SAMPLE DRAWINGS

The attached drawings are provided to show an example of details normally included in a set of plans. We do not recommend copying these details for another design.

We are grateful to Tipton and Kalmbach, Inc., Consulting Engineers, for giving us permission to publish a set of their drawings.

VAIL VALLEY CONSOLIDATED WATER DISTRICT

SPECIFICATION DRAWINGS FOR CONSTRUCTION OF THE BLACK LAKE NO. 1 ENLARGEMENT PROJECT

WATER DIVISION 5, WATER DISTRICT 37
EAGLE COUNTY, COLORADO

DRAWING INDEX

SHEET NO.	TITLE
S1-1	COVER SHEET
S1-2	LOCATION AND VICINITY MAPS
S1-3	PROJECT AREA MAP
S1-4	RESERVOIR SITE PLAN
S1-5	MATERIALS INVESTIGATIONS - AREA MAP
S1-6	MATERIALS INVESTIGATIONS - GEOLOGIC SECTIONS AND GRADATION CURVES
S1-7	MATERIALS INVESTIGATIONS - LOGS OF BOREHOLES
S1-8	MATERIALS INVESTIGATIONS - LOGS OF TEST PITS
S1-9	PLAN OF DAM, OUTLET WORKS AND SPILLWAY
S1-10	DAM PROFILE AND SECTIONS
S1-11	SPILLWAY PROFILE AND OUTLET WORKS PLAN AND PROFILE
S1-12	SPILLWAY AND OUTLET WORKS - SECTIONS AND DETAILS
S1-13	TOILET STRUCTURE - PLANS, ELEVATIONS AND SECTIONS
S1-14	TOILET STRUCTURE - SECTIONS AND DETAILS

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE REGION 2
ACCEPTED FOR CONSTRUCTION
BY [illegible] DATE [illegible] 1987
[illegible]
THIS ACCEPTANCE IS NOT A WAIVER OF PROJECT OR STRUCTURE IN ANY WRITTEN SYSTEM AND YEAR OF THE ABOVE DATE.

I hereby certify that these plans for construction of the Black Lake No. 1 Enlargement Project were prepared by me or under my direct supervision for the Vail Valley Consolidated Water District.

Edwin R. Mighell
E. R. Mighell, P.E.
Colorado Registration No. 6464

On behalf of the Vail Valley Consolidated Water District, the undersigned does hereby accept and approve these plans for construction of the Black Lake No. 1 Enlargement Project.

David E. Mott
Vail Valley Consolidated Water District

Title: General Manager

Approved on the 24th day of June, 1987.

(Seal)

Jerie A. Danielson
State Engineer

By H. D. Jeney
Deputy

STATE OF COLORADO
DIVISION OF WATER RESOURCES

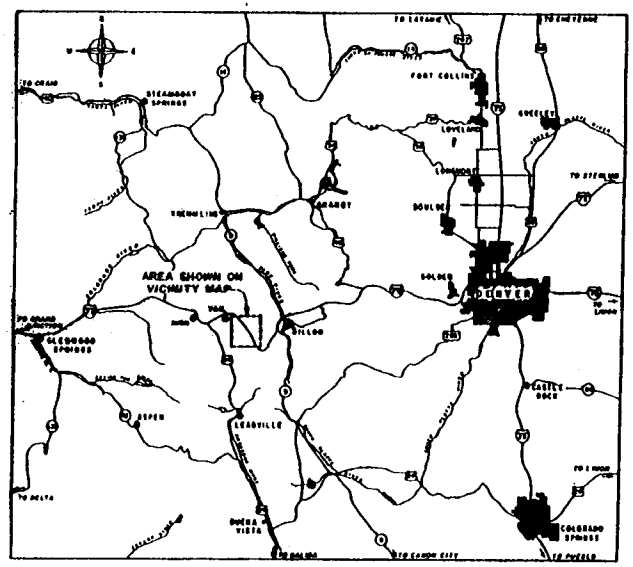
Plans Recommended: D. G. Mills 6-24, 1987
Design Review Unit

Approved Recommendation: [illegible] 6/24, 1987
Supervisor — Dam Safety Branch

TIPTON AND KALMBACH, INC.
CONSULTING ENGINEERS

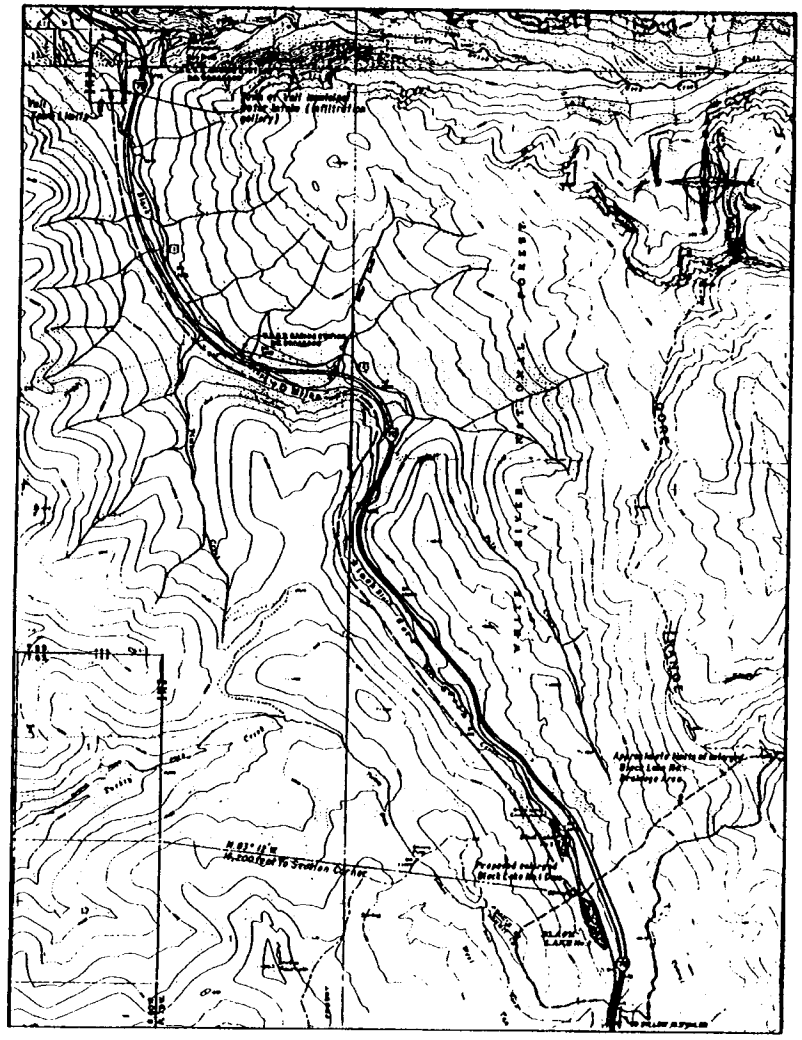
JANUARY 1987

C-1663 | S1-1



LOCATION MAP

SCALE



VICINITY MAP

SCALE

E.R. Mighell, P.E.
Colorado Registration No. 6464

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC. - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT

