37TH INTERNATIONAL NO-DIG FLORENCE 2019

Fortezza da Basso • FLORENCE (Italy)

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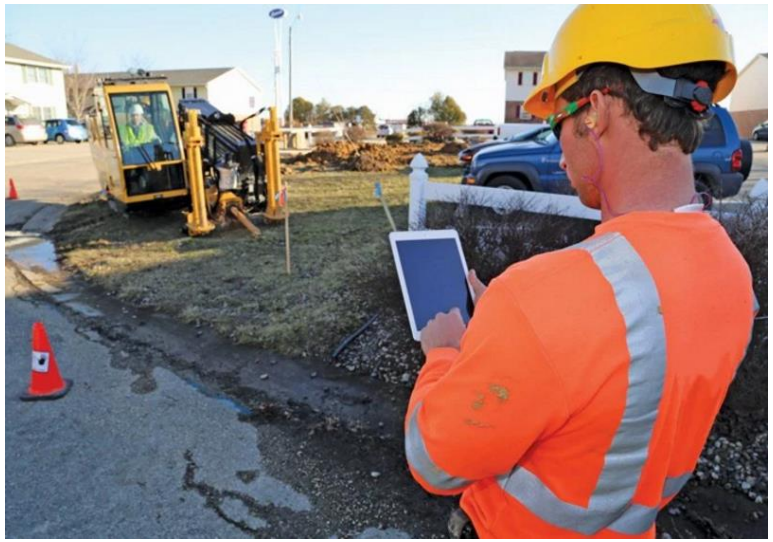
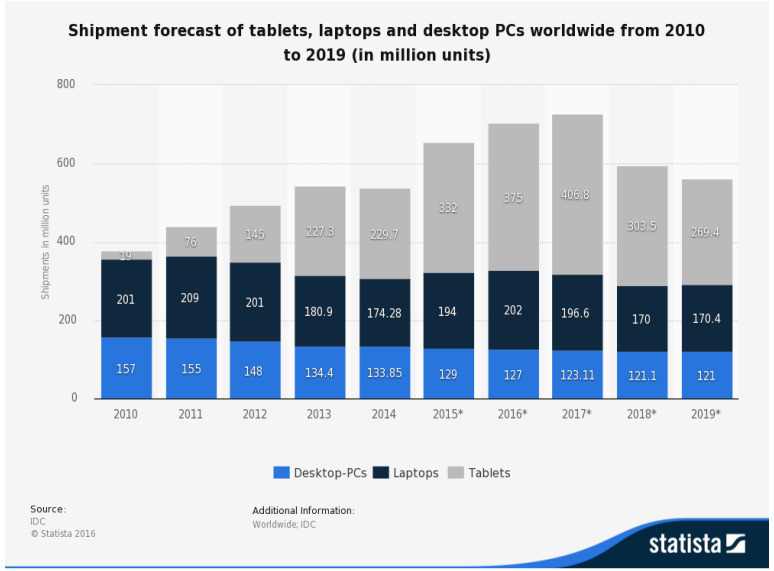
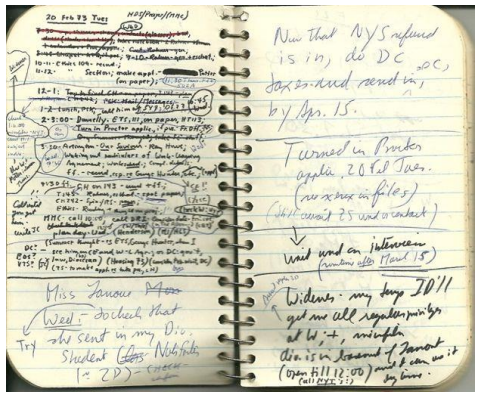
SMART TECHNOLOGIES FOR THE ENHANCEMENT OF PRODUCTIVITY, DIGITAL INTEGRATION AND SAFETY IN HDD PROJECTS

