USING SURVEY 123 TO AUTOMATE DATA ENTRY ACTIVITIES

Thursday, April 26th, 7:00am – 8:00am Room #318

TACOMA WATER
TACOMA PUBLIC UTILITIES

Presented By:

Andy Simpson,
Tacoma Water

INTRODUCTION


Replacing Water Pipe

- Facts about Tacoma Water and Mapping History
- 2 Survey123 Data Collection Solutions at Tacoma Water:
  - Water Quality Sampling
  - Hydrant Flow Reporting
- Summary & Future Uses

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TACOMA WATER FACTS

Basic Info:

- Purchased by the City of Tacoma in 1893
- Covers 117 square miles of service area
- 239 Employees
- 1,365 Miles of water mains

Water Use:

- Avg. Annual Use per Household: **67,923 gallons**
- Avg. Daily Use per Household: **186 gallons**
- Avg. Cost per Household: **$360 year / $30 month**
- Total Annual Usage: **6 billion gallons**

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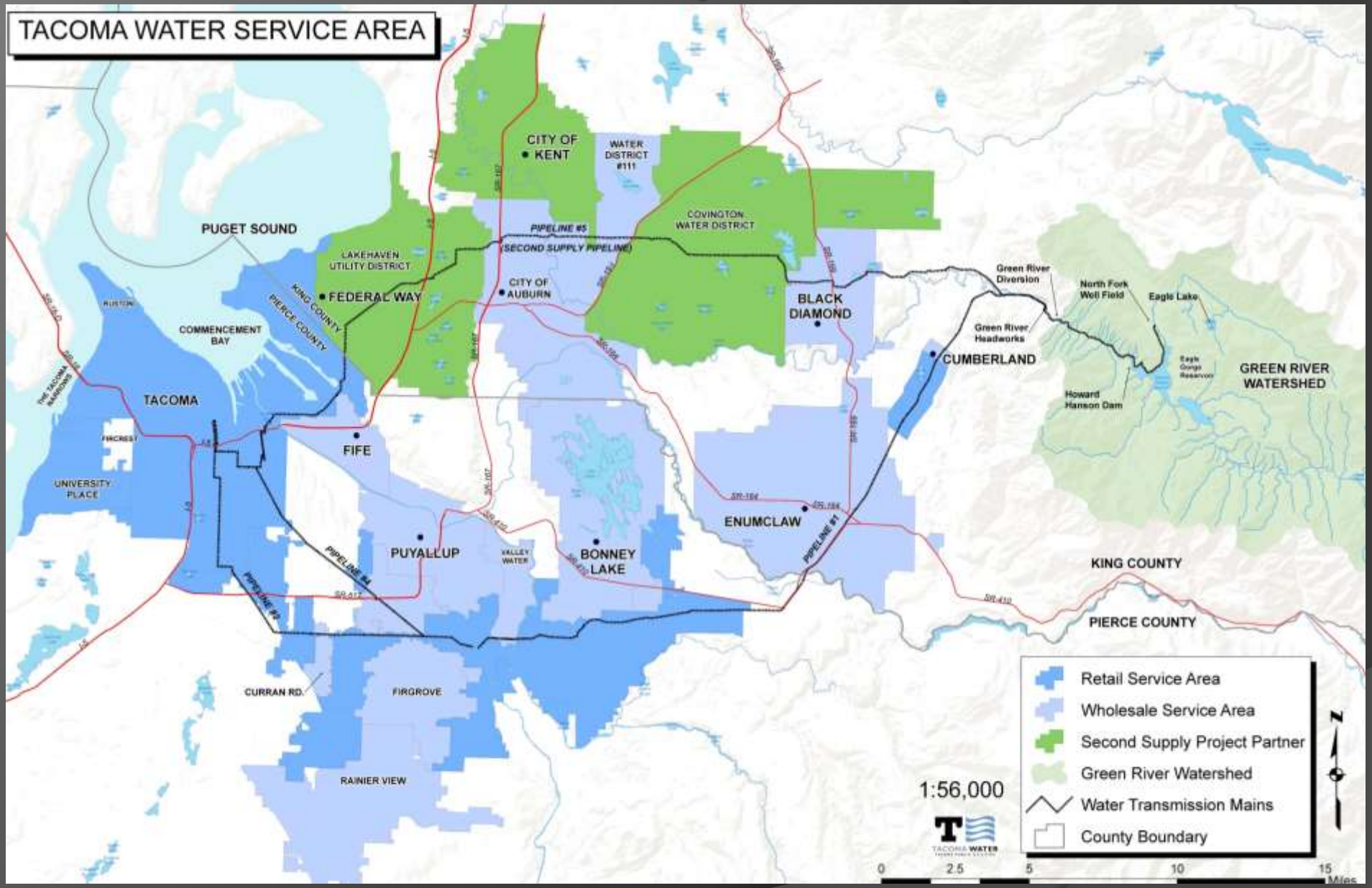
SURVEY 123 & WATER QUALITY SAMPLING



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FACILITIES MAPPING HISTORY OVERVIEW

- **Prior to 1990** – Water facilities were mapped using paper
- **1990** - Water infrastructure mapped using AutoCAD and newly created Base Map for the Incorporated are of Tacoma only
- **1996** – Tacoma Water rolls out Autodesk's Map Guide product and provides access to field users via a laptop computer
- **2003** – Tacoma Water acquires University Place and S.E. Tacoma Mutual water systems
- **2014** - Converted from AutoCAD to ESRI GIS mapping system

