



HYDROSTATIC DATA SHEET (C-8)

Project Greeley Crescent Gathering AFE/Work Order No. LA 16002

Pipeline 8" Flex Steel Produced Water Pipeline (Name) (Location) DSU 29/30 to C10

Testing Contractor Nitrogen Services

Pipe O.D. 9.117 Wall thickness. .746 Grade NA MFG'R: Flexsteel

Test Fluid Water Additive NA

Test Location: West Trap site Section No. D+DD - 961+07

Instrumentation: On Row

(Location)

(Type)

See Attached

(Mfg'r)

(S/N)

(Date Calibrated)

Time	Pressure PSIG	Ambient Temp.	Time	Pressure PSIG	Ambient Temp.	Time	Pressure PSIG	Ambient Temp.
0600	1015	71	0845	1011	72	1130	1010	78
0615	1015	71	0900	1011	72	1145	1010	79
0630	1015	71	0915	1011	72	1200	1010	80
0645	1014	70	0930	1011	73	1215	1010	81
0700	1014	70	0945	1010	74	1230	1010	82
0715	1013	70	1000	1010	74	1245	1010	83
0730	1013	70	1015	1010	75	1300	1010	83
0745	1013	70	1030	1010	76	1315	1010	84
0800	1012	71	1045	1010	76	1330	1010	85
0815	1012	71	1100	1010	77	1345	1010	86
0830	1012	71	1115	1010	78	1400	1010	87

Test Started 6:00 (Time) AM/PM 7-28-17 (Date) Test Ended 2:00 (Time) AM/PM 7-28-17 (Date)

Remarks:

Weather:

Testing Contractor's

Representative Mike Spratten (Name) supervisor (Title) Mike Spratten (Signature) 7-28-17 (Date)

Constr. Contractor's

Representative Justin C Peeler (Name) Foreman (Title) Justin C Peeler (Signature) 7-28-17 (Date)

Company

Representative THOMAS GRANCE (Name) QA/QC (Title) THOMAS GRANCE (Signature) 7-28-17 (Date)

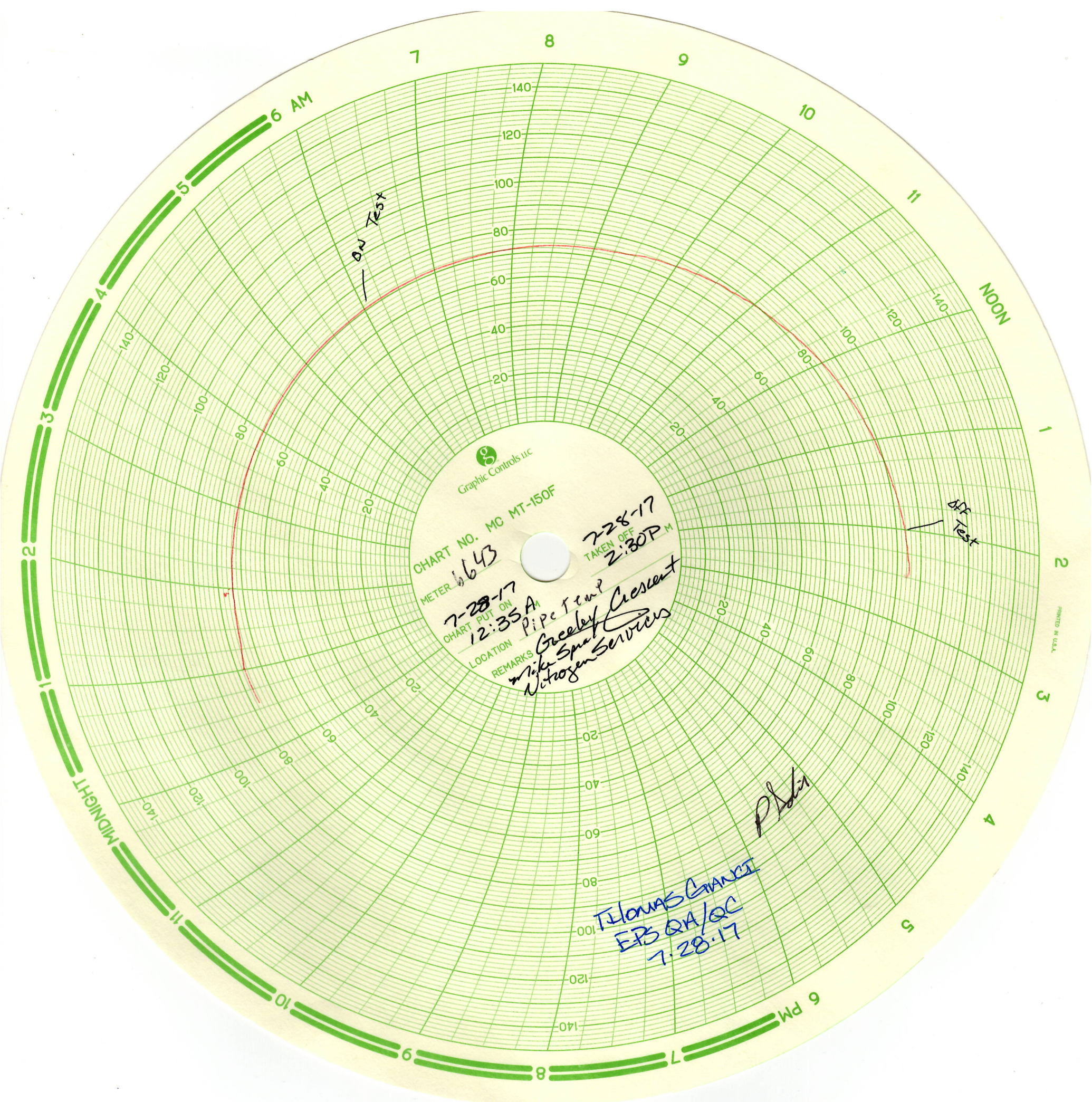
Construction

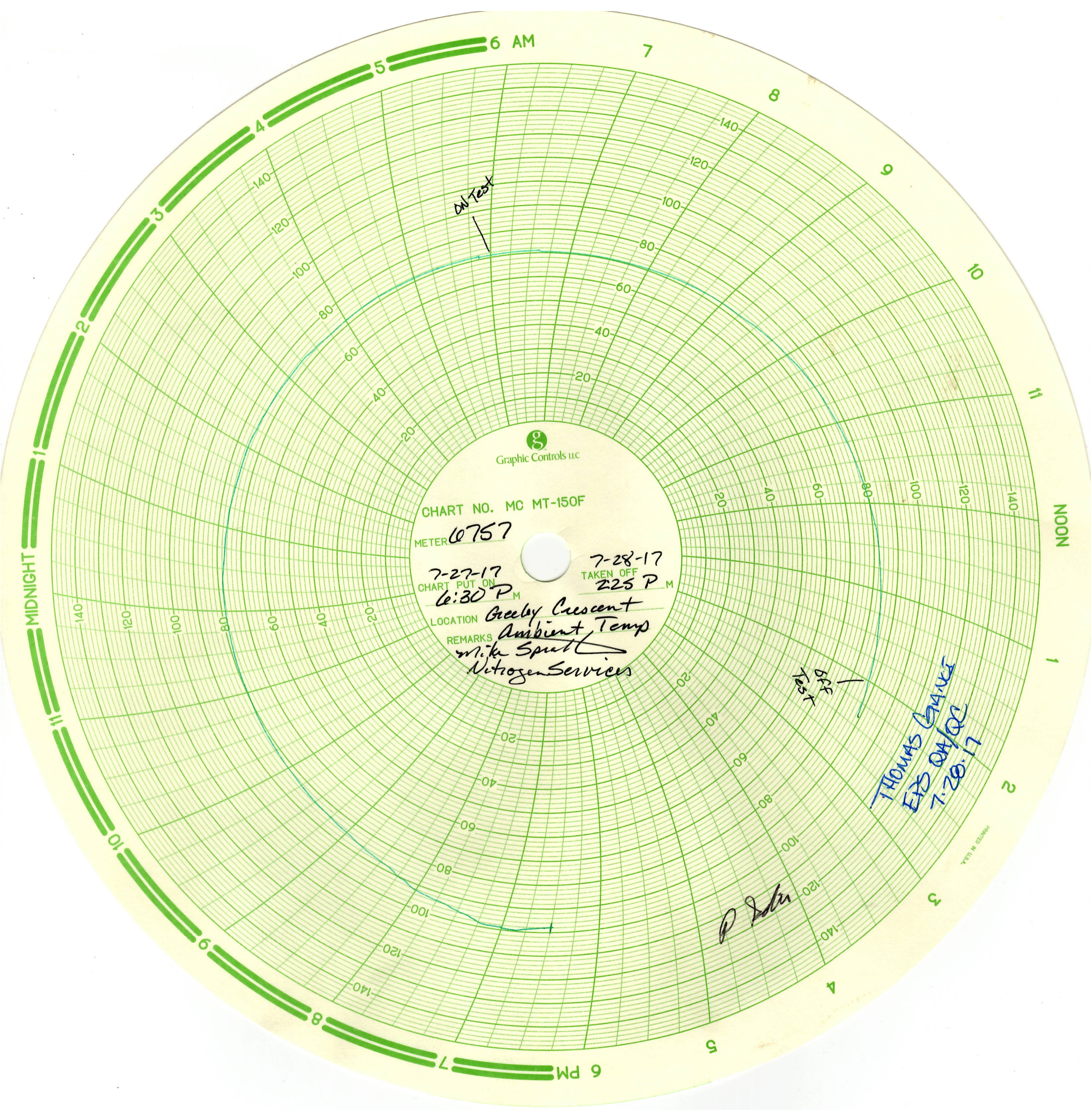
Superintendent ROGER LUCE (Name) CHIEF INSPECTOR (Title) ROGER LUCE (Signature) 7-28-17 (Date)

Greeley Crescent Flex Steel
Produced water hydrotest

7-28-17

Time	Notes	Pressure	Pipe	Ground	Ambient
6:00	On Test	1015.9	71	74	71
6:15	Ambient	1015.5	71	74	71
6:30	Ground Temp	1015.0	71	74	71
6:45	Recorder # 6757	1014.6	71	74	70
7:00		1014.2	71	74	70
7:15	Ground Temp	1013.7	71	74	70
7:30	Recorder # 6758	1013.3	71	74	70
7:45		1013.0	72	73	70
8:00	Pipe Temp	1012.7	73	73	71
8:15	Recorder # 6643	1012.4	73	73	71
8:30		1012.1	73	73	71
8:45	Pipe Pressure	1011.8	73	73	72
9:00	Recorder # 6760	1011.4	73	73	72
9:15		1011.2	73	73	72
9:30	Deadweight	1011.0	74	73	73
9:45	SN# 5366	1010.8	75	73	74
10:00		1010.7	76	72	74
10:15		1010.6	77	72	75
10:30		1010.5	78	72	76
10:45		1010.4	79	72	76
11:00		1010.3	80	72	77
11:15		1010.3	81	71	77
11:30		1010.3	82	71	78
11:45		1010.3	83	71	79
12:00		1010.3	84	71	80
12:15		1010.3	85	71	81
12:30		1010.3	86	71	82
12:45		1010.3	88	71	83
13:00		1010.4	89	71	83
13:15		1010.4	90	71	84
13:30		1010.4	91	71	85
13:45		1010.5	92	71	86
14:00		1010.6	94	71	87





Dal Test

Graphic Controls LLC

CHART NO. MC MT-150F

METER 6757

7-27-17
CHART PUT ON
6:30 P M

7-28-17
TAKEN OFF
2:25 P M

LOCATION Greely Crescent

REMARKS Ambient Temp

with Spurt

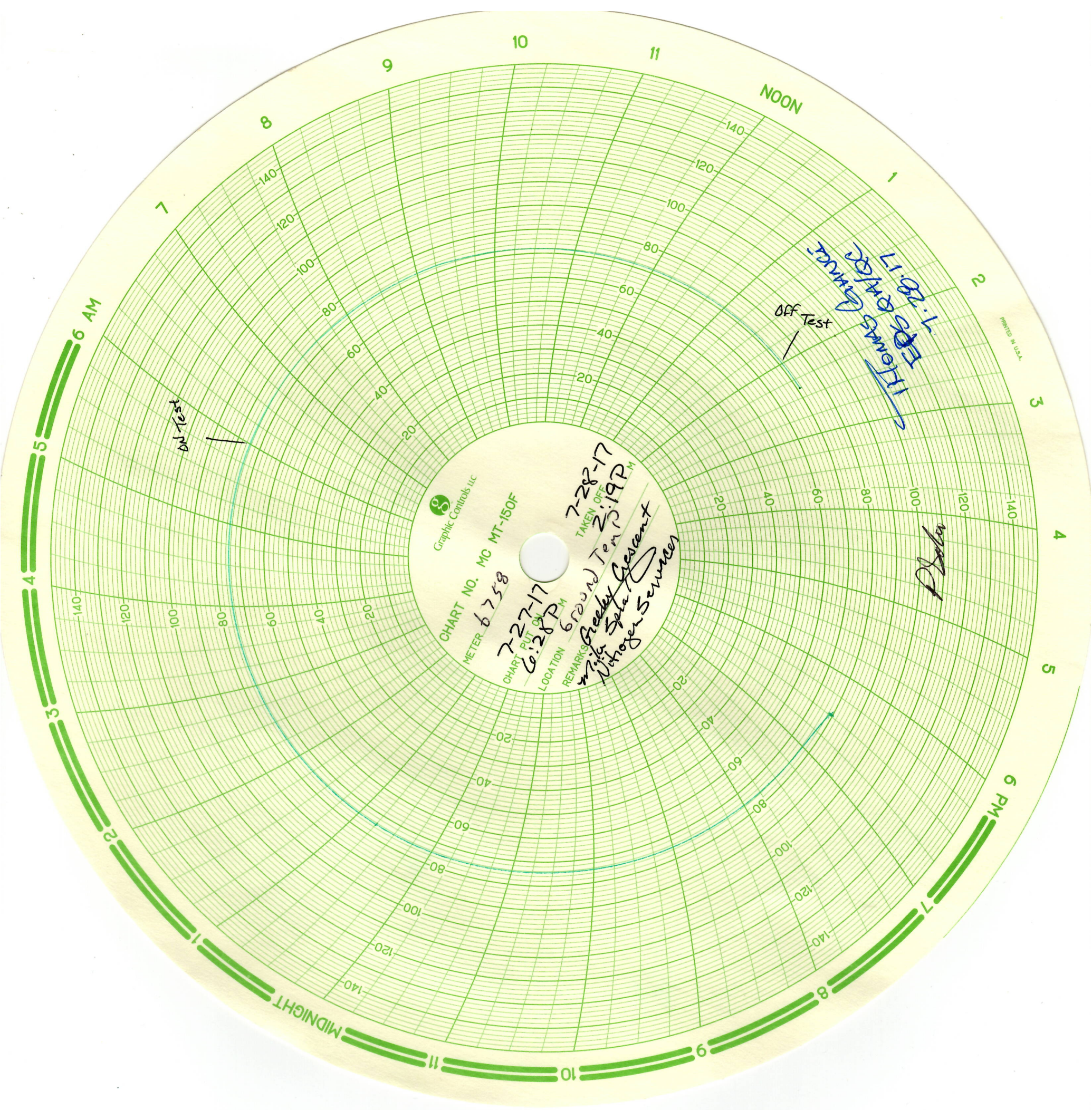
Nitrogen Services

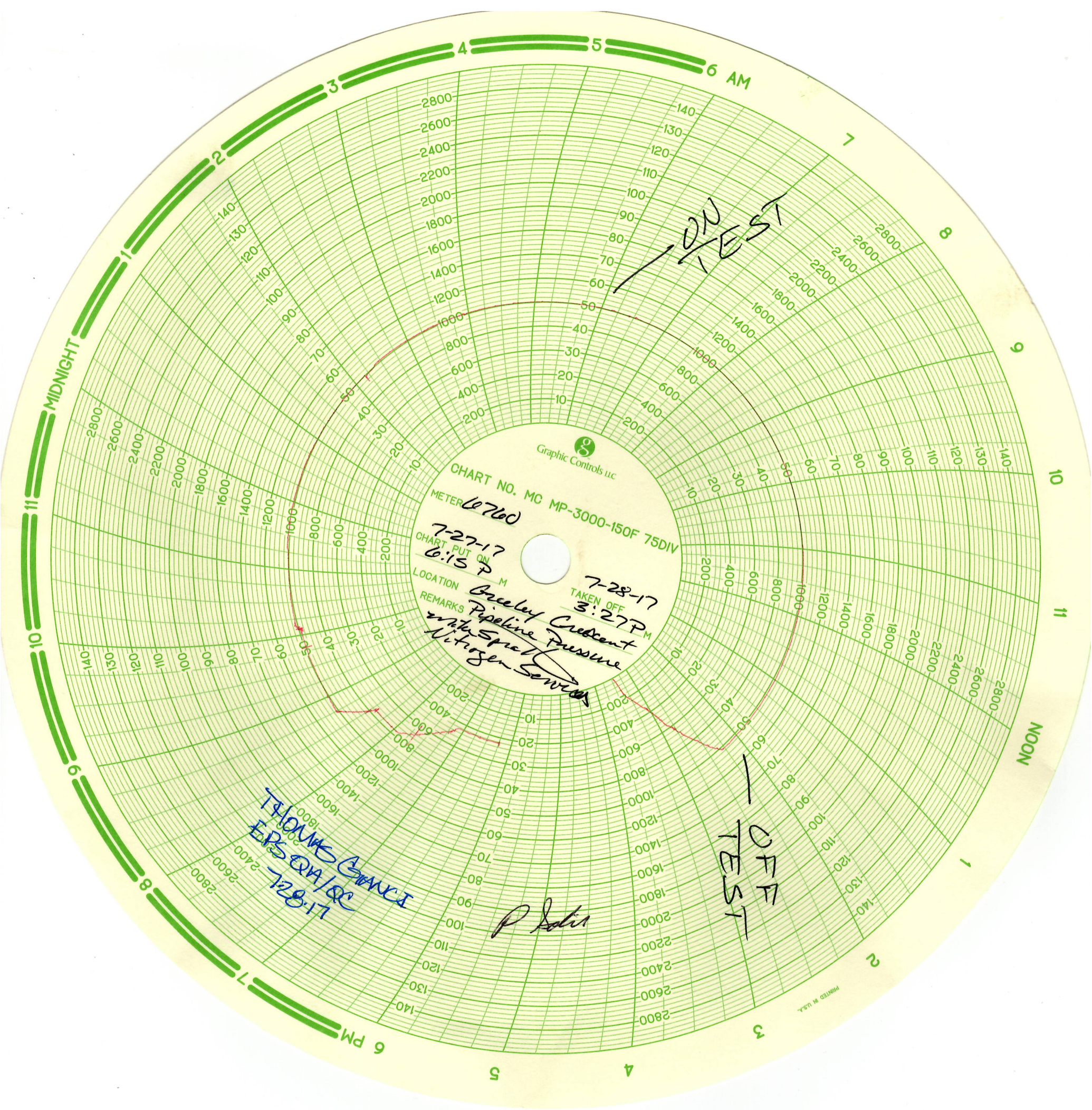
P. John

THOMAS G. M. V.
7-28-17
2:25 P M

off test

MADE IN U.S.A.





