

U.S. Department of Agriculture  
Natural Resources Conservation Service

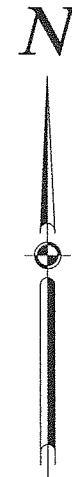
Detail Plans for  
Little Otter Creek Watershed  
Protection and Flood Prevention Project

Caldwell County, Missouri

in Cooperation with

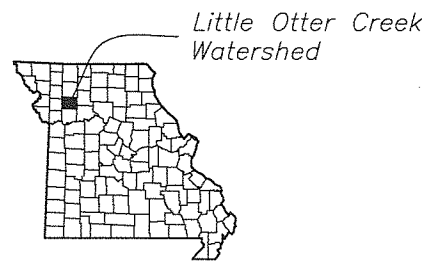
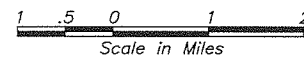
Caldwell County Commission and  
Soil and Water Conservation District of  
Caldwell County, Missouri

Structure LO-1



Site Location

**Preliminary Plans  
Not for Construction**



LOCATION IN MISSOURI

Note: The Contractor is responsible for having all utilities located at site LO-1 and on the ingress roads prior to beginning work. Missouri One Call number is 800-344-7483 (1-800-DIG-RITE).

Source: MO County Highway Maps (Polyconic Projection)  
Revision: 3-1-93

Certification by Experienced Professional Engineer

I hereby certify that these plans for the construction of this dam were prepared by me (or under my direct supervision) for the owners thereof.

/s/  
Registered Engineer  
E-29618

Certification of Owner

I, Dale Hartley, owner, whose Post Office address is 49 East Main, Kingston, Missouri, Zip 64650, do hereby accept and approve these plans.

/s/  
Presiding Commissioner, Caldwell Co. Commission

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Date  
April 08  
July 08  
Sept 08  
Designed MDS  
Drawn MDS, KAS, KRW  
Checked BBV  
Approved

Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name  
Sheet 1 of 117

STANDARD SYMBOLS FOR ENGINEERING MAPS AND PLANS

Watershed boundary	
Section line (label)	Sec. 1 Sec. 2
Section corner	211 11112
Section center	
Public road	
Private road	
Bridge	
Culvert	
Single track railroad	
Multiple track railroad	
Power line (label "Buried" if underground)	
Telephone line (label "Buried" if underground)	
Pipeline (label)	
Property line	
Existing fence	
Planned fence or fence to be constructed	
Fence to be removed	
Field boundary	
School	
Church	
Other buildings	
Farmstead	
Cemetery	

Quarry or gravel pit	
Well (label)	
Windmill	
Pump	
Spring	
Large stream	
Small stream	
Intermittent stream	
Large gully	
Grassed waterway or outlet	
Depression or sink hole	
Marsh	
Pond or lake (label)	
Intermittent pond or lake	
Reservoir or pond with dam	
Terrace	
Diversion	
Drainage ditch	
Tile drain	
Pipe riser	
Dike or levee with road	
Dike or levee without road	
Protective dike	

Drop inlet conduit (rectangular riser)	
Drop inlet conduit (circular riser)	
Hood inlet conduit	
Drop spillway	
Chute	
Box inlet on culvert	
Stock watering system	
Gated irrigation pipe	
Irrigation ditch	
Turnout or division box	
Bench mark or temporary bench mark	X BM 120 ° A
Control point	° P.1.3
Point of intersection	
Groundline (label)	
Centerline	
Contours	120 116
Timber line (label)	
Approximate limits borrow area (label)	
Work limits (label)	
Inclusion tie	
North arrow	
Scale	Scale: 1"=100'
Bar scale	

Preliminary Plans

LEGEND FOR GEOLOGIC INVESTIGATION

UNCONSOLIDATED MATERIAL			
	gravel		sand
	gravel, sandy		sand, gravelly
	gravel, silty		sand, silty
	gravel, clayey		sand, clayey
	silt		clay
	silt, gravelly		clay, gravelly
	silt, sandy		clay, sandy
	silt, clayey		clay, silty
	cobbles, boulders		cobbles, boulders
	water truck		water truck
CONSOLIDATED MATERIAL			
Sedimentary Rocks			
	conglomerate Cng.		shale sh.
	breccia brc.		siltstone slst.
	sandstone ss.		marl
	limestone ls.		dolomite dol.
	gypsum gyp.		chalk ck.
	chert cht.		coal
Metamorphic Rocks			
	gneiss		schist
	quartzite		slate
	marble		soapstone
	talc		serpentine
Igneous Rocks			
	intrusive		extrusive
	pyroclastic		Undifferentiated

ABBREVIATIONS	
ang.	angular
bl.	bluffs (>12")
calc.	calcareous
cali.	caliche
cav.	cavities
cmt.	cemented
cse.	coarse
cbl.	cobbles (3"-12")
cpt.	compact
con.	concretions
xln.	crystalline
ds.	dense
dip.	dipping
d.s.	downstream
fn.	fine
frm.	firm
frac.	fractured
frg.	fragments
fri.	friable
grn.	grain
gyp.	gypseous
hd.	hard
h.	highly
lat.	laminated
lo.	loose
mas.	massive
med.	medium
mic.	micaceous
mod.	moderately
n.r.	no recovery
per.	permeable
po.	poorly
rdd.	rounded
sl/.	slightly
sft.	soft
s/.	some
slo.	slowly
stf.	stiff
t.b.	thin-bedded
tuff.	tuffaceous
u.s.	upstream
var.	variable
v/.	very
w/.	with
wea.	weathered
w.l.	(date) static water level

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS	
GW	Well graded gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SW	Well graded sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sand
SC	Clayey sands; sand-clay mixtures
ML	Silts with liquid limit of 50 or less
MH	Silts with liquid limit above 50
CL	Clays with liquid limit of 50 or less
CH	Clays with liquid limit above 50
OL	Organic silts and clays with liquid limit of 50 or less
OH	Organic silts and clays with liquid limit above 50

TEST HOLE NUMBERING SYSTEM		
Centerline of dam	1-99	Stream channel
Borrow area	101-199	Relief wells
Emergency spillway	201-299	
Centerline of outlet structure	301-399	
Other Symbols		
●	hole logged only	↘
⊙	hole sampled	—
		↘
		—

Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	

Standard Symbols  
Structure LO-1  
Little Otter Creek Watershed  
Caldwell County, Missouri  
PL-566



File Name	
Drawing Name	
Sheet	2 of 117

# Preliminary Plans Not for Construction

DATA TABLE	
Drainage Area (Acres)	4,825
Sediment Storage (Acre Feet)	804
Retarding Storage (Acre Feet)	2,172
P.S. Pool @ Elev. 855.1 (Acres)	344.5
A.S. Pool @ Elev. 860.7 (Acres)	431.7

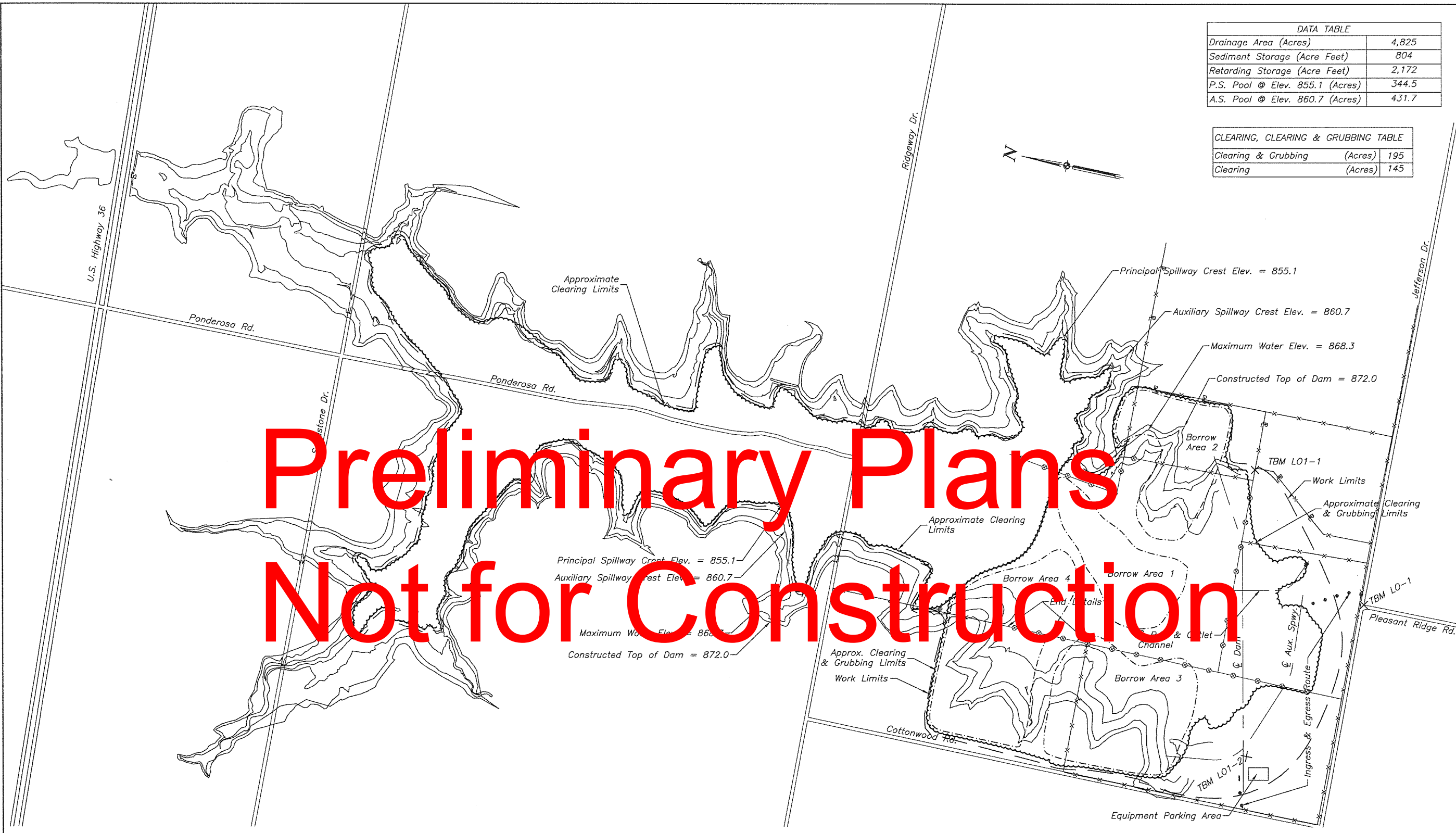
CLEARING, CLEARING & GRUBBING TABLE	
Clearing & Grubbing (Acres)	195
Clearing (Acres)	145

Date April 08  
 Designed MDS  
 Drawn MDS, KAS, KRW  
 Checked BBV  
 Approved \_\_\_\_\_

General Plan of Reservoir  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

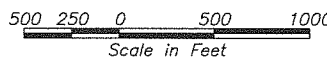


File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 3 of 117



- NOTES:**
- Topsoil removed from foundation of Dam, Auxiliary Spillway, Borrow Area, Ingress-Egress road and parking areas shall be conserved.
  - Topsoil may be removed down to a depth of 3 feet from Borrow Area No. 1 as approved by the Engineer. This borrow shall be a minimum of 400 feet upstream of the centerline of the dam.
  - Topsoil shall be placed to a depth of six (6) inches over the ingress road and parking areas.
  - For details of silt fence and pollution control features see Sheets 116 and 117.
  - For details of Borrow Area see Sheets 98 thru 115.
  - The locations of the fence end details, fence removal and new fence shall be marked in the field by the Engineer.

GENERAL PLAN OF RESERVOIR



Bench Mark - Coordinate Data Table			
TBM	Northing	Easting	Elevation
LO-1	1286835.160	2944465.400	807.240
LO1-1	1288178.773	2945563.694	871.251
LO1-2	1287680.177	2942737.322	869.838

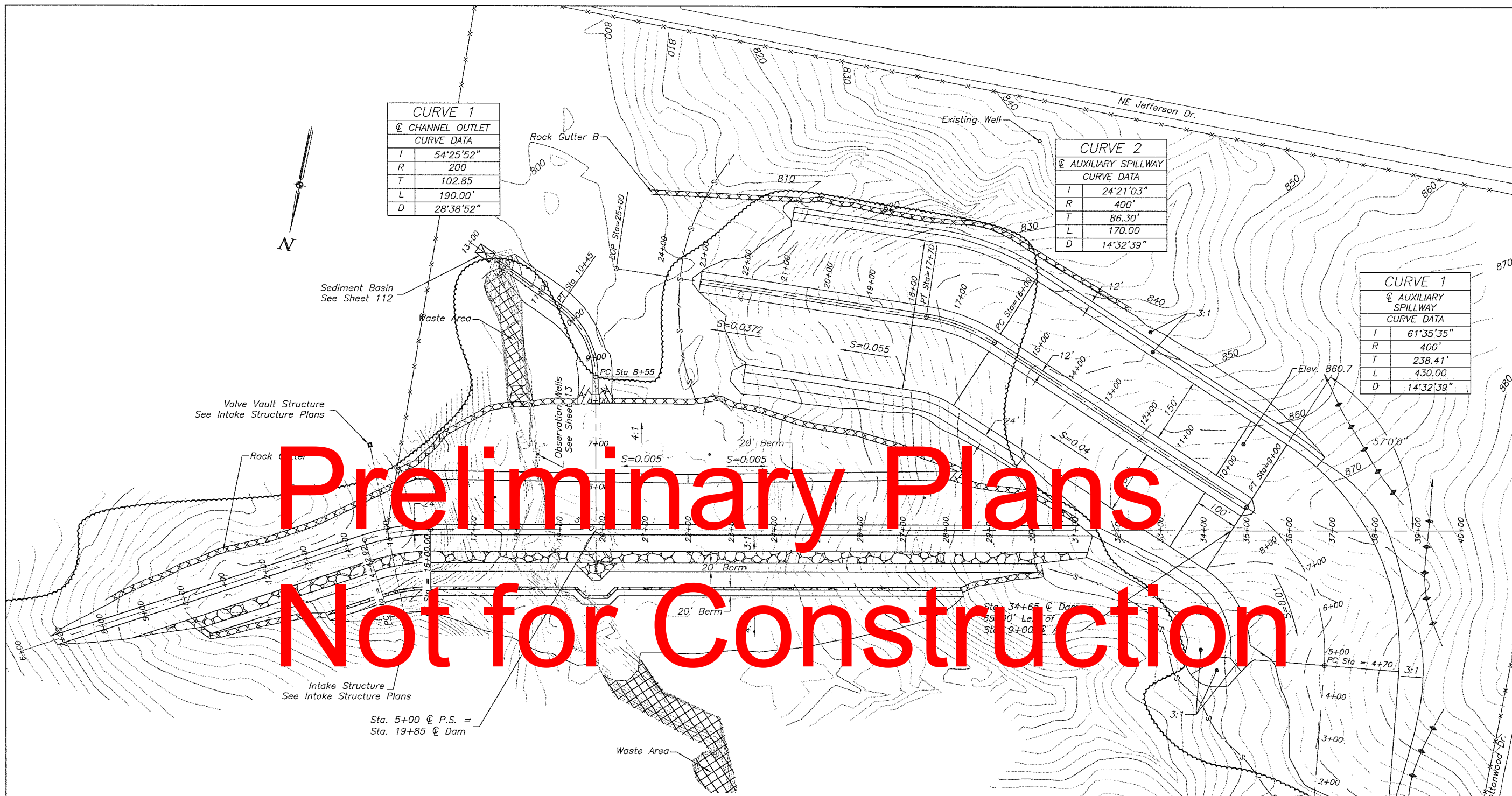
Structure LO-1 is located approximately 4 miles southeast of Hamilton, MO, in the SE 1/4 of Sec. 32 and the SW 1/4 of Sec. 33, T57N, R27W, Caldwell County, Missouri.

**TBM LO-1 ELEV 807.240**  
 Top of Brass Cap 34 feet South of centerline of Jefferson Dr. 10 feet West of first Powerpole.

**TBM LO1-1 ELEV 871.251**  
 1/2" Iron Pin, centerline Sta. 7+79.87, 127.22' Lt.

**TBM LO1-2 ELEV 869.838**  
 1/2" Iron Pin, centerline Sta. 36+48.13, 31.49' Lt.

# Preliminary Plans Not for Construction

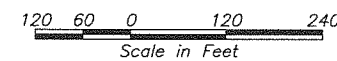


CURVE 1 CHANNEL OUTLET CURVE DATA	
I	54°25'52"
R	200
T	102.85
L	190.00'
D	28°38'52"

CURVE 2 AUXILIARY SPILLWAY CURVE DATA	
I	24°21'03"
R	400'
T	86.30'
L	170.00
D	14°32'39"

CURVE 1 AUXILIARY SPILLWAY CURVE DATA	
I	61°35'35"
R	400'
T	238.41'
L	430.00
D	14°32'39"

PLAN OF EMBANKMENT AND SPILLWAYS



QUANTITIES	
Excavation Common (EC) - Core Trench, Outlet Channel and Structure	211,000 Cu Yds
Earthfill (Class A)	860,000 Cu Yds
Topsoil*	187,000 Sq Yds
Rock Riprap - Rock Gutters, Drawdown Structure, and Outlet Channel**	15,000 Cu Yds
Seeding and Mulching	115 Acres

\* 187,000 sq. yds. of topsoil at a depth of 6 inches is equivalent to 31,200 cu. yds.  
 \*\* Rock riprap in outlet channel & impact basin contains approx. 170 cu. yds. of bedding. Rock riprap at the front berm contains approx. 2,900 cu. yds. of bedding.

**NOTES:**

**Protective Dike**  
 Dike dimensions: 12" effective height; 4:1 side slopes; 4' top width. Approx. length = 850 feet.

**Waste Area**  
 Required excavated soil material not suitable for use as Class A earthfill shall be placed in the existing channel downstream of the dam or in other areas approved by the Engineer. Areas shall be left in reasonably uniform condition as approved by the Engineer.

**Topsoil**  
 A minimum of 6 inches of topsoil shall be placed on all compacted earthfill (dam, auxiliary spillway, borrow area, waste areas, and parking area).

**Earthfill**  
 For earthfill material sources, placement requirements and laboratory test information, see Sheet 5.

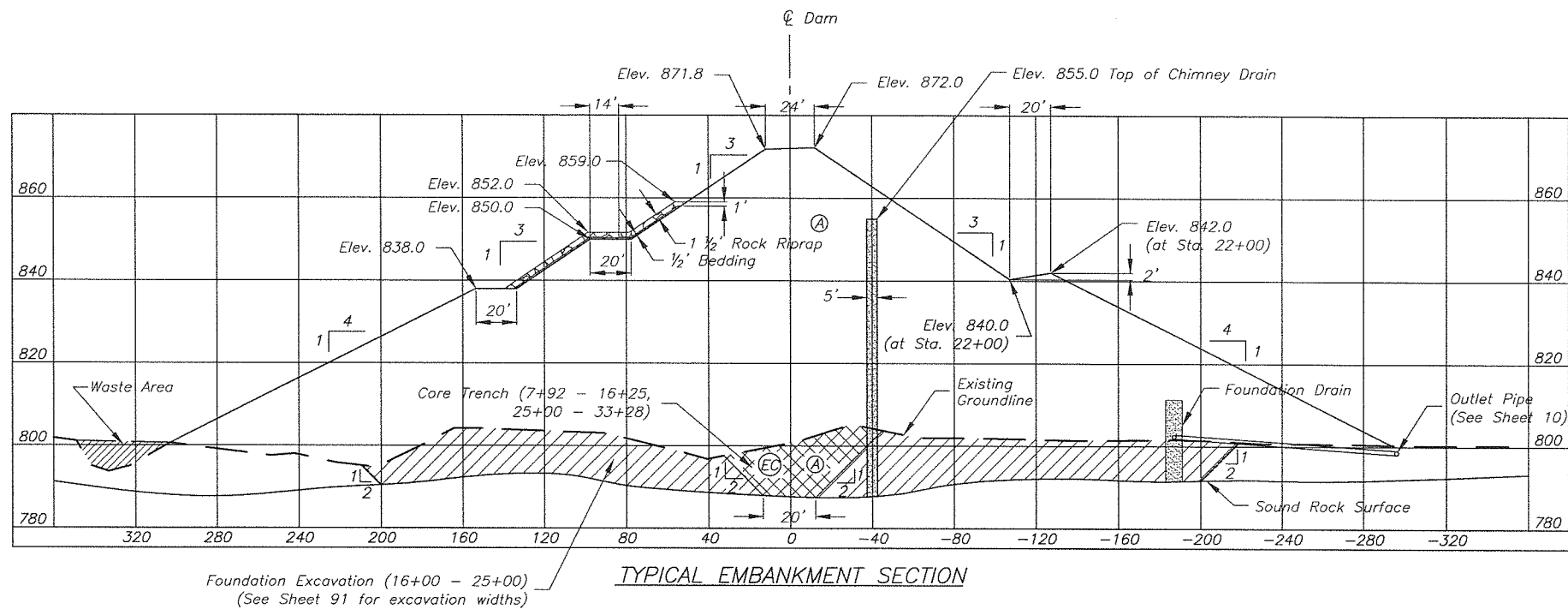
**Auxiliary Spillway**  
 All of the side slopes in the auxiliary spillway shall be placed at a 3:1. See sheet 93 and 94 for additional information.

**Existing Well**  
 Remove the well and casing at the location shown on the drawing. Chlorinate with a minimum of one gallon of bleach prior to backfill. Fill the well to within two feet of the groundline with clean aggregate material. Remove the casing to a minimum of three (3) feet below the existing ground line. Compact surface of well area. Place a minimum of two (2) foot thick blanket of compacted clay soil over the well a minimum of five (5) feet horizontally all around the well. All work shall conform to MoDNR requirements.

Date: April 08  
 Designed: MDS  
 Drawn: MDS, KAS, KRW  
 Checked: BBV  
 Approved: \_\_\_\_\_

Plan of Embankment  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



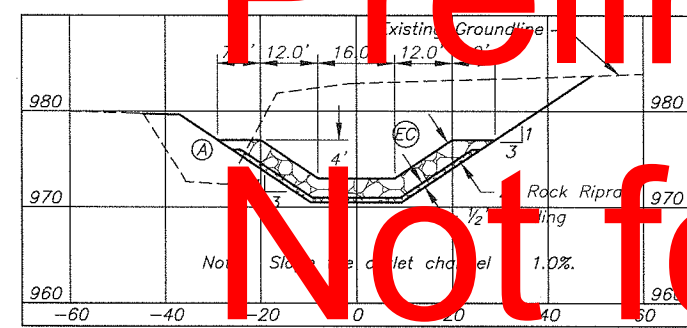


**GRADATION OF ROCK RIPRAP**

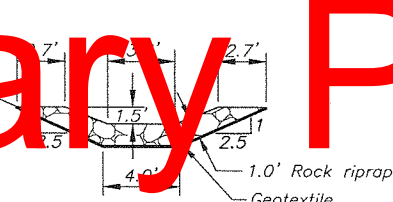
PERCENT PASSING BY SIZE	SIZE (INCHES)
100	2.0 $D_{50} = 16''$
50-80	1.4 $D_{50} = 11.2''$
25-50	$D_{50} = 8''$
10-30	0.5 $D_{50} = 4''$
0-5	0.2 $D_{50} = 1.6''$

Foundation Excavation (16+00 - 25+00)  
(See Sheet 91 for excavation widths)

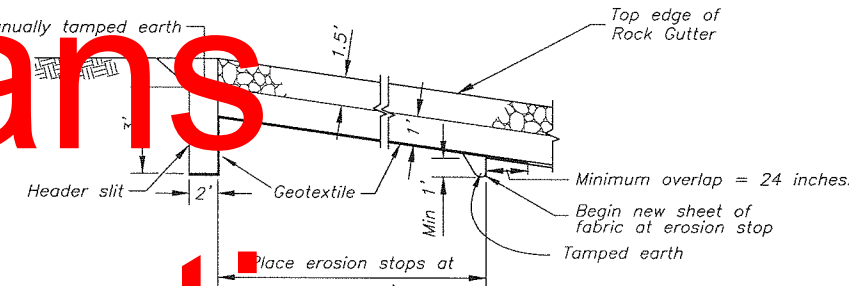
# Preliminary Plans Not for Construction



TYPICAL SECTION OUTLET CHANNEL STATION 8+22 to 10+45



DETAIL - ROCK GUTTER



TYPICAL PROFILE - ROCK GUTTER

DETAIL - ROCK GUTTER B

\*There are 0.54 and 0.64 cubic yards of riprap per linear foot of gutter within the neat lines for the 1.5 foot deep and the 2.0 foot deep gutters respectively. The 2.0 foot deep gutter (Rock Gutter B) shall be installed on the south side of the auxiliary spillway. Rocks larger than 12 inches shall be removed from the riprap used in the rock gutters. A layer of geotextile shall be installed beneath rock riprap. Geotextile shall be anchored into ground as shown beginning at the top of the slope and on intervals not exceeding 100' down the slope.

**NOTES:**

- The higher plastic soils (CH, CL) shall be placed in the core trench, center and upstream portion of the dam.
- The medium plastic soils (GC, CL, ML, SC) shall be placed in the downstream section of the dam.
- Low plastic soils (SC, SM, SP) with plastic index less than 8 from required excavations shall be wasted upstream of dam as directed by the Engineer.
- Dispersive soils from required excavations with crumb test of 4 shall be wasted upstream of dam or placed in upstream channel fill or channel blanket as directed by the Engineer.
- Gradation table for rock riprap applies to all locations that require rock riprap.
- The outlet channel shall be extended to the existing channel at approximate station 12+10. The typical section from 10+45 to 12+10 shall match the typical section from 8+22 to 10+45 except the rock riprap and bedding shall not be required.
- A smooth transition from the end of the outlet channel to the existing stream channel shall be constructed.
- The elevation of the flowline at the end of the outlet channel shall match the beginning of the existing stream channel. The profile of the outlet channel shall be adjusted, if necessary to ensure these elevations match in the field.
- Some of the glacial till contains boulders and cobbles. This material shall not be used as borrow unless approved by the Engineer.
- All rock surface areas that require grouting shall be identified in the field by the Engineer. These areas shall be located in the core trench and other excavated areas that contact a rock surface. See Construction Specification 6.3, Treatment of Rock Surfaces for additional information.
- Symbol (A) represents Class "A" Compaction and symbol (EC) represents Common Excavation. Refer to the specifications for additional information.
- The auxiliary spillway material is classified as borrow and shall be utilized as earthfill if determined by the Engineer to be suitable material. The borrow material shall be placed at a location approved by the Engineer.

BORROW MATERIAL DESCRIPTIONS									
Sample Number	D11.1	D1.1	F37.1	F37.2	G35.1	D27.1	M23.1	L23.1	D35.1
Unified Soil Classification	CL	CL	CL	CL	CH	CL	CH	CH	CH
Reference Test Method	Meth A	Meth A	Meth A	Meth A	Meth A	Meth A	Meth A	Meth A	Meth A
Maximum Dry Density (pcf)	111.0	107.0	104.5	106.5	99.5	108.5	97.5	93.0	88.5
Optimum moisture (%)	16.0	18.0	19.0	18.0	23.0	17.5	24.5	27.5	31.0

EMBANKMENT MATERIAL SOURCES AND PLACEMENT REQUIREMENTS								
EMBANKMENT PLACEMENT	MATERIAL SOURCE	UNIFIED SOIL CLASSIF.	DEPTH OF LIFT	MAX SIZE ROCK FRAGMENTS	ALLOWABLE MOISTURE CONTENT	COMPACTION CLASS	REFER TEST METHOD	MIN REQUIRED COMPACTION
Core Trench, Center & Upstream Section of Embankment, Auxiliary Spillway Dikes	Moist Material from Required Excavations, Borrow Area	CH, CL	9"	6"	-1 to +3% of Optimum	A	ASTM D-698 Meth A	95%
Downstream Section of Embankment, Center Auxiliary Spillway Dike	Moist Material from Required Excavations	GC, CL, ML	9"	6"	-1 to +3% of Optimum	A	ASTM D-698 Meth A	95%
Ingress-Egress Road, Downstream Section of Dam	Wet Material from Required Excavations	GC, CL, SM, SC	9"	6"	-1 to +3% of Optimum	A	ASTM D-698 Meth A	95%

Date: April 08, July 08, Sept 08  
 Designed: MDS  
 Drawn: MDS, KAS, KRW  
 Checked: BBV  
 Approved:

Typical Embankment Section  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



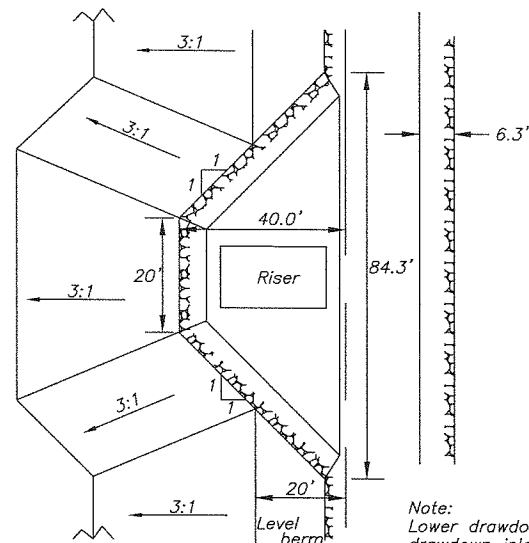
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 Drawing Name  
 Sheet 5 of 117

Sta 19+55

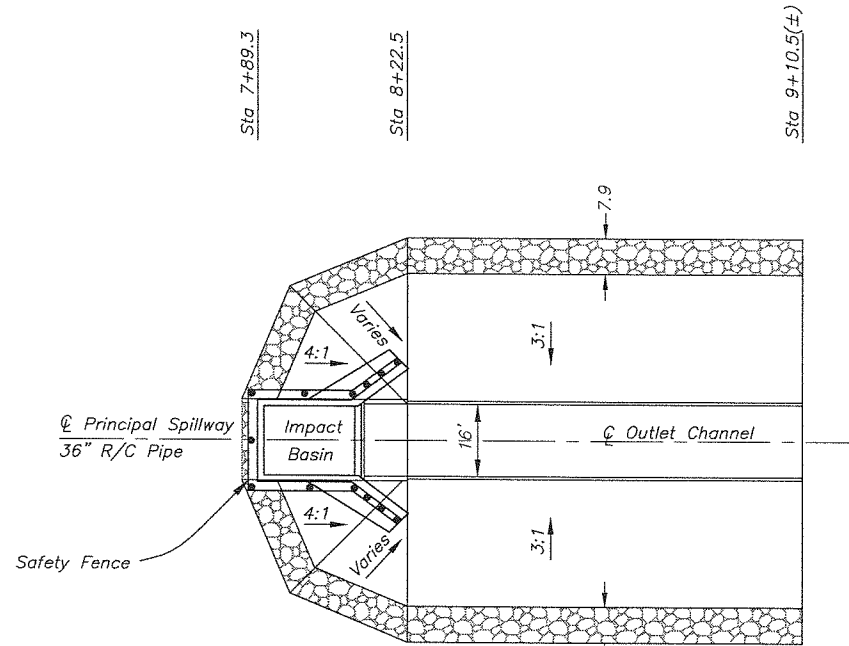
Sta 19+75

Sta 19+95

Sta 20+15



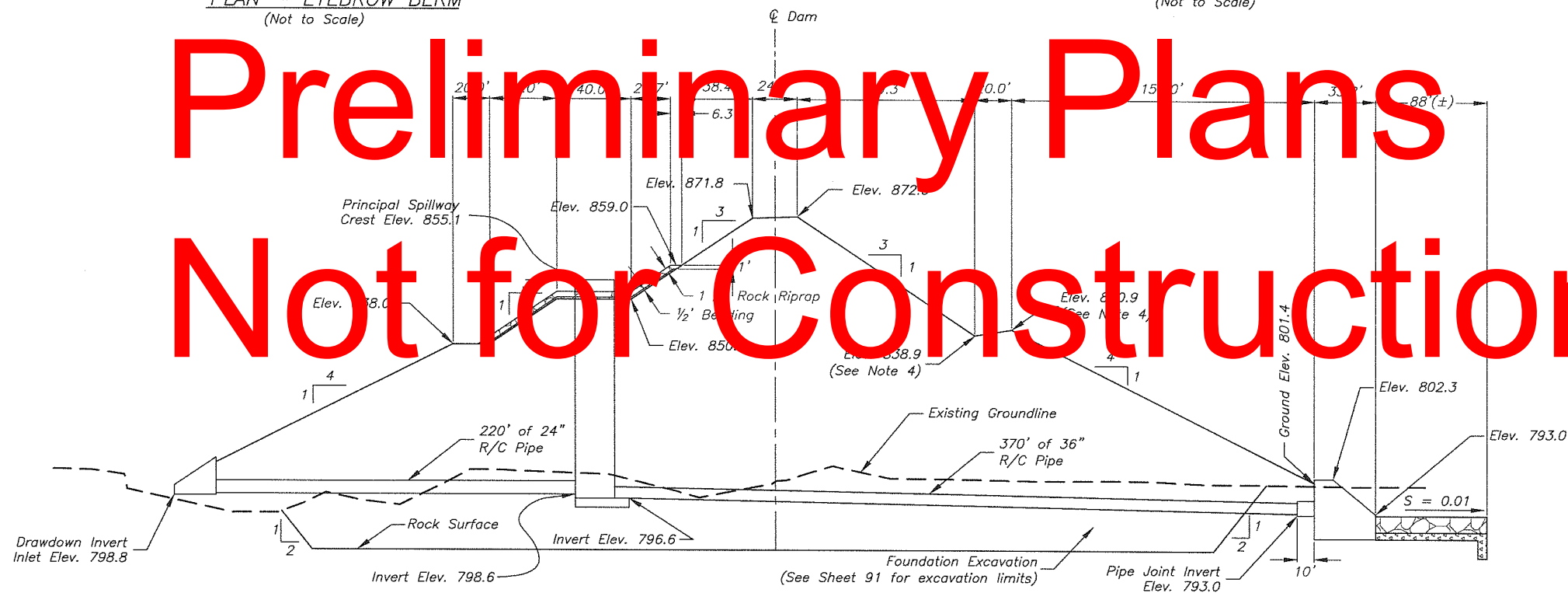
PLAN - EYEBROW BERM  
(Not to Scale)



PLAN - RIPRAP AROUND IMPACT BASIN  
(Not to Scale)

- Notes:
- Riprap extends 88'( $\pm$ ) downstream of end sill of impact basin. See Sheet 5 for typical cross section.
  - Safety fence shall be chain link fence. For details see Sheets 20-22.
  - For curve data see Sheet 4.
  - The Maximum elevation of the back berm is 840.0/842.0 at Station 22+00. The back berm slopes at -0.5% (downward) in both directions at this location.
  - The drainage system is not shown for clarity (see Sheets 7-11).

Distance From Outlet	Invert Elevation
0	793.00
10	793.00
30	793.24
50	793.47
70	793.70
90	793.93
110	794.16
130	794.39
150	794.61
170	794.83
190	795.05
210	795.26
230	795.48
250	795.69
270	795.89
290	796.10
310	796.30
330	796.45
350	796.55
370	796.60



SECTION @ \u2115 PRINCIPAL SPILLWAY (19+85)  
(Not to Scale)

MATERIALS

Concrete (Class 4000) -----	356 Cu Yds
Steel Reinforcement -----	94,350 Pounds
*Prestressed Concrete Pressure Pipe (36\"/>	

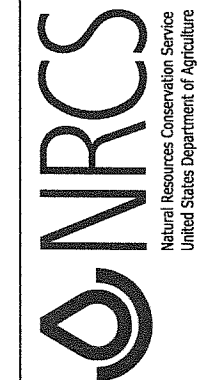
NOTES:

- Pipe elevations for pipe lengths other than those shown shall be approved by the Engineer.
- Camber table based on nominal pipe lengths. Actual laying length is 0.22' less than nominal length.
- For details of pipe bedding see Sheet 14.
- For details of low flow augmentation pipe see riser details.

Preliminary Plans  
Not for Construction

Designed	MDS	Date	April 08
Drawn	MDS, KAS, KRW	Date	July 08
Checked	BBV	Date	Sept 08
Approved			

Principal Spillway Section  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



**NOTES:**

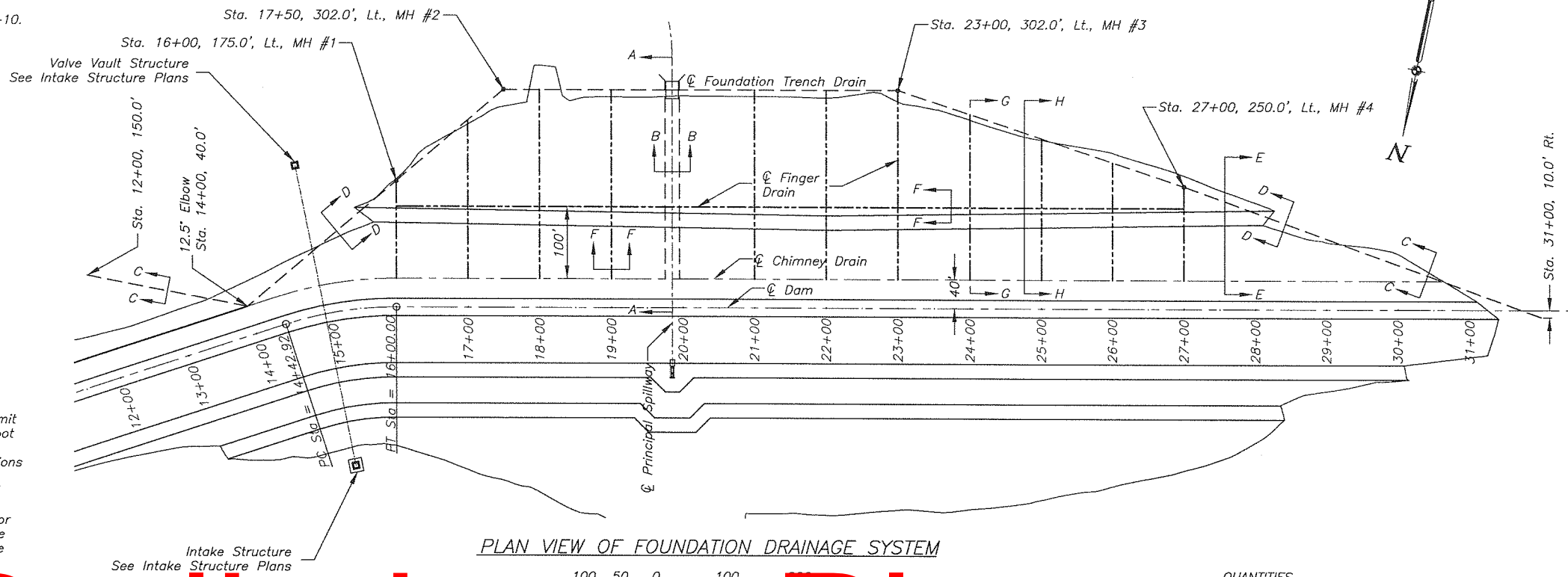
- For details of Sections A-A through H-H see Sheets 8-10.
- Fine drainfill gradation shall conform to the following:

Sieve Size	Approx. % Passing
3/8"	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	0-10
No. 200	0-5

- Medium drainfill gradation shall conform to the following:

Sieve Size	Approx. % Passing
3"	100
1 1/2"	95-100
3/4"	60-100
3/8"	40-100
No. 4	20-60
No. 8	0-30
No. 16	0-5

- All material with a size of No. 40 and smaller shall be non-plastic.
- Where bottom of drain pipe is more than four (4) feet below groundline, an access trench shall be used to limit this depth to 4 feet. Access trench shall have a 10 foot bottom and 3:1 side slopes.
- For soil boring data see profile and geologic cross sections on Sheet 91 and Sheet 92.
- Completed trench drain shall have a minimum 2 feet of soil cover over fine drainfill.
- Pipe deflection shall use either a specially made elbow or the pipe shall be deflected over several sections until the required pipe deflection has been attained. Refer to the table on this sheet for the maximum allowable pipe deflection.



PLAN VIEW OF FOUNDATION DRAINAGE SYSTEM

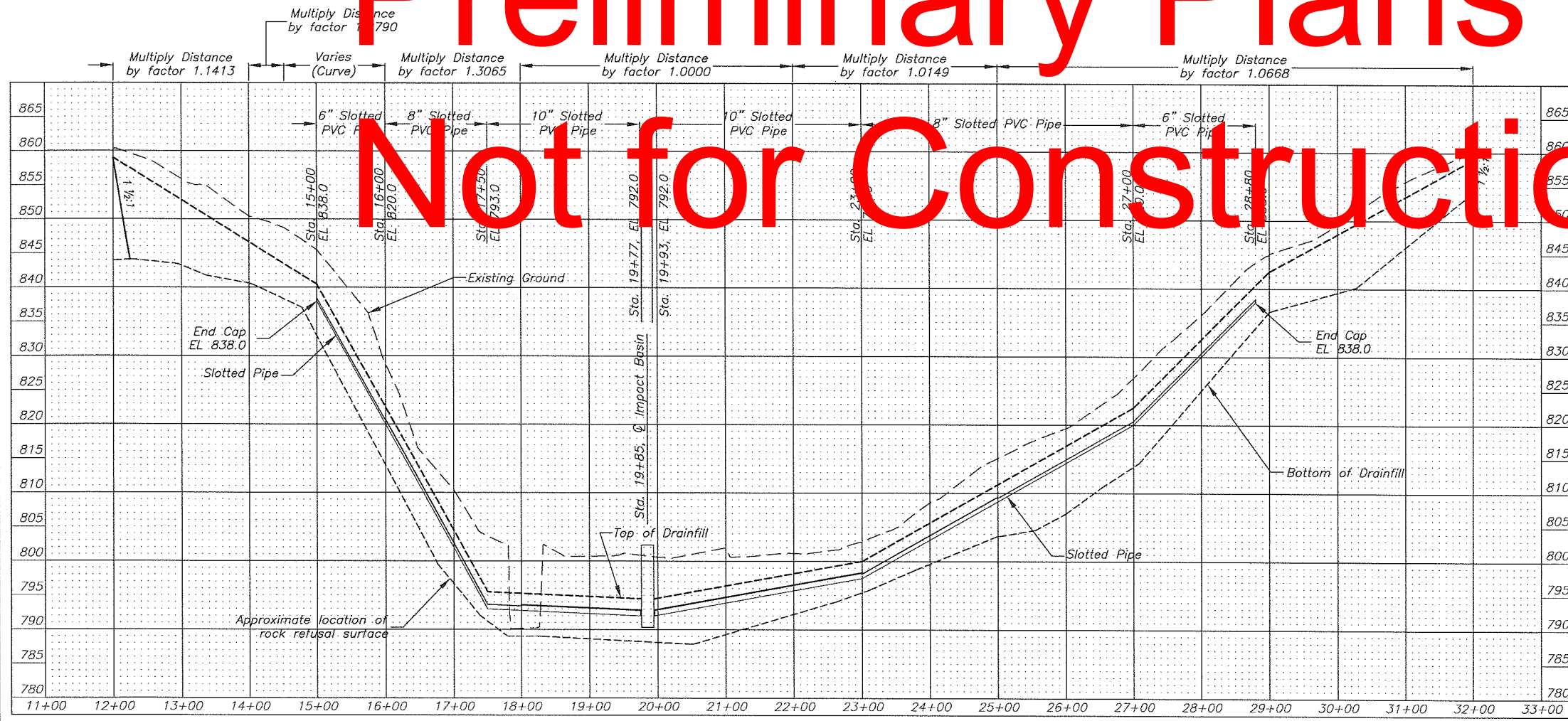
# Preliminary Plans Not for Construction

**QUANTITIES**

Polyvinyl Chloride (PVC) plastic pipe, 6" diameter, slotted	950 Lin Ft
Polyvinyl Chloride (PVC) plastic pipe, 6" dia.	25 Lin Ft
Polyvinyl Chloride (PVC) plastic pipe, 8" dia.	600 Lin Ft
Polyvinyl Chloride (PVC) plastic pipe, 10" dia.	525 Lin Ft
Fine drainfill	18,400 Cu Yds
Medium drainfill	1,275 Cu Yds
Total drainfill	19,675 Cu Yds

**NOTES:**

- Elbows and tees are included in the pipe length.
- For PVC pipe quantities and drainfill quantities adjacent to the impact basin, see Sheet 15.
- For additional information about manholes see Sheet 12.



PROFILE - CENTERLINE OF FOUNDATION TRENCH DRAIN

MAXIMUM PIPE DEFLECTION	
Pipe Diam (in)	Dimension "A" Maximum Deflection (in)
6	8
8	6
10	4

Maximum deflection is based on a 20' pipe length.

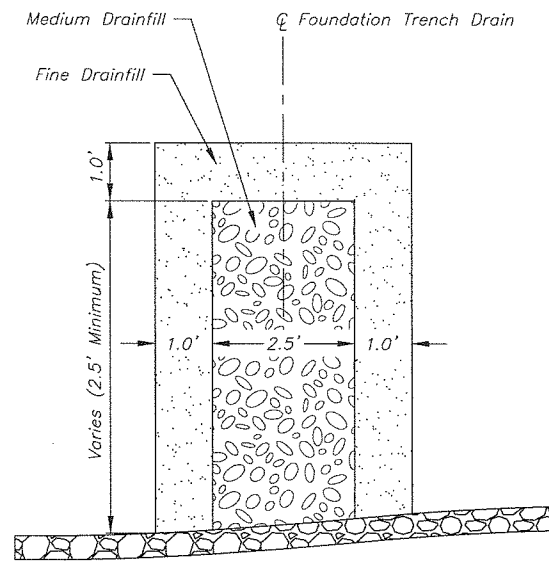
ALIGNMENT CENTERLINE FOUNDATION DRAIN		
☉ Dam Station	Distance Downstream of ☉ Dam (ft)	☐ Elevation (ft)
12+00	150.0	---
14+00	40.0	---
15+00	88.4	838.0
17+50	302.0	793.0
19+77	302.0 (End Pipe)	792.0
19+93	302.0 (End Pipe)	792.0
23+00	302.0	797.0
27+00	170.0	820.0
28+80	105.2	---

Date: April 08, July 08, Sept 08  
 Designed: MDS  
 Drawn: MDS, KAS, KRW  
 Checked: BBV  
 Approved: \_\_\_\_\_

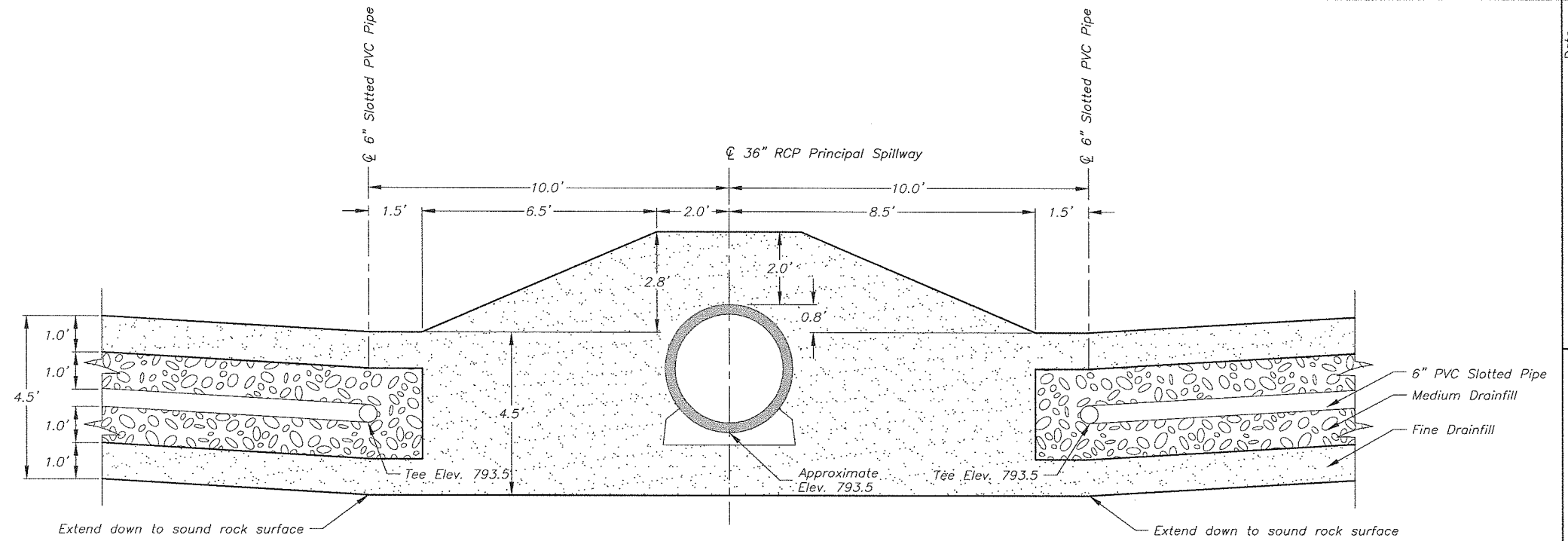
Foundation Trench Drain  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



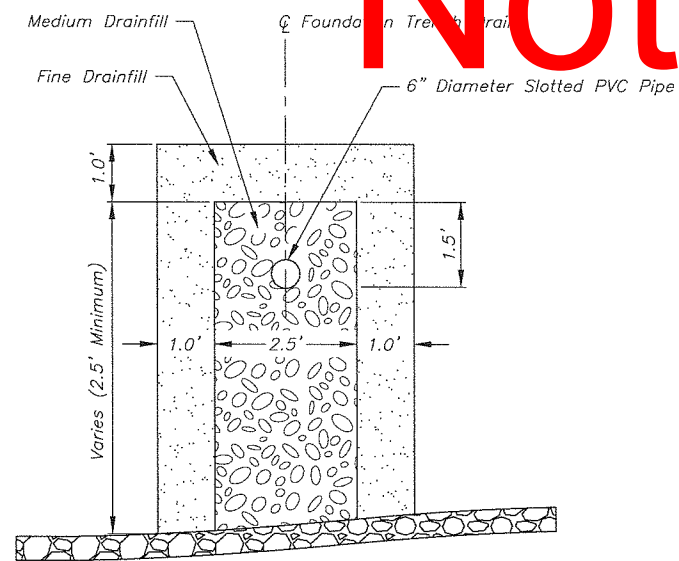
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 Drawing Name: \_\_\_\_\_



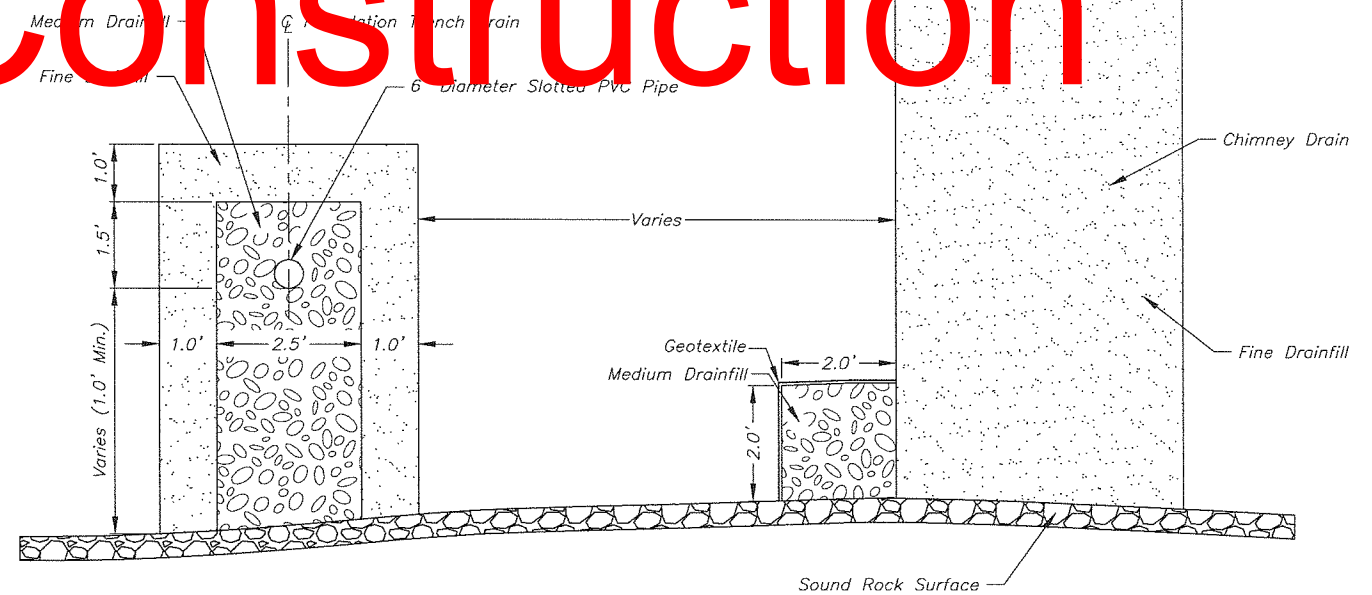
SECTION C-C  
Not to Scale



DETAILS OF FOUNDATION TRENCH DRAIN AT PRINCIPAL SPILLWAY



SECTION D-D  
Not to Scale



SECTION E-E  
Not to Scale

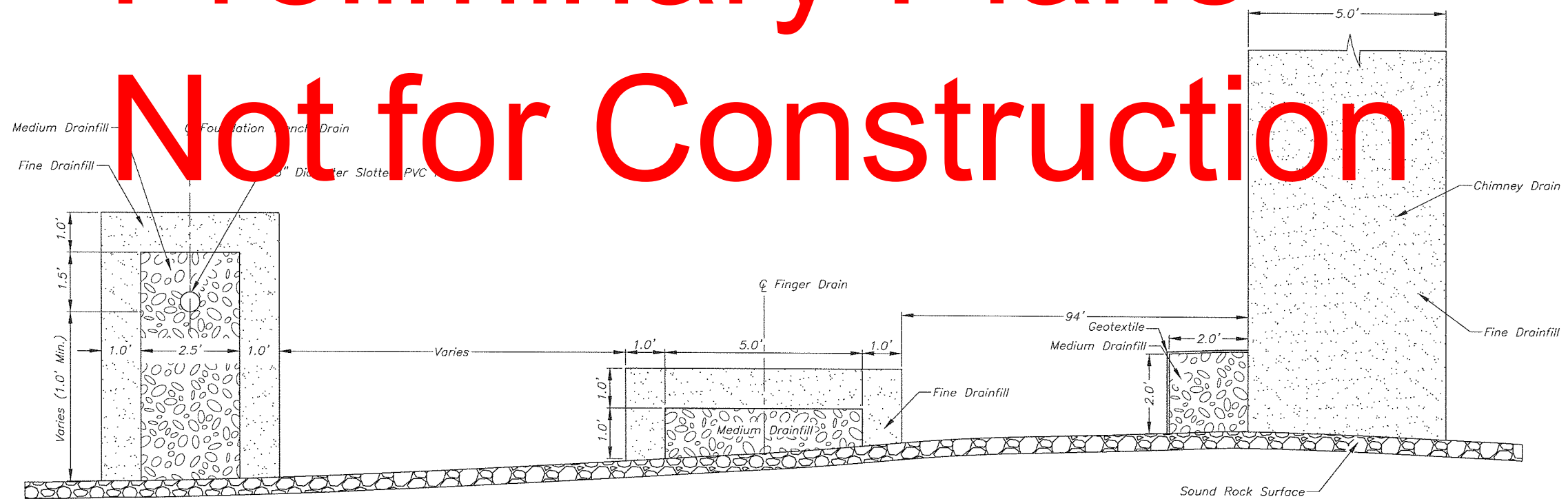
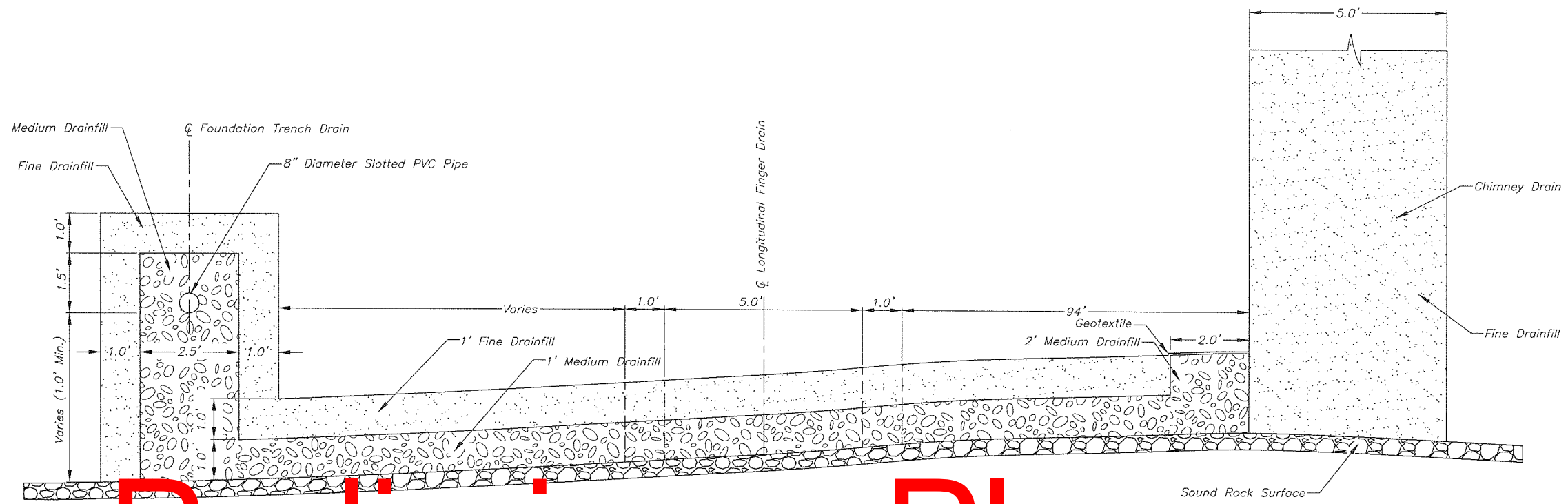
**Preliminary Plans  
Not for Construction**

Designed	MDS	Date	April 08
Drawn	MDS, KAS, KRW	Date	July 08
Checked	BBV	Date	Sept 08
Approved			

Drainage Sections  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri





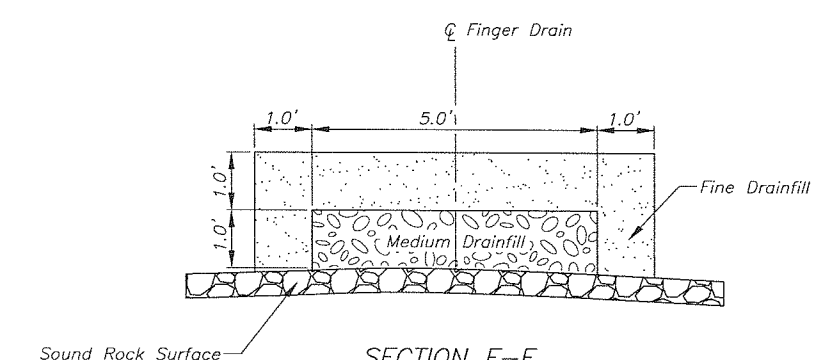
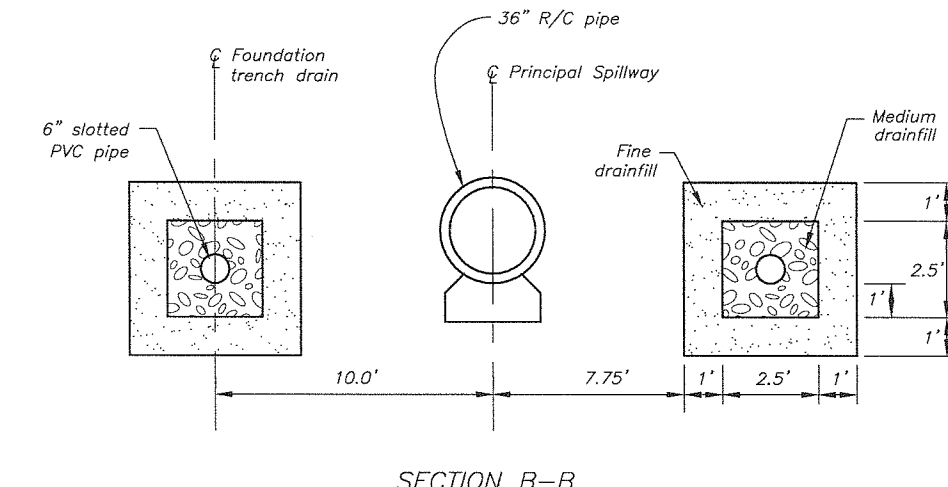
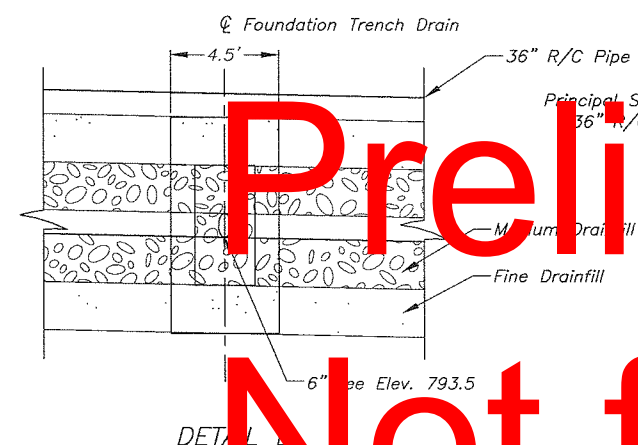
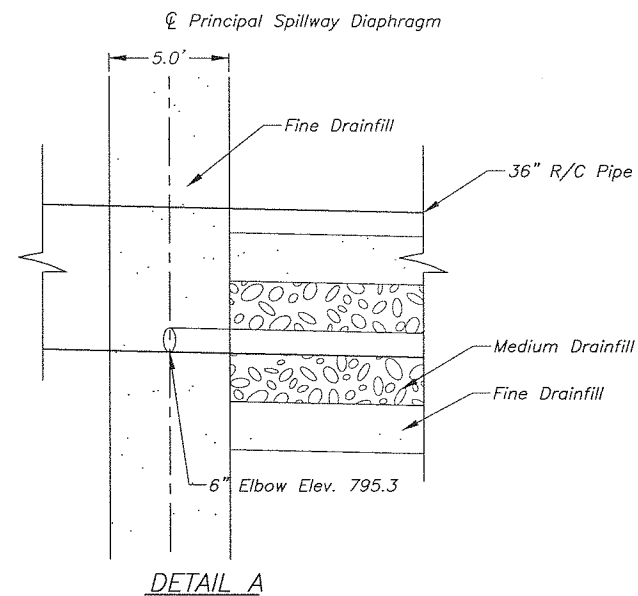
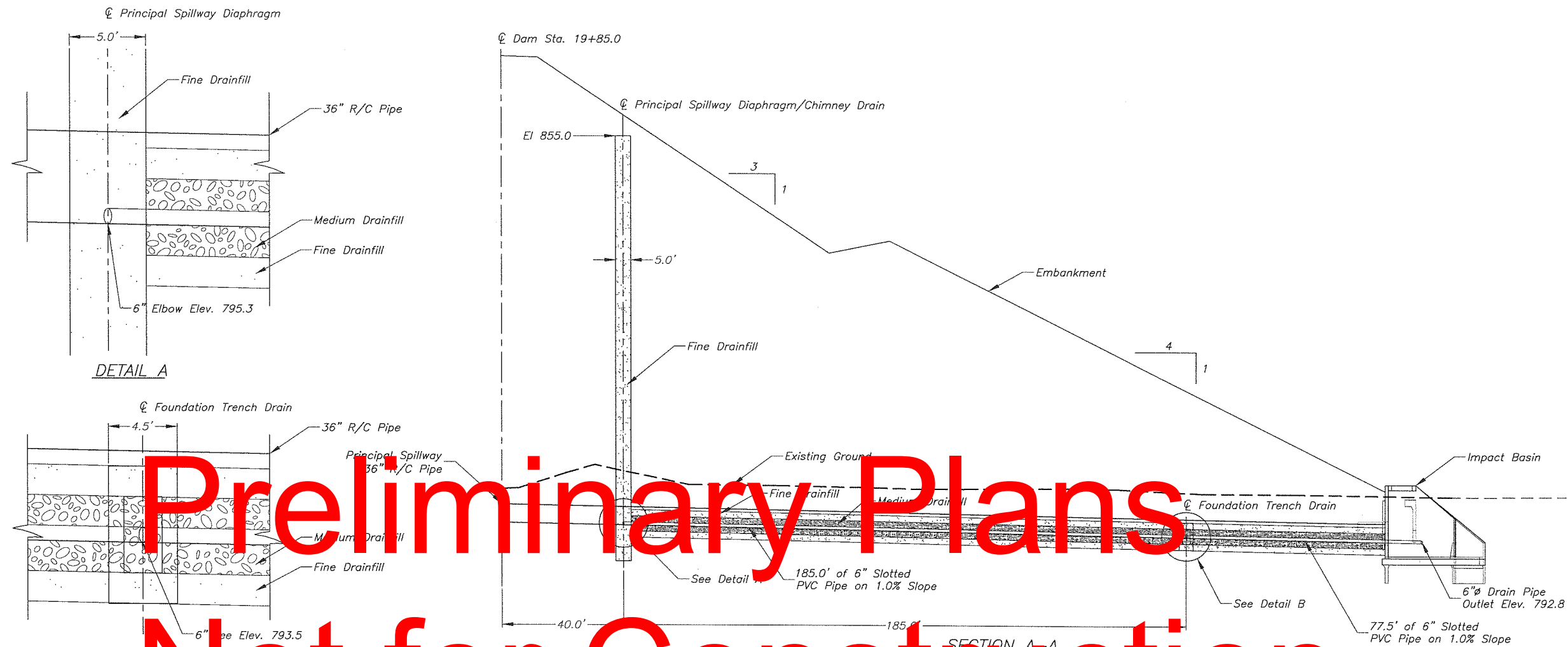


Preliminary Plans  
Not for Construction

Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	

Drainage Sections  
 Structure L0-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri





Preliminary Plans  
Not for Construction

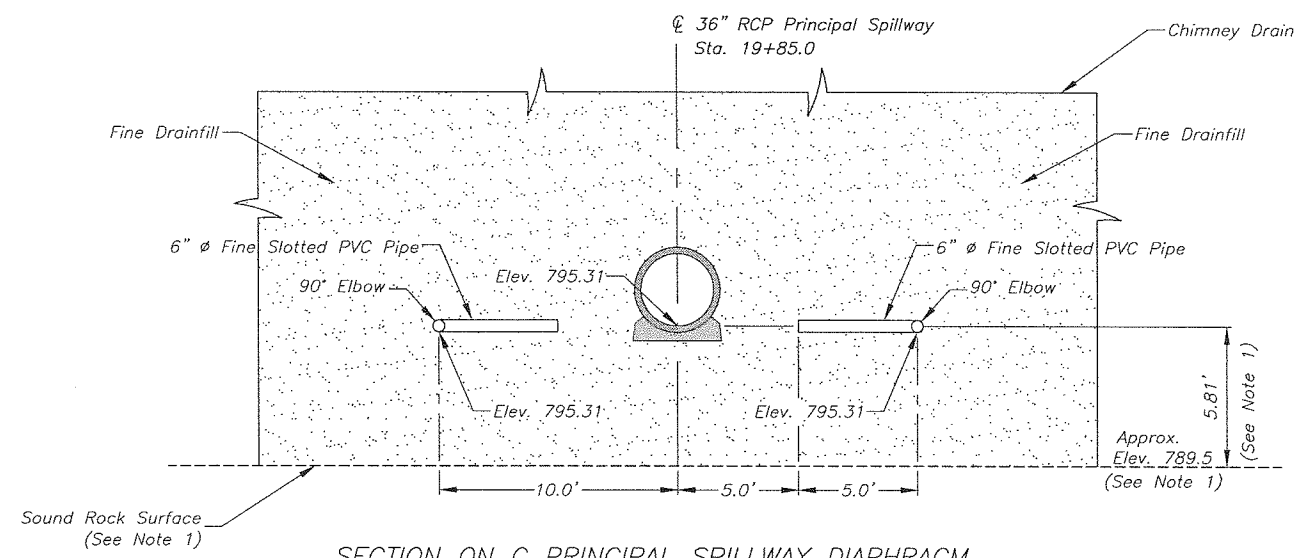
- NOTES:**
1. For details of drain around impact basin, see Sheet 15.
  2. For details of animal guards for drain outlets, see Sheet 16.
  3. PVC pipe shall be sawed off inside impact basin so it protrudes 2 inches as shown on Sheet 16.
  4. The location and width of the finger drains shall be approved in the field by the Engineer. Based on the condition of the uncovered basement foundation the Engineer may deem that additional finger drains or wider finger drains may be required. If this situation occurs the quantities shall be adjusted accordingly.

Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	

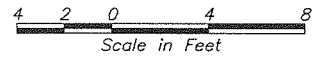
Drainage Sections  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



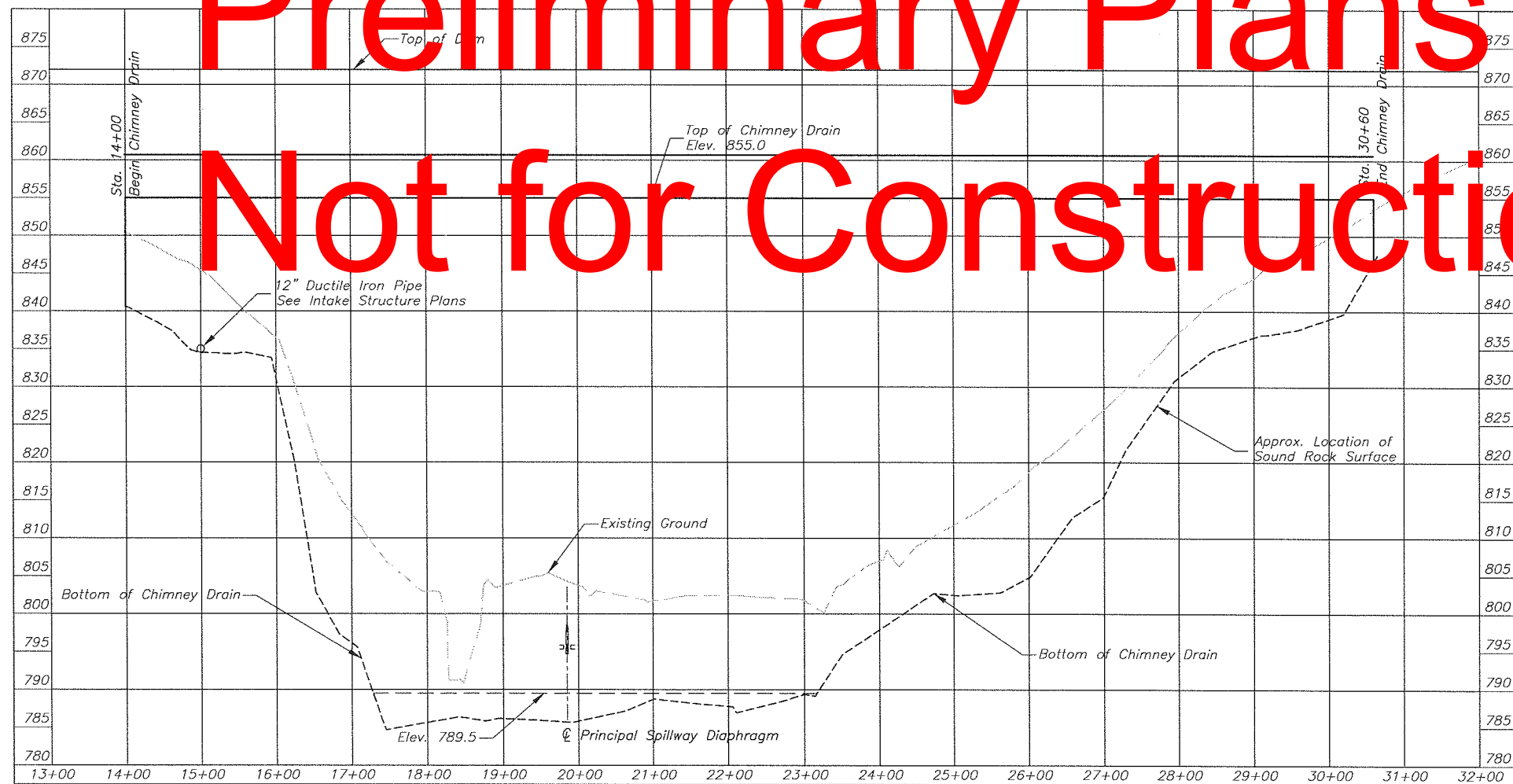
File Name  
Drawing Name



SECTION ON ̢ PRINCIPAL SPILLWAY DIAPHRAGM  
 (@ Chimney Drain; ̢ Dam Sta. = 19+85)



Preliminary Plans  
 Not for Construction



PROFILE - CENTERLINE OF CHIMNEY DRAIN

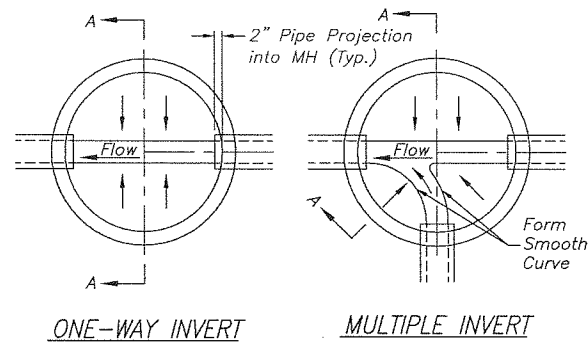
NOTES:

1. The elevation of the bottom of the principal spillway diaphragm shall depend on the location of the rock surface. This elevation shall be verified in the field by the Engineer. The minimum elevation shall be 789.5 feet.
2. The bottom of the chimney drain shall extend to sound rock as approved in the field by the Engineer.

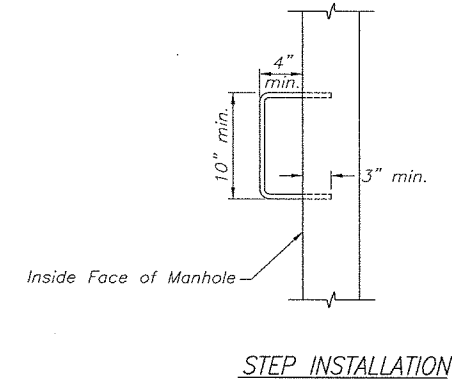
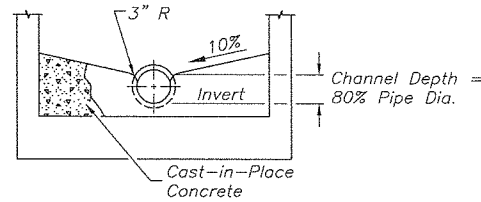
Designed	MDS	Date	April 08
Drawn	MDS, KAS, KRW		July 08
Checked	BBV		Sept. 08
Approved			

Chimney Drain  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri





PLAN - PRECAST CONCRETE INVERT



Preliminary Plans  
Not for Construction

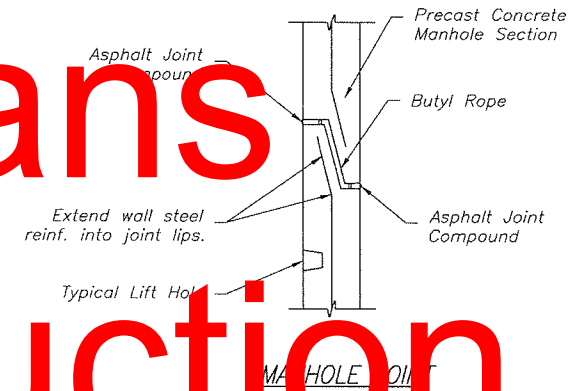
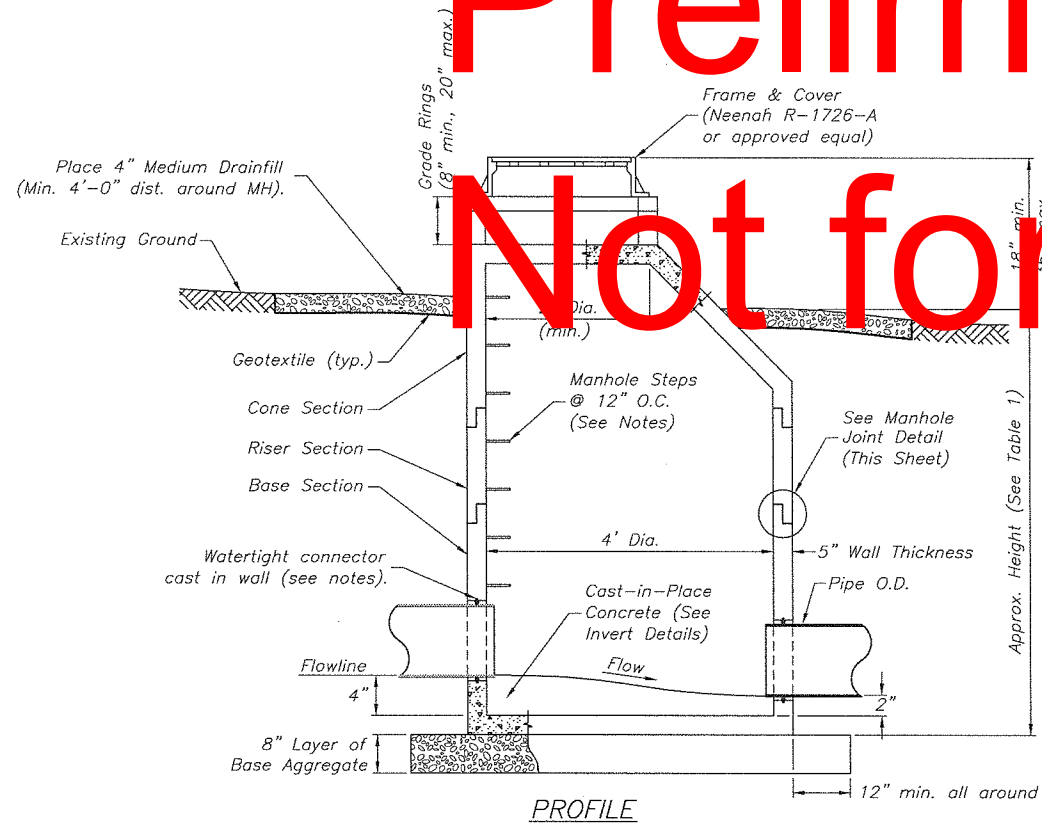


TABLE 1 - APPROXIMATE MANHOLE HEIGHT  
(Top of existing ground to the top of the base)

Station	Approximate Height, H (ft)
16+00	9.3
17+50	10.2
23+00	6.2
27+00	6.8

NOTES:

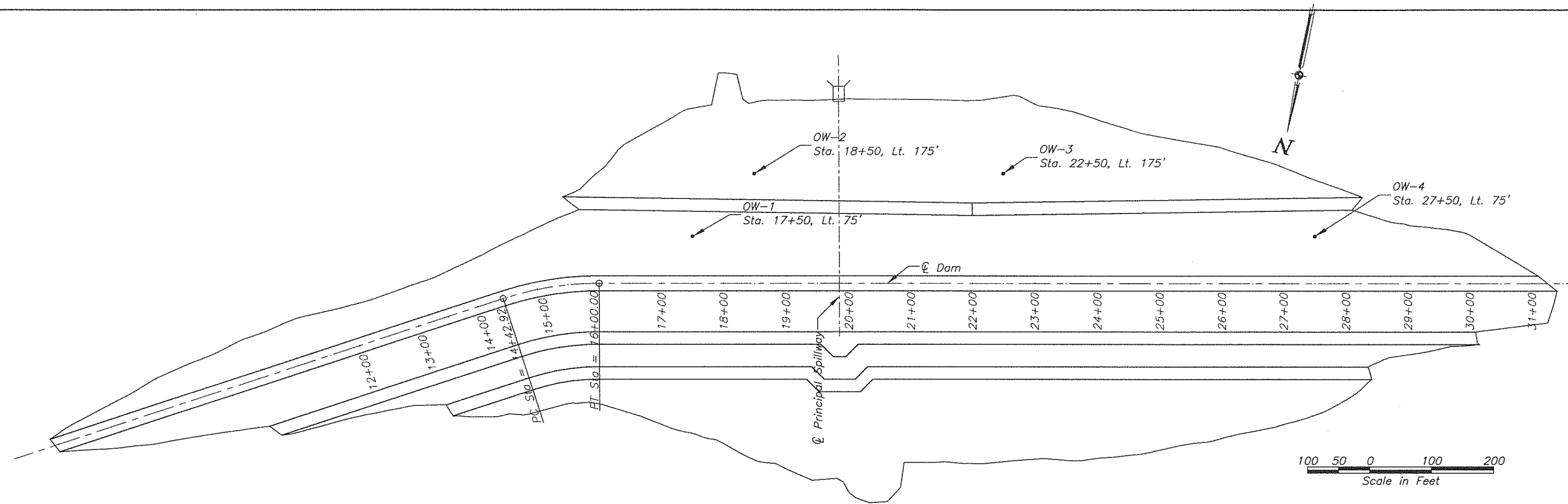
1. Manhole steps shall have a reinforced plastic exterior and contain a steel core conforming to ASTM A575, Grade 1020.
2. Precast bases, riser sections and top slabs shall conform with ASTM C478.
3. Precast sections shall be monolithic.
4. Remove lifting rings and trowel smooth holes, if present.
5. For watertight pipe connections, the rubber gasket shall conform to either ASTM C923 or ASTM C443.