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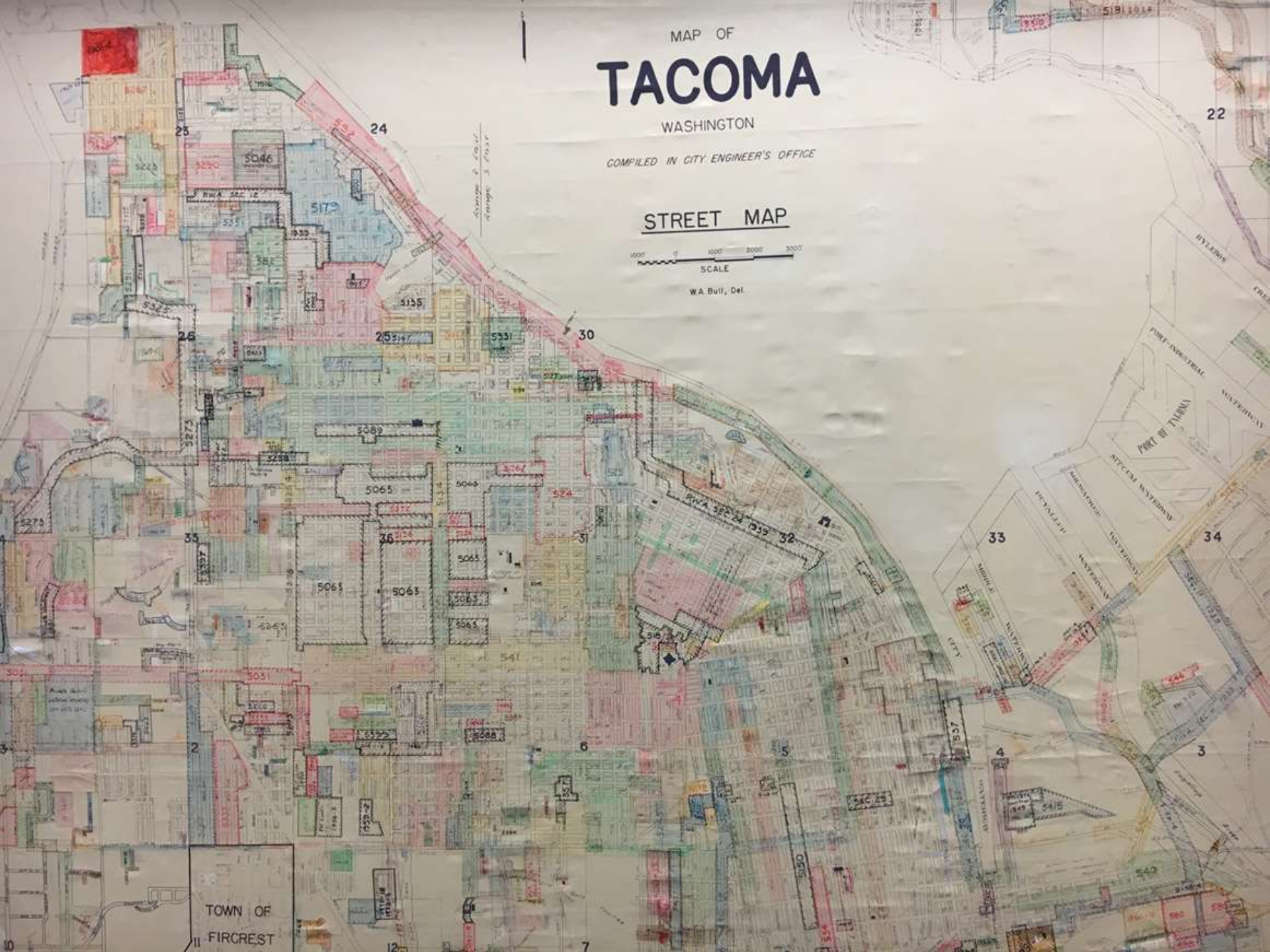
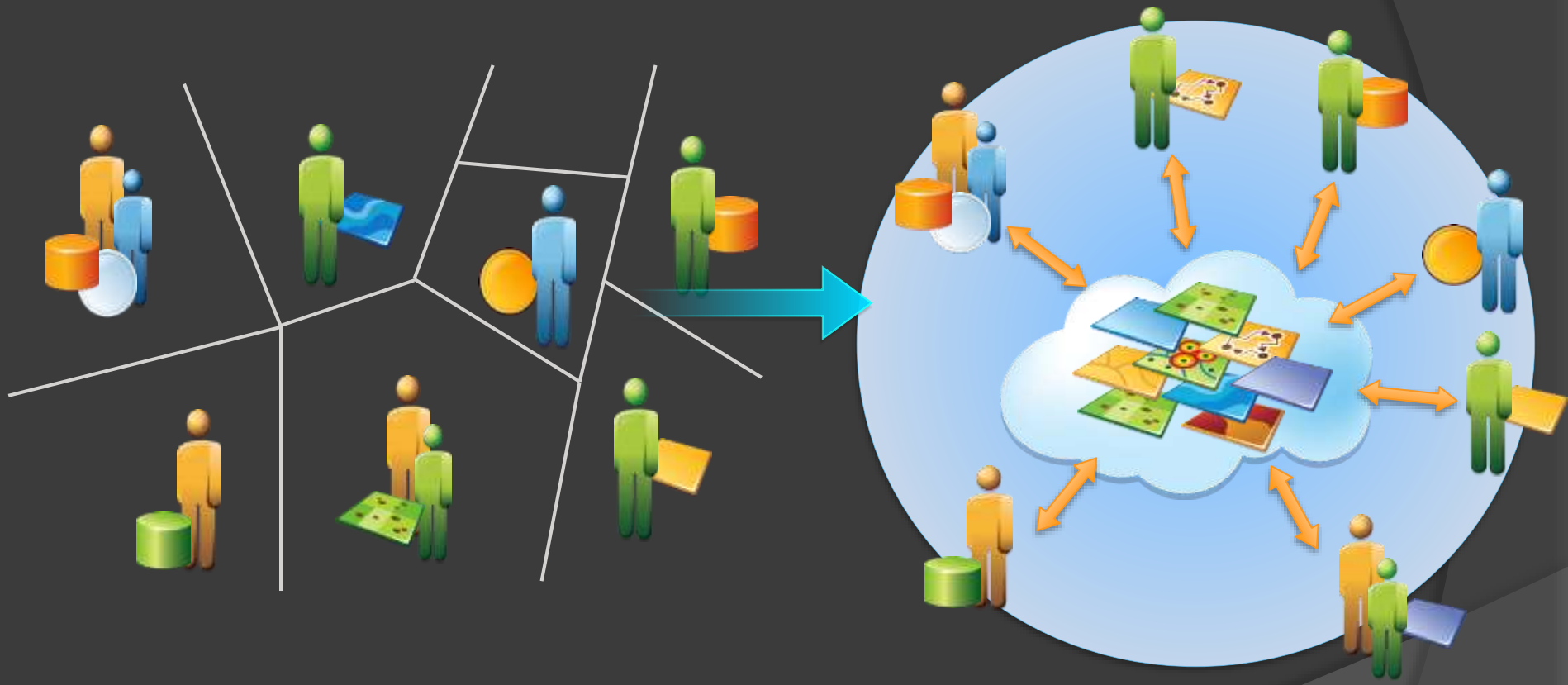