Graphic Controls Inc.

CHART NO. MC MP-3000-150F 75DIV
METER 6760

7-27-17
CHART PUT ON
6:15 P

7-28-17
TAKEN OFF
3:27 P

LOCATION Greely Crescent
REMARKS Pipeline Pressure
with Spiral Nitrogen Service

THOMAS GARCIA
ERSQA/R
7-28-17

P. Solis

PRINTED IN U.S.A.

CHARTS Ltd.

GAS MEASUREMENT

CALIBRATION CERTIFICATE

Cert Date: 4/21/2017
Due Date: 4/21/2018

Customer: NITROGEN SERVICES, LLC
Model: BULLFROG 12"
Serial#: 6760

This is to certify that this instrument has been inspected and tested against ADDITEL Digital Gauge ADT680-GP3K, S#218140F0012 Calibrated (11-2-16). Reference Standard#1244 Certified-- with Piston Gauge PG7202 Traceability#1500155509 to NIST. Calibrated in accordance with ISO Quality Standards

This instrument is certified to be accurate within +/- 1% of nominal value

Input Type/ Range: 3000#		Color:RED	
Pen Number: 1			
		<u>Descending</u>	
Applied	Reading:	Applied:	Reading :
0	0	2998	3000
600	600	2398	2400
1500	1500	1500	1500
2398	2400	600	600
2998	3000	0	0

Input Type/Range: 0-150F		Color:GREEN	
Pen Number: 2			
<u>Ascending</u>		<u>Descending</u>	
Applied:	Reading:	Applied:	Reading:
0	0	150	150
32	32	32	32
150	150	0	0

Input Type/ Range:		Color:	
Pen Number:			
<u>Ascending</u>		<u>Descending</u>	
Applied;	Reading:	Applied:	Reading:

P.O. BOX 2983 2031 TRADE DR.
MIDLAND, TX 79706
(432) 697-7801 (432) 520-3564

Technician: Lucanna, Hope

CHARTS Ltd.

GAS MEASUREMENT

CALIBRATION CERTIFICATE

Cert Date: 4/21/2017
Due Date: 4/21/2018

Customer: NITROGEN SERVICES, LLC

Model: BULLFROG 12"

Serial#: 6758

This is to certify that this instrument has been inspected and tested against ADDITEL Digital Gauge ADT680-GP3K, S#218140F0012 Calibrated (11-2-16). Reference Standard#1244 Certified-- with Piston Gauge PG7202 Traceability#1500155509 to NIST. Calibrated in accordance with ISO Quality Standards

This instrument is certified to be accurate within +/- 1% of nominal value

Input Type/ Range: 0-150F		RED	
Pen Number: 2			
		<u>Descending</u>	
Applied	Reading:	Applied:	Reading :
0	0	150	150
32	32	32	32
150	150	0	0

Input Type/Range:		Pen Number:	
Ascending		Descending	
Applied:	Reading:	Applied:	Reading:

Input Type/ Range:		Color:	
Pen Number:			
<u>Ascending</u>		<u>Descending</u>	
Applied;	Reading:	Applied:	Reading:

P.O. BOX 2983 2031 TRADE DR.
MIDLAND, TX 79706
(432) 697-7801 (432) 520-3564

Technician:

Suanna Lopez LP

CHARTS Ltd.

GAS MEASUREMENT

CALIBRATION CERTIFICATE

Date: 4/21/2017
DueDate: 4/21/2018

Customer: NITROGEN SERVICES LLC
Model: CLP 12"
SERIAL: 6643

This is to certify that this instrument has been inspected and tested against Additel Digital Gauge ADT GP30K, Serial#218141D00. Calibrated (11-12-16). Reference Standard Serial#11-218 Ce with Dead Weight Model#KY250 Traceability#1500132804 Traceable to NIST. Calibrated in accordance with ISO9000 Quality Standards

This instrument is certified to be accurate within +/- 1% of nominal value

Input Type/ Range: 0-150F		Color: RED	
Pen Number: 2			
<u>Ascending</u>		<u>Descending</u>	
Applied:	Reading	Applied:	Reading:
0	0	150	150
32	32	32	32
150	150	0	0

Input Type/ Range:		Color:	
Pen Number:			
<u>Ascending</u>		<u>Descending</u>	
Applied:	Reading:	Applied:	Reading:

Input Type/Range:		Color:	
Pen Number:			
<u>Ascending</u>		<u>Descending</u>	
Applied:	Reading:	Applied:	Reading:

P.O. BOX 2983 2031 TRADE DR.
MIDLAND, TX 79706
(432) 697-7801 (432) 520-3564Fax

Technician:

Suzanna Kapp

CHARTS Ltd.

GAS MEASUREMENT

CALIBRATION CERTIFICATE

Date: 4/21/2017
DueDate: 4/21/2018

Customer: NITROGEN SERVICES LLC
Model: BULLFROG12"
SERIAL: 6757

This is to certify that this instrument has been inspected and t
against Additel Digital Guage ADT GP30K, Serial#218141D00
Calibrated (11-12-16). Reference Standard Serial#11-218 Ce
with Dead Weight Model#KY250 Traceability#1500132804
Traceable to NIST. Calibrated in accordance with
ISO9000 Quality Standards

This instrument is cerified to be accurate within +/- 1% of nominal value

Input Type/ Range: 0-150F		Color: RED	
Pen Number: 2			
<u>Ascending</u>		<u>Descending</u>	
Applied:	Reading	Applied:	Reading:
0	0	150	150
32	32	32	32
150	150	0	0

Input Type/Range:		Color:	
Pen Number:			
<u>Ascending</u>		<u>Descending</u>	
Applied:	Reading:	Applied:	Reading:

Input Type/ Range:		Color:	
Pen Number:			
<u>Ascending</u>		<u>Descending</u>	
Applied:	Reading:	Applied:	Reading:

P.O. BOX 2983 2031 TRADE DR.
MIDLAND, TX 79706
(432) 697-7801 (432) 520-3564Fax

Technician:

Suzanne Hope

CHARTS Ltd.

GAS MEASUREMENT

CALIBRATION CERTIFICATE	
Date:	4/21/2017
DueDate:	4/21/2018

Customer:	NITROGEN SERVICES LLC
Model:	DEADWEIGHT
SERIAL:	5366

This is to certify that this instrument has been inspected and t
against Additel Digital Guage ADT GP30K, Serial#218141D00.
Calibrated (11-12-16). Reference Standard Serial#11-218 Ce
with Dead Weight Model#KY250 Traceability#1500132804
Traceable to NIST. Calibrated in accordance with
ISO9000 Quality Standards

This instrument is cerified to be accurate within +/- 1% of nominal value

Input Type/ Range: 3000#		Color: N/A	
Pen Number: N/A			
Ascending		Descending	
Applied:	Reading	Applied:	Reading:
0	0	2995	3000
499	500	2495	2400
1498	1500	1498	1500
2495	2400	499	500
2995	3000	0	0

Input Type/ Range:		Color:	
Pen Number:			
Ascending		Descending	
Applied:	Reading:	Applied:	Reading:

Input Type/Range:		Color:	
Pen Number:			
Ascending		Descending	
Applied:	Reading:	Applied:	Reading:

P.O. BOX 2983 2031 TRADE DR.
MIDLAND, TX 79706
(432) 697-7801 (432) 520-3564Fax

Technician: Blake Erstep

	Chassis	Lower Module	Upper Module	BARO Module	Left Scale	Right Scale
Serial Number	683559	576537	687923		576537	687923
Model	NV	10KPSI	RTD100			
Message Store						
Userspan		1.00000	1.00000			
Offset						
Datatype						
Units		PSI G	°F		Lower PSI G	Upper °F
Tare						
Average						
User Factor						
User Offset						
User Resolution						
Firmware Version	R080016	R090009	R100006			
Calibration Due		6-Feb-18	6-Feb-18			
Run Index	21					
Run Start Time			27-Jul-17/18:12:41			
Run Duration			20 hours 55 minutes			
Run Tag			Prod water			
Logging Interval	300.0					

Data Points				
Point #	Time	Left - PSI G	Right - °F	
1	07-27-17 18:12:41	0	-459.67	
2	07-27-17 18:17:41	446	-459.67	
3	07-27-17 18:22:41	446	-459.67	
4	07-27-17 18:27:41	446	-459.67	
5	07-27-17 18:32:41	446	90.97	
6	07-27-17 18:37:41	446	92.62	
7	07-27-17 18:42:41	446	91.23	
8	07-27-17 18:47:41	446	91.86	
9	07-27-17 18:52:41	446	94.15	

10	07-27-17 18:57:41	446	91.80
11	07-27-17 19:02:41	445	91.93
12	07-27-17 19:07:41	466	86.95
13	07-27-17 19:12:41	499	85.44
14	07-27-17 19:17:41	532	84.67
15	07-27-17 19:22:41	564	83.21
16	07-27-17 19:27:41	596	83.03
17	07-27-17 19:32:41	627	82.59
18	07-27-17 19:37:41	659	81.79
19	07-27-17 19:42:41	691	80.63
20	07-27-17 19:47:41	723	81.26
21	07-27-17 19:52:41	749	81.77
22	07-27-17 19:57:41	769	81.91
23	07-27-17 20:02:41	764	80.95
24	07-27-17 20:07:41	763	80.53
25	07-27-17 20:12:41	762	80.51
26	07-27-17 20:17:41	761	79.71
27	07-27-17 20:22:41	760	80.84
28	07-27-17 20:27:41	759	80.54
29	07-27-17 20:32:41	806	80.60
30	07-27-17 20:37:41	872	79.96
31	07-27-17 20:42:41	936	79.45
32	07-27-17 20:47:41	996	79.36
33	07-27-17 20:52:41	1018	78.68
34	07-27-17 20:57:41	1013	77.93
35	07-27-17 21:02:41	1011	77.70
36	07-27-17 21:07:41	1009	77.45
37	07-27-17 21:12:41	1007	78.00
38	07-27-17 21:17:41	1005	77.97
39	07-27-17 21:22:41	1004	77.58
40	07-27-17 21:27:41	1002	77.81
41	07-27-17 21:32:41	1001	77.88
42	07-27-17 21:37:41	1000	77.55
43	07-27-17 21:42:41	999	77.06
44	07-27-17 21:47:41	998	76.98
45	07-27-17 21:52:41	997	76.67
46	07-27-17 21:57:41	996	76.83

47	07-27-17 22:02:41	995	77.38
48	07-27-17 22:07:41	995	76.88
49	07-27-17 22:12:41	1020	76.68
50	07-27-17 22:17:41	1026	76.27
51	07-27-17 22:22:41	1023	76.43
52	07-27-17 22:27:41	1022	76.13
53	07-27-17 22:32:41	1021	76.14
54	07-27-17 22:37:41	1020	75.76
55	07-27-17 22:42:41	1019	75.79
56	07-27-17 22:47:41	1019	75.00
57	07-27-17 22:52:41	1018	74.84
58	07-27-17 22:57:41	1017	74.19
59	07-27-17 23:02:41	1017	74.25
60	07-27-17 23:07:41	1016	73.46
61	07-27-17 23:12:41	1015	72.91
62	07-27-17 23:17:41	1015	72.15
63	07-27-17 23:22:41	1024	70.95
64	07-27-17 23:27:41	1027	71.16
65	07-27-17 23:32:41	1025	70.87
66	07-27-17 23:37:41	1025	72.18
67	07-27-17 23:42:41	1024	71.41
68	07-27-17 23:47:41	1023	72.07
69	07-27-17 23:52:41	1023	72.23
70	07-27-17 23:57:41	1022	72.51
71	07-28-17 0:02:41	1022	72.42
72	07-28-17 0:07:41	1021	71.97
73	07-28-17 0:12:41	1021	71.43
74	07-28-17 0:17:41	1021	70.66
75	07-28-17 0:22:41	1020	69.13
76	07-28-17 0:27:41	1020	68.84
77	07-28-17 0:32:41	1019	69.03
78	07-28-17 0:37:41	1019	67.88
79	07-28-17 0:42:41	1019	67.53
80	07-28-17 0:47:41	1018	68.21
81	07-28-17 0:52:41	1018	68.22
82	07-28-17 0:57:41	1018	68.18
83	07-28-17 1:02:41	1017	68.26

84	07-28-17 1:07:41	1017	68.16
85	07-28-17 1:12:41	1017	68.36
86	07-28-17 1:17:41	1016	68.20
87	07-28-17 1:22:41	1016	68.48
88	07-28-17 1:27:41	1016	68.39
89	07-28-17 1:32:41	1015	68.03
90	07-28-17 1:37:41	1015	67.31
91	07-28-17 1:42:41	1015	67.51
92	07-28-17 1:47:41	1015	67.48
93	07-28-17 1:52:41	1014	67.34
94	07-28-17 1:57:41	1014	66.75
95	07-28-17 2:02:41	1014	66.22
96	07-28-17 2:07:41	1014	66.47
97	07-28-17 2:12:41	1013	65.79
98	07-28-17 2:17:41	1011	65.48
99	07-28-17 2:22:41	1010	65.83
100	07-28-17 2:27:41	1029	65.98
101	07-28-17 2:32:41	1027	65.43
102	07-28-17 2:37:41	1026	65.43
103	07-28-17 2:42:41	1025	65.31
104	07-28-17 2:47:41	1025	64.77
105	07-28-17 2:52:41	1025	64.91
106	07-28-17 2:57:41	1024	65.06
107	07-28-17 3:02:41	1024	64.70
108	07-28-17 3:07:41	1024	64.65
109	07-28-17 3:12:41	1023	64.64
110	07-28-17 3:17:41	1023	64.82
111	07-28-17 3:22:41	1023	63.75
112	07-28-17 3:27:41	1023	63.97
113	07-28-17 3:32:41	1022	63.83
114	07-28-17 3:37:41	1022	63.47
115	07-28-17 3:42:41	1022	63.10
116	07-28-17 3:47:41	1021	64.02
117	07-28-17 3:52:41	1021	63.73
118	07-28-17 3:57:41	1021	63.85
119	07-28-17 4:02:41	1021	64.07
120	07-28-17 4:07:41	1021	64.09

121	07-28-17 4:12:41	1020	64.19
122	07-28-17 4:17:41	1020	64.17
123	07-28-17 4:22:41	1020	63.57
124	07-28-17 4:27:41	1020	63.77
125	07-28-17 4:32:41	1019	63.82
126	07-28-17 4:37:41	1019	63.68
127	07-28-17 4:42:41	1019	63.60
128	07-28-17 4:47:41	1019	63.50
129	07-28-17 4:52:41	1019	63.40
130	07-28-17 4:57:41	1018	63.36
131	07-28-17 5:02:41	1018	63.03
132	07-28-17 5:07:41	1018	62.98
133	07-28-17 5:12:41	1018	63.54
134	07-28-17 5:17:41	1018	63.77
135	07-28-17 5:22:41	1017	63.69
136	07-28-17 5:27:41	1017	63.58
137	07-28-17 5:32:41	1017	63.51
138	07-28-17 5:37:41	1017	63.80
139	07-28-17 5:42:41	1017	64.11
140	07-28-17 5:47:41	1017	64.30
141	07-28-17 5:52:41	1016	64.78
142	07-28-17 5:57:41	1016	64.93
143	07-28-17 6:02:41	1016	65.22
144	07-28-17 6:07:41	1016	65.40
145	07-28-17 6:12:41	1016	65.51
146	07-28-17 6:17:41	1016	65.69
147	07-28-17 6:22:41	1016	65.82
148	07-28-17 6:27:41	1015	65.92
149	07-28-17 6:32:41	1015	65.98
150	07-28-17 6:37:41	1015	65.99
151	07-28-17 6:42:41	1015	65.97
152	07-28-17 6:47:41	1015	65.82
153	07-28-17 6:52:41	1015	65.82
154	07-28-17 6:57:41	1015	66.05
155	07-28-17 7:02:41	1014	66.19
156	07-28-17 7:07:41	1014	66.01
157	07-28-17 7:12:41	1014	66.61

