE NUMBER =	70.00	
RAINFALL DEPTH = 2.20 IN	CHANNEL LENGTH =	0.00	FT
	TIME OF CONC. =	.2400	HR
STORM DURATION = 24.00 HR	WATERSHED AREA =	70.40	AC
NUMBER OF LINES = 765	TIME INCREMENT =	.0320	HR

OUTPUT SUMMARY

RUNOFF DEPTH =	.3201	IN	
INITIAL ABSTRACTION =	.8571	IN	
PEAK FLOW =	17.33	CFS	(.2442 IPH)
AT TIME =	12.60	HRS	

Total 10y-24h event = 14.7

Total 25y-24h event = 27.8 Inflow Peak

.87 - 2hrs.

Kaiser Icelander Wash - After Storm of 8/7/87

8/14/87

Determine discharge of storm event.

1. Cement culvert diameter = 7.5'
2. Depth of flow in culvert = 5.0'
3. Slope of culvert = .01 From submittal of Icelander Reclamation

Assume Inlet Control

Assume HW was 6.0' $\frac{HW}{D} = \frac{6}{7.5} = .80$

Assume culvert groove end w. headwall

p 520 Bart. Index $= \frac{L}{100 S_o} = \frac{121.4}{100(.01)} = 121.4$ = Inlet Control

p 5-22 from Hydraulic Charts for Highway Culverts

$\frac{HW}{D} = .80$ Using Entrance type 2 (groove end w headwall) = 240 cfs

$\frac{HW}{D} = .67$ " " " = 160 cfs

from submittal 100y - 24h event is 107 cfs

SSSF -

Barry Depth of flow - 90,326 ft³ - 71.9ac $\times \frac{43,560 ft^2}{ac}$

.028 in.

1.8 in.

CRT -

20,249 - 7.93 ac

.06 in

Ra

From Richardson, E.A. Estimated Return Periods for Short Duration Precipitation In Utah (USU) Soil Science and Biometerology

Using Price as the nearest station Elev. 5680'
10yr / 2h event P = .81 in.
Using Hiawatha as the approx Elev. 7230'
10y / 2h event P = .75 in
Sunnyside Elev = 6800' P from Storm on 8/7/87 = .87 in/2h

Excess Rainfall – Bauf p 81

$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$ $S = \frac{1000}{CN} - 10 = 1.63$ CN=86 CRT plan

$Q = \frac{.296}{2.17} = .136$ in/2h P = .87

.136 in .068 in rainfall excess / hr.

4 or 5 questions on design event

SSSF As-built review

- ✓ Topsoil not salvaged? should have statement in the MRP stating why

✓ - Submit text for as-built configuration, modify pertinent portions of Oct. 30, 1986 + Oct. 16, 1986 submittals to reflect as-built config of drainage, culverts & ponds. Format to insert into MRP.

- ~~Map D4-0159 must show entire SSSF drainage area, please see D4-0143 (initial submittal) for portion of DA not utilized on D4-0159.~~

✓ - Final Reclamation + Temp veg plan for SSSF pond. - compaction, soil amend, veg

✓ - A typo in the Oct 16, 1986 submittal for sediment load should be corrected Vol of sediment for 3 years is 22,512 $ft^3/yr \times 3yr = 67,536\ ft^3$

- ~~Insert decant + sediment level marker Emergency spillway elevations on Sect A-A' drawing.~~

- Install + depict berm along side of emergency spillway

Pond Vol.

1. Area $= Ah^2 + Bh + C$

X-sectional area as a func. of ht.

6580 = 13,935 ft^2

6585 = 25,912 ft^2

6590 = 34,493 ft^2

2. $0 \quad C = 13{,}935$

3. $5, \; 25A + 5B + 13{,}935 = 25{,}912$

4. $10, \; 100A + 10B + 13{,}935 = 34{,}493$

Solve Eqn 4 for A:

5. $A = -.10B + 210.98$

Substitute Eqn 5 in Eqn. 3 =

6. $25(-.10B + 210.98) + 5B + 13{,}935 = 25912$

$-2.5B + 5274.5 + 5B + 13935 = 25912$

$5B = 6{,}702.5$

$B = 1340.5$

Substitute Eqn 6 in Eqn. 4 =

7.

$100A + 10(1340.5) + 13{,}935 = 34{,}493$

$A = 71.53$

Eqn. 1 can be expressed as

8. $A = 71.53(h^2) + 1340.5h + 13{,}935$

Integrating eqn. 8 gives vol as a func. of height

$\overset{h}{\underset{C}{\text{Area}}} = V = 23.84h^3 + 670.25h^2 + 13{,}935h$

$Ah^2 + Bh + C$

at $h = 1' = V = 14{,}090.09$

$h = 5' = V = 70{,}445.45$

DOGM version

Contour elev.	interval	Area	Ave Area	Vol
0		$13{,}935\ ft^2$		
	5		19,923.5	99,617
5		$25{,}912\ ft^2$		
	5			151,012
10		34,493		$250{,}629\ ft^3$

Total Pond Volume	250,629 ft^3
1 year of Sediment	- 22,512 ft^3
10y - 24h r/o vol	- 143,582 ft^3
	84,535 ft^3 Free board *

25y - 24h r/o vol = 205,986.44 ft^3

* pond as-built is adequate to contain sediment and 10y/24h r/o event.

All ditches meet or exceed minimum vol. requirements as shown on as builts.
All Culverts have been inspected in the field for erosion protection.

CRT Pond Review / As-built

- digital Borrow area on map.

- ~~Need a section on inlet ditch midpoint from beginning of ditch to section~~

- Address reclamation of Old Coarse Refuse Toe Pond, specifically removal or securing of emergency spillway & decant

- Modify revised submittal of 2/25/87 to reflect as-built conditions, inlet culvert, unknown culvert, ditch dimensions, outlet & decant dimensions - compare submittal & as-builts & make appropriate changes

ok → ~~Sections D-D', E-E' Ditch will require additional headwater protection, according to submittal of 2/25/87, 2' of freeboard will be required from the culvert inlet for a distance of ~~up to 100'~~ upstream~~

use because of culvert headwater

Pond Vol.	73,995	as-built vol
	-37,447	100y r/o vol
	-11,712	3y sed vol
	24,836 ft²	Free board - Pond size is adequate

contour elev	interval	Area	Ave Area	Vol
0		1176 ft²		
	5		3981.5	19,907.5
5		6787 ft²		
	5			54,087.5
10		14,848 ft²		
				73,995

- Submit temporary veg plan for pond embankment, ditches ~~and~~, topsoil pile, and other ~~area~~ disturb areas & when this will be accomplished.

Ditch

① Compute drainage area.

From Plate III-12 - Area = 7.55 ac.
" " " " Land Slope = .0595
CN = 98
" " " " Channel Length = 2,396'
Precip Depth 10year-6h = 1.84"

② Compute "Peak" Flow - Peak Flow Program

USE SCS Type B Storm Dist. Q_p = 9.96 cfs

③ Compute velocity of storm flow

Manning's eqn. $V = \frac{1.49}{n} R^{2/3} S^{1/2}$ n = .03 - for earth channels - some weeds

using Division's Trap Q program

Inputs	Outputs
Sideslope = 1:1	Depth of flow : 1.06'
Bottom Width = 0.68'	Area : 1.86'
n = .03	Wetted Perim : 3.7'
* S = .0289	Velocity : 5.3 fps
Q = 9.96 cfs	

* S - computed from average of ditch slope values, deleted eroded ditch slope values for ave.

④ Compute Static Equilibrium Slope (From OSM Diversion Ditch Manual)

$S_E = \frac{0.047 (G_s - 1) D_{50}}{R}$ bed material D_{50} or assume S_E = non eroding slope of ditch in question

S_E = .0289

⑤ Height of check dam = $(S_c - S_E)\Delta X$ S_c = slope in eroding section

(From OSM Diversion Manual) = (.0428 - .0289) 200 ΔX = Length of eroding section

= 2.78'

⑥ Number of dams = $\frac{H}{3} = \frac{2.78}{3} = <1$ at a height of 2.78'
(OSM Diversion Manual)

⑦ Average ditch depth is 2.0' in eroded section, 1 dam at a height of 2.78' will exceed ditch depth, ∴ use 2 dams with a drop height of 1.0'

⑧ Spacing $L = \frac{\Delta X}{N} = \frac{200}{2} = 100'$ spacing between dams.

⑨ Plot profile of eroded ditch section, determine area where 1st dam should be placed. Pick greatest slope section.

From Figure 1 place 1st dam at 2+25
place 2nd " " 3+25

⑩ Compute riprap dimensions - from OSM Diversion Manual

$\frac{V^2}{R^{.33}} = 35.25$

$V = 5.3$ f/s
$R = \frac{A}{wp} = .5027$

Check Froude # $y_c = \sqrt[3]{q^2/g} = 1.45$

$F = V/\sqrt{g y_c} = .77$

$F < .8$ go to table 6.4 in OSM Manual

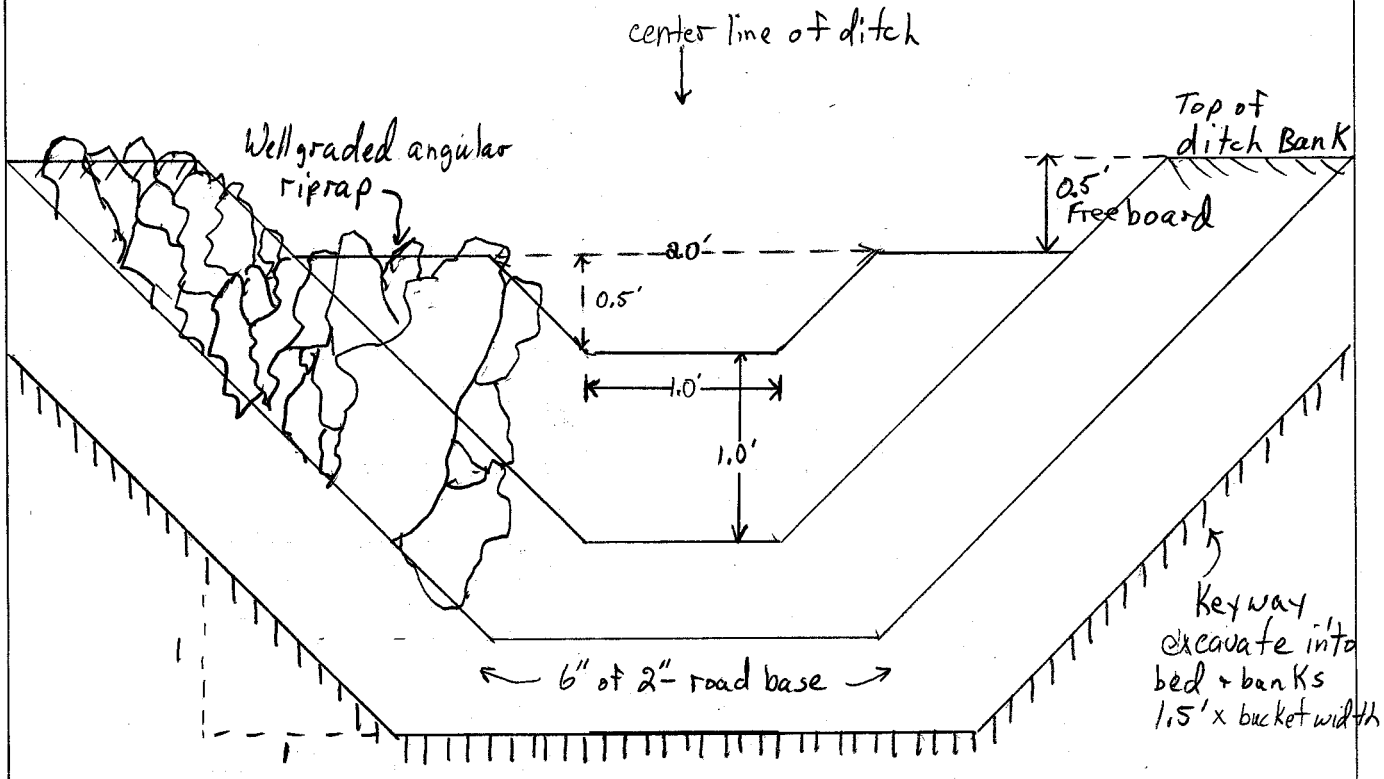
USE Type L Riprap

Dimensions 12" - at least 30% of all stones by weight shall be this dimension
9" - D_{50}
2" - D_{10}

* Place two inch minus road base gravel to a depth of six inches under all riprap.

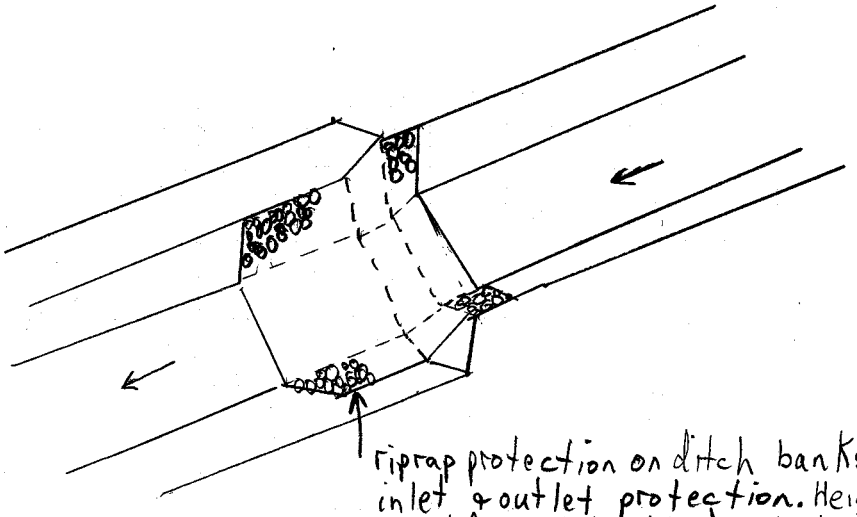
11 Check dam installation

Section View



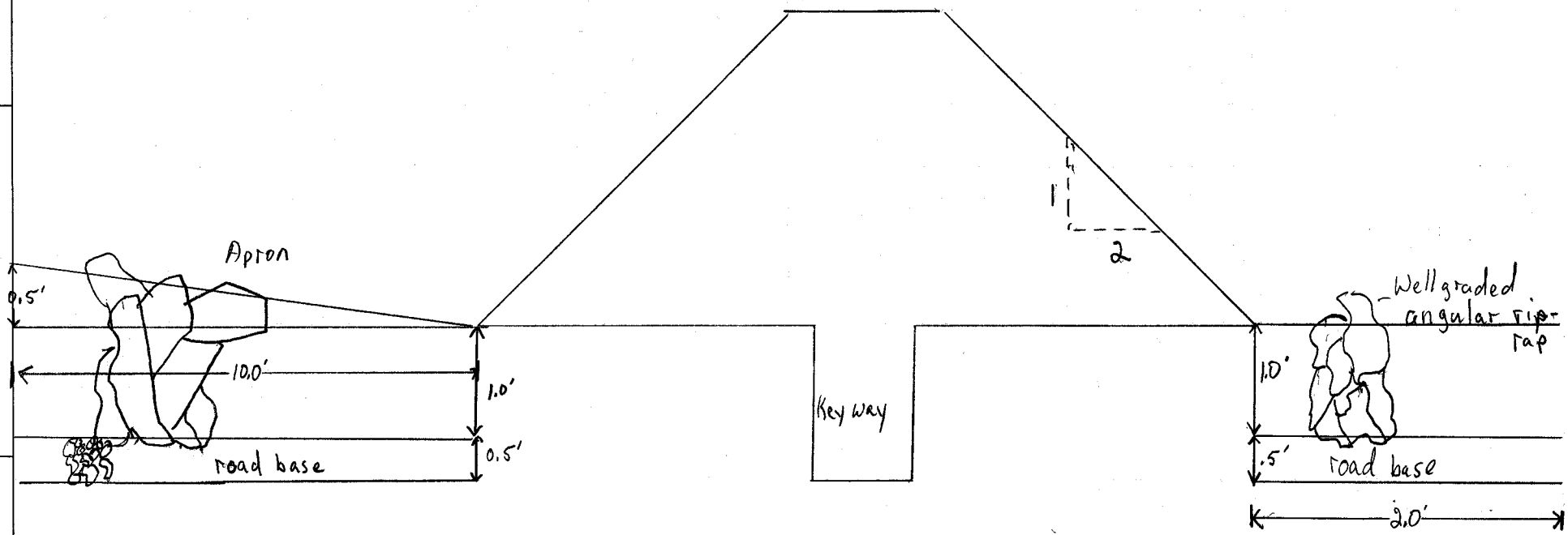
not drawn to scale

Plan View



riprap protection on ditch banks for length of inlet & outlet protection. Height of protection should equal height of check dam.