MAP OF
TACOMA
WASHINGTON
COMPILED IN CITY ENGINEER'S OFFICE
STREET MAP
SCALE
W.A. Bull, Del.
TOWN OF
FIRCREST
PORT OF TACOMA
RWA SEC 24
RWA SEC 12

FACILITIES MAPPING HISTORY

ORGANIZATIONAL THINKING ABOUT DATA

Since 2014 State:

Current State:



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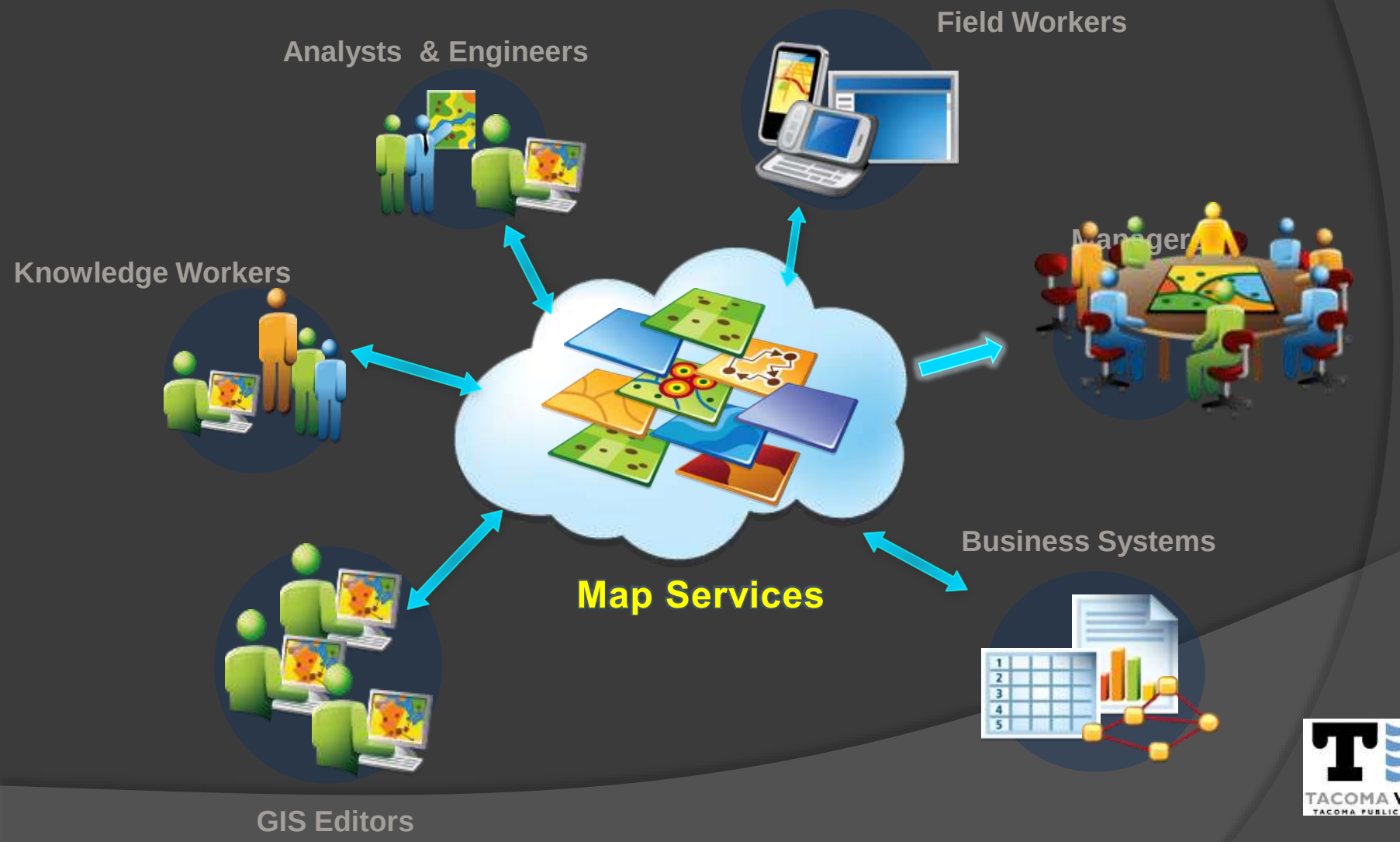
BEFORE ESRI GIS & NOW

