FLOW METERS AND METERING SYSTEMS

The Avanti Company

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Avanti/UMSI Itron MV-RS AMR System Survey
For: City of Opa-Locka, Florida.

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Submitted to: Miami-Dade/Opa-Locka AMR Team

March 14, 2017

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EXECUTIVE SUMMARY

In September 2016, the City of Opa-locka (City) and Miami-Dade County (County) contacted the Avanti Company (Avanti), an authorized vendor of Itron, to discuss the execution of an Automatic Meter Reading (AMR) System Analysis to assess the condition and operability of the City's AMR system.

In November 2016, a purchase order was issued to Avanti to commence the AMR System Survey assessment and identification. This AMR System Survey is used to determine the effort and the estimated cost of bringing the City's water and sewer AMR System to the industry standard 98.5% read rate.

Based on the results of our findings to date, the City's AMR system is operating at an approximately Overall AMR System Read Rate of 57% with a Accuracy AMR System Read Rate of 34% which is well below the recommended minimum 98.5% read rate industry standard for a healthy AMR System. The City provided Avanti with a listing of 5,853 meters for its service area. Avanti attempted visiting 5,637 meter locations; however, yielding less than 100% inventory/assessment of the City's AMR system. The above difference of 216 represents (approximately 4%) meter locations where no attempts were made to perform an AMR Survey because we did not want to further postpone an already lagging project timeline.

Moreover, Avanti also encountered some challenges with for example, overgrown landscapes, inaccessible properties, and meters that could not be located (683 meters or approximately 11%). Respectively, the County reached out to the areas outside of the City's boundaries (Miami Gardens and Miami-Dade County RER) that are serviced by the City's water and sewer system to assist with gaining access and/or addressing the overgrowth on the properties identified. This report and the Master production spreadsheet provides data related to these inaccessible and challenging locations.

In that, Avanti recognized trying to achieve 100% data collection in this report would have postponed the issuance of the AMR Survey Report; therefore, to minimize the impact of delaying the upcoming anticipated interlocal agreement with the City, for the County to administer the City's Water System, based on the AMR Survey findings, if all else remains the same, we believe the uncollected data; namely, 899 meter locations (or approximately 15%), will **not** significantly influence the AMR Survey findings and AMR Survey patterns indicated by the AMR meter data currently compiled. To that end, we believe the City and County can rely on this AMR System Survey Report for assessing and identifying the effort and cost of bringing the City's water and sewer AMR System Health up to the industry standard read rate of 98.5%.

Succinctly:

1. Total meters counted – 5,637 (or 96%).
2. Meters counted as needing further action (i.e. replacement/repair, etc.) – 3,049 (or 52%).
3. Meters counted as transmitting in accordance to the industry standard Read Rate for an AMR System – 1,905 (or 33%).
4. Meters counted as inaccessible (i.e. locked gate, dog, cannot locate, overgrown landscape, etc., etc.) – 683 meters (or 11%).
5. Locations not visited – 216 meters (or 4%).

Based on the analysis, we believe the cost of replacing and installing new encoder AMR meters, where applicable, should range from approximately $1.5 million to $2.1 million. This estimate includes a conservative projection for the inaccessible meters and those locations that were not visited. The anticipated time frame for this work to be completed should be approximately three to four months.

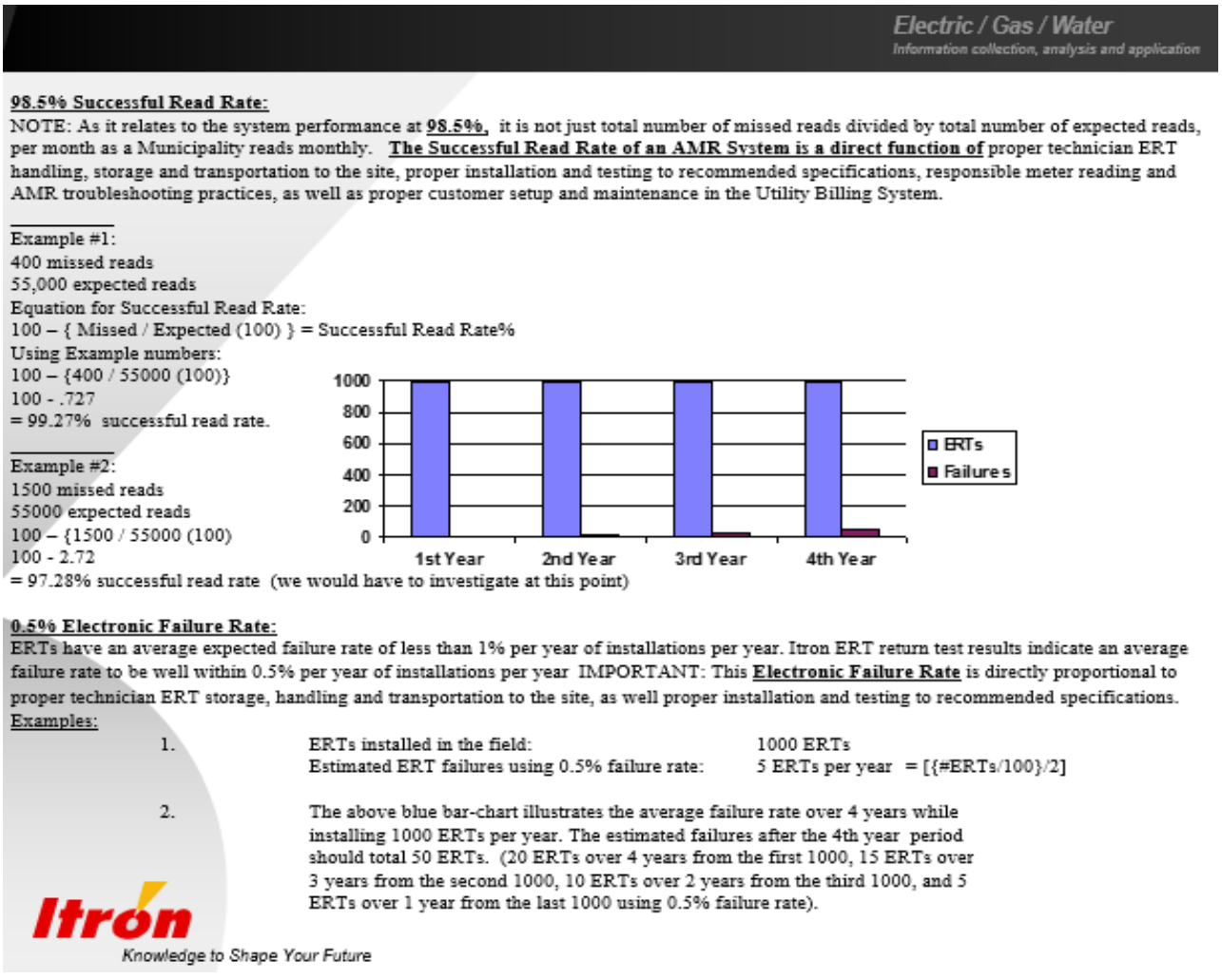
This AMR Survey Report is a technical findings report, and it is not intended to be an engineering report. Avanti has provided technical recommendations in the report that are highlighted in green.

1. AVANTI ROUTE SUMMARY REPORT

Overall AMR System Read Rate = 57%
(NOTE: For the Accuracy AMR System Read Rate = 34% – See TPTR Trouble Code in Glossary and Note in Master Production Spreadsheet)

AMR meter reading, installation, and maintenance must focus on monitoring the health of the Opa-locka AMR System according to a 98.5% minimum read rate being achieved for each route every month. As FIG 1, below, shows, the AMR read rate is a function of successfully following Itron guidelines for ERT and meter reading, installation, and maintenance.

FIG 1:



RECOMMENDED:

Provide Opa-locka MV-RS Operators (office staff) and Opa-locka Itron Meter Readers (field staff) live Itron AMR System training that encompasses an agreed to Municipal business policy process to follow for each ERT/meter installation that focuses on monitoring the health of their AMR System focusing on a minimum 98.5% read rate

Training example:

Customized to the office and field user friendly step-by-step ***SmartCards*** for performing their individual responsibilities, and co-developing with office and field staff a *beginning-to-end* ***Flow Chart*** *of AMR System Responsibilities for Maintaining AMR System Health*).

