










HARBISON-WALKER		REFRACTORY SYMBOLS	
	CERAMIC FIBER		MINERAL WOOL BLOCK INSULATION (UNSLICK-19)
	SUPER DUTY BRICK (CLIFFER DP)		KS-4 CASTABLE
	SUPER DUTY BRICK (VARNADO)		KS-D-11E 22 CASTABLE
			LD-ARGRADE CASTABLE
			MIZDU EXTREME TEMP CASTABLE

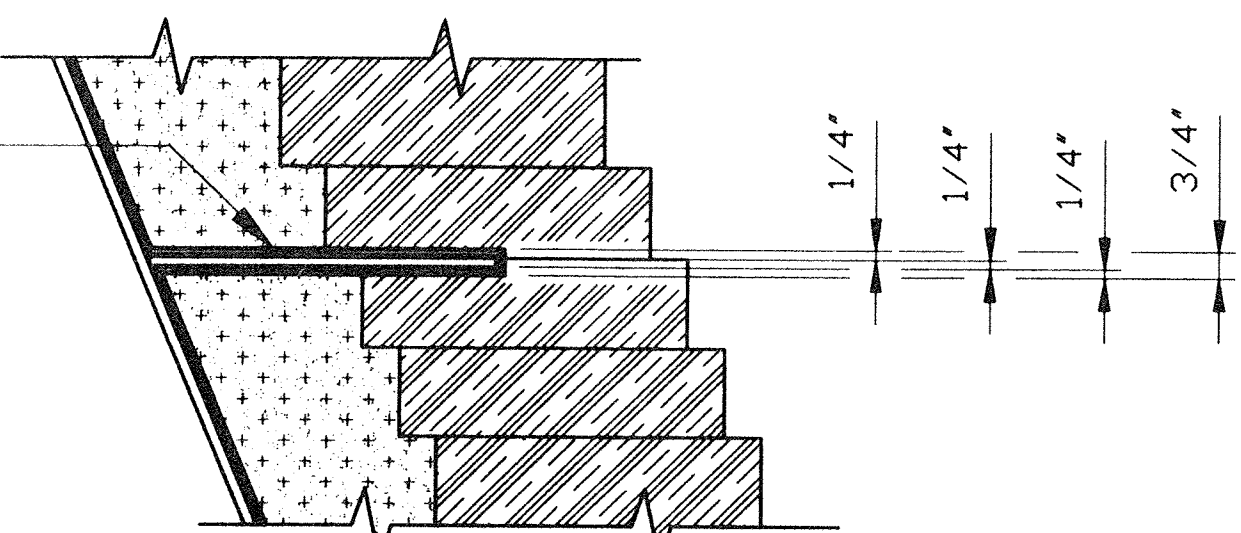


COURSE No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
TOTALS	66	19	1695	293	1130	205																				
SUPER DUTY BRICK	No. 2 KEY 12"x6"-5"x3"	No. 1 KEY 12"x6"-5 1/2"x3"	No. 1 KEY 9"x4 1/2"-4"x3"	STRAIGHT 9"x4 1/2"x3"	No. 1 KEY 9"x4 1/2"-4"x2 1/2"	STRAIGHT 9"x4 1/2"x2 1/2"																				
	66	19	1695	293	1130	205																				

DETAIL "C" SCALE: 1 1/2"=1'-0"

REACTOR BED TRANSITION COURSING  
SUPER DUTY BRICK  
(COURSES ARE 3' & 2.5')

COVER GAS BAFFLE PLATE  
WITH 1/4" THK. INSWOOL PAPER  
(2) 1/8" LAYERS



DETAIL "D" NO SCALE

NOTE:  
NO INSWOOL PAPER  
IN THIS AREA  
BEHIND SKEWBACKS

NOTE:  
NO INSWOOL PAPER  
ON TOP SURFACE  
OF SKEW SUPPORT PLATE

NOTE:  
COVER UNDERSIDE OF SKEW SUPPORT  
PLATE AND GUSSETS WITH  
1/4" THK. INSWOOL PAPER  
(2) 1/8" LAYERS

GRIND RECESS INTO BRICK  
TO FIT GAS SEAL PLATE

SEE DETAIL "D"

ELEV. 1956.73' TOP OF  
GAS SEAL PLATE

12'-0" I.D.

11'-6" I.D.

ELEV. 1954.67' TOP OF  
REFRACTORY TUYERE DOME

NOTE:  
NO INSWOOL PAPER  
IN THIS AREA  
BEHIND SKEWBACKS

NOTE:  
COVER UNDERSIDE OF SKEW SUPPORT PLATE  
AND GUSSETS WITH 1/4" THK. INSWOOL PAPER  
(2) 1/8" LAYERS

TOTALS	SUPER DUTY BRICK
452	#1 KEYS 9"x (4 1/2 - 4")x 2 1/2"
1356	#1 KEYS 9"x (4 1/2 - 4")x 3"
66	#2 KEYS 12"x (6'-5")x 3"
19	#1 KEYS 12"x (6'-5 1/2")x 3"
54	CIRCLE BRICK 9"x 4 1/2"x 2 1/2" (144-153-2 1/2)
54	CIRCLE BRICK 9"x 4 1/2"x 3" (144-153-3)

(1) COURSE SUPER DUTY BRICK  
(54) CIRCLE BRICK 9" X 4 1/2" X 2 1/2" (144-153-2 1/2)/COURSE

(1) COURSE SUPER DUTY BRICK  
(54) CIRCLE BRICK 9" X 4 1/2" X 3" (144-153-3)/COURSE

(12) COURSES SUPER DUTY BRICK  
(113) #1 KEYS 9"x (4 1/2"-4")x 3" PER COURSE (1356)

12'-0" I.D. WINDBOX WALL

11'-6" I.D. AT COURSE WITH 12' KEYS

(1) COURSE SUPER DUTY BRICK  
(66) #2 KEYS 12"x (6'-5")x 3" PER COURSE  
(19) #1 KEYS 12"x (6'-5 1/2")x 3" PER COURSE

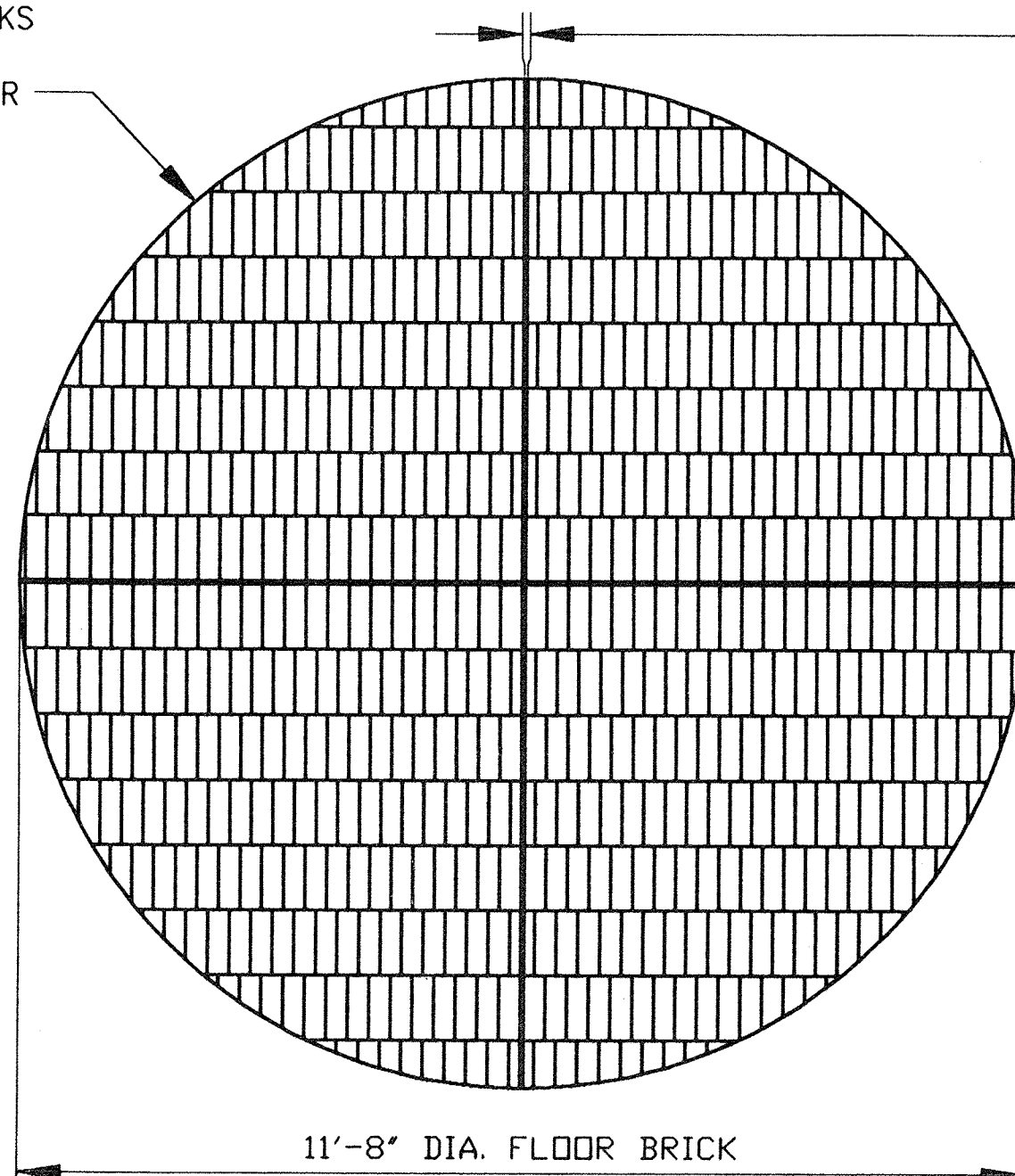
(4) COURSES SUPER DUTY BRICK  
(113) #1 KEYS 9"x (4 1/2"-4")x 2 1/2" PER COURSE (452)

NO INSWOOL PAPER UNDER  
WINDBOX FIREBRICK WALL

DETAIL "B" SCALE: 1 1/2"=1'-0"  
WINDBOX WALL COURSING

(580) 9"x 4 1/2"x 3"  
STRAIGHT BRICKS  
REQ'D. FOR  
WINDBOX FLOOR

1/2" EXPANSION JOINT  
IN WINDBOX FLOOR BRICK  
-FILL WITH 1/2" CERAMIC  
FIBER BOARD TO DIVIDE  
THE FLOOR BRICK INTO  
(4) QUADRANTS



DETAIL "A" SCALE: 1/2"=1'-0"  
WINDBOX FLOOR COURSING

REFRACTORY SYMBOLS

	CERAMIC FIBER
	SUPER DUTY BRICK (CLIPPER DP)
	SUPER DUTY BRICK (VARNON)
	KS-4 CASTABLE
	KAST-D-LITE 22 CASTABLE

NOTES:

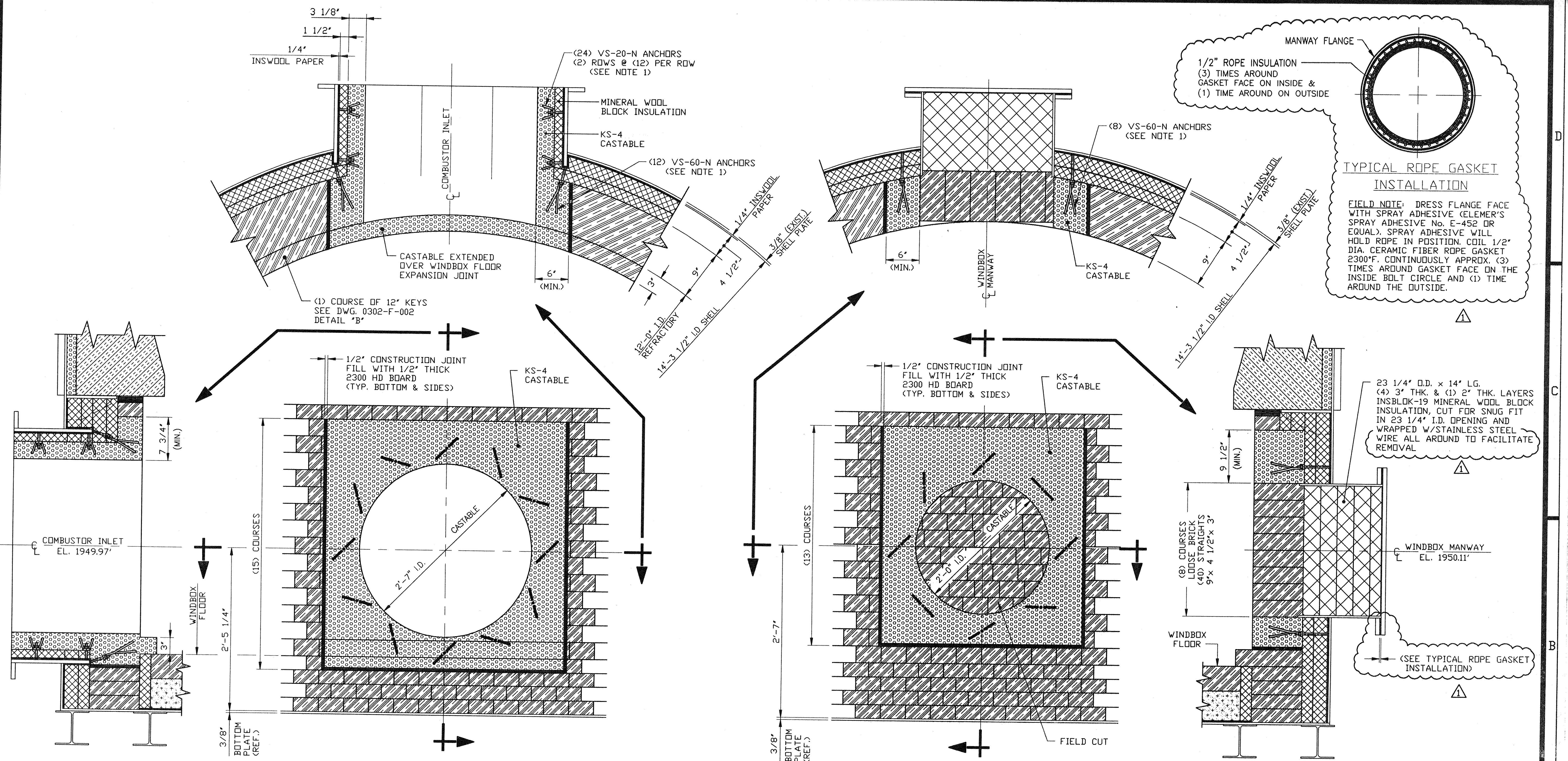
- 1) ORIENTATION OF ANCHORS SHOULD BE AT 45° ROTATION TO ANY AXIS OR CORNER, 90° TO EACH OTHER WHERE PRACTICAL.
- 2) SEE DWG. 0302-F-001 FOR GENERAL NOTES.

ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

04-16-04		DWG. UPDATED & ISSUED FOR CONSTRUCTION	SM	KJV	KJV	HM
2/17/04		ISSUE "0" TO REF. SUB.	SM	KJV	KJV	HM
DATE	NOL	ISSUES / REVISIONS	BY	CHK	APP	APP
 <small>THIS DRAWING IS THE PROPERTY OF HANKIN ENVIRONMENTAL SYSTEMS, INC. ON REQUEST, ITS CONTENTS ARE SECRET AND CONFIDENTIAL. ANY INFORMATION OBTAINED BY INSPECTION OF THIS DRAWING SHALL NOT BE USED FOR ANY OTHER THAN THE SPECIFIC PURPOSE FOR WHICH ITS INSPECTION IS AUTHORIZED BY HANKIN ENVIRONMENTAL SYSTEMS, INC.</small>			MODIFICATIONS TO FLUIDIZED BED INCINERATOR REFRACTORY - REACTOR DETAILS METROPOLITAN SEWER DISTRICT BUNCOMBE COUNTY, NORTH CAROLINA			
AS NOTED			DRAWING NO.		REV.	
0302			0302-F-002		1	

2002065





VIEWL "D-D"  
COMBUSTOR INLET

VIEWL "E-E"  
WINDBOX MANWAY

NOTES:

- 1.) ORIENTATION OF ANCHORS SHOULD BE AT 45° ROTATION TO ANY AXIS OR CORNER, 90° TO EACH OTHER WHERE PRACTICAL.
- 2.) SEE DWG. 0302-F-001 FOR GENERAL NOTES.

REFRACTORY SYMBOLS

HARBISON-WALKER		CERAMIC FIBER		MINERAL WOOL BLOCK INSULATION (INSBLOK-19)
		SUPER DUTY BRICK (CLIPPER DP)		KS-4 CASTABLE
		SUPER DUTY BRICK (VARNON)		KAST-O-LITE 22 CASTABLE

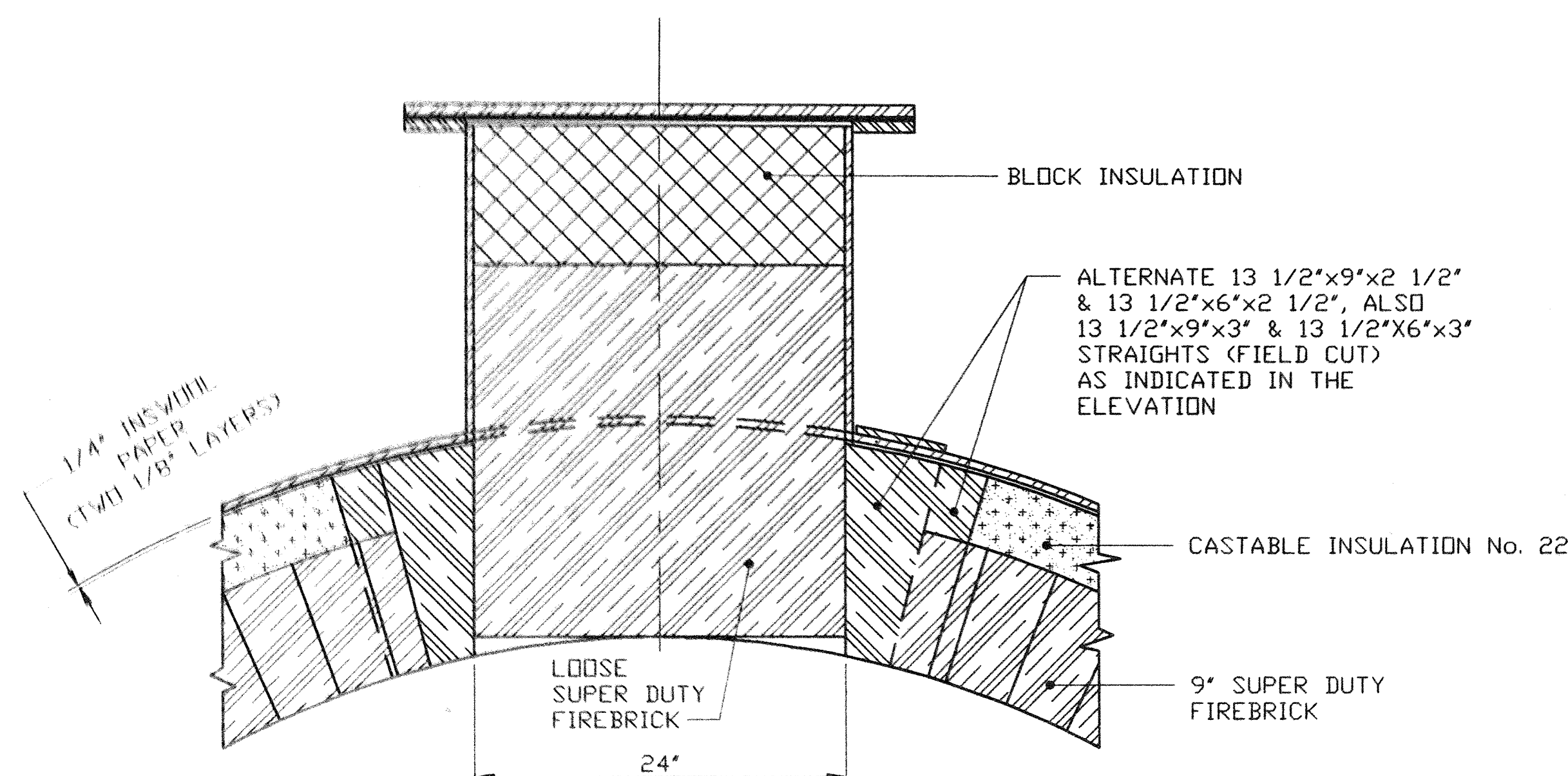
PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 1 #14472  
SPECIFICATION SECTION No. 1  
SUBPARAGRAPH No. 1  
CONTRACT DWG. SHEET No. 1

04-07-04	△	DWG. UPDATED & ISSUED FOR CONSTRUCTION	SM	KJV	KJV	HM
02/17/04	△	ISSUE "0" TO REFR. SUB.	SM	KJV	KJV	HM
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP
Hankin Environmental Systems, Inc.			MODIFICATIONS TO FLUIDIZED BED INCINERATOR REFRACTORY - REACTOR DETAILS			
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Scale: AS NOTED			DRAWING NO. 0302-F-003		REV. 1	

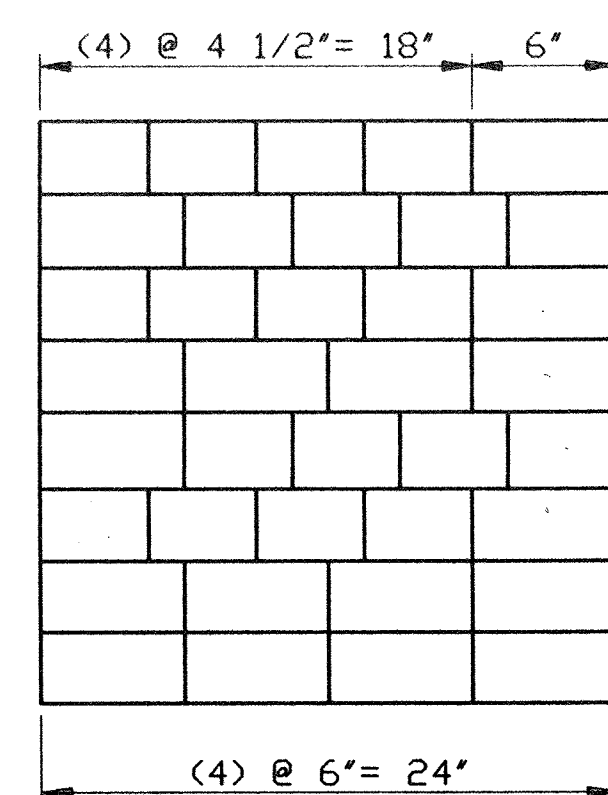




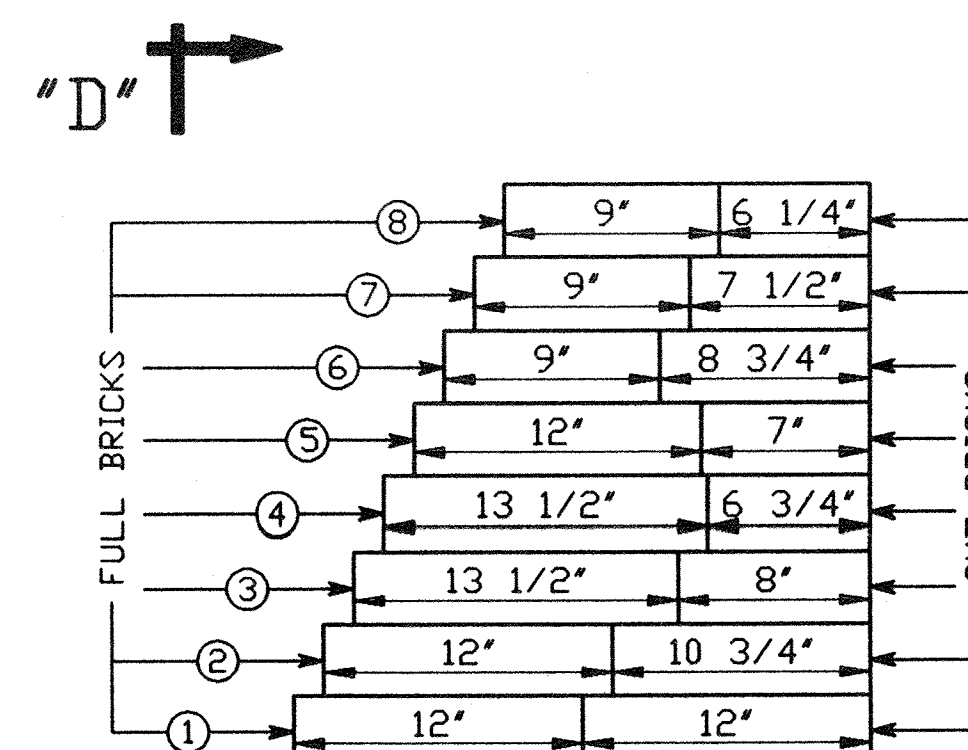




SECTION "A-A"

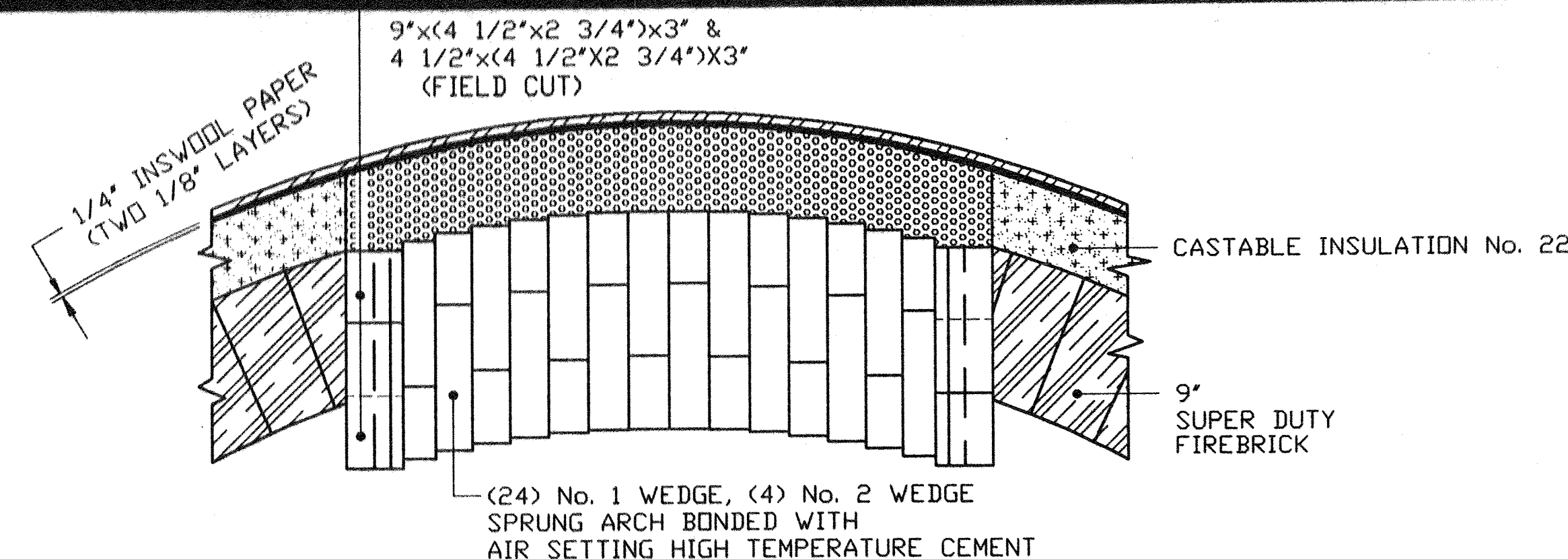
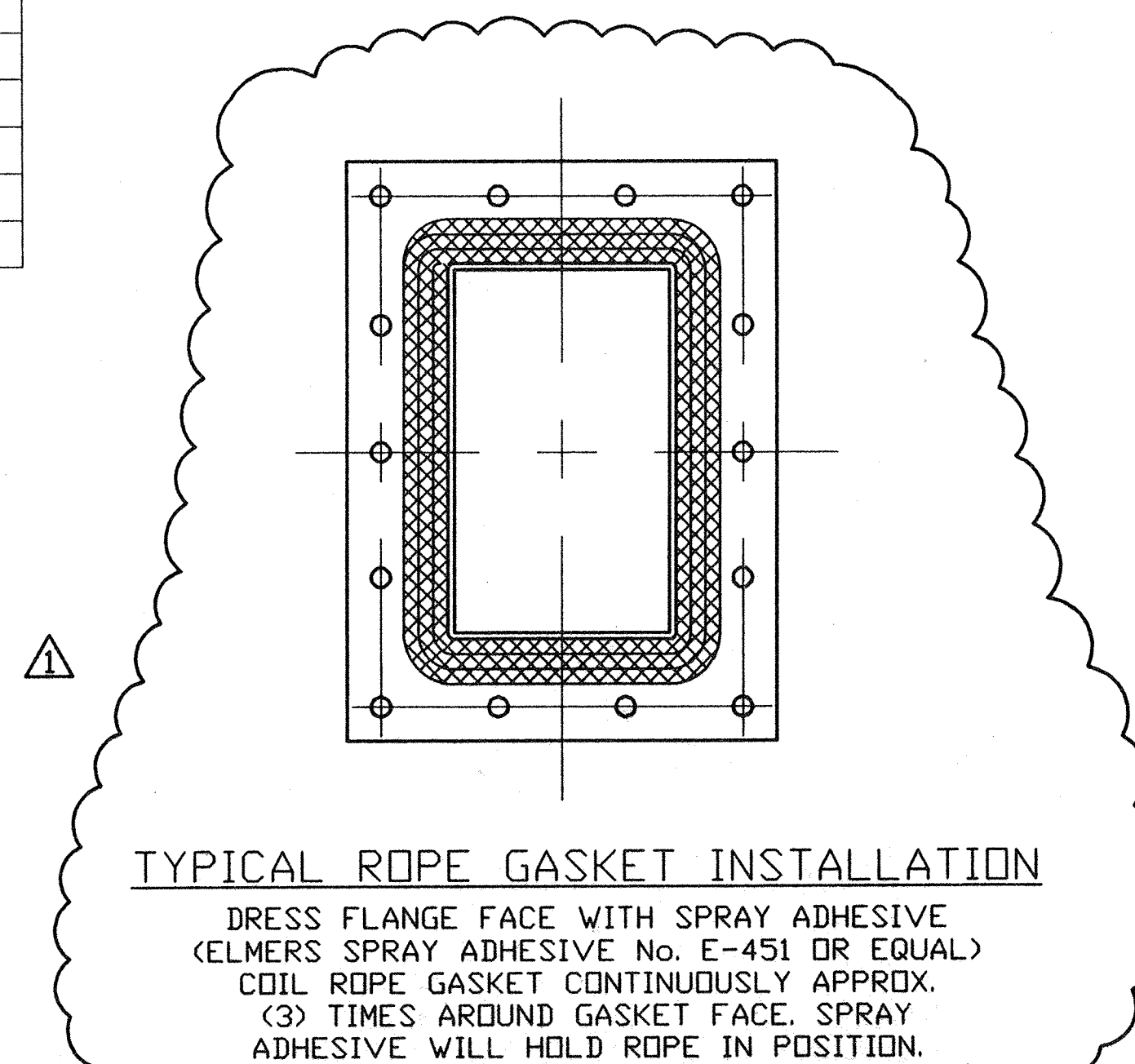


