

PIPE DIAMETER	LINE VELOCITIES (FPS)	
	500 m <sup>3</sup> /DAY	1068 m <sup>3</sup> /DAY
2"	8.8	18.9
3"	4.0	8.6
4"	2.3	5.0
6"	1.0	2.2

- NOTES:**
- 1) TUBING MATERIAL TO BE ASTM A269-TP316/316LM, FULLY ANNEALED.
  - 2) VESSEL TO HAVE 100% RADIOGRAPHY.
  - 3) FIELD TO LOCATE HIGH POINT AND LOW POINT DRAINS.
  - 4) MANUFACTURER TO SUPPLY VESSEL AND VESSEL SUPPORT ONLY.
  - 5) 3" NPT NOZZLE TO BE INSTALLED ON T-600 BEFORE VESSEL IS COATED.
  - 6) FRP PIPING AND FITTINGS AS PER GREY OWL PIPING SPECIFICATION AGS-1, AF SPEC (REV J). VALVES AS PER CNRL PIPING SPECIFICATION.

Certificate of Authorization  
 Grey Owl Engineering Ltd.  
 No. 4392 Date: 22/12/11

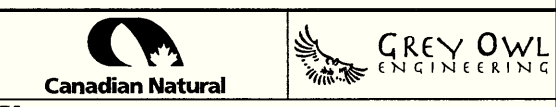
DRAWING NO.	REFERENCE DRAWINGS	REV.	DESCRIPTION	BY	DATE	CHK	APP.	CLIENT
T-10143-B103	UNIVERSAL INDUSTRIES LTD. - 750 BBL CONED BOTTOM API TANK COMMON REPAD FOR NOZZLES							
T-10143-D102	UNIVERSAL INDUSTRIES LTD. - 750 BBL CONED BOTTOM API TANK NOZZLE DETAILS							
T-10143-D101	UNIVERSAL INDUSTRIES LTD. - 750 BBL CONED BOTTOM API TANK GENERAL ARRANGEMENT							
13478-M-D-SS00-001	GRAVER - 60" O.D. x 9'-6" STR TRISEP COALESCING FILTER							
		0	PIERSON 14-09-002-29W1 FILTER & BACKWASH TANK ADDITION (IFC)	CDP	2011-12-22	TWB		

DRAWN BY:	DATE:	DESIGNED BY:	DATE:	CHECKED BY:	DATE:	APPROVED BY:	DATE:	CLIENT BY:	DATE:
C. PENNER	2011-10-03								

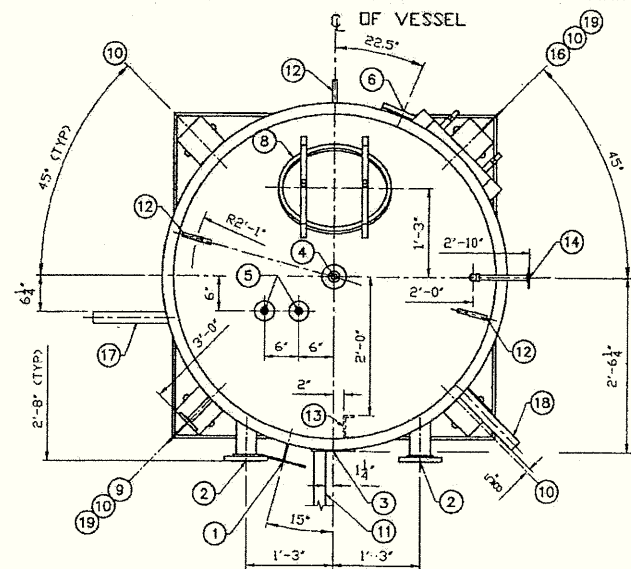
  

SCALE	JOB NO.	DRAWING NO.	REV.
N.T.S.	118804	PEA1409-220-0002	0

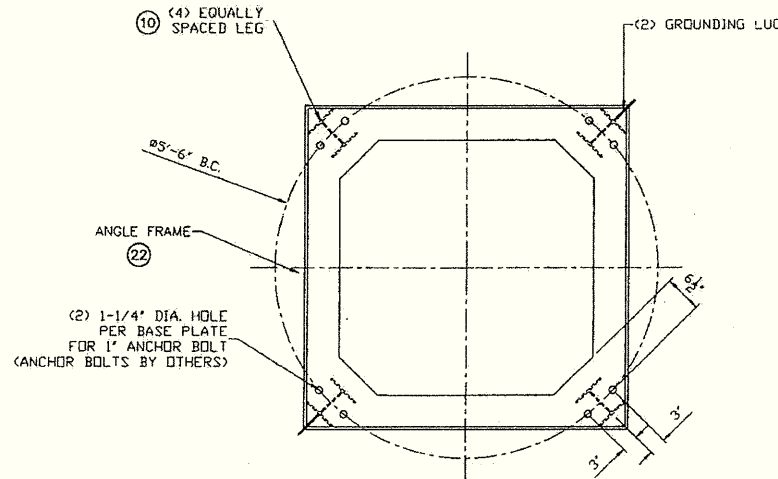


**PIERSON**  
 14-09-002-29W1  
 OIL BATTERY-TRISEP FILTER & BACKWASH TANK ADDITION  
 PROCESS & INSTRUMENTATION DIAGRAM

ENGINEERING AND PERMIT STAMPS TO APPLY TO CURRENT CONSTRUCTION ONLY.



