Multiple-Purpose Project
Osage River Basin
Osage River
Missouri

Harry S. Truman Dam & Reservoir

Operation and Maintenance Manual

Appendix VII
Volume Two

Construction Foundation Report

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US Army Corps of Engineers
Kansas City District

AD-A154 456
The purpose of this report is to provide a record of foundation conditions encountered during construction and methods used to adapt to these conditions during construction. This information is a part of the permanent collection of project engineering data required by Appendix A to ER 1110-1-1801, dated Dec 81. This report deals with construction of the main embankment, the Sterett Creek Dike and the Spillway-Powerhouse.
7. Authors (Cont.)

Mr. John W. Doty - Project Geologist
Mr. Wallace E. Penn - " "
Mr. Victor Anderson - Editing Geologist
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</tbody>
</table>

**STAGE IV CONSTRUCTION**

<table>
<thead>
<tr>
<th>File Number</th>
<th>Title</th>
<th>Plate No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12-9289</td>
<td>Observation Devices Sterett Creek</td>
<td>158</td>
</tr>
</tbody>
</table>

**STAGE VI CONSTRUCTION**

<table>
<thead>
<tr>
<th>File Number</th>
<th>Title</th>
<th>Plate No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12-9290</td>
<td>Observation Devices Main Embankment</td>
<td>159</td>
</tr>
<tr>
<td>0-12-9291</td>
<td>Strong Motion Accelerograph Plan and Details</td>
<td>160</td>
</tr>
</tbody>
</table>

**STAGE I CONSTRUCTION**

<table>
<thead>
<tr>
<th>File Number</th>
<th>Title</th>
<th>Plate No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12-9292</td>
<td>Log of Calyx Hole No. 1</td>
<td>161</td>
</tr>
<tr>
<td>0-12-9293</td>
<td>Log of Calyx Hole No. 2</td>
<td>162</td>
</tr>
<tr>
<td>0-12-9294</td>
<td>Log of Calyx Hole No. 3</td>
<td>163</td>
</tr>
<tr>
<td>0-12-9295</td>
<td>Log of Calyx Hole No. 4</td>
<td>164</td>
</tr>
<tr>
<td>0-12-9296</td>
<td>Foundation Map, Visitor Center</td>
<td>165</td>
</tr>
</tbody>
</table>

**TABLE**

<table>
<thead>
<tr>
<th>File Number</th>
<th>Title</th>
<th>Plate No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12-9297</td>
<td>Table D-2, Shot Data, Stage II Blasting</td>
<td>166</td>
</tr>
</tbody>
</table>
STAGE I CONSTRUCTION
DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE.
GEOLGIC MAP  LEFT ABUTMENT  
based on Photographs  Elevation & stations approx
LEFT ABUTMENT FOUNDATION MAP U.S.R.
740
700
660
640
620

ELEVATION

bankment limit

Dolomite
Shale Breccia Tan

Dolomite
Shale Breccia Tan

Dolomite
Overburden of brown silt

Dolomite

July 27 Excavate possible old slide area to bedrock or firm material

ATION MAP DURING CONSTRUCTION

2+00
3+00

IN FEET
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Lithologic Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-1</td>
<td>2.8' thick - Dolomite, light grey brown, very thin bedded with pyrolusite precipitate on bedding surfaces. Unit is hard and moderately weathered with brown stain along scattered discontinuous vertical fractures.</td>
</tr>
<tr>
<td>D-2</td>
<td>Dolomite - 3.5' thick - light grey-brown with lamellar shales interspersed throughout upper third of unit. Unit contains deformed undulating beds, very thin bedded, badly fractured with hairline black stained (pyrolusite) fractures vertically oriented. Unit is lightly weathered and moderately hard.</td>
</tr>
<tr>
<td>D-3</td>
<td>Dolomite - 5.0' thick - light grey, very thin to thin bedded, flaggy, microcrystalline, lightly weathered, hard and breaks with conchoideal fracture. Exposed bedding surfaces exhibit ramiform surface of ripple mark nature. Potholes and caves found to be most common in this unit.</td>
</tr>
<tr>
<td>D-4</td>
<td>Dolomite - brown-gray, gnarly, massive, tripolitic, with scattered intruded shale breccia, very thin bedded, cherty, and hard. Black and white chart fragments scattered throughout. Unit is randomly oriented fragments and blocks, lightly weathered, hard.</td>
</tr>
<tr>
<td>D-5</td>
<td>Dolomite - grey, hard, intensely fractured and tightly consolidated. Fragment size 1 to 3&quot;. Black stained fracture faces are common.</td>
</tr>
<tr>
<td>D-6</td>
<td>Dolomite, tripolitic, brown-gray, massive, hackly, hard, with an intense high angle fracture pattern, badly distorted, unweathered to moderately weathered. Unit is overlain by dolomite blocks in random orientation in a shale matrix.</td>
</tr>
<tr>
<td>D-7</td>
<td>Dolomite, grey lightly weathered, with scattered high angle fractures, microcrystalline, and thin bedded (bedding 6 – 12&quot;)</td>
</tr>
<tr>
<td>D-8</td>
<td>Dolomite, pink, very thin bedded (bedding 2 - 3&quot;) moderately weathered, badly fractured with random orientation of high angle fractures.</td>
</tr>
<tr>
<td>D-9</td>
<td>Dolomite, grey and brown-gray, very thin bedded (beds 2 - 4&quot;) with lamellar interbedded dolomite shales, blue and white, and paper thin shale lamellae. Dolomite badly fractured with considerable tight high angle fractures. Pyrolusite dendrites common in fracture faces. Beds undulating, lightly weathered to unweathered, tight.</td>
</tr>
<tr>
<td>D-10</td>
<td>Dolomite, brown, hackly, massive, tripolitic, lightly to moderately weathered and with scattered black chart.</td>
</tr>
<tr>
<td>D-11</td>
<td>Dolomite, grey, microcrystalline, hard, unweathered, lightly fractured, thin bedded, bedding 6 – 18&quot;, and deformed at scattered instances with shale intrusions, gently undulating.</td>
</tr>
<tr>
<td>D-12</td>
<td>Dolomite, hard, grey, lightly weathered with staining along fracture faces, very thin bedded (beds 2 - 4&quot;) with definite ripple mark bedding contacts.</td>
</tr>
<tr>
<td>D-13</td>
<td>Dolomite - 1.0' thick - brown-gray, with considerable black chart in pockets and seams, very thin bedded to thin bedded (beds 1 - 3&quot;).</td>
</tr>
<tr>
<td>D-14</td>
<td>Dolomite, grey and brown gray, very thin bedded, beds 1/2 - 2&quot;, flaggy, unweathered, tight and hard.</td>
</tr>
<tr>
<td>D-15</td>
<td>Dolomite, light brown-gray, hackly, beds 3 - 6&quot;.</td>
</tr>
<tr>
<td>D-16</td>
<td>Dolomite, grey, very thin bedded (&lt;2&quot;), unfractured. Surface resembles shale.</td>
</tr>
</tbody>
</table>
LITHOLOGIC DESCRIPTIONS

UPPER CUTOFF TRENCH STA 22+30 TO 38+00

Symbol | Lithologic Description
--- | ---
DB-1 | Dolomite Breccia - tightly consolidated pieces of red-brown, gray, and gray-brown dolomite in a blue-gray shale matrix. Dolomite is hard and competent. Shale is soft and unweathered. Chart is scattered throughout in random orientation. Fragments shapes are angular to subrounded and rounded and of varying sizes from 3/8'' to 3 and 4 foot blocks. Overturned beds are strongly evident. The bottom of the dolomite breccia is 5 feet above the toe of slope and has lamellar bedding characteristics (L1°). The beds dip N 50 W 26° NE at Sta 27+87 and become vertical at 27+90. The unit becomes badly fractured with considerable high angle fracture brown stained and radiating outward along the arc of the curve.

DB-2 | Dolomite blocks in shale and sandstone matrix gray, hard and unweathered. Blue-gray shale contains 95% fragments of white shale scattered throughout. Slickensides are common. Dolomite blocks range in size from 0.5' to 4.0' resting in a random pattern.

DB-3 | Dolomite, gnarly, deformed and broken into blocks with blue-gray shale and chert fragments scattered throughout. Units are competent but detached and locally situated without orientation.

DB-4 | Dolomite blocks in shale and shale breccia, tight, unfractured, in a random pattern unweathered to lightly weathered.

DB-5 | Dolomite blocks in black and blue shale and shale breccia, lamellar to very thin bedded, containing flaggy characteristics. Blocks appear molded with subrounded edges and shale in the interstices often leaping over the edge of the dolomite like folia. The dolomite is hard, gray and unweathered. Shale is moderately hard, black to gray, lamellar to fissile and unweathered. Between Sta 34+40 and 35+00, scattered dolomite breccia and intensely fractured dolomite resealed, with black chert concretions, cobbles sized, are scattered throughout. Unit is lightly to badly weathered but tightly consolidated.