Jasper van ‘t Westende

Technology on the Job Site







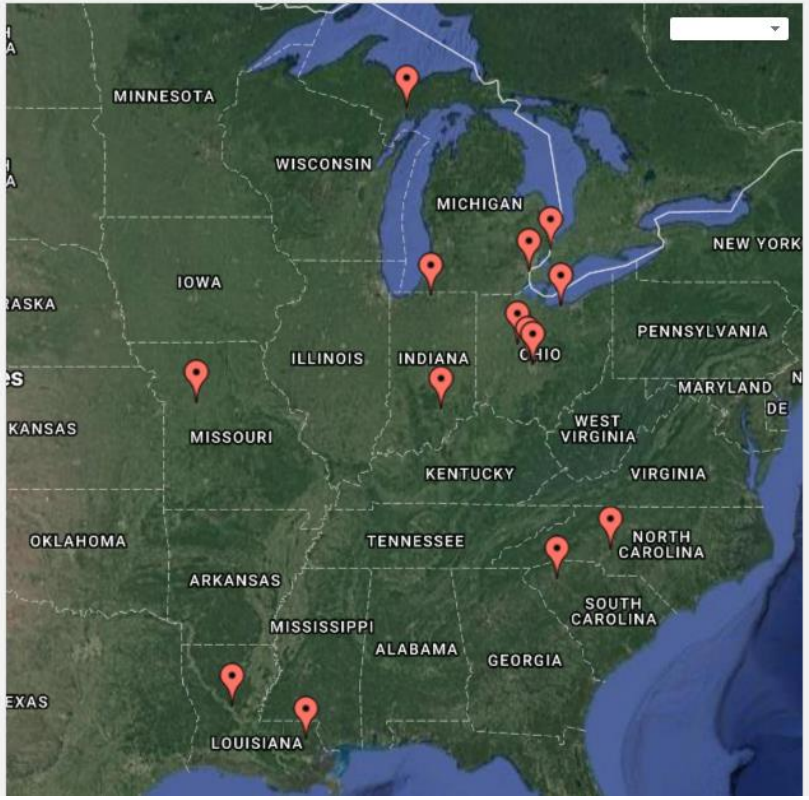
GPS Technology

Telematics

Model: *D24x40 S3* **Status:** *Owned, Sold*

Name	Engine Hrs (hr)	Idle Hrs (hr)	% Idle (%)	Fuel (gal)
200407	912.40	472.04	51.74	2,260.65
200408	314.05	181.25	57.71	629.39
200412	168.90	96.41	57.08	392.96
200413	459.25	230.44	50.18	1,033.71
200414	372.90	190.29	51.03	1,016.27
200415	602.90	331.45	54.98	1,465.10
200417	285.55	131.58	46.08	733.08
200419	470.55	310.61	66.01	949.43
200420	415.90	294.66	70.85	746.81
200421	404.30	233.85	57.84	1,007.16
200423	193.15	111.55	57.75	429.54
200424	117.00	65.16	55.69	308.16
200426	50.85	27.05	53.19	119.67
200427	22.75	10.89	47.85	51.78