Summary of Meters Not Surveyed

Meters Not Surveyed = 683*

***Based on Opa-locka SunGard database Excel export route files for:**
Cycle 1, 2, 3, and Commercial totaling 5,637 meters and total listing of 5,853

As a result of unavoidable Opa-locka Public Works personnel meter reading duties, circumstances, and customer service priorities during this Holiday season, and also due to related contractor workload priorities that arose, the goal of 100% Opa-locka meters surveyed was not achieved within the allotted project timeframe.

Moreover, Opa-locka Public Works workload during this Holiday season did not allow them the full opportunity for fulfilling their project scope of work assisting UMSI Auditors within the AMR Survey project timeframe, and as a result, **Opa-locka Public Works takes ownership and responsibility for completing the remaining meters not surveyed**.

UMSI Auditor typical reasons found for not performing the AMR Survey are:

Cannot Locate, No Access, and Overgrown.

Following are additional **Miscellaneous** reasons found for UMSI not performing an AMR Survey that total 183 customers (See FIG 2, next page):

> Vacant Lot, Empty Meter Box, No Meter-Meter Removed, No Water Supply-No Service, Cannot Verify Address, Dwelling Not Occupied, Bypass in Pit, No Such Address, Debris, Meter Under Water, Meter Box Filled with Concrete or Asphalt, Vehicle or Dumpster over Meter Box, Dog, Bees, Unsafe Area, Duplicate Address, Incorrect Address, Different Meter Size.

FIG 2:

RECOMMENDED:

As discussed on 1/31/2017, to further assist Opa-locka Publics works in completing their Scope of Work and achieving the goal of 100% Opa-locka meters surveyed, Avanti recommends spending another full day in the field with Johnny (See above FIG 2) live certifying him to perform an Itron AMR ERT/Meter Survey, and afterwards, Airia Austin assign Johnny to AMR Survey above mentioned remaining Opa-locka meters.

In so doing, Johnny would receive an Avanti Itron AMR System Technician certificate upon completion of his AMR ERT/Meter Survey work.

To that end, every day, Johnny's previous day's AMR ERT/Meter Survey work on paper would be scanned by Felicia and then emailed to Avanti for inputting into the Opa-locka AMR Survey database, etc., for ultimate **achieving the goal of 100% of Opa-locka meters surveyed.**

NOTE:
Above work with Johnny was offered to Opa-locka Public Works at no additional charge during the timeframe of the AMR Survey project; however, it was understandably not an option at the time for Public Works due to current workload, etc. If Opa-locka Public Works opts to hire Avanti to assist Johnny now that the AMR Survey project is ended, this is billable time.

Meters Brands Quantities Found = 4,906

AMCO	=	3,089
Badger	=	778
Elster	=	993
Hersey	=	40
Sensus	=	3
Trident	=	1
Neptune	=	2
Total	**=**	**4,906**

Missing Meter Box Lids	*= 61*
Damaged Meter Box Lid	*= 245*
Meter Boxes in Poor Condition	*= 315*
Meter Boxes in Fair Condition	*= 26*
Meter Box Missing or Broken	*= 62*

Minimizing missing meter box lids and maintaining meter boxes falls under the category of receiving Itron training performing an **Annual Meter Audit** performed via the MV-RS Operator loading the FC300 hand-helds with Opa-locka routes, Audit Survey Questions, and Audit Trouble Codes.

Then, unloading the collected ERT/Meter Audit data, printing, and compiling the reports to then issue work-orders to mitigate and maintain the meter boxes.

Example:
Guardian Meter Box Lid option for consideration as a possible solution for some Missing Lids?:

RECOMMENDED:

Provide Itron training with the MV-RS Operators (office staff) and Itron Meter Readers (field staff) for live Itron AMR System Annual Meter Audit training that encompasses an agreed to Municipal business policy process to follow for each **ERT/Meter Audit focuses on monitoring the health of their AMR System** focusing on a minimum 98.5% read rate.

ENDORSED:

Itron training such that: simultaneous to Opa-locka meter readers performing an Annual ERT/Meter Audit, as a "one-time" event, the Itron FC300 hand-held could also be setup to 1-tap collect the **GPS Coordinate location of every customer's meter box (also collect location of valves, etc.)** for use later with the same FC300 hand-held (or MC3 SME) when you need it to GPS navigate you to it (leak, etc., etc)!
This is using your Itron AMR technology options to make life easier and smoother for Opa-locka Public Works!

Itron training example: *Customized to the office and field user friendly step-by-step **Smartcards*** for performing their individual Annual ERT/Meter Audit responsibilities, and include this task when co-developing with office and field staff a *beginning-to-end **Flow Chart** of AMR System Responsibilities for Maintaining AMR System Health*).

Meter Box Lid Sizes

12 x 12 =	1
12 x 18 =	3,721
12 x 24 =	22
12 x 36 =	3
18 x 18 =	606
18 x 24 =	101
18 x 36 =	9
24 x 24 =	1
24 x 36 =	15
24 x 36 =	15
24 x 38 =	2
Vault =	1
Total	**= 4,497**

Pit Lid Examples:

RECOMMENDED:

To assist will visually locating the water meter, as shown above, Opa-locka Public Works spray **paint a blue mark, arrow**, etc. during the Annual ERT/Meter audit performed.

Fogged Lens = 1009
Register is Lose = 23

Fogged Lens means the glass lens on the water meter register no longer has a water tight seal (see FIG 3) resulting in the lens being clouded with moisture.

When the lens is Fogged, it can be impossible to visually see the water meter reading, etc.

If Fogged Lens, at a minimum, the register needs to be because the register lens glass lens seal is defective due to either manufacturer defect (this is typically rare) or vandalism.

Register is loose means the water meter register is no longer securely attached to the top of the water meter body.

If the Register is loose, possibly due to vandalism, on a PD meter, the register magnet will not fully interface/connect with meter body chamber magnet resulting in inaccurate measurement of water flow, and of course, also an inaccurate visual and AMR meter reading.

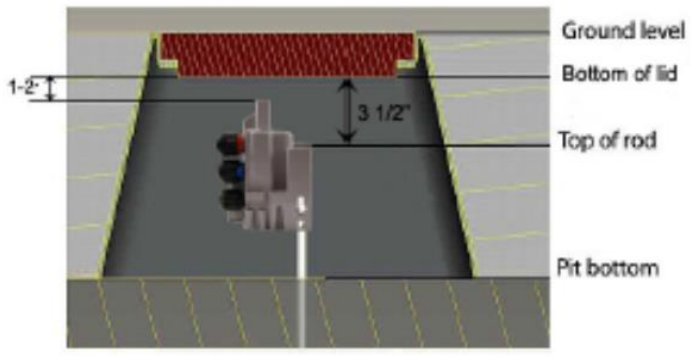
FIG 3:

RECOMMENDED:

Itron training for annually scheduled meter pit box audit <u>inspection of every water meter</u> to visually confirm if register lens is Fogged and Register is securely attached to the water meter body (among several other things to visually confirm). See FIG 4 for picture of Itron recommended Pit ERT Installation.

FIG 4:

Itron recommended Pit ERT Installation:



Example of Annually scheduled Meter Box survey from the MV-RS PC using FC300 hand-held that is loaded with 2 Survey Questions prompting the user to answer 2 Y/N questions for each customer:

1) Pit Lid Damaged Y/N?,
2) Meter Box Damaged Y/N?

The meter reader using the FC300 hand-held loaded with routes, out collecting this above information, along with collecting specific Survey Trouble Codes of other information found, completes the ERT/Meter field audit.

Then, after the ERT/Meter Audit data is collected by the meter reader using the FC300 hand-held, MV-RS Survey Question/Trouble Code Reports are printed, Opa-locka work-orders for these customers are then issued to mitigate accordingly; thusly serving an important function in maintain the health of the Opa-locka AMR System.