One "Swiss Army Knife" Application to Targeted Applications

GIS AT TACOMA WATER

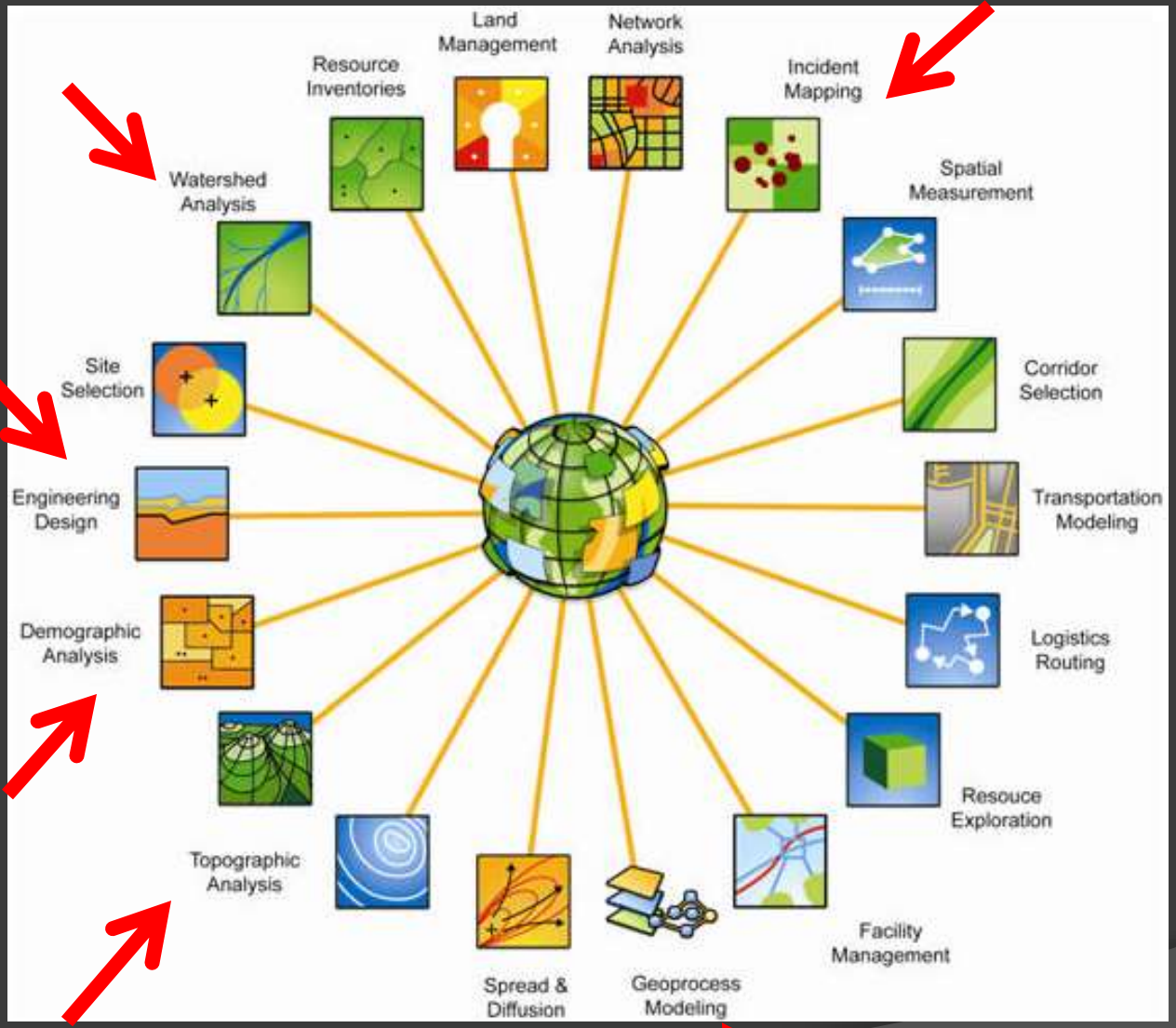
Provide Geo-Spatial Capabilities Across The Entire Organization



ORGANIZATIONAL TRANSFORMATION

The Organization Starts To Understand what GIS can do!

ORGANIZATIONAL TRANSFORMATION



Plus, the following:

-Hydraulic Modeling

-Economic Modeling

-Water Quality Sampling

FIELD DATA COLLECTION USING SURVEY123

- Water Quality Sampling

CURRENT WATER QUALITY SAMPLING METHOD

Tacoma Water Quality:

- 4 Fulltime Water Quality Specialists
- 110 Sample Locations
- 160-180 Samples taken per month, approx. 40-50 samples per week
- 20-40 avg. Water Quality calls per month, many occur due to our main flushing program, some calls require site visits for further investigation
- Daily Water Quality Self Reporting is Required by the State of Washington and the Pierce County for:
  - pH
  - CL (Chlorine Residual)

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CURRENT SAMPLING METHOD

Sample Being Taken

pH measured from the sample

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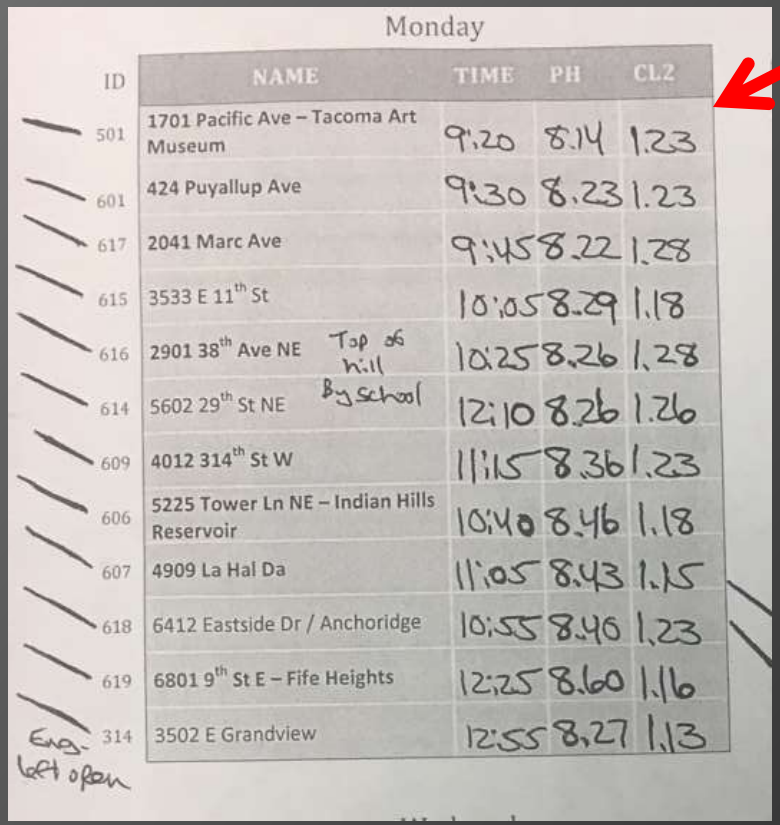
CURRENT SAMPLING METHOD