158	07-28-17 7:17:41	1014	66.70
159	07-28-17 7:22:41	1014	67.64
160	07-28-17 7:27:41	1014	68.02
161	07-28-17 7:32:41	1014	68.82
162	07-28-17 7:37:41	1014	70.63
163	07-28-17 7:42:41	1013	70.46
164	07-28-17 7:47:41	1013	68.83
165	07-28-17 7:52:41	1013	70.65
166	07-28-17 7:57:41	1013	71.75
167	07-28-17 8:02:41	1013	69.70
168	07-28-17 8:07:41	1013	69.87
169	07-28-17 8:12:41	1013	70.27
170	07-28-17 8:17:41	1013	72.41
171	07-28-17 8:22:41	1013	70.40
172	07-28-17 8:27:41	1013	69.71
173	07-28-17 8:32:41	1012	69.94
174	07-28-17 8:37:41	1012	70.18
175	07-28-17 8:42:41	1012	69.80
176	07-28-17 8:47:41	1012	70.22
177	07-28-17 8:52:41	1012	70.52
178	07-28-17 8:57:41	1012	70.66
179	07-28-17 9:02:41	1012	70.11
180	07-28-17 9:07:41	1012	70.55
181	07-28-17 9:12:41	1012	70.38
182	07-28-17 9:17:41	1012	71.46
183	07-28-17 9:22:41	1012	74.23
184	07-28-17 9:27:41	1011	74.40
185	07-28-17 9:32:41	1011	76.60
186	07-28-17 9:37:41	1011	73.97
187	07-28-17 9:42:41	1011	76.40
188	07-28-17 9:47:41	1011	75.31
189	07-28-17 9:52:41	1011	74.30
190	07-28-17 9:57:41	1011	74.26
191	07-28-17 10:02:41	1011	74.47
192	07-28-17 10:07:41	1011	74.79
193	07-28-17 10:12:41	1011	76.30
194	07-28-17 10:17:41	1011	76.72

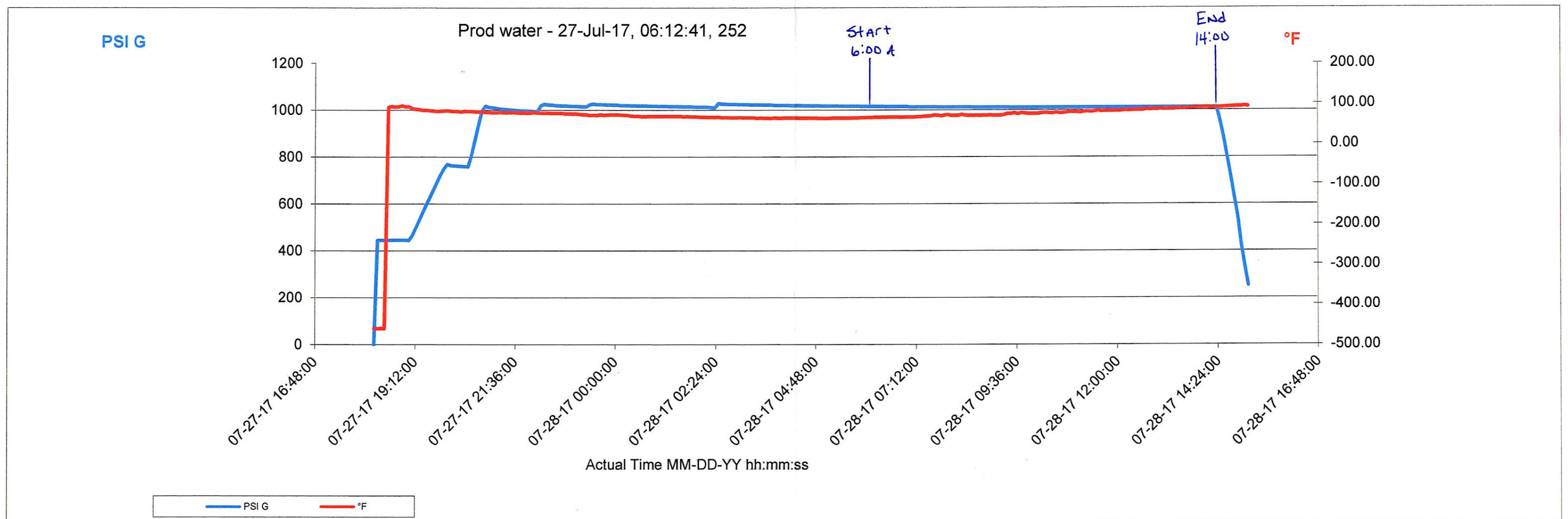


195	07-28-17 10:22:41	1011	75.90
196	07-28-17 10:27:41	1011	75.65
197	07-28-17 10:32:41	1011	77.53
198	07-28-17 10:37:41	1011	76.08
199	07-28-17 10:42:41	1011	76.26
200	07-28-17 10:47:41	1011	77.48
201	07-28-17 10:52:41	1011	79.09
202	07-28-17 10:57:41	1011	78.35
203	07-28-17 11:02:41	1011	78.26
204	07-28-17 11:07:41	1011	77.28
205	07-28-17 11:12:41	1011	79.42
206	07-28-17 11:17:41	1011	80.03
207	07-28-17 11:22:41	1011	79.65
208	07-28-17 11:27:41	1011	80.24
209	07-28-17 11:32:41	1011	82.57
210	07-28-17 11:37:41	1011	80.77
211	07-28-17 11:42:41	1011	80.84
212	07-28-17 11:47:41	1011	80.81
213	07-28-17 11:52:41	1011	81.28
214	07-28-17 11:57:41	1011	81.55
215	07-28-17 12:02:41	1011	81.79
216	07-28-17 12:07:41	1011	82.26
217	07-28-17 12:12:41	1011	82.98
218	07-28-17 12:17:41	1011	82.71
219	07-28-17 12:22:41	1011	83.22
220	07-28-17 12:27:41	1011	83.35
221	07-28-17 12:32:41	1011	83.75
222	07-28-17 12:37:41	1011	83.84
223	07-28-17 12:42:41	1011	85.61
224	07-28-17 12:47:41	1011	84.68
225	07-28-17 12:52:41	1011	85.32
226	07-28-17 12:57:41	1011	84.98
227	07-28-17 13:02:41	1011	86.35
228	07-28-17 13:07:41	1011	85.82
229	07-28-17 13:12:41	1011	85.75
230	07-28-17 13:17:41	1011	85.97
231	07-28-17 13:22:41	1011	86.08

232	07-28-17 13:27:41	1011	86.97
233	07-28-17 13:32:41	1011	86.59
234	07-28-17 13:37:41	1011	86.78
235	07-28-17 13:42:41	1011	86.95
236	07-28-17 13:47:41	1011	88.18
237	07-28-17 13:52:41	1011	88.75
238	07-28-17 13:57:41	1011	89.06
239	07-28-17 14:02:41	1011	89.28
240	07-28-17 14:07:41	1011	90.04
241	07-28-17 14:12:41	1011	88.75
242	07-28-17 14:17:41	1011	88.90
243	07-28-17 14:22:41	1011	89.33
244	07-28-17 14:27:41	951	89.74
245	07-28-17 14:32:41	881	90.37
246	07-28-17 14:37:41	796	91.00
247	07-28-17 14:42:41	721	91.35
248	07-28-17 14:47:41	632	91.85
249	07-28-17 14:52:41	547	92.07
250	07-28-17 14:57:41	426	92.47
251	07-28-17 15:02:41	335	93.40
252	07-28-17 15:07:41	252	92.07



8" Flexsteel Produced Water



Justin C Peeler
EPS Test foreman
Justin C Peeler
7-28-17

Thomas GANCE
EPS QA/QC
7-28-17



Calibration Certificate

7200 E. Dry Creek Rd, STE C-102, Centennial, CO 80112
Ph. 303-804-0667 Cal.Lab@Apex-Instruments.com

Certificate Number: 170429

Customer:

Cross Country Pipeline Supply
Aurora, CO

Manufacturer: Crystal Engineering

Model Number: nVision 10,000 psi

Serial Number: 576537

Description: Pressure Module

Procedure: CRY_P_nVPM

Calibrated To: Manufacturer's Specifications

Technician: Austin Molyneux

Calibration Date: 2/6/2017

Due Date: 2/6/2018

As Found: In Tolerance

As Left: In Tolerance

Temperature: 72 F

Humidity: 30 %

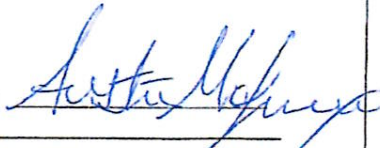
Tolerance Specs:

0 to 30% of FS: +/- 0.015% of FS

30% to 110% of FS: +/- 0.05% of Rdg

Technician Notes:

As Left Userspan: 1.00000

Approved Signatory: 

Apex Instruments certifies that the instrument listed above meets the specifications of the manufacturer at the completion of its calibration. Standards used are traceable to the National Institute of Standards and Technology (NIST), or have been derived from accepted values, natural physical constants, or through the use of the ratio method of self-calibration techniques.

Methods used are in accordance with the procedure listed above. This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

This certificate does not guarantee the continued performance of the instrument listed above. Any modifications or services performed hereafter may void this certificate.

This certificate is not to be reproduced other than in full, except with prior written approval from Apex Instruments Inc.

Standards Used

Description	Model Number	Serial Number	Calibration Date	Due Date	ID
Electronic Deadweight Tester	RPM4-E-DWT A100M/A10M	1709	11/2/2016	11/2/2017	APX00024



APX01014

Compass Import
10000PSI

Test Description	Nominal Value	Found / Left	Test Results	Upper Limit	Status
0	0.08 psi	-1.42 psi	0.4 psi	1.58 psi	Pass
2000	1999.90 psi	1998.40 psi	2000.4 psi	2001.40 psi	Pass
4000	3998.98 psi	3996.98 psi	3999.4 psi	4000.98 psi	Pass
6000	6000.90 psi	5997.90 psi	6001.4 psi	6003.90 psi	Pass
8000	8001.00 psi	7997.00 psi	8001.5 psi	8005.00 psi	Pass
10000	10001.21 psi	9996.21 psi	10001.9 psi	10006.21 psi	Pass
8000	8002.56 psi	7998.56 psi	8003.0 psi	8006.56 psi	Pass
6000	5999.03 psi	5996.03 psi	5999.9 psi	6002.03 psi	Pass
4000	3999.34 psi	3997.34 psi	4000.0 psi	4001.34 psi	Pass
2000	1999.24 psi	1997.74 psi	2000.0 psi	2000.74 psi	Pass
0	0.08 psi	-1.42 psi	0.0 psi	1.58 psi	Pass

- End of measurement results-



APX01014



APEX
INSTRUMENTS

7200 E. Dry Creek Rd, STE C-102, Centennial, CO 80112
Ph. 303-804-0667 Cal.Lab@Apex-Instruments.com

Calibration Certificate

Certificate Number: 170428

Customer:

Cross Country Pipeline Supply
Aurora, CO

Manufacturer: Crystal Engineering
Model Number: nVision RTD100
Serial Number: 687923
Description: Temperature Module (RTD)
Procedure: CRY_R_RTD100p
Calibrated To: Manufacturer's Specifications
Technician: Austin Molyneux

Calibration Date: 2/6/2017
Due Date: 2/6/2018
As Found: In Tolerance
As Left: In Tolerance
Temperature: 72 F
Humidity: 30 %

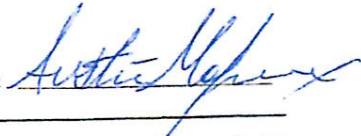
Tolerance Specs:

Range: 0 to 400 ohms ; -328 to 1562 degF (PT100 0.00385)

Resistance 0 to 100% of FS: +/- (0.015% of R_{dg} + 0.02 ohms)
Class B Probe Temperature Deviation: +/- (0.3 + 0.005*T) degC

Technician Notes:

As Left Userspan: 1.00000

Approved Signatory: 

Apex Instruments certifies that the instrument listed above meets the specifications of the manufacturer at the completion of its calibration. Standards used are traceable to the National Institute of Standards and Technology (NIST), or have been derived from accepted values, natural physical constants, or through the use of the ratio method of self-calibration techniques.

Methods used are in accordance with the procedure listed above. This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

This certificate does not guarantee the continued performance of the instrument listed above. Any modifications or services performed hereafter may void this certificate.

This certificate is not to be reproduced other than in full, except with prior written approval from Apex Instruments Inc.

Standards Used

Description	Model Number	Serial Number	Calibration Date	Due Date	ID
Multifunction Calibrator	5520A	1044011	3/8/2016	3/8/2017	APX00013
Reference Thermometer Readout	1502A	B64070	5/11/2016	5/11/2017	APX00014
Standard PRT	5628-12-D	3526	5/11/2016	5/11/2017	APX00016



APX01013

Crystal nVision RTD100 w/Probe

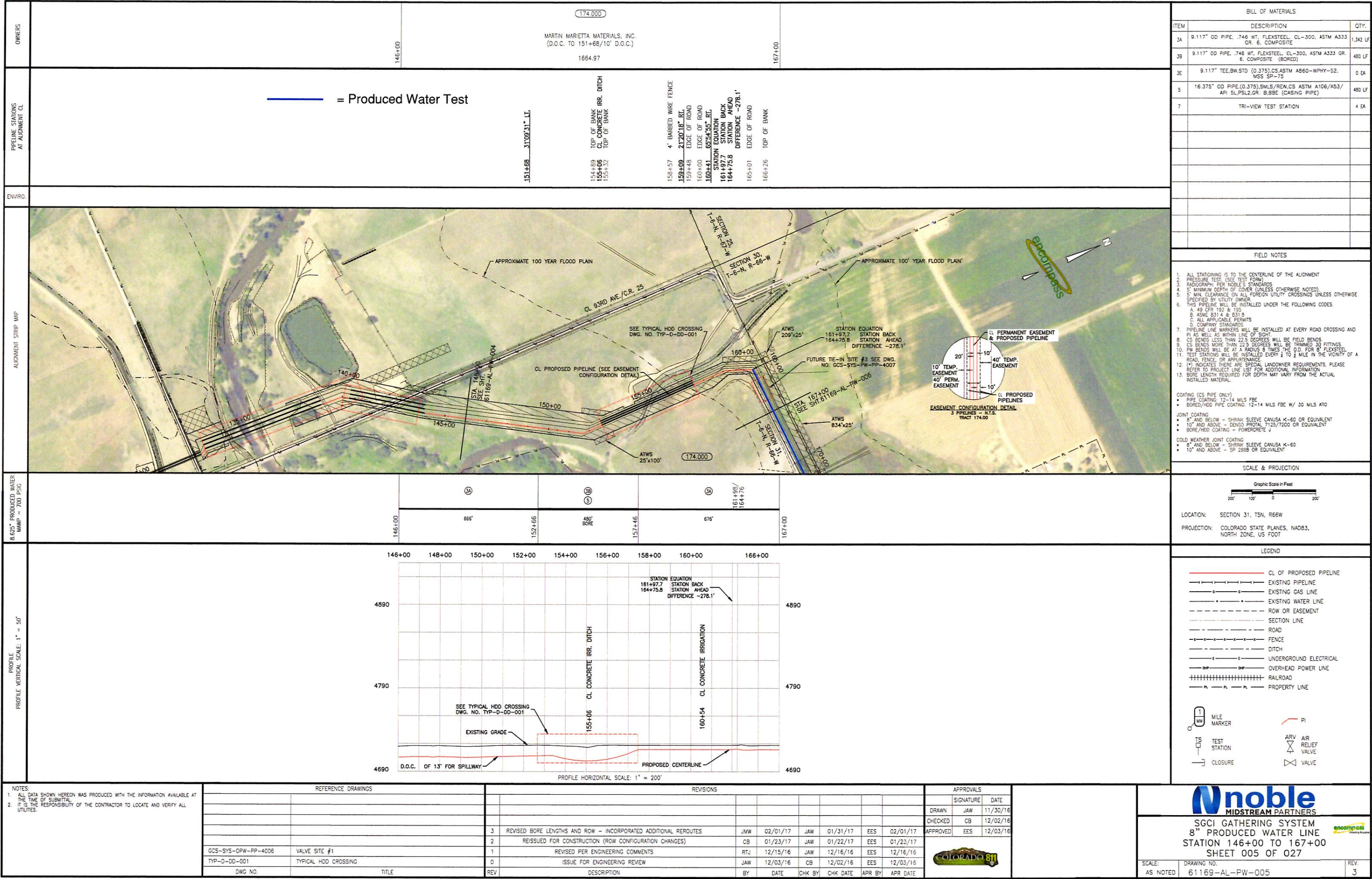
Manual Template

		Found / Left				Pass
Test Description	Nominal Value	Lower Limit	Test Results	Upper Limit	Status	
Measure Resistance						
5 Ohms	5.00 Ω	4.98 Ω	5.00 Ω	5.02 Ω	Pass	
100 Ohms	100.00 Ω	99.97 Ω	100.00 Ω	100.03 Ω	Pass	
200 Ohms	200.00 Ω	199.96 Ω	200.00 Ω	200.04 Ω	Pass	
300 Ohms	300.00 Ω	299.94 Ω	299.99 Ω	300.05 Ω	Pass	
400 Ohms	400.00 Ω	399.92 Ω	400.01 Ω	400.08 Ω	Pass	
RTD Probe Verification						
Class B / 3-Wire / PT100 0.00385						
32 F	32.00 °F	31.54 °F	32.41 °F	32.52 °F	Pass	
250 F	250.51 °F	248.88 °F	251.00 °F	252.14 °F	Pass	

— End of measurement results—



APX01013



OWNERS

Pipeline Stations at Alignment CL

ENVIRO.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY.
3A	9.117" OD PIPE, .746 WT, FLEXSTEEL, CL-300, ASTM A333 GR. 6, COMPOSITE	1,087 LF
3B	9.117" OD PIPE, .746 WT, FLEXSTEEL, CL-300, ASTM A333 GR. 6, COMPOSITE (BORED)	713 LF
3C	9.117" TEE,BW,STD (0.375)CS,ASTM A860-WPHY-S2, MSS SP-75	0 EA
5	16.375" OD PIPE(0.375)SMLS/REW.CS ASTM A106/A53/API 5L,PSL2,GR. B,BBE (CASING PIPE)	713 LF
7	TRI-VIEW TEST STATION	5 EA

FIELD NOTES

- ALL STATIONING IS TO THE CENTERLINE OF THE ALIGNMENT
- PRESSURE TEST (SEE TEST FORM)
- RADIOGRAPH - PER NOBLE'S STANDARDS
- MINIMUM DEPTH OF COVER (UNLESS OTHERWISE NOTED)
- 5' MIN. CLEARANCE ON ALL FOREIGN UTILITY CROSSINGS UNLESS OTHERWISE SPECIFIED BY UTILITY OWNER
- THIS PIPELINE WILL BE INSTALLED UNDER THE FOLLOWING CODES:
 - A. 49 CFR 192 & 199
 - B. ASME B31.4 & B31.8
 - C. ALL APPLICABLE PERMITS
 - D. COMPANY STANDARDS
- PIPELINE LINE MARKERS WILL BE INSTALLED AT EVERY ROAD CROSSING AND PI AS WELL AS WITHIN LINE OF SIGHT
- CS BENDS LESS THAN 22.5 DEGREES WILL BE FIELD BENDS
- CS BENDS MORE THAN 22.5 DEGREES WILL BE TRIMMED TO FITTINGS
- PW BENDS WILL BE AT A RADIUS 8 TIMES THE O.D. FOR 8" FLEXSTEEL
- TEST STATIONS WILL BE INSTALLED EVERY 1/2 TO 1 MILE IN THE VICINITY OF A ROAD, FENCE, OR APPURTENANCE
- (*) INDICATES THERE ARE SPECIAL LANDOWNER REQUIREMENTS, PLEASE REFER TO PROJECT LINE LIST FOR ADDITIONAL INFORMATION
- BORE LENGTH REQUIRED FOR DEPTH MAY VARY FROM THE ACTUAL INSTALLED MATERIAL

SCALE & PROJECTION

Graphic Scale in Feet
200' 100' 0' 100' 200'

LOCATION: SECTION 29 & 30, T6N, R66W
PROJECTION: COLORADO STATE PLANES, NAD83, NORTH ZONE, US FOOT

LEGEND

- CL OF PROPOSED PIPELINE
- EXISTING PIPELINE
- EXISTING GAS LINE
- EXISTING WATER LINE
- ROW OR EASEMENT
- SECTION LINE
- FENCE
- DITCH
- UNDERGROUND ELECTRICAL
- OVERHEAD POWER LINE
- RAILROAD
- PROPERTY LINE
- MILE MARKER
- PI
- TS TEST STATION
- ARV AIR RELIEF VALVE
- CLOSURE
- VALVE

NOTES:

- ALL DATA SHOWN HEREON WAS PRODUCED WITH THE INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND VERIFY ALL UTILITIES.