2. AVANTI DIGITAL WATER METER DISCREPENCY REPORT

DIGITAL DIRECT (aka visual) METER READING VERSES 60WP RADIO READING

DIGITAL METERS WITH:

60WP ERTS SURVEYED	= 2,866
DEAD 60WP ERTS FOUND	= 1,543
MATCHING DIRECT (aka visual) READ AND 60WP ERT RADIO READ	= 1,314
NONMATCHING DIRECT (aka visual) READ AND 60WP ERT RADIO READ	= 9

ERT Tampers = 1,027

These are the total quantity of ERT Tampers are not being addressed at Opa-locka (e.g. Read Tampers, Meter Tampers, Troubleshooting Tampers). See FIG 5.

Monthly monitoring and deliberate mitigation of ALL ERT Tampers is essential to a healthy AMR System that is operating at a minimum 98.5% read rate.

FIG 5:

2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000001	Total Tamper Exceptions for Route Number	33
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000002	Total Tamper Exceptions for Route Number	26
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000003	Total Tamper Exceptions for Route Number	27
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000004	Total Tamper Exceptions for Route Number	40
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000005	Total Tamper Exceptions for Route Number	13
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000006	Total Tamper Exceptions for Route Number	34
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000007	Total Tamper Exceptions for Route Number	22
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000008	Total Tamper Exceptions for Route Number	12
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000009	Total Tamper Exceptions for Route Number	15
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000010	Total Tamper Exceptions for Route Number	0
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000011	Total Tamper Exceptions for Route Number	0
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000012	Total Tamper Exceptions for Route Number	4
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000013	Total Tamper Exceptions for Route Number	10
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000014	Total Tamper Exceptions for Route Number	43
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000015	Total Tamper Exceptions for Route Number	21
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000016	Total Tamper Exceptions for Route Number	12
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000017	Total Tamper Exceptions for Route Number	19
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000018	Total Tamper Exceptions for Route Number	14
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000019	Total Tamper Exceptions for Route Number	49
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000020	Total Tamper Exceptions for Route Number	8
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000021	Total Tamper Exceptions for Route Number	10
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000022	Total Tamper Exceptions for Route Number	78
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000023	Total Tamper Exceptions for Route Number	5
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000024	Total Tamper Exceptions for Route Number	11
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000025	Total Tamper Exceptions for Route Number	6
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000026	Total Tamper Exceptions for Route Number	5
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000027	Total Tamper Exceptions for Route Number	13
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000028	Total Tamper Exceptions for Route Number	11
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000029	Total Tamper Exceptions for Route Number	29
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000030	Total Tamper Exceptions for Route Number	42
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000031	Total Tamper Exceptions for Route Number	26
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000032	Total Tamper Exceptions for Route Number	27
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000033	Total Tamper Exceptions for Route Number	18
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000034	Total Tamper Exceptions for Route Number	17
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000035	Total Tamper Exceptions for Route Number	23
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000036	Total Tamper Exceptions for Route Number	8
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000037	Total Tamper Exceptions for Route Number	11
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000038	Total Tamper Exceptions for Route Number	12
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000039	Total Tamper Exceptions for Route Number	15
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000040	Total Tamper Exceptions for Route Number	24
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000041	Total Tamper Exceptions for Route Number	68
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000042	Total Tamper Exceptions for Route Number	15
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000043	Total Tamper Exceptions for Route Number	19
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000044	Total Tamper Exceptions for Route Number	20
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000045	Total Tamper Exceptions for Route Number	17
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000046	Total Tamper Exceptions for Route Number	46
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000047	Total Tamper Exceptions for Route Number	4
2/2/2017	12:04:34PM	ERT Tamper Exception Report	Route:	1000048	Total Tamper Exceptions for Route Number	45
					Total Tamper Exceptions for all the Routes	**1027**

RECOMMEDNED:

Itron training to co-create with the office and field staff a **Flow-Chart** of responsibilities to follow for the smoothly managing ERT/Meter Tampers and co-create **SmartCards** with the staff to follow when performing their work.

Route optimization.

Opa-locka has 48 individual routes being read each month initially with the Itron MCLite w/ FC300 hand-held loaded with the Cycle to read by Ramon Piller, Opa-locka Public Works.

Ramon is an expert MCLite Operator, knowing the most efficient way to drive the city for optimal readability each month. Ramon is a PRO!

Briefly, operating the MCLite w/ FC300 hand-held involves the user (Ramon) navigating each of the many routes that are loaded for meter reading during his Drive-by meter reading in Opa Locka, and him also managing the customers that are line-item listed on the screen of the FC300 hand-held, and are scrolling on the screen of the FC300 hand-held as they are read, or not read.

That said, by **upgrading to the *new* Itron Tablet version of the *current* MCLite** (see FIG 6 not called the MC3 SME instead of MCLite), Ramon would decrease time spent during his Drive-by meter reading since now there are **DOTS for every customer**.

Now, Ramon is **driving around like PAC MAN** seeing dots disappearing as he drives and on parallel streets, etc.! – not having to manage the FC300 hand-held screen anymore as briefly described above.

NOTE: There are two method for obtaining DOTS for each meter customer:

1. Opa-locka use the readily available (i.e. FREE of charge) **standard 911 addresses** in the MV-RS routes for the resident or commercial accounts. Briefly, these coordinates were collected by the US Government for use by the Fire Department, First Responders, Police, so they can drive to a particular location.

    - Typically, this **GPS Coordinate is where the mail box is.** *Since Ramon and his meter reader's know where the meter location is, the mail box DOT is not a hindrance during Drive-by meter reading.*

2. Opa-locka hire a reputable company to go out and locate the meter location and acquire the GPS Coordinate of that meter for use in the MV-RS routes, and a DOT is placed at the meter location.

In addition, upgrading to the new Itron Tablet version of the MCLite (i.e., the MC3 SME, FIG6 – next page) **allows Ramon to delegate Drive-by meter reading to others, and Ramon focus on other work.**

FIG 6:
(Tablet is pedestal mounted in the Drive-by Vehicle for safe operation)

3. AVANTI READ COMPARE VERSES ENDPOINT COMPARE REPORT

Zero Consumption on Active Meter = 434

This number (See FIG 7) represents the active Opa-locka customers whose meter reading has not changed since last month's meter reading, and is due to either:

a) Customer has not used any water since last month (e.g. customer is away on vacation),
b) Water meter is stuck (i.e., the internals are jammed up from debris in the water line cause the meter not to move and measure water), or
c) ERT is disconnected-defective and is transmitting the "memory" meter reading from the last time it was able to obtain one from the water meter register.

FIG 7:

MV-RS Read Audit Report
FEB 8, 2017 8:49 AM
MV-RS READ AUDIT INFORMATION

FAILED HI 1.....00991
FAILED LO 1.....03998
FAILED HI 2.....00000
FAILED LO 2.....00000
ZERO CONSUMP ON ACT MTR.00434
TOTAL AUDITS.....05423

RECOMMENDED:

Provide Itron training for the Opa-locka MV-RS Operator and Meter Reader to use MV-RS Read Audit Report to identify and mitigate these reads such that one-by-one these Opa-locka customers be addressed by Opa-locka MV-RS office and field staff with respect to why this is occurring (**e.g. vacation, stuck-defective meter, disconnected-defective ERT)**.

This, in accordance with these folks following a customized to them user-friendly step-by-step **Smartcard** process included when co-developing with office and field staff a beginning-to-end **Flow Chart** of AMR System Responsibilities for Maintaining AMR System Health.

Duplicate Addresses = 39 (aka 78)
Incorrect Addresses = 52

Avanti PM working with Ann (Opa-locka MV-RS Operator) discussed in detail what is entailed with mitigating these Duplicate and Incorrect Address issues.

RECOMMENDED:

One by one these customers be addressed with respect to customer setup in Opa-locka SunGard Itron Interface, and a customized to the MV-RS Operator user friendly step-by-step **Smartcard** (with SunGard screen shoots) is co-developed with the Opa-locka MV-RS Operator and this process included when co-developing with office and field staff a beginning-to-end **Flow Chart** of AMR System Responsibilities for Maintaining AMR System Health.