LOCATION AND VICINITY MAPS

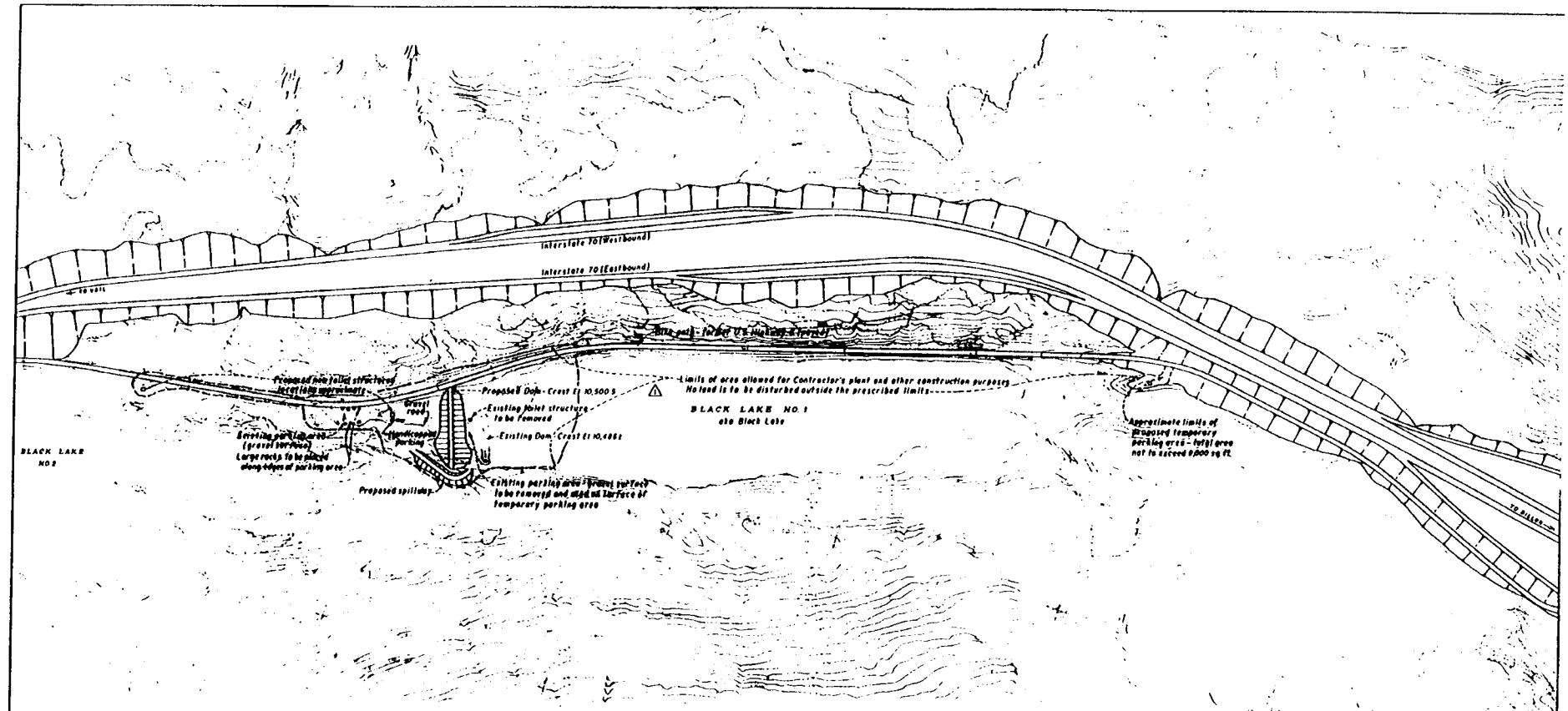
NO.	DESCRIPTION	DATE	BY
	REVISIONS		

C-1663

DRAWN R.S.A.
TRACED R.S.H.
CHECKED E.R.M.

APPROVED Edwin R. Mighell
TIPTON AND KALMBACH, INC.
APPROVED
VAIL VALLEY CONSOLIDATED WATER DISTRICT

TK227L-1 DENVER, COLORADO JANUARY 1967 81-2



NOTES

Topography taken from Colorado Division of Highways, CDOH Project No. 170-2(19)
Coordinates shown are Colorado Division of Highways coordinates
Limits of proposed parking areas shown are approximate
Gravel surfacing for the proposed temporary parking area to be taken from the existing gravel parking area located near the existing Black Lake No 1 Dam
The proposed locations of the new toilet structures are approximate and subject to change

E R Mighell, P E
Colorado Registration No 6464

REFERENCE DRAWINGS

RESERVOIR SITE PLAN S1-4
PLAN OF DAM, OUTLET WORKS AND SPILLWAY S1-9

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT

PROJECT AREA MAP

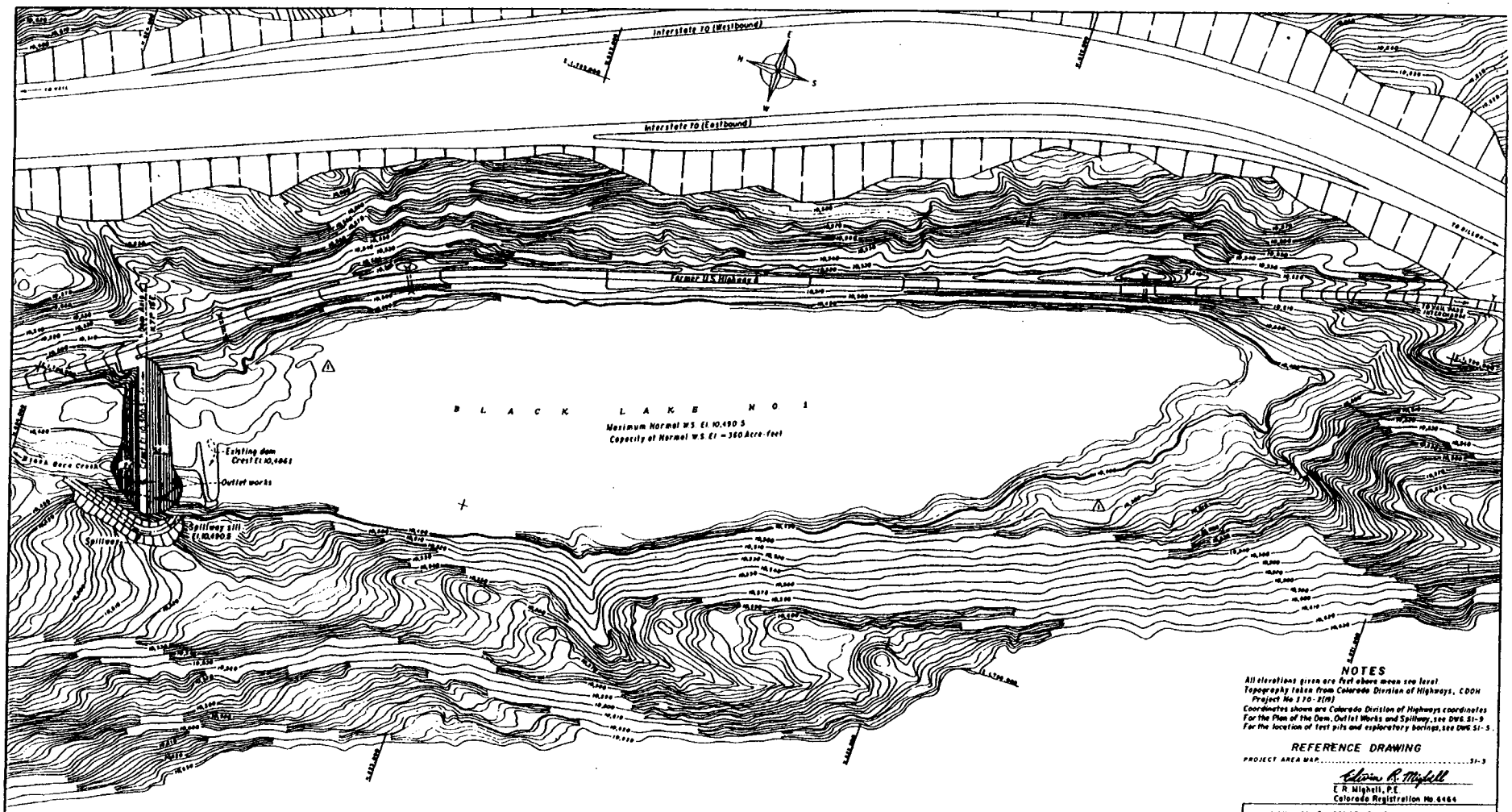
NO	DESCRIPTION	DATE	BY
1	CONSTRUCTION AREA	12/10/81	E.R.M.