Date  
 April 08  
 July 08  
 Sept 08  
 Designed MDS  
 Drawn MDS, KAS, KRW  
 Checked BBY  
 Approved

Precast Concrete Manhole Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

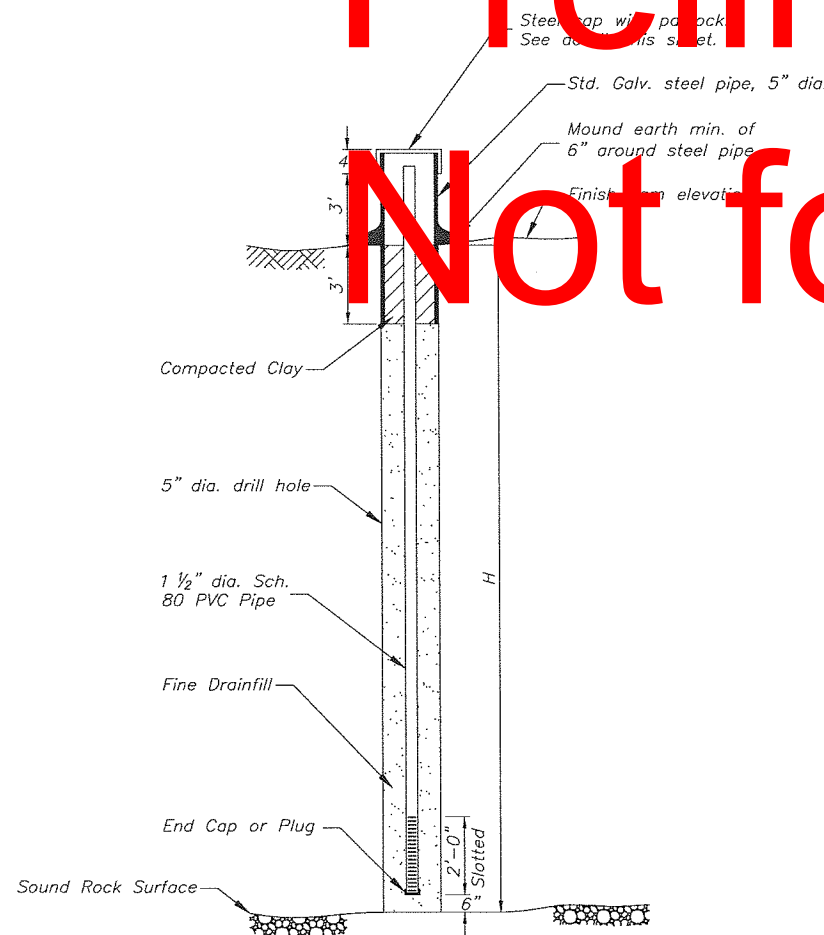


File Name  
 Drawing Name

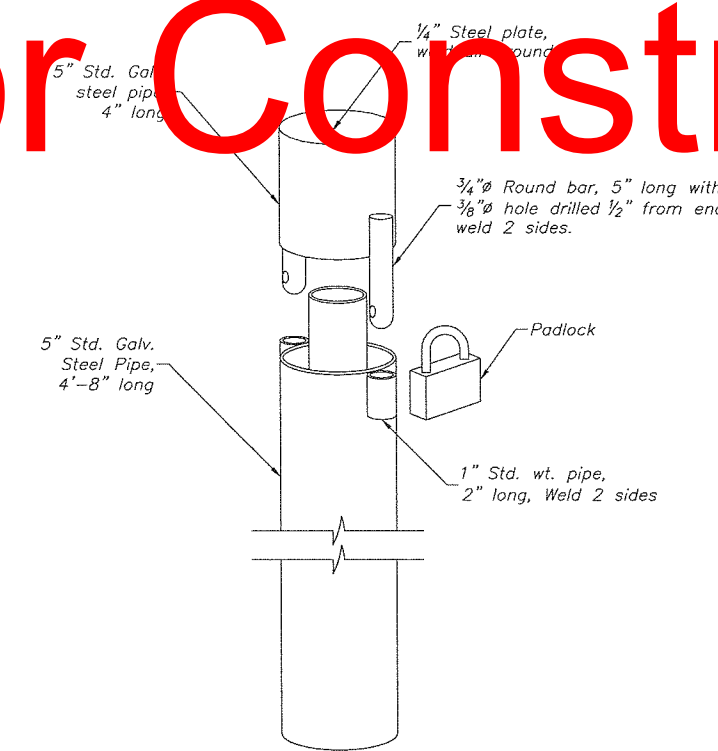


PLAN VIEW OF INSTRUMENTATION

# Preliminary Plans Not for Construction



OBSERVATION WELL DETAIL  
(Not to Scale)



DRAIN OF PROTECTIVE ENCLOSURE  
(Not to Scale)

Observation Well Number	Dam Station	Set	Approx. Elev. of Bottom	H
OW-1	17+50	75.0'	828.5	22.5'
OW-2	18+50	175.0'	829.8	40.0'
OW-3	22+50	175.0'	830.1	39.8'
OW-4	27+50	75.0'	831.0	20.0'

- NOTES:
- Elevation and "H" distances shown are approximate. Final elevations and "H" distances shall be as determined by the Engineer.
  - Earth shall be mounded around the steel pipe of the observation well a minimum vertical distance of 6 inches to prevent entry of surface water.
  - Observation wells shall be drilled to sound rock as determined by the Engineer in the field.

Date  
 April 08  
 July 08  
 Sept 08  
 Designed MDS  
 Drawn MDS, KAS, KRW  
 Checked BBV  
 Approved

Instrumentation  
 Structure LO-1  
 Little Otter Creek Watershed  
 Caldwell County, Missouri  
 PL-566



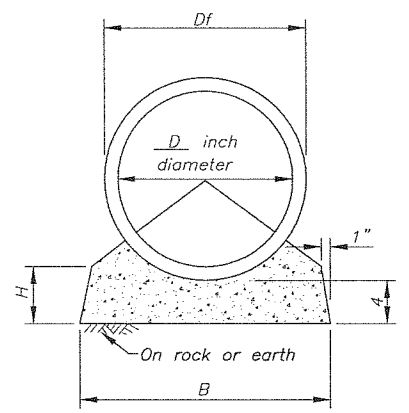
Date April 08  
April 08  
July 08  
Sept 08  
 Designed MDS  
 Drawn MDS, KAS, KRW  
 Checked BBV  
 Approved \_\_\_\_\_

BEDDING DIMENSIONS  
 AND  
 CONCRETE QUANTITY RELATIONS

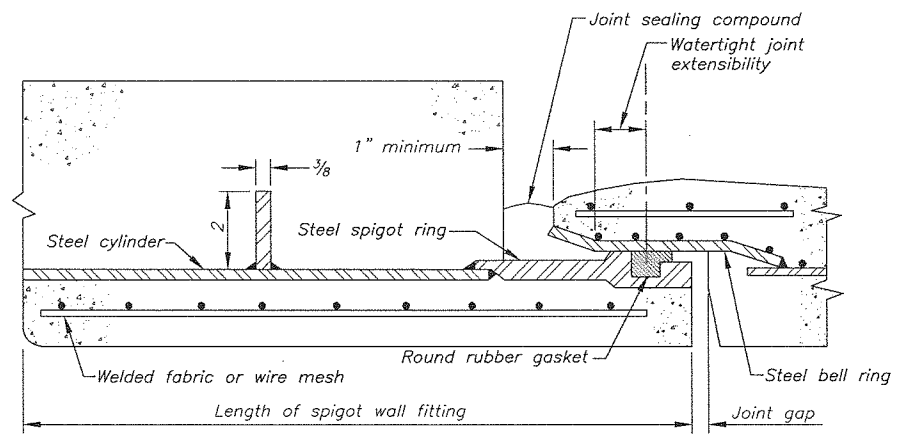
PIPE DIAMETER D INCHES	BEDDING WIDTH B FT - IN	BEDDING HEIGHT H INCHES	CONCRETE QUANTITIES CU. YDS./FT. OF BEDDING
24	3 - 1	7 1/2	0.0665-0.0004 (Df-32)
36	3 - 8	8 1/2	0.0833-0.0005 (Df-44)

**24" PIPE QUANTITIES**  
 CONCRETE QUANTITY IS BASED ON AN OUTSIDE DIAMETER OF PIPE, Df, OF 29 INCHES  
 THIS QUANTITY IS GIVEN BY  
 $0.0665 - 0.0004 (Df-32) = 0.0677$   
 CU. YDS. PER LINEAL FOOT OF BEDDING  
 TOTAL CONCRETE QUANTITY = 3.4 CU. YDS.

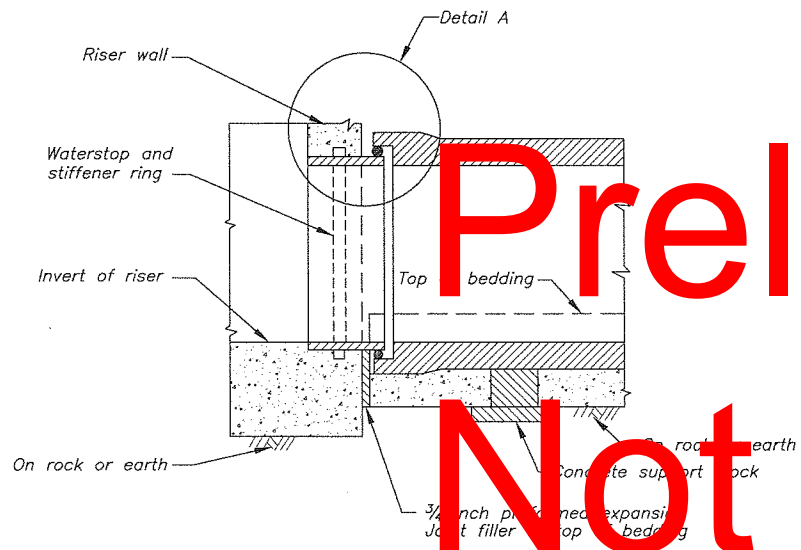
**36" PIPE QUANTITIES**  
 CONCRETE QUANTITY IS BASED ON AN OUTSIDE DIAMETER OF PIPE, Df, OF 42 1/2 INCHES  
 THIS QUANTITY IS GIVEN BY  
 $0.0833 - 0.0005 (Df-44) = 0.0841$   
 CU. YDS. PER LINEAL FOOT OF BEDDING  
 TOTAL CONCRETE QUANTITY = 31.1 CU. YDS.



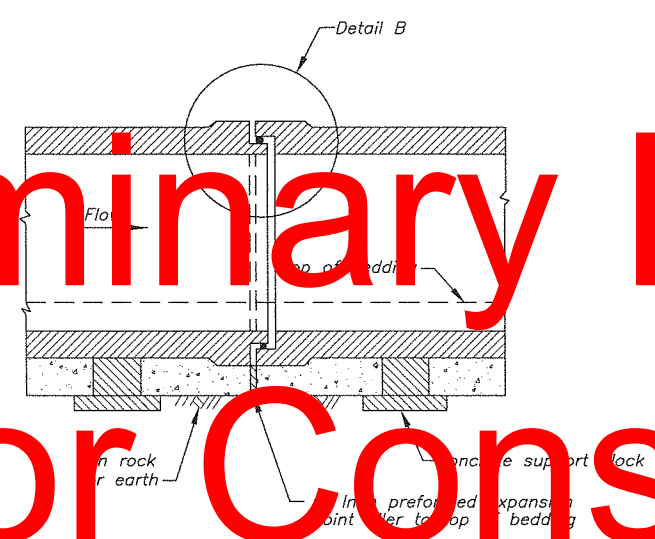
DETAIL OF BEDDING



DETAIL A



DETAIL OF SPIGOT - WALL FITTING



DETAIL OF PIPE JOINT

Preliminary Plans  
 Not for Construction

OUTSIDE DIAM OF PIPE INCHES	INSIDE DIAM OF PIPE INCHES	INTERNAL LOAD HYDROSTATIC PRESSURE FEET	EXTERNAL LOAD	
			MIN 3-EDGE BEARING STRENGTH IN LBS PER LIN FT OF PIPE	
			AWWA C-301	AWWA C-300
29	24	67.7	7,500	---
42 1/2	36	73.8	15,500	---

THE OUTSIDE DIAMETER OF PIPE ASSUMED IN DESIGN IS AS SHOWN. WHERE THE PIPE FURNISHED HAS AN OUTSIDE DIAMETER GREATER THAN ASSUMED IN DESIGN, THE THREE-EDGE BEARING STRENGTH OF THE PIPE FURNISHED MUST NOT BE LESS THAN THE SPECIFIED THREE-EDGE BEARING STRENGTH MULTIPLIED BY THE RATIO OF THE OUTSIDE DIAMETER OF THE PIPE FURNISHED TO THE OUTSIDE DIAMETER ASSUMED IN DESIGN.

THE STEEL CYLINDER THICKNESS SHALL NOT BE LESS THAN 10 GAGE FOR THE 36 INCH R/C PIPE.

THE STEEL CYLINDER THICKNESS SHALL NOT BE LESS THAN 12 GAGE FOR THE 24 INCH R/C PIPE.

JOINT REQUIREMENTS			
LENGTH OF PIPE SECTION FEET	MINIMUM JOINT LENGTH INCHES	MINIMUM JOINT LIMITING ANGLE	
		RADIANS	DEGREES
20	4.00	0.01745	1' 00'
10	4.00	0.01745	1' 00'

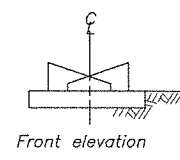
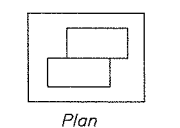
FOR PIPE LENGTH OTHER THAN SHOWN, JOINT REQUIREMENTS WILL BE DETERMINED BY THE ENGINEER.

WHERE PIPES OF DIFFERENT LENGTH ARE CONNECTED, ADJOINING PIPES SHALL MEET THE REQUIREMENTS OF THE LONGER PIPE.

PRIOR TO DELIVERY OF PIPE, THE PIPE JOINT DETAIL PROPOSED FOR USE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

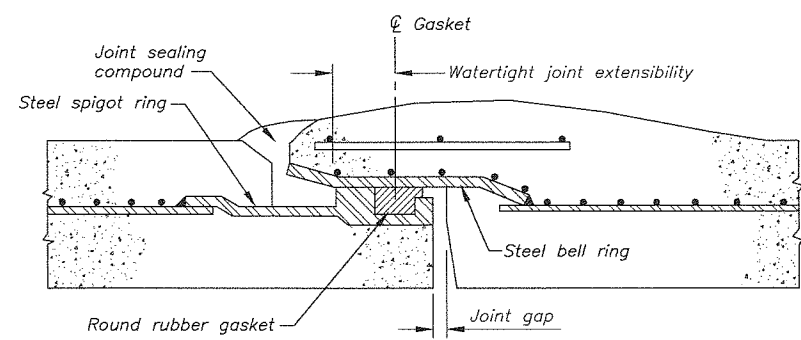
JOINT REQUIREMENTS APPLY TO BOTH THE 24 INCH AND 36 INCH DIAMETER PIPE.

JOINT LENGTH EQUALS WATERTIGHT EXTENSIBILITY PLUS JOINT GAP.  
 THE PIPE SHALL BE DRAWN TOGETHER SO THAT THE MAXIMUM JOINT GAP DOES NOT EXCEED 3/8 INCH FOR PIPE LAID ON A STRAIGHT LINE. FOR CAMBERED PIPE OR PIPE LAID ON A CURVED LINE, THE JOINT GAP AT THE CLOSEST POINT SHALL NOT EXCEED 3/8 INCH.



SUGGESTED SUPPORT BLOCKS AND WEDGES

Sufficient blocks and wedges shall be provided to support the pipe to the required line and grade. The contractor shall determine the number and size of blocks or wedges required. Support blocks or wedges shall be Class 4000 concrete.



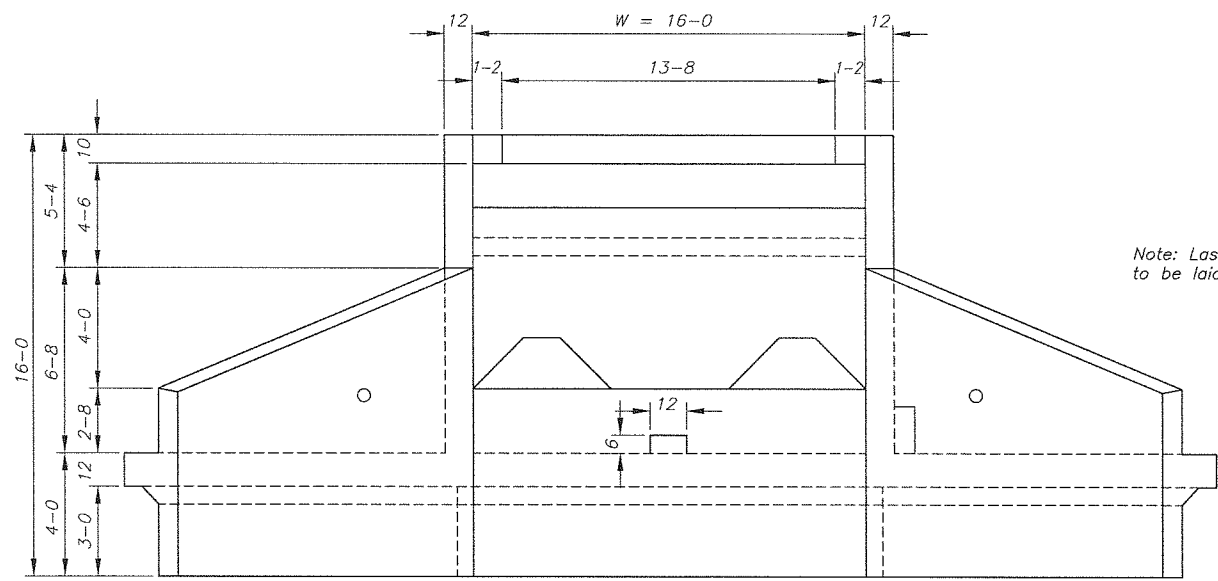
DETAIL B

STANDARD CONDUIT DETAILS	
FOR REINFORCED CONCRETE PRESSURE PIPE PRINCIPAL SPILLWAY	
STANDARD DWG. NO. ES-61-B	
DATE 5-86	SHEET 1 OF 1

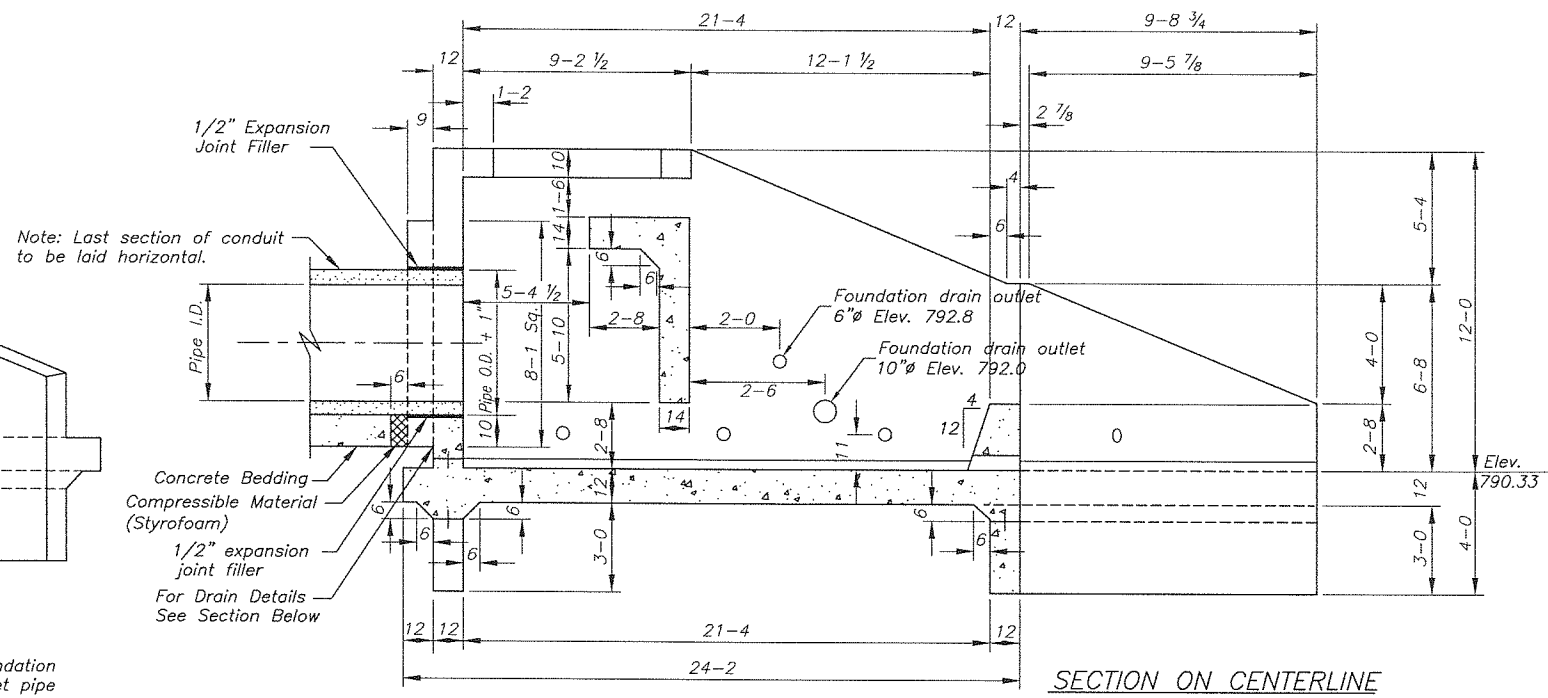
R/C Conduit Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 Caldwell County, Missouri  
 PL-566



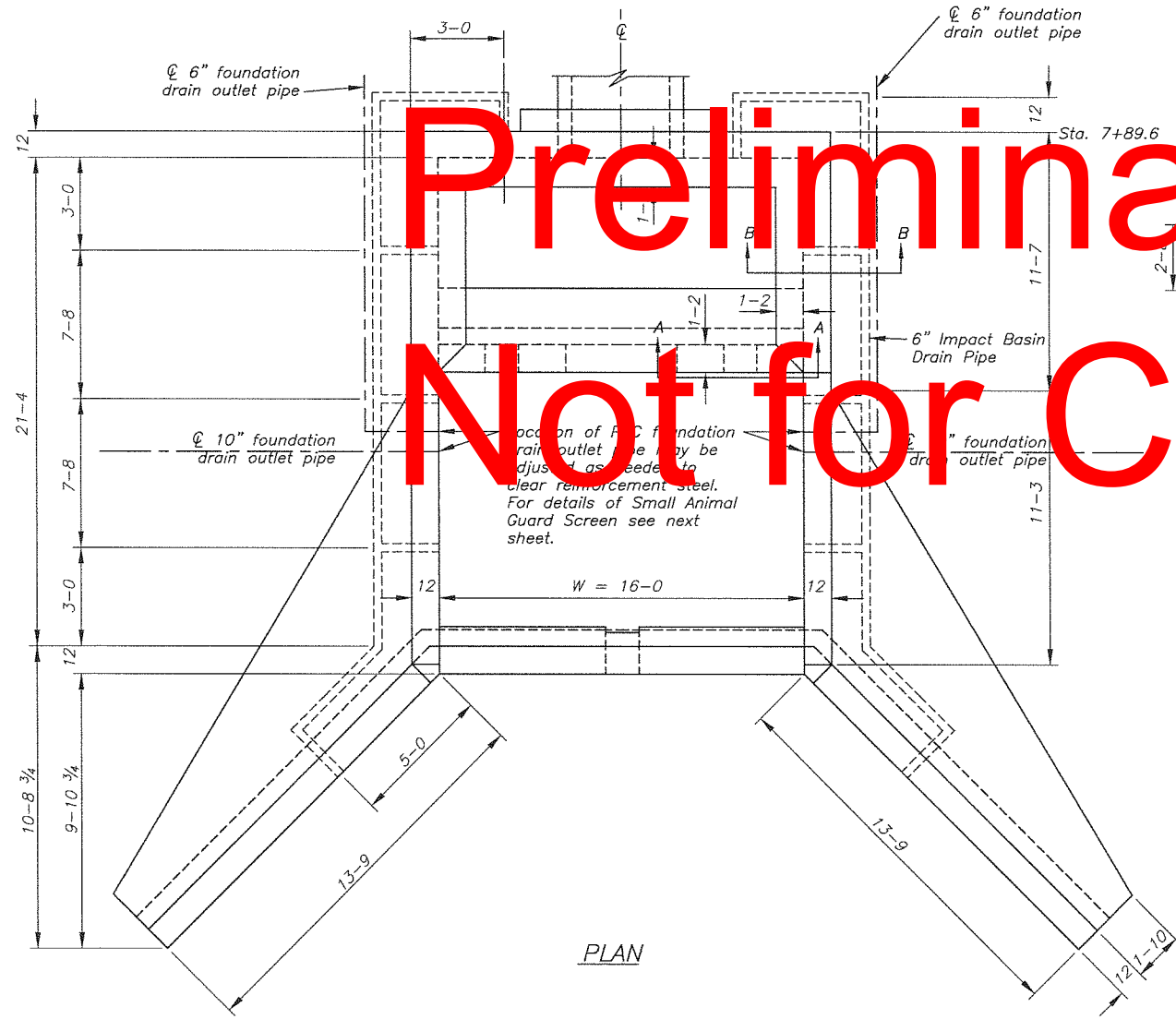
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 Drawing Name \_\_\_\_\_  
 Sheet 14 of 117



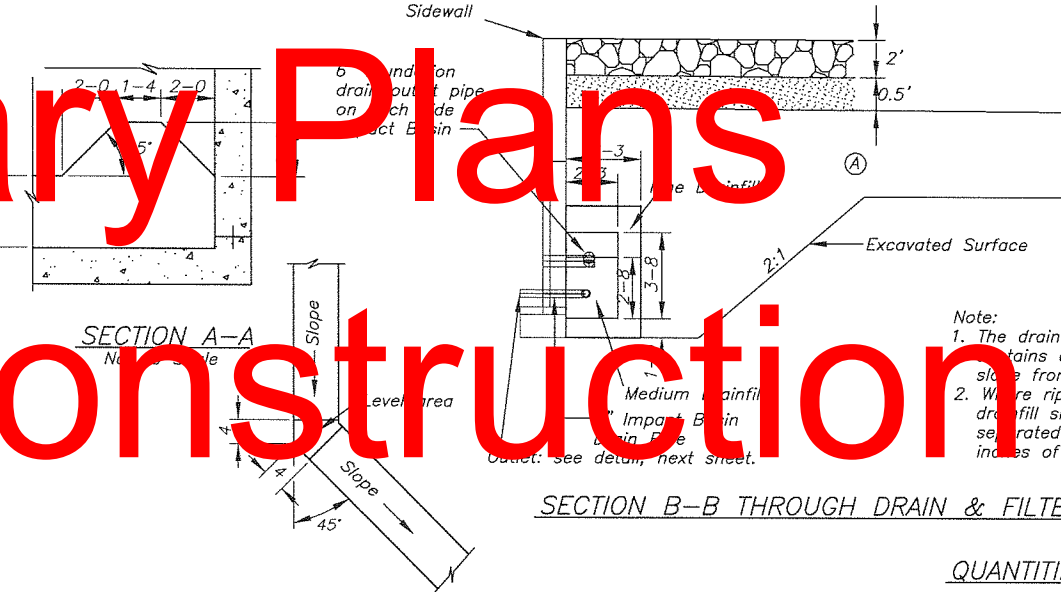
DOWNSTREAM ELEVATION



SECTION ON CENTERLINE



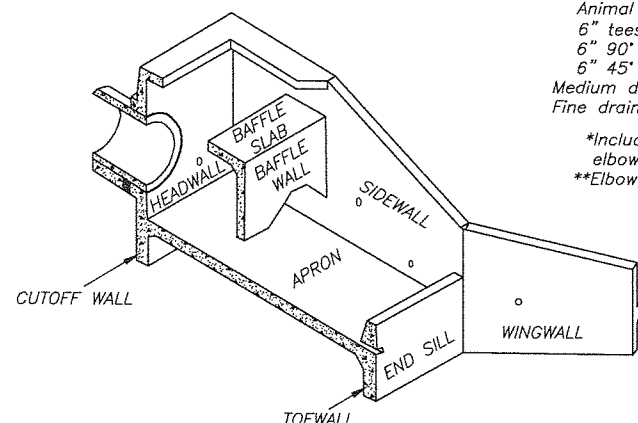
PLAN



SECTION A-A

SECTION B-B THROUGH DRAIN & FILTER

PLAN - JUNCTION SIDEWALL AND WINGWALL



ISOMETRIC VIEW

**Preliminary Plans  
Not for Construction**

Note:  
1. The drain section perpendicular to headwall contains only enough riprap to blend on level slope from top of headwall to embankment slope.  
2. Where riprap contacts medium drainfill, the fine drainfill shall be omitted. Fine drainfill shall be separated from riprap by a minimum of 12 inches of medium drainfill.

**QUANTITIES**

Reinforced Concrete, Class 4000	71 Cu. Yds.
Reinforcing Steel	10,923 Lbs.
Impact Basin Drainage	
**6" PVC pipe, Medium Slotted	64 Lin. Ft.
*6" PVC pipe, non-perforated	24 Lin. Ft.
Animal screen (see detail next sheet)	12 Each
6" tees	6 Each
6" 90° elbows	8 Each
6" 45° elbows	2 Each
Medium drainfill	17 Cu. Yds.
Fine drainfill	35 Cu. Yds.

\*Includes short sections of solid pipe to go from tee's or elbows through concrete wall.  
\*\*Elbows and tees are included in the pipe length.

STANDARD IMPACT BASIN (Modified)	
DESIGN CONSTANTS	$f'_c = 4000 \text{ psi}$ $f'_c = 1600 \text{ psi}$ $n = 8$ $f'_c = 20,000 \text{ psi}$
STANDARD DRAWING NO.	ES - 4160
DATE	1-70
SHEET	1 OF 5

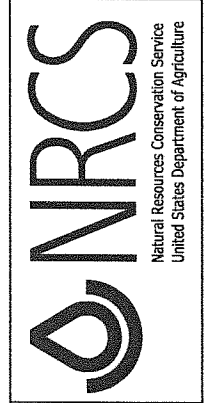
CARL ROHDE  
Consulting Engineer  
654 Ridgeway Rd., Lake Oswego, Ore.

Rev. 03/2008

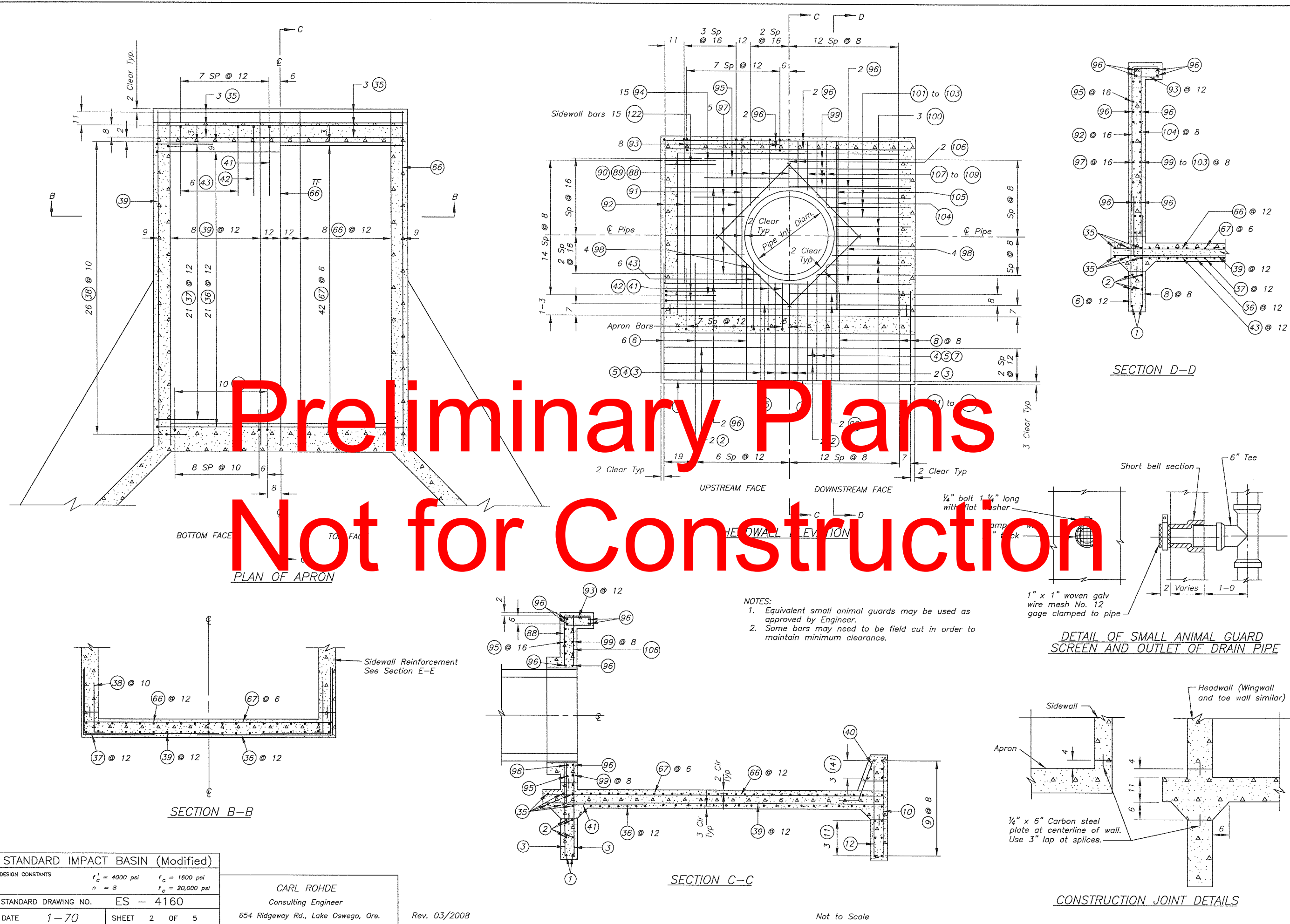
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Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	

Impact Basin  
Structure LO-1  
Little Otter Creek Watershed  
Caldwell County, Missouri  
PL-566



File Name	
Drawing Name	
Sheet	15 of 117



Preliminary Plans  
Not for Construction

STANDARD IMPACT BASIN (Modified)	
DESIGN CONSTANTS	$f'_c = 4000 \text{ psi}$ $f'_c = 1800 \text{ psi}$ $n = 8$ $f'_c = 20,000 \text{ psi}$
STANDARD DRAWING NO.	ES - 4160
DATE	1-70
SHEET	2 OF 5

**CARL ROHDE**  
Consulting Engineer  
654 Ridgeway Rd., Lake Oswego, Ore.

Rev. 03/2008

Not to Scale

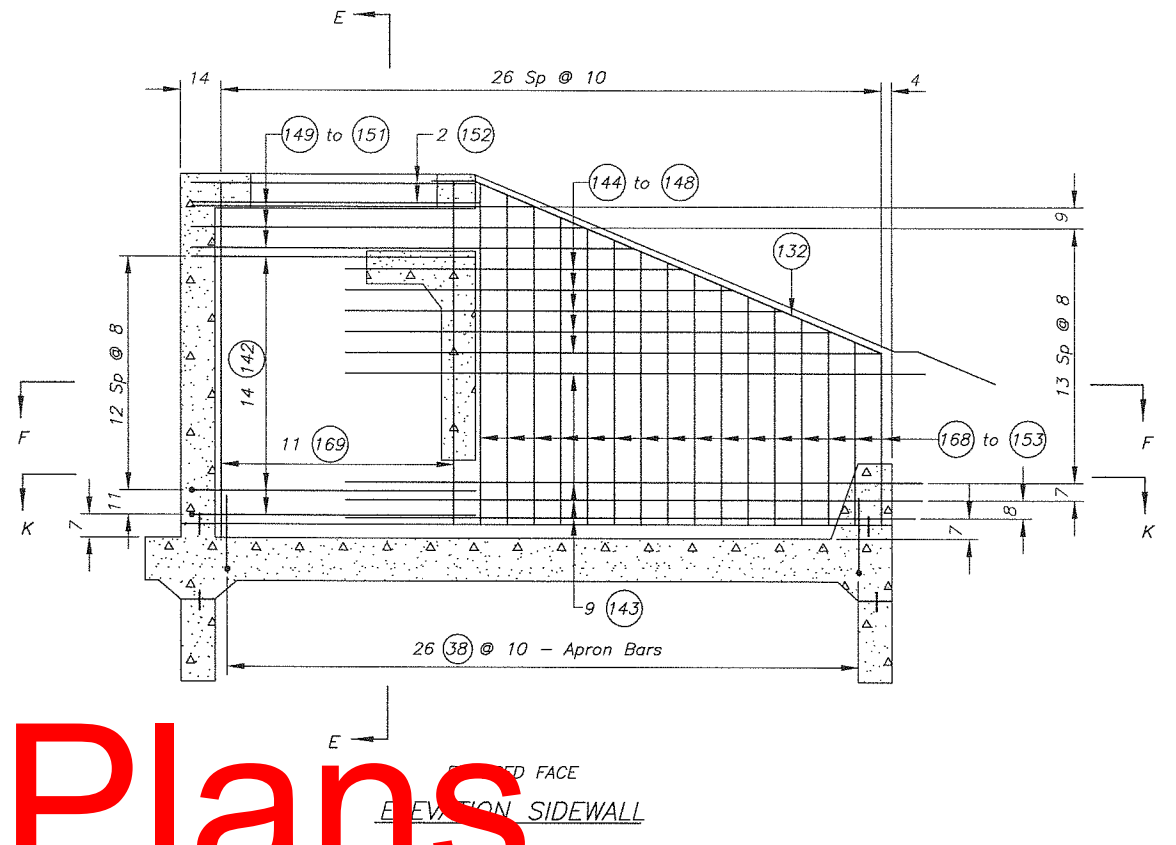
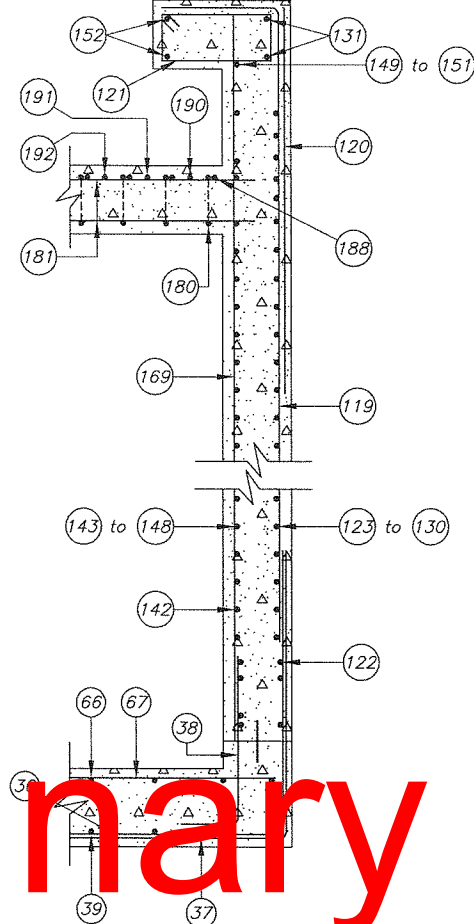
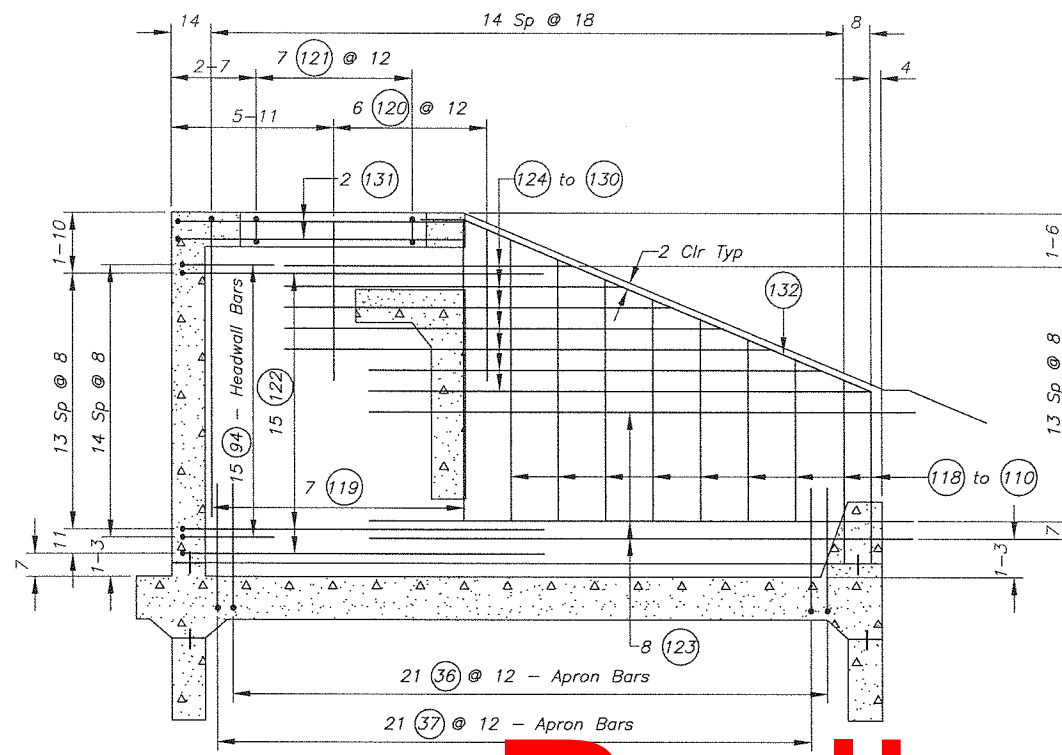
Date April 08  
Designed MDS  
Drawn MDS, KAS, KRW  
Checked BBV  
Approved

Impact Basin  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

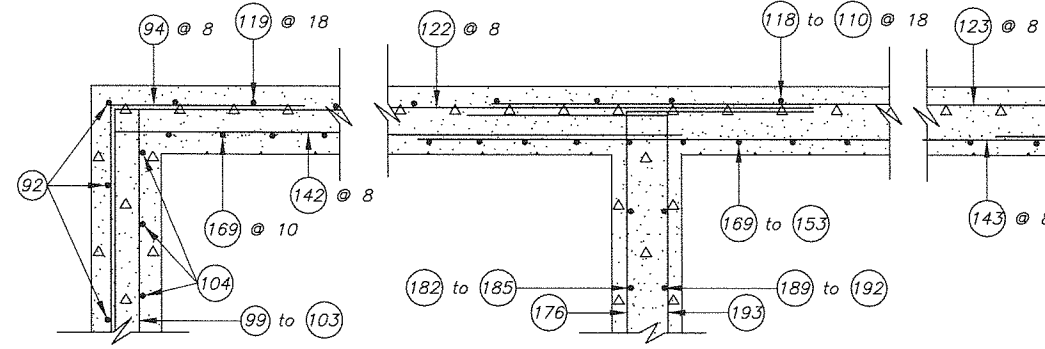


File Name  
Drawing Name  
Sheet 16 of 117

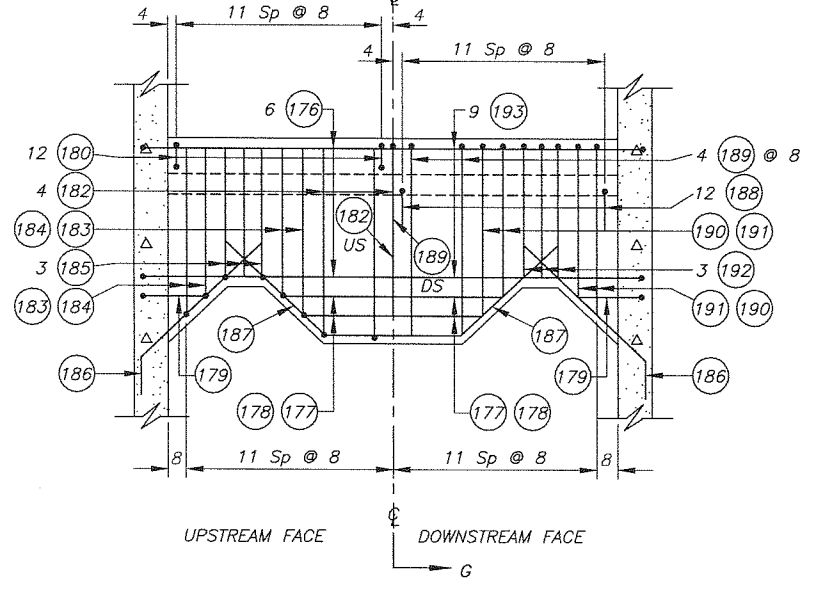




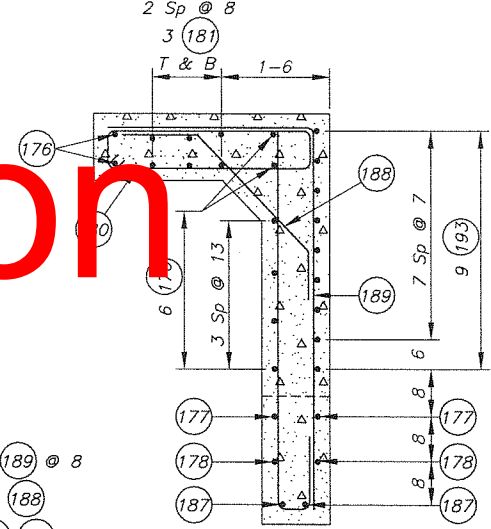
SECTION E-E



SECTION F-F



BAFFLE ELEVATION



SECTION G-G

Preliminary Plans  
Not for Construction

NOTES:  
1. Some bars may need to be field cut in order to maintain minimum clearance.

STANDARD IMPACT BASIN (Modified)			
DESIGN CONSTANTS	$f'_c = 4000 \text{ psi}$	$f'_c = 1600 \text{ psi}$	
	$n = 8$	$f_c = 20,000 \text{ psi}$	
STANDARD DRAWING NO.	ES - 4160		
DATE	1-70	SHEET	3 OF 5
CARL ROHDE Consulting Engineer 654 Ridgeway Rd., Lake Oswego, Ore.		Rev. 03/2008	

Date

April 08  
July 08  
Sept 08


Designed MDS

Drawn MDS, KAS, KRW

Checked BBV

Approved

Impact Basin  
Structure L0-1  
Little Otter Creek Watershed  
Caldwell County, Missouri  
PL-566

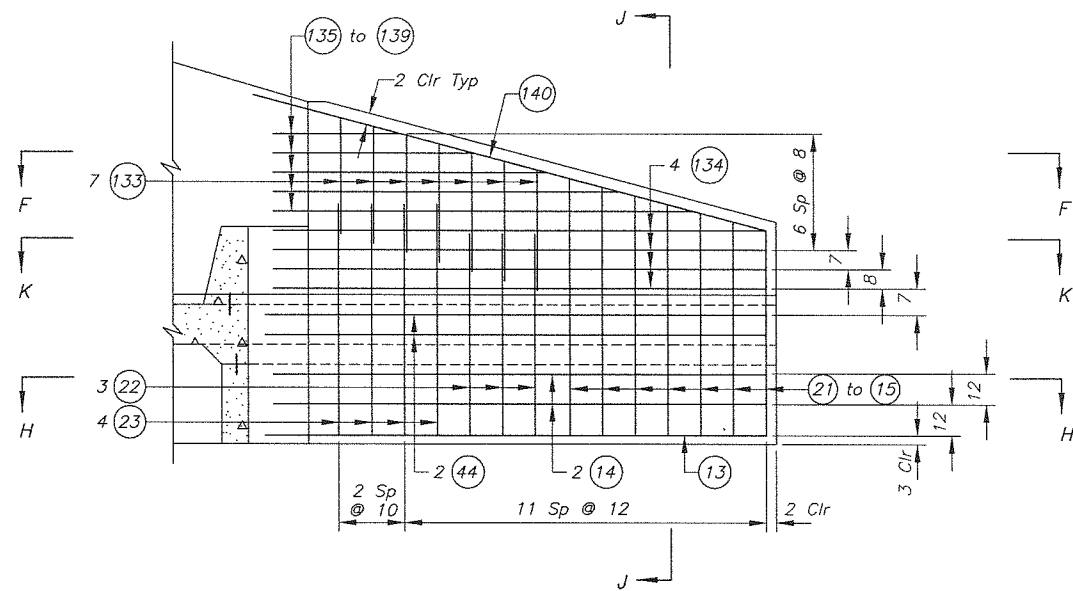


NRCS  
Natural Resources Conservation Service  
United States Department of Agriculture

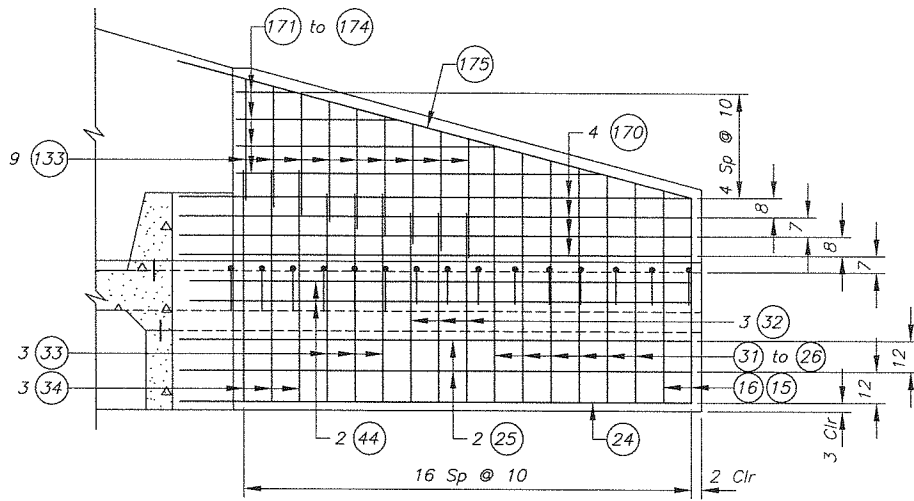
File Name

Drawing Name

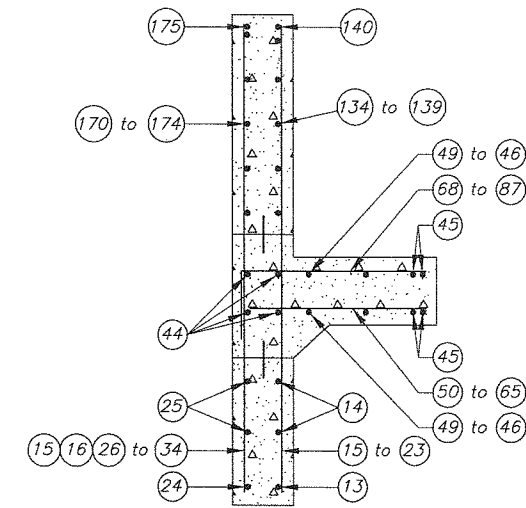
Sheet 17 of 117



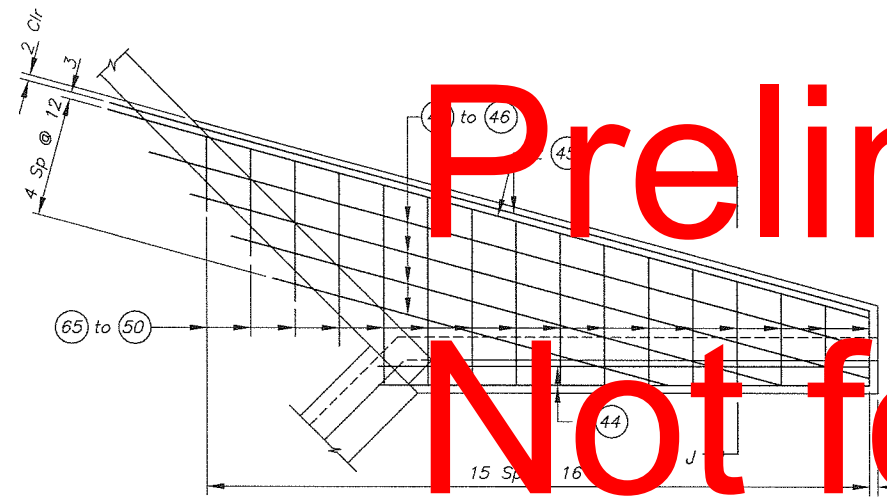
UNEXPOSED FACE  
WINGWALL ELEVATION



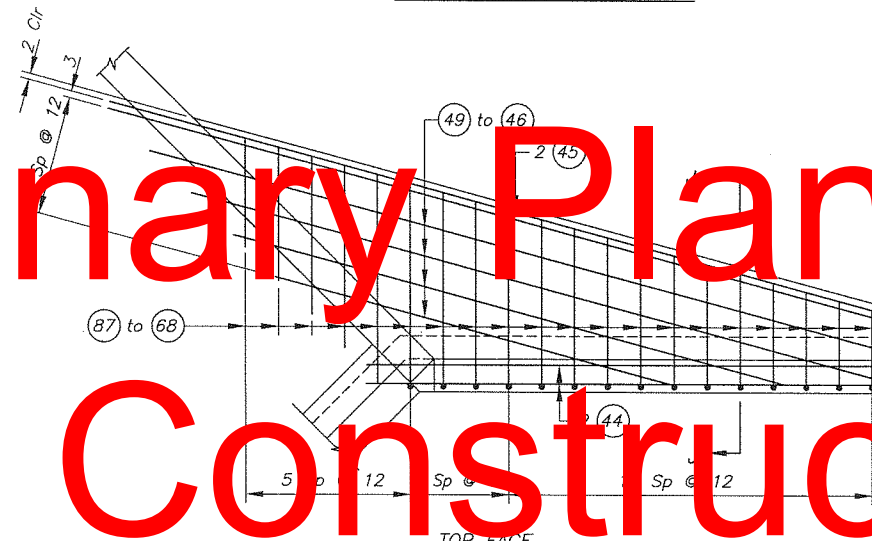
EXPOSED FACE  
WINGWALL ELEVATION



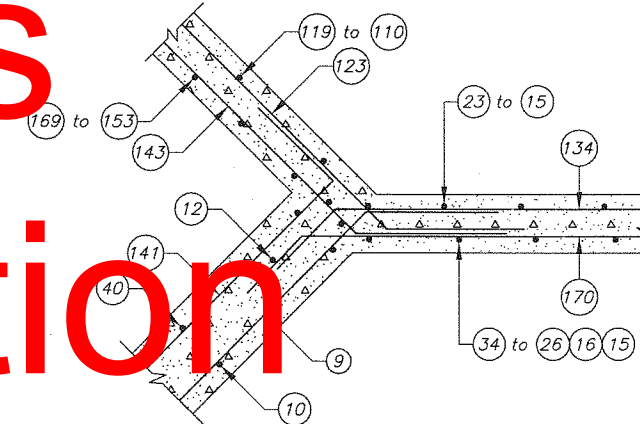
SECTION J-J



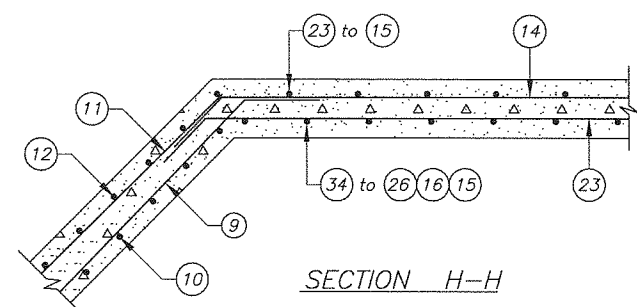
BOTTOM FACE  
PLAN WINGWALL FOOTING



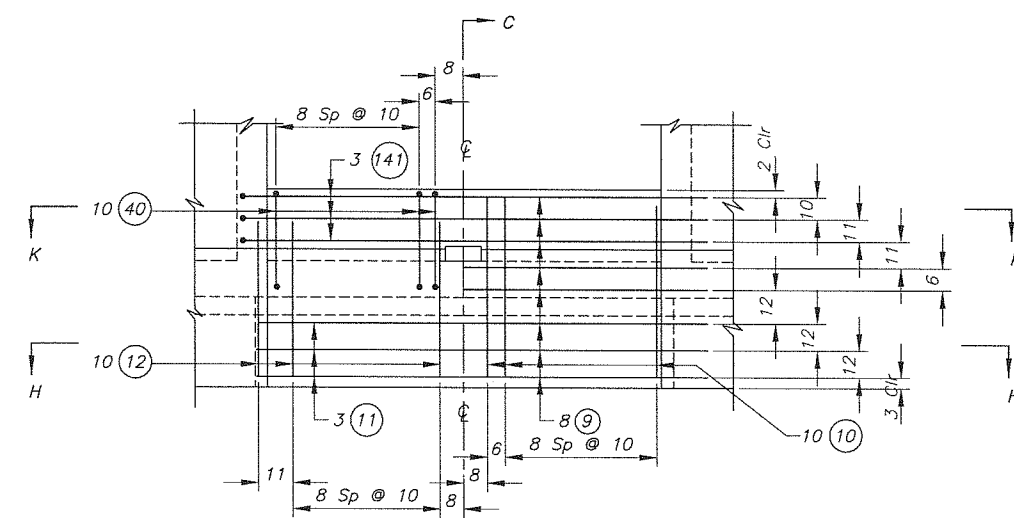
TOP FACE  
PLAN WINGWALL FOOTING



SECTION K-K



SECTION H-H



UPSTREAM FACE DOWNSTREAM FACE  
ELEVATION OF END SILL & TOEWALL

Not to Scale

NOTES:  
1. Some bars may need to be field cut in order to maintain minimum clearance.

Preliminary Plans  
Not for Construction

STANDARD IMPACT BASIN (Modified)	
DESIGN CONSTANTS	$f'_c = 4000 \text{ psi}$ $f'_c = 1800 \text{ psi}$ $n = 8$ $f_c = 20,000 \text{ psi}$
STANDARD DRAWING NO.	ES - 4160
DATE	1-70
SHEET	4 OF 5

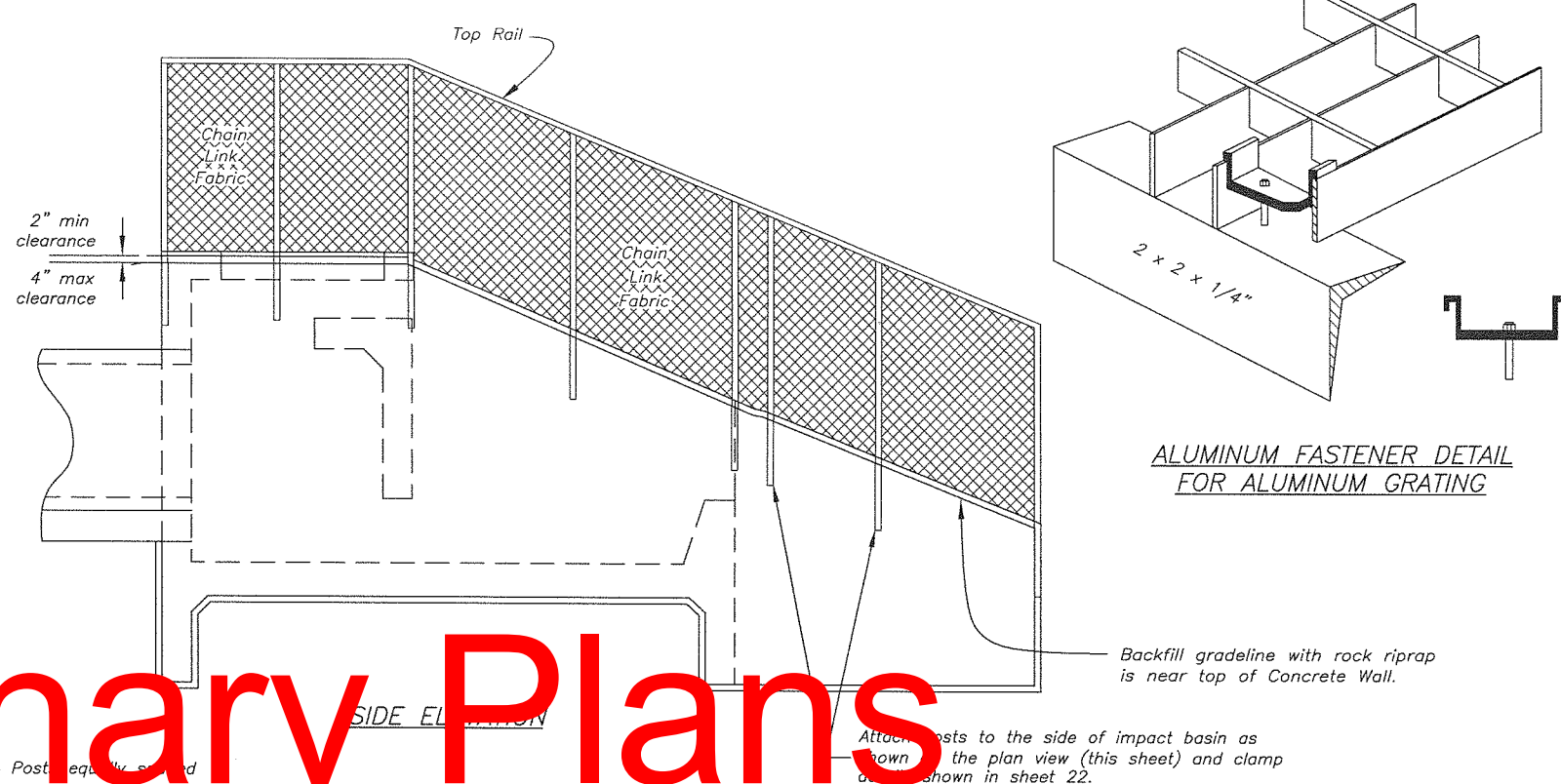
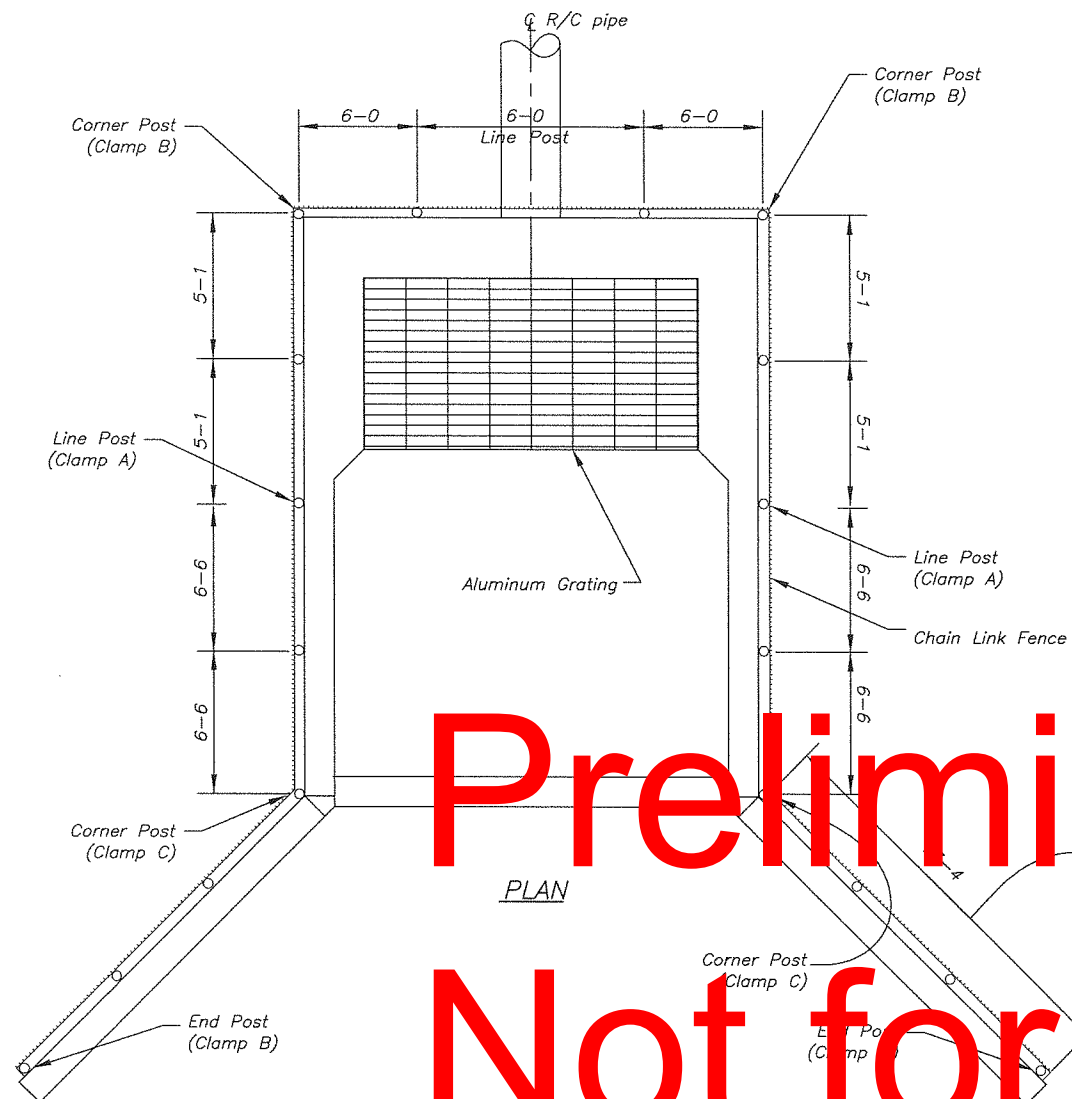
CARL ROHDE  
Consulting Engineer  
654 Ridgeway Rd., Lake Oswego, Ore.    Rev. 03/2008

Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	
	July 08
	Sept 08

Impact Basin  
Structure LO-1  
Little Otter Creek Watershed  
Caldwell County, Missouri  
PL-566





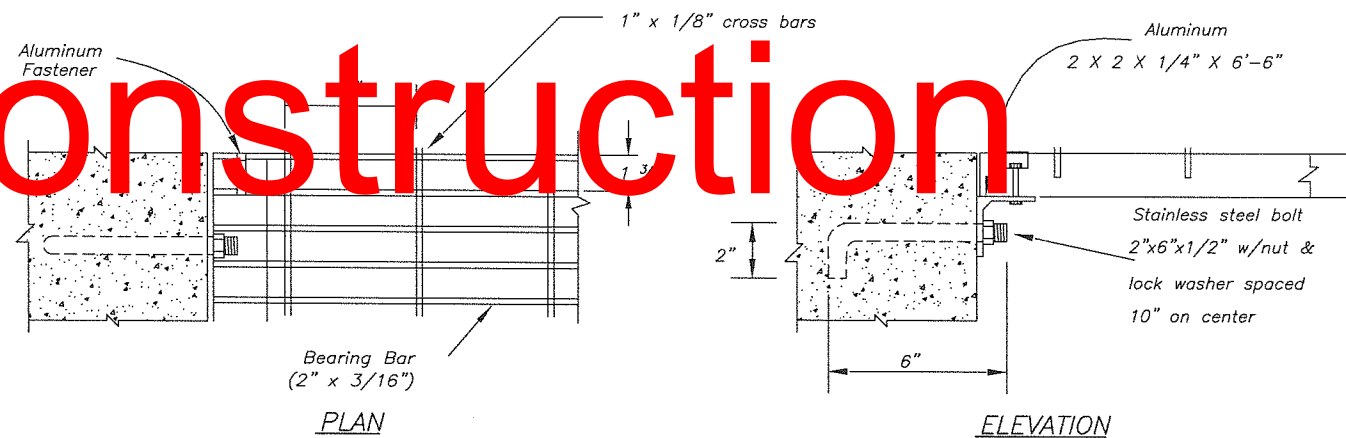


Preliminary Plans  
Not for Construction

ALUMINUM GRATING MATERIALS LIST	
ITEM	QUANTITY
Angles, 2 x 2 x 1/4", 6" long	4
Angles, 2 x 2 x 1/4", 6' - 6" long	2
Channel, 6 x 1.945 x 0.225, 6' - 8 1/2" long	1
Channel, 6 x 1.945 x 0.225, 13' - 8" long	1
Stainless L Bolts with nut and lock washer, 1/2" diam, 2" x 6"	22
Stainless Bolts with nut and lock washer, 1/2" diam, 2" long	12
Grating Panel w/Fasteners, 6' - 10 1/2" wide, 13' - 8" long	1

CHAIN LINK FENCE MATERIALS LIST		
ITEM	UNIT	QUANTITY
Chain link fence, 6' high, 9 gauge wire with 2" mesh and accessories 1/2/	Lin Ft	92'-0"
Top rails, 1.9" diam (OD) steel pipe 2/	Lin Ft	92'-0"
End, Line, and Corner post, 2 7/8" diam (OD) steel pipe 2/	Each	18
Anchor Bolts	Each	72
Steel Clamp - Type A	Each	24
Steel Clamp - Type B	Each	8
Steel Clamp - Type C	Each	4
Restraining Bolts	Each	18

1/ Includes stretcher bars, tie clips  
2/ PVC coated



**NOTES:**

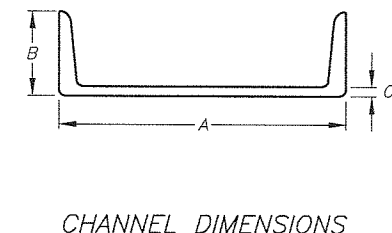
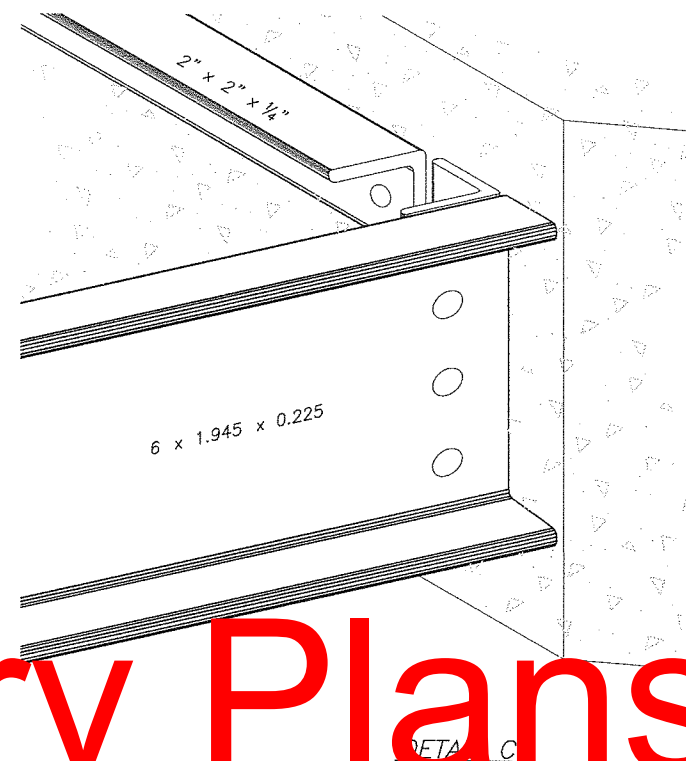
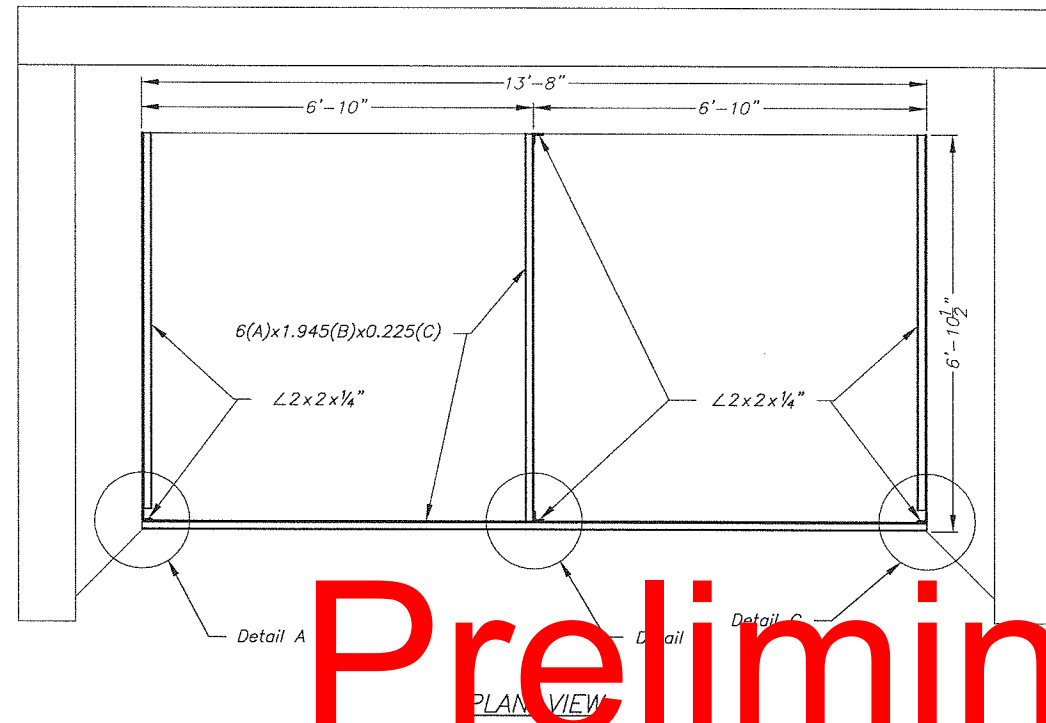
1. Material in grating and angles shall conform to Material Specification 581 for structural aluminum unless otherwise specified. Weight = 262 pounds.
2. Grating panel cross bars may be of alloy 6063-T5 in lieu of 6060-T6.
3. After installation upset threads on all bolts to prevent loosening.
4. Edges of grating shall be banded.
5. Space aluminum grating fasteners @ 1'-0" along 6'-10" sides.
6. Dimensions for chain link fence are measured horizontally. Actual lengths may be greater. Payment for the length of fence shall be based on the horizontal dimensions.
7. Refer to the next sheet for additional grating support details.
8. Refer to Sheet 22 for steel pipe clamp details.