Kaiser SSSF Ditch



(12) - The diversion ditch should be regraded from 1+75 to 4+50 feet from 0+00. A 1 foot bottom width should be maintained. Ditch sideslopes should be 1:1 or less steep.

- Do not place check dams within ± 50' of a ditch bend.

- Outlet apron should be 10.0' in length and installed on a inverse slope back to the check dam.

USLE

↓ From Submittal

17.2 Tons/ac × 71.93 ac. = 1,237.2 Tons/yr.

y = DA (pg 353 + 355)

Area = .11 mi²

y = 519.6 Tons/yr D = .42

Assume soil classfc'n is: from Plate 8-1 - Sandy loam

% Sand	Silt	Clay	> From Submittal
62	28	10	

From Table 6.2 - Barf

III normally empty

Wc	Wm	Ws
40	72	97

Specific weight of Sediment is:

$$40(.10) + 97(.62) + 72(.28)$$

$$W = 80.7 \text{ lbs/ft}^3$$

$$V_s = \frac{y \text{ (lbs/Ton)}}{w} = \frac{(519.6)(2000)}{80.7} = 12,877 \text{ ft}^3/\text{yr.}$$

Pond Volume

Contour Elev.	Interval	Area	Ave Area	Vol.
0		18,507		
	5		21,861	109,305
5		25,216		
	5		31,383	156,915
10		37,551		

266,220.0

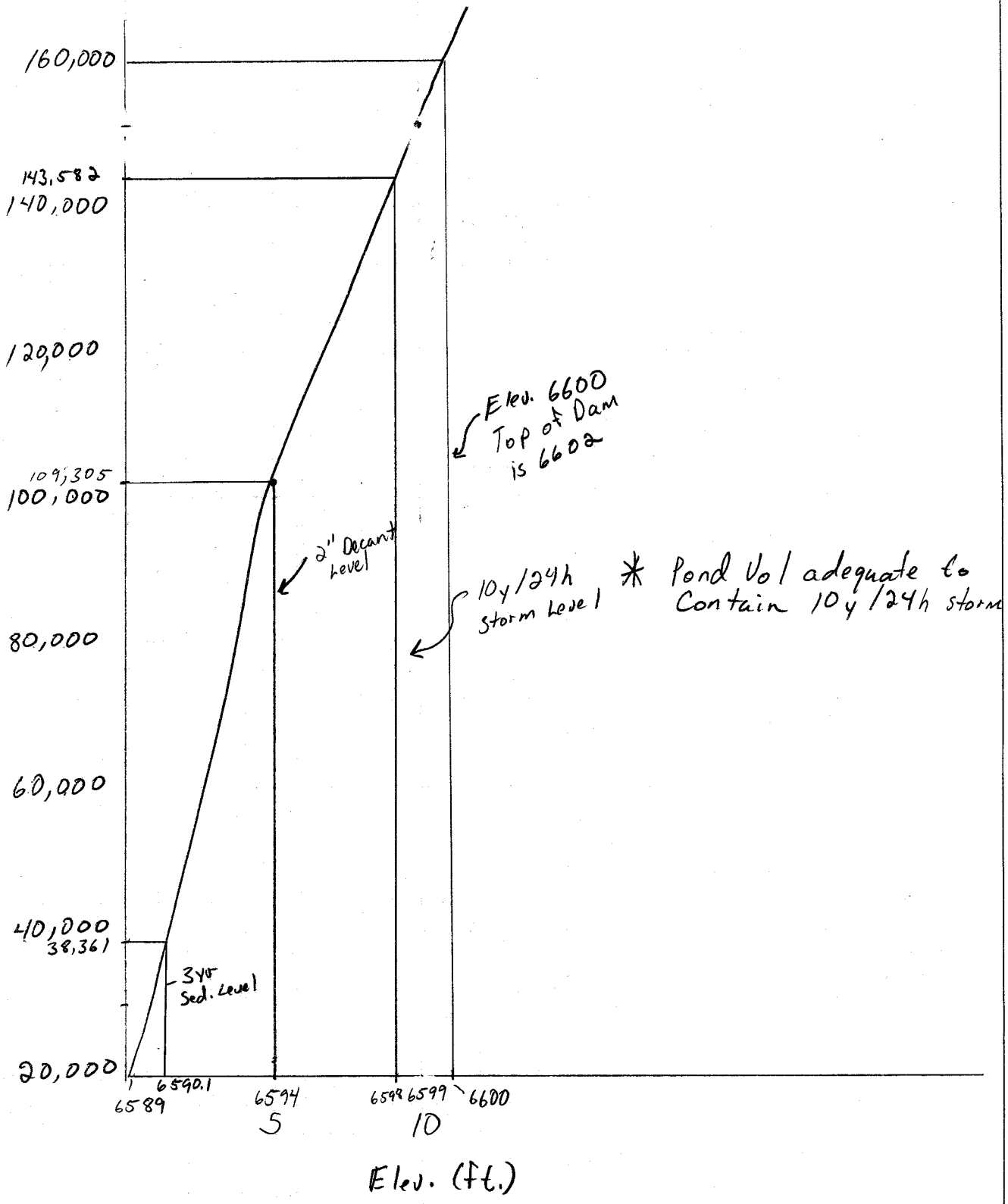
− 38,631 Sed. for 3 yrs

− 143,582 - 10y - R/O

84,007 ft³ Freeboard

Free board = 84,007 ft^3

Pond Top Area = 37,551.6 ft^2 x



* Pond Vol adequate to Contain 10y/24h storm

2" Decant Flow rate pg 230 Barf

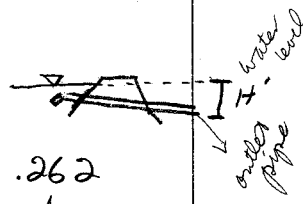
Weir eqn $Q_w = CLH^{1.5} \Rightarrow Q = (.80)(.5836)\,H^{1.5}$

$C = .80$ pg 229 Barf

L = Circum inlet

$Q_o = C' a \sqrt{2gH} = .80\,(.262)\sqrt{64.4H}$

$Q_p = \dfrac{a\,(2g\,H')^{1/2}}{(1 + K_e + K_b + K_c L)^{1/2}}$

H' = 

$* \; Q_p = \dfrac{.262\,(64.4\,H')^{1/2}}{3.04}$ *

$a = .262$
$K_e = 1$
$K_b = .5$
$K_c = .05$
$L = 135'$

Head	Q_w	Q_o	Q_p*
.5	.15	1.19	
2.5 H'			1.09
1.0	.42		
~~3.0 H'~~			
1.5	.77		
2.0	1.18	2.38	1.38
4.0 H'			
3.0	2.18	2.91	1.55
4.0			
5.0			
(H') 7.0			1.83

* Maximum decant flow cfs.

$143{,}582$ cf (10 yr R_o) $\div$ 1.83 cfs $= 78{,}460\,s \times \dfrac{60\,m}{3600\,s} \times \dfrac{1\,h}{60\,m} \times \dfrac{1\,d}{24\,h} = .91$ day

Decant Time < 1 day $\therefore$ 2" decant is sufficient

Ditch D-1

Area 10 will require new ditch ~~800~~ 20 + Area 8

Trap Q

SS .5:1 - From submittal
BW 3.0 " "
n = .035 " "
Slope = .025 Plate D4-0143
Q = 26.62 Peak Q

Output
D = 1.27
A = 4.62
W.P. = 5.84
V = 5.76 fps

Existing D-1 in good condition as of field insp (August 86)

NATIONAL 42-381 50 SHEETS 5 SQUARE 42-382 100 SHEETS 5 SQUARE 42-389 200 SHEETS 5 SQUARE Made in U.S.A.

10/20 | SSSF

Doug ? ~~Is the Slurry from Prep Plant going to the East Slurry Cell~~ - yes

? Areas 6 & 7 ✓

? Decant - Valved? ✓

~~eye level~~ ? I get 1/2 as much Sed. Yield - SDR ✓

~~? Pond Vol calcs Zero Ht = 6593 ok!~~

~~? Vol. Sediment x 3 yrs 3904 x 3 = 67,536~~ ? ✓

? Installation Plan for grouted areas - Key in sides, entrances + exits - plate III-35 (D4-0124) not adequate for this.

III-40

? anti seep collars - how long will 8" pipe be? I ✓ get 135' from the drawing

✓ ? D-1 not labeled ? 19 cfs when design flow to pond is

If so need a X sect & profile of Ditch

? Area 10 will it require new ditch from C-11 to pond What about new ditch where slurry culvert is not installed completely ie. C7-C10 C8-C11 - Delineate flow path / Ditches

✓? Ditch D-1 - BW = 3' ? -

ESC ✓? D-2 does it start below ponds - Is it part of this submittal - D2, 3 + 4 are Slurry Ditch

? Slurry Area Culvert Summary Table

✓? Need HW protection at C1, C6 ~~x~~ ? can't find on map, C8, C11 -

✓ * For culverts needing outlet protection, must submit protection design or commit to details per plate III-35.

✓? ~~Profile of culvert~~

✓? Land Slope for Qd to pond (10y/24h) 16.6 (25y)

↓ Delineated in Peak Runoff program.

Planimeter program Date: 01-01-1980 Time: 10:40:58

Region 1 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	94.016	94.016			
SQ. MILES:	0.147	0.147	MILES:	1.484	1.484
SQ. YARDS:	455,038.100	455,038.100	YARDS:	2,611.849	2,611.849
SQ. FEET:	4,095,342.000	4,095,342.000	FEET:	7,835.547	7,835.547
SQ. METERS:	380,469.800	380,469.800	METERS:	2,388.158	2,388.158
SQ.IN(map):	102.384	39.178	INCH (map):	39.178	39.178

Region 2 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	16.661	110.677			
SQ. MILES:	0.026	0.173	MILES:	1.508	2.992
SQ. YARDS:	80,640.070	535,678.100	YARDS:	2,654.168	5,266.017
SQ. FEET:	725,760.600	4,821,103.000	FEET:	7,962.503	15,798.050
SQ. METERS:	67,425.370	447,895.200	METERS:	2,426.853	4,815.011
SQ.IN(map):	18.144	78.990	INCH (map):	39.813	78.990

Region 3 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	19.892	130.569			
SQ. MILES:	0.031	0.204	MILES:	1.051	4.043
SQ. YARDS:	96,274.910	631,953.100	YARDS:	1,849.266	7,115.282
SQ. FEET:	866,474.200	5,687,577.000	FEET:	5,547.797	21,345.850
SQ. METERS:	80,498.100	528,393.300	METERS:	1,690.886	6,505.897
SQ.IN(map):	21.662	106.729	INCH (map):	27.739	106.729

Region 4 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	10.800	141.369			
SQ. MILES:	0.017	0.221	MILES:	0.584	4.627
SQ. YARDS:	52,274.280	684,227.300	YARDS:	1,028.025	8,143.307
SQ. FEET:	470,468.500	6,158,046.000	FEET:	3,084.074	24,429.920
SQ. METERS:	43,707.950	572,101.200	METERS:	939.980	7,445.876
SQ.IN(map):	11.762	122.150	INCH (map):	15.420	122.150

Region 5 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	0.959	142.328			
SQ. MILES:	0.001	0.222	MILES:	0.360	4.987
SQ. YARDS:	4,639.147	688,866.500	YARDS:	633.290	8,776.597
SQ. FEET:	41,752.320	6,199,798.000	FEET:	1,899.870	26,329.790
SQ. METERS:	3,878.918	575,980.100	METERS:	579.052	8,024.928
SQ.IN(map):	1.044	131.649	INCH (map):	9.499	131.649

Region 6 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	1.877	144.205			
SQ. MILES:	0.003	0.225	MILES:	0.404	5.391
SQ. YARDS:	9,086.080	697,952.500	YARDS:	710.978	9,487.575
SQ. FEET:	81,774.720	6,281,573.000	FEET:	2,132.935	28,462.730
SQ. METERS:	7,597.120	583,577.300	METERS:	650.087	8,675.016
SQ.IN(map):	2.044	142.314	INCH (map):	10.665	142.314

Region 7 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	7.810	152.015			
SQ. MILES:	0.012	0.238	MILES:	0.554	5.945
SQ. YARDS:	37,798.330	735,750.800	YARDS:	974.772	10,462.350
SQ. FEET:	340,185.000	6,621,758.000	FEET:	2,924.318	31,387.040
SQ. METERS:	31,604.220	615,181.500	METERS:	891.288	9,566.304
SQ.IN(map):	8.505	156.935	INCH (map):	14.622	156.935

Region 8 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	7.387	159.401			
SQ. MILES:	0.012	0.249	MILES:	0.611	6.555
SQ. YARDS:	35,752.110	771,503.000	YARDS:	1,074.796	11,537.140
SQ. FEET:	321,769.000	6,943,527.000	FEET:	3,224.389	34,611.430
SQ. METERS:	29,893.310	645,074.800	METERS:	982.746	10,549.050
SQ.IN(map):	8.044	173.057	INCH (map):	16.122	173.057

Region 9 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	1.154	160.555			
SQ. MILES:	0.002	0.251	MILES:	0.447	7.002
SQ. YARDS:	5,584.711	777,087.600	YARDS:	786.488	12,323.630
SQ. FEET:	50,262.400	6,993,789.000	FEET:	2,359.465	36,970.900
SQ. METERS:	4,669.530	649,744.300	METERS:	719.130	11,268.180
SQ.IN(map):	1.257	184.854	INCH (map):	11.797	184.854

Region 10 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	0.768	161.324			
SQ. MILES:	0.001	0.252	MILES:	0.319	7.321
SQ. YARDS:	3,718.542	780,806.200	YARDS:	561.567	12,885.200
SQ. FEET:	33,466.880	7,027,256.000	FEET:	1,684.702	38,655.600
SQ. METERS:	3,109.175	652,853.500	METERS:	513.472	11,781.650
SQ.IN(map):	0.837	193.278	INCH (map):	8.424	193.278

Region 11 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	0.838	162.162			
SQ. MILES:	0.001	0.253	MILES:	0.182	7.503
SQ. YARDS:	4,058.169	784,864.400	YARDS:	319.740	13,204.940
SQ. FEET:	36,523.520	7,063,780.000	FEET:	959.220	39,614.820
SQ. METERS:	3,393.146	656,246.600	METERS:	292.356	12,074.010
SQ.IN(map):	0.913	198.074	INCH (map):	4.796	198.074

Region 12 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	27.595	189.757			
SQ. MILES:	0.043	0.296	MILES:	0.943	8.446
SQ. YARDS:	133,558.300	918,422.600	YARDS:	1,659.167	14,864.110
SQ. FEET:	1,202,024.000	8,265,804.000	FEET:	4,977.502	44,592.320
SQ. METERS:	111,671.700	767,918.300	METERS:	1,517.069	13,591.080
SQ.IN(map):	30.051	222.962	INCH (map):	24.888	222.962

SQ.IN(map):	15.061	16.006	INCH (map):	16.006	16.006
SQ.IN(map):	10.050	29.171	INCH (map):	13.165	29.171

Planimeter program Date: 01-01-1980 Time: 11:28:06

Region 1 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.862	0.862			
SQ. MILES:	0.001	0.001	MILES:	0.152	0.152
SQ. YARDS:	4,172.400	4,172.400	YARDS:	266.684	266.684
SQ. FEET:	37,551.600	37,551.600	FEET:	800.051	800.051
SQ. METERS:	3,488.658	3,488.658	METERS:	243.844	243.844
SQ.IN(map):	15.021	16.001	INCH (map):	16.001	16.001

Region 2 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.579	1.441			
SQ. MILES:	0.001	0.002	MILES:	0.125	0.276
SQ. YARDS:	2,801.747	6,974.147	YARDS:	219.268	485.952
SQ. FEET:	25,215.720	62,767.320	FEET:	657.804	1,457.855
SQ. METERS:	2,342.617	5,831.275	METERS:	200.489	444.332
SQ.IN(map):	10.086	29.157	INCH (map):	13.156	29.157

