

DESIGN DRAWINGS

FOR

SANTA MARIA SIPHON SUPPORT SYSTEM STABILIZATION PROJECT

PREPARED FOR

SANTA MARIA RESERVOIR COMPANY  
MINERAL COUNTY, COLORADO

URS

URS Center  
8101 East Tufts Avenue  
Denver, Co. 80231-2637  
303 894-2770 (phone)  
303 894-3946 (fax)

SANTA MARIA  
RESERVOIR  
COMPANY

SANTA MARIA  
SIPHON SUPPORT SYSTEM  
STABILIZATION PROJECT

FINAL DESIGN



ISSUED FOR BIDDING 8/27/12 MSL

ISSUED FOR CONSTRUCTION DATE BY

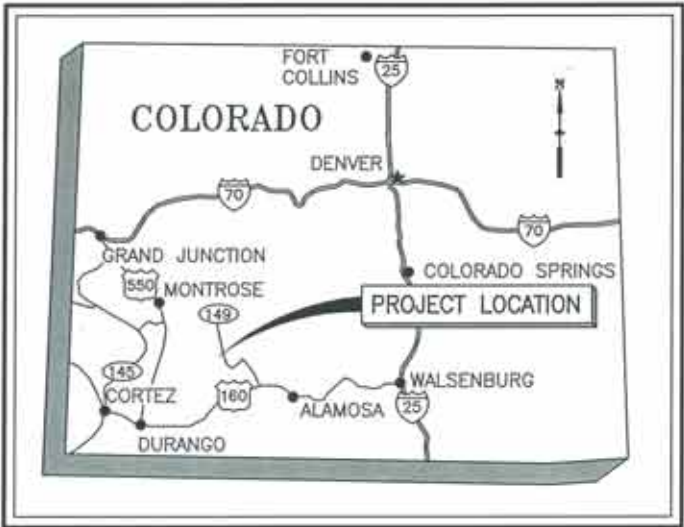
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△	ISSUED FOR BID	8/27/12
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URS PROJECT NO. 22241248  
DRAWN BY: DWG  
DESIGNED BY: JMC  
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PLOT DATE: -  
SCALE: AS SHOWN  
ACAD VER: 2012

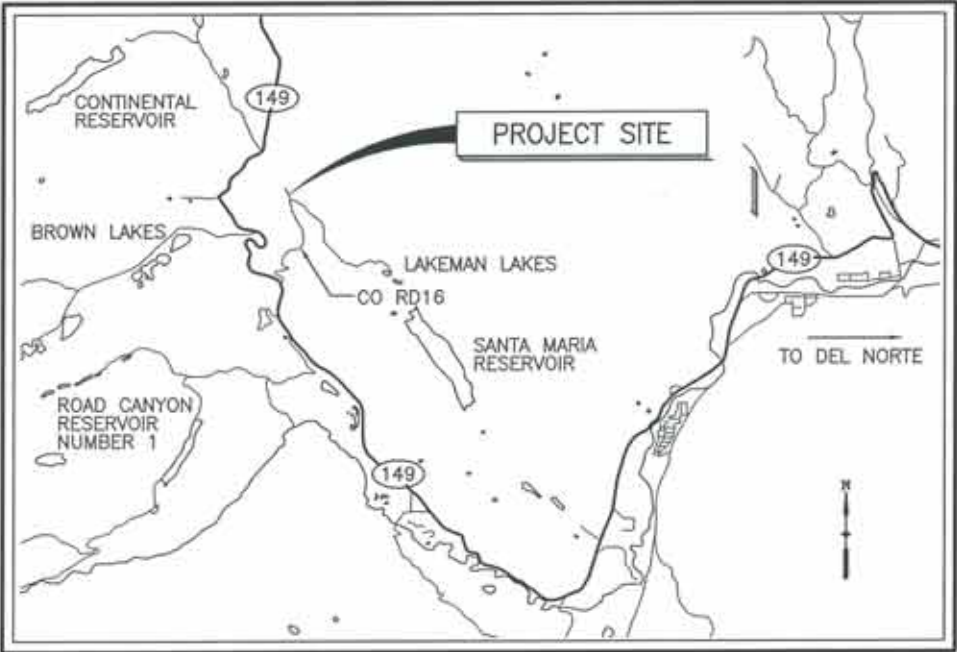
SHEET TITLE  
  
COVER SHEET,  
LOCATION MAPS  
AND SHEET INDEX

G-1

SHEET 1 OF 6



STATE MAP  
NOT TO SCALE



VICINITY MAP  
NOT TO SCALE

SHEET INDEX		
SHEET NO.	DRAWING NO.	DRAWING TITLE
GENERAL		
1	G-1	COVER SHEET, LOCATION MAPS AND SHEET INDEX
STRUCTURAL		
2	S-1	SIPHON PLAN AND PROFILE
3	S-2	SIPHON SUPPORT SYSTEM DEMOLITION
4	S-3	INTERMEDIATE SUPPORT MODIFICATIONS
5	S-4	THRUST BLOCK MODIFICATIONS
6	S-5	STRUCTURAL NOTES, STANDARD DETAILS, AND SEQUENCE OF WORK



SANTA MARIA  
SIPHON SUPPORT SYSTEM  
STABILIZATION PROJECT

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	DATE	BY

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DESIGNED BY: JMC

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SCALE: AS SHOWN

ACAD VER: 2012

QUESTIONS

SHEET TITLE: \_\_\_\_\_

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**SIPHON**

## PLAN AND PROFILE

**PERSONAL PROFILE**  
 Name: [redacted]      Address: [redacted]  
 Phone: [redacted]      Email: [redacted]

[illegible]