Date: April 08  
 Designed: MDS  
 Drawn: MDS, KAS, KRW  
 Checked: BBV  
 Approved: \_\_\_\_\_

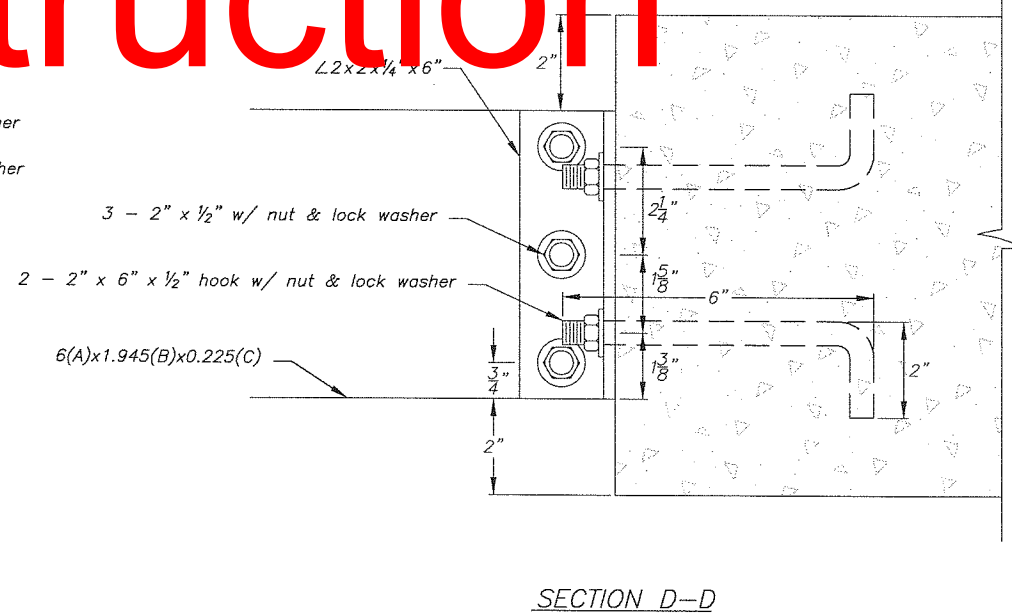
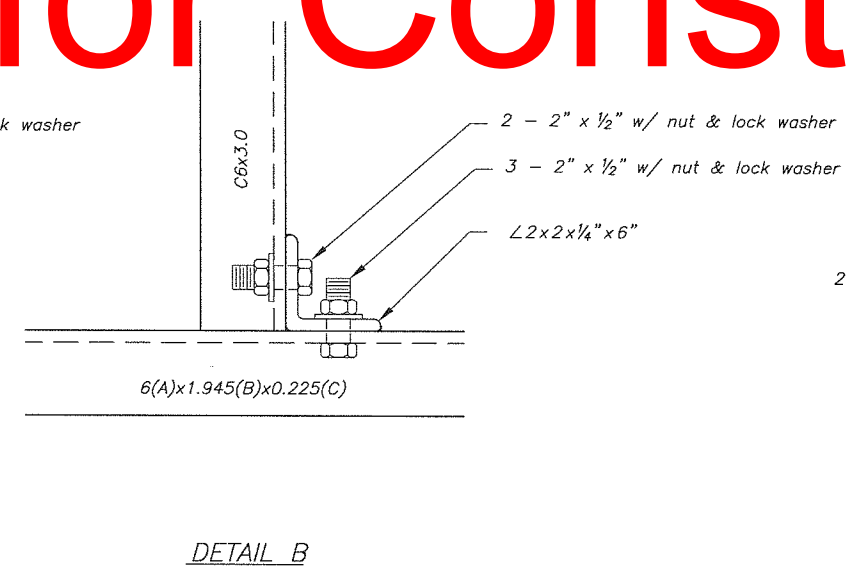
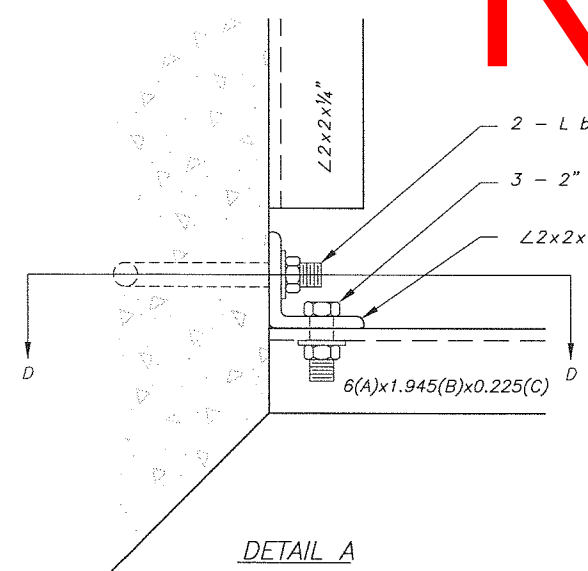
Chain Link Fence  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name: \_\_\_\_\_  
 Drawing Name: \_\_\_\_\_  
 Sheet 20 of 117



**Preliminary Plans**  
**Not for Construction**



Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	

Grating Support Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



Date  
 April 08  
 July 08  
 Sept 08

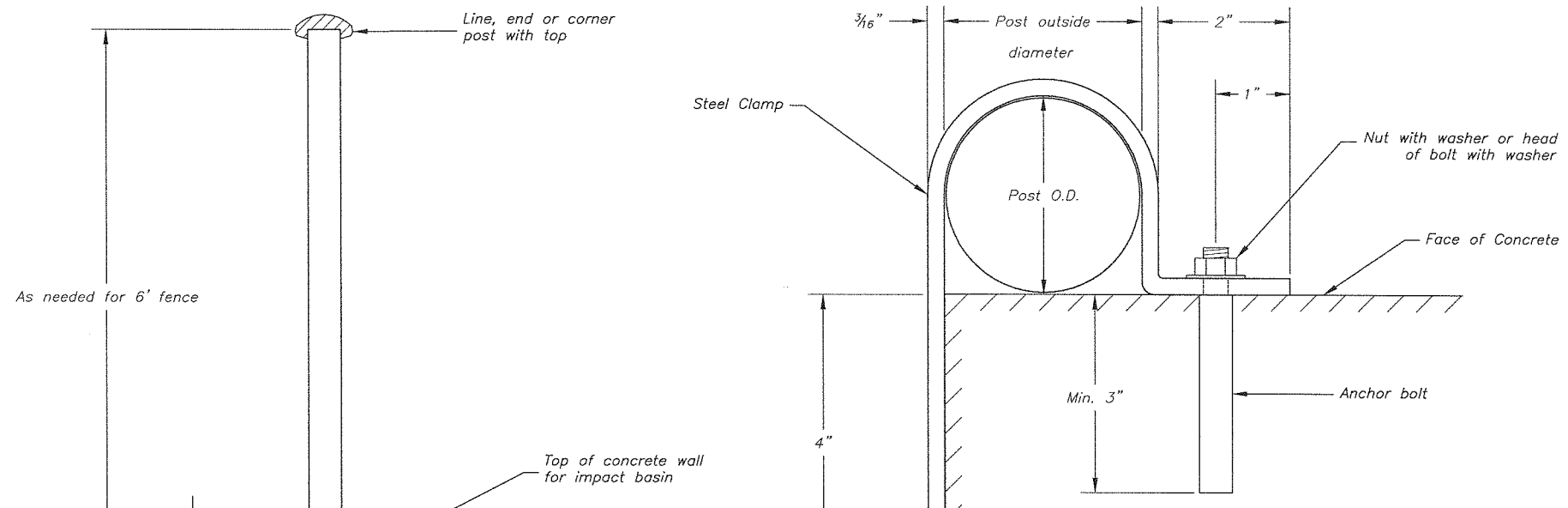
Designed MDS  
 Drawn MDS, KAS, KRW  
 Checked BBV  
 Approved

Chain Link Fence Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name  
 Sheet 22 of 117

- NOTES:**
1. Posts to be mounted on outside of concrete wall for impact basin.
  2. Pipe clamp to be constructed of minimum 3/16" x 2" wide galvanized steel strap with a heavy coat of coal tar epoxy. Equivalent dimensions, coatings or materials may be used as approved by Engineer. Stainless steel may be used in lieu of galvanized steel with coal tar epoxy coating.
  3. Anchor bolts shall have 0.5 inch diameter anchor with 3/8" diameter bolt. Anchor bolt shall be sleeve anchor or wedge type anchor. Anchor shall extend a minimum of 3 inches into concrete. Anchor hole shall be drilled slightly deeper than 3 inches to permit proper operation of anchor bolt. Anchor bolts shall be stainless steel. Total length of bolt for wedge anchors is approximately 4 1/4 inches. Two anchor bolts per clamp are required.
  4. Restraining bolts shall be similar to the anchor bolts except the total length of bolt for wedge anchors shall be a minimum of 6 1/2 inches.
  5. Equivalent anchor and restraining bolts may be used as approved by the Engineer.
  6. Location of holes may be adjusted to miss reinforcing steel as directed by the Engineer.



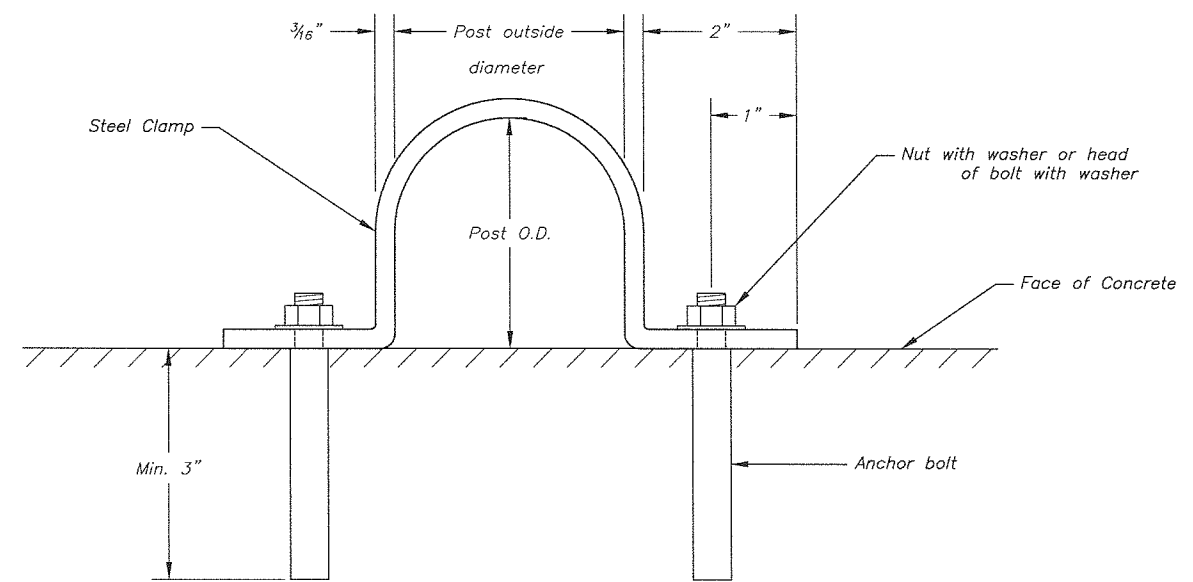
DETAIL OF STEEL CLAMP - Type B  
 (For Corner and End Post)

CLAMP TYPE		
Clamp Type	No. Required	
Clamp Type A	24	
Clamp Type B	8	
Clamp Type C	4	

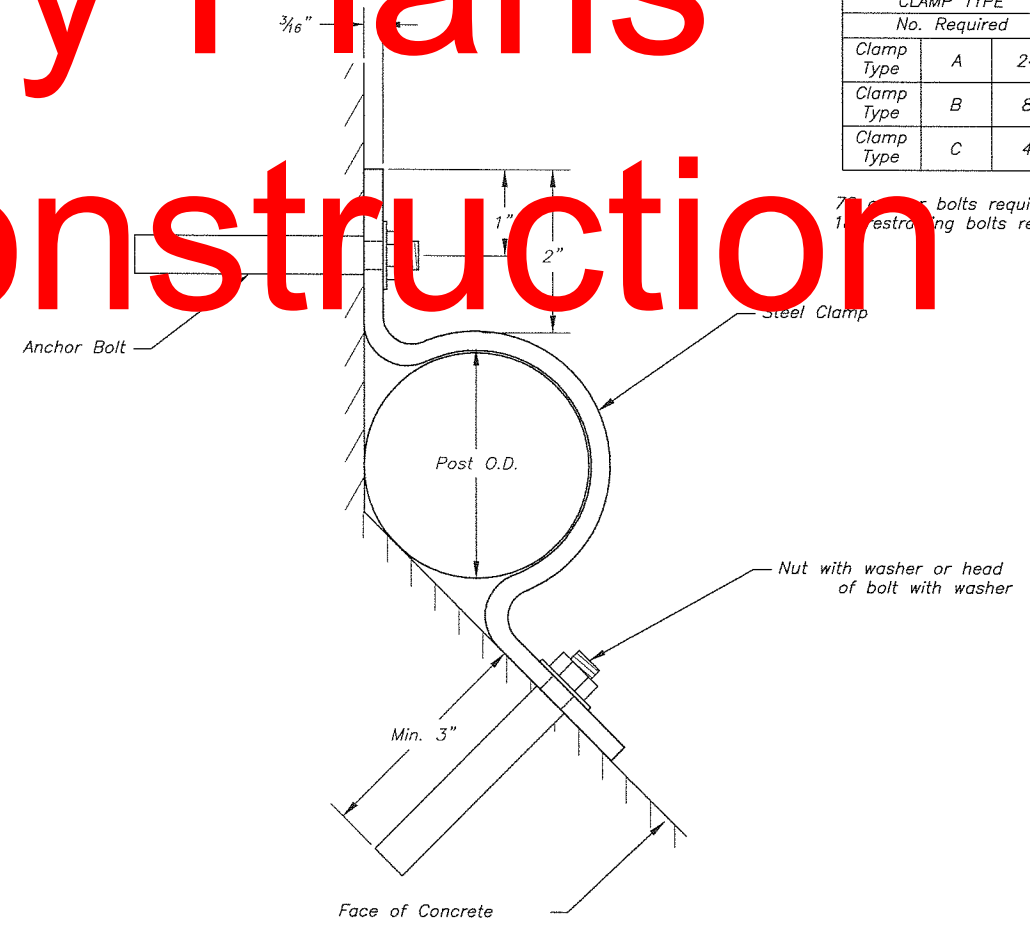
7 1/2" anchor bolts required  
 11" restraining bolts required

ELEVATION

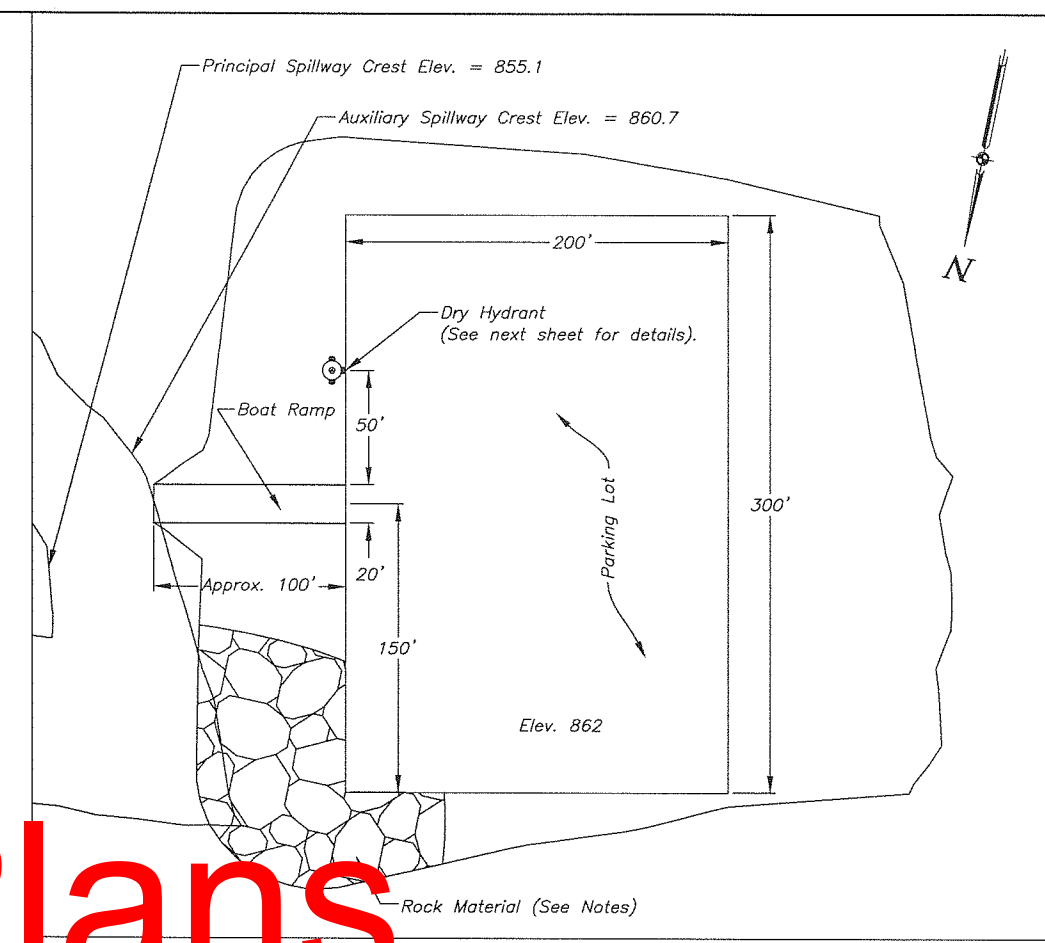
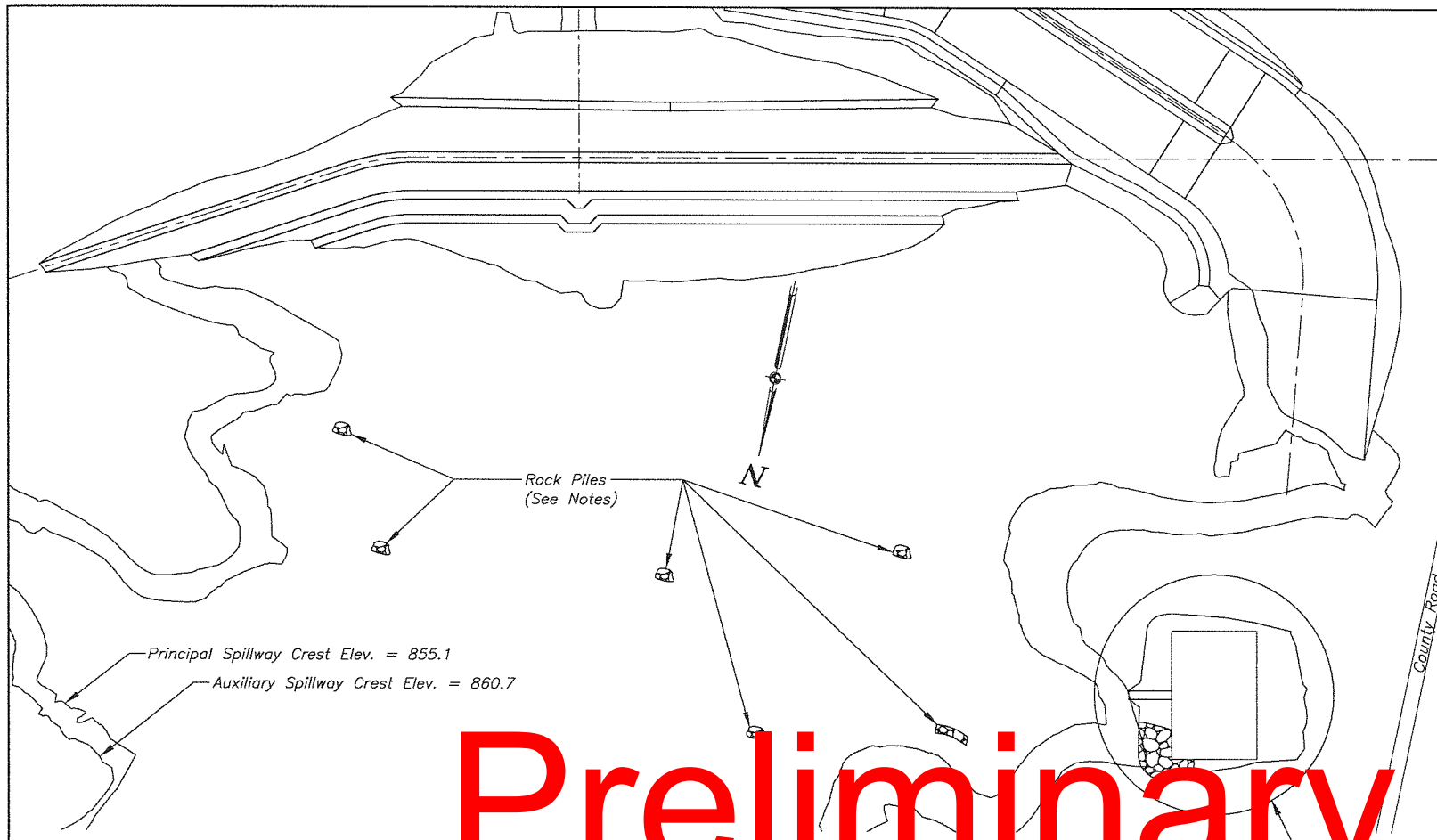
**Preliminary Plans**  
**Not for Construction**



DETAIL OF STEEL CLAMP - Type A  
 (For Line Post)

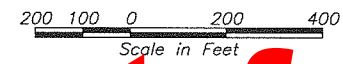


DETAIL OF STEEL CLAMP - Type C

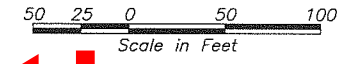


# Preliminary Plans Not for Construction

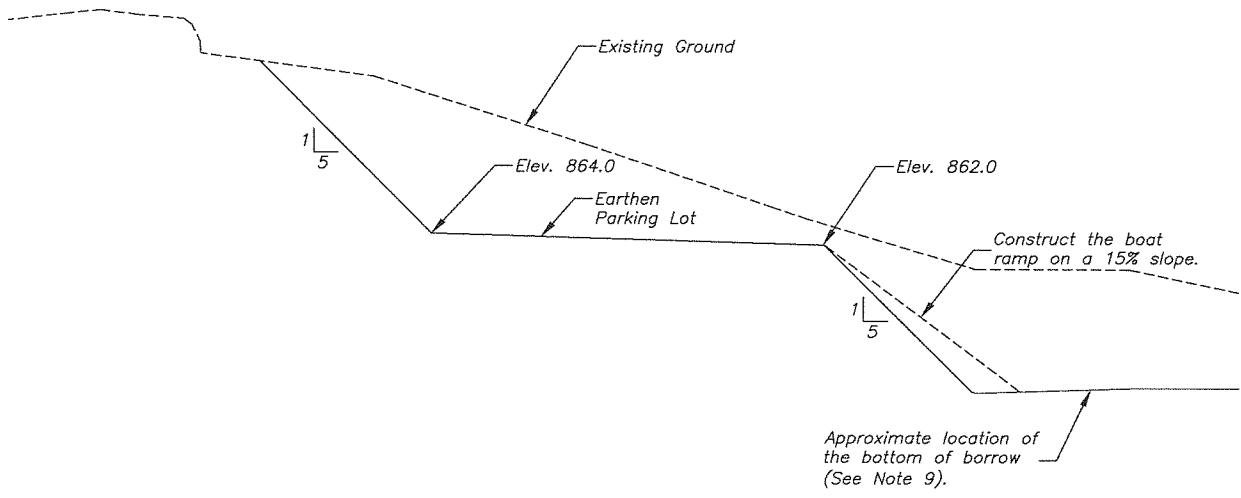
PLAN VIEW OF MDC PARKING AREA & BOAT RAMP



DETAIL A

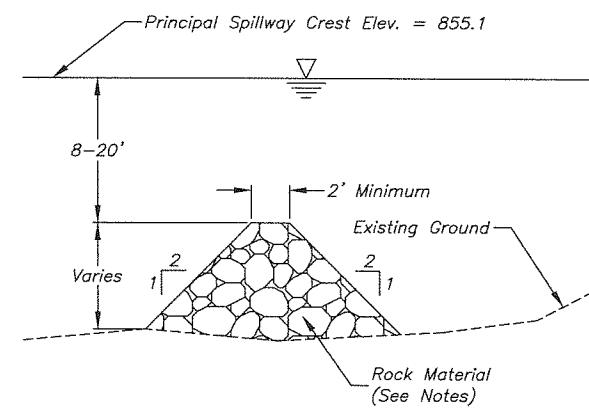


MDC PARKING LAYOUT		
Location	North	Easting
NE Corner	128913.26	2942710.94
NW Corner	1289095.96	2942515.26
SE Corner	1288843.73	2942772.89
SW Corner	1288802.43	2942577.22
⊙ Boat Ramp (Upper End)	1289002.73	2942739.34
⊙ Boat Ramp (Lower End)	1289023.53	2942837.90



TYPICAL CROSS SECTION

Not to Scale



ROCK PILES

Not to Scale

**NOTES:**

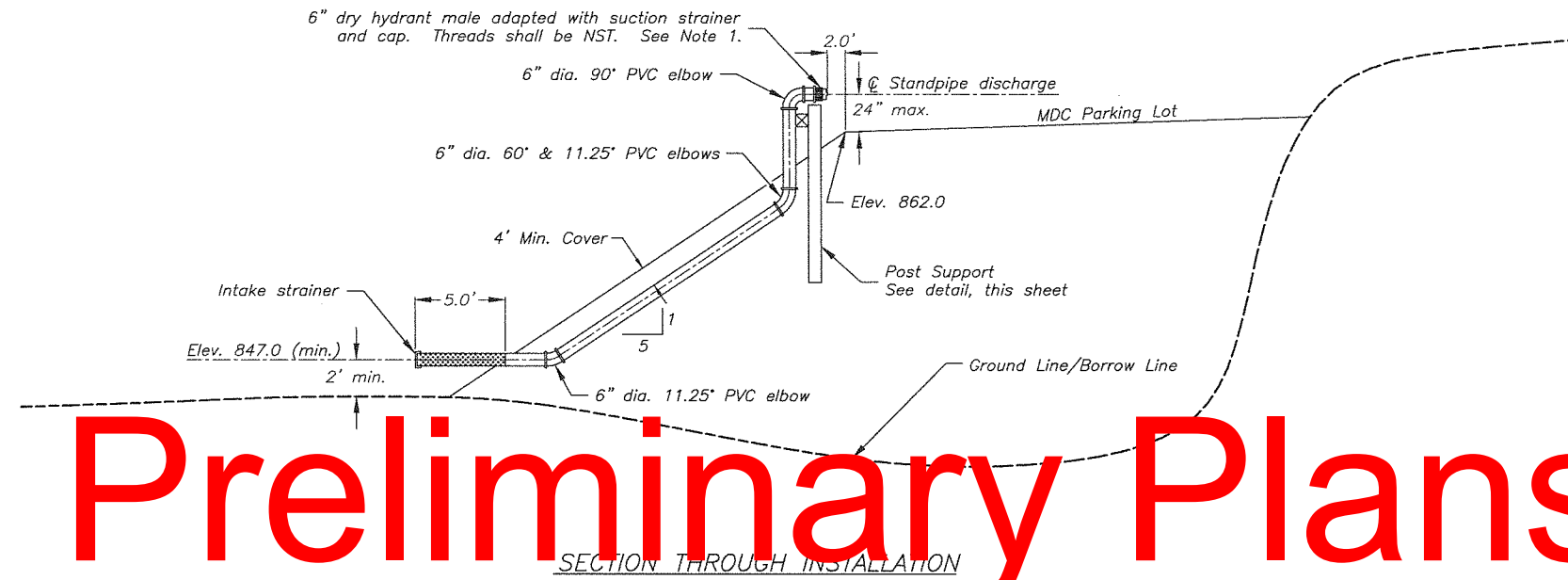
1. Rock material used to armor the side slopes of the parking lot and for the rock piles shall come from the rocky excavated material from the dam and auxiliary spillway as approved by the Engineer.
2. Place rock material below elevation 862.0 on side slopes of the parking lot and the boat ramp.
3. The approximate quantity to armor the parking lot is 3,000 C.Y. based on a 2' thick layer of excavated rock material.
4. Rock piles shall be either cone shaped or formed in a reef facing the south. The approximate quantity to construct 6 rock piles is 1,000 C.Y. Quantity is based on a 10' tall rock pile.
5. The minimum quantity of excavated material used for the rock piles and for armoring the parking lot shall be 1,000 C.Y. and 3,000 C.Y. respectively. No payment shall be made for these items. Compensation for these items shall be included in Excavation, Common.
6. The location and dimensions of the rock piles and the armoring of the parking lot shall be approved in the field by the Engineer.
7. The location of the parking lot and boat ramp may need to be adjusted to fit the final contours of the borrow area. The final location of the parking lot and boat ramp shall be approved in the field by the Engineer.
8. Adjustment to the location of the dry hydrant may be required. The final location of the dry hydrant shall be approved in the field by the Engineer.
9. The minimum elevation of the bottom of the borrow shall be 845.0 at the location of the intake pipe of the dry hydrant.

Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	

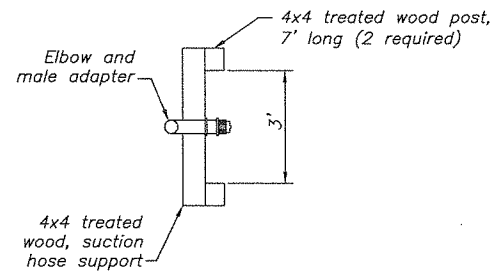
MDC Parking Lot & Rock Piles  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name



# Preliminary Plans Not for Construction



PLAN OF POST SUPPORT

BILL OF MATERIALS		
ITEM	NO.	UNIT
Hydrant head assembly 90°	1	each
6" diam. PVC 60° elbow	1	each
6" diam. PVC 11.25° elbow	2	each
6" diam. PVC pipe	75	lf
PVC intake strainer	1	each
4" x 4" x 7' treated post	2	each
4" x 4" x 4' treated post	1	each

**NOTES:**

1. Check with local fire department for approved type of connection. Each fire truck utilizing the dry fire hydrant should have an adapter or equivalent to fit the 6" dry hydrant male adapter.
2. All material used for the dry hydrant shall be corrosion resistance.
3. Intake strainer shall have a minimum open area of 4 times the pipe cross section area or 113 square inches for 6 inch diameter pipe. Inlet holes shall be 3/8 inch diameter.
4. Holes shall be cut in a manner so as not to significantly reduce strength of the pipe. Holes shall be clean cut and free of burrs. Holes shall be located in bottom 2/3 of pipe. A manufactured well screen may be used if it provides required open area.
5. Treated lumber shall be pressure treated with 0.4 pounds per cubic foot of preservative.
6. The hydrant sleeve shall be made of bronze, brass, aluminum alloy or other durable, non-corrosive metal.
7. Sleeve shall be permanently affixed inside a PVC head using epoxy adhesive and stainless steel bolts.
8. The dry hydrant cap shall be a snap-on/snap-off design and removable without special tools. It shall be joined with a steel cable or chain and permanently attached. The cap shall be made of the same PVC material as the pipe or the same metal as the NST connection.
9. The final location of the dry hydrant shall be approved in the field by the Engineer.

Date	Designed	Drawn	Checked	Approved
April 08	MDS	MDS, KAS, KRW	BBV	
July 08				
Sept 08				

Dry Fire Hydrant Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
Drawing Name



PLATE LIST	
PLATE	TITLE
S-1	Plate List
S-2	General Notes
S-3	Plan View
S-4	Elevation Views
S-5	Sectional Elevations
S-6	Transition Sections
S-7	Base Sectional Elevation
S-7A	Berm Armor
S-7B	Berm Armor and Foundation Base
S-7C	Berm Armor and Foundation Base
S-8	Footing Plan and Riser Section
S-9	Riser Sections
S-10	Riser Sections
S-11	Riser Sections
S-12	Riser Sections
S-13	Plan - Riser Cover
S-14	Trashrack Elevation
S-14A	Trashrack Details
S-15	Trashrack Details
S-16	Riser Details
S-16A	Riser Details
S-17	Plan - Gate-Well Grating
S-18	Grating Sections
S-19	Gate Support
S-20	Reinforcement: Sectional Elevation
S-21	Reinforcement: Sectional Elevation
S-22	Reinforcement: Sectional Elevation
S-23	Reinforcement: Sections
S-24	Reinforcement: Sections
S-25	Reinforcement: Sections

PLATE LIST	
PLATE	TITLE
S-26	Reinforcement: Sidewall
S-27	Reinforcement: Sidewall
S-28	Reinforcement: Sidewall
S-29	Reinforcement: Endwall, Upstream
S-30	Reinforcement: Endwall, Upstream
S-31	Reinforcement: Endwall, Upstream
S-32	Reinforcement: Center Wall
S-33	Reinforcement: Center Wall
S-34	Reinforcement: Center Wall
S-35	Reinforcement: Endwall, Downstream
S-36	Reinforcement: Endwall, Downstream
S-37	Reinforcement: Endwall, Downstream
S-37A	Reinforcement: Footing
S-38	Reinforcement: Footing
S-39	Reinforcement: Base Section
S-40	Reinforcement: Transition
S-40A	Reinforcement: Riser Sections
S-41	Reinforcement: Riser Sections
S-42	Reinforcement: Riser Sections
S-43	Reinforcement: Riser Sections
S-44	Reinforcement: Riser Sections
S-45	Reinforcement: Riser Sections
S-46	Reinforcement: Riser Sections
S-47	Reinforcement: Riser Sections
S-48	Reinforcement: Riser Sections
S-48	Reinforcement: Trashrack, Upstream
S-49	Reinforcement: Trashrack, Downstream
S-50	Reinforcement: Cover Slab, Bottom Bars
S-51	Reinforcement: Cover Slab, Top Bars
S-52	Reinforcement: Bar Schedule
S-53	Reinforcement: Bar Schedule Details

Preliminary Plans  
Not for Construction

PLATES S-1 THROUGH S-53 PREPARED BY:

**NATIONAL DESIGN, CONSTRUCTION, AND SOIL MECHANICS CENTER**  
Fort Worth, Texas

Designed L. F. Fragomeli Date May 08  
 Drawn J. Renteria Date May 08  
 Checked BBV, MDS Date Sept 08  
 Approved \_\_\_\_\_

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_

GATE OPERATOR NOTES

Gate operator shall be a pedestal-mounted Waterman Type 3E geared operator, or approved equal.

Gate operator shall be designed so as to operate the gate as shown on these drawings under all conditions. Gate operator shall be designed to be fully submerged for extended periods of time with no loss of operating performance.

Gate operator shall have an approximate height from base to centerline of crankshaft of 36 inches.

Under normal operating conditions, hand-crank pull force shall be limited to 25 pounds.

Gate operator shall be furnished with three separate hand cranks, which shall be detachable from the operator assembly.

Gate operator shall be furnished with an appropriate stem cover.

Gate operator shall be furnished with a dial-type gate position indicator.

Gate operator shall be attached to the riser structure using approved anchor bolts. Anchor bolts shall be installed in the formwork prior to placement of concrete.

GENERAL NOTES

1. Contractor shall verify all dimensions and specifications prior to the start of any work.
2. All concrete shall conform to the requirements of the current version of Construction Specification 31-Concrete for Major Structures, Part 642, National Engineering Handbook, 210-VI-NEH.
3. All concrete shall develop a 28-day compressive strength of at least 4000 pounds per square inch.
4. All steel reinforcement shall conform to the requirements of the current version of Construction Specification 34-Steel Reinforcement, and Material Specification 539-Steel Reinforcement (for concrete), Part 642, National Engineering Handbook, 210-VI-NEH.
5. All steel reinforcement shall develop a tensile yield stress of not less than 60,000 pounds per square inch.
6. All reinforcing steel bars shall be installed at the locations shown on the drawings. Unless otherwise noted, all reinforcing steel dimensions are to centerline of bar.
7. Clear cover between the formwork and the reinforcing steel bars shall be two inches. Clear cover between the base material and the bottom reinforcing steel bars shall be three inches.
8. Reinforcing steel bars shall not be spliced, except as shown on the drawings.
9. Construction joints shall be located only as shown on the drawings. Construction joints shall be prepared in accordance with the current version of Method 1, Construction Specification 31-Concrete for Major Structures, Part 642, National Engineering Handbook, 210-VI-NEH.
10. All laps and/or formed keys shall not be made at any construction joint.
11. All corners and edges shall have a 1/4-inch chamfer.
12. Structural steel shapes and plate shall conform to the requirements of ASTM A36.
13. Structural steel shapes and plate shall develop a yield stress of not less than 36,000 pounds per square inch.
14. Bolts shall conform to the requirements of ASTM A307, grade "A."
15. Nuts shall conform to the requirements of ASTM A563.
16. Washers shall conform to the requirements of ASTM A436.
17. Structural steel shapes and plate shall be Hot-Dip Galvanized after fabrication in accordance with the requirements of ASTM A123. The zinc grade shall be G185.
18. Bolts, nuts, and washers other than stainless steel shall be Hot-Dip Galvanized after fabrication, in accordance with the requirements of ASTM A153.
19. Stainless steel bolts, nuts and washers shall be TYPE 316 unless otherwise noted.
20. Anchor bolts other than Stainless Steel shall conform to the requirements of ASTM 1554, Grade 36, and shall be Hot-Dipped Galvanized after fabrication.
21. Stainless Steel anchor bolts shall be Type 18-8 or Type 316, unless otherwise noted.
22. For low flow port details see Plate S-16.

Preliminary Plans  
Not for Construction

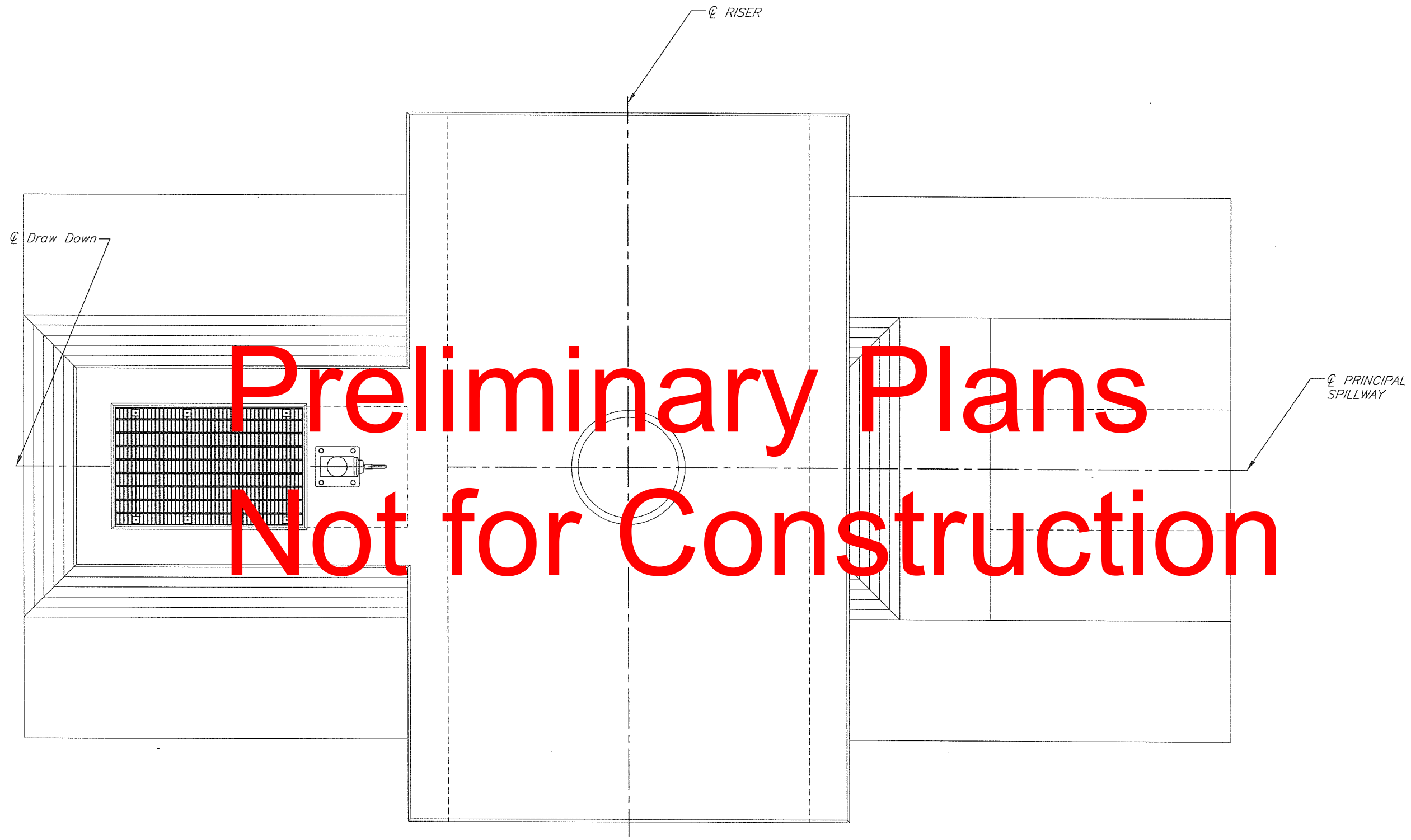
QUANTITIES	
Steel Reinforcement	82,730 Lbs.
Concrete	280 Cu.Yd.
3" Aggregate	126 Cu.Yd.

Date  
 Designed L. F. Fragomeli May 08  
 Drawn J. Renteria May 08  
 Checked BBV, MDS Sept 08  
 Approved \_\_\_\_\_

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

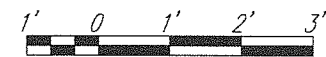


File Name  
 Drawing Name



Preliminary Plans  
 Not for Construction

PLAN  
 SCALE: 3/4" = 1'-0"

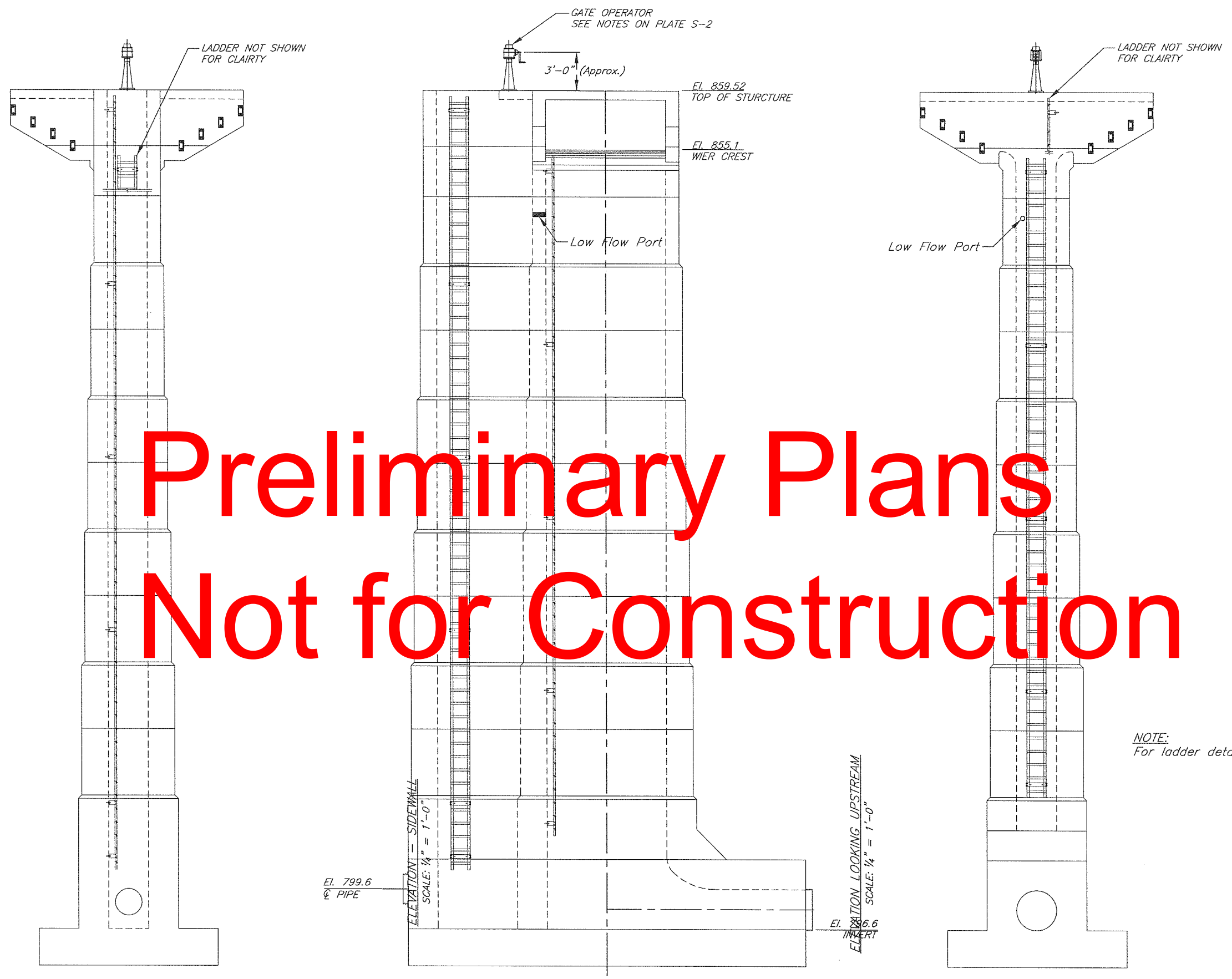


Designed	L. F. Fragomeli	Date	May 08
Drawn	J. Renteria		May 08
Checked	BBV, MDS		Sept 08
Approved			

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

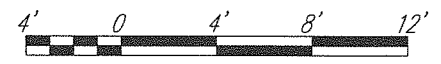


File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_



Preliminary Plans  
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*NOTE:*  
For ladder details see sheet 86.



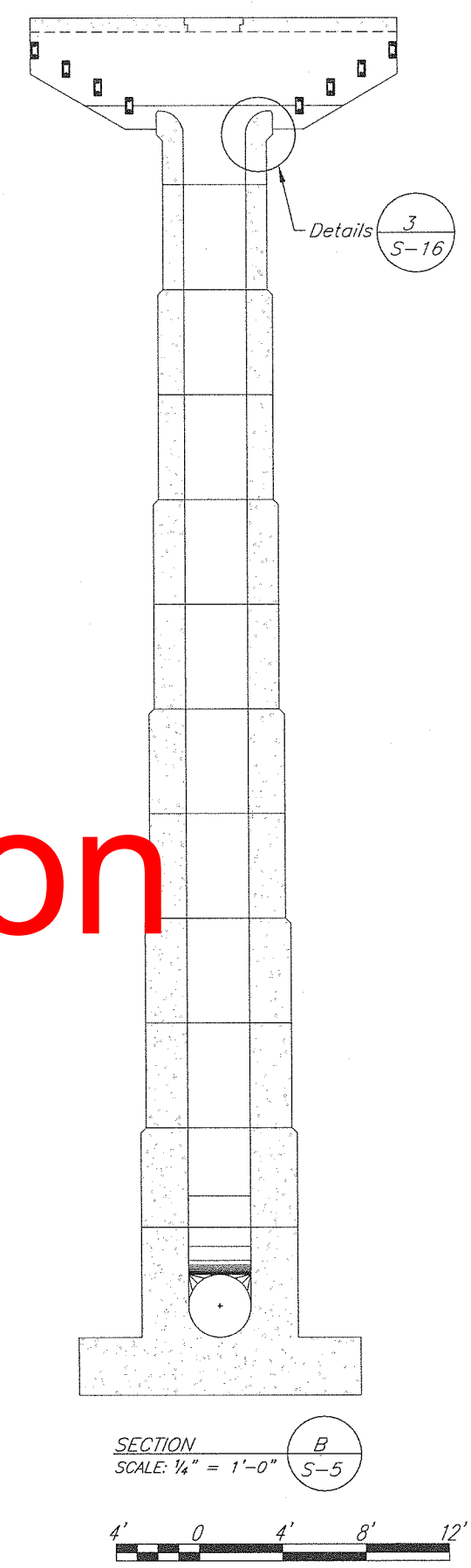
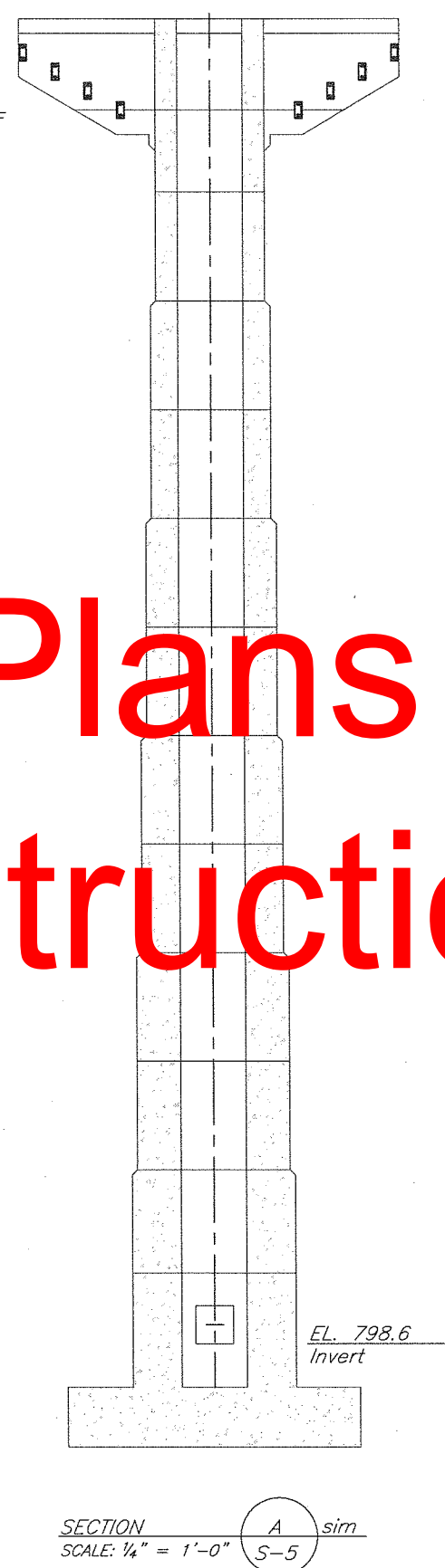
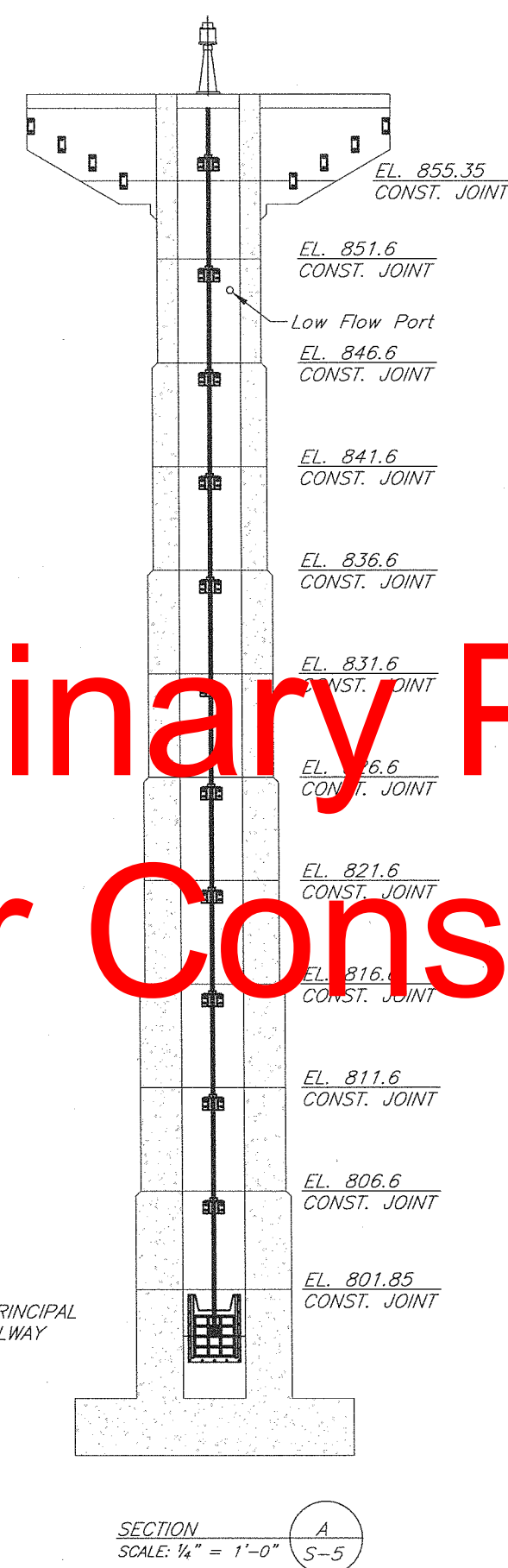
Date	May 08
Designed	L. F. Fragomeli
Drawn	J. Renteria
Checked	BBV, MDS
Approved	

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
Drawing Name

# Preliminary Plans Not for Construction



Date	May 08
Designed	L. F. Fragomeli
Drawn	J. Renteria
Checked	BBV, MDS
Approved	

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



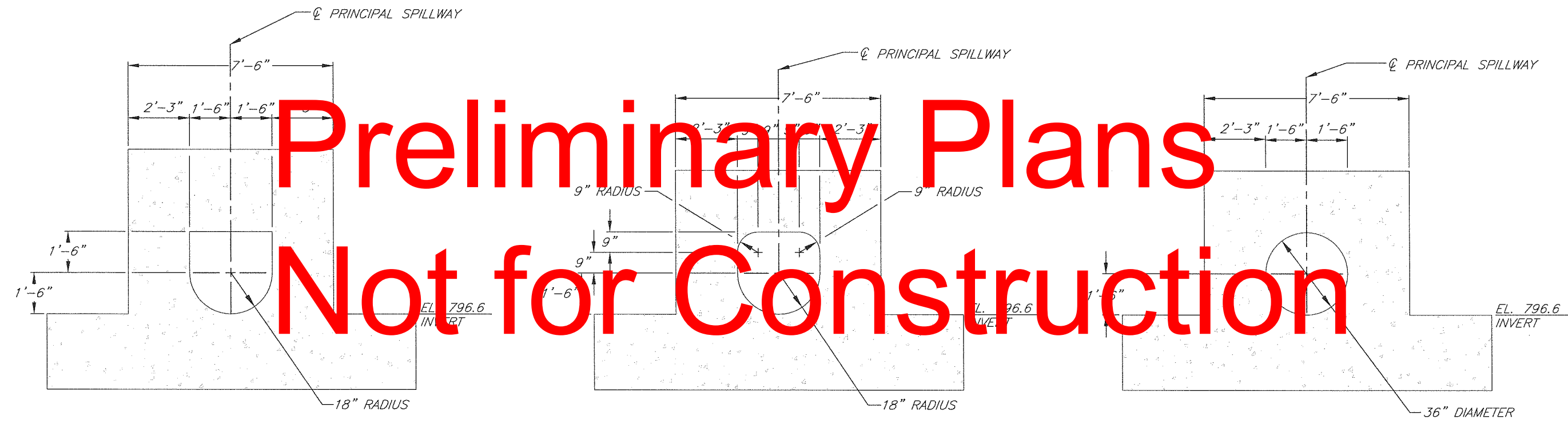
Date  
 May 08  
 May 08  
 Sept 08  
 Designed L. F. Fragomeli  
 Drawn J. Renteria  
 Checked BBV, MDS  
 Approved

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name

**Preliminary Plans  
 Not for Construction**



SECTION C  
 SCALE: 1/4" = 1'-0"  
 S-5

SECTION SHOWN AT 8'-1 1/2"  
 DOWNSTREAM OF  $\phi$  RISER

SECTION D  
 SCALE: 1/4" = 1'-0"  
 S-5

SECTION SHOWN AT 11'-6 3/4"  
 DOWNSTREAM OF  $\phi$  RISER

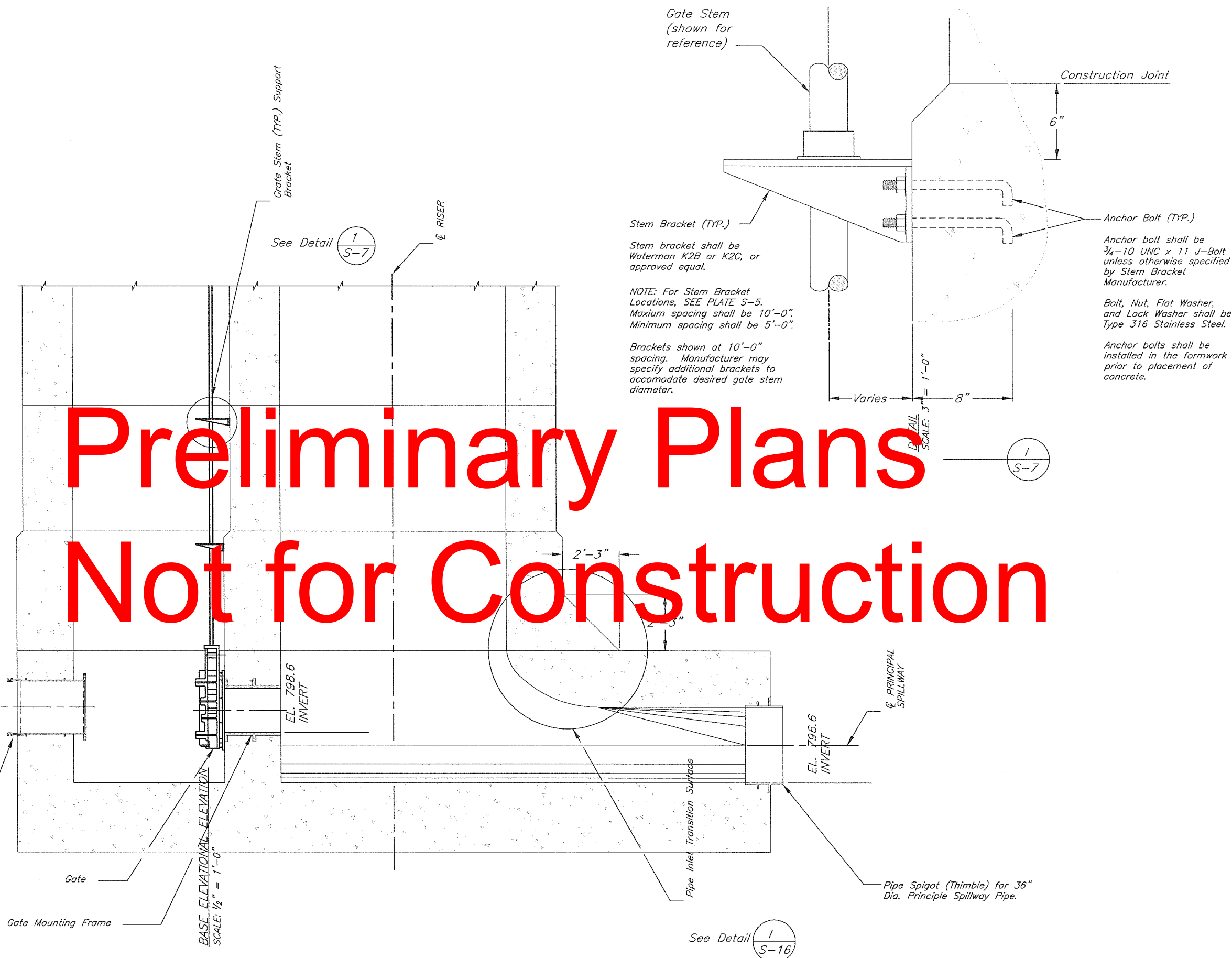
SECTION E  
 SCALE: 1/4" = 1'-0"  
 S-5

SECTION SHOWN AT 15'-0"  
 DOWNSTREAM OF  $\phi$  RISER  
 PRINCIPAL SPILLWAY PIPE SPIGOT  
 (THIMBLE) NOT SHOWN, FOR CLARITY



**NOTES:**

1. Gate shall be a 21"x21" square opening Waterman S-5000 or approved equal. Gate shall be mounted to a matching gate frame (Wall Thimble) designed by the gate manufacturer.
2. Gate mounting frame (Wall Thimble) shall have a clear inside dimension of 21-inches height by 21-inches width, and shall be Hot-Dip Galvanized after fabrication.
3. Gate mounting frame shall be installed in the formwork prior to placement of concrete. A "Block-out" shall not be used.



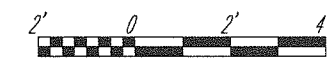
Preliminary Plans  
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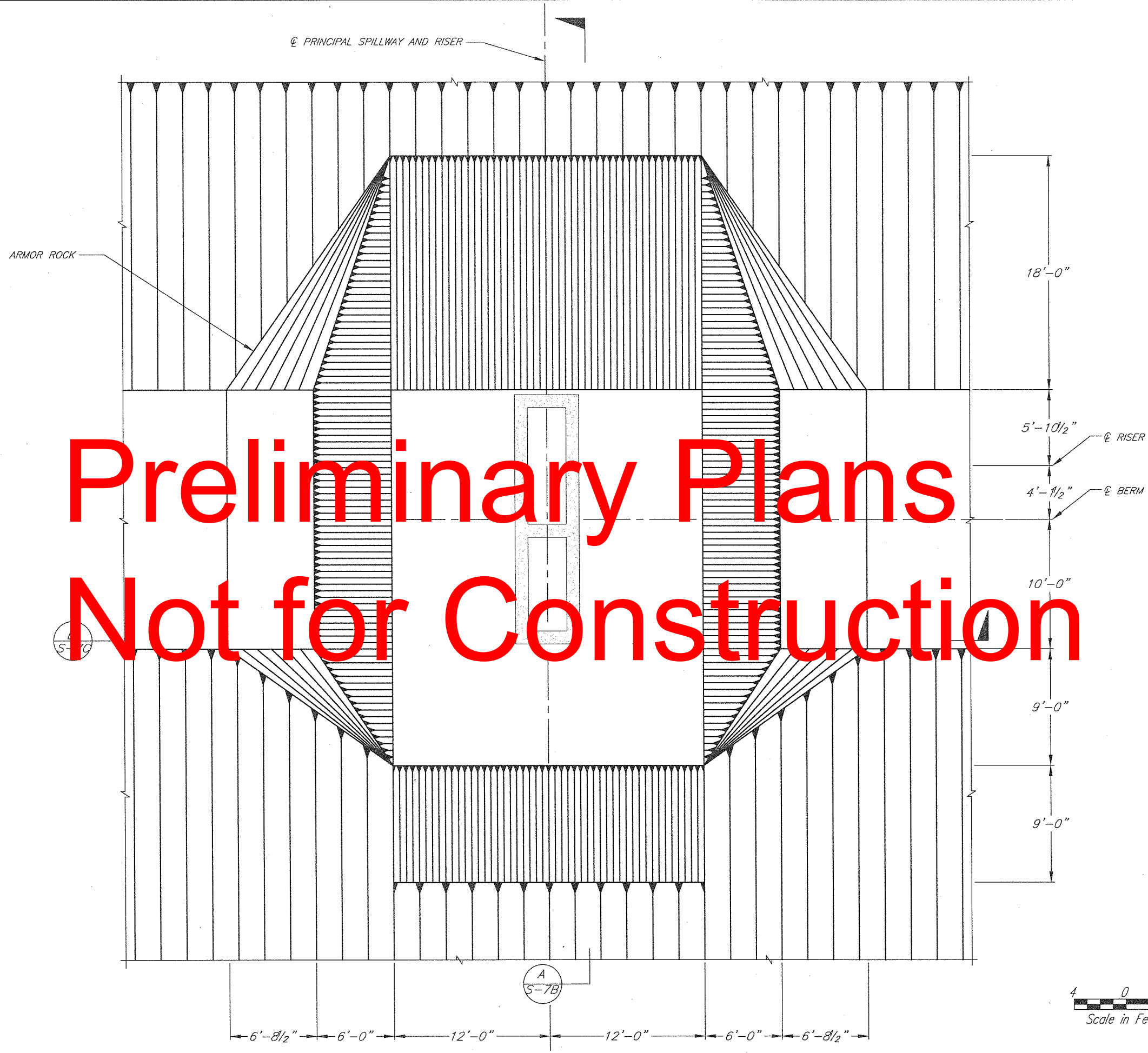
Date	May 08
Designed	L. F. Fragomeli
Drawn	J. Renteria
Checked	BBV, MDS
Approved	Sept 08

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



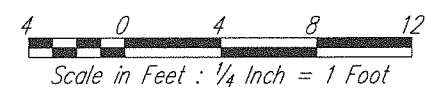
File Name	
Drawing Name	





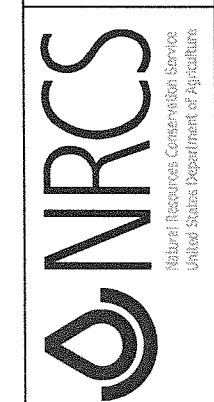
Preliminary Plans  
Not for Construction

PLAN  
SCALE: 1/4" = 1'-0"  
ARMOR ROCK



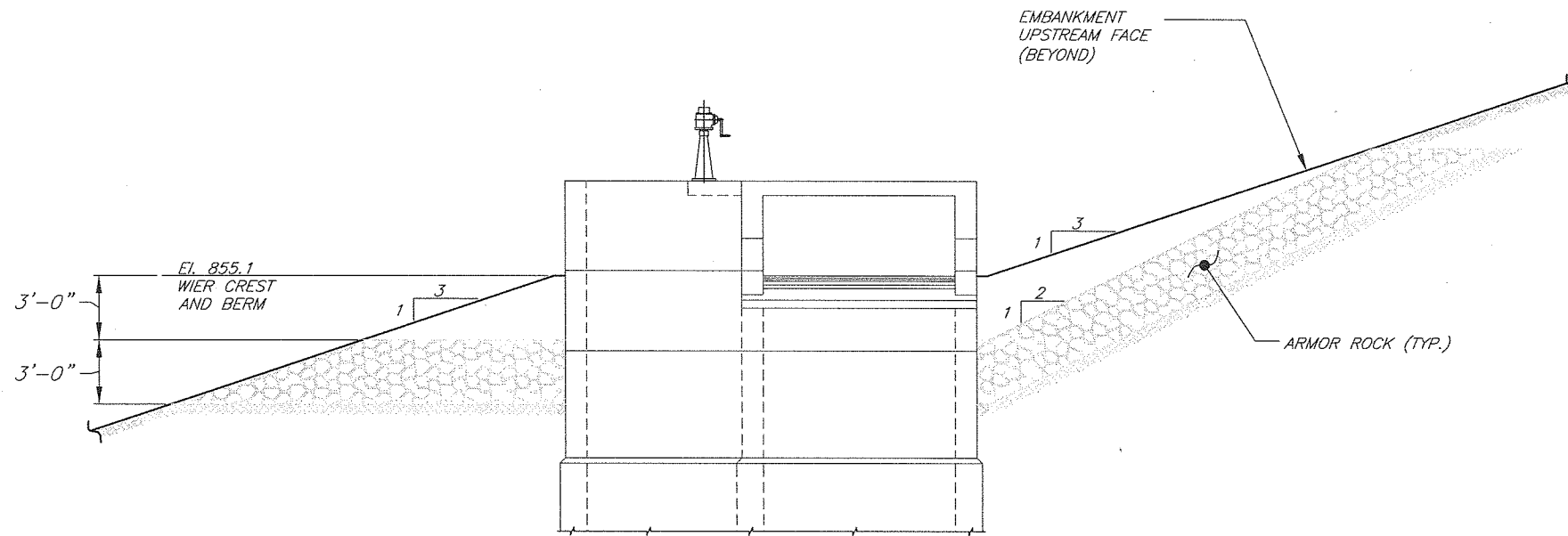
Designed	L. F. Fragomeli	Date	May 08
Drawn	J. Renteria		May 08
Checked	BBV, MDS		Sept 08
Approved			

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



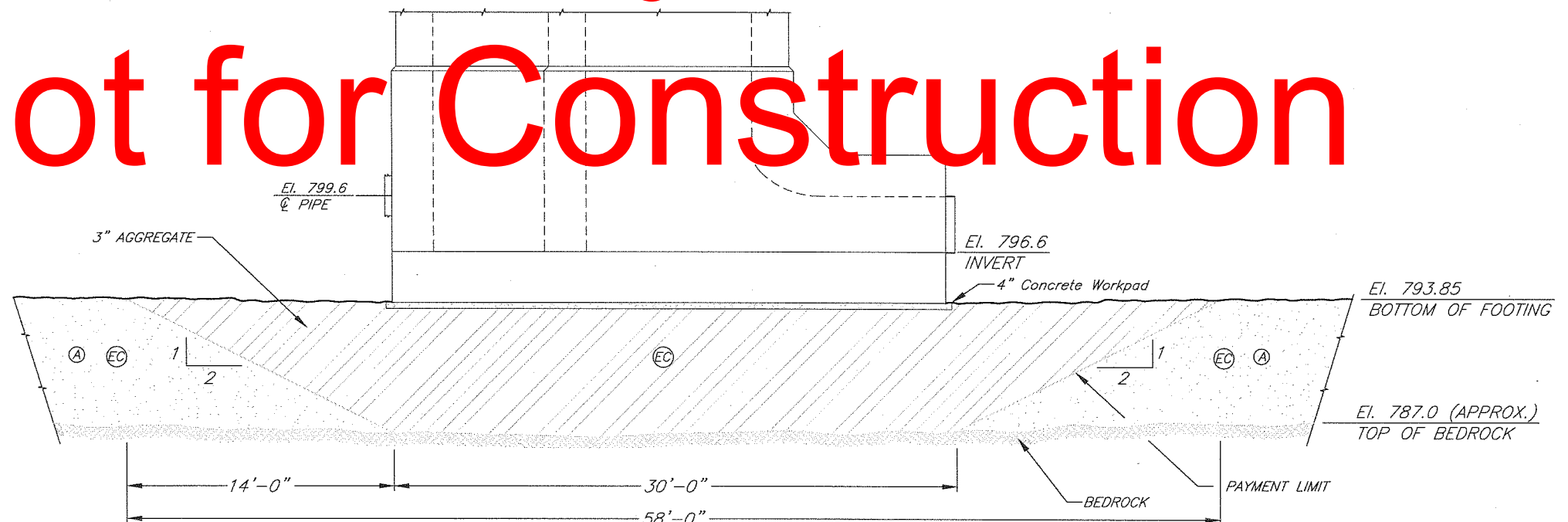
File Name  
Drawing Name





SECTION A  
SCALE: 1/4" = 1'-0"  
S-7B  
BERM ARMOR

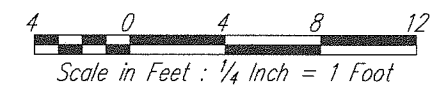
# Preliminary Plans Not for Construction



QUANTITIES	
3" Aggregate	353 Cu. Yds.
4" Conc. Workpad	5.2 Cu. Yds.

NOTE:  
Symbol (A) represents Class "A" Compaction and symbol (EC) represents Common Excavation. Refer to the specifications for additional information.