Region 3 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.425	1.866			
SQ. MILES:	0.001	0.003	MILES:	0.108	0.384
SQ. YARDS:	2,056.400	9,030.547	YARDS:	190.048	676.000
SQ. FEET:	18,507.600	81,274.910	FEET:	570.144	2,027.999
SQ. METERS:	1,719.412	7,550.687	METERS:	173.771	618.104
SQ.IN(map):	7.403	40.560	INCH (map):	11.403	40.560

Planimeter program Date: 01-01-1980 Time: 11:34:25

Region 1 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.581	0.581
YARDS	1,021.911	1,021.911
FEET:	3,065.732	3,065.732
METERS:	934.390	934.390
INCHES (map):	15.329	15.329

Region 2 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.061	0.641
YARDS	106.549	1,128.459
FEET:	319.646	3,385.378
METERS:	97.423	1,031.813
INCHES (map):	1.598	16.927

Region 3 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.348	0.990
YARDS	613.114	1,741.573
FEET:	1,839.342	5,224.720
METERS:	560.604	1,592.417
INCHES (map):	9.197	26.124

Region 4 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.249	1.239
YARDS	438.305	2,179.878
FEET:	1,314.915	6,539.635
METERS:	400.766	1,993.183
INCHES (map):	6.575	32.698

Region 5 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.169	1.408
YARDS	297.852	2,477.730
FEET:	893.556	7,433.191
METERS:	272.343	2,265.526
INCHES (map):	4.468	37.166

Region 6 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.406	1.814
YARDS	714.428	3,192.158
FEET:	2,143.284	9,576.474
METERS:	653.241	2,918.767
INCHES (map):	10.716	47.882

Region 7 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.202	2.016
YARDS	355.244	3,547.403
FEET:	1,065.733	10,642.210
METERS:	324.820	3,243.587
INCHES (map):	5.329	53.211

Region 8 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.641	2.656
YARDS	1,127.535	4,674.938
FEET:	3,382.604	14,024.810
METERS:	1,030.968	4,274.554
INCHES (map):	16.913	70.124

Region 9 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.331	2.987
YARDS	582.186	5,257.123
FEET:	6004 1,746.557	15,771.370
METERS:	532.325	4,806.879
INCHES (map):	8.733	78.857

Region 10 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.224	3.211
YARDS	394.250	5,651.373
FEET:	1,182.751	16,954.120
METERS:	360.485	5,167.364
INCHES (map):	5.914	84.771

Region 11 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.799	4.010
YARDS	1,405.996	7,057.369
FEET:	4,217.989	21,172.110
METERS:	1,285.580	6,452.944
INCHES (map):	21.090	105.861

Peak Flow from DOGM Digitizer & Peak Program.

①. See Attached Computer Sheets for Digitizer & Peak Computer Analysis

② Runoff Vol.

$43560 \frac{ft^2}{ac} \times 7.51 ac \times 1.3685 in \times \frac{1 ft}{12 in} = 37,307.1 ft^3$

USLE - Sediment Load - See previous calculations dated 6/30 - 7/9/86 -

DOGM Sed. Load (7/1/86) = $3,862.2 ft^3$
Kaiser Sed. Load (9/17/86) = $3904.0 ft^3$

Submitted Sed. Load is adequate

Emergency Spillway Calcs.

Trap Q analysis - Inputs from drawing 04-0142 + Submittal

Crest
SS = 2:1
BW = 2'
n = .03
Channel Slope = .0001
Output
Depth = 2.5 *
V = .60
Q = 10.54

Side slope
Slope = .28
BW = 2'
n = .03
SS = 2h:1V
Depth = .35'
V = 10.93
n = .03

* Weir Eqn - Broad Crested
Q = 10.54
b = 2'

$Q = 3.087 b H^{1.5}$

$\left(\frac{Q}{3.087(b)}\right)^{2/3} = H \doteq 1.43'$ ✓

Culvert Analysis

Slope = 14.39° → From Ditch Section Drawing on 04-0142
Dia = 2.0' → From Submittal
Q = 10.54 → From DOGM Peak Program
Assume Inlet Control
Hw = 1.75' → From Chart H pg 10-37 in Capacity Charts for the Hydraulic Design of Highway Culverts

UDOT - Chart # 2-62 - Partial Flow in a Circular Pipe

Solve $\frac{Qn}{D^{8/3} S^{1/2}} = .098$

$n = .025$
$D = 2'$
$S = .143$ ft/ft.
$Q = 10.54$ cfs

Enter Chart with soln of above eqn & find $\frac{d}{D}$

$\frac{d}{D} = .31$ Solve for d $.31 \times (D) = d = .62'$

USE Chart 39 in DOT Circular Open Channel Flow Chapter 5

Velocity = 15 fps

NATIONAL 42-381 50 SHEETS 5 SQUARE 42-382 100 SHEETS 5 SQUARE 42-389 200 SHEETS 5 SQUARE Made in U.S.A.

9/13 Kaiser

Coarse Refuse Toe Sediment Pond

Using OSM Manual Method on pg 17

Weir flow eqn. $Q_w = C \overset{9.42}{L} H^{1.5} \Rightarrow Q = (3.27 + .04H)\, 9.42\, H^{1.5}$ (173)

Orifice flow eqn. $Q_o = C_o \overset{7.11}{A} (2gH)^{0.5} \Rightarrow Q = .75\,(7.11)\,(64.4\,H)^{0.5}$

11.25 Pipe Flow eqn. $Q = A\,(2gH)^{0.5} / (1 + K_e + K_f + K_b + K_c)^{0.5}$

$Q_p = 7.11\,(64.4\,H)^{0.5} / (1 + 0.8 + 2.41 + 0.5)^{0.5}$

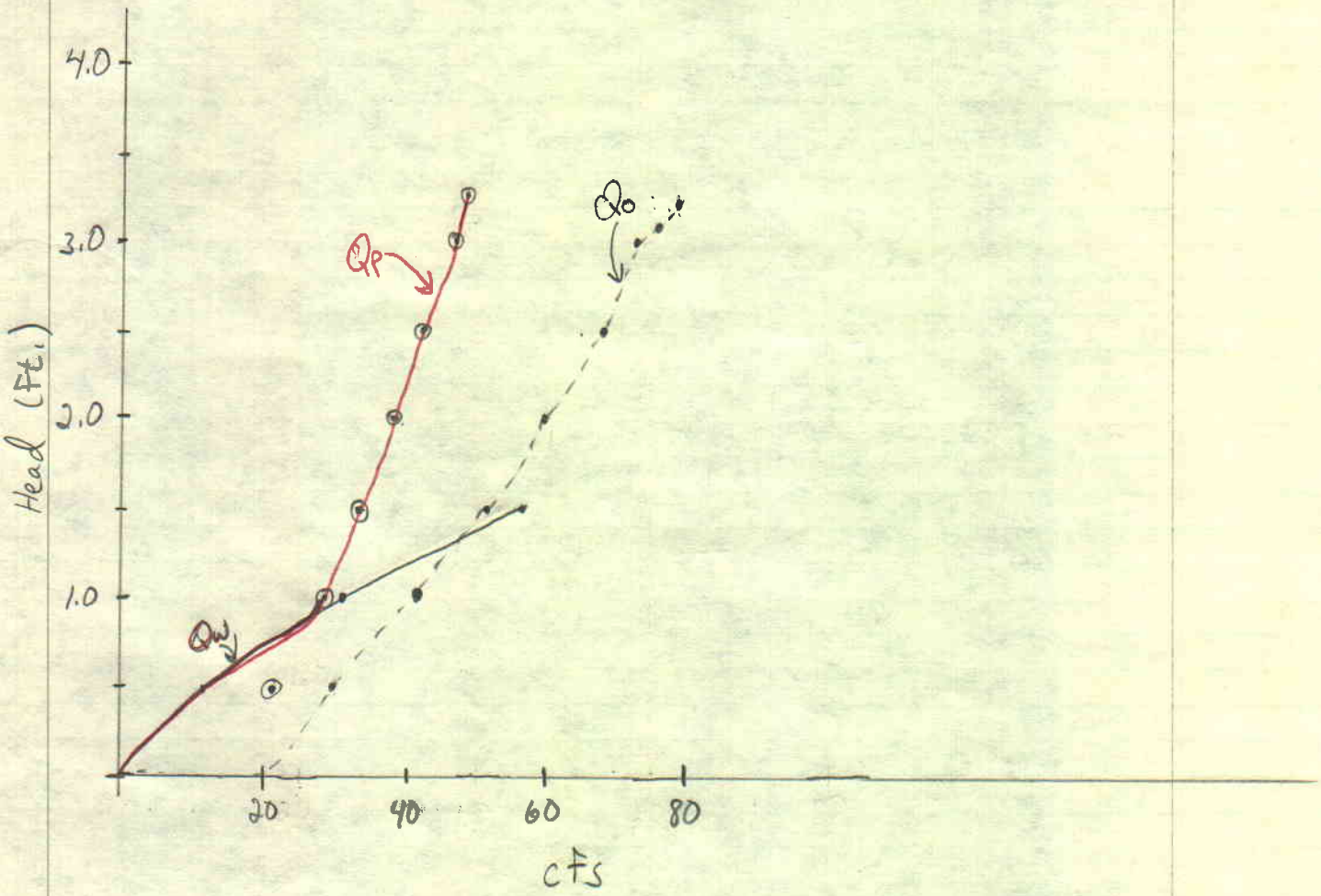
$K_f = (184.6\, n^2 L) / D^{4/3} = 2.41$

$n = 0.025$
$L = 90.625'$
$D = 3^{1.3333} = 4.33$

$Q_p = 7.11\,(64.4\,H + 12.5)^{0.5} / 2.17 \Rightarrow Q_p = 3.28\,(64.4H + 12.5)^{0.5}$

H	Qw (cfs)	Qo (cfs)	Qp (cfs)
0	0	0	0
.5	10.96	30.26	21.93
1.0	31.18	43.79	28.76
1.5	57.61	52.41	34.26
2.0		60.52	38.99
2.5		67.66	43.2
3.0		74.12	47.04
3.125		75.65	47.95
3.25		77.15	48.85

Kaiser



- Letter to all mines or SS & state that hydrometer tests of all potentially disturbed area soils should be run or Division will assume worst case example

~~- Must discuss amount of~~.

- Sediment level marker appears that SLM ~~will not~~ does not have 60% level differentiated. - lack of clear scale - commit specific types & size of SLM marker

- ~~Ex~~ Emergency Spillway Side slope & Crest Sections ~~are~~ detail view doesn't correlate with location on plan view of pond B B on plan view - ~~denotes~~ is shown on Side Slope and on typical section it is denoted as the Top section? ~~Spillway will be grouted & rr - need d50 of rr.~~ ~~& justification n value Division calcs n @~~ Division calculates that the n value submitted is at the maximum range ∴ the op must submit D50 of rr that will justify use of the max n.

- Splash basin design - 4' x 4' x 1' must be these dimensions after rip rap and grout installation

- Culvert slope is determined ~~as 14.3 or 14.3% not 4.3%~~ cannot be determined item 16 in the letter of 6/2[illegible] specifically asks for a x sect of the culvert to determine the slope. The Ditch section submitted is of an inappropriate scale to determine culvert slope!

✓ The operator must reply to item 17 with specific depth of rip rap - exposure of rr above grade etc. Extent of protection up the channel sides on the emergency spillway, & culvert outlet protection, drawing of the splash basin with details of rr placement & depth

✓ - All rip rap areas must be keyed in at inlets - bottom & sides

6/30/86 Coarse Refuse Toe Sediment Pond (CRTSP) ①

USLE Calc.

Type II $R = \frac{EI}{100} = 27 P^{2.2} \quad (2y/6h) = .80$

pg 313 Barfi. $R = 16.53$

$K = ?$

$\rightarrow LS =$

From Fig. 5.15 Table 5.7

1-1'	Segment #	Slope %	Uniform LS Value	× Adj. Factor	Total Length	Slope	
Slope 1 (Uniform)	1	.13 θ=7.6	2.2	.35	112.5	.77	
Slope 2 (Uniform)	2	.0615	.85	.65	762.5	.55	1.32
2-2' concave	1	.26	7.7	.35	175	2.69	
	2	.20	4.25	.65	125	1.49	4.18
3-3' concave	1	.28	7.5	.35	125	2.62	
	2	.20	4.2	.65	125	2.73	5.35
4-4' convex	1	.25	6.0	.35	100	1.5	5.75
	2	.40	10.5	.65	100	4.2	
							4.15

USLE (cont'd)

C_p = accept their calculation - can't justify any other value w/o site inspection with a biologist

USLE = A = R x K x LS x C_p

Use 10.2 ton/ac/yr = A

Delivery ratio from Barf pg 353 D = Y/A DA = Y
D = .70 A = 10.2 Tons/Ac-yr. x 7.53 ac = 76.81 Tons/yr
Y = 76.81 x .70 = 53.76 Tons/yr. from the 7.53 acres.

Volume of sediment is:

Assume soil classfcn is sandy loam (from MRP Table 1 Append 8-4 inadequate data and no data from the specific area)

Ave % sand - silt - clay
64% 22% 14%

From Table 6.2 (Barf)

III - normally empty: Wc Wm Ws
40 72 97

Specific weight of the sediment is:

W = (40)(.14) + (97)(.64) + (72)(.22)
= 83.52 lbs/ft^3

$V_s = \frac{(Y)}{(W)}$ (lbs/Ton conversion)

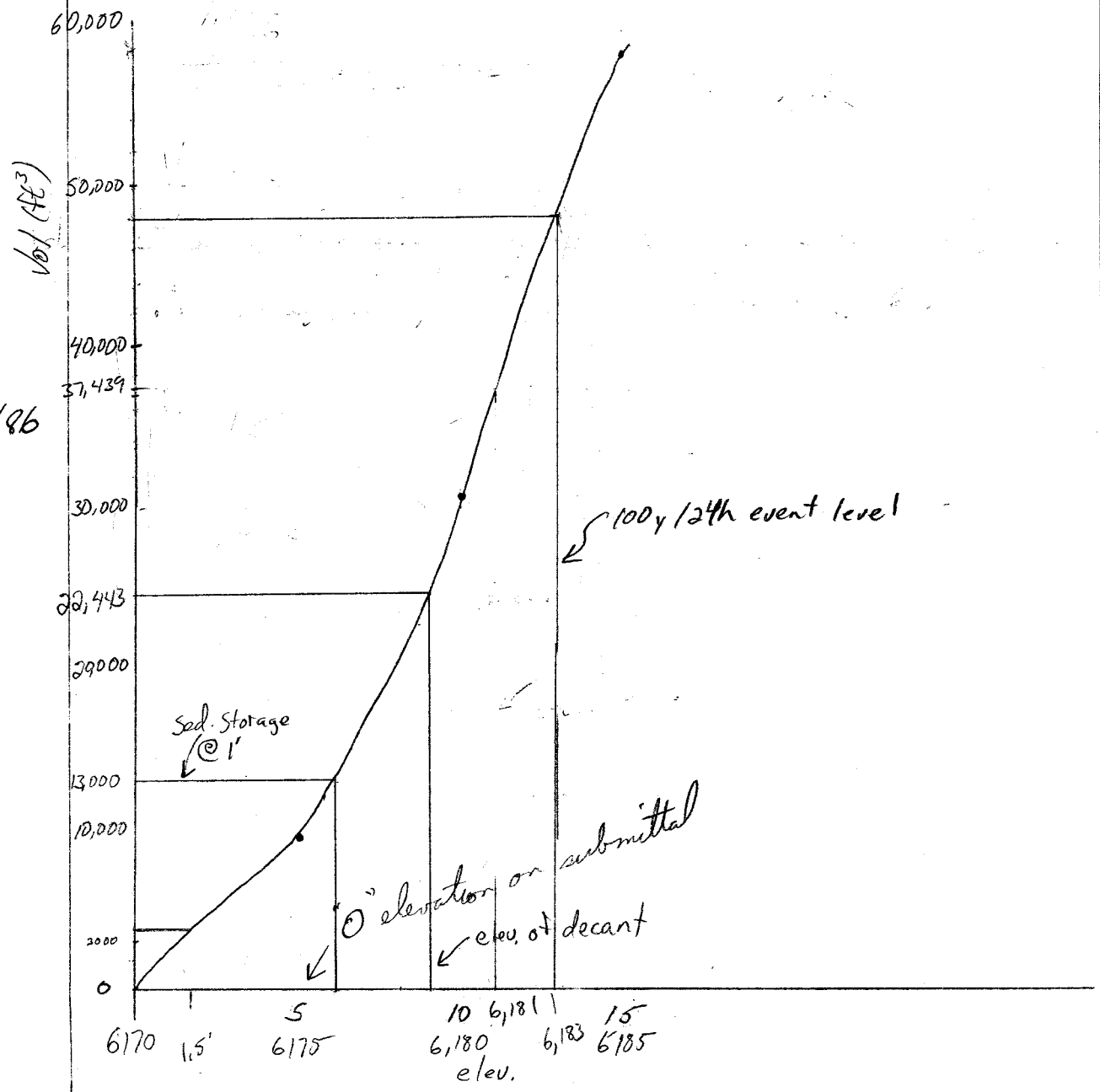
V_s = 1,287.4 ft^3/yr x 3 yr = 3,862.2 ft^3

Sediment Pond Size Calculation

1 Contour elev.	2 Interval	3 Area (ft²)	4 Ave Area	(2x4) Vol (ft³)
5		185.0		0
	5		1983.5	
10		3782.4		9,917.50
	5		6,195.75	
15		8609.08		30,978.75
	5		11,627.00	
20		14,644.72		58,135.0

Σ = 99,031.25 ft³

7/8/86



Ditch Calcs Trap Q

Slope #1 $\frac{190'}{400'} = 47.5\%$ $V_1 =$

n = .03

* $S_2 = \frac{56}{480} = 9.3\%$ $V_2 = 5.8$ D = .26

$S_3 = \frac{140}{960} = 14.6\%$ $V_3 =$

* $S_4 = \frac{30}{220} = 22.7$ $V_4 = 7.7$ D = .2

* $S_5 =$ $= 11.9\%$ $V_5 = 6.3$ D = .24

CR TSP

Certified as built on 2' contours

- Locate pond structure on D4-0142 insert

- Does not properly address runoff from area outside of the 7.53 ac to the north and south of 7.53 acre need a map with structure & proposed disturbed area at a scale of 1" = 200'

cannot tell what will keep runoff from area outside of 7.53 acre area

- Doesn't address ~~previous pond~~ show drainage of ~~direction~~ of iron seep at toe of present pile & location of future pile. W & problem (high iron)

- Depth of runoff used for runoff volume calculation is not correct nor is the result of the calculation correct.

