Multiple-Purpose Project
Little Blue River Basin
East Fork Little Blue River
Missouri

Blue Springs Lake

Operation and Maintenance Manual

Appendix IV
Volume Two

Construction Foundation Report

US Army Corps of Engineers
Operation and Maintenance Manual

Appendix IV
Volume Two

Construction Foundation Report

US Army Corps of Engineers
Kansas City District
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### APPENDIX IV to the Blue Springs Lake, Missouri Operation & Maintenance Manual

**MULTIPLE-PURPOSE PROJECT; LITTLE BLUE RIVER BASIN; EAST FORK LITTLE BLUE RIVER, MO; BLUE SPRINGS LAKE, OPERATION AND MAINTENANCE MANUAL; APPENDIX IV, VOLUMES ONE & TWO CONSTRUCTION FOUNDATION REPORT**

### I. REPORT NUMBER
- **APPENDIX IV**

### II. TITLE
- MULTIPLE-PURPOSE PROJECT
- LITTLE BLUE RIVER BASIN
- EAST FORK LITTLE BLUE RIVER, MO
- BLUE SPRINGS LAKE
- OPERATION AND MAINTENANCE MANUAL

### III. TITLE (and subtitle)
- APPENDIX IV

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**KEY WORDS (Continue on reverse side if necessary and identify by block number)**
- Volume Two (of 2 Volumes)
- Construction Foundation Report

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**ABSTRACT (Continue on reverse side if necessary and identify by block number)**

The purpose of this report is to provide a record of foundation conditions encountered during construction and methods used to adapt to these conditions. This information is a part of the permanent collection of project engineering data required by ER 1110-1-1801, change 2, dated 1 April 1983.
APPENDIX IV
VOLUME TWO
CONSTRUCTION FOUNDATION REPORT

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<td>40.9</td>
<td>1.02574088 505.1684.30 0°</td>
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<td>1.02574088 505.1684.30 0°</td>
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<td>1.02574088 505.1684.30 0°</td>
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 existing sewer (removed) }
VALUE ENGINEERING P.

ELEVATION IN FEET BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

SECTION C STA.75+50

CONDUIT SECTION (STA.75+02.7)

NOTE:
For slopes, see Plan Dwg. Blk D11

Choked limestone for road base

NOTE:
For slopes, see Plan Dwg. Blk D11

C. South Road

Bridge abutment fill detail

Outlet works excavation

Limestone (Wintercrest & Bethany Falls)

Excavated surface

Impervious

3' Limestone

Limestone (includes

Choked limestone for road base

NOTE: For slopes, see Plan Dwg. Blk D11

C. South Road

Limestone

Excavated surface

Impervious

3' Limestone

OUTLET WORKS EXCAVATION

BRIDGE ABUTMENT FILL DETAIL
SECTION STA. 75+50

NOTES:
1. Upstream 1% slope extends from right abutment to Sta 75+50 and
   transitions to 1% slope at Sta 76+00.
2. Downstream 2.8% slope extends from right abutment to Sta 76+00 and
   transitions to 1% slope at Sta 76+50.
3. Downstream impervious fill extends from right abutment to Sta 76+00.

SECTION STA. 74+50

NOTES:
- For backfill details see Dwg B12.
NOTE:
The impervious fill transitions (slopes) to random and berm fill at Sta 76+50. Construct full impervious fill at Sta 76+00 and full random and berm at Sta 76+50.
"For pay purposes only" The break point of impervious to random and berm will be Station 76+25.

SECTION E  STA 76+50

NOTE:
Limestone (Greater than 20% passing 2" sieve) Limestone & Shale

1. 6' thick x 8' wide pervious finger drains at Stations 83+00, 85+50, 88+00, 90+50, 93+00 and 95+50.
2. 18' Limestone fill with 3' thick x 20' wide pervious finger drains at Stations 77+00, 79+00, 81+00, 83+00, 85+00, 87+00, 89+00, 91+00, 93+00 and 95+00 wide at 95+00.
3. Upstream 10°2°6' slope extends from right abutment to Sta 76+50 and transitions to 10°3° slope at Sta 76+00.
4. Downstream 10°2°8' slope extends from right abutment to Sta 76+100 and transitions to 10°3° slope at Sta 76+50.
5. Downstream impervious fill extends from right abutment to Sta 76+00.

EMBANKMENT SECTIONS
NOTE:
The impervious fill transitions (slopes) to random and berm fill at Sta. 76+50. Construct full impervious at Sta. 76+00 and full random and berm at Sta 76+50.
"For pay purposes only" - The break point of impervious to random and berm will be Station 76+25.

SECTION E STA 76+50

NOTES:
1. 8" thick x 8' wide pervious finger drains at Stations 83+00, 85+50, 88+00, 90+50, 93+00 and 95+50.
2. 18" Limestone fill with 3' thick x 20' wide pervious finger drains at Stations 77+00, 79+00, 81+00, 83+00, 85+00, 87+00, 89+00, 91+00, 93+00 and 20' wide at 95+00.
3. Upstream 1 on 2.75 slope extends from right abutment to Sta. 75+50 and transitions to 1 on 3 slope at Sta. 76+00.
4. Downstream 1 on 2.8 slope extends from right abutment to Sta. 75+00 and transitions to 1 on 3 slope at Sta. 76+50.
5. Downstream impervious fill extends from right abutment to Sta. 76+00.
Embarkment Sections

Notes:
1. 6" Thick x 8' Wide Pervious Finger Drains at Stations 83+00, 83+50, 84+00, 84+50, 85+00, 85+50, 86+00, 86+50, and 87+50.
2. 18" Limestone Fill with 3' Thick x 20' Wide Pervious Finger Drains at Stations 77+00, 77+50, 81+00, 81+50, 82+00, 82+50, 83+00, 83+50, 87+00, 87+50, 93+00, 93+50, and 50' Wide at 95+00.
DETAIL SHOWING PERVERSIVE TIE-INS BETWEEN OUTLET WORKS AND CUTOFF TRENCH EXCAVATIONS, AT OUTLET WORKS STA. 50+20 (LOOKING DOWNSTREAM)

TYPICAL UNLINED TOE DITCH DETAIL

TYPICAL SECTION CULVERT DRAINAGE CHANNEL

TYPICAL ABUTMENT GUTTER DITCH DETAIL

TYPICAL LINED DITCH DETAIL

SECTION STA. 91+00

INSPECTION TRENCH EXCAVATION

SECTION STA. 98+60

CUTOFF TRENCH

SECTION STA. 76+20

CUTOFF TRENCH
TYPICAL SECTION
RIVERBANK EXCAVATION INCLUDING ABANDONED
RIVER CHANNEL AND EXISTING CHANNEL

Note: Within the limits of the embankment foundation, remove mud and cut existing riverbanks to no deeper than 1 on 3 or as directed by Contracting Officer.

TYPICAL SECTION
PROTECTION DIKE
Not to Scale

CROSS-SECTION
APPROACH AND OUTLET CHANNELS
Not to Scale

SECTION
CUTOFF TRENCH
Sla. 73+881 to Sla. 74+221

SECTION ACROSS ABANDONED RIVER

EXCAVATION OF EXISTING TEMPORARY SEWER
Not to Scale
See Profile Drawing B.13.

EQUIPMENT DETAILS

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DRAFTSMAN
CONSTRUCTION FOUNDATION REPORT

EMBANKMENT CONSTRUCTION DETAILS
DETAIL SHOWING PERVERS TIE-INS BETWEEN OUTLET WORKS AND CUT-OFF TRENCH EXCAVATIONS, AT OUTLET WORKS STA. 50+20 (LOOKING DOWNSTREAM)

TYPICAL SECTION
CULVERT DRAINAGE CHANNEL
Not to Scale

TYPICAL ABUTMENT GUTTER DITCH DETAIL
Not to Scale

TYPICAL LINED DITCH DETAIL
Not to Scale

SECTION STA. 98+60
CUTOFF TRENCH
S1a 78+30 to S1a 79+66 (Rock excavation)
S1a 98+85 to S1a 99+66 (Overbunden excavation)

SECTION STA. 76+20
CUTOFF TRENCH
S1a 75+36 to S1a 76+40
Not to Scale
Note: All ditch depths, except as shown, shall be 2 ft. minimum. Depths and grades shall be established in the field by the Contracting Officer.