VIEW "D-D"



DETAIL No. 2

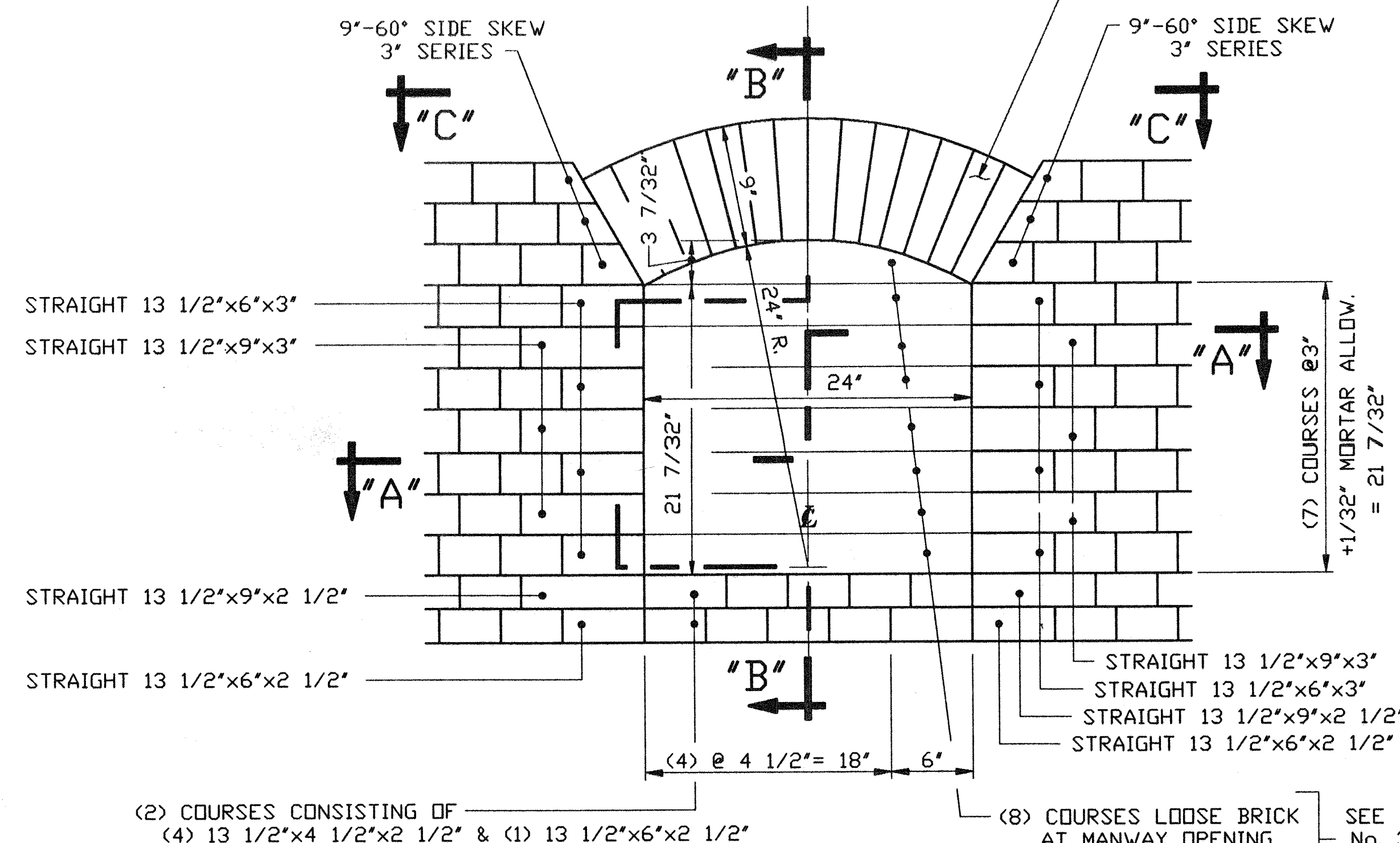
TABLE No. 3									
LOOSE BRICK @ MANWAY (FULL BRICK)									
QUANTITIES OF STRAIGHT BRICK									
BRICK SIZE	COURSE								TOTALS
	1	2	3	4	5	6	7	8	
9"x4 1/2"x3"	-	-	4	4	-	8	8	8	32
9"x6"x3"	-	-	1	1	4	2	2	2	12
12"x6"x3"	8	8	-	-	4	-	-	-	20
13 1/2"x4 1/2"x3"	-	-	4	4	-	-	-	-	8
13 1/2"x6"x3"	-	-	1	1	-	-	-	-	2



SECTION "C-C"

SEE TABLE No. 1 FOR QUANTITIES

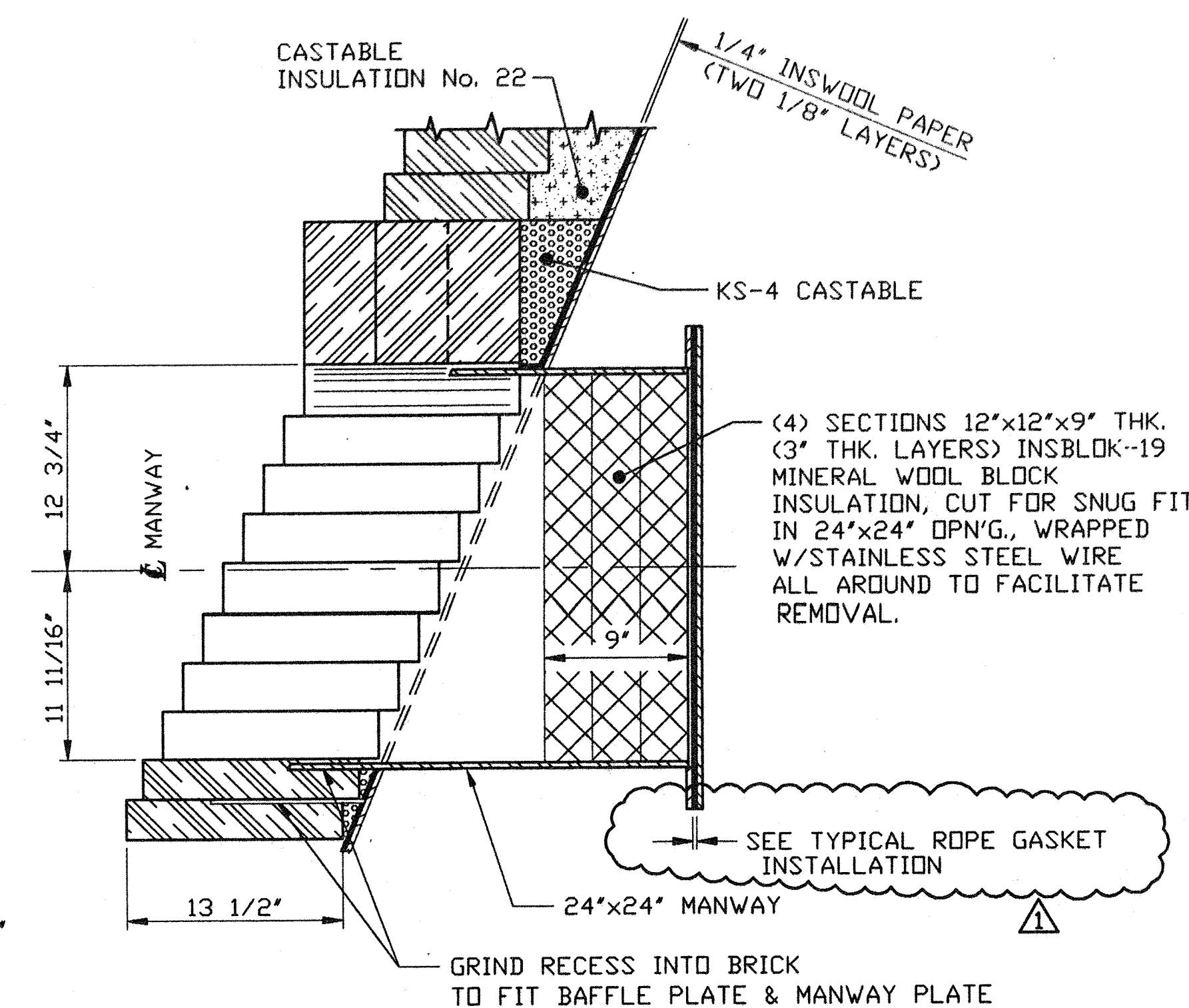
No. 1 WEDGE 9"x9"x(2 1/2'-1 7/8")  
 No. 2 WEDGE 9"x9"x(2 1/2'-1 1/2")  
 No. 1 WEDGE 9"x4 1/2'x(2 1/2'-1 7/8")  
 No. 2 WEDGE 9"x4 1/2'x(2 1/2'-1 1/2")  
 SPRUNG ARCH BONDED WITH (SAIRSET) AIR SETTING HIGH TEMPERATURE CEMENT



24"x 24" MANWAY - BRICKWORK ELEVATION

TABLE No. 1		
QUANTITIES OF STRAIGHT, WEDGE, SIDE SKEW BRICK (SUPER DUTY) BOARD AND BLOCK INSULATION		LOCATION
WINDBOX MANWAY WITH 13 1/2" WALL	SPRUNG ARCH	
3" INSBLK-19 MINERAL WOOL BLOCK INSULATION	12 SQ. FT.	SECT. "A-A", & "B-B"
No. 1 WEDGE 9"x4 1/2'x(2 1/2'-1 7/8")	12	SEE SECT. "C-C" & ELEVATION
No. 2 WEDGE 9"x4 1/2'x(2 1/2'-1 1/2")	2	
No. 1 WEDGE 9"x9'x(2 1/2'-1 7/8")	12	
No. 2 WEDGE 9"x9'x(2 1/2'-1 1/2")	2	
60" SIDE SKEW 9"x(4 1/2'-2 3/4'x3"	9	ELEVATION
NOTE: (3) SIDE SKEWS TO BE FIELD CUT IN HALF		
STRAIGHT 13 1/2'x6'x2 1/2"	4	
STRAIGHT 13 1/2'x9'x2 1/2"	2	
STRAIGHT 13 1/2'x6'x3"	8	
STRAIGHT 13 1/2'x9'x3"	6	
STRAIGHT 13 1/2'x4 1/2'x2 1/2"	8	

REFRACTORY SYMBOLS			
	CERAMIC FIBER		LE-ABRADE CASTABLE
	SUPER DUTY BRICK (KX-99 BF)		KS-4 CASTABLE
	SUPER DUTY BRICK (CLIPPER *900*)		CASTABLE INSUL. No. 22
	MINERAL WOOL BLOCK INSULATION (INSBLOK-19)		



SECTION "B-B"

NOTE: LOOSE BRICK NOT SHOWN IN THIS VIEW

REFERENCE DRAWINGS:

0302-F-001...REFRACTORY- REACTOR ASSEMBLY

NOTES:

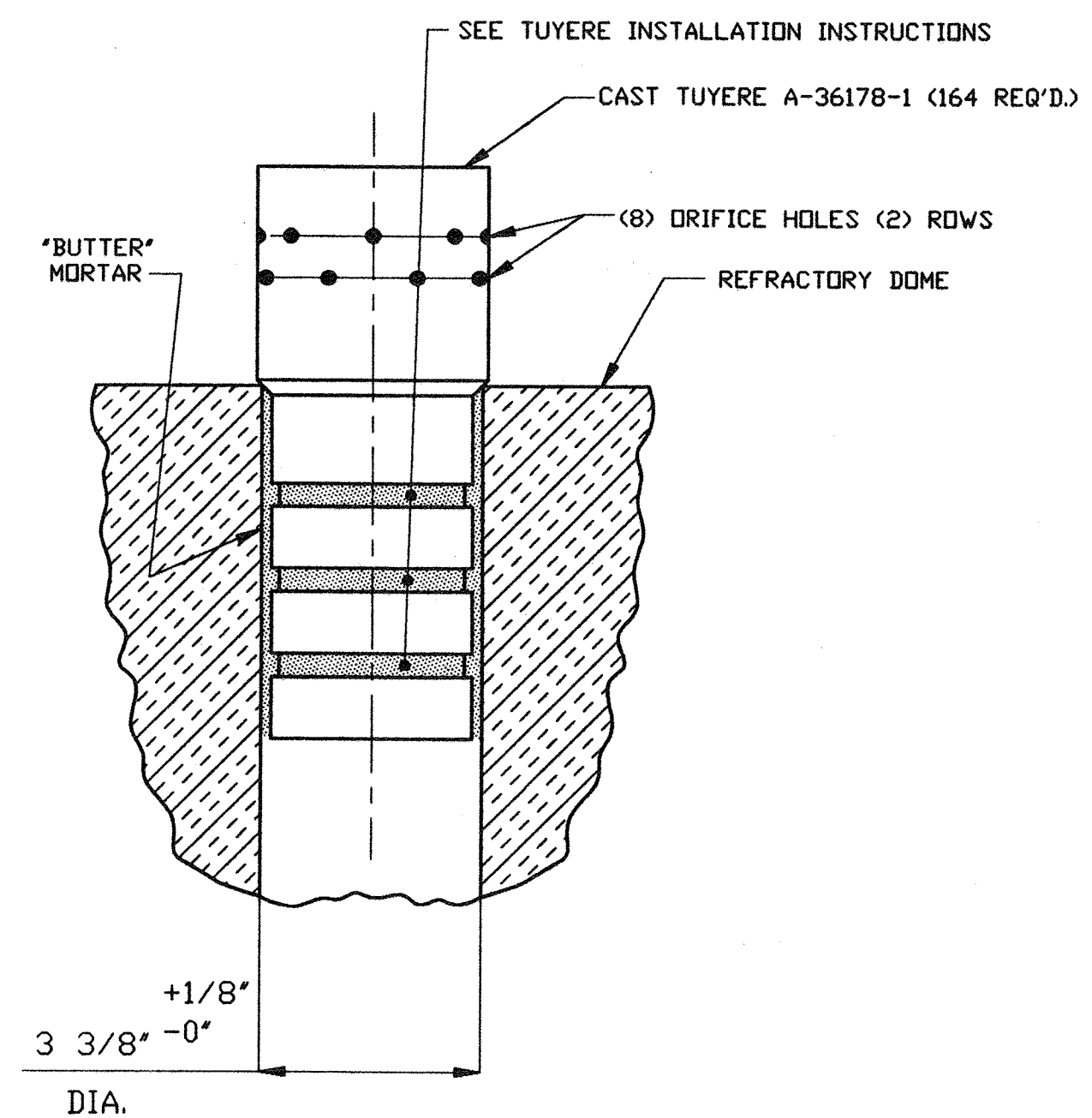
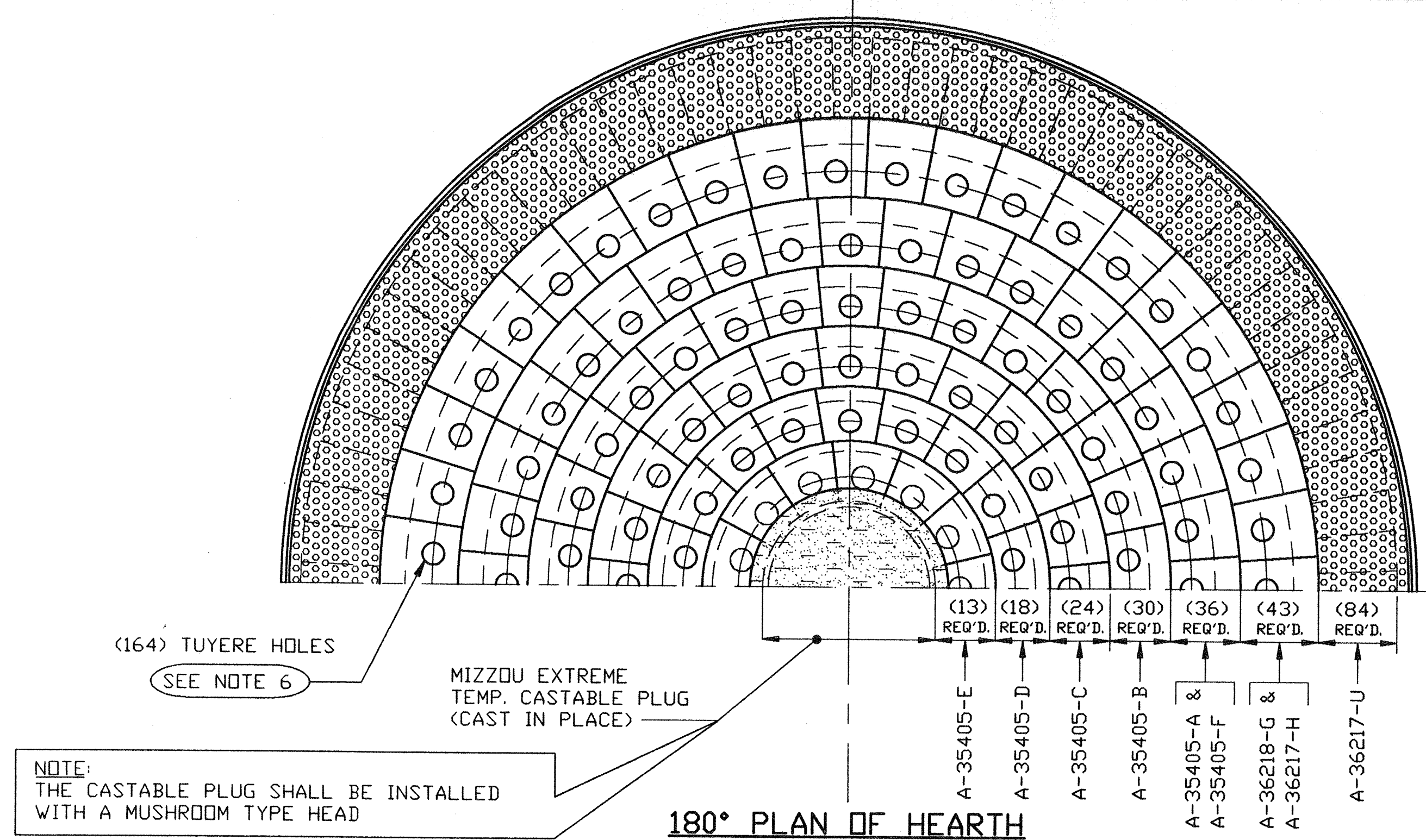
1. FOR GENERAL NOTES SEE DWG. 0302-F-001.

ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 1 #14472  
SPECIFICATION SECTION No. 1  
SUBPARAGRAPH No. 1  
CONTRACT DWG. SHEET No. 1

04-07-04	△	DWG. UPDATED & ISSUED FOR CONSTRUCTION	SM	KJV	KJV	HM
02-17-04	△	ISSUE "0" TO REFR. SUB.	SM	KJV	KJV	HM
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP
Title			MODIFICATIONS TO FLUIDIZED BED INCINERATOR			
Location			REFRACTORY - REACTOR MANWAY			
Location			METROPOLITAN SEWER DISTRICT BUNCOMBE COUNTY, NORTH CAROLINA			
Scale			1 1/2"=1'-0"			
Contract No.			0302			
Drawing No.			0302-F-005			
Rev.			1			

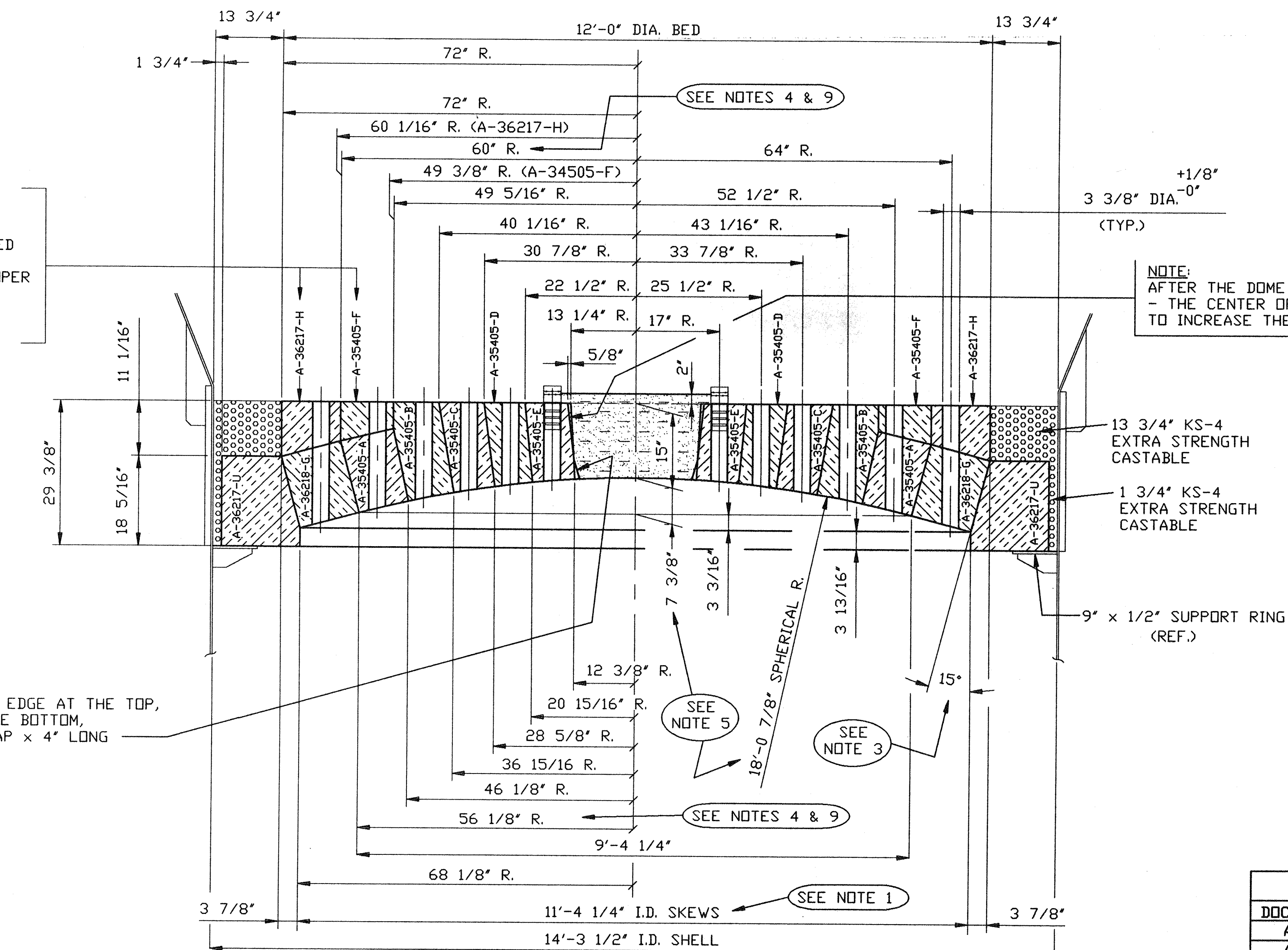




- ### TUYERE INSTALLATION INSTRUCTIONS
1. USING TOILET TYPE BRUSH, CLEAN HOLE AND TUYERE WITH WATER. TAPE OVER BOTH ROWS OF TUYERE AIR HOLES.
  2. USING BRUSH, COAT TUYERE HOLE WITH (#36 REFRACTORY CEMENT) "DIPPING" MORTAR (SOUP).
  3. LET MORTAR DRY.
  4. USING (#36 REFRACTORY CEMENT) "BUTTER" MORTAR (DIRECT FROM CAN), COAT HOLE AND TOP OF HOLE WITH MORTAR.
  5. USING SAME "BUTTER" MORTAR COAT ONLY THE LENGTH OF THE TUYERE THAT WILL BE INSERTED INTO THE TILE RING.
  6. AS THE TUYERE IS PUSHED INTO THE REFRACTORY HOLE TURN TUYERE ABOUT 1/2 TURN.
  7. DO NOT WALK ON OR TOUCH TUYERES UNTIL DRYOUT IS COMPLETE.
  8. DO NOT REMOVE THE PROTECTIVE TAPE OVER THE AIR HOLES UNTIL AFTER CLEAN UP & THE DOME SURFACE HAS BEEN SWEEP BROOM CLEAN.

	MATERIAL (PER HEARTH)	QUANTITY
HARBISON WALKER	#36 REFRACTORY CEMENT	2,000 LBS.
	KS-4 CASTABLE	7,100 LBS.
	MIZZOU EXTREME TEMP. CASTABLE	900 LBS.
	SAIRSET MORTAR	430 LBS.

- ### NOTES:
1. IMPORTANT- SET HEARTH SKEWS LEVEL & SET HEARTH SKEWS SO THAT THE INSIDE DIAMETER OF SKEWS IS EXACT & A TRUE CIRCLE. THEN GROUT BETWEEN BACK OF SKEWS & SHELL WITH KS-4 CASTABLE.
  2. KS-4 CASTABLE BACKING HEARTH SKEWS IS PROVIDED AS A MEANS OF ADJUSTMENT TO MAINTAIN EXACT DIAMETER & SETTING OF THE SKEWS TO A TRUE CIRCLE & EXACT DIMENSION.
  3. FACE ANGLE OF HEARTH SKEWS MUST BE CHECKED TO COINCIDE WITH THE ANGLE INDICATED BEFORE ANY ADJACENT TILES ARE INSTALLED.
  4. RADIUS DIMENSIONS INDICATED AT BOTH UPPER & LOWER FACE OF HEARTH MUST BE CHECKED AS EACH SUCCESSIVE RING OF TILE IS INSTALLED.
  5. IMPORTANT! EXACT TOTAL RISE OF DOME & EXACT RADIUS OF LOWER FACE MUST BE HELD TO THE DIMENSIONS INDICATED TO INSURE CORRECT PLACEMENT OF EACH TILE.
  6. (164) TUYERES SHOULD BE PLACED IN TILE RINGS "A" THRU "F" DWG. A-35405, "H" DWG. A-36217, & "G" DWG. A-36218. SEE DETAIL "A" & TUYERE INSTALLATION INSTRUCTIONS SHOWN ABOVE.
  7. ALL SHAPES TO BE HARBISON WALKER VARNON SUPER DUTY FIREBRICK.
  8. ALL HEARTH SHAPES TO BE LAID WITH HARBISON WALKER No. 36 REFRACTORY CEMENT, EXCEPT FILLER TILES (A-35405-F & A-36217-H), WHICH ARE TO BE LAID WITH SAIRSET.
  9. ALL SHAPES ARE SIZED WITH A MORTAR JOINT ALLOWANCE OF 1/16" ALL AROUND. EXCEPT 1/8" JOINTS FOR THE FILLER TILES (A-35405-F & A-36217-H, K, & M). THE RADII SHOWN FOR ALL SHAPES IS TO THE FRONT CORNER OF EACH TILE & NOT TO THE BACK CORNER OF THE ADJACENT TILE, WHICH WOULD BE 1/16" LESS. FOR HEARTH SHAPES 1/8" LESS. FOR FILLER TILES.



### REFRACTORY SYMBOLS

HARBISON WALKER	VARNON SUPER DUTY BRICK
	KS-4 CASTABLE
	MIZZOU EXTREME TEMP. CASTABLE

### REFERENCE TABLE

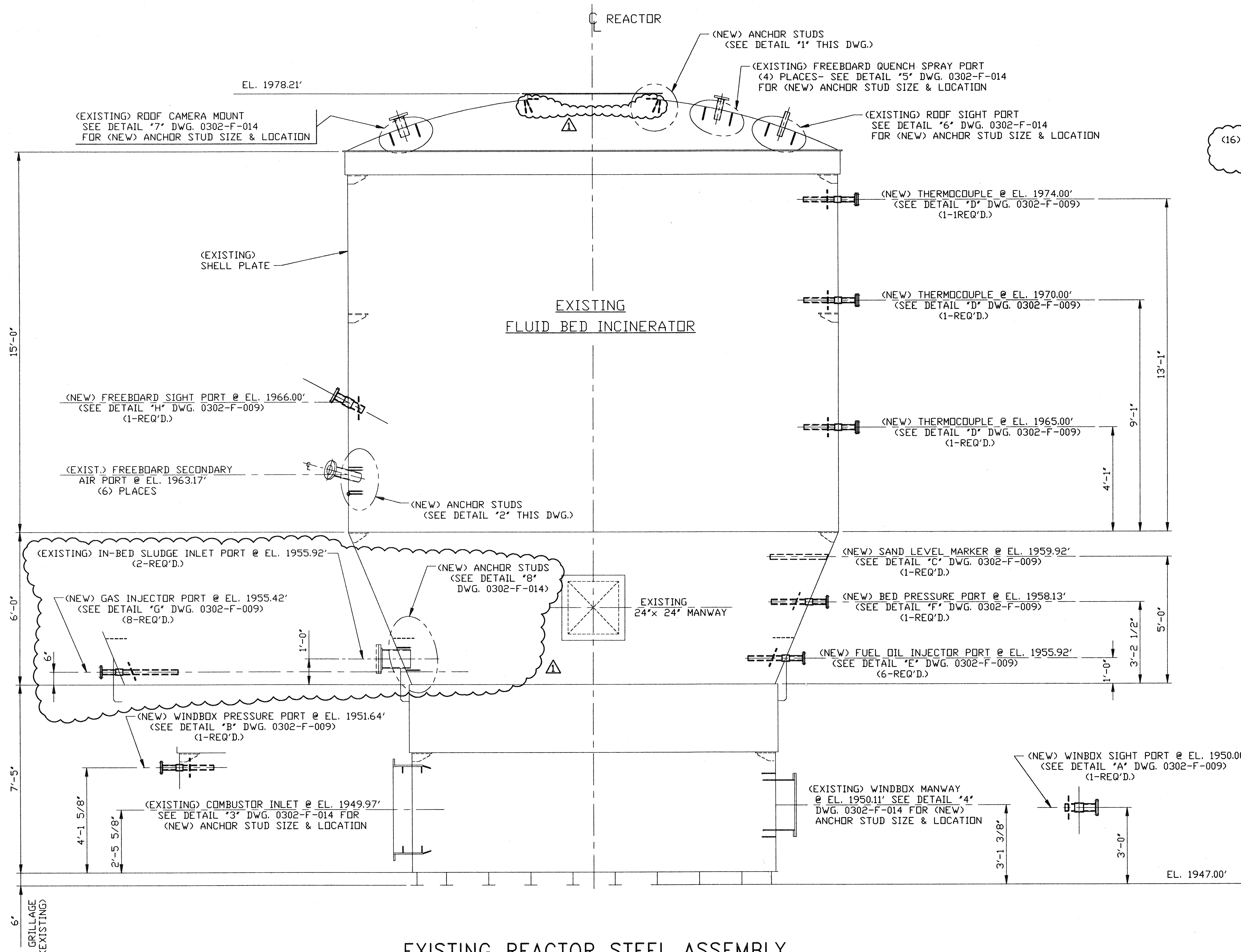
DOCUMENT NO.	TITLE/DESCRIPTION
A-36217	REFRACTORY HEARTH SPECIAL SHAPES
A-36218	REFRACTORY HEARTH SPECIAL SHAPES
A-36178	CAST TUYERE HOT WINDBOX

PROJECT NAME: BUNCOMBE COUNTY  
 CONTRACT No. 1 #14472  
 SPECIFICATION SECTION No. 1 11709  
 SUBPARAGRAPH No. 1 2.04D  
 CONTRACT DWG. SHEET No. 1

ISSUED  
 ENGINEERING DEPT.  
 JUN 28 2004  
 HANKIN ENVIRONMENTAL  
 SYSTEMS INC.