DETAIL 1  
SCALE: 1/4" = 1'-0"  
S-7B  
FOUNDATION BASE

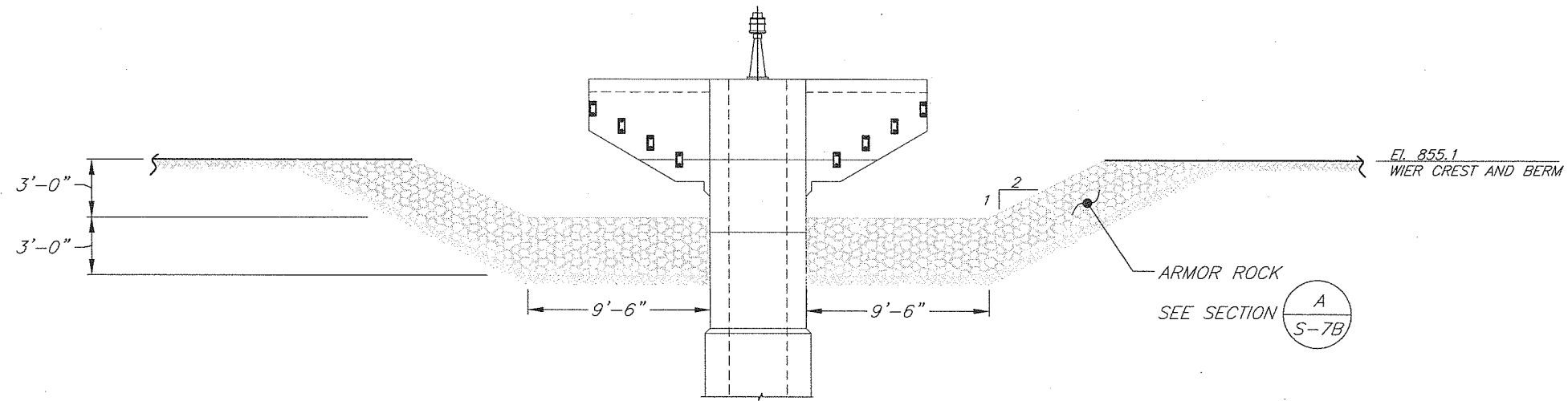


Date  
Designed L. F. Fragomeli May 08  
Drawn J. Renteria May 08  
Checked BBV, MDS Sept 08  
Approved

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

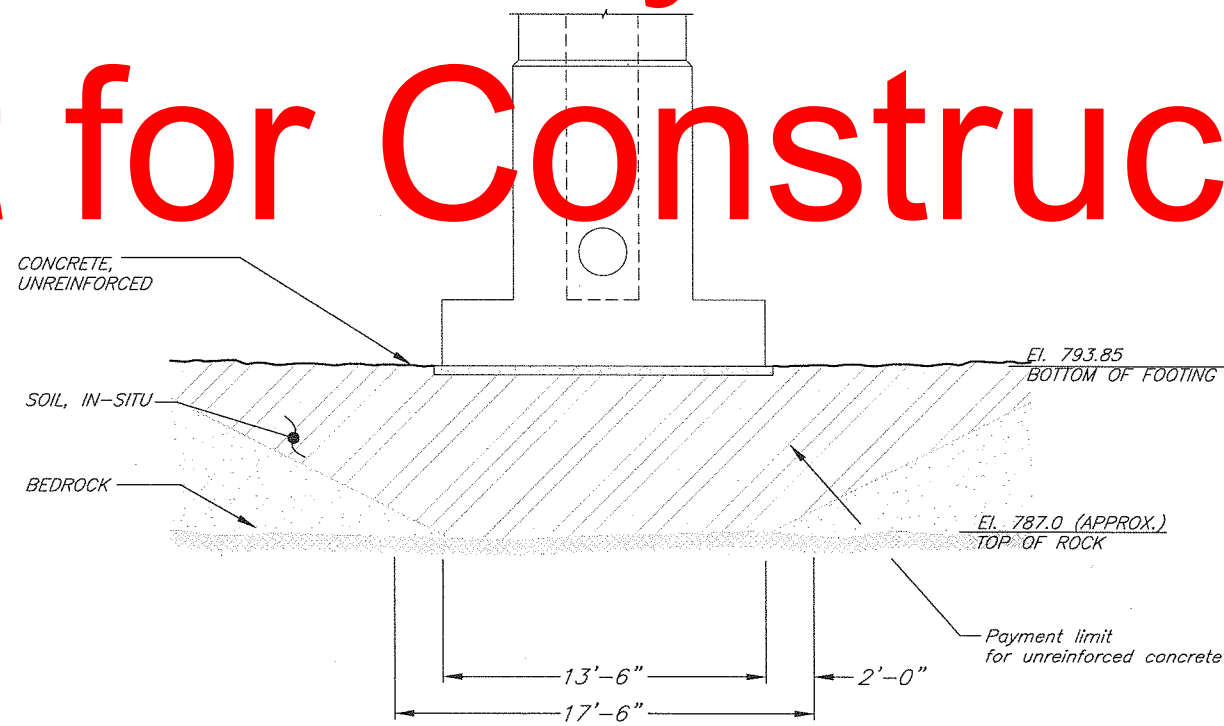


File Name  
Drawing Name

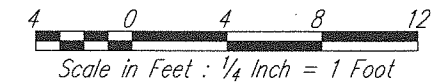


SECTION B  
SCALE: 1/4" = 1'-0"  
S-7A

# Preliminary Plans Not for Construction



DETAIL 1  
SCALE: 1/4" = 1'-0"  
S-7C  
FOUNDATION BASE

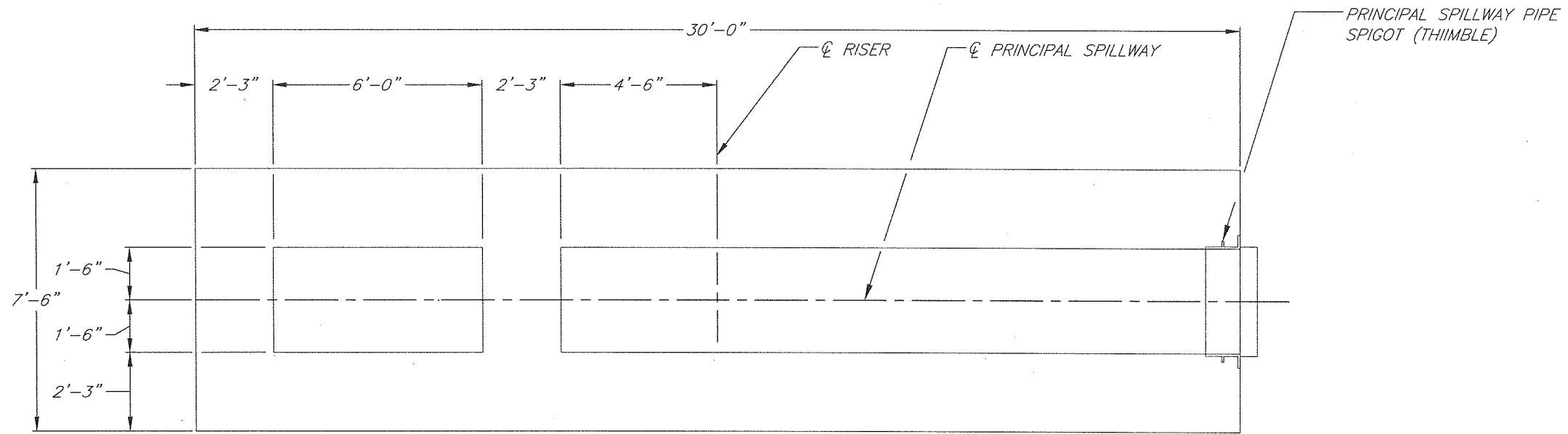


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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



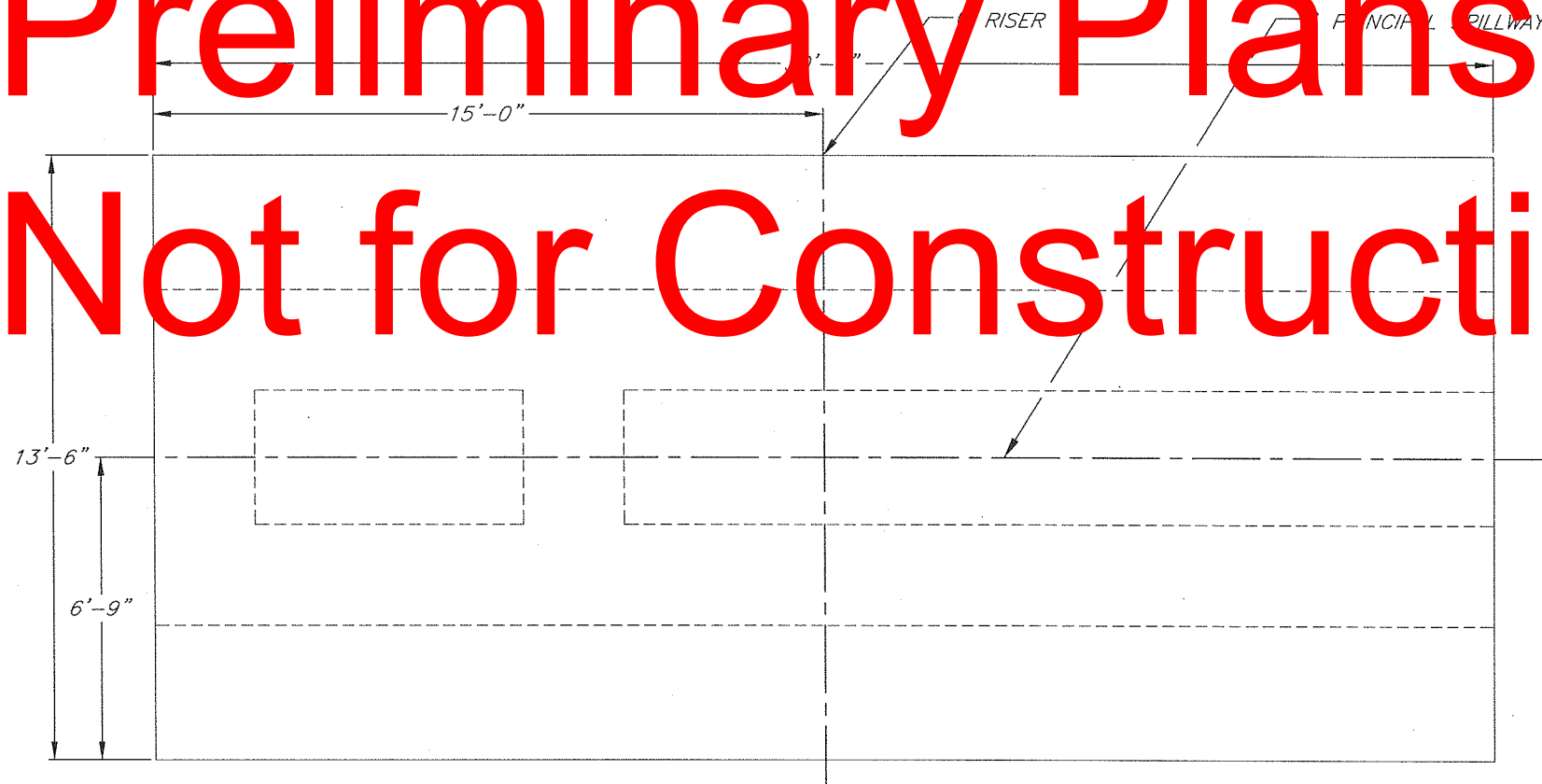
File Name  
Drawing Name



SECTION F  
 SCALE: 1/2" = 1'-0"

SECTION SHOWN AT ELEVATION  
 798.1

Preliminary Plans  
 Not for Construction



PLAN - FOOTING  
 SCALE: 1/2" = 1'-0"

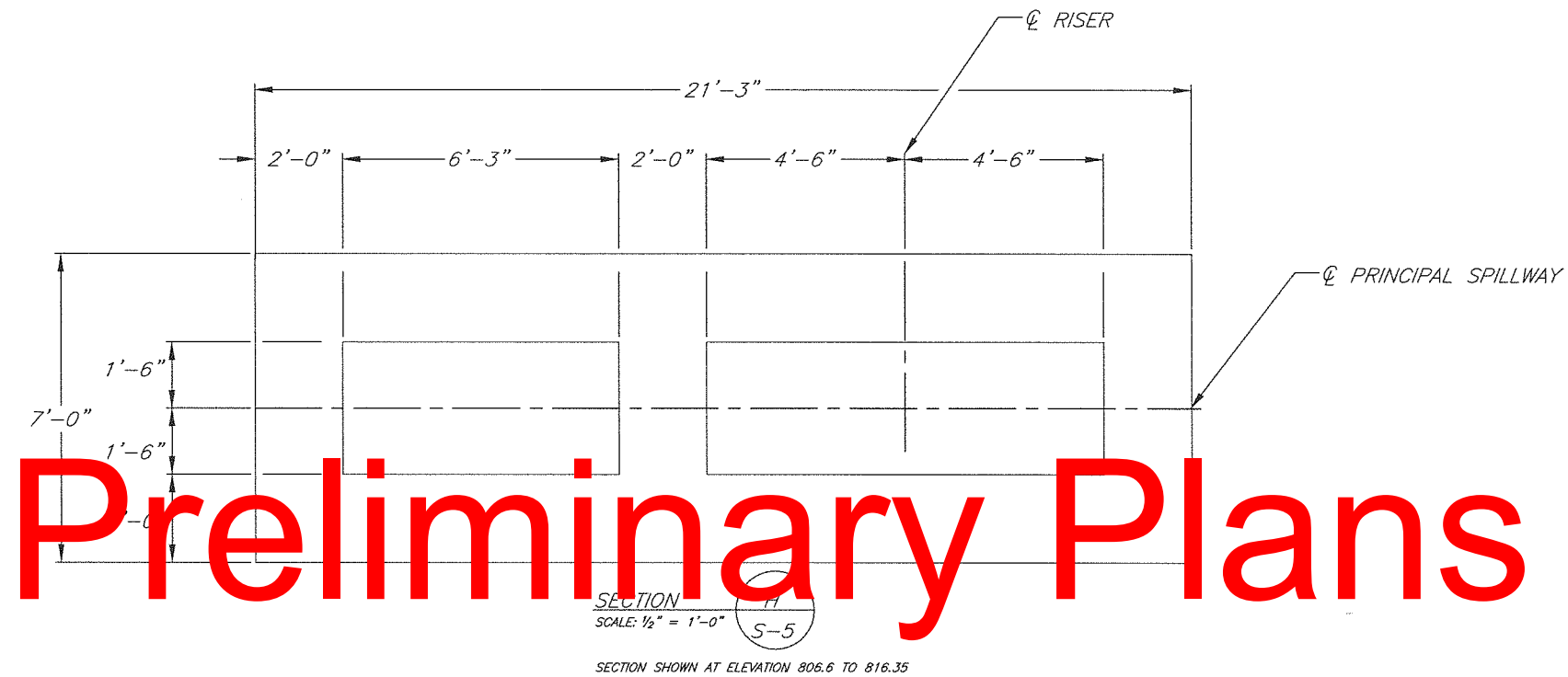


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Checked	BBY, MDS
Approved	

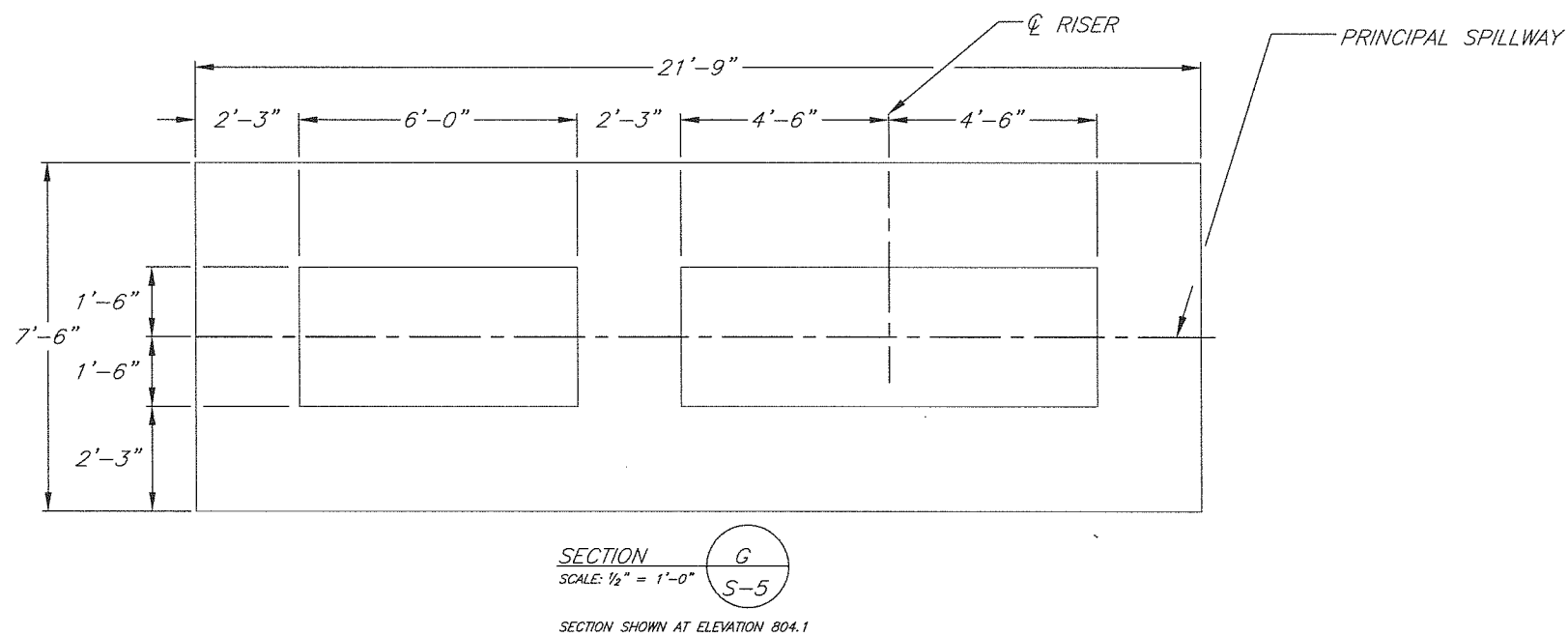
Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name



# Preliminary Plans Not for Construction

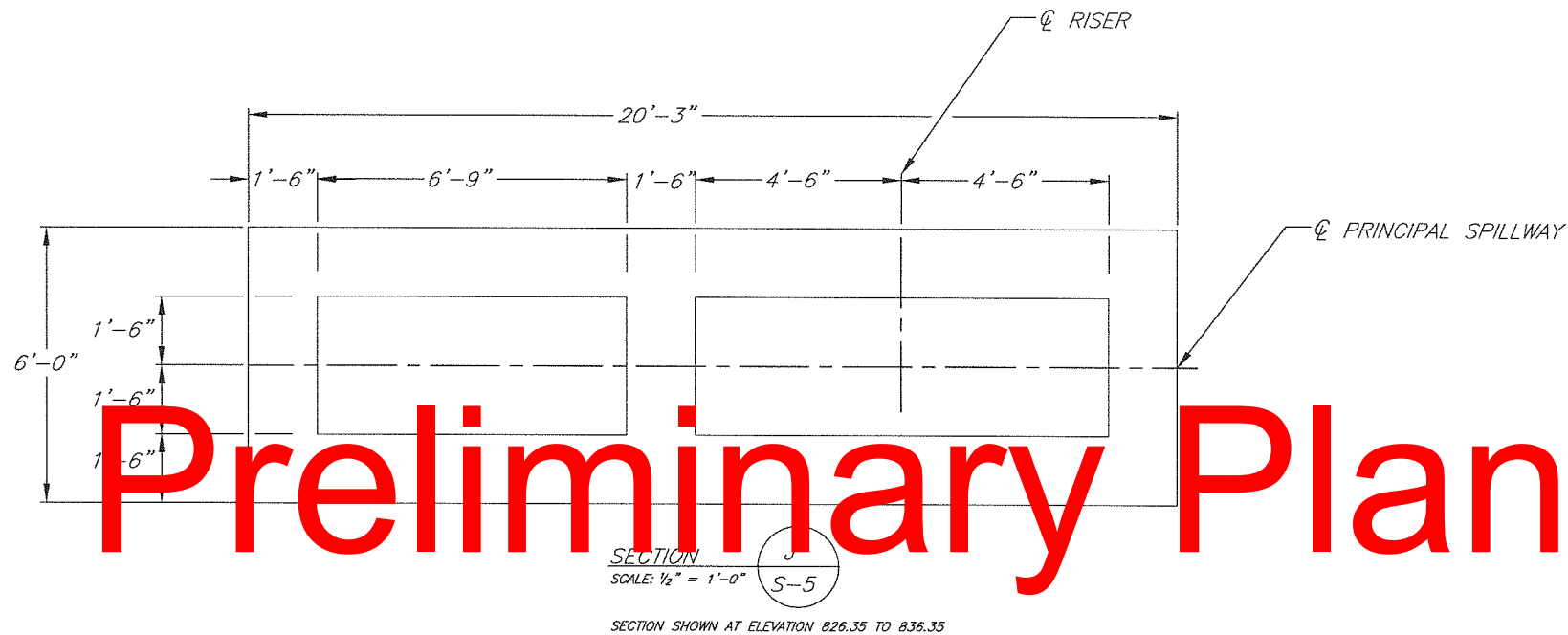


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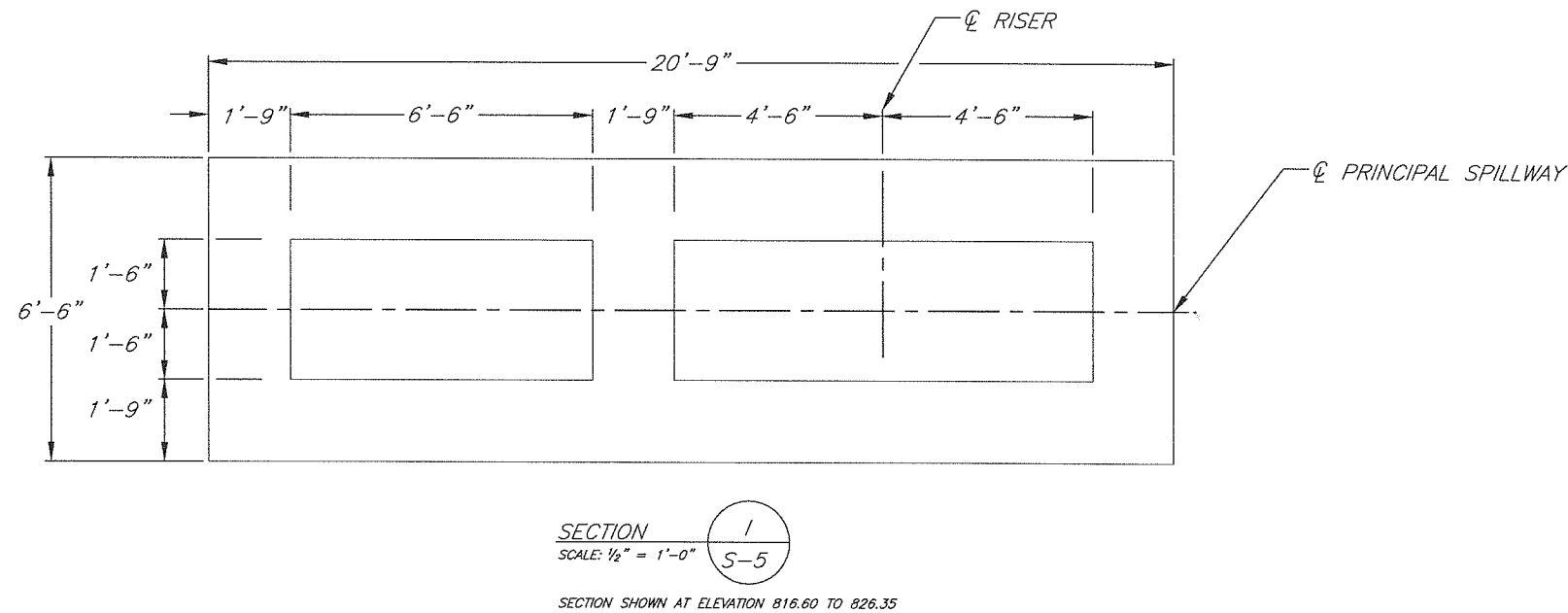
Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



**Preliminary Plans  
Not for Construction**

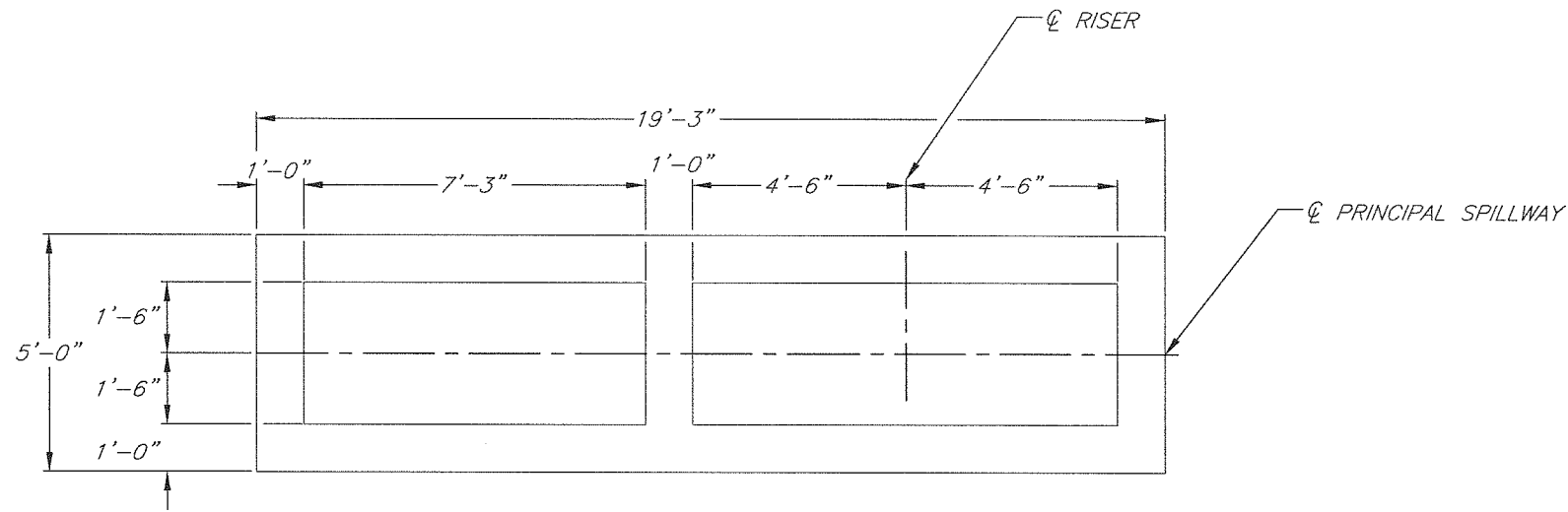


Date  
Designed L. F. Fragomeli May 08  
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Checked BBY, MDS Sept 08  
Approved

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

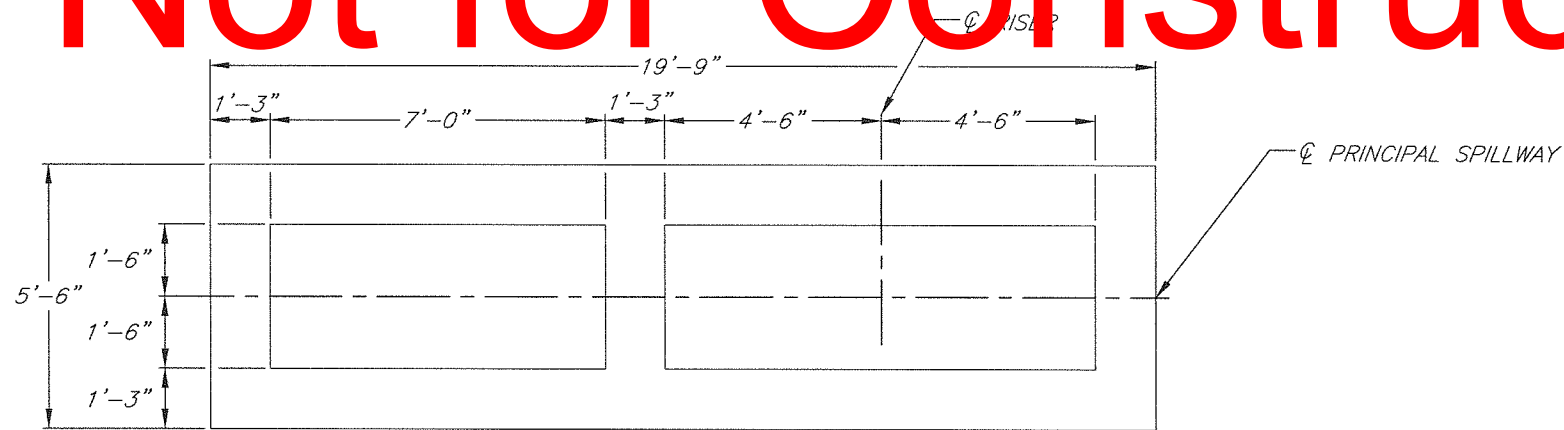


File Name  
Drawing Name



SECTION **L**  
 SCALE: 1/2" = 1'-0"  
 SECTION SHOWN AT ELEVATION 846.6 TO 846.68

# Preliminary Plans Not for Construction



SECTION **K**  
 SCALE: 1/2" = 1'-0"  
 SECTION SHOWN AT ELEVATION 836.60 TO 846.35

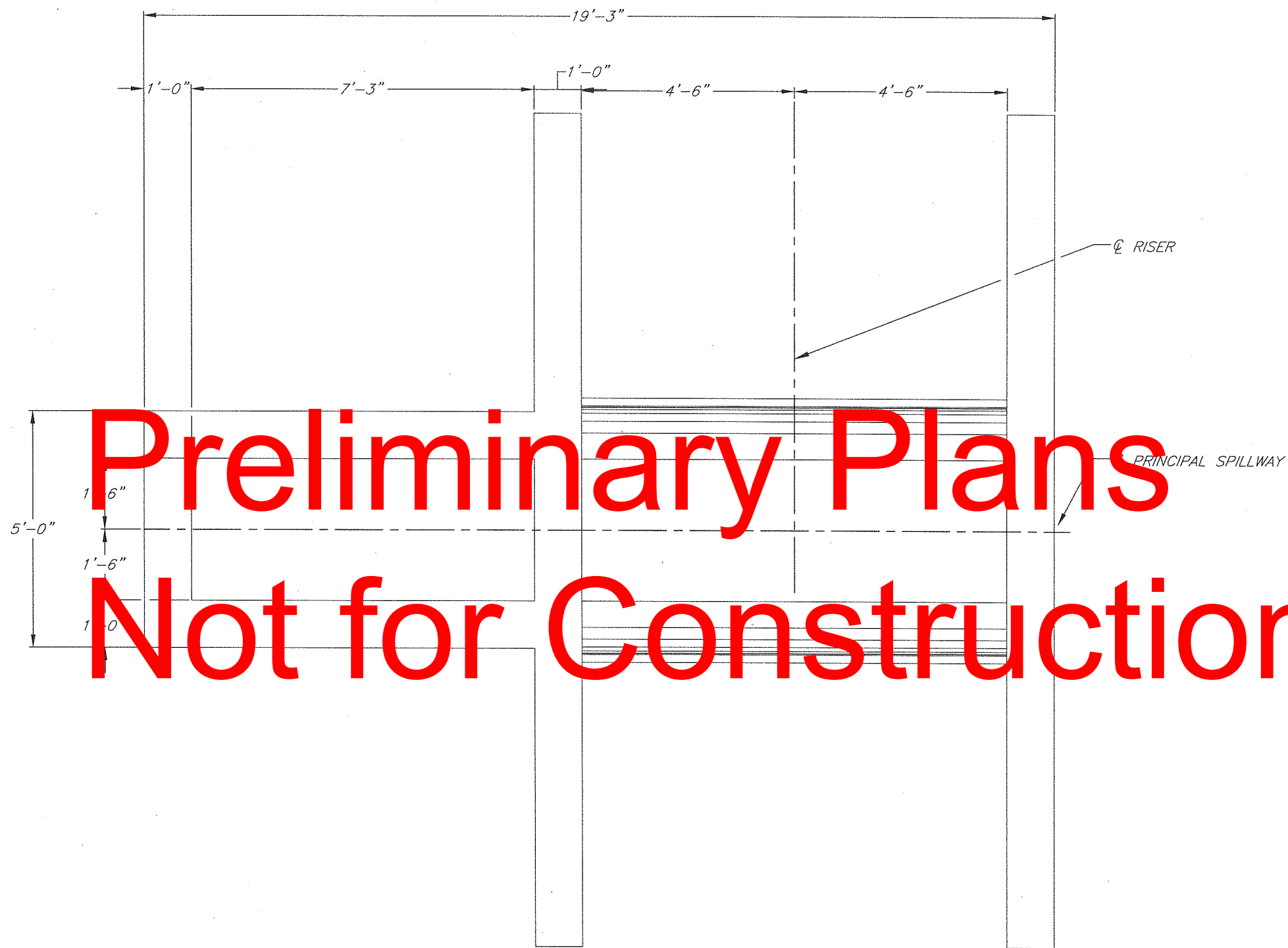


Date May 08  
 Designed L. F. Fragomeli  
 Drawn J. Renteria  
 Checked BBV, MDS  
 Approved \_\_\_\_\_

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_



Preliminary Plans  
Not for Construction

SECTION M  
SCALE: 3/4" = 1'-0" S-5

SECTION SHOWN AT ELEVATION  
855.1

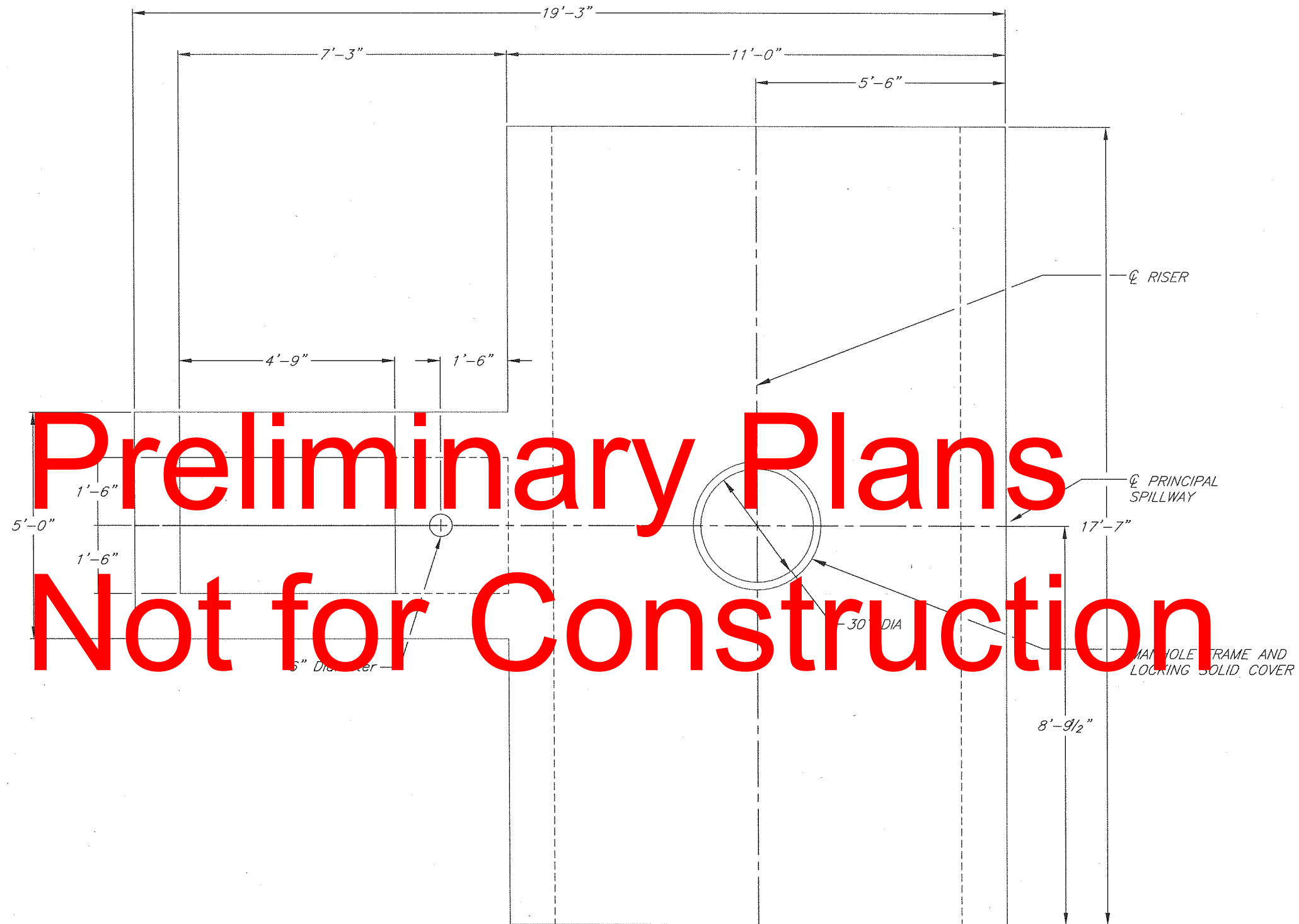


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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



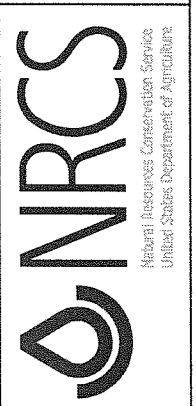
Preliminary Plans  
Not for Construction

PLAN - RISER COVER  
SCALE: 1/4" = 1'-0"



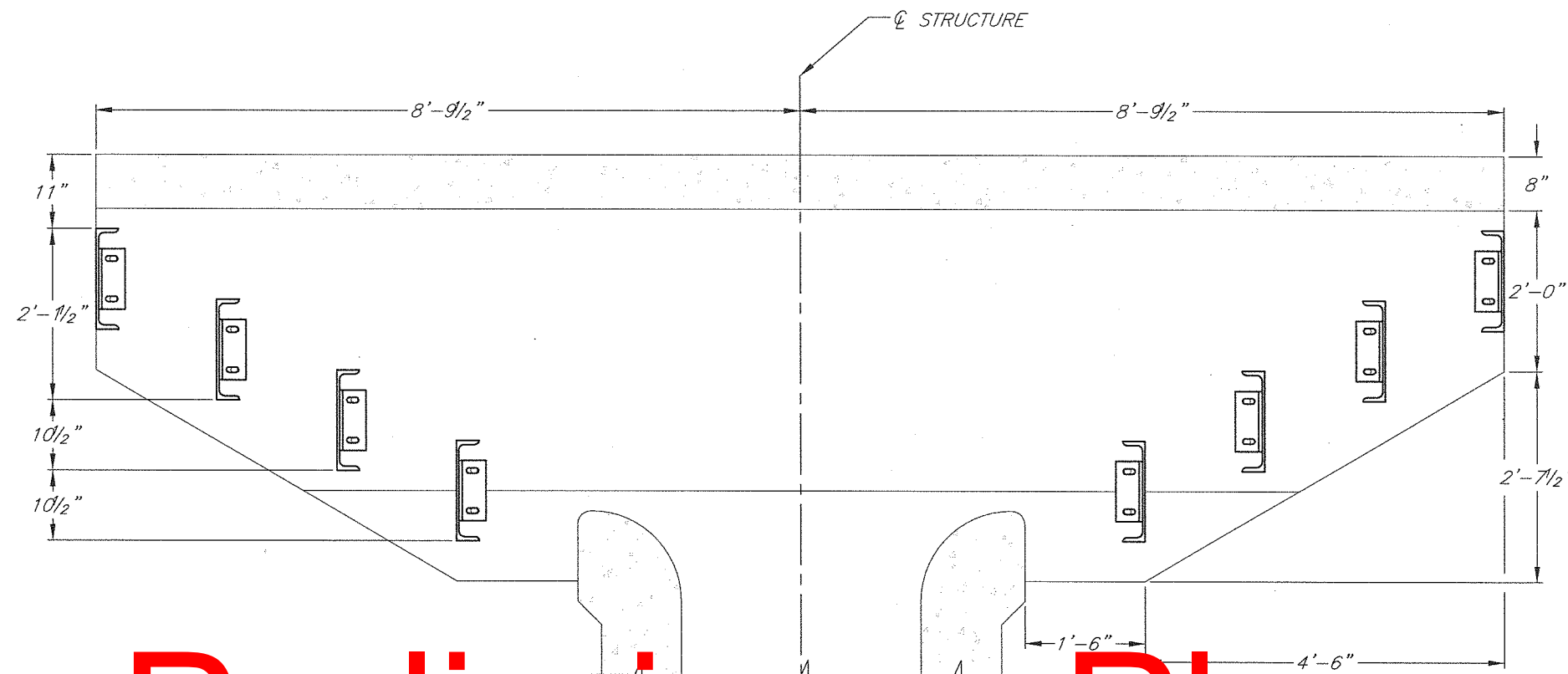
Designed	L. F. Fragomeli	Date	May 08
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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

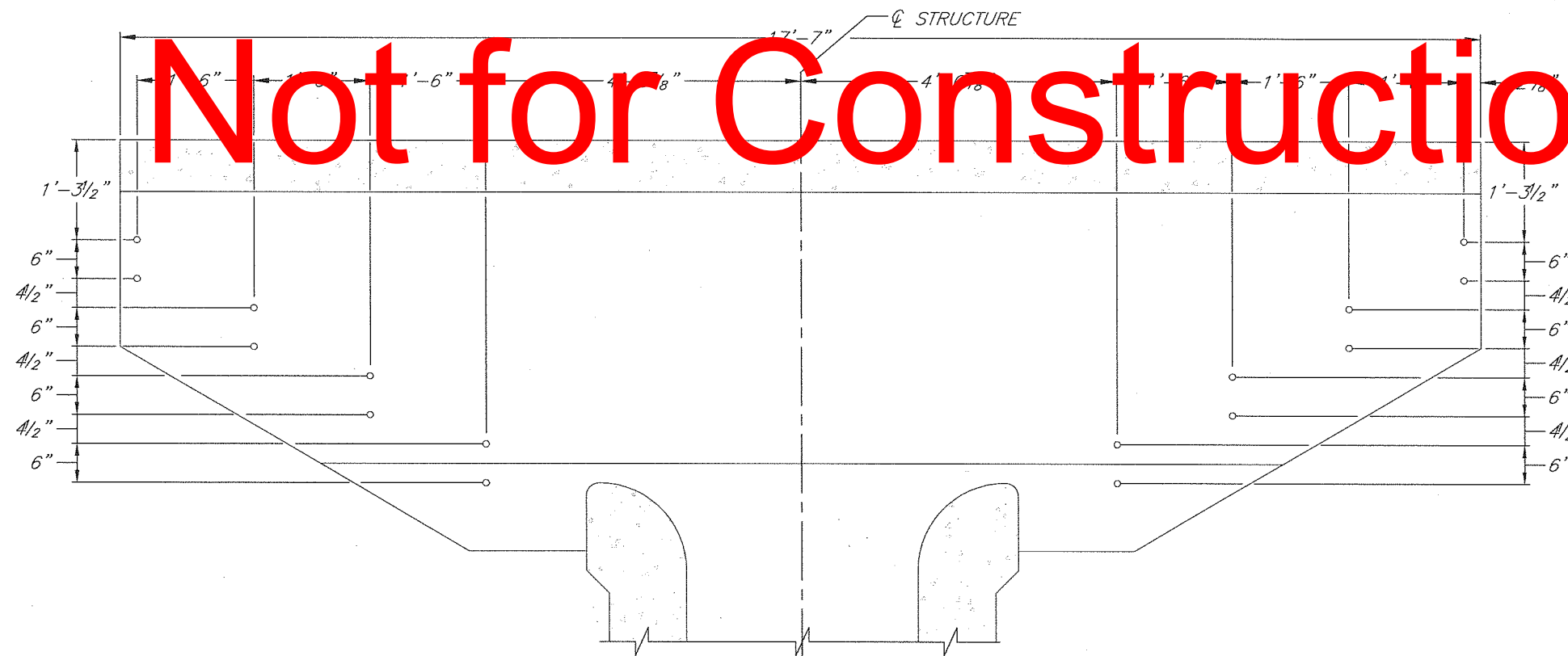


File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_





TRASHRACK ANCHOR BOLT LOCATION  
 SCALE: 1" = 1'-0"



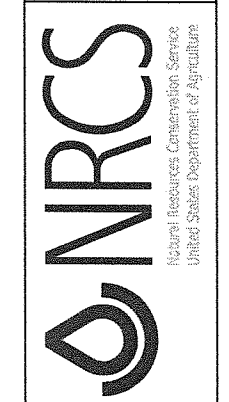
TRASHRACK ANCHOR BOLT LOCATION  
 SCALE: 1" = 1'-0"



Preliminary Plans  
 Not for Construction

Designed	L. F. Fragomeli	Date	May 08
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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name

TRASH RACK MATERIALS LIST		
MARK	ITEM	QUANTITY
A	Channels, 15" x 3.400" x 0.400", 8'-10" Long, Aluminum	8
B	Angles, 6" x 4" x 1/2", Aluminum	16
C	Straight Bolts, 3/4" x 10 UNC x 16" Long With Hex Nut, Flat And Lock Washers Type 18-8 Stainless Steel	32
D	Plates, 9" x 4" x 1/2", Aluminum	16
E	Straight Bolts, 3/4" x 10 UNC x 2 1/2" Long With Hex Nut, Flat And Lock Washers Type 18-8 Stainless Steel	32

Weight Of Structural Aluminum = 725 Pounds

**NOTES:**

1. Structural Aluminum Shall Be Alloy 6061-T6.
2. All Aluminum Surfaces In Contact With Concrete Shall Be Cleaned And Given A Heavy Coat Of Alkali-Resistant Bituminous Paint And Allowed To Dry Before Assembly.

Date  
 May 08  
 May 08  
 Sept 08  
 Designed L. F. Fragomeli  
 Drawn J. Renteria  
 Checked BBV, MDS  
 Approved

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name  
 Sheet 40 of 117

STRUCTURE

BACKING PLATE (TYP.) ①  
 9x4x1/2

TRASHRACK ANCHOR BOLT ③

FLAT WASHER

ANCHOR BOLT ⑤

TRASHRACK BEAM (TYP.) ④

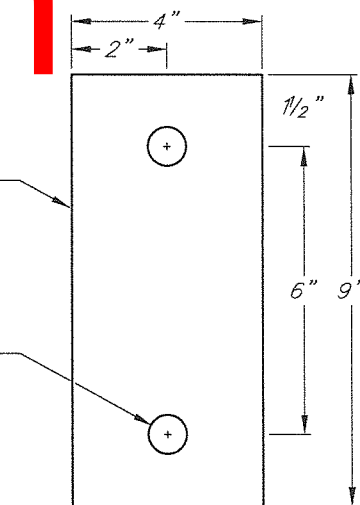
CONNECTION BRACKET (TYP.) ②

NUT, STANDARD HEX (TYP.)

FLAT WASHER AND LOCK WASHER FOR TRASHRACK ANCHOR BOLT (TYP.)

1/2-INCH PLATE

13/16-INCH DIA. HOLE (TYP.)



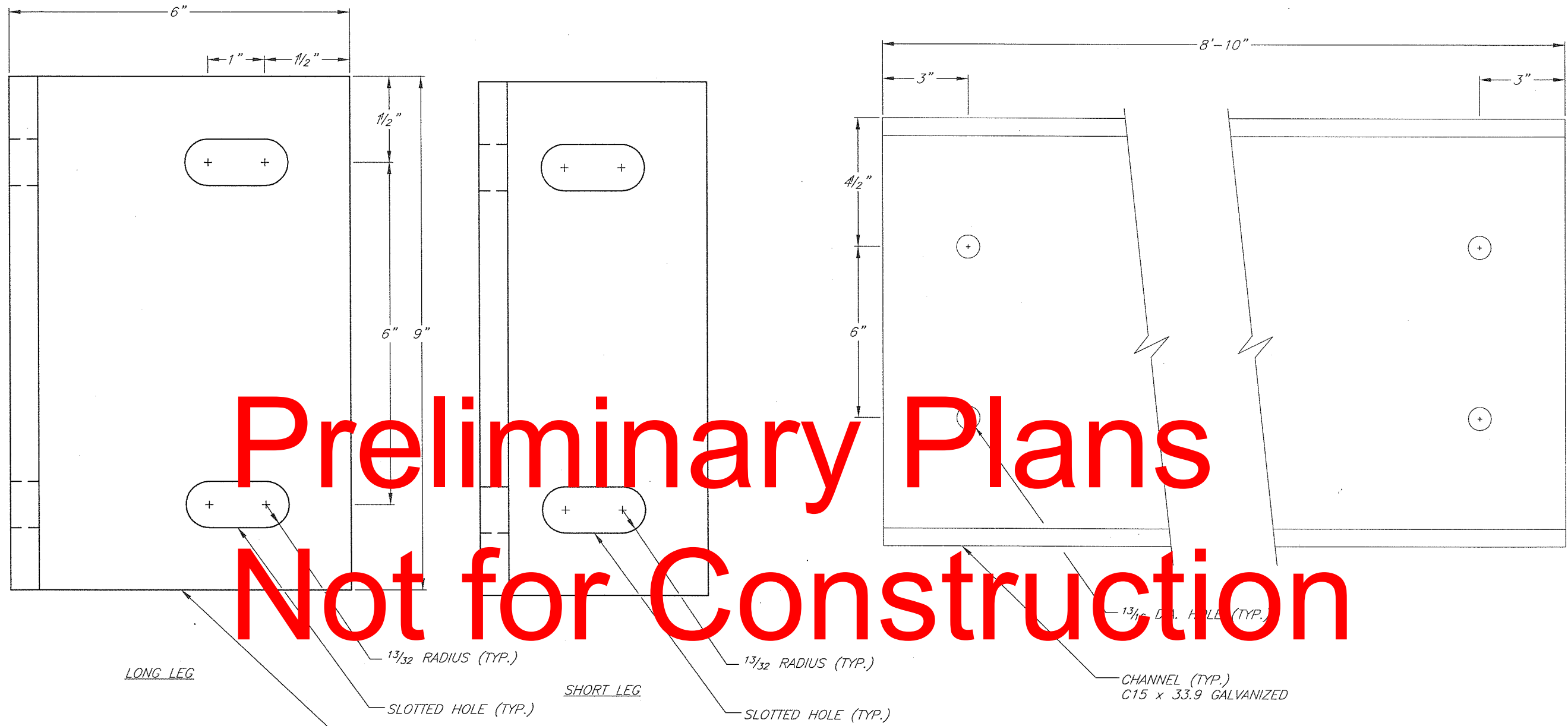
BACKING PLATE DETAIL ①

SCALE: 1:2

TRASHRACK CONNECTION DETAIL

SCALE: 1:2

Preliminary Plans  
 Not for Construction



Preliminary Plans  
Not for Construction

CONNECTION BRACKET DETAIL  
SCALE: 1:1

TRASHRACK BEAM DETAIL  
SCALE: 2:1

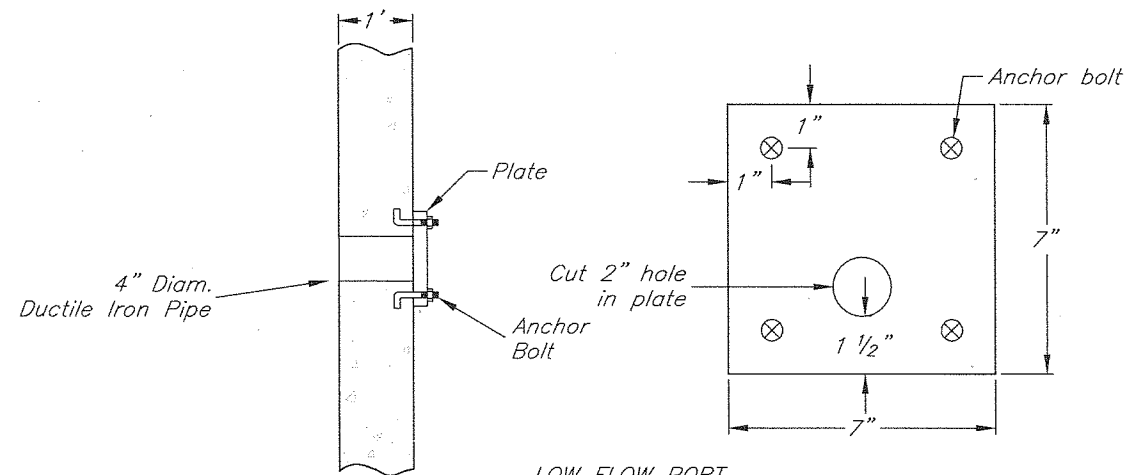
NOTE: HOT-DIP GALVANIZE TRASHRACK BEAM AND CONNECTION BRACKETS, AFTER FABRICATION.

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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



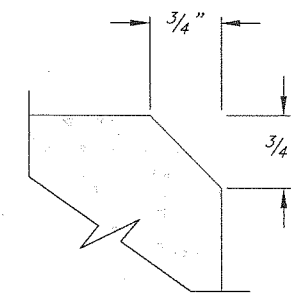
File Name  
Drawing Name



LOW FLOW PORT  
N.T.S.

Notes:

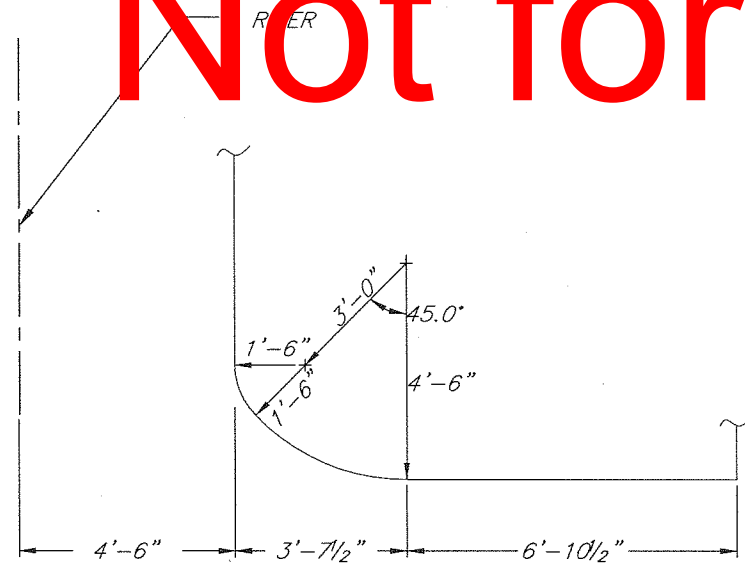
1. Cut 7" x 7" plate out of 3/8" thick plate steel. Cut 2" diameter hole in plate as shown. Drill 4-5/8" holes as shown for anchor bolts. Plate will be installed with bottom of 2" hole at flowline of 4" ductile iron pipe.
2. Bolts will be 1/2" diameter stainless steel anchor bolts with nut and lock washer (4 required). Bolts will be anchored a minimum of 3 inches into concrete with minimum of 1 inch of threads exposed. Equivalent anchor bolts may be used as approved by engineer.
3. Plate steel shall have a shop primer and paint.
4. Approximate location of ductile iron pipe is as shown on sheets S-25 and S-26. As approved by engineer, location may be shifted slightly to clear reinforcing steel.



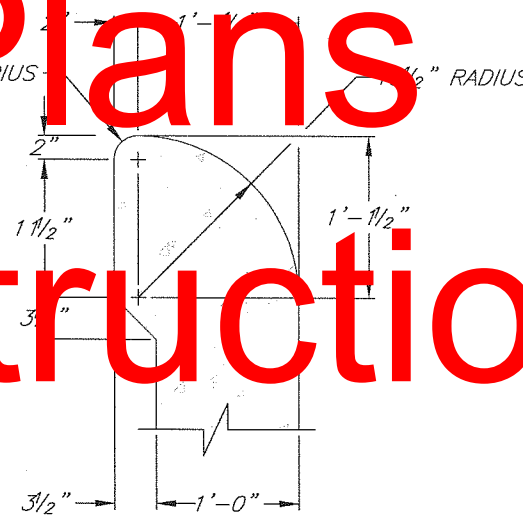
DETAIL 2  
N.T.S. S-  
CHAMFER

NOTE: OUTSIDE CORNER SHOWN,  
INSIDE CORNER SIMILAR

Preliminary Plans  
Not for Construction



DETAIL 1  
SCALE: 1/2" = 1'-0" S-7  
PIPE INLET TRANSITION SURFACE



DETAIL 3  
SCALE: 1/2" = 1'-0" S-5  
WEIR CREST

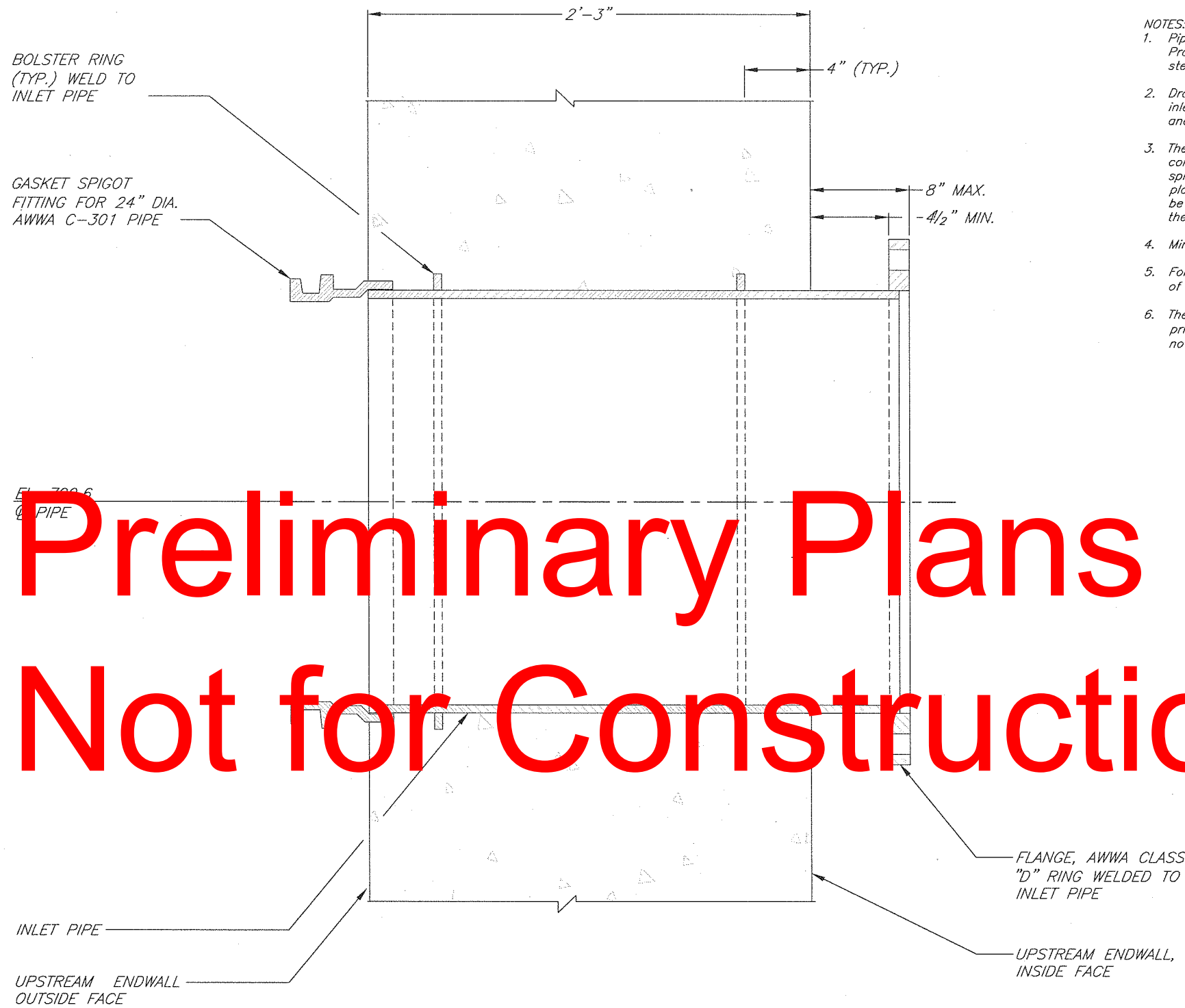


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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



**NOTES:**

1. Pipe Inlet Assembly shall be designed by a Registered Professional Engineer experienced in the design of welded steel pressure pipe, and hydraulic structure appurtenances.
2. Drawings and computations for the design of the pipe inlet assembly shall be certified by the design engineer, and shall be submitted for approval.
3. The pipe inlet assembly shall be designed to allow for the complete dewatering of the riser structure and principal spillway pipe. The design shall include a matching end plate to be bolted to the flange ring. The end plate shall be designed so as to provide a watertight connection to the flange.
4. Minimum design head shall be 70 feet of water.
5. For allowable stress design, a minimum factor of safety of five (5) shall be used.
6. The pipe inlet assembly shall be installed in the formwork prior to placement of the concrete. A "block out" shall be not used.

EL. 788.6  
PIPE

Preliminary Plans  
Not for Construction

DETAIL 1  
SCALE: 3" = 1'-0" S-7  
PIPE INLET ASSEMBLY



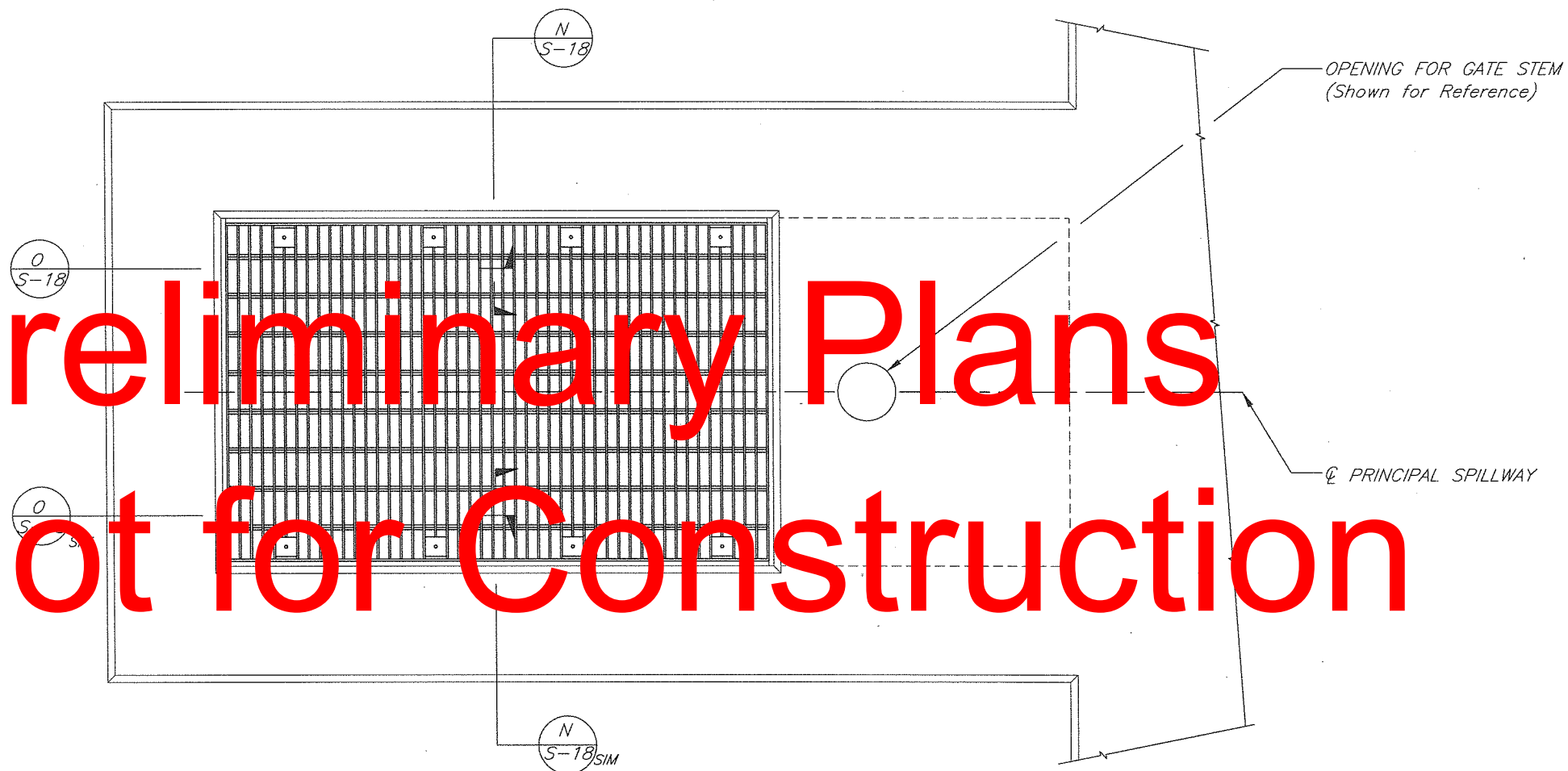
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Riser Details  
 Structure LO-1  
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 PL-566 Caldwell County, Missouri



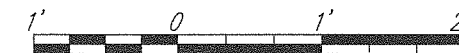
File Name  
Drawing Name

# Preliminary Plans Not for Construction



PLAN - GATE WELL GRATING  
SCALE: 1/2" = 1'-0"

NOTE:  
Bar grate assembly and support is  
symmetric about  $\phi$  Principal Spillway.  
Plan shown at EL. 859.52

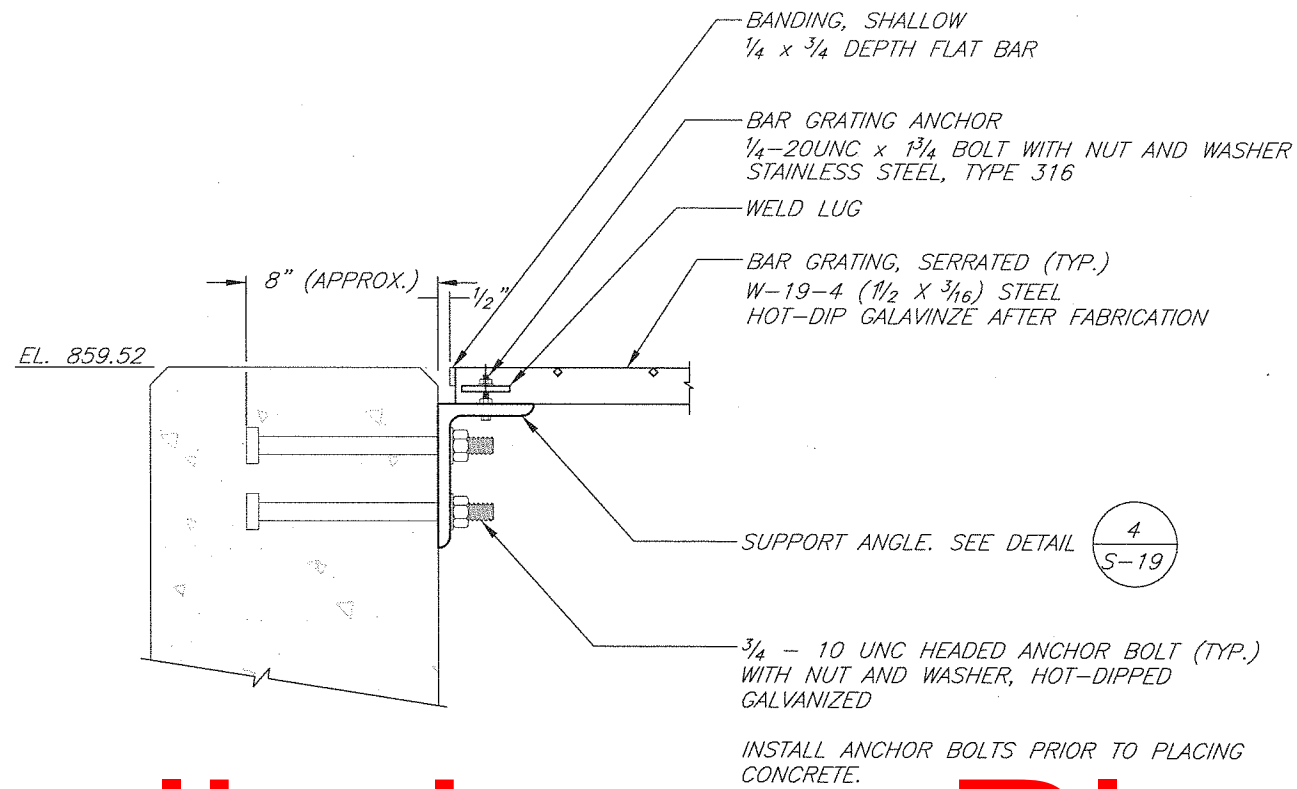


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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

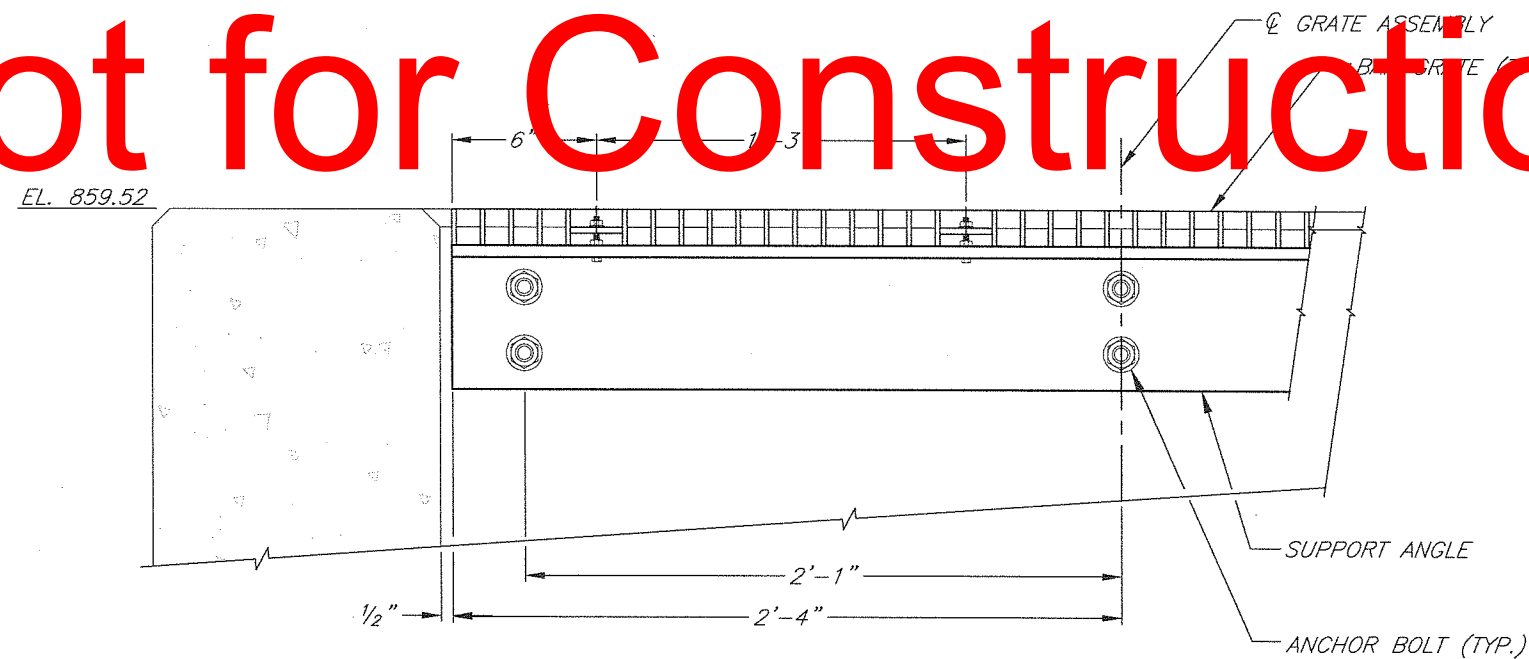


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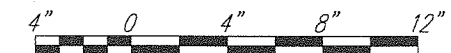
INSTALL ANCHOR BOLTS PRIOR TO PLACING CONCRETE.

# Preliminary Plans Not for Construction



SECTION N  
SCALE: 3" = 1'-0" S-17

NOTE: Symmetric about  $\varnothing$  Grate Assembly

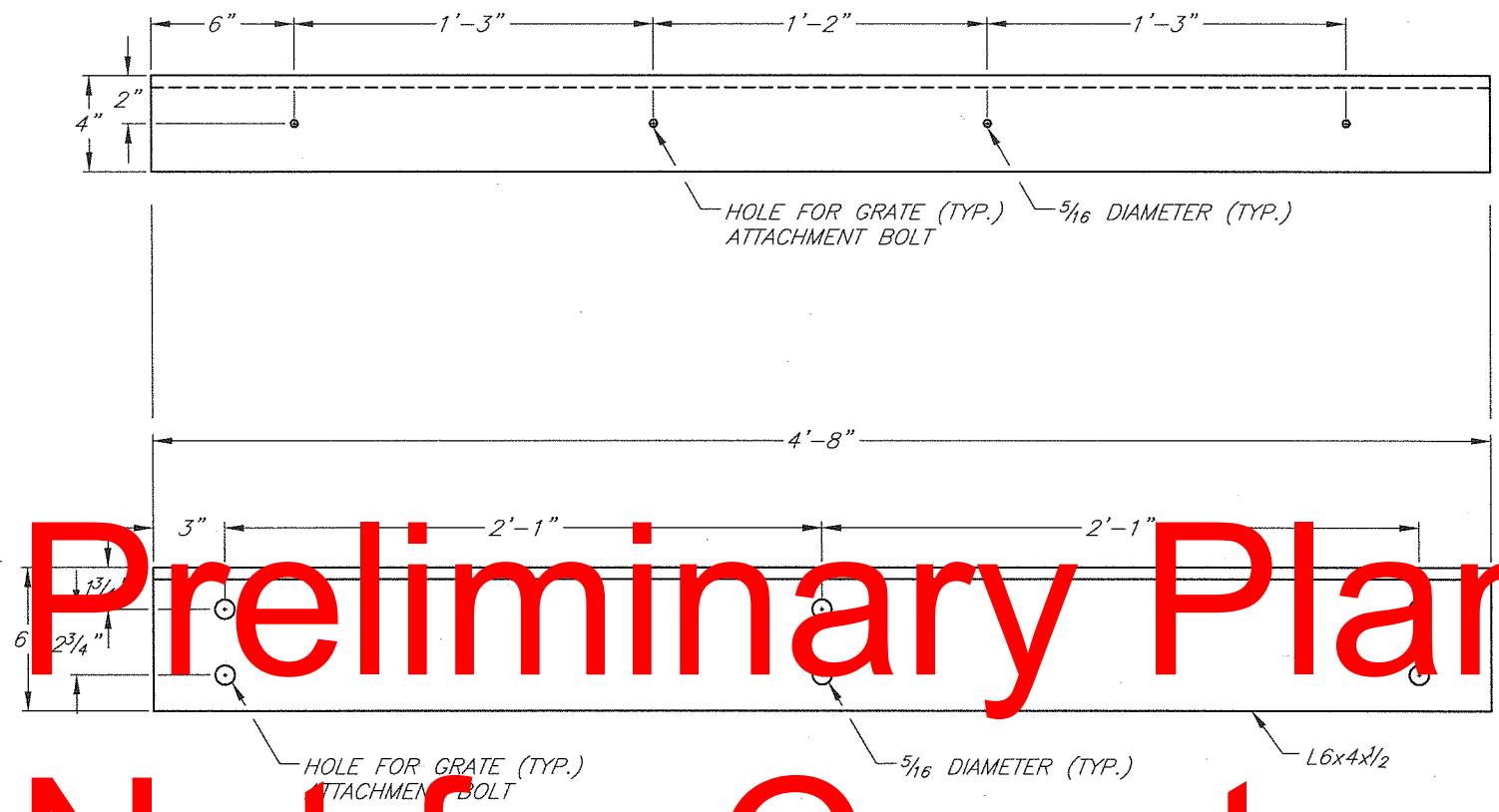


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Riser Details  
 Structure LO-1  
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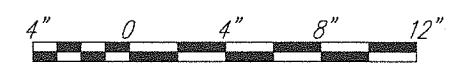
File Name  
Drawing Name



Preliminary Plans  
Not for Construction

DETAIL 4  
 SCALE: 3" = 1'-0" S-18  
 Grate Support

- NOTES:
1. HOLE LOCATION DIMENSIONS SHOWN FOR REFERENCE.
  2. MATCH ANCHOR BOLT HOLE LOCATIONS TO ANCHOR BOLTS AFTER INSTALLATION OF ANCHOR BOLTS IN THE STRUCTURE.
  3. MATCH GRATE ATTACHMENT BOLT HOLES TO WELD LUG HOLES IN GRATE ASSEMBLY.
  4. HOT-DIP GALVANIZE AFTER FABRICATION. GALVANIZING SHALL MEET OR EXCEED THE REQUIREMENTS OF ASTM A123, GRADE G185.
  5. L6x4x1/2 ANGLE SHALL HAVE A MINIMUM YIELD STRENGTH OF 36,000psi ( $F_y = 36$  ksi min.).