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S-1

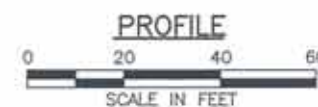
SHEET 2 OF 8

SHEET 2 OF 6



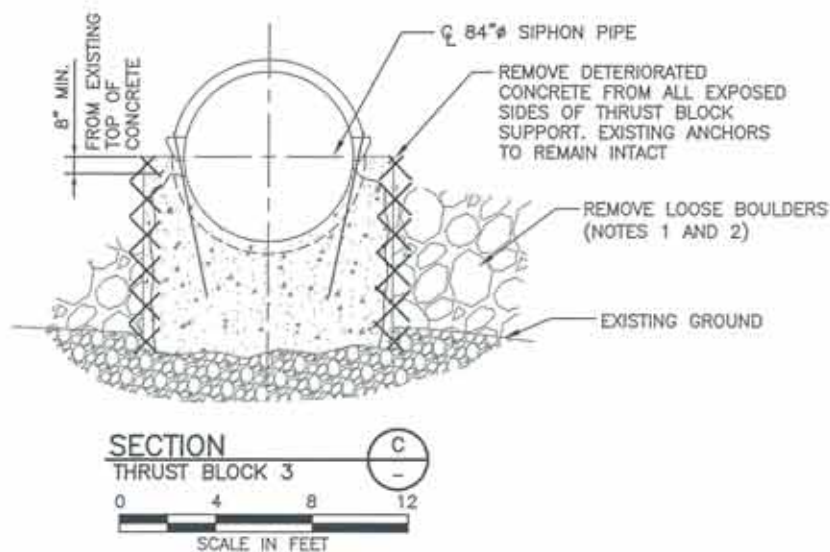
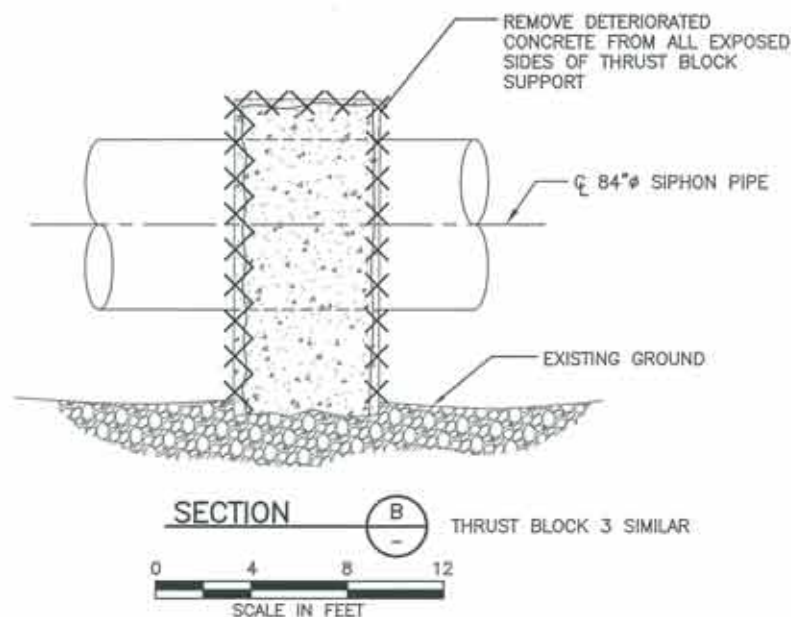
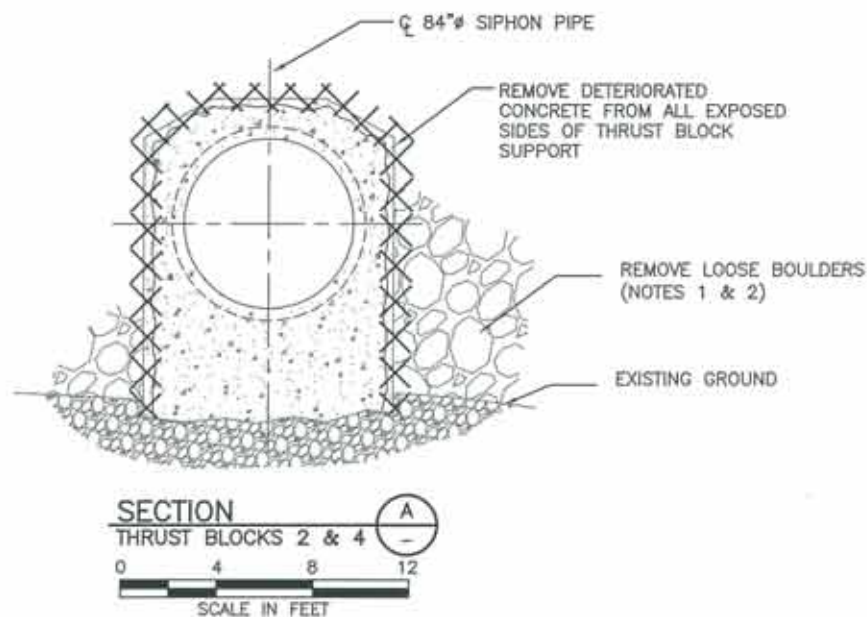
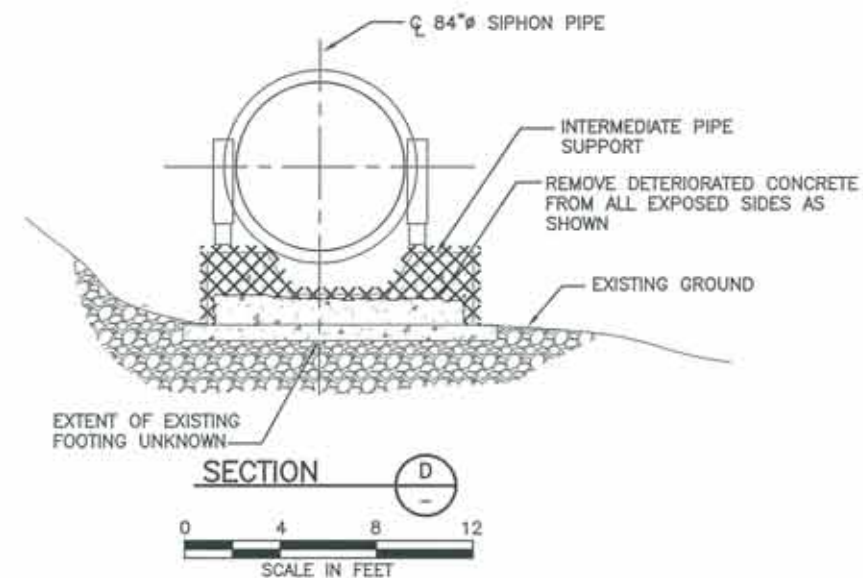
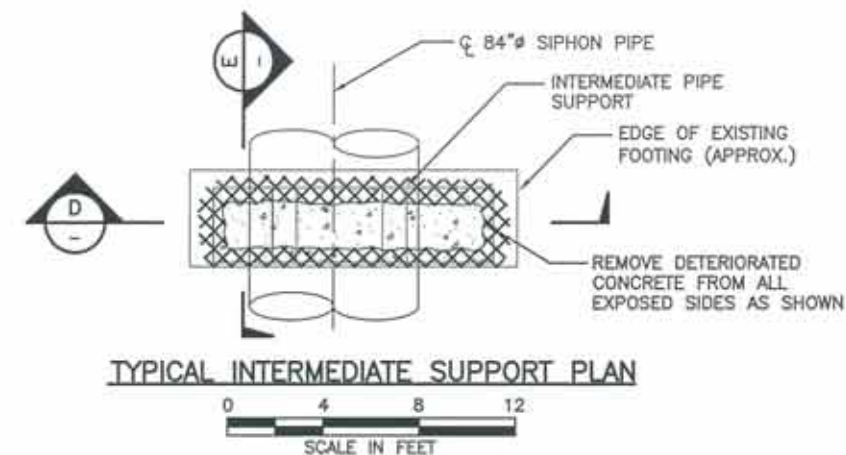
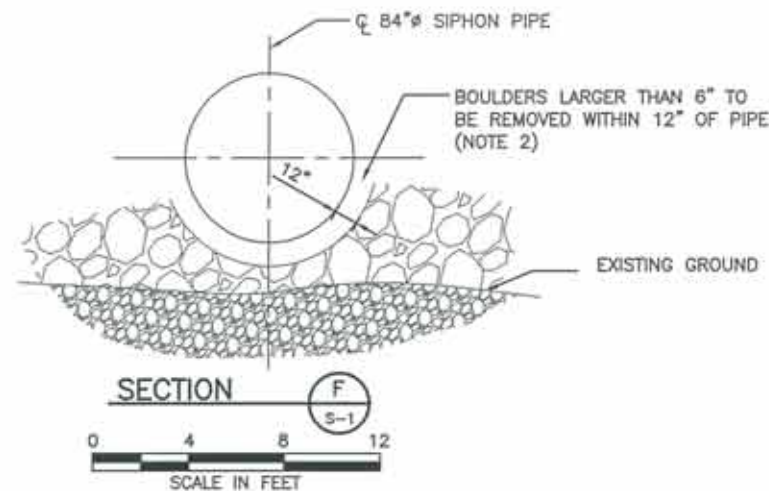
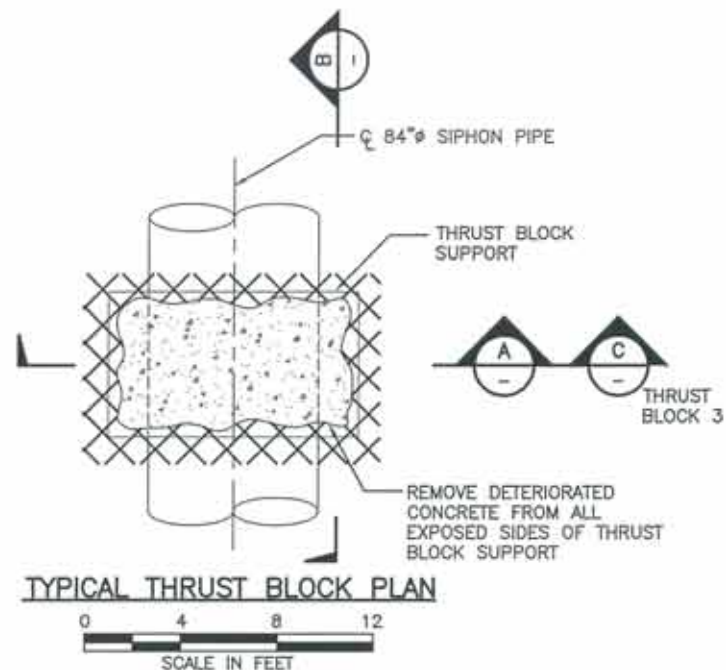
NOTES:

