



Practical Uses of Mobile Data Management and Computerized Maintenance Management Systems



Landon Kendricks

COMMITMENT & INTEGRITY DRIVE RESULTS

The Wise Man



Mobile Data Management and Computerized Maintenance Management Systems



MDM and CMMS...

- Changes our Mindset
- Changes our Methodology



The Dishwasher Dilemma



The Dishwasher Dilemma



Why MDM and CMMS?



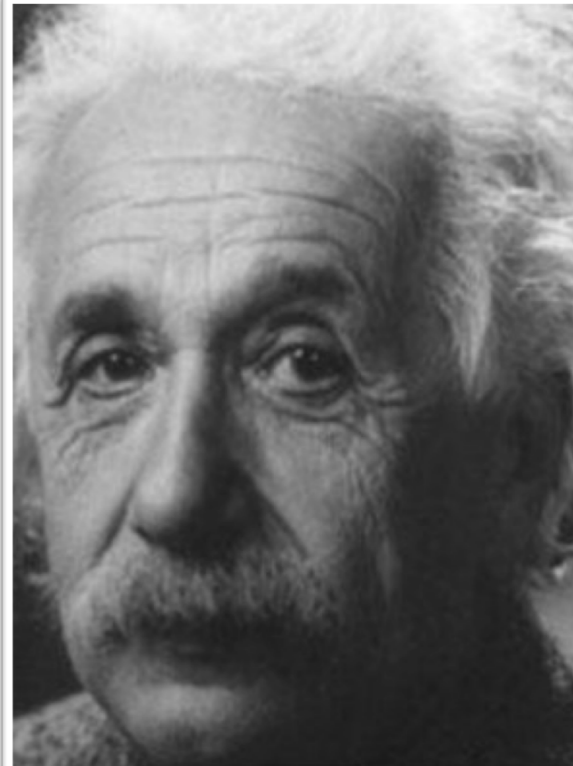
**START
WITH
WHY**

Asset Management



Asset Management

- Personnel
- Time



Energy cannot be created or
destroyed, it can only be changed
from one form to another.

— *Albert Einstein* —

AZ QUOTES

Time is Set in Stone

TIME

$$\times \quad \begin{array}{l} \text{Seconds Per Minute} = 60 \\ \text{Minutes Per Hour} = 60 \end{array}$$

$$\times \quad \begin{array}{l} \text{Seconds Per Hour} = 3,600 \\ \text{Hours Per Day} = 24 \end{array}$$

$$\times \quad \begin{array}{l} \text{Seconds Per Day} = 86,400 \\ \text{Day Per Year} = 365 \end{array}$$

$$\div \quad \begin{array}{l} \text{Seconds Per Year} = 31,536,000 \\ \text{Seconds Per Hour} = 3,600 \end{array}$$

$$\text{Hours Per Year} = 8,760$$



What is Efficiency?

*“Our ability to accomplish a job with
a minimum expenditure of time and effort.”*



The Holy Grail

Problems in Efficiency Maximization

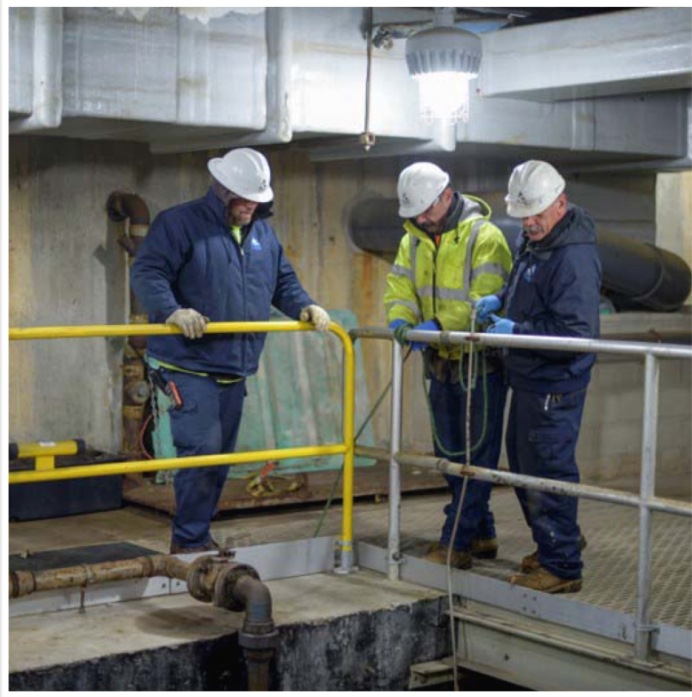
- *Acquiring Real-Time Data*
- *Planning in Advance*