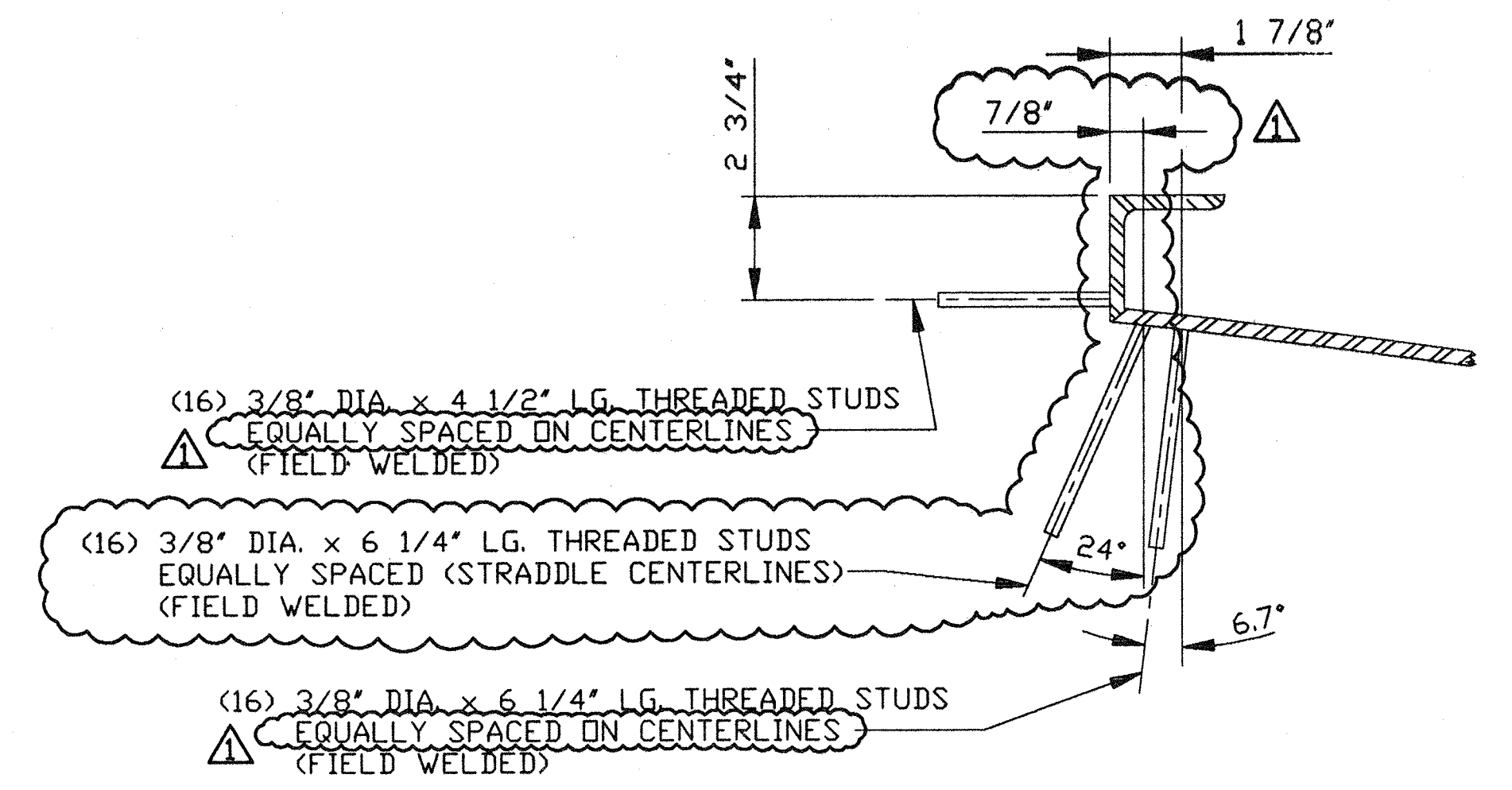
02-17-04	0	ISSUE "0" TO REFE. SUB.	SM	KJV	KJV	HM
10-13-03	1	ISSUED FOR APPROVAL	SM			
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP
			MODIFICATIONS TO FLUIDIZED BED INCINERATOR REFRACTORY - REFRACTORY DOME			
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Scale: 3/4"=1'-0" Contract No. 0302			DRAWING NO. 0302-F-006 REV. 0			





# EXISTING REACTOR STEEL ASSEMBLY

(SEE 0302-F-008 FOR TRUE ORIENTATION)



DETAIL "1"  
NO SCALE

LEGEND  
.....EXISTING  
.....NEW EQUIPMENT

## REFERENCE DRAWINGS:



- 0302-F-008.....REACTOR STEEL-ORIENTATION
- 0302-F-009.....REACTOR STEEL-NOZZLE DETAILS


## NOTES:

- 1.) INSTALL (8) EIGHT GAS INJECTOR PORTS.
- 2.) INSTALL (6) SIX FUEL OIL INJECTOR PORTS.
- 3.) INSTALL (1) ONE BED PRESSURE PORT.
- 4.) INSTALL (1) ONE SAND LEVEL MARKER.
- 5.) INSTALL (3) THREE FREEBOARD T/C.
- 6.) INSTALL (1) ONE FREEBOARD SIGHT PORT.
- 7.) INSTALL (1) ONE WINBOX SIGHT PORT.
- 8.) INSTALL (1) ONE WINBOX PRESSURE PORT.
- 9.) FOR NOZZLE MATERIALS OF CONSTRUCTION-SEE DWG. 0302-F-009.
- 10.) INSTALL (48) ANCHOR STUDS AROUND THE ROOF GAS OUTLET AS SHOWN ON THIS DWG. 'DETAIL 1'.
- 11.) INSTALL (36) ANCHOR STUDS AROUND THE SECONDARY AIR PORTS AS SHOWN ON THIS DWG. 'DETAIL 2'.
- 12.) INSTALL (36) ANCHOR STUDS AROUND THE COMBUSTOR INLET.
- 13.) INSTALL (8) ANCHOR STUDS AROUND THE WINBOX MANWAY.
- 14.) INSTALL (16) ANCHOR STUDS AROUND THE FREEBOARD QUENCH SPRAY PORTS.
- 15.) INSTALL (4) ANCHOR STUDS AROUND THE CAMERA MOUNT.
- 16.) INSTALL (4) ANCHOR STUDS AROUND THE ROOF SIGHT PORT.
- 17.) INSTALL (8) ANCHOR STUDS AROUND THE IM-BED SLUDGE INLET PORT AND SPARE PORT.

ISSUED  
ENGINEERING DEPT.  
JUN 2 8 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 1 #14472  
SPECIFICATION SECTION No. 11709  
SUBPARAGRAPH No. 1 N.A.  
CONTRACT DWG. SHEET No. 1

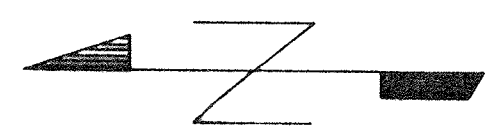
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04/08/04		ISSUED FOR CONSTRUCTION	SDM	KJV	KJV	HM
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP

 TM	<b>Hankin</b> Environmental Systems, Inc.	Title	MODIFICATIONS TO FLUIDIZED BED INCINERATOR		
			<u>REACTOR STEEL - ASSEMBLY</u>		
		Location	METROPOLITAN SEWER DISTRICT BUNCOMBE COUNTY, NORTH CAROLINA		
		Scale	1/2"=1'-0"		
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		0302	0302-F-007		1

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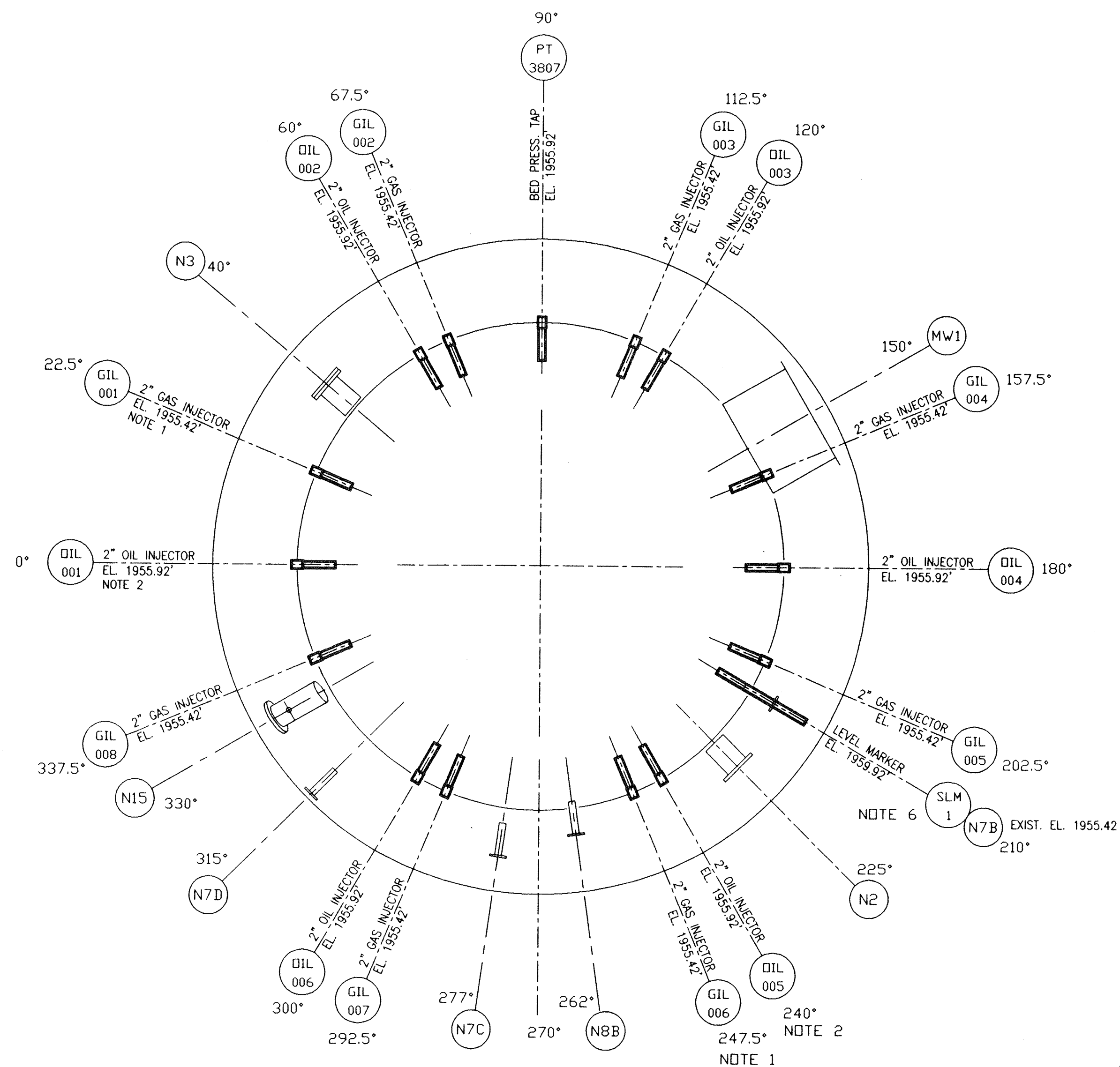
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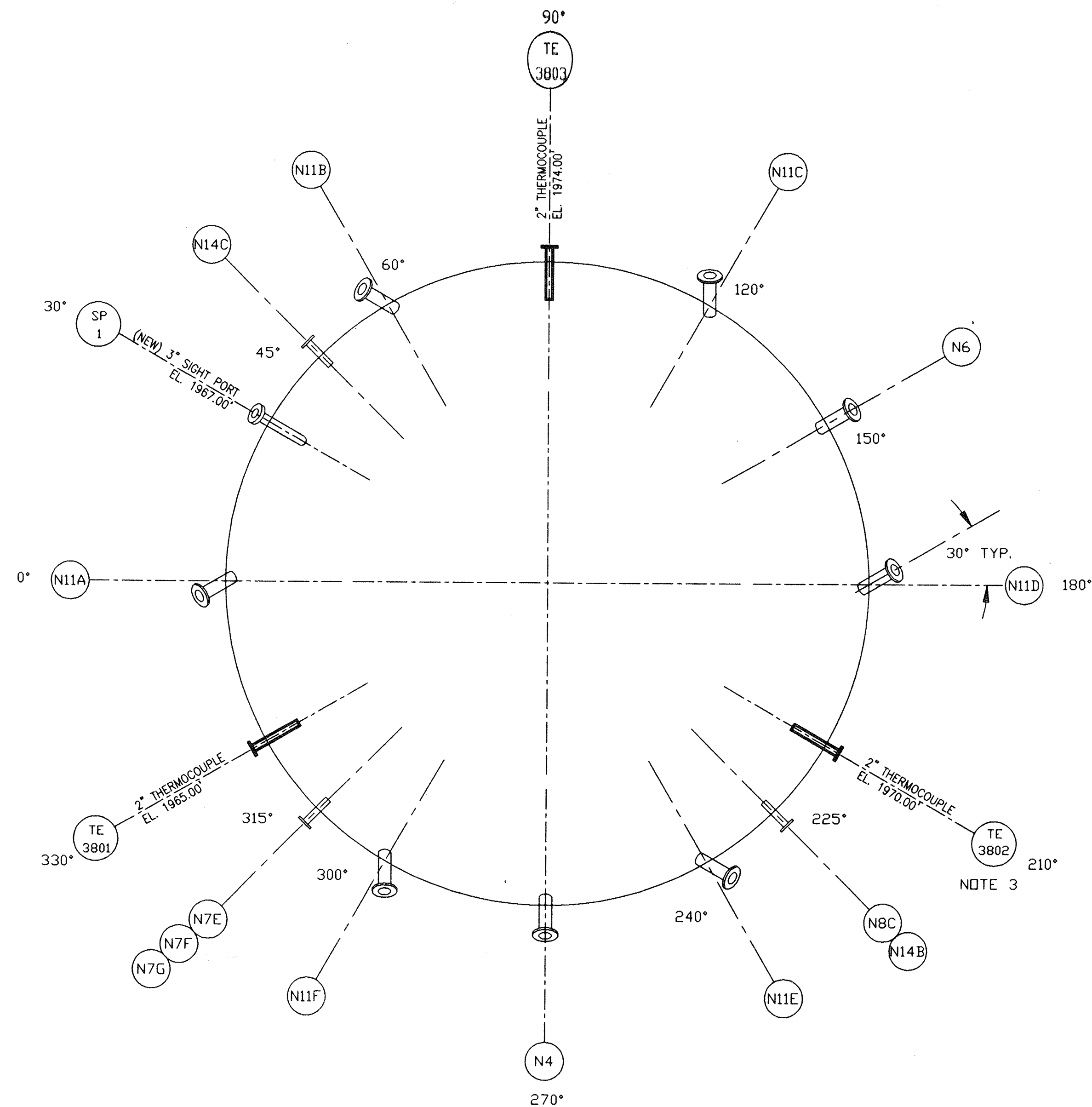


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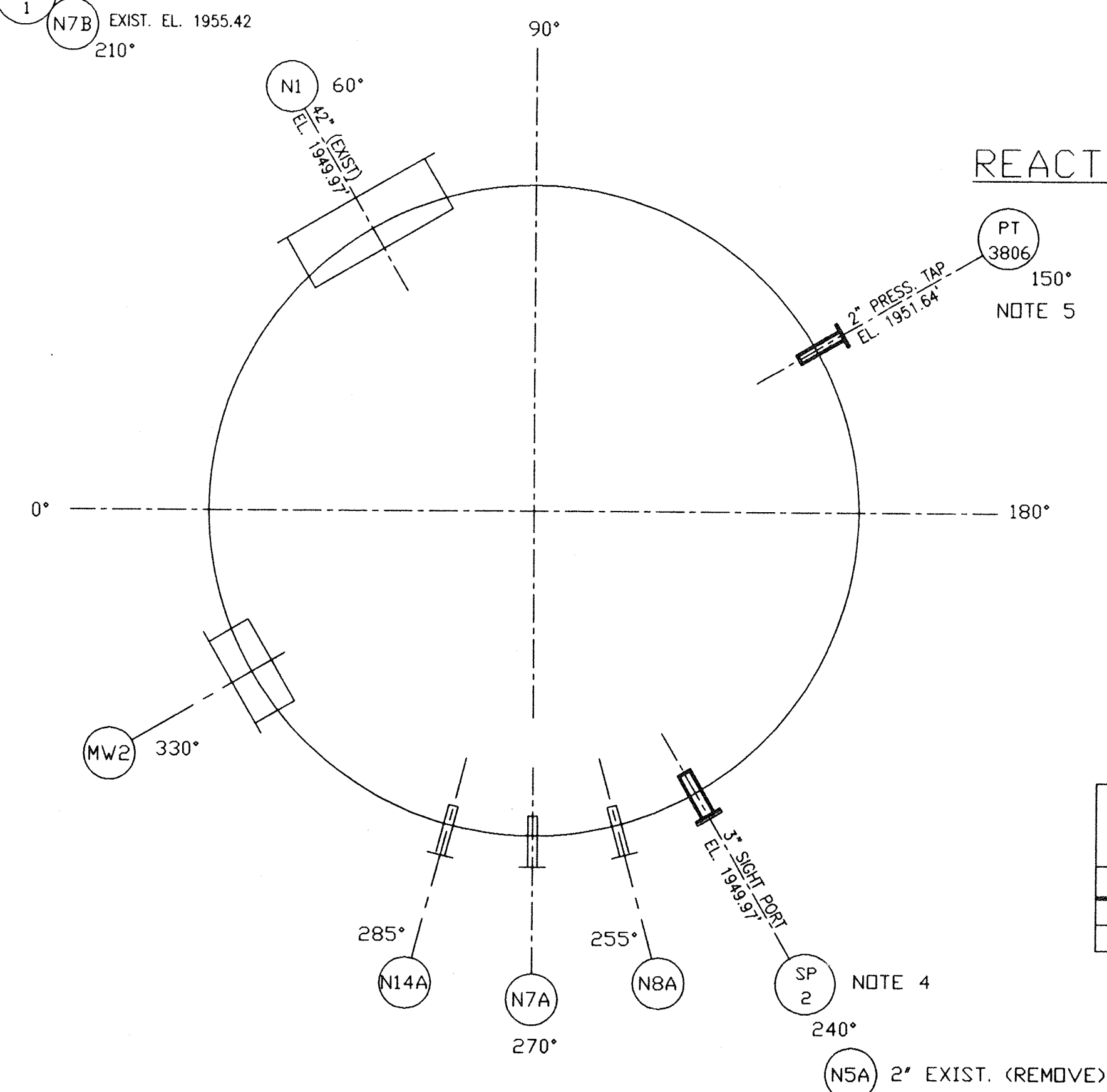
1. REPLACE (8) EXISTING GAS INJECTORS PROTECTOR TUBES (GIL-001 THRU -008) WITH NEW PROTECTOR TUBES IN SAME LOCATIONS.
2. REPLACE (6) EXISTING OIL INJECTORS NOZZLES PROTECTOR TUBES (OIL-001 THRU -006) NOZZLES WITH NEW PROTECTOR TUBES IN SAME LOCATIONS.
3. (3) NEW THERMOCOUPLE NOZZLES AS SHOWN IN FREEBOARD.
4. (2) 3"-SIGHT PORTS, ONE IN WINDBOX & OTHER IN FREEBOARD.
5. (1) PRESSURE TAP IN WINDBOX.
6. (1) LEVEL MARKER IN SAND BED.



REACTOR BED AREA ORIENTATION



REACTOR FREEBOARD ORIENTATION



REACTOR WINDBOX ORIENTATION

LEGEND:

- EXISTING EQUIPMENT
- NEW EQUIPMENT

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
0302-M-001	PIPING SCHEMATIC DIAGRAM
0302-F-007	REACTOR STEEL - ASSEMBLY

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 14472  
SPECIFICATION SECTION No. 11709  
SUBPARAGRAPH No. N.A.  
CONTRACT DWG. SHEET No. :

ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

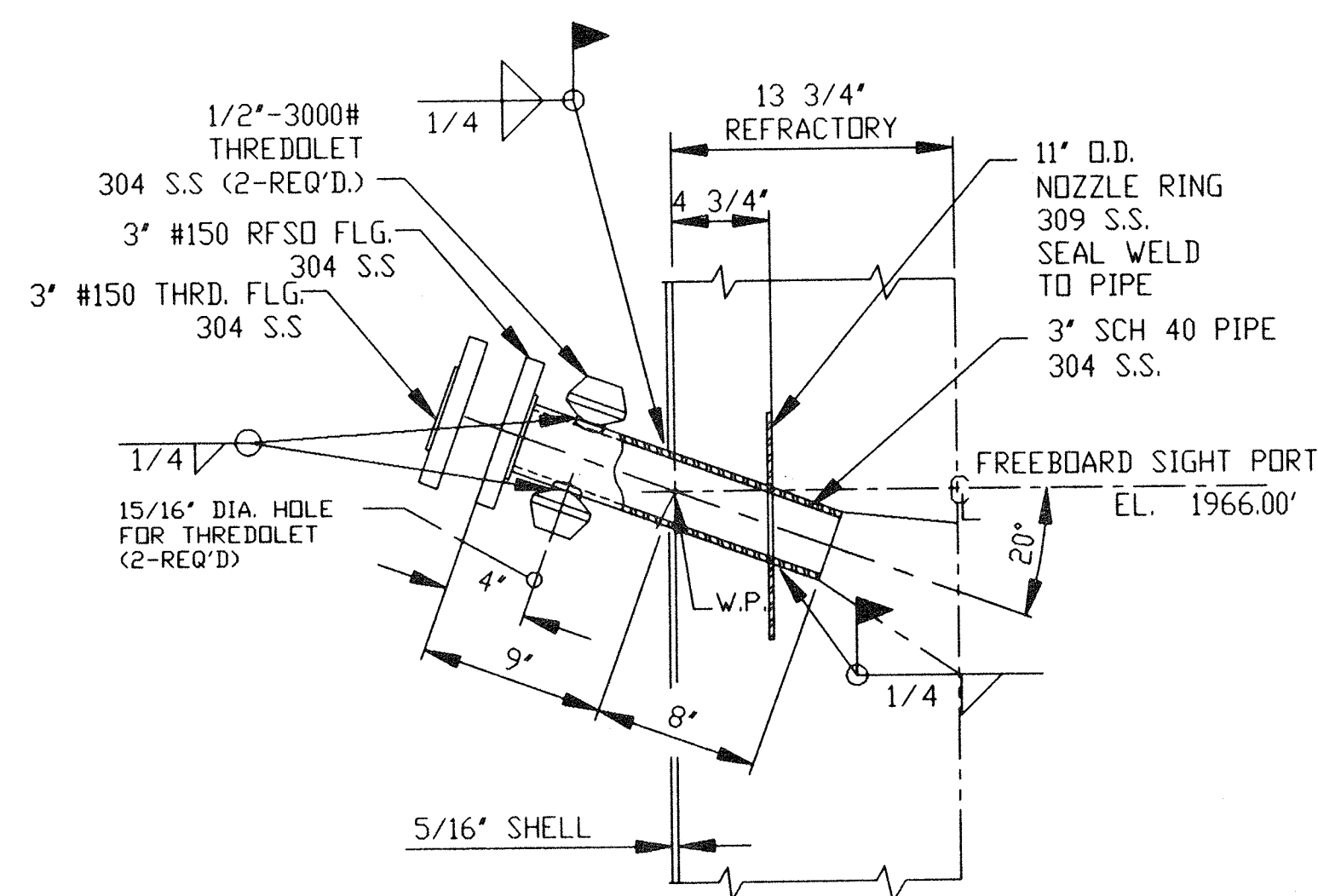
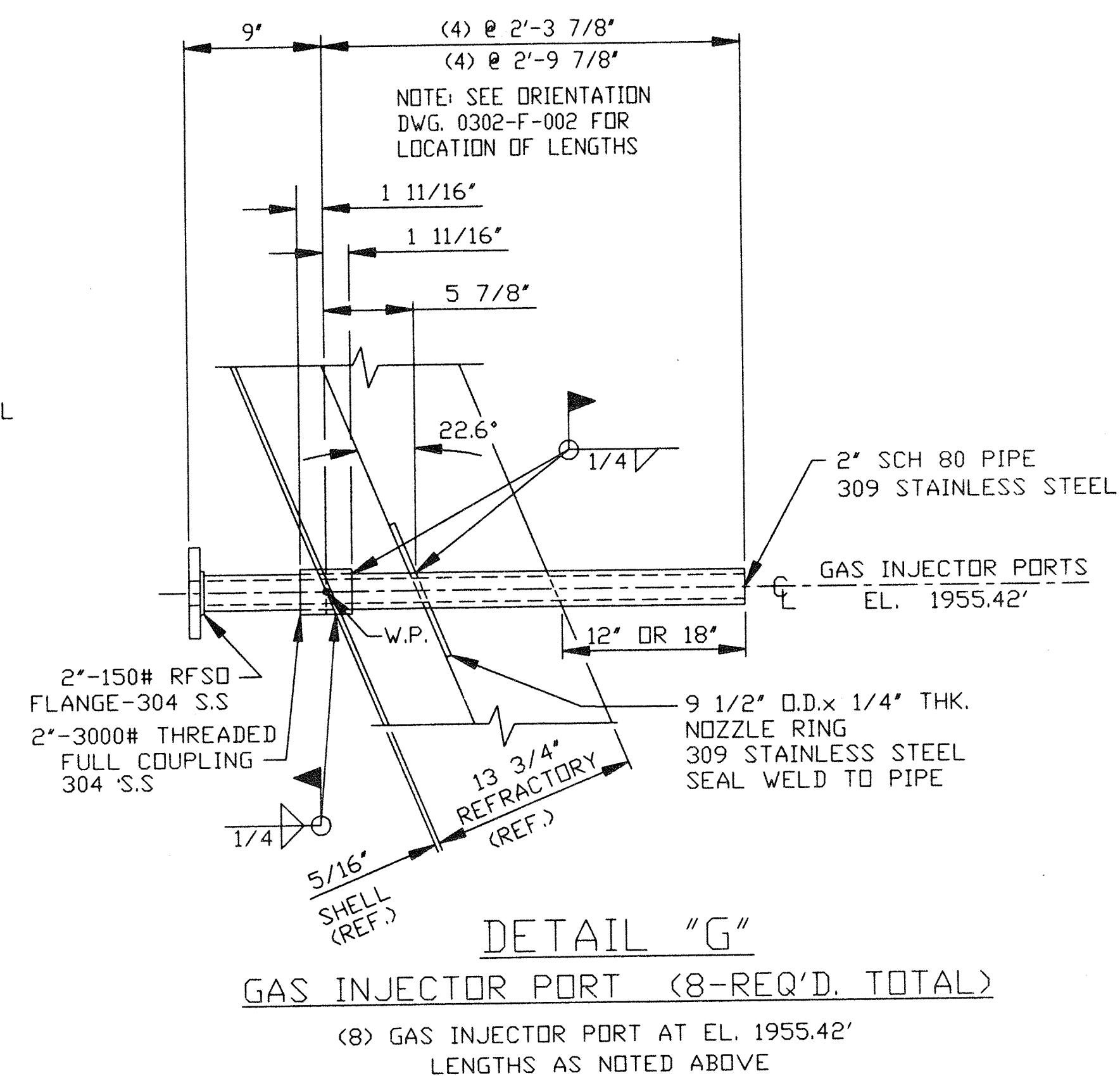
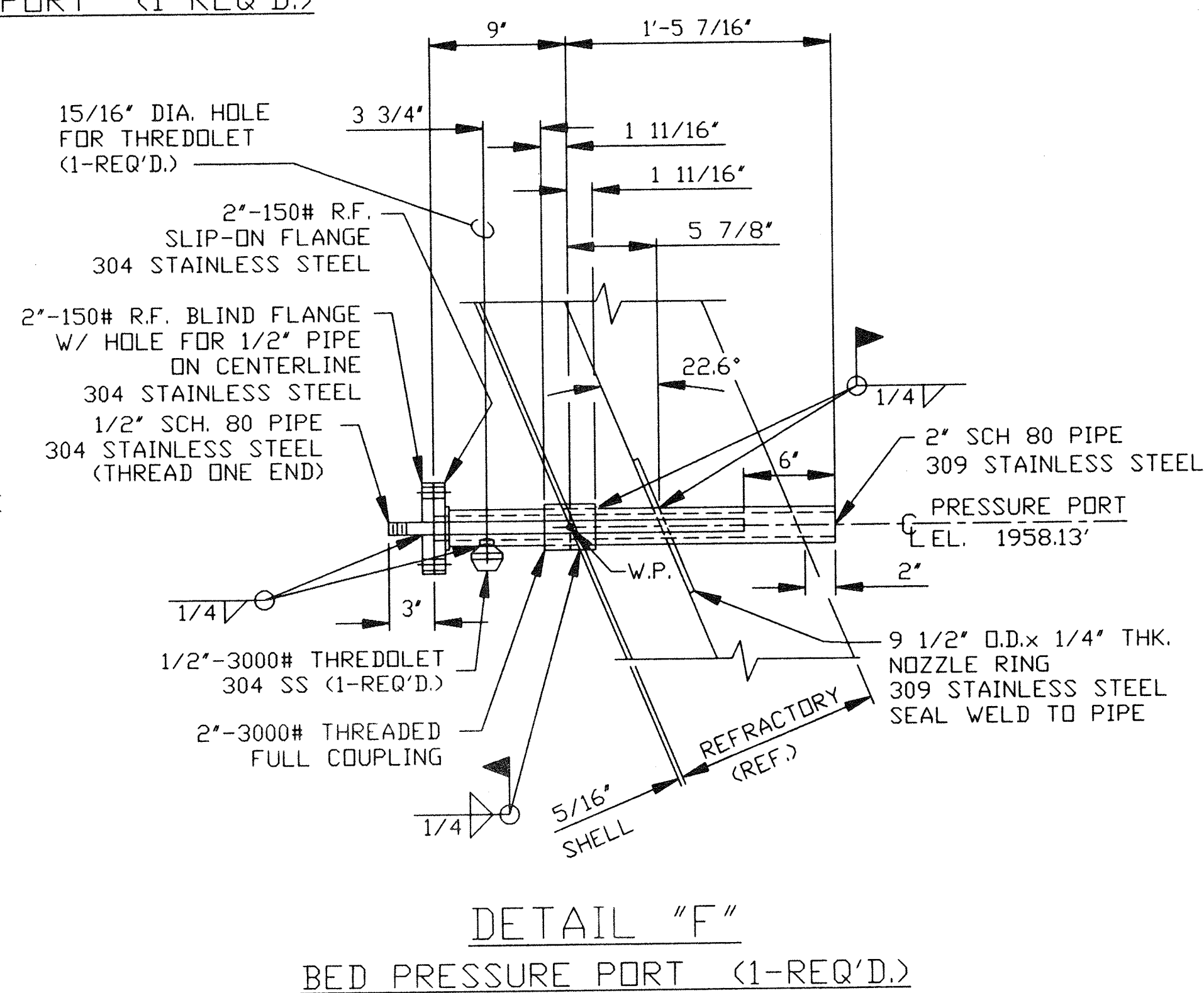
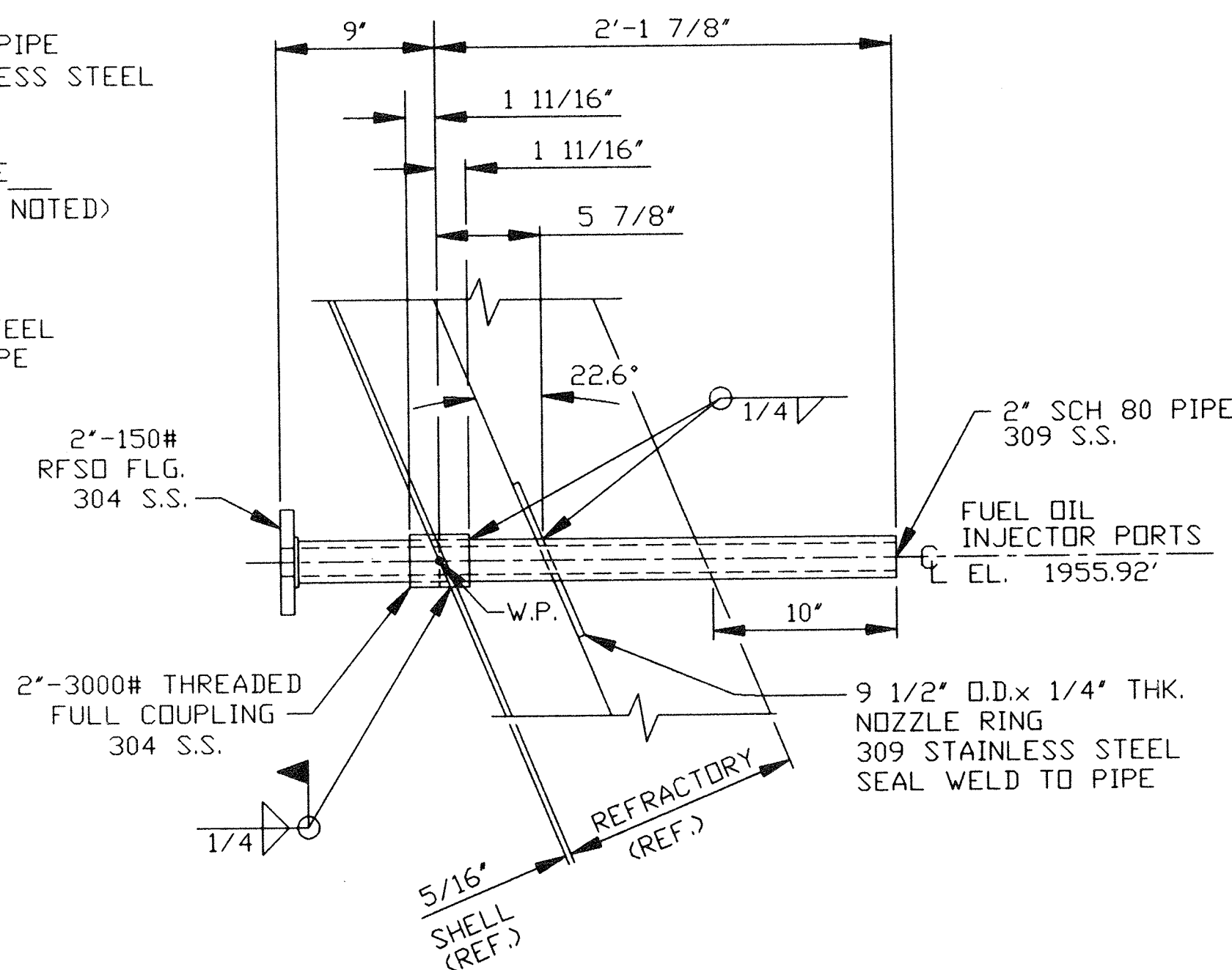
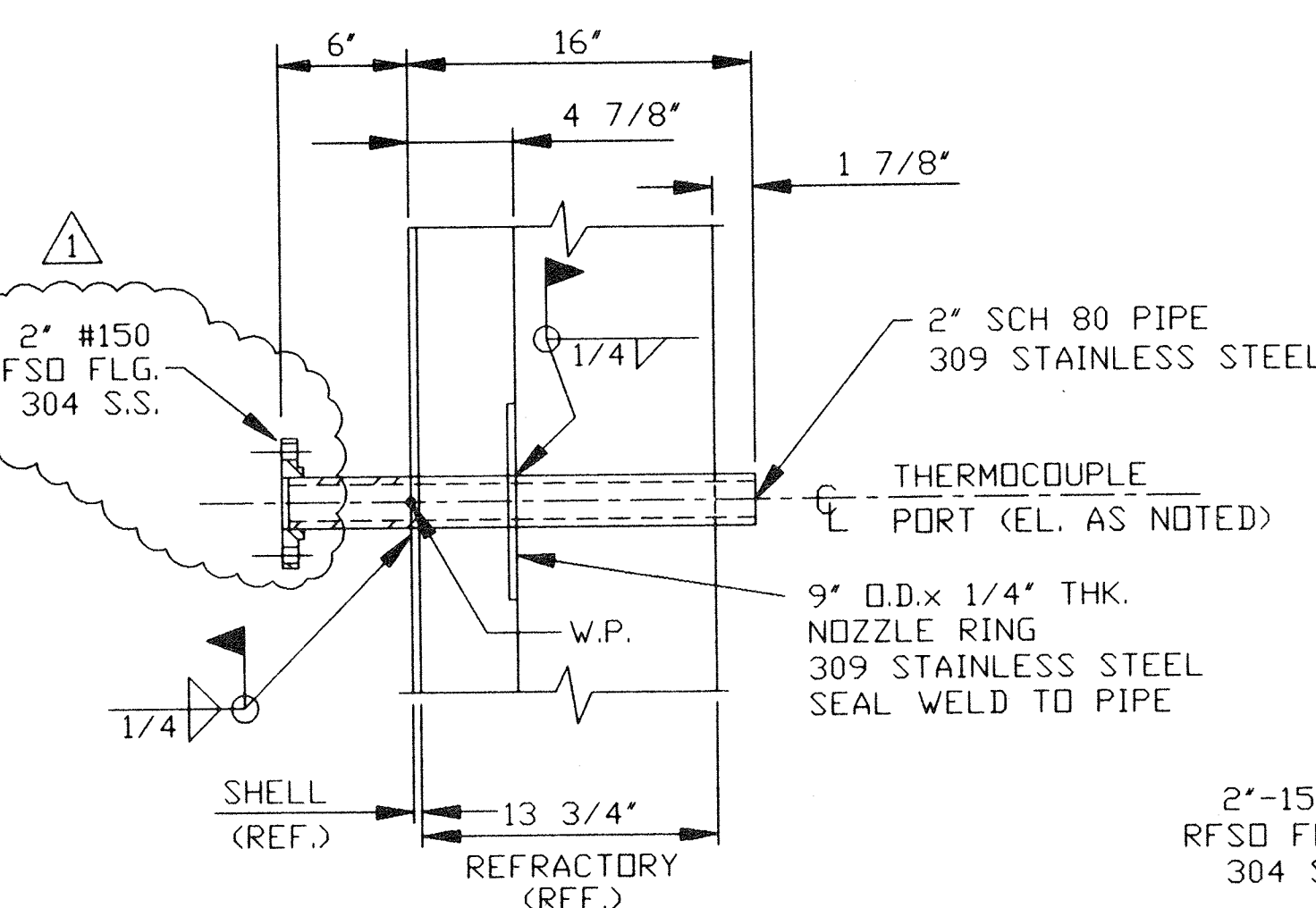
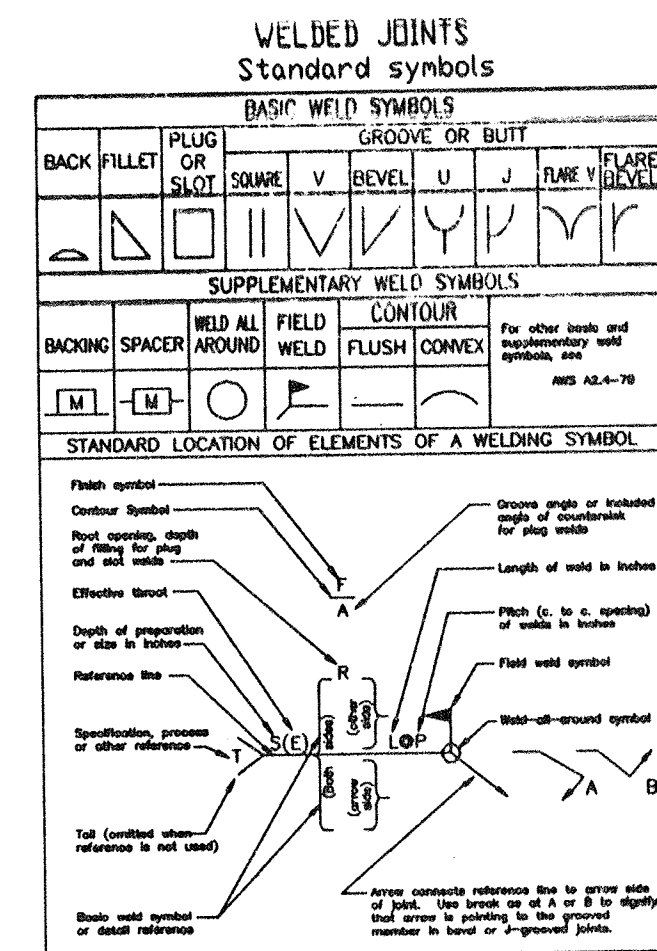
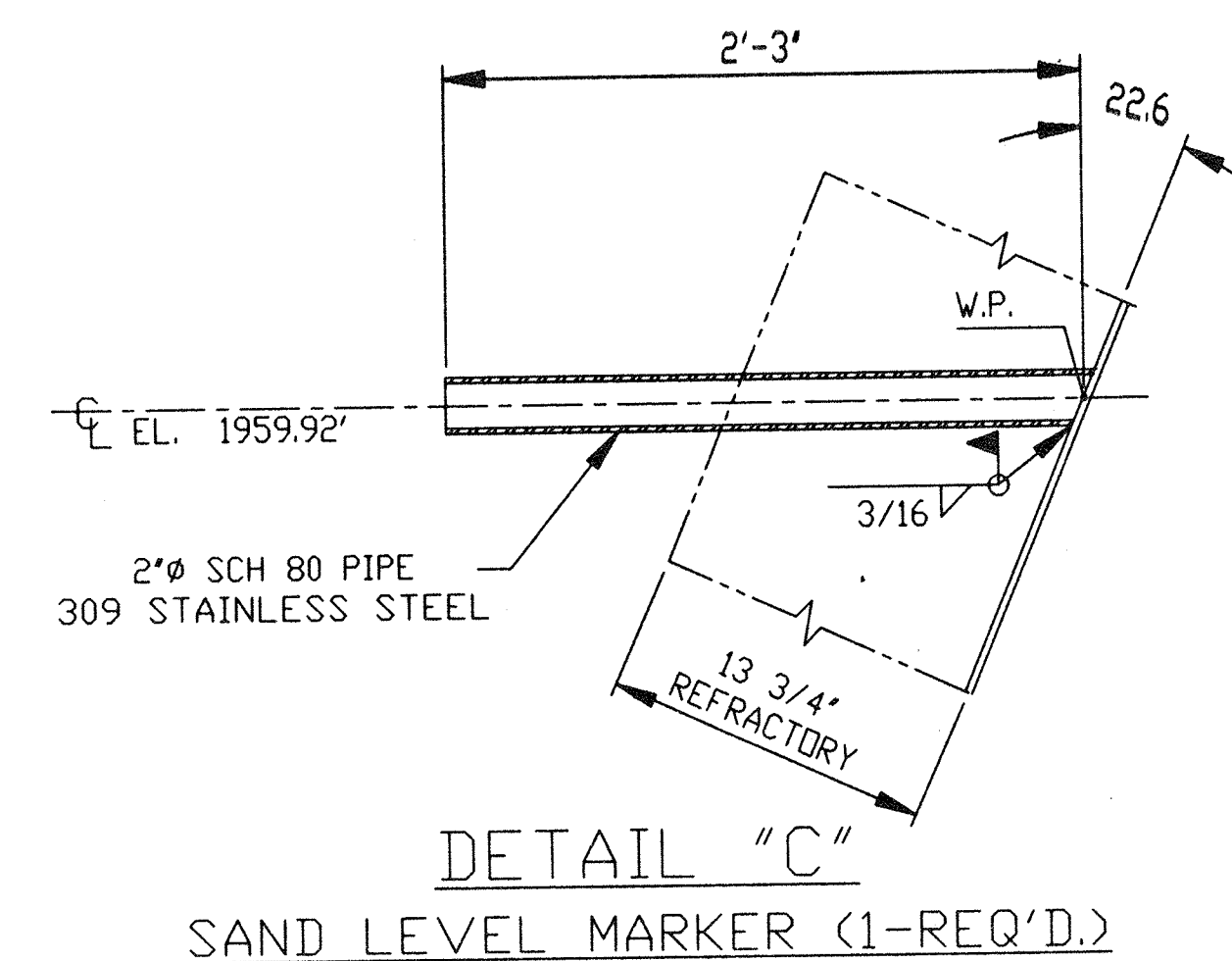
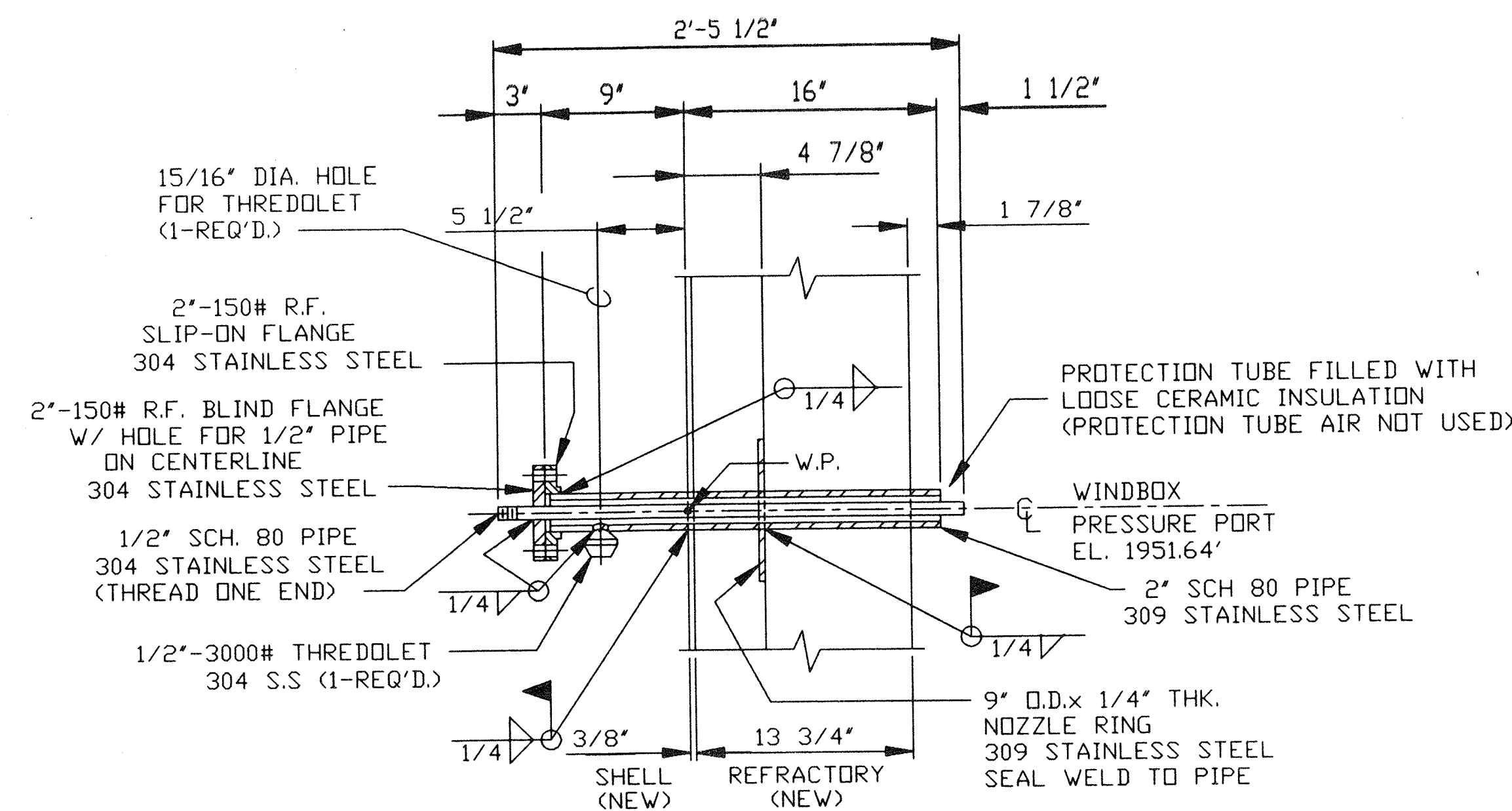
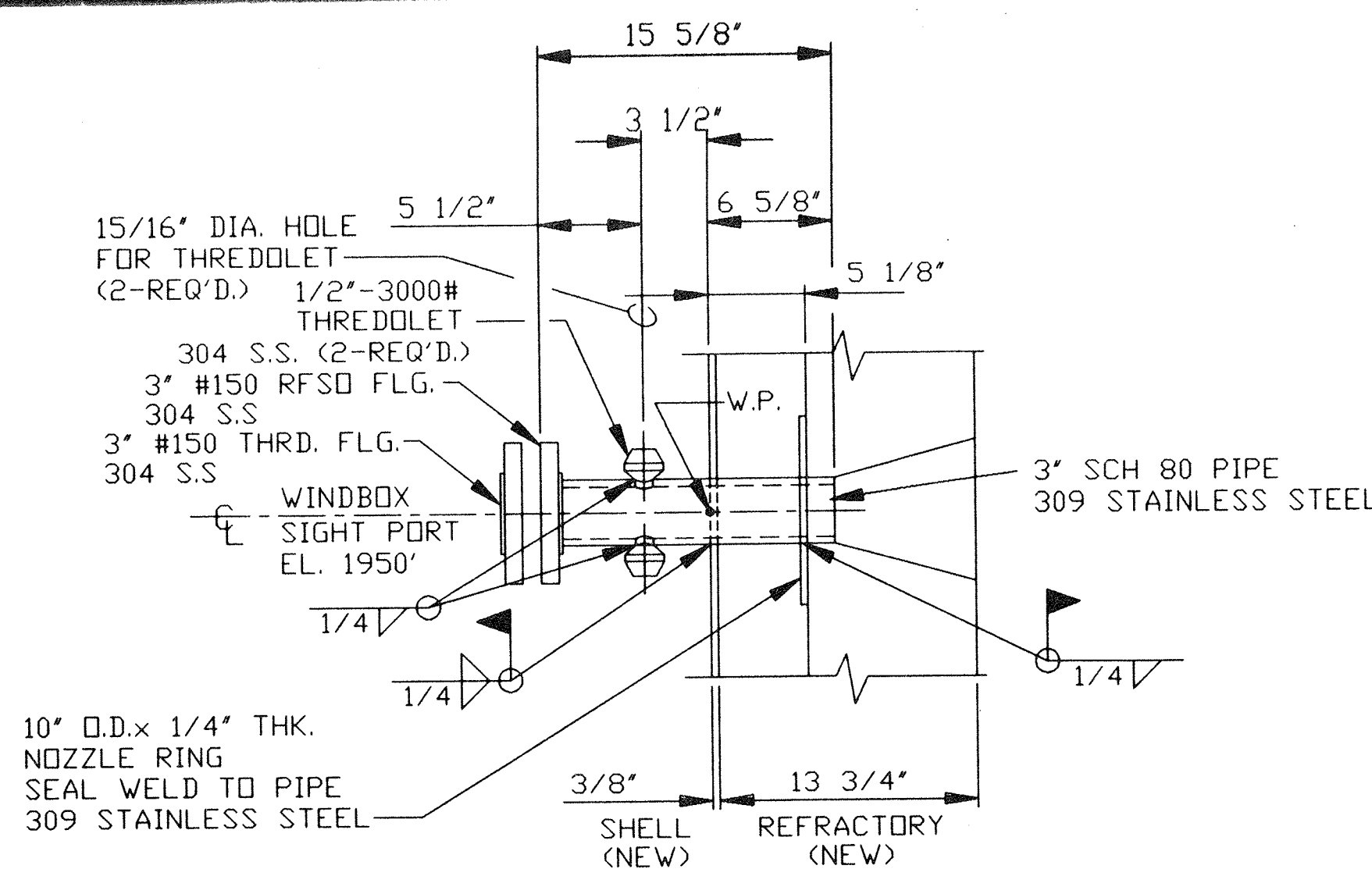
04/08/04	ISSUED FOR CONSTRUCTION	GS	KJV	KJV	HM		
DATE	NO.	ISSUES / REVISIONS		BY	CHK	APP	APP
		MODIFICATIONS TO FLUIDIZED BED INCINERATOR REACTOR STEEL - ORIENTATION					
		Location METROPOLITAN SEWER DISTRICT BUNCOMBE COUNTY, NORTH CAROLINA					
		Scale N.T.S.		DRAWING NO. 0302-F-008		REV. 0	
		Contract No. 0302					

Hankin  
Environmental Systems, Inc.

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2002065





BOLT LIST (BOLTS, NUTS AND WASHERS TO BE ZINC PLATED)			
QTY REQ'D	QTY FURN.	DESCRIPTION	LOCATION
76	82	HEX HD BOLT 5/8"-16 UNC 2 3/4" LG. A 307 W/HEX NUT & (2) WASHERS	DETAIL "B", "D", "E", "F" & "G"
8	10	HEX HD BOLT 5/8"-16 UNC 5 1/4" LG. A 307 W/HFX NUT & (2) WASHERS	DETAIL "A" & "H"

REFERENCE DRAWINGS	
DRAWING NO.	DRAWING TITLE
0302-F-007	REACTOR STEEL - ASSEMBLY
0302-F-008	REACTOR - ORIENTATION

NOTES:

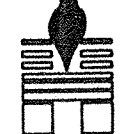
1. FABRICATOR TO PROVIDE NON ASBESTOS HI-TEMPERATURE FIBER GASKETS FOR ALL FLANGES. (19")-2" #150 GASKETS REQ'D (4)-3" #150 GASKETS REQ'D
2. FABRICATOR TO SUPPLY, BAG, AND TAG (WITH DWG NO.) ALL BOLTS, NUTS AND WASHERS IN BOLT LIST.

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 14472  
SPECIFICATION SECTION No. 11709  
SUBPARAGRAPH No. N.A.  
CONTRACT DWG. SHEET No. :

ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

04/08/04	1	DWG. UPDATED	SDM	KJV	KJV	HM
02/04/04	0	ISSUED FOR FABRICATION	GS	KJV	KJV	HM
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP



# Hankin

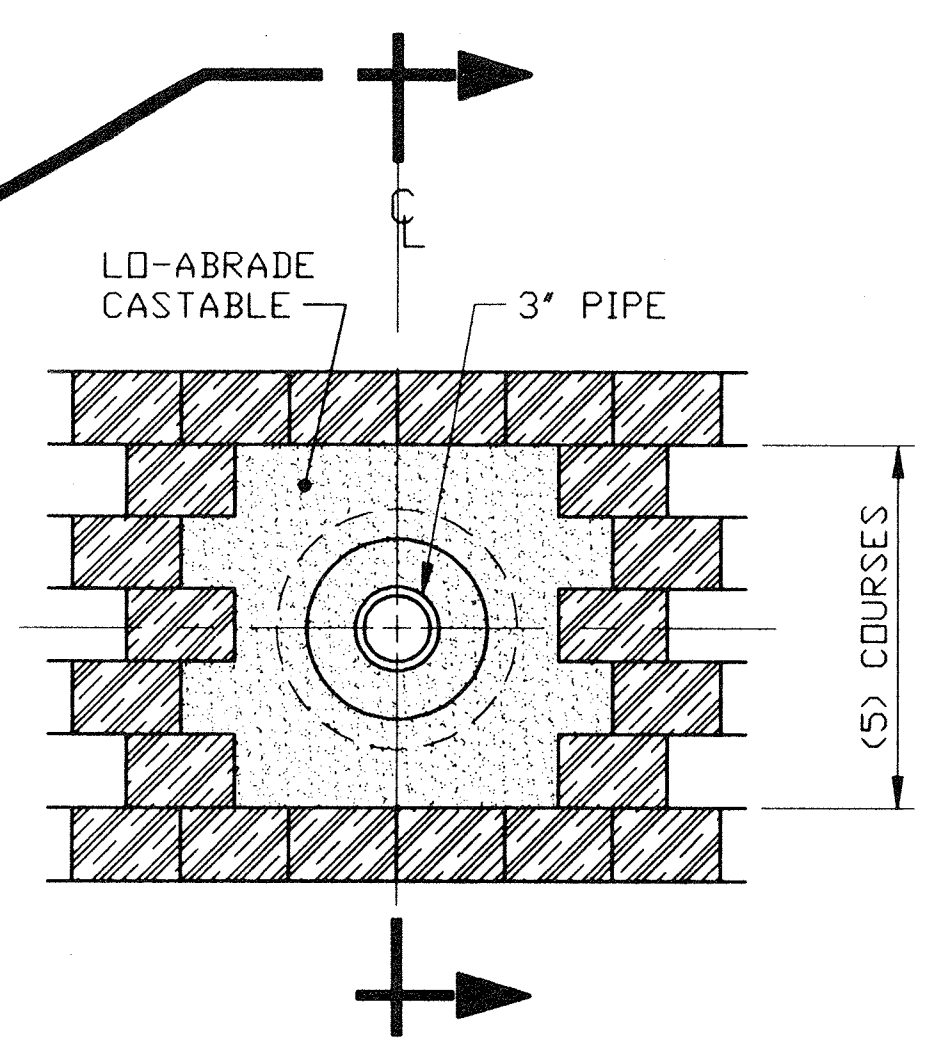
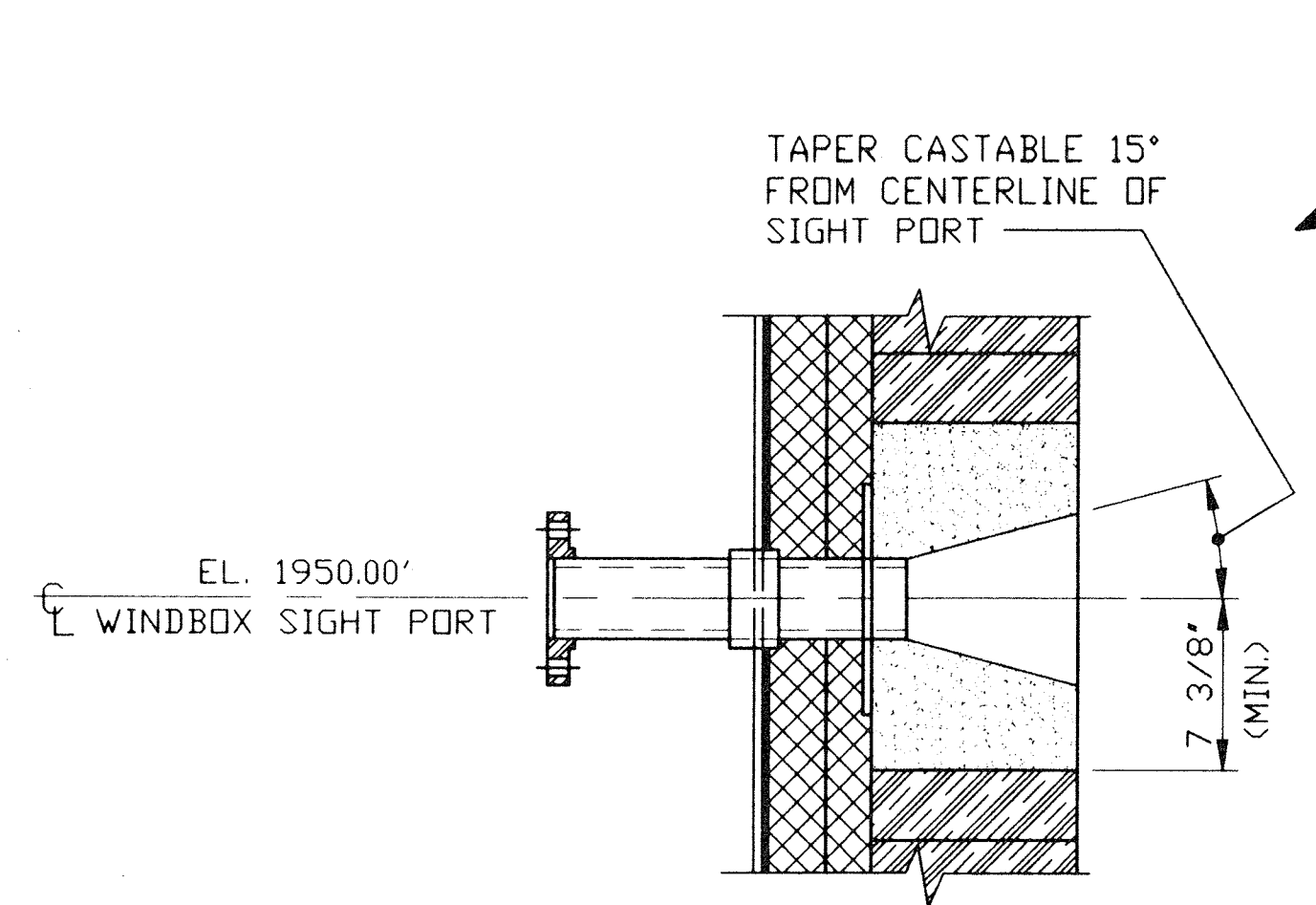
**Environmental Systems, Inc.**