- D4-0142 Typical Dam Section does not show sediment level marker

- The soil erodibility factor (K) used in the USLE calculation cannot be justified. The procedures used to estimate K, requires that the percent sand, silt and clay be known as well as the soil structure and permeability rating. This infor must be supplied for NJF2 in order to ~~calculated as~~ check the submittal.

- In the calculation for soil loss (USLE) to cubic feet of sediment the submittal doesn't justify ~~what~~ how the 1,097 ft³ of sediment was calculated. I need particle ~~diameter meas for the~~ percentage of sand, silt and clay for the NJF2 soil complex cannot be found in the NRP

need specific weight calculations for the sediment

JF KC

Volume of sediment reaching pond is 3862 ft^3 - 3,291 ft^3
571 ft^3 more than they calculated.

- ~~According to Section A-A the sediment pond floor is on a $\frac{12.5}{75}$ = 16.7% slope at this slope the pond floor volume would be decreased significantly~~

the cross section view of

also this section denotes the pond floor elevation at 6240 - while the typical dam section shows the pond floor below the 6176 sediment level.

~~the plan view of the pond shows that excavation will take place in the pond floor - while the cross section view of the pond floor shows a 16.7% slope. clarify.~~

- ~~The up~~ the sediment pond design does not have provisions for a emergency spillway, according to UMC 817.46(i)(~~ii~~)(~~i~~)(~~A~~) an appropriate combination of principal and emergency spillways shall be provided to safely discharge the runoff resulting from a ~~100~~ 25 y/24h storm

- Section A-A denotes a dam height of over 50' while the ~~a~~ 1" = 50' elevation scale denotes a height of 12.5'.

- As designed the sediment pond doesn't have enough volume to contain the 100 y/24h event

The submittal doesn't contain verbage as to the constructed height of the dam. ~~it~~ according to 817.42 ~~§~~(K) the constructed height of the dam shall be a minimum of 5% over the design height.

X - As builts - 2' contours

- Cut off collars

- State eng. form

- Equation #9 the second integer in the integral reads $4.13.75h^2$ - this is obviously a typo

- The operator refers to the borrow site as previously approved by the Division. A reference as to date, location in the MRP of the approval, or a copy of said approval must accompany this submission

last

X - The submittal does not contain any information on the reclamation of the proposed pond after the pond is no longer needed

x According to UMC 784.16 §(b)(2) - comply w 30CFR 77.216-1&2

- The submittal shows that the diversion ditch length is 250' the Division measures the ditch length at

- ~~The diversion ditch shows a width of 6' is this BW or TW on drawing~~

- ~~What is the design flow 100 y~~ on drawing

- A slope of 2% is not correct the ditch slope must be calculated

- What is the manning's n for the ditch

- The velocity for three segments of the ditch are considered erosive.

- Provide a cross section of the culvert installation area - with elevations for inlet and outlet.

- Must provide information as to the sizing, ~~and~~ installation and reclamation of the rip rap at the culvert outlet and pond inlet & pond outlet

Kaiser CRT Pond

INPUT SUMMARY
FOR W.S.: SSCRT

STORM: 100y 24h WATERSHED:

DISTRIBUTION = SCS TYPE 2 LAND SLOPE = 37.0000 PCT
CURVE NUMBER = 86.00
PRECIP.DEPTH = 2.66 IN CHANNEL LENGTH = 1367.40 FT
TIME OF CONC. = .0915 HR
DURATION = 24.00 HR AREA = 7.51 AC
NUMBER OF LINES = 1983 D = .0122 HR

OUTPUT SUMMARY

RUNOFF DEPTH = 1.3685 IN
INITIAL ABSTRACTION = .3255 IN
PEAK FLOW = 10.54 CFS (1.3922 IPH)
AT T = 12.50 HRS

Kaiser CRT Drainage Area

Planimeter program Date: 09-19-1986 Time: 12:19:45

Region 1 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	7.514	7.514			
SQ. MILES:	0.012	0.012	MILES:	0.697	0.697
SQ. YARDS:	36,368.320	36,368.320	YARDS:	1,226.406	1,226.406
SQ. FEET:	327,314.900	327,314.900	FEET:	3,679.219	3,679.219
SQ. METERS:	30,408.550	30,408.550	METERS:	1,121.371	1,121.371
SQ.IN(map):	8.183	18.396	INCH (map):	18.396	18.396

Region 2 (MAP SCALE: 1 inch= 200 feet)

	AREA	total		PERIMETER	total
ACRES:	7.514	7.514			
SQ. MILES:	0.012	0.012	MILES:	0.697	0.697
SQ. YARDS:	36,368.320	36,368.320	YARDS:	1,226.406	1,226.406
SQ. FEET:	327,314.900	327,314.900	FEET:	3,679.219	3,679.219
SQ. METERS:	30,408.550	30,408.550	METERS:	1,121.371	1,121.371
SQ.IN(map):	8.183	18.396	INCH (map):	18.396	18.396

CRT Pond Contours

Planimeter program Date: 09-19-1986 Time: 12:22:11

Region 1 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.087	0.087			
SQ. MILES:	0.000	0.000	MILES:	0.048	0.048
SQ. YARDS:	419.271	419.271	YARDS:	85.294	85.294
SQ. FEET:	3,773.440	3,773.440	FEET:	255.882	255.882
SQ. METERS:	350.564	350.564	METERS:	77.989	77.989
SQ.IN(map):	1.509	5.118	INCH (map):	5.118	5.118

Region 2 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.199	0.286			
SQ. MILES:	0.000	0.000	MILES:	0.072	0.120
SQ. YARDS:	963.298	1,382.569	YARDS:	126.508	211.802
SQ. FEET:	8,669.680	12,443.120	FEET:	379.523	635.405
SQ. METERS:	805.440	1,156.004	METERS:	115.673	193.662
SQ.IN(map):	3.468	12.708	INCH (map):	7.590	12.708

Region 3 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.336	0.621			
SQ. MILES:	0.001	0.001	MILES:	0.095	0.215
SQ. YARDS:	1,625.209	3,007.778	YARDS:	166.326	378.128
SQ. FEET:	14,626.880	27,070.000	FEET:	498.978	1,134.383
SQ. METERS:	1,358.882	2,514.885	METERS:	152.081	345.743
SQ.IN(map):	5.851	22.688	INCH (map):	9.980	22.688

Region 4 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.073	0.695			
SQ. MILES:	0.000	0.001	MILES:	0.072	0.287
SQ. YARDS:	354.347	3,362.125	YARDS:	127.284	505.412
SQ. FEET:	3,189.120	30,259.120	FEET:	381.852	1,516.235
SQ. METERS:	296.279	2,811.164	METERS:	116.383	462.126
SQ.IN(map):	1.276	30.325	INCH (map):	7.637	30.325

Region 5 (MAP SCALE: 1 inch= 50 feet)

	AREA	total		PERIMETER	total
ACRES:	0.073	0.695			
SQ. MILES:	0.000	0.001	MILES:	0.072	0.287
SQ. YARDS:	354.347	3,362.125	YARDS:	127.284	505.412
SQ. FEET:	3,189.120	30,259.120	FEET:	381.852	1,516.235
SQ. METERS:	296.279	2,811.164	METERS:	116.383	462.126
SQ.IN(map):	1.276	30.325	INCH (map):	7.637	30.325

CRT Channel Length

Planimeter program Date: 09-19-1986 Time: 12:28:28

Region 1 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.259	0.259
YARDS	455.799	455.799
FEET:	1,367.397	1,367.397
METERS:	416.762	416.762
INCHES (map):	6.837	6.837

08/19/85 Kaiser Sunnyside - Reclamation of Upper Hillside

Area Measurements

Map scale is 1:200

Lower 1/2 Upper Hillside rep #1 - 29.14 sq in.
#2 - 29.3
#3 - 29.65
ave 29.4 sq in

Upper 1/2 Upper Hillside rep 1 - 20.11
2 - 20.19
3 - 20.19
20.16 sq in.

Total Upper Hillside Area : 49.56 sq in = 415.5 ac

Channel Length
rep 1 - 8.0 inches
2 - 8.05
3 - 8.1
ave 8.05 x 200' = 1,610 ft.

Ave. slope
elev. 7750'
6720'
1030'
Length = 2,840'

$$S = \frac{1030}{2840} = .3627 = 36.27\%$$

CN - Ive come up with a CN of 74 - using good Land condition + range use.

Peak Flow

After inputing their #'s into the PEAK program and using a 100 yr 24 hr intensity of 2.74 (our #) inches the program came up with a ~~P~~ Qp of 44.5 cfs - they came up with 41.59 cfs.

I ran a sequence with a smaller area + shorter channel length and same storm intensity and came up with a Qp of ~~#~~ 34.24 cfs.

Their channel length was from the top of the WS-I used actual channel length meas. from their map.

LOG Trap Q Results - H_2O (D) = 0.4905

V = 6.4 ft/s

1/X Rip Rap - D_{50} = 0.7701 units ?

From Trap Q
WP = 14.0967
A = 6.4964
S = .071
D = .4905

Table III-46. POST MINE DRAINAGE DESIGNS AND REFERENCE AREAS

Drainage Area	Length (ft)	Slope (%)	Curve Number	Area	Peak Flow	Disturbed & Ref. Area Slope	Channel Width	Side Slope	Manning's Number	Velocity (ft/sec)	Depth H_2O Flow (ft)	% Rock (4"+)	% Gravel (¼"-4")	% Sand (¼"-)	% Litter	% Vegetation	Soil Unit (flow area)
SSS U Hillside	2800	35.36	75	60.61	41.59	7.1	13	1v:2h	0.037	6.13	0.48	---	--	---	--	--	IGC
Reference Area 1 Pole Canyon	10800	21.33	60	786.96	35.79	6.0	10	--	0.037	6.00	0.54	13.5	11	59.5	16	0	CIC
No. 2 Canyon	20000	15.20	60	2579.00	83.92	5.8	13	1v:2h	0.038	7.36	0.78	---	--	---	--	--	HBC
Reference Area 2 Pole Canyon	10500	21.33	60	737.37	33.78	4.3	10	--	0.035	5.45	0.55	12	20	57	8.5	2.5	CIC
S½ Section 5	10600	12.64	75	292.92	86.08	3.43	13	1v:2h	0.037	6.38	0.91	--	--	--	--	--	IGC
Reference Area Section 14	8100	4.69	65	138.66	10.28	3.5	4	--	0.030	4.72	0.45	21.5	22	39	16	1.5	IGC

INPUT SUMMARY
FOR W.S.: USSS

STORM: WATERSHED:

DISTRIBUTION = SCS TYPE 2 LAND SLOPE = 35.3600 PCT
CURVE NUMBER = ~~74.00~~ 75.00
PRECIP.DEPTH = 2.74 IN CHANNEL LENGTH = 2800.00 FT
TIME OF CONC. = .2425 HR
DURATION = 24.00 HR AREA = ~~45.50~~ AC 60.61
NUMBER OF LINES = 758 D = .0323 HR

My It don't know why They used

OUTPUT SUMMARY

RUNOFF DEPTH = ~~.7477~~ IN .7947
INITIAL ABSTRACTION = ~~.7027 IN~~ .6666 in
PEAK FLOW = ~~36.90 CFS~~ 42.5 (~~.6735~~ IFH)
AT T = 12.57 HRS .7282

INPUT SUMMARY
FOR W.S.: USSS2

STORM: WATERSHED:

DISTRIBUTION = SCS TYPE 2 LAND SLOPE = 36.3000 PCT
CURVE NUMBER = 74.00
PRECIP.DEPTH = 2.74 IN CHANNEL LENGTH = 1610.00 FT
TIME OF CONC. = .1537 HR
DURATION = 24.00 HR AREA = 45.50 AC
NUMBER OF LINES = 1186 D = .0204 HR

OUTPUT SUMMARY

RUNOFF DEPTH = .7446 IN
INITIAL ABSTRACTION = .7027 IN
PEAK FLOW = 34.24 CFS (.7463 IFH)
AT T = 12.54 HRS

1. Additional acreage

		r/o) depth (25y) Vol.
SSSF Drainage	61.12 ac	.0536 ft.
? SSSF #2 Canyon Hillside	27.97	

at 10' A = 16,000 ft²

for every 1' rise in elev area inc by 16 ft²

at 10' A = 80 x 200

at 11' A = 84 x 204 = 17,136.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL Made in U.S.A.

Peak Runoff

Sunnyside Facilities Drainage

P = 1.84 (10y/24hr)	CN	Stream Length	Slope	Area	Q (in.)	Qp
6 SFD-1	94 [1]	1180	(.09+.03)/2 = .062	10.03	1.24 (.1033)	11.82
1 Und. Nth.	79*	1480	.151*	16.2	.43 (.036)	6.6
2 Und M	79*	1280	.151*	11.62	.43 (.036)	4.87
3 Und. So	79*	1300	.151*	10.71	.43 (.036)	4.48
4 SFD-2	88 [2]	1620	.187	12.75	.83 (.069)	10.85
5 SFD-3	79*	1040	(.125+.033)/2 = .079	9.57	.43 (.036)	3.86
6 #2 Canyon	61*	2400*	.252*	28.79	.045 (.004)	.15 cf
7 SD-1	74*	2472	.127	16.27	.278 (.023)	2.83
8 SD-2B	61*	640	.05	13.78	.045 (.004)	.07
9 SD-2A	61*	900	.043	15.5	.045 (.004)	.08
SD-3	79*	680*	.0740*	11.9	.429 (.036)	5.15

1. $\frac{4ac}{10.03ac} \times 98$ (Barf - Pavement) $+ \frac{6.03ac}{10.03ac} \times 91 = 94$

2. Barf - Grp B - Industrial = 88

* From submittal

NATIONAL 42-381 50 SHEETS 5 SQUARE 42-382 100 SHEETS 5 SQUARE 42-389 200 SHEETS 5 SQUARE Made in U.S.A.

Culvert + Ditch Calcs.