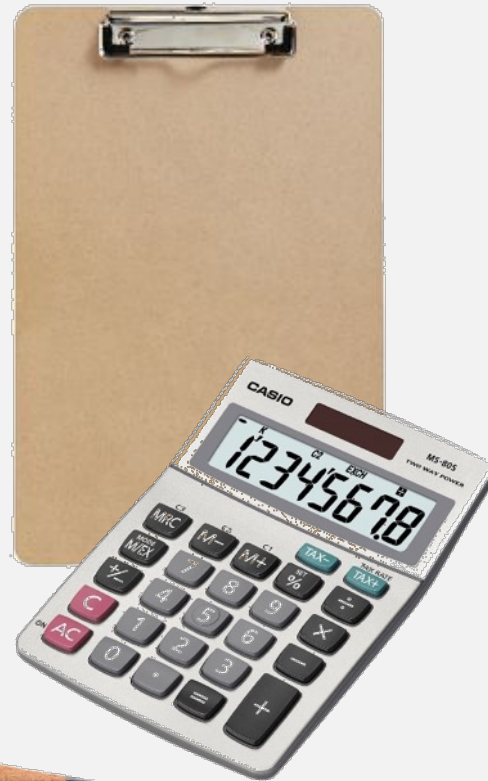
The Budget Crunch



Scenario 1: Low Efficiency



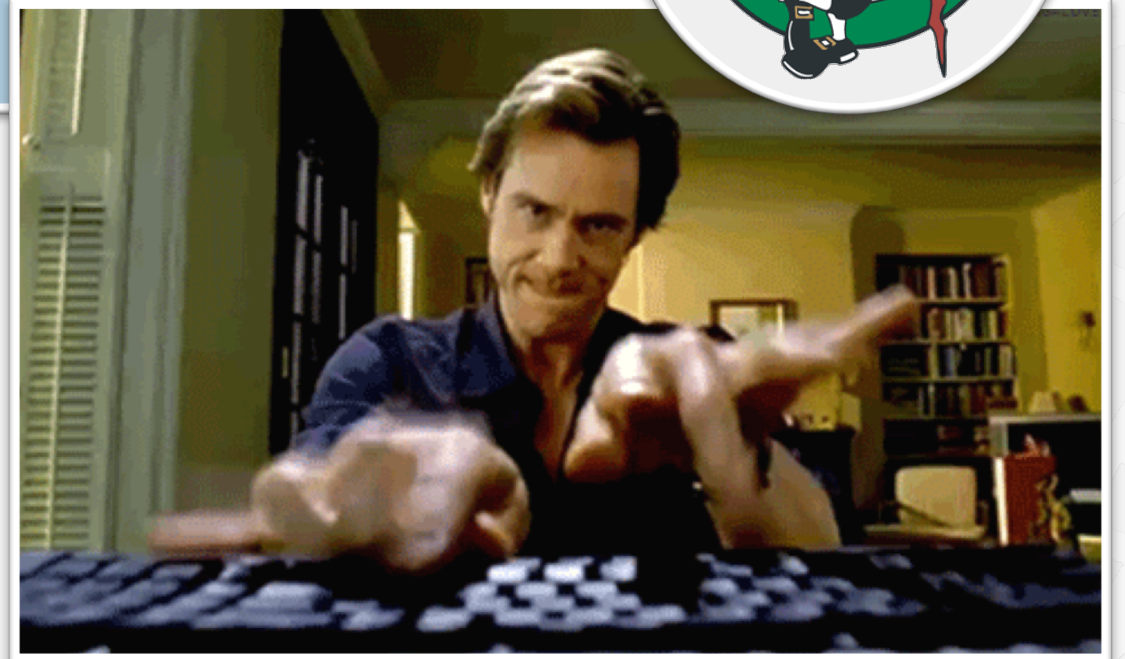