DB-6 | Dolomite Blocks - 1.0' thick - intensely fractured in mass of dolomite breccia, gray, massive, lightly to unweathered.
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Lithologic Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS-1</td>
<td>Dolomite with interbedded blue-gray, lamellar shale, brown, very thin bedded (less than 1&quot;) lightly to moderately weathered and brown stained, and hard. Gently undulating beds contained scattered chert and considerable high angle fractures with brown stain faces. Bedding surface exposures exhibit a knobby surface resembling ripple marks.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-1</td>
<td>0.2' thick - Shale, gray-green, lamellar, with badly deformed beds and considerable dolomite fragments intruded into the shale mass, lightly to moderately weathered, moderately hard.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-2</td>
<td>Shale - 0.5' thick - gray-green, fissile, lightly weathered, moderately hard. Considerable number of chert concretions resembling suspect biostrome of possible permineralized pelocypods, brachiopods or both.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-3</td>
<td>Dolomitic Shale - 1.0' thick - gray-green, lamellar to fissile, lightly weathered, moderately hard, unfractured and containing scattered lamellifer interbeds of dolomite, gray, moderately hard.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-4</td>
<td>Shale, white and blue-gray, vertically dipping with scattered red beds and chert fragments. The contact vicinity of Sta 22+10 is rust brown, soft. Suspect grout take some is in this area.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-5</td>
<td>Shale, yellow-brown with chert scattered throughout. Only a trace of structure remaining as most of this unit has decomposed to soil.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-6</td>
<td>Shale, white, lamellar, soft, decomposed, with slickensides locally.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-7</td>
<td>Shale, white and green-gray, lamellar and interbedded in a random pattern, moderately weathered, soft, tight, and with scattered brown staining.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-8</td>
<td>Shale, red and gray mottled with sandstone gravels and lamass scattered throughout; rust-brown and gray-brown. Considerable slickensided surfaces portraying a gnarly surface, massive but badly fractured. Structure reflects shale lithified then collapsed. Subsequent reconsolidation and lithification developed. Local lamellar bedding is discontinuous and distorted.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S-9</td>
<td>Shale, gray, lamellar, moderately soft, unweathered, unfractured but badly deformed by undulatory beds.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Symbol</td>
<td>Lithologic Description</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------</td>
</tr>
<tr>
<td>SB-1</td>
<td>Shale Breccia - black-gray, unweathered, soft, unstable, with fine grained dolomite and chert fragments in subangular shapes (less than #4 screen) scattered throughout. A depression to a depth of 1.0' is formed by the presence of this unit.</td>
</tr>
<tr>
<td>SB-2</td>
<td>Shale and Shale Breccia - scattered rust stained sandstone in shale and shale breccia ranging from rust brown to white with red streaks, lamellar to very thin bedded but dipping in a random pattern from high angle to horizontal, soft to hard. Pockets of chert, red, black, and white are scattered throughout.</td>
</tr>
<tr>
<td>SB-3</td>
<td>Shale and Shale Breccia with interbeds of sandstone; soft, friable and rust-brown to red in random orientation. Shale, white to blue-gray, lamellar and badly deformed beds generally resting at high angles.</td>
</tr>
<tr>
<td>SB-4</td>
<td>Shale Breccia, brown, hackly, hard, moderately weathered with dolomite blocks subrounded 3 - 12&quot; in size, scattered throughout as float.</td>
</tr>
<tr>
<td>SB-5</td>
<td>Shale breccia, black dolomite and chert fragments in black shale breccia, unweathered, locally pyritized, moderately hard.</td>
</tr>
<tr>
<td>SS-1</td>
<td>Sandstone, soft, friable, fine grained to silty, poorly sorted, white, rounded with variegated limonite, red and green scattered throughout. CL comprises the matrix.</td>
</tr>
<tr>
<td>SS-2</td>
<td>Sandstone, soft, friable, golden brown, with limonite - red streaks scattered in discontinuous near horizontal pattern.</td>
</tr>
<tr>
<td>SS-3</td>
<td>Sandstone, flesh pink with variegated red streaks scattered throughout. Unit is composed of moderately hard, well sorted, fine grained, rounded sand grains. Bedding is thin to medium (4&quot; to 48&quot;) with strike and dip ranging between N 6 E 10 SE and N 18 E 11 SE.</td>
</tr>
<tr>
<td>SS-4</td>
<td>Sandstone, white and brown-white, thin bedded, with flat lying beds 3 - 12&quot; thick, moderately hard and friable. Grains are uniformly graded and rounded.</td>
</tr>
<tr>
<td>SS-5</td>
<td>Interblend of topsoil, black, and sandstone decomposed to sand, red, gray and with shale and clay, yellow, green, and gray. Chert fragments are scattered throughout. GC class. On the contact between overburden and competent rock is found dolomite, (in float) very thin bedded, gray to yellow-gray, badly weathered and stained along the fractures, badly fractured and containing considerable chert.</td>
</tr>
<tr>
<td>SS-6</td>
<td>Sandstone, red and red-brown, badly weathered and decomposed to sand, fine grained, well sorted, rounded and subrounded.</td>
</tr>
<tr>
<td>SS-7</td>
<td>Sandstone - 1.5' thick - fine ground, silty, lamellar, brown, soft and friable.</td>
</tr>
</tbody>
</table>
For Legend See Plates 11 & 12

SH TRENCH STA 27+60 TO STA 29+00
NCH STA 29+00 TO STA 30+75

0-6 & OB-2
S 8-3 & S 8

SANDSTONE UN scatted chert

High unit beds dipping toward center 55° E

0-9

0-8

Consistent unit begin at Sta. 30+18

SCALE IN FEET
STAGE I
MAP CUTOFF TRENCH STA 30+75 TO

DIRECTION DATE  
Number of Photo

For Legend See Plates 11 & 12
STA 34+25 to STA 36+05

Scale in Feet

Limit of Excavation

Celomile Blocks in blue & black Shale

Platte No. 20
STA 36+05 TO STA 38+20

C-15
Dolomite - light brown-gray
nearly beds 3" to 6"

D-14
Dolomite - gray & brown-gray
v thin beds 1/2" to 2"
flaky, unweathered, tight & hard

LIMIT OF EXCAVATION

SCALE IN FEET

0 - 10
STAGE I MAP CUTOFF TRENCH STA 48+50

Direction Date $ Number of Photo

From STA 35+20 to STA 49+30 See Spillway
Examination Plates 62 thru 71
FRENCH STA 48+30 TO STA 50+05

48+30 See Spillway Powerhouse

Scale 1:1

0 10
SCALE IN FEET
STAGE I MAP CUT-OFF TRENCH STA. 50+05 TO

{other information on the page, including diagrams and annotations}
Line Profile

Dolomite beds that are light gray dolomite and caliche limestone highly fractured light and deformed beds.

White to light pink, gray, light undulated beds, inclusions of blue white, chart, lightly weathered dolomitic matrix.

White to light pink, gray, thin undulated beds, inclusions of blue white, chart, lightly weathered dolomitic matrix.

Caliche Breccia with smaller samples.

Scale in feet.

CH STA 50+05 TO STA 51+80
STAGE I MAP CUTOFF TRENCH STA 51+80 TO 5

Direction Number 6
Date of Photo
PLATE NO. 24

MAP CUTOFF TRENCH
STA. 51+80 TO STA. 53+40

0 10
SCALE IN FEET

ST. A51+80 TO STA. 53+40
STAGE I MAP CUTOFF TRENCH STA 53+40 TO 54

Dolomite hard blue-gray to light gray with brown stained surfaces lightly weathered lightly fractured very thin bedded to lamellar (beds ¼") inter-bedded seams of blue shale near brecia contact tiny few joints

Dolomite thinly brown grey weathered fractured brecciated but light in shale matrix blue-gray & brown gray fragments of dolomite mixed with concretions

TOP OF ROCK

ELEVATION

630

620

53+50

53+00

54+00

CENTERLINE PROFILE

UPSTREAM

Match Line Plate 24

Match Line Plate 41

53+50

54+00

AXIS

DOWNSTREAM

Direction Number 4
Date of Photo
Dolomitic grey-brown, blocky, deformed bedding. 

Brecia is a hard calcite-tuff tuff, angular breccia blocks in a matrix of shale breccia blue to black, desquamated bedding.

Profile: STA 53+40 to STA 54+90

Scale: 1/4" = 1'
STAGE 1 MAP CUTOFF IN CLAY STA 54+90 TO 51

Direction, Date & Number
of Photo
STAGE I MAP CUTOFF TRENCH STA 56+55 TO

For Detail Description of Sec 4 plates 59, 60 & 61

Direction Number & Date of Photo
STA 56+55 TO STA 58+35

Detail Description of Geologic Units see Plate 4 & Plates 59, 60 & 61

Dolomite Breccia

Dolomite brown-grey tuff 2" thick, healed vertical feature, hackly surface, with minor solution channels highly to moderately weathered low level domes up to 2" diameter.