4. AVANTI ENDPOINT EVALUATION REPORT

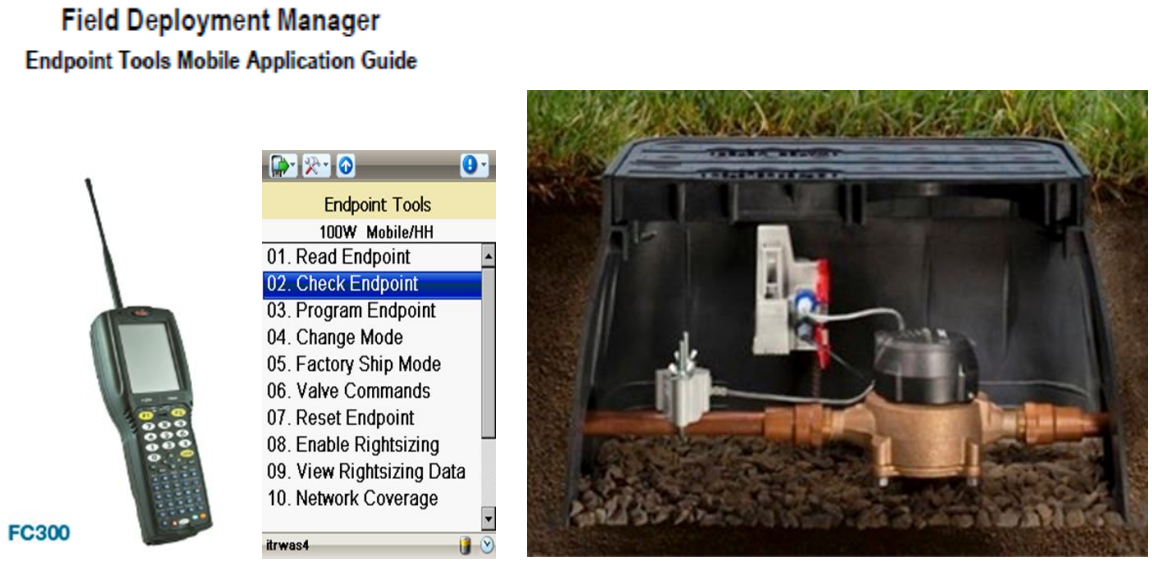
Endpoint Performance Rate for Dead ERTs = 1,875

Reference the Glossary now to understand Endpoint Performance Rate and its relationship to AMR System Read Rate (which combined represent the monthly barometer measuring AMR System Health).

Typically, this is a result of an ERT not installed and maintained according to Itron Guidelines. Electronic devices (e.g. ERT) must be installed and maintained according to the manufacturer recommended guidelines.

Itron has a super user-friendly Check Endpoint installation process to follow every time a ERT is installed that confirms the ERT is working to specifications and that the ERT will quickly be read by the FC300 during the monthly Opa-locka meter reading process (See FIG 8).

FIG 8:



ERT installation in the field must be performed according to Itron guidelines for the ERT to work and perform to expectations over its 20 year life – to stay working and not prematurely die (i.e. Dead ERT) due to improper handling, testing, and installation (see FIG 1 above again).

To maintain the minimum **98.5% route read rate**, MV-RS office and field staff must perform troubleshooting of Dead ERTs each month according to Itron guidelines.

RECOMMENDED:

Provide the Opa-locka MV-RS Operators (office staff) and Opa-locka Itron Meter Readers (field staff) live Itron training for **AMR System meter reading, installation, and maintenance** training that encompasses an agreed to Municipal business policy **ERT/Meter work-order process** to follow for each ERT/Meter installed and read for billing by focusing on monitoring the health of their AMR System with respect to maintaining the minimum 98.5% read rate.

Evaluation of Endpoints Currently Deployed

Incorrect ERT Number = 68

This means the ERT number found on the ERT device at the customer site is not the same as the ERT number in SunGard MV-RS route that is loaded on the Opa-locka Itron meter reading device (e.g. FC300 hand-held) for the customer.

This is due to an old ERT# in SunGard because the new ERT work-order was not fully processed. Also, there could be a ERT# typo in SunGard for the customer Itron setup section in the billing system.

When the ERT# does not match, what happens is:

a) Meter reader in the field will not obtain a AMR meter reading in the route loaded on the Itron meter reading device for the customer, and/or worse,

b) ERT number is erroneously-unknowingly assigned in SunGard to someone else, and/or worse,

c) ERT is installed on someone else's meter resulting in a giving that customer a meter reading that is not there meter reading. Sound confusing?

Therefore, as a critical part of successful ERT installation in the field at the customer site, the unique ERT number is used in FC300 hand-held FDM testing during installation, and then ERT number is accurately recorded on the Utility installation work-order for later accurate input into the Opa-locka SunGard Utility Billing System customer account.

VERY IMPORTANT TO NOTE:

- An Incorrect ERT# can cause a **No AMR Read** of the customer.

- And a No AMR Read of a customer can be caused by erroneous **ERT AMR customer setup** in the Utility Billing System (i.e., SunGard) not being performed according to Opa-locka SunGard Itron Billing Interface for ERT communication requirements (*e.g. #Dials, Read Type Code, Read Method*).

- And, the result of Incorrect Billing Clerk setup of ERT AMR customer setup in Opa-locka SunGard Itron Billing Interface can cause **incorrect billable reads** being posted – which creates a lot of extra work, wasted time and frustration in the office and the field.

RECOMMEDED:

Itron training to co-create with the office and field staff a **Flow-Chart** of responsibilities to follow for the ERT AMR customer setup (work-order) process, and co-create **SmartCards** with the staff to follow when performing their work.

ENDORSED

Also, included in the above Itron training process is the "quick and easy" use of Opa-locka MV-RS for collecting 100W Datalog information for display in a **handy MV-RS bar-graph for explaining customer billing disputes** (i.e., the 100W ERT is automatically, 24/7/365, always saving the last 40 days of every top-of-the-hour meter reads).

Disconnected ERT = 136

This means the ERT cable connected to the water meter register is no longer connected. See FIG 9. This is usually a result of vandalism and results in:

a) Moisture overtime will wick (i.e., travel) up the exposed bare wire **to the ERT** unit and damage the electronics of the ERT unit (i.e., water and electronics do not mix).

b) Moisture overtime will wick (i.e., travel) up the exposed bare wire **to the Register** causing the glass lens to be fogged and damage the electronics of the Register (i.e., water and electronics do not mix).

c) AMR meter reading collected from the disconnected ERT is a "**memory meter read**" from the last time the ERT cable was connected to the water meter register which is typically seen as low consumption or even no consumption meter reading from last month's meter reading; thusly, erroneously reporting of the actual meter reading that should be collected and billed for the customer.

FIG 9:
(Note: this is intentionally the same pic as Fogged Lens to illustrate an example of a **multiple issue** and the importance of an Annual Meter Audit – ERT is missing!):

RECOMMENDED:

MV-RS identifies the disconnected ERT in a MV-RS Report via the **Cut Cable Tamper** indicator built into the ERT device.

The Cut Cable Tamper indicator is transmitted with the radio meter reading collected when the ERT cable is disconnected from the water meter register.

Monthly, the MV-RS Operator prints out this Report that lists all the customers having a Cut Cable. See FIG 10 on next page.

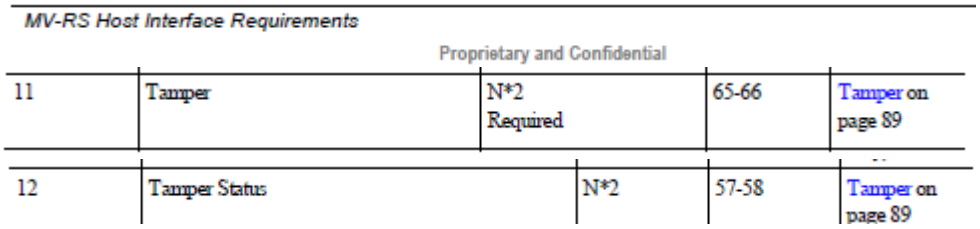
FIG 10:

```
MV-RS  Mobile Read Detail Report        FEB  2, 2017 11:33 AM   Page:   1

Company Name: MVRS

ROUTE ID:  01000001 CYCLE: 01

Customer Address      ERT ID#   ERT/CAT  Reading    Time HMI Tamper
-------------------------------------------------------------------------
901 SUPERIOR STREET   69050616   11 W    1264       14:02 H  Leak
                                                             Low battery
                                                             Cut Cable
                                                           Cable Cut
670 JANN AVENUE       35111604   11 W    2564       15:11 H  Last Good Read
                                                             Extended Tamper
```

In order for MV-RS to identify the disconnected ERTs, the Utility Billing System (i.e., Opa-locka SunGard) Itron Interface must be setup to process the Cut Cable Tamper Code for each customer in the upload.dat meter reading file. Currently, Opa-locka SunGard does not process the Cut Cable Tamper Code.