Scenario 1: Low Efficiency




Scenario 1: Low Efficiency

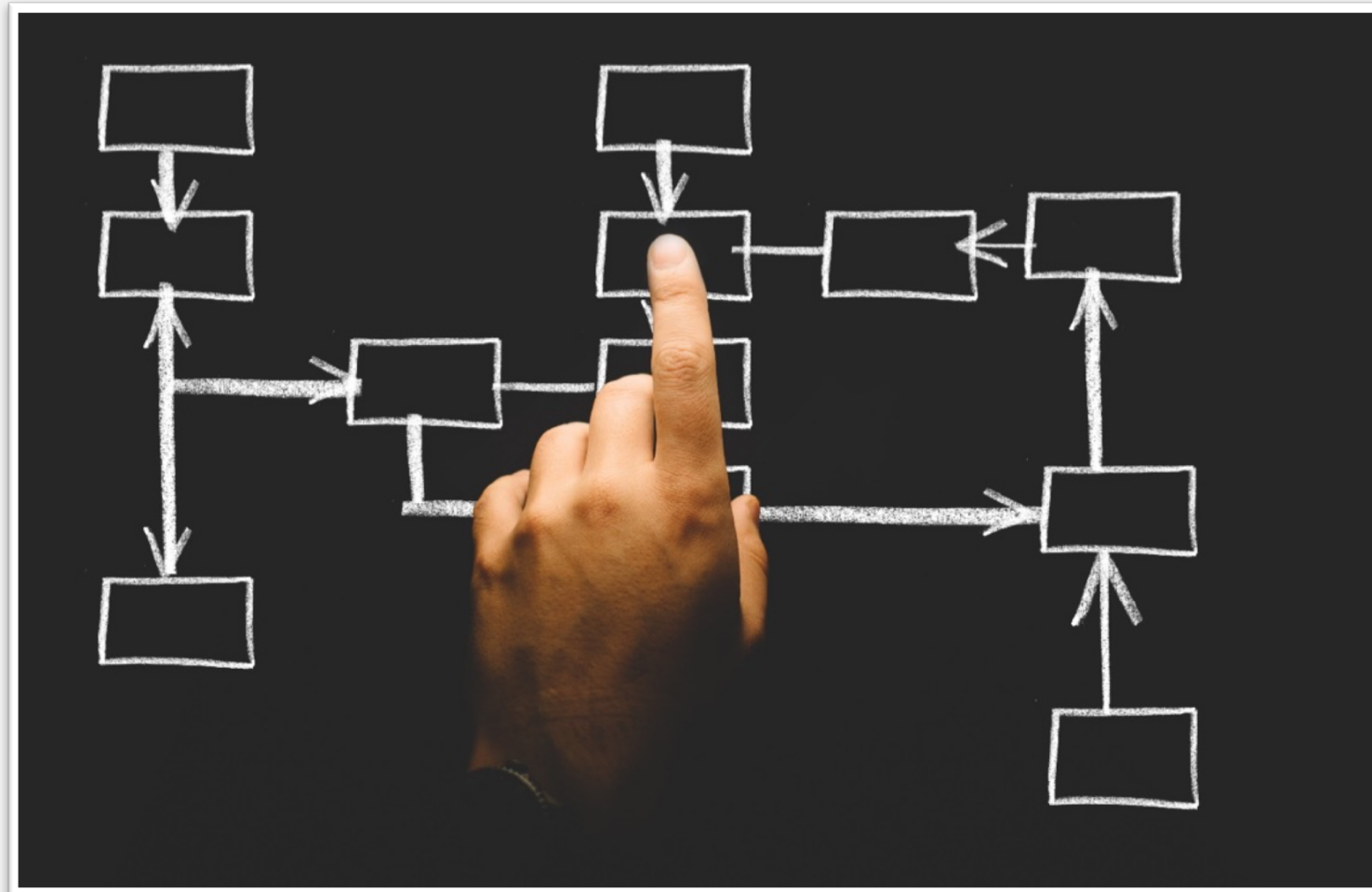


Scenario 1: Is it Impossible?