PLAN



ANCHOR BOLT PLAN

NOTES:

- 1. TANK TO BE LIFTED USING LIFTING LUGS ONLY. DO NOT USE ANY OTHER ATTACHMENT, TO PREVENT DAMAGE TO EQUIPMENT.
- 2. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE SUBJECT TO NORMAL SHOP TOLERANCE OF  $\pm 1/8"$ .
- 3. ALL BOLT HOLES STRADDLE CENTERLINE, UNLESS OTHERWISE NOTED.
- 4. ALL BOLT SHALL BE STUD BOLT, A197 W/194 NUTS, GALVANIZED.
- 5. VESSEL SHALL BE STAMP WITH MAX. ALLOWABLE PRESS. BASED ON THE ACTUAL MATERIAL USED FOR FABRICATION.
- 6. ALL NOZZLES AND MANWAY SHALL BE REINFORCED AS REQUIRED PER ASME CODE SECTION VIII DIVISION I. PADS SHALL BE INTEGRAALLY REINFORCED AND SHALL BE CENTERED IN SHELL PLATE EXCEPT AS NOTED.
- 7. ALL FLANGE TO BE 150#, RF.
- 8. MATERIAL TO BE 316L SS OR 316SS/316LSS DUAL CERTIFIED.
- 9. ALL DIMENSION TO STEEL UNLESS OTHERWISE NOTED.

VESSEL DATA

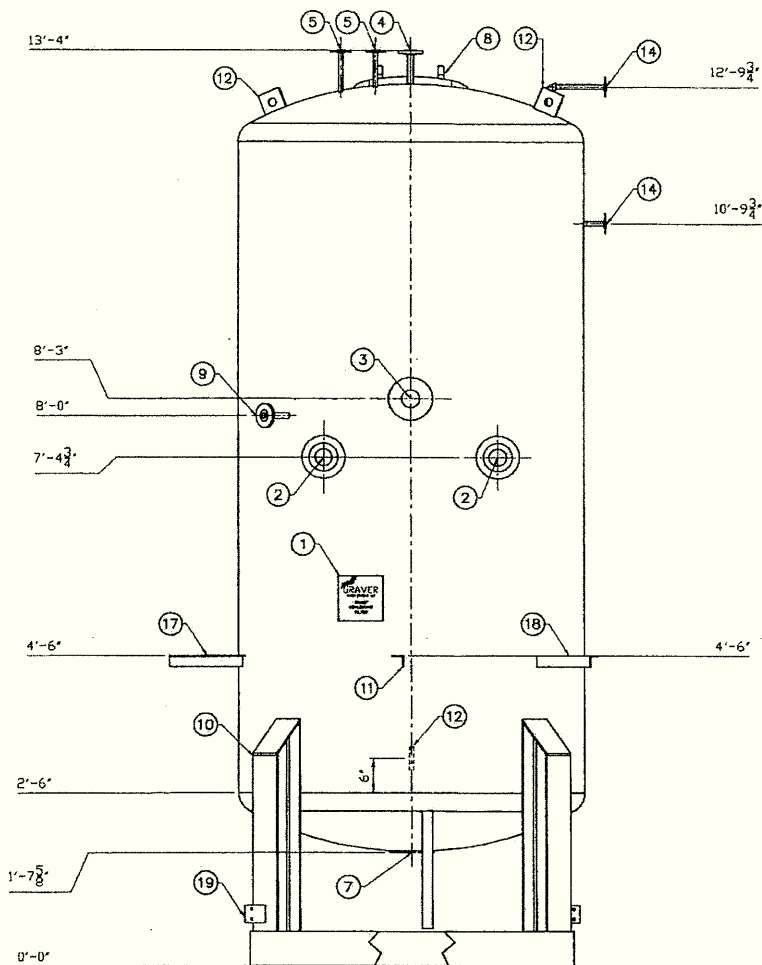
DESIGN PRESSURE	100 PSIG	ASME CODE SECT.	VIII DIV. I 2010 ED.
TEST PRESSURE	PER CODE	CODE CERT. REQ'D	YES
DESIGN TEMPERATURE	210 °F	COUNTRY REQ'MENT	CANADA
SHELL MATERIAL	SA-240 316L SS	STRESS RELIEVED	NO
HEAD MATERIAL	SA-240 316L SS	RADIOGRAPHED	AS REQ'D BY CODE
HEAD TYPE	ASME F&D		
NOZZLE NECK MAT'L	SA-240 316L SS		
FLANGE MATERIAL	316L SS		

BILL OF MATERIAL

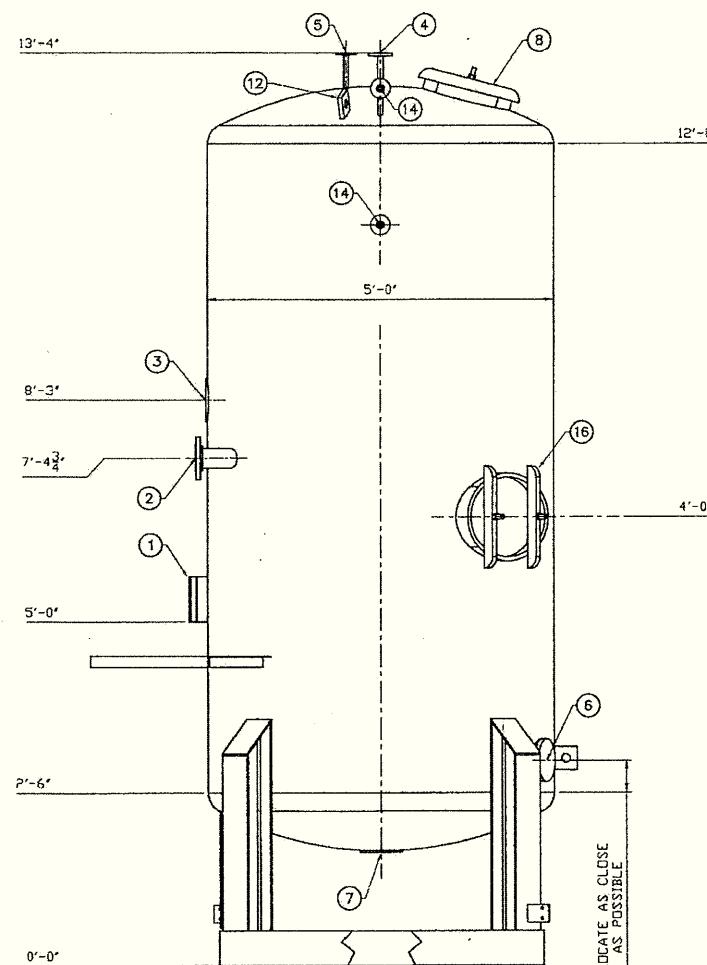
PART NO.	QTY	DESCRIPTION	SIZE	MAT'L
1	1	NAME PLATE		316L SS
2	2	WATER INLET/BACKWASH OUTLET	3"	316L SS
3	1	WATER OUTLET	3"	316L SS
4	1	OIL OUTLET	1"	316L SS
5	2	VENT	1/2"	316L SS
6	1	SPARE CONNECTION	3"	316L SS
7	1	BACKWASH INLET	3"	316L SS
8	1	MANHOLE	14"x18"	316L SS
9	1	UPPER COMPARTMENT DRAIN		316L SS
10	4	STRUCTURAL LEGS		A36
11	1	PIPE SUPPORT		304 SS
12	3	LIFTING LUG		304 SS
13	1	PIPE SUPPORT	C4x7.25	304 SS
14	2	LEVEL GAUGE	1/2"	316L SS
16	1	MANHOLE	14"x18"	316L SS
17	1	PIPE SUPPORT		304 SS
18	1	PIPE SUPPORT		304 SS
19	2	GROUNDING LUG		316 SS
22	1	BOTTOM ANGLE FRAME		A36