TYPICAL SECTION
PROTECTION DIKE
Not to Scale

CROSS-SECTION
APPROACH AND OUTLET CHANNELS
Not to Scale

SECTION A
CUTOFF TRENCH
S1a 79-86 to S1a 74+221

SECTION ACROSS ABANDONED RIVER CHANNEL AND EXISTING CHANNEL SHOWING
PLACEMENT OF PERVERIOUS
Not to Scale

EXCAVATION OF EXISTING TEMPORARY SEWER
Not to Scale
See Profile Drawing B12.
Note:
1. For Outlet Works excavation see Dwg. BB.
2. For Approach and Outlet Channels see Dwg. EE.
3. For Spillway Profile and Sections see Dwg. EI and EJ.
4. For slopes and elevations in Outlet Works area, see D.
5. For bottom elevations and slope of spillway excavation, see Dwg.
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**U.S. ARMY ENGINEER DISTRICT**  
**CORPS OF ENGINEERS**  
**KANSAS CITY, MISSOURI**

**EAST FORK LITTLE BLUE RIVER, MISSOURI**  
**BLUE SPRINGS LAKE**  
**CONSTRUCTION FOUNDATION REPORT**

**GENERAL PLAN OF EXCAVATION**

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**PLATE NO. 9**
Final grading from Sta 57+00 to Sta. 59+50 to be accomplished after diversion and placement of channel fill.

Downstream termination of existing permanent sewers
Site 104+29.19 (See Detail B)
PROFILE ALONG CENTERLINE OF SEWER AND TOWER STRUCTURE

PLAN OF EXCAVATION FOR APPROACH AND TOWER STRUCTURE

Grade of work bench to be 80' at grade of base of sewer excavation downstream from Sta 47+66.5

SECTION A STA. 46+58

SECTION B STA. 46+88
Excavation at upstream termination of existing permanent sewer

Not to Scale
Plan of Excavation for Stilling Basin and Permanent Sewer

* Grade of work bench to be 80' above grade of base of sewer excavation from Sta 97+88.5 to Sta 103+12.
** Grade of work bench to be 7.5' above grade of base of sewer excavation from Sta 103+12 to end.

Profile Along E. of Outlet Works

NOTE:
See Dwg B11 for layout of stilling basin

Estimated top of rock, actual location may vary

PLAN OF EXCAVATION FOR STILLING BASIN AND PERMANENT SEWER
xisting ground surface

See profile along of outlet channel Fig. 67

STA. 51+50

STA. 53+35

STA. 52+20

STA. 52+85

STA. 53+01

NOTE:
See excavation and backfill Sta. 51+35 on drawing 67

Existing Sewer

actual location may vary
### Curve Data

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*Estimated top of rock, actual location may vary.*

### Profile Along E of Outlet Works

*Note: See Dwg B11 for layout of stilling basin.*

---

*Grade of work bench to be 8% above grade of base of sewer excavation from Sta 97+83.5 to Sta 103+32.*

**Grade of work bench to be 7.5% above grade of base of sewer excavation from Sta 103+19 to end.*

---

**Plan of Excavation for Stilling Basin and Permanent Sewer**

Scales in feet.
SECTION J STA. 53+01

NOTE:
See excavation and backfill Sta. 53+55 on
dug bill

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STILLING BASIN EXCAVATION
AND BACKFILL

Drawn by:

Checked by:

Submitted by:

PLATE NO. 12
Choked limestone surface for road

30° Culvert Pipe

30° Culvert Pipe

APPRAOCH STRUCTURE

PERMANENT SEWERS
See alignment data (fig 81)

Minimum Upstream Embankment
(3' impervious blanket)
(3' limestone cover)

"Slope varies (not steeper than 1 on 25) to provide min 3'
impervious cover over bedrock"
PLAN

*Backslope varies to intersect embankment slope within 8' of ditchline.

AXIS OF DAM

SECTION THRU OUTLET WORKS

NOTE:
See drawings 82 and 83 for embankment details

OUTLET WORKS PLAN AND SECTION

<table>
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U.S. ARMY ENGINEER DISTRICT
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Designed by: [signature]
Drawn by: [signature]
Checked by: [signature]
PLAN

*Backslope varies to intersect embankment slope within 8' of ditchline.

15 OF DAM

Topsoil and seeding

Impervious - Pervious

35' x 475' Arch conduit

Outlet channel

Sanitary sewers

NOTE:
See drawings B2 and B3 for embankment details
Note:
1. All Material Galv Low Carbon Steel
2. Extra Collapse Strength

"For connecting the 4-foot-lined ditch to side-hill drainage channel, See Fig B1 and B11."

Outlet Works Right Angle Offset to Side Drainage Channel
<table>
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<td>56+00.00</td>
<td>26.30 764.0</td>
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<td>56+50.00</td>
<td>20.60 762.0</td>
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<tr>
<td>57+50.00</td>
<td>7.00 764.0</td>
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Detail of Side-Hill Drainage Channel
Looking Downstream
Not to Scale

Plan of Stilling Basin
Slope Protection and Drains

Termination Protection
To Scale

Stilling Basin Outlet Drain
Installation Detail
Riprap Over Bedding
Not to Scale

<table>
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U.S. Army Engineer District
Corps of Engineers
Kansas City, Missouri

Designed by:
EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

OUTLET WORKS SECTIONS AND DETAILS
DETAIL OF SIDE-HILL DRAINAGE CHANNEL
LOOKING DOWNSTREAM
Not to Scale

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<th>RIGHT ANGLE OFFSET</th>
<th>SIDE DRAIN ELEVATION IN FT (NGVD)</th>
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Between 55+53.03 and 56+54+13, drains of 25 centers of elevation 768.764, and 764; each side

STILLING BASIN OUTLET DRAIN
INSTALLATION DETAIL
 RIPRAP OVER BEDDING
Writing to backfill

STILLING BASIN OUTLET DRAIN
INSTALLATION DETAIL
 RIPRAPOVER BEDDING

TERMINATION & PROTECTION
 Not to Scale

RECORD DRAWING
SEPTEMBER 1950
CONTRACT NO. BACW 41-62-C-0105

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

PLATE NO. 14
PROFILE ALONG S. DAM AND CI (LOOKING UPSTREAM)

UPSTREAM
Manhole (P16) Sta 37+17.58

Note: Abandon reach between 39+04 and 39+72. Seal both ends with concrete plugs. Remove manhole at Sta. 37+17.58.

Manhole (P15) Sta 36-64

Approx. existing ground surface

NOTE:
See detail on Fig. 09 for connection between P15A and upstream termination of existing permanent sewer

Inv 6.7968
Upstream limit of sewer removal

Inv 6.7976

STATIONING ALONG SEWER ALINEMENT

Note: All data for this profile obtained from Burns & McDonnell Plan Profile drawings No 6-I and 7-I of Contract No 6, dated August 1, 1978.