Profile

ZONE
15-1 & 15-2

D.2.00

SCALE 1 INCH = 50 FEET

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

HARRY S. TRUMAN DAM & RESERVOIR
CONSTRUCTION FOUNDATION REPORT

MAP CUTOFF TRENCH
STA. 56+55 TO STA. 58+35

PLATE NO. 27
Dolomite 15-A & 15-B
Brown-gray lightly to moderately weathered tend
very fine grained thin beds <3" thick. Scattered interbed
clay = 1/2" thick black shale filled thin line fractures.

DAM
AXIS
58+30
59+00

DOWNSRAME

(2) Shale breccia
15-A Dolomite
Brown-gray moderately
moderately hard weathered. Thin
undulated vertical fractures < 3"
Dolomite 15-A
Sandy, very fine-grained
beds 1" to 3" thick, mod hard
weathered, locally incipient fractures

DAM
A

AXIS

MOUTH OF SLEEPER MOUTH OF SLEEPER

MATCH LINE PLATE 28

DAM

AXIS

MATCH LINE PLATE 28

60+50

61+00

STAGE I MAP CUTOFF TRENCH 171-12-6 TO

Direction Number & Date
of Photo
For Legend See Plates 59, 60, 61
STATION

50 25/50 to 56C53 + 05 Unconsolidated Chalk
very fine-grained, chalky, brown-gray, massive fragments from minute to
4" diameter beds 3 to 4" thick

209
11-23-77

463 + 50

Slate and shale some as above
uncemented beds except fragments,
2" to 4" diameter with white to pink
chert nodules.

10-7-71

463 + 00

10-7-71

11-6-71

11-6-71

11-6-71

CH STA 61.95 TO STA 63+75
STAGE I MAP CUTOFF 200' FREE ZONE IN STA 8

Director, Date &
Number of Photo

For Legend See Plates 59, 60, 61
To STA 65+55

Silicic sand, sandy and gravel

Over weathered gray to brown gray

Thin discontinuous bands (0.5" thick) undulated

Some surface etching and erosion parallel to river. Scattered tripoliite jasper.
STAGE I MAP CUTOFF TRENCH STA 65+55 TO STA

Direction, Date &
Number of Photo

For Legend See Plates 59, 60 & 61
STANDARD PROFILE

66+35 to 67+00
Dolomite competent units
broken into fragments 2" to 6"
Dolomite Breccia hard light brown thin bedded blocks

66+50
Dolomite mud bedded
hard brown
slightly cherky
crystalline
surface
undulated

67+00
many areas of intensely fractured oolitic
dark gray chert

STA 65+55 TO STA 67+35

SCALE IN FEET

MARCH 1988
PLATE NO. 32
STAGE I  MAP CUTOFF TRENCH  STA 67+35 TO STA 68+00

For Legend See Plates 59, 60, 61
I. 30-40 km 36+50(TA) 5TA69.69+A15/TU 17x30 2A/ft= OF EXCAVATION

STA 67+35 TO STA 69+15

Unit 12-A

57+69+00 to 57+69+30
After grouting Shale Breccia was excavated to solid dolomite and area back filled with impervious clay

Scale in Feet
STAGE I
MAP CUTOFF TRENCH
STA 69+15 TO STA 70+50

Direction, Date &
Number of Photo
For Legend See Plates 59, 60 & 61

SCALE IN FEET

TOP OF ROCK

UPSTREAM

LIMIT OF EXCAVATION

UNIT 12

DOWNSTREAM

LIMIT OF EXCAVATION

CAM AXIS

MATCH LINE 33
STAGE II CONSTRUCTION
EXISTING EXCAVATION LIMITS (see drawing 2-3 on sheet 5)

EXCAVATION LIMIT

HALF THE ORIGINAL SCALE PROFI LE

AR4M, ENGINEER DISTRICT OF ENGINEERS OF THE ARMY, MISSOURI

INSTRUCTION FOUNDATION REPORT GEOLOGIC PROFILES 4-4 AND 3-3

MARCH 1988

PLATE NO 36
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE.
STAGE III CONSTRUCTION
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
BULKHEAD - FILL TIE - IN
PLAN OF FILL AT EL 713.0

PROFILE - CREST DETAIL - BULKHEAD FILL TIE - IN
R 04+17.0 TO R 04+26.4 UPSTREAM

DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
D FILL TIE - IN

SECTION AT BULKHEAD
STA 47+480.0 TO 48+400
STA 38+37.0 TO 38+500

PROFILE - CREST DETAIL - BULKHEAD FILL TIE - IN
STA 120 TO STA 17.0 UPSTREAM
STA 120 TO STA 19.5 DOWNSTREAM

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE.
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
TYPICAL SECTION CHANNEL SLOPE
TRANSITION AREA

TYPICAL 2:1 SLOPE

OUTLET CHANNEL
PLAN FOR TRANSITIONS

RIVER CHANNEL SLOPE PROTECTION

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE
EXISTING EMBANKMENT LIMITS

BEDROCK EXCAVATION LIMITS

EXISTING CUTOFF TRENCH LIMITS

EXSTING EMBANKMENT LIMITS

APPROXIMATE BEDROCK EXCAVATION LIMITS

PLAN OF BORINGS - SPILLWAY & POWERHOUSE
DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CONSTRUCTION FOUNDATION REPORT
LOGS OF EXPLORATIONS
SPILLWAY POWERHOUSE
SECTION AND PROFILE

PLATE NO. 51
EXISTING EXCAVATION LIMITS

EXCAVATION LIMIT

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE

ARMY ENGINEER DISTRICT
UNITED STATES ENGINEERS
KANSAS CITY, MISSOURI

LEGEND OF EXPLORATION
SPILLWAY-POWERHOUSE PROFILE

APPROVED

PLATE NO 52
EXISTING EXCAVATION LIMITS

EXCAVATION LIMIT

C-284

C-282

LIMITS

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE

FIELD ENGINEERING DISTRICT
U.S. ARMY, ENGINEERS
KANSAS CITY DISTRICT

CONSTRUCTION FOUNDATION REPORT
LOGS OF EXPLORATION
SPILLWAY - POWERHOUSE PROFILES

MARCH 1985

PLATE NO. 53
SECTION - PROFILE ALONG DAM AXIS
LOOKING UPSTREAM

SCALE IN FEET

CONTROL LINE "A"
Dam Axis 540 40+68

REVISED

U.S. ARMY ENGINEER DISTRICT
COEUR D'ALENE ENGINEERING OFFICE
BOISE, IDAHO

LIMITS OF ROCK EXCAVATION
PROFILE ALONG DAM AXIS

PLATE NO. 54

0-12-9184

MARCH 1988
For Legend See Plate 4
LIMITS OF ROCK EXCAVATION - PROFILE 1

Control Line "C" = Dam Station 1+59.65
Dem Axis is at Sta 50+00

For Legend see Plate 4
LIMITS OF ROCK EXCAVATION
PROFILE ALONG LINE "C"

PLATE NO. 58
To understand the map of the spillway powerhouse area, it may be interesting to note the method used to obtain the detail of the units, subunits, and their location. The vast exposure of the rock surfaces portrayed the big picture in viewing the units, and their trends, individually; and in relation to each other. Unit descriptions and their directions were obtained and traced along the unweathered presplit final rock surfaces. Accuracy in locating these units in respect to elevation and station was assured by the following method.

As the rock was being prepared (scaled, trimmed, and cleaned) there was an opportunity to examine the rock and to map it by increments specifically pinpointed by the concrete pour layout drawings of the contract plans. As the rock was marked according to scheduled concrete pours, the foundation was also mapped. Essentially, steel rebars, a part of the reinforced concrete design, were generally situated near the exposed rock surface on 12-inch centres to form a mat. The mat served as a grid over the rock providing control in which to map. Generally, stations, ranges, and elevations were a part of the pour layouts providing sufficient survey accuracy to map without the use of a survey party. Hence, no survey party was used. Finally, the "big picture" was thereby reproduced showing each rock unit, subunit, and boundary merely by fitting the rock map of each concrete pour together after concreting was completed.

**GEOLOGIC UNIT DESCRIPTIONS**

**Unit 9**

Unit 9 (bed to 1-3' loc) - Dolomite, shaly, lamellar to very thin bedded (up to 0.5") and shaly with blue-gray and black shale along beds. Unit is undulating generally and deformed locally.

**Subunit A**

- **0.7 - 1.3'** Dolomite, gray, moderately hard
- **0.7 - Upper half** - hackly and tripolitic.
- **0.7 - Lower half** - very thin beds (1-3") locally indistinct and overridden by tripolitic dolomite, undulating, gnarly, with considerable healed high angle fractures.
- Top contact of 7 - 1" back chert locally indistinct.

**Subunit 2**

- **0.2 - Upper half** - massive, medium grained (macroscopic) sandy, with scattered high angle fractures (no accurate fracture frequency determinable).
- **0.2 - Lower half** - very thin bedded, (beds uniformly 1 - 2") very fine grained (argillaceous), shaly contacts along beds, lightly fractured to unfractured, undulating.