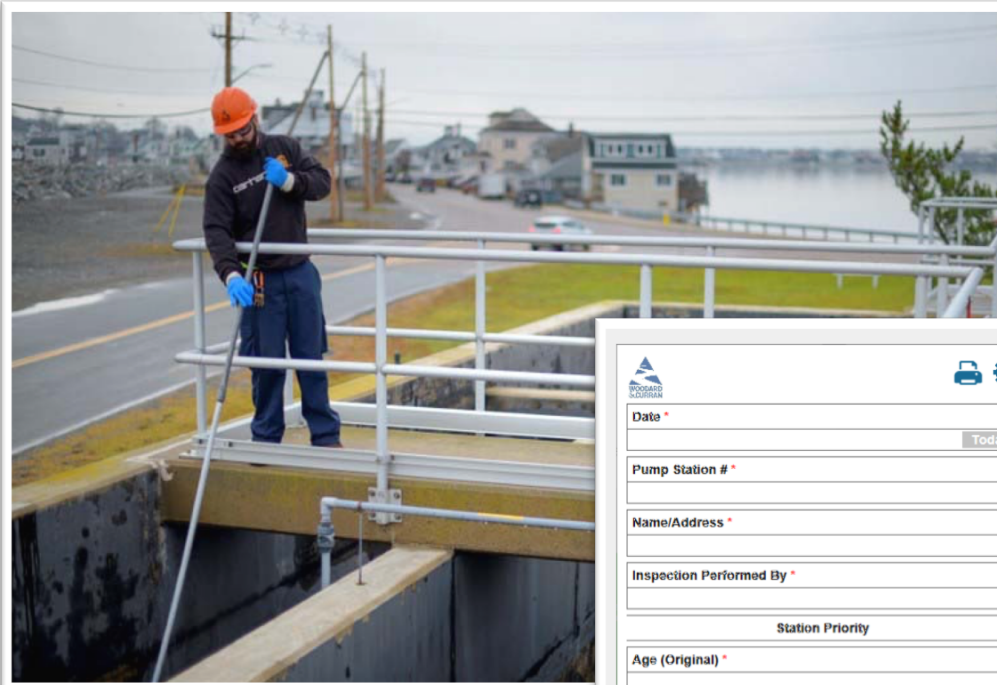





But What If We Could?

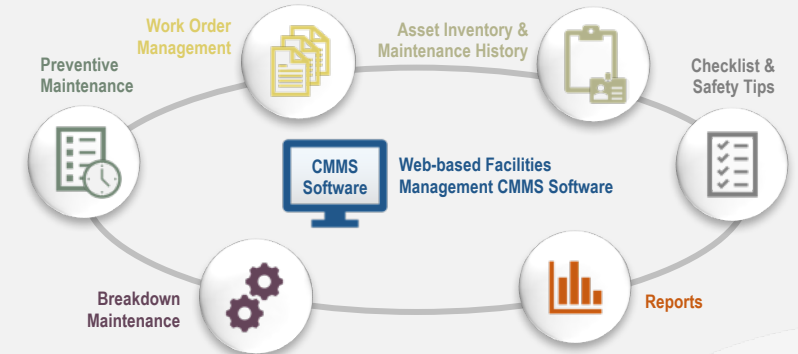
- 
- Benefit Plant Operation
 - Maximize Longevity of Assets