Showing items 1 to 14 of 14



Fault Monitoring

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

Log Unscheduled Maintenance

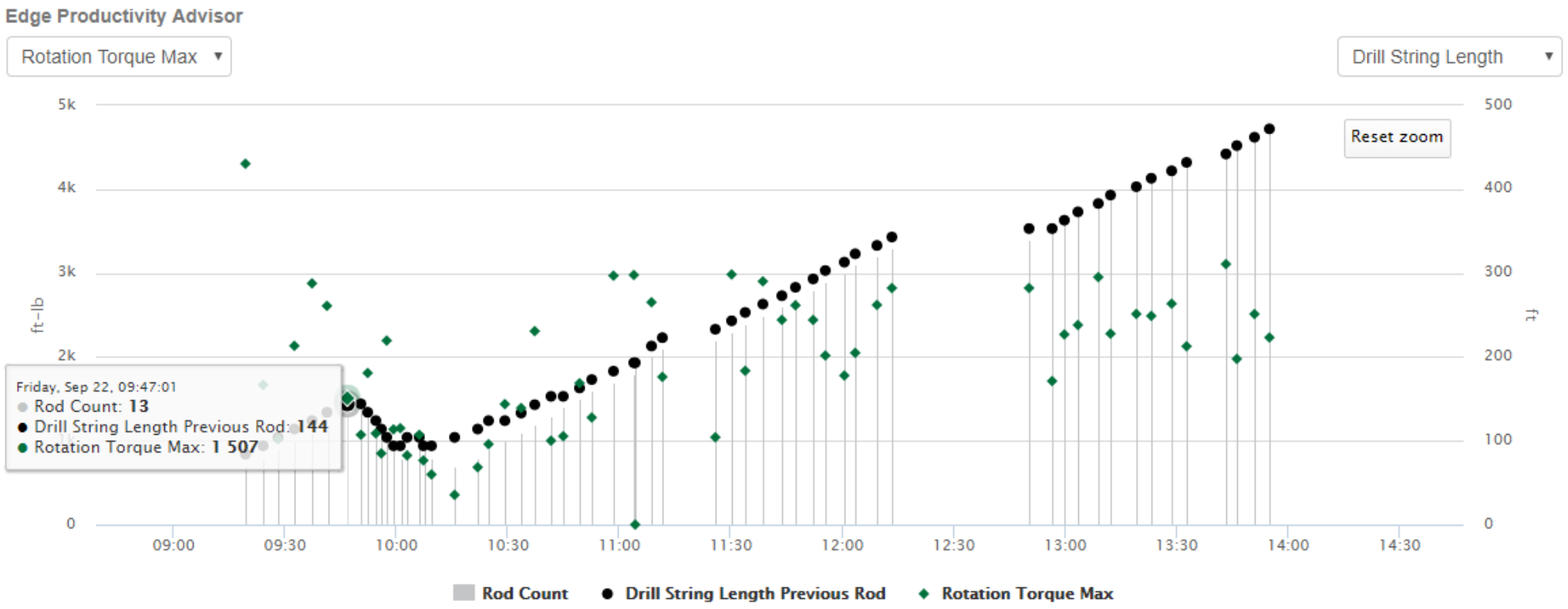
Current | History | Defined

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

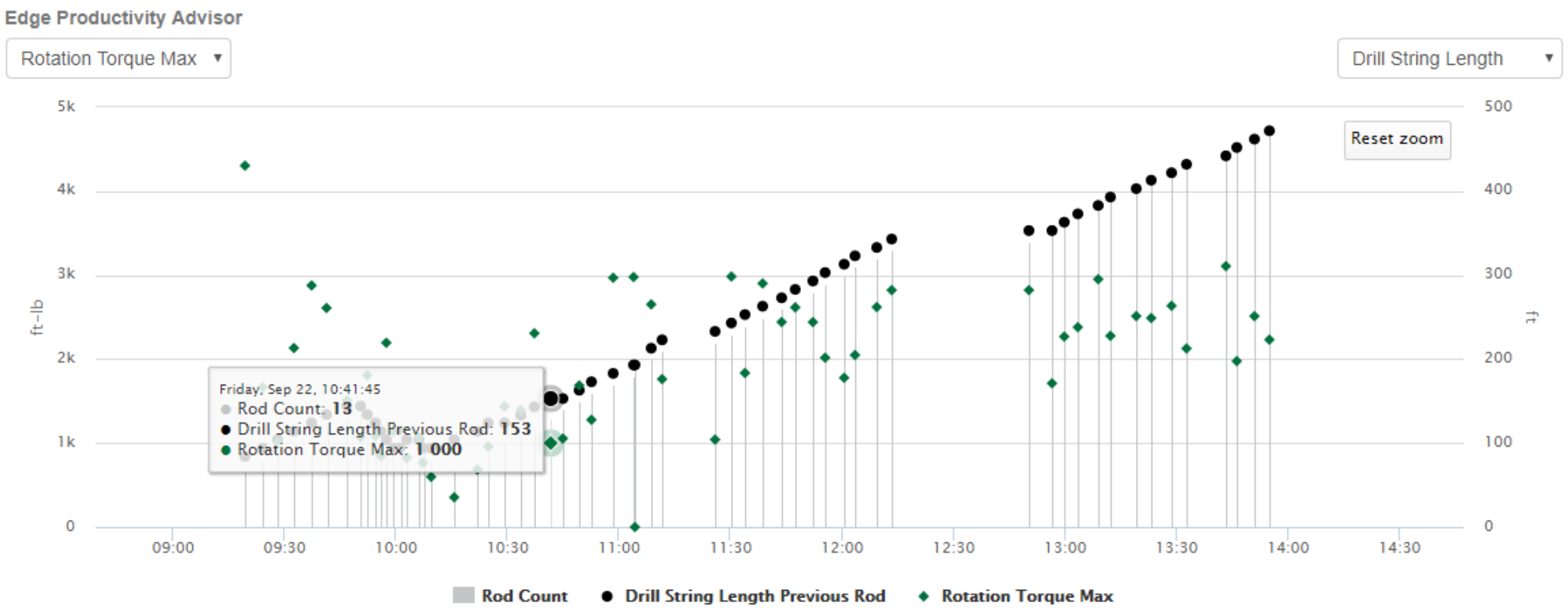
Showing items 1 to 8 of 8