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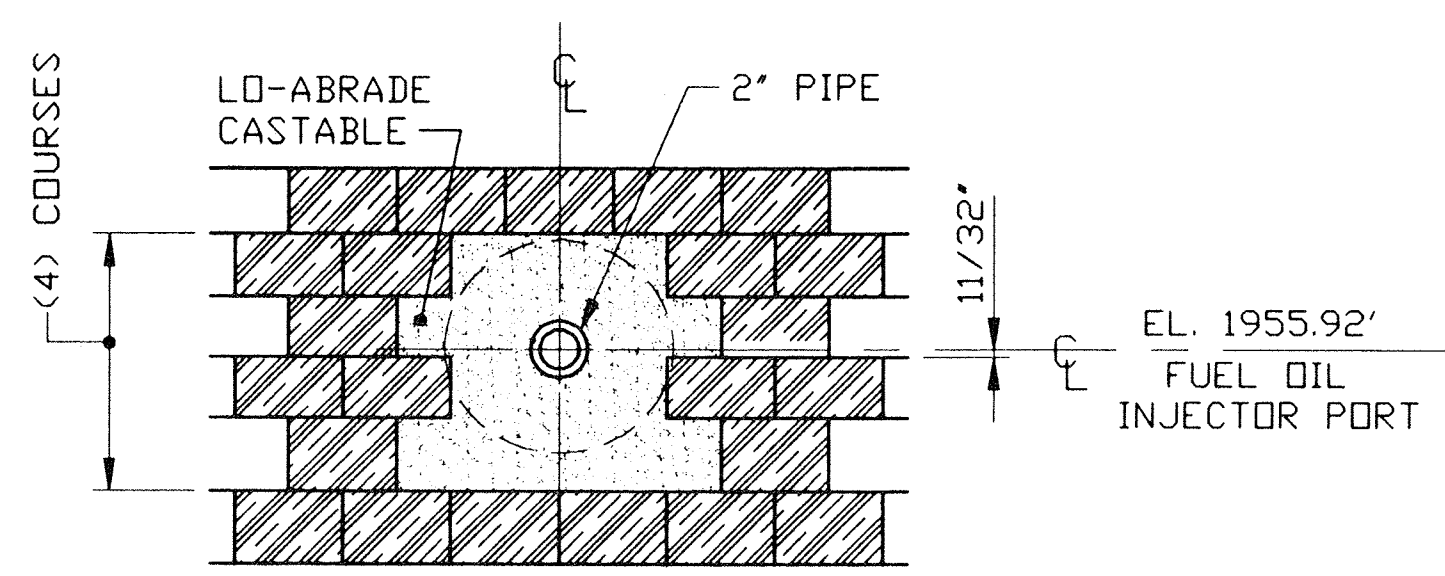
  

Title	MODIFICATIONS TO FLUIDIZED BED INCINERATOR  <u>REACTOR STEEL - NOZZLE DETAILS</u>		
Location	METROPOLITAN SEWER DISTRICT BUNCOMBE COUNTY, NORTH CAROLINA		
Scale	1/2"=1'-0"	DRAWING NO.	REV.
Contract No.	0302	0302-F-009	1

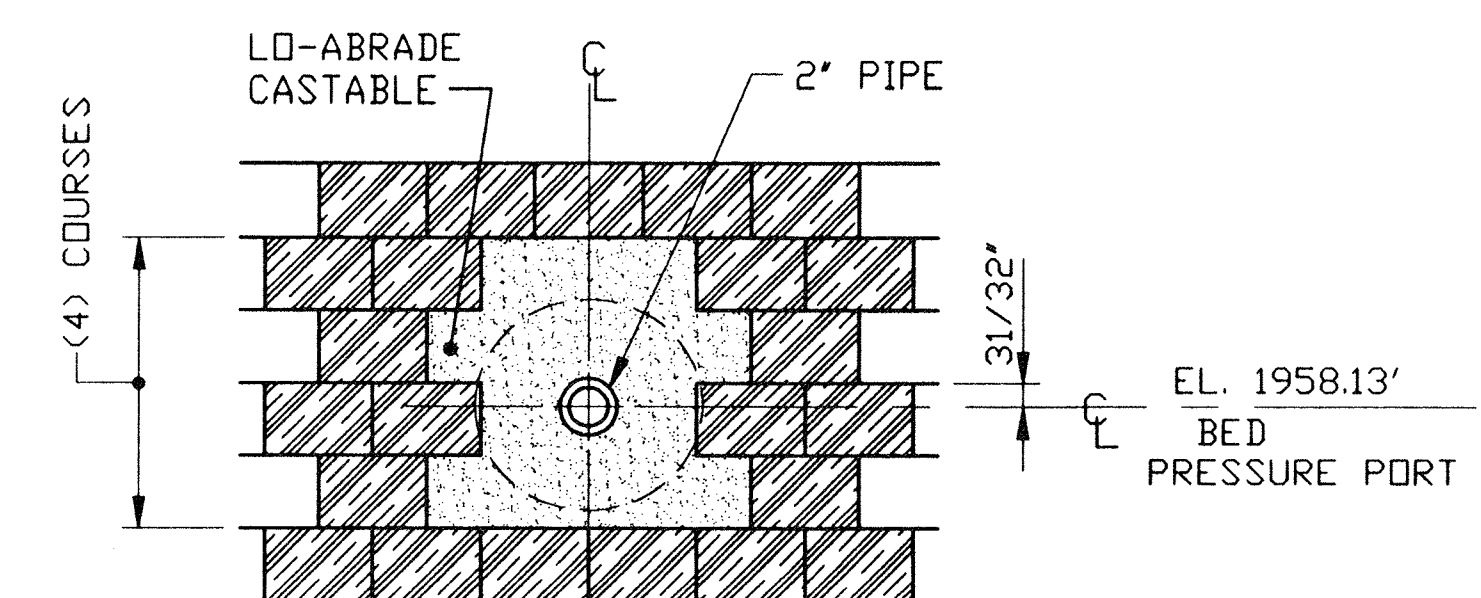




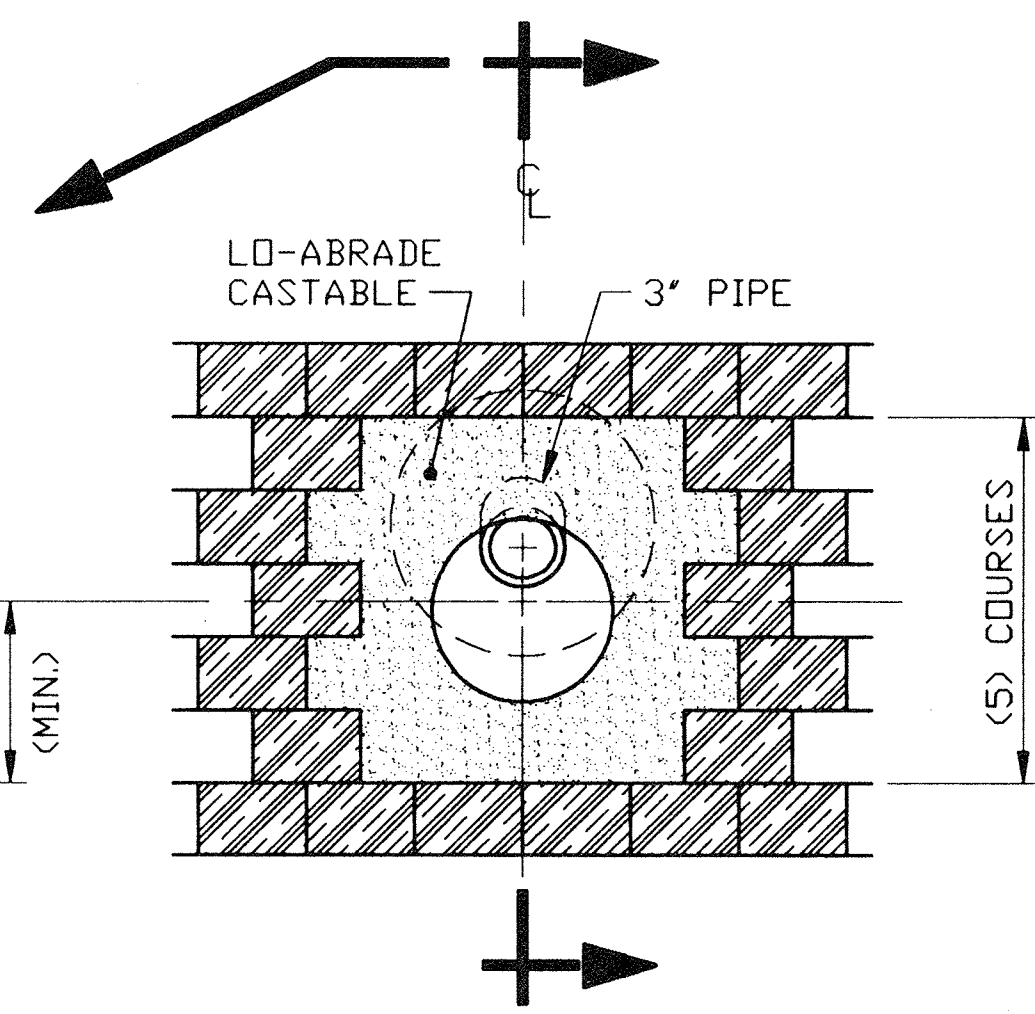
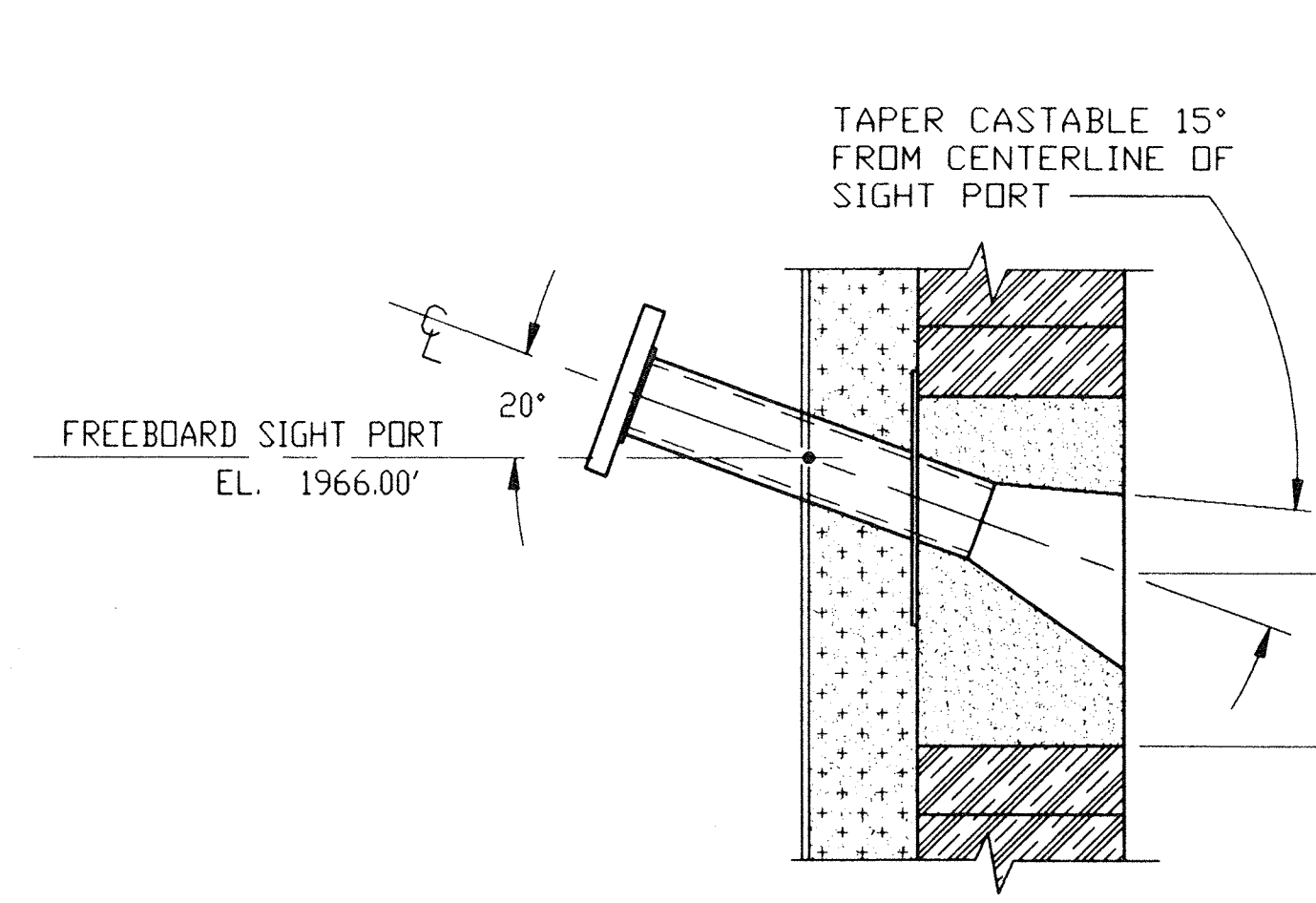
**VIEW "F-F"**  
WINDBOX SIGHT PORT  
(1) PLACE



**VIEW "J-J"**  
FUEL OIL INJECTOR PORT  
(6) PLACES

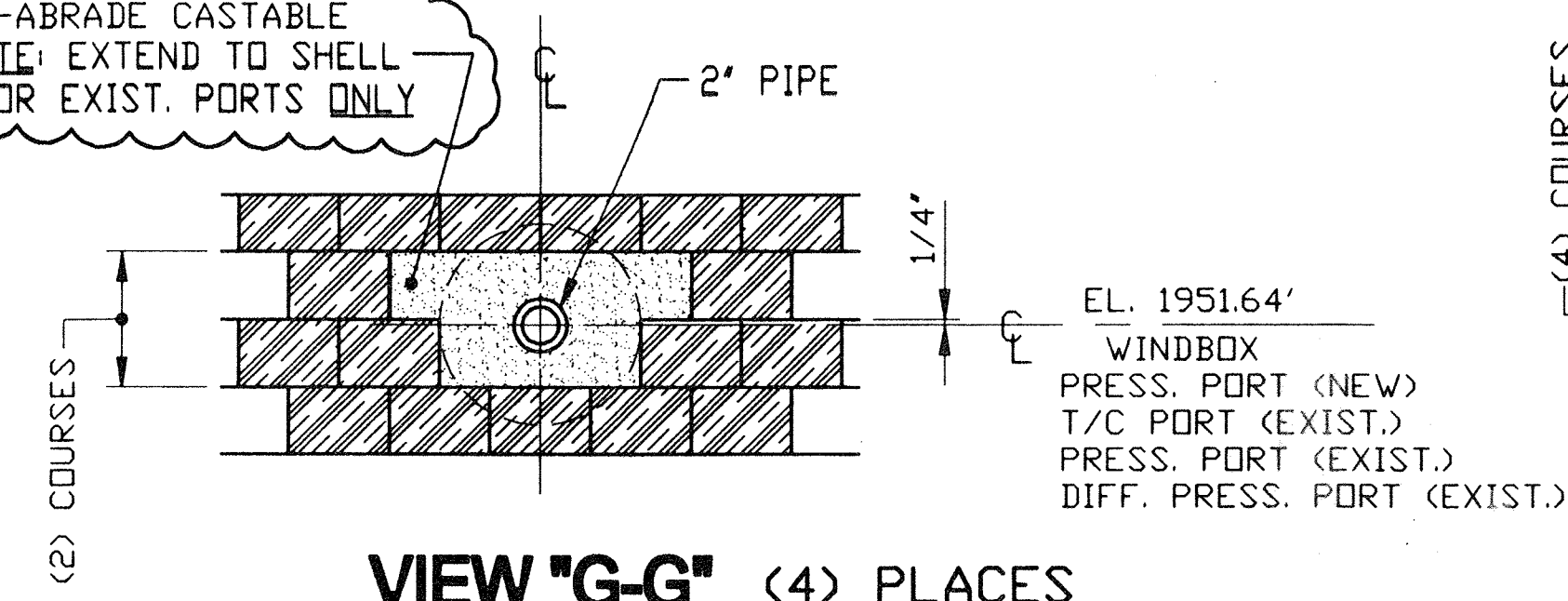


**VIEW "K-K"**  
BED PRESSURE PORT  
(1) PLACE

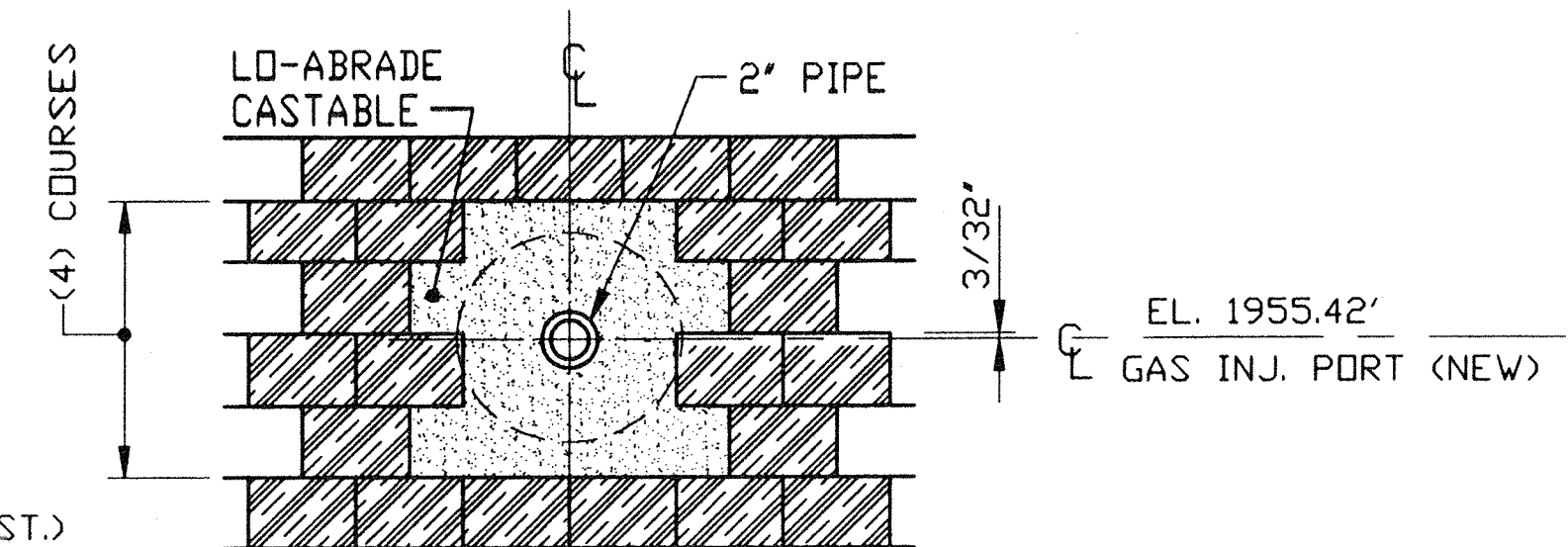


**VIEW "M-M"**  
FREEBOARD SIGHT PORT  
(1) PLACE

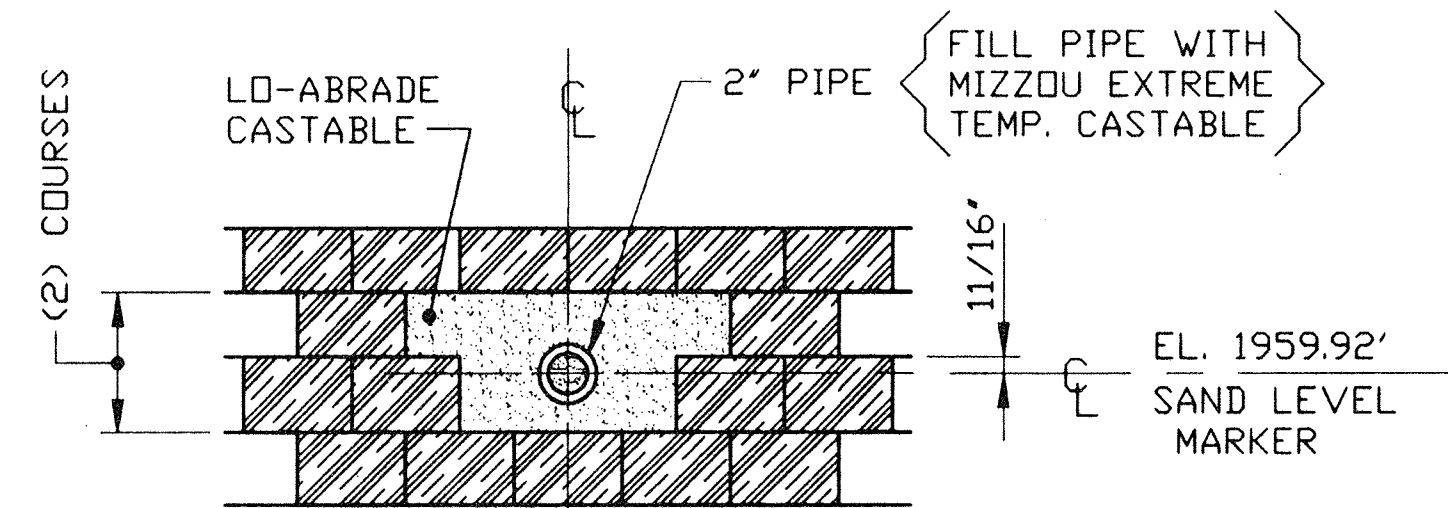
LO-ABRADE CASTABLE  
NOTE: EXTEND TO SHELL  
FOR EXIST. PORTS ONLY



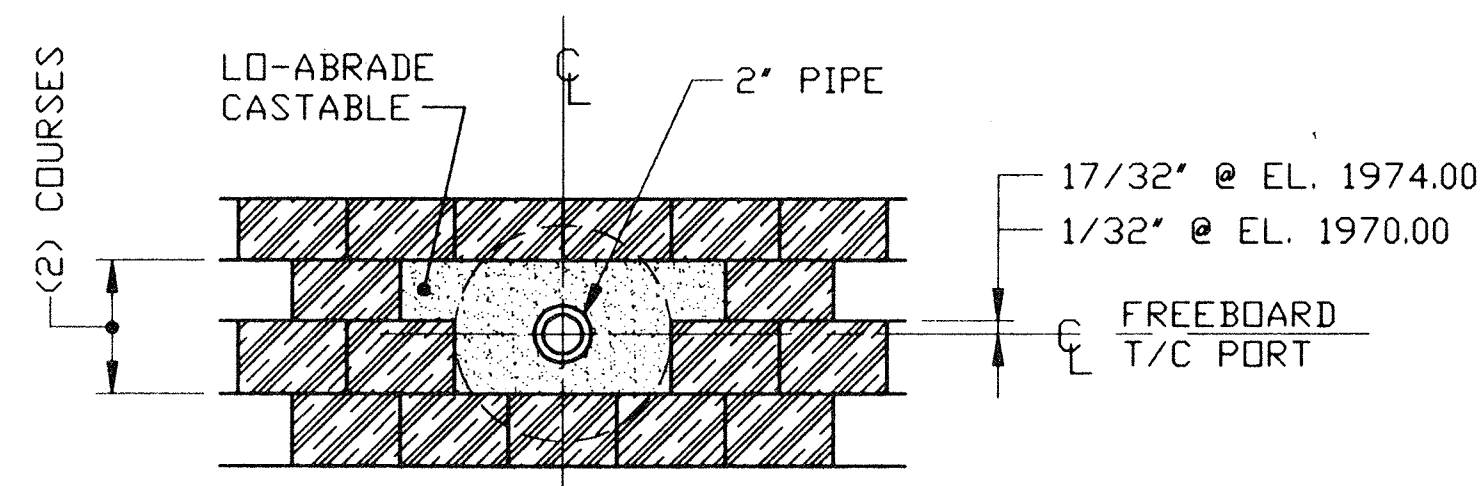
**VIEW "G-G"** (4) PLACES  
(1) WINDBOX PRESSURE PORT (NEW)  
(1) WINDBOX T/C PORT (EXIST.)  
(1) WINDBOX PRESS. INDICATOR PORT (EXIST.)  
(1) WINDBOX DIFF. PRESS. INDICATOR PORT (EXIST.)



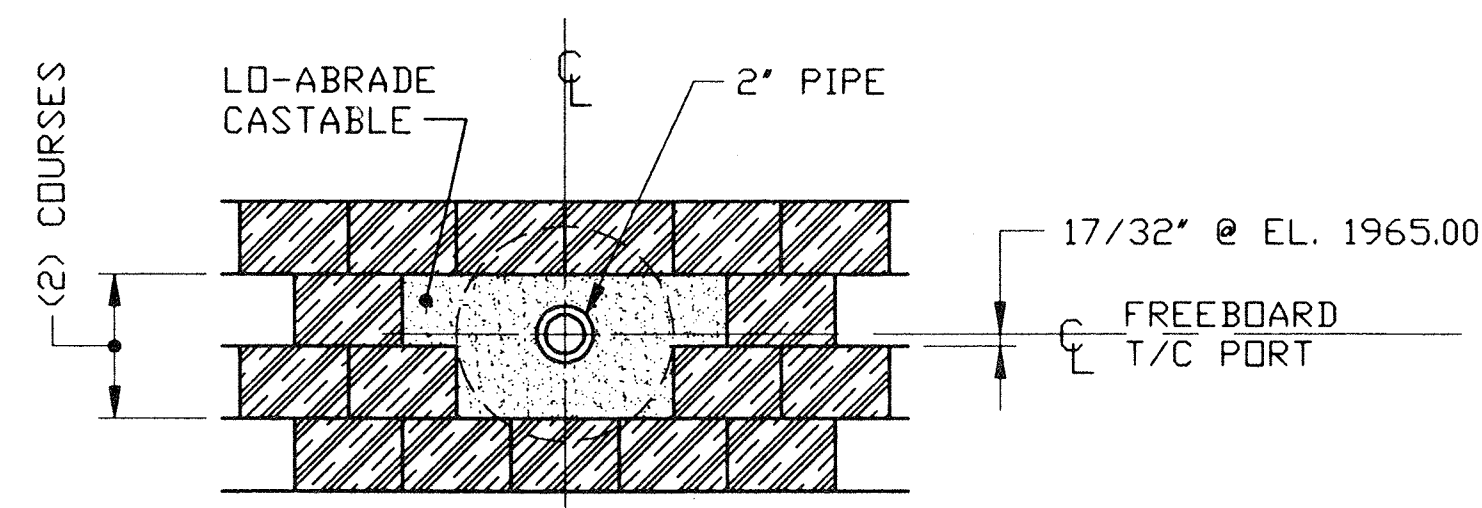
**VIEW "H-H"**  
GAS INJECTOR PORTS (NEW)  
(8) PLACES



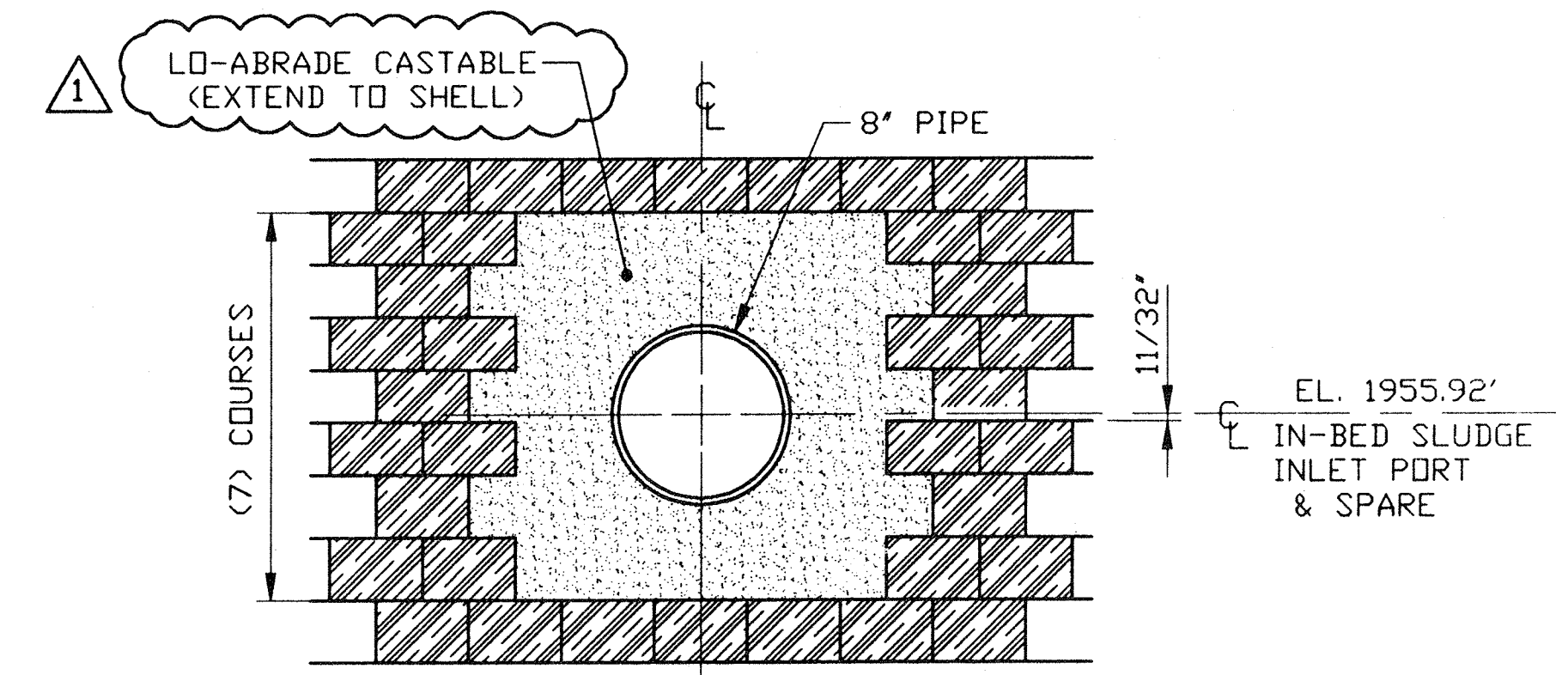
**VIEW "L-L"**  
SAND LEVEL MARKER  
(1) PLACE



**VIEW "N-N"**  
FREEBOARD T/C PORT  
(2) PLACES AS NOTED



**VIEW "P-P"**  
FREEBOARD T/C PORT  
(1) PLACE



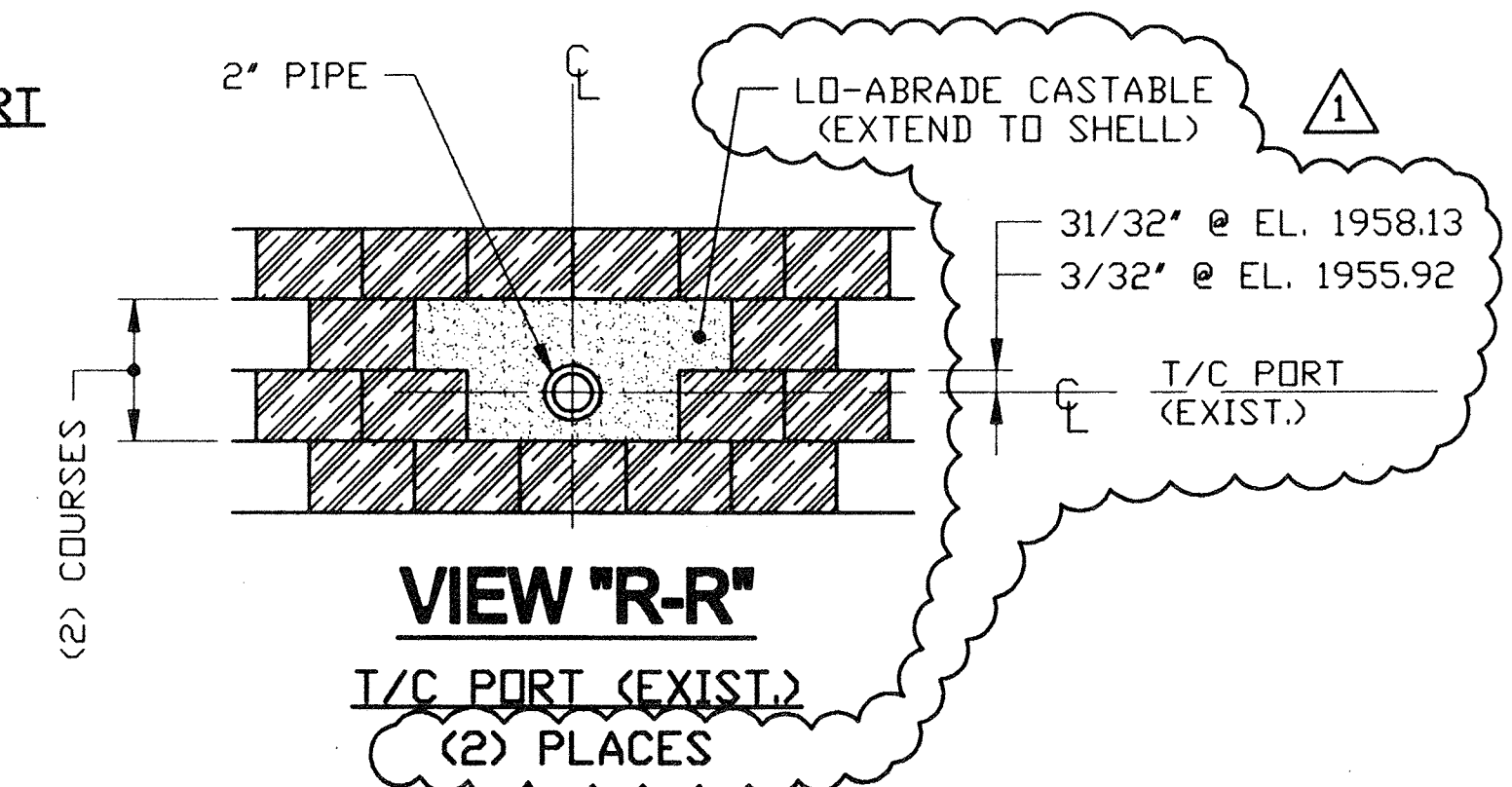
**VIEW "S-S"** (2) PLACES  
(1) IN-BED SLUDGE INLET PORT  
(1) SPARE PORT

ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 1 #14472  
SPECIFICATION SECTION No. 1  
SUBPARAGRAPH No. 1  
CONTRACT DWG. SHEET No. 1

- 1) ORIENTATION OF ANCHORS SHOULD BE AT 45° ROTATION TO ANY AXIS OR CORNER, 90° TO EACH OTHER WHERE PRACTICAL.
- 2) SEE DWG. 0302-F-001 FOR GENERAL NOTES.