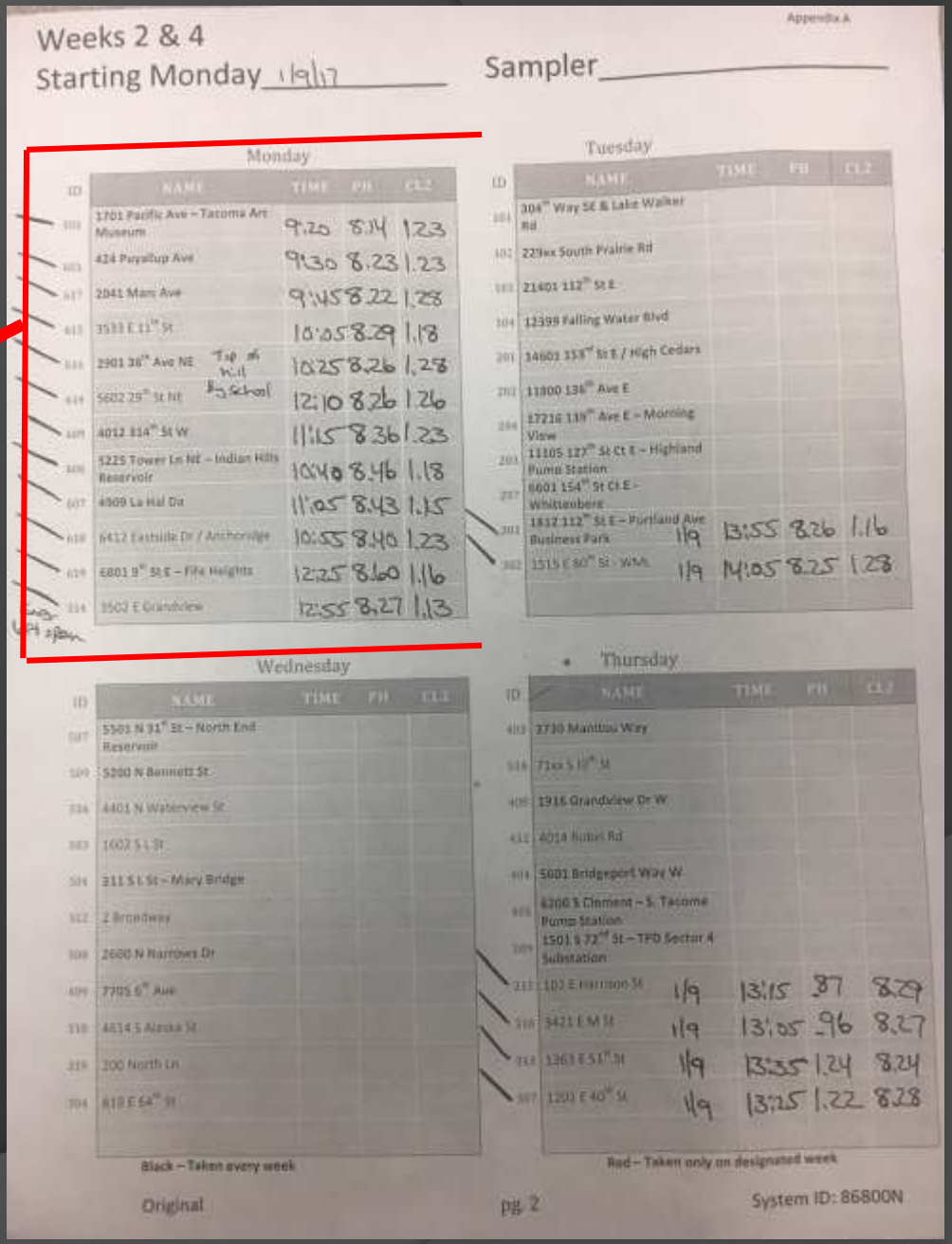
The pH and CL Values are then recorded on paper sheets:



Monday

ID	NAME	TIME	PH	CL2
501	1701 Pacific Ave – Tacoma Art Museum	9:20	8.14	1.23
601	424 Puyallup Ave	9:30	8.23	1.23
617	2041 Marc Ave	9:45	8.22	1.28
615	3533 E 11th St	10:05	8.29	1.18
616	2901 38th Ave NE Top of hill By school	10:25	8.26	1.28
614	5602 29th St NE	12:10	8.26	1.26
609	4012 314th St W	11:15	8.36	1.23
606	5225 Tower Ln NE – Indian Hills Reservoir	10:40	8.46	1.18
607	4909 La Hal Da	11:05	8.43	1.15
618	6412 Eastside Dr / Anchoridge	10:55	8.40	1.23
619	6801 9th St E – Fife Heights	12:25	8.60	1.16
314	3502 E Grandview	12:55	8.27	1.13

Eng. left open



Appendix A

Weeks 2 & 4

Starting Monday 1/9/17

Sampler

Monday

ID	NAME	TIME	PH	CL2
501	1701 Pacific Ave – Tacoma Art Museum	9:20	8.14	1.23
601	424 Puyallup Ave	9:30	8.23	1.23
617	2041 Marc Ave	9:45	8.22	1.28
615	3533 E 11th St	10:05	8.29	1.18
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619	6801 9th St E – Fife Heights	12:25	8.60	1.16
314	3502 E Grandview	12:55	8.27	1.13

Tuesday

ID	NAME	TIME	PH	CL2
101	304th Way SE & Lake Walker Rd			
102	229xx South Prairie Rd			
103	21401 112th St E			
104	12398 Falling Water Blvd			
201	14601 153rd St E / High Cedars			
202	11800 136th Ave E			
204	17216 139th Ave E – Morning View			
203	11105 127th St Ct E – Highland Pump Station			
237	6601 154th St Ct E – Whitesboro			
201	1812 112th St E – Portland Ave Business Park	1/9	13:55	8.26 1.16
202	1515 E 80th St - WML	1/9	14:05	8.25 1.28

Wednesday

ID	NAME	TIME	PH	CL2
507	5501 N 31st St – North End Reservoir			
509	5200 N Bennett St			
334	4401 N Waterview St			
503	1602 S L St			
504	311 S L St – Mary Bridge			
512	2 Broadway			
508	2600 N Narrows Dr			
409	7705 6th Ave			
510	4614 S Alaska St			
219	200 North Ln			
304	610 E 64th St			

Thursday

ID	NAME	TIME	PH	CL2
403	3730 Manitou Way			
514	71xx S 19th St			
405	1916 Grandview Dr W			
412	4014 Rubin Rd			
404	5601 Bridgeport Way W			
401	6200 S Climent – S. Tacoma Pump Station			
509	1501 S 72nd St – TPD Sector 4 Substation			
213	102 E Harrison St	1/9	13:15	.87 8.29
516	3421 E M St	1/9	13:05	.96 8.27
214	1361 E 51st St	1/9	13:35	1.24 8.24
507	1201 E 40th St	1/9	13:25	1.22 8.28