Advanced Telematics

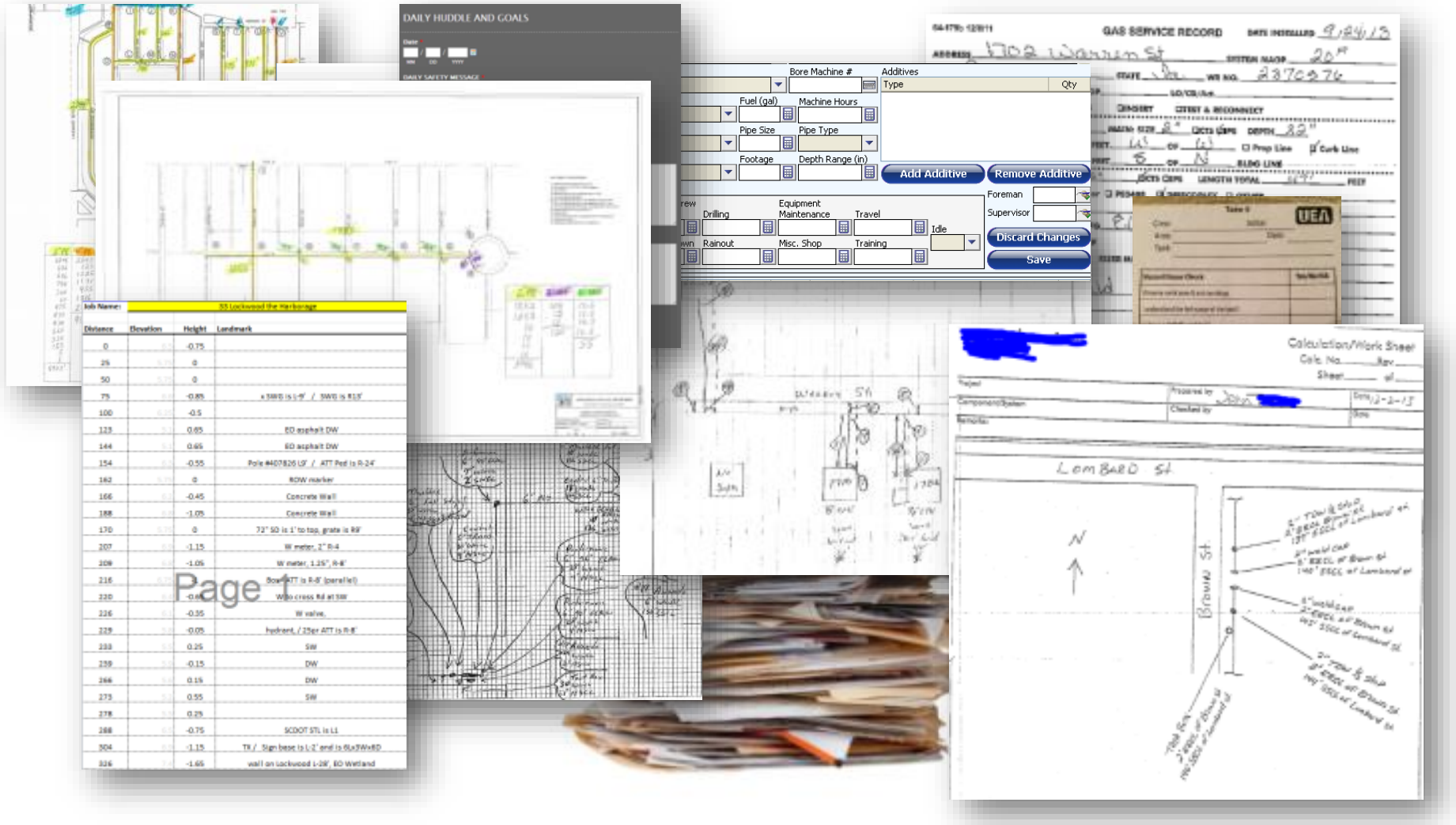
Advanced Telematics



Advanced Telematics



Jobsite Planning



Jobsite Planning

Google Earth

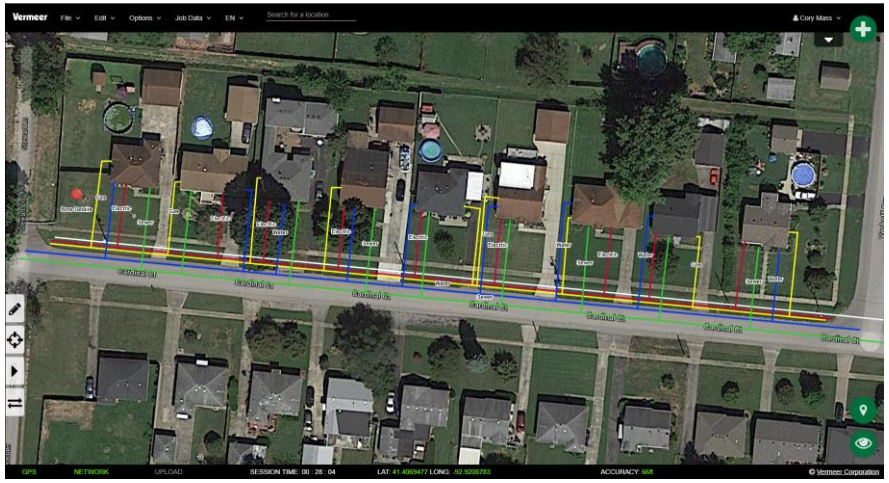
QGIS

Esri

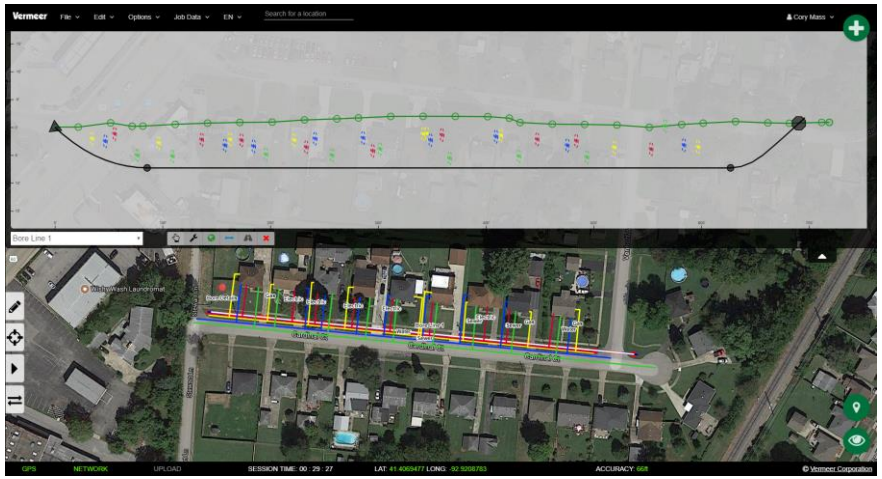
Jobsite Planning

Utilities mapped in relation to the whiteline by potholing crews