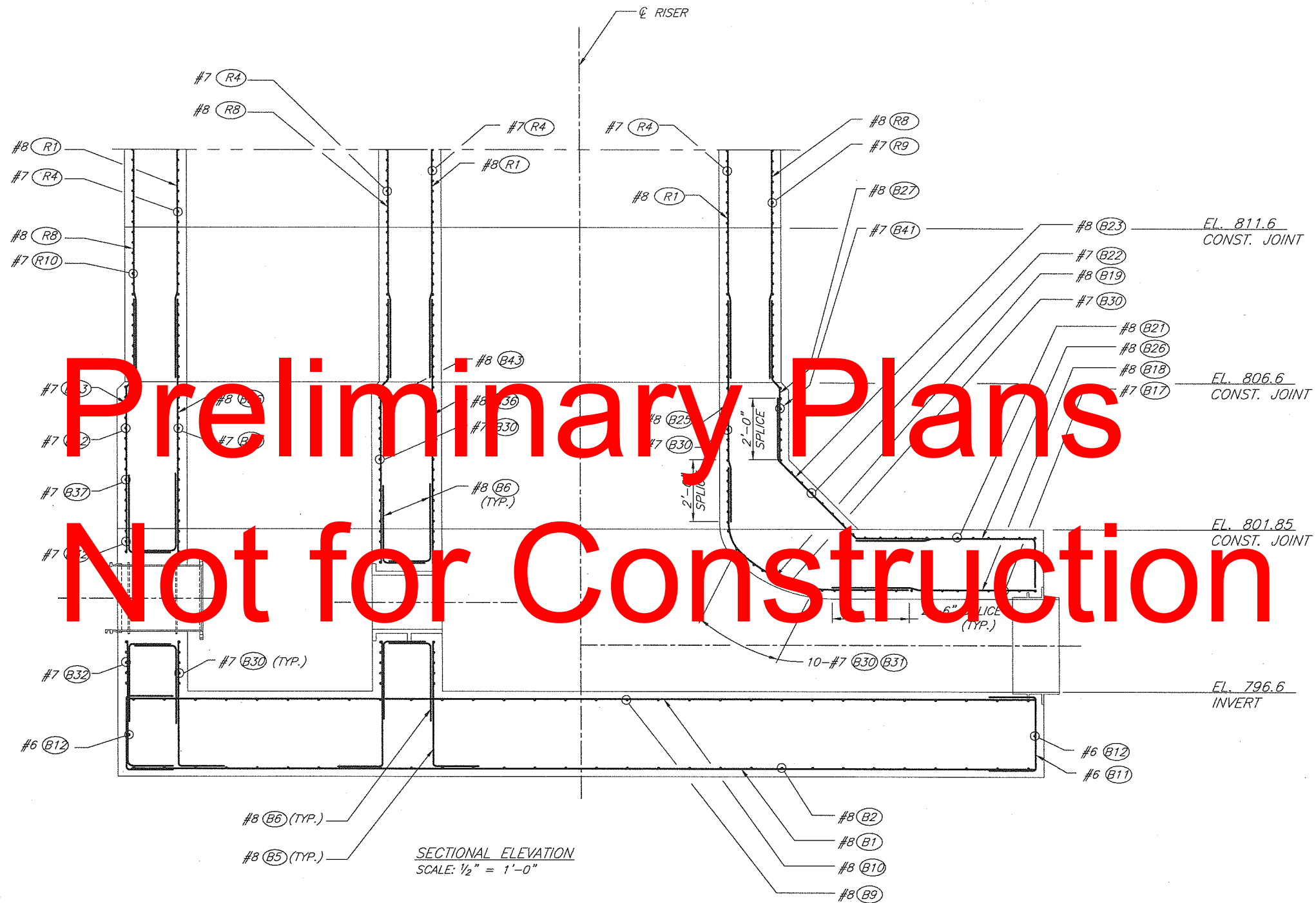
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Riser Details  
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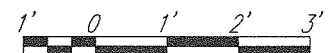
File Name  
 Drawing Name





Preliminary Plans  
Not for Construction

SECTIONAL ELEVATION  
SCALE: 1/2" = 1'-0"

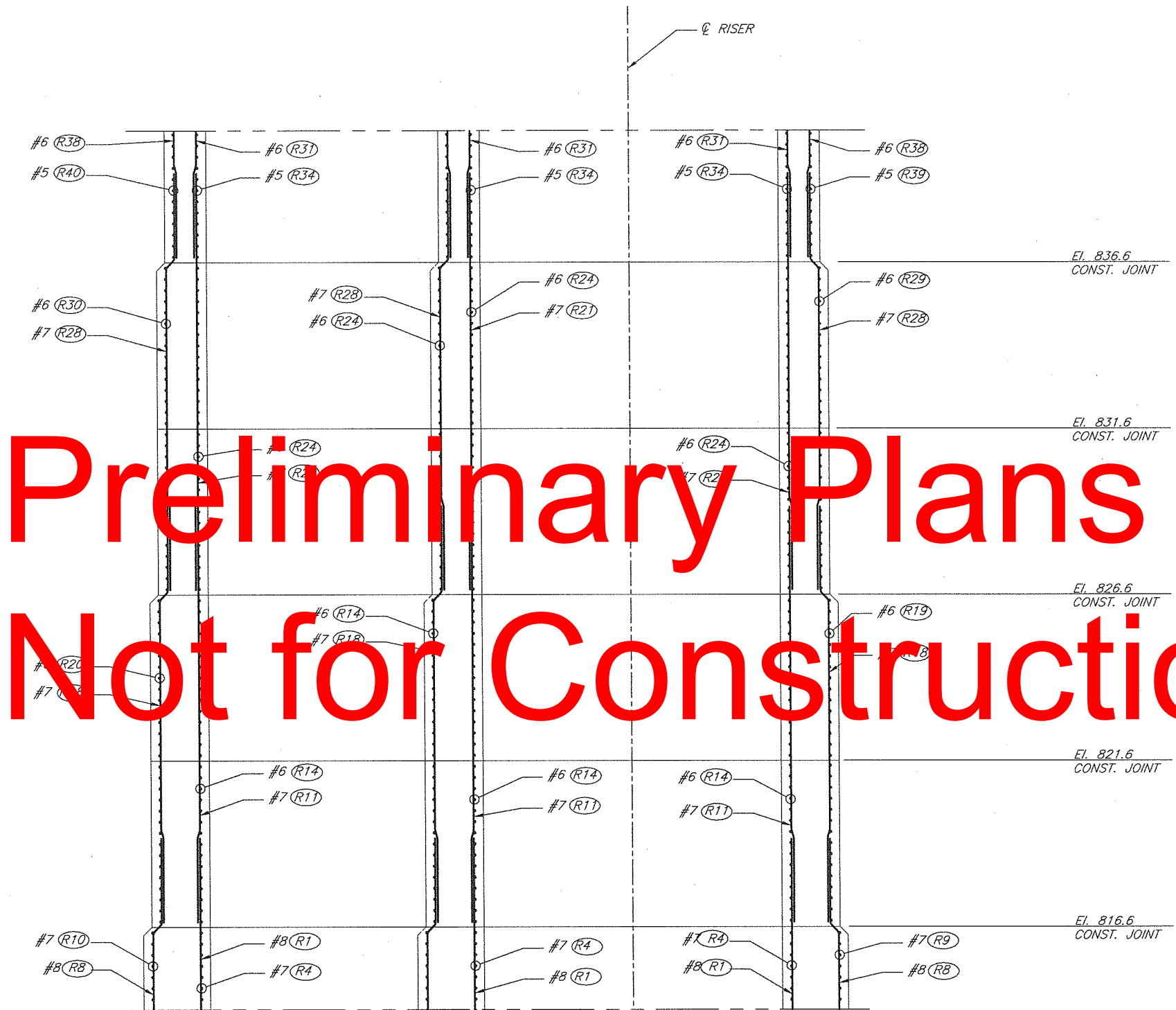


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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



Preliminary Plans  
Not for Construction

SECTIONAL ELEVATION  
SCALE: 1/2" = 1'-0"

NOTE: SECTION SHOWN ALONG  $\phi$   
PRINCIPAL SPILLWAY



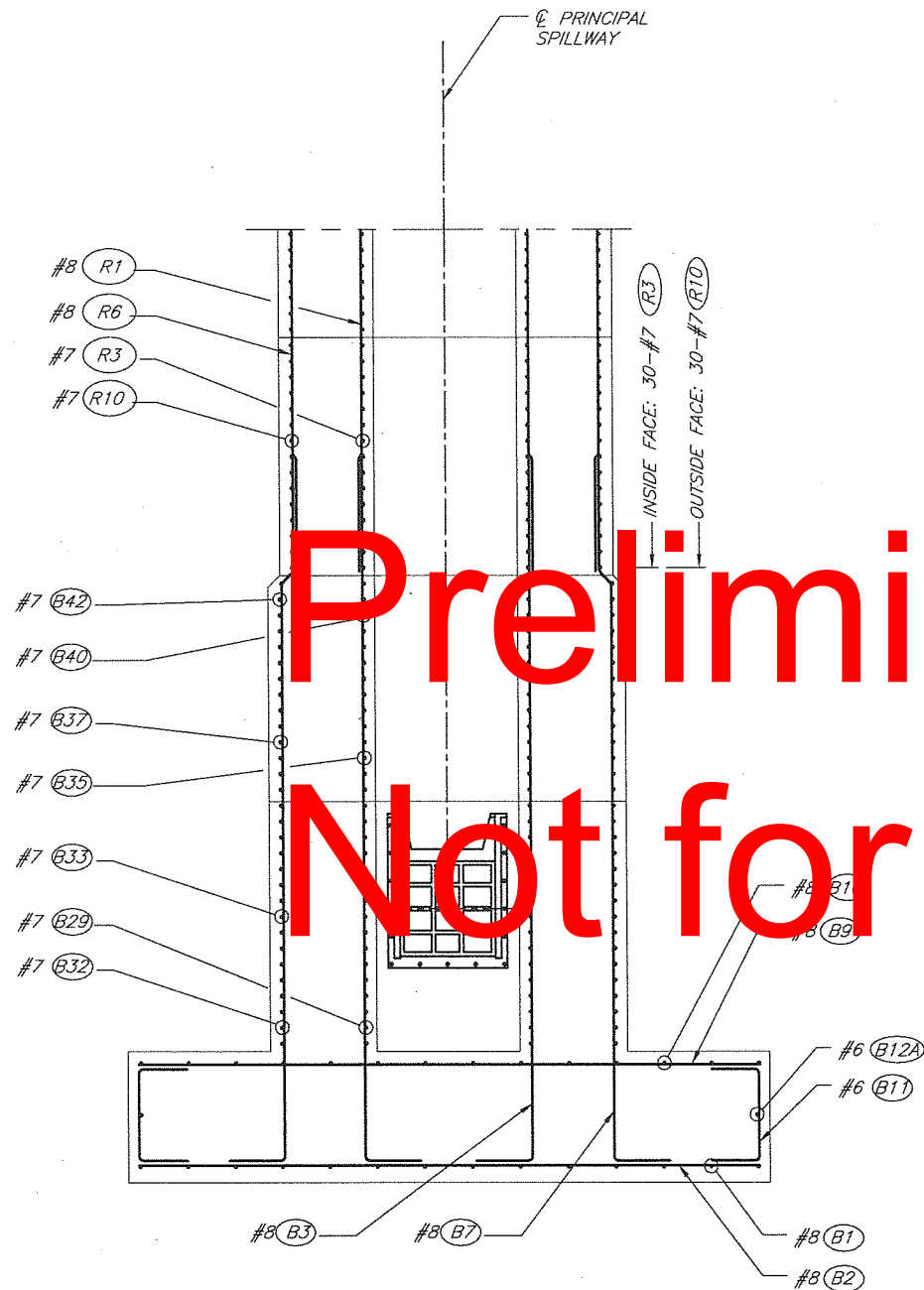
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
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File Name  
Drawing Name

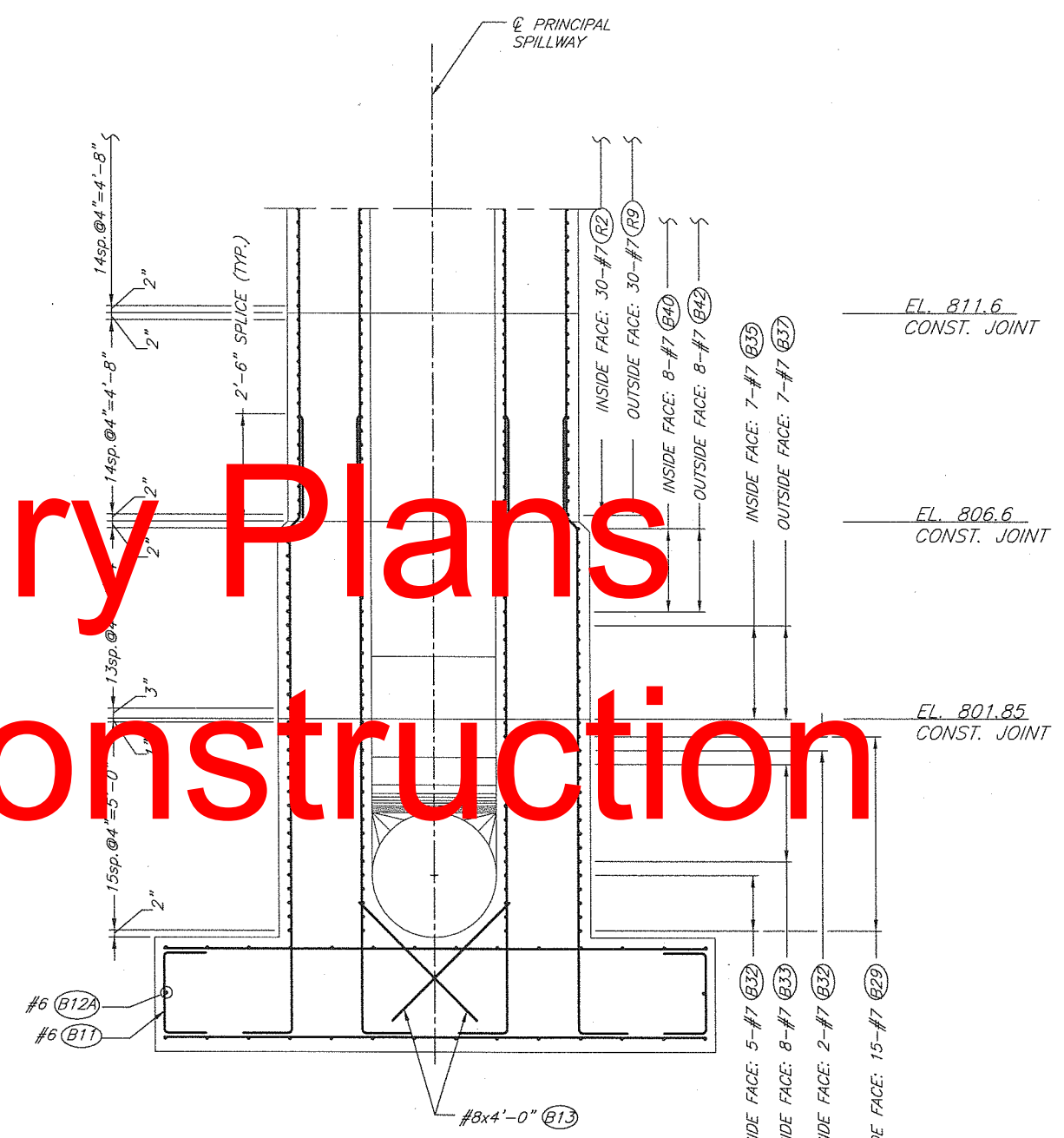




GATE-WELL CROSS-SECTION  
SCALE: 1/2" = 1'-0"

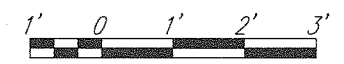
NOTE 1: FOR BAR SPACING DIMENSIONS,  
SEE RISER-WELL CROSS-SECTION  
ON PLATE S-23

2: GATE SHOWN FOR REFERENCE



RISER-WELL CROSS-SECTION  
SCALE: 1/2" = 1'-0"

NOTE: SYMMETRIC ABOUT  $\phi$   
PRINCIPAL SPILLWAY



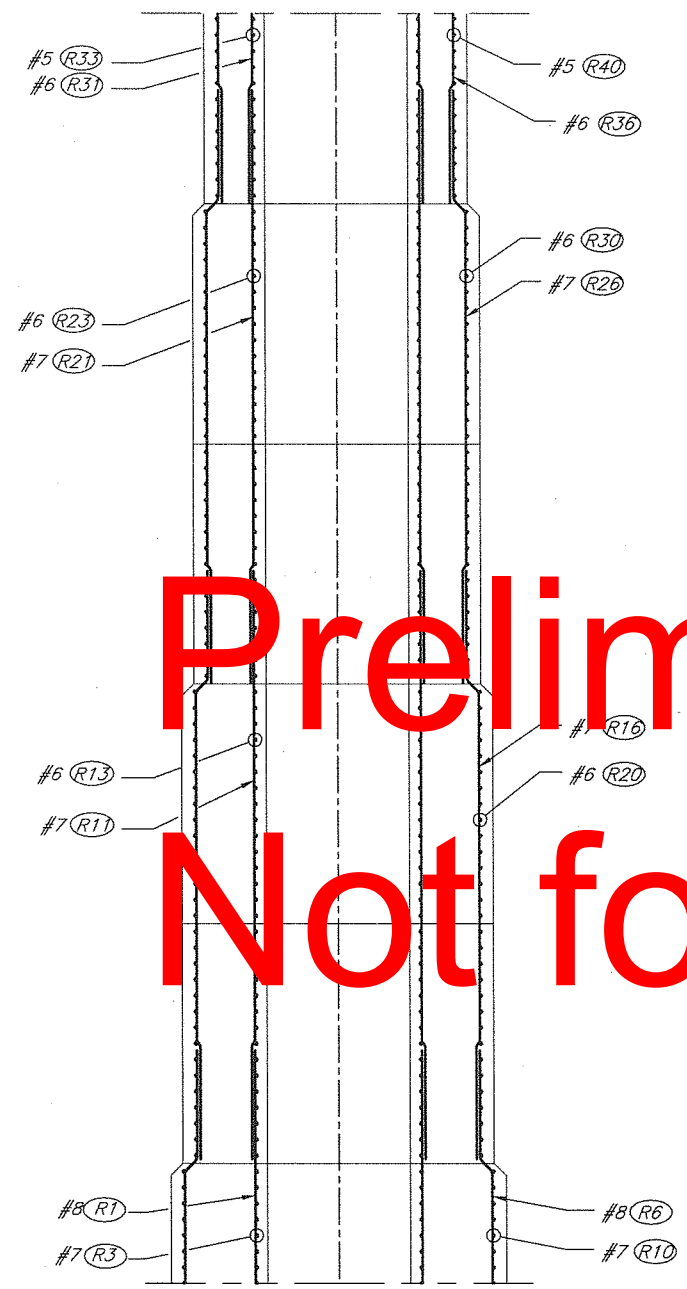
Preliminary Plans  
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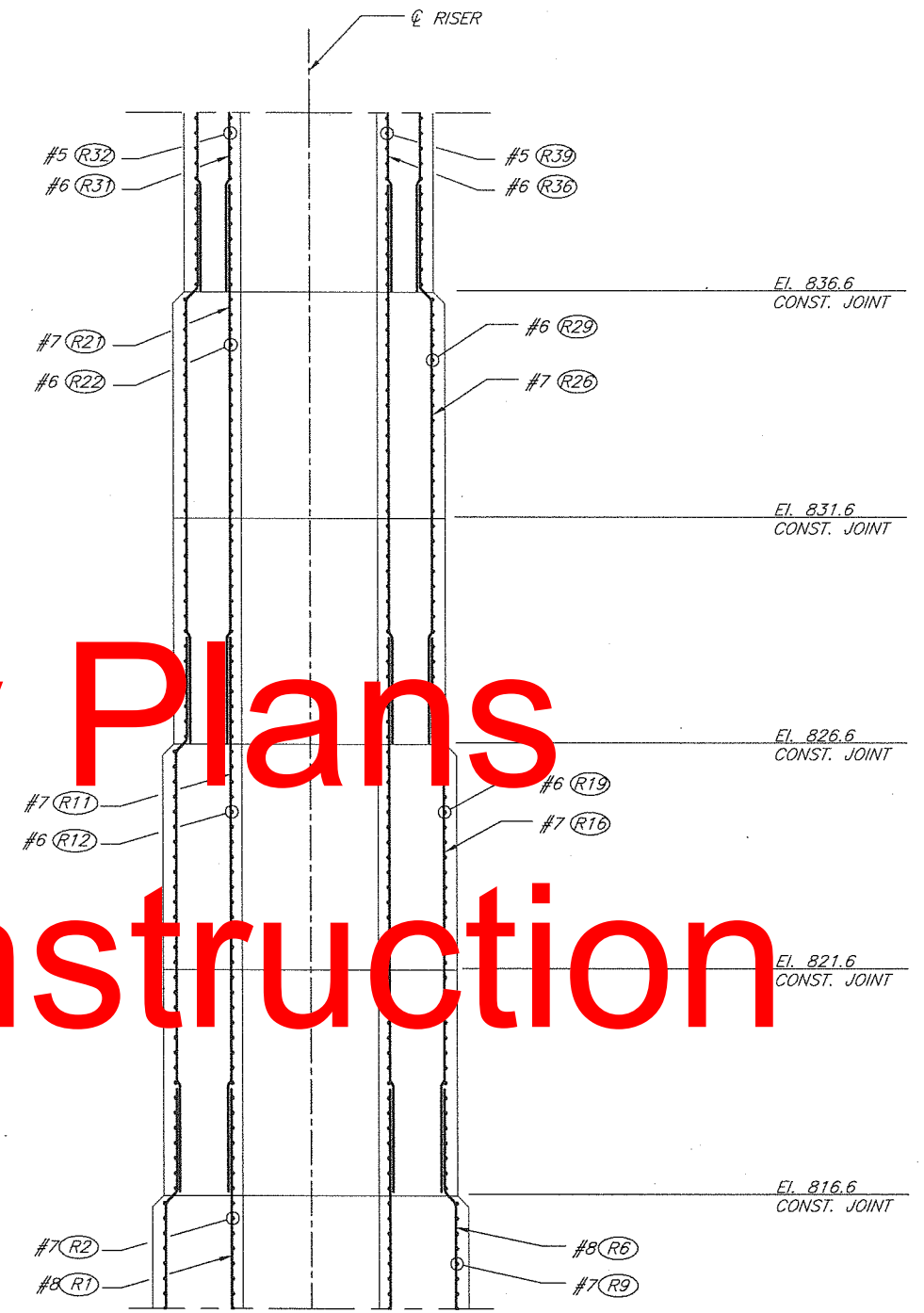
Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name	
Drawing Name	

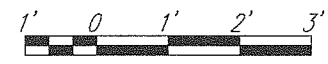


GATE-WELL CROSS-SECTION  
SCALE: 1/2" = 1'-0"  
A  
S-5



RISER-WELL CROSS-SECTION  
SCALE: 1/2" = 1'-0"  
B  
S-5

Preliminary Plans  
Not for Construction

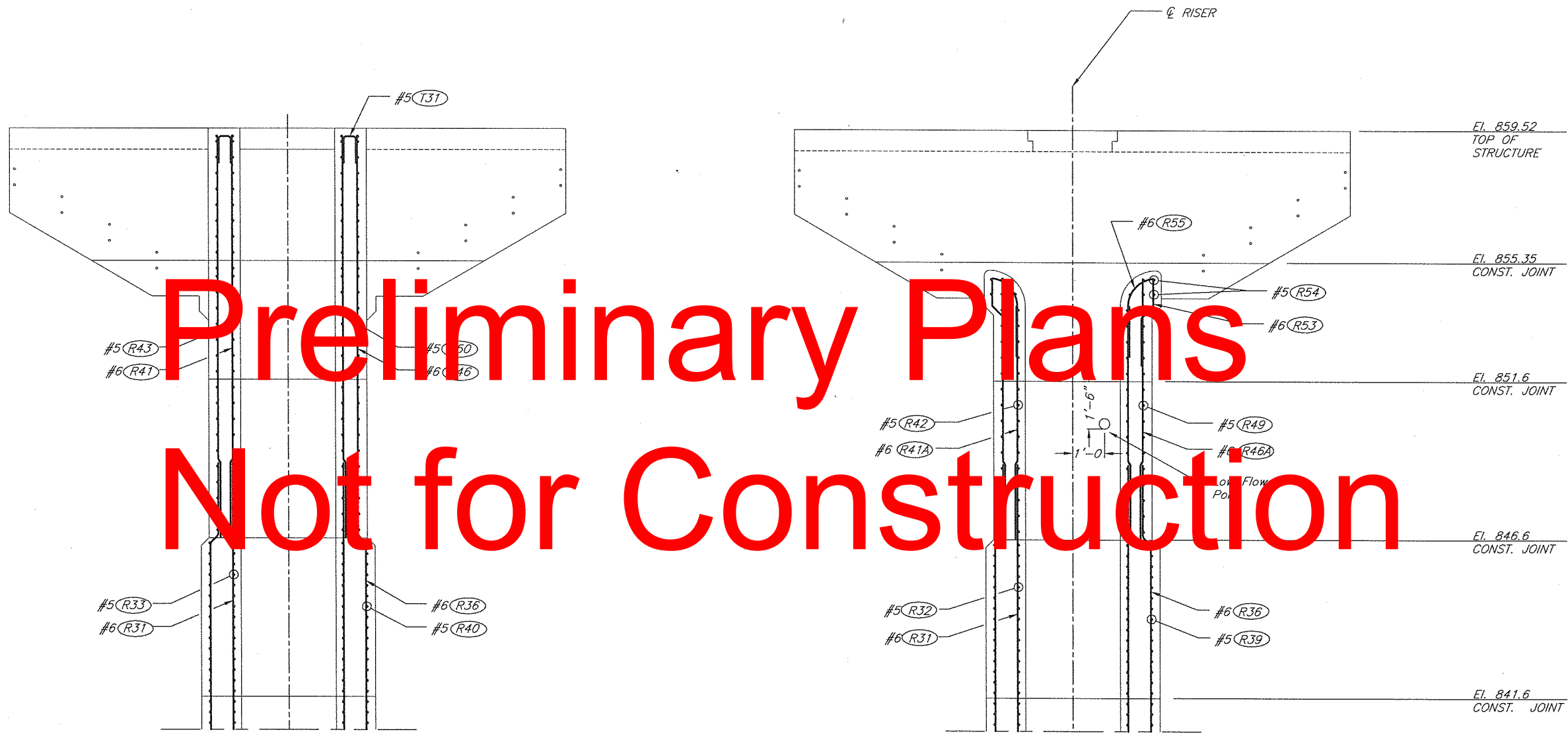


Designed	L. F. Fragomeli	Date	May 08
Drawn	J. Renteria		May 08
Checked	BBV, MDS		Sept. 08
Approved			

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
Drawing Name

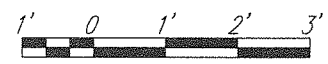


Preliminary Plans  
Not for Construction

GATE-WELL CROSS-SECTION  
SCALE: 1/2" = 1'-0"  
A  
S-5

RISER-WELL CROSS-SECTION  
SCALE: 1/2" = 1'-0"  
B  
S-5

NOTE: SYMMETRIC ABOUT Q  
STRUCTURE



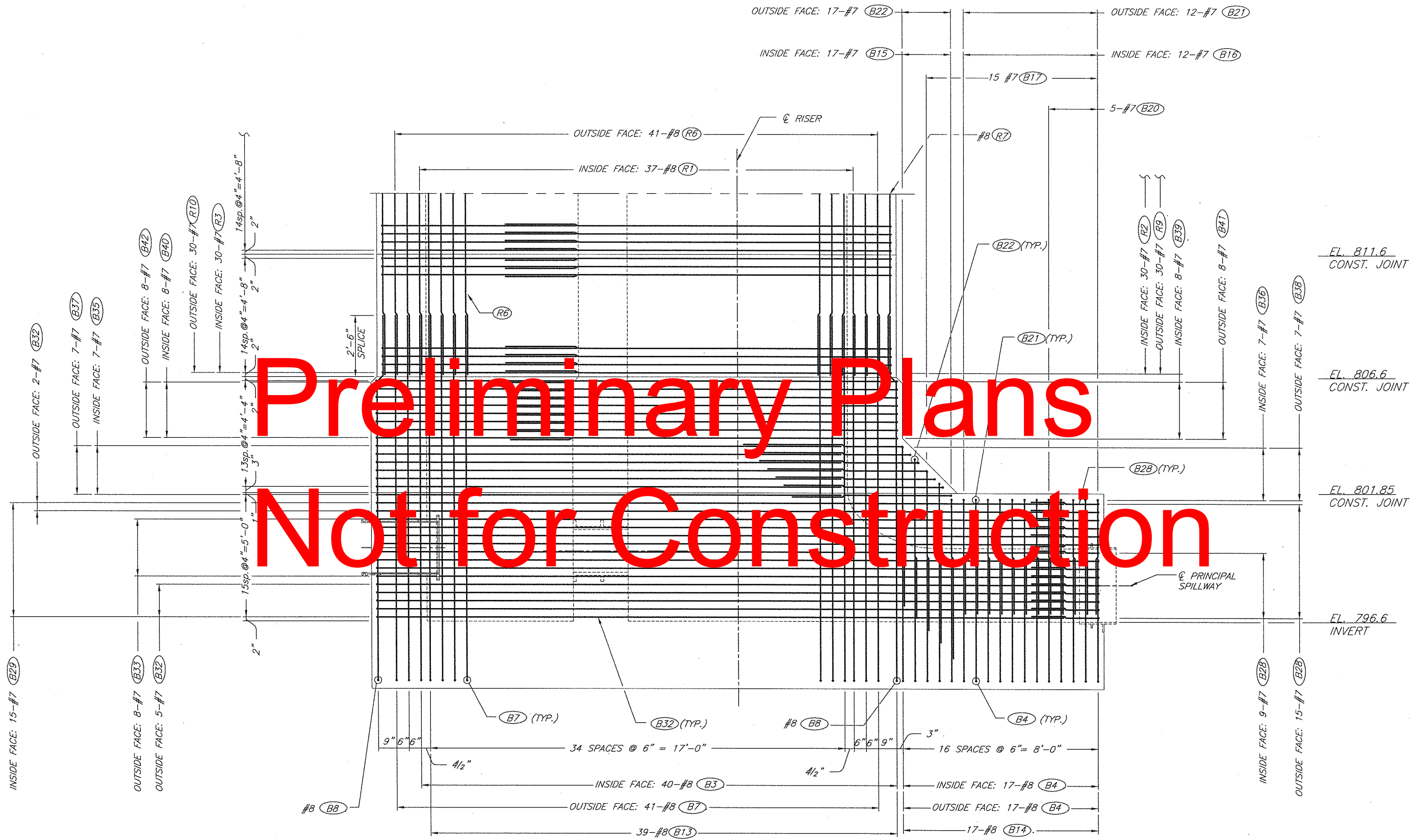
Designed	L. F. Fragomeli	Date	May 08
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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
Drawing Name

# Preliminary Plans Not for Construction



SIDEWALL  
SCALE: 1/2" = 1'-0"

NOTE: OUTSIDE FACE BARS SHOWN;  
INSIDE FACE BARS SIMILAR  
FOR BARS (B13) SEE PLATE S-23

FOR BARS (B14) (B15) (B16) (B17) (B21) (B22) SEE PLATE S-40

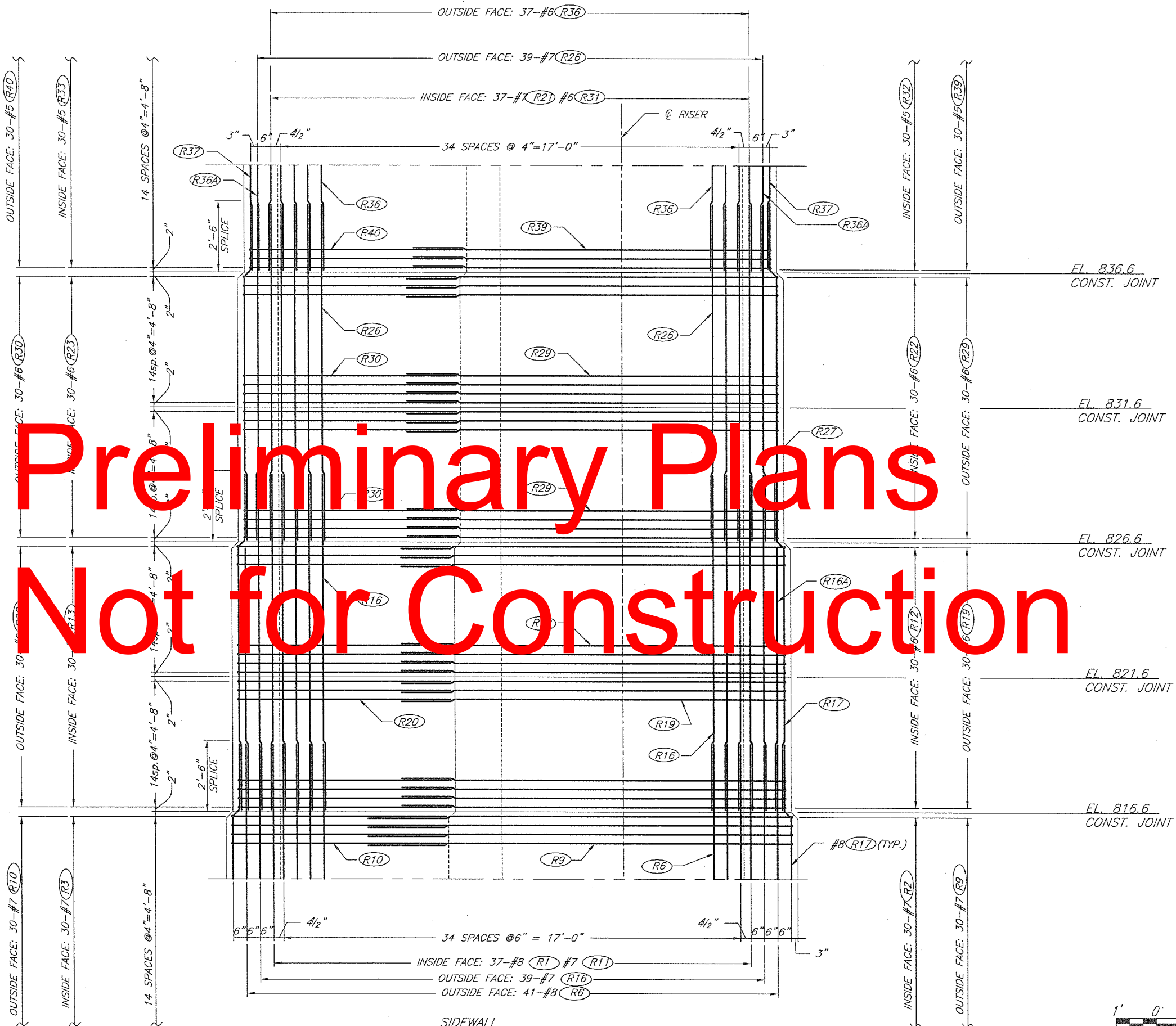


Date	May 08
Designed	L. F. Fragomeli
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Approved	Sept 08

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



Preliminary Plans  
Not for Construction

SIDEWALL  
SCALE: 1/2" = 1'-0"  
NOTE: OUTSIDE FACE SHOWN,  
INSIDE FACE SIMILAR

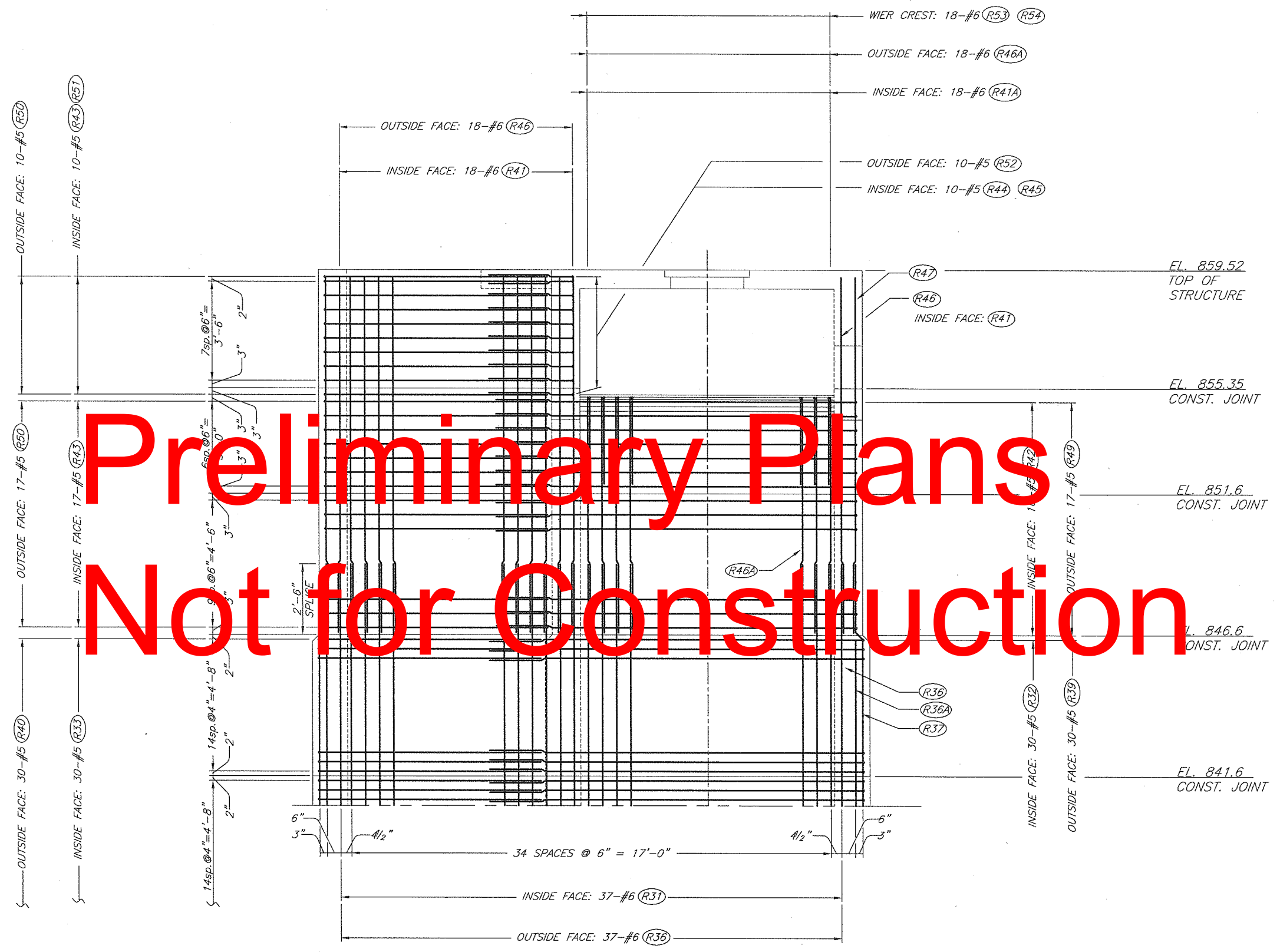
Date	May 08
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



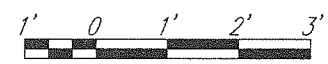
File Name  
Drawing Name





Preliminary Plans  
Not for Construction

SIDEWALL  
SCALE: 1/2" = 1'-0"  
NOTE: OUTSIDE FACE SHOWN,  
INSIDE FACE SIMILAR

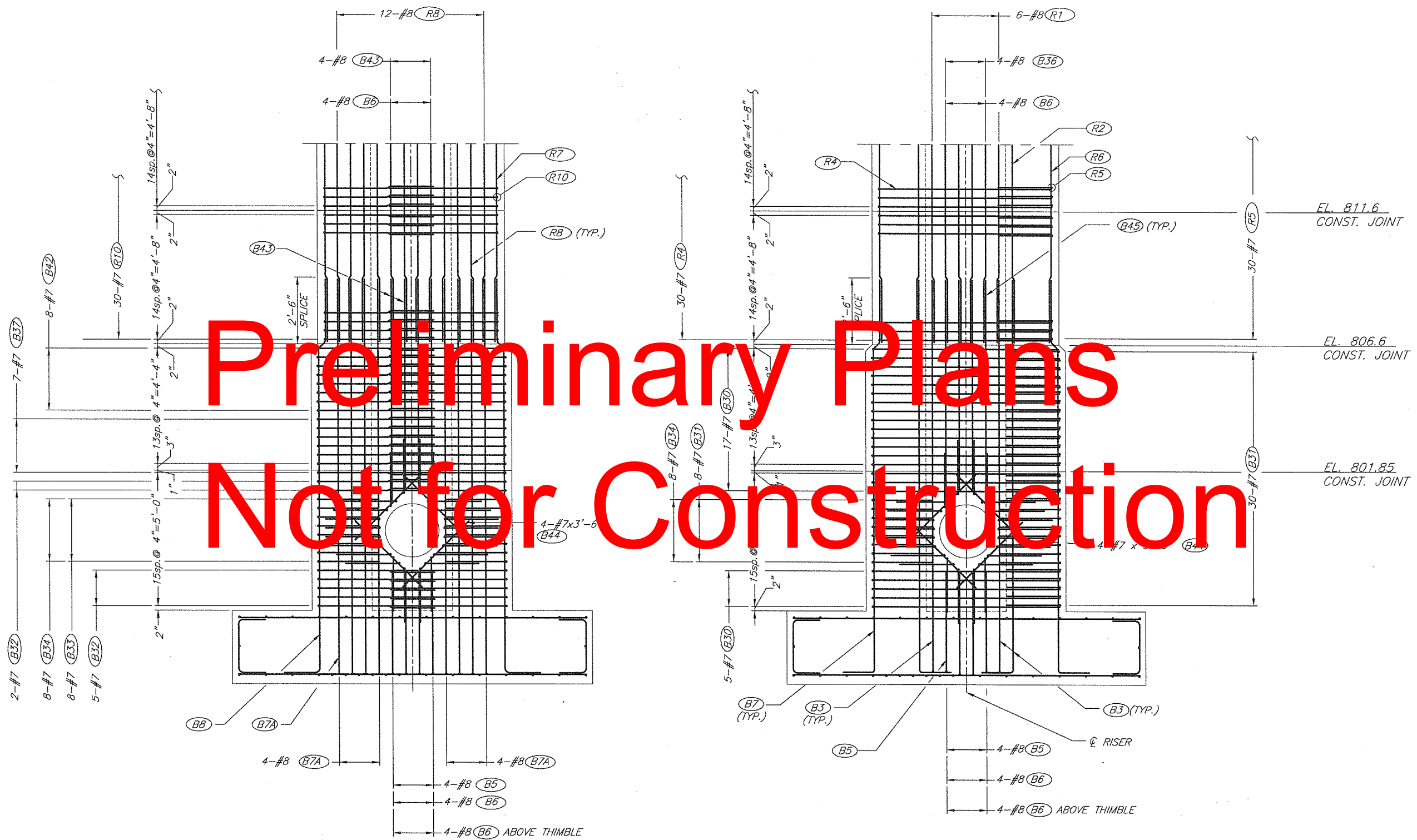


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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name

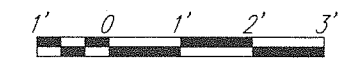


Preliminary Plans  
Not for Construction

OUTSIDE FACE UPSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

INSIDE FACE UPSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

NOTE: SYMMETRIC ABOUT  $\phi$  RISER

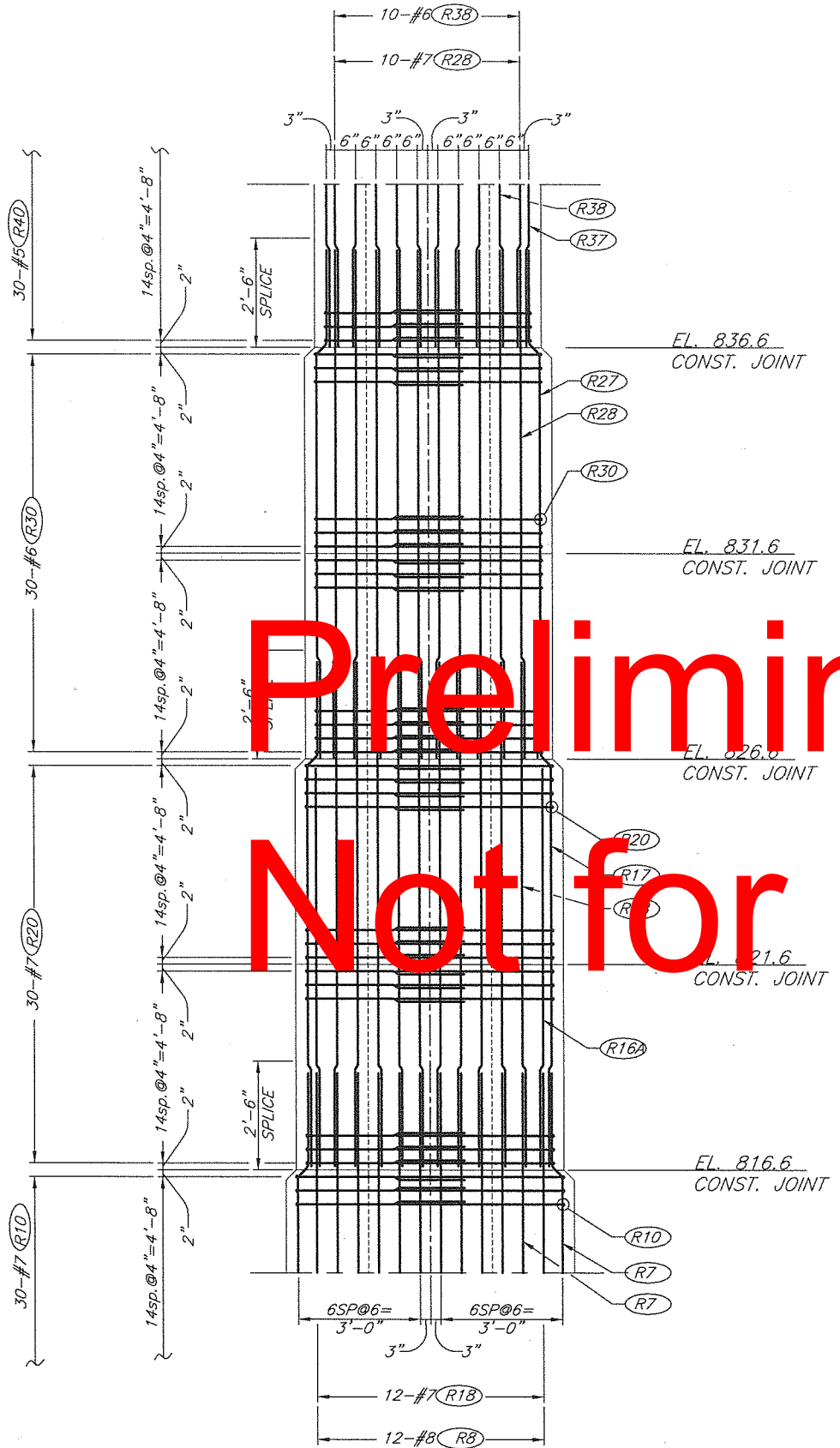


Designed	L. Fragomeli	Date	May 08
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

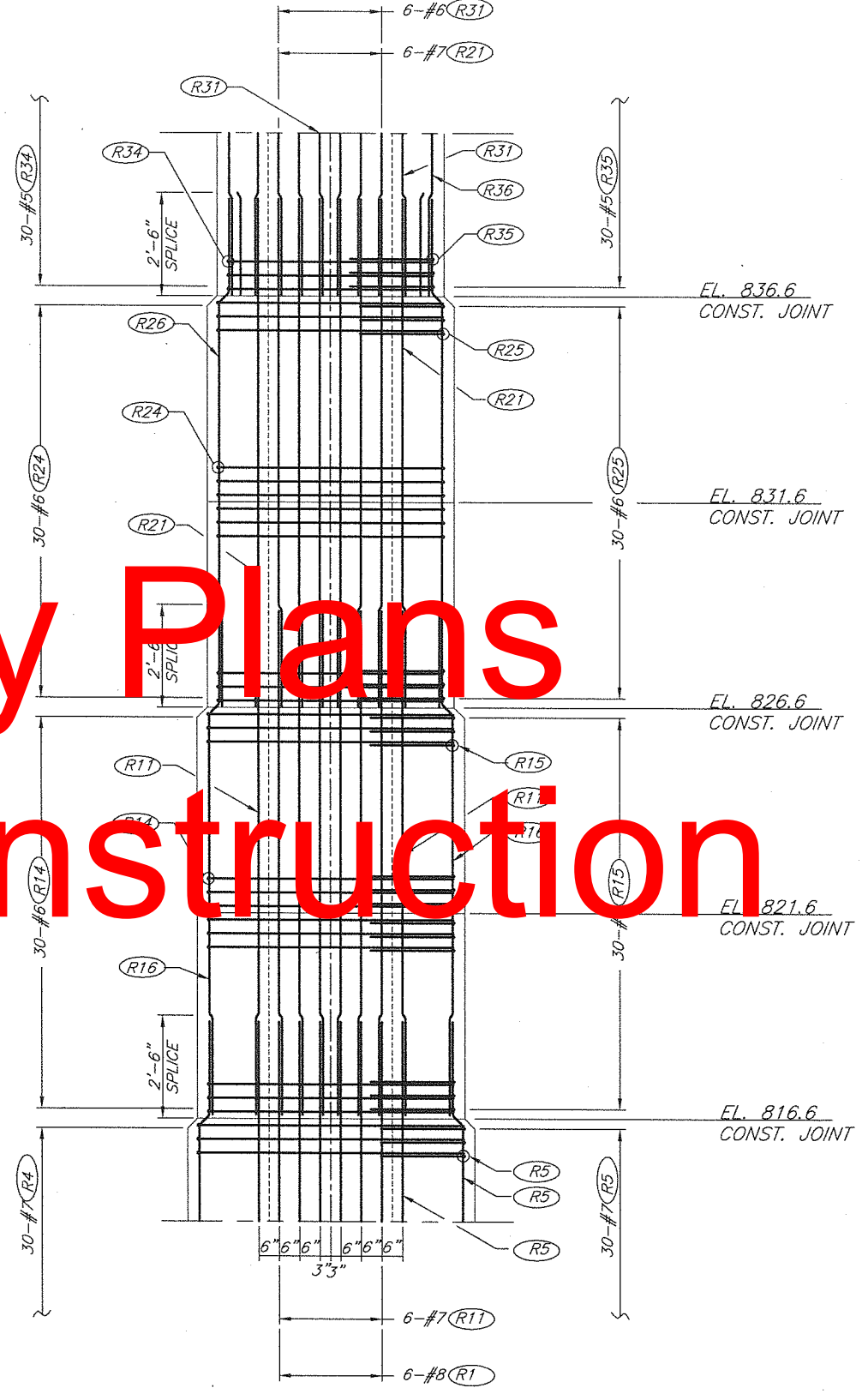


File Name	
Drawing Name	



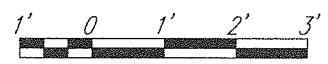
OUTSIDE FACE UPSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

P  
S-5



INSIDE FACE UPSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

P  
S-5



Preliminary Plans  
Not for Construction

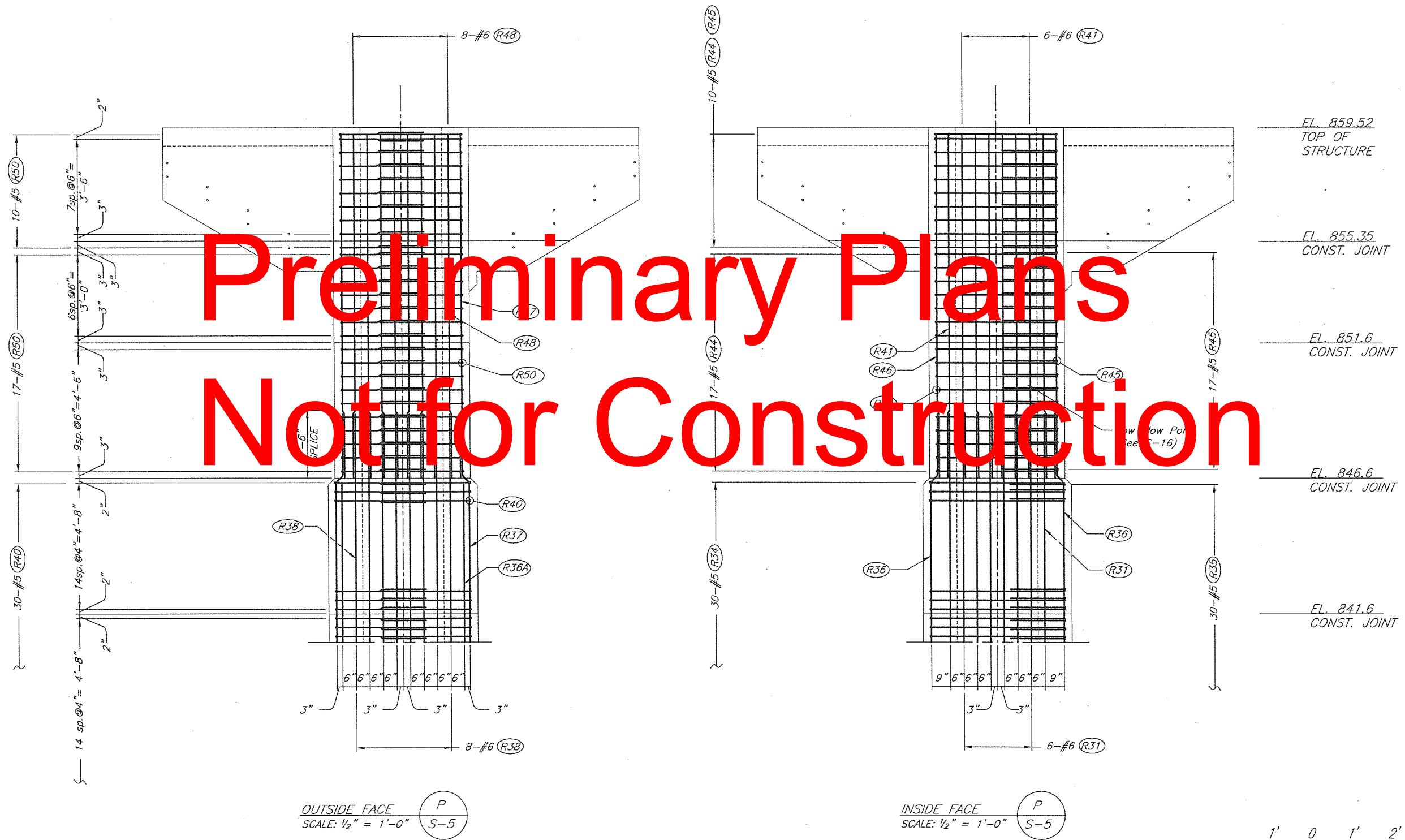
Designed	L. F. Fragomeli	Date	May 08
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name

Preliminary Plans  
Not for Construction



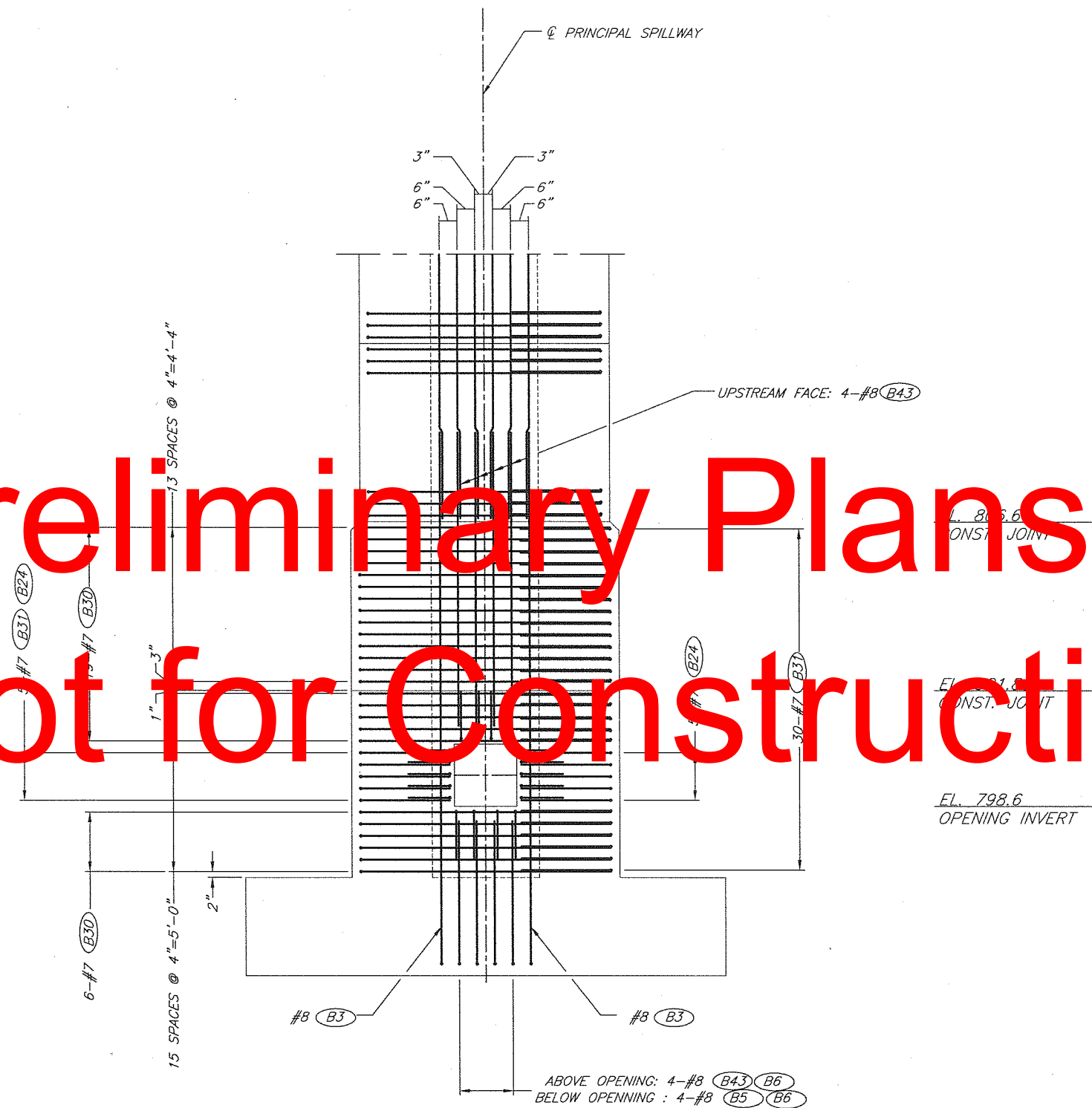
Date: May 08  
 Designed: L. F. Fragomeli  
 Drawn: J. Renteria  
 Checked: BBY, MDS  
 Approved: \_\_\_\_\_  
 Date: May 08  
 Date: Sept 08

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name: \_\_\_\_\_  
 Drawing Name: \_\_\_\_\_

# Preliminary Plans Not for Construction



CENTER WALL  
SCALE: 1/2" = 1'-0"

NOTE: FOR BARS (B5) (B6) (B36) SEE ALSO PLATE S-20



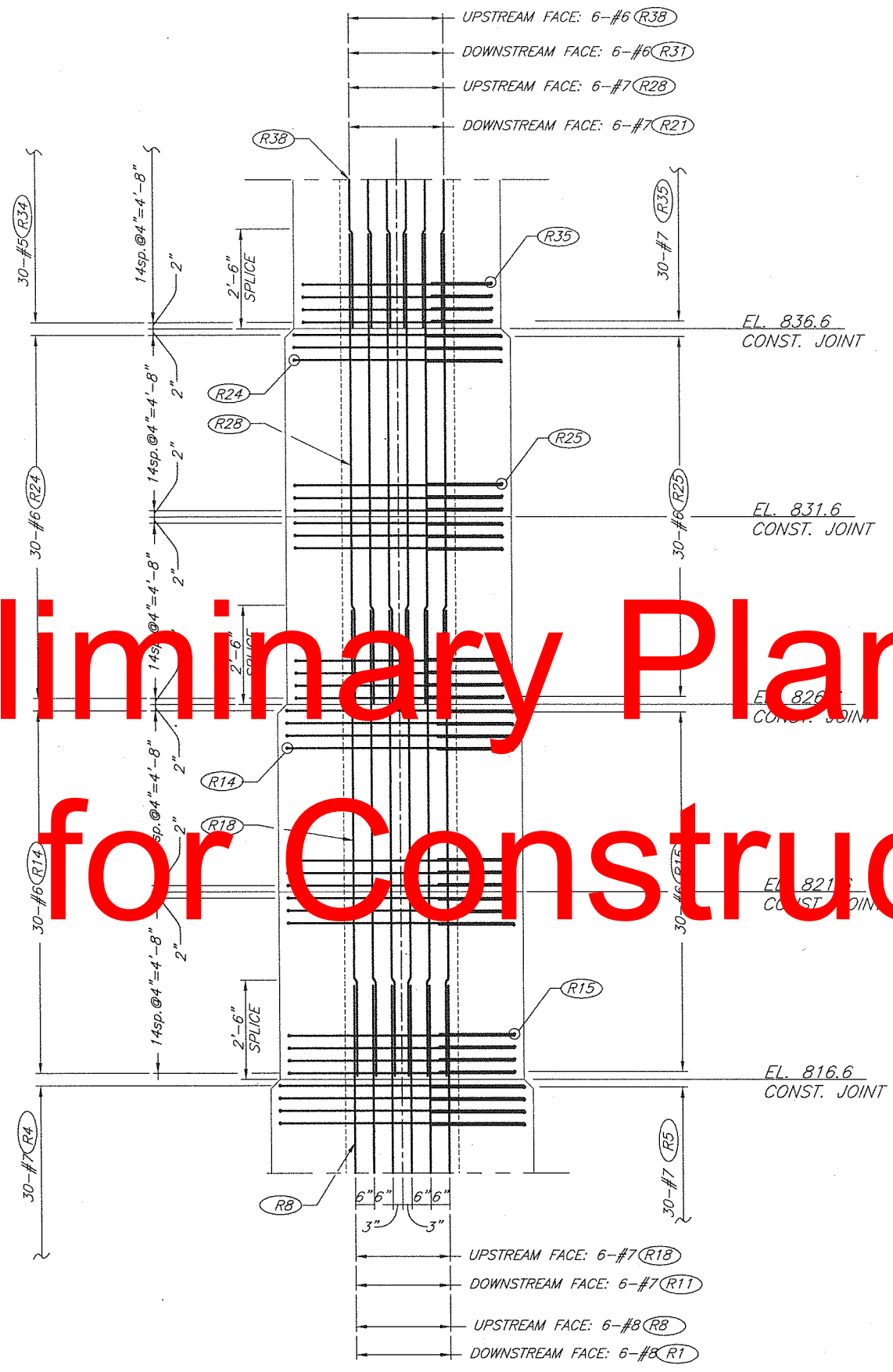
Designed	L. F. Fragomeli	Date	May 08
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

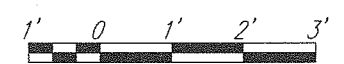


File Name  
Drawing Name

# Preliminary Plans Not for Construction



CENTER WALL  
SCALE: 1/2" = 1'-0"

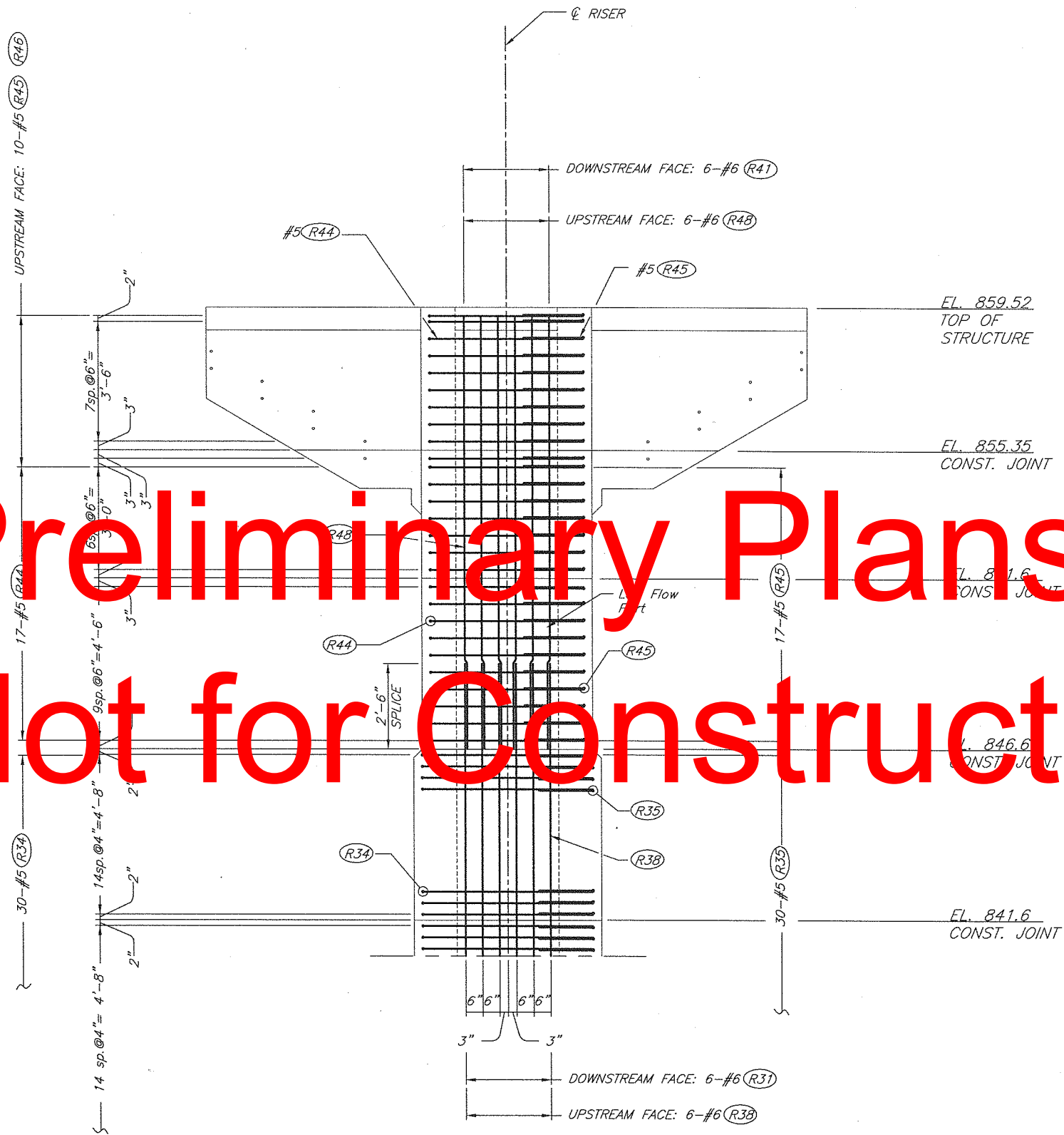


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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

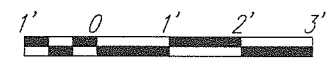


# Preliminary Plans Not for Construction



CENTER WALL  
SCALE: 1/2" = 1'-0"

- NOTES:
1. SYMMETRIC ABOUT  $\phi$  RISER
  2. UPSTREAM FACE SHOWN;  
DOWNSTREAM FACE SIMILAR EXCEPT AS NOTED.

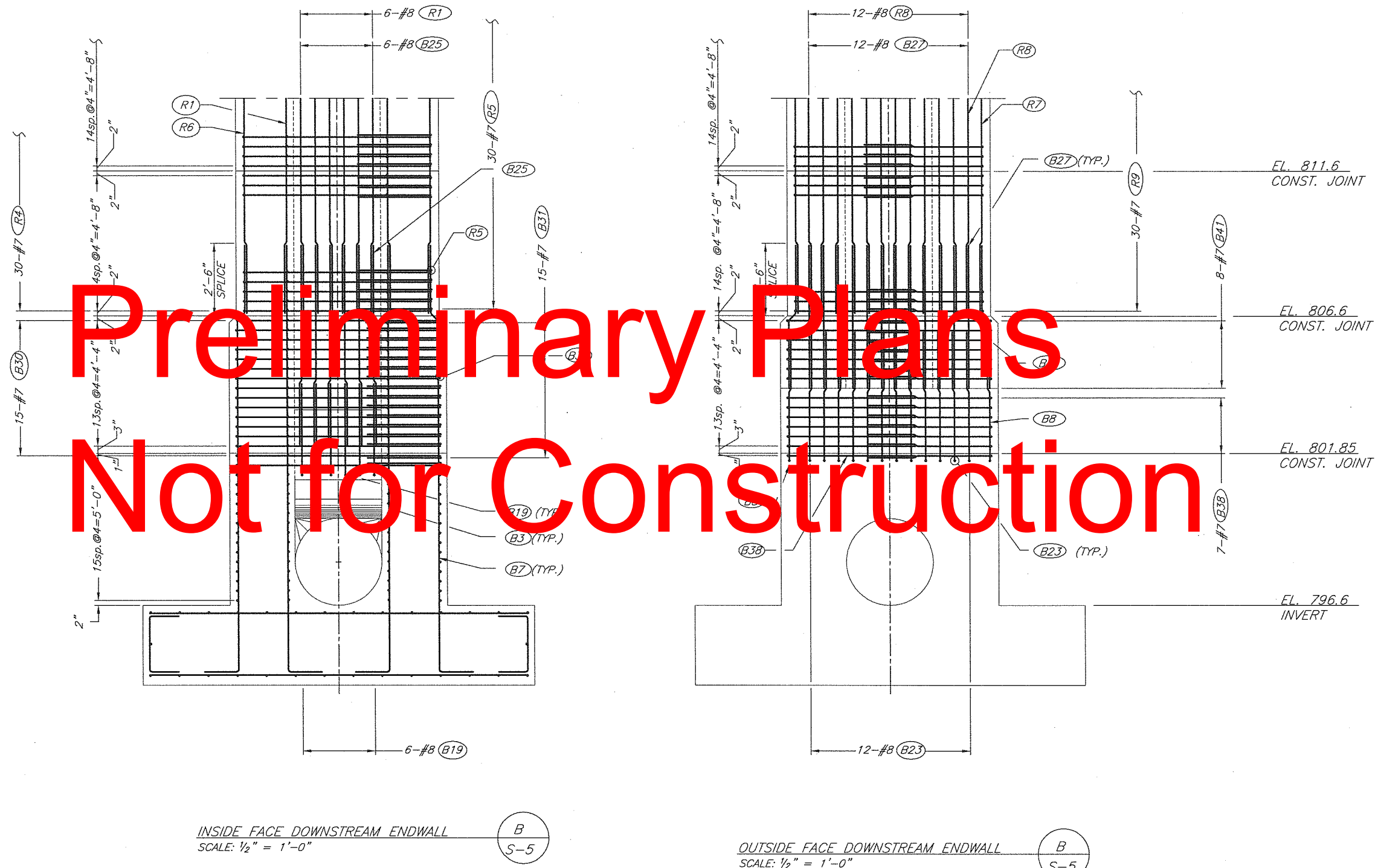


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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name	
Drawing Name	



INSIDE FACE DOWNSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

B  
S-5

OUTSIDE FACE DOWNSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

B  
S-5



Designed	L. F. Fragomeli	Date	May 08
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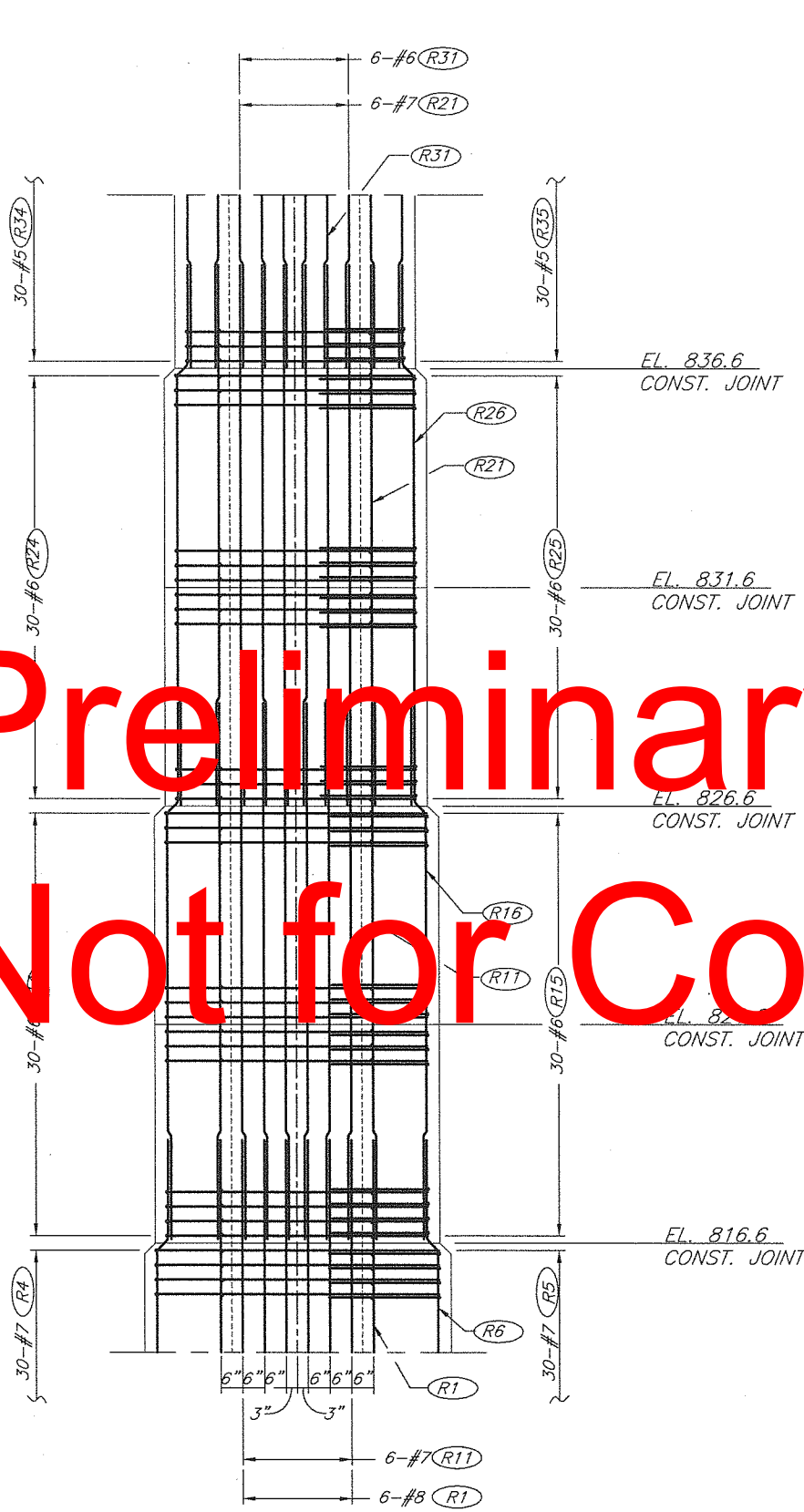
Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



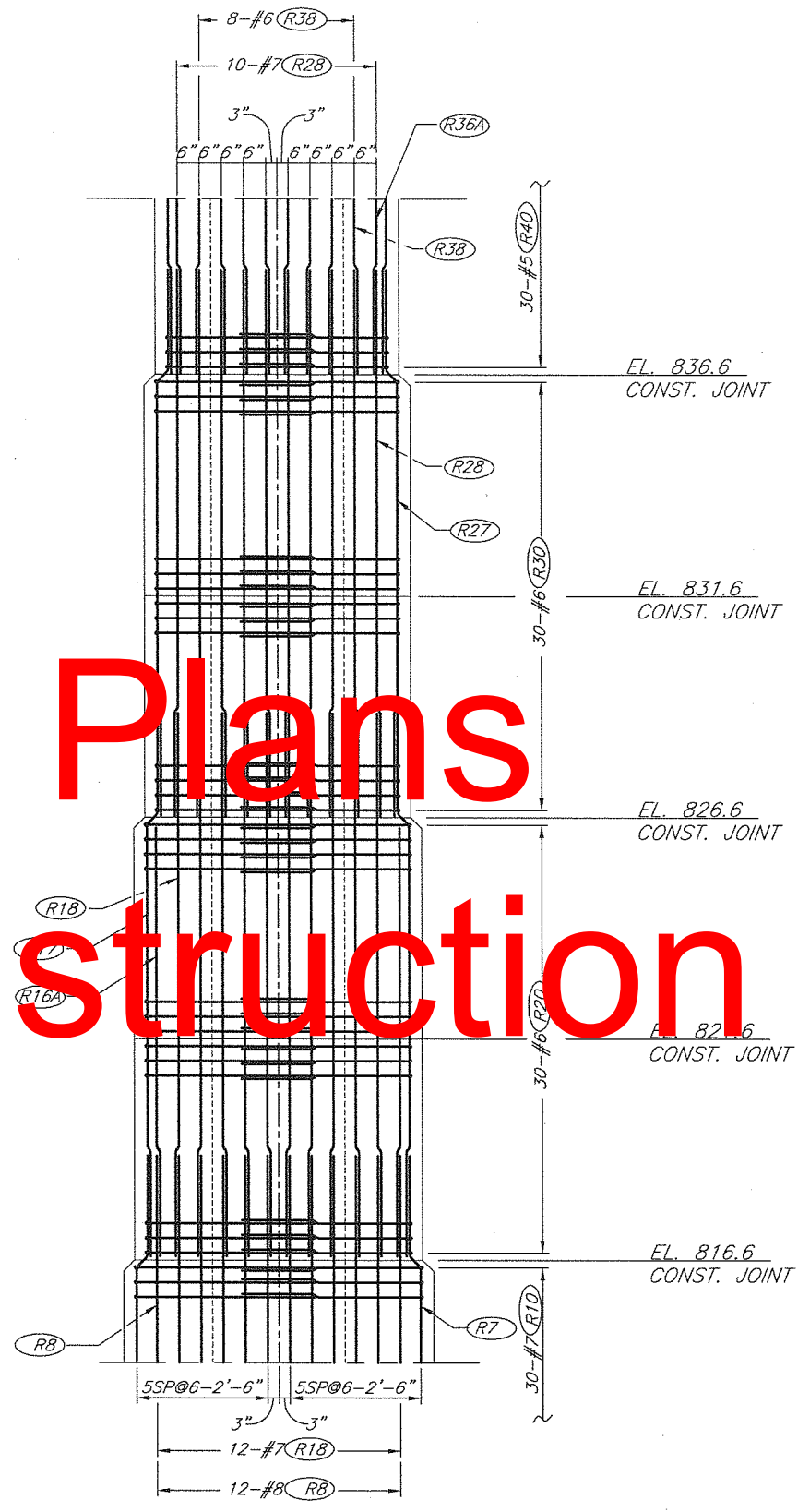
File Name	
Drawing Name	
Sheet	62 of 117



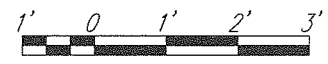
# Preliminary Plans Not for Construction



INSIDE FACE DOWNSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"



OUTSIDE FACE DOWNSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

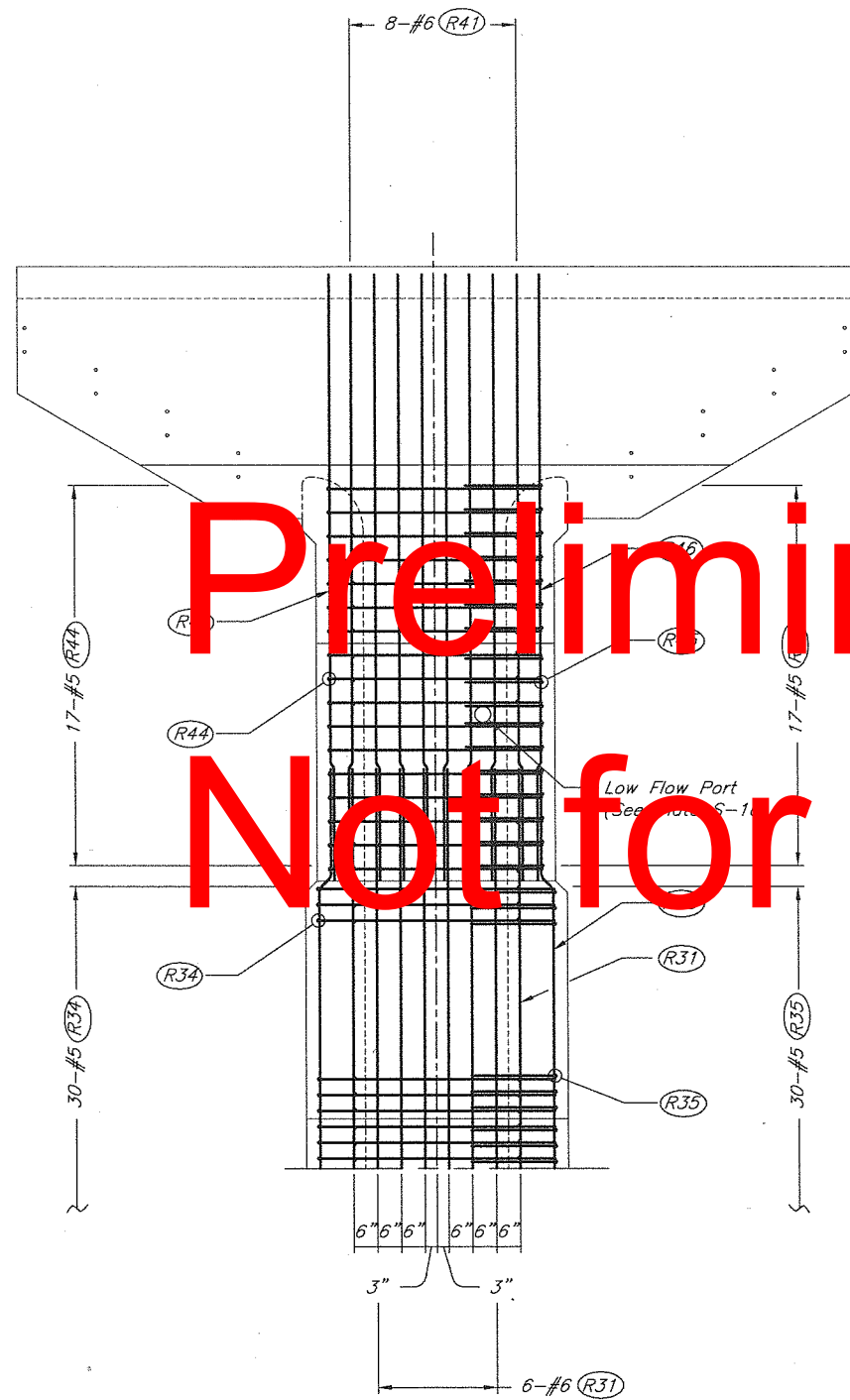


Date: May 08  
 Designed: L. F. Fragomeli  
 Drawn: J. Renteria  
 Checked: BBV, MDS  
 Approved: \_\_\_\_\_  
 Date: May 08  
 Date: Sept 08

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

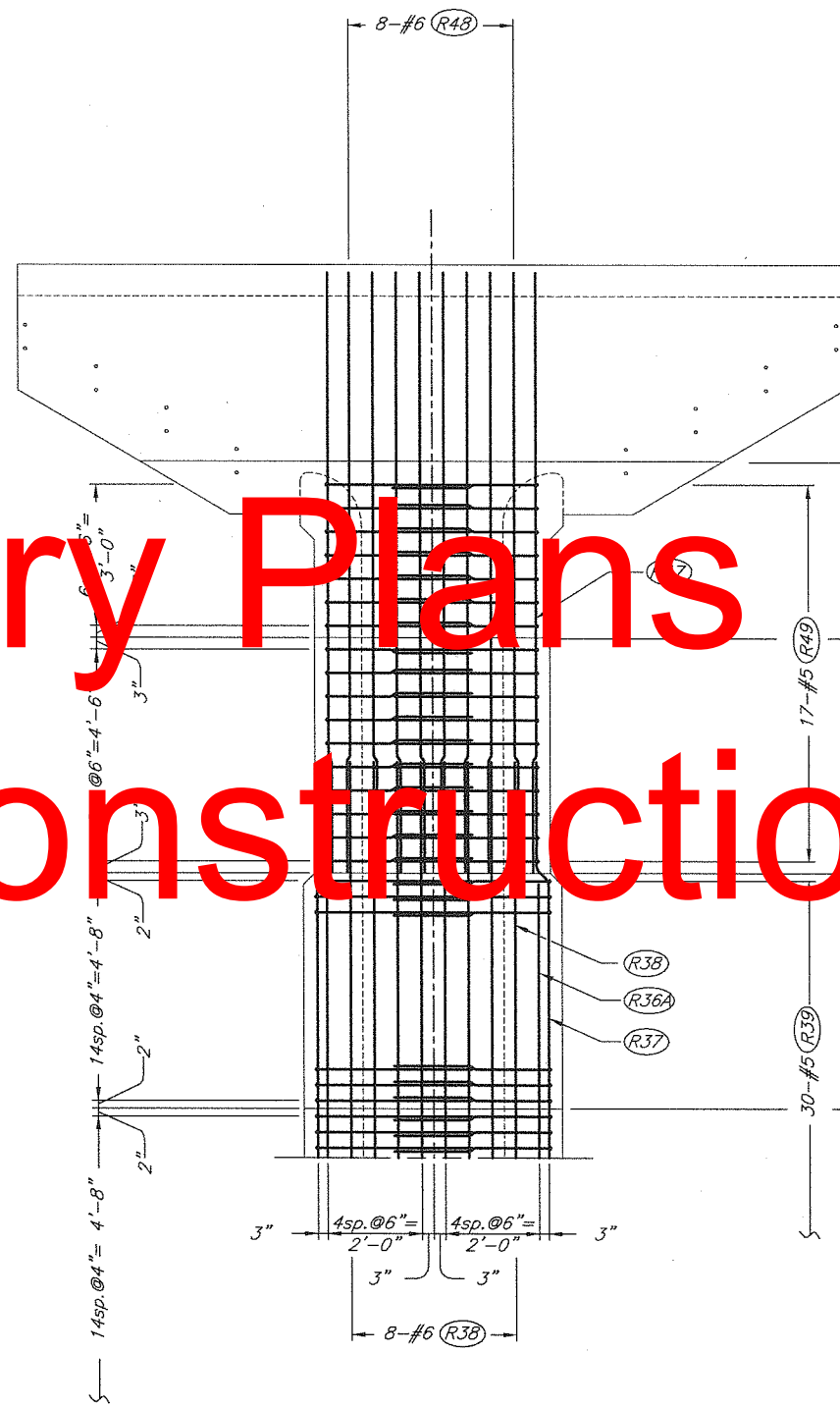


File Name: \_\_\_\_\_  
 Drawing Name: \_\_\_\_\_



INSIDE FACE DOWNSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

B  
S-5



OUTSIDE FACE DOWNSTREAM ENDWALL  
SCALE: 1/2" = 1'-0"

B  
S-5



Preliminary Plans  
Not for Construction

FL. 859.52  
TOP OF  
STRUCTURE

FL. 855.35  
CONST. JOINT

FL. 851.6  
CONST. JOINT

FL. 846.6  
CONST. JOINT

FL. 841.6  
CONST. JOINT

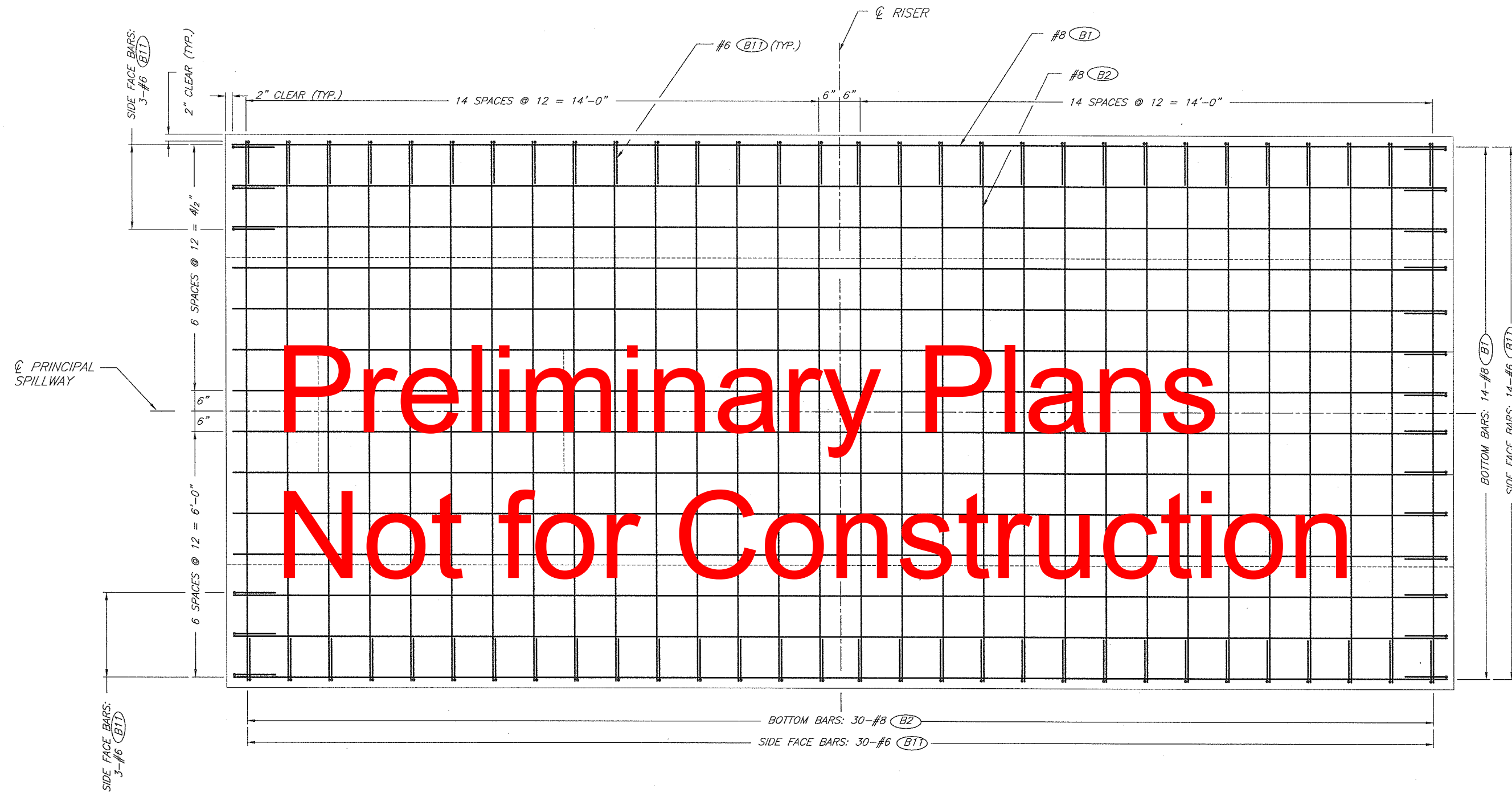
Designed	L. F. Fragomeli	Date	May 08
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name

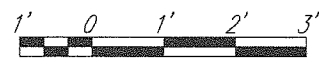
Drawing Name



Preliminary Plans  
Not for Construction

**REINFORCEMENT: FOOTING**  
 SCALE: 3/4" = 1'-0"  
 BOTTOM BARS

**NOTES:**  
 1. SYMMETRIC ABOUT  $\phi$  PRINCIPAL SPILLWAY  
 2. SYMMETRIC ABOUT  $\phi$  RISER

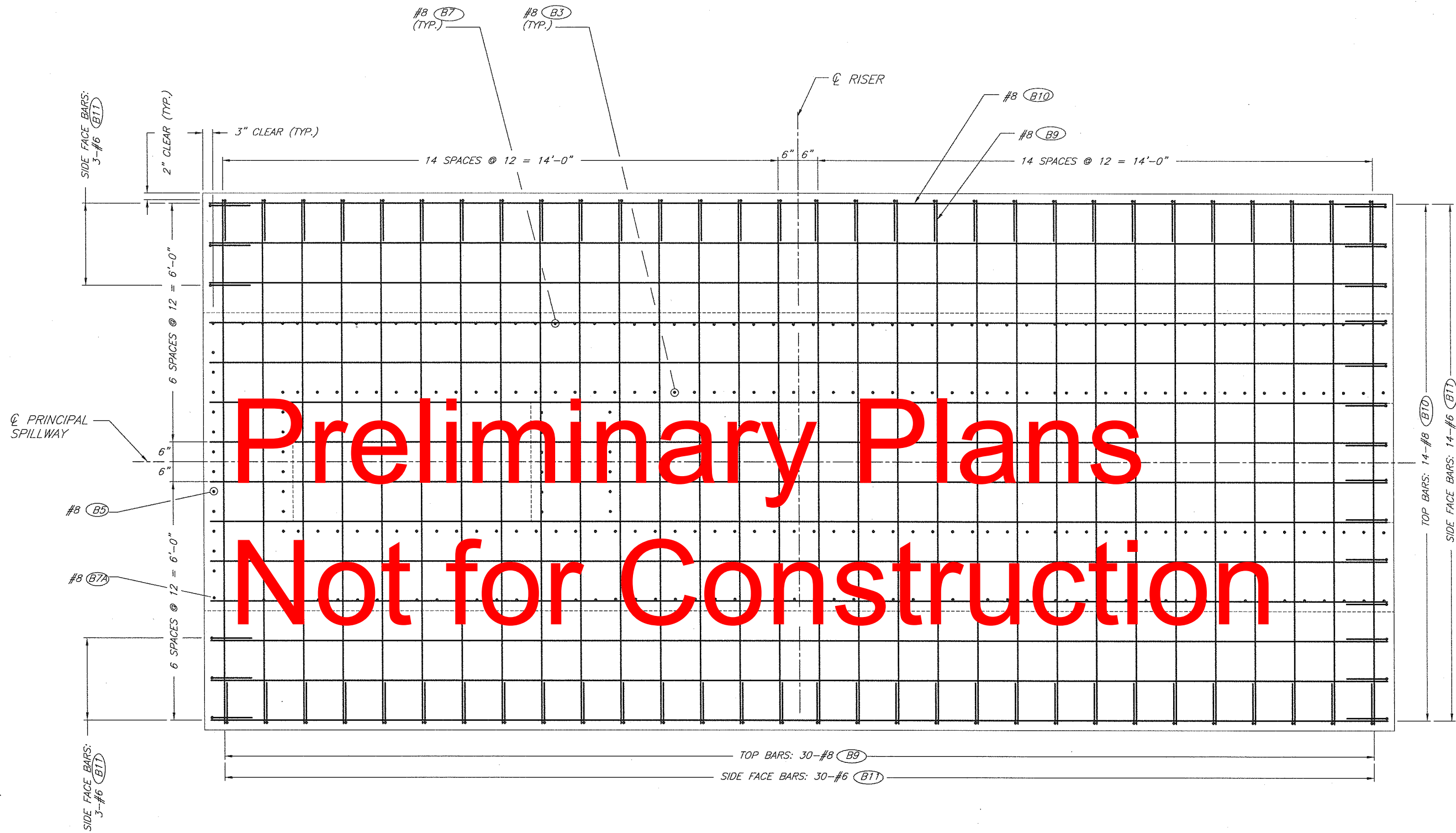


Date  
 Designed L. F. Fragomeli May 08  
 Drawn J. Renteria May 08  
 Checked BBV, MDS Sept 08  
 Approved

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name  
 Sheet 65 of 117



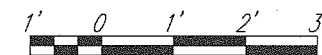
Preliminary Plans  
Not for Construction

REINFORCEMENT: FOOTING  
SCALE: 3/4" = 1'-0"

TOP BARS

NOTES:

1. SYMETRIC ABOUT  $\phi$  PRINCIPAL SPILLWAY.
2. SYMETRIC ABOUT  $\phi$  RISER
3. BARS (B3) (B5) (B7) (B7A) SHOWN FOR REFERENCE
4. FOR BAR (B12) SEE PLATE S-20.
5. FOR BARS (B12A) (B13) SEE PLATE S-23.