To resolve this, ***Nelson*** would work with SunGard to setup the Itron Interface to process the Cut Cable Tamper Code (see FIG 11) accordingly: download.dat RFF Record 11 Tamper BYTES 65-66, and upload.dat RFF Record 12 BYTES 57-58.

FIG 11:



MV-RS Host Interface Requirements

Proprietary and Confidential

11	Tamper	N*2 Required	65-66	Tamper on page 89
12	Tamper Status	N*2	57-58	Tamper on page 89

Once this is done, the Cut Cable Tamper Code will be **automatically handled** by the Opa-locka SunGard Itron Interface and allow MV-RS to accurately identify disconnected ERTs for monthly reporting and mitigation

Missing ERT = 385

Missing ERTs are typically a result of **vandalism.** A Missing ERT is usually discovered during the meter reading process and should be duly noted by the meter with a "Missing ERT" Skip Code (for later follow up on a work-order to install a new ERT) while key punch collecting the visual direct meter reading for billing purposes. Opa-locka is currently does not deal with this Trouble item.

RECOMMEDNED:

Opa-locka MV-RS Operator receive Itron training and SunGard training for developing a smooth process to deal with replacing a Missing ERT.

Leak (detected by 100W ERT quantity) = 449

For the purposes of collecting Leak notifications transmitted during meter reading of ERTs, there are customer side leaks and there are city (aka distribution) side leaks.

The 100W ERT reports on the **customer side leak** (e.g. dripping faucet, running toilet, garden hose, etc.).

If there is continuous flow (e.g. dripping faucet), the ERT considers this a Leak and will transmit the Leak notification until such time water stops flowing in a 24 hour period. The logic here is within 24 hours someone living in a house will stop using their water (i.e., sleeping). This Leak threshold of 24 hours may not apply to all customers, and there is a way to handle that as well.

This information along with the hourly DataLog information from the 100W ERT over the past 40 days reconciles billing disputes with Opa-locka customers (via a nice MV-RS bar graph showing top of the hour meter reads, etc.).

RECOMMENDED:

Opa-locka MV-RS Operator and Meter Reader receive Itron training process for handling the 100W ERT Leak Tampers and **resolving customer billing disputes** using MV-RS user-friendly Datalog bar-graphs showing the customer their top of the hour meter reading and hourly consumption of when they used water excessively within the past 40 days, etc. (e.g. leaving the garden hose running, etc., etc.).

Glossary Introduction

This section introduces the glossary for the Opa-locka AMR Survey to the reader.

Glossary Objectives

This glossary has the following objectives:

- To formally define all industry abbreviations used on the Opa-locka AMR Survey.
- To formally define all industry technical terms used on the Opa-locka AMR Survey.
- To thereby improve communication among the Opa-locka AMR Survey stakeholders and members of the Miami-Dade/Opa-locka development staff.

Intended Audiences

This glossary has the following intended audience:

- Stakeholders:
  - Miami-Dade City Council, etc., who are either:
    a) Hands-on familiar with live AMR System monthly meter reading, maintenance, and troubleshooting operations, or
    b) have spent the day with the Miami-Dade/Opa-locka Development Staff (aka Itron AMR System Team) discussing and understanding the AMR System intricacies within this Avanti Itron AMR Survey Report.

- Miami-Dade/Opa-locka Development Staff:
  - Miami-Dade/Opa-locka Oversight/Coordinator
  - Opa-locka Project Manager
  - WASD Water Distribution Chief
  - WASD Director of Customer Service
  - WASD Assistant Director
  - Business Process Specialist (Works with Ann Barnett)
  - Opa-locka Utility Director
  - Opa-locka Special Project Manager
  - Opa-locka Field Supervisor
  - Opa-locka Customer Service Manager
  - Opa-locka Billing Coordinator
  - Opa-locka Finance Director Architect

AMR/AMI Abbreviations

This section defines common industry abbreviations and proprietary system development abbreviations.

Avanti AMR Survey Reports:

The following industry standard, project-specific, and general technical abbreviations are used on the Opa-locka AMR Survey project:

AMI Automated Metering Infrastructure (e.g. Fixed Network Collectors/Repeaters radio meter reading)

AMR Automated Meter Reading (e.g. Walk-by or Drive-by radio meter reading)

ERT Encoder Receiver Transmitter – also referred to as an Endpoint

ERT# Encoder Receiver Transmitter Number (a unique 8 digit number assigned to each ERT)

FCS Field Collection System (Windows software application for meter reading – virtually identical to MV-RS, just much more user friendly, automatable, and powerful, etc.)

FC300 Field Collector 300 (hand-held hardware for meter reading)

FDM Field Deployment Manager (hand-held hardware for AMR system installation, maintenance, troubleshooting)

MC3 Mobile Collector 3 (laptop or tablet hardware for meter reading)

MV-RS Multi Vendor Reading System (Windows software application for meter reading – FCS is the upgrade for MV-RS – ask for PowerPoint on upgrading your MV-RS to FCS – no charge for FCS software if under annual SW/HW maintenance)

Master Spreadsheet (Cycle/Routes 1, 2, 3 and Commercial) Notes:

Inaccessible:	**Repair Items**	**Uility Billing Database**
CL = CANNOT LOCATE	BB = BROKEN BOX	CANNOT VERIFY ADDRESS
CL3A = CL THIRD ATTEMPT	BIM = BOX IS MISSING	CANNOT VERIFY SERIAL NUMBER
MUW = METER UNDER WATER	BL = BOX LOOSE	DUPLICATE
NA = NO ACCESS	DE = DEAD ERT	ENCODER ERT ON PULSER METER
NAG = NO ACCESS GATE	EIS = ERT IS DISCONNECTED	ERDM = ERT NUMBER DOES NOT MATCH
NA3A = NA THIRD ATTEMPT	L = LEAK	METER/ERT INFO ACTUALLY FOR ANOTHER ACCOUNT
	LD = LID DAMAGED	MDNM = METER NUMBER DOES NOT MATCH
	LIM = LID IS MISSING	MSD = METER SIZE DIFFERENT
	ME = MISSING ERT	NON ITRON ENDPOINT
	NMI = NO METER INSTALLED	NO SERVICE
	RD = REGISTER DAMAGED	PAM = PRE AMR METER
	RIF = REGISTER IS FOGGY	VACANT LOT
	RIM = REGISTER IS MISSING	
	NO METER BOX	**AMR Meter:**
		BLANK NOTE = NO ISSUES
		TPTR = TRANSMITTING BUT REGISTER PULSE TEST
		REQUIRED DUE TO RADIO READ NOT MATCHING
		DIRECT VISUAL READ

AMR/AMI Definitions

This section defines common industry definitions and proprietary system development definitions.

A

AMR Survey – Analysis of current AMR System Health to identify the starting points for development of a comprehensive program/project to restore AMR Read Rate.

AMR System Health – Monitoring various monthly AMR system operational elements (see page for listing) such that MV-RS Report for each route read has a minimum AMR System Monthly Read Rate of 98.5%

AMR System Read Rate – Monthly goal for meter reading rate per route of 98.5%. MV-RS Report provides the % for each route read each month. A main contributor to this is achieving the Industry Standard Annual Electronic Failure Rate of 0.5%.

B

Battery Low Tamper – The 100W ERT is transmitting notification the ERT battery is nearing its end of life and is informing you the ERT needs to be replaced asap.

C

Check Endpoint (p.) – FDM program for a) confirming new meter/ERT installed is work to specifications, and b) monthly troubleshooting for maintaining 98.5% Read Rate and 0.5% Industry Electronic Acceptable Failure Rate.