Black – Taken every week

Red – Taken only on designated week

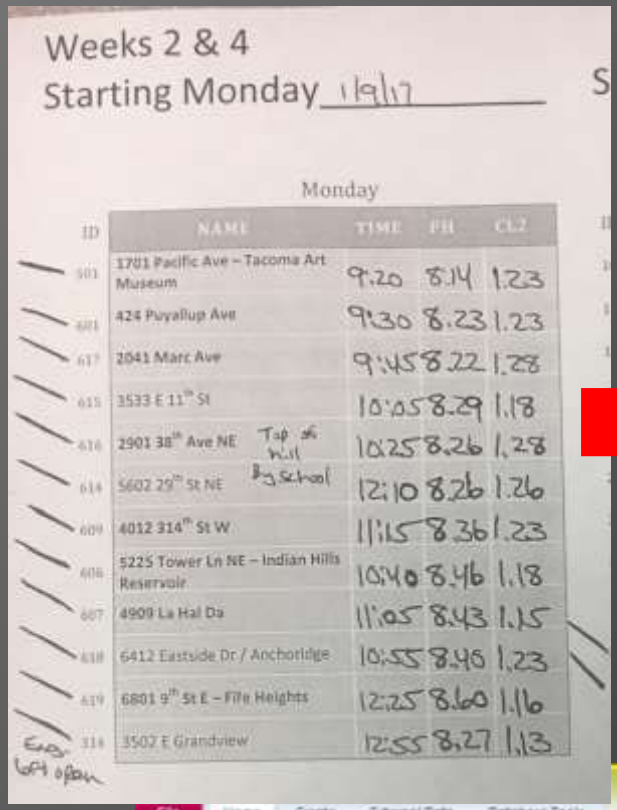
Original

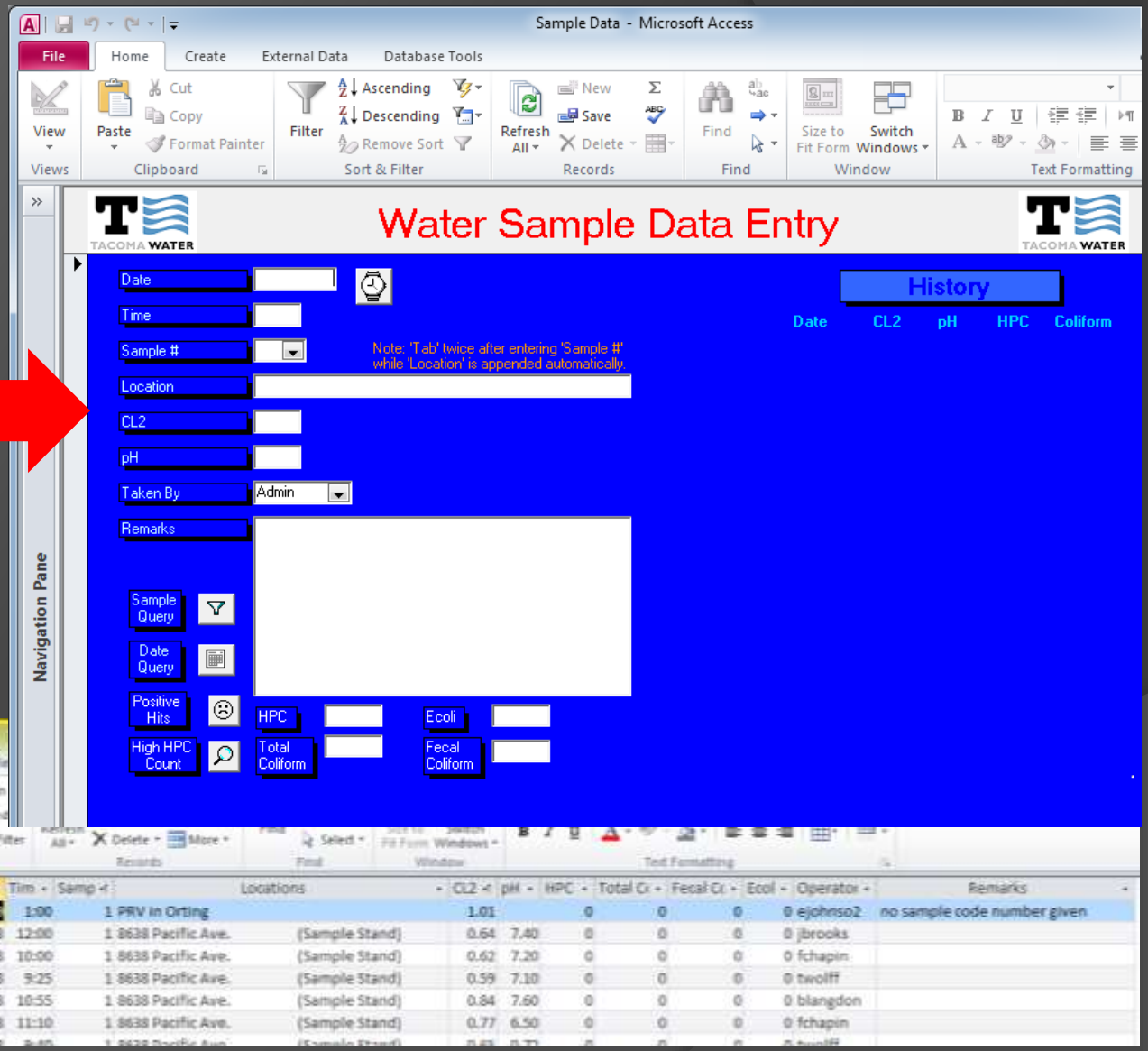
pg 2

System ID: 86800N

CURRENT SAMPLING METHOD

Values are then entered from the Sample Sheet into an Access Database





USE CASE - CURRENT SAMPLING METHOD

What we realized about the current sampling method:

- Paper Based recording works but is time consuming
- A lot of data entry occurring at each step of the process
- Easy to make mistakes and write down the wrong values
- pH and CL sample results are not easily communicated to the rest of the organization quickly or at all