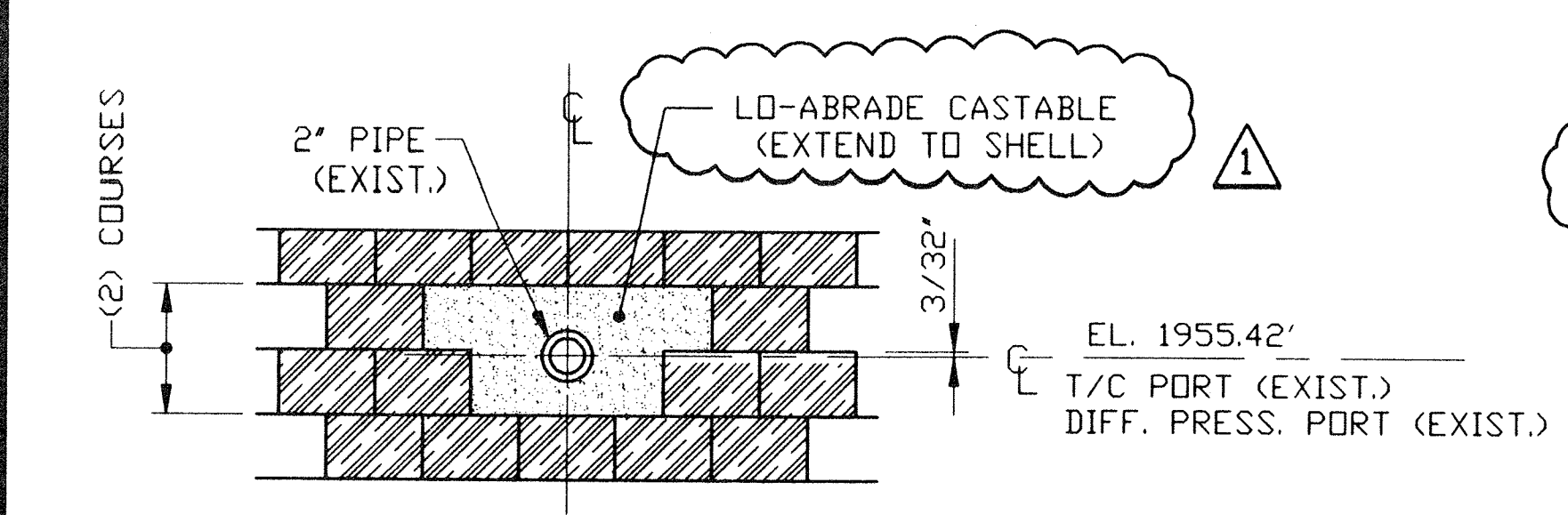
REFRACTORY SYMBOLS			
	CERAMIC FIBER		MINERAL WOOL BLOCK INSULATION (INSBLOK-19)
	SUPER DUTY BRICK (CLIPPER DP)		LO-ABRADE CASTABLE
	SUPER DUTY BRICK (VARNON)		MIZZOU EXTREME TEMP. CASTABLE
	KS-4 (PLUS) CASTABLE		KAST-O-JITE 22 CASTABLE



**VIEW "R-R"**  
T/C PORT (EXIST.)  
(2) PLACES

03-26-04	△	DWG. UPDATED & ISSUED FOR CONSTRUCTION	SM	KJV	KJV	HM
02/17/04	△	ISSUE "0" TO REFR. SUB.	SM	KJV	KJV	HM
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP
			<b>MODIFICATIONS TO FLUIDIZED BED INCINERATOR</b> <b>REFRACTORY - REACTOR DETAILS</b>			
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PROJECT NAME: BUNCOMBE COUNTY CONTRACT No. 1 #14472 SPECIFICATION SECTION No. 1 SUBPARAGRAPH No. 1 CONTRACT DWG. SHEET No. 1			2002065 <b>0302-F-012</b> 1			

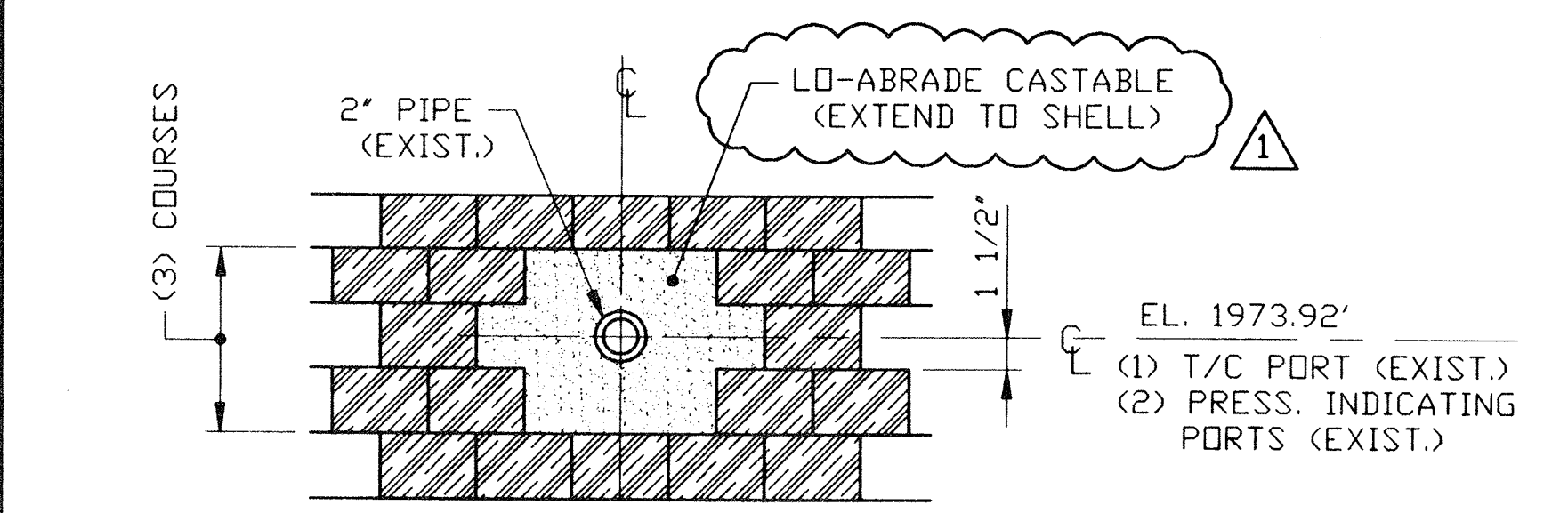




**VIEW 'T-T'** (2) PLACES

(1) TRANSITION T/C PORT (EXIST.)

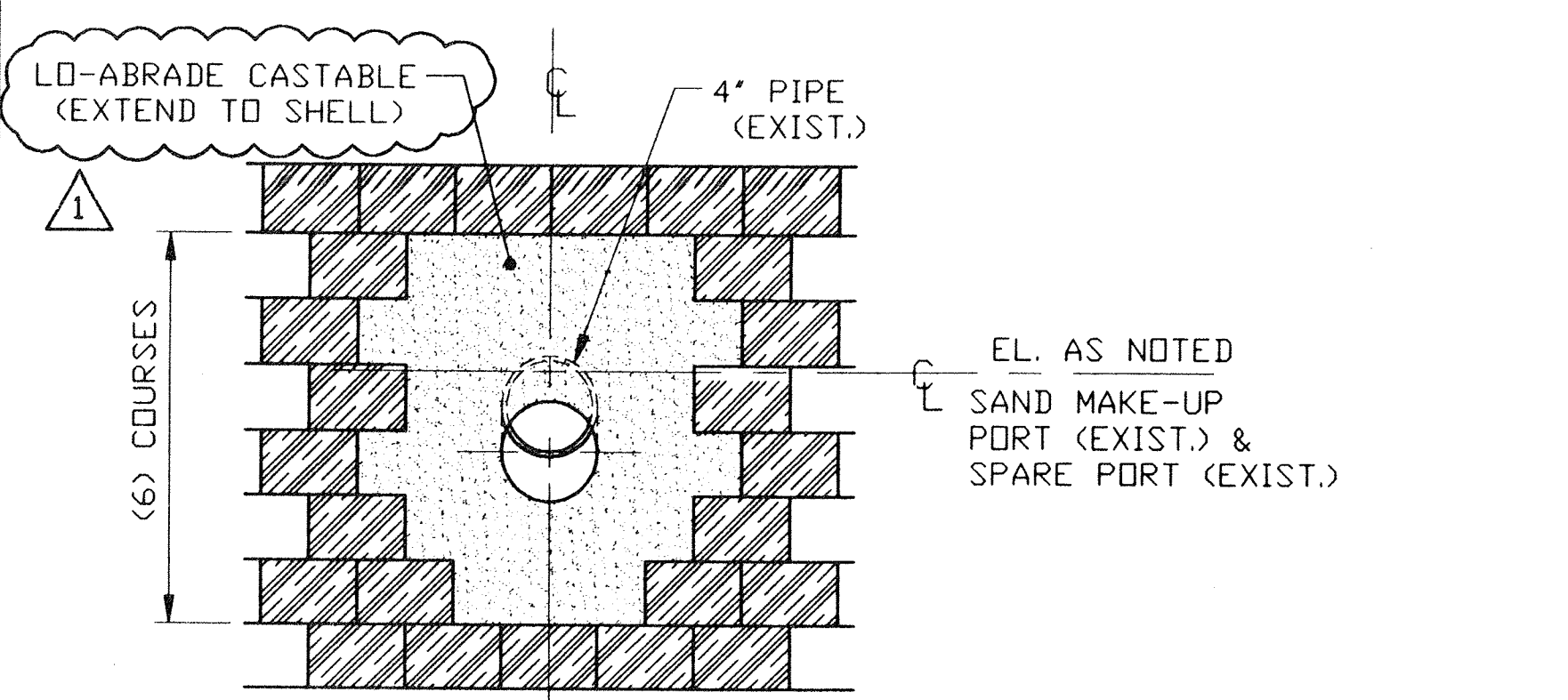
(2) TRANSITION DIFF. PRESS. PORT (EXIST.)



**VIEW 'W-W'**

(1) FREEBOARD T/C PORT (EXIST.)

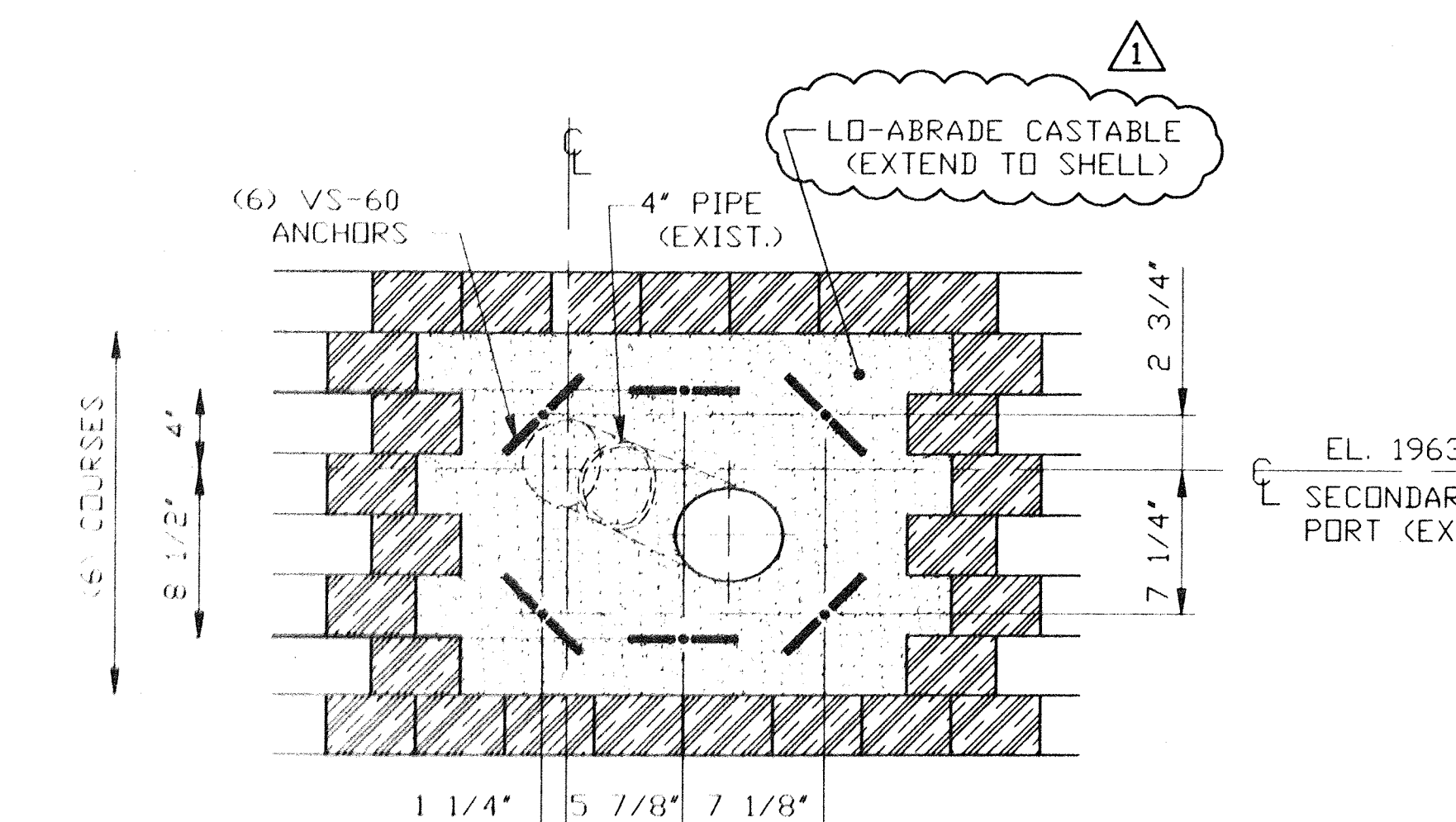
(2) PRESS. INDICATOR PORTS (EXIST.)



**VIEW 'X-X'**

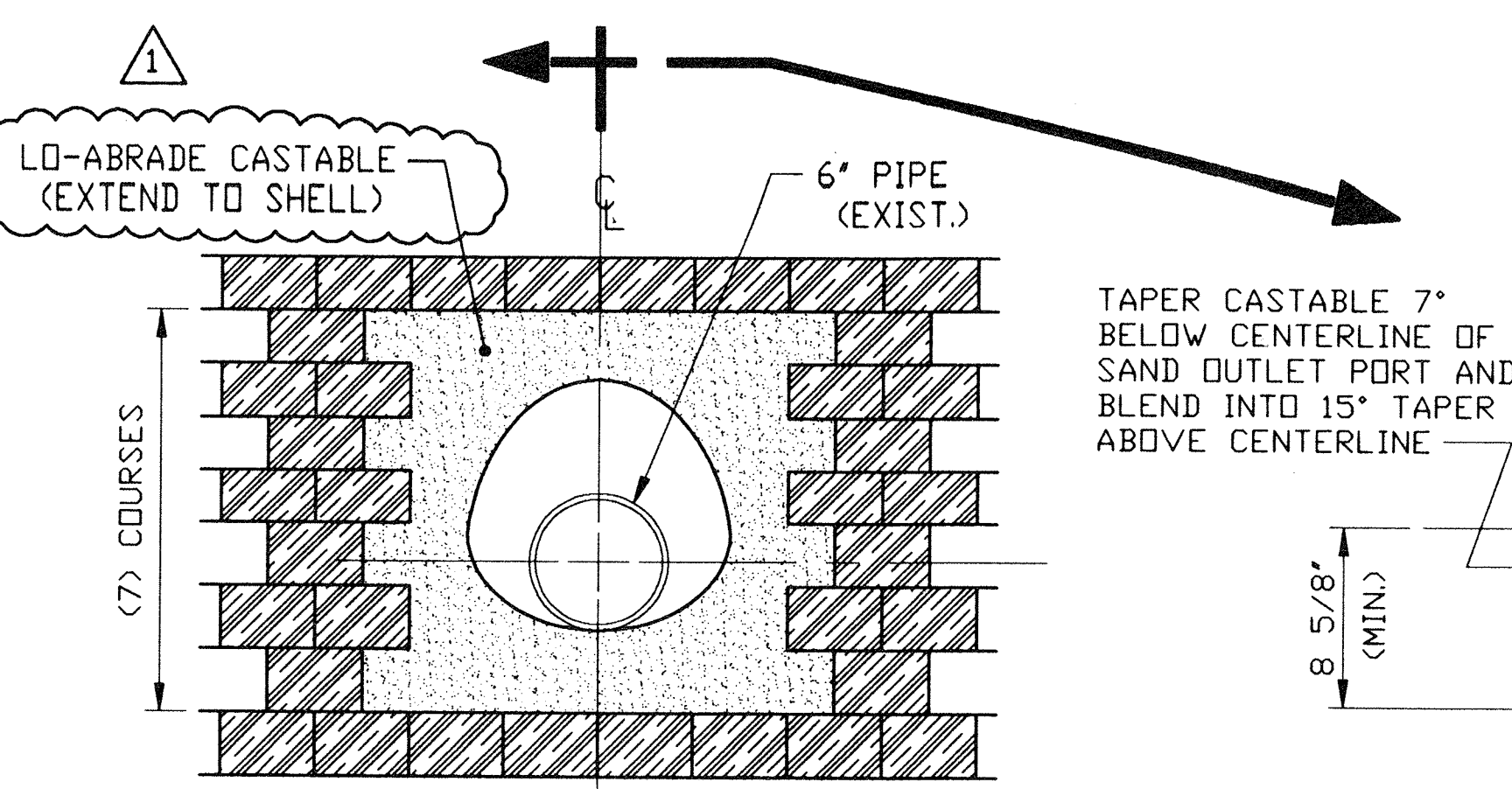
(1) FREEBOARD SAND MAKE-UP PORT (EXIST.) EL. 1962.92

(1) SPARE PORT (EXIST.) EL. 1968.00



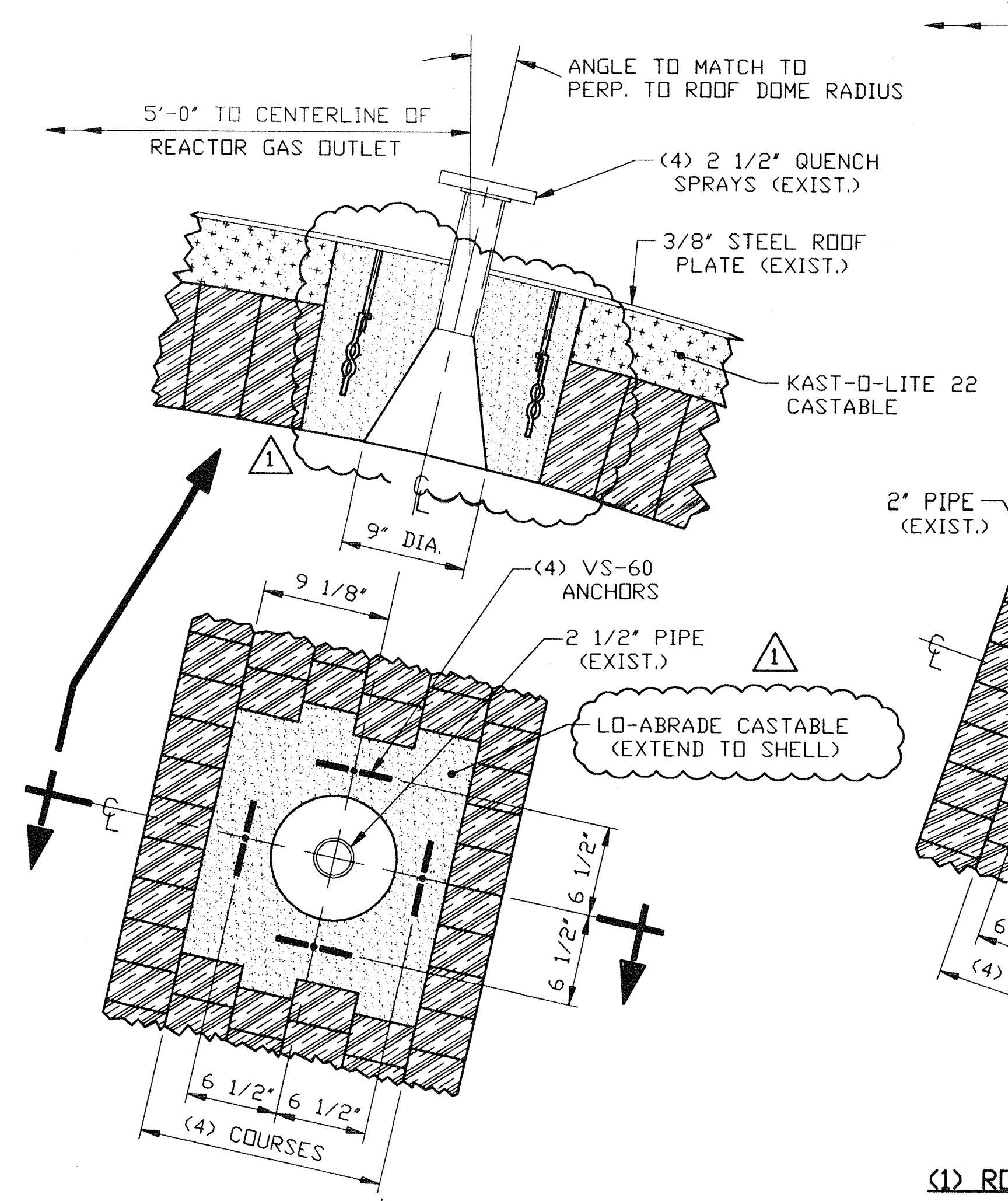
**VIEW 'Y-Y'**

(6) SECONDARY AIR PORTS (EXIST.)



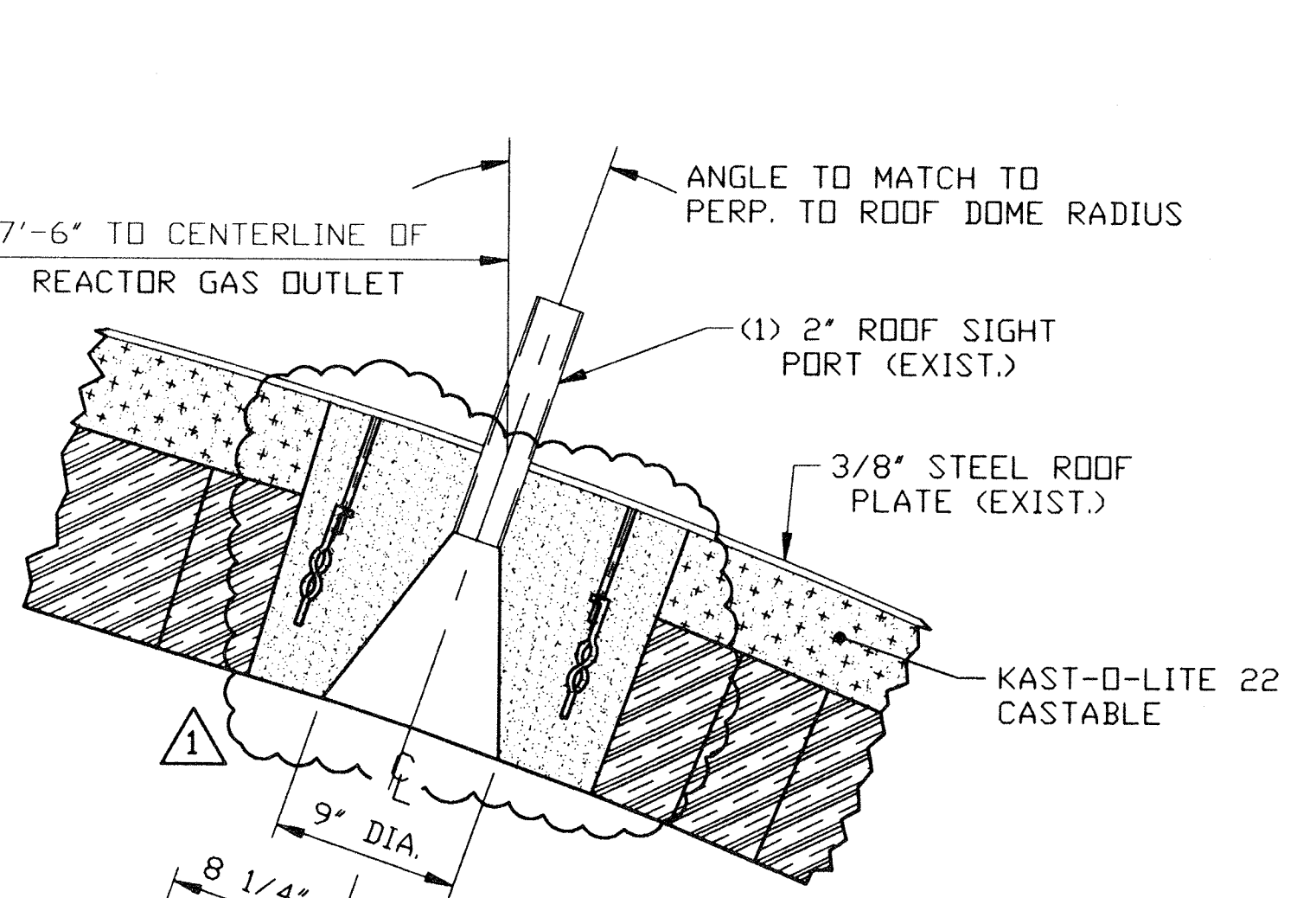
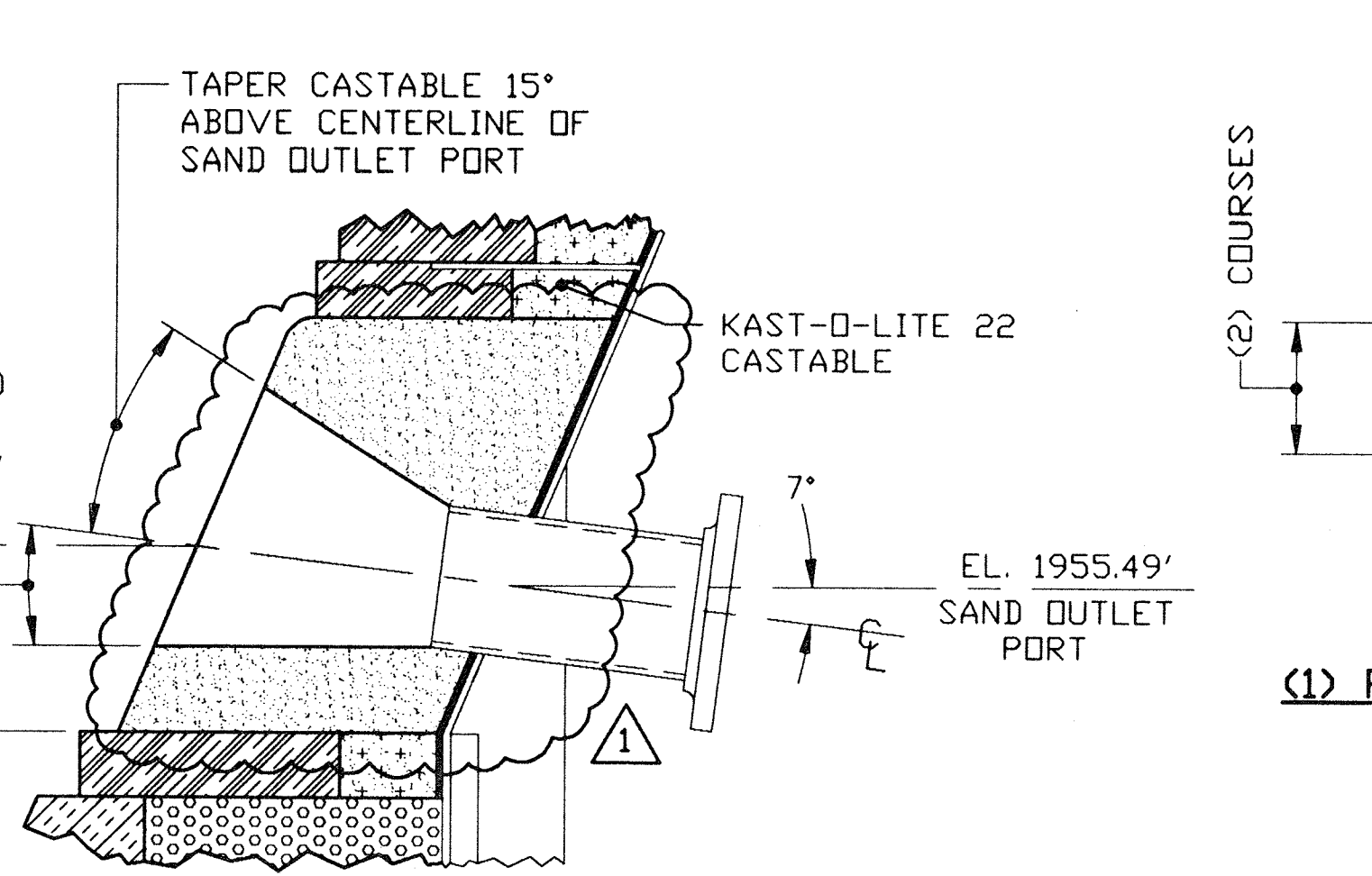
**VIEW 'U-U'**

(1) SAND OUTLET PORT (EXIST.)