City (aka Distribution) Side Leak – Water is leaking before it goes into the water meter.

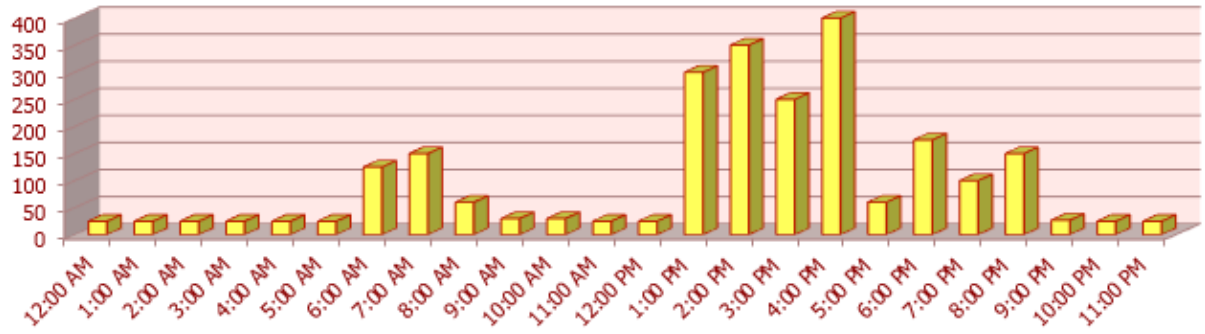
Collect GPS coordinates for water meter location – Typically obtained with a hand-held (e.g. Itron FC300) by standing over/near the water meter and pressing button to lock-in the GPS coordinate of where you are standing (i.e., over/near the meter). Then, ultimately using that GPS coordinate as a DOT on the screen on the hand-held, tablet, or laptop during meter reading that beeps and disappears when read (kind of like PAC MAN).

Customer Side Leak – The water meter and ERT are detecting a leak occurring some place from the meter coupling as water flows from the meter or somewhere down line (e.g., underground, spigot, faucet, toilet, etc.).

Cut Cable Tamper – ERT has detected a cut in the cable and is transmitting this Cut Cable Tamper code out with the last meter reading the ERT obtained from the water meter register.

D

Datalogging – The 100W ERT is continually saving every top of the hour meter reading for the past 40 days (that is 960 meter readings). This meter data is collected and easily bar-graphed for visually explaining to a customer why their bill is high during a customer billing dispute event. See bar-graph example below:



Dead ERT – The ERT has been diagnosed to no longer be transmitting meter data (e.g. meter reading, tampers) and needs to be replaced. Each Dead ERT should be labelled (i.e. using sticker, tag)

Digital Register – In a water meter, a rotating magnet is placed close to a reed switch. The rotation of this magnet is proportional to the amount of water that flows through the meter. Every time a pole goes by the switch it closes and provides a contact signal (continuity). Sometimes an in-line resistor is provided for protection. A remote counter (aka ERT) is connected to both connectors and simply counts the number of times the switch closes. This counter (aka ERT) is programmed with the particular meter's value for each closure (i.e. 1 USG per closure, 5 USG per closure, 10 USG per closure, etc.).

Duplicate Address – A customer in SunGard utility billing has been erroneously setup twice in the database. This occurrence is avoided by regularly scheduled db query maintenance for such occurrences. These waste considerable time for the utility billing clerk chasing non-existent meter readings.

Disconnected ERT – The ERT has been physically disconnect from the water meter register. The Cut Cable Tamper notification (i.e., MV-RS Report) lists customers with Disconnected ERTs. A Disconnect ERT transmits the meter reading of the last time the ERT was connected to the water meter register. This wastes a lot of time for the utility billing clerk who is not monitoring the Cut Cable Tamper MV-RS Report because they are erroneously thinking there is zero consumption, etc.

Digital Direct Reading verses 60WP Radio Reading – The direct visual read of the Digital (i.e. pulse) water meter register and the radio meter reading from the 60WP ERT must match. If they do not match, the FC300 hand-held Check Endpoint function should be used to confirm the 60WP ERT is programmed properly. As a comparison, programming the meter reading is not necessary with a "plug-n-play" 100W Encoder ERT (as opposed to a 60WP Digital ERT).

E

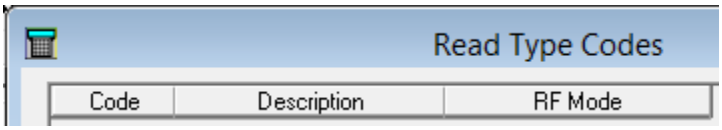
Endpoint Performance Rate – Is synonymous to Industry Standard Electronic Failure Rate.

Endpoint Evaluation Report – Endpoints are monitored monthly by the utility office and field staff regarding factors affecting their ability to provide a monthly billable meter reading. Evaluating Endpoints and this ability becomes problematic when: the ERTs unique 8 digit number for each customer is not handled accurately, or when the ERT is not installed according to Itron guidelines, or when the ERT is disconnected from the water meter register and not promptly identified as such, or when the ERT is not read either because it is a Dead ERT, or there is RF interference (vehicle parked over meter pit, etc.), or a No Read is a result of incorrect ERT AMR Customer Setup.

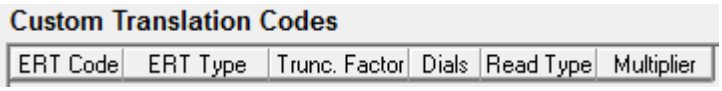
ERT AMR Customer Setup – In order for radio meter readings to be collected and/or be accurate (i.e., billable) and for radio readings to be collected at all, certain parameters and settings must be made and specifically maintained in the Utility Billing System (i.e., SunGard) and in the Meter Reading System

(i.e., MV-RS). Following a monthly process for doing so is referred to as the ERT AMR Customer Setup. Such MV-RS meter reading parameters and settings to maintain monthly are:

- #Dials, Read Method, Read Type Code,

Read Type Codes Example: 

- Radio Parameters, RF Translation.

Translation Codes Example: 

ERT Memory Meter Reading – When the ERT becomes disconnect-defective, it will transmit the meter reading of the last time it was able to read the water meter register. This meter reading is saved in the ERT memory. If the Cut Cable Report is not used during monthly meter reading, the ERT Memory Meter Reading erroneously looks like zero consumption to the utility billing clerk.

ERT Tampers – The ERT monitors and transmits with the meter reading certain important occurrences with itself and the water meter, and categorizes them as ERT Tampers, they are for example: if the ERT is disconnected, this is categorized as a Cut Cable Tamper, if the water meter is installed backwards, this is categorized as Reverse Flow Tamper, if the 100W ERT battery is getting low in power, this is categorized as a Low Battery Tamper. ERT Tampers must be identified monthly and mitigated accordingly.

Evaluation of Endpoints Currently Deployed – Utility office and field staff always knowing the current status of their Endpoints deployed is a matter of flowing Itron recommended go-to guidelines, (SmartCards, and Flow-Charts) for quickly and smoothly monthly mitigating occurrences of: Dead ERTs, Missing ERTs, Incorrect ERT#, ERT AMT Customer Setup, Incorrect billable read, Disconnected ERT, Missing ERT, Leak.

F

Fogged Register Lens – Moisture has entered the register as a result of water tight integrity being compromised. Electronics and moisture do not mix and therefore this meter reading may not be accurate. Page 12.

Flow Chart – An AMR System can be broken up into its operational parts and detail Flow Charted according to agreed to business process and who is responsible for each step in the process. Example the business process of issuing and implementing a AMR Work-Order for a Missed Read. The entire step-by-step process for issuing and implementing (including AMR Troubleshooting why it is a Missed Read) is Flow Charted. Done deal!

FAILED HI 1 – This customer either has used a lot of water beyond their typical monthly usage (e.g. family is visiting, washing cars, filling a pool), or has a large leak, or the HI/LO billing parameters are not properly set for this customer. If this is MV-RS notification is not needed, it can be "turned off" in MV-RS, and just let Utility Billing Reporting handle this solely.