EXISTING TEMPORARY SEWER PROFILE
Approximate excavation and backfill for inspection trench

ALONG & DAM AND CUTOFF TRENCH
(LOOKING UPSTREAM)

ANCHOR DETAIL

SPECIAL SURFACE AND BEARING SURFACE PROTECTION
LEAN CONCRETE DETAILS FOR
INTAKE TOWER AND OUTLET WORKS

NTS

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KANSAS CITY, MISSOURI

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EAST FOR LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE CONSTRUCTION FOUNDATION REPORT

Drawn by:
DAM AXIS AND TEMPORARY SEWER PROFILES AND ANCHOR DETAILS

Checked by:

Submitted by:

Page No. RBL-2-1235

PLATE NO. 15
FLOOD CONTROL APPROACH STRUCTURE

EXISTING SEWERS

SEWER APPROACH STRUCTURE

INTAKE TOWER

OUTLET WORKS

PLAN

EXISTING SEWERS

SEWER APPROACH STRUCTURE

CONDUIT

DUAL SEWERS

DUAL SEWER STRUCTURE

SEWER APPROACH STRUCTURE

850 EL.

800 EL.

750 EL.

700 EL.

650 EL.

600 EL.

550 EL.

500 EL.

450 EL.

SECTION THRU OUTLET WORKS

14 MONOLITHS x 32 O.B. 449.12'
OF DAM
- STA. 504.00 & OUTLET WORKS
  EQUAIS 75 ft. 7.75 AXIS OF DAM.

STILLING BASIN

FISHERY LINE MANHOLE
SEWER MANHOLSES

EXISTING SEWERS
E DUAL SEWERS

NOTE:
EMBANKMENT NOT SHOWN.
SEE DWS. BB

REFERENCE DWGS.

INTAKE TOWER
CONDUIT
STILLING BASIN
APPROACH STRUCTURE (SEWER)
APPROACH STRUCTURE (FLOOD CONTROL)
DOWNSTREAM SEWER

DWG. NO. J1
P1
R1
N1
N3
01
SEWER APPROACH STRUCTURE

14 MONOLITHS 32'-00' 449'-12"
STA. 30+00 E OUTLET WORKS EQUALS 2% 2.75 AXIS OF DAM.

NOTE:
EMBANKMENT NOT SHOWN.
SEE DWG. 88

REFERENCE DWG.

STILLING BASIN
FISHERY LINE MANHOLE
SEWER MANHOLE
E. DUAL SEWERS
MONOLITH NO. 15

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EAST FOR LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

OUTLET WORKS - PLAN AND PROFILE
REFERENCE DWG. DWG. NO.

RUBBER WATERSTOP-------------P2
INTAKE TOWER------------------J3

GENERAL NOTES - APPROACH STRUCTURE

1. M.J. • Monolith joint. - Painted
2. C.J. • Construction joint
3. Reinforcement is not continuous through Monolith joints.
4. Reinforcement is continuous through Construction joint.
5. Clear distance of reinforcement from waterstop shall be 2 1/2".

TRASHRACK DETAILS
Scale: 1/2" = 1' - 0"

SECTION C

SECTION D

SECTION E

TRASHRACK DETAILS
Scale: 1/2" = 1' - 0"

GENERAL NOTES - APPROACH STRUCTURE

1. M.J. • Monolith joint. - Painted
2. C.J. • Construction joint
3. Reinforcement is not continuous through Monolith joints.
4. Reinforcement is continuous through Construction joint.
5. Clear distance of reinforcement from waterstop shall be 2 1/2".

REFERENCE DWG. DWG. NO.

RUBBER WATERSTOP-------------P2
INTAKE TOWER------------------J3
See Typical Sewer Section Dwg.No. H1
Sewer Str. 96+9325

PLAN

ELEVATION A

Painted gage
left wall only

Note:
For more information on painted
gages, see "Tile Gage Details" on
Dwg. U1.

PAINTED GAGE DETAILS
LEFT APPROACH WALL
GENERAL NOTES - APPROACH STRUCTURE

1. M.J. - Monolith joint - Painted
2. C.J. - Construction joint
3. Reinforcement is not continuous through Monolith joints.
4. Reinforcement is continuous through Construction joint.
5. Clear distance of reinforcement from waterstop shall be 2½".

REFERENCE DWG. DWG. NO.
RUBBER WATERSTOP P2
INTAKE TOWER J3

Scale: 1/4" = 1' - 0"
(Except as noted)
Bridge crane not shown. Anchorage to be provided as per manufacturer.

*NOTE:* Parapet railing & removable railing not shown.

Bridge crane runway beam. Bridge crane not shown. Anchorage to be provided as per manufacturer.

Service deck El. 810.0

Bridge east El. 806.75

Sanitary sewer passageway

6" lean concrete (typical for bottom)

28'-6"

SECTION E
Bridge crane
runway beam

Note:
Ladder cage
not shown

Sanitary
Sewer
Passageway

FLOW

6" minimum
lean concrete

CURVE DATA

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CONCRETE QUANTITY
1268 CU YDS

SECTION A

REFERENCE DWGS.

RAILINGS
LADDERS
HATCHES
LOW FLOW PIPING
WATERSTOPS
Scale: 1/4" = 1'-0"
SECTION 1

VERTICAL GUTTER DETAIL "A"

REFERENCE DWGS.  DWG NO.
MACHES AND FRAMES__ A-4
DROP INLET TRASHRACK__ L-5
PIPING__ M-1
SECTION D

Vertical 1-1/2" x 3" Gutter
4' Change in Elevation

REFERENCE DWGS. DWG NO.
MACHINES AND FRAMES L4
DROP INLET TRASHRACK L5
PIPING M1

Scale: 1/4" = 1'-0"
Note:
Parapet railing and removable railing not shown.
1/4" sponge rubber (top only)
ASTM - C1056 grade RE-81

REFERENCE DWGS. DWG. NOS.
WATERSTOPS ____________-16
DROP INLET TRASHRACK _______L5

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INTAKE TOWER CONCRETE DIMENSIONS
### Flood Control Invert Elevations

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<tr>
<td>52+97.28</td>
<td>765.71</td>
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</table>

**Note:** Install 4 Re-Bar 6" @ 6" on 24" centers where structure concrete has previously been placed. The 4 Bar shall be dowel and spliced as necessary. The concrete in this area shall conform to the dashed line.
GENERAL NOTES - CONDUIT AND SEWER ENCASTEMENT

2. C.J. - Construction Joint.
3. Clear distance of reinforcement from Monolith Joint shall be 6" and from face of concrete shall be 4" unless otherwise noted.
4. Clear distance of reinforcement from waterstop and joint filler shall be 1/4".
5. All reinforcement splice and anchorages lengths shall conform to table shown on Dwg. No. H4 unless otherwise noted.
6. Reinforcement continuous thru C.J.
7. Reinforcement not continuous thru M.J.
8. All conduit monolith joints shall be coated with bituminous curing compound and the flood control invert joint shall have a 1/8" tooled edge.
9. Provide 3-3/4" #4, #5 upstream and downstream of each monolith joint between Stn. 47+06.9 and Stn. 52+51.26. Drill 4 1/2" deep hole. Install rods flush with surface using epoxy adhesive Sika Sikadur Lo-Mod Gel or equal. Follow epoxy manufacturer's recommendations for installation. The rods shall be center punched with a fine point punch and approved by the Contracting Officer prior to installation. The final product shall be a permanent, firmly anchored system that will be used to monitor conduit monolith movement.
10. Monolith joints and sewer points of intersection (P1, P3) downstream of Sta. 47+06.00 may differ in the location shown (upstream-downstream direction only) by not more than or less than 0.01 feet, accumulatively, for each 15 feet of sewer pipe. Deviations in the conduit monolith locations will be adjusted in Monolith 16 so that the headwall is located at Sta. 52+11.00.

REFERENCE DWG. DWG. NO.
Conduit Monolith 1... P3
Conduit Monolith 16... P2
9" Rubber Waterstop... P2

CONCRETE QUANTITY
CONDUIT MONO 1 THRU 16
1685 CU. YDS.

TYPICAL PRECAST PIPE
MONOLITH JOINT DETAIL

[Diagram showing conduit layout and details]
FLOOD CONTROL INVERT ELEVATIONS

<table>
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<td>48+18.08</td>
<td>768.41</td>
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<tr>
<td>49+50.66</td>
<td>768.31</td>
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<td>767.01</td>
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<td>52+71.00</td>
<td>767.00</td>
</tr>
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SECTION A
Scale: Horiz. 1"=20'-0" Vert. 1"=2'-0"

48" Precast conc. cylinder pipe

SECTION THRU CONDUIT (1)
MONOLITHS 2 THRU 15
Scale: 1"=1'-0"

Note: Install #4 Re-Bar 6"x6" on 24" centers where structure concrete has previously been placed. The #4 Bar shall be dowel in and set in epoxy. The concrete in this area shall conform to the dashed section shown.