REVISIONS

C-1663

DRAWN B.S.J.
TRACED R.S.H.
CHECKED E.R.M.
APPROVED TIPTON AND KALMBACH, INC.
APPROVED VAIL VALLEY CONSOLIDATED WATER DISTRICT

TK227 L-1 DENVER, COLORADO JANUARY 1967 S1-3



NOTES

All elevations given are feet above mean sea level
Topography taken from Colorado Division of Highways, CDOH Project No 170-2(19)
Coordinates shown are Colorado Division of Highways coordinates
For the Plan of the Dam, Outlet Works and Spillway, see DWG. S1-9
For the location of test pits and exploratory borings, see DWG S1-5.

REFERENCE DRAWING

PROJECT AREA MAP S1-3

Edwin R. Mighell
E. R. Mighell, P.E.
Colorado Registration No. 4464

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC. - CONSULTING ENGINEERS

BLACK LAKE NO. 1
ENLARGEMENT PROJECT

RESERVOIR SITE PLAN

NO.	DESCRIPTION	DATE	BY
1	[illegible]	[illegible]	[illegible]

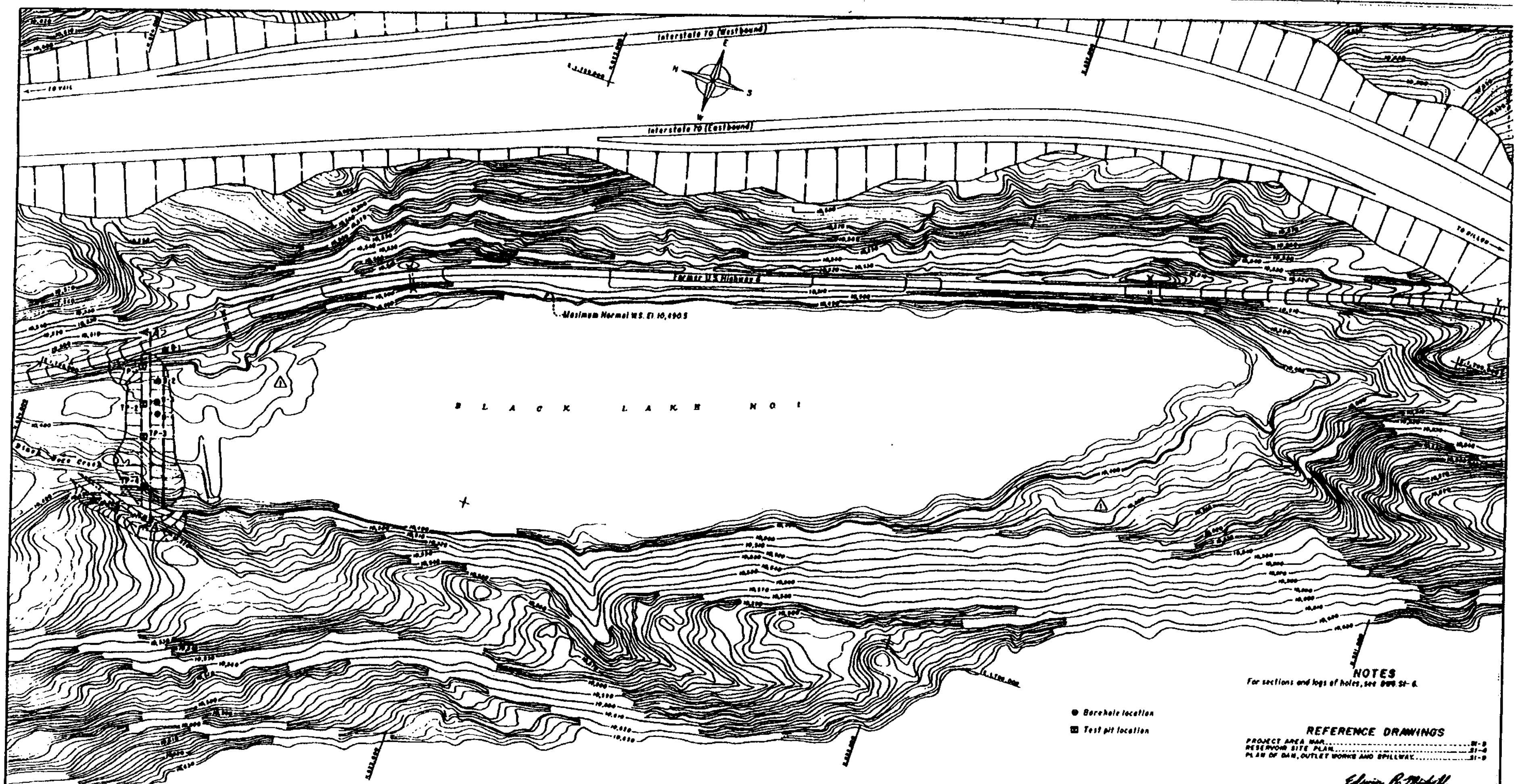
REVISIONS

C-1663

DRAWN R.R.L.
TRACED R.R.M.
CHECKED E.R.M.

APPROVED Edwin R. Mighell
APPROVED [illegible]

TK227 L-1 DENVER, COLORADO JANUARY 1967 S1-4



● Borehole location

⊠ Test pit location

NOTES

For sections and logs of holes, see Dwg. St-6.

REFERENCE DRAWINGS

PROJECT AREA MAP.......St-3
RESERVOIR SITE PLAN.......St-4
PLAN OF DAM, OUTLET WORKS AND SPILLWAY.......St-5

E. R. Mighell, P.E.
Colorado Registration No. 6464

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC. - CONSULTING ENGINEERS

BLACK LAKE NO. 1
ENLARGEMENT PROJECT

MATERIALS INVESTIGATIONS
AREA MAP

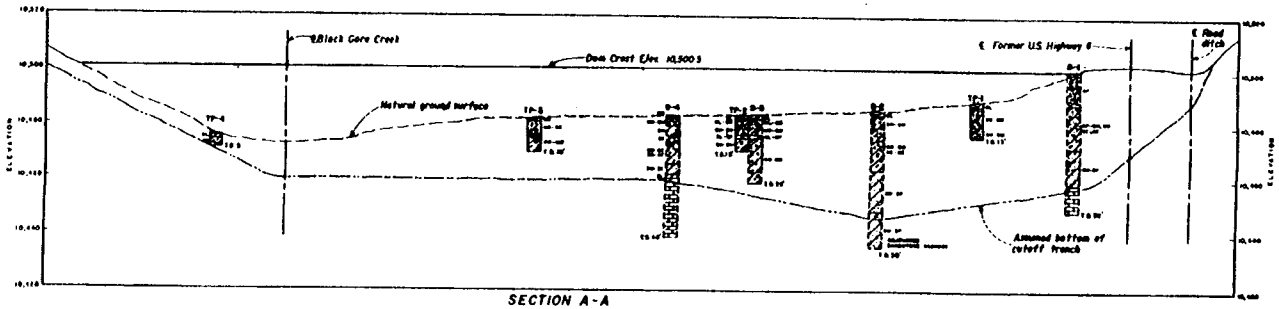
1	[illegible]	[illegible]	[illegible]
NO.	DESCRIPTION	DATE	BY
REVISIONS			

C-1663

DRAWN B.S.J.
TRACED R.S.H.
CHECKED E.R.M.