REFERENCE DRAWINGS

DWG NO.	TITLE
GCS-SYS-HDD-MP-9035	WRC 27 HDD CROSSING
TYP-D-DD-001	TYPICAL HDD CROSSING

REVISIONS

REV	DATE	DESCRIPTION
4	02/20/17	REVISED STATIONING CALL OUTS / HDD DRAWING NUMBERS
3	02/01/17	REVISED BORE LENGTHS AND ROW - INCORPORATED ADDITIONAL REROUTES
2	01/23/17	REISSUED FOR CONSTRUCTION (ROW CONFIGURATION CHANGES)
1	12/15/16	REVISED PER ENGINEERING COMMENTS
0	12/03/16	ISSUE FOR ENGINEERING REVIEW

APPROVALS

SIGNATURE	DATE
DRAWN JAW	11/30/16
CHECKED CB	12/02/16
APPROVED EES	12/03/16

SCGC MIDSTREAM PARTNERS

SGCI GATHERING SYSTEM
8" PRODUCED WATER LINE
STATION 261+00 TO 236+00
SHEET 007 OF 027

SCALE: AS NOTED
DRAWING NO. 61169-AL-PW-007
REV. 4

OWNERS

161.000	157.000	156.200
ORR ED	GREAT WESTERN RAILROAD	GOETZEL RICHARD W AND MARY ANN
2169.57	116.42	794.67

PIPELINE STATIONS AT ALIGNMENT CL

— = Produced Water Test

ENVIRONMENTAL

ALIGNMENT STRIP MAP

9.117" PRODUCED WATER MAIN - 700 PSIG

PROFILE VERTICAL SCALE: 1" = 50'

REFERENCE DRAWINGS

DWG NO.	TITLE
GCS-SYS-OPW-PP-9002	GREAT WESTERN RAILROAD HDD CROSSING
GCS-SYS-OPW-PP-4008	FUTURE TIE-IN SITE #4
TYP-D-DD-001	TYPICAL HDD CROSSING

REVISIONS

REV	DATE	DESCRIPTION
4	02/20/17	JAW
3	02/01/17	JAW
2	01/23/17	CB
1	12/15/16	RTJ
0	12/03/16	EES

APPROVALS

SIGNATURE	DATE
DRAWN JAW	11/30/16
CHECKED CB	12/02/16
APPROVED EES	12/03/16

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY.
3A	9.117" OD PIPE, .746 WT. FLEXSTEEL, CL-300, ASTM A333 GR. B, COMPOSITE	2518 LF
3B	9.117" OD PIPE, .746 WT. FLEXSTEEL, CL-300, ASTM A333 GR. B, COMPOSITE (BORED)	446 LF
3C	9.117" TEE,BW,STD (0.375),CS,ASTM A860-WPHY-52, MSS SP-75	0 EA
5	16.375" OD PIPE(0.375),SMLS/REW,CS ASTM A106/A53/API 5L,PSL2,GR. B,BBE (CASING PIPE)	446 LF
7	TRI-VIEW TEST STATION	4 EA

FIELD NOTES

- ALL STATIONING IS TO THE CENTERLINE OF THE ALIGNMENT
- PRESSURE TEST (SEE TEST FORM)
- RADIOGRAPHY PER NDT SOCIETY STANDARDS
- 5' MINIMUM DEPTH OF COVER (UNLESS OTHERWISE NOTED)
- 5' MIN. CLEARANCE ON ALL FOREIGN UTILITY CROSSINGS UNLESS OTHERWISE SPECIFIED BY UTILITY OWNER
- THIS PIPELINE WILL BE INSTALLED UNDER THE FOLLOWING CODES:
A. 49 CFR 192 & 199
B. ASME B31.4 & B31.8
C. ALL APPLICABLE PERMITS
D. COMPANY STANDARDS
- PIPELINE LINE MARKERS WILL BE INSTALLED AT EVERY ROAD CROSSING AND PI AS WELL AS WITHIN LINE OF SIGHT
- CS BENDS LESS THAN 22.5 DEGREES WILL BE FIELD BENDS
- CS BENDS MORE THAN 22.5 DEGREES WILL BE TRIMMED JOINT FITTINGS
- PW BENDS WILL BE AT A RADIUS 8 TIMES THE O.D. FOR 6" FLEXSTEEL
- TEST STATIONS WILL BE INSTALLED EVERY 2 TO 2.5 MILE IN THE VICINITY OF A ROAD, FENCE, OR APPURTENANCE
- (*) INDICATES THERE ARE SPECIAL LANDOWNER REQUIREMENTS, PLEASE REFER TO PROJECT LINE LIST FOR ADDITIONAL INFORMATION
- BORE LENGTH REQUIRED FOR DEPTH MAY VARY FROM THE ACTUAL INSTALLED MATERIAL

SCALE & PROJECTION

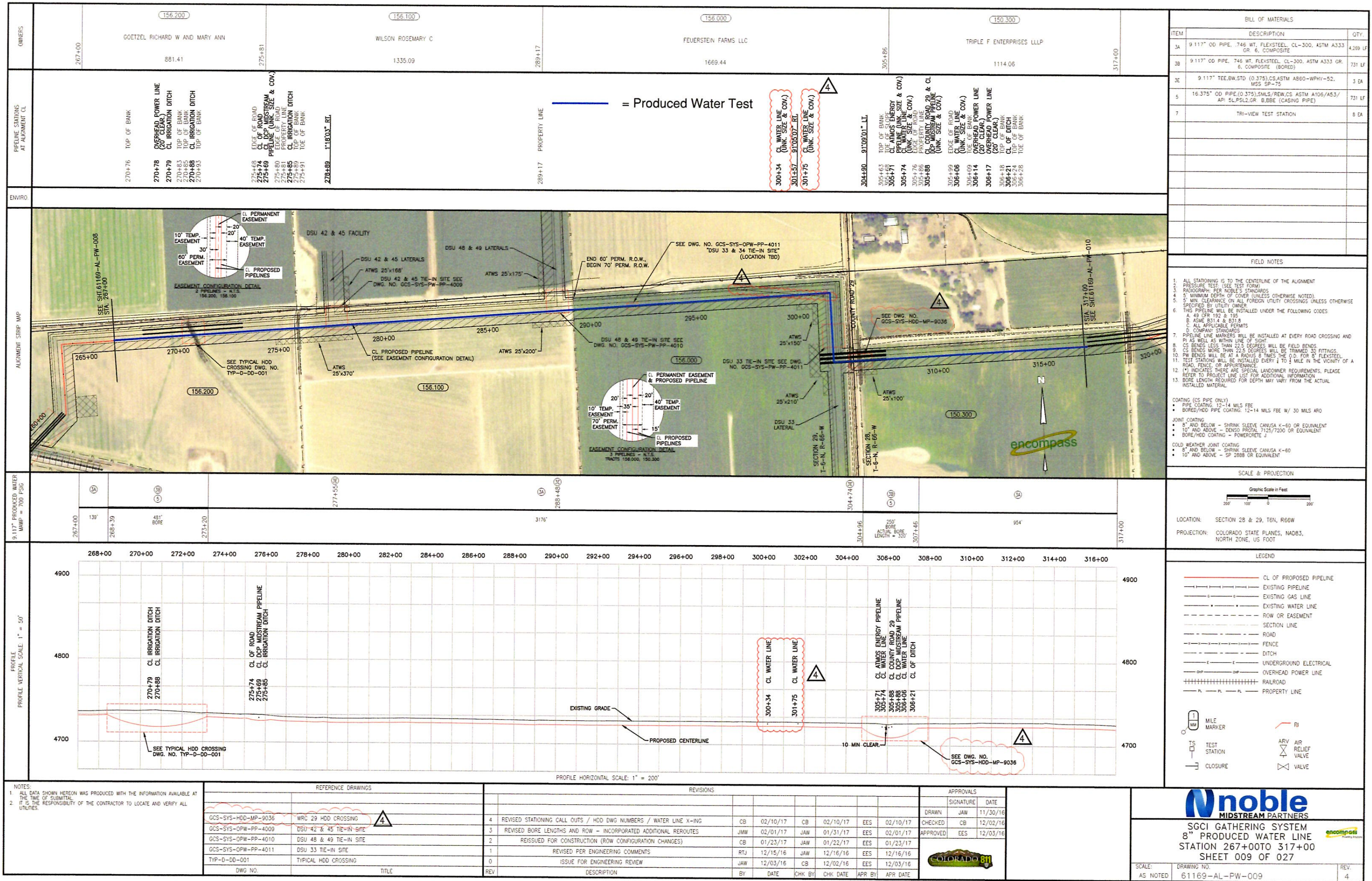
Graphic Scale in Feet

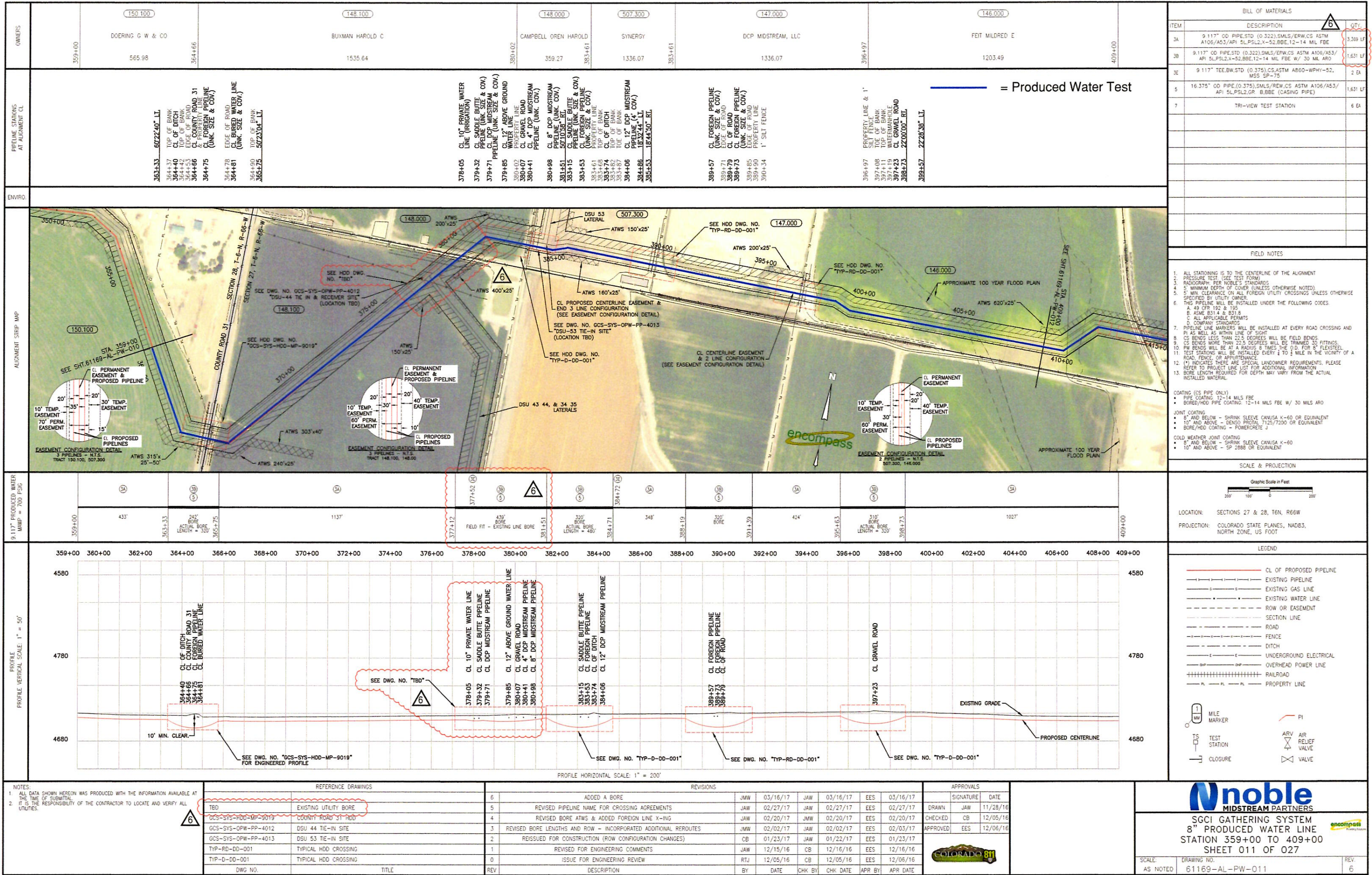
LOCATION: SECTION 29, T6N, R66W

PROJECTION: COLORADO STATE PLANES, NAD83, NORTH ZONE, US FOOT

LEGEND

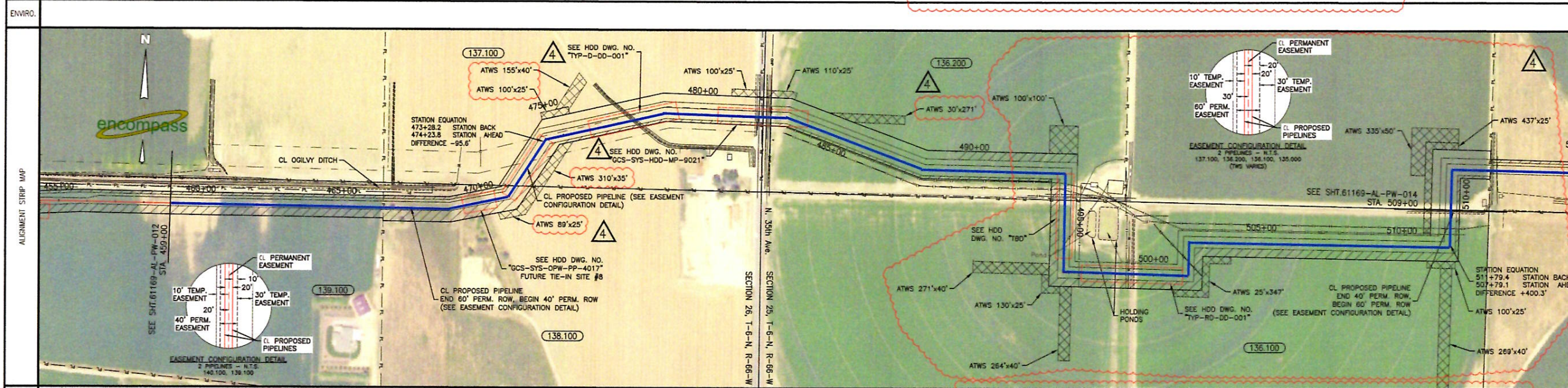
- CL OF PROPOSED PIPELINE
- EXISTING PIPELINE
- EXISTING GAS LINE
- EXISTING WATER LINE
- ROW OR EASEMENT
- SECTION LINE
- ROAD
- FENCE
- DITCH
- UNDERGROUND ELECTRICAL
- OVERHEAD POWER LINE
- RAILROAD
- PROPERTY LINE
- MILE MARKER
- PI
- TS TEST STATION
- ARV AIR RELIEF VALVE
- CLOSURE
- VALVE