1. SEE SHEET S-2. FOR GENERAL DEMOLITION DETAILS OF CONCRETE THRUST BLOCKS 2, 3, AND 4, AND INTERMEDIATE SUPPORTS.
2. SEE SHEET S-3 FOR INTERMEDIATE SUPPORT MODIFICATIONS.
3. SEE SHEET S-4 FOR CONCRETE THRUST BLOCKS 2, 3 AND 4.
4. PORTIONS OF SIPHON UPSTREAM OF THRUST BLOCK 2 AND DOWNSTREAM OF THRUST BLOCK 5 ARE NOT INCLUDED IN THIS WORK.
5. EXISTING GROUND SHOWN IS APPROXIMATE.



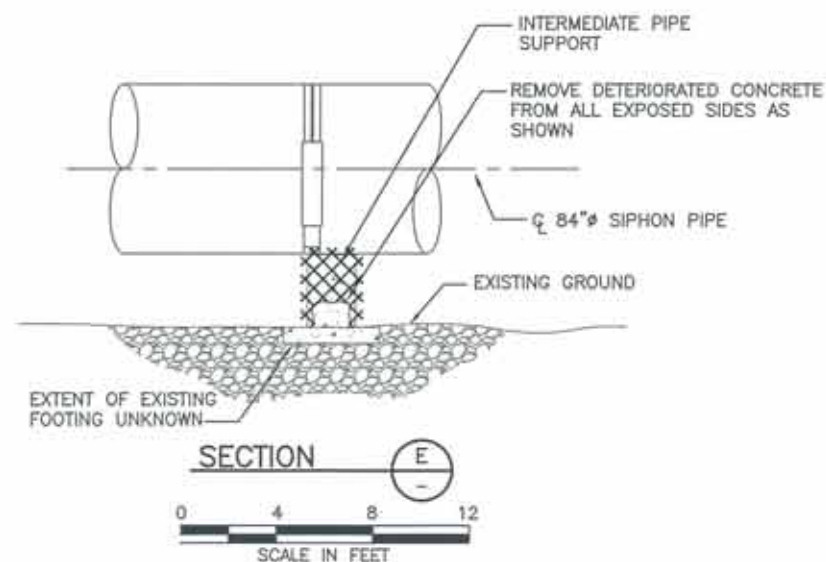


URS DRAWING PATR: N:\Projects\2241248 Santa Maria Corridor\Sub 0000 0 Create Design\Santa Maria Siphon\Support Repair.dwg



#### NOTES:

1. REMOVE ROCKS AND BOULDERS AS REQUIRED TO COMPLETE WORK.
2. CONTRACTOR SHALL NOT DESTABILIZE ROCK SLOPE WHEN REMOVING BOULDERS.
3. INTERMEDIATE SUPPORTS S7 THROUGH S11 EACH CONTAIN TWO EMBEDDED STEEL PLATES THAT SHALL BE REMOVED AS PART OF DEMOLITION. INTERMEDIATE SUPPORTS S12 AND S13 EACH CONTAIN TWO STEEL PLATES THAT SHALL BE REMOVED AND REINSTALLED. SEE APPENDIX A OF THE TECHNICAL SPECIFICATIONS FOR HISTORICAL DRAWINGS OF THE EXISTING HARDWARE.



# URS

URS Center  
181 East Tulla Avenue  
Denver, Co. 80237-2637  
303 694-2770 (phone)  
303 694-3946 (fax)

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STABILIZATION PROJECT

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ISSUED FOR CONSTRUCTION 6/27/12 MSL