D-1 - Check against Trap Q — V = 6.48 ~~cfs~~ fps
n = .03 - vegetated channel D = 1.3'
C-1 - 36" CMP Headwater = 2' } ok

D-2 n = .032 V = 2.68 fps
$D_F = .3 + .7F_b = 1.0'$
C-2 18" CMP $H_W = .7$ .7 > .3 ∴ ok

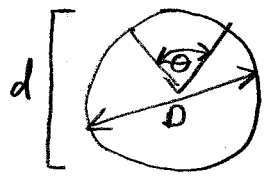
C-3 - 18" cmp 4.8 cfs $H_W = 1.4$ ok

C-4 - 24" cmp 4.8 cfs $H_W = 1.0$ ok

* C-5 - 24" CMP - Flow = 6.6 + 4.8 + 4.48 = 15.88 cfs $H_W = 2.36$ - (Nomograph)

$H_W > C_{dia}$

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$$



$n = .024$

$$A = \frac{D^2}{8}\left(2\pi - \frac{\pi\theta}{180} + \sin\theta\right)$$

$$R = \frac{45D}{\pi(360-\theta)}\left(2\pi - \frac{\pi\theta}{180} + \sin\theta\right)$$

$\theta = 4\cos^{-1}\sqrt{d/D}$

$\frac{1.18 \times 2}{2} = 2.36$

Culverts & Ditches

✓ C-6a Flow = C5 (15.88) + SFD-2 (10.85) = 26.73 cfs. 36" CMP

$H_w = 2.4' < C_{dia.}$

✓ C-6b Flow from office area = 11.82 cfs 30" CMP

$H_w = 1.6' < C_{dia.}$

✱ C-6c 24" CMP Flow from Peak for Area weighted CN & S_o = .43 Q = 36 cfs
Culvert will handle 22 cfs

Outlet Control

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$n = .024$

$$A = \frac{D^2}{8}\left(2\pi - \frac{\pi\theta}{180} + \sin\theta\right)$$

$\theta = 4\cos^{-1}\sqrt{d/D}$

$d = 1.13'$ (222) calculated from Ditch D-4 geometry and "Peak" program flow of 32 cfs (pg 4)

B.S.

$$\text{Area} = \frac{2^2}{8}\left(2\pi - \frac{\pi 165}{180} + \sin\theta\right)$$ (222)

$\theta = 4\cos^{-1}\sqrt{1.13/2}$
$= 165.06$ (222)

(10.31) Area = 1.83 ft² (1.74) $A = \pi r^2$ $r = 1$ $A = 3.14$

$\frac{A}{P}$ 3.14 $1 = R$

$P = \pi R =$

$$R = \frac{45D}{\pi(360\cdot\theta)}\left(2\pi - \frac{\pi\theta}{180} + \sin\theta\right)$$ (1.73)

$$= \frac{45(2)}{\pi(360\cdot 165)}(3.66)$$ (222)

$R = .0018$ (.0006)

$$Q = \frac{1.486}{.024}(1.83)(.0018)^{2/3}(.032)^{.5}$$ (.0048)

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

Q = 21.9 cfs

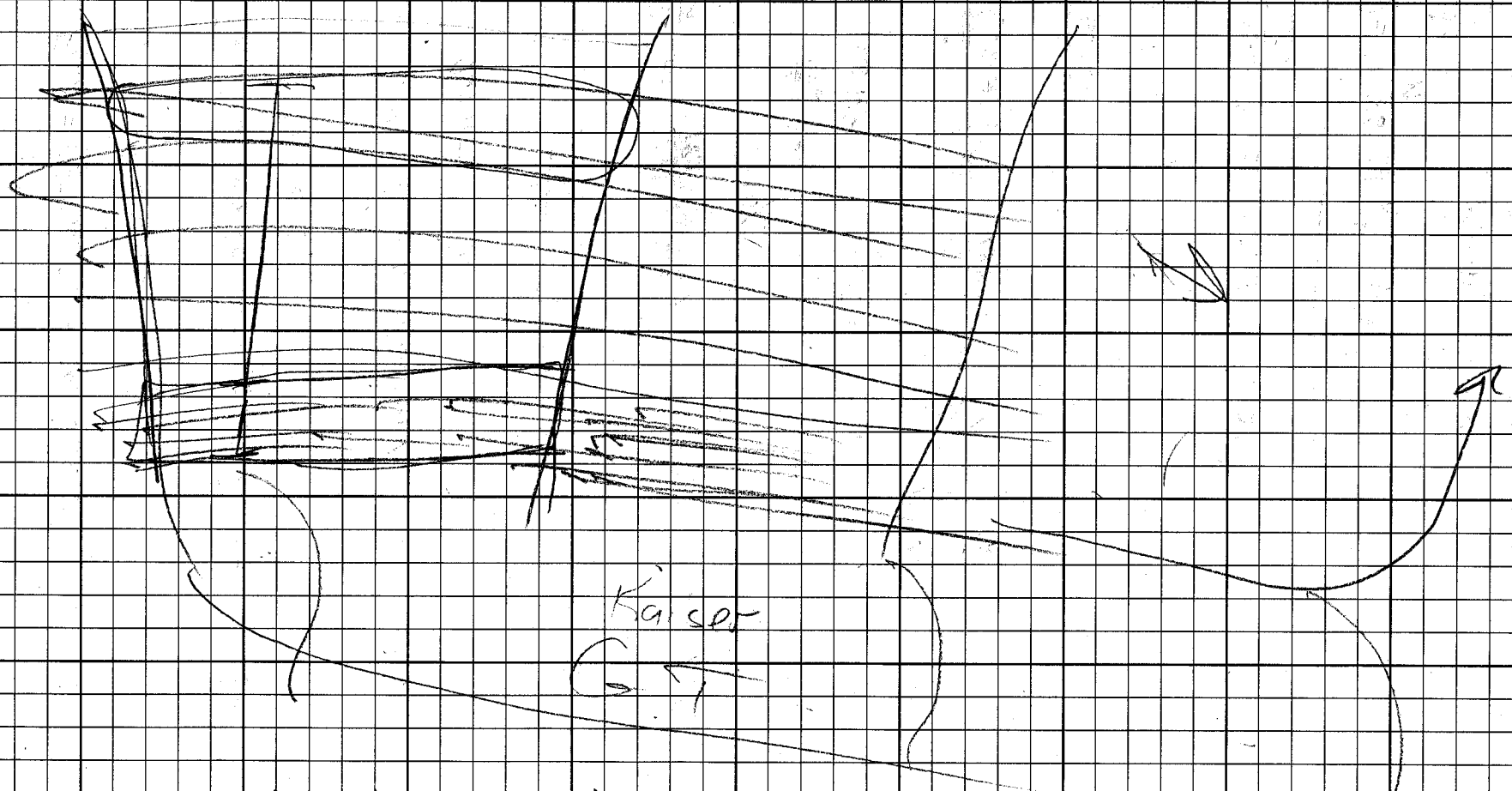
$r = 1.0'$

$A = \pi r^2 = 3.14$

$R = \frac{A}{P}$ P = circum pipe - when pipe full flow

$P = 2\pi r =$

$R = \frac{3.14}{6.28} = .4997$



$$\frac{(\text{Length})\ (\text{Ctr Interval})}{\text{Area of W.S.}}$$

Peak for upper area

Area	CN	Acres	% of Area	CN x %
SFD-1	94	10.03		15.5
SSSFUnd-N	79	16.2		21
Und.-M	79	11.06		14.4
Und-S	79	10.72		14
SFD-2	88	12.75		18.5
	Total	60.76		
SFD-3				83
#2 can.				
SLDA-1				
SLD 2A				
2B				
SLD-3		11.98		

38cfs

Peak Input

Ave Slope = .14

Stream length = 2,548

Area = 60.76ac

CN = 83 → Wang Peak = 31.99cfs ~ 32cfs

Runoff = 2.962 ac-ft.

Adjust slope by Hooper method.

$$S_w = \frac{(\text{Contour Length})(\text{Contour Interval})}{\text{Area of W.S.}}$$

$$= \frac{(45{,}742.2')(25')}{60.76\text{ac} \times \frac{43{,}560\text{ft}^2}{\text{ac}}} = 0.43$$

Peak -
Q = 36.19cfs.

Culvert + Ditches

C-7 - Flow of .15 cfs - 12" CMP - that doesn't go below 1 cfs ok

* C-8 36" CMP - Flow from Upper Facilities area = 36 cfs < 51 cfs ok

Outlet Control $Hw = 3' + .2' = \underline{3.2'}$

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

$Q = \frac{1.486}{.024} 7.07 \cdot .75^{2/3} \cdot .02^{1/2}$

$Q = \underline{51 \text{ cfs}}$

$n = .024$
$A = \pi r^2$
$R = \frac{A}{P}$ $P = 2\pi r$
$S = .02$

C-9 36" CMP - Flow 36 cfs Hw 3.0' - culvert will be running full.

C-10 48" CMP - Flow 39 cfs Hw 2.8' < CMP Dia ok

C-11 12" CMP - .03 cfs ok

C-12 36" CMP - Flow 15 cfs Hw 2.0' < CMP Dia ok

Ditches

	Q	Flow Depth	Ditch Depth	Freeboard	Velocity	
✓ D-1	15.45	0.58	1.3'	.8	6.48	
D-2	36	1.4+.2	1.0	~~1.0~~	6.6	Undersized
D-3						
* D-4	36	1.2+.2	1.7 (1.5 from submittal)	.3	5.5	Undersized - F.B.
D-5	36+2.5	1.25+.2	1.75 (1.6)	.3	5.5	Undersized F.B.
✓ D-6	38.5	1.24+.2	1.74 (1.8)	.3	5.6	

Drawing A4-0170

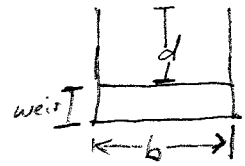
$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$S = .02$

$n = .02$ - concrete

$A = bd$

$R = \frac{bd}{b + 2d}$



$$Q = \frac{1.486}{.020} 5 (.789)^{2/3} .02^{1/2}$$

$A = 3.333 \times 1.5'$

$= 5 ft^2$

$R = .789$

$Q = 44.8$ cfs

$Q_{design} = 38$ cfs $< Q$

structure will pass flow

NATIONAL 42-381 50 SHEETS 5 SQUARE 42-382 100 SHEETS 5 SQUARE 42-389 200 SHEETS 5 SQUARE Made in U.S.A.

Planimeter program Date: 07-28-1986 Time: 14:32:57

Region 1 (MAP SCALE: 1 inch= 200 feet)

SFD-1

AREA		total	PERIMETER		total
SQ. MILES:	0.016	0.016	MILES:	0.582	0.582
ACRES:	10.034	10.034	YARDS	1,024.254	1,024.254
SQ. FEET:	437,078.700	437,078.700	FEET:	3,072.763	3,072.763
SQ. YARDS:	48,564.300	48,564.300	METERS:	936.533	936.533
SQ IN(map)	10.927	10.927	INCHES (map):	15.364	15.364
SQ. METER:	40,605.940	40,605.940			

Planimeter program Date: 07-28-1986 Time: 14:36:58

SSSF Undisturbed N.

Region 1 (MAP SCALE: 1 inch= 200 feet)

AREA		total	PERIMETER		total
SQ. MILES:	0.025	0.025	MILES:	0.957	0.957
ACRES:	16.207	16.207	YARDS	1,684.810	1,684.810
SQ. FEET:	705,959.300	705,959.300	FEET:	5,054.431	5,054.431
SQ. YARDS:	78,439.930	78,439.930	METERS:	1,540.516	1,540.516
SQ IN(map)	17.649	17.649	INCHES (map):	25.272	25.272
SQ. METER:	65,585.770	65,585.770			

Region 2 (MAP SCALE: 1 inch= 200 feet)

SSSF Un. M

AREA		total	PERIMETER		total
SQ. MILES:	0.017	0.043	MILES:	0.583	1.541
ACRES:	11.059	27.266	YARDS	1,026.531	2,711.341
SQ. FEET:	481,733.800	1,187,693.000	FEET:	3,079.593	8,134.024
SQ. YARDS:	53,525.980	131,965.900	METERS:	938.614	2,479.130
SQ IN(map)	12.043	29.692	INCHES (map):	15.398	40.670
SQ. METER:	44,754.530	110,340.300			

Region 3 (MAP SCALE: 1 inch= 200 feet)

SSSF Und S

AREA		total	PERIMETER		total
SQ. MILES:	0.017	0.059	MILES:	0.681	2.221
ACRES:	10.721	37.987	YARDS	1,198.180	3,909.521
SQ. FEET:	467,011.200	1,654,704.000	FEET:	3,594.540	11,728.560
SQ. YARDS:	51,890.140	183,856.000	METERS:	1,095.562	3,574.692
SQ IN(map)	11.675	41.368	INCHES (map):	17.973	58.643
SQ. METER:	43,386.760	153,727.100			

Region 4 (MAP SCALE: 1 inch= 200 feet)

SFO-2

AREA		total	PERIMETER		total
SQ. MILES:	0.020	0.079	MILES:	0.817	3.038
ACRES:	12.750	50.737	YARDS	1,437.943	5,347.464
SQ. FEET:	555,395.200	2,210,100.000	FEET:	4,313.829	16,042.390
SQ. YARDS:	61,710.580	245,566.600	METERS:	1,314.791	4,889.483
SQ IN(map)	13.885	55.252	INCHES (map):	21.569	80.212
SQ. METER:	51,597.900	205,325.000			

Region 5 (MAP SCALE: 1 inch= 200 feet)

SFO-3

AREA		total	PERIMETER		total
SQ. MILES:	0.015	0.094	MILES:	0.532	3.570
ACRES:	9.569	60.306	YARDS	936.607	6,284.071
SQ. FEET:	416,829.100	2,626,929.000	FEET:	2,809.821	18,852.220
SQ. YARDS:	46,314.350	291,881.000	METERS:	856.392	5,745.875
SQ IN(map)	10.421	65.673	INCHES (map):	14.049	94.261
SQ. METER:	[illegible]	[illegible]			

Region 6 (MAP SCALE: 1 inch= 200 feet)

#2 Canyon Hillside

AREA		total	PERIMETER		total
SQ. MILES:	0.045	0.139	MILES:	1.097	4.667
ACRES:	28.786	89.092	YARDS	1,930.041	8,214.111
SQ. FEET:	1,253,922.000	3,880,851.000	FEET:	5,790.122	24,642.340
SQ. YARDS:	139,324.700	431,205.700	METERS:	1,764.743	7,510.618
SQ IN(map)	31.348	97.021	INCHES (map):	28.951	123.212
SQ. METER:	116,493.200	360,542.900			

Region 7 (MAP SCALE: 1 inch= 200 feet)

SOA 1

AREA		total	PERIMETER		total
SQ. MILES:	0.022	0.161	MILES:	1.056	5.723
ACRES:	14.035	103.127	YARDS	1,858.812	10,072.920
SQ. FEET:	611,359.400	4,492,210.000	FEET:	5,576.435	30,218.770
SQ. YARDS:	67,928.820	499,134.500	METERS:	1,699.614	9,210.232
SQ IN(map)	15.284	112.305	INCHES (map):	27.882	151.094
SQ. METER:	56,797.150	417,340.000			

Planimeter program Date: 07-28-1986 Time: 14:54:40

Region 1 (MAP SCALE: 1 inch= 200 feet)

SD-1

AREA		total	PERIMETER		total
SQ. MILES:	0.025	0.025	MILES:	1.281	1.281
ACRES:	16.275	16.275	YARDS	2,254.625	2,254.625
SQ. FEET:	708,928.000	708,928.000	FEET:	6,763.875	6,763.875
SQ. YARDS:	78,769.780	78,769.780	METERS:	2,061.529	2,061.529
SQ IN(map)	17.723	17.723	INCHES (map):	33.819	33.819
SQ. METER:	65,861.560	65,861.560			

Region 2 (MAP SCALE: 1 inch= 200 feet)

SD-2B

AREA		total	PERIMETER		total
SQ. MILES:	0.022	0.047	MILES:	0.756	2.037
ACRES:	13.782	30.056	YARDS	1,330.210	3,584.836
SQ. FEET:	600,326.400	1,309,254.000	FEET:	3,990.631	10,754.510
SQ. YARDS:	66,702.930	145,472.700	METERS:	1,216.285	3,277.814
SQ IN(map)	15.008	32.731	INCHES (map):	19.953	53.773
SQ. METER:	55,772.150	121,633.700			

Region 3 (MAP SCALE: 1 inch= 200 feet)