ESTIMATED VESSEL WEIGHT:  
SHIP WEIGHT: 6,000 LB  
OPERATING WEIGHT: 19,500 LB

FOR  
INFORMATION  
ONLY



ELEVATION



RIGHT ELEVATION

Oct. 13, 2011 - 8:34 am FILE: J:\13478 - Canadian Natural Res Ltd\CAD\Mech\13478-M-D-5500-001.002.dwg THIS DRAWING IS THE PROPERTY OF GRAVER WATER SYSTEMS, LLC, A MARMON WATER / BERKSHIRE HATHAWAY COMPANY. IT IS NOT TO BE USED FOR ANY PURPOSES DETRIMENTAL TO THE INTEREST OF THIS COMPANY AND IS SUBJECT TO RETURN UPON REQUEST. SCALE: 3/4" = 12"

REV.	DATE	REMARKS	CAD	ENG.	REV.	DATE	REMARKS	CAD	ENG.	REV.	DATE	REMARKS
A	10-13-11	RELEASE FOR FABRICATION										
A	07/19/11	ISSUE FOR APPROVAL										

CANADIAN NATURAL RESOURCES LIMITED  
PIERSON, MB CANADA

LAYOUT

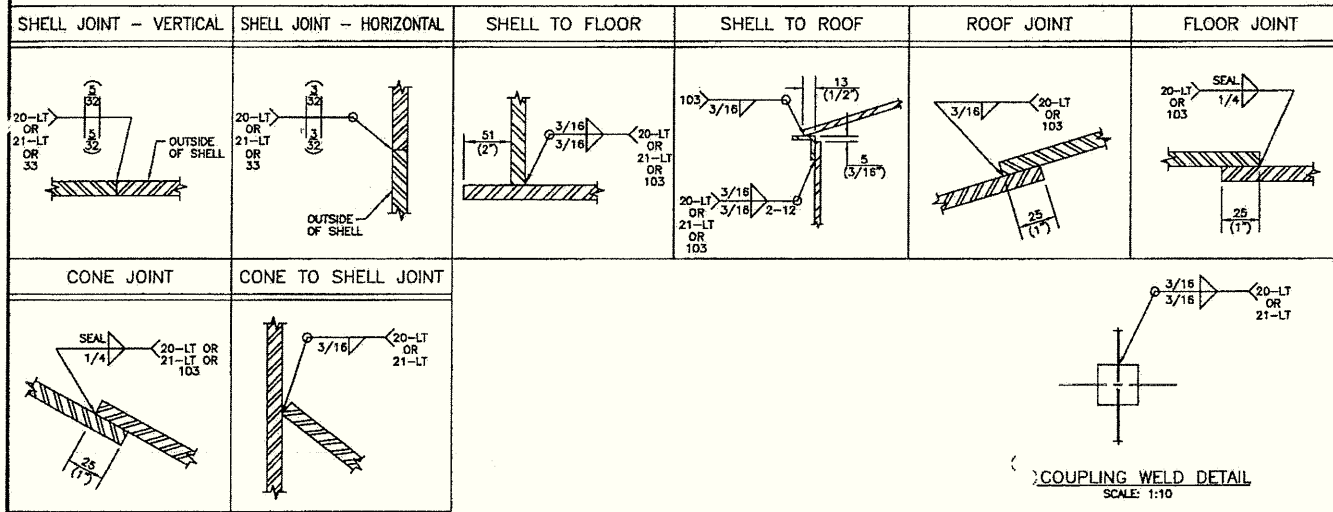
60" OD X 9'-6" STRAIGHT  
TRISEP FILTER



DRAWING NO. 13478-M-D-5500-001

GRAVER JOB: 13478

U.I.L. STANDARD WELD DETAILS (N.T.S.)



DESIGN CODE: API  
 DESIGN PRESSURE: 4 oz. PRESS. x 0.4 oz. VAC.  
 OPERATING TEMPERATURE:  
 DESIGN TEMPERATURE:  
 SERVICE:  
 OPERATING LEVEL:  
 CORROSION ALLOWANCE: NONE  
 OTHER:  
 FINISHING  
 EXTERNAL: NONE  
 INTERNAL: NONE  
 TESTING: LIMITED TO AIR TESTING AS PER API 12F CODE  
 INSULATION: APPLY MIN. 2" URETHANE TO SHELL & ROOF & COVER WITH MIN. 20 MILS BLACK TOWERTHON SEALER.