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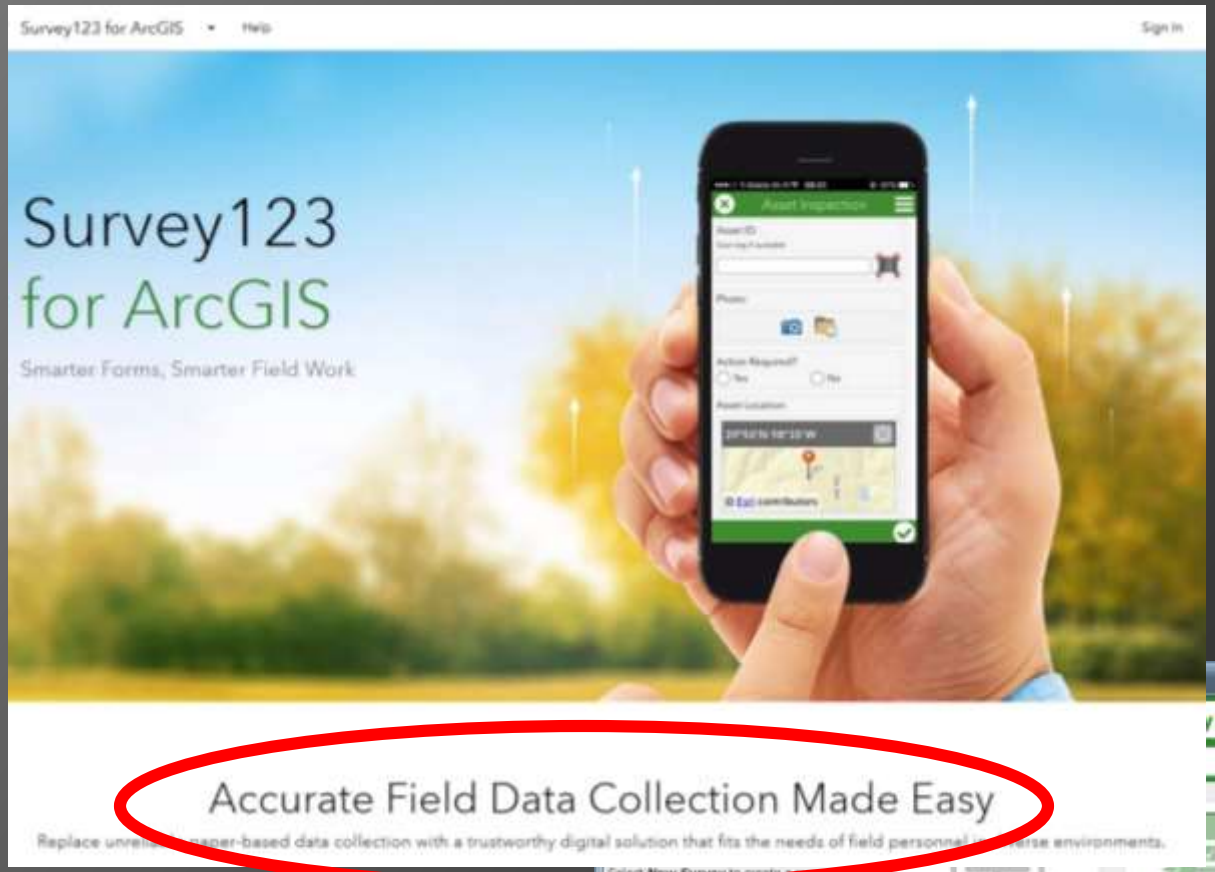
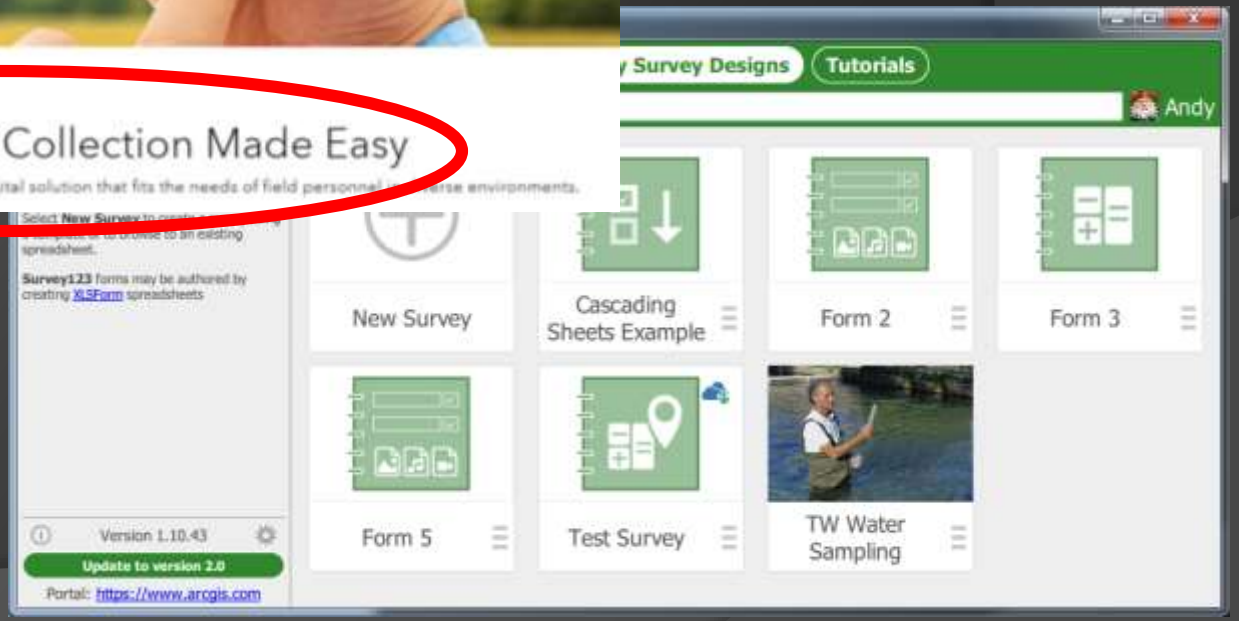
SURVEY 123 SOLUTION