Typical
MONOLITH
Use either No.

---Concrete surface prior to modification
GENERAL NOTES: CONDUIT AND SEWER ENCASMENT

1. MJ. - Monolith Joint.
2. CJ. - Construction Joint.
3. Clear distance of reinforcement from Monolith Joint shall be 6" and from face of concrete shall be 4" unless otherwise noted.
4. Clear distance of reinforcement from waterstop and joint filler shall be 1/8".
5. All reinforcement splice and anchorage lengths shall conform to table shown on Dwg. No. H4 unless otherwise noted.
6. Reinforcement continuous thru Cj.
7. Reinforcement not continuous thru MJ.
8. All conduit monolith joints shall be coated with bituminous curing compound and the flood control invert joint shall have 1/4" tool edge.
9. Provide 3-8, 11/2 #4, 5" upstream and downstream of each monolith joint between Sta. 47+85.9 and Sta. 52+51.26. Drill 4½" deep hole. Install rods flush with surface using epoxy adhesive. Spike Shadur Lo-Mod Gel or equal. Follow epoxy manufacturer's recommendations for installation. The rods shall be center punched with a fine point punch and approved by the Contracting Officer prior to installation. The final product shall be a permanent, firmly anchored system that will be used to monitor conduit monolith movement.
10. Monolith joints and sewer pipes of intersection (PLs) downstream of Sta. 47+86.00 may differ in the location shown (upstream-downstream direction only) by not more than or less than 0.01 feet, accumulative, for each 18 feet of sewer pipe. Deviations in the conduit monolith locations will be adjusted in Monolith 16 so that the headwall is located at Sta. 52+71.00.

CONCRETE QUANTITY
CONDUIT MONL 1 THRU 16
1685 CU YDS.

REFERENCE DWG. DWG. NO.
Conduit Monolith L... P3
Conduit Monolith R... Q1
6" Rubber Waterstop... P2

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

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

CONDUIT PROFILE AND DETAILS

<table>
<thead>
<tr>
<th>Revisions</th>
<th>Date</th>
<th>Approval</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>

Method of Construction:
- METHOD A
- METHOD B

Typical Precast Pipe Monolith Joint Detail
Use either Method A or B throughout
Not to Scale
TRANSITION DETAILS

PLAN

ELEVATION

PRECAST CONCRETE CYLINDER PIPE

SECTION

<table>
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<tr>
<td>3</td>
<td>1.17</td>
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<tr>
<td>4</td>
<td>1.75</td>
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SECTION A

PATTERN 'A' REINF.

PATTERN 'B' REINF.

PATTERN 'C' REINF.

<table>
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<tr>
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<td>0.00</td>
<td>4.50</td>
<td>4.00</td>
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<tr>
<td>2</td>
<td>0.58</td>
<td>2.85</td>
<td>3.83</td>
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<tr>
<td>3</td>
<td>1.17</td>
<td>1.33</td>
<td>3.67</td>
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<tr>
<td>4</td>
<td>1.75</td>
<td>0.00</td>
<td>3.50</td>
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Scale: 3/4" = 1'-0"
PLAN

32'-1"

ELEVATION

12'-6"

1'-6"

Slope 00'1/2'ft/H

Precast concrete cylinder pipe

TRANSITION DETAILS

SECTION R (FT)
1 0.00
2 0.58
3 1.17
4 1.75
The D.S. M.J.S will be extended 9.25' E.J starting at the D.S. Side of Sta 103+33.65

**Sewer Manholes**

**Sewer Reducers** 48" to 30""}

**Pipe Joint**

**Profile**

**Section C**

**Concrete Quantities**

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<tr>
<th>Sta. 102</th>
<th>Sta. 104+41.49</th>
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<td>220 Cu. Yds.</td>
<td>220 Cu. Yds.</td>
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PLAN OF MONOLITH 16
Scale: 1/4"=1'-0"

REFERENCE DWG.

SECTION A
Scale: 1/4"=1'-0"

SECTION B
Scale: 1/4"=1'-0"
PLAN
Scale 1/2"=1'-0"

SECTION A
Scale 1/2"=1'-0"

CONCRETE QUANTITIES
STILLING BASIN
188 CU YDS.

<table>
<thead>
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<th>X</th>
<th>Y</th>
<th>ELEVATION</th>
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<tr>
<td>52 + 71</td>
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<td>0</td>
<td>767.00</td>
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<tr>
<td>52 + 76</td>
<td>5</td>
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<td>766.75</td>
</tr>
<tr>
<td>52 + 81</td>
<td>10</td>
<td>1.00</td>
<td>766.00</td>
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<tr>
<td>52 + 86</td>
<td>15</td>
<td>1.75</td>
<td>764.75</td>
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</table>
TYPICAL SECTION
Scale ¼"=1'-0"

Note:
The sponge rubber shall be secured to the concrete placed first with a double row of 1 ¼" x 12 gage copper nails & 4½ ø c.

MONOLITH JOINT DETAIL
Not to Scale

GENERAL NOTES- STILLING BASIN
1. C.J. * Construction Joint
   M.J. * Monolith joint
2. Reinforcement continuous thru Construction joints.
3. Reinforcement not continuous thru Monolith joints.
4. Reinforcement in top of base slab shall have a clear distance of 6" from surface of concrete. All other reinforcement shall have a clear distance of 4" from surface of concrete unless otherwise noted.
5. Reinforcement splice and anchorage lengths are shown on Dwg. No. H.4
6. All exposed edges of concrete shall be chamfered 45° unless otherwise noted.

SYMBOL TABLE

<table>
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<tr>
<th>Symbol</th>
<th>Description</th>
<th>Date</th>
<th>Approval</th>
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

STILLING BASIN
CONCRETE FOUNDATION

DAY

END FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT
GENERAL NOTES: STILLING BASIN

1. C.J. = Construction Joint
2. M.J. = Monolithic Joint
3. Reinforcement continuous thru Construction joints.
4. Reinforcement not continuous thru Monolithic Joints.
5. Reinforcement in top of base slab shall have a clear distance of 6" from surface of concrete.
6. All other reinforcement shall have a clear distance of 4" from surface of concrete unless otherwise noted.
7. Reinforcement splice and anchorage lengths are shown on Dwg. No. H-4
8. All exposed edges of concrete shall be chamfered 45° unless otherwise noted.

TYPICAL SECTION
Scale 1/4"=1'-0"

Note:
The sponge rubber shall be secured to the concrete placed first with a double row of 1/4" x 12 gauge copper nails @ 1/4" O.C.

Note:
End sill & baffles not shown.

Note:
Rock Elevation, see Dwg. No. B-12

6" min. lean concrete

ED-LE-AF

ED-

7" gales

Vales

Pl-1

DI.

nlo.