APPROVED ... TIPTON AND KALMBACH, INC.
APPROVED ... VAIL VALLEY CONSOLIDATED WATER DISTRICT

TK227 L-1 DENVER, COLORADO JANUARY 1981 St-6



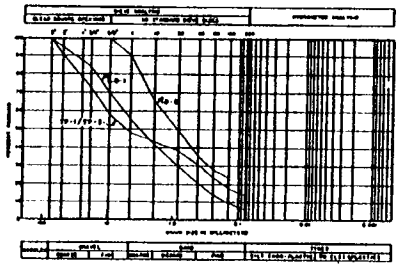
SECTION A-A

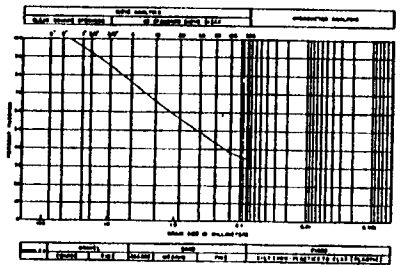
GEOLOGIC SECTION

SCALE

LEGEND

- Topsoil
- Gravel
- Clay
- Silt
- Sand
- Silty or Clayey Sand
- Silty or Clayey Gravel
- Bedrock
- Ground water level
- Total depth of test pit or drill hole





LOCATION	DEPTH	DESCRIPTION
TP1/TP2-Combined sample	2 to 6 feet	Silty sand and gravel (SM-GM)
B-1	20 feet	Silty sand, poorly graded with some gravel (SM-SP)
B-2	15 feet	Silty sand (SM)

LOCATION--Blue River Aggregates Pit 7 miles north of I-70 adjacent to Colorado Highway 9
SAMPLE----Sample 1A taken from a location ½ mile east of the pit wash area
DESCRIPTION-Clayey, gravelly sand SM-SC
FIELD MOISTURE--11.5%
STANDARD PROCTOR VALUE
(ASTM D-698)--123.6 lbs/cu ft
OPTIMUM MOISTURE--11.5%
LIQUID LIMIT--20
PLASTIC INDEX--5
% PASSING 200 SCREEN--34.7%

NOTES

For location of test pits and borings, see DWG S1-5
Soil classifications indicated on logs are according to the Unified Soil Classification System (USCS), see chart on DWG S1-8 for additional information.

REFERENCE DRAWINGS

MATERIALS INVESTIGATIONS - AREA MAP S1-5

Edwin R. Mighell
E R Mighell, P.E.
Colorado Registration No 6464

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT
MATERIALS INVESTIGATIONS
GEOLOGIC SECTIONS AND GRADATION CURVES

NO.	DESCRIPTION	DATE	BY
1	[illegible]	[illegible]	[illegible]

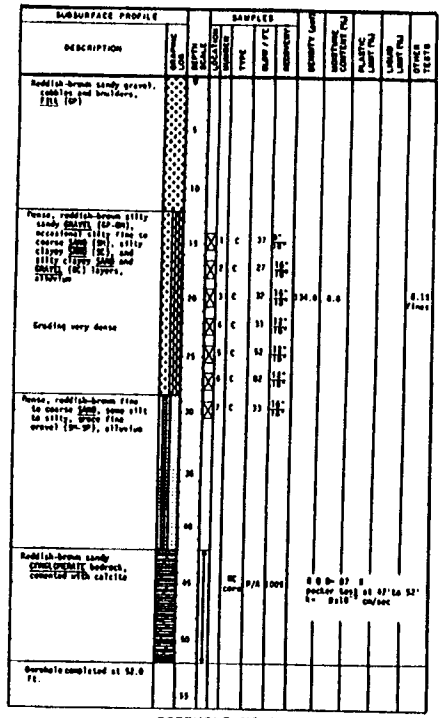
REVISIONS

C-1663

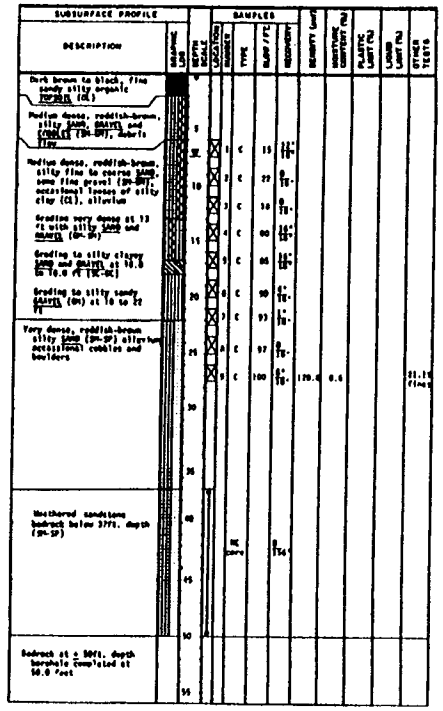
DRAWN B.S.J.
TRACED R.B.H.
CHECKED E.R.M.

APPROVED Edwin R. Mighell TIPTON AND KALMBACH, INC.
APPROVED [illegible] VAIL VALLEY CONSOLIDATED WATER DISTRICT

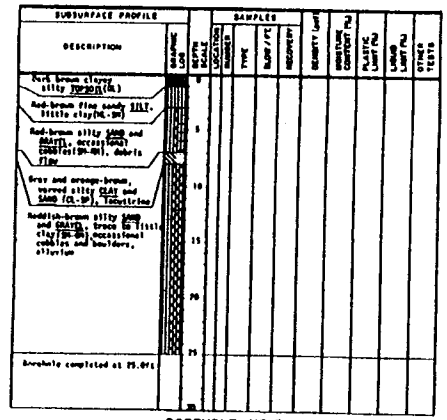
TK227L-1 DENVER, COLORADO JANUARY 1967 S1-6



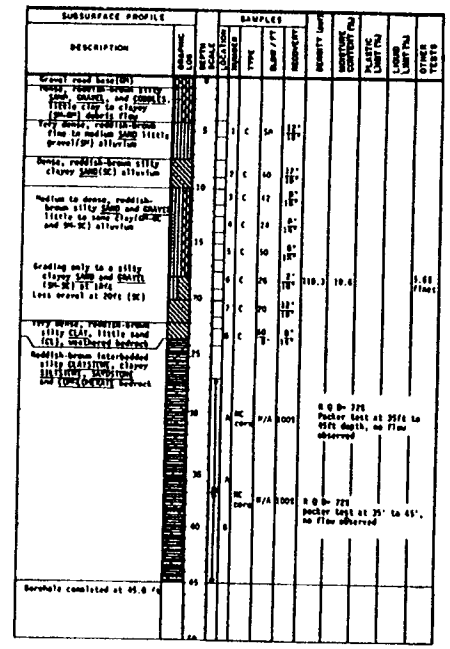
BOREHOLE NO. 1
ELEVATION 10,600.1 ±



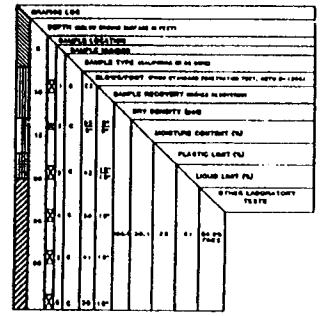
BOREHOLE NO. 2
ELEVATION 10,488.0 ±



BOREHOLE NO. 3
ELEVATION 10,484.0 ±



BOREHOLE NO. 4
ELEVATION 10,482.0 ±



BOREHOLE EXPLANATION

NO. OF BLOWS, N	RELATIVE DENSITY
0 - 5	Very Loose
6 - 15	Loose
SANDS 16 - 40	Medium Dense
41 - 70	Dense
OVER 70	Very Dense

	CONSISTENCY
0 - 2	Very Soft
3 - 4	Soft
SILTS & CLAYS 5 - 8	Firm
9 - 18	Stiff
19 - 35	Very Stiff
OVER 35	Hard

CORRELATION OF PENETRATION RESISTANCE (CALIFORNIA SAMPLER) WITH RELATIVE DENSITY AND CONSISTENCY

NOTES

Borehole logs reproduced from Golder Associates, Inc. report entitled "Results of Geologic and Geotechnical Investigations, Proposed Black Lake Dam, Vail Pass, Colorado" dated November 1986.
Soil Classifications are according to the Unified Soil Classification System, see chart on DWG SI-8 for additional information.
For locations of boreholes, see DWG SI-5.