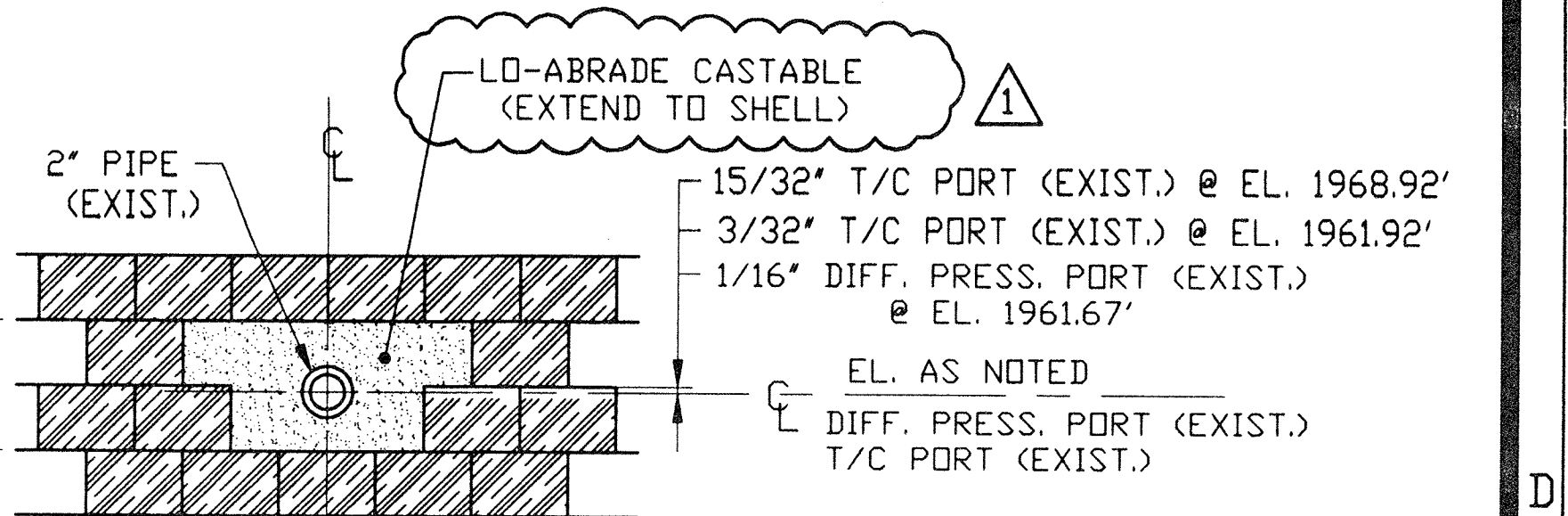
**VIEW 'Z-Z'**

(4) FREEBOARD QUENCH SPRAY PORTS (EXIST.)



**VIEW 'Z1-Z1'**

(1) ROOF SIGHT PORT (EXIST.)

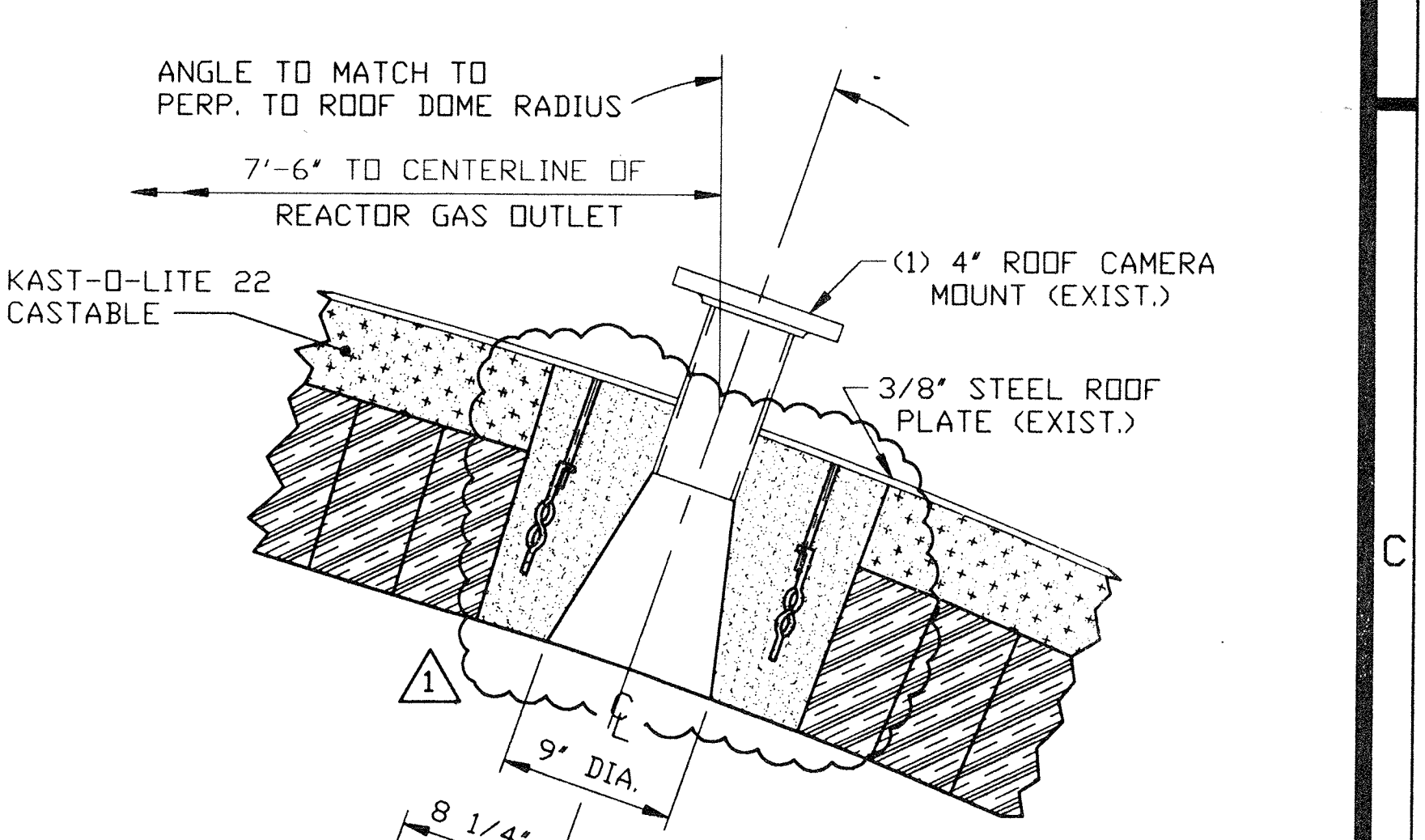


**VIEW 'V-V'**

(1) FREEBOARD DIFF. PRESS. PORT (EXIST.) @ EL. 1961.67'

(1) FREEBOARD T/C PORT (EXIST.) @ EL. 1961.92'

(1) FREEBOARD T/C PORT (EXIST.) @ EL. 1968.92'



**VIEW 'Z2-Z2'**

(1) ROOF CAMERA MOUNT (EXIST.)

REFRACTORY SYMBOLS			
HARBISON-WALKER		CERAMIC FIBER	
		SUPER DUTY BRICK (CLIPPER DP)	
		SUPER DUTY BRICK (VARNOLD)	
		SUPER DUTY BRICK (VARNOLD)	
		MINERAL WOOL BLOCK INSULATION (INSBLOK-19)	
		KAST-O-LITE 22 CASTABLE	

ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 1 #14472  
SPECIFICATION SECTION No. 1  
SUBPARAGRAPH No. 1  
CONTRACT DWG. SHEET No. 1

1.) ORIENTATION OF ANCHORS SHOULD BE AT 45° ROTATION TO ANY AXIS OR CORNER, 90° TO EACH OTHER WHERE PRACTICAL.  
2.) SEE DWG. 0302-F-001 FOR GENERAL NOTES.

04-07-04	1	DWG. UPDATED & ISSUED FOR CONSTRUCTION	SM	KJV	KJV	HM
02/17/04	0	ISSUE "0" TO REFR. SUB.	SM	KJV	KJV	HM
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	A/P

Hankin  
Environmental Systems, Inc.

MODIFICATIONS TO  
FLUIDIZED BED INCINERATOR  
REFRACTORY - REACTOR DETAILS

Location  
METROPOLITAN SEWER DISTRICT  
BUNCOMBE COUNTY, NORTH CAROLINA

Scale  
AS NOTED

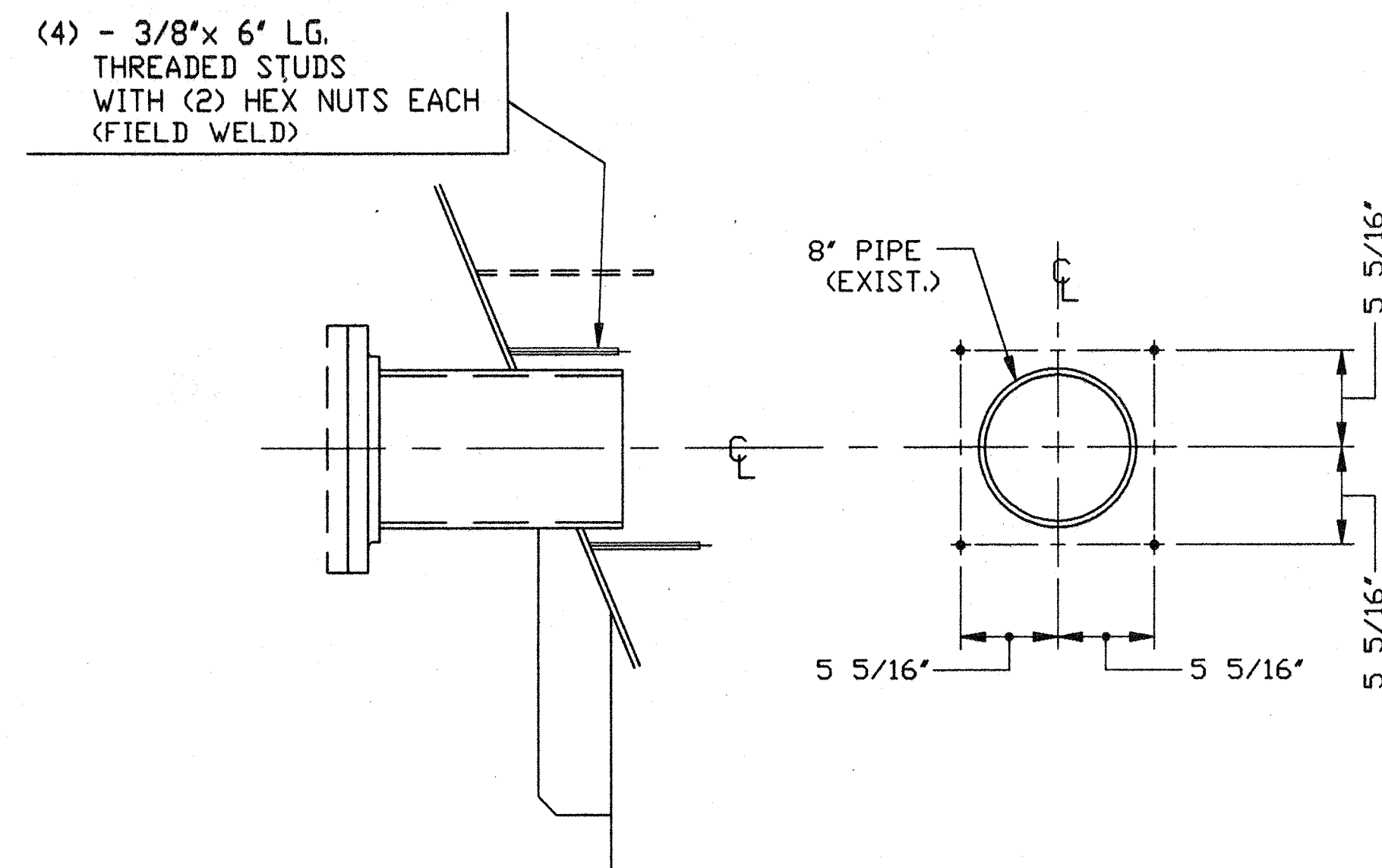
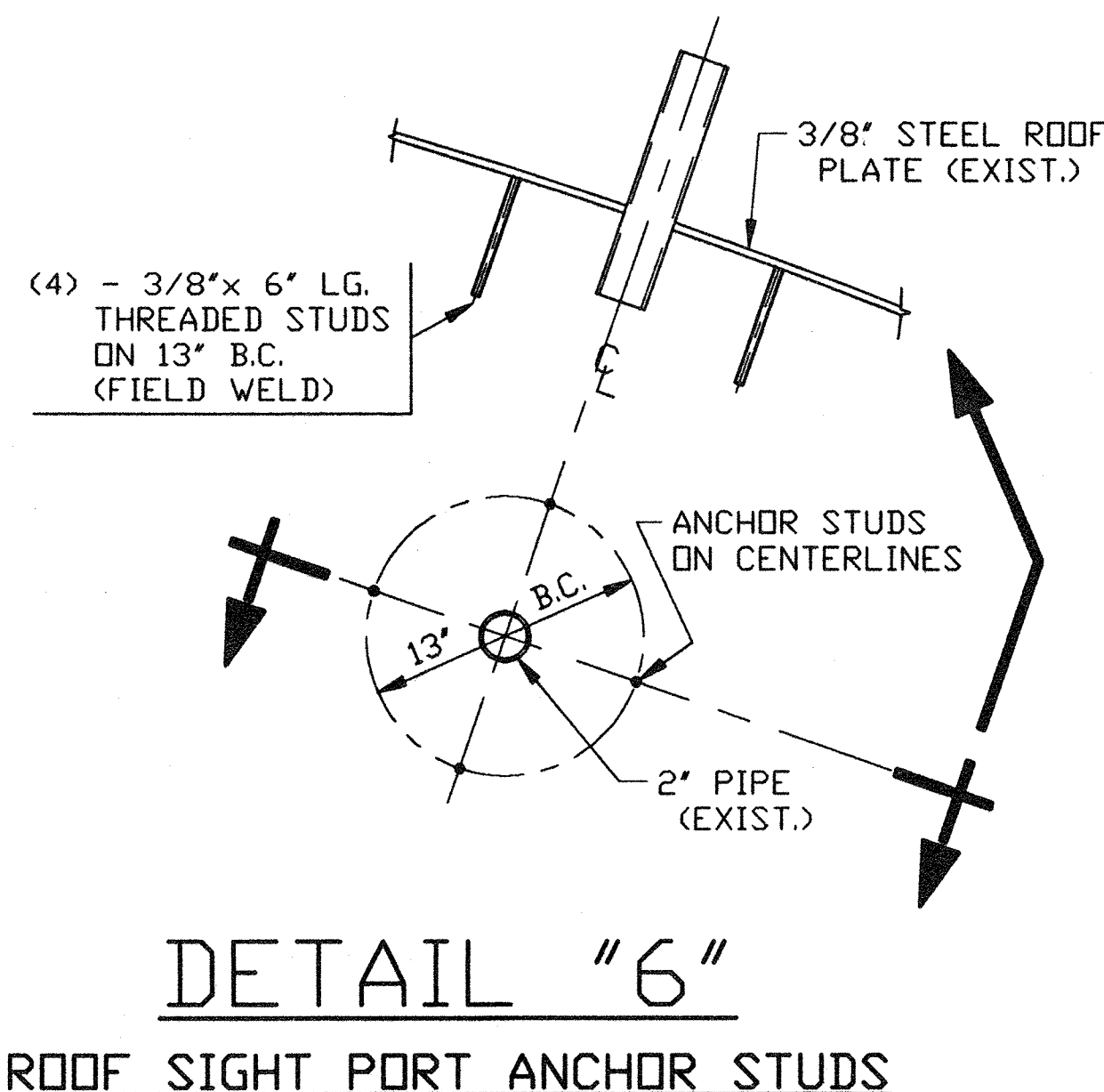
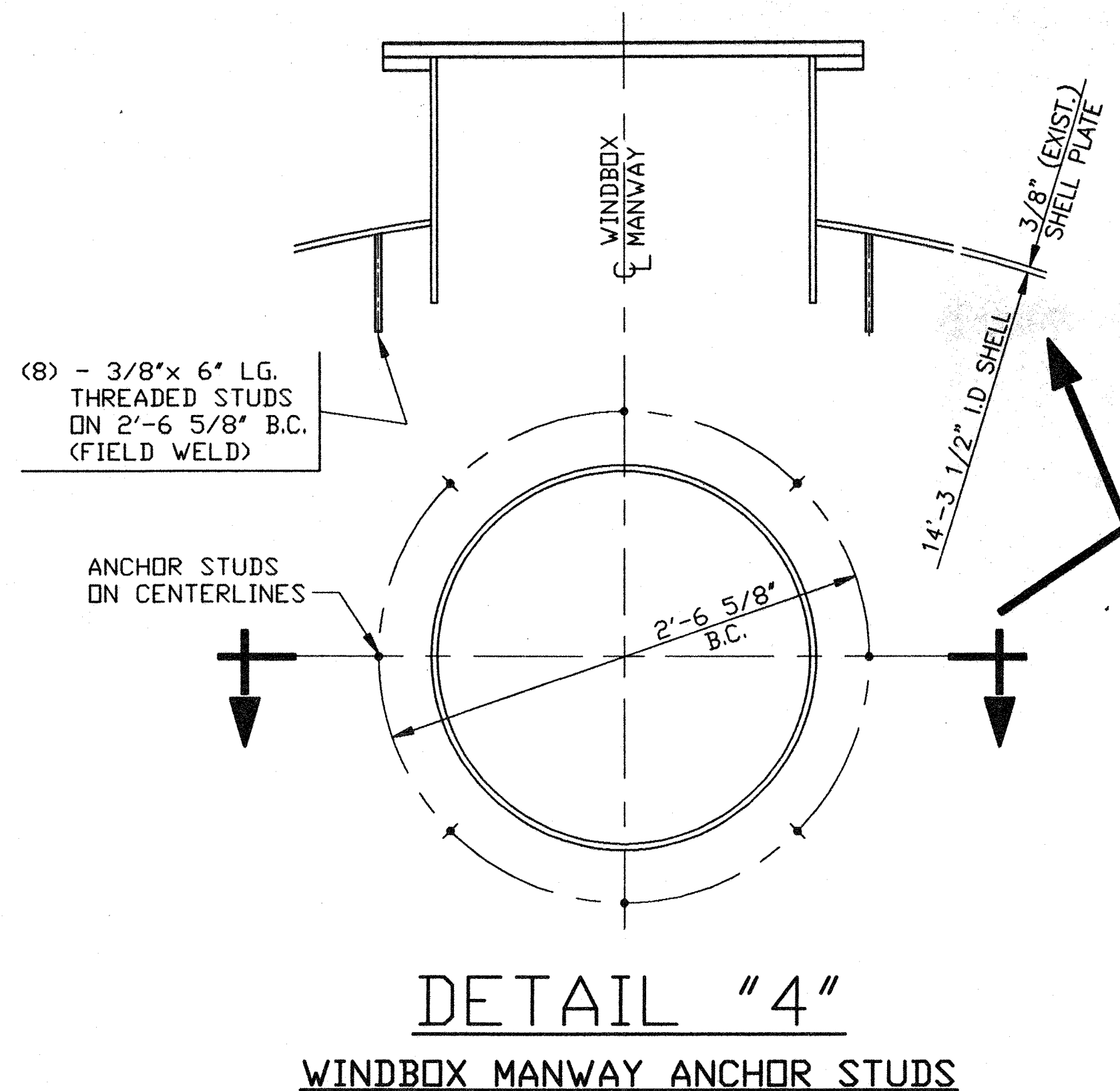
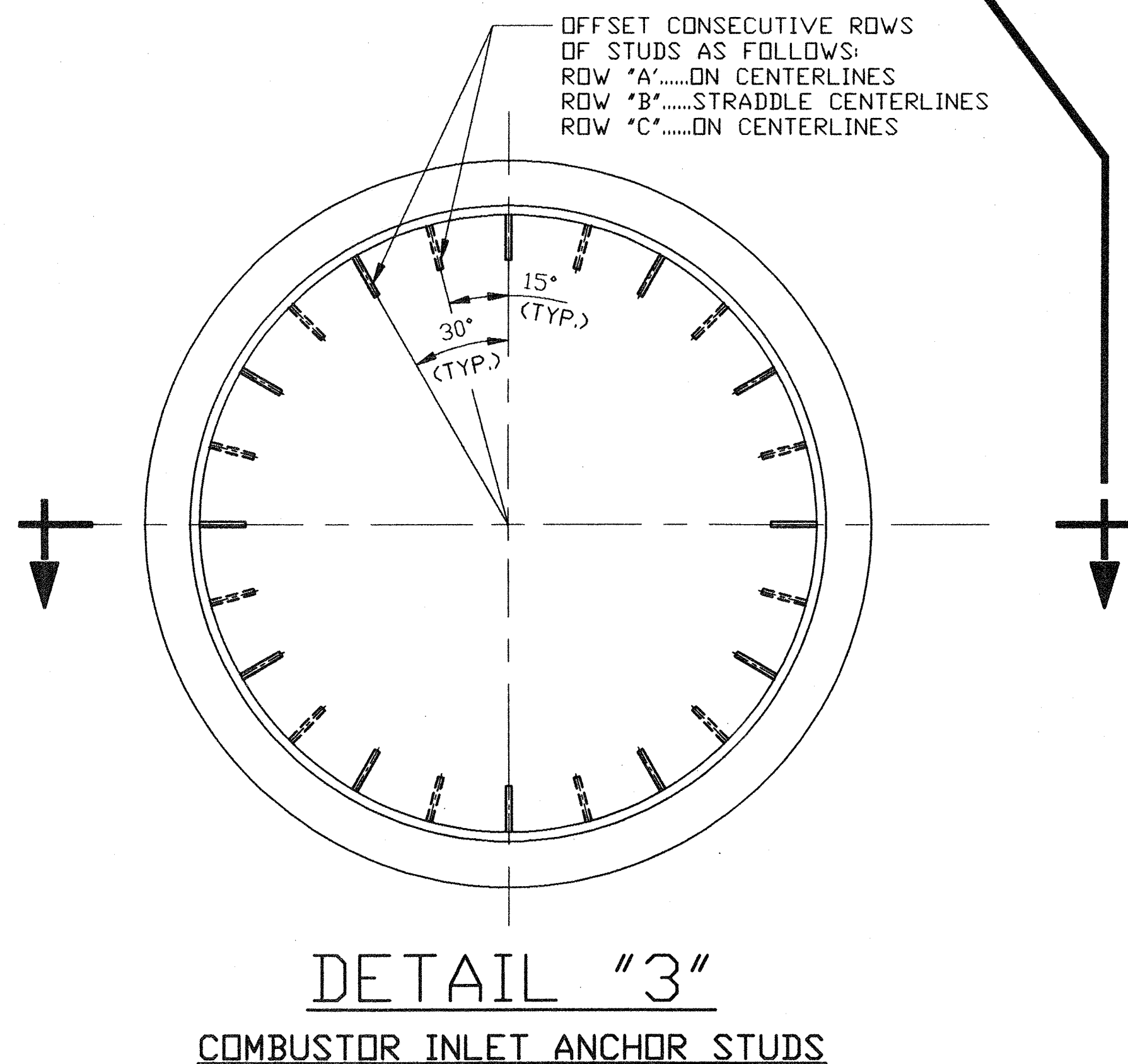
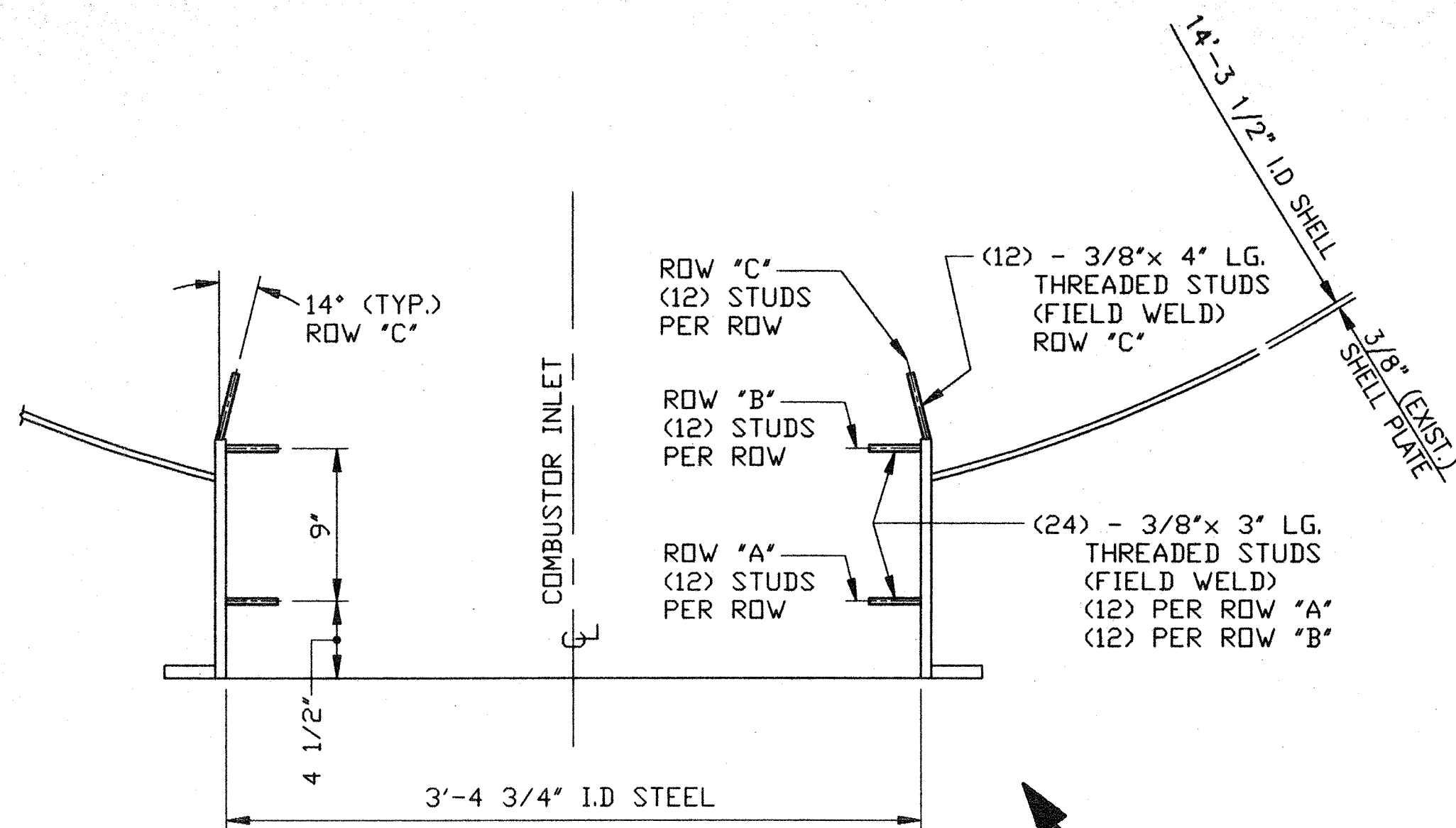
Contract No.  
0302