OWNERS	139.100 VANDERSON DEAN R VANDERSON MARNE J 753.31	138.100 REICHEL ANDRIA 498.67	137.100 UNION COLONY INVESTORS LLC (SEGREGATE TOP SOIL) 975.74	136.200 UNION COLONY INVESTORS LLC (SEGREGATE TOP SOIL) 1209.12	136.100 UNION COLONY INVESTORS LLC (SEGREGATE TOP SOIL) 1877.08
PIPELINE STATIONS AT ALIGNMENT CL	459+00 466+46 468+84 470+97 471+42 473+28.2 474+23.8 474+47 477+47 477+52 477+59 477+64 478+70 481+91 481+96 481+97 482+03 482+04 482+14 482+17 482+31 482+32 482+37 482+43 482+46 483+06 488+23 493+29 493+66 493+88 494+03 494+11 494+16 495+12 495+16 497+36 499+02 499+12 499+21 499+27 499+31 501+24 501+74 501+76 502+45 511+69 511+79.4 507+79.1 508+15 508+36 508+90 508+96	459+00 466+46 468+84 470+97 471+42 473+28.2 474+23.8 474+47 477+47 477+52 477+59 477+64 478+70 481+91 481+96 481+97 482+03 482+04 482+14 482+17 482+31 482+32 482+37 482+43 482+46 483+06 488+23 493+29 493+66 493+88 494+03 494+11 494+16 495+12 495+16 497+36 499+02 499+12 499+21 499+27 499+31 501+24 501+74 501+76 502+45 511+69 511+79.4 507+79.1 508+15 508+36 508+90 508+96	459+00 466+46 468+84 470+97 471+42 473+28.2 474+23.8 474+47 477+47 477+52 477+59 477+64 478+70 481+91 481+96 481+97 482+03 482+04 482+14 482+17 482+31 482+32 482+37 482+43 482+46 483+06 488+23 493+29 493+66 493+88 494+03 494+11 494+16 495+12 495+16 497+36 499+02 499+12 499+21 499+27 499+31 501+24 501+74 501+76 502+45 511+69 511+79.4 507+79.1 508+15 508+36 508+90 508+96	459+00 466+46 468+84 470+97 471+42 473+28.2 474+23.8 474+47 477+47 477+52 477+59 477+64 478+70 481+91 481+96 481+97 482+03 482+04 482+14 482+17 482+31 482+32 482+37 482+43 482+46 483+06 488+23 493+29 493+66 493+88 494+03 494+11 494+16 495+12 495+16 497+36 499+02 499+12 499+21 499+27 499+31 501+24 501+74 501+76 502+45 511+69 511+79.4 507+79.1 508+15 508+36 508+90 508+96	459+00 466+46 468+84 470+97 471+42 473+28.2 474+23.8 474+47 477+47 477+52 477+59 477+64 478+70 481+91 481+96 481+97 482+03 482+04 482+14 482+17 482+31 482+32 482+37 482+43 482+46 483+06 488+23 493+29 493+66 493+88 494+03 494+11 494+16 495+12 495+16 497+36 499+02 499+12 499+21 499+27 499+31 501+24 501+74 501+76 502+45 511+69 511+79.4 507+79.1 508+15 508+36 508+90 508+96

BILL OF MATERIALS		
ITEM	DESCRIPTION	QTY.
3A	9.117" OD PIPE, STD (0.322) SMLS/ERW, CS ASTM A106/A53/API 5L, PSL2, X-52, BBE, 12-14 MIL FBE	4,141 LF
3B	9.117" OD PIPE, STD (0.322) SMLS/ERW, CS ASTM A106/A53/API 5L, PSL2, X-52, BBE, 12-14 MIL FBE W/ 30 MIL ARO	1,163 LF
3C	9.117" TEE, BW, STD (0.375) SMLS/ERW, CS ASTM A106/A53/MS SP-75	0 EA
5	16.375" OD PIPE (0.375) SMLS/ERW, CS ASTM A106/A53/API 5L, PSL2, GR. B, BBE (CASING PIPE)	1,163 LF
7	TRI-VIEW TEST STATION	9 EA



- FIELD NOTES
- ALL STATIONING IS TO THE CENTERLINE OF THE ALIGNMENT.
 - PRESSURE TEST (SEE TEST FORM).
 - RADIOGRAPH PER NOBLE'S STANDARDS.
 - 5" MINIMUM DEPTH OF COVER (UNLESS OTHERWISE NOTED).
 - 5" MIN. CLEARANCE ON ALL FOREIGN UTILITY CROSSINGS UNLESS OTHERWISE SPECIFIED BY UTILITY OWNER.
 - THIS PIPELINE WILL BE INSTALLED UNDER THE FOLLOWING CODES:
A. 49 CFR 192 & 195
B. ASME B31.4 & B31.8
C. ALL APPLICABLE PERMITS
D. COMPANY STANDARDS
 - PIPELINE LINE MARKERS WILL BE INSTALLED AT EVERY ROAD CROSSING AND PI AS WELL AS WITHIN LINE OF SIGHT.
 - CS BENDS LESS THAN 22.5 DEGREES WILL BE FIELD BENDS.
 - CS BENDS MORE THAN 22.5 DEGREES WILL BE TRIMMED 30 FITTINGS.
 - PI BENDS WILL BE AT A RADIUS 8 TIMES THE O.D. FOR 6" FLEXSTEEL.
 - TEST STATIONS WILL BE INSTALLED EVERY 1/2 TO 1 MILE IN THE VICINITY OF A ROAD, FENCE, OR APPROPRIATE.
 - (*) INDICATES THERE ARE SPECIAL LANDOWNER REQUIREMENTS, PLEASE REFER TO PROJECT LINE LIST FOR ADDITIONAL INFORMATION.
 - BORE LENGTH REQUIRED FOR DEPTH MAY VARY FROM THE ACTUAL INSTALLED MATERIAL.
- COATING (CS PIPE ONLY)
• PIPE COATING: 12-14 MILS FBE
• BORED/HDD PIPE COATING: 12-14 MILS FBE W/ 30 MILS ARO
- JOINT COATING
• 8" AND BELOW - SHRINK SLEEVE CANUSA K-60 OR EQUIVALENT
• 10" AND ABOVE - DENSOPROTAL 7125/7200 OR EQUIVALENT
• BORE/HDD COATING - POWERCRETE J
- COLD WEATHER JOINT COATING
• 8" AND BELOW - SHRINK SLEEVE CANUSA K-60
• 10" AND ABOVE - SP 2088 OR EQUIVALENT

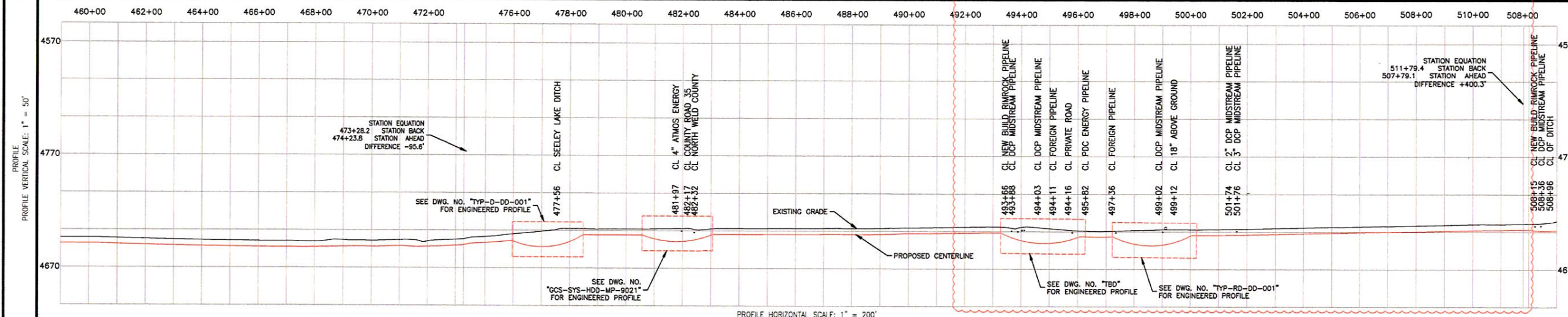
9.117" PRODUCED WATER MWP = 700 PSIG	1600'	274' ACTUAL BORE LENGTH = 320'	197'	249' ACTUAL BORE LENGTH = 320'	1023'	280' ACTUAL BORE LENGTH = 360'	135'	360' BORE	1195'
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SCALE & PROJECTION

Graphic Scale in Feet
200' 100' 0' 100' 200'

LOCATION: SECTIONS 25 & 26, T6N, R66W

PROJECTION: COLORADO STATE PLANES, NAD83, NORTH ZONE, US FOOT



LEGEND

- CL OF PROPOSED PIPELINE
- EXISTING PIPELINE
- EXISTING GAS LINE
- EXISTING WATER LINE
- ROW OR EASEMENT
- SECTION LINE
- ROAD
- FENCE
- DITCH
- UNDERGROUND ELECTRICAL
- OVERHEAD POWER LINE
- RAILROAD
- PROPERTY LINE

MILE MARKER

TS TEST STATION

CLOSURE

PI


ARV AIR RELIEF VALVE

VALVE

NOTES:

- ALL DATA SHOWN HEREON WAS PRODUCED WITH THE INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND VERIFY ALL UTILITIES.

REFERENCE DRAWINGS		REVISIONS							APPROVALS		
									SIGNATURE	DATE	
		5	REVISED TIE-IN LOCATION	JAW	03/08/17	JAW	03/08/17	EES	03/08/17	DRAWN JAW 11/28/16	
		4	POND REROUTE & WORKSPACE CONFIGURATION CHANGES	JAW	02/25/17	JMW	02/27/17	EES	02/27/17	CHECKED CB 12/05/16	
TYP-RD-DD-001	TYPICAL HDD CROSSING	3	REVISED BORE LENGTHS AND ROW - INCORPORATED ADDITIONAL REROUTES	JMW	02/02/17	JAW	02/02/17	EES	02/03/17	APPROVED EES 12/06/16	
TYP-D-DD-001	TYPICAL HDD CROSSING	2	REISSUED FOR CONSTRUCTION (ROW CONFIGURATION CHANGES)	CB	01/23/17	JAW	01/22/17	EES	01/23/17		
GCS-SYS-OPW-PP-4017	FUTURE TIE-IN SITE #8	1	REVISED FOR ENGINEERING COMMENTS	JAW	12/15/16	CB	12/16/16	EES	12/16/16		
GCS-SYS-HDD-MP-9021	COUNTY ROAD 35 HDD DRAWING	0	ISSUE FOR ENGINEERING REVIEW	RTU	12/05/16	CB	12/05/16	EES	12/06/16		
DWG NO.	TITLE	REV	DESCRIPTION	BY	DATE	CHK BY	CHK DATE	APR BY	APR DATE		



SCALE: AS SHOWN

Noble
MIDSTREAM PARTNERS

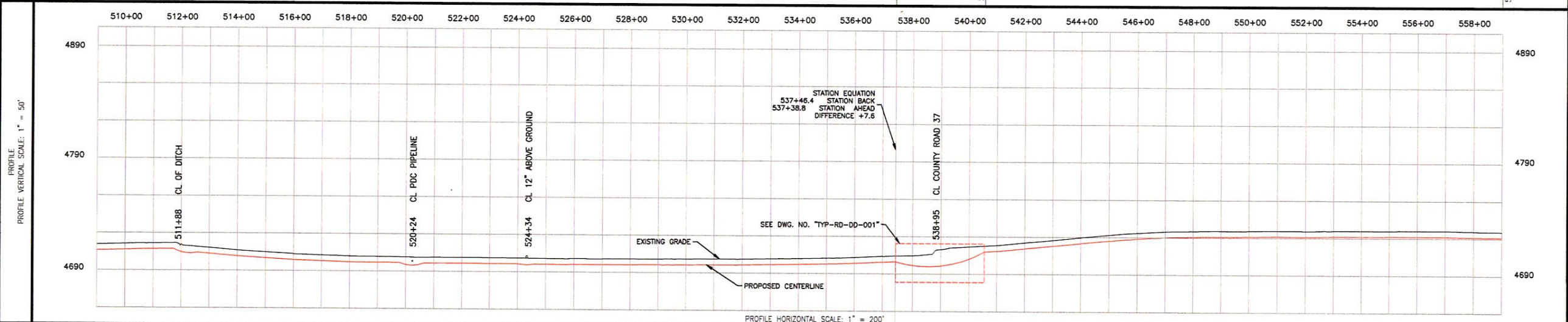
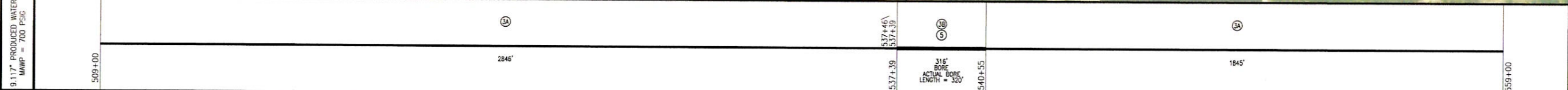
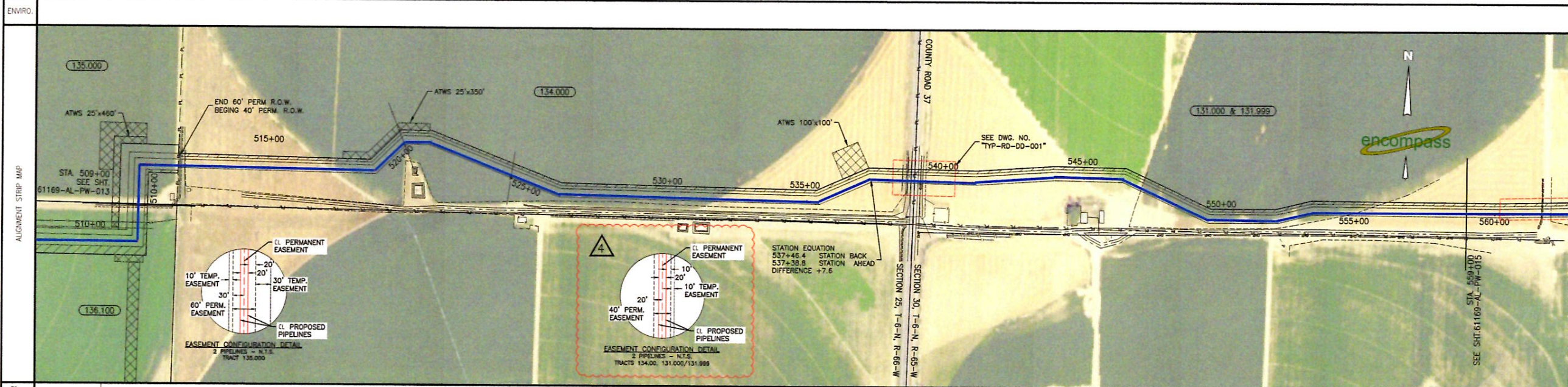
SGCI GATHERING SYSTEM
8" PRODUCED WATER LINE
STATION 459+00 TO 509+00
SHEET 013 OF 027

SCALE: AS NOTED

DRAWING NO.: 61169-AL-PW-013

REV: 5

PIPELINE STATIONS AT ALIGNMENT CL	OWNERS
509+03 PROPERTY LINE TOP OF BANK 510+46 90'00"00" RT 511+81 PROPERTY LINE TOP OF BANK 511+83 CL OF DITCH 511+88 TOP OF BANK 511+93 TOP OF BANK 512+04 TOE OF BANK	509+00 136.100 UNION COLONY INVESTORS LLC (SEGREGATE TOP SOIL) 2.69 509+03
518+81 45'20"34" LT 520+24 CL PDC PIPELINE (UNK. SIZE & COV.) 521+19 20'03"36" RT	278.11 511+81 CONLON PATRICIA J (50%) LILLY SUZANNE & BALL GERRY (50%) (SEGREGATE TOP SOIL) 278.11
524+34 CL 12" ABOVE GROUND WATER LINE 528+18 20'12"33" LT	511+81 134.000 HUNGENBERG GROUP FARMS LLLP 2721.18
= Produced Water Test	
535+44 24'44"04" LT 537+46 24'48"1" RT STATION EQUATION 537+46.4 STATION BACK 537+38.8 STATION AHEAD DIFFERENCE +7.6 538+69 TOE OF SLOPE 538+81 TOE OF SLOPE 538+83 EDGE OF ROAD 538+94 PROPERTY LINE 538+95 CL COUNTY ROAD 37 539+16 OVERHEAD POWER LINE (20' CLEAR.) & TOP OF BANK 539+23 TOE OF BANK 539+34 TOE OF BANK 541+16 500'12" LT	538+94 559+00
543+95 500'12" RT 546+40 23'42"08" RT	2005.58 131.000 & 131.999 HUNGENBERG GROUP FARMS LLLP
549+77 25'04"04" LT 552+22 13'33"16" LT 553+50 14'01"39" RT	559+00



NOTES:
1. ALL DATA SHOWN HEREON WAS PRODUCED WITH THE INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND VERIFY ALL UTILITIES.

REFERENCE DRAWINGS	
TYP-RD-DD-001	TYPICAL HDD CROSSING
TYP-D-DD-001	TYPICAL HDD CROSSING
DWG NO.	TITLE

REVISIONS							
4	REVISED ROW CONFIGURATION	JAW	03/02/17	JAW	03/02/17	EES	03/02/17
3	REVISED BORE LENGTHS AND ROW – INCORPORATED ADDITIONAL REROUTES	JMW	02/02/17	JAW	02/02/17	EES	02/03/17
2	REISSUED FOR CONSTRUCTION (ROW CONFIGURATION CHANGES)	CB	01/23/17	JAW	01/22/17	EES	01/23/17
1	REVISED FOR ENGINEERING COMMENTS	JAW	12/15/16	CB	12/16/16	EES	12/16/16
0	ISSUE FOR ENGINEERING REVIEW	RTJ	12/05/16	CB	12/05/16	EES	12/06/16
REV	DESCRIPTION	BY	DATE	CHK BY	CHK DATE	APR BY	APR DATE

APPROVALS		
	SIGNATURE	DATE
DRAWN	JAW	11/28/16
CHECKED	CB	12/05/16
APPROVED	EES	12/06/16

The logo for Colorado 811, featuring the word "COLORADO" in a stylized font with a mountain range background, and the number "811" in a large, bold font with a small "call" icon next to it.