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1	ISSUED FOR BID	6/27/12
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URS PROJECT NO.	2241248
DRAWN BY:	DWG
DESIGNED BY:	JMC
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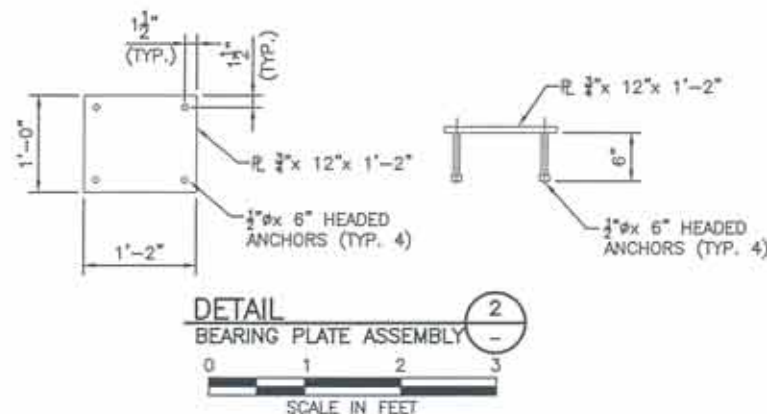
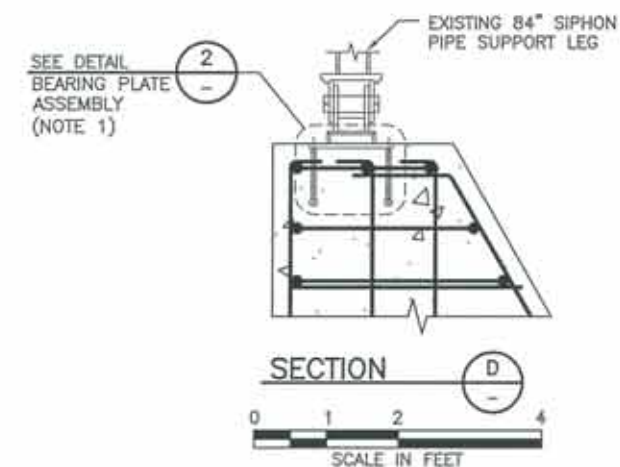
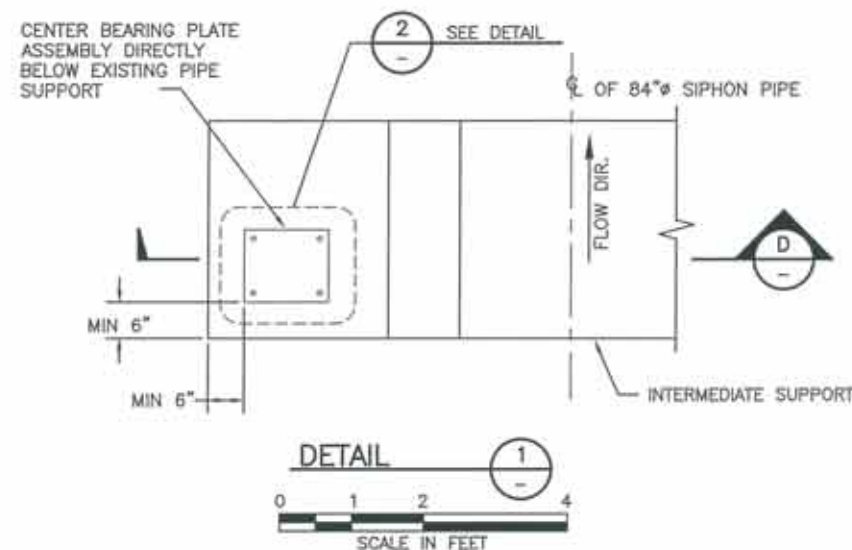
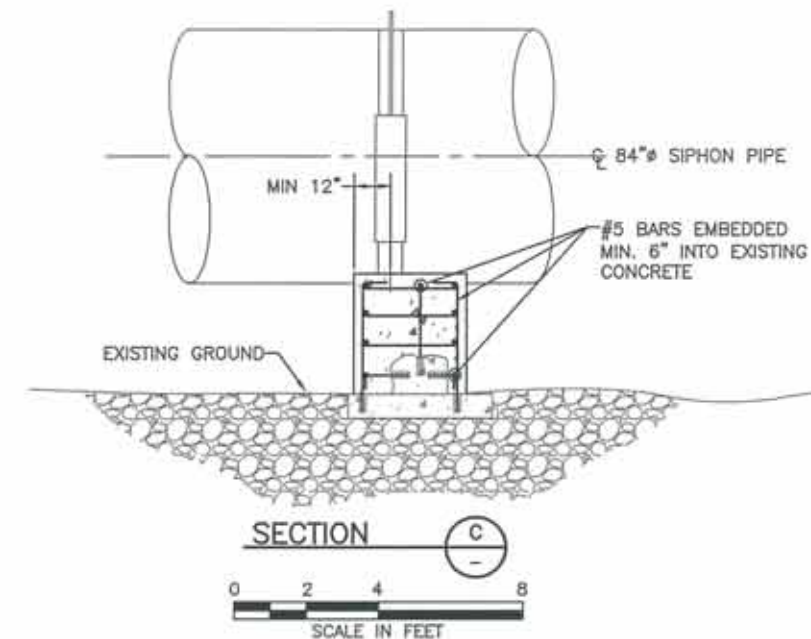
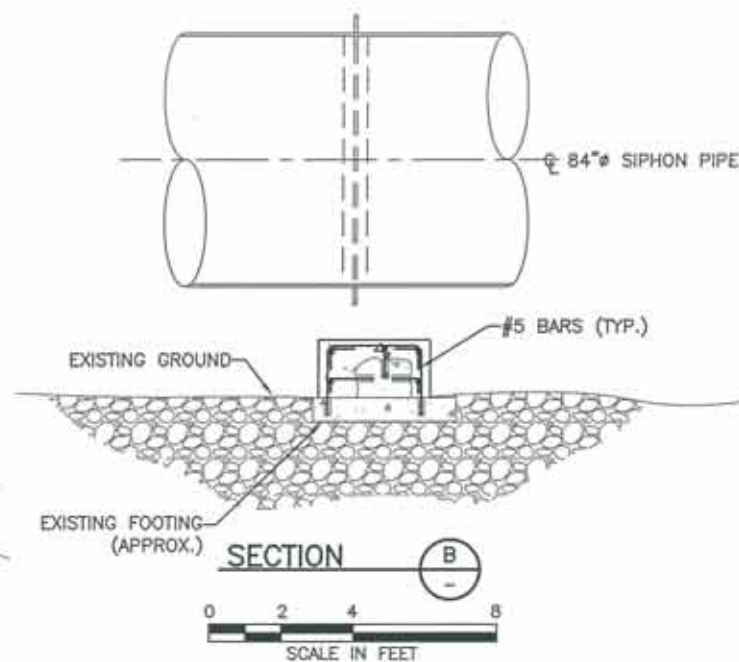
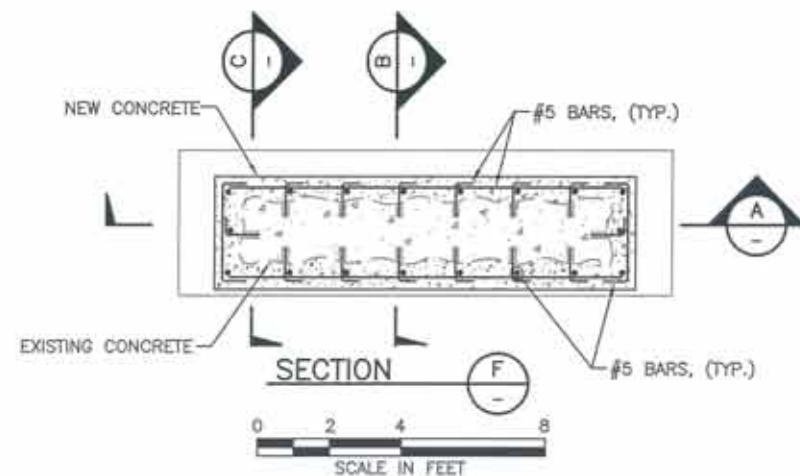
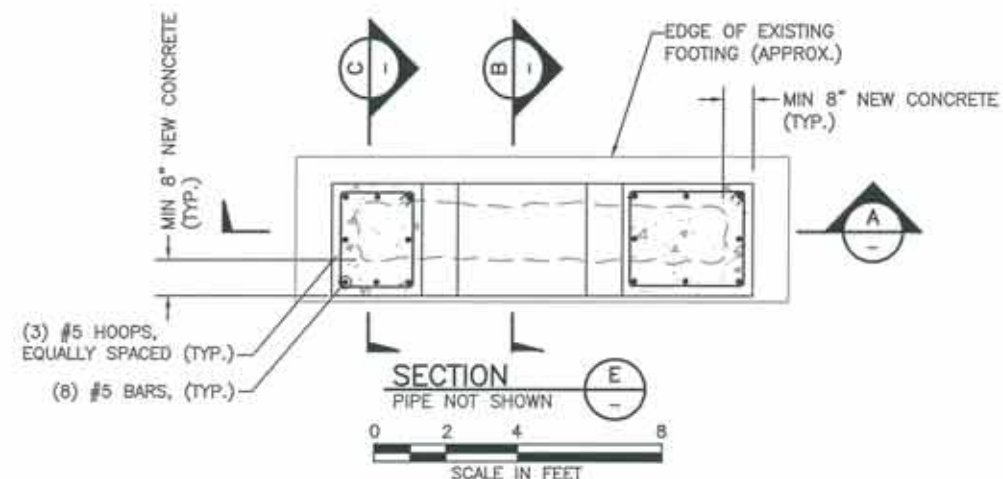
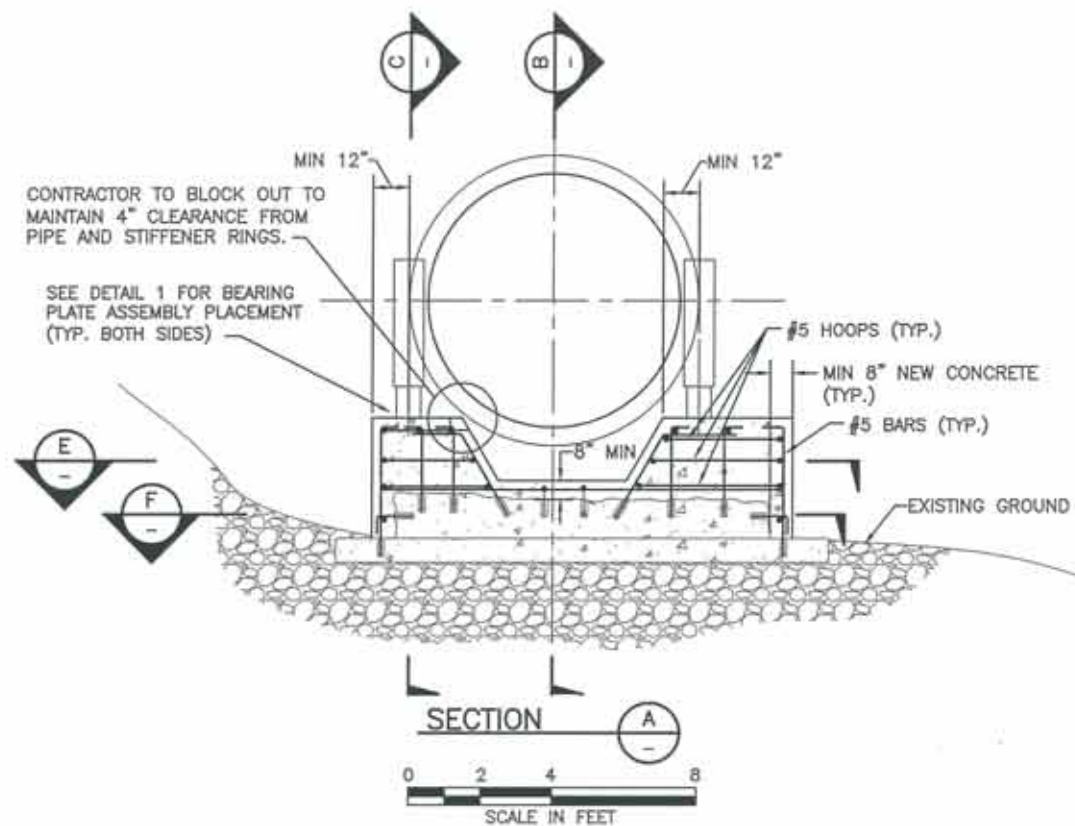
SHEET TITLE