COUPLING WELD DETAIL  
 SCALE: 1:10

NOZZLE SCHEDULE

MK	NO	SIZE	SCH	RATE	TYPE	PROJ INT.	REPAD EXT.	DESCRIPTION
N1	1	2 1/2"	STD	ANSI 150	RFSO	25	10	TRUCK UNLOADING C/W GATE VALVE
N2	1	80"	2"	STD	ANSI 150	25	171	DESAND INLET
N2	2	80"	2"	STD	ANSI 150	25	171	DESAND INLET
N3	1	114"	4"	STD	ANSI 150	25	152	DESAND DRAIN
C1	1	78"	3"	MERCH.	FULL CPLG.	-	102	OIL INLET C/W GATE VALVE
C2	2	78"	3"	MERCH.	FULL CPLG.	-	102	OUTLETS (MOUNTED IN M1)
C4	3	18"	3/4"	MERCH.	FULL CPLG.	-	102	SAMPLE CONNECTIONS C/W VALVES
C5	1	78"	3"	MERCH.	FULL CPLG.	-	102	VENT
C6	1	36"	1 1/2"	MERCH.	FULL CPLG.	-	102	GAUGE BOARD CABLE ACCESS
C7	1	18"	3/4"	MERCH.	FULL CPLG.	-	102	T.I. (0-100°C)
C8	1	22"	1"	MERCH.	FULL CPLG.	-	102	T.C.
C9	1	78"	3"	MERCH.	FULL CPLG.	-	102	OIL FLUSH C/W GATE VALVE
C10	1	22"	1"	MERCH.	FULL CPLG.	-	102	SHELL MANWAY C/W C2 g.b.
M1	1	2200"	-	-	ENVARDO 330	-	152	THIEF HATCH SET @ 4 oz. PRESS./0.4 oz. VAC.
T1	1	203"	8"	-	FAB'D	-	152	THRIFT FOR 8" U-TUBE

MATERIAL LIST

MK	QTY.	DESCRIPTION	MATERIAL	WT
1	1	FLOOR: PLATE 1/4" THK. X 15'-7 3/8" DIA.	G40.21-44W	1955
2	1	ROOF: PLATE 3/16" THK. X 15'-5 13/16" DIA.	G40.21-44W	1442
3	3	SHELL: PLATE 3/16" THK. X 8'-0" X 24'-0" LG.	G40.21-44W	4412
4	3	SHELL: PLATE 3/16" THK. X 8'-0" X 23'-11 1/2" LG.	G40.21-44W	4405
5	1	RUNAROUND ANGLE 2" x 2" x 3/16" x 48'-6 3/8" LG.	G40.21-44W	123
6	1	8" REMOVABLE U-TUBE ASSEMBLY	REF. DWG. EDS-3053	719
7	1	U/L STYLE "B" FLAME ARRESTOR C/W 1 1/2" BURNER (150,000 BTU) C/W PILEOT	REF. DWG. EDS-3016	20
8	1	STACK 8" X 0.120 WALL X 20'-0" LG. ERW MITERED C/W DAMPER	A-53-B	112
9	1	CONE SUPPORT PIPE 10" SCH STD	A-53-B	-
10	1	COMMON REPAD 3/16" THK. FOR N2 g-c	REF. DWG. T-10143-B103	15
11	1	STACK SUPPORT BRACKET	-	1
12	1	U/L LEVEL INDICATOR ASSY C/W METRIC BOARD, PULLEYS, Pkg. FLAT. SPRINGER BAR & FLOOR CLIP	REF. DWG. EDS-2714	20
13	1	PIPE 3" SCH STD X 15'-2 9/16" LG. ERW	A-53-B	115
14	1	NAMEPLATE	-	1
15	1	U/L SHELL MANWAY 2'-0" X 4'-0" C/W 3/16" COVER	REF. DWG. EDS-2805	231
16	1	LOADING SPOUT 8" X 0.083 WALL X 8'-0" LG.	REF. DWG. EDS-1104	135
17	1	NOZZLE DETAILS	REF. DWG. T-10143-D102	614
18	1	CLIP GATE VALVE 8" X 125# FF FLANGED	-	200
19	1	8" COMPANION FLANGE	-	30
20	1	8" LOADING NOZZLE	REF. DWG. EDS-1113	58
21				
22	18	STUDS 3/4" DIA. X 4" LG.	A-193-B7	7
23	32	HEX NUTS 3/4" NOM.	A-194-2H	10
24	2	REPAD PLATE 3/16" THK. X 8" DIA.	G40.21-44W	4
25				
26	4	U/L TANK HAULING PADS	REF. DWG. EDS-1106	120
27				
28	1	U/L LADDER 24'-0" LG. C/W 17'-0" CAGE	REF. DWG. EDS-1028	250
29	1	U/L LOADING SPOUT PLATFORM 3' X 3'	REF. DWG. EDS-1102	62
30	1	U/L BURNER PLATFORM 4' X 4'	REF. DWG. EDS-1107	150
31	1	THIEF HATCH NOZZLE C/W ENVARDO 330 THIEF HATCH B SET @ 4 oz. PRESS. & 0.4 oz. VAC.	REF. DWG. EDS-2101	20
32	1	FULL CPLG. 1" MERCHANT THR'D	STEEL	1
33	1	FULL CPLG. 1 1/2" MERCHANT THR'D	STEEL	3
34	5	FULL CPLG. 3" MERCHANT THR'D	STEEL	35
35	4	FULL CPLG. 3/4" MERCHANT THR'D	STEEL	2
36	2	LIFTING LUGS	REF. DWG. EDS-2401	40
37	1	THERMOWELL 3/4" NPT X 1/2" X 6" LG.	S.S	1
38	1	TEMPERATURE GAUGE 4" FACE X 6" LG. STEM X 1/2" NPT CONN. OFF TO 100°F RANGE	-	1
39	1	CONE PLATE 1/4" THK. X 17'-1" DIA.	G40.21-44W	2340
40	1	CONE SUPPORT 1/4" THK. X 2'-5 1/8" X 2'-8 3/8" LG. (ROUDED TO R-1 3/8" DIA)	G40.21-44W	711
41	3	NIPPLE 3/4" X SCH STD X 2" LG. ERW TBE	A-53-B	1
42	3	BALL VALVE 3/4" NPT	-	1
43	2	NIPPLE 3" X SCH STD X 6" LG. ERW TBE	A-53-B	15
44	18	ANGLE 4" X 4" X 1/4" X 6" LG.	G40.21-44W	20
45	18	U-BOLT 3/8" X 2" N.P.S. C/W NUTS	C.S.	54
46				
47	2	CLIP GATE VALVE 3" X 125# THR'D	-	32
48	1	PLUG 3" N.I.	-	1
49	1	REPAD 8" NOM.	REF. DWG. EDS-2201	10
50	1	CHANNEL C3 X 4.1# X 7'-7 1/2" LG.	G40.21-44W	32
51	2	GASKET 8" X ANSI 150 RF X 1/16" THK.	GARLOC	1
52	1	REPAD 3/16" THK. X 4 X 3/8" I.D. X 10 1/2" O.D.	G40.21-44W	17
53				