Scenario 2: High Efficiency



  	
Date *	<input type="text"/> Today
Pump Station # *	<input type="text"/>
Name/Address *	<input type="text"/>
Inspection Performed By *	<input type="text"/>
Station Priority	
Age (Original) *	<input type="text"/>
Age (since reconditioned) *	<input type="text"/>
Status of Unit *	<input type="text"/>
Criticality of Unit *	<input type="text"/>
Flow Rate (GPD) *	<input type="text"/>
Pump Hours *	<input type="text"/>



Scenario 2: High Efficiency



Hull Wastewater

Manhole Inspection

Work Order Information

Date: 02/19/2016	Type: Inspections	Status: Completed
Manhole ID: MH 20968	Priority: Normal	Reason: Operational

Description of Issue

Description: Manhole Inspection



Notes: Inspection and cleaning of MH, heavy debris of dirt sand and stones also broken rim, high infiltration

Actions Taken

Staff: Eric Sutton

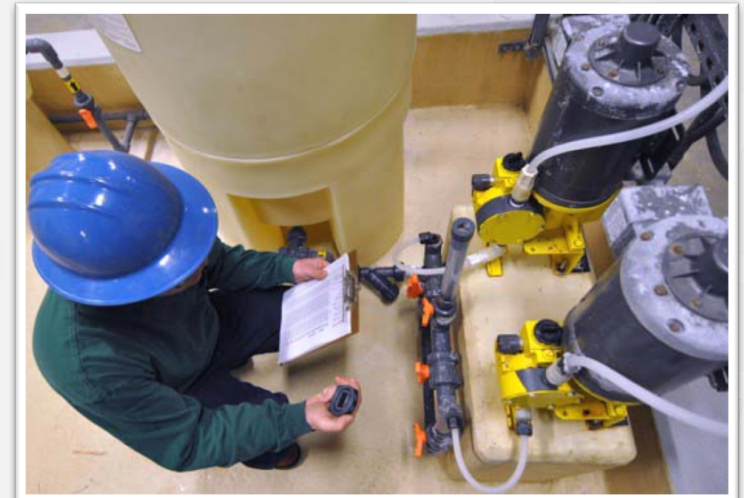
Service: Clean manhole of dirt sand and stones