SIPHON  
SUPPORT SYSTEM  
DEMOLITION

S-2

SHEET 3 OF 6





NOTES:

1. AT INTERMEDIATE SUPPORTS S12 AND S13, REINSTALL EXISTING ROLLER SUPPORT PLATES. SEE APPENDIX A OF THE TECHNICAL SPECIFICATIONS FOR HISTORICAL DRAWINGS OF THE EXISTING HARDWARE.

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URS PROJECT NO:	2224124
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DRAWN BY: DW

DESIGNED BY: JM

CHECKED BY: \_\_\_\_\_ MS

DATE CREATED:

PLOT DATE: \_\_\_\_\_

SCALE: AS SHOWN

ACAD VER: 5011

1. *Journal of the American Medical Association*, 2000; 283: 2669-2675.

SHEET TITLE

[illegible]

INTERMEDIATE

INTERMEDIATE  
SUPPORT

## SUPPORT

## MODIFICATIONS

© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 105–112

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SHEET 4 OF 8

SHEET 4 OF 6

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URS Center  
8181 East Tufts Avenue  
Denver, Co. 80237-2637  
303-694-2770 (phone)  
303-694-3948 (fax)

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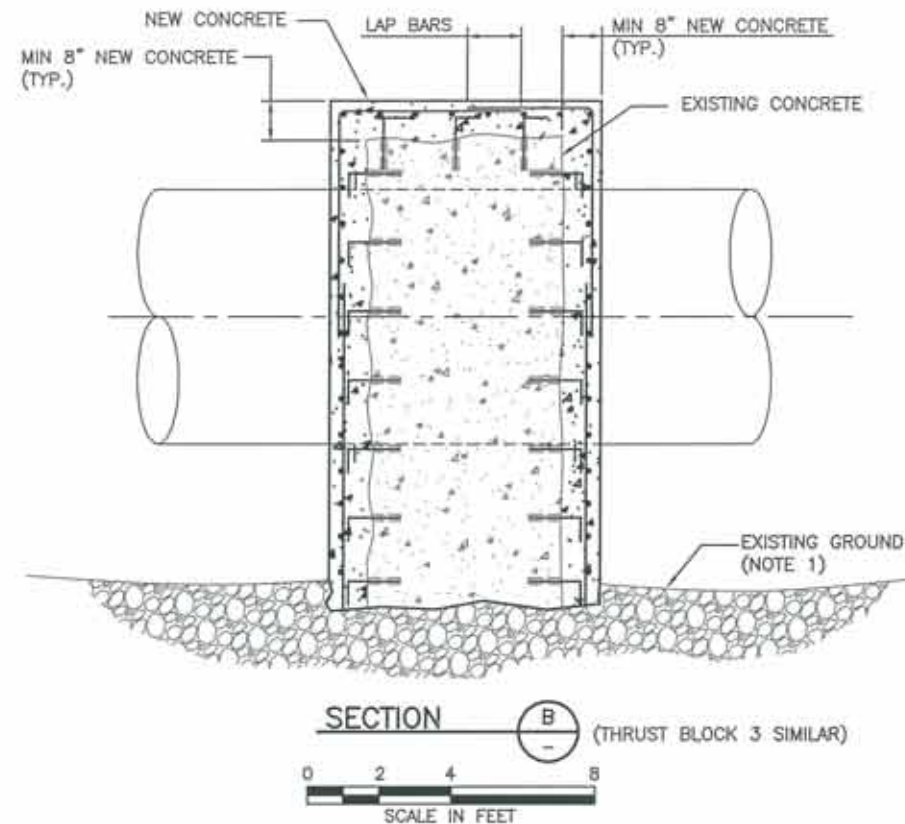
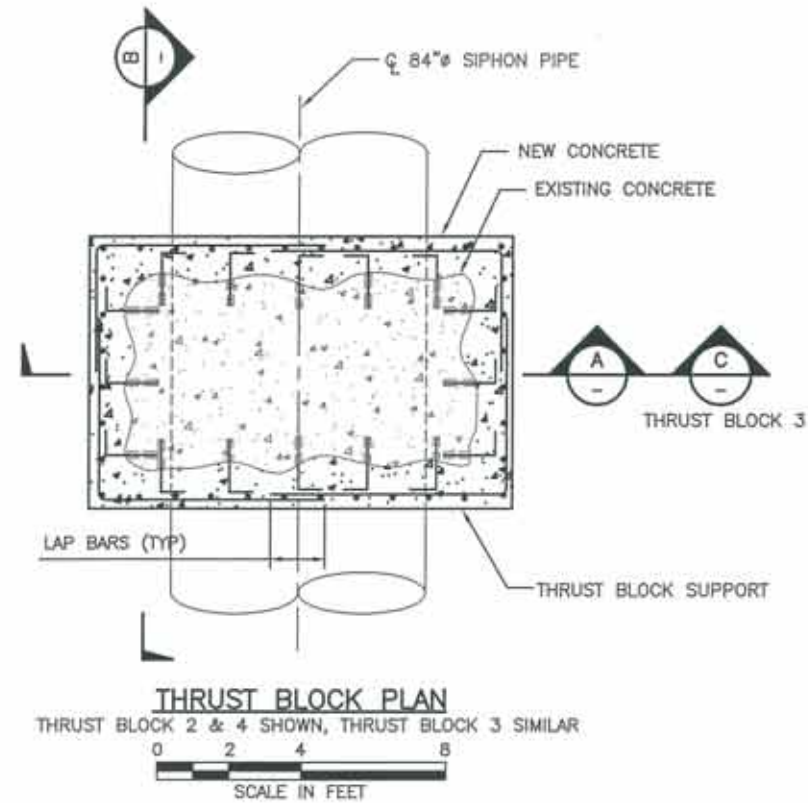
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SHEET TITLE

THRUST BLOCK  
MODIFICATIONS

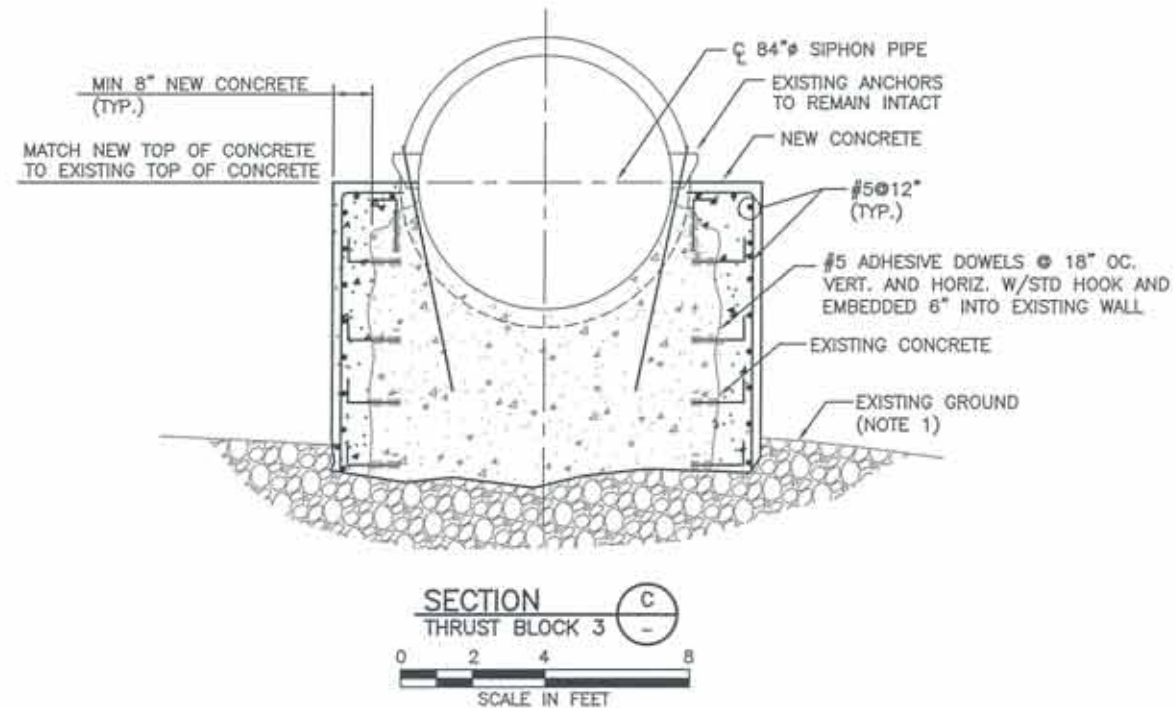
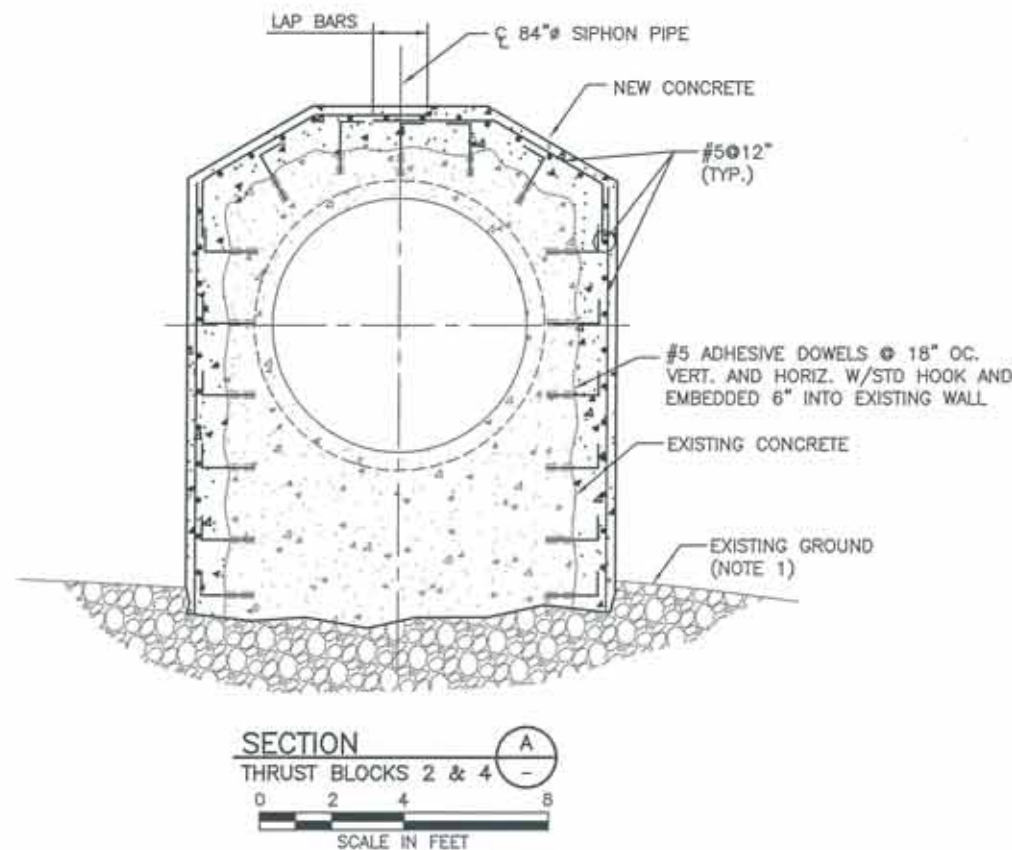
S-4