PL-2

MONOLITH JOINT DETAIL
Not to Scale

SECTION B

SECTION C

ELEVATION OF JOINT

CONSTRUCTION FOUNDATION REPORT

STILLING BASIN
CONCRETE DIMENSIONS

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

Designed by:

EAST FOR LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

Submitted by:

Date: AS SHOWN

June 1950

PLATE NO. 29
**GENERAL GEOLOGIC COLUMN**

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>MEMBER OR ZONE</th>
<th>SYMBOL</th>
<th>AVERAGE THICKNESS AND FRIENICITY</th>
<th>GENERAL DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>HARRISA</td>
<td>WEA WE</td>
<td>W</td>
<td>2-7</td>
<td>LIMESTONE: Moderately hard, medium to thick bedded, very finely crystalline, dark gray.</td>
</tr>
<tr>
<td></td>
<td>BLOCK Fl</td>
<td>F</td>
<td>1.9</td>
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<tr>
<td></td>
<td>FOUNTANA Fa</td>
<td>F</td>
<td>2.0</td>
<td>SHALE: Soft, partly brecciated, occasionally sandy, dark gray to black.</td>
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<td>WINTERGST WS</td>
<td>W</td>
<td>13.5</td>
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<tr>
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<td>GALESBURG Ga</td>
<td>G</td>
<td>0.1</td>
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<td>BETHANY FALLS BF</td>
<td>B</td>
<td>21.0</td>
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<tr>
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<td>HUGH-POUNDNEY HP</td>
<td>H</td>
<td>2.5</td>
<td>LIMESTONE: Moderately hard, thin bedded, very finely crystalline, slightly sandy, gray.</td>
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<tr>
<td></td>
<td>MIDDLE GREY MG</td>
<td>M</td>
<td>1.2</td>
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<td>LADORE LD</td>
<td>L</td>
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<td>SHARBAR SB</td>
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<td>MOUND CRY Mo</td>
<td>M</td>
<td>4.1</td>
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<td>CRIZER Cz</td>
<td>C</td>
<td>2.1</td>
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<td>ZONE A Pa</td>
<td>P</td>
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<td>ZONE B Pb</td>
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<td>ZONE C Pc</td>
<td>P</td>
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<td>P</td>
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<td>HOLMSTEADHO HO</td>
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**MAP SYMBOL**

- **Anticline**
- **Syncline**
- **Fault**
- **Mine**
- **Road**

**CODE DESIGNATIONS**

- **Soil**
- **Vegetation**
- **Surface Water**
- **Building**

**GENERAL DESCRIPTION**

**SOIL**

- **Consistency**
- **Texture**
- **Relief**
- **Parent Material**

**EXPLORATION OF SOIL**

- **Pore Water**
- **Soil Gas**
- **Soil Temperature**
- **Soil pH**

**ABBRIVATIONS**

- **G**
- **L**
- **S**
- **T**
- **C**
- **C**
- **M**
- **D**
- **F**
- **K**
- **N**
- **O**
- **P**
- **R**
- **S**
- **U**
- **X**
- **Z**

**FACTORS INFLUENCING SOIL FORMATION**

- **Parent Material**
- **Climate**
- **Topography**
- **Vegetation**
- **Time**
**BECK**

**SCALES OF HARDSNESS**

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<th>Medium</th>
<th>Very Hard</th>
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<tr>
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<td>0.10</td>
<td>20</td>
</tr>
<tr>
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<td>0.05</td>
<td>0.10</td>
<td>20</td>
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**BECK UNIT THICKNESS**

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<th>Thick Bed</th>
<th>Massive</th>
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<td>Massive</td>
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<td>0.10</td>
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**ABBRIVATIONS**

- **M:** Medium
- **F:** Fine
- **C:** Clayey
- **S:** Sandstone
- **L:** Limestone
- **P:** Peak
- **I:** Intercalation
- **O:** Oval
- **Q:** Quartz
- **G:** Gravel
- **D:** Drift
- **T:** Till
- **R:** Rock
- **F:** Fossil
- **K:** Keel
- **H:** Humus
- **V:** Vitrine
- **S:** Silt
- **C:** Clay
- **S:** Shale
- **L:** Limestone
- **S:** Sandstone
- **G:** Grit
- **P:** Pebble
- **Q:** Quartz
- **F:** Fossil

**PALEOGEOGRAPHIC LOCATION**

- **CLAY**
- **Shale**
- **Sandstone**
- **Limestone**
- **Gravel**
- **Drift**
- **Till**
- **Rock**
- **Fossil**
- **Humus**
- **Vitrine**
- **Silt**
- **Clay**
- **Sandstone**
- **Limestone**
- **Grit**
- **Pebble**
- **Quartz**
- **Fossil**

**PALEONTOLOGICALLY INTERESTING**

- **Clay**
- **Shale**
- **Sandstone**
- **Limestone**
- **Gravel**
- **Drift**
- **Till**
- **Rock**
- **Fossil**
- **Humus**
- **Vitrine**
- **Silt**
- **Clay**
- **Sandstone**
- **Limestone**
- **Grit**
- **Pebble**
- **Quartz**
- **Fossil**

**PALEONTOLOGICALLY UNINTERESTING**

- **Clay**
- **Shale**
- **Sandstone**
- **Limestone**
- **Gravel**
- **Drift**
- **Till**
- **Rock**
- **Fossil**
- **Humus**
- **Vitrine**
- **Silt**
- **Clay**
- **Sandstone**
- **Limestone**
- **Grit**
- **Pebble**
- **Quartz**
- **Fossil**
NOTES:
For general location see Dwg E-2
For legend see Dwg E-1

APPROX LOCATION OF EXISTING DIVERSION CHANNEL
APPROX LOCATION OF EXISTING EMBANKMENT
ABANDONED RIVER CHANNEL
CONSTRUCTION FOUNDATION REPORT
PLAN OF EXPLORATIONS, INSET B,
RIGHT ABUTMENT
AND OUTLET WORKS

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

Designed by:
EAST FOR LITTLE RIVER, MISSOURI
BLUE SPRINGS LAKE

Reviewed by:

Sheet number
A5 SHORTS

DATE

APPROXIMATE LOCATION OF EXISTING EMBANKMENT
TEMPORARY 24" C.C.P. SEWER
PERMANENT SEWER
APPROX LOCATION OF EXISTING DIVERSION EMBANKMENT ABANDONED RIVER CHANNEL

DAM AXIS

APPROX LOCATION OF EXISTING DIVERSION EMBANKMENT

EXISTING DIVERSION EMBANKMENT

EMBANKMENT

ABANDONED RIVER CHANNEL

OUTLET WORKS

TEMPORARY 24" CCP SEWER

PERMANENT SEWER

0-234
Note:
1. For location of borings see Dwg. E6, E8 and E10.
2. For General Geologic Column and Legend see Dwg. E1.

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

Designed by:
EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

Drawn by:

Checked by:

Submitted by:

Scale 35 SHOWN

Date JUNE 1990

Sheet

PLATE NO. 30
RBL-2-1250
NOTE:
1. For location of Profiles, Sections and Borehgs, see Dign A. 
2. For General Geologic Column and Legend see Dign B. 
3. For location of Excavated Areas see Dign C. 
4.フfor location of Excavation Limits see Dign D. 
5. For location of Sewer and Outlet Works see Dign E. 
6. For location of North service road see Dign F. 
7. For location of South service road see Dign G. 
8. For location of East Fork Blue River see Dign H. 
9. For location of Little Blue River see Dign I. 
10. For location of Conner Lake see Dign J. 
11. For location of Construction Foundation Report see Dign K. 
12. For location of U.S. Army Engineer District see Dign L. 
13. For location of Corps of Engineers see Dign M. 
14. For location of East Fork Little Blue River, Missouri see Dign N. 
15. For location of Blue Springs Lake see Dign O. 
16. For location of Kansas City, Missouri see Dign P. 
17. For location of Construction Foundation Report see Dign Q. 
18. For location of DOTENORS see Dign R. 
19. For location of BORINGS see Dign S. 
20. For location of EXCAVATION LIMITS see Dign T. 
21. For location of SEWER AND OUTLET WORKS see Dign U. 
22. For location of NORTH SERVICE ROAD see Dign V. 
23. For location of SOUTH SERVICE ROAD see Dign W. 
24. For location of EAST FORK BLUE RIVER see Dign X. 
25. For location of LITTLE BLUE RIVER see Dign Y. 
26. For location of CONNER LAKE see Dign Z. 
27. For location of U.S. ARMY ENGINEER DISTRICT see Dign A. 
28. For location of CORPS OF ENGINEERS see Dign B. 
29. For location of EAST FORK LITTLE BLUE RIVER, MISSOURI see Dign C. 
30. For location of BLUE SPRINGS LAKE see Dign D. 
31. For location of KANSAS CITY, MISSOURI see Dign E. 
32. For location of CONSTRUCTION FOUNDATION REPORT see Dign F. 
33. For location of OUTLET WORKS GEOLOGIC PROFILES AND SECTIONS AND EXCAVATION LIMITS see Dign G.
NOTES:
1. For location of Profile, Sections and Borings, see Sheet No. 6.
2. For General Geologic Column and Legend see Sheet No. 8.
3. For Logs of Drilled Borings see Sheets 6-15.