SD-2A

AREA		total	PERIMETER		total
SQ. MILES:	0.024	0.071	MILES:	0.693	2.730
ACRES:	15.502	45.559	YARDS	1,220.466	4,805.302
SQ. FEET:	675,275.500	1,984,530.000	FEET:	3,661.397	14,415.900
SQ. YARDS:	75,030.610	220,503.300	METERS:	1,115.940	4,393.753
SQ IN(map)	16.882	49.613	INCHES (map):	18.307	72.080
SQ. METER:	62,735.150	184,368.900			

Planimeter program Date: 07-31-1986 Time: 08:28:50

Region 1 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.120	0.120
YARDS	211.347	211.347
FEET:	634.040	634.040
METERS:	193.246	193.246
INCHES (map):	3.170	3.170

Region 2 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.142	0.262
YARDS	250.585	461.932
FEET:	751.756	1,385.796
METERS:	229.124	422.370
INCHES (map):	3.759	6.929

Region 3 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.158	0.421
YARDS	278.412	740.344
FEET:	835.235	2,221.031
METERS:	254.567	676.937
INCHES (map):	4.176	11.105

Region 4 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.168	0.589
YARDS	296.070	1,036.414
FEET:	888.211	3,109.241
METERS:	270.713	947.651
INCHES (map):	4.441	15.546

Region 5 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.219	0.808
YARDS	384.994	1,421.408
FEET:	1,154.981	4,264.222
METERS:	352.021	1,299.672
INCHES (map):	5.775	21.321

Region 6 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.214	1.022
YARDS	376.938	1,798.346
FEET:	1,130.814	5,395.036
METERS:	344.655	1,644.327
INCHES (map):	5.654	26.975

Region 7 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.396	1.418
YARDS	697.836	2,496.181
FEET:	2,093.507	7,488.543
METERS:	638.070	2,282.397
INCHES (map):	10.468	37.443

Region 8 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.469	1.887
YARDS	824.665	3,320.846
FEET:	2,473.995	9,962.537
METERS:	754.037	3,036.433
INCHES (map):	12.370	49.813

Region 9 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.434	2.321
YARDS	763.346	4,084.192
FEET:	2,290.038	12,252.570
METERS:	697.969	3,734.403
INCHES (map):	11.450	61.263

Region 10 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.332	2.653
YARDS	584.741	4,668.933
FEET:	1,754.224	14,006.800
METERS:	534.661	4,269.064
INCHES (map):	8.771	70.034

Region 11 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.297	2.949
YARDS	522.128	5,191.061
FEET:	1,566.384	15,573.180
METERS:	477.411	4,746.475
INCHES (map):	7.832	77.866

Region 12 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.310	3.259
YARDS	545.506	5,736.566
FEET:	1,636.517	17,209.700
METERS:	498.786	5,245.261
INCHES (map):	8.183	86.049

Region 13 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.323	3.582
YARDS	568.133	6,304.699
FEET:	1,704.399	18,914.100
METERS:	519.475	5,764.737
INCHES (map):	8.522	94.570

Region 14 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.310	3.892
YARDS	545.142	6,849.841
FEET:	1,635.425	20,549.520
METERS:	498.453	6,263.190
INCHES (map):	8.177	102.748

Region 15 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.292	4.184
YARDS	513.770	7,363.611
FEET:	1,541.309	22,090.830
METERS:	469.768	6,732.958
INCHES (map):	7.707	110.454

Region 16 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.287	4.471
YARDS	505.778	7,869.388
FEET:	1,517.333	23,608.170
METERS:	462.460	7,195.418
INCHES (map):	7.587	118.041

Region 17 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.281	4.752
YARDS	495.010	8,364.399
FEET:	1,485.031	25,093.200
METERS:	452.616	7,648.033
INCHES (map):	7.425	125.466

Region 18 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.283	5.036
YARDS	498.791	8,863.189
FEET:	1,496.372	26,589.570
METERS:	456.072	8,104.105
INCHES (map):	7.482	132.948

Region 19 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.289	5.325
YARDS	509.095	9,372.285
FEET:	1,527.286	28,116.850
METERS:	465.494	8,569.599
INCHES (map):	7.636	140.584

Region 20 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.277	5.603
YARDS	488.314	9,860.599
FEET:	1,464.943	29,581.800
METERS:	446.493	9,016.092
INCHES (map):	7.325	147.909

Region 21 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.275	5.878
YARDS	483.942	10,344.540
FEET:	1,451.826	31,033.620
METERS:	442.495	9,458.587
INCHES (map):	7.259	155.168

Region 22 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.278	6.155
YARDS	488.810	10,833.350
FEET:	1,466.431	32,500.050
METERS:	446.946	9,905.533
INCHES (map):	7.332	162.500

Region 23 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.272	6.428
YARDS	479.054	11,312.410
FEET:	1,437.161	33,937.220
METERS:	438.025	10,343.560
INCHES (map):	7.186	169.686

Region 24 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.270	6.697
YARDS	474.546	11,786.950
FEET:	1,423.638	35,360.850
METERS:	433.904	10,777.460
INCHES (map):	7.118	176.804

Region 25 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.252	6.949
YARDS	442.840	12,229.790
FEET:	1,328.520	36,689.370
METERS:	404.913	11,182.380
INCHES (map):	6.643	183.447

Region 26 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.251	7.200
YARDS	442.475	12,672.270
FEET:	1,327.425	38,016.800
METERS:	404.579	11,586.950
INCHES (map):	6.637	190.084

Region 27 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.241	7.441
YARDS	424.456	13,096.720
FEET:	1,273.368	39,290.170
METERS:	388.104	11,975.060
INCHES (map):	6.367	196.451

Region 28 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.239	7.681
YARDS	421.321	13,518.040
FEET:	1,263.963	40,554.130
METERS:	385.237	12,360.300
INCHES (map):	6.320	202.771

Region 29 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.227	7.907
YARDS	398.721	13,916.770
FEET:	1,196.164	41,750.290
METERS:	364.573	12,724.870
INCHES (map):	5.981	208.751

Region 30 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.221	8.128
YARDS	388.789	14,305.550
FEET:	1,166.367	42,916.660
METERS:	355.491	13,080.360
INCHES (map):	5.832	214.583

Region 31 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.228	8.356
YARDS	400.743	14,706.300
FEET:	1,202.230	44,118.890
METERS:	366.422	13,446.780
INCHES (map):	6.011	220.594

Region 32 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.211	8.567
YARDS	371.095	15,077.390
FEET:	1,113.284	45,232.170
METERS:	339.312	13,786.090
INCHES (map):	5.566	226.161

Region 33 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.202	8.769
YARDS	355.437	15,432.830
FEET:	1,066.310	46,298.480
METERS:	324.995	14,111.090
INCHES (map):	5.332	231.492

Region 34 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.174	8.942
YARDS	305.583	15,738.410
FEET:	916.748	47,215.230
METERS:	279.411	14,390.500
INCHES (map):	4.584	236.076

Region 35 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.122	9.064
YARDS	214.559	15,952.970
FEET:	643.677	47,858.900
METERS:	196.183	14,586.680
INCHES (map):	3.218	239.295

Region 36 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.104	9.168
YARDS	182.491	16,135.460
FEET:	547.472	48,406.380
METERS:	166.861	14,753.550
INCHES (map):	2.737	242.032

Region 37 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.089	9.257
YARDS	157.123	16,292.580
FEET:	471.369	48,877.750
METERS:	143.666	14,897.210
INCHES (map):	2.357	244.389

Region 38 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.074	9.331
YARDS	130.539	16,423.120
FEET:	391.616	49,269.370
METERS:	119.359	15,016.570
INCHES (map):	1.958	246.347

Region 39 (MAP SCALE: 1 inch= 200 feet

	Line Lengths	total
MILES:	0.020	9.351
YARDS	34.337	16,457.460
FEET:	103.010	49,372.380
METERS:	31.396	15,047.970
INCHES (map):	0.515	246.862

Do you want to DIGITIZE another area? (y-n)

To: Coal File
From: James R Fricke
RE: Kaiser Coal Corporation, Sunnyside Mine, ACT/007/007, Folder #3, Sunnyside Surface Facility Pond, Carbon County, Utah

The applicants proposal for drainage control of the Sunnyside facilities area is not adequate. The applicant proposes to utilize the east slurry cell as a sediment treatment pond. The east slurry cell does not meet the requirements of UMC 817.46 (d)(i). Furthermore, the proposal does not justification for using the east slurry cell as a sediment pond. The applicant should address all the requirements of UMC 817.46 for the east slurry cell. ~~Although~~ the cell is sized for total containment of a 100 year - 24 hour event occuring over 38.56 acres. Additional runoff would be added to the pond due to adding the facilities ~~acc~~ acreage. The applicant plans to ~~use~~ decant water from the slurry cell via a water hauling truck. The water would be discharged on the roads, or at discharge point 004 if it meets effluent requirements. The proposal does not give any information as to the ability of the water to meet effluent limitations. Discharging the water onto the roads would not be acceptable if the roads were already wet due to a rainfall event.

In a June 3, 1986 letter to the Division the surface applicant states that the proposed Sunnyside Facilities Pond would be undersized due to adding the undisturbed area runoff to the pond. In the letter the applicant states that the undisturbed area clear water diversion ditch cannot be constructed due to leaving the railroad tracks in place. Examination of Plate III-12 shows that the applicant will be diverting undisturbed runoff to the culverts C-3 and C-4. It appears that the applicant can divert all of the undisturbed runoff ~~to~~ off the permit area except ~~10.5~~ runoff from 10.54 acres. The Division finds that this area would contribute only:

$$10.54\,ac \times \frac{43{,}560\,ft^2}{ac} \times \frac{0.4292\,in}{12\,in/ft} = 16{,}421.3\,ft^3$$ additional runoff to pond.

The above information came from the proposal dated July 14, 1986.

The pond would have a volume of 114,036 ft^3, the runoff and sediment ~~a~~ volume ~~w~~ would be 113,948 ft^3 (Append III-1).

To accomodate the additional volume of 16,421.3 ft^3 of runoff the pond would have to be:

For every 1 ft inc in pond height the area increases by 16 ft^2.
At a pond height of 10 feet the area is: 80 x 200
By increasing the dam height 1 ft, the volume would be $84 \times 204 \times 1 = 17{,}136\,ft^3$.

Therefore by increasing the proposed pond height by one foot there would be enough volume to contain the extra undist. drainage.

✓ - ~~Calculate~~ Check old proposed SSSF pond for
- area - pond capacity
- location
- add new area and check pond cap.

Doug,

Maps

✓ Why test SLD Area 1, 2 & 3

X What storm goes with which depth

Icelander - ~~By overlays, it says~~

- No sediment calcs. & slurry calcs to each cell during storm

Plate 3-23 X What is vol of east slurry cell - ~~what~~ at what elevation is the 4.2 feet of freeboard - so I can calc. vol.

✓ Asphalt ~~in~~ Append III-1 says 2.1 ac & CN = 98
in Submitted says .91 ac = 95

Stip 8/7.91-93 cell vol in stip presentation was 81 vol from plate 3-23

✓ Culvert C-6a - where CN calcs for prep plant area.

✓ SSSF Upper Hillside will it be routed thru the Culvert C-1 - Where's calcs for C-1 is it installed & approved on this submittal

? X Acreage for SSSF Drainage does not agree with acreage from last years submittal

Will slurry settle or will you need a filter

X How are you going to pump clean water out of east slurry cell to discharge. Design for pump station.

Need a blow up of culvert mess by #2 Canyon drainage outlet

Why not divert the 38.04 acres south of SSSF Upper Hillside away from permit area. Shot crete ditch - last portion damn near vertical

Railroad Ditch as shown takes runoff out of permit area. Does it and how does runoff from Slurry Ditch A1 enter the slurry ditch - Need ~~a~~ ~~Decon~~ Key on ~~cross section~~ what is WFD, ID - is WFD & D-5 ~~the same~~

At cross-section C-C ~~how~~ where does west face drainage go & how does it go thru railroad berm and culvert C-8

C8 West facing runoff

24" culvert from slurry plant (North of culvert C6c) - where is calcs for this culvert.

Ditch D-2 is noted on ~~the~~ Table of having only .15 cfs in it this contradicts statement in the SSSF Drainage page.

SSSF #2 Canyon Hillside - says Ditch D-3 says that flow from Upper Hillside (.15 cfs) is routed thru this Ditch - which map shows D-1 containing Upper Hillside, also ~~drainage~~ runoff from Upper Hillside is 14.9 cfs - Locate accurately on Map Ditch-2+3

X What will convey flow from C-3 to C-4, if its a ditch ~~it no~~ where are the calcs & label of ditch
also C-4 to C-5

- Culvert C-6c - Total flow on ~~the~~ Culvert Summary is shown as 18.58 cfs - total flow should be flow from C-6b and C-6a which would be 18.58 + 18.58 = 37.16 cfs to determine headwater for a outlet control culvert
- C-6c - Area weighted CN = 83 Q_p = 36 cfs, culvert will only pass 22 cfs - <u>undersized</u> this doesn't take into account slurry of .2' - need ~~this in~~ a value from ~~backup~~ → slurry plant in cfs.
  C-7 - Two on map - 1 on Plate III-27 & one on III-12 different culvert locations
- C-8 Headwater of 3.2' - outlet control need a drawing to show Hw depth & ditch depth & water profile upstream of culvert mouth.

✓ Ditch D-2 - Plate III-12 shows a Ditch D-2 or Culvert C6C which is it & is undersized for Division calc peak flow from Facilities area.

values for ditches

✓ Hillside Diversion ~~for~~ West facing Hillside drainage area ~~has~~ no design specs or calculations.

✓ Ditch D-3 cannot be located on maps

✓ Profiles of all ditches & typical section

✓ D-4 Division calc flow of 36 cfs = Depth of flow 1.2 + .2 from Sheet 4
= 1.4' + .3' = 1.7' ditch depth

- D-5 undersized for freeboard at 38.5 cfs

- Need channel slope + n ~~values for~~

Kaiser Calcns on Old Coarse Refuse Pnd.

63.3 w3

$A = RKLSCP$

$= \cancel{28.86\ T/A}$

$(20)(.28)(4.2)(.65)$

$\boxed{A = 15.29\ T/A/yr.}$

(.28) (16) $R = \cancel{35}\ 20$

subsoil $\cancel{37} = K = ?\ \cancel{.49}$ - my interpretation

(4.2) $\cancel{6.0} = LS = ??$ I get an ave slope of 24%

(.54) $CP = ?\ .65 = 1.2$ road + .32 slope/2%

may change LS factor significantly

Ave length = 125' @ ~~24% slope~~ 20% slope

SDR = 65% pg 355 Area = .0106 sq mi

$(A)(SDR) = \boxed{9.94\ T/A/yr} \times 6.8\ ac = \boxed{67.59\ T/yr. = \text{Sed. yield}}$

Contributing Area:

.369
.379
.377
$\boxed{.375}\ in^2$

$\cancel{.375\ in^2 \times \frac{1\ ft^2}{144\ in^2} \times \frac{1\ ac}{43560\ ft^2}}$

$\cancel{375'\ wide \times 2{,}125'\ long = 796{,}875\ ft^2 \times \frac{1\ ac}{43560} = 18\ ac?}$

3" x 3" sq yields - .955 in²
.953
.936
.948

$\cancel{3 \times 3}\ \frac{3\ in^2}{.948} = \frac{?}{.375} \rightarrow 1.1867 \Rightarrow 1.19\ in^2 \times \frac{(500\ ft)^2}{1\ in^2} \times \frac{1\ ac}{43560\ ft^2} = \boxed{6.8\ ac}$

$V_{10/24} = 17{,}995\ ft^3$ using 6.8 ac → $.729\ in \times 10 \times \frac{1\ ft}{12\ in} \times 6.8\ ac \times \frac{43560\ ft^2}{1\ ac}$

$V_{25/24} = 24{,}684\ ft^3$

$S_y = \frac{(SY)\ (lbs/Tons)}{(lbs/ft^3)(43{,}560\ ft^2/ac)} = \frac{(67.6\ T)(2000\ lbs/Ton)}{(93.55\ lbs/ft^3)(43{,}560\ ft^2/ac)} = 1445\ ft^3$

Pond size

4" x 4" sq 1st contour — Plan red = 1.632
1.633
1.654
1.64

$\frac{(200')^2}{1.64\ sq\ in} = \frac{?}{.063\ in\ sq} = 1{,}536\ sq\ ft$

.030	.347
.052	.292
.108	.336
.063	.325

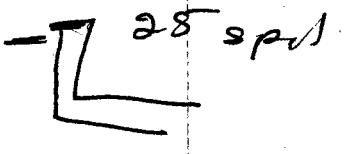
2nd contour

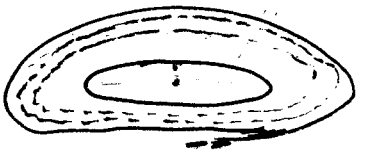
$\frac{(200')^2}{1.64\ in^2} = \frac{?}{.325\ in^2} = 7{,}928\ sq\ ft$

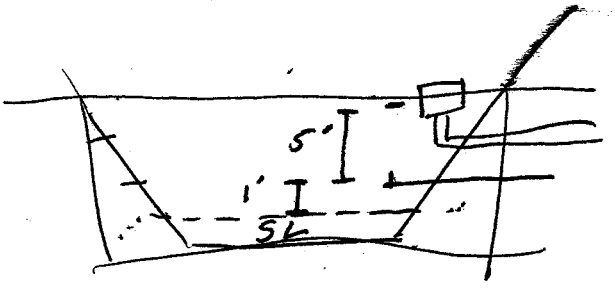
Kaiser Calcns for OCR Pnd

h of sediment = ~~1536~~ $\frac{1445\ ft^3}{1536\ ft^2} = .94'$

h of 25y/24h storm = $\frac{24{,}684\ ft^3}{7{,}927\ ft^2} = 3.1'$







Ot Kaiser - Old Coarse Refuse Sed Pond.