REFERENCE DRAWINGS

MATERIALS INVESTIGATIONS - AREA MAP SI-5
MATERIALS INVESTIGATIONS - GEOLOGIC SECTIONS AND GRADATION CURVES SI-6

Edwin R. Mighell
E R Mighell, P.E
Colorado Registration No. 6464

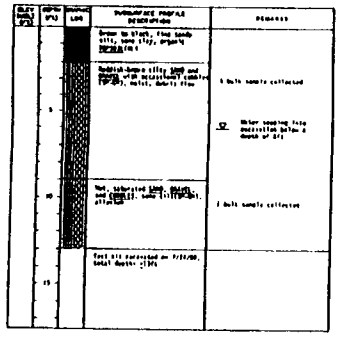
VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALNBACH, INC - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT
MATERIALS INVESTIGATIONS
LOGS OF BOREHOLES

NO	DESCRIPTION	DATE	BY
REVISIONS			

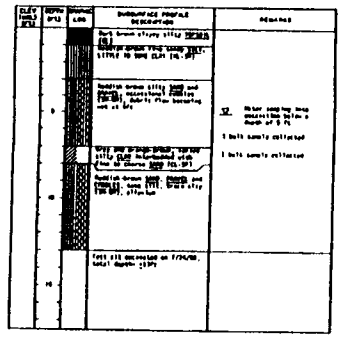
C-1663

DRAWN B S J
TRACED H L M
CHECKED E R M
APPROVED Edwin R. Mighell
TIPTON AND KALNBACH, INC
APPROVED
VAIL VALLEY CONSOLIDATED WATER DISTRICT

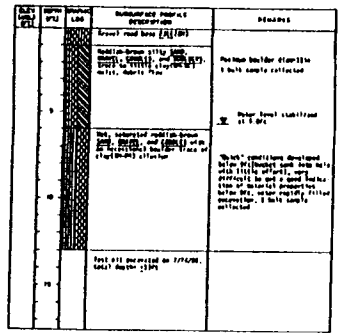
TK227L-I | DENVER, COLORADO JANUARY 1987 | SI-7



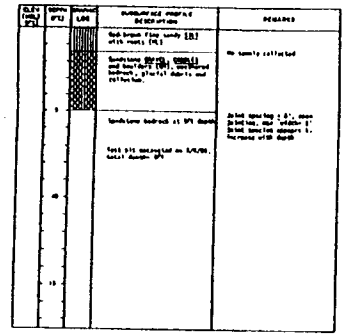
TEST PIT NO. 1
ELEVATION 10,400.3 ±



TEST PIT NO. 2
ELEVATION 10,408.0 ±



TEST PIT NO. 3
ELEVATION 10,402.1 ±



TEST PIT NO. 4
ELEVATION 10,410.0 ±

NOTES

Test pit logs reproduced from Golder Associates, Inc. report entitled "Results of Geologic and Geotechnical Investigations, Proposed Black Lake Dam, Vail Pass, Colorado" dated November, 1986.

Soil classifications are according to the Unified Soil Classification System.

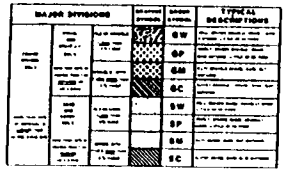
For locations of test pits, see BWG SI-5

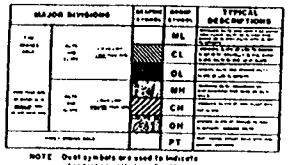
All test pits excavated with rubber-tired backhoe.

REFERENCE DRAWINGS

MATERIALS INVESTIGATIONS - AREA MAP SI-5

MATERIALS INVESTIGATIONS - GEOLOGIC SECTIONS AND GRADATION CURVES SI-6





NOTE Dual symbols are used to indicate borderline soil classifications

SOIL CLASSIFICATION CHART
UNIFIED SOIL CLASSIFICATION SYSTEM

Edwin R. Mighell
E.R. Mighell, P.E.
Colorado Registration No 6464

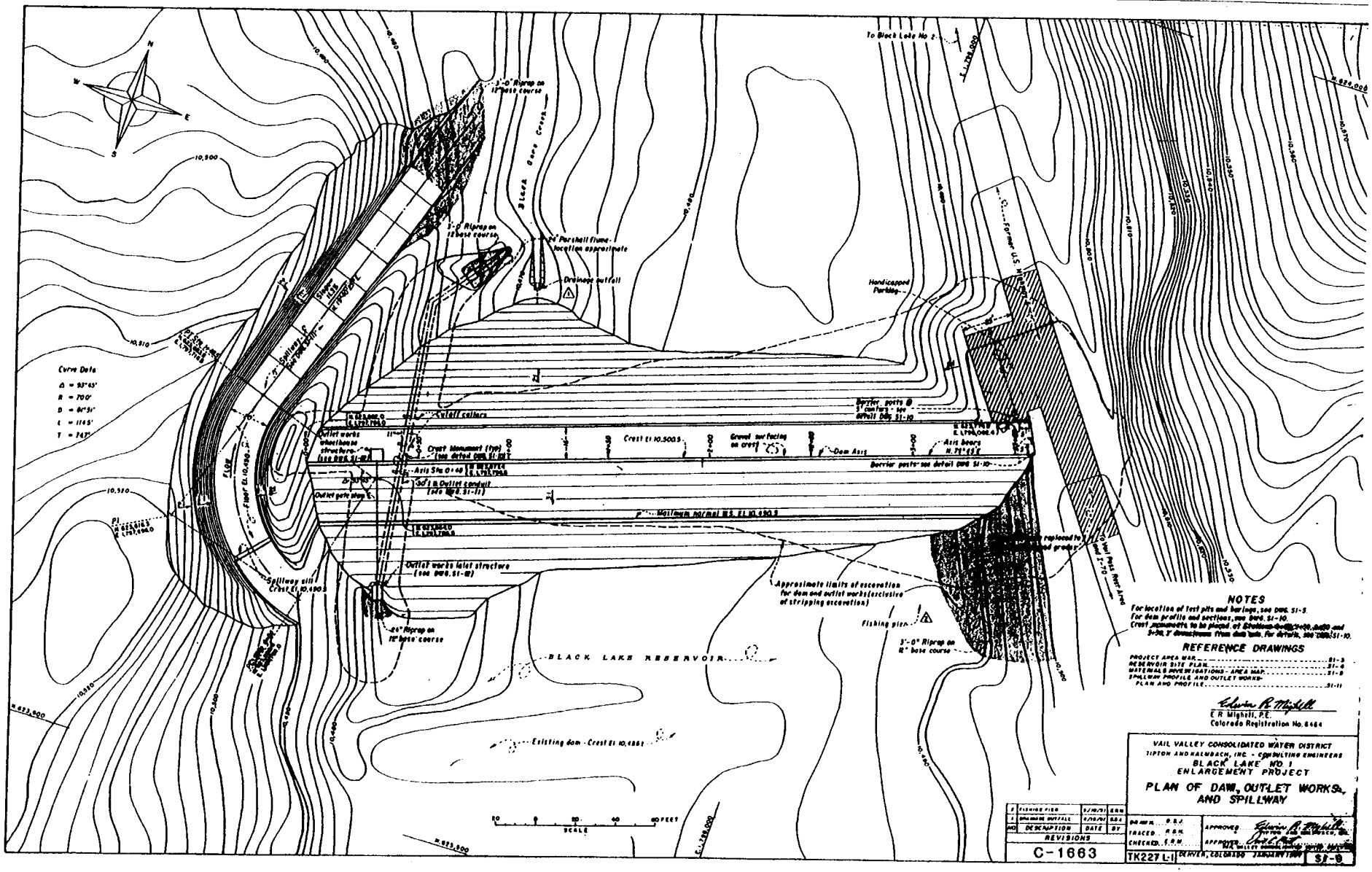
VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT
MATERIALS INVESTIGATIONS
LOGS OF TEST PITS

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

C-1663

DRAWN B.S.J.
TRACED M.L.W.
CHECKED E.R.M.
APPROVED Edwin R. Mighell, TIPTON AND KALMBACH, INC
APPROVED, VAIL VALLEY CONSOLIDATED WATER DISTRICT

TK227L-1 | DENVER, COLORADO JANUARY 1987 | SI-8



NOTES

For location of test pits and borings, see DWG. S1-5.
For dam profile and sections, see DWG. S1-10.
Crest monuments to be placed at Stations [illegible] and 3+50, 3' downstream from dam axis. For details, see DWG. S1-10.