OUTLET WORKS GEOLOGIC PROFILES
AND SECTIONS AND EXCAVATION LIMITS

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

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

Designed by:
Drawn by:
Checked by:
Submittal by:

Sheet No. 32
1. For general geologic column see Dwg. EI.
2. For location of borings see Dwg. EE.
3. Only primary grout holes are shown on plan.
4. Borings C-261 & C-262 are drilled landward and parallel to dam axis.
PLAN - RIGHT ABUTMENT

Outlet works excavation

TOP OF DAM EL. 840
SPILLWAY CREST EL. 623.6
MULTIPURPOSE POOL EL. 802

ZONE I
ZONE II

PROFILE - RIGHT ABUTMENT

Notes:
1. For General Geologic Column and legend, see Dwg E1
2. For location of borings see Dwgs E2, E3 & E4
3. Borings with a single *, see Dwg E5
4. Borings with a double **, see Logs of Defected Borings
5. Borings with a triple***, see Dwg E7
6. Only primary grout holes are shown on Plan

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<td>CURTAIN GROUTING-PLAN AND PROFILE FOR RIGHT ABUTMENT STA. 71+00 TO STA. 78+00</td>
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1: RSL-2-1254

PLATE NO 34
**Notes**
1. For General Geologic Column, see Dam E1
2. For location of Gauge, see Dam E3
TOP OF DAM EL. 840

SPILLWAY CREST EL. 823.6

MULTIPURPOSE POOL EL. 802

Approximate base of highly fractured zone

GROUTING PROFILE - LEFT ABUTMENT

GROUND SURFACE

Approx Top of Bedrock

STARK-GALESBURG SHALE

BETHANY FALLS LIMESTONE

HUSHPUCKNEY SHALE

MIDDLE CREEK LIMESTONE

SNIABAR LIMESTONE

LADORE SHALE

MOUND CITY SHALE

CRITZER MEMBER

PLEASANTON ZONE A

PLEASANTON ZONE B

PLEASANTON ZONE C
Approximate excavation limits of cutoff trench

Note: Conduit foundation grouting shall be performed after completion of grout curtain and after conduit completion and before backfill.

Notes:
1. For General Geologic Column, see Dwg. 61.
2. For location of Boreholes, see Dwg 63.
3. Only primary grout holes are shown on plan.
4. Boreholes with a single #, see Dwg 65.
5. Boreholes with a double #, see Logs of Detached Boreholes.

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

Prepared by:

Drawn by:

Checked by:

Certified by:

Scale: AS SHOWN

Sheet Number: 35

PLATE NO. 35
NOTES:
1 For general geologic column and legend see Dwg. E-1
2 For plan of spillway see Dwg. D-7.
3 For location of Boringa, see Dwg. E2 & E3.
NOTES:
1. For general geologic column and legend see Dwg. E1
2. For plan of spillway see Dwg. 87
3. For location of borings see Dwg. 62483,

19+15 (D)
EST 012

55 (E)
EST 102

[Diagram of geologic layers and construction sections]

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

Design by: [Signature]

CONSTRUCTION FOUNDATION REPORT

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE

SPILLWAY SECTIONS,
GEOLgy AND EXCAVATION LIMITS

Drawn by: [Signature]

Checked by: [Signature]
LIMESTONE  MOUND CITY SHALE  1 on 2  10''

NOTES:
1 For general geologic column and legend see Dwg. E 1
2 For plan of spillway see Dwgs 57
3 For location of Borings see Dwgs E2 & E3.

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

DESIGNER:

Dwg. No.

PLATE NO. 37
VALUE ENGINEERING PAYS
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<td>16</td>
<td>Diagram of location and legend</td>
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**NOTES:**
1. For General Geologic Column and legend see Dwg. E-6.
2. For location of borings see Dwgs. E-2, E-3, and E-4.

**Logs of Detached Borings:**

**Regions:**

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<tr>
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**Designated by:**

| EAST FORK LITTLE BLUE RIVER, MISSOURI | BLUE SPRINGS LAKE |

**CONSTRUCTION FOUNDATION REPORT**

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<td>NOS. 54 THROUGH 119</td>
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**PLATE NO. 39**
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### Note
- The location of boring data can be found in the report.
### Table: Logs of Detached Borings

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<td>239</td>
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BLUE SPRINGS LAKE GROUT CURTAIN PROFILE LE
LINE A 5 FEET DOWNSTREAM STA 95
LOOKING UPSTREAM
ILE  LEFT ABUTMENT
STA 95+30 TO STA 96+60

U.S. ARMY ENGINEER DISTRICT
COASTAL ENGINEERS
HARBOR CITY, MASSACHUSETTS

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT
GROUT CURTAIN PROFILE
LEFT ABUTMENT LINE A
STA 95+30 TO STA 96+60

DESIGNED BY:
V.A.

REPORTED TO:
C.H.

SUBMITTED TO:

AS SHOWN
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE L
LINE A 5 FEET DOWNSTREAM STA 90+
LOOKING UPSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE: LINE A 5 FEET DOWNSTREAM STA 96
LOOKING UPSTREAM

SCALE: 1 IN FEET

FOR LEGEND SEE...
OFILE LEFT ABUTMENT
STA 96+60 TO STA 97+80
Legend see plate 44

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

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT
GROUT CURTAIN PROFILE
LEFT ABUTMENT LINE A
STA. 96+60 TO STA. 97+80

C.H. AS SHOWN
Date: JUNE 1990

RBL-2-1265
PLATE NO. 45
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<th>TERTIARY</th>
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Rock weathered during winter shutdown - Removed after pressure testing on Line C.

**Match Line Plate**

**Blue Springs Lake Grout Curtain Profile**

**LINE A 5 FEET DOWNSTREAM STA 9**

Looking upstream
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE A 5 FEET DOWNSTREAM STA 97
LOOKING UPSTREAM

for legend: see plate
PROFILE LEFT ABUTMENT
STA. 97+80 TO STA 99+00

and see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE LINE A 5 FEET DOWNSTREAM STA 99+6
LOOKING UPSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE LINE A 5 FEET DOWNSTREAM STA 99+00
LOOKING UPSTREAM

HOLES DRILL SACKS
PRIMARY 10 1016' 289.8
SECONDARY 9 '946' 0.5
TERTIARY 3 '385' 1.6
EXPLORATORY 1 '108' 48.5

SCALE IN FEET 0 10

Match Line Plate
IN PROFILE LEFT ABUTMENT
TEAM: STA 100+20 TO STA 101+40
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE A 5 FEET DOWNSTREAM STA
LOOKING UPSTREAM

SCALE IN FEET
V PROFILE LEFT ABUTMENT
EAM: STA 100+20 TO STA 101+40

For legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE A 5 FEET DOWNSTREAM STA
LOOKING UPSTREAM
END GROUTING LINE A
LEFT ABUTMENT

Bethany Falls Limestone

Hushpuckney Shale
Middle Creek Ls
Ladore Shale
Shiabler Ls

Mound City Shale
Shale

Crittser Ls

Pleasanton Form Zone A

Pleasanton Form Zone B sandstone

IN PROFILE LEFT ABUTMENT
REAM STA 101+40 TO STA 102+50

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

Designed by:

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT
GROUT CURTAIN PROFILE
LEFT ABUTMENT LINE A
STA 101+40 TO STA 102+50
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE A 5 FEET DOWNSTREAM ST.
LOOKING UPSTREAM

SCALE IN FEET
IN PROFILE LEFT ABUTMENT
PEAM STA 101+40 TO STA 102+50

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN P.
LINE B 5 FEET UPSTREAM

HOLDS DRILL SACKS

PRIMARY 18 1010' 0
SECONDARY 17 947' 0

LOOKING UPSTREAM.
PLEASANTON FORMATION
ZONE C

RETAIN PROFILE LEFT ABUTMENT
STREAM STA 95+30 TO STA 97+05

EAST PORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
U.S. ARMY ENGINEERS DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CONSTRUCTION FOUNDATION REPORT
GROUT CURTAIN PROFILE
LEFT ABUTMENT LINE B
STA 95+30 TO STA 97+05

DESIGNED BY:

V.A.