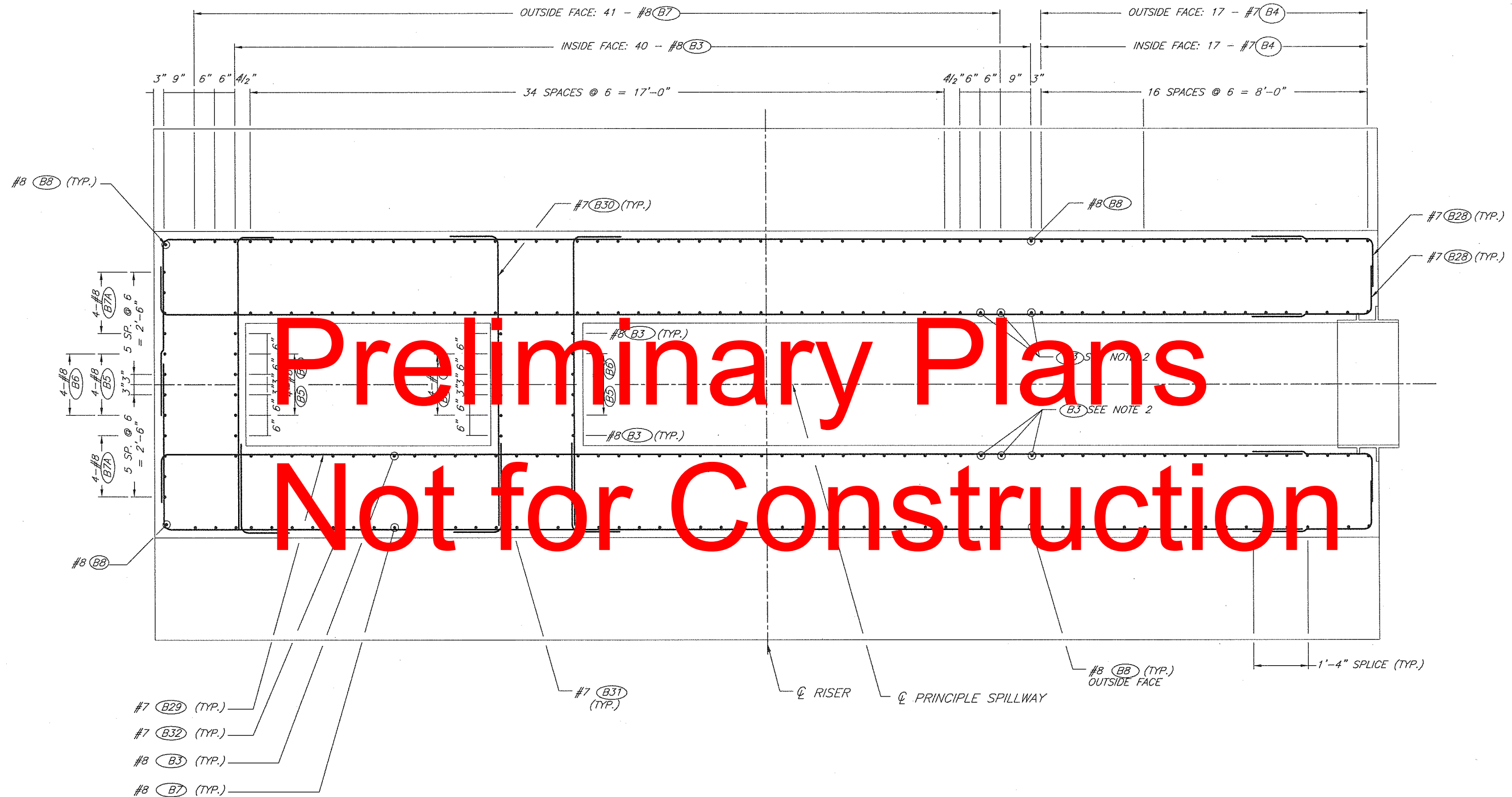


Date	May 08
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Checked	BBV, MDS
Approved	

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



Preliminary Plans  
Not for Construction

REINFORCEMENT: BASE SECTION FROM EL. 796.6 to 798.1  
SCALE: 3/4" = 1'-0"

- NOTES 1: SYMMETRIC ABOUT CL PRINCIPAL SPILLWAY
- 2: NOTED BARS TERMINATE AT EL. 809.1
- 3: FOR BARS B5 AND B6 SEE ALSO PLATE S-20.



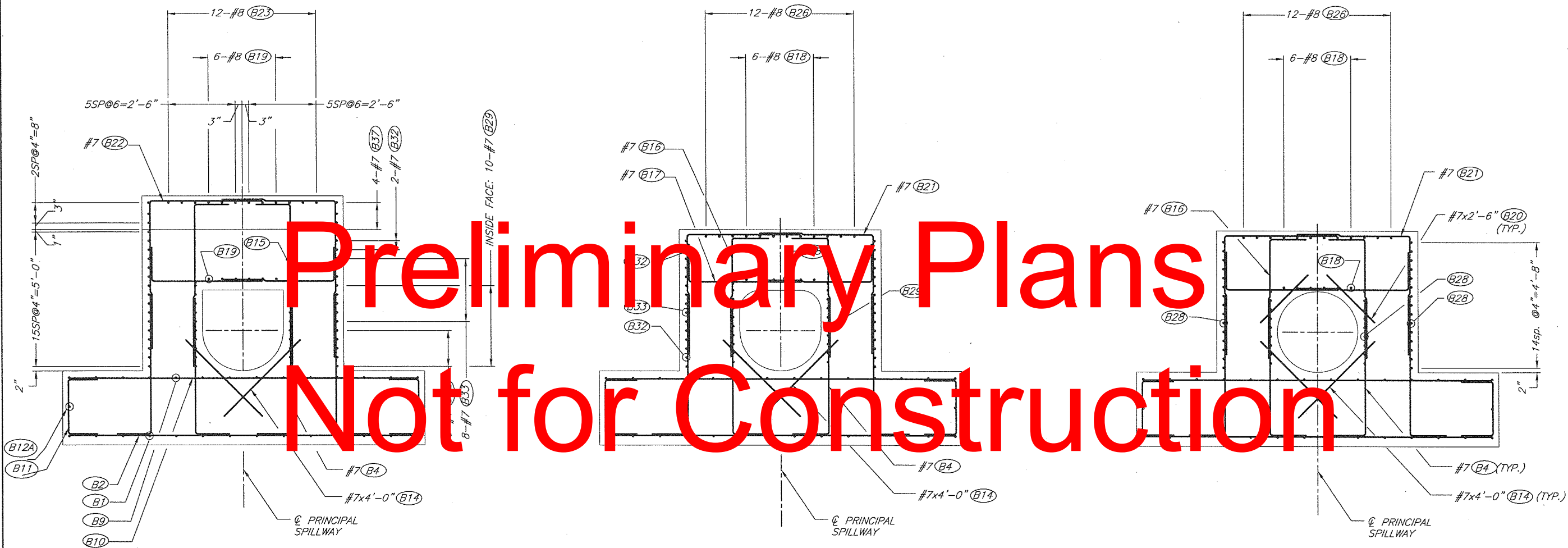
Designed	L. F. Fragameli	Date	May 08
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name	
Drawing Name	

Preliminary Plans  
Not for Construction



SECTION C  
SCALE: 1/2" = 1'-0"  
S-5

NOTE:  
SECTION SHOWN AT 7'-9"  
DOWNSTREAM OF  $\phi$  RISER

SYMMETRIC ABOUT  $\phi$   
PRINCIPAL SPILLWAY

SECTION D  
SCALE: 1/2" = 1'-0"  
S-5

NOTE:  
SECTION SHOWN AT 12'-0"  
DOWNSTREAM OF  $\phi$  RISER

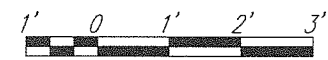
SYMMETRIC ABOUT  $\phi$   
PRINCIPAL SPILLWAY

SECTION E  
SCALE: 1/2" = 1'-0"  
S-5

NOTE:  
SECTION SHOWN AT 13'-6"  
DOWNSTREAM OF  $\phi$  RISER

SYMMETRIC ABOUT  $\phi$   
PRINCIPAL SPILLWAY

NOTES:  
FOR BARS (B18) (B19) SEE PLATE S-20.  
FOR BARS (B14) (B15) (B16) (B17) (B20) (B21) (B22) SEE PLATE S-26.  
FOR BARS (B23) (B26) SEE PLATE S-20.

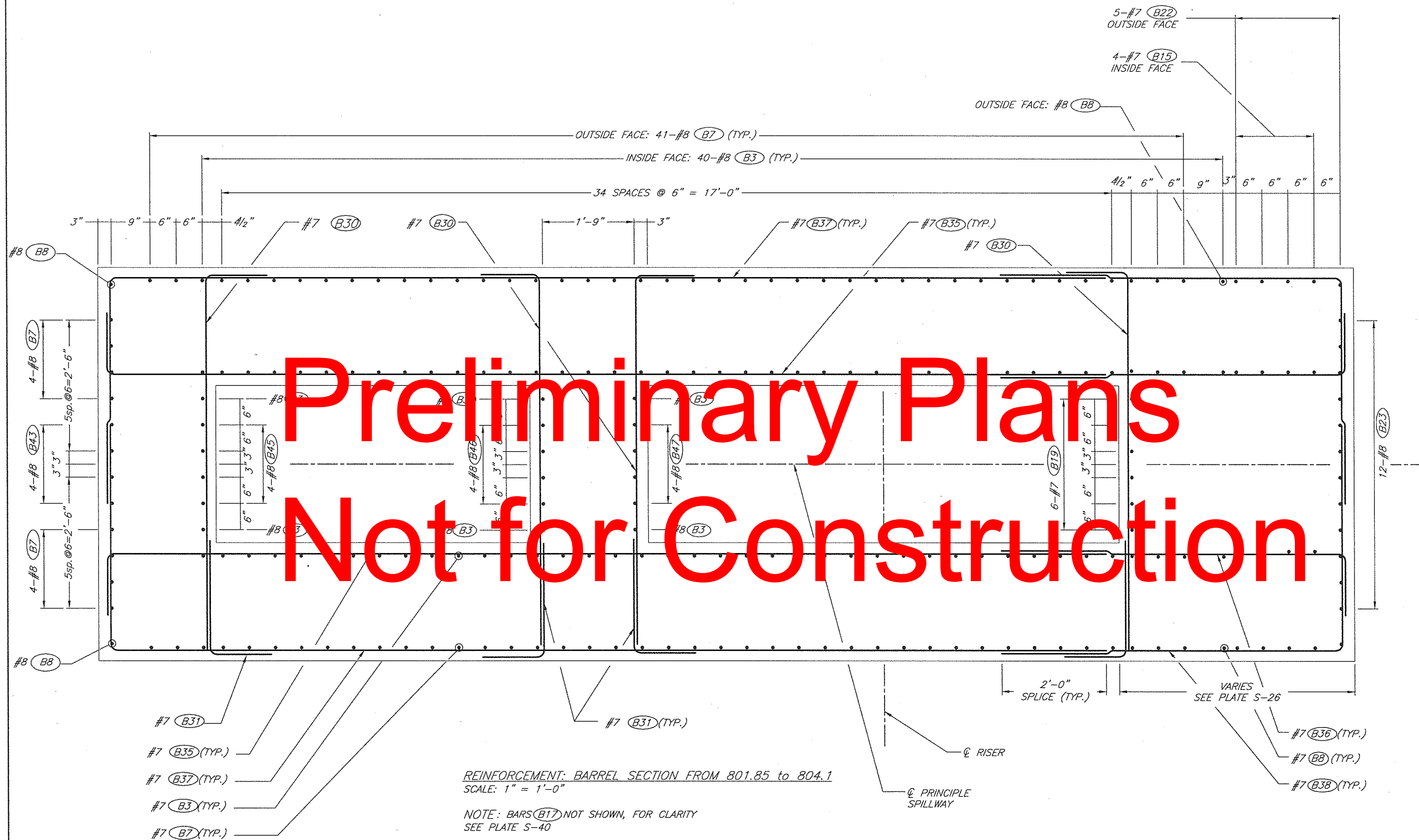


Date  
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Approved

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name  
Sheet 68 of 117



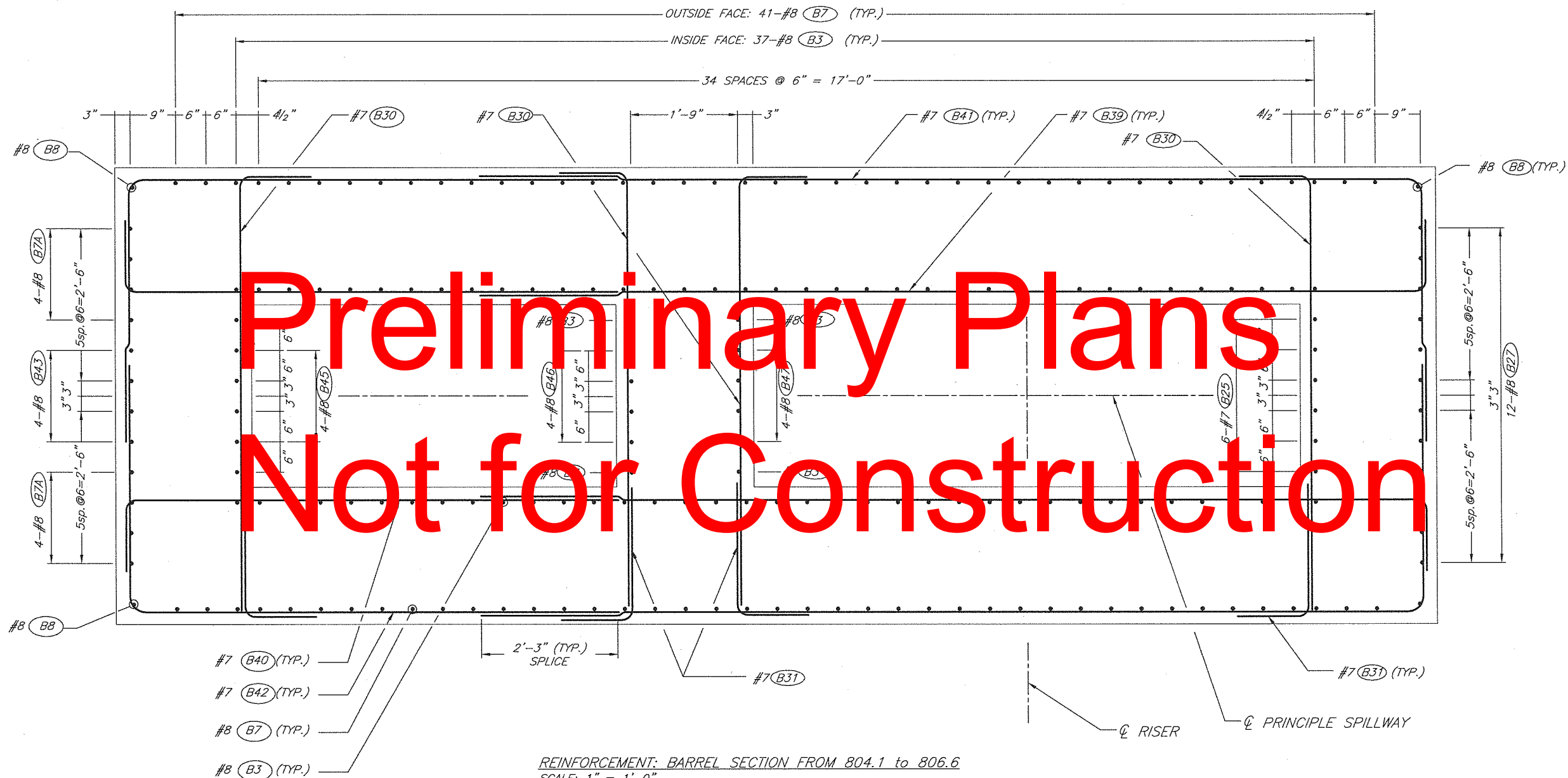
Preliminary Plans  
Not for Construction

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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



Preliminary Plans  
Not for Construction

- #7 (B40) (TYP.)
- #7 (B42) (TYP.)
- #8 (B7) (TYP.)
- #8 (B3) (TYP.)

REINFORCEMENT: BARREL SECTION FROM 804.1 to 806.6  
SCALE: 1" = 1'-0"

NOTE: FOR BARS (B25) (B27) SEE PLATE S-20.



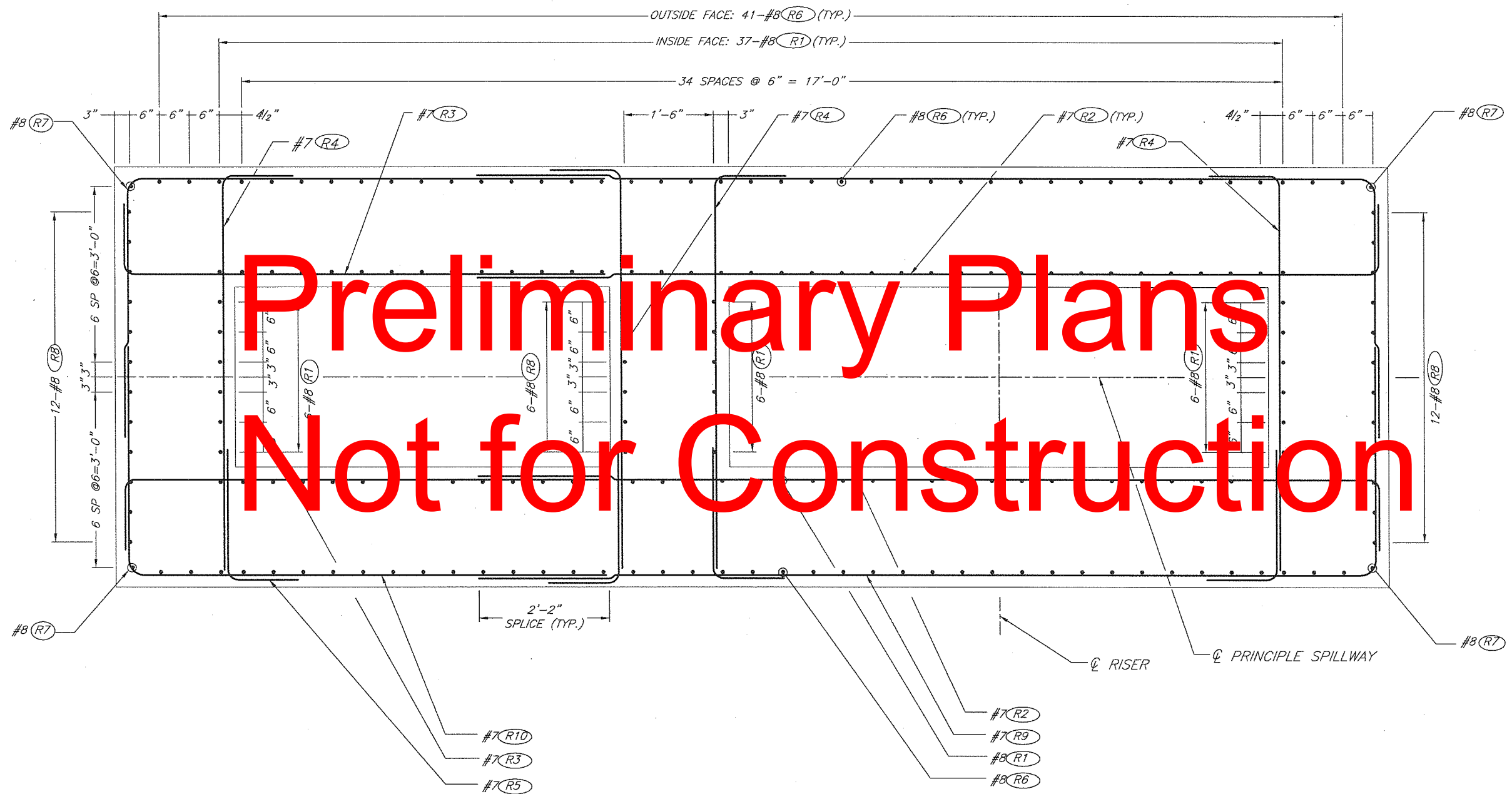
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Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri

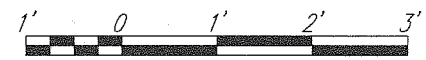


File Name  
Drawing Name





REINFORCEMENT: BARREL SECTION FROM 806.6 to 816.6  
 SCALE: 1" = 1'-0"



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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

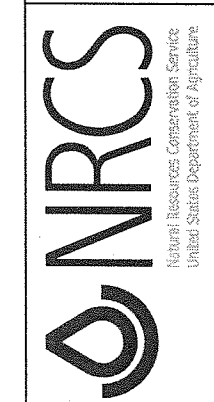


File Name  
 Drawing Name

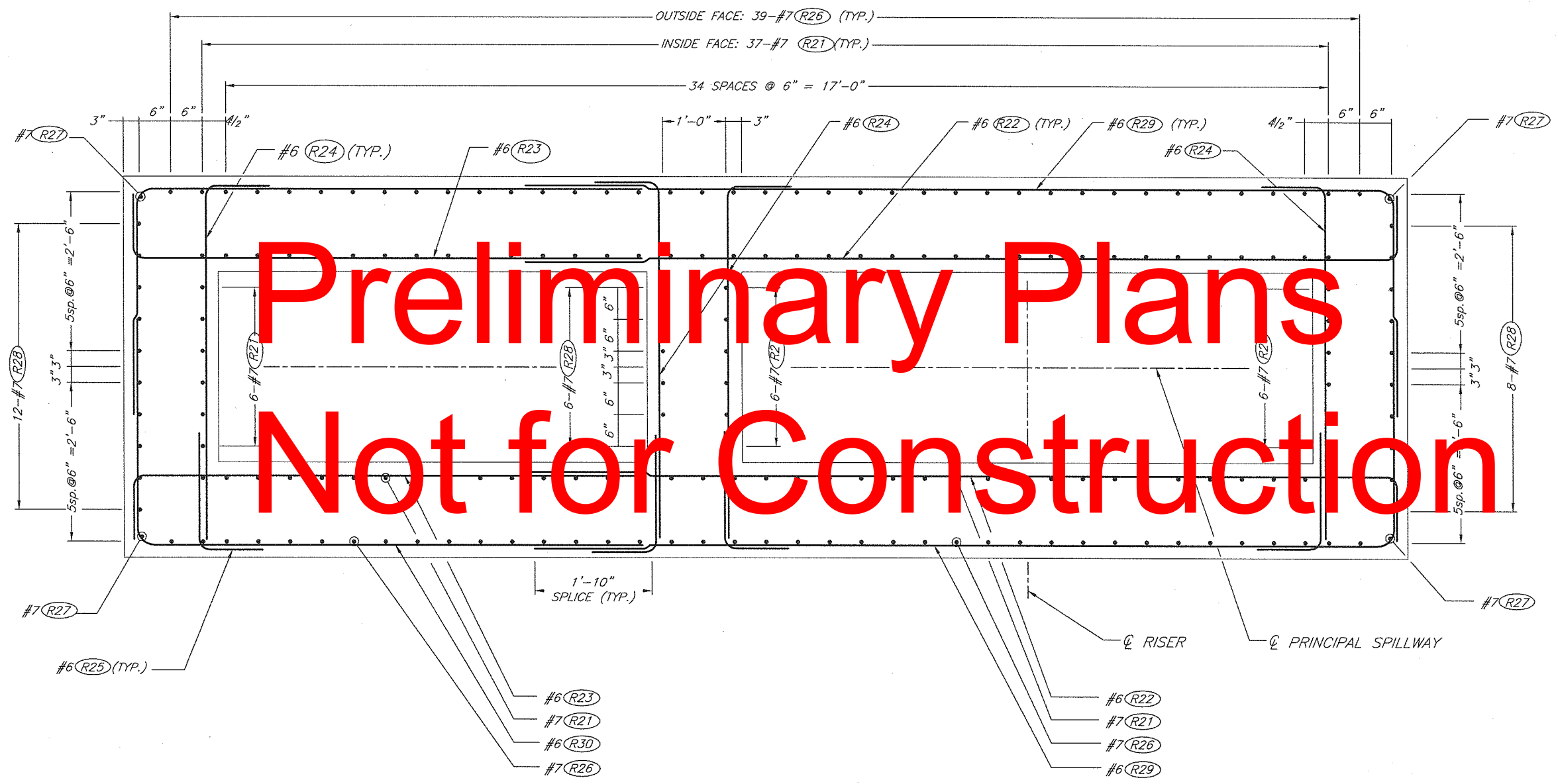


Date  
 Designed L. F. Fragomeli May 08  
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 Checked BBV, MDS Sept 08  
 Approved

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

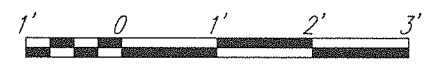


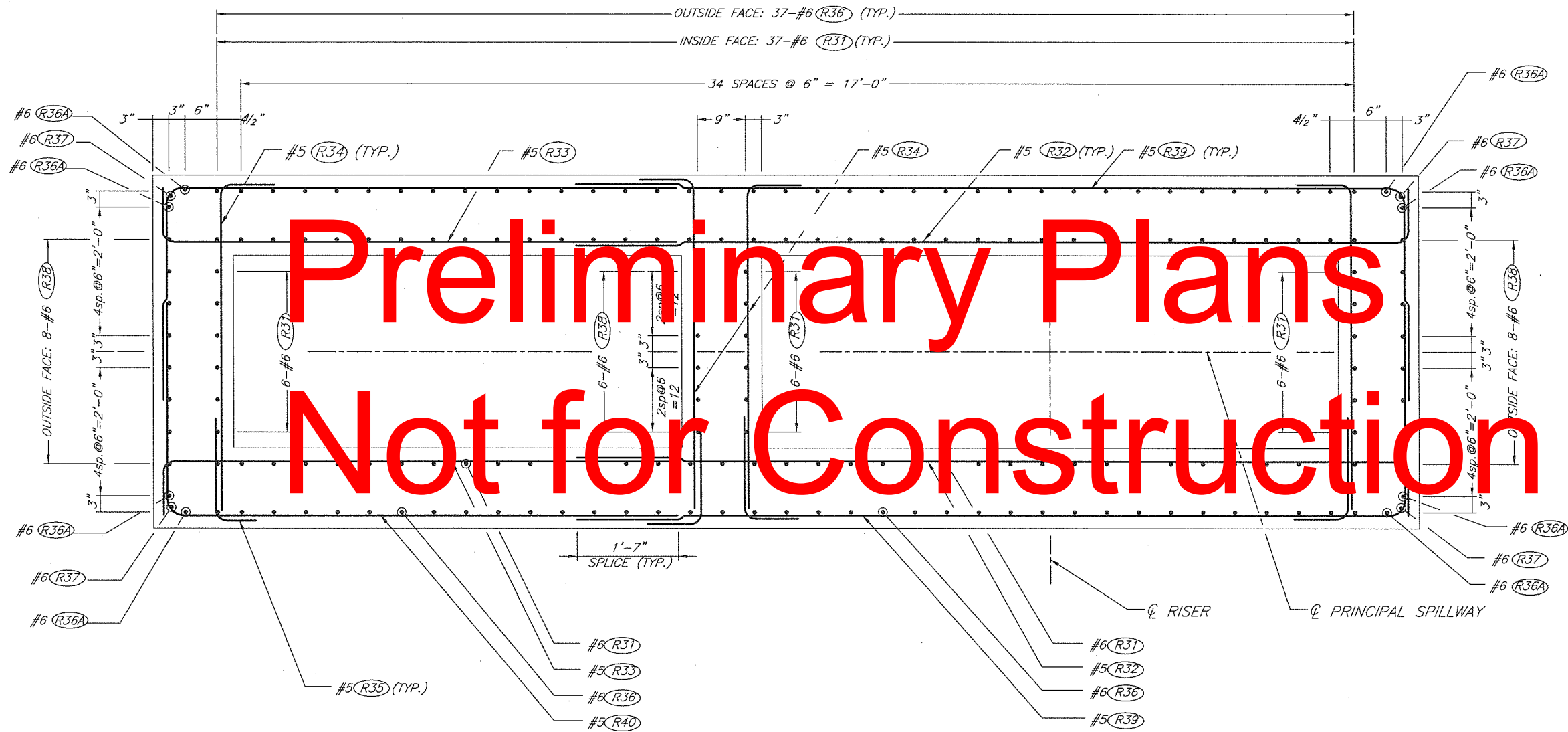
File Name  
 Drawing Name



**Preliminary Plans  
 Not for Construction**

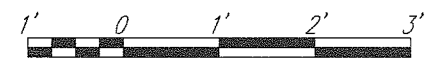
REINFORCEMENT: BARREL SECTION FROM 826.6 to 836.6  
 SCALE: 1" = 1'-0"





Preliminary Plans  
Not for Construction

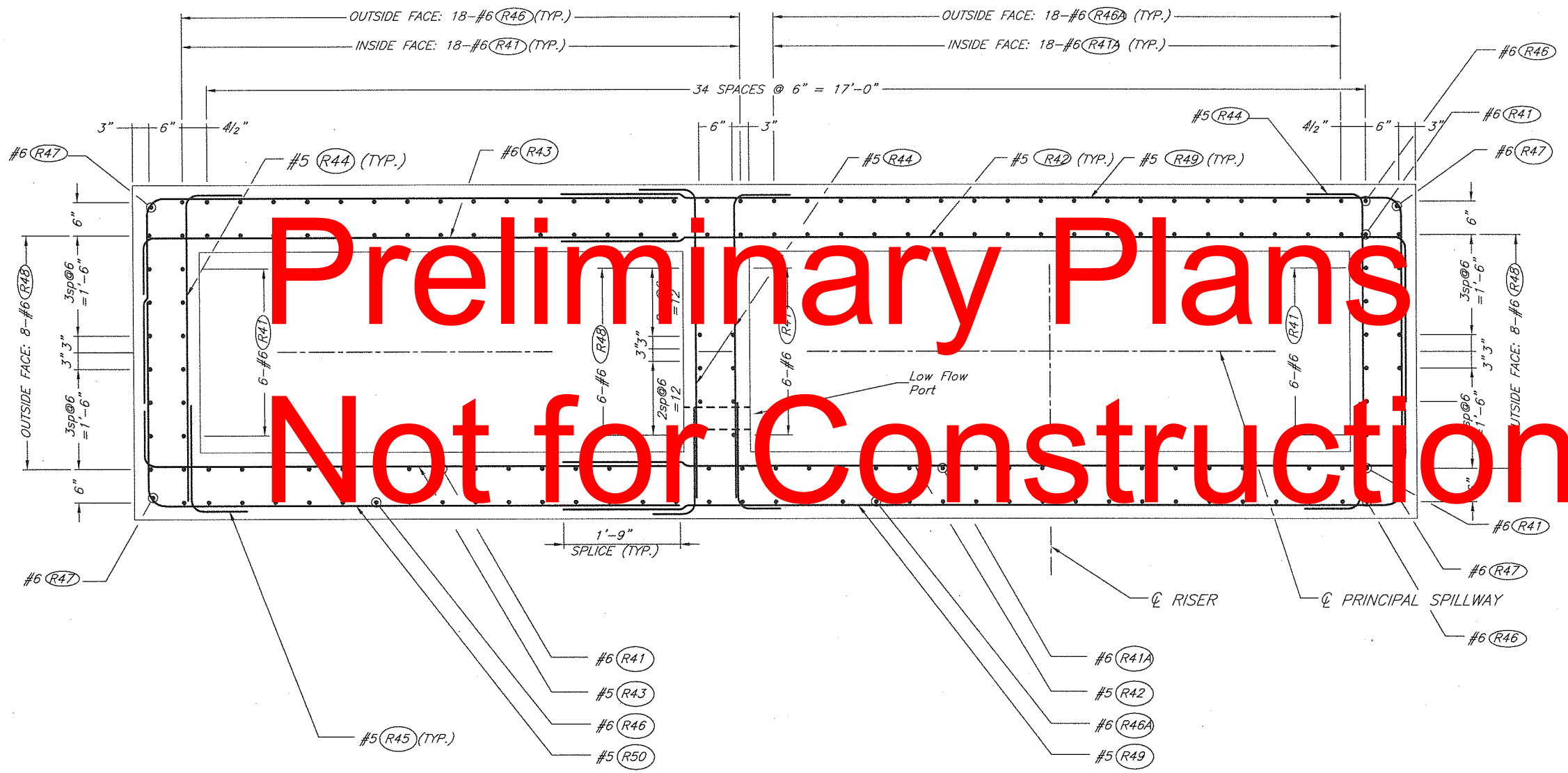
REINFORCEMENT: BARREL SECTION FROM 836.6 to 846.6  
SCALE: 1" = 1'-0"



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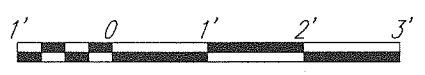
Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri





Preliminary Plans  
Not for Construction

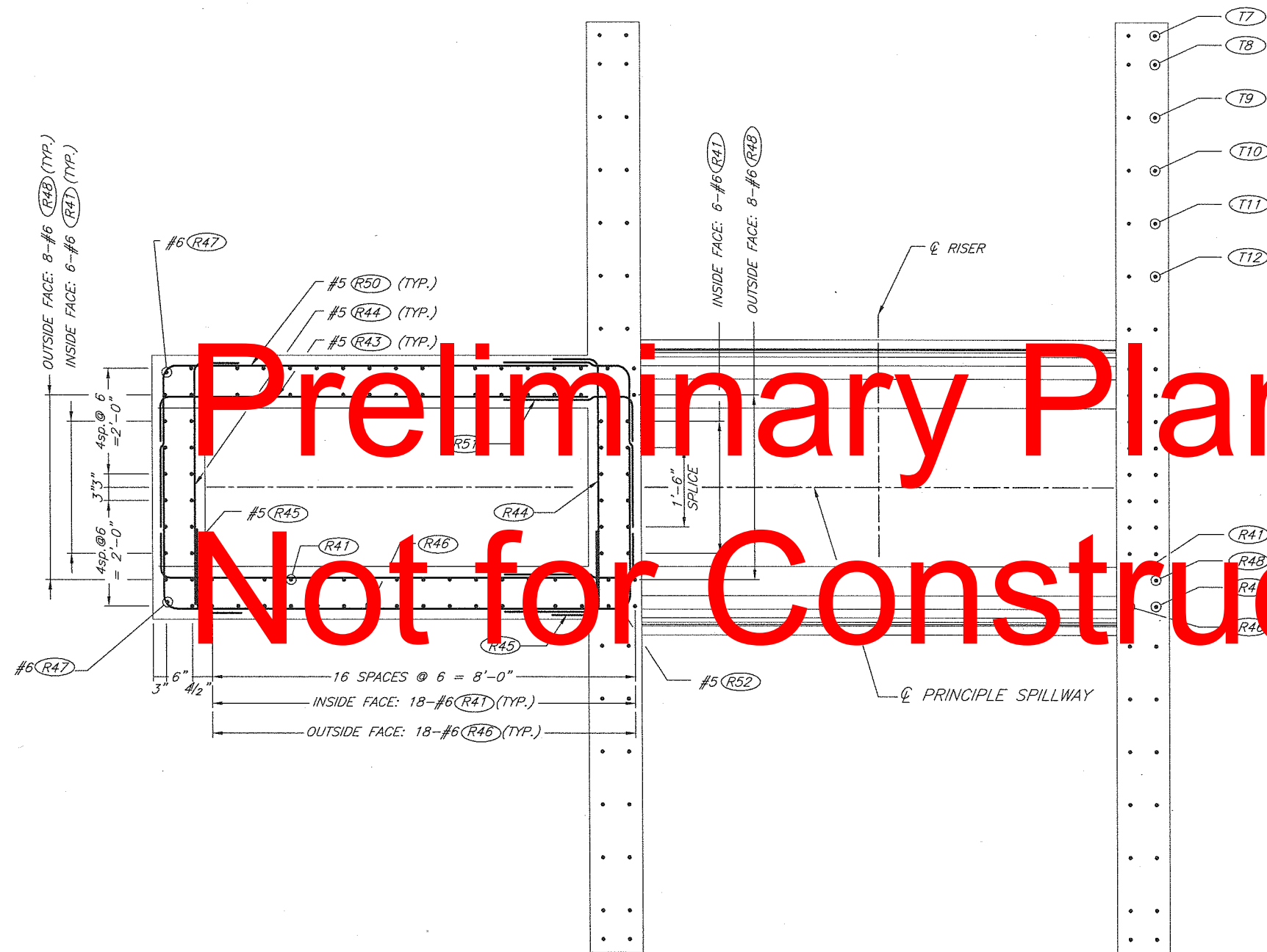
REINFORCEMENT: BARREL SECTION FROM 846.6 to 855.1  
SCALE: 1" = 1'-0"



Designed	L. F. Fragomeli	Date	May 08
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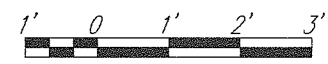
Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri





Preliminary Plans  
Not for Construction

REINFORCEMENT: GATE WELL SECTION FROM EL. 855.1 to EL. 859.52  
SCALE: 3/4" = 1'-0"

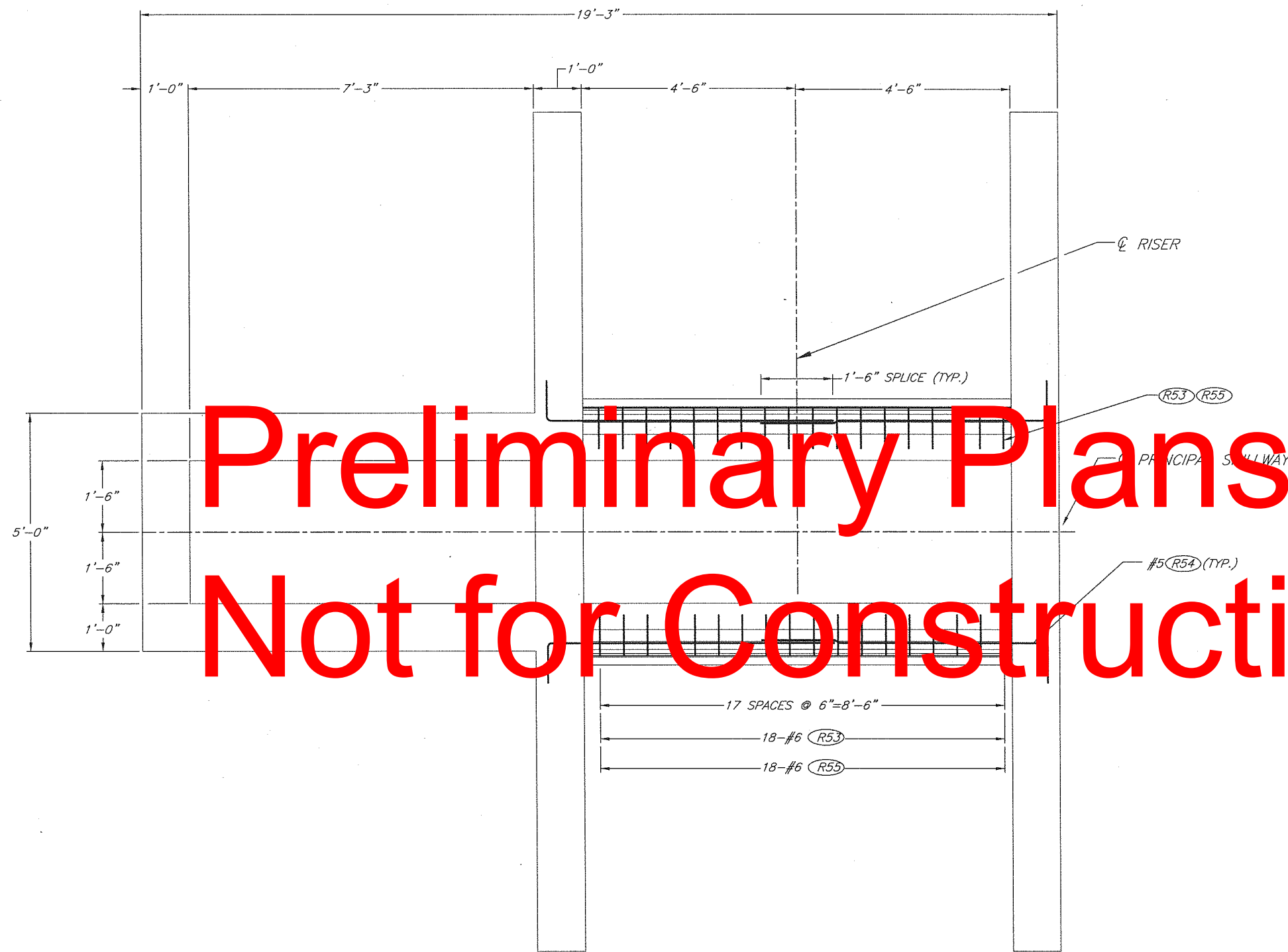


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Checked	BBV, MDS		Sept 08
Approved			

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name



Preliminary Plans  
Not for Construction

SECTION M  
 SCALE: 1/4" = 1'-0" S-5  
 SECTION SHOWN AT ELEVATION 855.1  
 NOTE: FOR BARS (R53) (R55) SEE PLATE S-25.

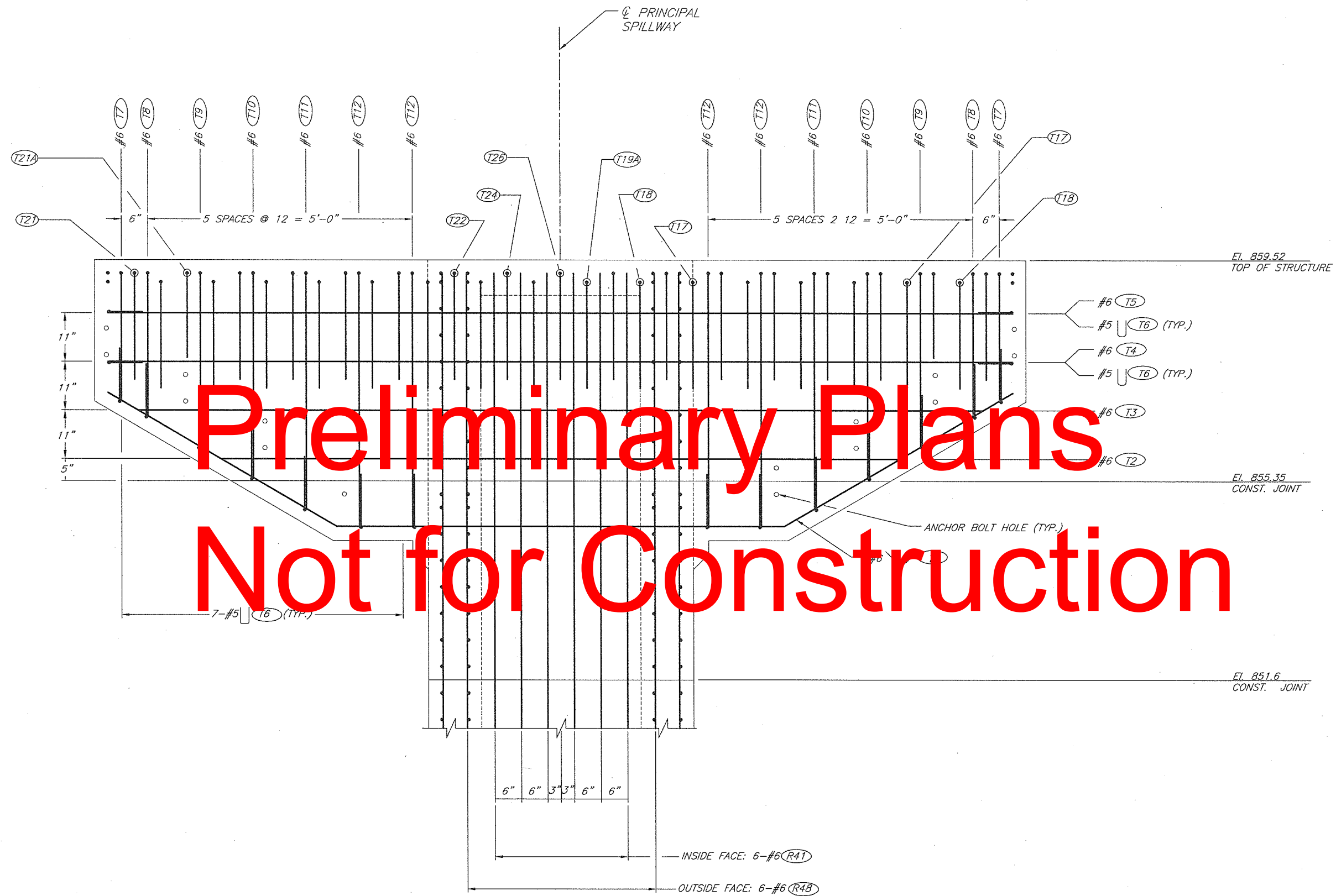


Date	May 08
Designed	L. F. Fragomeli
Drawn	J. Renteria
Checked	BBV, MDS
Approved	

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name	
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Sheet	77 of 117



Preliminary Plans  
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REINFORCEMENT: BAFFLE WALL, UPSTREAM  
SCALE: 1" = 1'-0"

NOTE: UPSTREAM FACE SHOWN;  
DOWNSTREAM FACE SIMILAR

NOTE: SOME BARREL SECTION  
BARS NOT SHOWN, FOR CLARITY

NOTE: SYMMETRIC ABOUT Q  
PRINCIPAL SPILLWAY

NOTE: TRIM BARS (T17) (T18) (T21) (T21A)  
AS NEEDED TO CLEAR ANCHOR BOLT HOLES



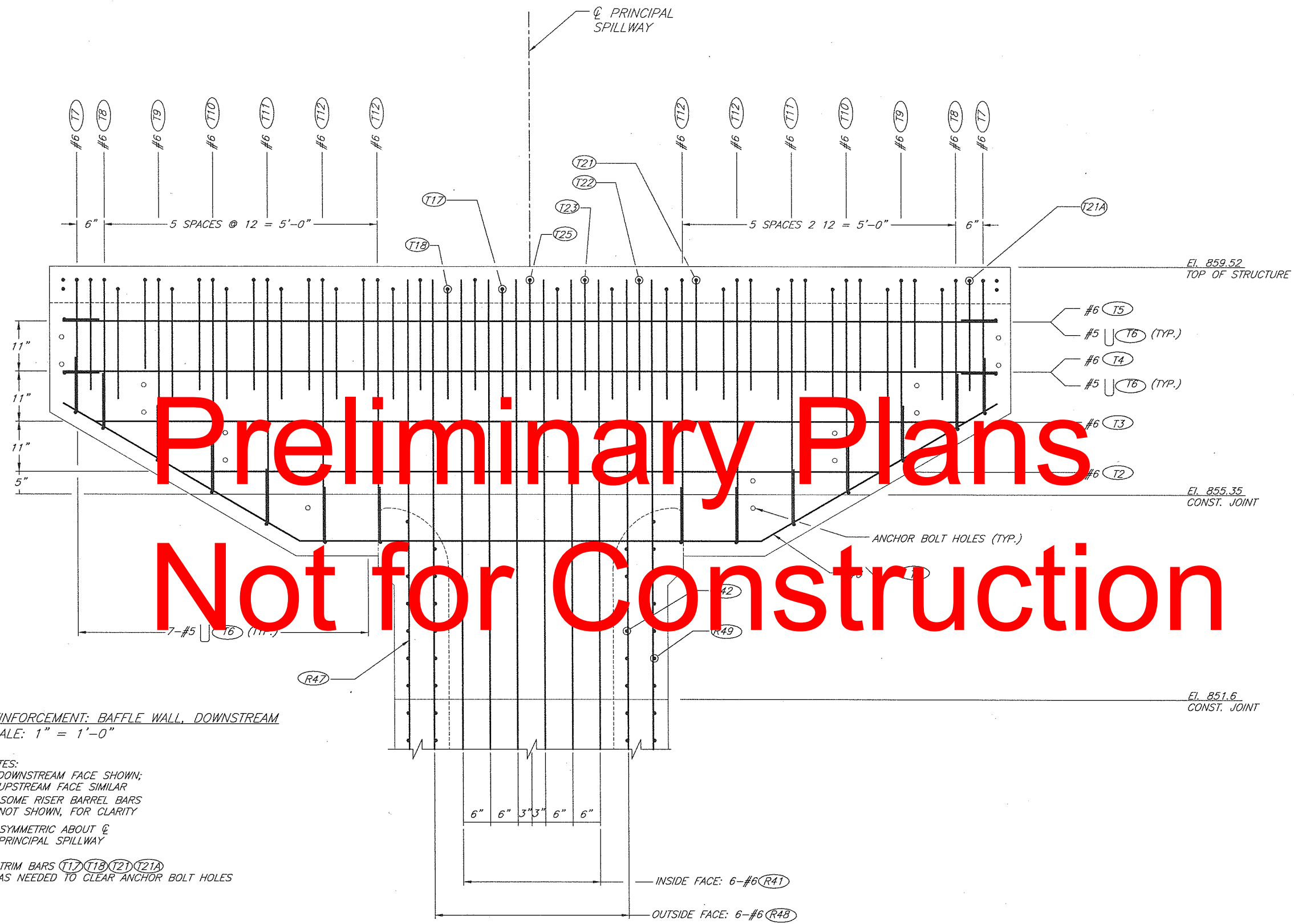
Designed	L. F. Fragomeli	Date	May 08
Drawn	J. Renteria		May 08
Checked	BBV, MDS		Sept 08
Approved			

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name	
Drawing Name	
Sheet	78 of 117

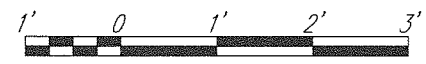




REINFORCEMENT: BAFFLE WALL, DOWNSTREAM  
SCALE: 1" = 1'-0"

- NOTES:
1. DOWNSTREAM FACE SHOWN; UPSTREAM FACE SIMILAR
  2. SOME RISER BARREL BARS NOT SHOWN, FOR CLARITY
  3. SYMMETRIC ABOUT  $\bar{C}$  PRINCIPAL SPILLWAY
  4. TRIM BARS (T17) (T18) (T21) (T21A) AS NEEDED TO CLEAR ANCHOR BOLT HOLES

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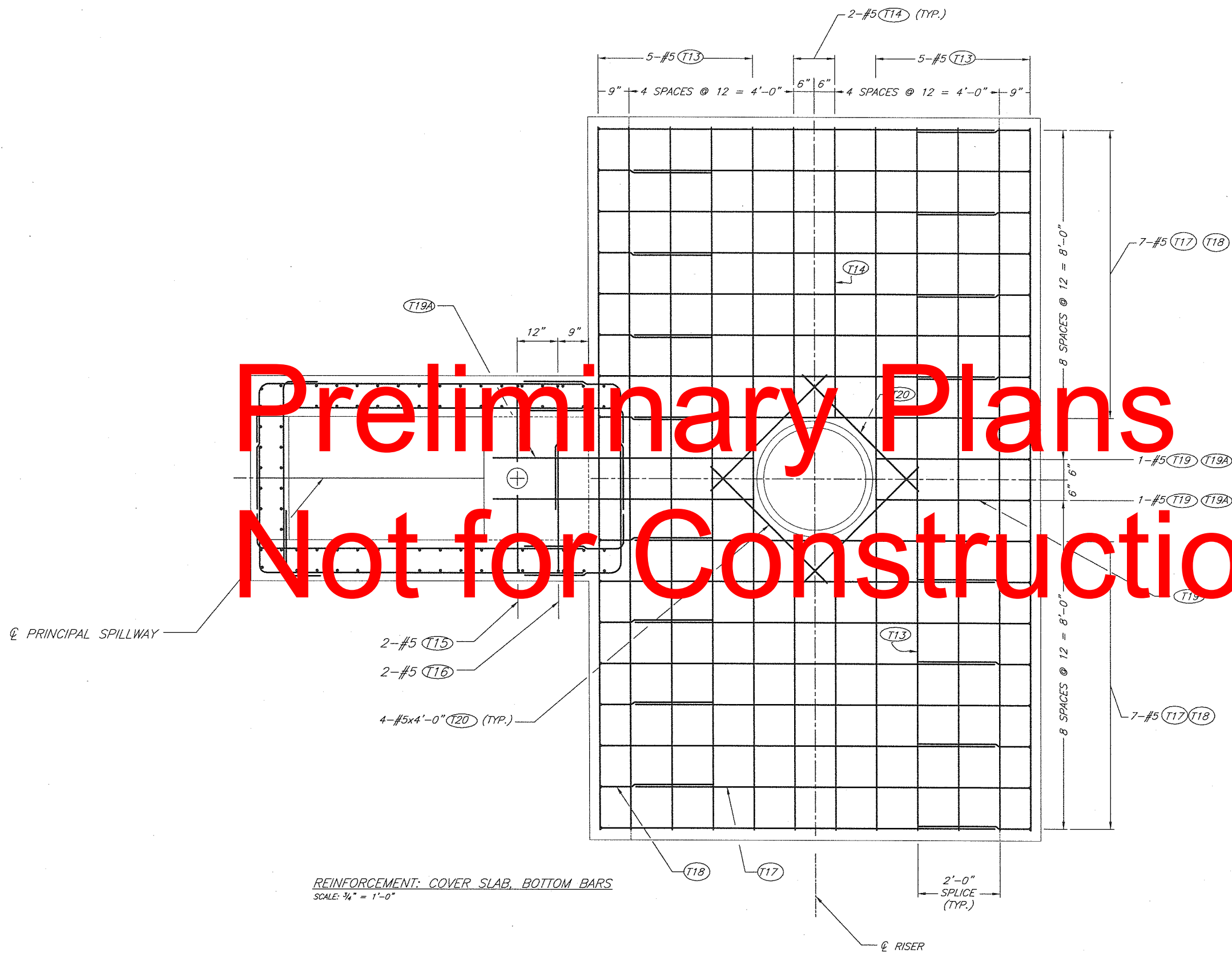
Date  
Designed L. F. Fragomeli May 08  
Drawn J. Renteria May 08  
Checked BBV, MDS Sept 08  
Approved

Riser Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
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Preliminary Plans  
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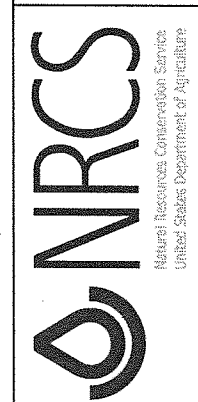


REINFORCEMENT: COVER SLAB, BOTTOM BARS  
SCALE: 3/4" = 1'-0"



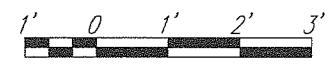
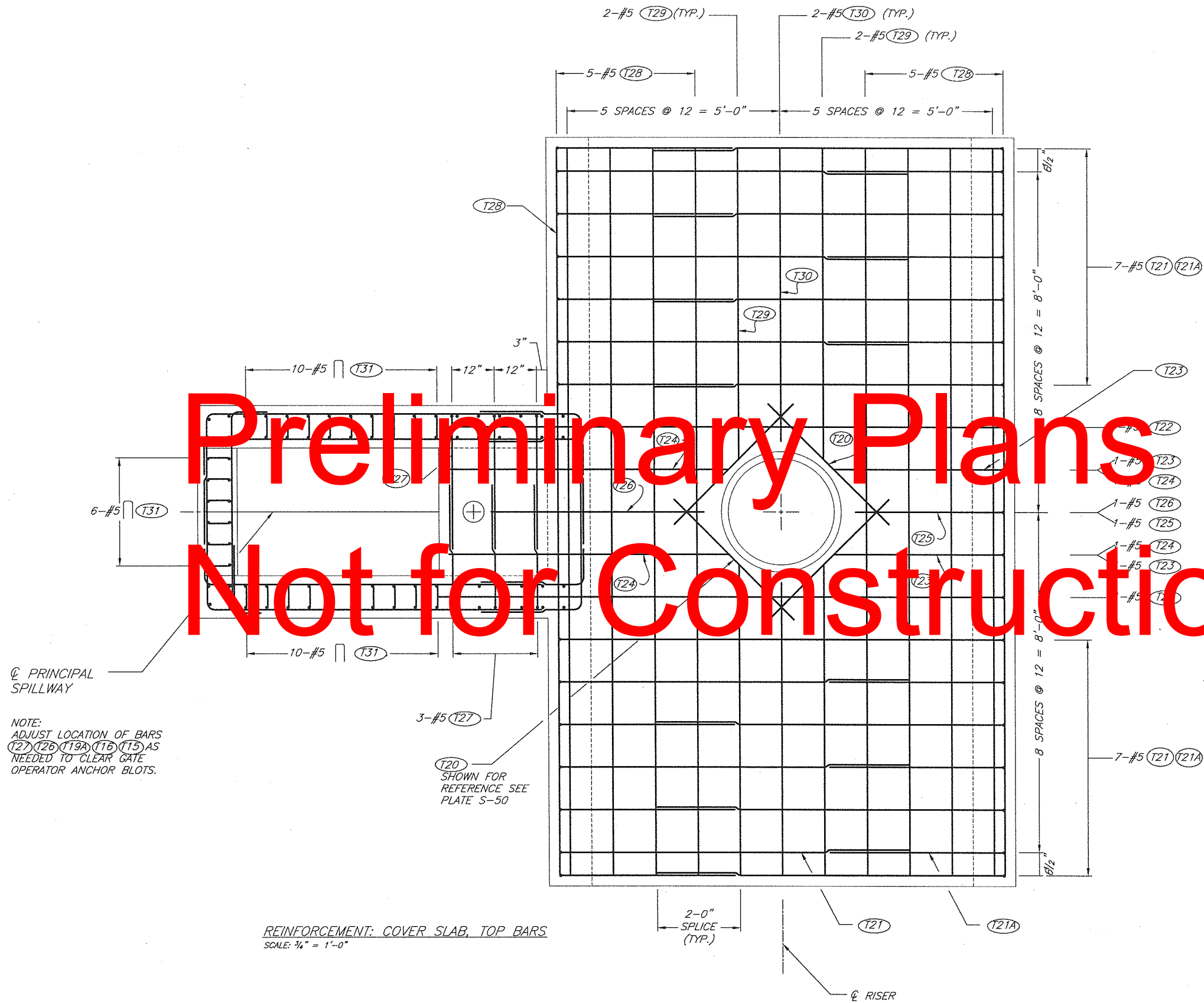
Designed	L. F. Fragomeli	Date	May 08
Drawn	J. Renteria		May 08
Checked	BBV, MDS		Sept 08
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Riser Details  
Structure LO-1  
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File Name	
Drawing Name	

Preliminary Plans  
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Date  
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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name

REINFORCING STEEL SCHEDULE

MARK	BAR			LENGTH	DIMENSION								TOTAL	
	SIZE	TYPE	QUANTITY		A	B	C	D	E	G	H	K	LENGTH (Ft.)	WEIGHT (lbs.)
B1	8	ST	14	29'-8"		29'-8"							415'-0"	1109
B2	8	ST	30	13'-2"		13'-2"							395'-0"	1055
B3	8	2	84	16'-4"	1'-4"	15'-0"				-			1372'-0"	3663
B4	8	2	68	6'-4"	1'-4"	5'-0"				-			430'-0"	1149
B5	8	2	16	5'-4"	1'-4"	4'-0"				-			85'-0"	228
B6	8	2	16	3'-10"	1'-4"	2'-6"				-			61'-0"	164
B7	8	SP-1	82	16'-5"		1'-4"	12'-3"	0'-4"	2'-6"		0'-3"	0'-3"	1346'-0"	3594
B7A	8	SP-2	8	16'-5"		1'-4"	12'-3"	0'-4"	2'-6"		0'-3"	0'-3"	131'-0"	351
B8	8	SP-1	4	16'-6"		1'-4"	12'-3"	0'-5"	2'-6"		0'-3"	0'-4"	66'-0"	176
B9	8	ST	30	13'-2"		13'-2"							395'-0"	1055
B10	8	ST	14	29'-8"		29'-8"							415'-0"	1109
B11	8	17	80	4'-2"		1'-0"	2'-2"	1'-0"					334'-0"	891
B12	6	ST	2	13'-2"		13'-2"							26'-0"	40
B12A	6	ST	2	29'-8"		29'-8"							59'-0"	89
B13	8	ST	78	4'-0"		4'-0"							312'-0"	833
B14	7	ST	34	4'-0"		4'-0"							136'-0"	278
B15	7	2	10	7'-2"	1'-2"	6'-0"				-			72'-0"	147
B16	7	2	24	5'-6"	1'-2"	4'-4"							132'-0"	269
B17	7	2	30	5'-6"	1'-2"	4'-4"							165'-0"	337
B18	8	ST	6	6'-8"		6'-8"							40'-0"	106
B19	8	SP-5	6	8'-10"		2'-0"	0'-0"	3'-4"	2'-6"				53'-0"	142
B20	8	ST	10	2'-6"		2'-6"							25'-0"	57
B21	7	17	24	8'-8"		4'-4"	4'-4"						208'-0"	425
B22	7	17	10	10'-4"		6'-0"	4'-4"						103'-0"	211
B23	8	SP-4	12	8'-0"		2'-0"	3'-6"	2'-6"					96'-0"	256
B24	2	20	2'-4"	1'-2"	1'-2"	-							47'-0"	95
B25	ST	6	7'-0"		7'-0"								42'-0"	111
B26	2	12	7'-0"		1'-9"	6'-0"							23'-0"	24
B27	2	SP-5	2	5'-4"		0'-0"	2'-6"				0'-0"		64'-0"	17
B28	7	2	60	4'-2"	1'-2"	2'-10"				-			250'-0"	511
B29	7	2	30	28'-4"	1'-2"	28'-0"				-			850'-0"	1737
B30	7	2	115	8'-2"	1'-2"	7'-0"				-			940'-0"	1920
B31	7	2	147	3'-4"	1'-2"	2'-2"				-			490'-0"	1002
B32	7	2	14	32'-6"	4'-6"	28'-0"				-			455'-0"	930
B33	7	2	16	30'-4"	2'-4"	28'-0"				-			485'-0"	992
B34	7	2	32	3'-2"	1'-2"	2'-0"				-			101'-0"	207
B35	7	2	14	20'-2"	1'-2"	19'-0"				-			282'-0"	576
B36	7	2	14	7'-8"	1'-2"	6'-6"				-			107'-0"	219
B37	7	2	14	23'-6"	4'-6"	19'-0"				-			329'-0"	672
B38	7	2	14	11'-0"	4'-6"	6'-6"				-			154'-0"	315
B39	7	2	16	16'-8"	1'-2"	15'-6"				-			267'-0"	545
B40	7	2	16	9'-2"	1'-2"	8'-0"				-			147'-0"	300
B41	7	2	16	20'-0"	4'-6"	15'-6"				-			320'-0"	654
B42	7	2	16	12'-6"	4'-6"	8'-0"				-			200'-0"	409
B43	8	SP-5	4	8'-4"		5'-6"	0'-4"	2'-6"					33'-0"	89
B44	7	ST	8	3'-6"		3'-6"							28'-0"	57
B45	8	ST	4	8'-0"		8'-0"							32'-0"	85
B46	8	SP-5	4	8'-7"		5'-9"	0'-4"	2'-6"					34'-0"	92
B47	8	ST	4	8'-3"		8'-3"							33'-0"	88

Preliminary Plans  
Not for Construction

Date  
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 May 08  
 Sept. 08  
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Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name

REINFORCING STEEL SCHEDULE

MARK	BAR				DIMENSION								TOTAL	
	SIZE	TYPE	QUANTITY	LENGTH	A	B	C	D	E	G	H	K	LENGTH (Ft.)	WEIGHT (lbs.)
R1	8	ST	92	12'-6"		12'-6"							1150'-0"	3071
R2	7	2	60	16'-2"	1'-2"	15'-0"				-			970'-0"	1983
R3	7	2	60	9'-2"	1'-2"	8'-0"				-			550'-0"	1125
R4	7	2	120	7'-8"	1'-2"	6'-6"				-			920'-0"	1881
R5	7	2	120	3'-4"	1'-2"	2'-2"				-			400'-0"	817
R6	8	SP-5	82	12'-7"		9'-9"	0'-4"	2'-6"		-	0'-3"	0'-3"	1032'-0"	2754
R7	8	SP-5	4	12'-8"		9'-9"	0'-5"	2'-6"		-	0'-3"	0'-4 1/2"	51'-0"	136
B8	8	SP-5	30	12'-7"		9'-9"	0'-4"	2'-6"		-	0'-3"	0'-3"	377'-0"	1008
R9	7	2	60	19'-6"	4'-6"	15'-0"				-			1170'-0"	2392
R10	7	2	60	12'-6"	4'-6"	8'-0"				-			750'-0"	1533
R11	7	ST	92	12'-6"		12'-6"							1150'-0"	2351
R12	6	2	60	15'-6"	1'-0"	14'-6"				-			930'-0"	1397
R13	6	2	60	9'-0"	1'-0"	8'-0"				-			540'-0"	811
R14	6	2	120	7'-0"	1'-0"	6'-0"				-			840'-0"	1262
R15	6	2	120	2'-10"	1'-0"	1'-10"				-			340'-0"	510
R16	7	SP-5	78	12'-7"		9'-9"	0'-4"	2'-6"			0'-3"	0'-3"	981'-0"	2006
R16A	7	ST	4	9'-9"		9'-9"							39'-0"	80
R17	7	SP-5	4	12'-8"		9'-9"	0'-5"	2'-6"			0'-3"	0'-4 1/4"	51'-0"	104
R18	7	SP-5	26	12'-7"		9'-9"	0'-4"	2'-6"			0'-3"	0'-3"	327'-0"	669
R19	7	2	60	11'-6"	1'-0"	14'-6"				-			930'-0"	1397
R20	7	2	60	9'-0"	1'-0"	8'-0"				-			540'-0"	811
R21	7	2	92	12'-6"		12'-6"							1150'-0"	2351
R22	6	2	60	14'-9"	1'-0"	13'-9"				-			885'-0"	1329
R23	6	2	60	9'-0"	1'-0"	8'-0"				-			540'-0"	811
R24	6	2	120	6'-6"	1'-0"	5'-6"				-			780'-0"	1172
R25	6	2	120	2'-10"	1'-0"	1'-10"				-			340'-0"	510
R26	7	SP-5	82	12'-7"		9'-9"	0'-4"	2'-6"			0'-3"	0'-3"	981'-0"	2006
R27	7	SP-5	4	12'-8"		9'-9"	0'-5"	2'-6"			0'-3"	0'-4 1/4"	51'-0"	104
R28	7	SP-5	30	12'-7"		9'-9"	0'-4"	2'-6"			0'-3"	0'-3"	377'-0"	1008
R29	6	2	60	17'-5"	3'-8"	13'-9"				-			1045'-0"	1099
R30	6	2	60	11'-8"	3'-8"	8'-0"				-			700'-0"	1052
R31	6	ST	92	12'-6"		12'-6"							1150'-0"	1727
R32	5	2	60	13'-10"	0'-10"	13'-0"				-			830'-0"	866
R33	5	2	60	8'-10"	0'-10"	8'-0"				-			530'-0"	553
R34	5	2	60	5'-10"	0'-10"	5'-0"				-			350'-0"	365
R35	5	2	60	2'-5"	0'-10"	1'-7"				-			145'-0"	151
R36	6	SP-5	74	12'-7"		9'-9"	0'-4"	2'-6"			0'-3"	0'-3"	931'-0"	930
R36A	6	ST	8	9'-10"		9'-10"							79'-0"	118
R37	6	SP-5	4	12'-8"		9'-9"	0'-5"	2'-6"			0'-3"	0'-4 1/4"	51'-0"	76
R38	6	SP-5	22	12'-7"		9'-9"	0'-4"	2'-6"			0'-3"	0'-3"	277'-0"	416
R39	5	2	60	16'-3"	3'-3"	13'-0"				-			975'-0"	1017
R40	5	2	60	11'-3"	3'-3"	8'-0"				-			675'-0"	704
R41	6	ST	56	12'-9"		12'-9"							714'-0"	1072
R41A	6	ST	36	7'-3"		7'-3"							261'-0"	392
R42	5	2	32	13'-6"	0'-10"	12'-8"				-			432'-0"	451
R43	5	2	54	8'-10"	0'-10"	8'-0"				-			477'-0"	783
R44	5	2	88	5'-4"	0'-10"	4'-6"				-			469'-0"	489
R45	5	2	88	2'-5"	0'-10"	1'-7"				-			213'-0"	222
R46	6	ST	36	12'-9"		12'-9"							459'-0"	689
R46A	6	ST	36	8'-2"		8'-2"							294'-0"	443

Preliminary Plans  
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Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name  
Drawing Name

REINFORCING STEEL SCHEDULE

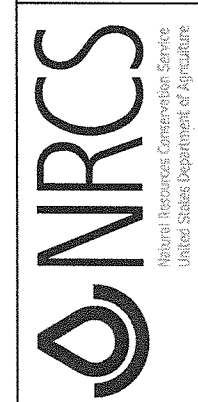
MARK	BAR				DIMENSION								TOTAL	
	SIZE	TYPE	QUANTITY	LENGTH	A	B	C	D	E	G	H	K	LENGTH (Ft.)	WEIGHT (lbs.)
R47	6	ST	4	12'-9"		12'-9"							51'-0"	77
R48	6	ST	22	12'-9"		12'-9"							281'-0"	421
R49	5	2	34	15'-8"	3'-0"	12'-8"				-			533'-0"	556
R50	5	2	54	11'-0"	3'-0"	8'-0"				-			594'-0"	620
R51	5	2	20	3'-3"	0'-10"	2'-5"				-			65'-0"	68
R52	5	2	20	5'-1"	2'-5"	2'-8"				-			102'-0"	106
R53	6	SP-6	36	3'-4 1/2"		2'-0"	1'-4 1/2"	R=10 1/2"					122'-0"	183
R54	5	2	8	6'-10"	0'-10"	6'-0"				-			55'-0"	57
R55	6	SP-5	36	3'-2"		1'-9"	0'-5"	1'-0"					114'-0"	171
T1	6	14	4	28'-6"		5'-0"	8'-6"	5'-0"				2'-4 1/2"	114'-0"	171
T2	6	ST	4	12'-10"		12'-0"							51'-0"	77
T3	6	ST	4	16'-0"		16'-0"							64'-0"	96
T4	6	ST	4	17'-3"		17'-3"							69'-0"	104
T5	6	ST	4	17'-3"		17'-3"							69'-0"	104
T6	5	17	36	2'-2"		0'-10"	0'-6"	0'-10"					78'-0"	81
T7	6		8	4'-6"		2'-4"							36'-0"	56
T8	6		8	4'-8"		2'-4"							32'-0"	56
T9	6		8	3'-5"		2'-4"							41'-0"	81
T10	6	2	8	5'-11"	2'-2"	3'-9"				-			47'-0"	71
T11	6	2	8	6'-6"	2'-2"	4'-4"				-			52'-0"	78
T12	6	2	16	6'-11"	2'-2"	4'-9"				-			111'-0"	166
T13		ST	10	17'-3"		17'-3"							173'-0"	180
T14		ST	4	7'-0"		7'-0"							28'-0"	28
T15	2	2	2	3'-10"	1'-10"	2'-0"							8'-0"	8
T16	2	2	2	5'-0"	2'-0"	3'-0"							10'-0"	10
T17	5	2	16	11'-8"	2'-0"	9'-8"				-			187'-0"	195
T18	5	2	16	4'-9"	2'-0"	2'-9"				-			76'-0"	79
T19	5	2	2	5'-9"	2'-0"	3'-9"				-			12'-0"	12
T19A	5	ST	2	6'-4"		6'-4"							13'-0"	13
T20	5	ST	4	4'-0"		4'-0"							16'-0"	17
T21	5	2	14	10'-3"	2'-0"	8'-3"				-			144'-0"	150
T21A	5	2	14	6'-3"	2'-0"	4'-3"				-			88'-0"	91
T22	5	2	2	15'-0"	2'-0"	13'-0"				-			30'-0"	31
T23	5	2	2	6'-0"	2'-0"	4'-0"				-			12'-0"	19
T24	5	ST	2	6'-9"		6'-9"							14'-0"	14
T25	5	2	1	5'-6"	2'-0"	3'-6"				-			6'-0"	6
T26	5	ST	1	5'-0"		5'-0"							5'-0"	5
T27	5	2	6	5'-0"	2'-0"	3'-0"				-			30'-0"	31
T28	5	ST	10	17'-3"		17'-3"							173'-0"	180
T29	5	ST	4	7'-3"		7'-3"							29'-0"	30
T30	5	ST	2	6'-9"		6'-9"							14'-0"	14
T31	5	17	26	2'-2"		0'-10"	0'-6"	0'-10"					56'-0"	59
<b>GRAND TOTAL</b>												46,666'-0"	82,730	