**Subunit 3**

- **2 - 3'** Dolomite, gray, moderately hard
- **2 - Upper three-quarters** - massive, tripolitic, hackly, and weathers brown.
- **2 - Lower one-quarter** - red-brown-gray, very thin bedded (beds 0.5") with locally indistinct separations, weying mass appearance. Unit is gnarly with intense random high angle fracture system; discontinuous.
GEOLOGIC UNIT DESCRIPTIONS

Unit 9

Dolomite, moderately hard, brown-grey, mass appearing, (bedding exemplified by discontinuous chart bands along horizons 6-12” apart in lower 2/3 of this unit. Chart is 1-2” thick along discontinuous bands, blue, black, and white, locally disturbed and/or deformed. Dolomite is fine to medium grained, lightly to unfractured. Upper 1/3 of this unit is brown, without chart, locally hackly, locally vuggy, and containing random assortment of disoriented rock fragments of other units.

Upper contact appears to be chart seam which may or may not be continuous.

Unit 10

Subunit A - Dolomite (2 distinguishing units)

1.5’  +

Upper 1/2 of subunit A, Dolomite, pink-gray, moderately hard, very thin bedded (beds varying 1/2-3”). Beds marked by shale veneer. No separations along beds except locally single discontinuous chart horizon at the unit base. Slightly fractured with shale veneer on fracture faces. No separation along fractures except in scattered areas. This unit contains a very fine grained texture, is strongly undulating, and possesses several shale veneer bedding surfaces developing into lamellae shale stringers.

Lower 1/2 of subunit A, Dolomite, dark grey, course grained (sandy), massive with scattered high angle healed fractures (lightly fractured). No bedding planes are apparent. A strong continuous lamellae, grey, shale seam 1/2 - 1” thick is at the contact between the upper and lower subunits.

Subunit 1 - Dolomite, grey, moderately hard, massive, hackly, very fine grained but not tripolitic. A discontinuous wide 4”+ chart band appears at a horizon about 1-2 feet below top of unit. The chart is very hard, dark blue and white band. A very thin continuous blue chart band underlies the upper contact ranging in thickness between 1/2 - 4”. These bands locally reflect pre-lithification distortion and/or disturbance. Most prominent in the upper half of this unit are discontinuous horizons of dolomite, very fine grained, very thin bedded (beds 1”+), locally deformed and disturbed, and undulating.

Subunit 2 - Dolomite, moderately hard, light grey, thin bedded (beds 2-6”) very fine grained (argillaceous) and containing conchoidal fracture characteristic. Unit is lightly fractured to unfractured. Shale veneer on bedding planes.

Lower 1/2 reflects a shaley appearance with blue-grey shale stringers, lamellar (1/4”-1 1/2”) scattered throughout. Shaly dolomite, light blue-grey, is common. Contact with upper unit indistinct except for rock tafnure.
UNIT DESCRIPTIONS

UNIT 11

Unit 11 (From base to top)

11A Shale, dolomitic, blue-gray and white interbeds; lamellar to very thin bedded (1"), moderately hard, scattered fractures, undulating; varies in thickness locally. (Reduces to flat and elongated sherds under artificial breaking).

11B Dolomite, dark gray to brown-gray, dense, cherty, gnarly, very finely crystalline, hard, and very thin bedded (beds 1/2 - 1" but without separations). Bedding often obliterated and replaced by massive unfractured conglomeration of brown and dark gray dolomite in random pattern. Rock is badly fractured with very fine or incipient discontinuous fractures, with dark gray chert common locally (no tripolitic chert).

11C Dolomite, light gray, very fine grained, (not argillaceous), hard, dense, with considerable healed high-angle fractures (0.5'±) with shale veneer. Unit is undulating, massive (bedding indistinct), cherty, black-gray and white, in discontinuous seam along upper contact.

11D Dolomite, dark gray and brown-gray, mottled, hard, dense, unfractured, (except locally) and massive. Locally, traces of very thin beds, 1/2" and less, deformed and undulating occur without bed separations. This unit may, with small differences, be defined as a sister unit to 

11E Chert, very hard, black and white, oolitic, very thin bedded (beds ± 1-2") intensely fractured and locally vuggy.

UNIT 12

Contact with top of Unit 13 (Base of Unit 12)

12A Dolomite, moderately hard, brown, dark gray to black-gray, massive, hackly, intensely fractured (high angle) in areas of local distortion. This unit reflects a dense, finely crystalline dolomite, that has been severely broken up and redeposited in a random fashion with a softer, lighter gray dolomite as matrix; appearing to weather more easily, this resembling a tripolitic mass. Dark crystalline fragment sizes vary widely. Chert is scattered throughout. Scattered evidence of very thin beds (1-2"), deformed, are in lower 1/2 of the unit. Lower one-half of 12A consists of a hard dense, blue-gray to brown-gray dolomite portraying a very thin bedded structure (beds one-inch thick and less) deformed and distorted. Mass looks like whole around large chert nodules intensely fractured and broken. Deformation and distortion common. Seepage avenues with accompanying perminerilation locally prominent.

12B Dolomite, hard, light gray, very fine grained, sandy, thin bedded (1"-6") but with relatively indistinct bedding separations. Unit is gnarly with considerable number of heaved, discontinuous, vertical and high angle fractures.

12C Chert, very hard, oolitic, dense, blue, brown, and gray, lightly fractured with intense fracturing associated with undulations.

12D Dolomite, tan-gray, massive, hackly (resembles pebble conglomerate locally), unfractured, and capped with a black and white 1" chert band, lightly fractured, and strongly tripolitic.
STAGE III CONSTRUCTION
Truman Dam and Reservoir, Missouri
Mapping - Spillway Powerhouse Area

GEOLOGIC UNIT DESCRIPTIONS

12C1 Dolomite, brown-gray, hackly, massive, but possessing bedding locally that is generally indistinct. Unit appears sandy, very fine grained at the base, but reflects a transitional finer texture toward the top. Argillaceous appearance is characteristic near top of unit. Oolitic dark gray and blue chart mixed with dark gray dense dolomite, produces a mottling appearance that can locally be defined as bedding, very thin (beds 1 - 3'). This unit resembles a conglomeration of units (more than one) mixed together prior to the completion of lithification and redeposited in a deformed distorted mass.

12C2 Dolomite, gray and tan-gray, very fine grained, very thin bedded, (beds 3' and less), intensely fractured, gnarly, with scattered discontinuous chart seams locally deformed, distorted, and undulating.

12B2 Dolomite, moderately hard, pink to tan-gray, very thin bedded, (beds 3 - 5'), argillaceous appearing, unfractured except for scattered high angle fractures marked by shale vaneer. This unit is capped and based with shale stringers, blue-gray, lamellar, soft to moderately hard, with blue and white chart scattered throughout the shale. Considerable undulation is noted in the shale.

12B2a Locally identified as shale with chart prominent enough to be considered as an independent subunit.

Unit 13 Dolomite, light gray, uniformly very fine grained, argillaceous, scattered high angle healed fractures with shale vaneer, very thin bedded with shale vaneer along bedding plane (no separations) massive appearing and undulating. Unit bounded at the base by the "S" chart horizon and at 1' below the top by a prominent stringer of chart 1" thick, continuous, blue and white, very hard, and undulating with the unit. Chart is locally interlaced with lamellar blue-gray shale.

"S" Chert, blue and white, very hard, badly fractured with dark gray, dense, dolomite fragments, tripolitic (white) chart, and barite deposits widely scattered throughout. Black and gray shale interstices locally common. Iron stain on exposures prominent. This unit forms the base and is identified with Unit 13.

Unit 14 This unit is generally uniformly hackly portraying secondary deposition or a redeposition of semilithified primary sediments earlier disturbed by possible wave action. The unit is considered hackly, locally vuggy and possessing white tripolitic chart bands on a spacing of 6 to 10' (notably 5 bands passing through the center of the unit). This unit is bounded by chart zones each identified individually. There is some evidence that this unit doubles in thickness (287 or 8') on the powerhouse wall indicating possible translational movement along a bedding plane (bedding plane fault).
STAGE III CONSTRUCTION

Harry S. Truman Dam and Reservoir, Missouri
Foundation Mapping - Spillway Powerhouse Area

GEOLOGIC UNIT DESCRIPTIONS

Unit 14A rests atop Unit 15C, the sandy unit of 15.

Unit 14A - Dolomite, and chert, light gray to dark gray, hard, dense to crystalline, badly fractured (fracture internal: 1-3") very thin bedded (beds 1/2'-3"') capped with white to blue gray discontinuous chert seam, very hard and lightly fractured. Estimated thickness 1 - 1.5'.

Unit 14B - Dolomite, hackly, moderately hard, gray to brown gray (locally), lightly tripolitic with 5 nearly continuous hard white tripolitic chert seams 1/4-1" thick on 6 to 10" spacings. Within the five bands is confined the vuggy formation with vugs not larger than 1" diameter. No interconnections are apparent.

Unit 14C - Dolomite, cherty, hard, dense, finely crystalline, gray to black gnarly, with interbeds (indistinct) of brown gray dolomite. Chert, crystalline and tripolitic scattered throughout with nearly continuous seam of blue-gray and white chert on upper contact with Unit 13. Unit appears massive with indistinct beds and locally deformed and/or distorted.