Photos

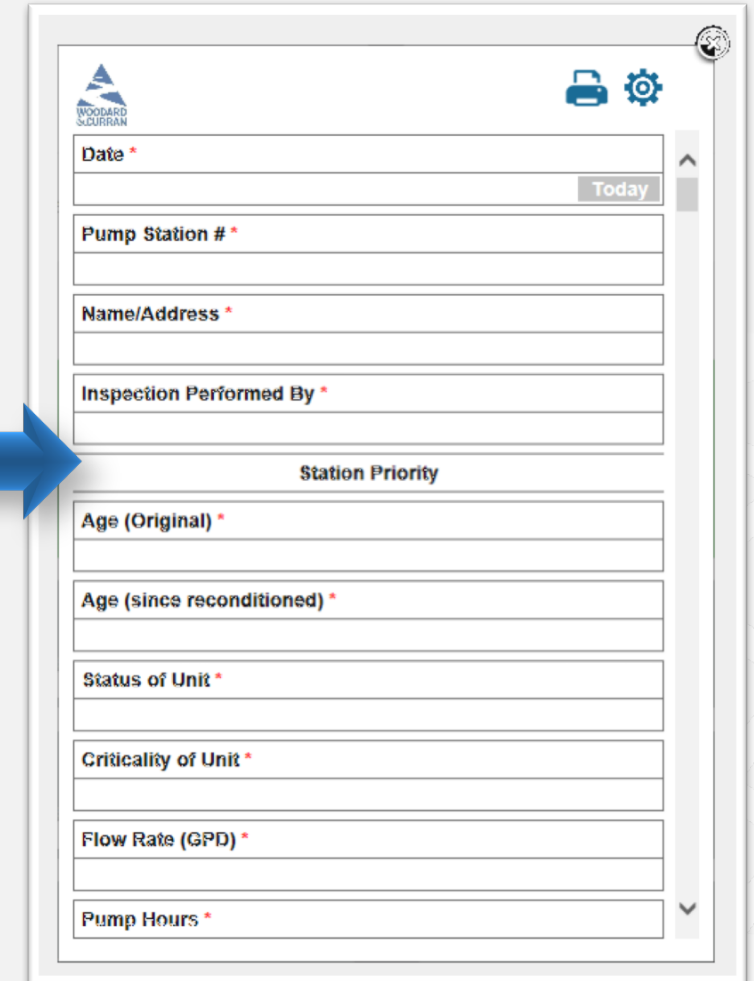



After cleaning slow flow began this could be common not many houses use this MH until this area is fully jetted and cleaned may see proper flow

This work order was created in doFORMS



Scenario 2: High Efficiency



The screenshot shows a mobile application interface for pump station inspection. It features a header with the Woodard & Curran logo, a printer icon, and a settings gear icon. The form includes the following fields:

- Date ***: A date picker set to "Today".
- Pump Station # ***: A text input field.
- Name/Address ***: A text input field.
- Inspection Performed By ***: A text input field.
- Station Priority**: A section header.
- Age (Original) ***: A text input field.
- Age (since reconditioned) ***: A text input field.
- Status of Unit ***: A text input field.
- Criticality of Unit ***: A text input field.
- Flow Rate (GPD) ***: A text input field.
- Pump Hours ***: A text input field.

Scenario 2: High Efficiency



Plant KPI Monthly Report

January 2009

Date	Influent Flow MGD	Influent BOD mg/L	Influent TSS mg/L	Primary Eff BOD Load lbs/day	MLSS mg/L	Food/Micro organisms Ratio	Solids Retention Time Days	Sludge Volume Index ml/g	Effluent BOD mg/L	Effluent TSS mg/L
1/1/2009	2.50	220	200	4,504	3,700	0.0721	54.06	124.3	13	20
1/2/2009	2.62	220	225	4,348	3,500	0.0677	40.64	108.6	15	13
1/3/2009	3.11	230	215							
1/4/2009	2.80	215	216							
1/5/2009	2.73	280	238							
1/6/2009	3.47	255	257							
1/7/2009	4.23	245	264							
1/8/2009	3.44	230	246							
1/9/2009	3.88	235	540							
1/10/2009	3.21	241	225							
1/11/2009	3.11	221	204							
1/12/2009	3.20	331	182							
1/13/2009	2.88	320	208							
1/14/2009	2.87	281	191							
1/15/2009	2.78	319	212							
1/16/2009	3.00	260	165							
1/17/2009	2.64	285	196							
1/18/2009	2.90	297	207							
1/19/2009	2.83	305	220							
1/20/2009	2.78	285	212							
1/21/2009	3.06	260	201							
1/22/2009	2.76	323	161							
1/23/2009	2.91	282	196							
1/24/2009	2.87	285	182							
1/25/2009	3.14	316	166							
1/26/2009	3.24	270	194							
1/27/2009	3.02	303	214							
1/28/2009	2.69	259	162							
1/29/2009	3.30	284	185							
1/30/2009	2.78	283	206							
1/31/2009	2.63	271	191							
Minimum	2.50	215	161							
Maximum	4.23	331	540							
Total	93.48	8,415	6,693							
Average	3.02	271	216							