Preliminary Plans  
Not for Construction

CONCRETE QUANTITY	
REINFORCED	280 cy

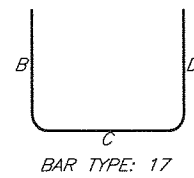
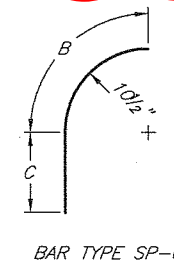
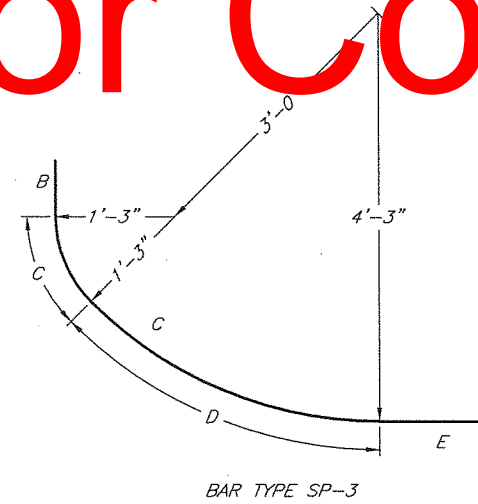
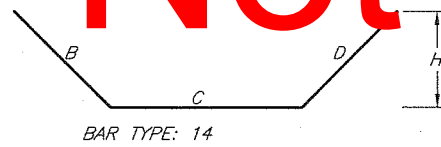
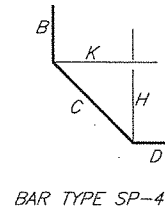
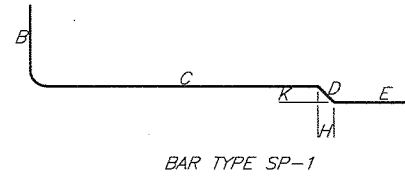
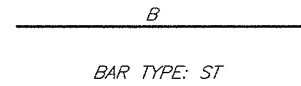
Date May 08  
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 Drawn J. Renteria  
 Checked BBY, MDS  
 Approved Sept 08

Riser Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
Drawing Name

REINFORCEMENT: BAR SCHEDULE  
SCALE: N/A



Preliminary Plans  
Not for Construction

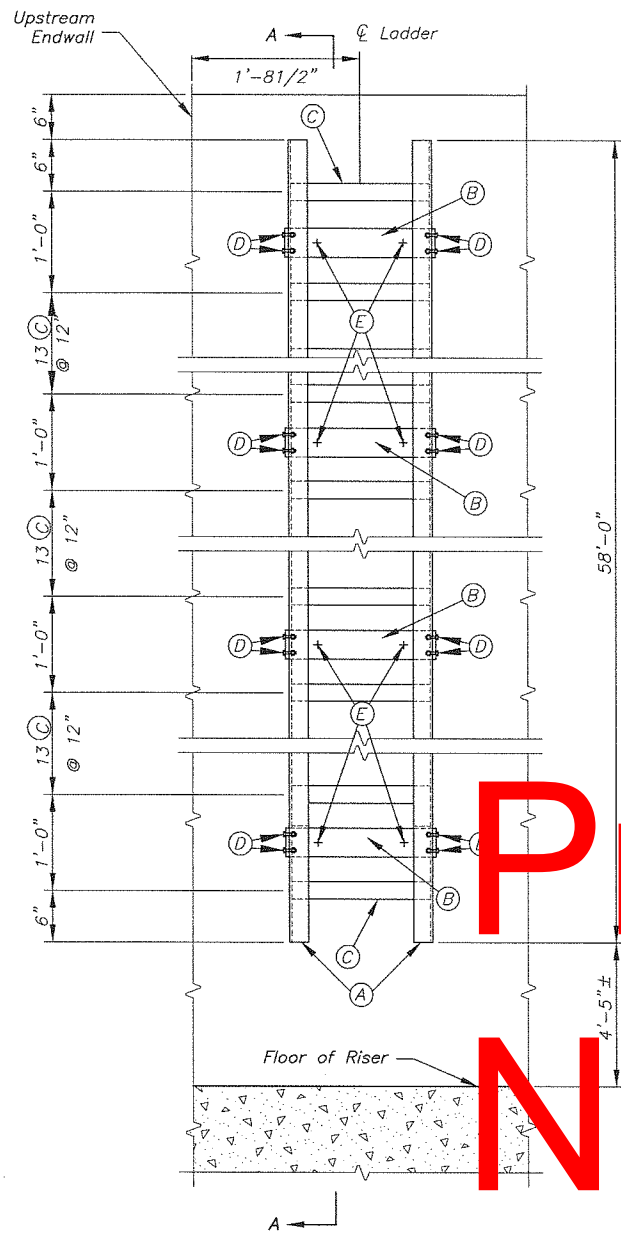
Designed	L. F. Fragomeli	Date	May 08
Drawn	J. Renteria		May 08
Checked	BBV, MDS		Sept. 08
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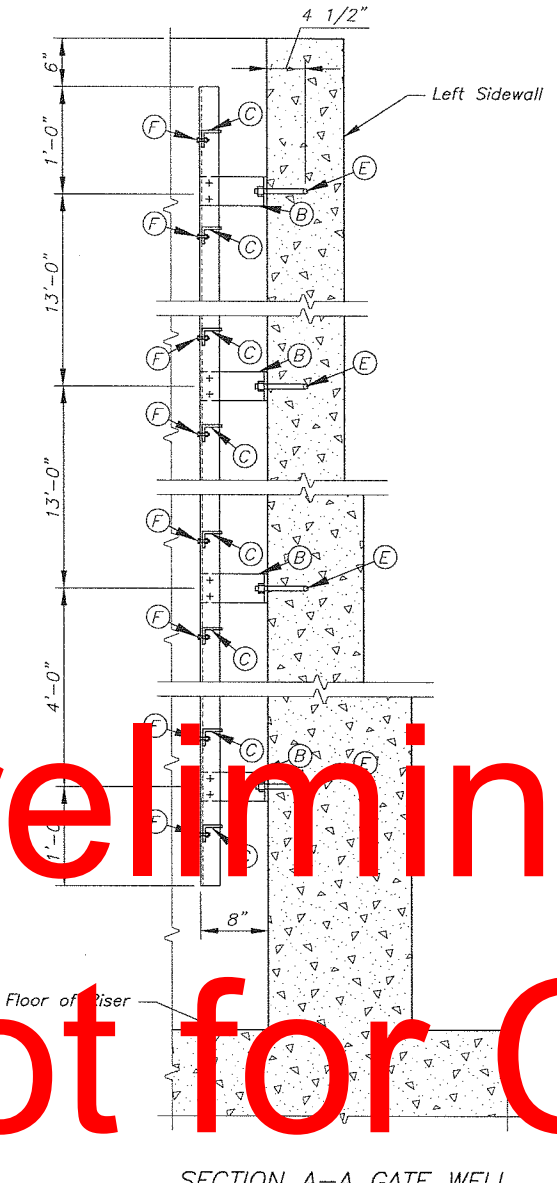


File Name
Drawing Name
Sheet 85 of 117

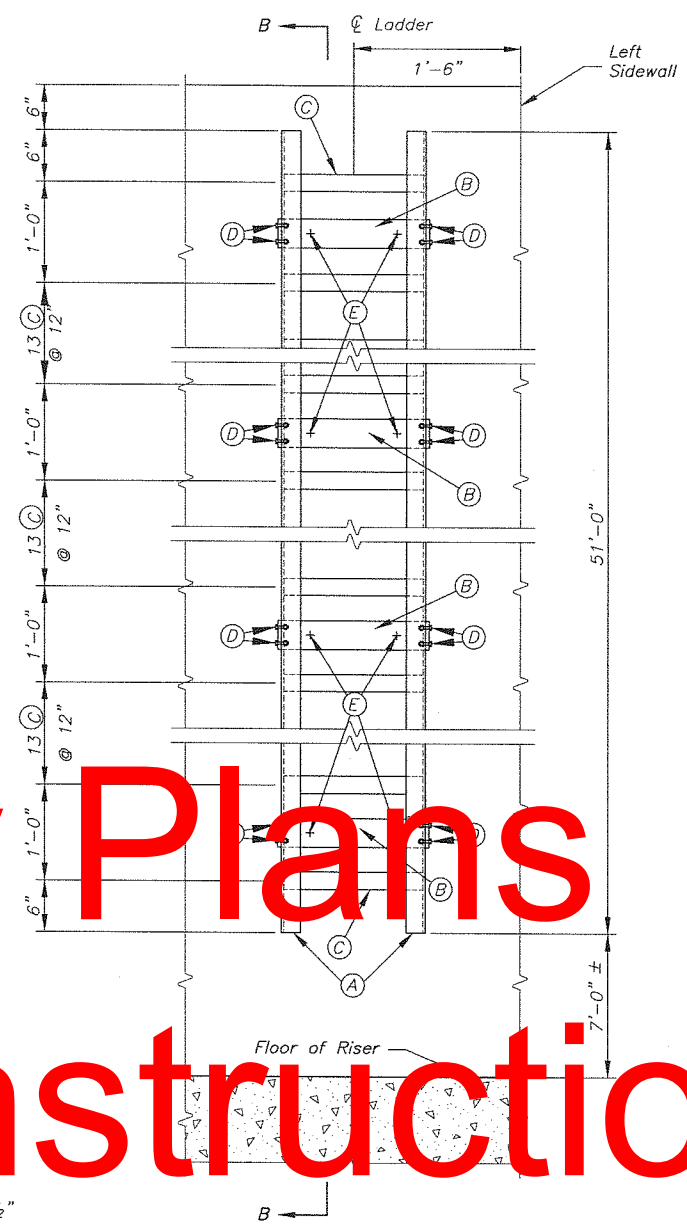
# Preliminary Plans Not for Construction



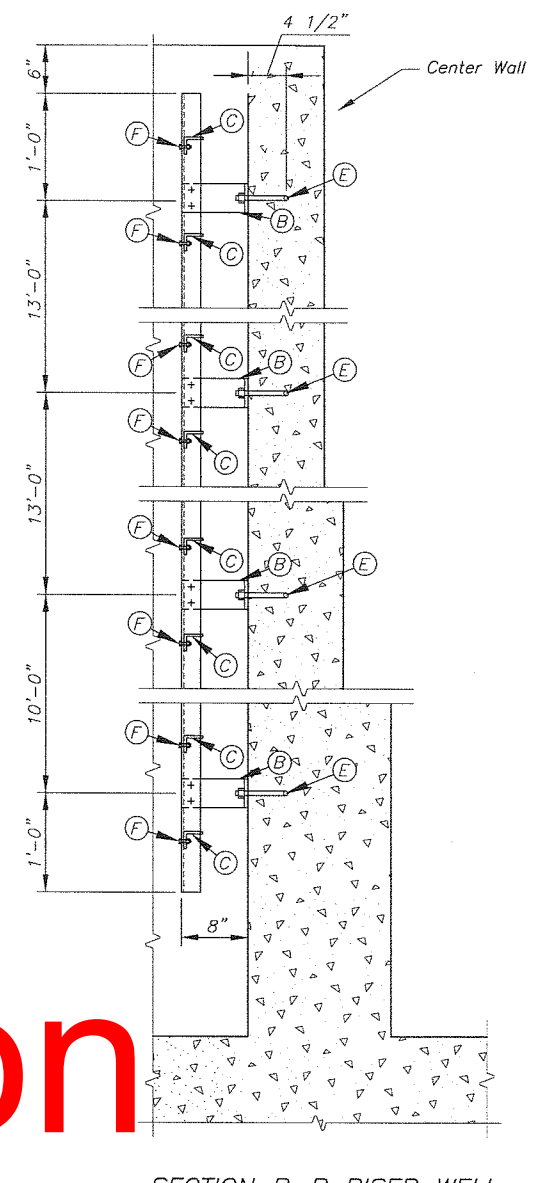
FRONT ELEVATION GATE WELL  
(Endwalls Not Shown)



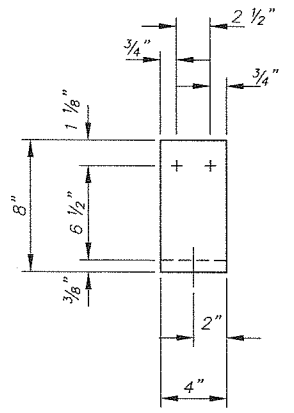
SECTION A-A GATE WELL



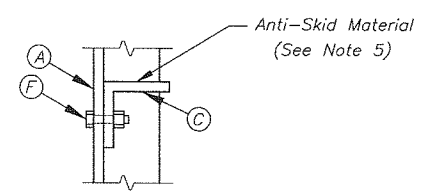
FRONT ELEVATION RISER WELL  
(Sidewalls Not Shown)



SECTION B-B RISER WELL



SECTION D-D  
MEMBER (B) DETAILS



DETAILS OF LADDER RUNGS

- NOTES:**
- Ladder located on sidewall, endwall as shown on Sheet 28.
  - All members of ladder are structural aluminum alloy 6061-T6 with stainless steel bolts.
  - All aluminum angles in contact with a concrete surface shall be cleaned and given a coat of alkali resistant bituminous paint or equivalent and allowed to dry before assembly.
  - A safety system for the ladder shall be similar to and equal to the SAF-CLIMB fall prevention system manufactured by North Safety Products. The carrier rail shall be stainless steel. Ladder rung clamps, safety locking mechanism, sleeve and belt shall be in accordance with the manufacturer recommendations and conform to OSHA regulations 29 CFR Ch. XVII Section 1926.1053.
  - An approved anti-skid material shall be applied to the stepping surface of member (C). The material shall be applied according to the manufacturer's recommendations.
  - Anchor bolts (E) shall be 1" x 6" x 1/2" hook.

LADDER MATERIAL LIST GATE WELL

MARK	ITEM	QUANT.
A	L"2" x 2" x 3/16" x 58'-0" long"	2
B	U-Bar (See Detail of Member (B) for dimensions)	6
C	L"2" x 2" x 3/16" x 17 1/2" long"	58
D	1/2" Dia. stainless steel bolt w/nut and washers, 1 1/4" long	24
E	1/2" Dia. stainless steel anchor bolt w/nut and washers	12
F	1/2" Dia. stainless steel bolt w/nut and washers, 1 1/4" long	116

Total weight of ladder = 198 lb

LADDER MATERIAL LIST RISER WELL

MARK	ITEM	QUANT.
A	"2" x 2" x 3/16" x 48'-0" long"	2
B	U-Bar (See Detail of Member B for dimensions)	5
C	"2" x 2" x 3/16" x 17 1/2" long"	48
D	1/2" Dia. stainless steel bolt w/nut and washers, 1 1/4" long	20
E	1/2" Dia. stainless steel anchor bolt w/nut and washers	10
F	1/2" Dia. stainless steel bolt w/nut and washers, 1 1/4" long	96

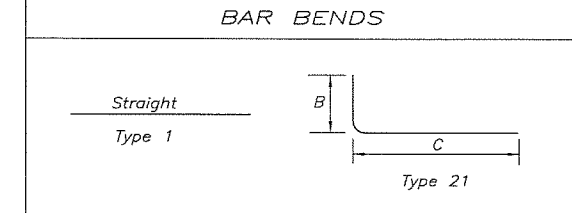
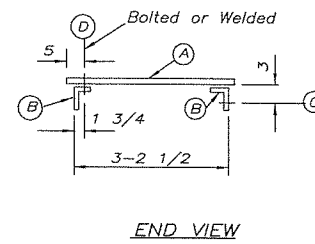
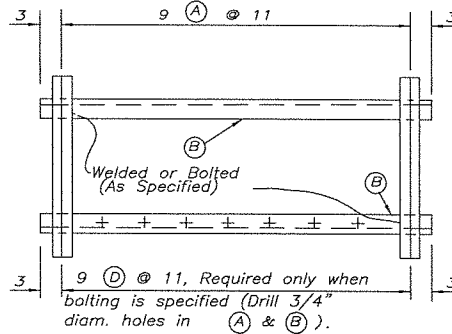
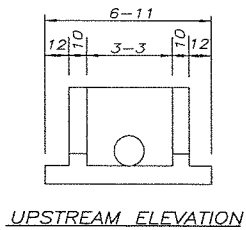
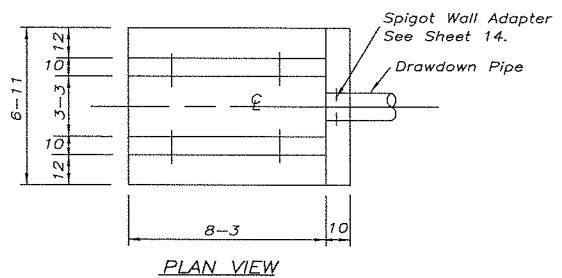
Total weight of ladder = 164 lb

Date: April 08  
 Designed: MDS  
 Drawn: MDS, KAS, KRW  
 Checked: BBV  
 Approved: \_\_\_\_\_

Ladder Details  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

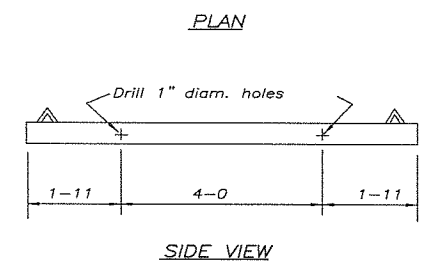
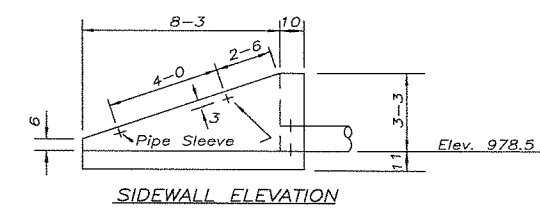






STEEL SCHEDULE  
For Each Drawdown Structure

Mark	Size	Quantity	Length	Total Length	Type	B	C
1	5	12	8-6	102-0	1		
2	5	15	6-6	97-6	1		
3	5	2	2-9	5-6	1		
4	5	2	0-9	1-6	1		
5	5	2	1-0	2-0	1		
6	5	2	1-6	3-0	1		
7	5	2	2-0	4-0	1		
8	5	2	2-3	4-6	1		
9	5	2	2-9	5-6	1		
10	5	2	3-3	6-6	1		
11	5	2	8-0	16-0	1		
12	5	6	4-0	24-0	1		
13	5	4	8-9	35-0	1		
14	5	6	3-6	21-0	1		
15	5	2	2-3	4-6	21	1-0	1-3
16	5	2	2-6	5-0	21	1-5	1-1
17	5	2	3-0	6-0	21	1-10	1-2
18	5	2	3-6	7-0	21	2-3	1-3
19	5	2	3-9	7-6	21	2-8	1-1
20	5	2	4-3	8-6	21	3-1	1-2
21	5	2	4-9	9-6	21	3-6	1-3
22	5	4	5-0	20-0	21	3-9	1-3
23	5	2	11-6	23-0	21	3-0	8-6
24	5	2	7-6	15-0	21	3-0	4-6
25	5	2	4-6	9-0	21	1-6	3-0
26	5	2	3-9	7-6	21	0-9	3-0



TRASH RACK MATERIAL LIST

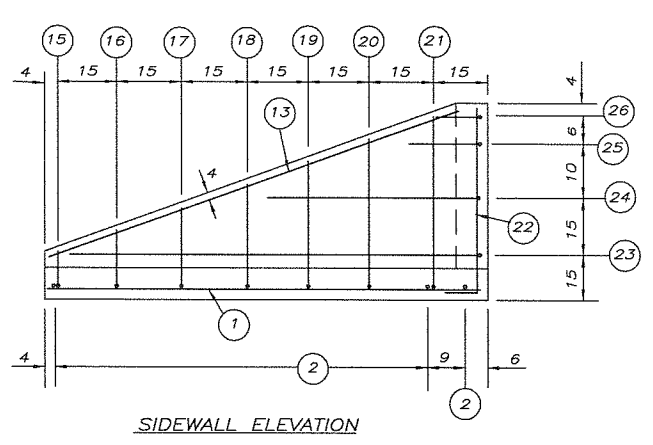
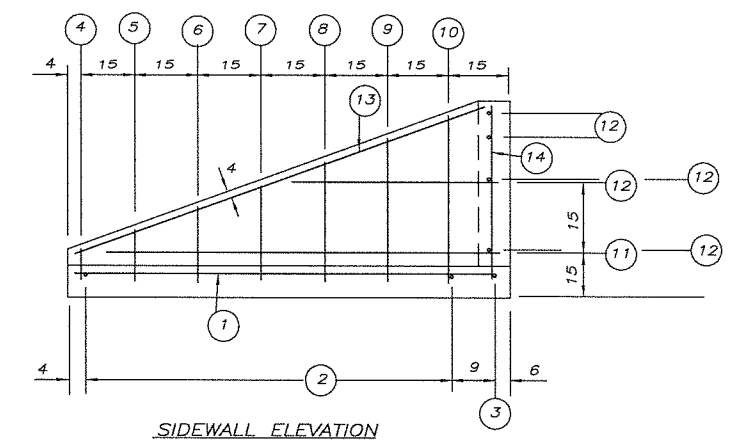
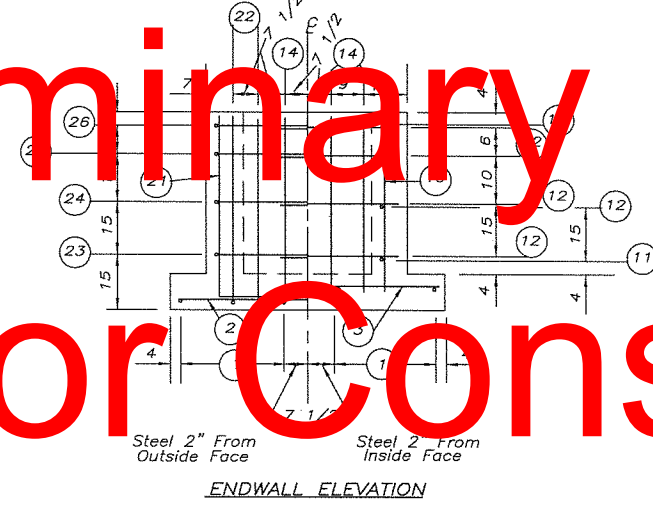
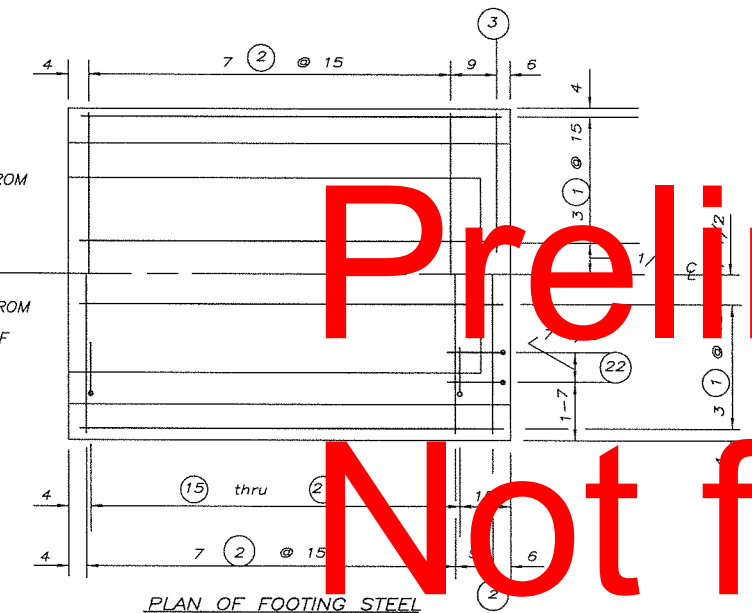
MARK	ITEM	QUANTITY
A	Angle 2 x 2 x 1/4 3-9 Long	9
B	Angle 5 x 3 x 3/8 7-10 Long	2
C	Bolt - 5/8" Diam. 12 1/2" Long	4
D	Bolt - 5/8" Diam. 2 3/4" Long	18
E	Washer - 5/8" x 5/16"	18
F	Washer - 5/8" x 5/16"	4

**Preliminary Plans**

**Not for Construction**

STEEL 2" FROM TOP OF FOOTING

STEEL 3" FROM BOTTOM OF FOOTING



MATERIAL AND FABRICATION (check appropriate block)

- Trash Rack Shall Be Const. of:
  - Structural Steel
  - Aluminum Alloy 6061-T6
- Rack Shall Be:
  - Bolted
  - Welded
- Structural Steel Shall Be:
  - Galvanized
  - Painted

Galvanizing or painting shall be in accordance with specifications

- CONSTRUCTION NOTES:
- Bars in headwall to be field cut to clear fitting by 2 inches.
  - All aluminum angles in contact with a concrete surface shall be cleaned and given a coat of alkali resistant bituminous paint and allowed to dry before assembly.

QUANTITIES

Concrete, Class 4000	3.58	Cu. Yds.
Steel Reinforcement	.470	Pounds

DRAWDOWN STRUCTURE FOR  
14" THROUGH 24" DIAM. PIPE

E & WP UNIT - DESIGN SECTION  
LINCOLN, NEBRASKA

BASE DWG. NO. 5,E-33,041

DATE APPROVED: MARCH 31, 1969

REV. JULY, 1970 REV. 12-76

SHEET 1 OF 1

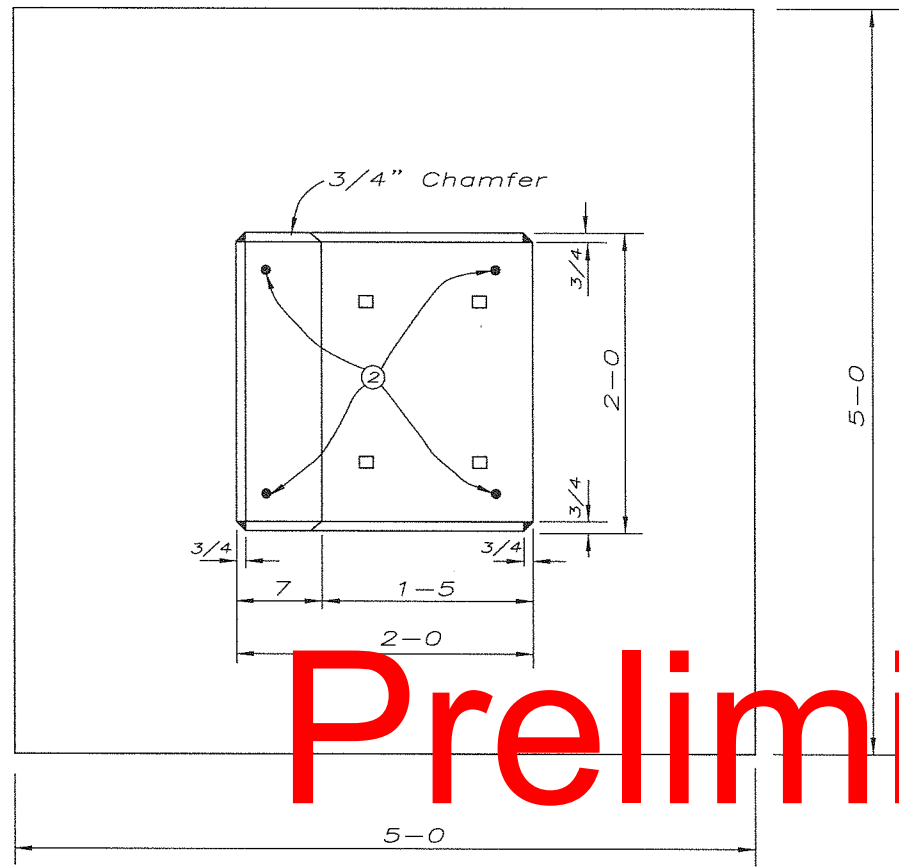
NOT TO SCALE

Date: April 08  
 Designed: MDS  
 Drawn: MDS, KAS, KRW  
 Checked: BBV  
 Approved: [Signature]

Drawdown Structure  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri

**NRCS**  
 Natural Resources Conservation Service  
 United States Department of Agriculture

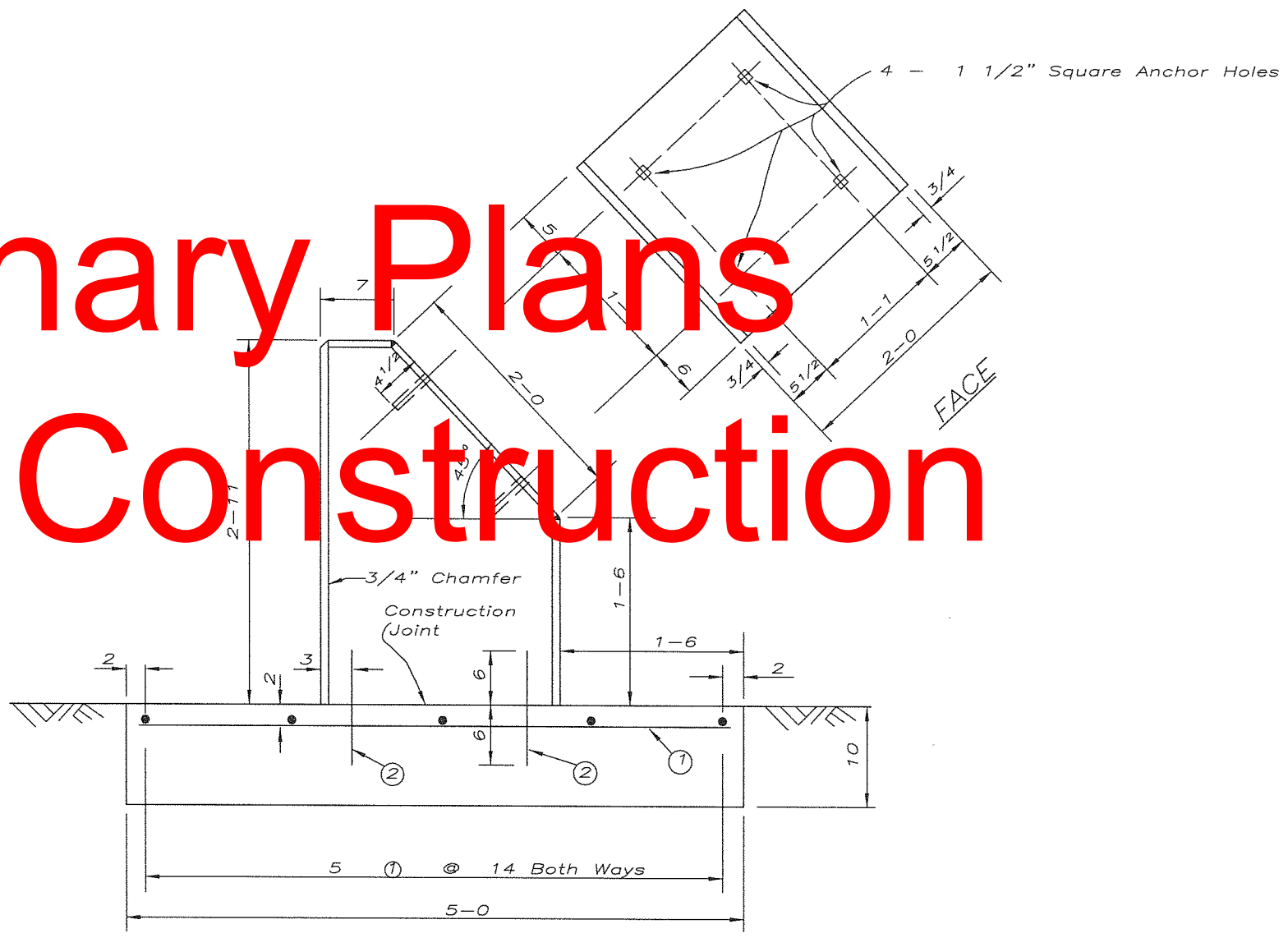
File Name: \_\_\_\_\_  
 Drawing Name: \_\_\_\_\_  
 Sheet 87 of 117



STEEL SCHEDULE						QUANTITIES	
MARK	QUANTITY	TYPE	SIZE	LENGTH	TOTAL LENGTH	1/2 STEEL TOTAL POUNDS	CONCRETE CU. YDS.
1	10	Straight	3	4-10	48-4	18.17	1.13 *
2	4	Straight	4	1-0	4-0	2.67	

1/2 Total Steel = 20.8 Pounds \*Class 4000

Note: Location of concrete monument will be determined by the Engineer on the site. Monument to be poured in place.



SIDE ELEVATION

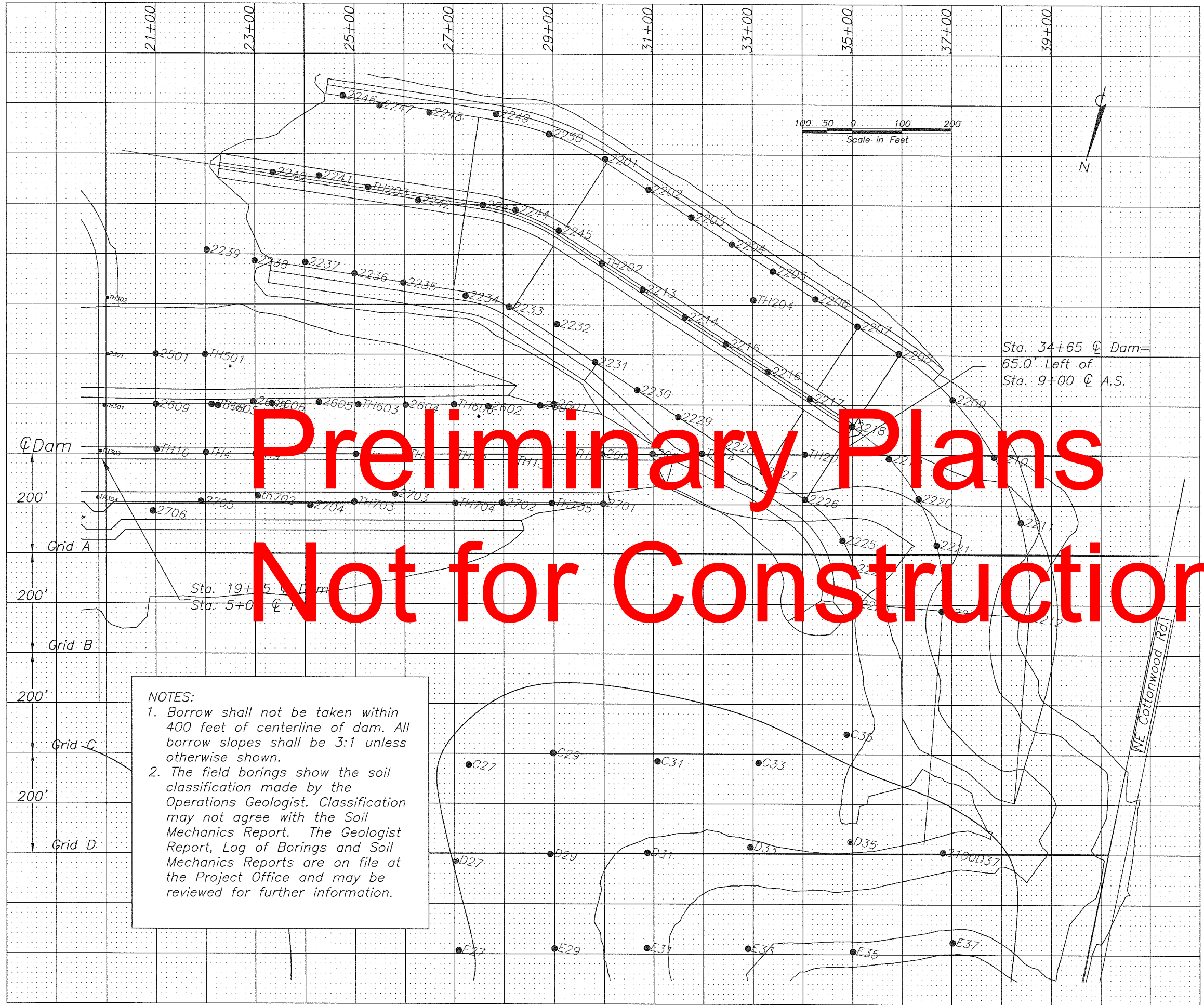
Preliminary Plans  
Not for Construction

Date April 08  
 Designed MDS  
 Drawn MDS, KAS, KRW  
 Checked BBV  
 Approved \_\_\_\_\_  
 Date July 08  
 Date Sept 08

Concrete Monument  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 88 of 117



**NOTES:**

- Borrow shall not be taken within 400 feet of centerline of dam. All borrow slopes shall be 3:1 unless otherwise shown.
- The field borings show the soil classification made by the Operations Geologist. Classification may not agree with the Soil Mechanics Report. The Geologist Report, Log of Borings and Soil Mechanics Reports are on file at the Project Office and may be reviewed for further information.

**LEGEND**

**SYMBOLS**

**UNCONSOLIDATED MATERIAL**

gravel	sand	silt	clay
gravel, sandy	sand, gravelly	silt, gravelly	clay, gravelly
gravel, silty	sand, silty	silt, sandy	clay, sandy
gravel, clayey	sand, clayey	silt, clayey	clay, silty
cobbles, boulders	peat or muck		

**CONSOLIDATED MATERIAL**

**Sedimentary Rocks**

conglomerate	shale	limestone	coal
breccia	siltstone	dolomite	gypsum
sandstone	marl	chalk	chert
ss.		cl.	cht.

**Metamorphic Rocks**

gneiss	schist	intrusive	extrusive
quartzite	slate	pyroclastic	
marble	soapstone	taic	Undifferentiated
	serpentine		

**ABBREVIATIONS**

ang. bid.	angular boulders (>12")	lam.	laminated
calc.	calcareous	lse.	loose
cali.	caliche	mas.	massive
cav.	cavities	med.	medium
cmt.	cemented	mic.	micaceous
cse.	coarse	mod.	moderately
chl.	cobbles (3"-12")	n.r.	no recovery
cpt.	compact	per.	permeable
con.	concretions	po.	poorly
con.	concretions	rd.	rounded
cr.	crystalline	slf.	slightly
den.	dense	sl.	soft
dip.	dipping	s.	some
d.s.	downstream	sl.	slowly
fr.	fine	stf.	stiff
frm.	firm	t.b.	thin-bedded
frac.	fractured	tuff.	tuffaceous
fig.	fragments	u.s.	upstream
fr.	friable	var.	variable
grn.	grain	v.	very
gyp.	gypseous	weo.	weathered
hd.	hard	w/.	with
h.	highly	w.l.	(gate) static water level

**TEST HOLE NUMBERING SYSTEM**

Centerline of dam	1-99
Borrow area	101-199
Emergency spillway	201-299
Centerline of outlet structure	301-399
Stream channel	401-499
Relief wells	501-599 601-699 701-799

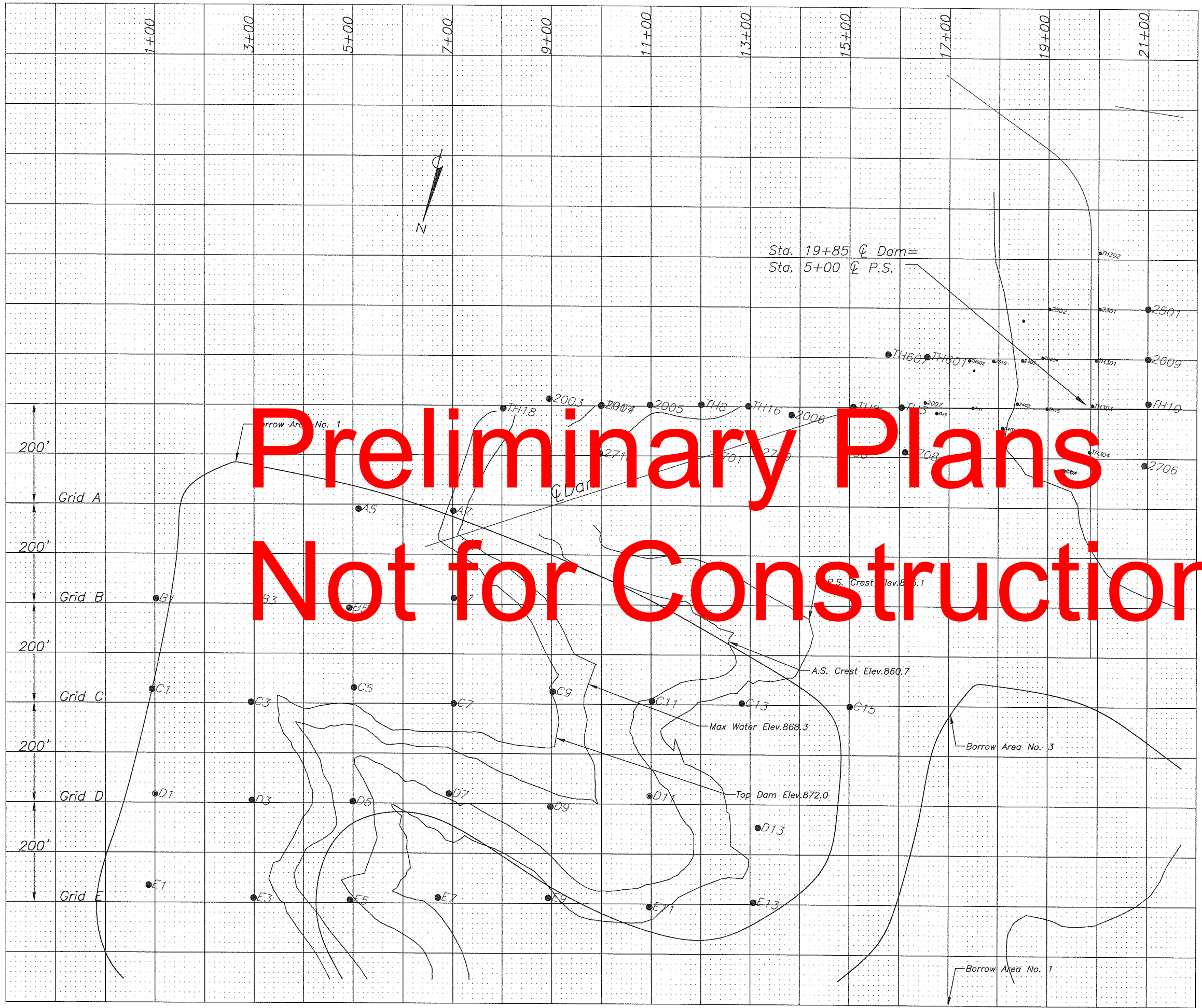
**UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS**

GW	Well graded gravels; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SW	Well graded sands; sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sand
SC	Clayey sands; sand-clay mixtures
ML	Silts with liquid limit of 50 or less
MH	Silts with liquid limit above 50
CL	Clays with liquid limit of 50 or less
CH	Clays with liquid limit above 50
OL	Organic silts and clays with liquid limit of 50 or less
OH	Organic silts and clays with liquid limit above 50

**Other Symbols**

- hole logged only
- ⊙ hole sampled
- ↖ strike and dip
- ⊥ pit or trench
- ⊙ pit sampled

# Preliminary Plans Not for Construction



### LEGEND

#### SYMBOLS

**UNCONSOLIDATED MATERIAL**


**CONSOLIDATED MATERIAL**

**Sedimentary Rocks**


**Metamorphic Rocks**


**Igneous Rocks**


**ABBREVIATIONS**

ang. bld.	angular boulders (>12")	lom.	laminated
calc.	calcareous	loos.	loose
cav.	cavities	mas.	massive
cm.	cemented	med.	medium
co.	coarse	mic.	micaceous
con.	concretions	mod.	moderately
cr.	crystalline	n.r.	no recovery
dbl.	dense	per.	permeable
comp.	compact	po.	poorly
con.	concretions	rd.	rounded
xin.	crystalline	sl.	slightly
ds.	dipping	sft.	soft
d.s.	downstream	st.	stiff
fn.	fine	stf.	stiff
frm.	firm	t.b.	thin-bedded
frac.	fractured	tuff.	tuffaceous
fg.	fragments	u.s.	upstream
fri.	friable	var.	variable
gm.	grain	v.	very
gyp.	gypsiferous	wea.	weathered
hd.	hard	w/.	with
h.	highly	w.l.	(date) static water level

**TEST HOLE NUMBERING SYSTEM**

Centerline of dam	1-99
Borrow area	101-199
Emergency spillway	201-299
Centerline of outlet structure	301-399
Stream channel	401-499
Relief wells	501-599
	601-699
	701-799

**UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS**

GW	Well graded gravels; gravel-sand mixtures
GP	Poorly graded gravels
GM	Silty gravels; gravel-sand-silt mixtures
GC	Clayey gravels; gravel-sand-clay mixtures
SW	Well graded sands; sand-gravel mixtures
SP	Poorly graded sands
SM	Silty sand
SC	Clayey sands; sand-clay mixtures
ML	Silts with liquid limit of 50 or less
MH	Silts with liquid limit above 50
CL	Clays with liquid limit of 50 or less
CH	Clays with liquid limit above 50
OL	Organic silts and clays with liquid limit of 50 or less
OH	Organic silts and clays with liquid limit above 50

**Other Symbols**

	hole logged only		strike and dip
	hole sampled		pit or trench
	pit sampled		

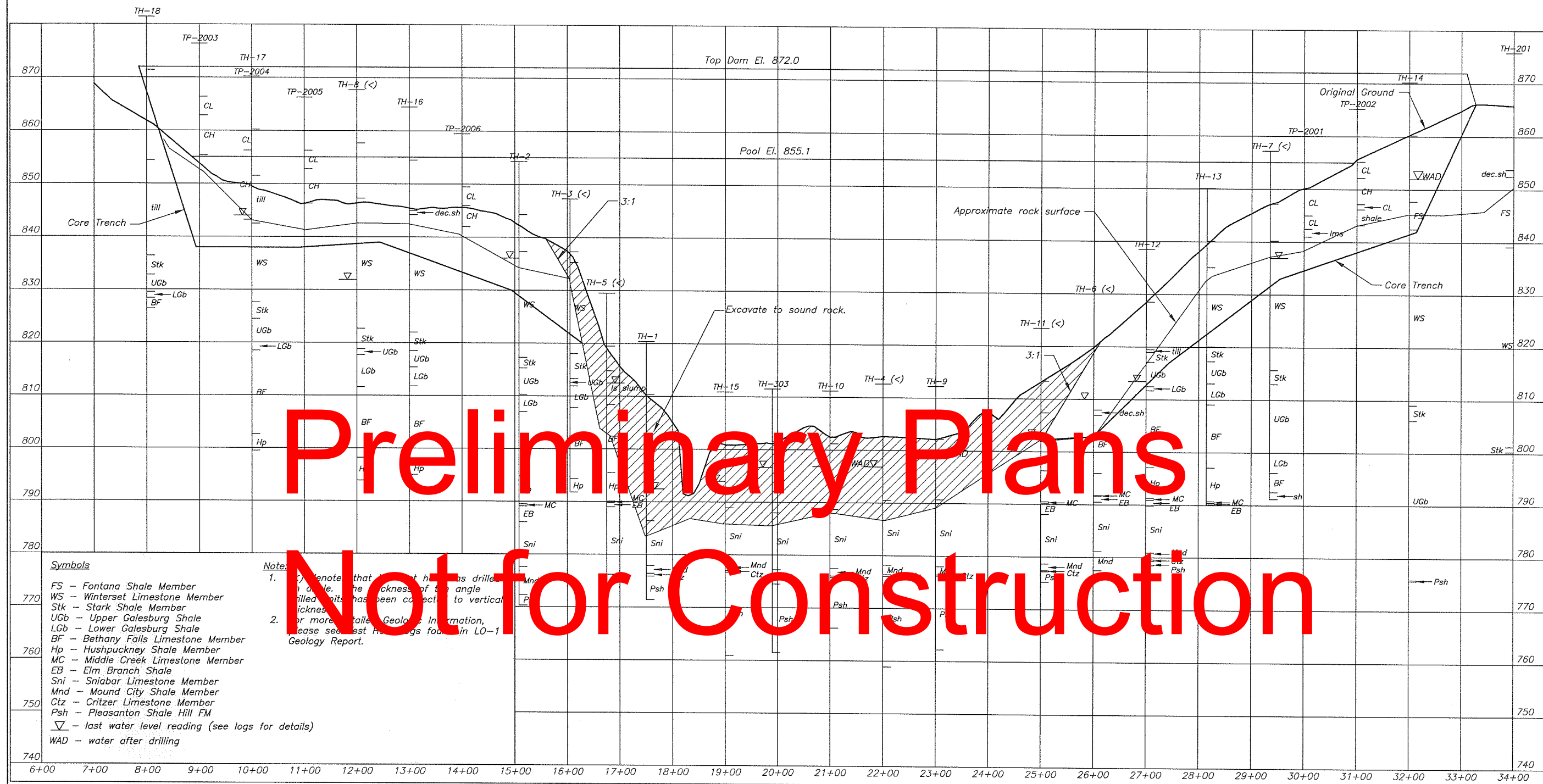
Date April 08  
 Designed MDS Drawn D. Muckel Checked BBV Approved  
 1/07  
 Sept 08

PLAN AND PROFILES FOR GEOLOGIC INVESTIGATIONS  
 STRUCTURE LO-1  
 LITTLE OTTER CREEK WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI

**NRCS**  
 Natural Resources Conservation Service  
 United States Department of Agriculture

File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 90 of 117

Revised February 1983

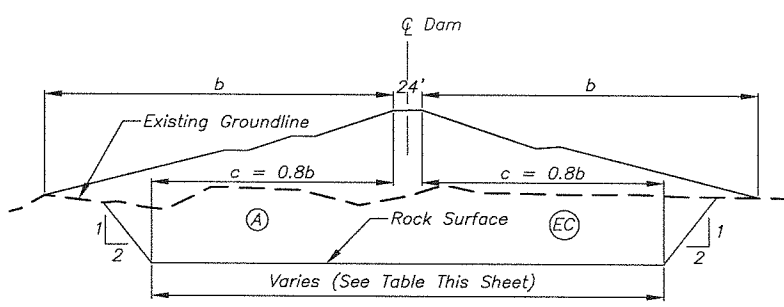


Preliminary Plans  
 Not for Construction

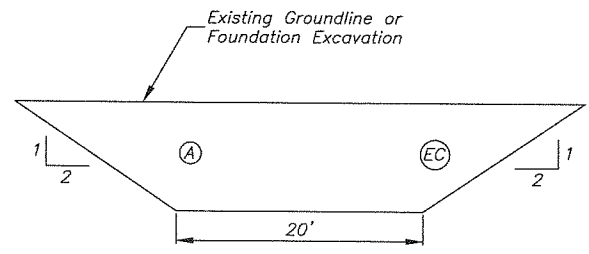
- Symbols**
- FS - Fontana Shale Member
  - WS - Winterset Limestone Member
  - Stk - Stark Shale Member
  - UGb - Upper Galesburg Shale
  - LGb - Lower Galesburg Shale
  - BF - Bethany Falls Limestone Member
  - Hp - Hushpuckney Shale Member
  - MC - Middle Creek Limestone Member
  - EB - Elm Branch Shale
  - Sni - Sniabar Limestone Member
  - Mnd - Mound City Shale Member
  - Ctz - Critzer Limestone Member
  - Psh - Pleasanton Shale Hill FM
  - ▽ - last water level reading (see logs for details)
  - WAD - water after drilling
- Notes:**
1. Note that the thickness of the angle drilled units has been corrected to vertical thickness.
  2. For more detailed Geologic Information, please see test logs found in LO-1 Geology Report.

Profile and Geologic Cross Section: Centerline Dam

Station	MINIMUM FOUNDATION EXCAVATION WIDTH	
	Distance From $\phi$ Dam Left (Ft.)	Distance From $\phi$ Dam Right (Ft.)
16+00	135.0	145.0
17+00	195.0	175.0
18+00	220.0	200.0
19+00	225.0	230.0
20+00	225.0	240.0
21+00	225.0	220.0
22+00	225.0	220.0
23+00	220.0	215.0
24+00	200.0	215.0
25+00	180.0	205.0



Typical Foundation Excavation  
 16+00 thru 25+00



Typical Core Trench

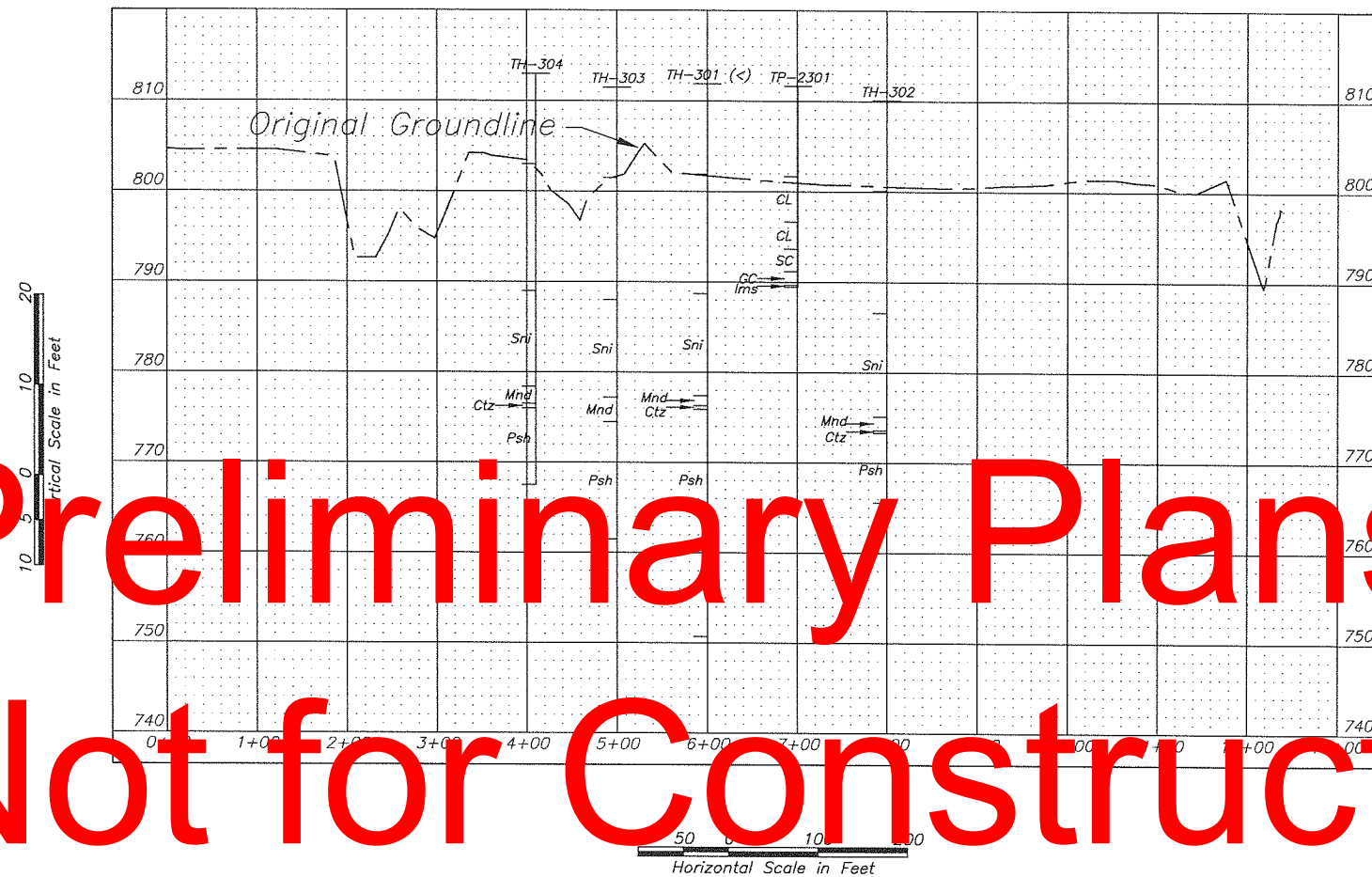
APPROXIMATE CORE TRENCH

Station	Elevation
7+92	870.75
9+00	838.0
11+00	838.0
12+50	839.0
15+00	830.0
16+25	820.0

APPROXIMATE CORE TRENCH

Station	Elevation
25+00	802.0
26+00	803.0
27+50	817.0
29+60	833.0
32+20	842.0
33+28	865.15

# Preliminary Plans Not for Construction



Profile and Geologic Cross Section: Centerline Principal Spillway

Symbols

- FS - Fontana Shale Member
- WS - Winterset Limestone Member
- Stk - Stark Shale Member
- UGb - Upper Galesburg Shale
- LGb - Lower Galesburg Shale
- BF - Bethany Falls Limestone Member
- Hp - Hushpuckney Shale Member
- MC - Middle Creek Limestone Member
- EB - Elm Branch Shale
- Sni - Sniabar Limestone Member
- Mnd - Mound City Shale Member
- Ctz - Critzer Limestone Member
- Psh - Pleasanton Shale Hill FM

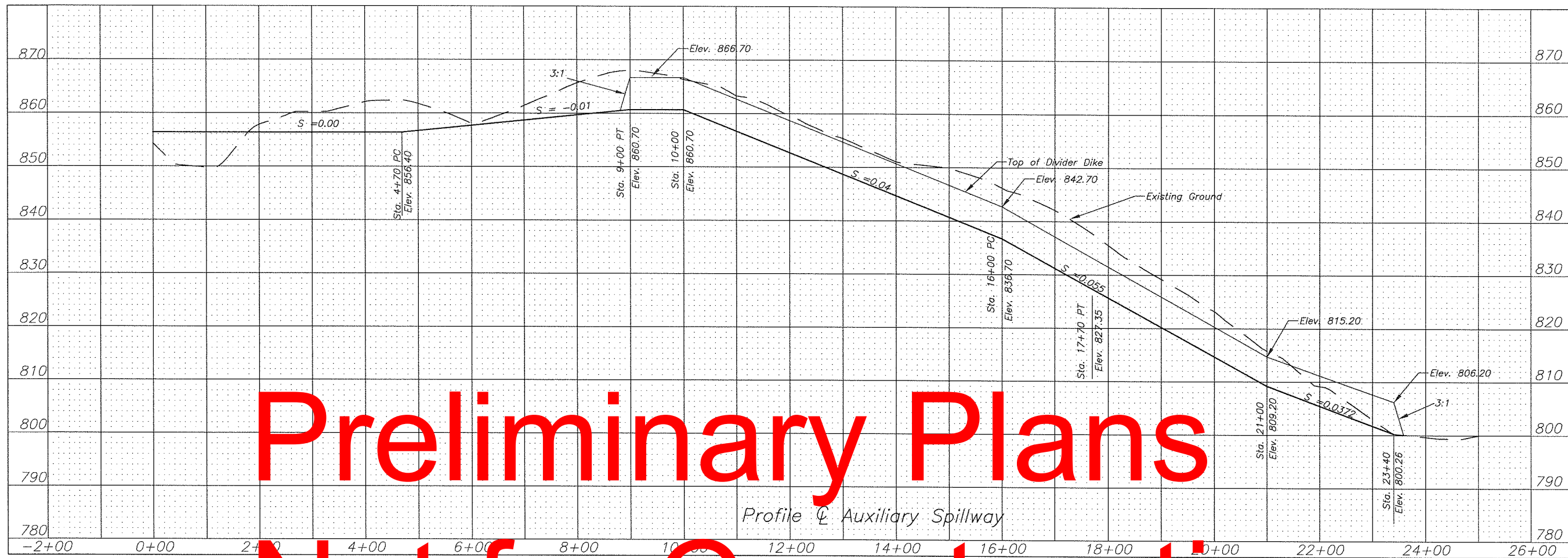
\*Note: (<) denotes that the test hole was drilled on angle. The thickness of the angle drilled units has been corrected to vertical thickness.

Date	April 08
Designed	MDS
Drawn	J. Rosenfelder
Checked	BBV
Approved	
Date	9/2007
Date	Sept 08

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



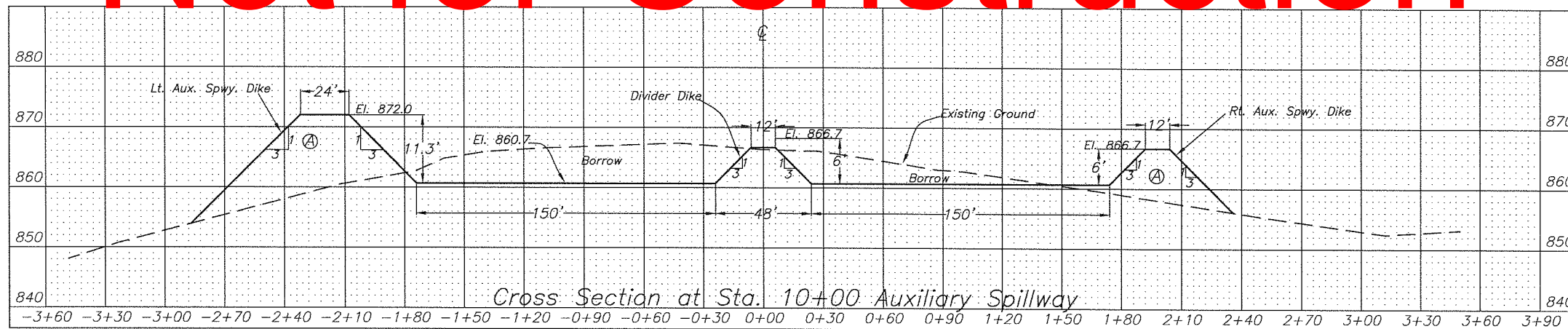
File Name
Drawing Name
Sheet 92 of 117



Preliminary Plans

Not for Construction

Profile of Auxiliary Spillway



Cross Section at Sta. 10+00 Auxiliary Spillway

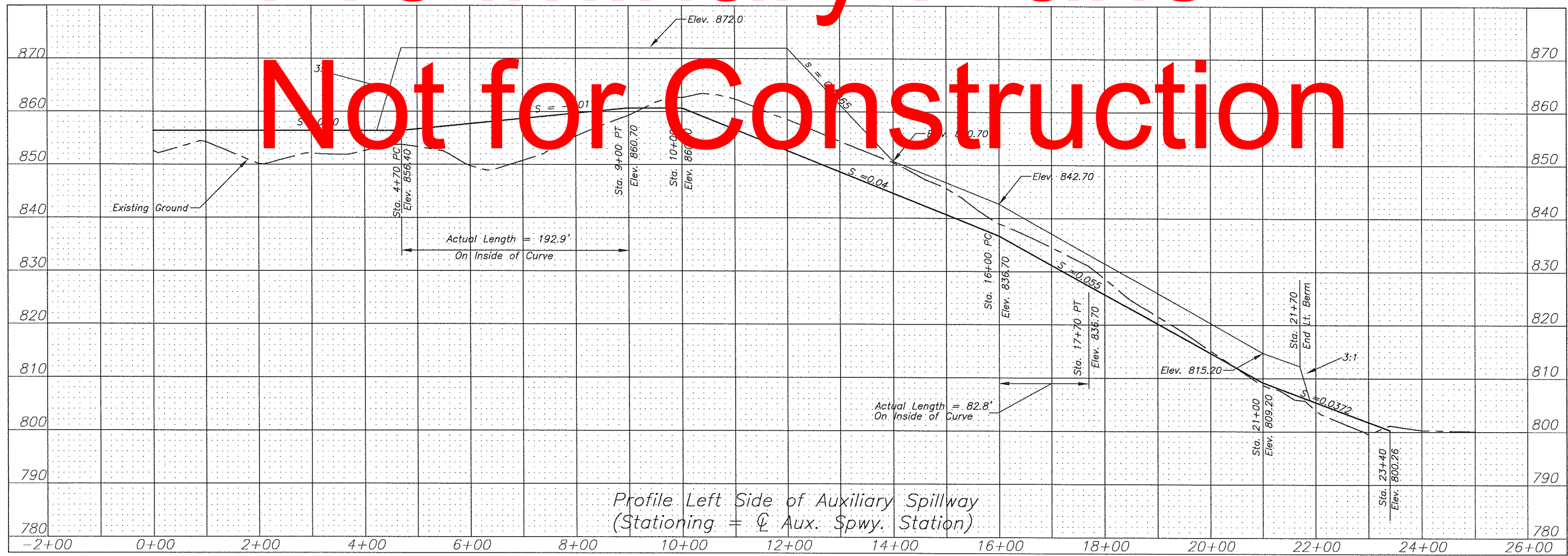
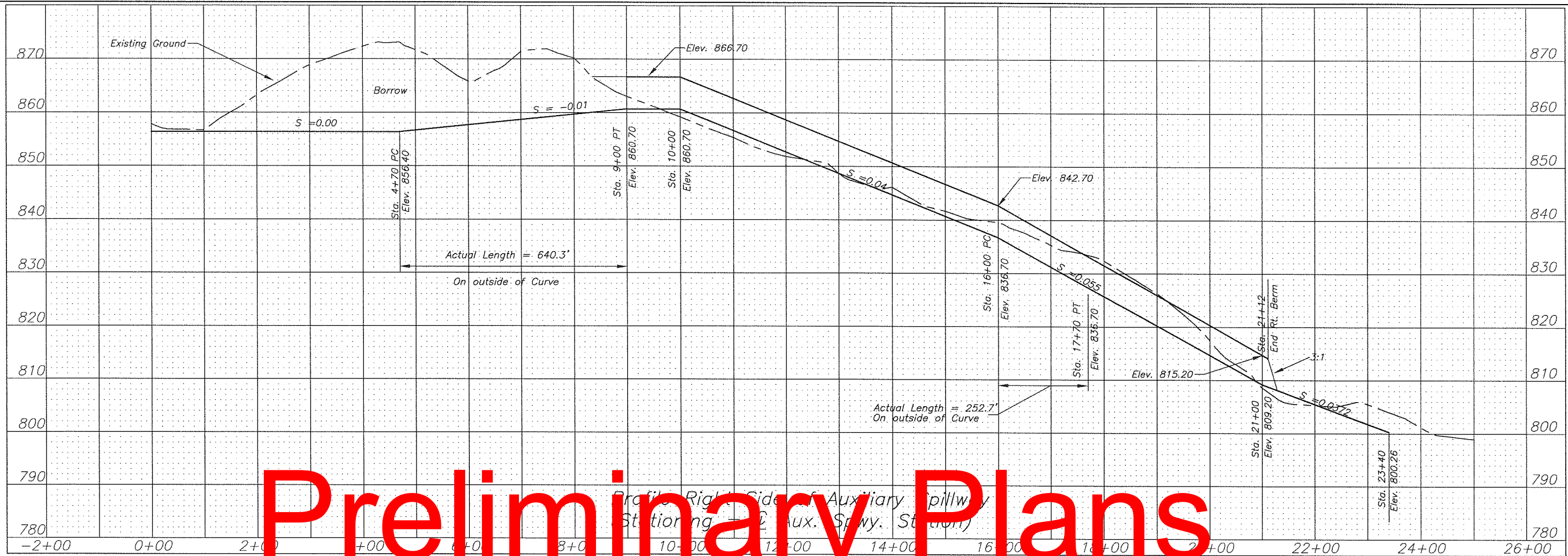
Date  
 April 08  
 July 08  
 Sept 08  
 Designed MDS  
 Drawn MDS, KAS, KRW  
 Checked BBV  
 Approved

PROFILE CENTERLINE AUXILIARY SPILLWAY  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name  
 Drawing Name  
 Sheet 93 of 117

# Preliminary Plans Not for Construction



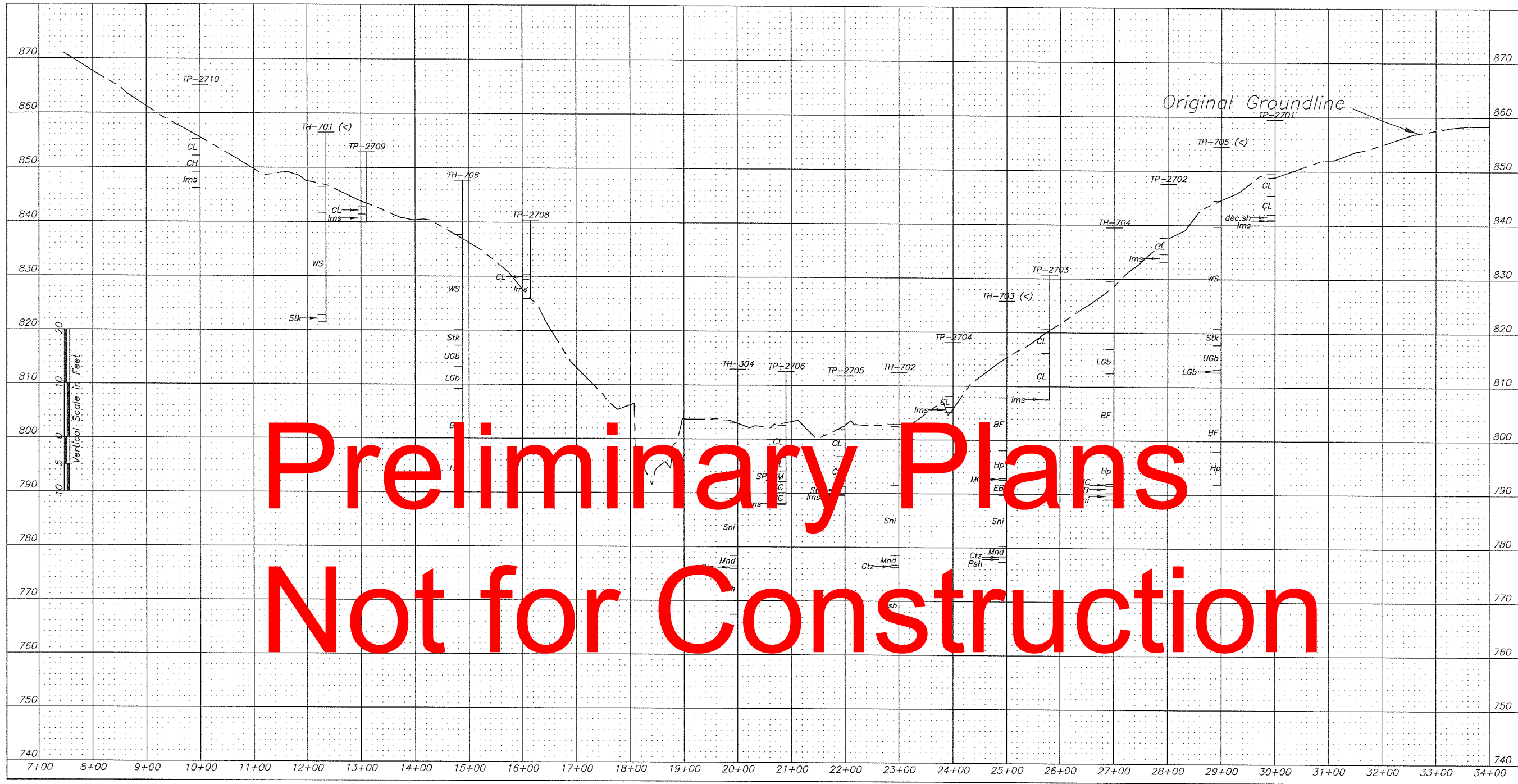
Date: April 08  
 Designed: MDS  
 Drawn: MDS, KAS, KRW  
 Checked: BBV  
 Approved: \_\_\_\_\_  
 Date: July 08  
 Date: Sept 08

PROFILES RT. AND LT. AUX. SPILLWAY DIKE  
 Structure LO-1  
 Little Otter Creek Watershed  
 PL-566 Caldwell County, Missouri



File Name: \_\_\_\_\_  
 Drawing Name: \_\_\_\_\_





Preliminary Plans  
Not for Construction

*Profile and Geologic Cross Section: 100 Feet Upstream Centerline Dam*

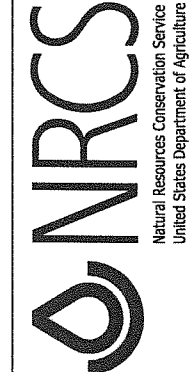
- Symbols**
- FS - Fontana Shale Member
  - WS - Winterset Limestone Member
  - Stk - Stark Shale Member
  - UGb - Upper Galesburg Shale
  - LGb - Lower Galesburg Shale
  - BF - Bethany Falls Limestone Member
  - Hp - Hushpuckney Shale Member
  - MC - Middle Creek Limestone Member
  - EB - Elm Branch Shale
  - Sni - Sniabar Limestone Member
  - Mnd - Mound City Shale Member
  - Ctz - Critzer Limestone Member
  - Psh - Pleasanton Shale Hill FM

\*Note: (<) denotes that the test hole was drilled on angle. The thickness of the angle drilled units has been corrected to vertical thickness.

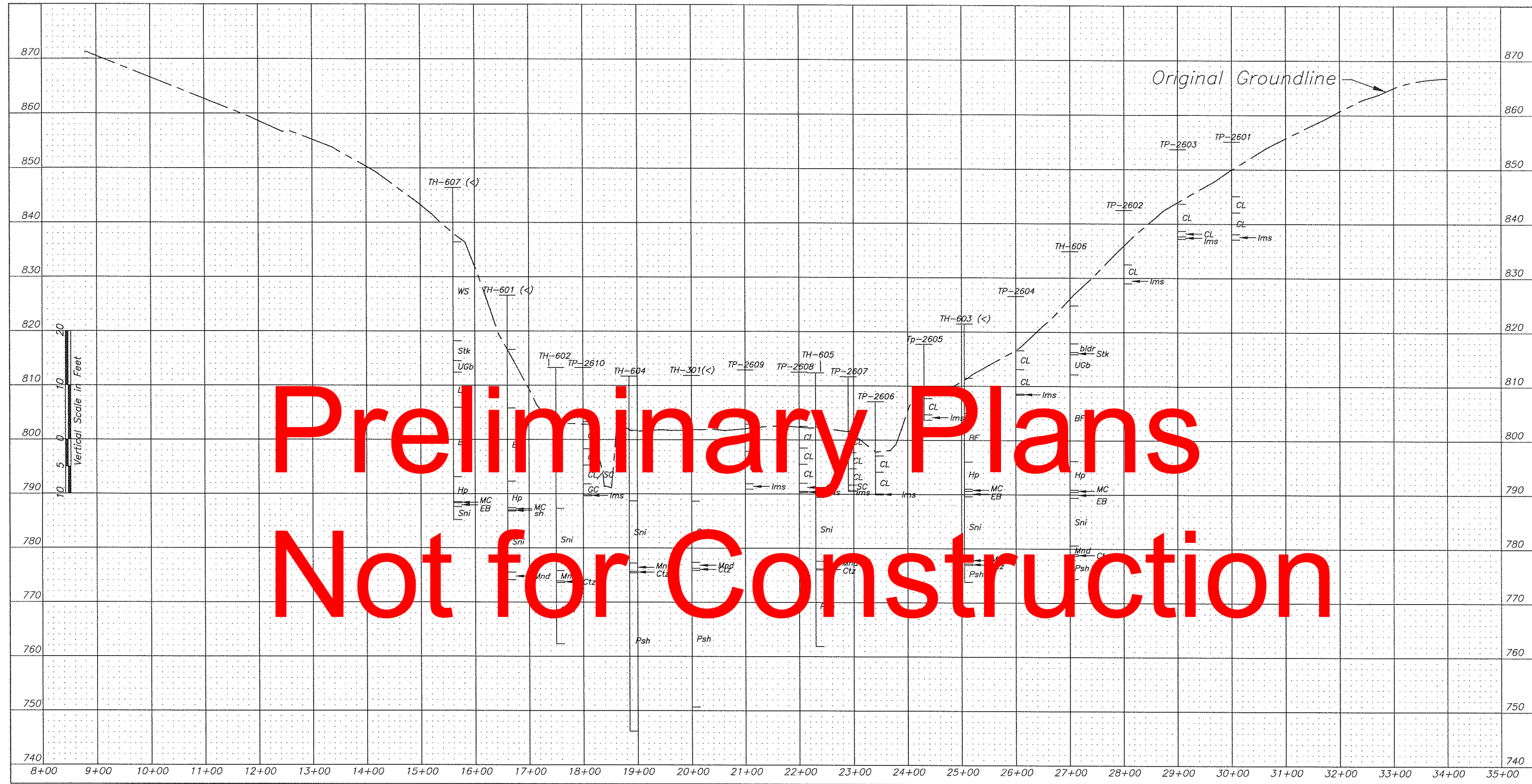


Date April 08  
 Designed MDS  
 Drawn J. Rosenfelder  
 Checked BBV  
 Approved \_\_\_\_\_  
 Date 9/2007  
 Date Sept 08

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 95 of 117



Preliminary Plans  
Not for Construction

*Profile and Geologic Cross Section: 100 Feet downstream Centerline Dam*

**Symbols**

- FS - Fontana Shale Member
- WS - Winterset Limestone Member
- Stk - Stark Shale Member
- UGb - Upper Galesburg Shale
- LGb - Lower Galesburg Shale
- BF - Bethany Falls Limestone Member
- Hp - Hushpuckney Shale Member
- MC - Middle Creek Limestone Member
- EB - Elm Branch Shale
- Sni - Sniabar Limestone Member
- Mnd - Mound City Shale Member
- Ctz - Critzer Limestone Member
- Psh - Pleasanton Shale Hill FM

\*Note: (<) denotes that the test hole was drilled on angle. The thickness of the angle drilled units has been corrected to vertical thickness.