\* QTY'S ARE FOR ONE TANK - 2 REQ'D

NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIONS IN BRACKETS ARE FOR REFERENCE ONLY.  
 2. ALL NOZZLE PROJECTIONS ARE GIVEN ALONG NOZZLE Q'S  
 3. SEE DWG. EDS-1113  
 4. ALL NOZZLE FLANGE RATING TO BE ASME/ANSI B16.5-1988 ADDENDA B16.5a - 1992.

SUBTOTAL 19011  
 X 1.06  
 TOTAL 20152 lbs.

NO	DATE	REVISIONS	BY	APP
26/11/97		AS-BUILT	ALS	
12/12/98		REVISED ELEVATION OF DESAND CONE AND RINGS; MK. #39 & 40	DAL	JK
29/10/98		ISSUED FOR CONSTRUCTION	DAL	JK
09/10/98		ISSUED FOR CUSTOMER APPROVAL	DAL	JK

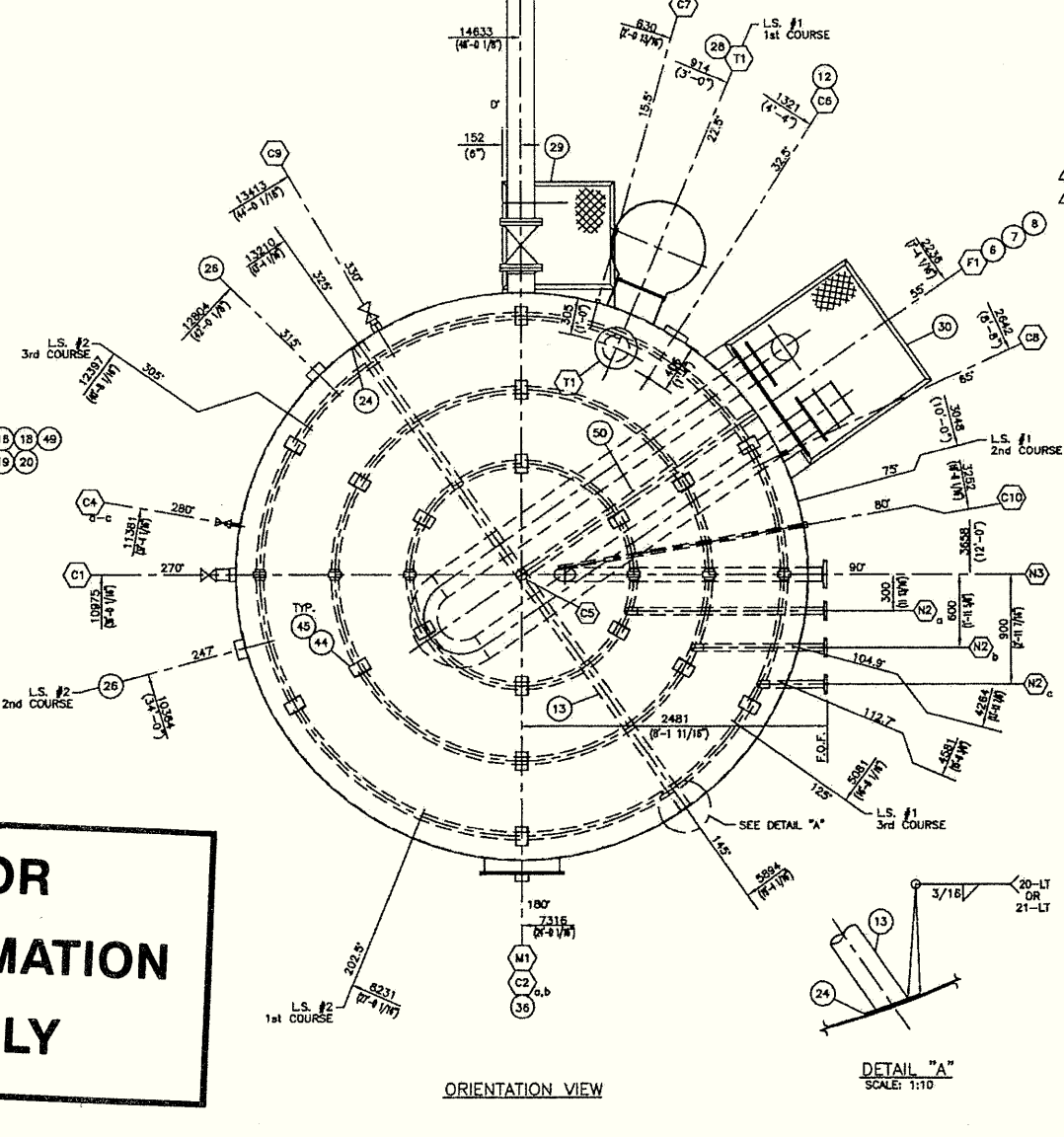
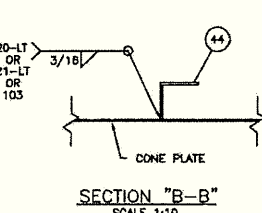
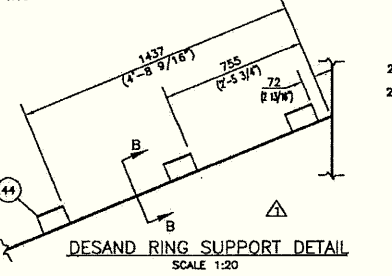
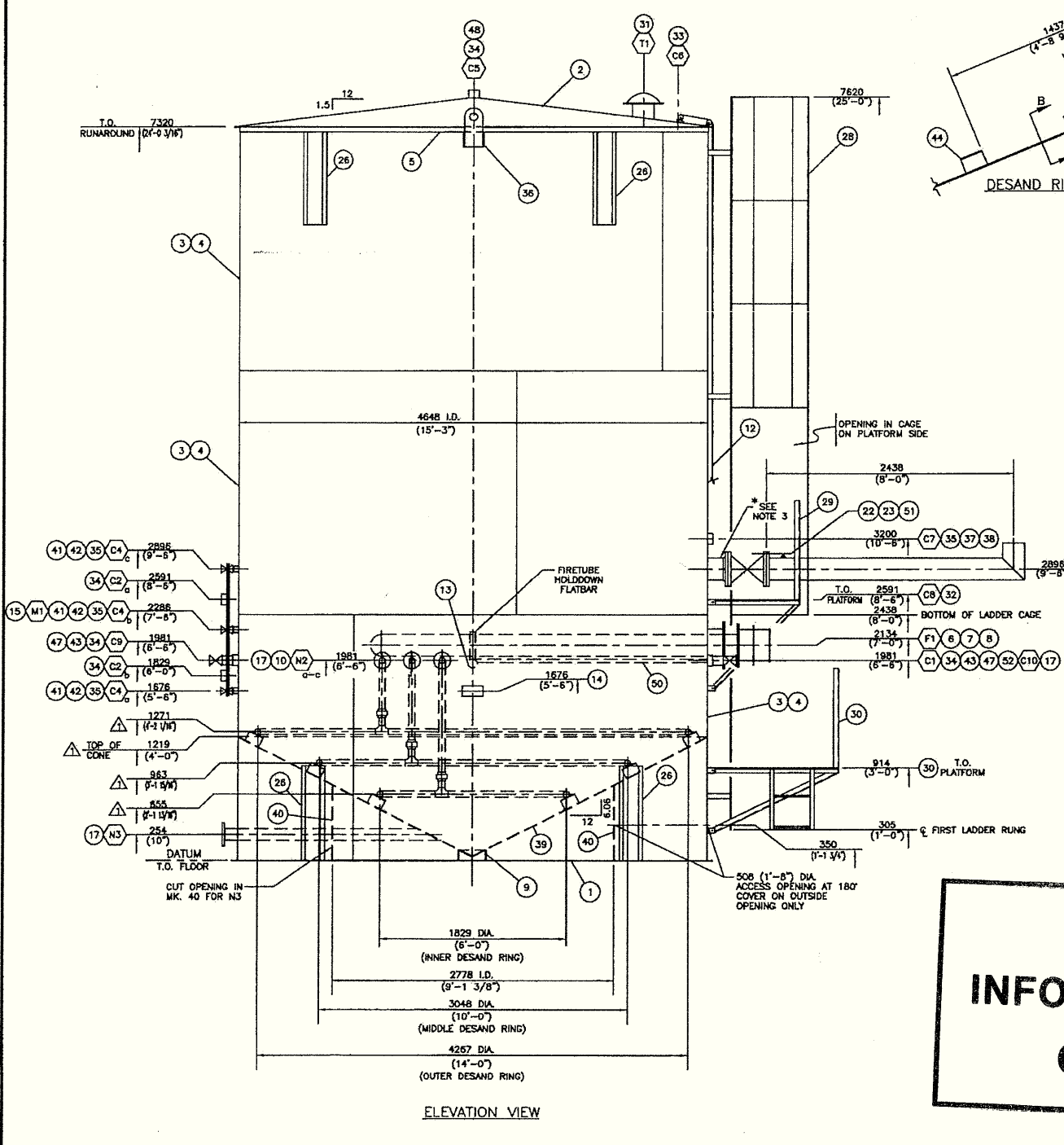
**UNIVERSAL INDUSTRIES LTD.**  
 P.O. BOX 1590  
 LLOYDMINSTER, ALTA./SASK. S9V 1K5

CLIENT: CANADIAN NATURAL RESOURCES LTD.  
 CALGARY, AB.

DWG. TITLE: 750 BBL CONED BOTTOM API TANK  
 GENERAL ARRANGEMENT

SIZE: 4848 I.D. X 7320 HIGH (15'-3" I.D. X 24'-0" 3/16" HIGH)  
 VOLUME: 120 cu. metres (750 BBL.)

