



37TH INTERNATIONAL
NO - DIG
FLORENCE 2019

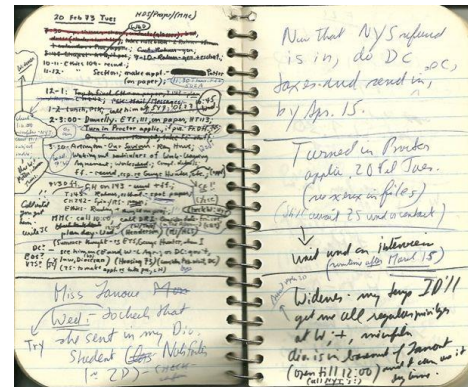
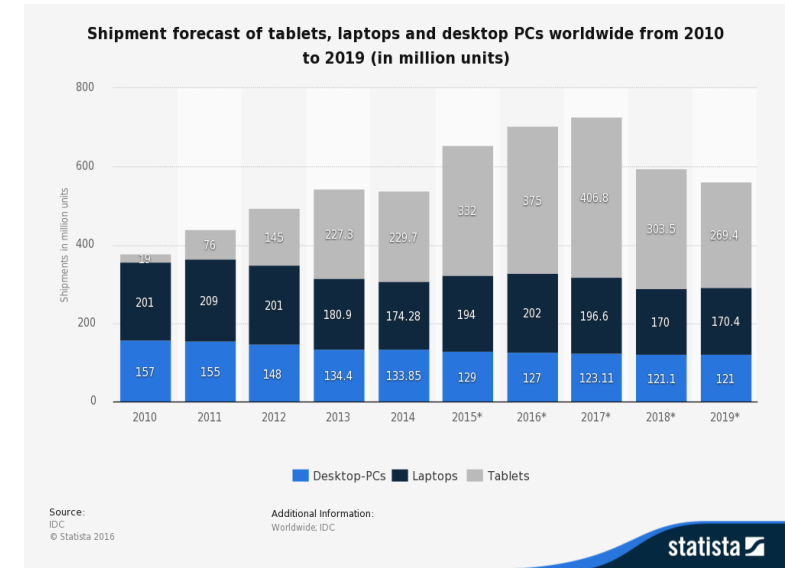
Fortezza da Basso • FLORENCE (Italy)