DRAWN BY:

V.A.

CHECKED BY:

V.A.
BLUE SPRINGS LAKE GROUT CURTAIN PRO
LINE B 5 FEET UPSTREAM
LOOKING UPSTREAM

HOTES DRILL SACKS
PRIMARY 18 101G' 0
SECONDARY 17 947' 0

FOR LEGEND SEE PLATE
Pleasanton Formation
Zone C

GROUT CURTAIN PROFILE
LEFT ABUTMENT LINE B
STREAM STA 95+30 TO STA 97+05
STREAM

See Plate 44

U.S. Army Engineer District
CONSTRUCTION FOUNDATION REPORT
EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT
GROUT CURTAIN PROFILE
LEFT ABUTMENT LINE B
STREAM STA 95+30 TO STA 97+05
PLATE NO. 50
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE B 5 FEET UPSTREAM 5F
LOOKING UPSTREAM

SCALE IN FEET FOR LEG
TIN PROFILE LEFT ABUTMENT
REAM STA 98+70 TO STA 100+00

and see Plate 44.
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE B 5 FEET UPSTREAM STA 100
LOOKING UPSTREAM.
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE B 5 FEET UPSTREAM STA 100
LOOKING UPSTREAM.

SCALE IN FEET
PROFILE  LEFT ABUTMENT  
STA 100+00 TO STA 101+30

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN. PROFILE
LINE B: 5 FEET UPSTREAM STA 101+5
LOOKING UPSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE B: 5 FEET UPSTREAM STA 101+3
LOOKING UPSTREAM

SCALE IN FEET
OFILE LEFT ABUTMENT
STA 101+30 TO STA 102+50

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 95+00

PRIMARY: 13728.8
SECONDARY: 13728.8

HOLE ORIGIN SACKS

LOOKING UPSTREAM
Deformed Shale

Pleasanton Formation
Zone C

1 in Profile, Left Abutment
STA 95+30 to STA 96+60

For legend, see Plate 44

U.S. Army Engineer District
COE OF ENGINEERS
KANSAS CITY, MISSOURI

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE

CONSTRUCTION FOUNDATION REPORT
GROUT CURTAIN PROFILE
LEFT ABUTMENT LINE C
STA. 95+30 TO STA. 96+60

Sheet: 75

Prepared by: C.M.

Plt. No. RBL-2-1275

PLATE NO. 35
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 96+60
LOOKING UPSTREAM

SCALE IN FEET

FOR LEGEND SEE A
PROFILE LEFT ABUTMENT
STA 96+60 TO STA 97+85

Legend: see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 97+0
LOOKING UPSTREAM

SCALE: 1 IN. = 10 FEET
FOR LEGEND
IN PROFILE  LEFT ABUTMENT
STA 97+85 TO STA 99+10

for legend see plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 99+10
LOOKING UPSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C. ON DAM AXIS STA 100+20
LOOKING UPSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 101+40 TI
LOOKING UPSTREAM
PROFILE LEFT ABUTMENT
101+40 TO STA 102+50
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**BLUE SPRING LAKE GROUT CURTAIN PROFILE**

**LINE A 5 FEET DOWNSTREAM STA 75**

**LOOKING DOWNSTREAM**

**SCALE IN FEET**
PROFILE RIGHT ABUTMENT
STA 76+30 TO STA 75+20

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT
GROUT CURTAIN PROFILE

Design by:

Drawn by:

V.A.
PROFILE RIGHT ABUTMENT
M STA 76+30 TO STA 75+20

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE A 5 FEET DOWNSTREAM STA 75+2
LOOKING DOWNSTREAM

SCALE IN FEET
N PROFILE RIGHT ABUTMENT
4M STA 75+20 TO STA 74+00
DOWNSTREAM

for legend see Plate 44

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

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

GROUT CURTAIN PROFILE
RIGHT ABUTMENT LINE A
STA 75+20 TO STA 74+00

AS SHOWN: June 1990

PLATE NO. 62
IN PROFILE RIGHT ABUTMENT
AM STA 75+20 TO STA 74+00
DOWNSTREAM

for legend see Plate 44

IN FEET
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE RIGHT ABUTMENT LINE A 5 FEET DOWNSTREAM STA 74+00 TO STA 72+96 LOOKING DOWNSTREAM

Scale in feet

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PRO
LINE B 5 FEET UPSTREAM STA

LOOKING DOWNSTREAM

SCALE 1:1000
BLUE SPRINGS LAKE GROUT CURTAIN PROJ. LINE B 5 FEET UPSTREAM STA:

LOOKING DOWNSTREAM

SCALE IN FEET
GROUT CURTAIN PROFILE
RIGHT ABUTMENT
LINE A
STA 76+30 TO STA 75+00

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE R
LINE B 5 FEET UPSTREAM STA 75+00
LOOKING DOWNSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE RI
LINE B 5 FEET UPSTREAM STA 75+00
LOOKING DOWNSTREAM
SCALE IN FEET
PROFILE RIGHT ABUTMENT
STA 75+00 TO STA 73+90

SCALE IN FEET for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE RIGHT ABL
LINE B 5 FEET UPSTREAM STA 73+90 TO STA 72+5
LOOKING DOWNSTREAM

ELEVATION

SCALE IN FEET
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE RIGHT ABUT LINE B 5 FEET UPSTREAM STA 73+90 TO STA 72+90 LOOKING DOWNSTREAM

for legend see Plate 44
N PROFILE RIGHT ABUTMENT
STA. 76+30 TO STA. 74+80
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE LINE C ON DAM AXIS STA 76+30
LOOKING DOWNSTREAM

SCALE IN FEET
0 10 for 1'eg
N PROFILE RIGHT ABUTMENT
TA 76+30 TO STA 74+80

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFIL
LINE C ON DAM AXIS STA 74+80
LOOKING DOWNSTREAM
PROFILE RIGHT ABUTMENT
4 74+80 TO STA 73+55
W PROFILE RIGHT ABUTMENT TA 74+80 TO STA 73+55 CAM

for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE R.
LINE C ON DAM AXIS STA 73+55 TO 5
LOOKING DOWNSTREAM
for legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 72+05 TO
LOOKING DOWNSTREAM

SCALE IN FEET
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 70+50
LOOKING DOWNSTREAM

SCALE IN FEET
PROFILE RIGHT ABUTMENT
STA 70+50 TO STA 69+00

For legend see Plate 44
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 69+00
LOOKING DOWNSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 69+00
LOOKING DOWNSTREAM

SCALE IN FEET
PROFILE RIGHT ABUTMENT
A 69+00 TO STA 67+00

For legend see Plate 44.
PROFILE RIGHT ABUTMENT
STA 67+60 TO STA 66+30

U.S. ARMY ENGINEER DISTRICT
KANSAS CITY, MISSOURI
CONSTRUCTION FOUNDATION REPORT
GRAV CURTAIN PROFILE
RIGHT ABUTMENT LINE C
STA 67+60 TO STA 66+30

MATCH LINE PLATE

HOLES DRILL SACKS
PRIMARY 7 654 401.5
SECONDARY 6 560 0
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 67+6
LOOKING DOWNSTREAM

SCALE IN FEET
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 66+3
LOOKING DOWNSTREAM
BLUE SPRINGS LAKE GROUT CURTAIN PROFILE
LINE C ON DAM AXIS STA 66+30
LOOKING DOWNSTREAM