Inslope + Outslope gradient = 2:1 + 2.33:1 = 4.33:1

master plan map orientation of pond to area

No information found on ~~height~~ elevation of decant device or elevation of ~~principal~~ emergency spillways see original plan

1. Check sed yield
2. Check sed vol to pond
3. Size decant
4.

LS factor - used uniform slope method

43560#

- pg 2 of 4 ~~for~~ in Append III, errors on runoff and discrepancies on slope and length
- Where did ~~precip~~ design storm ~~precipitation~~ runoff volumes values come from pg 1 of 4 in append III

1,50

Doug 888-4421

- Need a map of the contributing area for the OCRP. Could make it scale of 1:500
- could we go up there Mon morn before the groundwater shut course.

- LS factor - How did you come up with your #. if used 117.5 feet for slope length where did you come up with the 117.5 ft.

K value - Jim using 0.49 - what did you use

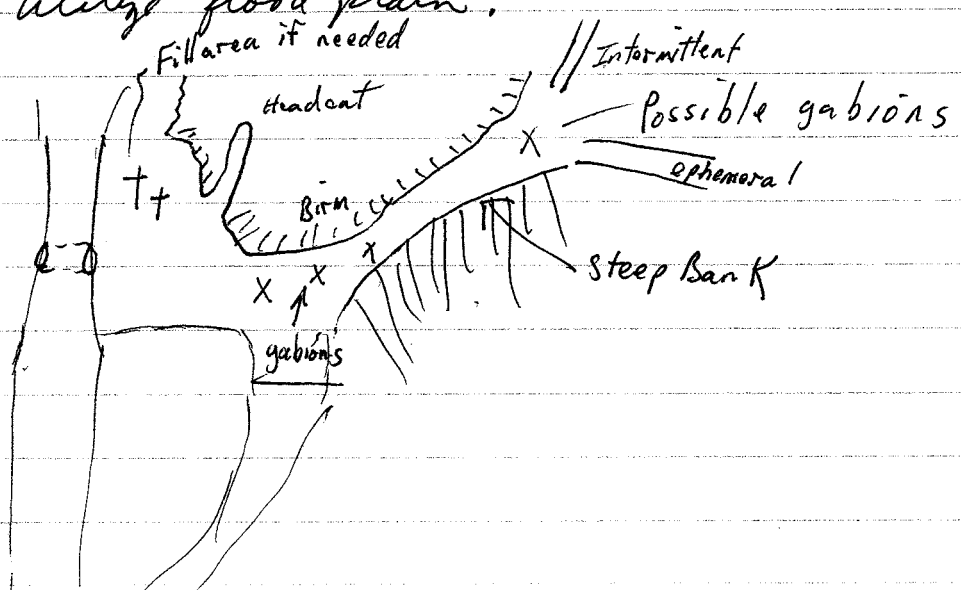
Kaiser - Reclaim of Sed. Pond

- Storm Size
  - Drainage area
  - Precip
  - CN
  - Soils - embankment (Topsoil)

- Slope

- Sequence / Spillway is breached already

- Xsects + profile of stream - 100yds upstream & down to culvert. Map w 5' contours of area.
- Pull pond embankments down to 3:1
- Install gabion structures upstream of culvert (natural no wire)
- Create flood plain for 10y + events
- May or may not need gabion in area where ephemeral & intermittent come together
- Try and build up stream elevation to be able to utilize flood plain.



FTS-9M

NATIONAL
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
Made in U.S.A.

ameled iron, or stainless steel. They should be fastened securely to a vertical wall, column, or other well-anchored support. For best visibility, staff gages should be separated from the high-velocity area in the stream. They should be referenced carefully to a permanent elevation marker and the recorder datum for ease in checking the gage setting after frost and ice periods, which may damage or loosen the support. Reservoir staff gages often are fastened to an inclined timber, metal, or concrete surface. This surface must be graduated carefully and placed accurately to insure correct stage readings. The location and setting of stage gages for weirs, flumes, and gaging stations should follow recommendations in appropriate handbooks (*23, 41*).

Crest gages.—These gages are an inexpensive means of determining maximum stage when no observer is present. They indicate the maximum stage reached between visits of the observer and provide useful information for computing peak discharge of flood events. They are located with reference to bridges, culverts, spillways, and stable streambank sections for which stage-discharge relationships can be obtained.

A commonly used crest gage consists of a well-anchored 2-inch (5 cm) galvanized pipe with a perforated cap on the bottom and a fill cap or pipe cap with vent hole on top. A length of thin-wall conduit or a wood measuring stick is placed within the pipe, as shown in figure 2.42. Extreme caution should be taken when inserting a wood stick since rapid lowering may cause a false high water measure. A supply of powdered or granulated cork in the pipe rises with the water level and adheres to the measuring rod, thus recording maximum water level. A graduated rod simplifies reading of high water levels. The cap should be locked or fastened securely for protection against vandalism. Figure 2.43 shows a typical crest gage installation.

Float-Type Recording Gages

Many float-actuated water-level recorders are available from instrument manufacturers. The recorder and accessories best suited for a specific site depend on (1) the time interval between chart changes and clock servicing, (2) expected maximum rate of stage changes, (3) available funds for site instrumentation, (4) importance of continuous records, (5) accuracy required in flow computations, and (6) compatibility with other instrumentation in the total program. Drum-type recorders are much cheaper, require weekly servicing, and are less compatible with other hydrologic instrumentation. Therefore, more expensive strip-chart recorders usually are used at remote locations where continuous records are necessary.

The water-level recorder should be equipped with a graduated float tape and index pointer to enable the observer to check the recorder pen reading against the actual water level in the stilling well and on the outside staff gage. Careful calibration of the water-level recorder before field installation will prevent inaccurate data from being recorded. Proper calibration and adjustment assure that (1) pen reversals occur at the appropriate edge of the printed chart, (2) the pen arm is the proper length and applies proper pen-inking pressure, (3) binding in the bearings or misalinement in the mechanism does not occur, (4) the pen follows the chart lines on the full traverse, (5) no recorder parts are missing or damaged, and (6) the clock is timed properly.

Field installation should follow instructions provided with the recorder. Detailed planning of the field installation should provide:

- Manufacturer's installation instructions.
- Careful packing of the recorder and accessories for safe transport.
- Proper tools to complete the installation.
- Adequate personnel to establish a precise recorder level datum.
- Necessary equipment for a field calibration.

Drum-type recorders.—Vertical or horizontal drum-type recorders are used in runoff studies on small watersheds and plots where visits are scheduled to the site weekly or more frequently. These recorders may be driven by spring-wound, falling-weight, or battery-powered clock mechanisms and usually are designed with interchangeable gear ratios for time and gage scales. The time scale varies with the anticipated maximum rate of change in stage. A 6-hour drum rotation (1 min resolution) may be needed on most plot studies. Most recorders have reversing mechanisms that do not limit

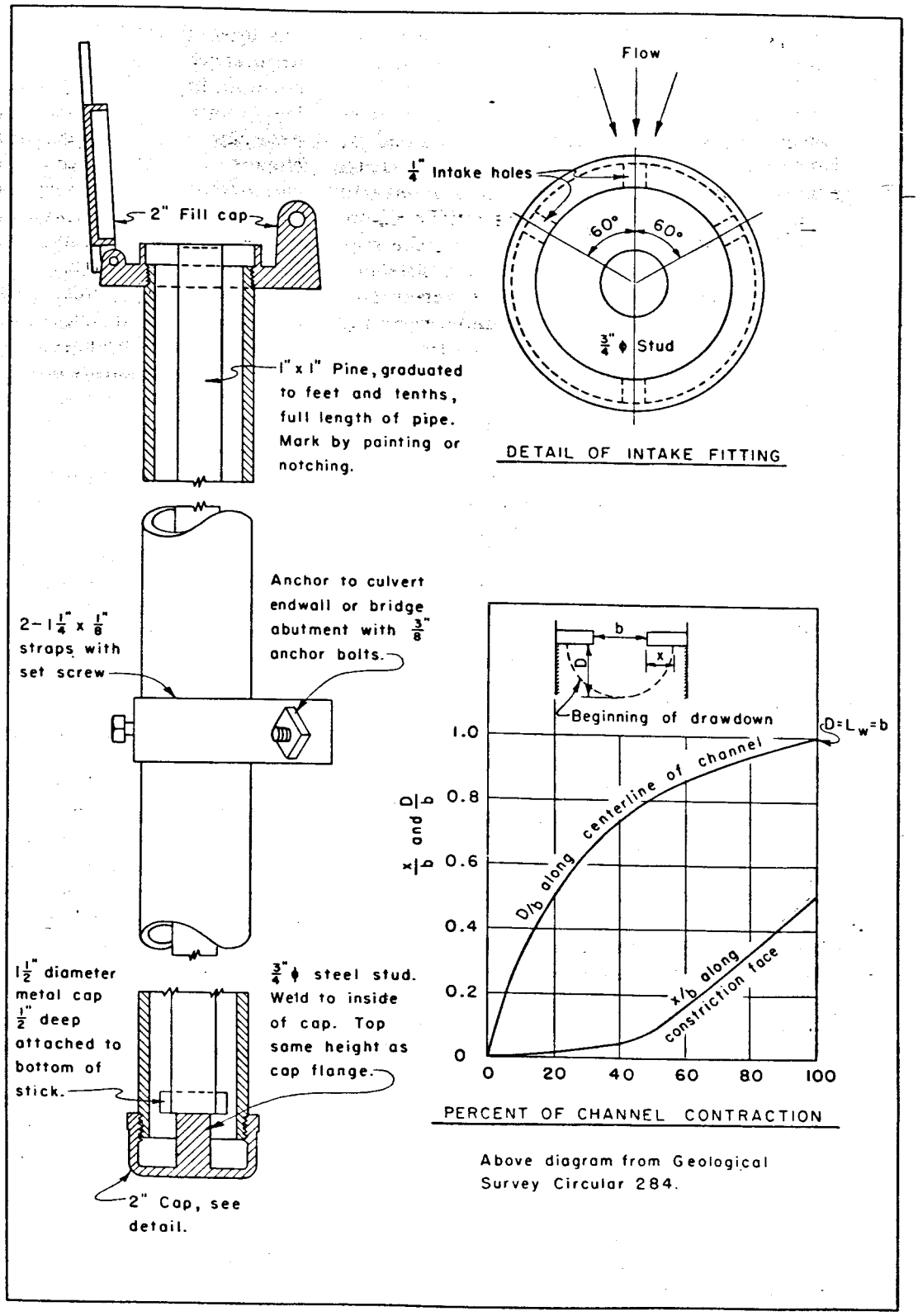
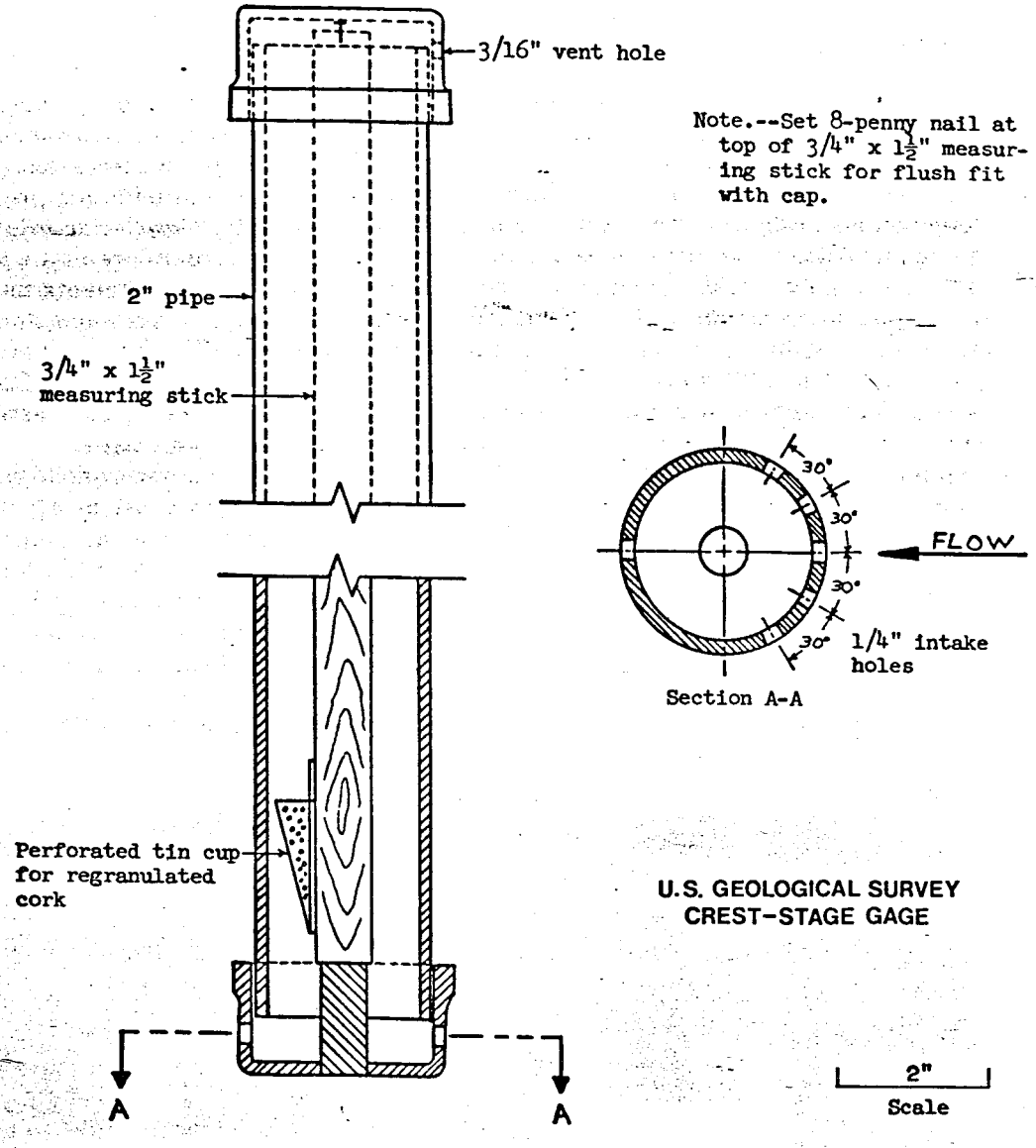
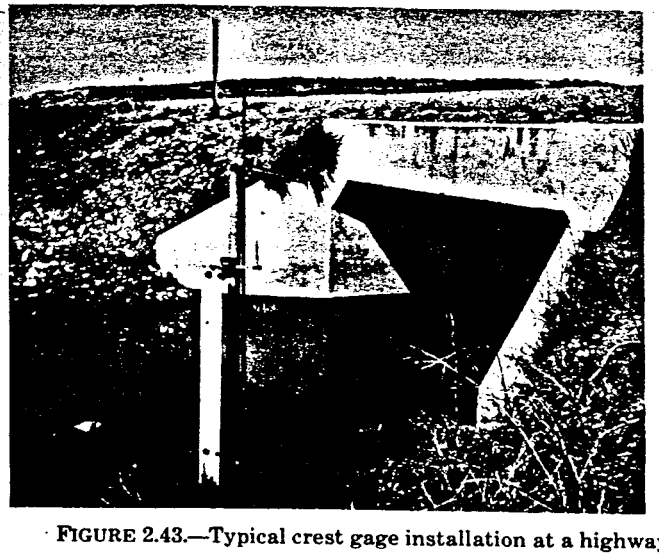


FIGURE 2.42.—Details of a maximum stage gage and its location.