30th September • 2nd October 2019

SMART TECHNOLOGIES FOR THE ENHANCEMENT OF PRODUCTIVITY, DIGITAL
INTEGRATION AND SAFETY IN HDD PROJECTS

Jasper van 't Westende

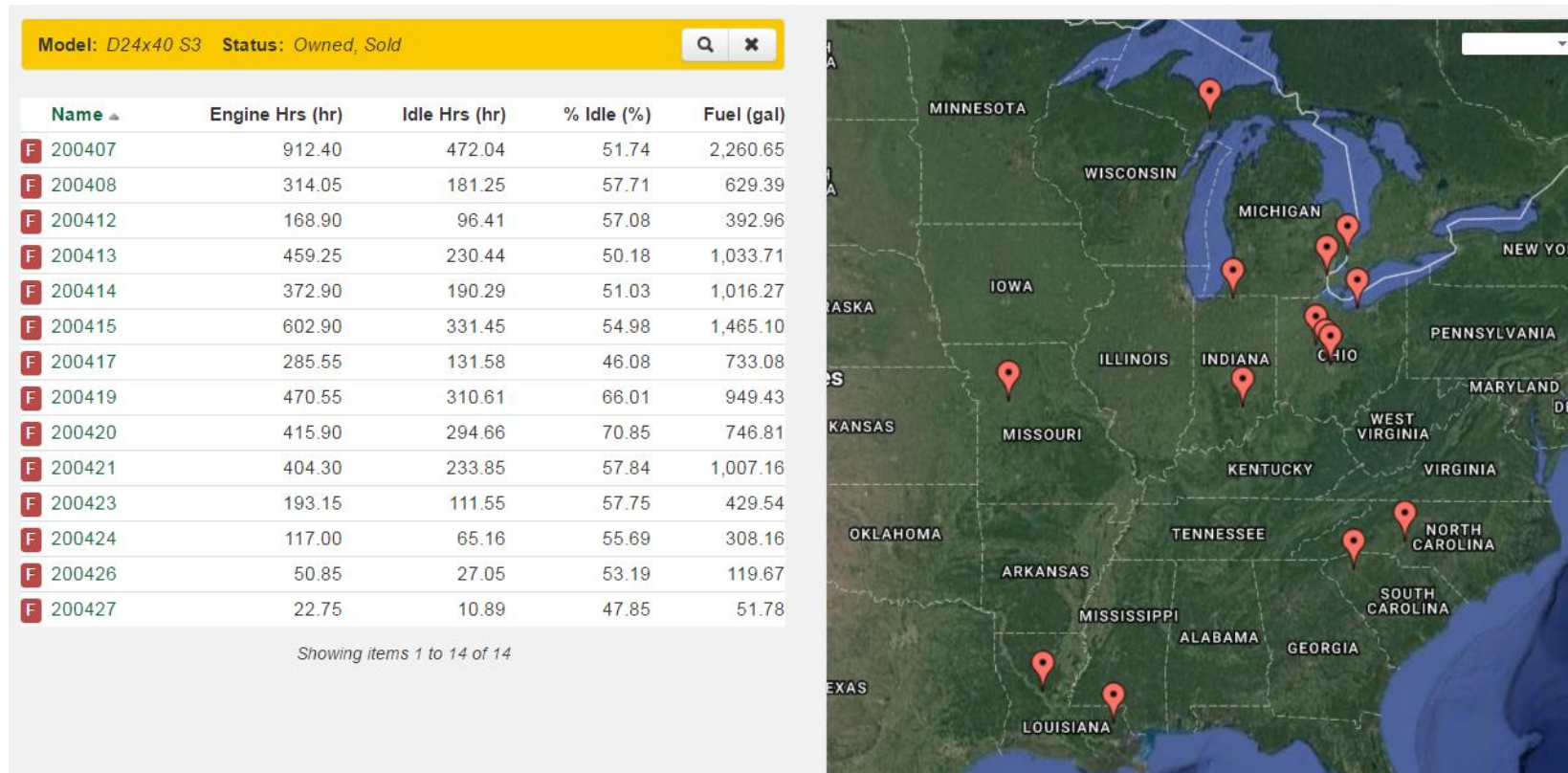
Technology on the Job Site



GPS Technology



Telematics



Fault Monitoring

From	To	Lamp Severity	Fmi		
02/01/2016	11/11/2016	All	All	Search	Reset

Last Occurrence ▼	CAN Bus	PGN	SPN	FMI	Occurrence Count	
11/9/2016 10:03:00 AM	0	65271	168: Battery Voltage	18: Data Valid But Below Normal Operating Range - Moderately Severe Level	42	
10/20/2016 1:53:38 PM	0	65263	111: Engine Coolant Level	17: Data Valid But Below Normal Operating Range - Least Severe Level	4	A
7/11/2016 12:04:09 PM	1	65128	1713: Hydraulic Oil Filter Restriction Switch	16: Data Valid But Above Normal Operating Range - Moderately Severe Level	1	R
7/7/2016 12:09:54 PM	1		520239: Mud Inlet Pressure	14: Special Instructions	1	A
6/27/2016 3:23:21 PM	1		2211: Rod Position Sensor	9: Abnormal Update Rate	1	A
6/27/2016 3:07:09 PM	1		2194: Cab Display Unit	9: Abnormal Update Rate	1	R
6/27/2016 2:59:08 PM	1		2211: Rod Position Sensor	13: Out Of Calibration	1	A
6/27/2016 12:02:15 PM	1		2210: Carriage Position Sensor	9: Abnormal Update Rate	1	A
6/27/2016 11:54:29 AM	1		2210: Carriage Position Sensor	13: Out Of Calibration	1	A
6/27/2016 11:53:49 AM	1		2201: Carriage Controller Offline	9: Abnormal Update Rate	1	R
6/27/2016 11:51:42 AM	1		2233: Strike Alert Controller	9: Abnormal Update Rate	1	R
6/27/2016 11:51:39 AM	1		2200: Rack Controller Offline	9: Abnormal Update Rate	1	R
6/27/2016 11:48:52 AM	1		2000: Engine Control Unit	9: Abnormal Update Rate	1	R
6/27/2016 11:48:39 AM	1		2193: Cab Controller	9: Abnormal Update Rate	1	R
6/21/2016 11:50:33 AM	1		520239: Mud Inlet Pressure	18: Data Valid But Below Normal Operating Range - Moderately Severe Level	1	R