SCALE: 1:30  
 DWG. BY: D. LIEBELT  
 DATE: 09/10/98  
 CHK'D: APP:  
 REV. NO. T-10143-D101



**FOR INFORMATION ONLY**

MATERIAL LIST

MK	QTY.	DESCRIPTION	MATERIAL	WT.
1				
2	3	ELBOW 2" SCH STD x 90° L.R.	A-234-WPB	5
3				
4				
5	3	TEE 2" SCH STD	A-234-WPB	11
6				
7				
8	1	COMMON REPAD FOR N2 g-c	REF DWG. T-10143-B103	
9				
10				
11	1	PIPE 2" SCH STD x 5'-0 1/2" LG. ERW	A-53-B	18
12	3	FLANGE 2" ANSI 150 RFSD	A-105	15
13	3	PIPE 2" SCH STD x 3" LG. ERW	A-53-B	1
14	1	PIPE 2" SCH STD x 20'-0" LG. ERW	A-53-B	73
15	9	UNION 2" 3000# S.W.	A-105	48
16	1	PIPE 2" SCH STD x 2'-5 1/2" LG. ERW	A-53-B	9
17	1	PIPE 2" SCH STD x 3'-3 5/16" LG. ERW	A-53-B	12
18	1	PIPE 2" SCH STD x 32'-0" LG. ERW	A-53-B	117
19	1	PIPE 2" SCH STD x 3'-4 15/16" LG. ERW	A-53-B	12
20	1	PIPE 2" SCH STD x 1'-6 3/8" LG. ERW	A-53-B	6
21	1	PIPE 2" SCH STD x 45'-0" LG. ERW	A-53-B	164
22	1	PIPE 2" SCH STD x 1'-5 7/16" LG. ERW	A-53-B	5
23	1	PIPE 4" SCH STD x 8'-0" LG. ERW	A-53-B	29
24	63	HALF COUPLING 1/4" 3000# F.S. SCR'D	A-105	5
25	63	V-JETS 1/4" H1/4H4030	BRASS	5
26	1	PIPE 10" SCH STD x 4" LG. ERW	A-53-B	14
27	1	FLANGE 4" ANSI 150 RFSD	A-105	13
28	1	REPAD 3/16" THK. - 4" SHELL	G40.21-44W	11
29	1	FULL COUPLING 1" MERCHANT THR'D	STEEL	1
30	1	PIPE 1" SCH STD x 8'-8" LG ERW TDE	A-53-B	11
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QTY'S ARE FOR ONE TANK - 2 REQ'D SUB-TOTAL 583  
X 1.06 TOTAL 618 lbs.

- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIONS IN BRACKETS ARE FOR REFERENCE ONLY.
  - ALL NOZZLE PROJECTIONS ARE GIVEN ALONG NOZZLE Q'S
  - ALL NOZZLE FLANGE RATINGS TO BE ASME/ANSI B16.5-1988 ADDENDA B16.5a-1992.

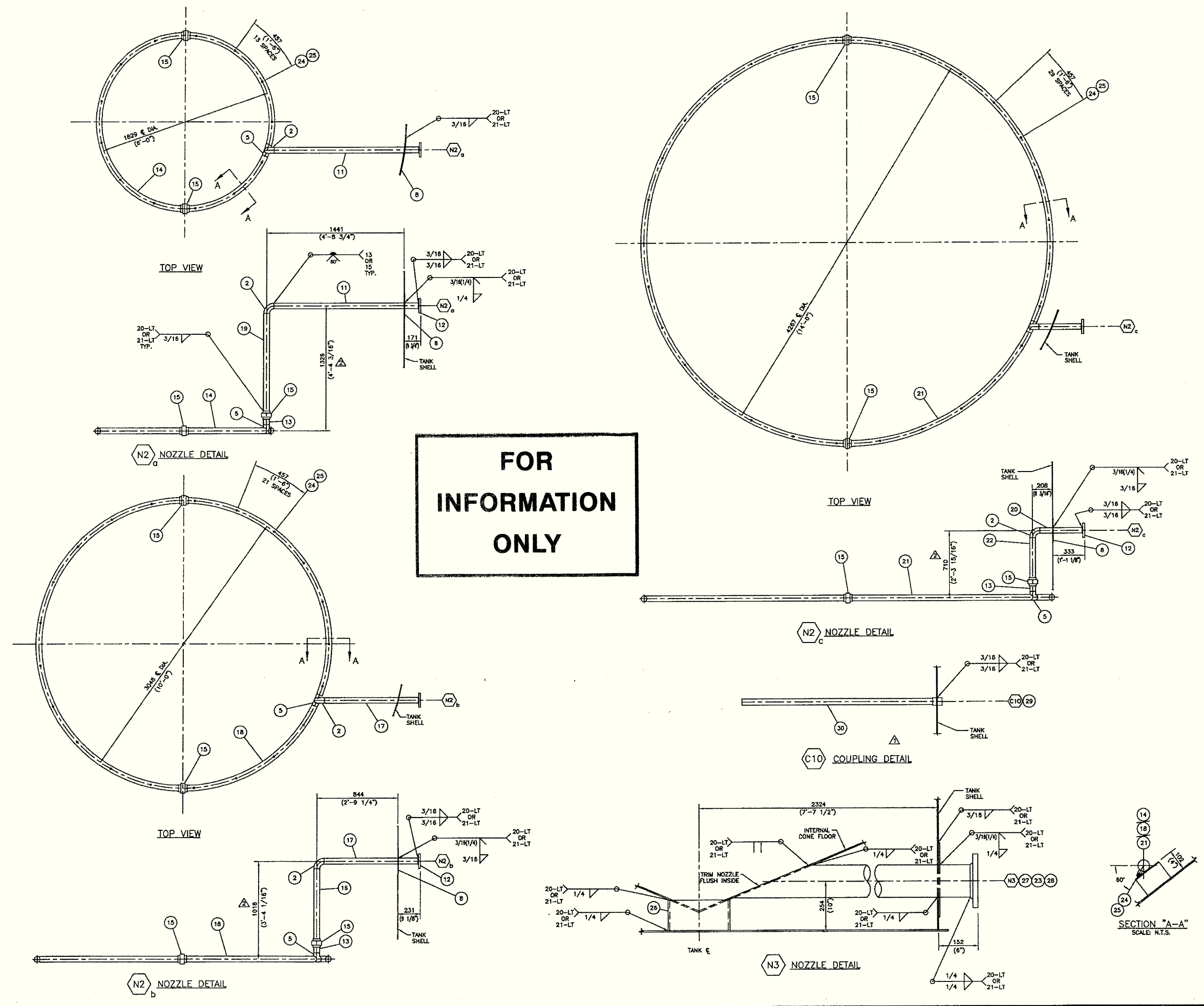
NO	DATE	REVISIONS	BY	APP
28/11/97		AS-BUILT	ALS	
12/12/98		REVISED MK. #18, 19 & 22	DAL	JK
29/10/98		ADDED COUPLING DETAIL	DAL	JK
16/10/96		ISSUED FOR CONSTRUCTION	DAL	JK