BILL OF MATERIALS		
ITEM	DESCRIPTION	QTY.
3A	9.117" OD PIPE,STD (0.322),SMLS/ERW,CS ASTM A106/A53/API 5L,PSL2,X-52,BBE,12-14 MIL FBE	4.691 LF
3B	9.117" OD PIPE,STD (0.322),SMLS/ERW,CS ASTM A106/A53/API 5L,PSL2,X-52,BBE,12-14 MIL FBE W/ 30 MIL ARD	316 LF
3C	8.625" TEE,BW,STD (0.375),CS,ASTM A860-WPHY-52, MSS SP-75	0 EA
5	16.375" OD PIPE,(0.375),SMLS/REW,CS ASTM A106/A53/API 5L,PSL2,GR. B,BBE (CASING PIPE)	316 LF
7	TRI-VIEW TEST STATION	0 EA

FIELD NOTES
1. ALL STATIONING IS TO THE CENTERLINE OF THE ALIGNMENT.
2. PRESSURE TEST. (SEE TEST FORM)
3. RADIOGRAPHY - PER NOBLE'S STANDARDS
4. 5' MINIMUM DEPTH OF COVER (UNLESS OTHERWISE NOTED).
5. 5' MIN. CLEARANCE ON ALL FOREIGN UTILITY CROSSINGS UNLESS OTHERWISE SPECIFIED BY UTILITY OWNER.
6. THIS PIPELINE WILL BE INSTALLED UNDER THE FOLLOWING CODES: A. 49 CFR 192 & 199 B. ASME B31.4 & B31.8 C. ALL APPLICABLE PERMITS D. COMPANY STANDARDS
7. PIPELINE LINE MARKERS WILL BE INSTALLED AT EVERY ROAD CROSSING AND PI AS WELL AS WITHIN LINE OF SIGHT.
8. CS BENDS LESS THAN 22.5 DEGREES WILL BE FIELD BENDS.
9. CS BENDS MORE THAN 22.5 DEGREES WILL BE TRIMMED 30 FITTINGS.
10. PW BENDS WILL BE AT A RADIUS 8 TIMES THE O.D. FOR 8\"/>
11. TEST STATIONS WILL BE INSTALLED EVERY 1/2 TO 1 MILE IN THE VICINITY OF A ROAD, FENCE, OR APPURTENANCE.
12. (*) INDICATES THERE ARE SPECIAL LANDOWNER REQUIREMENTS, PLEASE REFER TO PROJECT LINE LIST FOR ADDITIONAL INFORMATION.
13. BORE LENGTH REQUIRED FOR DEPTH MAY VARY FROM THE ACTUAL INSTALLED MATERIAL.
COATING (CS PIPE ONLY) • PIPE COATING: 12-14 MILS FBE • BORED/HDD PIPE COATING: 12-14 MILS FBE W/ 30 MILS ARO
JOINT COATING • 8\"/>
COLD WEATHER JOINT COATING • 8\"/>

SCALE & PROJECTION
Graphic Scale in Feet 200' 100' 0' 100' 200'
LOCATION: SEC. 25, T6N, R66W & SEC. 30, T6N, R65W
PROJECTION: COLORADO STATE PLANES, NAD83, NORTH ZONE, US FOOT

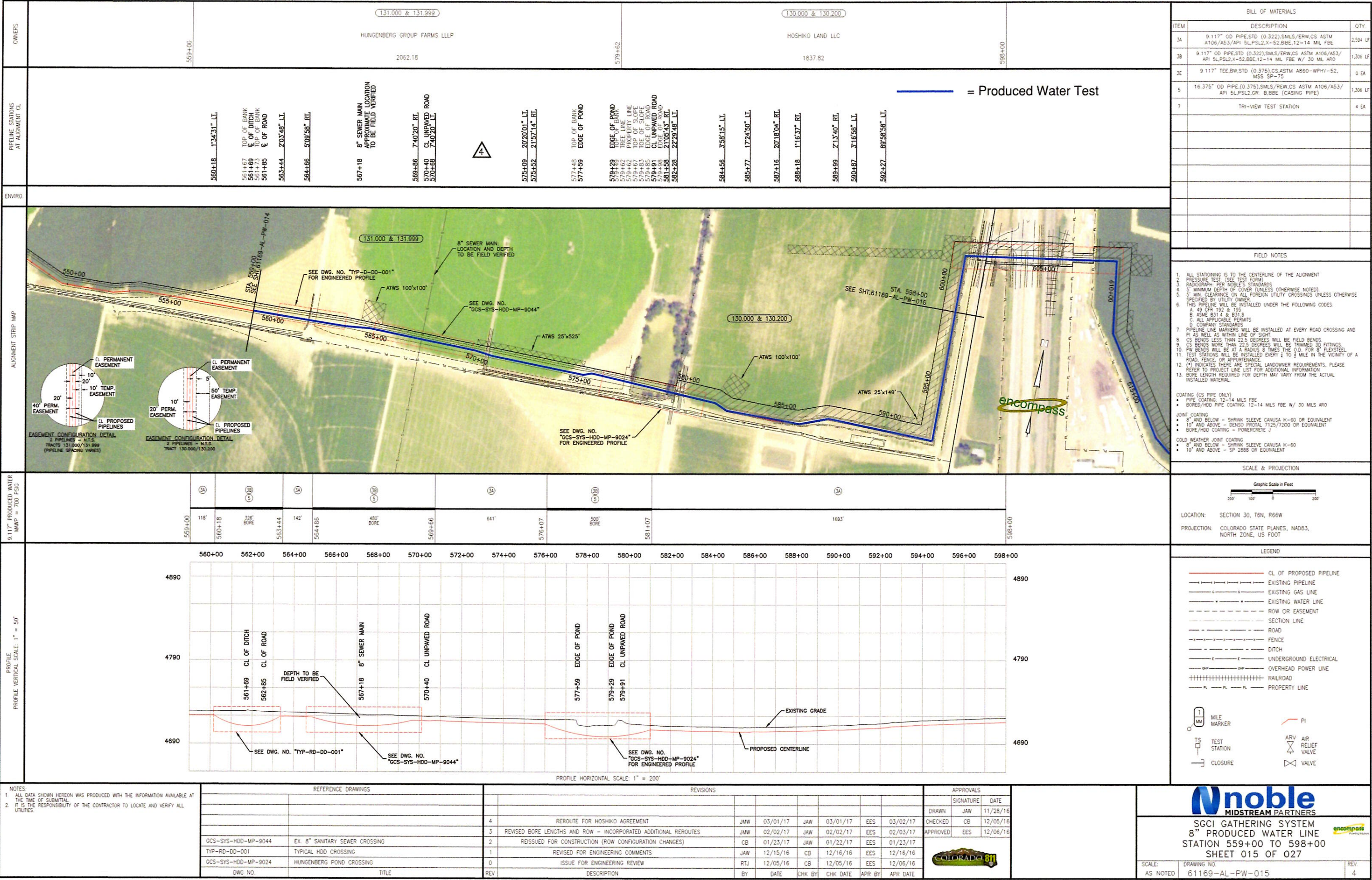
LEGEND
CL OF PROPOSED PIPELINE
EXISTING PIPELINE
EXISTING GAS LINE
EXISTING WATER LINE
ROW OR EASEMENT
SECTION LINE
ROAD
FENCE
DITCH
UNDERGROUND ELECTRICAL
OVERHEAD POWER LINE
RAILROAD
PROPERTY LINE
MILE MARKER
TEST STATION
CLOSURE
PI
AIR RELIEF VALVE
VALVE

SGCI GATHERING SYSTEM
8\"/>

SCALE: AS NOTED

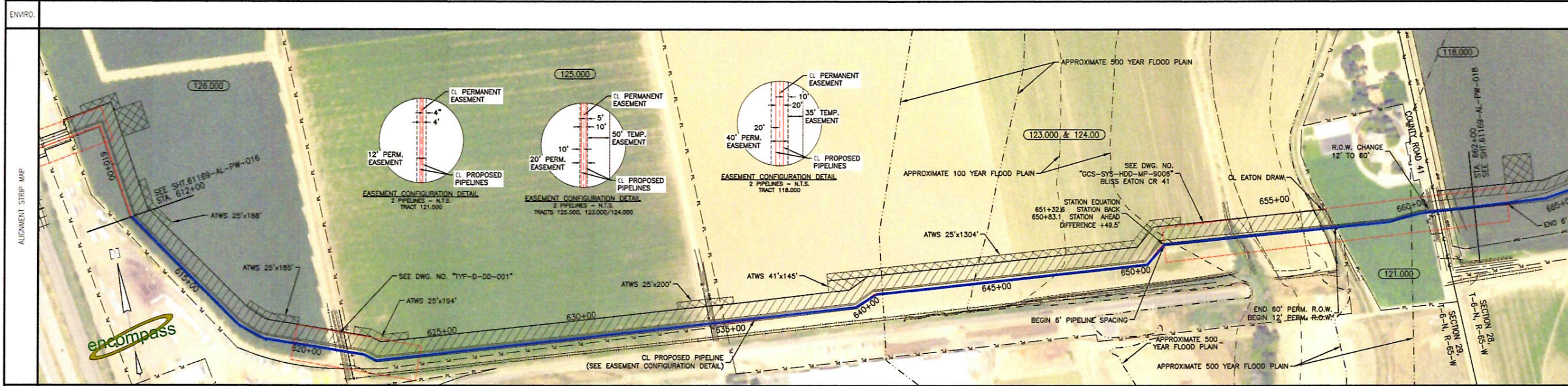
DRAWING NO.
61169-AL-PW-014

REV.
4

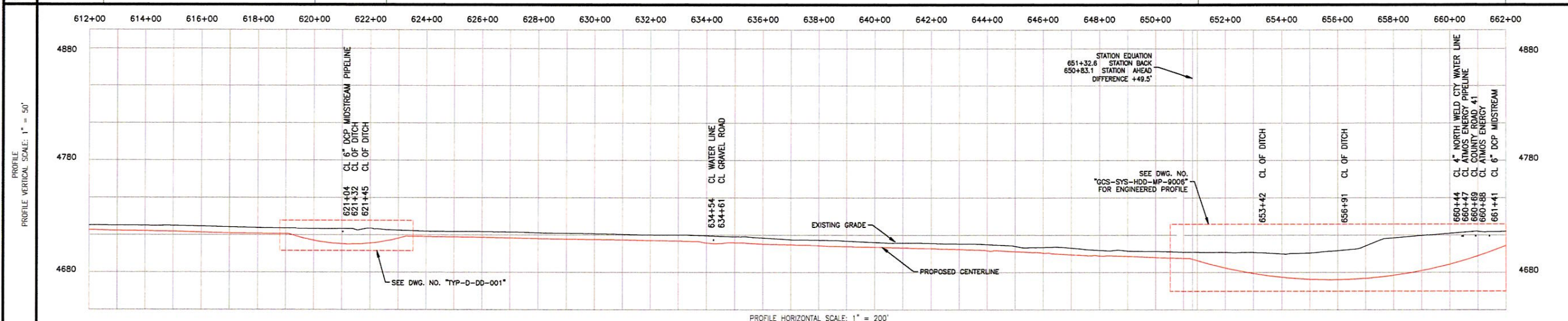


[illegible]

OWNERS	126.000 HOSHIKO LAND LLC 943.56	125.000 HOSHIKO LAND LLC 1331.64	123.000 & 124.00 HOSHIKO LAND LLC 2188.84	121.000 DUANE D ZABKA 337.63	120.000 COUNTY ROAD 41 39.89	118.000 FIVE M FARM CO 131.07
PIPELINE STATIONS AT ALIGNMENT CL	612+00 25'56.01" LT	621+62 CL 6" DCP MIDSTREAM PIPELINE (4.8' COV.) 621+18 TOP OF BANK 621+23 TOP OF DITCH 621+32 TOP OF BANK 621+45 TOP OF DITCH 621+57 TOP OF BANK 622+06 PROPERTY LINE 622+57 33'47.51" LT	635+07 CL WATER LINE 634+56 EDGE OF ROAD 634+61 EDGE OF ROAD 634+72 OVERHEAD POWER LINE (30' CLEAR) 634+75 130.58" RT 635+07 PROPERTY LINE 635+23 209.28" LT	656+96 650+37 44'35'22" LT 651+25 45'00'00" RT STATION EQUATION 651+32.6 STATION BACK 650+83.1 STATION AHEAD DIFFERENCE +49.5' 653+33 TOP OF BANK 653+42 CL OF DITCH 653+52 TOP OF BANK 656+52 TOE OF SLOPE 656+84 TOP OF BANK 656+84 CL EATON DRAIN 656+96 PROPERTY LINE 656+99 TOP OF BANK	660+34 658+87 10'00'00" LT 660+09 10'00'00" RT PROPERTY LINE 660+34 COUNTY ROAD 41 660+47 CL ATMOS ENERGY PIPELINE (UNK. SIZE & COV.) 660+69 CL COUNTY ROAD 41 & PROPERTY LINE 660+81 EDGE OF ROAD 660+88 TOP OF BANK 660+94 OVERHEAD POWER LINE (30' CLEAR) 661+16 CL 6" DCP MIDSTREAM PIPELINE (UNK. COV.)	662+00



9.117' PRODUCED WATER MWP = 700 PSIG	752'	2948'	1088'
612+00	619+52 ACTUAL BORE LENGTH = 360'	622+06	662+00



NOTES	1. ALL DATA SHOWN HEREON WAS PRODUCED WITH THE INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL. 2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE AND VERIFY ALL UTILITIES.
REFERENCE DRAWINGS	TYP-D-DD-001 TYPICAL HDD CROSSING GCS-SYS-HDD-MP-9006 HORIZONTAL DIRECTIONAL DRILL - BUSS EATON COUNTY ROAD 41
REVISIONS	5 REROUTE FOR HOSHIKO AGREEMENT 4 REVISED ROW CONFIGURATION 3 REVISED BORE LENGTHS AND ROW - INCORPORATED ADDITIONAL REROUTES 2 REISSUED FOR CONSTRUCTION (ROW CONFIGURATION CHANGES) 1 REVISED FOR ENGINEERING COMMENTS 0 ISSUE FOR ENGINEERING REVIEW
APPROVALS	DRAWN JAW 11/28/16 CHECKED CB 12/05/16 APPROVED EES 12/06/16
BY DATE CHK BY CHK DATE APR BY APR DATE	

BILL OF MATERIALS		
ITEM	DESCRIPTION	QTY.
3A	8.625" OD PIPE, STD (0.322) SMLS/ERW, CS ASTM A106/A53/ API 5L, PS2, X-52, BBE, 12-14 MIL FBE	3,700 LF
3B	8.625" OD PIPE, STD (0.322) SMLS/ERW, CS ASTM A106/A53/ API 5L, PS2, X-52, BBE, 12-14 MIL FBE W/ 30 MIL ARO	1,350 LF
3C	8.625" TEE, BW, STD (0.375) CS, ASTM A860-WPHY-52, MSS SP-75	0 EA
5	16.375" OD PIPE, (0.375) SMLS/ERW, CS ASTM A106/A53/ API 5L, PS2, GR. B, BBE (CASING PIPE)	1,350 LF
7	TRI-VIEW TEST STATION	5 EA

FIELD NOTES

- ALL STATIONING IS TO THE CENTERLINE OF THE ALIGNMENT
- PRESSURE TEST (SEE TEST FORM)
- RADIOGRAPHY PER NOBLE'S STANDARDS
- 5' MINIMUM DEPTH OF COVER (UNLESS OTHERWISE NOTED)
- 5' MIN. CLEARANCE ON ALL FOREIGN UTILITY CROSSINGS UNLESS OTHERWISE SPECIFIED BY UTILITY OWNER
- THIS PIPELINE WILL BE INSTALLED UNDER THE FOLLOWING CODES:
A. 49 CFR 192 & 195
B. ASME B31.4 & B31.8
C. ALL APPLICABLE PERMITS
D. COMPANY STANDARDS
- PIPELINE LINE MARKERS WILL BE INSTALLED AT EVERY ROAD CROSSING AND PI AS WELL AS WITHIN LINE OF SIGHT.
- CS BENDS LESS THAN 22.5 DEGREES WILL BE FIELD BENDS
- CS BENDS MORE THAN 22.5 DEGREES WILL BE TRIMMED 30 FITTINGS.
- PI BENDS WILL BE AT A RADIUS 8 TIMES THE O.D. FOR 8" FLEXSTEEL
- TEST STATIONS WILL BE INSTALLED EVERY 1 TO 2 MILE IN THE VICINITY OF A ROAD, FENCE, OR APPURTENANCE
- (*) INDICATES THERE ARE SPECIAL LANDOWNER REQUIREMENTS, PLEASE REFER TO PROJECT LINE LIST FOR ADDITIONAL INFORMATION
- BORE LENGTH REQUIRED FOR DEPTH MAY VARY FROM THE ACTUAL INSTALLED MATERIAL

COATING (CS PIPE ONLY)
PIPE COATING: 12-14 MILS FBE
BORED/HDD PIPE COATING: 12-14 MILS FBE W/ 30 MILS ARO

JOINT COATING:
• 8" AND BELOW - SHRINK SLEEVE CANUSA K-60 OR EQUIVALENT
• 10" AND ABOVE - DENDO PROTEK 1125/7200 OR EQUIVALENT
• BORE/HDD COATING - POWERCRETE J