Maintenance Planning



37TH INTERNATIONAL
NO - DIG
FLORENCE 2019

Log Unscheduled Maintenance

Current	History	Defined			
Type	Name	Data Point	Due	Reminder	
Milestone	100 Service Hours	Engine Hours	at 100 Hours (hr)	at 50 Hours (hr)	Details
Milestone	1000 Service Hours	Engine Hours	at 1,000 Hours (hr)	at 950 Hours (hr)	Details
Milestone	1500 Service Hours	Engine Hours	at 1,500 Hours (hr)	at 1,450 Hours (hr)	Details
Milestone	2000 Service Hours	Engine Hours	at 2,000 Hours (hr)	at 1,950 Hours (hr)	Details
Milestone	250 Service Hours	Engine Hours	at 250 Hours (hr)	at 200 Hours (hr)	Details
Milestone	4500 Service Hours	Engine Hours	at 4,500 Hours (hr)	at 4,450 Hours (hr)	Details
Milestone	50 Service Hours or Weekly	Engine Hours	at 50 Hours (hr)	at 20 Hours (hr)	Details
Milestone	500 Service Hours	Engine Hours	at 500 Hours (hr)	at 450 Hours (hr)	Details

Showing items 1 to 8 of 8

Advanced Telematics

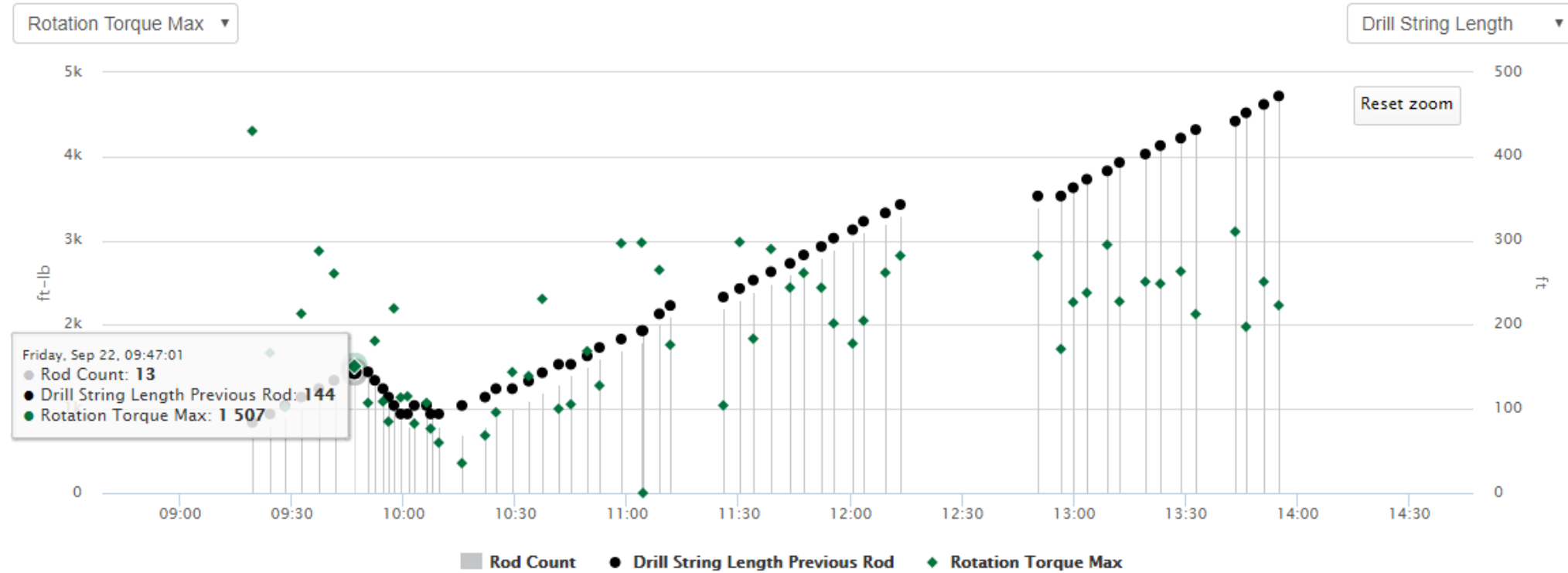


Advanced Telematics



37TH INTERNATIONAL
NO - DIG
FLORENCE 2019

Edge Productivity Advisor



Advanced Telematics

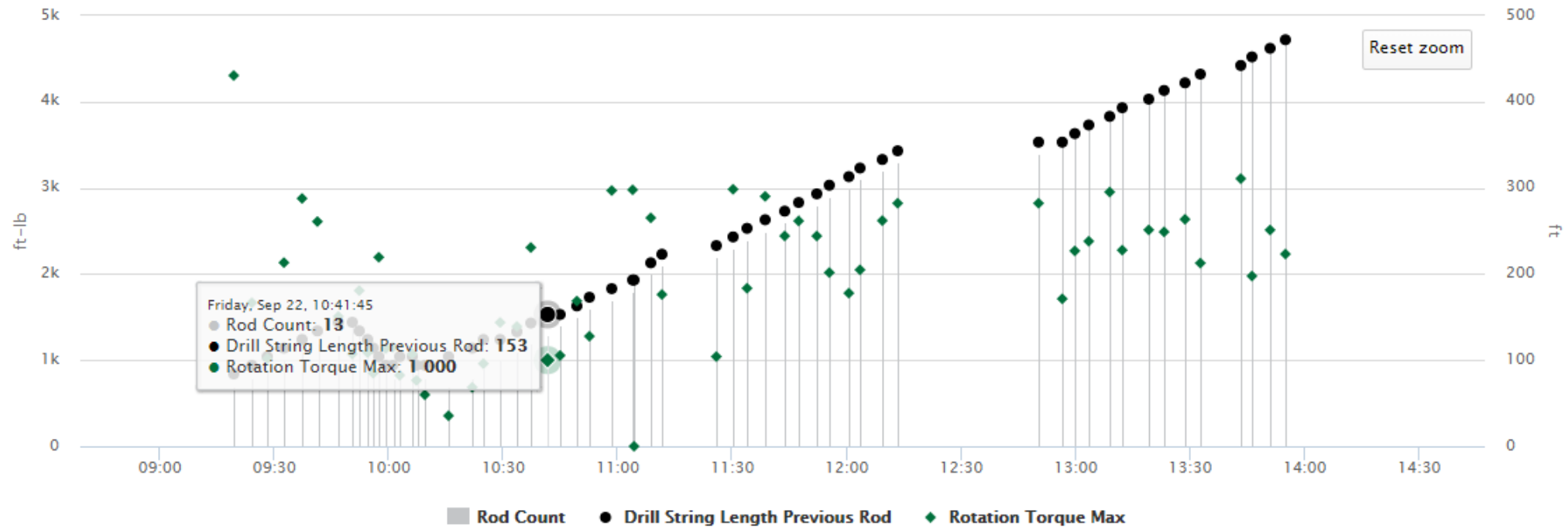


37TH INTERNATIONAL
NO - DIG
FLORENCE 2019

Edge Productivity Advisor

Rotation Torque Max ▾

Drill String Length ▾



Jobsite Planning

The collage displays several key documents used in jobsite planning:

- Top Left:** A technical map showing utility lines (gas, water, sewer) and street layouts.
- Top Center:** A 'DAILY HUDDLE AND GOALS' form with checkboxes for weather and safety.
- Top Right:** A 'GAS SERVICE RECORD' form with fields for date, address, and service details.
- Middle Left:** A large spreadsheet titled 'Job Name: 85 Lockwood the interchange'. It contains a table with columns for Distance, Elevation, Height, and Landmark.
- Middle Center:** A 'Bore Machine # Additives' form with fields for Fuel (gal), Machine Hours, Pipe Size, Pipe Type, Footage, and Depth Range (in).
- Middle Right:** A 'Task 8 UEA' form with fields for Date, Time, and Task.
- Bottom Left:** A 'Page 1' spreadsheet showing a detailed list of landmarks and elevations.
- Bottom Center:** A hand-drawn site sketch on graph paper showing the layout of the interchange.
- Bottom Right:** A 'Calculations/Mark Sheet' with a hand-drawn map of Lombard St and Brown St, showing various measurements and landmarks.