REFERENCE DRAWINGS

PROJECT AREA MAP S1-3
RESERVOIR SITE PLAN S1-4
MATERIALS INVESTIGATIONS - AREA MAP S1-9
SPILLWAY PROFILE AND OUTLET WORKS - PLAN AND PROFILE S1-11

E. R. Mighell, P.E.
Colorado Registration No. 8464

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC. - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT

PLAN OF DAM, OUTLET WORKS, AND SPILLWAY

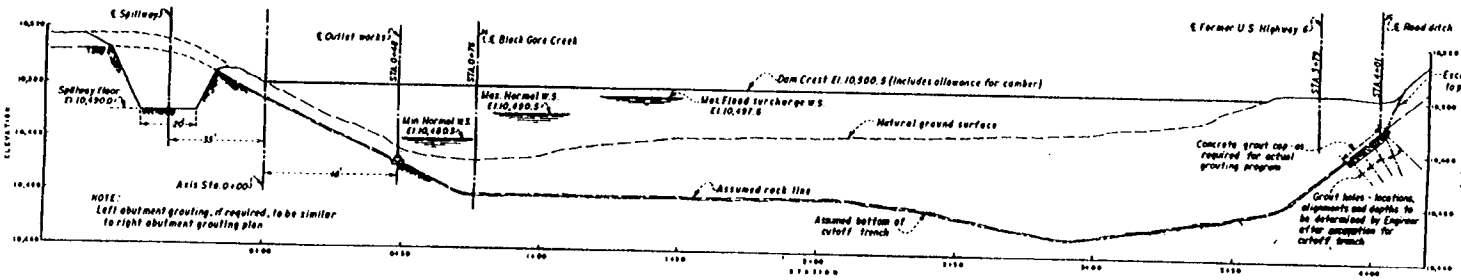
NO	DESCRIPTION	DATE	BY
2	FISHING PIER	5/10/91	E.R.M.
1	DRAINAGE OUTFALL	4/10/91	S.B.J.

REVISIONS

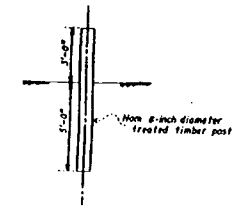
DRAWN: D.B.J.
TRACED: R.B.H.
CHECKED: E.R.M.
APPROVED: Edwin R. Mighell, TIPTON AND KALMBACH, INC.
APPROVED: [illegible], VAIL VALLEY CONSOLIDATED WATER DISTRICT

C-1663

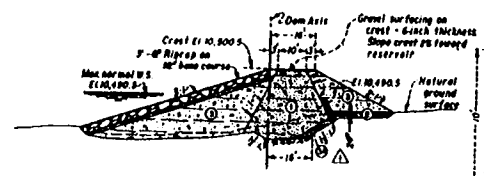
TK227 L-1 | DENVER, COLORADO JANUARY 1991 | S1-9



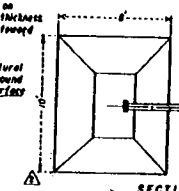
PROFILE ALONG AXIS OF DAM



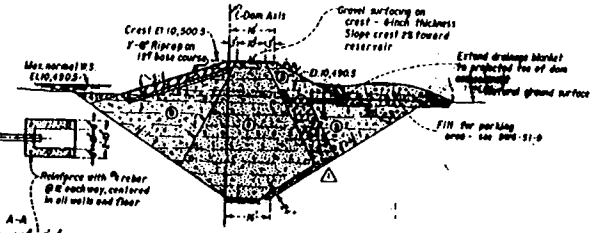
BARRIER POST DETAIL
(NO SCALE)
For locations, see DWG S1-9



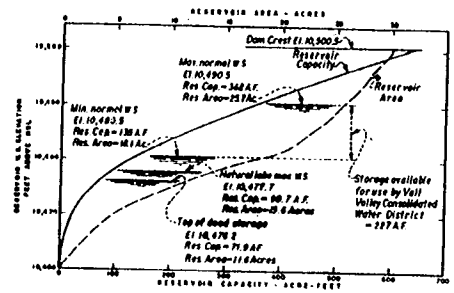
STATION 0+44

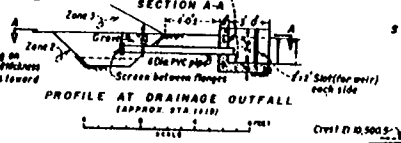


SECTION A-A

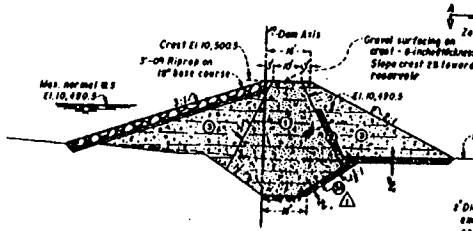


STATION 3+12

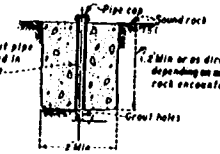




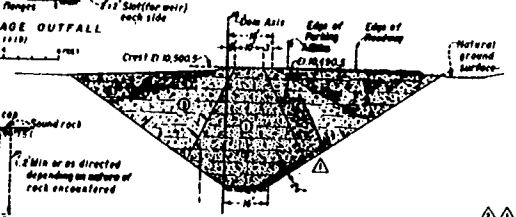
PROFILE AT DRAINAGE OUTFALL
(APPROX. STA 1+10)



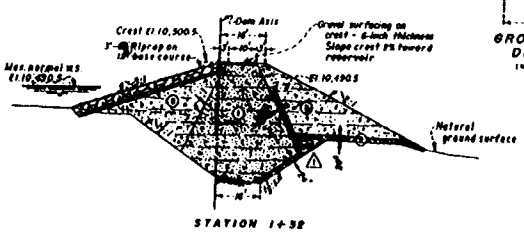
STATION 0+76



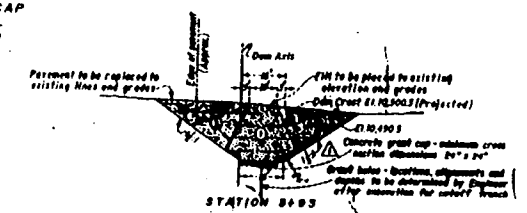
GROUT CAP DETAIL
(NO SCALE)



STATION 3+56



STATION 1+32



STATION 5+93

TYPICAL EMBANKMENT SECTIONS

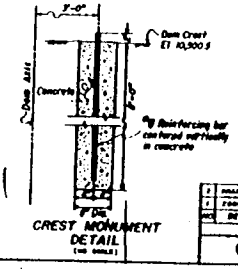
EMBANKMENT EXPLANATIONS

① Selected impervious materials obtained from designated Borrow Areas and compacted to 6-inch layers.

② Selected well graded granular materials obtained from approved source, compacted to 12-inch layers.

③ Random fill composed predominantly of granular materials with cobbles larger than 6-inches removed, obtained from required excavations and designated Borrow Areas, compacted to 12-inch layers.

③ ③ ③ Selected sand and gravel materials with cobbles larger than 3 inches removed, obtained from required excavations and designated Borrow Areas, compacted to 12-inch layers.



CREST MONUMENT DETAIL
(NO SCALE)

NOTES

Cutoff trench to be excavated to sound bedrock as directed by the Engineer.