Unit 15

15A Contact with top of Unit 16 (Base of Unit 15)
Dolomite, moderately hard, brown gray, massive, strong pattern of incipient healed fracture with pyrolusite or shale veneer in random pattern. No bedding orientation except locally deformed strata blue-white and black chert randomly oriented and scattered throughout, very fine grained.

15B Dolomite, very hard, dark gray, dense, massive, but containing very thin beds of cyclic deposition ranging from black-gray to light gray, (beds 1/4") without distinct separation planes. Bedding strongly deformed and distorted with considerable blue-gray and white chert bands distorted and deformed penetrating at random throughout the mass. Texture is sandy (but fine grained). Chert comprises the majority of the whole in local instances.

15C Dolomite, sandy, medium grained, resembling possible fossil debris, massive, light gray, (bedding not apparent) scattered traces of one chert band, undulating but continuous portraying a specific temporal horizon. This band is about 2' from base of 15B, 0.2' thick blue-gray, and oolitic. Above the band appears a lightly tripolitic and hackly texture. Tripolitic chert bands discontinuous but resembling the same temporal horizons are scattered more prominently in the upper 1/2 - 1/3 of 15C. Spacing 3-6".

15D Dolomite, light (white) gray, moderately hard, very thin bedded (1/2-3") medium grained sandy texture, not in contact with 15C to very fine argillaceous texture in contact with 14A. Unit undulates. Unit contains some minute vugs and considerable number of high angle fractures. Shale veneer common on beds and on high angle fractures locally.

Unit 16

Dolomite, very fine grained, massive to very thick bedded, (beds 12") containing shale veneer (may be defined as shale stylolites - see 16 definition KCD0). Bottom third is tripolitic, with thin beds of tripolitic chert, one of which is continuous one-fourth up from unit base. One-third up from unit base is tripolitic shale seams 1/2" on center for a thickness of 3-4 inches. Above the shale, the dolomite portrays an aphanitic texture with considerable perpendicular and high angle fractures healed or containing a shale veneer. Fracture frequency 4 in 12 inches.
GEOLOGIC UNIT DESCRIPTIONS

Unit 17

A3 - Base of 17
Shale, moderately hard, gray and green gray, lamellar, but possessing massive characteristics, widely scattered fractures, healed, undulating, deformed occasionally and containing scattered white chart nodules, bounded by white chart seams and nodules relatively discontinuous. Chart seams serving suitable markers immediately below and above the shale with greater chart concentration at the base.

A2 - Dolomite, gray, moderately hard, massive, gneissic, tripolitic upper half, with trace of hard, dark gray and blue, discontinuous, chart zone midway throughout the unit. Scattered blue and white chart throughout the lower half. Unit possesses very fine grain, sandy texture.

A1 - Dolomite, very thin bedded, (beds 1/4 to 1"), moderately hard, brown-gray, unfractured, (possessing massive characteristic), and containing very fine grain sandy texture. (This unit may be the top of the massive tripolitic unit defined by A2 as tripolitic rock is exposed on the 583 floor)

A - Dolomite, dark gray, moderately hard, very thin bedded, (beds 1/4" to 1"), intensely fractured, with bands of chart, white, gray, scattered in uniformly horizontal orientation throughout. Unit is capped with white chart band, 1/2" thick. Fractures noted are healed and partially healed. Upper section is sandy dolomite, very fine grained.

B - Dolomite, massive to thick bedded, gray, moderately hard.
Upper 1.5' - Unit is tripolitic, vuggy, indicating some solution cavitation in the sandy tripolitic zone.
Lower 2.5' - Shale veneer on bed 1-6" thick with no separation planes. Fractures are scattered and healed. Dolomite is smooth, aphanitic, and massive in appearance with scattered bands of white chart in the lower 1/4 of the unit.

C - Chert, light gray to white, very hard, sandy, very fine grained with some gray shale lenses. Lower contact is tripolitic, soft, white, 1/2-3" thick.

D - Dolomite, gray, massive, lightly tripolitic, sandy, (coarsely crystalline), locally vuggy, and scattered discontinuous shale veneers. Unit is sandy, moderately hard.

E - Chert, dark gray to blue, very hard, lightly fractured, massive.

E - Top of Unit 17.
STAGE III  UPSTREAM FACE EXCAVATION NON-OVERF.

LOOKING UPSTREAM

For Legend See Plates 59, 60 & 61

SCALE IN FEET
STAGE III

FOUNDATION MAP ERECTION
MONOLITH 5

Range from Control Line C
Control Line C = Draw Axis STA 43+56.25

For Legend see Plates 59, 60 & 61
STAGE III
POWERHOUSE ERECTION BAY AND SUMP EXCAVATION
LEFT WALL

SECTION AT DAM AXIS 576
CONTROL LINES RANGE 2

SCALE IN FEET

For Legend See Plates 59, 60 & 61
SUMP EXCAVATION

SECTION A+ DAH AXE SIA 4016B

* ELEVATION

* PLATE NO. 38

HARRY & TROHMAN EAK & KININORD
CONSTRUCTION FOUNDATION REPORT
POWERHOUSE ERECTION BAY & SUMP EXCAVATION LEFT WALL

PLATE NO. 60
STAGE III
POWERHOUSE EXCAVATION RIGHT WALL

ELEVATION AT DAM AXIS STA 400.08 FROM CONTROL LINE C1 KANS

For Legend See Plates 59, 60 & 61

SCALE IN FEET
STAGE III
TAILRACE EXCAVATION RIGHT WALL

ELEVATION AT 600 FT. 0" 15 FT. 0" FROM CONTROL LINE OF WORK

FOR LEGEND SEE PLATES 59, 60 & 61

SCALE 1" = 10'

SINK STRUCTURE
RIGHT WALL STA 52+80 TO STA 51+47

CONTROL LINE 6 RANGE 23885 R

SINK STRUCTURE
DISTORTED DOLOMITE BLOCS

TOP OF WALL EL 693

TW-3
EL 695

TW-2

TW-1

TOP OF ROCK R 2+60.28 R

TOP OF ROCK R 2+83.75 R

690
680
670
660
650
640
630
620
610
600
590

ELEVATION

MATCHLINE PLATE 67

DISTANCE

PLATE NO. 68

CONSTRUCTION FOUNDATION REPORT

U S ARMY ENGINEER DISTRICT
KANSAS CITY, MISSOURI

MARCH 1956

TH. 0-12-9190
STAGE III
TAILRACE EXCAVATION RIGHT WALL 374

ELEVATION AT STA 40+68 FROM CONTROL LINE 2 RANGE 2+68.25 R

For Legend See Plates 59, 60 & 61

0 10
SCALE IN FEET
TAILRACE EXCAVATION
RIGHT WALL

16' 11" WALL  STA 54+15 TO STA 52+80

E 208.85' R

FEET

MATCH LINE PLS 68

MATCH LINE PLS 68

-683

TW-G

FEET

ELEVATION
STAGE I CONSTRUCTION
STAGE III
SPILLWAY EXCAVATION LEFT WALL STA 45+54 T.

ELEVATION AT DAM AXIS STA 46+10
FROM CONTROL LINE "C" RANGE 2+43.75 L

For Legend See Plates 59, 60 & 61
Excavation from STA 45+54 to STA 51+10.

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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

DESIGNED BY
JERRY S. FRYER

ENGINEER DRAFTSMAN

CONSTRUCTION FOUNDATION REPORT
SPILLWAY EXCAVATION
LEFT WALL

PLATE NO. 70

MARCH 1965
STAGE III

SPILLWAY EXCAVATION LEFT WALL STA 51+10 TO STA 53+40

SCALE IN FEET

ELEVATION AT DAM AXI'S STA 46+10
FROM CONTROL LINE C' RANGE 2+43.75 L

Legend See Plates 59, 60 & 61
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE.
ARMY ENGINEER DISTRICT
KANSAS CITY, MISSOURI

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FULL PERFORATED SLEEVE BOLT DETAIL

WITH THREADED BOLT

WITHOUT THREADED BOLT

ROCK DEFORMER BOLT DETAIL

PROTECTIVE CAP
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STAGE IV CONSTRUCTION
OVERBUILD DETAIL

RIGHT ABUTMENT SECTION
STA 9+70+0 TO STA 11+40

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE

PLATE NO. 87
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
STEREIT CREEK DIKE

INSPECTION TRENCH PROFILE STA

LOOKING UPSTREAM

SCALE AS SHOWN
CREEK DIKE STAGE IV

STA 11+50 TO STA 62+50

for legend see Plate 90

SCALE AS SHOWN
STERETT CREEK DIKE

INSPECTION TRENCH PROFILE STAGE

LOOKING UPSTREAM

SCALE AS SHOWN
**Legend**

- **A**: CH gray with locally brown mottling
- **B**: CH Gray with gray black
- **C**: CH Light brown gray; C' Brown at base blending to black at top
- **D**: CH Dark gray gray black & brown gray
- **E**: CH Gray
- **F/D**: CH Dark gray, gray black & brown gray with gravel
- **G**: CH Black