COLD WEATHER JOINT COATING:
• 8" AND BELOW - SHRINK SLEEVE CANUSA K-60
• 10" AND ABOVE - SP 288B OR EQUIVALENT

SCALE & PROJECTION

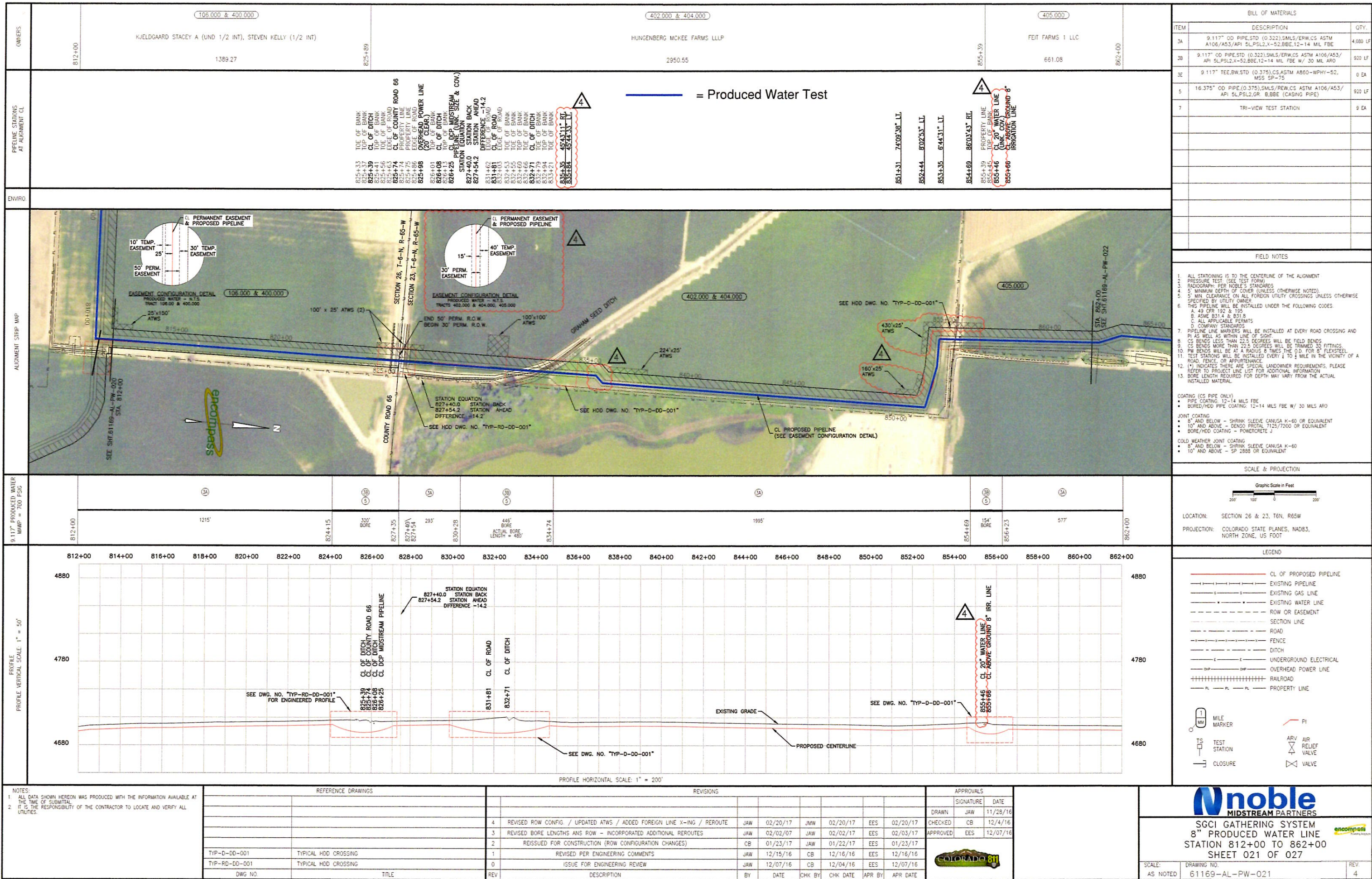
Graphic Scale in Feet
200' 100' 0' 100' 200'

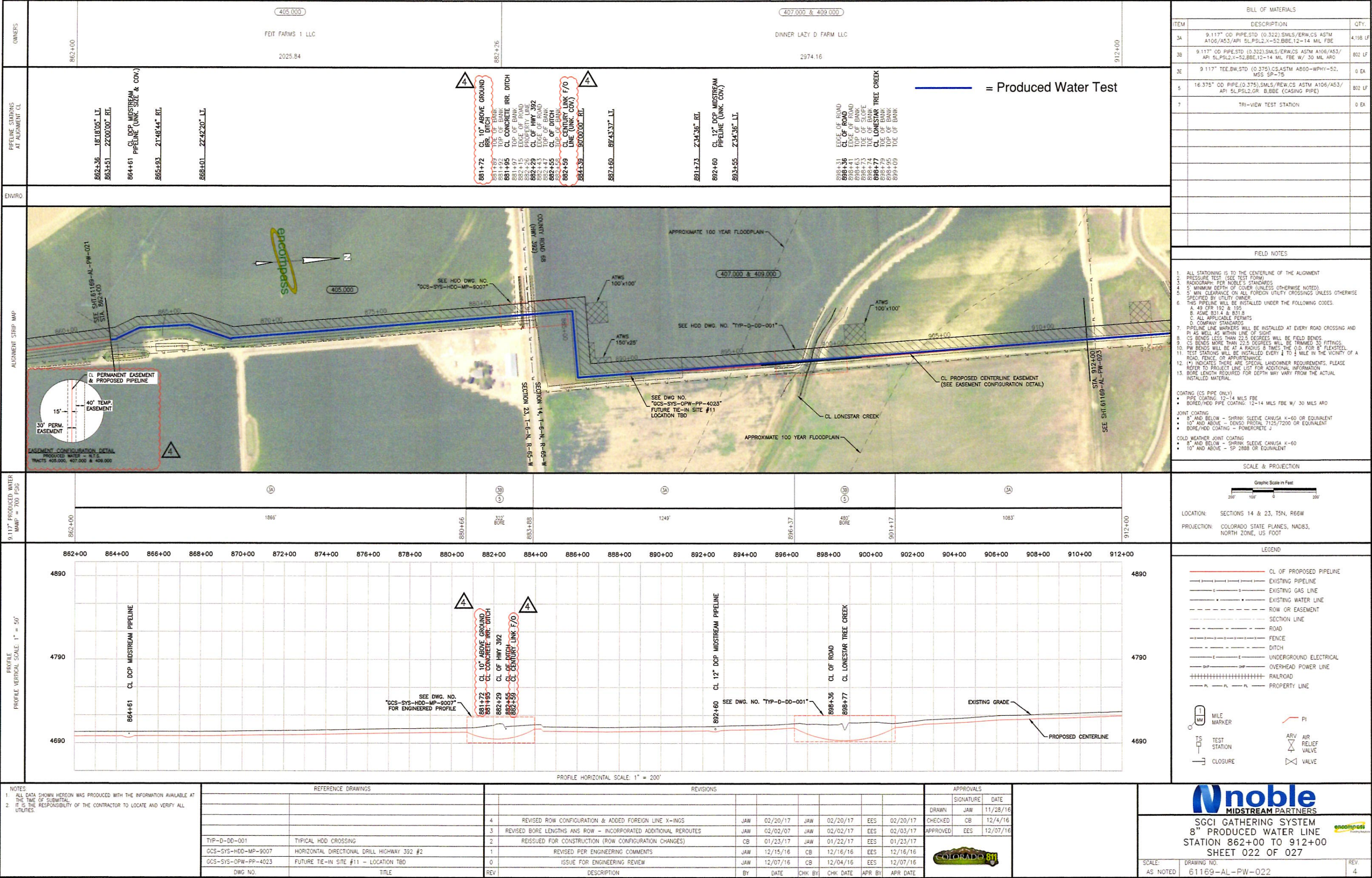
LOCATION: SECTIONS 28 & 29, T6N, R65W
PROJECTION: COLORADO STATE PLANES, NAD83, NORTH ZONE, US FOOT

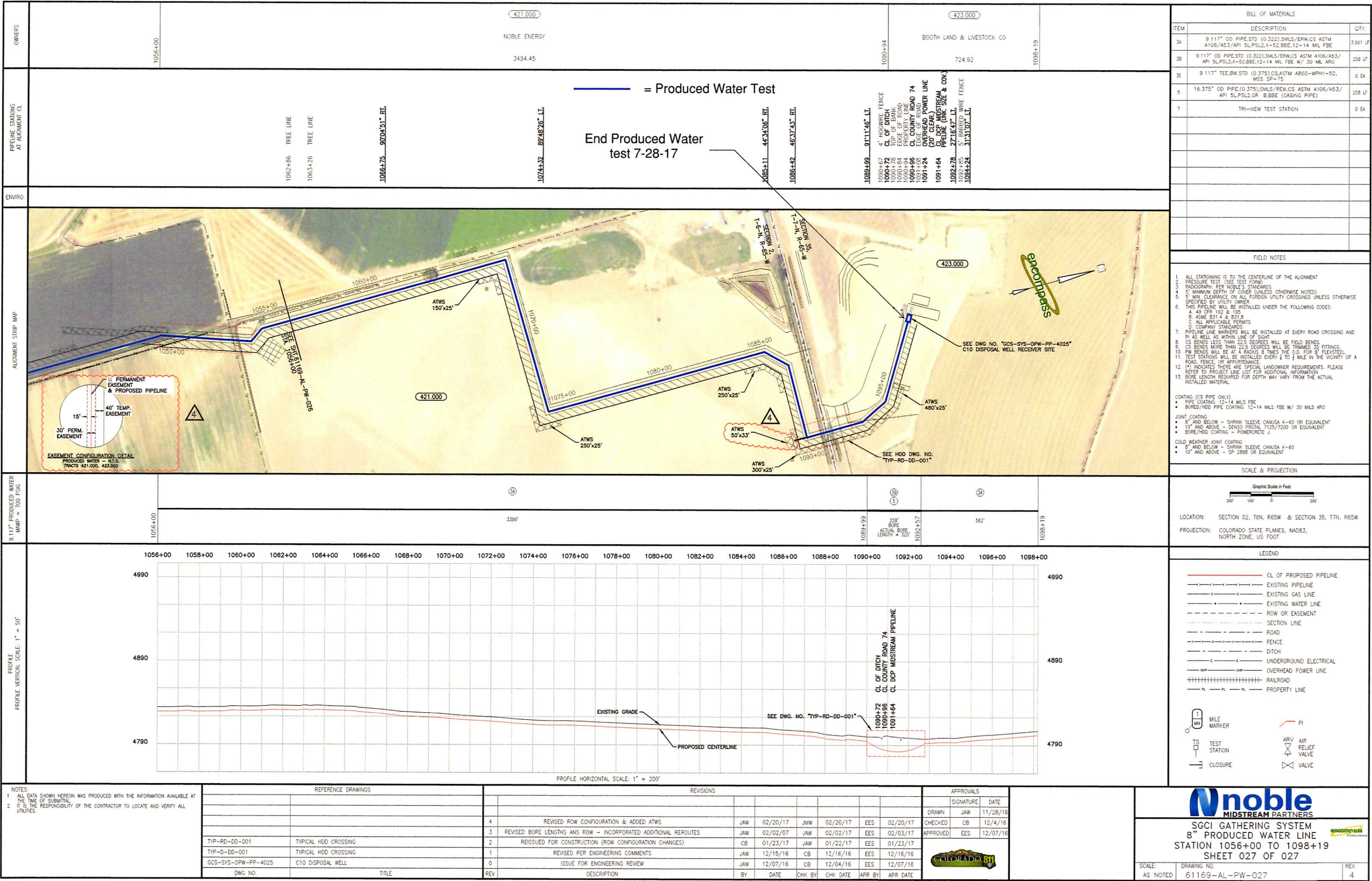
LEGEND	
CL OF PROPOSED PIPELINE	EXISTING PIPELINE
EXISTING GAS LINE	EXISTING WATER LINE
ROW OR EASEMENT	SECTION LINE
ROAD	FENCE
DITCH	UNDERGROUND ELECTRICAL
OVERHEAD POWER LINE	RAILROAD
PROPERTY LINE	
MILE MARKER	PI
TEST STATION	ARV AIR RELIEF VALVE
CLOSURE	VALVE

SGCI GATHERING SYSTEM
8" PRODUCED WATER LINE
STATION 612+00 TO 622+00
SHEET 017 OF 027

SCALE: AS NOTED
DRAWING NO. 61169-AL-PW-017
REV. 5









Hydrostatic Pressure Test Procedure
Greeley Crescent Produced Water Pipeline

NMP Doc.
No.:

N/A

Rev.:

1

DJBU



Greeley Crescent
Gathering Project


8" FlexSteel Produced Water Pipeline

Hydrostatic Pressure Test Procedure
DSU 29/30 to C10 Disposal Well

1	05/31/2017	KMS	Issued for Review		
REV	DATE	BY	DESCRIPTION	CHKD	APPVD
			Noble Midstream Partners, LLC		
			Hydrostatic Pressure Test Procedure		
			Doc. No. N/A		

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	3
2	PRE-TEST CONSIDERATIONS	3
2.1	TEST PRESSURE.....	3
2.2	TEST DURATION.....	4
2.3	SAFETY PRECAUTIONS.....	4
2.4	TEST EQUIPMENT AND MATERIALS.....	4
2.5	QUALIFICATION OF CONTRACTOR AND OPERATOR PERSONNEL	6
2.6	PERMIT TO WORK.....	6
3	TEST PROCEDURE	6
3.1	SOURCE WATER	6
3.2	EQUIPMENT INSTALLATION	7
3.3	LINE FILL	7
3.4	INITIAL PRESSURIZATION	8
3.5	PIPE CONDITIONING	9
3.6	THE TEST PERIOD	10
3.7	SEARCHING FOR LEAKS	11
3.8	PRESSURE TEST FAILURES	11
3.9	DEPRESSURIZATION, DISPLACEMENT, AND DISPOSAL OF TEST WATER	11
3.10	DRYING OPERATIONS	12
4	RECORDS	12
5	REFERENCES.....	13

	Hydrostatic Pressure Test Procedure				DJBU
	Greeley Crescent Produced Water Pipeline				
	NMP Doc. No.:	N/A	Rev.:	1	

1 EXECUTIVE SUMMARY

This procedure and the accompanying site-specific Hydrostatic Test Plan define the minimum requirements for the hydrostatic pressure testing of the **8" Greeley Crescent produced water pipeline**. The piping and components to be tested using this procedure meet or exceed the pressure requirements of the ASME Class 300 flange rating for Type 2.2 materials between -20 °F and 100 °F.

The hydrostatic pressure test has been analyzed for acceptable practices per applicable codes.

2 PRE-TEST CONSIDERATIONS

The pressure test shall comply with American Petroleum Institute's "Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide." (*API RP 1110*) Chapter 6 of API's handbook provides general guidelines for pressure test implementation of steel pipe. In addition, testing will be in accordance with *ASME B31.4*, *ASME B16.5*, *49 CFR Part 195*, and the *FlexSteel Technical Manual*.

2.1 TEST PRESSURE

The **8" Greeley Crescent produced water** pipeline shall be tested at a minimum test pressure of 125% the internal pressure rating and a maximum test pressure of 150% the internal design pressure rounded to the next higher 25 psig increment. The upper and lower bounds of the test pressures are derived from *ASME B16.5* and *ASME B31.4 / 49 CFR Part 195* respectively.


The **Greeley Crescent produced water** internal design pressure is **720 PSIG**, limited by the flange rating. The pipeline MOP is **700 PSIG**.

The **Greeley Crescent produced water** final hydrostatic test pressure shall be **1,025 PSIG** or **988 PSIG**, at the point of filling, depending on where the operator chooses to fill the pipeline. See the table in **Section Error! Reference source not found.** for the two possible locations.

The minimum pipeline test pressure shall be **940 PSIG** and the maximum test pressure shall be **1,100 PSIG**.

Table 1: Upper and Lower Bound Test Pressures

ASME Flange Classification	Pipeline Wall Thickness (in)	Design Pressure – DP (psig)	Pipe Pressure Rating – PR (psig)	Minimum Test Pressure 125% PR (psig)	Maximum Test Pressure 150% DP (psig)
300	0.746	720	750	940	1,100

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline			DJBU
	NMP Doc. No.:	N/A	Rev.: 1	

2.2 TEST DURATION

The hydrostatic test pressure shall be maintained for **8 hours** after final test pressure has stabilized, and the pipe has been conditioned properly in the field. With pipe conditioning, accounted for, the test commonly takes **16 – 20 hours**. This is dependent, however on how well the pipe responds to the conditioning procedure (**times up to 24 hours may be required**).

The test pressure shall be considered stabilized after **5 minutes** without fluctuation.

2.3 SAFETY PRECAUTIONS

This safety information is in addition to the safety information in other sections of this document.

Always take precautions to eliminate hazards to persons near lines being tested. For the entire duration of the procedure, including filling, initial pressurization, time at test pressure, and depressurization, only persons conducting the test or inspecting the system should be allowed near the section under test. These persons should be fully informed of the hazards of field pressure testing. All other persons should be kept a safe distance away. The test section must be supervised at all times. Failure may result in sudden, violent, uncontrolled, and dangerous movement of system piping, or components, or parts of components.

2.4 TEST EQUIPMENT AND MATERIALS

Pressure test equipment shall be selected to meet the hydrostatic test conditions and shall be in working order. The measurement equipment shall be designed for the pressures expected during the pressure test.

2.4.1 FILL PUMP

The pump used to fill the line shall be a high-volume pump which provides adequate pressure to overcome static head and maintains sufficient velocity to move pigs, spheres, and any debris in the pipeline.

The fill pump or associated discharge piping shall be equipped with a flow measurement device capable of maintaining a specified fill rate.

2.4.2 SUPPLY WATER FILTER

The pump discharge piping shall be equipped with an in-line filter capable of capturing debris greater than **100 µm**.