FAILED LO 1 – This customer either is using less water than they usual do, or the water meter is being periodically "by-passed" during the month, or there is a "stuck" meter not allowing the water to be measured accurately. This occurrence should be mitigated monthly.

I

Incorrect Address – The customer address in the SunGard Utility Billing System database is not the same address the meter is installed. Not knowing how to prevent this from occurring and/or mitigate this results in a lot of frustration and wasted man hours.

Incorrect Billable Read – Factors causing this are ERT to transmit an Incorrect Billable Read are: Incorrect ERT/meter installation, or Incorrect ERT AMR Customer Setup, or not monthly monitoring and mitigating the Cut Cable Tamper Report. Not knowing how to prevent this from occurring and/or mitigate this results in a lot of frustration and wasted man hours.

Incorrect ERT Number – Factors resulting in an Incorrect ERT number are: Incorrect ERT/meter installation or Incorrect ERT AMR Customer Setup. Not knowing how to prevent this from occurring and/or mitigate this results in a lot of frustration and wasted man hours.

Industry Standard Electronic Failure Rate – All electronic devices experience what is referred to as "infant mortality". As an example, if you have a Best Buy semi-trailer full of thousands of televisions, there are likely some of those TVs that will not operate to specifications, etc. even though they past all the rigorous testing in the factory. This is understandable. The same holds true for the ERT, and the way to weed out those not operating to specifications is by using the FDM Check Endpoint function when installing a new ERT. That done, the total number of ERTs installed, typically within a month, should still be operational (excluding vandalism, incorrect installation, etc., etc.) one year from now less 0.5% of them. If >0.5%, Itron Technical Support should be asked to assist in determining why this is happening.

L

Leak Tamper – The ERT transmits this notification when water flow has been constant for 24 hours (p.20).

M

Meter Box In Fair Condition – Meter box and/or lid has a structural crack.

Meter Box In Poor Condition – Meter box and/or lid has more than one structural crack.

Meter Box Is Broken – Meter box is falling apart.

Meter Box Is Missing – Meter box is no longer installed and cannot be located.

Meter Box Lid Is Missing – Meter box lid is not installed and cannot be located.

Meter Brand Quantities Found – The meters identified during the AMR Survey and their respective Meter Brand Found recorded and Quantified.

Missing ERT – The ERT is not installed and cannot be located.

N

No AMR Read – The meter reading was not collected during meter reading as a result of either a Dead ERT, RF Obstruction (e.g. vehicle parked over meter box, severely overgrown foliage, vandalism), Incorrect ERT/meter installation, or Incorrect ERT AMR Customer Setup.

R

Register Is Lose – The UMSI company auditor discovered this during the AMR Survey. It is a result of either incorrect installation, vandalism, unintentional damage, or someone is periodically removing the register to lessen their water bill by the register not recording water usage. (Page 12).

Reverse Flow Tamper – When there is a Reverse Flow event the ERT transmits this Tamper with the meter reading. Reverse Flow and theft detection are achieved by the ERT comparing the current register reading against the previous reading and if the current is less than the previous, the Reverse Flow Tamper is transmitted. Reverse Flow can occur for a variety of reasons:

- Water main break
- Customers may invert the water meter to save on their water bill (i.e., install it backwards)
- During new construction the water meter may inadvertently be installed backwards
- Water pumps may malfunction and not distribute water through the system
- The meter register may be defective and erroneously report an inaccurate consumption value

Route Optimization – In a Drive-by AMR System, since the ERT meter readings are always in the air being transmitted 24/7/365 for the ERTs 20 year battery life, waiting for the Drive-by meter reader to drive through the reads - as they hit the mag mount receiver antenna on the Drive-by vehicle. The stereo radio in car that tuned to your favorite music radio station is effectively operating the same way – don't over think this analogy. Therefore, meter reading in a Drive-by AMR system is a function of how long it takes you to drive the route. See page 13 for specific Route Optimization for Opa-locka.

S

SmartCard – A puzzle piece in the Flow Chart. It is one of several templated documents explaining certain processes of an operational AMR System and is co-written with the user to produce a customized "Cheat Sheet"/SmartCard that steps the user through for example:

- AMR Work-Order process (why a/each particular Word-Order is issued, and how/why the AMR Technician precisely accomplishes the particular Work-Order, and when that Work-Order is closed out, and tracking its contribution to monthly MV-RS Reporting for the AMR System Health).

Standard 911 Address – This is an alternative to Collect GPS coordinates for water meter location (see page 13).

SunGard – Opa-locka, Fl. Utility Billing System.

Z

Zero Consumption on Active Meter – See page 14, and ERT Memory Meter Reading and Cut Cable Tamper. Not knowing/having the (SmartCard) process for handling this occurrence in an AMR System results in a lot of wasted man hours and frustrated people.

APPENDIX

Opa-Locka &Avanti Business Relationship

2006-2016 Historical Summary:

This is a brief summary of history for the City of Opa-Locka's Automated Meter Reading System. The concept for the Automated Meter Reading System began in May 2006 with a discussion on an Aclara Hexagram System.

Conrad Harris from the City of Opa-Locka indicated that it needed to be a straight streamlined process that required the least amount of involvement from Public Works and Customer Service.

The City moved forward with the project through Johnson Controls Inc. (Energy Saving Company), when the commission approved this project the product was switched from the Avanti Company to AMR International (an older technology at less cost).

After a short period of time the AMR International System began developing issues with the meter communicating with the radio endpoint. At that time JCI came in and tasked the Metering contractor with the remediation of the metering issues. US Bronco (Metering Contractor) then contacted the Avanti Company to supply a new meter.

Unfortunately, these radios were pulse accumulating radios and could only be married to a Pulse register. Shortly after that the Eagle Radio (AMR International product), also began to fail at an alarming rate.

JCI then again tasked US Bronco with the remediation. US Bronco again contacted the Avanti Company to provide the Itron meter reading system and the radio endpoints.

In 2010 the City again contacted the Avanti Company regarding poor read rate performances. The Avanti Company worked with the City and Itron to remediate these issues which were identified as system maintenance issues. Avanti and Itron provided operations and maintenance system training, which when implemented saw the read rate percentage greatly improve. There was an issue that appeared to be linked to the Digital registers not matching the legal read.

In July 2010 the Avanti Company brought Elster AMCO in for warranty discussions. Elster AMCO indicated they would provide advanced warranty replacements in batches of 200 at a time. This included switching the Digital registers under warranty to the InVision Encoder registers at no additional cost. This process was started however, the City did not take advantage of the warranty offer.

In April of 2011 Avanti brought Elster AMCO back in at the City's request. Elster AMCO agreed to the same terms as the previous agreement. Unfortunately, the City, once again did not take advantage of the warranty offer.

In January 2013 Elster AMCO ceased the manufacturing of mechanical meters and parts. Elster agreed to continue warrantying broken registers but only the digital registers at this point. The Avanti Company met with the City and tried out a couple of different meters to see where to go from there. Badger Metering was chosen due to their track record with Itron Radio products. During this time the City also concurred with the Avanti Company to change their radio endpoints from the 60W to the 100W at no additional charge.

Between 2013 and 2015 the System was running very well under the project management of The IT Director. The IT Director also began the investigation and data collection for the feasibility of an AMI System in the City, which he believed would allow him to closely monitor the system and proactively deal with any issues that would arise.

With the support of the City Manager, the City began to replace some of their legacy products with new meters and radios. A three phase project was developed to move the City toward an AMI System and a standard operating procedure moving forward. This eventually fell through however the City still does possess all of this information should they look to inquire into the subject again.

In 2016 the City was pretty quiet regarding the AMR or AMI System. Mostly just procuring 10-20 meters every few months. The billing issues continued to get worse. Most of the technical inquires we had were from IT and worked with Itron to resolve them.

In September 2016 the Avanti Company was contacted by Miami-Dade Water and Sewer and The City of Opa-Locka to discuss the development of an AMR System Analysis.

Below is the detailed project timeline.

Many of these inputted notes were collected from the time period of 2006 – 2016. They do not represent the views of the Avanti Company. They are simply a collection of visits and events carried out over the above timeline. These timeline events are as accurate as possible but they were collected over time.

Opa-Locka & Avanti Overall AMR System Project Timeline:

9/1/16 - AMR Analysis Discussion began.