- **Sample number, UC Liquid Limit, PI, Plastic Index**

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**CREEK DIKE STAGE IV**

**PROFILE STA 62+50 TO STA 86+00**

**UPSTREAM**

**Scale as shown**
STAGE VI CONSTRUCTION
STAGE VI CONSTRUCTION
LEFT ABUTMENT UPSTREAM BLANKET DETAIL
RANGE 1+97 (LOOKING UPSTREAM)

WN EL 756.36

S PROFILE - LOOKING UPSTREAM

DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE

PLATE NO. 92
APPROX EXCAVATION LIMITS FOR RANDOM I (GRAVELLY GRAY BLANKET)

- APPROX EXCAVATION LIMITS
- GROUT LINE B
- GROUT LINE C
- AXIS OF DAM
- SEDALIA-COMP'TON EXCAVATION
- LIMIT OF EXCAVATION FOR ACCESS ROAD A

DRAWING HAVE BEEN HALF THE
DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE

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<th>SECTION IDENTIFICATION</th>
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U.S. ARMY ENGINEER DISTRICT
KANSAS CITY, MISSOURI

CONSTRUCTION FOUNDATION REPORT

PLAN OF EXPLORATIONS
LEFT ABUTMENT AND CLOSURE

MARCH 1985
0-12-9224
PLATE NO. 84
DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE.
HALF THE ORIGINAL SCALE

DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
STEP I

PLACEMENT OF ROCK DIKES

STA 63+00 TO STA 64+00

DETAIL "A"
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
STEP 1
EXCAVATION OF RIVER BOTTOM, AND PROTECTIVE DIKE, AND EXISTING EMBANKMENT

COFFERDAM SECTIONS
AXIS OF DAM

SECALIA-COMPTON EXCAVATION
SEE EXCAVATION DETAIL ON PLATE 93.

LEFT ABUTMENT CUTOFF TRENCH
ELEVATION VARIES-SEE PROFILE ON PLATE 92.

CUTOFF TRENCH (ELEVATION VARIES-SEE PROFILE ON PLATE 92.)

STEP I
PLACEMENT OF U.S. COFFERDAM

LEFT ABUTMENT TOE GUTTER

DETAIL "T"

LEFT ABUTMENT SECTION C

LEFT ABUTMENT TOE GUTTER

DETAIL "H"

UPSTREAM

DOWNSTREAM

Axis of Dam

Note: Upstream toe gutter terminates at top of upstream abutment.

Upstream toe gutter terminates at top of upstream abutment.
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE.
PLAN UPSTREAM DEVATERING COLLECTOR SYSTEM AND SL.

PROFILE UPSTREAM SLURRY WALL
SYSTEM AND SLURRY WALL CLOSURE AREA

Top Slurry Wall

ELEVATION

-10'

N-Channel

- Fill

WALL

Direction Date & Number of Photo

Prominent Seepage Points

SCALE IN FEET

0 100
C -

Dewatering wells

EMANKMENT

ELE 605

ELE 650

ROCK ZONE II
 STOCKPILE
 Slurry Wall Cutoff

PLAN
 DOWNSTREAM DEWATERING COLLECTOR SYSTEM
 AND SLURRY WALL CLOSURE ARE

ELEVATION

670

660

650

640

630

Bottom of Slurry Wall
(Top of Rock) Retardation of Vibrating Beam

PROFILE DOWNSTREAM SLURRY WALL
STAGE I CONSTRUCTION
STAGE I CONSTRUCTION
LINE C STAGE I GROUT CURTAIN PROFILE STA 22+59 LOOKING DOWNSTREAM

Grout Line is on Dam Axis
IN PROFILE STA 22+38 TO STA 23+42
NG DOWNSTREAM

LEGEND

PRESSURE TEST
PSI

WATER TAKE GPM

PACKER SETTING

GROUT TAKE SACKS
OF CEMENT

GROUT PRESSURE
PSI

PRIMARY HOLES

SECONDARY HOLES

TERTIARY HOLES

TOP OF BEDROCK

ZONE I

RIGHT ABUTMENT

ZONE II

COPPER AND JEFFERSON CITY DOLOMITE LIMESTONE

ZONE III

ELEVATION

0
10
SCALE IN FEET
LINE C  STAGE I  GROUT CURTAIN PROFILE  STA 23+42
LOOKING DOWNSTREAM

Grout Line is on Dam Axis
PROFILE STA 23+42 TO STA 24+86

FOR LEGEND SEE PLATE 106
LINE C  STAGE I  FRONT CURTAIN PROFILE  STAGE II  LOOKING DOWNSTREAM

Grout line is on Dam Axis
PROFILE STA 24+86 TO STA 26+48
DOWNSTREAM

JOHNSON CITY DOLOMITE LIMESTONE

PLET NO. 106

FOR FURTHER INFORMATION SEE PLATE 106
LINE C STAGE I GROUT CURTAIN PROFILE STAGE 48
LOOKING DOWNSTREAM

Grout Line is on Own Axis

SCALE IN FEET
FILE STA 26+48 TO STA 27+98 DOWNSTREAM

FOR LEGEND SEE PLATE 106
MAIN PROFILE STA 27+98 TO STA 29+75

DOWNSTREAM

SCALE IN FEET

For Legend see Plate 104

---

Explanatory core hole

---

LIMESTONE

---

For Legend see Plate 104
LINE C STAGE I GROUP CURTAIN PROFILE STABILIZE TO 2500 TT TON MOLLEUM

Grout line is on Unit 4th

SCALE IN FEET
LINE C STAGE I GROUT CURTAIN PROFILE STA 33+26
LOOKING DOWNSTREAM
Grout line is on Dam Axis
PROFILE STA 34+91 TO STA 36+62
RUNNING DOWNSTREAM

For Legend see Plate 106
FIND GROUT CURTAIN PROFILE STA 36+6

LINE C STAGE I GROUT CURTAIN PROFILE STA 36+6

Grout Line is on Dam Axis

Looking Downstream

Drill Sacks I II III
14 Primary holes 546' 1.55 0 0.25 1.30
11 Secondary holes 523' 1.15 0.10 0.30 0.75
26 Tertiary holes 536' 0.75 0 0 0.75

ELEVATION

SECTION 1E

Percussion Drilled Holes are marked with dot

Drill

38+00

37+50

SCALE IN FEET FOR LE
STAGE I
LOCATION OF GROUT HOLES AND KARS
IN CUTOFF TRENCH

Drilled 1,086.5 linear feet in 50 holes
Injected 387 sacks of grout in 13 holes
Injected 19.2 sacks of grout in 12 open caves
LOCATION OF KARST FEATURES IN CUT-OFF TRENCH

- Holes and Karst Features

Legend:
- Vertical Grant Hole Number
  - Direction of Hole Origin from Vertical of Trench Section

Note: Further details and annotations are present on the diagram.
LINE C STAGE I GROUT CURTAIN PROFILE STA 35+30
LOOKING DOWNSTREAM

Grout line is on Dam Axis
ZONE I

ZONE II

ZONE III

LOTTER AND JEFFERSON CITY DOLomite LIMESTONE

PROFILE STA 48+36 TO STA 49+74

For Legend see Plate 106

10 IN FEET
LINE C STAGE I GROUT CURTAIN PROFILE 5/1/49-7/24-70
LOOKING DOWNSTREAM

Front line is on Dam Axis
For Legend see Plate 100
Rotary Drilled
Primary Zone I Book A
Zone II Book B
Zones III & IV Book C
Secondary Zone I Book D
Zone II Book E
Tertiary Zone I Book F

Percussion Drilled

LINE C STAGE I GROUT CURTAIN PROFILE STA 53+10 TO LOOKING DOWNSTREAM

Grout Line is on Dam Axis
LINE C STAGE I  GROUT CURTAIN PROFILE STA 54+81 TO LOOKING DOWNSTREAM

Grout Line is on Dam Axis

SCALE IN FEET
LINE C STAGE I GROUT CURTAIN PROFILE STA 58+26 TO 59+50
LOOKING DOWNSTREAM

Grout Line is on Dam Axis

COTTER AND JEFFERSON CITY DOLOMITE LIMESTONE

Drill:  Sakes I II III
19 Primary 846’ 6.75 0.15 2.15 4.45
13 Secondary 725’ 9.55 1.00 2.00 6.55
20 Tertiary 637’ 2.95 0.35 1.05 1.85

Top of Bedrock
FILE STA 58+26 TO STA 59+91
UNSTREAM

For legend see Plate 106
LINE C  STAGE I GROUT CURTAIN PROFILE 31+59+91  FT
LOOKING DOWNSTREAM

Grout line is on Dam Axis

For Legend
Percussion Drilled

Rotary Drilled

Top of Bedrock

Grout Curtain Profile

STA 59+91 TO STA 61+68

For Legend see Plate 106
STAGE I LINE C
PROFILE STA 61+68 TO STA 63+36
NG DOWNSTREAM