Distance	Elevation	Height	Landmark
0	-0.75		
25	0		
50	0		
75	-0.85		x 3885 is 1/4" / 3885 is 1/4"
100	-0.5		
125	0.65		EO asphalt DW
144	0.65		EO asphalt DW
154	-0.55		Pole #407825 LF / ATT Pole is R-24'
162	0		ROW marker
166	-0.45		Concrete Wall
188	-1.05		Concrete Wall
170	0		72" SD is 1" to top, grate is R/R
207	-1.15		W meter, 2" R-4
208	-1.05		W meter, 1.15", R-8'
216	-0.6		South ATT is R-8' (parallel)
220	-0.6		Who cross Rd at 388
226	-0.35		W valve
229	-0.05		hydrant, / 15er ATT is R-8'
233	0.25		SW
239	-0.15		DW
246	0.15		DW
275	0.55		SW
278	0.25		
288	-0.75		SCOTT STL is LL
304	-1.15		TR / Sign base is 1.2' and is 8x7Wx8D
326	-1.65		wall on lockwood 1-DW, EO Wetland

Jobsite Planning



37TH INTERNATIONAL
NO - DIG
FLORENCE 2019

Google Earth



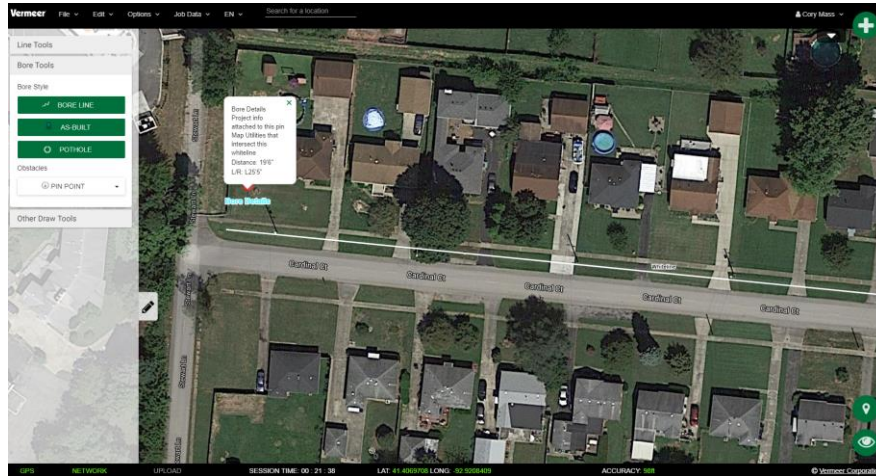
QGIS



Esri



Jobsite Planning

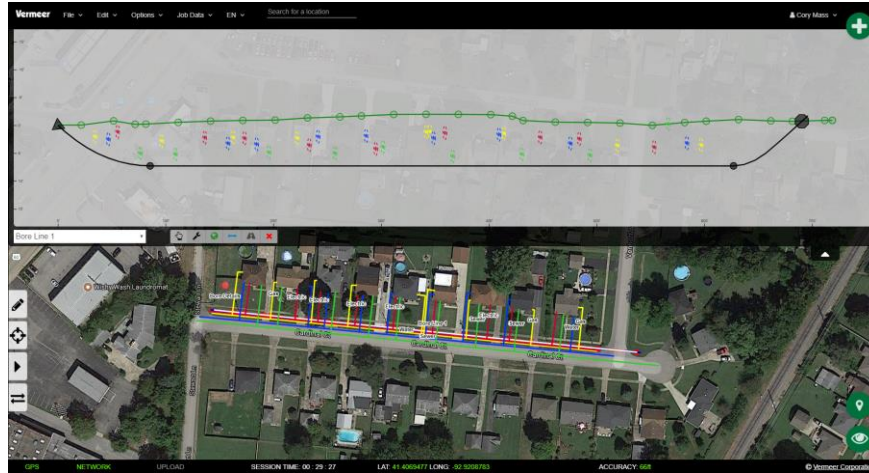


Utilities mapped in relation to the whiteline by potholing crews

Whitelines placed on the map to guide crews

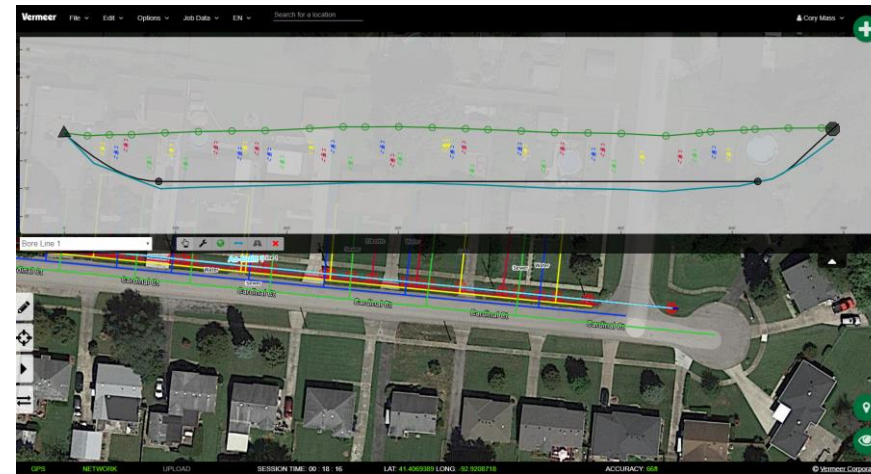


Jobsite Planning



Add your as-built after the bore is complete right from the locator

Create a bore designed to avoid the utilities and be productive



Jobsite Planning

Rod by Rod Report

For bore: Bore Line 1

Machine/Rod Information: D24x40 S3/D2.375" X L10' X U2.625"

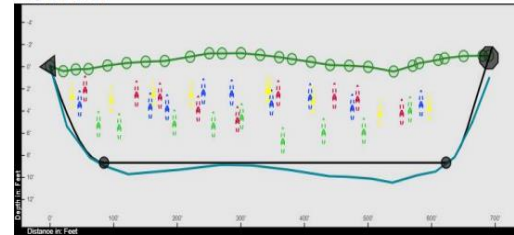