**UNIVERSAL INDUSTRIES LTD.**  
P.O. BOX 1590  
LLOYDMINSTER, ALTA./SASK. S9V 1K5

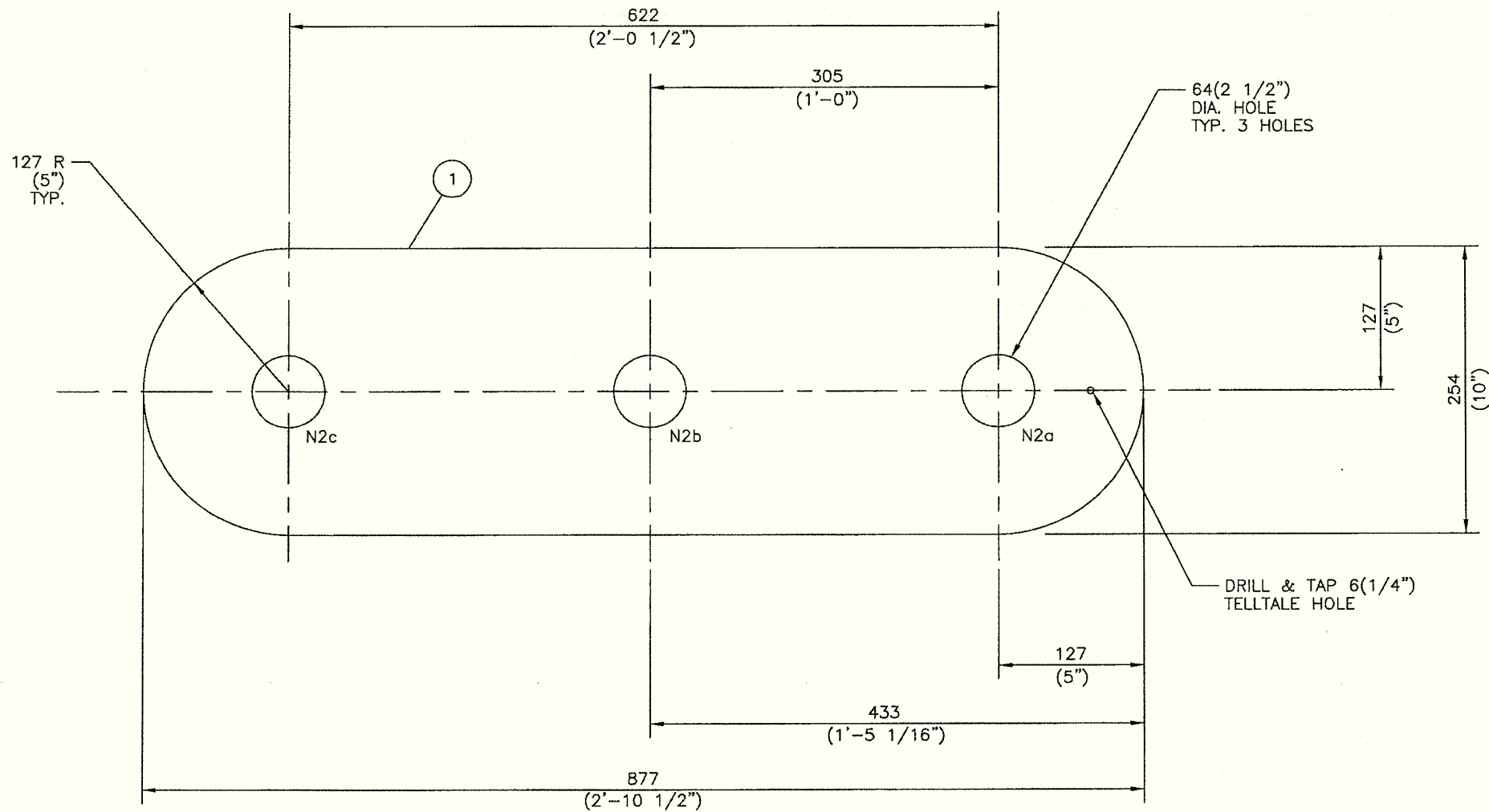
CLIENT: CANADIAN NATURAL RESOURCES LTD.  
CALGARY, AB.

DWG. TITLE: 750 Bbl CONED BOTTOM API TANK NOZZLE DETAILS

SCALE: 1:20	DWG. BY: D. LIEBELT	DWG. NO. T-10143-D102	REV. NO. 3
DATE: 11/10/98	CHK'D: APP:		



COPYING IS PROHIBITED BY LAW



COMMON REPAD

**FOR  
INFORMATION  
ONLY**

MK	QTY	DESCRIPTION	MAT'L	WT.
1	1	PLATE 3/16" THK. x 10" x 2'-10 1/2" LG.	G40.21-44W	15
2				
3				
4				
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22				
23				
24				
25				

QTY'S ARE FOR ONE TANK - 2 REQ'D  
 NOTE:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIONS IN BRACKETS ARE FOR REFERENCE ONLY.

**UNIVERSAL INDUSTRIES LTD.**  
 BOX 1590 LLOYDMINSTER, ALTA/SASK. S9V 1K5

SHOP DRAWING

CLIENT: CANADIAN NATURAL RESOURCES LTD.  
 CALGARY, AB.

TITLE: 750 Bbl CONED BOTTOM API TANK  
 COMMON REPAD FOR NOZZLES N2a-c

SCALE: 1:5    DWN BY: D. LIEBELT    DWG NO: T-10143-B103  
 DATE: 15/10/96    CHK'D: APPD

REV: 0

CADFILE: C:\DWG\S10143\10310143