GROUT CURTAIN PROFILE
LINE C
STA. 61+68 TO STA. 63+36

---

NOT SCALE IN FEET

---

MATCH LINE PLATE 124
Profile of Galleries

Drawings in this folio have been reduced to one half the original scale.
Routing Stage III

See Plate 127 for Plan & Profile of Galleries

For Legend See Plate 100

IN FEET
SPILLWAY-POWERHOUSE GROUTING STAGE III
MONOLITHS 2, 3, AND 4
LOOKING DOWNSTREAM
STA 38+80 TO STA 39+77
0 10
SCALE IN FEET
Grout Line is 4.55' I.F. of 730 Axis

DOUTING STAGE III

0 10
SCALE IN FEET

MONOLITH 2

MONOLITH 2

Drill Sacks

<table>
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<th>Level</th>
<th>I</th>
<th>II</th>
<th>III</th>
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<tr>
<td>Primary</td>
<td>390</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>Secondary</td>
<td>390</td>
<td>3.12</td>
<td>3.15</td>
</tr>
<tr>
<td>Teritary</td>
<td>10</td>
<td>2.34</td>
<td>2.36</td>
</tr>
</tbody>
</table>
Grout Mix 4:1 unless noted otherwise
Monolith 6 Grout Line is 29.92'
Upstream of Dam Axis
Monolith 5 Grout Line is 8.5'
Upstream of Dam Axis
Monolith 4 Grout Line is 4.55'
Upstream of Dam Axis

These holes drilled & grouted before concrete placement
to seal possible solution cavities in Spillway &
Powerhouse Foundation Oct 71

STAGE III
SPIIlWAY-POWERHOUSE
GROUTING MONOLITHS 4, 5 & 6
LOOKING DOWNSTREAM
STA 39+77 TO STA 40+98

SCALE IN FEET
These holes drilled & grouted Oct 71 before concrete placement to seal possible solution cavities in Spillway-Powerhouse Foundation.

Spillway-Powerhouse Grouting Stage III
Monoliths 6 and 7

Looking Downstream

STA 40+98 to STA 42+61
Fall 73 to Spring 74

Scale in Feet
SPILLWAY-POWERHOUSE GROUTING STAGE
MONOLITHS 10 THRU 13
LOOKING DOWNSTREAM
M2 45+26 TO STA 45+90
MONOLITH II

Floor E 1 602

MONOLITH 10

Top of Rock

ZONE I

ZONE II

ZONE III

Grouting Stage III

Grout line is 44.71' upstream of Dam Axis

Scale in feet
SPILLWAY-POWERHOUSE GROUTING STAGE III

MONOLITHS 13 THRU 16

LOOKING DOWNSTREAM

STA 45+90 TO STA 47+10

SCALE IN FEET

Primary 1,208' 53.2' 43.4' 3.31 6.42
Secondary 903' 34.99 31.86 3.14 0
Tertiary 140' 6.52 2.90 3.62 0

Grout Holes Not Shown 3:1 Mix
3° at 46+00
Range 7.71' O/F 0.86' sk
17.71' O/F 1.07' sk
17.71' O/F 0.71' sk
28.71' O/F 0.3' sk

Monoliths 14, 15 & 16
Grout Line is 6' Upstream of Dam Axis

Monoliths 9 thru 13
Grout Line is 44.71'
Upstream of Dam Axis

Grout Line is 6' Upstream of Dam Axis
BEGIN STAGE III GROUTING
SPIELWAY-POWERHOUSE

END STAGE III GROUTING SEE PLATE 117

Top of Rock

Drill Saks

16 Primary 1837' 39.64' 40.10' 5.00' 7.94'
13 Secondary 654' 15.96' 12.02' 9.00' 1.38'
9 Tertiary 176' 1.87' 0' 0' 1.57'
1 Quaternary 91' 0' 0' 0' 0'

Pressure Test Psi

Elevation

690
680
670
660
650

Water Take
Gallons per minute

48+50

Scale in Feet

STA 4710 TO STA 48+64

SPILLWAY-POWERHOUSE GROUTING STAGE III
MONOLITHS 16, 17 AND 18
LOOKING DOWNSTREAM
Grout Line is 6' upstream of Dam Axis in Monoliths 16, 17 & 18

Match Line Plate 134
STAGE VI CONSTRUCTION
TRUCTION

STAGE VI CONSTRUCTION
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE.
STAGE VI  GROUTING LINE 17A 65+39 TO 65+56  LOOKING DOWNSTREAM

Grout Line is on Dam Axis  
For Legend See Plate 100.
END GROUTING
SECTION E STA 63+59

G30
G29
G29
G27
G25
G24
G23
G22
G21
G20
G19
G18
G17
G16
G15
G14
G13
G12
G11
G10
G9
G8
G7
G6
G5
G4
G3
G2
G1

63+39 TO STA 64+04

While grouting G423 leaks at G4+58 's ups & 64+58 's ups, & G4+58 leaks at surface between G4+53 line B & G4+58 line B while grouting G4+35 & G4+25 while grouting G4+35 leaks at G4+35 ups & G4+58 ups. While grouting G4+48 leaks at G4+48 line B while grouting G4+58 leaks at G4+58 ups & G4+58 line B.

<table>
<thead>
<tr>
<th>Drill Sample</th>
<th>I</th>
<th>II</th>
<th>III</th>
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<tbody>
<tr>
<td>Primary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td></td>
<td></td>
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</tbody>
</table>

U.S. ARMY ENGINEER DISTRICT
COAST ENGINEER
CONSTRUCTION FOUNDATION REPORT
GROUTING LINE C
STA. 63+39 TO STA 64+04

Designed by:

Prepared by:

Printed by:

Photographed by:

AS SHOWN MARCH 1986

PLATE NO. 137
STAGE VI GROUTING LINES STA 65+04 TO STA 66
LOCKING DOWNSTREAM

Drill Sacks I II III
14 Primary 652 1.25 0 0.86 1.68
13 Secondary 435 1.25 0 1.08 0.17
8 Tertiary 288 1.05 0.60 0.08 0.36

For Legend See Plate 106
BEGIN GROUTING SECTION E

STATION 68+19

Overlap See Plate 140

ZONE I

ZONE II

ZONE III

STAGE VI GROUTING LINE C STA 68+63 TO

Looking Downstream

Great Line is on Jim Axis

For legend See Plate 06
while grouting hole at 68'10" grade omitted from records at 68/4-68+13, on line A, some stations 6' 10"
while grouting hole at 68'10" grade omitted from 68'10" on line B and 15' 10&.

STA 66+63 TO STA 68+19

Drawn: J.W. M. M. O. W. V A. P L. E. N. O.

U. S. ARMY ENGINEER DISTRICT
CITY OF KANSAS CITY, MISSOURI

CONSTRUCTION CORPORATION CONSTRUCTION CORPORATION,

GROUTING LINE C
STA. 66+63 TO STA. 68+19

As Shown:

Engineer:

MARCH 1999

PLATE NO. 139

10 FEET
STAGE VI  GROUTING LINE C STA 67+73 TO STA 69+50
WORKING DOWNSTREAM

Grout Line is on Dam Axis

For Legend See Plate 106
BEGIN GROUTING
30 APRIL 79

[Diagram showing various zones with elevation marks and annotations]

STA 67+73 TO STA 68+93

[Table with columns for Symbol, Descriptions, Date, Approved]

U.S. ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT

[Handwritten notes and signatures]

PLATE NO. 140
Stage VI Grouting Unit 29-41 70+00 to 70+400
Looking Downstream

For Legend See Plate 106
STAGE VI GROUTING LINE C STA 71+99 TO STA 73+00
LOOKING DOWNSTREAM

For Legend See Plate 106

Scale in Feet

0 10
During grouting hole 74+81, a joint was encountered between depths 8 and 10.

**Stage VI Grouting Line C STA 73+07 to STA 74**

Looking downstream

Scale in feet

For legend see Plate 106
STAGE VI GROUTING LINE A STA 67+50 TO ST.
LOOKING DOWNSTREAM

For Legend See Plate 106

BEGIN GROUTING
24 APRIL 1978

BEGIN SECTION 2, GROUTING
OVERLAP

Top of Bedrock

Scale in feet

Grout line is 10 ft.
BEGIN GRouting
1 APRIL 1978

Top of Bedrock

18 Primary 232'
18 Secondary 232'
10 Tertiary 80'

Kirr Sacks

Drill
I
II
5.39
5.39
7.20
0.17
7.06
0.99
0.99
0

Match Line Plate 145.