Diameter: 2.375" Length: 10'0" Bend Limit: 1082"

Rod #	Distance	L/R	Elevation	Depth	Pitch	Azimuth	Radius
1	6'10"	R0'0"	454'9"	1'0"	-16.91%	0.00%	670'4"
2	16'9"	R0'0"	453'2"	2'5"	-15.48%	0.00%	670'4"
3	26'7"	R0'0"	451'9"	3'10"	-13.88%	0.00%	670'4"
4	36'6"	R0'0"	450'5"	5'2"	-12.28%	0.00%	670'4"
5	46'6"	R0'0"	449'3"	6'4"	-10.33%	0.00%	373'8"
6	56'5"	R0'0"	448'5"	7'3"	-7.69%	0.00%	373'8"
7	66'5"	R0'0"	447'9"	8'0"	-4.89%	0.00%	373'8"
8	76'5"	R0'0"	447'5"	8'5"	-2.27%	0.00%	373'8"
9	86'5"	R0'0"	447'4"	8'8"	0.00%	0.00%	373'8"
10	96'5"	R0'0"	447'4"	8'9"	0.00%	0.00%	∞
11	106'5"	R0'0"	447'4"	8'10"	0.00%	0.00%	∞
12	116'5"	R0'0"	447'4"	8'11"	0.00%	0.00%	∞
13	126'5"	R0'0"	447'4"	8'11"	0.00%	0.00%	∞
14	136'5"	R0'0"	447'4"	9'0"	0.00%	0.00%	∞
15	146'5"	R0'0"	447'4"	9'0"	0.00%	0.00%	∞
16	156'5"	R0'0"	447'4"	9'1"	0.00%	0.00%	∞
17	166'5"	R0'0"	447'4"	9'1"	0.00%	0.00%	∞
18	176'5"	R0'0"	447'4"	9'1"	0.00%	0.00%	∞
19	186'5"	R0'0"	447'4"	9'2"	0.00%	0.00%	∞
20	196'5"	R0'0"	447'4"	9'3"	0.00%	0.00%	∞
21	206'5"	R0'0"	447'4"	9'4"	0.00%	0.00%	∞
22	216'5"	R0'0"	447'4"	9'5"	0.00%	0.00%	∞
23	226'5"	R0'0"	447'4"	9'6"	0.00%	0.00%	∞
24	236'5"	R0'0"	447'4"	9'8"	0.00%	0.00%	∞
25	246'5"	R0'0"	447'4"	9'9"	0.00%	0.00%	∞
26	256'5"	R0'0"	447'4"	9'9"	0.00%	0.00%	∞
27	266'5"	R0'0"	447'4"	9'9"	0.00%	0.00%	∞
28	276'5"	R0'0"	447'4"	9'9"	0.00%	0.00%	∞
29	286'5"	R0'0"	447'4"	9'9"	0.00%	0.00%	∞