Plant KPI Trend Report

Month	Influent Flow MGD	Influent BOD mg/L	Influent TSS mg/L	Primary Eff BOD Load lbs/day	MLSS mg/L	Food/Micro organisms Ratio	Solids Retention Time Days	Sludge Volume Index ml/g	Effluent BOD mg/L	Effluent TSS mg/L
Jan 2008	3.05	281	200	5,116	3,684	0.0793	52.01	117.4	22	21
Feb 2008	3.06	275	204	4,922	3,623	0.0770	54.22	120.3	30	21
Mar 2008	3.02	285	206	5,099	3,669	0.0793	51.07	119.7	24	23
Apr 2008	3.04	285	206	5,073	3,661	0.0791	51.18	117.7	24	23
May 2008	3.10	285	206	5,181	3,678	0.0802	51.64	121.7	22	20
Jun 2008	2.99	285	206	5,007	3,665	0.0779	52.43	119.2	21	20
Jul 2008	3.04	285	206	5,099	3,669	0.0793	51.07	118.3	23	23
Aug 2008	3.03	288	206	5,056	3,673	0.0786	51.21	120.2	25	23
Sep 2008	3.56	276	190	5,535	3,627	0.0860	48.66	123.4	36	22
Oct 2008	4.99	249	175	9,105	3,709	0.1391	15.60	115.2	27	24
Nov 2008	3.05	236	206	5,093	3,649	0.0794	51.18	119.6	25	23
Dec 2008	3.05	229	206	5,098	3,665	0.0793	51.18	120.4	20	22
Jan 2009	3.02	271	216	5,075	3,663	0.0787	52.01	119.6	31	21
Feb 2009	5.66	248	297	7,608	3,539	0.6258	1,049.59	113.5	690	37
Mar 2009	3.05	285	208	5,116	3,684	0.0793	52.01	117.4	22	21
Apr 2009	3.06	275	204	4,922	3,623	0.0770	54.22	120.3	30	21
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Dec 2009	3.03	288	206	5,056	3,673	0.0786	51.21	120.2	25	23
Minimum	2.99	228	175	4,922	3,539	0.0770	15.60	113.5	20	20
Maximum	6.99	288	297	9,105	3,709	0.6258	1,049.59	123.4	690	37
Total	80.10	6,616	5,007	128,655	87,799	2,5059	2,204.14	2,858.3	1,255	546
Average	3.34	276	209	5,361	3,658	0.1044	91.84	119.1	52	23

A Better Inspection Report...

W&C Lift station Inspection

Woodard & Curran Pump Station Inspection



Date

02/07/2014

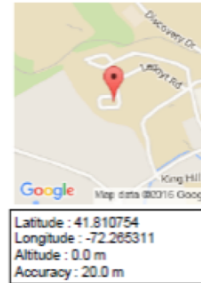
Time

13:02

Inspector

Landon Kendrick

GPS Location



Client Information

Contact

John Q Public

Address

48 Pleasant Ave Mansfield CT

Phone Number

(555) 867-5309

Station Grounds Condition

Grounds Condition



Outside of building in good condition. Grass is mowed short. Driveway leading to Station is clear and free of cracks.



Outer fencing in good condition. This portion of grass needs to be mowed and weeded.



Some grease in well. May need to be pumped out soon. Some evidence of very high levels

General Grounds Comments

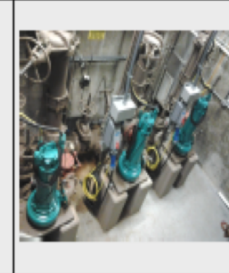
Overall grounds in good condition. No major safety hazards and generally look good from the outside.

Station Building Condition

Building Condition



Two of the 3 VFD's on site.



The the 110 HP pumps on site. Lead, Lag and a standby.



Generator onsite. Regular maintenance performed by outside contractor

General Building Comments

All in the building is operational. Pump #2 making grinding noise after initial start up.

Pump Stats

58	35
47	29
0.60	0.62

Authorization Signature

John Q Public

Email Report

Lmkendricks@woodardcurran.com

Evaluation 1

The Unfortunate News.....



3 Quick Tips for Success

1. Make sure your labor resources match with your desire to implement these systems



Water & Wastewater Operator Membership Card



First Day of Work Photo

3 Quick Tips for Success

2. Make sure labor resources and time are on your side



3 Quick Tips for Success

3. Be patient. Take your time. “Rome wasn’t built in a day.”



Finally Circling Back to the Dishwasher...



While this is running...