2002065

DRAWING NO.  
0302-F-013

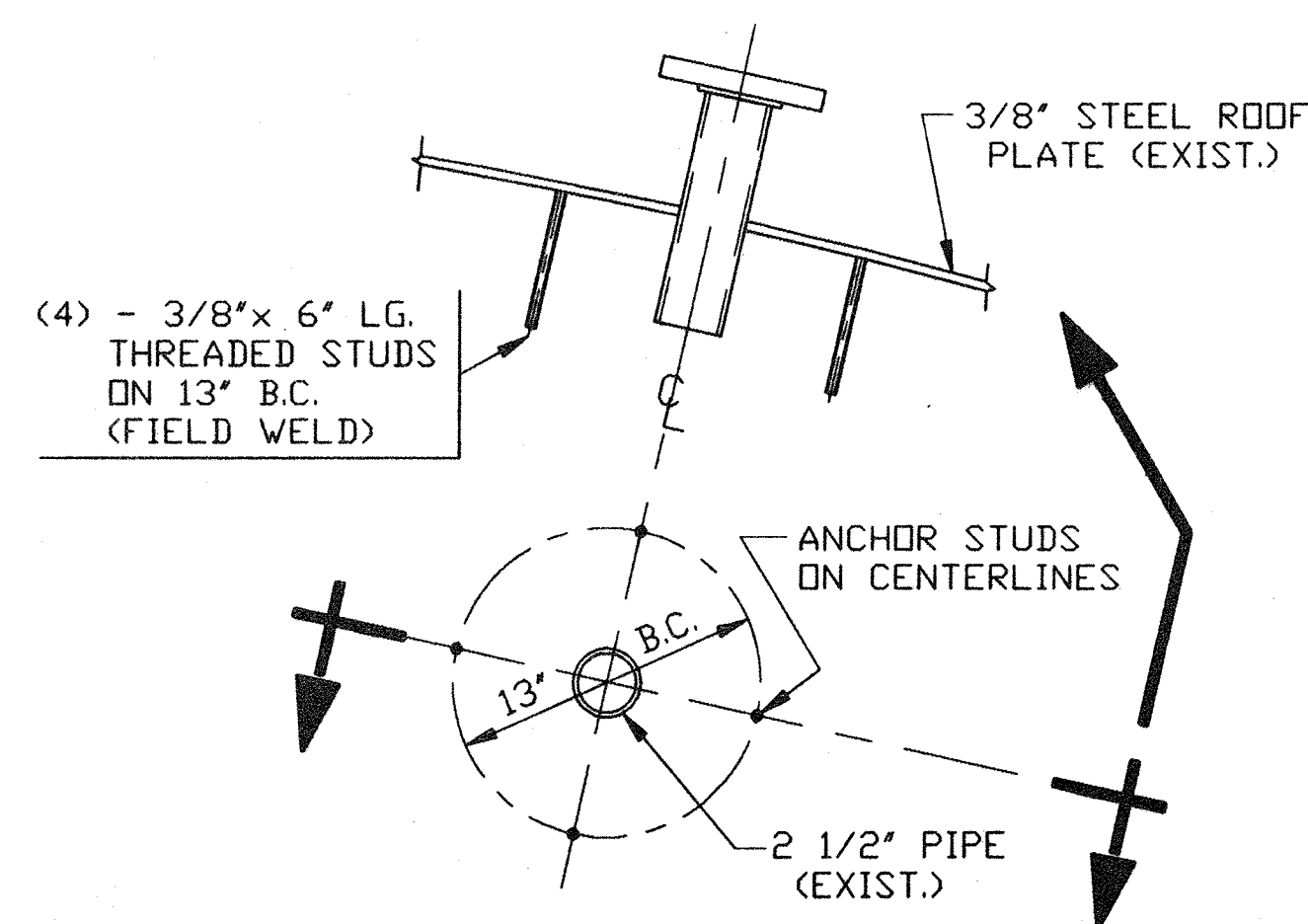
REV.  
1



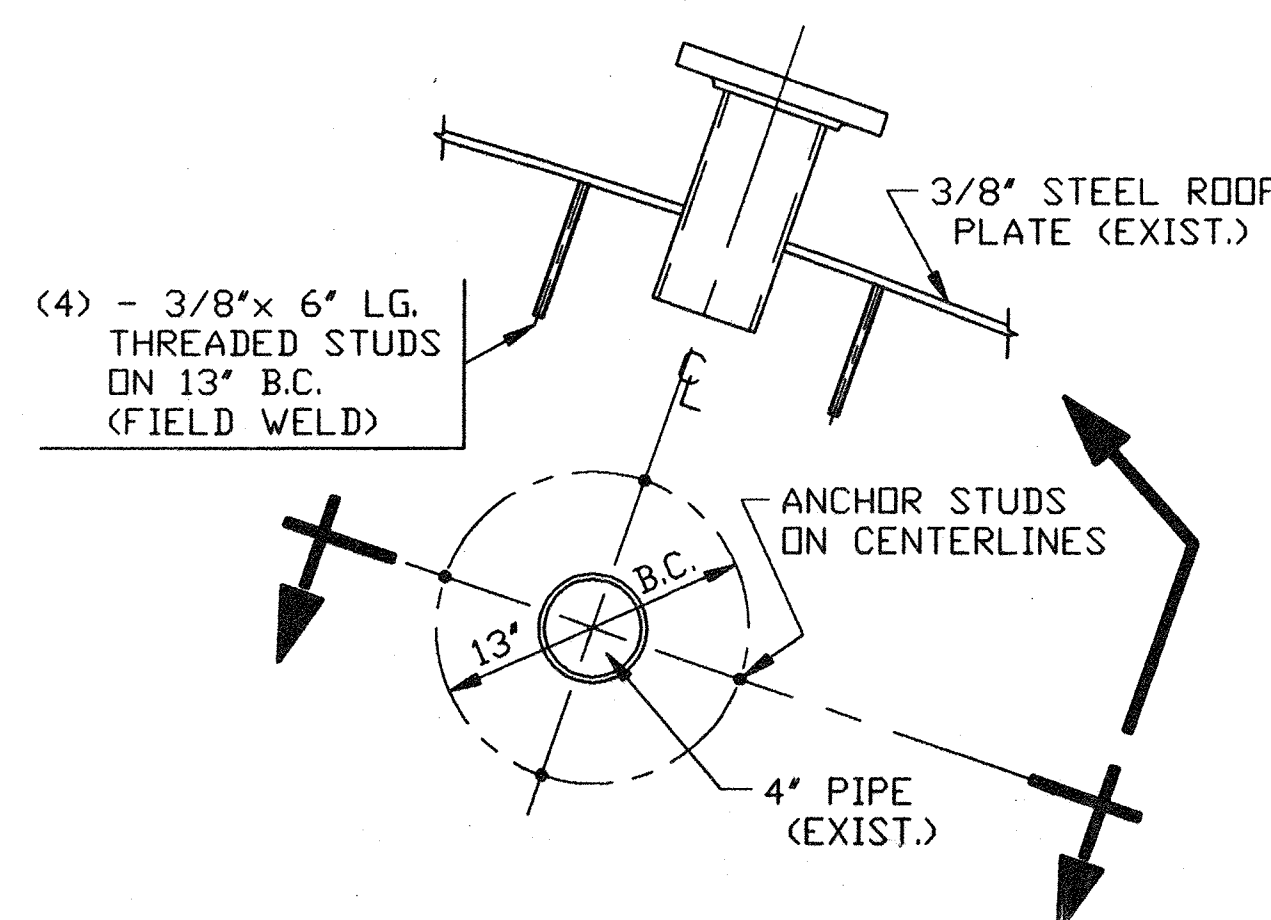


**DETAIL "8"**  
IN-BED SLUDGE INLET PORT  
(1) SHOWN.....(2) REQ'D.

REFRACTORY ANCHOR STUD LIST				
QTY REQ'D	QTY FURN.	DESCRIPTION	LOCATION	REF.
24	24	3/8"-16UNC x 3" LG. ANCHOR STUDS (FULLY THREADED) (MATERIAL: 310 SS)	COMBUSTOR INLET	DETAIL "3" (THIS DWG.)
12	12	3/8"-16UNC x 4" LG. ANCHOR STUDS (FULLY THREADED) (MATERIAL: 310 SS)	COMBUSTOR INLET	DETAIL "3" (THIS DWG.)
16	16	3/8"-16UNC x 4 1/2" LG. ANCHOR STUDS (FULLY THREADED) (MATERIAL: 310 SS)	GAS OUTLET	DETAIL "1" (DWG. 0302-F-007)
68	68	3/8"-16UNC x 6" LG. ANCHOR STUDS (FULLY THREADED) (MATERIAL: 310 SS)	SECONDARY AIR PORTS	(36) DETAIL "2" (DWG. 0302-F-007)
			WINDBOX MANWAY	(8) DETAIL "4" (THIS DWG.)
			FREEBOARD QUENCH SPRAY PORTS	(16) DETAIL "5" (THIS DWG.)
			ROOF SIGHT PORT	(4) DETAIL "6" (THIS DWG.)
			ROOF CAMERA MOUNT	(4) DETAIL "7" (THIS DWG.)
32	32	3/8"-16UNC x 6 1/4" LG. ANCHOR STUDS (FULLY THREADED) (MATERIAL: 310 SS)	GAS OUTLET	DETAIL "1" (DWG. 0302-F-007)
8	8	3/8"-16UNC x 6" LG. ANCHOR STUDS (FULLY THREADED) WITH 2 NUTS EACH (MATERIAL: 310 SS)	SLUDGE INLETS	DETAIL "8" (THIS DWG.)



**DETAIL "5"**  
FREEBOARD QUENCH SPRAY PORT ANCHOR STUDS  
(1) SHOWN.....(4) REQ'D.



**DETAIL "7"**  
ROOF CAMERA MOUNT ANCHOR STUDS

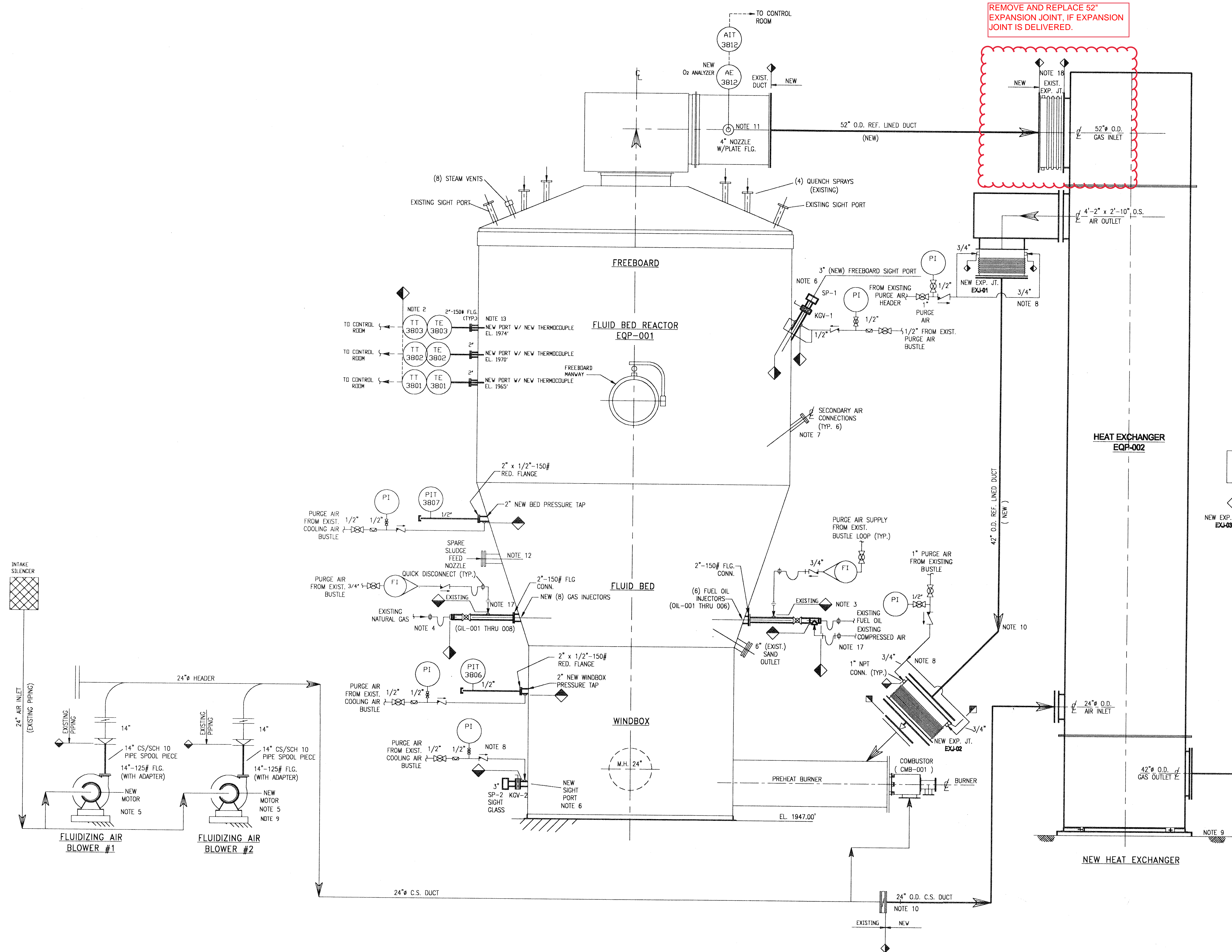
ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

NOTE:  
1. THE REFRACTORY ANCHOR STUDS ARE TO BE  
INSTALLED PRIOR TO THE PAINTING OF THE  
INCINERATOR SHELL INTERIOR.  
2. SEE DWG. 0302-F-007 FOR LOCATION OF  
DETAILS "3" THRU "8".

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. 1 #14472  
SPECIFICATION SECTION No. 1  
SUBPARAGRAPH No. 1  
CONTRACT DWG. SHEET No. 1

6-25-04	ISSUED FOR CONSTRUCTION	SH	KJV	KJV	HM
DATE	ISSUES / REVISIONS	BY	CHK	APP	APP
		Title: MODIFICATIONS TO FLUIDIZED BED INCINERATOR Location: METROPOLITAN SEWER DISTRICT, BUNCOMBE COUNTY, NORTH CAROLINA			
Scale: AS NOTED Contract No. 0302		Drawing No. 0302-F-014 Rev. 0			





#### FLUIDIZING AIR BLOWERS (QTY-2)

TAG NO. : FAB-001 & FAB-002  
CAPACITY: 6400 ICFM  
QTY: 2 (TWO)  
DISCH. PRESSURE: 6.5 PSIG  
MFG/MODEL/SIZE: GARDNER DENVER ( LAMSON 1405-AD )  
NO. OF STAGES: 5  
MOTOR DATA: NEW 250HP, TEFC, 3600RPM, 3/60/460V, TOSHIBA,  
FRAME SIZE 449TS.

#### HEAT EXCHANGER

TAG NO. : EQP-002  
MFG/MODEL/SIZE: THERMAL TRANSFER / FGTT /  
MATERIAL OF CONSTR.:  
TUBES: ALLOY 20  
HOT TUBESHEET: ALLOY 20  
REFRACTORY: INSULATING BRICK

PROJECT NAME: BUNCOMBE COUNTY  
CONTRACT No. : 14472  
SPECIFICATION SECTION No. : 11709  
SUBPARAGRAPH No. : N.A.  
CONTRACT DWG. SHEET No. :

#### NOTES:

- FOR GEN. INDEX, NOTES, ABBREVIATIONS & LEGEND SEE CONTRACT DWG. X1.
- INSTALL 3-NEW THERMOCOUPLES @ EL. 1965, 1970, & 1974, LOCATED @120' APART IN NEW PORTS, WIRING BY HCCI.
- INSTALL 6-NEW FUEL OIL INJECTORS @ EXISTING CONNECTIONS & CONNECT FUEL OIL, ATOMIZING AIR, & COOLING AIR CONNECTIONS.
- INSTALL 8-NEW NATURAL GAS INJECTORS @ EXISTING LOCATIONS & CONNECT NATURAL GAS & COOLING AIR CONNECTIONS.
- EXISTING (2) LAMSON BLOWERS SHALL BE MODIFIED FROM 4-STAGE BLOWERS TO 5-STAGE BLOWERS WITH NEW MOTORS.
- INSTALL (2) 3" SIGHT PORTS (NEW) @ WINDBOX & FREEBOARD WITH 3" S.S. KNIFE GATE VALVE.
- MAINTAIN EXISTING OVERBED AIR (SECONDARY AIR) CONNECTIONS FOR FUTURE USE.
- HCCI (HAREN CONSTRUCTION COMPANY INC.) WILL PROVIDE PURGE AIR TO ALL (3) THREE NEW EXPANSION JOINTS & (2) SIGHT PORTS.
- FURNISH NEW ANCHOR BOLTS FOR NEW HEAT EXCHANGER & FLUIDIZING AIR BLOWERS.
- DESIGN, FURNISH AND INSTALL ALL NECESSARY SUPPORTS FOR DUCTWORK.
- FURNISH AND INSTALL NEW OXYGEN ANALYZER.
- EXISTING SLUDGE FEED NOZZLE MODIFIED.
- FOR TRUE NOZZLE ORIENTATION & LOCATION SEE HANKIN DRAWINGS 0302-F-007 & 0302-F-008.
- FOR ARRANGEMENT DRAWINGS SEE HANKIN DRAWING 0302-P-001.
- PROVIDE SEAL PLATE FOR SCRUBBER VENTURI INLET
- ROTATE EXISTING TEE SECTION OF SCRUBBER INLET & MODIFY AS SHOWN ON HANKIN DRAWINGS.
- RECONNECT EXISTING PURGE AIR CONNECTIONS TO GAS AND OIL INJECTORS.
- EXISTING 52" EXPANSION JOINT SHALL BE MOVED TO NEW LOCATION AS SHOWN.

#### LEGEND

- EXISTING
- NEW WORK
- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- KNIFE GATE VALVE
- QUICK DISCONNECT COUPLING
- ROTAMETER W/NEEDLE VALVE
- FULL UNION
- DIAPHRAGM SEAL
- NEEDLE VALVE
- EXISTING HANKIN
- INDICATES TIE-IN POINT

#### REFERENCE DRAWINGS:

- 0302-F-001 REACTOR STEEL ASSEMBLY  
0302-F-002 REACTOR STEEL ORIENTATION  
0302-P-001 GENERAL ARRANGEMENT - FIRST FLOOR PLAN  
0302-P-002 GENERAL ARRANGEMENT - SECOND FLOOR PLAN  
0302-P-003 GENERAL ARRANGEMENT - THIRD FLOOR PLAN  
0302-P-004 GENERAL ARRANGEMENT - ELEVATIONS  
0302-P-008 REACTOR STEEL - NOZZLE DETAIL  
0302-P-010 REACTOR BED FUEL OIL INJECTOR GUN  
0302-P-011 REACTOR BED GAS INJECTOR GUN

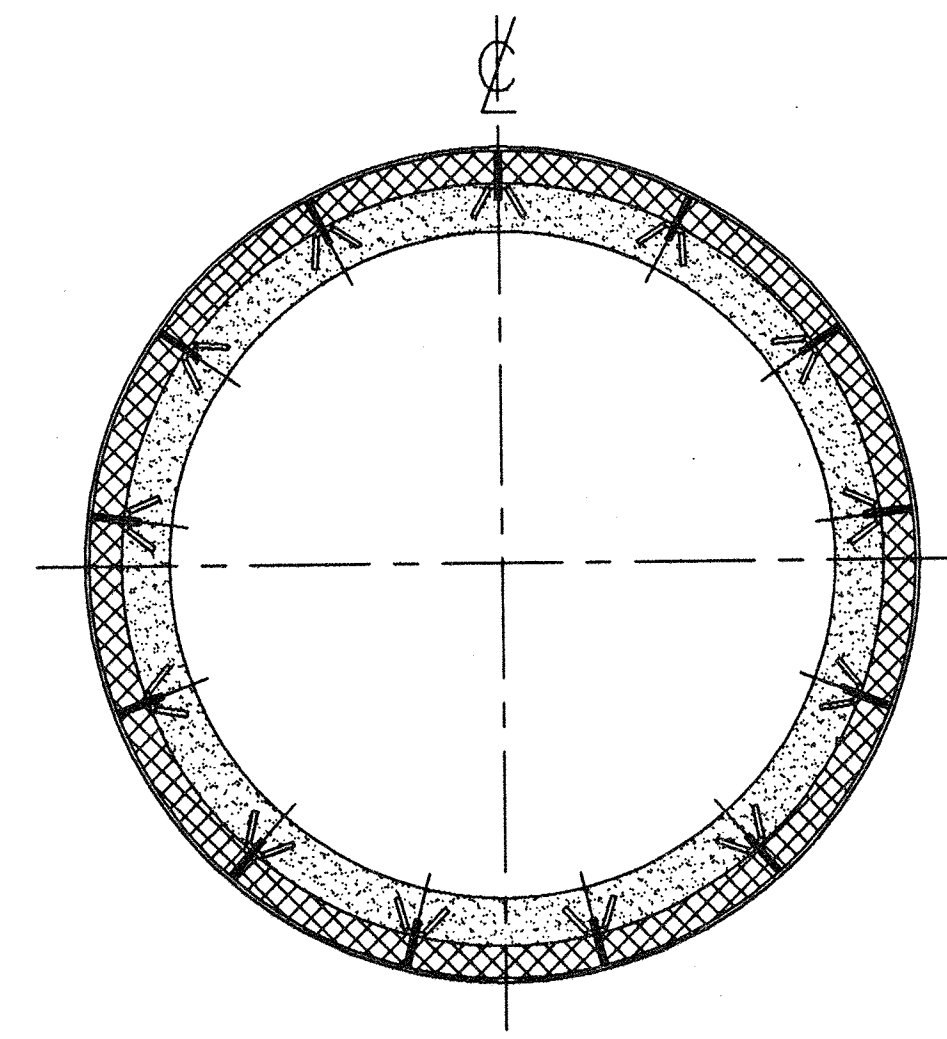
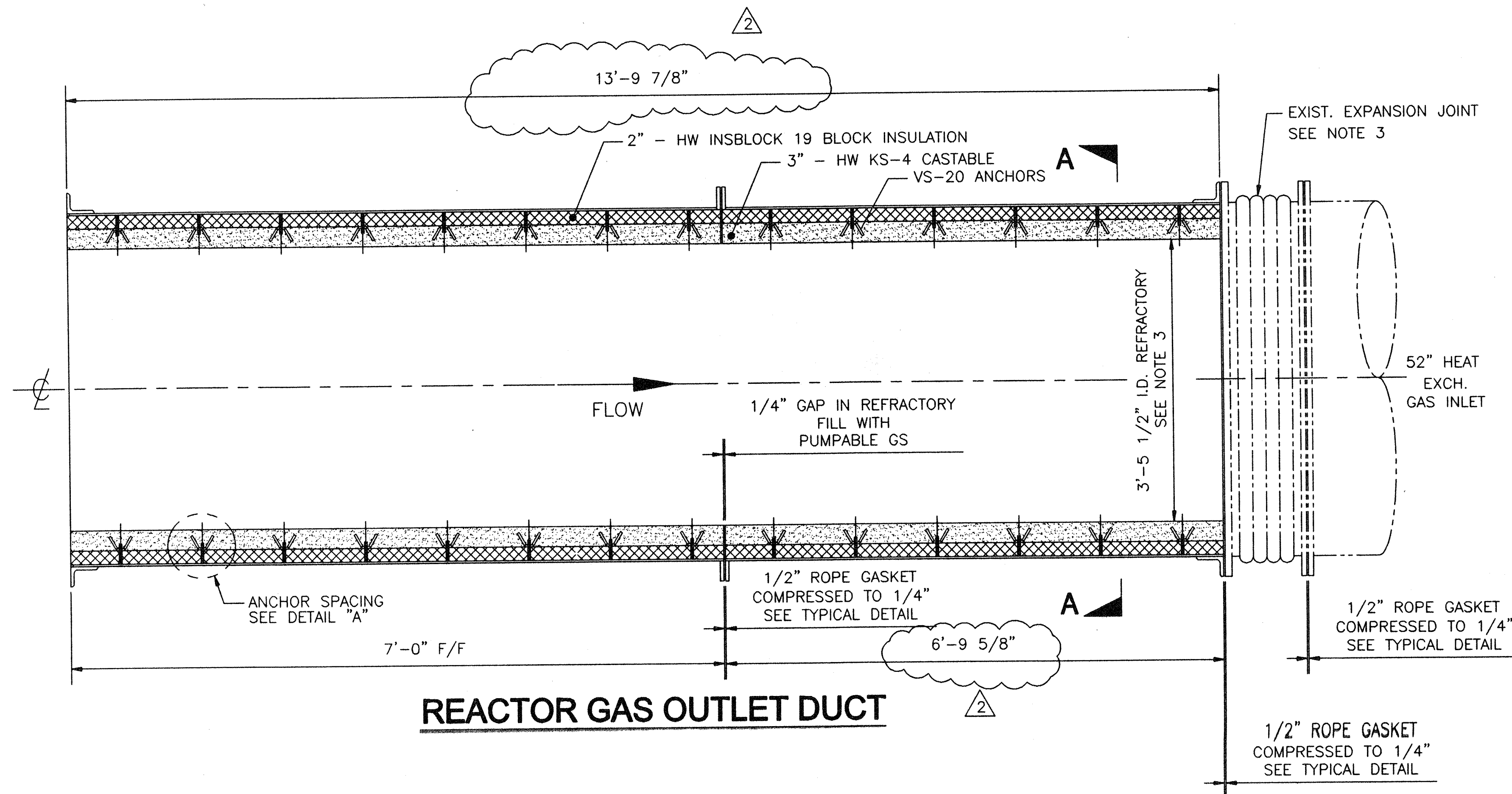
ISSUED  
ENGINEERING DEPT.  
JUN 28 2004  
HANKIN ENVIRONMENTAL  
SYSTEMS INC.

6/23/04	2	ISSUED FOR CONSTRUCTION	WVC	M.S.	DC/HSM	HSM
1/21/04	1	UPDATED PER ENGINEERS COMMENTS & GENERAL REVISIONS	WVC	M.S.	DC/HSM	HSM
11/4/03	0	ISSUED FOR APPROVAL	GS	M.S.	HSM	HSM
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP
Title			MODIFICATIONS TO FLUIDIZED BED REACTOR			
Location			PIPING SCHEMATIC DIAGRAM			
			METROPOLITAN SEWERAGE DISTRICT OF BUNCOMBE COUNTY, NORTH CAROLINA			
Scale			NO SCALE			
Contract No.			0302			
Drawing No.			0302-M-001			
Rev.			2			

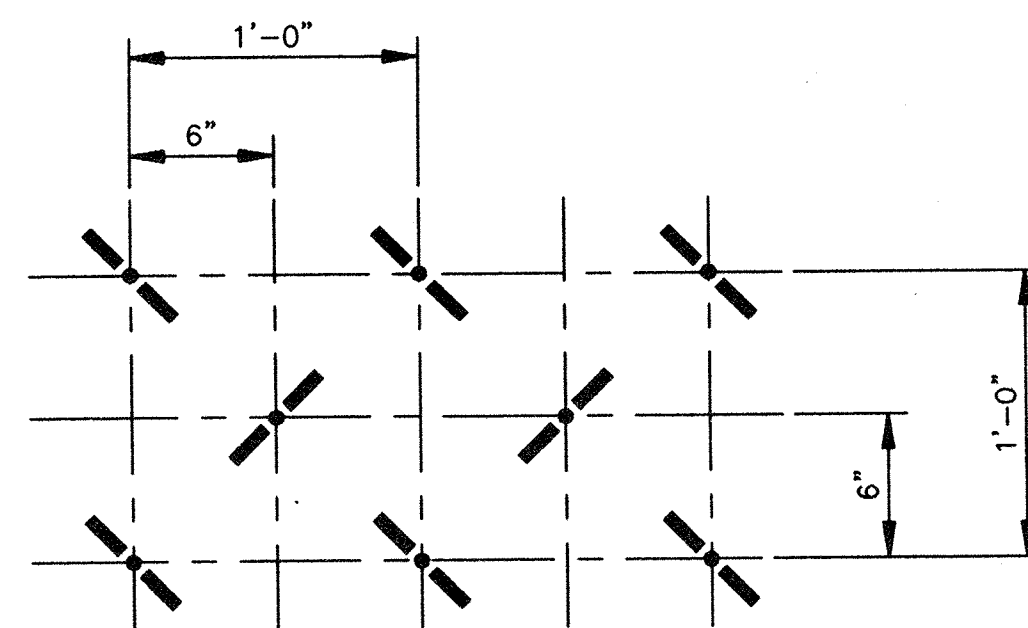
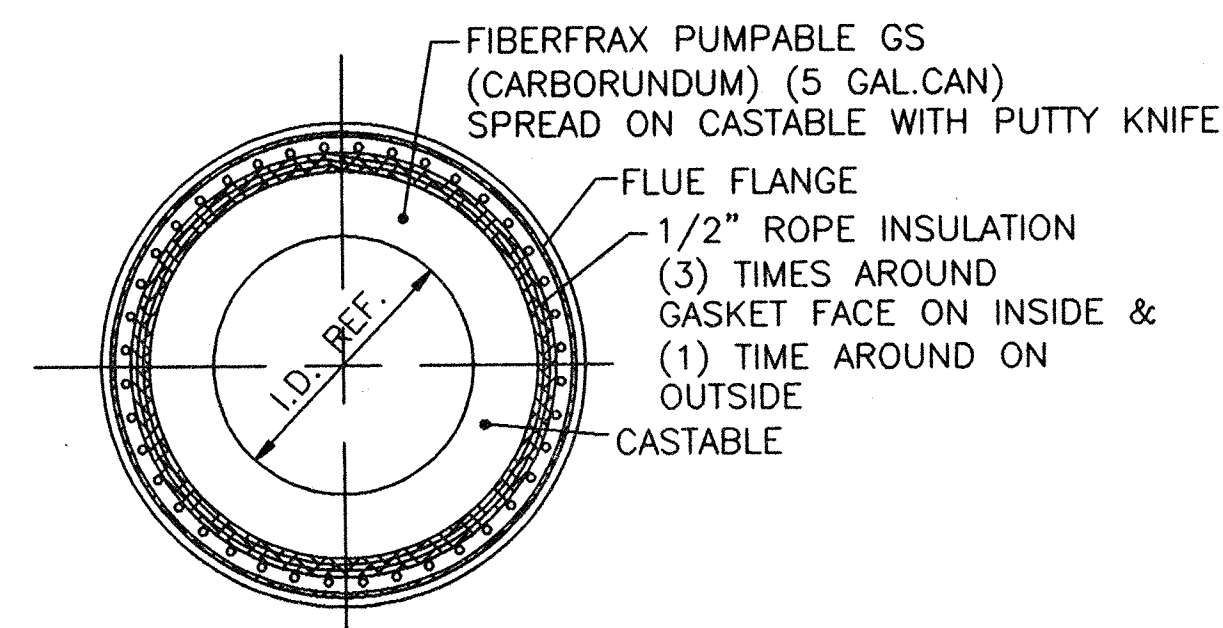


## REFRACTORY SYMBOLS

CASTABLE KS-4

MINERAL WOOL  
BLOCK INSULATION  
(INSBLOCK 19)

SECTION A-A

TYPICAL ANCHOR SPACING  
DETAIL "A"

**TYPICAL ROPE GASKET INSTALLATION**  
 FIELD NOTE: DRESS FLANGE FACE WITH SPRAY ADHESIVE  
 (ELMERS SPRAY ADHESIVE No. E-451 OR EQUAL)  
 SPRAY ADHESIVE WILL HOLD ROPE IN POSITION.  
 COIL 1/2" DIA. CERAMIC FIBER ROPE GASKET 2300°F.  
 CONTINUOUSLY APPROX. (3) TIMES AROUND GASKET FACE ON  
 THE INSIDE OF B.C. AND (1) TIME AROUND THE OUTSIDE OF B.C.  
 NOT TO SCALE

## NOTES:

1. ORIENTATION OF ANCHORS SHOULD BE AT 45° ROTATION TO ANY AXIS OR CORNER, 90° TO EACH OTHER WHERE PRACTICAL.
2. REFRACTORY TO BE SHOP INSTALLED.
3. REPAIR EXISTING REFRACTORY IN EXPANSION JOINT IN FIELD AS REQUIRED.

ISSUED  
ENGINEERING DEPT.

JUN 28 2004


HANKIN ENVIRONMENTAL  
SYSTEMS INC.

PROJECT NAME: BUNCOMBE COUNTY  
 CONTRACT No. : HAREN # 14472  
 SPECIFICATION SECTION No. : 11709  
 SUBPARAGRAPH No. : 2.02  
 CONTRACT DWG. SHEET No. :

## REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
0302-P-005	REACTOR GAS OUTLET DUCT MODIFICATIONS
0302-P-006	DUCT FROM HEAT EXCHANGER TO PRE-HEAT BURNER

06/25/04	2	ISSUED FOR CONSTRUCTION	SDM	KJV	KJV	HM
04/08/04	1	DWG. UPDATED	SDM	KJV	KJV	HM
02/17/04	0	ISSUE "0" TO REFR. SUB.	WC	KJV	HM	
12/17/03	P1		WC	KJV	HM	
DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP



# Hankin

Environmental Systems, Inc.

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Title	MODIFICATIONS TO FLUIDIZED BED REACTOR REFRACTORY REACTOR GAS OUTLET DUCT LINING		
Location	METROPOLITAN SEWERAGE DISTRICT OF BUNCOMBE COUNTY, NORTH CAROLINA		
Scale	1"=1'-0"	DRAWING NO.	REV.
Contract No.	0302	0302-P-012	2