STA 67+50 TO STA 69+25
STREAM

Grout Line is 10' Off of Dam Axis

LE IN FEET
Match Line Plate 148

COTTER - JEFF CITY SHALY DOLOMITE BRECCIA

Grout leaks at surface
5T4 70-97 & 5T8 70-93

For Legend See Plate 106

STAGE VI GROUTING LINE A STAB
LOOKING DOWNSTREAM
NG LINE A STA 69+25 TO STA 70+93

Grouting Downstream

Grout Line is 10' OLS of Dam Axis

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

GROUTING LINE A
STA 69+25 TO STA 70+93

AS SHOWN
MARCH 1965

PLATE NO. 147
While Grouting at Sta 71+26
Surface leak at edge of Dolomite Block 2½' uphill

Large Dolomite Block from Sta 71+30
 to Sta 71+50

LINE A STA 70+93 TO STA 72+55
STAGE VI GROUTING LINE B
STA 63+36 TO STA 67+56
LOOKING DOWNSTREAM

For Legend, see...
STAGE VI GROUTING LINE B
STA 67+56 TO STA 69+37
LOOKING DOWNSTREAM

For Legend See Plate 104

SCALE IN FEET
Drill Socks I II
18 Primary 522' 4.90 0 4.90
18 Secondary 417' 14.47 2.57 11.90
13 Tertiary 104' 3.44 5.44 0

Grout Line is 10'/s or 0.1 Axi.
STAGE VI GROUTING LINE B
STA 69+37 TO STA 70+98
LOOKING DOWNSTREAM

For Legend See Plate 106

SCALE IN FEET
Drill Sack I II
1. Primary 412' 14.16 9.06 5.0
2. Secondary 3' 5.68 0.12 3.56
3. Tertiary 122' 6.44 4.60 2.04

Bedrock

out line is 10' 4/3 of Dam Axis
STAGE VI GROUTING LINE B
STA 70+93 TO STA 72+31
LOOKING DOWNSTREAM

For Legend See Plate 106
III.

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<td>1B Primary</td>
<td>7.9</td>
<td>0.05</td>
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<tr>
<td>1C Secondary</td>
<td>6.94</td>
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</tr>
<tr>
<td>2 Tertiary</td>
<td>0.67</td>
<td>0.12</td>
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Note: Drilled water from depth of Dolomite Block.

At Sta. 71+50 to Sta. 71+50.

Line is 10' N of Dam Axis.
<table>
<thead>
<tr>
<th>Stage I</th>
<th>STAGE I STA 22+38 TO STA 38+03 &amp; STA 48+36 TO STA 79+01</th>
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<th>SPILLWAY-POWERHOUSE STA 31+75 TO STA 37+70</th>
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<th>LINE A 10' DOWNSTREAM STA 63+36 TO STA 74+81</th>
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<td>Primary</td>
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<td>Tertiary</td>
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<table>
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<tr>
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<th>LINE B 10' UPSTREAM STA 63+36 TO STA 74+81</th>
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<td>Primary</td>
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<td>Secondary</td>
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<th>Stage III</th>
<th>LINE C &amp; STA 63+39 TO STA 74+81</th>
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<tbody>
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<tr>
<td>Secondary</td>
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<td>Tertiary</td>
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<th>TOTAL GROUT CURTAIN STA 22+38 TO STA 74+81</th>
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<tr>
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<td>Quaternary</td>
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<tr>
<td>Total</td>
<td>1,084</td>
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| Grand Total | 1,084 | 86,649 | 100.00 |

**Curtain Grouting Summary**

Does not include Sterett Creek Dike.
### SUMMARY OF GROUT TAKES

For Shreve Creek Dike Grouting during Stage IV which is not included: summary see Plates 154 & 155.

---

**Grout Injected in Pounds of Cement per Linear ft of Hole**

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<tr>
<th>PRIMARY</th>
<th>SECONDARY</th>
<th>TERTIARY</th>
<th>QUATERNARY</th>
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<tr>
<td>P</td>
<td>S</td>
<td>T</td>
<td>Q</td>
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<tr>
<td>0.02</td>
<td>0.11</td>
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<td>2.51</td>
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<td>4.99</td>
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<td>2.91</td>
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<td>0.69</td>
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<td>0.50</td>
<td>1.23</td>
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<td>0.04</td>
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<tr>
<td>0.40</td>
<td>0.45</td>
<td>0.28</td>
<td>0.02</td>
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</table>

**Stage III**

- 27.13 to 39.48 ft
- 39.48 to 50.96 ft
- 50.96 to 62.59 ft
- 62.59 to 74.21 ft
- 74.21 to 85.83 ft
- 85.83 to 97.44 ft
- 97.44 to 109.05 ft
- 109.05 to 120.66 ft
- 120.66 to 132.28 ft
- 132.28 to 143.89 ft
- 143.89 to 155.50 ft
- 155.50 to 167.11 ft
- 167.11 to 178.73 ft
- 178.73 to 190.34 ft
- 190.34 to 201.96 ft
- 201.96 to 213.57 ft
- 213.57 to 225.18 ft
- 225.18 to 236.79 ft

---

1. Does not include average of 2% pounds per linear ft for 64 holes grouted from 40.7% to 43.96.5% drilled ground before placing cement.
2. Total bedding planes for top 15 ft.
3. Osage River Channel Area.
STAGE IV CONSTRUCTION
STAGE IV CONSTRUCTION
CUTOFF TRENCH DETAIL
EXCAVATION AND DENTAL TREATMENT

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE

SECTION
TURNOUT DETAIL
STERETT CREEK DIKE GROUT CURTAIN PROFILE

STAGE IV

LOOKING UPSTREAM

LEGEND
Primary hole
Secondary hole
Tertiary hole
Pressure test water take in gallons per min
Packer setting
Grout take
Sacks of cement

SCALE IN FEET
**Curtain Profile**

<table>
<thead>
<tr>
<th>Number of Holes</th>
<th>Linear Feet</th>
<th>Grout Sacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>14</td>
<td>0.14</td>
</tr>
<tr>
<td>Secondary</td>
<td>15</td>
<td>0.10</td>
</tr>
<tr>
<td>Tertiary</td>
<td>1</td>
<td>0.01</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>0.25</td>
</tr>
</tbody>
</table>

**Origin Grout Curtain**

STA 11+38

---

**Plate No. 155**
STAGE III CONSTRUCTION
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
STAGE IV CONSTRUCTION
INSTRUCTION

STAGE IV CONSTRUCTION
STERETT CREEK EMBANKMENT

SCHEDULE OF OBSERVATION DEVICES

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE
STAGE VI CONSTRUCTION
AXIS OF DAM

LEGEND

A. BORDERS, INSTALLS IN PERMANENT MATERIAL
B. BORDERS, INSTALLS IN INTERMEDIATE MATERIAL
C. DEVICES INSTALLED IN PERMANENT MATERIAL
D. MONUMENTS AND TEMPORARY POSTS
E. MONUMENTS INSTALLED BY GOVERNMENT
F. IMMOVABLE STATIONS AND ALIGNMENT TARGETS
G. INSTRUMENT DEVICES
H. CUTOFF TRENCH AND GROUT CURTAIN

MAIN EMBANKMENT PREFERENCE SIDE SCHEDULE

ALIGNMENT MONUMENTS LINE "A"

<table>
<thead>
<tr>
<th>WEEK</th>
<th>STATION (ORIGIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>800</td>
</tr>
<tr>
<td>2</td>
<td>750</td>
</tr>
</tbody>
</table>

ALIGNMENT MONUMENTS LINE "B"

<table>
<thead>
<tr>
<th>WEEK</th>
<th>STATION (ORIGIN)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>800</td>
</tr>
<tr>
<td>2</td>
<td>750</td>
</tr>
</tbody>
</table>

PLATE NO 159

DRAWINGS IN THIS FOLIO
HAVE BEEN REDUCED TO ONE
HALF THE ORIGINAL SCALE.
DRAWINGS IN THIS FOLIO HAVE BEEN REDUCED TO ONE HALF THE ORIGINAL SCALE
STAGE I CONSTRUCTION
STAGE I CONSTRUCTION
OF CALYX HOLE NO 3

For Location See Plan of Borings Plate 2

0 5
SCALE IN FEET

completed 3 July 1964
FOUNDATION MAP VISITOR CENTER
WITH ANGLE BORING DATA

SCALE IN FEET
## Table D-2

**Shot Data—Mary's Truman Dam**

**Stage II Blasting**

<table>
<thead>
<tr>
<th>NO.</th>
<th>DRAWING</th>
<th>DIAMETER OF BURST</th>
<th>DRAWING</th>
<th>DIAMETER OF BURST</th>
<th>DRAWING</th>
<th>DIAMETER OF BURST</th>
<th>DRAWING</th>
<th>DIAMETER OF BURST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>10</td>
<td>B</td>
<td>10</td>
<td>C</td>
<td>10</td>
<td>D</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>15</td>
<td>F</td>
<td>15</td>
<td>G</td>
<td>15</td>
<td>H</td>
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<tr>
<td>3</td>
<td>I</td>
<td>20</td>
<td>J</td>
<td>20</td>
<td>K</td>
<td>20</td>
<td>L</td>
<td>20</td>
</tr>
</tbody>
</table>


- **Drawings in this field have been reduced to one-half the original scale.**

WHERE B = BURSTING EXRESSED IN FEET
WHERE C = SMALLEST DEPTH OF BURSTING
WHERE D = DEPTH OF BURSTING EXRESSED IN FEET