SHEET 5 OF 6



NOTES

- DO NOT EXCAVATE BELOW EXISTING CONCRETE OR OTHERWISE UNDERMINE THE THRUST BLOCKS.





## GENERAL NOTES

UNLESS OTHERWISE SHOWN ON THE REINFORCEMENT DESIGN DRAWINGS, THE DETAILS AND NOTES SHOWN ARE TYPICAL FOR ALL REINFORCEMENT DRAWINGS.

### ABBREVIATIONS

BF = BOTTOM FACE  
TF = TOP FACE  
NF = NEAR FACE  
FF = FAR FACE  
EF = EACH FACE  
IF = INSIDE FACE  
OF = OUTSIDE FACE  
CJ = CONSTRUCTION JOINT  
OCJ = OPTIONAL CONSTRUCTION JOINT  
CTJ = CONTROL JOINT

CRJ = CONTRACTION JOINT  
EJ = EXPANSION JOINT  
BR = BOTTOM ROW  
TR = TOP ROW  
NR = NEAR ROW  
FR = FAR ROW  
ER = EACH ROW  
IR = INSIDE ROW  
OR = OUTSIDE ROW  
MR = MIDDLE ROW

BL = BOTTOM LAYER  
TL = TOP LAYER  
ML = MIDDLE LAYER  
NS = NEAR SIDE  
FS = FAR SIDE  
ES = EACH SIDE  
EW = EACH WAY  
EC = EACH CORNER  
Ld = DEVELOPMENT LENGTH  
db = NOMINAL DIAMETER  
OF REINFORCING BAR

SPC. = SPACE OR SPACES  
EQ. SPC. = EQUALLY SPACED, EQUAL SPACES  
UV = UNIFORMLY VARYING LENGTHS OF BARS BETWEEN LENGTHS SHOWN  
CL = CLEAR  
CTR. = CENTER OR CENTERS

### SYMBOLS

○ AN OPEN CIRCLE AT THE END OF A BAR INDICATES A BEND WITH THE BAR TURNED AWAY FROM THE OBSERVER.  
● A CLOSED CIRCLE AT THE END OF A BAR INDICATES A BEND WITH THE BAR TURNED TOWARDS THE OBSERVER.  
SPICES SHOWN THUS ——— INDICATE A LAPPED SPICE, NOT A BEND IN THE BAR.

### DIMENSIONS

DIMENSIONS BETWEEN BARS ARE TO THE CENTERLINE OF THE BARS UNLESS OTHERWISE SHOWN. CLEAR COVER DIMENSIONS ARE MARKED "CL".

### COVER

PLACE THE REINFORCEMENT SO THAT THE CLEAR DISTANCE BETWEEN FACE OF CONCRETE AND NEAREST REINFORCEMENT IS 1 1/2" FOR #5 BARS AND SMALLER, PROVIDE 3" CLEAR DISTANCE FROM FACE OF CONCRETE FOR ALL BARS WHEN THE CONCRETE IS PLACED AGAINST EARTH OR ROCK. CLEAR DISTANCE IS THE DESIGN DIMENSION LINE. REINFORCEMENT PARALLELING CONSTRUCTION JOINTS SHALL HAVE A MINIMUM OF 2" CLEAR COVER.

### BENT BARS:

UNLESS OTHER RADIUS BENDS ARE INDICATED ON THE DRAWINGS, ALL REINFORCEMENT REQUIRING BENDING SHALL BE BENT AROUND A PIN HAVING THE FOLLOWING DIAMETER:

TABLE 1

PIN DIAMETER IN INCHES

BAR NO.	3	4	5	6	7	8	9	10	11
STANDARD BENDS	2 1/4	3	3 3/4	4 1/2	5 1/4	6	9 1/2	10 3/4	12
STIRRUP AND TIE BENDS	1 1/2	2	2 1/2	4 1/2	5 1/4	6	—	—	—

### REINFORCEMENT TABLE

$f'_c = 4000$  psi  $f_y = 60,000$  psi

BAR SIZE	DEVELOPMENT LENGTH (Ld) (INCHES)		LENGTH OF LAPPED SPICE (INCHES)	
	OTHER BARS	TOP BARS*	OTHER BARS	TOP BARS*
3	12	12	16	16
4	12	15	16	20
5	14	18	18	23
6	17	22	22	29
7	25	33	33	42
8	28	36	36	48
9	32	42	42	55
10	38	49	49	65
11	47	61	61	79

\*TOP BARS ARE HORIZONTAL BARS IN BEAMS AND SLABS SO PLACED THAT MORE THAN 12" OF CONCRETE IS CAST IN THE MEMBER BELOW THE BAR.

### REINFORCEMENT DOWELS:

DOWELS INDICATED ON THE DRAWING, SUCH AS #8 (d), SHALL BE EMBEDDED A LENGTH EQUAL TO  $L_d$  AND SHALL HAVE A PROJECTION EQUAL TO THAT REQUIRED FOR TOP SPLICING TO A BAR OF THE SAME DIAMETER.

### ACCESSORIES:

BAR SUPPORTS, SPACERS, AND OTHER ACCESSORIES ARE NOT SHOWN ON THE DRAWINGS. THE RECOMMENDATIONS OF THE ACI DETAILING MANUAL—1988, OR OTHER APPROVED SUPPORTING SYSTEM MAY BE USED.

### REFERENCE CODE:

UNLESS OTHERWISE SHOWN, FOLLOW THE RECOMMENDATIONS ESTABLISHED BY THE AMERICAN CONCRETE INSTITUTE'S "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES, ACI 315".

### NOTES TO DETAILERS:

SPLICE LENGTHS SHOWN ON THE TABLE ON THIS DRAWING ARE FOR CLASS B SPLICES IN ACCORDANCE WITH ACI 318-08. SPLICES OR DEVELOPMENT LENGTHS OTHER THAN THOSE SHOWN IN THE TABLES MUST BE DETAILED ON THE REINFORCEMENT DESIGN DRAWINGS.