Reservoir capacity comprised of the following incremental amounts:
1 Natural Lake ..... 98.7 A.F.
2 Black Lake Reservoir ..... 44.3 A.F.
3 Black Lake Enlargement ..... 237.0 A.F.
Total Reservoir Capacity ..... 380.0 A.F.

Drainage blanket (Zone 2) to extend from approximately Station 0+10 to approximately Station 0+60.

Slope crest of dam 2% towards reservoir from approximately Station 0+00 to approximately Station 3+60.

REFERENCE DRAWING

PLAN OF DAM, OUTLET WORKS AND SPILLWAY S1-9

Edwin R. Mighell
E.R. Mighell, P.E.
Colorado Registration No. 6466

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC. - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT

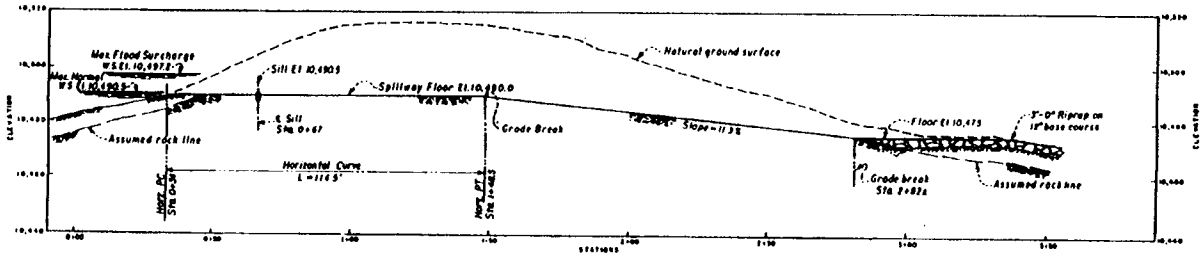
DAM PROFILE AND SECTIONS

NO.	DESCRIPTION	DATE	BY
3	DRAINAGE OUTFALL	1/30/80	E.R.M.
2	ZONE 2A	1/30/80	BMS
1	ZONE 2A	1/30/80	BMS

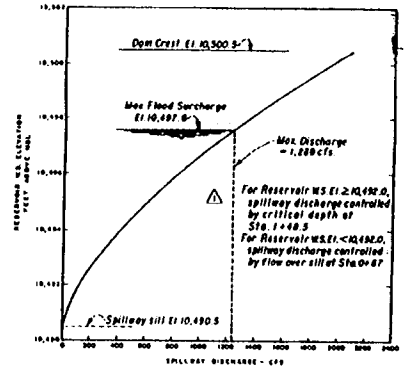
REVISIONS

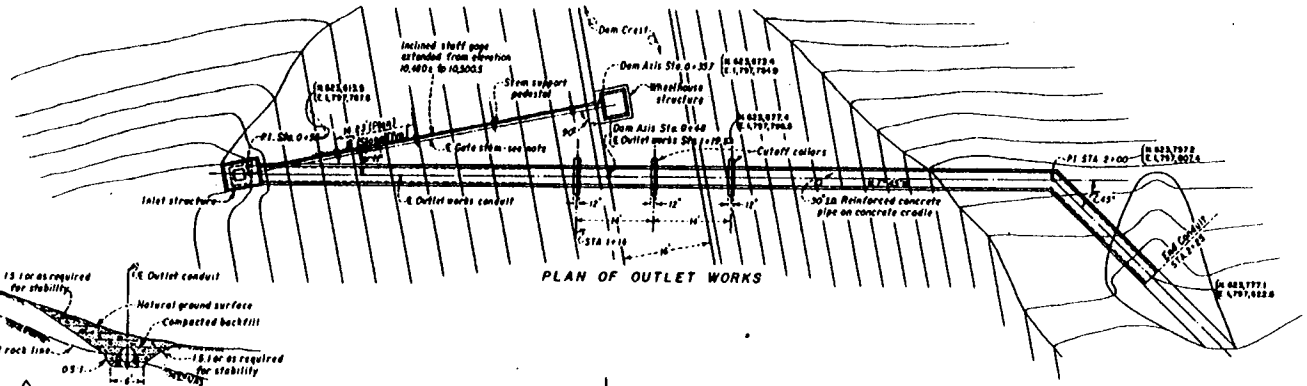
C-1663

DESIGNED E.R.M. APPROVED Edwin R. Mighell TIPTON AND KALMBACH, INC.
DRAWN E.R.M.
TRACED E.R.M.
CHECKED E.R.M. APPROVED VAIL VALLEY CONSOLIDATED WATER DISTRICT
TK227L1 DENVER, COLORADO JANUARY 1973 S1-10

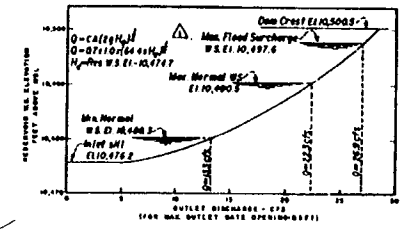


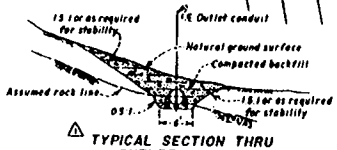
SPILLWAY ℄ PROFILE



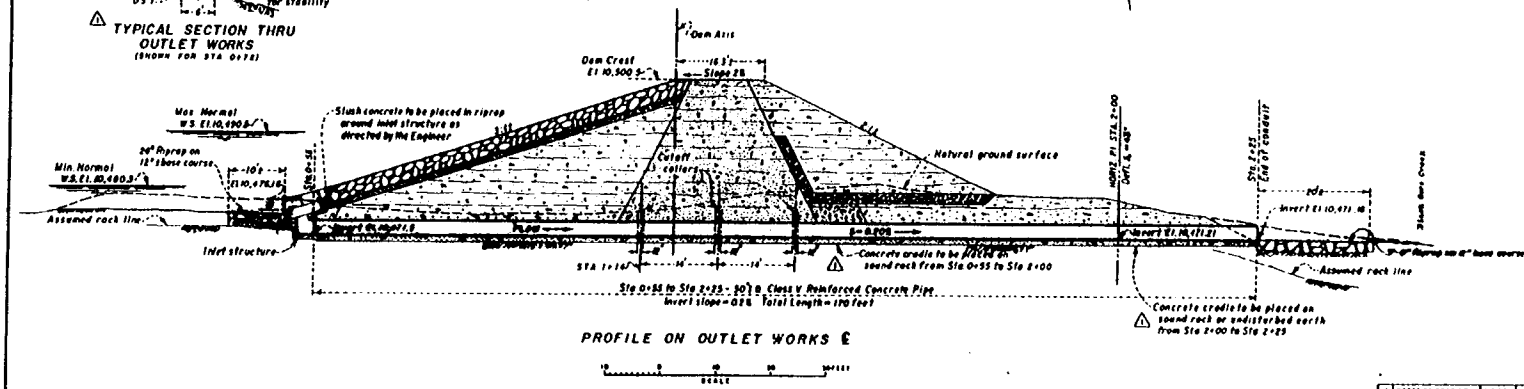


PLAN OF OUTLET WORKS





TYPICAL SECTION THRU OUTLET WORKS
(SHOWN FOR STA 0+72)



PROFILE ON OUTLET WORKS ℄

NOTES

For location of spillway and outlet works, see [illegible]
For details of spillway and outlet works structures, see DWG. S1-12.
Sluice gate stem to be encased in all-filled steel pipe in accordance with gate manufacturer's recommendations.