12/15 - 6/16 - Very little, if any communication with the Public Works Director. Mostly requests for 10-20 meters at a time very infrequently. Avanti proposed a free AMR system upgrade to begin using the data logging as the AMI discussion has died. Also did not receive any further reports regarding system health.

11/3/15 - Met with the IT Director and the Asst. City Manager to discuss the AMI Project as he indicated that this would be the only way to keep an eye on the system and develop a proper maintenance plan.

10/8/15 - Attempted schedule AMR project overview with Public Works Director who declined, and indicated everything was fine and they were going to work on cleaning out the meter boxes.

9/10/15 - Avanti met with the IT Director who indicated that the read rate has gone back down to the high 70 percentile again. He also indicated that there was a billing truncation issue that they are working with Itron to attempt to resolve.

3/15 - 9/15 - Very little, if any communication with the Public Works Director. Was receiving reports from IT that the read rate was being to fall off again.

2/4/15 - Avanti met with Opa-Locka to discuss locking lids due to high tamper rate in the City regarding the meters.

6/13 - 10/14 - Opa-Locka deployed a meter change out project and was ordering 100-200 meters every few months. Approximately 1200 meters were deployed through this project. Meter system health was very good (operating between 95% - 97.5%, which was the best system performance to date). The IT Director and Avanti were conducting quarterly system health reports. During this time period the IT Director and Avanti completed the informal AMI feasibility analysis. Collected all of the data for the Fixed Network propagation study and all address locations. Towards the end of this time period. The Public Works Director was assigned to become the AMR Project Manager. This was against the advice of The Avanti Company as IT was a crucial component and the IT Director had proven a very capable project manager.

5/17/13 - Avanti met with the Public Works Director to conduct QC inspections on the recent installation. Avanti noted that not all meter boxes were being cleaned out. The Public Works Director indicated he would get with the contractor.

4/16/13 - City Manager has assigned the IT Director as the AMR Project Manager. They ordered and received the 1100 Elster meters with the new Itron 100W's. Installation seems to be going well since the Radios are mounted directly to the meters and can't fall over.

3/7/13 - Avanti met with the IT Director and Public Works Director with UMSI (Meter installation contractor) to discuss Meter box maintenance program. The Public Works Director brought another contractor with him from North Miami who indicated that he would be conducting the work. The IT Director did not agree and cancelled the meeting and indicated that they were going to need to meet with the City Manager.

2/28/13 - Avanti technical services came into Opa-Locka. MV-RS was operating perfectly. The handhelds and other equipment seemed to be functioning well. Biggest issue that we could see was system required significant maintenance.

1/22/13 - Avanti met with the IT Director, The Public Works Director and the New City Manager who was not happy at all with the System. Indicated that he wanted us to come in a fix it. We indicated that the AMCO warranty agreement issue can be re-addressed but would could not guarantee that it is still available.

5/11 - 12/12 – The City Engineer has left the City and the Elster warranty program is not a priority. Business as usual. The Asst. Public Works Director is in charge of the AMR system. Avanti conducted yearly training re-training (10/7/12) with the IT Director and the Asst. Public Works Director and the meter reading department on system operation and maintenance.

4/12/11 - Second Elster AMCO warranty meet with Opa-Locka. Elster again agrees to the warranty deal they had previously offered.

3/1/11 - Avanti met with the City Engineer who wanted to get the Elster warranty project moving forward. Requested that Elster come back to see if the deal is still available.

12/14/10 - Avanti met with the Engineering Supervisor and the City Engineer. They indicated that the City is really having problems and they can't get anything done to action the Elster warranty agreement.

7/10 thru 12/14 - Radio silence on the AMCO meeting. Worked with the Public Works Director on odds and ends in the system.

7/14/10 - First Elster AMCO warranty meeting with Opa-Locka AMR team to go over QC results. Deal struck regarding seed stock request from the City to upgrade Digitals registers that are returned for InVision encoder registers.

4/20/10 - Met with the City Engineer to gain all information for the AMCO warranty discussion. She needs to QC all of the routes to get us an accurate number. She indicated it may take a couple of months.

4/13/10 - Had a meeting with the City of Opa-Locka. The meeting details are below. They stated that 3.2 Million dollars invested though the system only cost 2.2 Million. The Finance Director wanted a timeline to complete the project. All 3 cycles are reading at above 97% but they are still having issues between the radio reads and the manual reads. They have been paying for service since 2005 from JCI. They are having issues with 214 reads in cycle 3 (failed audits) parcel reads. They have 1400 Total services in cycle 3. Cycle 2 has 2400 total services

11/20/09 – The Engineering Supervisor and the City Engineer indicated that the AMR system is having issues and it's mostly due to endpoints falling off of the re-bar.

10/8/09 - Avanti met with Public Works Director, the Supervisor Engineer and the Asst. Public Works Director who indicated they were having some billing issues. Avanti went to the billing department and remediated them. Should not have any additional issues.

8/22/09 - Avanti met with the City Engineer to discuss open issues. The City Engineer stated that after they finished cleaning out the meters boxes in Cycle 3. The route went from 76% to 99% read rate. She also indicated that the 800 meters were not going to be ordered at once but over time. We did not receive any orders after that conversation.

8/1/09 - City of Opa-Locka began route maintenance plan on Cycle 3.

7/30/09 - Itron and Avanti conducted System operation and maintenance training all day. The new City Manager has placed the 800 meter order on hold. Bernie indicated that it would probably be approved at the next commission meeting. Interesting since it has already been approved. Not sure what's going on here.

7/22/09 - Avanti attended the City commission meeting for the item containing the 800 meters and it was pushed through with little resistance. Spoke with the public works director who said we should have the PO soon.

5/31/09 - Avanti met with Fernand Thony to discuss the last 800 meters that need to be installed to finish the project. These were the meters that US Bronco could not gain access and the City indicated that they would finish.

5/1/2009 - Avanti Project Management transitioned from the previous territory manager to the new one.
3/20/09 - Avanti met with US Bronco and JCI to prepare for the close out meeting and discuss all open issues. All issues on the AMR System and Software side had been closed out per the scope of work.

1/17/09 - Met with Asst. Public Works Director and the IT Director to conduct Meter reading software training.

1/16/09 - Itron Meter Reading Software integrated with billing software and fully operational.

9/3/08 - US Bronco procured and began 60WP deployment.

8/22/08 - Began working with the City on installing Itron Meter Reading Software.

7/17/08 - Avanti met with the IT Director, the Public Works Director, the City Engineer and the Customer Service Director to discuss the Itron 60WP replacement program for the failing Eagle radios.

1/11/08- Avanti met with US Bronco to discuss Eagle radio failures and to explore feasibility to changing all units out to Itron 60WP's.

1/11/08 - Avanti met with the Public Works Director and discussed AMR System not working. City believed it was the meters. After further investigation it was proven to be the Eagle radios were failing to communicate with the new digital registers.

11/30/07 - Avanti met with Utilities Customer Service regarding the AMR System not functioning properly. Confirmed by US Bronco, assumed to be Eagle Radios (per US Bronco).

2/14/07 - US Bronco orders AMCO meters from Avanti to replace Butler Meters.

1/9/07 - US Bronco/JCI approach the Avanti Company regarding replacing the existing Butler meters with the AMCO C700 Meters with Pulse registers (to marry to the existing Eagle Radio pulse endpoints).

11/6/06 - JCI tasks US Bronco (Installation contractor) to remediate issues.

9/15/06 - The City began to experience issues with the Butler meter not reading the Eagle radio.

8/6/06 - The City of Opa-Locka procured the AMR International System with Butler meters and Eagle Radios

7/7/06 - Avanti attended the City Commission meeting where JCI received approval for to proceed with the AMR System. However, JCI switched from using the Avanti Company to AMR International without notice to The Avanti Company.

5/27/06 - Avanti attended the City Commission meeting where they passed the financing resolution 3-2. Approval should be at the next meeting.

5/20/06 - The Avanti Company met with the Acting Public Works Director for 3 hours on all issues related to the upcoming AMR project. He agreed that the Hexagram technology was the right technology for the City who have significant meter reading issues.