PN-5890

FIGURE 2.43.—Typical crest gage installation at a highway bridge with detailed drawing.

the range in stage. Instruments have been adapted for self-starting in special studies (*15*).

Strip-chart recorders.—Most strip-chart recorders will operate unattended for a month or longer, depending on the length and speed of the chart. Clock and drive mechanisms usually are powered by a falling weight, a spring drive, or a battery. For unusual installations, chart speeds are available from about 1 inch (2.54 cm) to over 700 feet (213 m) per day. The range in stage may vary from a few inches to several hundred feet. The common A–35 recorder accommodates a strip chart 25 yards (23 m) long and usually is changed 1 to 12 times per year, depending on the chart speed selected.

The pen reverses at each chart margin to record a wide fluctuation in water level. Many floats, float tapes, float pulleys, time-scale gears, stage-scale gears, and driving mechanisms are available on order.

Catalogs describing strip-chart recorders are available at many Federal and State offices concerned with hydrologic measurements. Numerous publications explain suitable locations and successful installations (*7, 34*).

Digital punch recorders.—Digital punched tape recorders are battery-operated, paper-tape recording instruments that mechanically convert angular positions of a rotating shaft into a coded digital output. The primary actuating unit permits liquid level analog measurements to be digitally converted and recorded on punched paper tape.

The basic recorder (fig. 2.44) may be used in conjunction with many primary actuating devices for measuring and recording parameters. The liquid level recorder has been designed, however, to measure liquid level by a cable, drum, and float assembly similar to that used in drum and strip-chart recorders. The measurement source may be geared to the liquid level recorder to obtain a convenient ratio

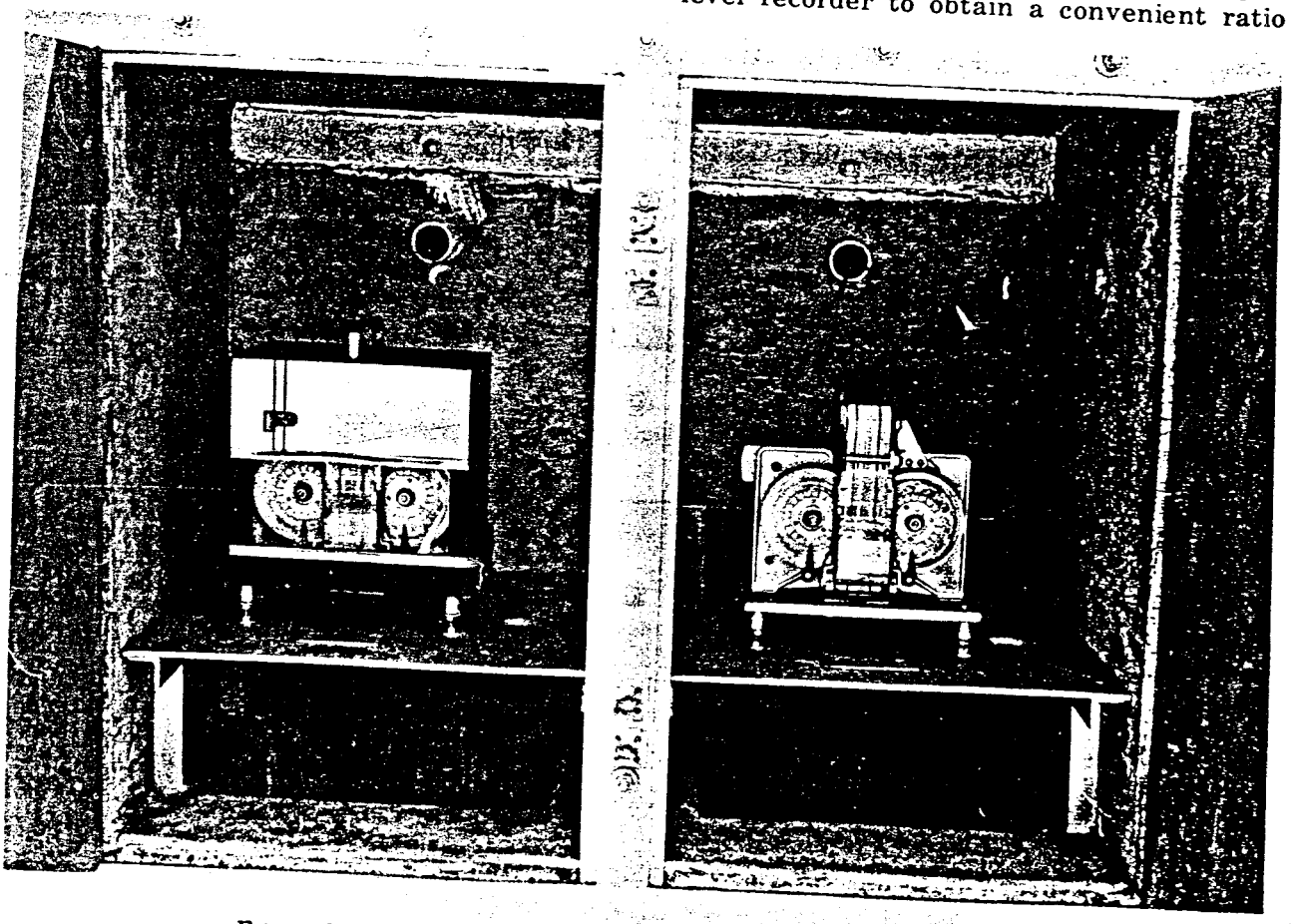


FIGURE 2.44.—Digital punched tape recorders: *Left*, exterior; *right*, interior.

PN–5881

D

- Icelander Wash -
  Install Crest Gage near culvert inlet.
  in front of at least 4 feet.

- Measure culvert dimensions; D&L survey profile 50' upstream & downstream of culvert.

- Potograph area - espec. culvert inlet.

* Carl - Map of the area

Velocity Check

Slope - from culvert to stream fork

Drop is 11.9 feet, Run = 227.5 feet

3 drop structures with 1 foot drops

∴ 3 × 1 = 3' > 11.9 - 3' = 8.9'

∴ resultant slope is $\frac{8.9}{227.5} = .0391$

Doug Lifetime of grout

.032

Velocity below last structure

.026
8.4
.017 → 7.3

is! S = 1.2% (input) (Trap Q)
BW = 4
Q = 108
n = .03

output
Depth flow = 2.07
Area = 16.9
Wp = 13.3
V = 6.4 f/s

4 @ 2' = 8'
S1 = .017
V = 7.3

Check critical depth Yc to see if it is greater than the drop height (1') this will determine if the undular flow will occur (Fitts • Daniel) pg 22

Bent pg 27/28 $Y_c = \left(\frac{Q^2}{b^2 g}\right)^{1/3}$ Q = 108, b = channel bottom width = 4, g = 32.2

$Y_c = 2.8$

2.8 > 1 ∴ undular waves will occur

From OSM manual (Diversion Design)

Section 6.7.3

$$S = \frac{.047\,(G_s - 1)\,D_{50}}{R}$$

D_{50} assume 1in

$R = .60$

$G_s = 2.65$

$R = \frac{A}{P} \frac{11.2}{11.0}$

$S = .01$ (equilibrium slope)

Natural Channel Slope = .039

$.039 > .01$ ∴ need drop structures to attain equilibrium slope

$$V = \frac{1.49\, R^{2/3}\, S^{1/2}}{n}$$

$$\left(\frac{V n}{1.49\sqrt{S}}\right) = R^{2/3}$$

.294

Use V of 7fps
$n = .03$
$S = .039$

$.71 = R^{2/3}$
$.71^{3/2} = R$
$.60 = R$

6.7.4 Spacing

H = Height to be controlled
S_o = Original channel slope .039
S = static equilibrium slope .01
ΔX = length of diversion = 227.5

$H = (S_o - S)\,\Delta X$

$H = 6.6'$

N = # structures required to handle 6.6' drop

$N = \frac{H}{3}$

$N = 2.2$ ∴ use three structures

Use a height of 2 feet.

6/10/86

(3)

Design Specs from OSM Diversion Manual
Chapter 16 sec 16.5

To Jim Fricke

Date 3-13-84

Speed Message

From John

Subject Icelander Wash Reclamation Kaiser Coal

Please review the attached submittal in light of your memo to file of 12-20-85. Document your analysis in a memo to the file. Please complete by 3-28-84

tks

Done 4/1

Signed John

Wilson Jones Company
GRAYLINE FORM 44-899 2-PART
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KAISER COAL

KAISER COAL CORPORATION
Sunnyside Coal Mines
P.O. Box D
Sunnyside, Utah 84539
Telephone (801) 888-4421

RECEIVED
MAR 13 1986
DIVISION OF
OIL, GAS & MINING

March 11, 1986

John Whitehead
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

RE: Icelander Wash Pond Reclamation
Sunnyside Mines, ACT/007/007

Dear Mr. Whitehead

Please find enclosed three (3) copies of the Icelander Wash Pond Reclamation plan requested by your office January 21, 1986. We apologize that this plan was not in your office on February 28, 1986 as requested. If you have questions on this submission, please contact me at the above number.

Sincerely,
Kaiser Coal Corporation

Douglas C Pearce

Douglas C Pearce
Mine Engineer

attachments

ICELANDER WASH POND RECLAMATION

PLAN

Sunnyside Mines ACT/007/007

Present Conditions

Icelander Wash Pond was constructed by creating a depression at the inside of an oxbow in the Icelander Wash stream channel. The oxbow is located (see drawing D5-0134) above a 4 foot concrete culvert under a historic railroad fill. A rip rapped channel around the the northwest corner of the pond embankment was provided to decant water from the structure. During, several years of use the pond depression filled with sediment to within several inches of the embankment crest. During a series of storms the runnoff overtopped the embankment and eroded the outslope fill. To prevent further damage the stream channel was diverted around the pond.

Stream Channel Restoration

The original stream channel plan view is shown on drawing D5-0134. The disturbed area is area is located between a abandoned railroad fill with a four foot cement culvet and the confluence of an ephemeral and a intermittent drainage. The intermittent stream is characterized by a shallow meandering stream bed (see Section A-A) with a well vegetated flood plain. The ephemeral drainage is characherized by steep side slopes and a very rough channel bottom.

A new channel bypassing the pond on the south side was constructed after the embankment breached. The new channel is characterized by a solid rock (Mancos Shale) bottom and a shallow meandering stream bed (see Typical Cross Section, Drawing D5-0134).

Head cutting is not expected to be a problem in the stream channel because of the concrete culvert located 40 feet downstream which will not allow upstream extension of erosion. The rock bottom is also expected to be extreamly resistent to erosion up to the confluence of the ephemeral and intermitent stream channels. Fill on the north side of the reclaimed channel which could be affected by the run off from a 100 year - 24 hour event will be protected by vegetation.

Slope Reconstruction

The pond embankment will be contoured to blend with the surrounding terrian. The immediate stream banks on the north side of the wash will be contoured to 2:1 slopes approximately

2.5 feet high as shown on Drawing D5-0134.

Reclamation

Revegation will be accomplished as outlined in Chapter III and IX of the Sunnyside Permit. The Pinyon-Juniper/Grass seed mix shown on Table III-17 will be used at broadcast rates. Narrowleaf willows cuttings will be placed every 4 feet along the north side of the stream channel at the soil-rock interface. Willows cuttings will be placed along the south side the stream channel where sufficient soil is available for growth.

Runoff and Flow Depth Calculations

Runoff was calculated using a storm hydrograph computer program writen by Richard H. Hawkins and Kim A. Marshall at Utah State University, Logan, Utah. A average CN (curve number) of 70 was calculated using the following information assuming good conditions:

Soil	Description	Soil Group	CN	Area
IGC	Ildefonso very stony loam 3-8%	B	61	183.2
IEE	Ildefonso very stony loam 8-30%	B	61	73.0
MRG	Menefee - rock outcrop	D	80	138.8
MUE	Cabba - Podo - Patmos complex	C	74	105.6
NJF2	Shingle - Ildefonso badland com.	D	80	52.8
KXH	Podo - Rock outcrop complex	D	80	24.8

```
INPUT SUMMARY
  FOR W.S.:   ICELANDER POND
-----------------------------------------------------------------------
     STORM:                                          WATERSHED:
-----------------------------------------------------------------------
DISTRIBUTION = SCS TYPE 2          LAND SLOPE =  15.8000 PCT
                                   CURVE NUMBER =  70.00
PRECIP.DEPTH =  2.66 IN            CHANNEL LENGTH =   10000 FT
                                   TIME OF CONC. =  1.1219 HR
DURATION =  24.00 HR               AREA =    576.20 AC
  NUMBER OF LINES =     176        D =   .1496 HR
-----------------------------------------------------------------------

OUTPUT SUMMARY
-----------------------------------------------------------------------
        RUNOFF DEPTH =    .5338 IN
        INITIAL ABSTRACTION =    .8571 IN
           PEAK FLOW =    107.98 CFS          (   .1859 IPH)
                AT T =  13.31 HRS
-----------------------------------------------------------------------
```

Depth of flow in an open channel (1.46') was calculated using the CHEZY-MANNING EQUATION and the following assumptions:

Drainage slope	5.9%
Bottom width	4.0'
Side slopes	2:1
n	.03

4/27/89

Pipe Flow, Sunnyside at Permit Boundry

BWH

$$Q = \frac{a(2gH')^{1/2}}{(1 + K_e + K_b + K_c L)^{1/2}}$$

a = area of inlet $= \pi r^2$

$= \pi (3.5)^2 = 38.48\ ft^2$

g = gravity $= 32\ ft/sec$

$$H' = \frac{V^2}{2g}(1 + K_e + K_b + K_c L)$$

$V = 3\ ft/sec$ measured in field

$$= \frac{(3)^2 ft/sec}{2(32.2\ ft/sec)}(1 +$$

K_e = entrance head loss coefficient =

Area $= \pi D^2/8$ $\quad D = 2'$ $\quad V = 3\ ft/sec$

$= \pi \frac{(2^2)}{8} = 1.57\ ft^2$

$3(1.57) = 4.71\ ft^3/sec$

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

May 10, 1990

Mr. William P. Balaz
General Mine Manager
Sunnyside Reclamation and Salvage, Inc.
P. O. Box 99
Sunnyside, Utah 84539

Dear Mr. Balaz:

Re: **Reclamation at Sunnyside #2 Mine, Sunnyside Reclamation and Salvage, Inc., Sunnyside Mines, ACT/007/007,Folder #2, Carbon County, Utah**

In a March 27, 1990 letter from Sunnyside Reclamation and Salvage, Inc. (SRS) the Division was notified of the commencement reclamation at the Sunnyside #2 Mine.

This letter is a reminder that the specifics of the reclamation at that site must be coordinated with the Division before surface reclamation begins.

Sincerely,

Pamela Grubaugh-Littig
Permit Supervisor

djh
cc: A. Team
AT45/97

an equal opportunity employer

April	O+G	TSS	TDS
21	3.29	11	1395
22	3.53	26	1580
23	5.64	11	1630
24	7.64	18	1550
25	4.47	19	1520
26	9.18	14	1410
27	8.35	17	1420
28	12.4	12	1385

Above

	TDS	TSS	OG	
27	* 888	4	.70	Kaiser
	* 507	1	<10	DOGMS

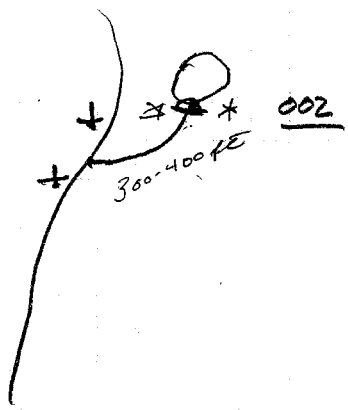
Below April 27th

TDS	TSS	OG
528	2.0	1.41
880	3.0	9.9

(GT-4)

TDS	TSS	OG
9.33	1	<0.5
507	4	12.0

not pertinent

Chem Tech

Freon extraction