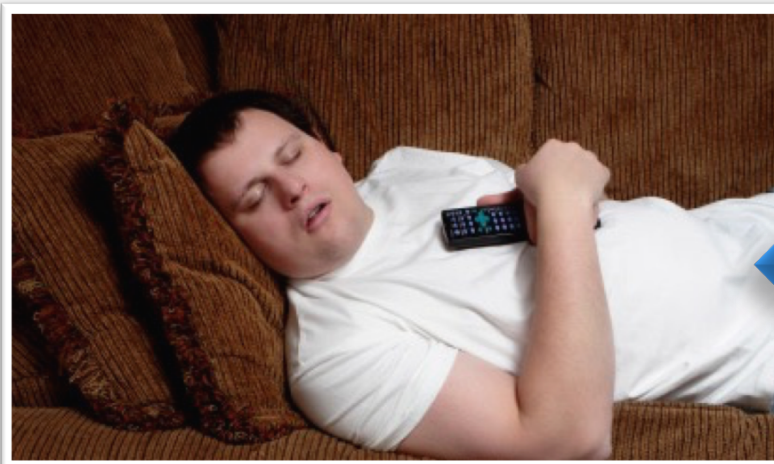
This should be you



Finally Circling Back to the Dishwasher...



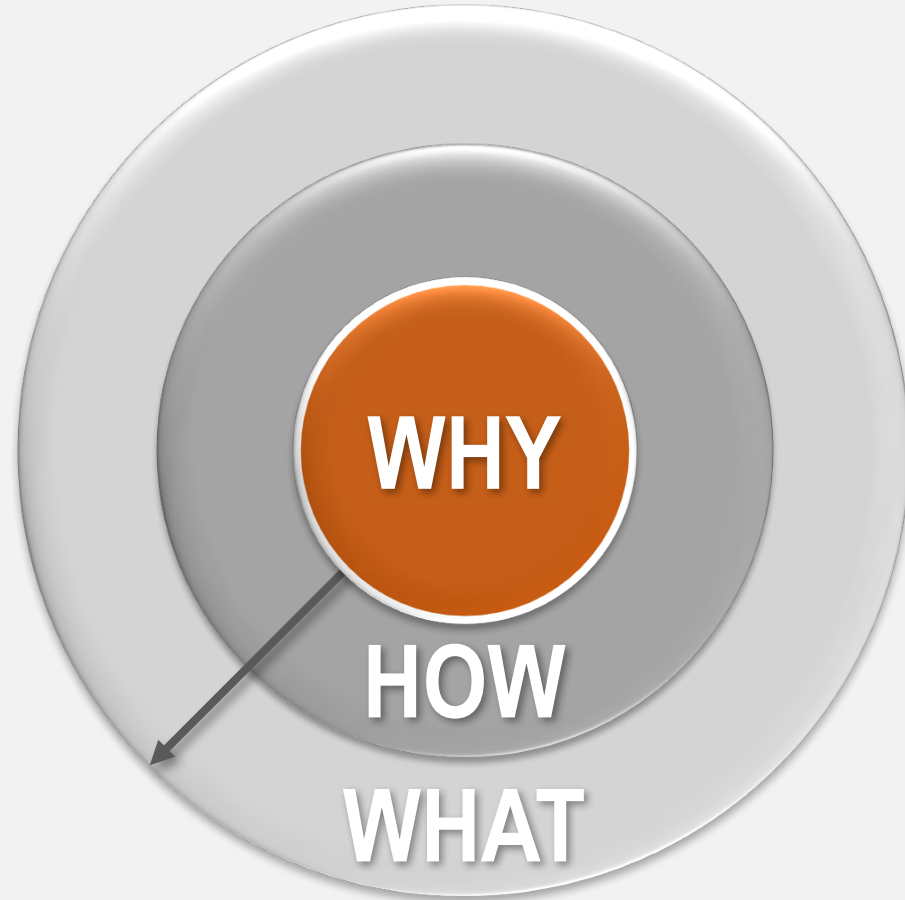
← While this is running...



Actually you...



Why MDM and CMMS? Efficiency!



START
WITH
WHY



Questions / Discussion



Landon Kendricks