2.4.3 PRESSURIZATION PUMP

The pressurization pump shall be a variable speed, positive displacement pump that pressurizes the line to the specified test pressure. The pump shall have a known volume per stroke and shall be equipped with a stroke counter.

A constant-speed pump with a variable flowrate control may be used in lieu of the above pump if the liquid test medium injected into the pipeline is measured during pressurization.

2.4.4 CALIBRATION DEVICES

2.4.4.1 Pressure Calibration Device

A deadweight tester or an equivalent pressure sensing device that is capable of measuring in increments of less than or equal to one (1) psig shall be used. The device shall have a certificate of calibration that is not more than one year old at the start of testing.

2.4.4.2 Temperature Calibration Device

A certified thermometer shall be provided. The device shall have a certificate of calibration that is not more than one year old at the start of testing.

2.4.5 RECORDING DEVICES

2.4.5.1 Pressure Recording

This procedure refers to the recording device used during the test duration as a chart recorder. A digital recorder may be used in lieu of the more traditional chart recorder.


Pressure recording equipment shall be provided and qualified as follows:

- A continuous-recording pressure measurement device that provides a permanent record of pressure versus time. This device should be calibrated immediately before each use with the deadweight tester.
- Electronic pressure/temperature monitoring and recording systems that assist in the analysis of test data. Such systems can be used in lieu of the components listed above provided that the individual pressure sensors included in the systems have a level of sensitivity and can be field calibrated in a manner similar to those instruments listed above.

2.4.5.2 Temperature Recording

Temperature recording equipment shall be provided and qualified as follows:

- A test medium temperature sensing and display instrument that is properly calibrated to a range suitable for anticipated test temperatures. Temperature instrument accuracy should be within 1 °F of actual temperature. Temperature instrument sensitivity should be within 0.1 °F.
- A continuous-recording temperature measurement device that provides a permanent record of test medium temperature versus time. This device should be calibrated immediately before each use with a certified thermometer.
- An ambient temperature sensing and display instrument that is properly calibrated to a range suitable for anticipated ambient temperatures. Temperature instrument accuracy should be within 1 °F of actual temperature. Temperature instrument sensitivity should be within 0.1 °F.
- A continuous-recording temperature measurement device that provides a permanent record of ambient temperature versus time. This device should be calibrated immediately before each use with a certified thermometer.

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline			DJBU
	NMP Doc. No.:	N/A	Rev.: 1	

2.4.6 SAFETY RELIEF VALVE

The hydrostatic test fill pump and pressurization pump or associated discharge piping shall be equipped with a pressure relief valve. The pressure relief valve shall be set to relieve at **1,100 PSIG**.

2.5 QUALIFICATION OF CONTRACTOR AND OPERATOR PERSONNEL

Qualifications of contractor and operator personnel for conducting pressure tests will be based on certification requirements by *49 CFR Part 195*, Code, or Noble standards and procedures.

Noble personnel and contractors involved with designing, planning, conducting, or approval of a pressure test should be qualified by both training and experience. Noble is responsible for establishing these qualifications. The following factors to determine qualifications are recommended per *API RP 1110*:

- Performance of applicable calculations and interpretation of test data and results.
- Knowledge of code requirements and regulations.
- Qualification requirements of governing authority to conduct or witness testing.
- Governmental or operator requirements to certify test results.
- Familiarity with equipment and pressure test set-up.
- Familiarity with test procedures.

2.6 PERMIT TO WORK

Prior to commencing work, work permits shall be obtained. At a minimum, the below documents shall be submitted:


- Operator Qualification records for each person performing tasks.
- Test equipment certifications.
- Water source.
- Biocide injection plan.
- Biocide Safety Data Sheets (SDS).
- Leak monitoring plan.
- Depressurization plan.
- Water disposal plan.
- Drying plan (If Applicable).

3 TEST PROCEDURE

As part of the work permit, a hydrostatic test plan for each section of pipe shall be developed and submitted to the appointed Noble representative prior to commencing work. The test plan shall, at a minimum, address the requirements specified in this procedure.

3.1 SOURCE WATER

The water for the hydrostatic test shall be sourced from the Neff Lake storage reservoir via an existing hydrant at the DSU 53 Tie-in site. The quality of the test water shall be determined prior to the permitting process.

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline			DJBU
	NMP Doc. No.:	N/A	Rev.: 1	

Non-potable water shall be treated with biocide prior to entering the pipeline. The SDS sheets and injection rate for the Biocide shall be submitted and approved by a Noble representative prior to work permit issuance.

Water shall be filtered prior to entering the pipeline. The maximum allowable particle size is **100 µm**.

3.2 EQUIPMENT INSTALLATION

If possible, excavated segments shall be backfilled prior to the initial pressurization.

Temporary piping shall be properly anchored and adequately secured from movement. Pipe couplings shall have safety devices or restraints to limit movement due to unexpected piping separation.

A flow meter shall be placed in the line to monitor and maintain the planned design rate of fill.

The sensor on each temperature recording device shall be installed so that it is in contact with the pipeline at a point where it has normal cover. Additionally, it shall be at a distance far enough from the injection point so that the effects of the exposed piping and make-up injection(s) on temperature is minimized. The backfill around the temperature recording device sensor shall be tamped.

Insulation, if appropriate, shall be used on the capillary lines to the temperature recorder and the temperature recorder should be installed in an insulated box. Large centrifugal pumps and storage tanks will affect the temperature of the test medium.

NOTE: According to the *FlexSteel Commissioning Field Notes*, FlexSteel recommends that the vent valves on all end fittings be removed during the hydrostatic test and replaced thereafter.

3.3 LINE FILL


Calculated line fill water volume: **5,429 US Oil Barrels**

All temporary piping and test heads shall be adequately secured before the line fill process is started.

If pigs or spheres are used in the filling process, they shall be equipped with trackers for monitoring location and speed during the line fill process.

NOTE: Only polyurethane pigs are allowed to be used with FlexSteel. (*FlexSteel Commissioning Field Notes*)

The fill pump shall be sized for the pigs to travel at a speed that will maintain a seal with the pipeline. This will reduce the risk of introducing air behind the pigs. A travel speed of 2 – 3 mph shall be maintained. The line fill flow rate for the **8" Greeley Crescent produced water** pipeline must be **450 – 680 GPM (11 – 16 BPM)** in order to maintain the pig velocity in the 2 – 3 mph range.

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline			DJBU
	NMP Doc. No.:	N/A	Rev.: 1	

High velocities may cause excessive wearing of the pigs and may cause the displaced air to mix with the test medium. As pigs travel down the line and down a slope, unless backpressure is applied during the line fill, the weight of the column of fluid could cause the pig to travel faster than the specified speed and introduce air behind the pig.

Air shall be bled during the filling process to minimize the time for line pressure stabilization. The total amount of residual air shall be less than 0.2% of the volume of the test section.

If it is determined that air is trapped in the pipeline, vents or traps at high elevation points may be installed in order to bleed the air from the pipeline. Any equipment added to the pipeline shall be removed after the pipeline has been dewatered.

The temperature, pressure, and flow rate of the test medium during line fill shall be recorded. All applicable conditions shall be monitored to prevent over-pressurization during line fill.

3.4 INITIAL PRESSURIZATION

A pipe maintained at high pressure is potentially dangerous. Established safety guidelines in accordance with the work permit shall be followed at all times.

The amount of water required to increase the pressure from the initial fill to the final test pressure shall be calculated prior to the pressure test and made available to test personnel.

The initial pressurization of the segment of pipe to be tested begins once the segment is full of fluid and the appropriate measures have been taken to bleed all air.

Personnel conducting the test shall maintain continuous surveillance over the operation to ensure that it is carefully controlled. Test personnel should be located at a safe distance from the test section.

Pipe connections shall be periodically checked for leaks during the pressurization process.


The flowrate shall be monitored and logged for the preparation of a pressure-volume plot.

A pressure-volume plot shall be initiated at the start of the pressurization process and continue until the test pressure is reached. The lower end of the pressure-volume plot can be used to determine the total amount of residual air in the test section. The upper end of the pressure-volume plot can be used to determine if any pipe in the test segment may have reached its elastic limit.

The **Greeley Crescent produced water** pipeline is **96,107 feet** of **8" 0.746 w.t. FlexSteel** pipe. It will be pressurized to either of the following hydrostatic test pressures at the corresponding location:

DSU 30/29 Well Pad	1,025 psig
C10 Disposal Well	988 psig

Pressurization up to 25% of the final test pressure shall occur at a rate of **10 PSIG/MIN.**

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline				DJBU
	NMP Doc. No.:	N/A	Rev.:	1	

Once 25% of the final test pressure is reached, the pressure must be allowed to stabilize for a minimum of **15 minutes**. The pressure shall be considered stabilized after **5 minutes** without fluctuation.

This process should be repeated for pressurizing the pipe to 50% of the final test pressure. Once the pressure has stabilized for **15 minutes**, the pipe should be pressurized to 75% of the final test pressure at a rate of **10 PSIG/MIN**. Now, the pressure should be allowed to stabilize for 1 hour.

After the pressure has stabilized to 75% of the final test pressure, pressurization at a rate of **5 PSIG/MIN** shall be used to complete the pressurization process up to the final test pressure. The final test pressure shall be considered stabilized after **5 minutes** without fluctuation.

When the final test pressure is reached and has stabilized, pressurization shall cease, the pipe blocked in, and all valves and connections to the line shall be inspected for leakage.

3.5 PIPE CONDITIONING


FlexSteel but be conditioned prior to commencing a "hold" or test period. This is for the purpose of allowing the polymer liner in the FlexSteel to creep to bed into the tensile elements in the FlexSteel. (*FlexSteel Technical Manual*)

After the test pressure has stabilized in the Initial Pressurization phase, the pipe should be blocked in. Then, the pressure drop in the pipe should be monitored and recorded continuously, or at least every fifteen (15) minutes for 1 hour. After that, the pipe should be re-pressurized to the test pressure, blocked in, and have its pressure monitored and recorded continuously, or at least every fifteen (15) minutes for 1 hour. (*FlexSteel Technical Manual*)

The two recorded pressure drops should be compared. If the rate of pressure drop is smaller for the second run, the pipe is conditioning and not leaking. (*FlexSteel Technical Manual*)

However, if the pressure drop rate does not decrease, there is a possibility that leak exists in the pressure boundary system. These leaks are usually in the test equipment or flanges rather than the pipe. If this occurs, testing should continue for two (2) additional cycles to verify that the pressure drop rate is still not changing. If the pressure drop rate remains constant, or increases, the test fittings and flange connections should be checked for leakage. Following this, if there is still no decline in the rate of pressure drop, the pipe is leaking. A leak in the pipe is rare, and if it occurs, it could result from a faulty end fitting or end fitting installation. Thus, the end fittings should be carefully inspected and/or replaced to determine if the leak occurred at an end fitting. (*FlexSteel Technical Manual*)

If the rate of pressure drop did decrease without any issues, the cycle of pressurizing to the test pressure, blocking the pipe in, and monitoring and recording the test pressure for an hour should continue a few more times to get more data and demonstrate that the rate of pressure drop is decreasing with each cycle. If an issue arises, then the steps mentioned above to determine if a leak is present should be followed.

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline				DJBU
	NMP Doc. No.:	N/A	Rev.:	1	

Otherwise, the anticipated 24-hour test pressure drop shall be calculated. That is, in a hypothetical 24-hour test, the anticipated pressure drop shall be calculated assuming the most recent pressure drop rate is maintained. If the predicted pressure is less than the Lower-Bound Test pressure (see the Site-Specific Hydrostatic Test Plan), then more conditioning cycles are needed. After each cycle, the predicted pressure drop shall be calculated for a 24-hour test to see if the pressure will always stay above the Lower-Bound Test Pressure. Once this has been confirmed, the pipe has been properly conditioned. The pipe should be re-pressurized to the test pressure, blocked in, and The Test Period shall start. (*FlexSteel Technical Manual*)

NOTE: The conditioning process can take several hours (8 – 12). It may be the case that the pipe needs to be pressurized up to the final test pressure a few times to finalize the conditioning before being blocked in and starting the test period. Also, it is recommended that all personnel be at least 50 feet away from the pipe during the pressure test. (*FlexSteel Commissioning Field Notes*)

3.6 THE TEST PERIOD

The Test Period shall begin after the temperature of the test medium, pipe temperature, and ground temperature have stabilized. When this stabilization process is complete, the pressurization pump should be isolated from the test section.


After inspecting for leakage, test personnel shall verify that the specified test pressure is being maintained.

Pressure and temperature shall be continuously monitored during the test. Data shall be recorded every half hour throughout the duration of the test.

The maximum allowable range of pressure fluctuation during the pressure test is defined by the “**Upper Bound Test Pressure**” and “**Lower Bound Test Pressure**” as shown in the **site-specific Hydrostatic Test Plan**, which is supplemental to this Hydrostatic Test Procedure. Any pressure excursions outside of these limits shall be reported to the Noble representative for further analysis.

Weather changes, such as the development of rain or clouds, which could affect the pressure and temperature of the pipe and test medium shall be documented on the test log.

The volume of any added or subtracted test medium shall be documented on the test log as well as its temperature and pressure at that time and be accounted for in the assessment of the results of the pressure test. For any pressure test of piping that cannot be 100% visually checked for leaks, it is mandatory that the volume of any test medium added or removed be accounted for to determine if the pressure test has been completed without evidence of leakage.

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline			DJBU
	NMP Doc. No.:	N/A	Rev.: 1	

3.7 SEARCHING FOR LEAKS

Prior to commencing work, the method(s) for locating leaks or failures shall be approved by the Noble representative. The operator may choose to fly, drive and/or walk the pipeline right-of-way to visually check for evidence of leaks during the pressure test. The operator should develop contingency plans for locating large and small leaks in areas of difficult terrain or in the event of inclement weather.

Acceptable methods for finding leaks during a pressure test are listed as follows:

- Sectioning or segmenting the pipeline and monitoring the pressure of each section. Closing mainline block valves will isolate the pipeline into smaller segments. Freeze plugs may also be used to isolate sections of the pipeline for evaluation.
- Acoustical monitoring equipment may be employed to narrow the search area.
- Odorants or tracers introduced into the test medium during the filling process will allow the operator to detect leaks with sensing equipment.

3.8 PRESSURE TEST FAILURES

All leaks and test failures shall be reported to the Noble representative immediately.

Any pipeline leaks or failures shall be documented in the test report.

If a rupture or a substantial leak occurs, the test shall be stopped and the pipeline depressurized. The cause of failure shall be understood, test procedures shall be reevaluated, and approval from the Noble representative shall be obtained before proceeding with repairs and starting a new hydrostatic test.

Pipe, valves, fittings, and test components that fail during a pressure test shall be investigated to determine the cause of failure and to minimize the possibility of a recurrence.

Pipe or other failed components shall be preserved for further examination and failure analysis.


If a small leak occurs, the pressure should be reduced to 80% of the final test pressure while locating the leak. After repairs are completed and authorization from the Noble representative has been obtained, the test can be restarted per the initial pressurization steps above.

Pressure excursions outside of the **Maximum and Minimum Test Pressures** as defined in **Section 2.1** of this procedure are considered test failures.

3.9 DEPRESSURIZATION, DISPLACEMENT, AND DISPOSAL OF TEST WATER

Prior to commencing work, a depressurization, displacement, and disposal plan shall be submitted to and approved by the Noble representative.

Depressurization activities shall not commence without authorization from the Noble representative. Once authorization is received, depressurization should commence at a rate of **10 PSIG/MIN** in increments of 25% of the final test pressure. The pressure should be allowed to stabilize for **15 minutes** between increments.

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline				DJBU
	NMP Doc. No.:	N/A	Rev.:	1	

Displacement and disposal activities shall not commence prior to Noble engineering acceptance of the hydrostatic test results.

A disposal plan for the test medium must be developed and the Noble representative shall review and approve the disposal plan.

Pigs or spheres used in the dewatering process shall be equipped with trackers for monitoring location and speed during the dewatering process.

The travel speed for the dewatering pigs shall be maintained at **2 – 3 MPH**.

For the Greeley Crescent Produced Water Pipeline: The pipe will not be dewatered. Instead, the line will be put into service with the test water inside. All of the water in the mainline will be sent to the C-10 Disposal Well.


3.10 DRYING OPERATIONS

Drying operations are not required for the **Greeley Crescent produced water** pipeline.

4 RECORDS

After the hydrostatic test has been completed, the following records shall be submitted as part of the Final Test Report, which must be retained as long as the pipeline is in use.

- Pressure / Volume Plot
- Pressure Recording Chart / Plot
- Calibration Records
 - Deadweight Tester
 - Chart Recorder
 - Temperature Recorders
 - Certified Thermometer
- 49 CFR Part 195 Operator Qualifications
 - Operator
 - Person responsible for making the test
 - Test company used, if any
- Hydrostatic Test Log, including:
 - Date and time of the test
 - Minimum test pressure
 - Test medium
 - Description of the pipeline tested and the test apparatus
- Leak Reports
- Failure Reports
- Site-specific hydrostatic test plan including:
 - Elevation profile of the pipeline
 - Locations of test sites over the entire length of the pipeline
- Temperature Chart / Plot

	Hydrostatic Pressure Test Procedure Greeley Crescent Produced Water Pipeline				DJBU
	NMP Doc. No.:	N/A	Rev.:	1	

5 REFERENCES

- 1) API RP1110 "Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide"
- 2) ASME B31.4 "Pipeline Transportation Systems for Liquids and Slurries"
- 3) ASME B16.5 "Pipe Flanges and Flanged Fittings"
- 4) 49 CFR Part 195 "Transportation of Hazardous Liquids by Pipeline"
- 5) "FlexSteel Technical Manual"
- 6) "FlexSteel Commissioning Field Notes"
- 7) Site Specific Hydrostatic Test Plan

Greeley Crescent (DSU 30/29 to C10) - 8 in PW Pipeline Hydrostatic Pressure Test Plan