### SPLICES:

THE MINIMUM LENGTH OF LAP FOR SPLICING PARALLEL BARS SHALL BE GIVEN IN THE APPLICABLE TABLE (REINFORCEMENT TABLE). SPLICES SHALL BE STAGGERED TO GIVE 24 INCHES CLEAR BETWEEN ENDS OF ADJACENT SPLICES. BARS SPLICED BY NONCONTACT LAP SPLICES SHALL NOT BE SPACED TRANSVERSELY FARTHER APART THAN ONE-FIFTH THE REQUIRED LAP SPICE LENGTH, NOR 6 IN. WHEN REINFORCING BARS OF DIFFERENT SIZE ARE TO BE SPLICED, THE LENGTHS OF LAP SHALL BE GOVERNED BY THE SMALLER DIAMETER BAR. SPLICES ARE TO BE MADE SO THAT THE REQUIRED CLEAR DISTANCES TO FACE OF CONCRETE WILL BE MAINTAINED.

### PLACING:

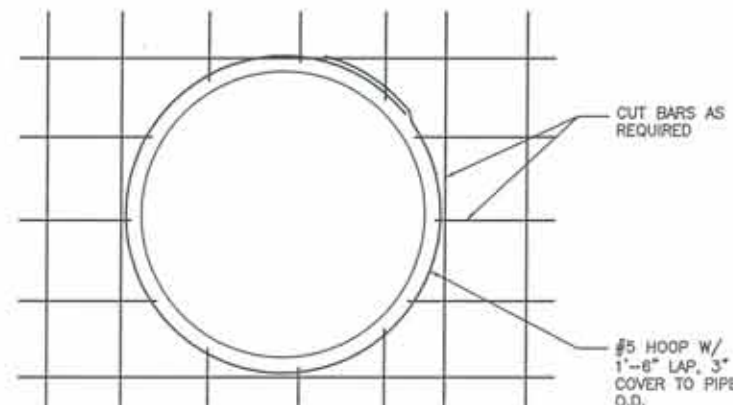
REINFORCEMENT AT SMALL OPENINGS (MAX. 1'-5") IN WALLS AND SLABS MAY BE SPREAD APART NOT MORE THAN 1.5 TIMES THE BAR SPACING. REINFORCEMENT MAY BE ADJUSTED LATERALLY TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1" BETWEEN THE REINFORCEMENT AND KEYS, WATERSTOPS, ANCHOR BOLTS, FORM TIES, CONDUITS AND OTHER EMBEDDED MATERIALS. IN HEAVILY REINFORCED AREAS, RELOCATION OF THE EMBEDDED MATERIAL MUST BE CONSIDERED. WHEN BARS ARE BENT DUE TO OFFSETS LESS THAN 3" DEEP, THE SLOPE OF THE INCLINED PORTION MUST NOT EXCEED 6 TO 1. REINFORCEMENT PARALLEL TO ANCHOR BOLTS OR OTHER EMBEDDED MATERIAL SHALL BE PLACED TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1.33 TIMES THE MAXIMUM SIZE AGGREGATES.

### SPACING:

THE FIRST AND LAST BARS IN WALLS AND SLABS, STIRRUPS IN BEAMS, AND TIES IN COLUMNS ARE TO START AND END AT A MAXIMUM OF ONE HALF OF THE ADJACENT BAR SPACING. A MINIMUM OF 2.5db CLEAR FROM THE EDGE IS REQUIRED FOR #9, #10, AND #11 BARS IF SPLICE LENGTHS OR REDUCED DEVELOPMENT LENGTHS GIVEN IN TABLES 3-60 AND 4-60 ARE TO BE USED.

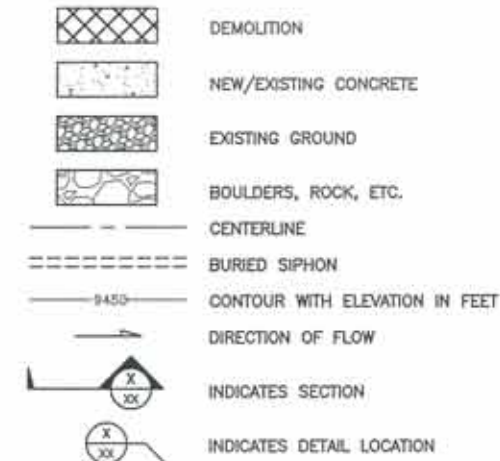
### STANDARD HOOKS:

HOOKS SHALL HAVE 180° BENDS AND EXTENSIONS OF 4-BAR DIAMETERS BUT NOT LESS THAN 2-1/2" PARALLEL TO THE MAIN LEG OF THE BAR. OR 90° BENDS AND EXTENSIONS OF AT LEAST 12-BAR DIAMETERS. HOOKS FOR STIRRUP AND TIE ANCHORAGE ONLY SHALL HAVE EITHER A 90° OR 135° BEND PLUS AN EXTENSION OF AT LEAST 6-BAR DIAMETERS BUT NOT LESS THAN 2-1/2" AT THE FREE END OF THE BAR. RADIUS OF BEND TO BE AS SPECIFIED IN THE TABLE OF PIN DIAMETERS.



TYPICAL OVERLAY REINFORCING AT CIRCULAR OPENINGS

### LEGEND:



### SEQUENCE OF WORK

1. TEMPORARILY SUPPORT BOTH SIDES OF EXPANSION JOINTS 'A' AND 'B'. THE SUPPORTS SHALL BE SNUG-FIT AND AVOID CONCENTRATED FORCES ON THE WALL OF THE SIPHON PIPE. WEIGHT OF EMPTY PIPE IS APPROXIMATELY 230 LBS/FT.
2. PERFORM DEMOLITION WORK SHOWN ON DRAWING S-2. NOTE THAT INTERMEDIATE SUPPORTS S12 AND S13 ARE DIRECTLY CONNECTED TO THE SIPHON VIA ROLLER BEARING ASSEMBLIES AND THEREFORE COULD HAVE LOCKED IN STRESSES DUE TO SLIDING FOUNDATIONS. CARE SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF THESE SUPPORTS.
3. CONSTRUCT CONCRETE OVERLAYS SHOWN ON DRAWINGS S-3 AND S-4.
4. REMOVE TEMPORARY SUPPORTS INSTALLED IN STEP 1 AFTER CONCRETE HAS ACHIEVED STRENGTH.

# URS

URS Center  
8181 East Tuffa Avenue  
Denver, Co. 80237-2637  
303-694-2770 (phone)  
303-694-3946 (fax)

SANTA MARIA  
RESERVOIR  
COMPANY

SANTA MARIA  
SIPHON SUPPORT SYSTEM  
STABILIZATION PROJECT

FINAL DESIGN



ISSUED FOR BIDDING 6/27/12 MSL BY

ISSUED FOR CONSTRUCTION DATE BY

### REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	6/27/12
2		
3		
4		
5		

URS PROJECT NO: 22241248

DRAWN BY: DWG

DESIGNED BY: JMC

CHECKED BY: MSL

DATE CREATED: -

PLOT DATE: -

SCALE: AS SHOWN

ACAD VER: 2012

SHEET TITLE

STRUCTURAL NOTES,  
STANDARD DETAILS,  
AND SEQUENCE OF  
WORK

## S-5

SHEET 6 OF 6