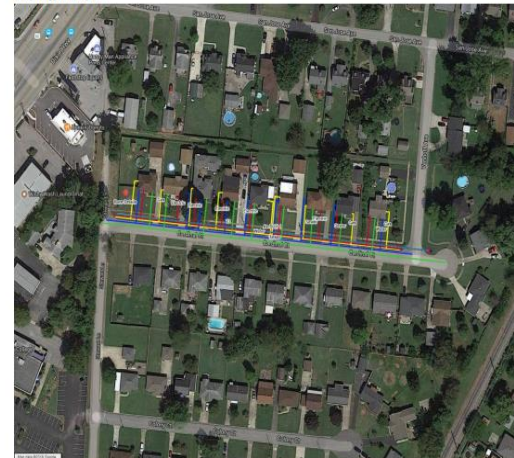
Bore Aerial and Profile View

For Bore: Bore Line 1

Profile View



Aerial View



As-Built

For As-Built: 23

undefined0"

#	Distance	Rod Length	Depth	Pitch	Type	Lat	Long
0	0'0"	0'0"	0'0"	-24%	PO	38.1771163 *	-85.8185568 *
1	7'0"	7'0"	2'2"	-25.5%	DAP	38.1771144 *	-85.8185326 *
2	17'0"	10'0"	4'3"	-18%	DAP	38.1771117 *	-85.818498 *
3	27'0"	10'0"	5'3"	-9.5%	DAP	38.1771091 *	-85.8184634 *
4	37'0"	10'0"	5'4"	-1.1%	DAP	38.1771064 *	-85.8184288 *
5	47'0"	10'0"	5'3"	0.6%	DAP	38.1771037 *	-85.8183941 *
6	57'0"	10'0"	5'3"	-0.9%	DAP	38.177101 *	-85.8183595 *
7	67'0"	10'0"	5'3"	-0.2%	DAP	38.1770983 *	-85.8183249 *
8	77'0"	10'0"	5'3"	-0.8%	DAP	38.1770956 *	-85.8182903 *
9	87'0"	10'0"	5'2"	-2.1%	DAP	38.1770929 *	-85.8182557 *
10	97'0"	10'0"	5'2"	-1.2%	DAP	38.1770902 *	-85.818221 *
11	107'0"	10'0"	4'9"	0.3%	DAP	38.1770876 *	-85.8181864 *
12	117'0"	10'0"	4'10"	0.7%	DAP	38.1770849 *	-85.8181518 *
13	127'0"	10'0"	4'9"	-0.5%	DAP	38.1770822 *	-85.8181172 *
14	137'0"	10'0"	4'11"	-0.7%	DAP	38.1770795 *	-85.8180826 *
15	147'0"	10'0"	5'1"	-0.2%	DAP	38.1770768 *	-85.818048 *
16	157'0"	10'0"	5'0"	-1.7%	DAP	38.1770741 *	-85.8180133 *
17	167'0"	10'0"	5'4"	-1.2%	DAP	38.1770714 *	-85.8179787 *
18	177'0"	10'0"	5'7"	-2.5%	DAP	38.1770687 *	-85.8179441 *
19	187'0"	10'0"	5'10"	-2%	DAP	38.1770661 *	-85.8179095 *
20	197'0"	10'0"	5'11"	-1.8%	DAP	38.1770634 *	-85.8178749 *
21	207'0"	10'0"	6'0"	-0.7%	DAP	38.1770607 *	-85.8178402 *
22	217'0"	10'0"	6'1"	0.2%	DAP	38.177058 *	-85.8178056 *
23	227'0"	10'0"	5'11"	3.2%	DAP	38.1770553 *	-85.817771 *
24	237'0"	10'0"	5'3"	5.4%	DAP	38.1770526 *	-85.8177364 *
25	247'0"	10'0"	5'2"	2.4%	DAP	38.1770499 *	-85.8177018 *
26	257'0"	10'0"	4'10"	0.7%	DAP	38.1770472 *	-85.8176671 *
27	267'0"	10'0"	5'2"	-0.6%	DAP	38.1770445 *	-85.8176325 *
28	277'0"	10'0"	5'1"	-0.4%	DAP	38.1770419 *	-85.8175979 *