REFERENCE DRAWINGS

PLAN OF DAM, OUTLET WORKS AND SPILLWAY S1-10
SPILLWAY AND OUTLET WORKS SECTIONS AND DETAILS S1-12

Edwin R. Mighell, P.E.
Colorado Registration No. 6464

VAIL VALLEY CONSOLIDATED WATER DISTRICT
TIPTON AND KALMBACH, INC. - CONSULTING ENGINEERS
BLACK LAKE NO. 1
ENLARGEMENT PROJECT

SPILLWAY PROFILE AND OUTLET WORKS PLAN AND PROFILE

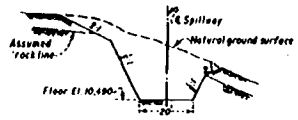
NO.	DESCRIPTION	DATE	BY
1	NOTES ON PROFILE	4/5/67	R.G.J.

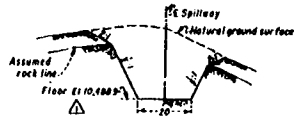
REVISIONS

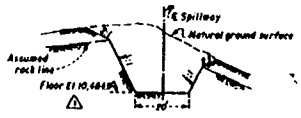
DRAWN R.G.J.
TRACED R.G.M.
CHECKED E.R.M.
APPROVED [illegible] TIPTON AND KALMBACH, INC.
APPROVED [illegible] VAIL VALLEY CONSOLIDATED WATER DISTRICT

C-1663

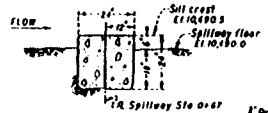
TK227L-1 DENVER, COLORADO



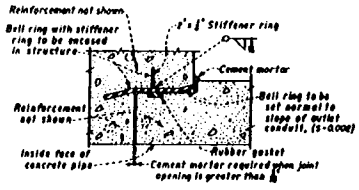




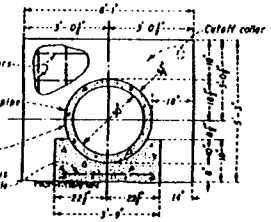
SECTIONS THROUGH SPILLWAY



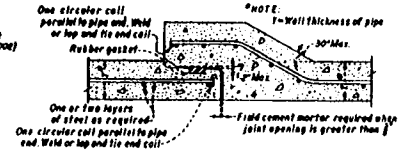
SPILLWAY SILL DETAIL



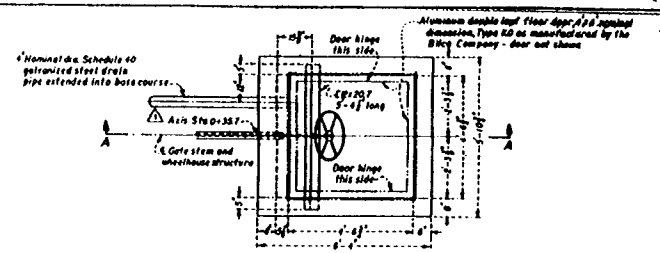
DETAIL A
(NO SCALE)



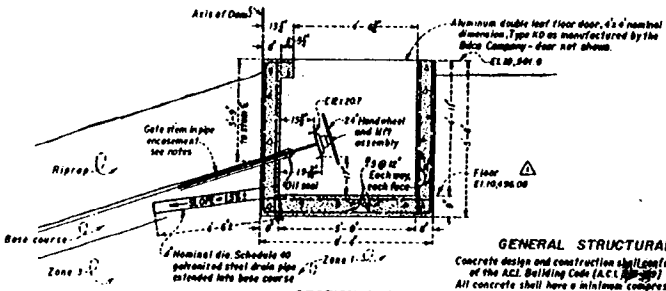
TYPICAL SECTION THROUGH OUTLET CONDUIT



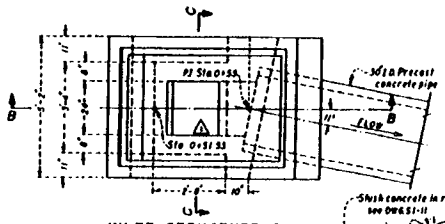
TYPICAL CONCRETE PIPE JOINT
(USBR TYPE A-4)
NO SCALE



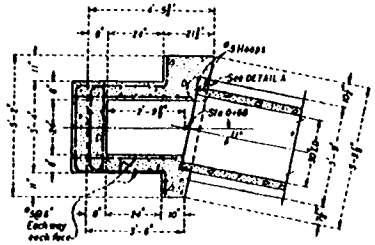
WHEELHOUSE STRUCTURE PLAN



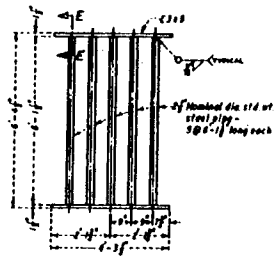
SECTION A-A



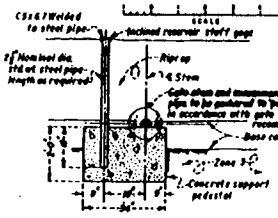
INLET STRUCTURE PLAN



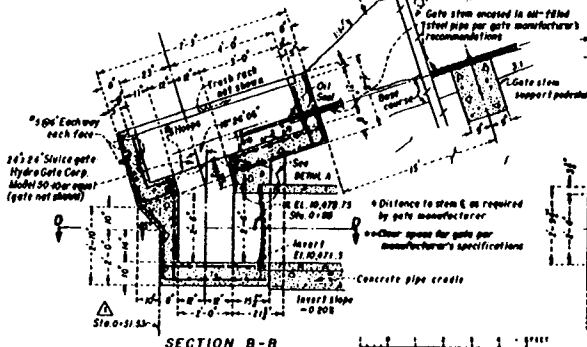
SECTION D-D



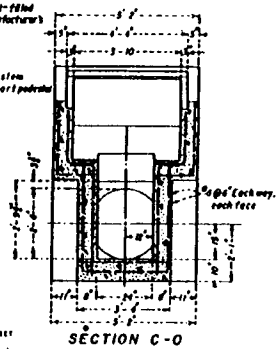
TRASHRACK PLAN



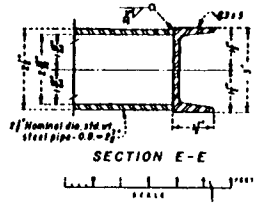
TYPICAL SECTION THROUGH GATE STEM SUPPORT PEDESTAL



SECTION B-B



SECTION C-C



SECTION E-E

GENERAL STRUCTURAL NOTES

Concrete design and construction shall conform to the provisions of the A.C.I. Building Code (A.C.I. [illegible])

All concrete shall have a minimum compressive strength of 4,000 psi in 28 days.

Reinforcement shall be grade 60, deformed bars (A.S.T.M. Designation: A-615).

Unless otherwise shown, place all reinforcement so that the clear distance between face of concrete and nearest reinforcement is 1½ except provide a clear distance of 3" from face of concrete placed against earth [illegible]

Bend splices in vertical wall and column [illegible] rubber diameters. Alternate splices shall [illegible]

All exposed corners shall be chamfered [illegible]

Structural steel shall be ASTM A36 and [illegible] shall conform to the latest AISC Specifications.

NOTES

For location of outlet works structures, see [illegible]

Gate stem support pedestal to be placed at [illegible] along encased stem.

Precast concrete pipe joints to be [illegible] alternate.

Sluice gate to be encased in oil-filled steel pipe in accordance with gate manufacturer's recommendations.

REFERENCE DRAWINGS

PLAN OF DAM, OUTLET WORKS AND SPILLWAY 51-10

SPILLWAY PROFILE AND OUTLET WORKS PLAN AND PROFILE 51-11

J. R. NOBLE
[illegible]

VAIL VALLEY CONSOLIDATED [illegible]
TIPTON [illegible]
[illegible]
CIVIL ENGINEERING PROJECT

SPILLWAY AND OUTLET WORKS
SECTIONS AND DETAILS

NO.	DESCRIPTION	DATE	BY
1	STATIONS AND ELEV	1/26/67	R.B.A.

REVISIONS

C-1663

DR. BY R.B.A.
TRACED R.B.A.
CHECKED F.R.N.
APPROVED [illegible]
APPROVED [illegible]

TK22TL [illegible]