Whitelines placed on the map to guide crews

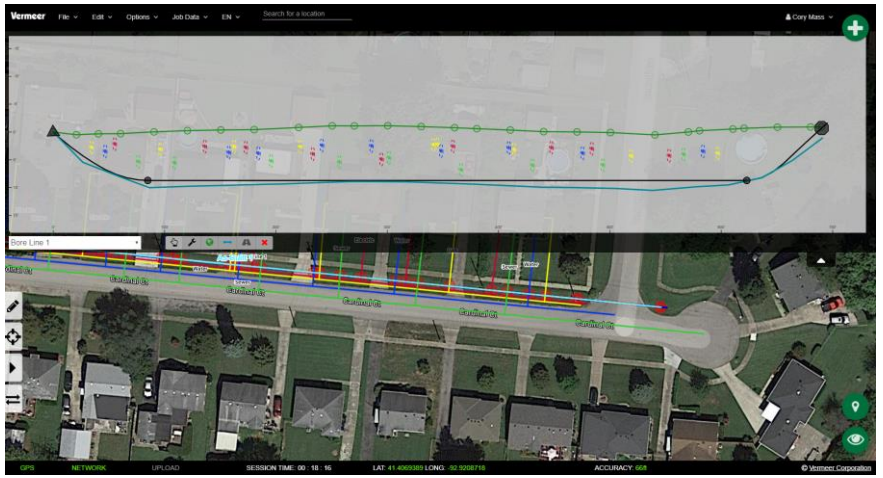


Jobsite Planning



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"

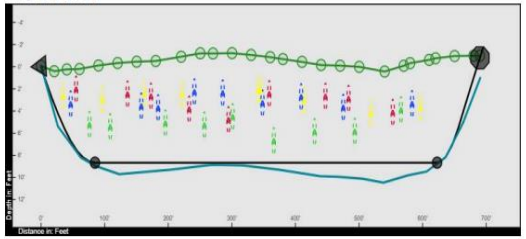
Diameter: 2.375" Length: 10'0" Bend Limit: 108'2"

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 *