SCALE IN FEET
## LEFT ABUTMENT

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### SACKS OF CEMENT INJECTED

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BLUE SPRINGS DAM SUMMARY OF GROUTING
### RIGHT ABUTMENT

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### SUMMARY OF GROUTING

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<td>Q-1 21</td>
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**U.S. ARMY ENGINEER DISTRICT**
**CORPS OF ENGINEERS**
**KANSAS CITY, MISSOURI**

**CONSTRUCTION FOUNDATION REPORT**

**EAST FORK LITTLE BLUE RIVER, MISSOURI**
**BLUE SPRINGS LAKE**

**SUMMARY OF GROUTING**
<table>
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<tr>
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**Left Abutment**

- **Holes**
  - P-59
  - S-58
  - T-0
  - EXP-2

- **Drill**
  - 4410
  - 4415
  - 436
  - 170

- **Sacks**
  - 1069.8
  - 1030.5
  - 1.0
  - 48.5

**Line A**

- 124 feet 9431' to 2150.4'

**Line B**

- 119 feet 8852' to 122.3'

**Line C**

- EXP-1

- EXP-2

**TOTALS**

- 364 feet 17411' to 2488.7'

---

**Blue Springs Dam Summary of Grouting**
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**Summary of Grouting**

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**Designed by:**

**Revised by:**

**Checked by:**

**Drawn by:**

**AS SHOWN**

**Plate No.:** 75

**Submitted:** June 1990

**PLATE NO. 75**
PLEASANTON ZONE B - SURFACE IS VERY IRREGULAR BECAUSE OF SEPARATION ALONG BEDDING PLANES & JOINTS IN THE UPPER CARBONACEOUS SANDSTONE

SEWER EXCAVATION LIMITS

EDGE OF SEWER STRUCTURAL CONCRETE

5+0275 & CONDUIT 50+00 & CONDUIT

PLEASANTON ZONE C
PLEASANTON ZONE A

PLEASANTON ZONE B
PLEASANTON ZONE C

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

EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

CUTOFF TRENCH
FINAL CROSS SECTIONS
STA. 97+78 TO STA. 96+83

AS SHOWN

JUNE 1990
80

RBL-2-1300
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

EAST FORK LITTLE BLUE RIVER, MISSOURI-
BLUE SPRINGS LAKE
CONSTRUCTION FOUNDATION REPORT

OUTLET WORKS
FINAL CROSS SECTIONS
STA. 54+00 TO STA. 53+01

Designed by: [Signature]

Drawn by: [Signature]

Checked by: [Signature]

Scale: AS SHOWN

Date: JUNE 1993

Sheet Number: 81

RBL-2-1301
ELEVATION IN FEET BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

PLEASANTON ZONE C

A

B

C

D

5

4

3
EAST FORK LITTLE BLUE RIVER, MISSOURI
BLUE SPRINGS LAKE

CONSTRUCTION FOUNDATION REPORT

OUTLET WORKS
FINAL CROSS SECTIONS
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NOTES:
1. USE EXTENDED CENTERLINE OF DAM FOR LOCATION OF PIEZOMETERS 153 AND 158.
2. THE EXISTING PIEZOMETERS ARE TO REMAIN OPERATIVE THROUGHOUT THE CONTRACT AND SHALL BE EXTENDED UP THROUGH THE EMBANKMENT AS REQUIRED.
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** existing observation devices **

- **open tube piezometers**
- **air operated piezometers**
- **settlement gage and open tube piezometers**
- **alignment monuments**
- **inclinometers**
- **crest settlement monuments**
- **instrument monuments**

**legend**

**existing observation devices plan, sections and schedules**

**u.s. army engineer district**

**corps of engineers**

**kansas city, missouri**

**east fork little blue river, missouri**

**blue springs lake**

**construction foundation report**

**observation devices plan, sections and schedules**

**notes:**
1. use extended centerline of dam for location of piezometers.
2. the existing piezometers are to remain operative throughout the contract and shall be extended up through the embankment as required.

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**plate no. 84**
OPEN TUBE PIEZOMETER
INSTALLATION AND EXTENSION

DETAIL-A

1. Brace or aluminum
   identification plate.
2. Bored, welded, bolted
   or riveted to cap.
3. 3" x 8' std galv. steel
   pipe with pipe flange
   flange on bottom.

PIEZOMETER INSTALLATION
WITH TUBING F

FINAL POSITION OF PIEZOMETERS
DETAIL-E

LOCKING DEVICE
DETAIL-K

LOCKING DEVICE
SECTION A

SOIL FILL AREAS
ALINEMENT MONUMENTS
DETAIL-L

LIMESTONE FILL AREA

INSTRUMENT DET
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**BLUE SPRINGS DAM BLASTING**

- **Purpose:** Production
- **Hole FT.:** 226
- **Depth Spacing/Spacing:** 12' 1/4'
- **Shot FT.:** 25'
- **Stem FT.:** 6.1
- **Explosives:** R-80

**Note:** This table details the blast operations at Blue Springs Dam, including the date, geologic location, elevation, station, purpose, hole depth, depth spacing, shot depth, stem depth, and type of explosive used.
### SPRINGS DAM BLASTING REPORT

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### VALUE ENGINEERING PATS

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### BLASTING SCHEDULE

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

**DESIGNED BY**

**DRAWN BY**

**CHECKED BY**

**SUBMITTED BY**

<table>
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<th>APPRV.</th>
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*Note: The above table represents data from B.H. Falls, detailing the dates, locations, elevations, stations, purposes, numbers of depth spacing, stems, shot volumes, and expected outcomes. This information is crucial for understanding the geological and surveying processes in the area.*
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**Revisions**

**Symbol**
- Description
- Date Approved

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

**Designed by**
- (Signature)

**Drawn by**
- US Army Corps of Engineers
- CONSTRUCTION FOUNDATION REPORT

**Blasting Schedule**

**Checked by**
- (Signature)

**Submitted by**
- (Signature)

**Plate No. 87**

**Sheet Number**
- 87

**Project Number**
- DMP 000631652.00

**Date**
- June 1950

**File No.**
- RBL-2-1507
<table>
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## Value Engineering Pays

### J.E. Springs Dam Blasting Report

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### Blast Schedule

**U.S. Army Engineer District**

- **Corps of Engineers**
- **Kansas City, Missouri**

**Blasting Foundation Report**

- **East Fork Little Blue River, Missouri**

**Designed by**

- **US Army Corps of Engineers**

**Drawn by**

- **V.A.B.**

**Checked by**

- **AS SHOWN**

**Submitted by**

- **JUNE 1990**

- **1990/6385OCH**

- **RBL-2-1303**
### BLASTING SCHEDULE

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

<table>
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#### Notes

- No. of casings (500)
- Gallons of water (50)

#### Design

- Designed by: [Name]
- Drawn by: [Name]
- Checked by: [Name]

#### Approval

- Submitted by: [Name]
- Date: [Date]
- Sheet Number: [Number]
- Plot Score: [Score]
- Plan Score: [Score]
- Drafting Score: [Score]
- Engineering Score: [Score]

- EAST FORK LITTLE BLUE RIVER, MISSOURI
- BLASTING SCHEDULE

#### Plate No. 89
### E SPRINGS DAM BLASTING REPORT

**EXPLOSIVES (LBS.)**

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**NOTES**

- Use explosive No. 10054 for all blasting operations.
- All deals to be loaded in accordance with specifications.
- Ensure proper ventilation is maintained during the blasting operation.

**REMARKS**

- All blasts to be conducted under the supervision of a licensed explosive technician.
- Blasting operations to be performed in a manner that minimizes environmental impact.

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

- **DESIGNATED BY**: U.S. Army Corps of Engineers
- **DRAWN BY**: V.A.
- **CHECKED BY**: V.A.

**Blasting Schedule**

- **JUNE 1990**
- **PLATE NO. 90**