Date  
 April 08  
 9/2007  
 Sept 08  
 Designed MDS  
 Drawn J. Rosenfelder  
 Checked BBV  
 Approved

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 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name  
 Drawing Name  
 Sheet 96 of 117

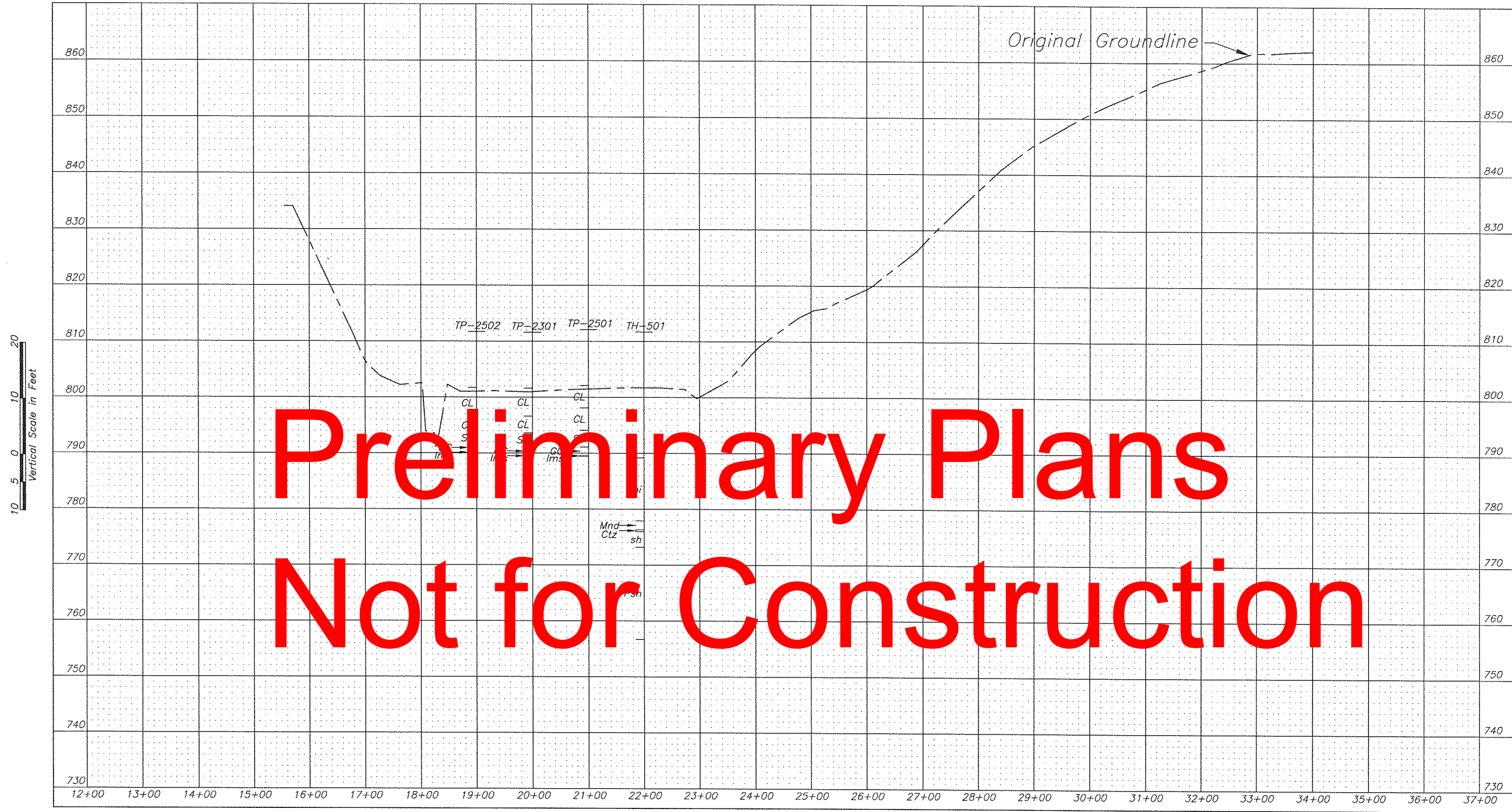
Date  
 April 08  
 9/2007  
 Sept 08

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 Approved

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
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 CALDWELL COUNTY, MISSOURI



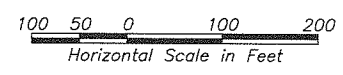
File Name  
 Drawing Name  
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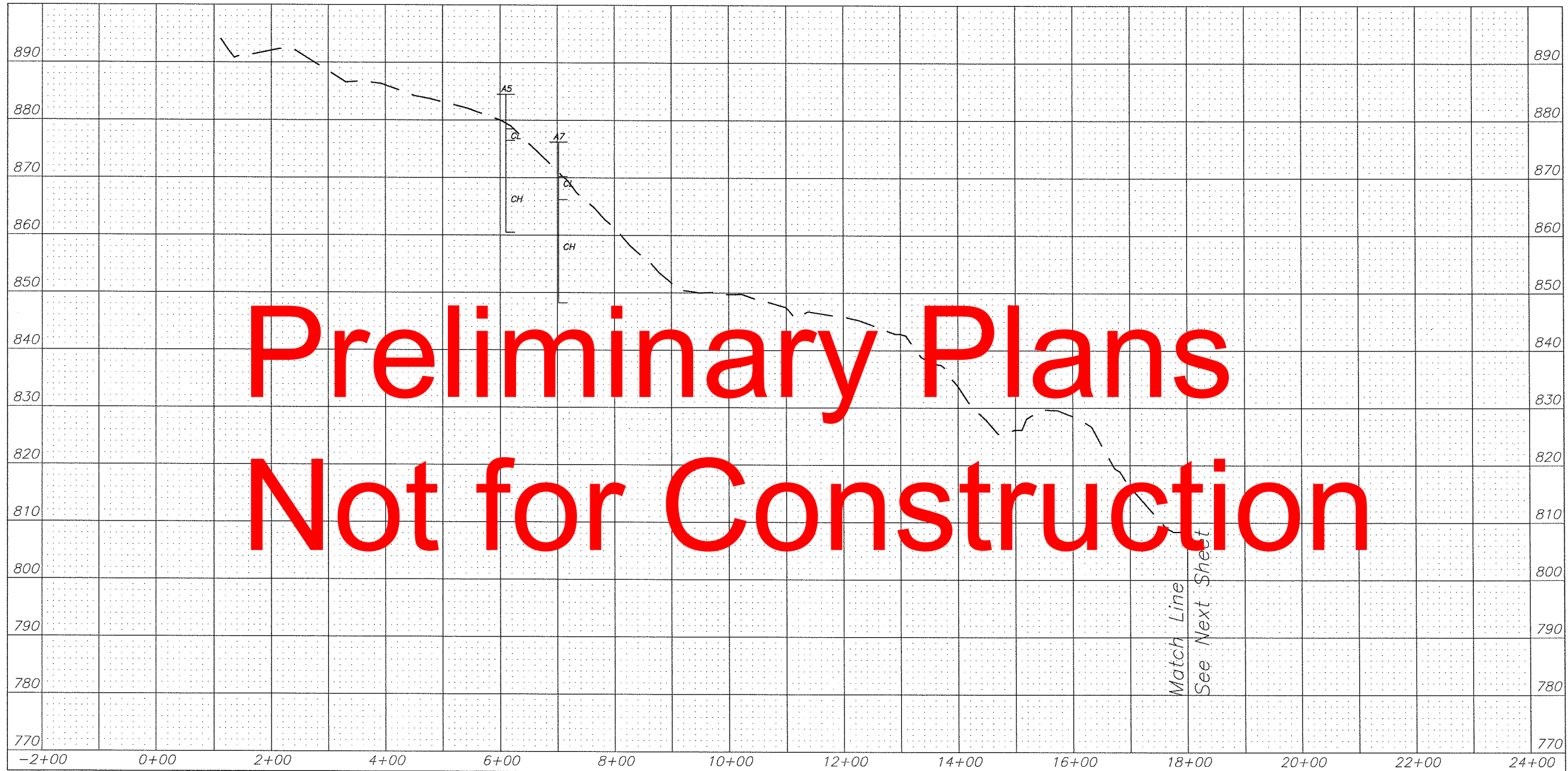
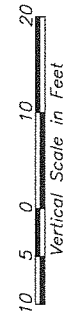


**Preliminary Plans  
 Not for Construction**

Profile and Geologic Cross Section: 200 Feet Downstream Centerline Dam

- Symbols**
- FS - Fontana Shale Member
  - WS - Winterset Limestone Member
  - Stk - Stark Shale Member
  - UGb - Upper Galesburg Shale
  - LGB - Lower Galesburg Shale
  - BF - Bethany Falls Limestone Member
  - Hp - Hushpuckney Shale Member
  - MC - Middle Creek Limestone Member
  - EB - Elm Branch Shale
  - Sni - Sniabar Limestone Member
  - Mnd - Mound City Shale Member
  - Ctz - Critzer Limestone Member
  - Psh - Pleasanton Shale Hill FM





Preliminary Plans  
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*Profile and Geologic Cross Section: Grid A*



Date April 08  
 Designed MDS  
 Drawn K. WALLER  
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 Approved \_\_\_\_\_  
 Date July 08  
 Date Sept 08

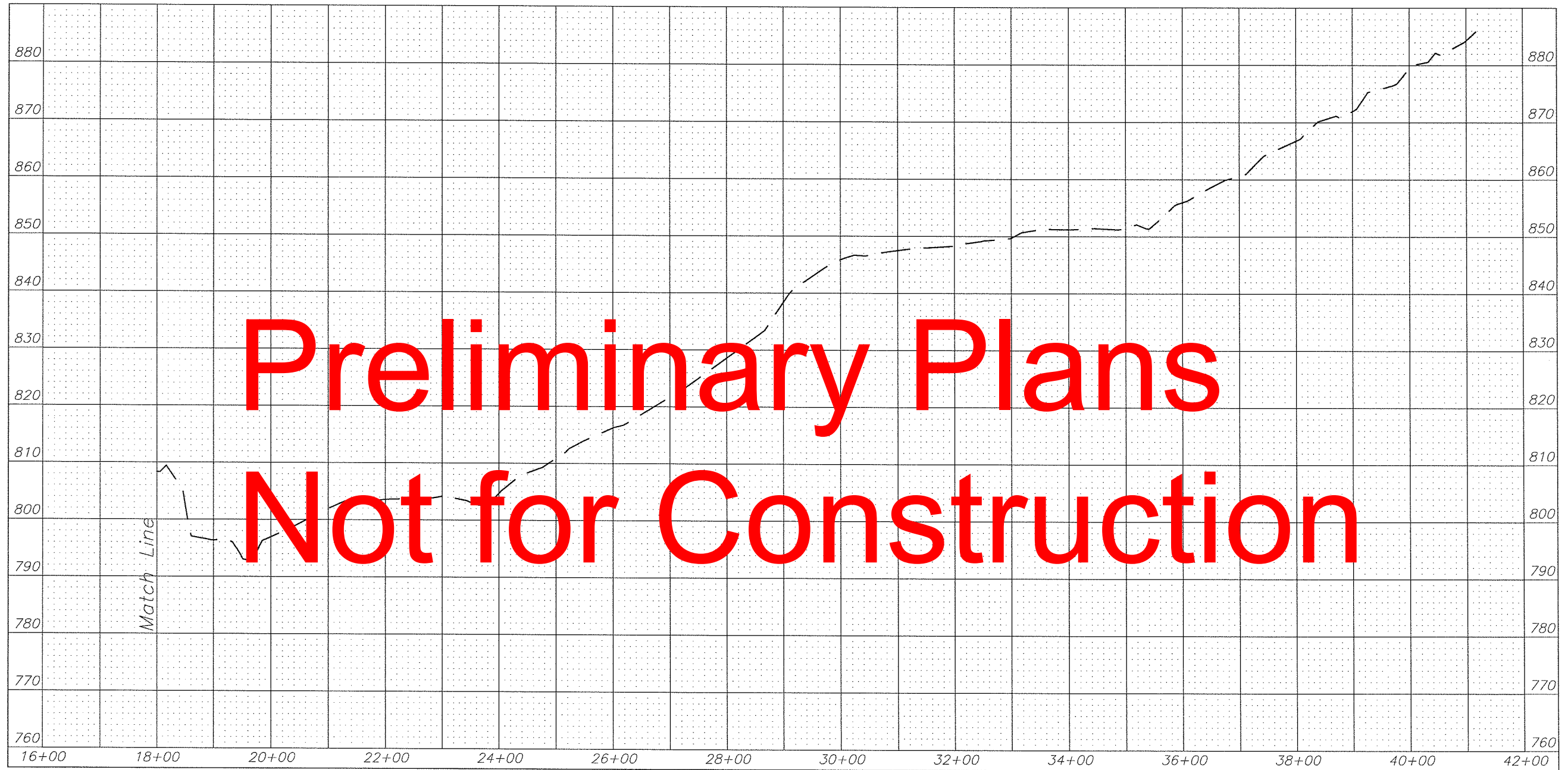
PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name \_\_\_\_\_

Drawing Name \_\_\_\_\_

10 5 0 10 20  
Vertical Scale in Feet



*Profile and Geologic Cross Section: Grid A Cont.*

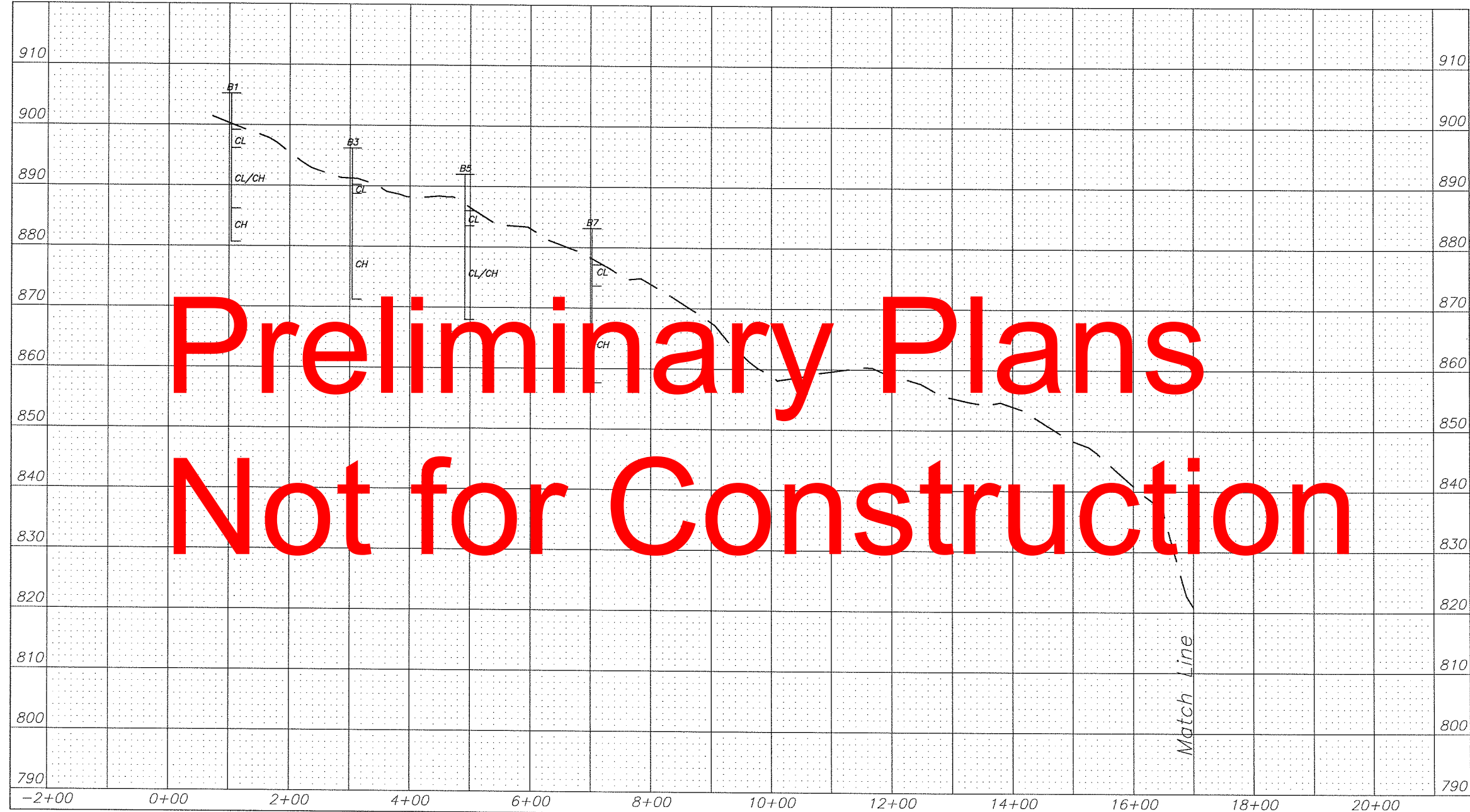
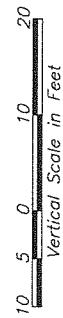
100 50 0 100 200  
Horizontal Scale in Feet

Date  
 April 08  
 July 08  
 Sept 08  
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 Drawn K.WALLER  
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 Approved

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI

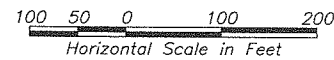


File Name  
 Drawing Name  
 Sheet 99 of 117



Preliminary Plans  
Not for Construction

*Profile and Geologic Cross Section: Grid B*

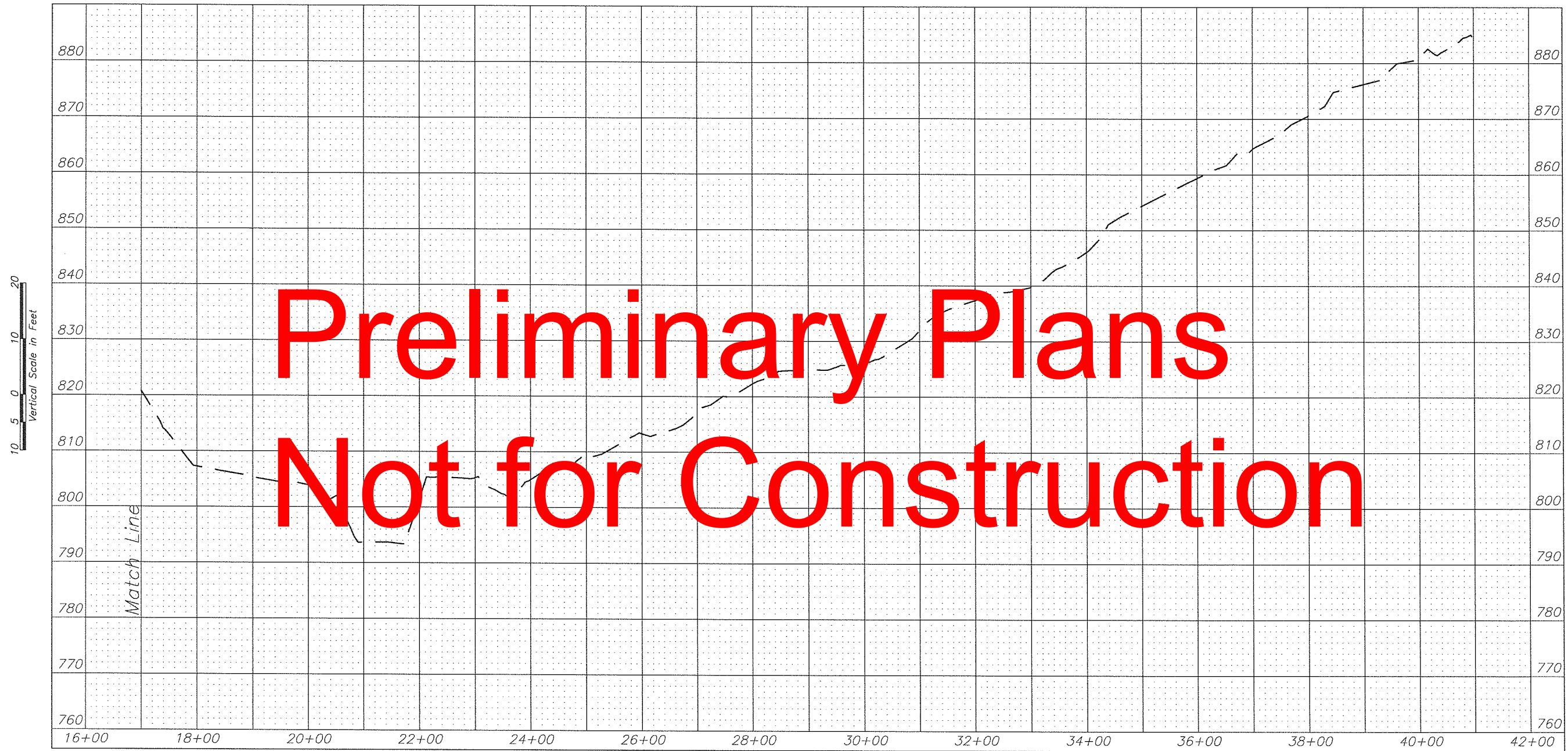


Date \_\_\_\_\_  
 April 08  
 July 08  
 Sept 08  
 Designed MDS  
 Drawn K. WALLER  
 Checked BBV  
 Approved \_\_\_\_\_

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 100 of 117

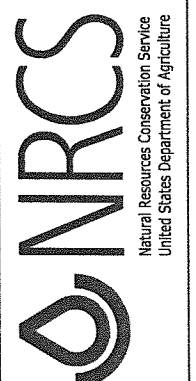


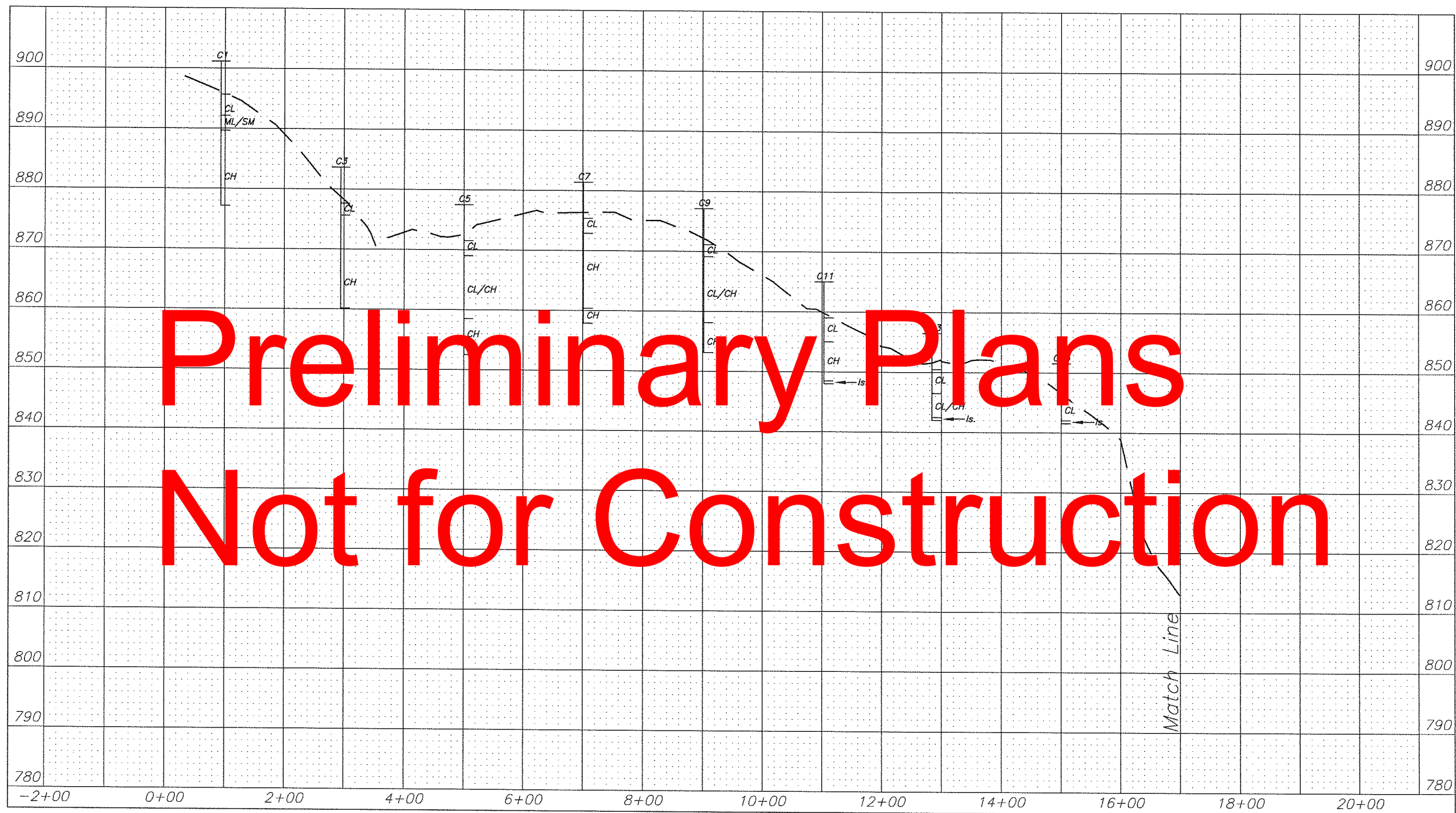
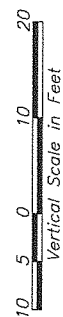
Profile and Geologic Cross Section: Grid B Cont.



Date: April 08  
 Designed: MDS  
 Drawn: K. WALLER  
 Checked: BBV  
 Approved: \_\_\_\_\_  
 Date: July 08  
 Date: Sept 08

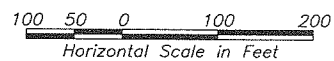
PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI





Preliminary Plans  
Not for Construction

Profile and Geologic Cross Section: Grid C



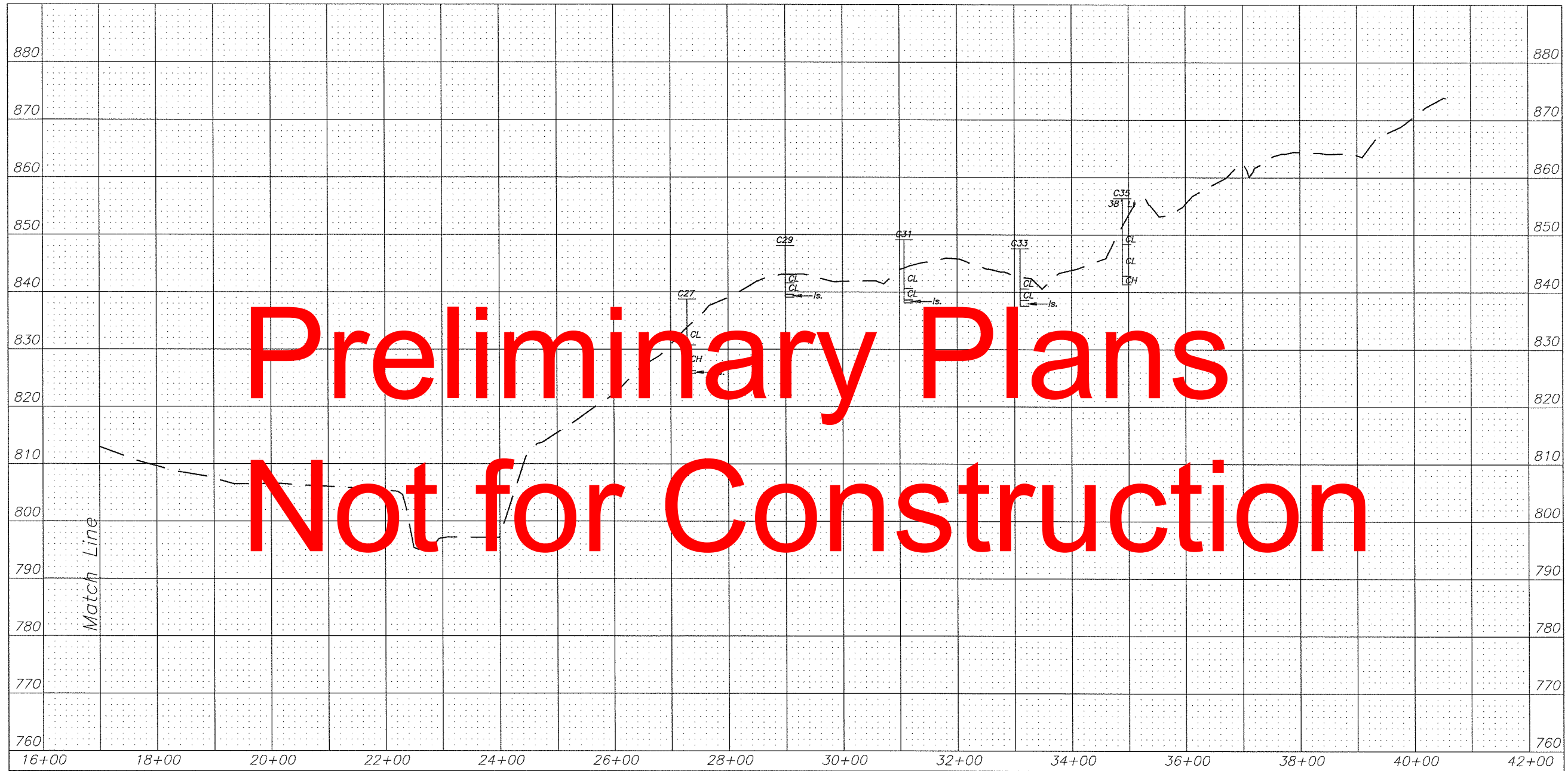
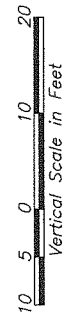
Date April 08  
 Designed MDS  
 Drawn K. WALLER  
 Checked BBV  
 Approved \_\_\_\_\_  
 Date April 08  
 Date Sept 08

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 102 of 117





Preliminary Plans  
Not for Construction

Profile and Geologic Cross Section: Grid C Cont.

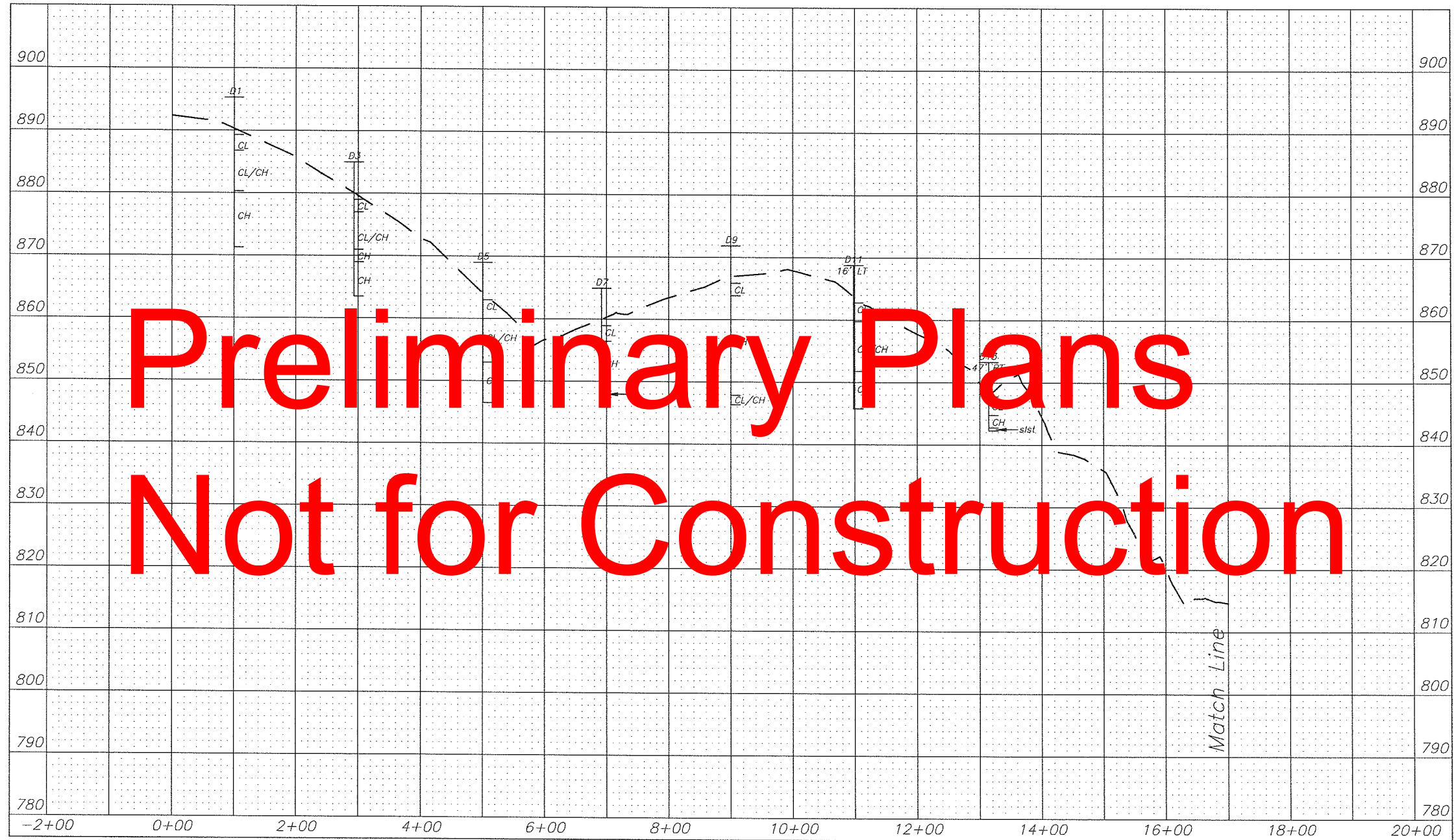
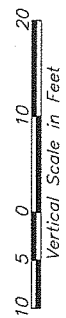


Date: April 08, July 08, Sept 08  
 Designed: MDS  
 Drawn: K. WALLER  
 Checked: BBV  
 Approved:

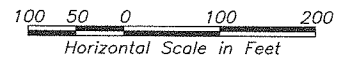
PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name  
 Drawing Name  
 Sheet 103 of 117

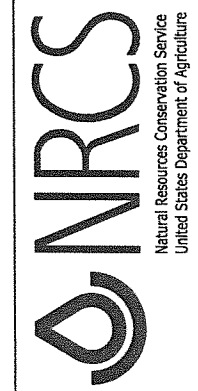


Profile and Geologic Cross Section: Grid D

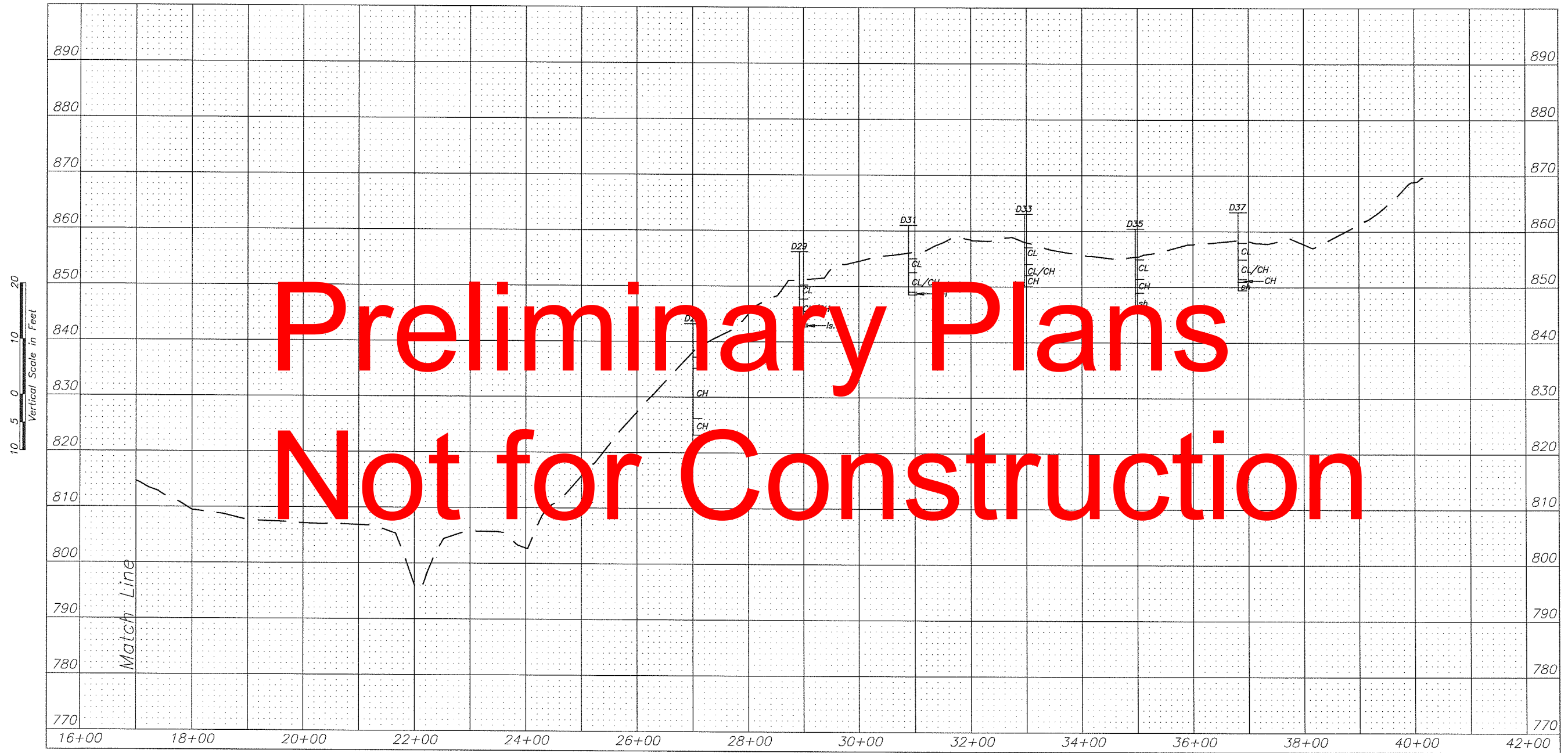


Date  
 Designed MDS April 08  
 Drawn K. WALLER July 08  
 Checked BBV Sept 08  
 Approved

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI

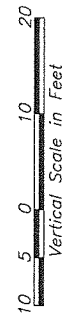


File Name  
 Drawing Name  
 Sheet 104 of 117



Preliminary Plans  
Not for Construction

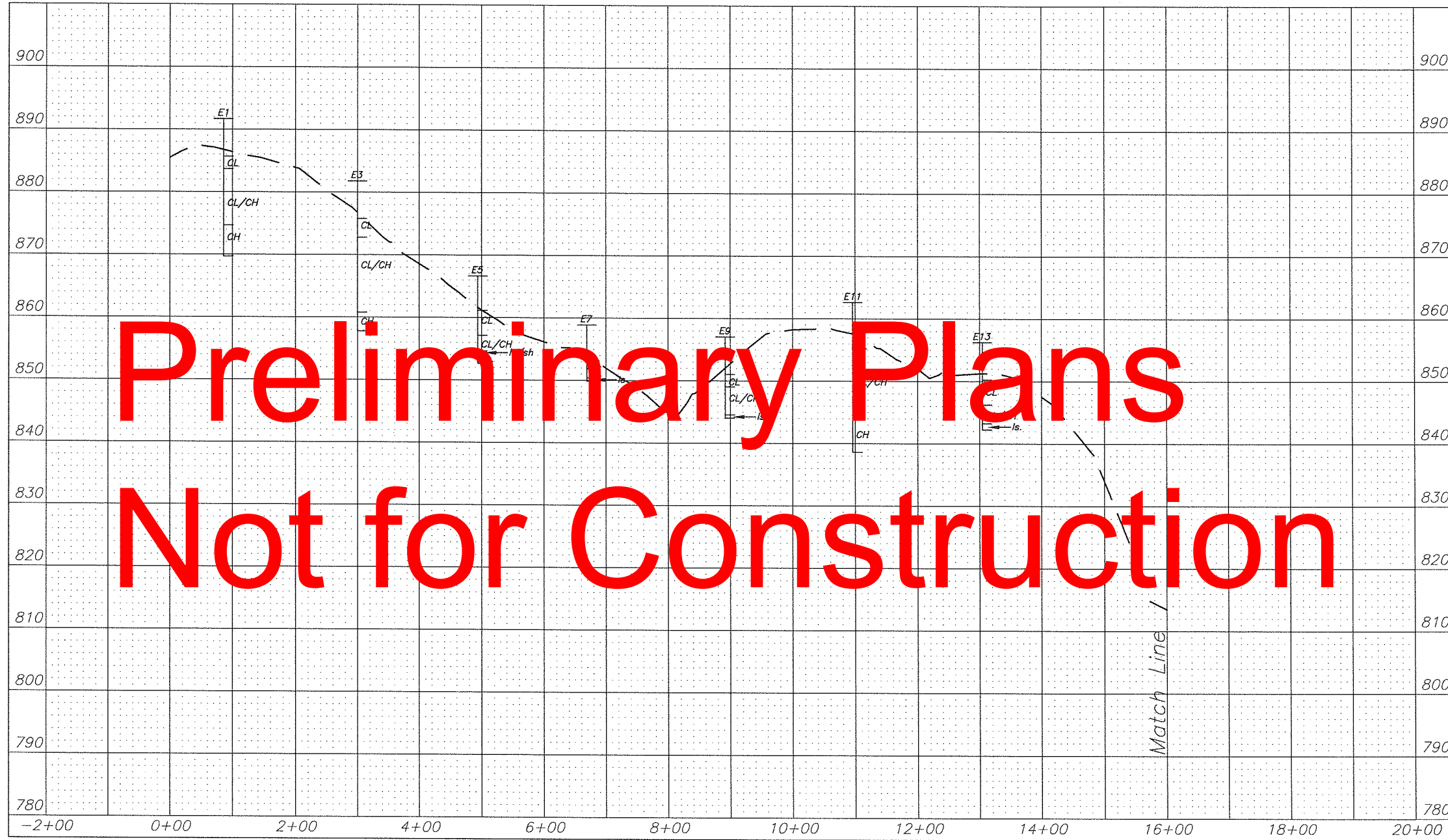
*Profile and Geologic Cross Section: Grid D Cont.*



Designed	MDS	Date	April 08
Drawn	K. WALLER	Date	July 08
Checked	BBV	Date	Sept 08
Approved			

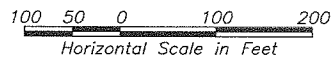
PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI





Preliminary Plans  
Not for Construction

*Profile and Geologic Cross Section: Grid E*



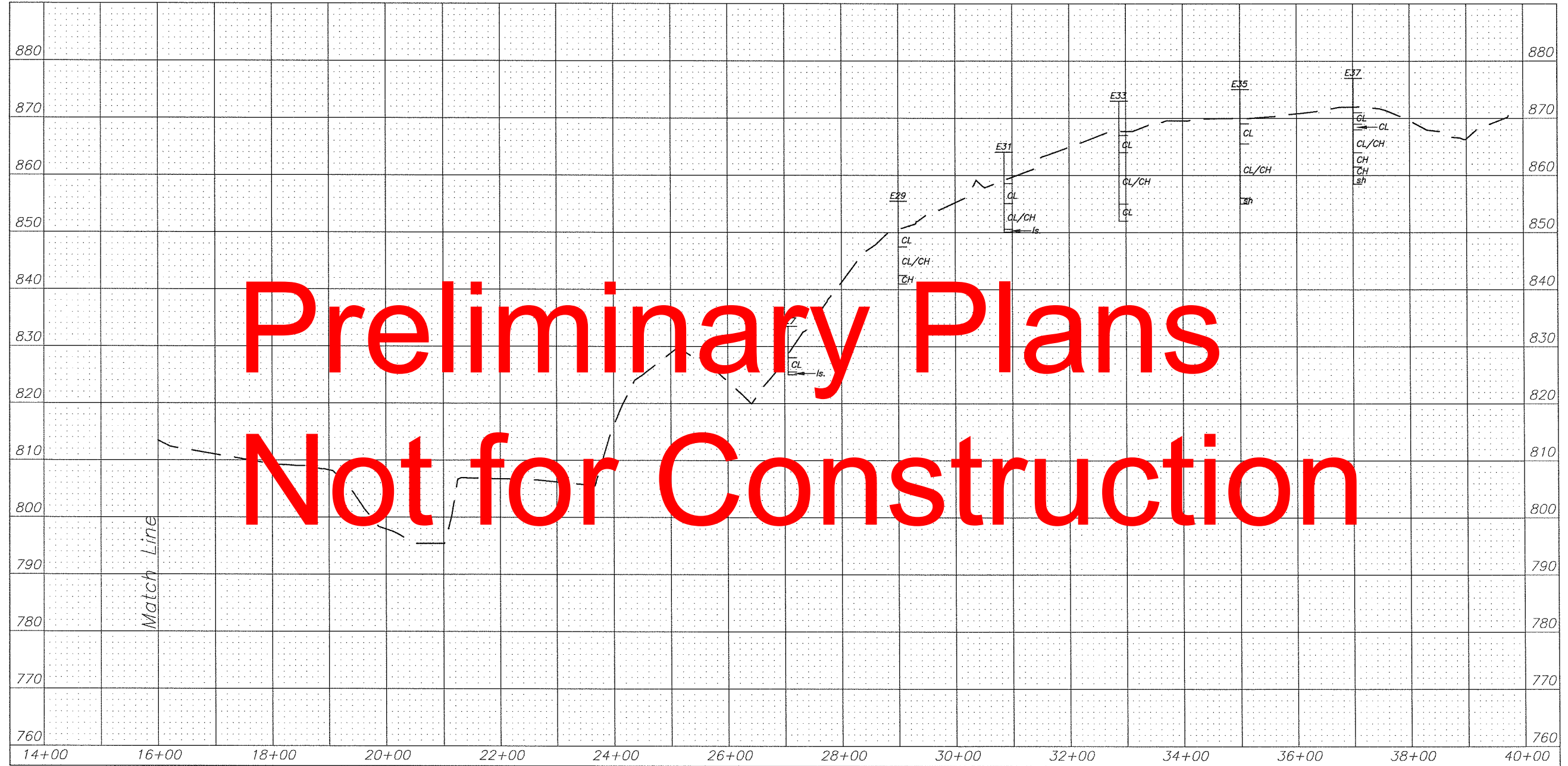
Date \_\_\_\_\_  
 April 08  
 July 08  
 Sept 08  
 Designed MDS  
 Drawn K.WALLER  
 Checked BBV  
 Approved \_\_\_\_\_

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 106 of 117

Vertical Scale in Feet  
 10 5 0 10 20



**Preliminary Plans  
 Not for Construction**

Profile and Geologic Cross Section: Grid E Cont.

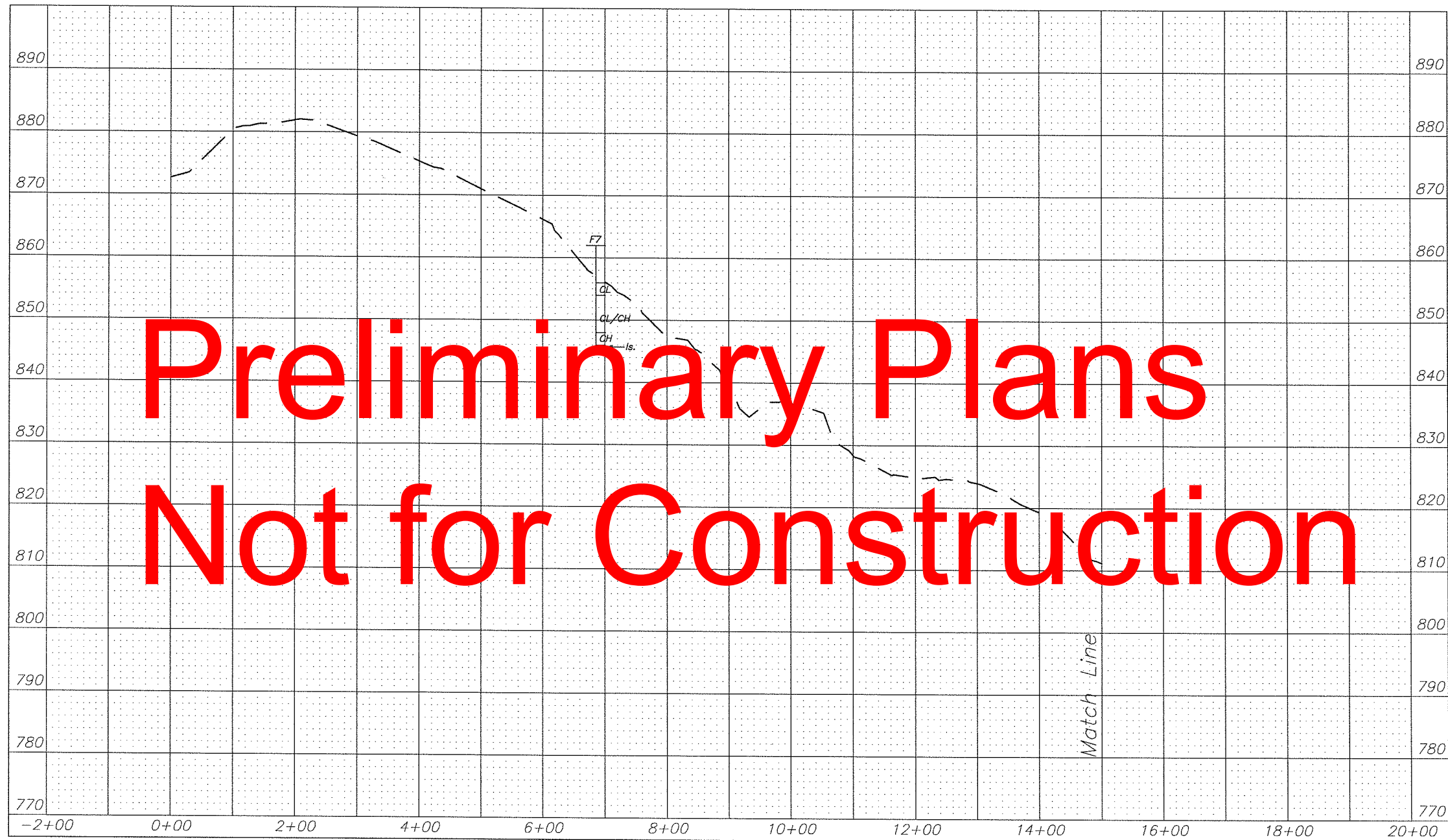
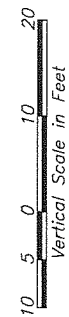
Horizontal Scale in Feet  
 100 50 0 100 200

Designed MDS  
 Drawn K. WALLER  
 Checked BBV  
 Approved \_\_\_\_\_  
 Date April 08  
 July 08  
 Sept 08

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name  
 Drawing Name  
 Sheet 107 of 117



Preliminary Plans  
Not for Construction

Profile and Geologic Cross Section: Grid F

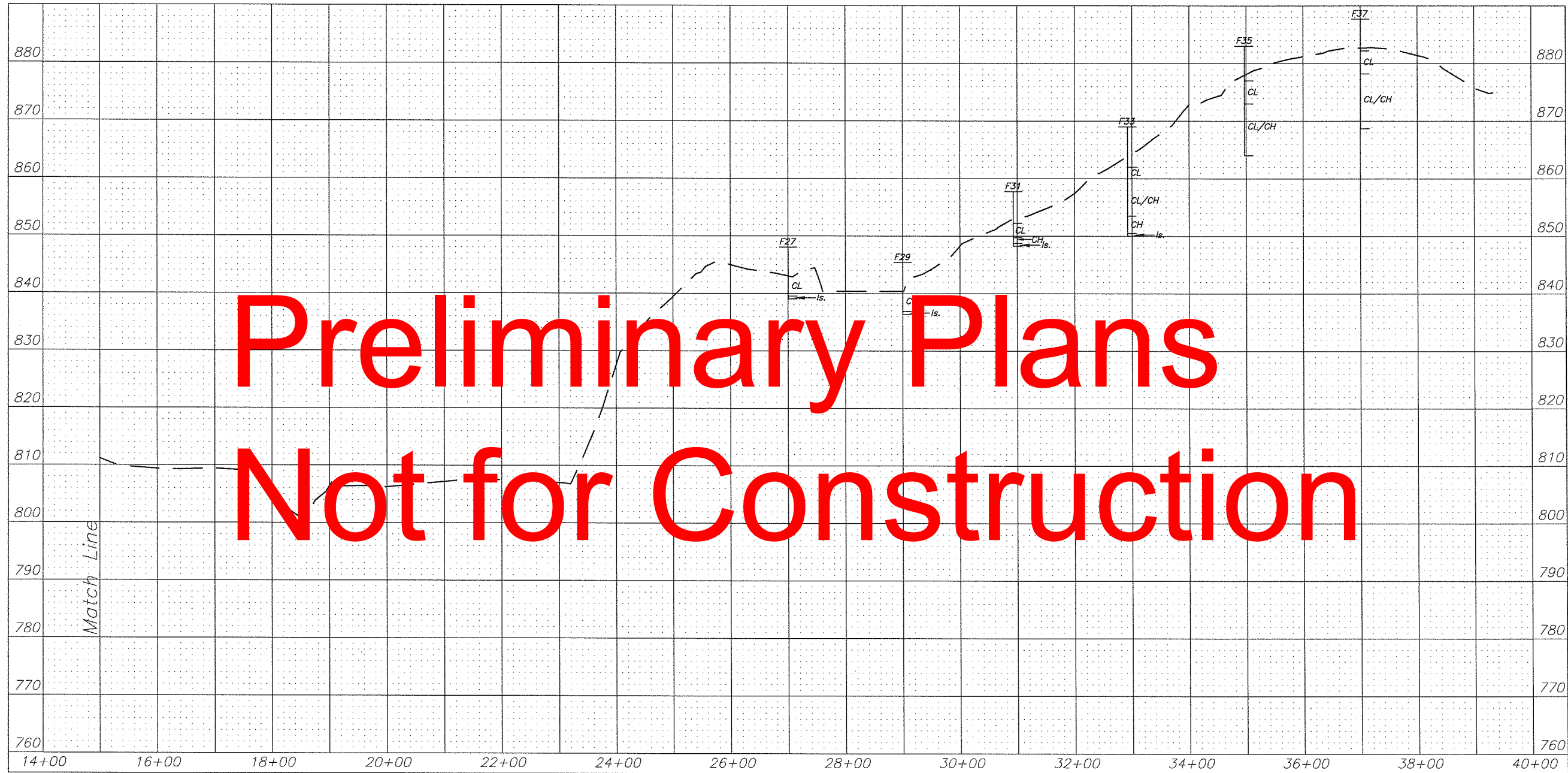


Designed	MDS	Date	April 08
Drawn	K. WALLER		July 08
Checked	BBV		Sept 08
Approved			

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



10 5 0 10 20  
Vertical Scale in Feet



Profile and Geologic Cross Section: Grid F Cont.

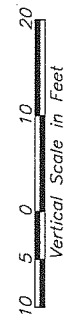
100 50 0 100 200  
Horizontal Scale in Feet

Date  
 April 08  
 July 08  
 Sept 08  
 Designed MDS  
 Drawn K.WALLER  
 Checked BBV  
 Approved

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name  
 Drawing Name  
 Sheet 109 of 117



Preliminary Plans  
Not for Construction

Profile and Geologic Cross Section: Grid G



Date  
 April 08  
 July 08  
 Sept 08

Designed MDS  
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PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



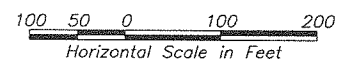
File Name  
 Drawing Name  
 Sheet 110 of 117





Preliminary Plans  
Not for Construction

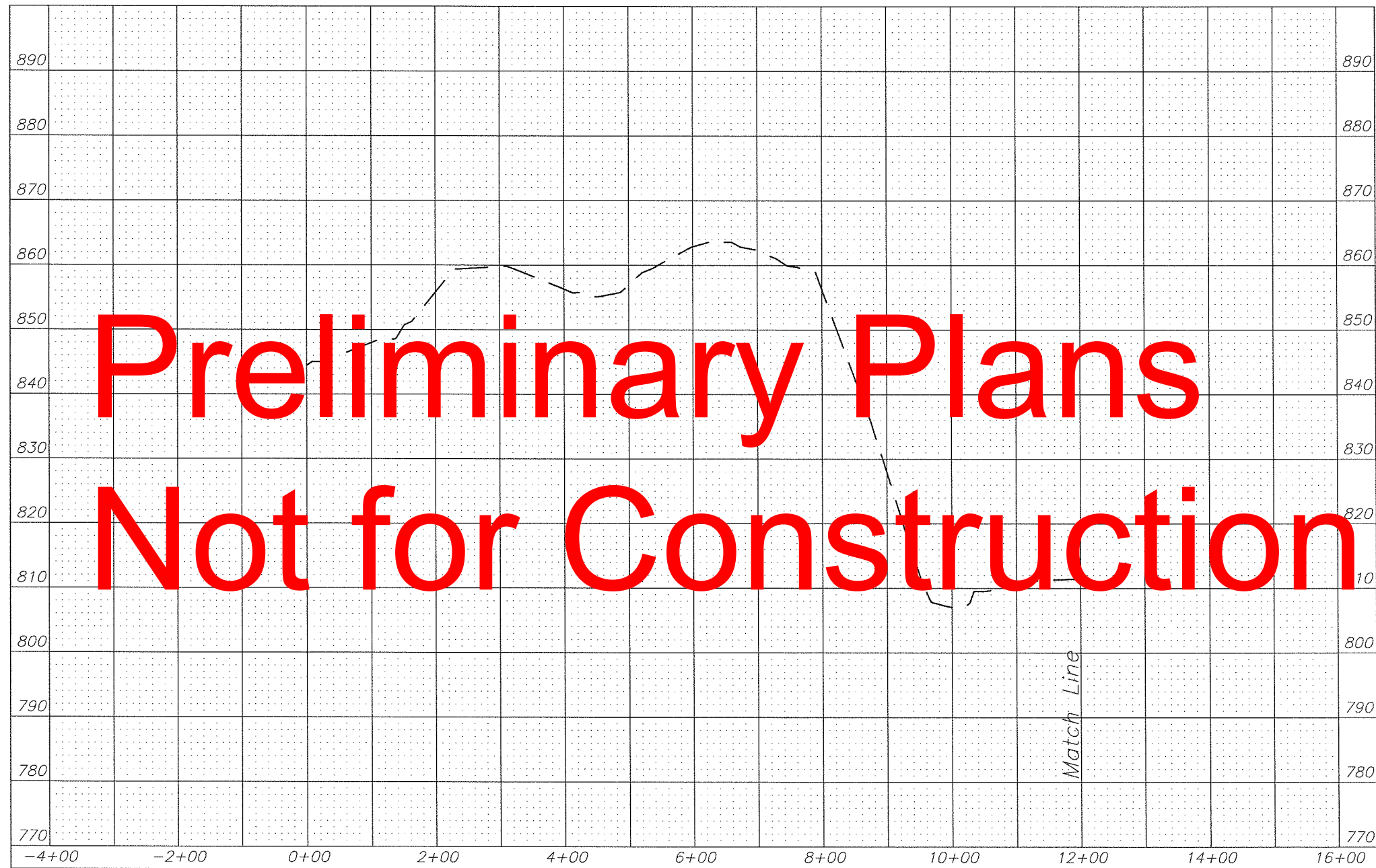
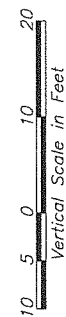
*Profile and Geologic Cross Section: Grid G Cont.*



Designed	MDS	Date	April 08
Drawn	K. WALLER		July 08
Checked	BBV		Sept 08
Approved			

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI





Preliminary Plans  
Not for Construction

*Profile and Geologic Cross Section: Grid H*

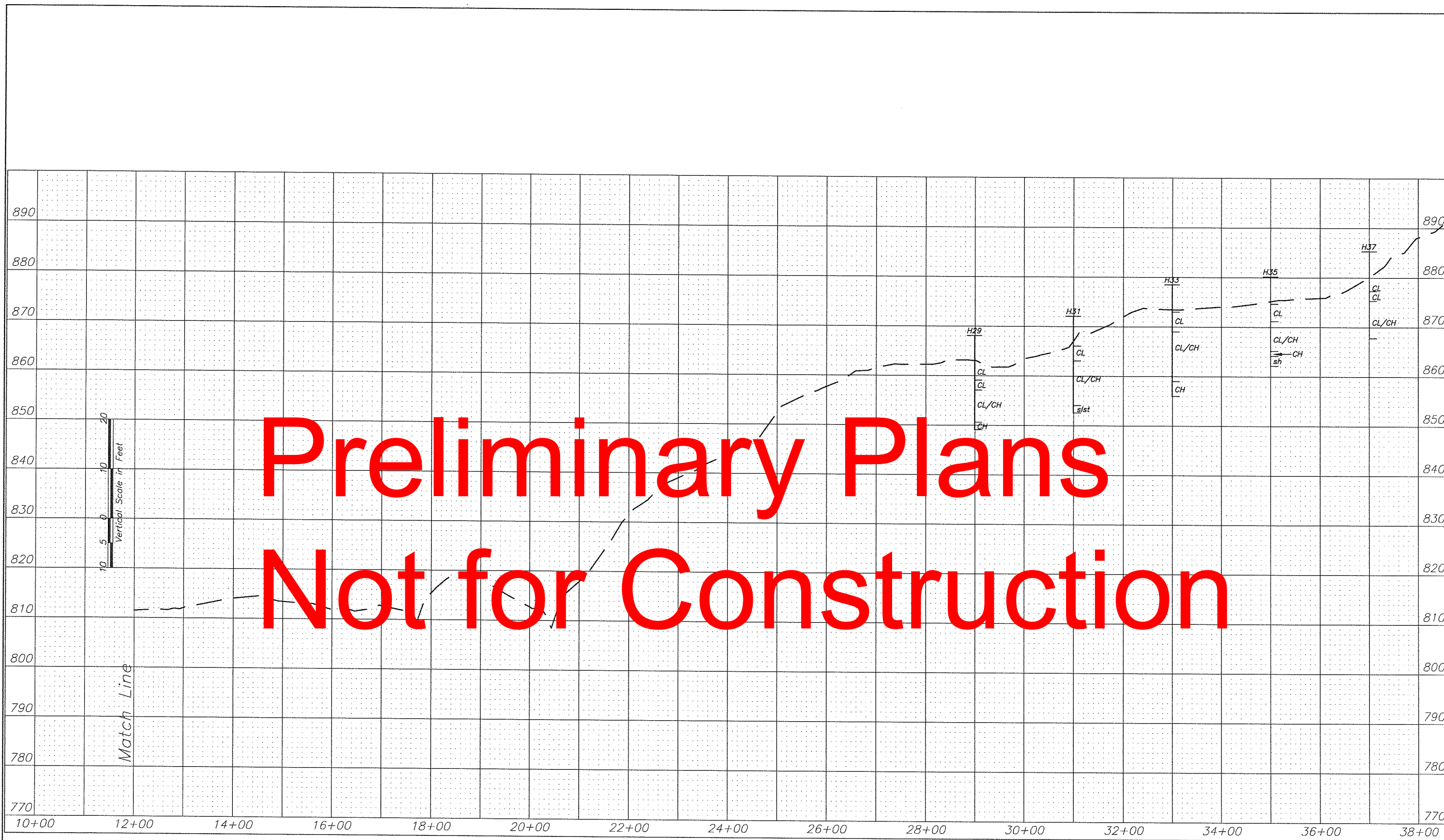


Date \_\_\_\_\_  
 Designed MDS \_\_\_\_\_ April 08  
 Drawn K. WALLER \_\_\_\_\_ July 08  
 Checked BBV \_\_\_\_\_ Sept 08  
 Approved \_\_\_\_\_

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



File Name \_\_\_\_\_  
 Drawing Name \_\_\_\_\_  
 Sheet 112 of 117



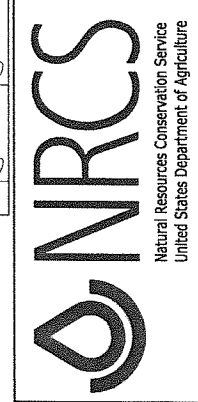
Preliminary Plans  
Not for Construction

*Profile and Geologic Cross Section: Grid H Cont.*

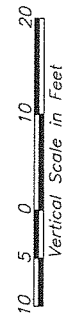


Designed	MDS	Date	April 08
Drawn	K. WALLER	Date	July 08
Checked	BBV	Date	Sept 08
Approved			

**PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION**  
**STRUCTURE LO-1**  
**LITTLE OTTER WATERSHED PL-566**  
**CALDWELL COUNTY, MISSOURI**



File Name
Drawing Name
Sheet 113 of 117

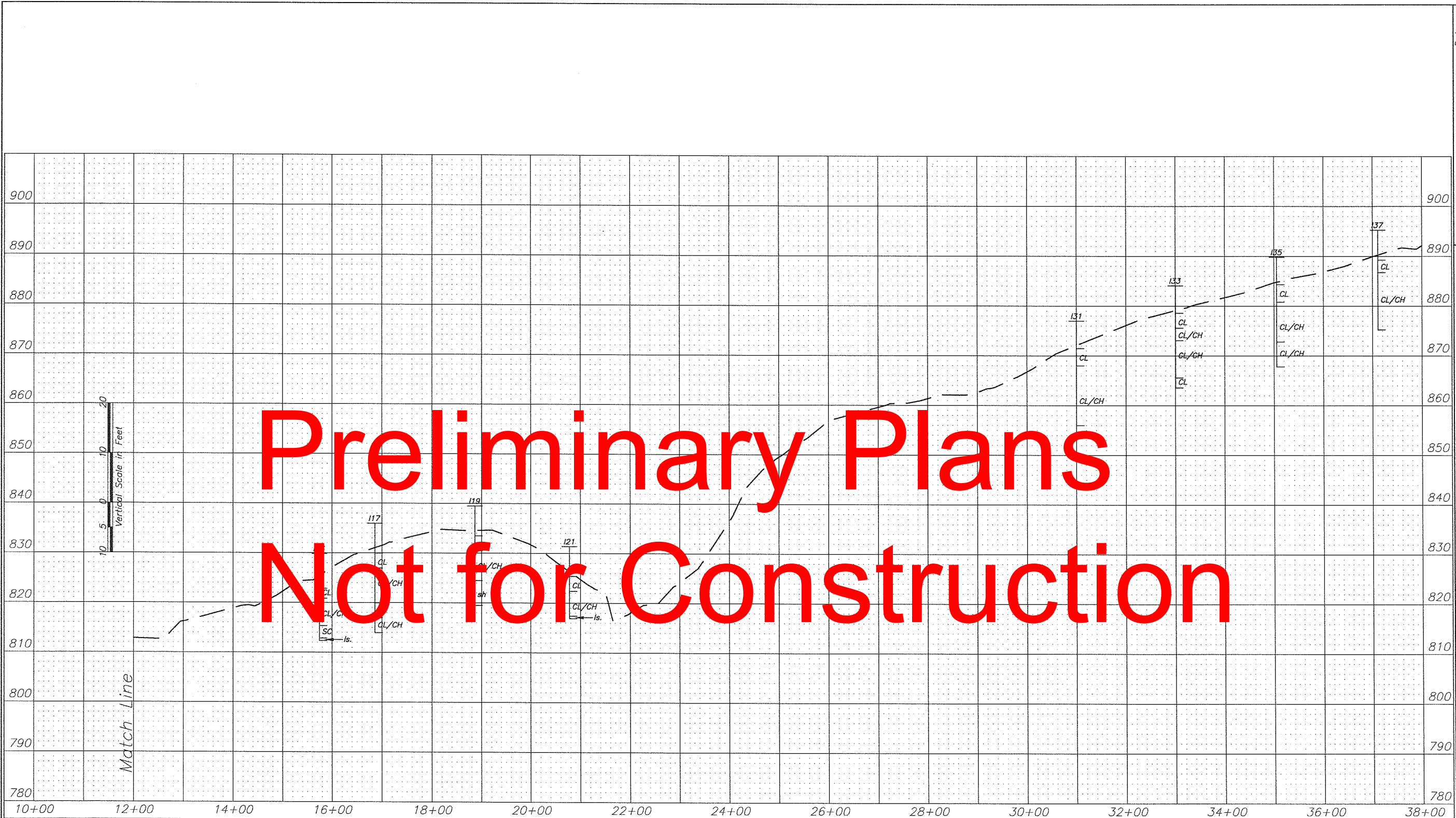


Profile and Geologic Cross Section: Grid 1

Designed	MDS	Date	April 08
Drawn	K. WALLER		July 08
Checked	BBV		Sept 08
Approved			

PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI





Preliminary Plans  
Not for Construction

*Profile and Geologic Cross Section: Grid I Cont.*

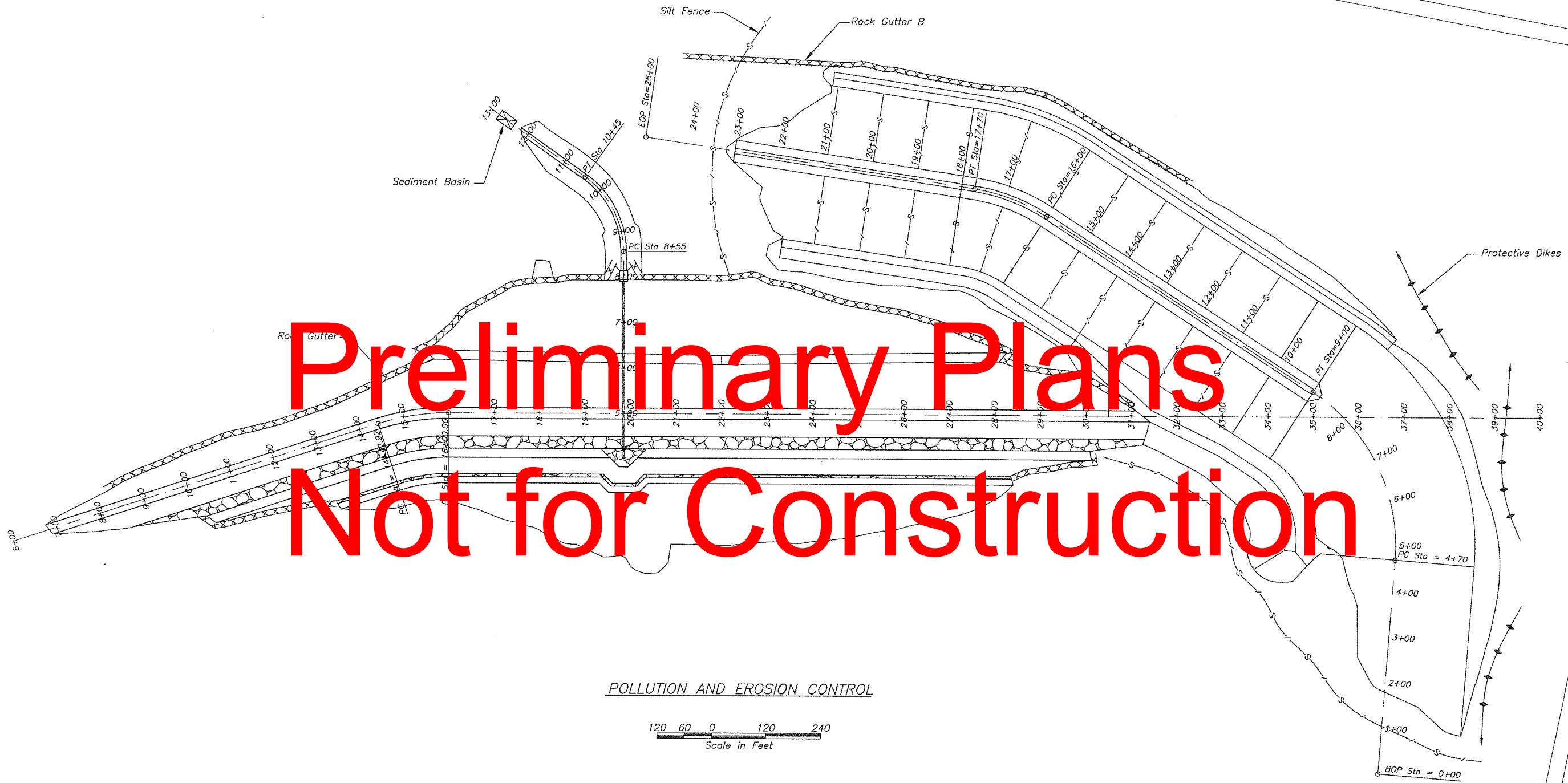


Date	April 08
Designed	MDS
Drawn	K. WALLER
Checked	BBV
Approved	

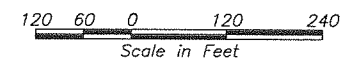
PLAN AND PROFILE FOR GEOLOGIC INVESTIGATION  
 STRUCTURE LO-1  
 LITTLE OTTER WATERSHED PL-566  
 CALDWELL COUNTY, MISSOURI



# Preliminary Plans Not for Construction



**POLLUTION AND EROSION CONTROL**



**NOTES:**

Protective Dike  
Dike dimensions: 12" effective height; 4:1 side slopes; 4' top width.

Borrow Area  
A strip of ground shall be left undisturbed, except for clearing and grubbing, between borrow area and creek to serve as a diversion to trap any sediment from borrow operations.

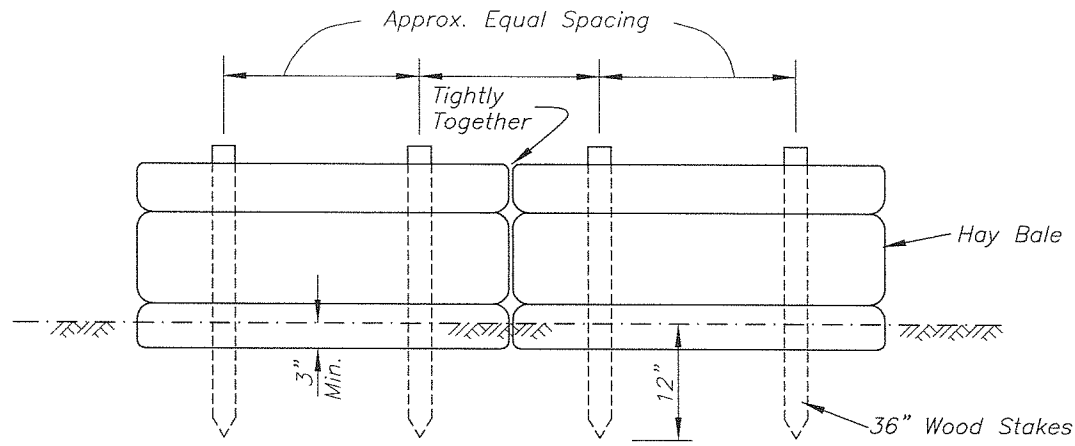
**Quantities**

Protective Dikes	-----	850 Lin. Ft.
Silt Fence	-----	5,500 Lin. Ft.
Temporary Seeding	-----	40.0 Acres
Temporary Mulching	-----	80.0 Tons
Seeding and Mulching	-----	115.0 Acres
Excavation - Silt Fence	-----	550 C.Y.
Excavation - Sediment Basin	-----	200 C.Y.

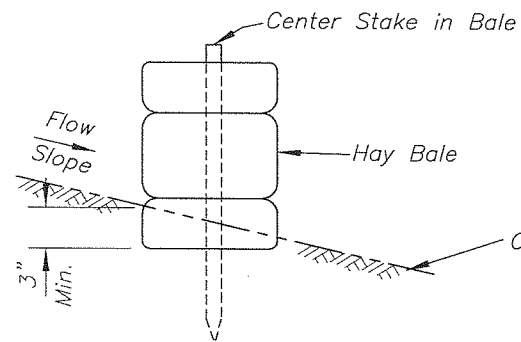
Designed	MDS	Date	April 08
Drawn	MDS, KAS, KRW		July 08
Checked	BBV		Sept 08
Approved			

Pollution Control Plan  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



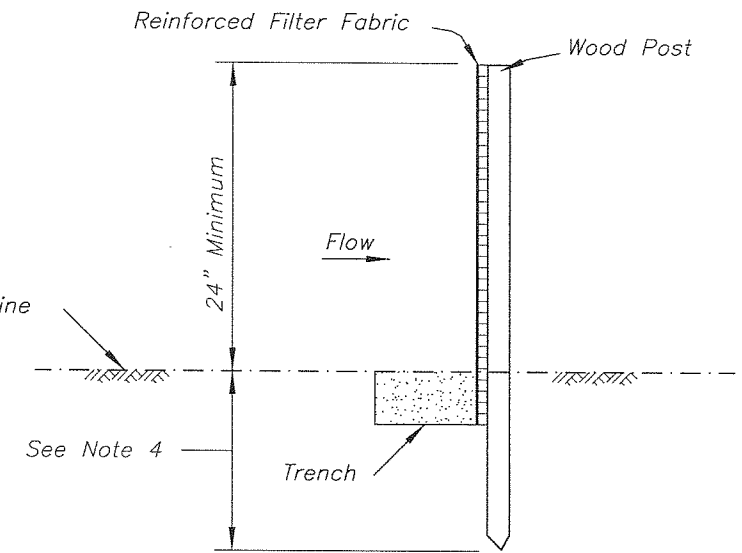


SIDE VIEW



END VIEW

STRAW OR GRASS HAY BALES



SILT FENCE DETAIL

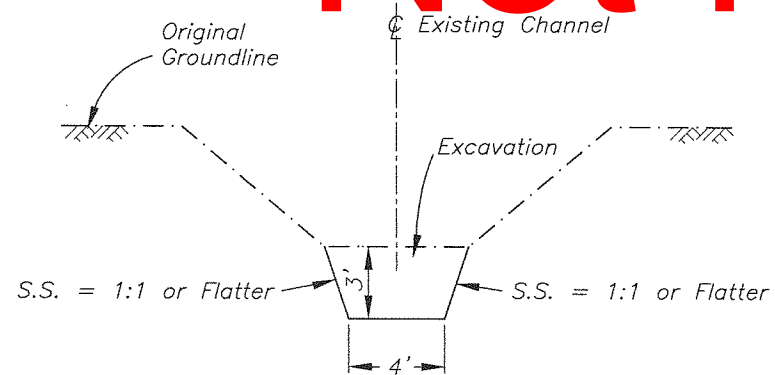
NOTES:

1. Bales shall be tied together with plastic twine. Wire tied bales are not permitted.
2. Stakes shall be of sufficient size to provide required strength. Broken stakes shall be replaced as needed.

NOTES:

1. Trench dimensions: 6" deep; minimum 6" wide. Compacted backfill with the bottom 6" of fabric in trench.
2. Post spacing shall be as needed to properly support silt fence but shall not exceed 8 feet.
3. Drainage area above silt fence should not exceed flow capacity of geotextile (approximately 2 acres).
4. Post shall be driven into ground a sufficient distance as needed to properly support silt fence.
5. Wood posts shall be minimum 1 1/2" x 1 1/2" for softwoods such as Pine and minimum 1 1/8" x 1 1/8" for hardwoods such as Oak.

**Preliminary Plans**  
**Not for Construction**



TYPICAL CROSS SECTION OF SEDIMENT BASIN

NOTES:

1. Basin as drawn, contains approximately 40 cubic yards of excavation.
2. Size and location of basin may be adjusted as staked in the field.
3. Excavation and cleanout of sediment basins will be paid for as excavation.

Date	April 08
Designed	MDS
Drawn	MDS, KAS, KRW
Checked	BBV
Approved	

Pollution Control Details  
Structure LO-1  
Little Otter Creek Watershed  
PL-566 Caldwell County, Missouri



File Name	
Drawing Name	
Sheet	117 of 117