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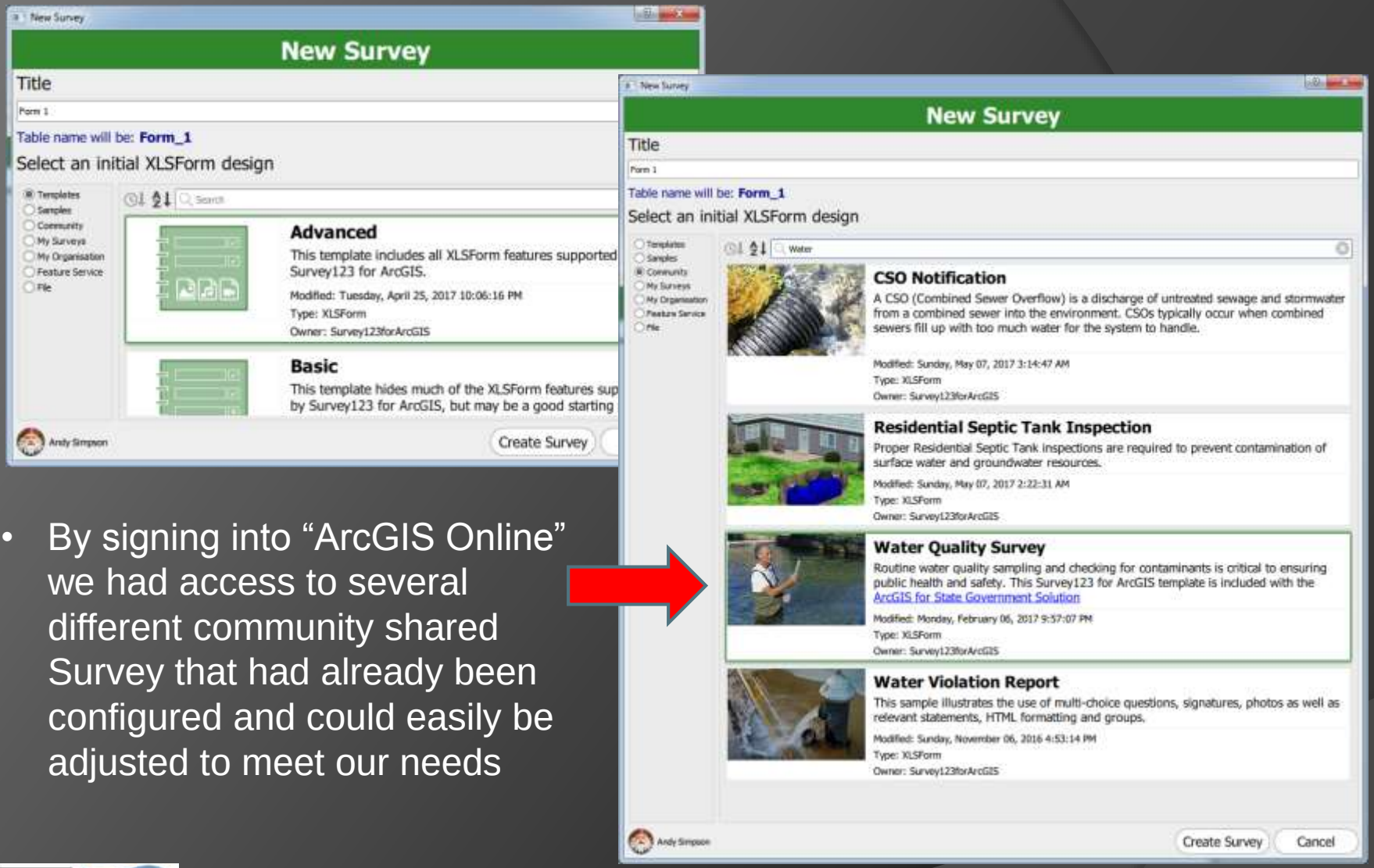
SURVEY 123 SOLUTION



- By signing into “ArcGIS Online” we had access to several different community shared Survey that had already been configured and could easily be adjusted to meet our needs

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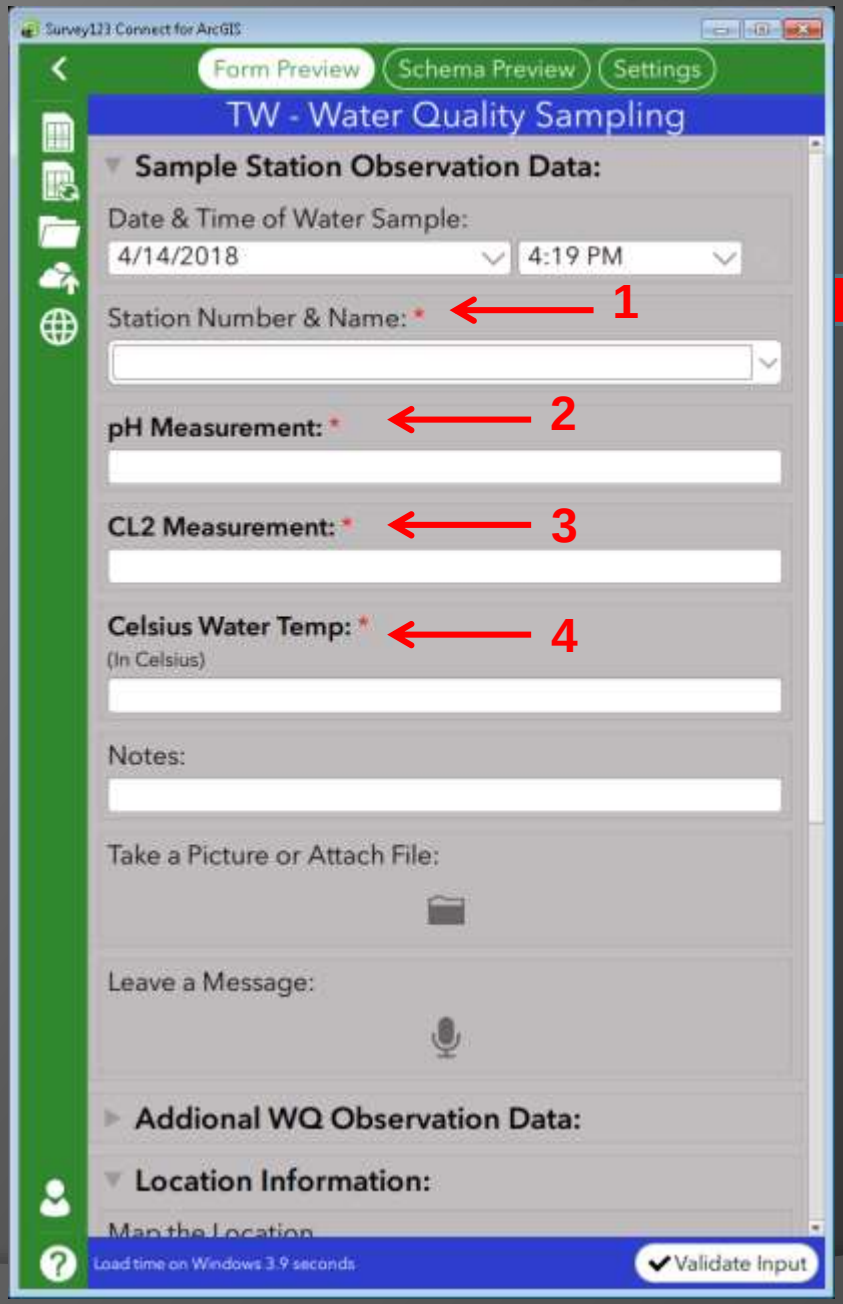
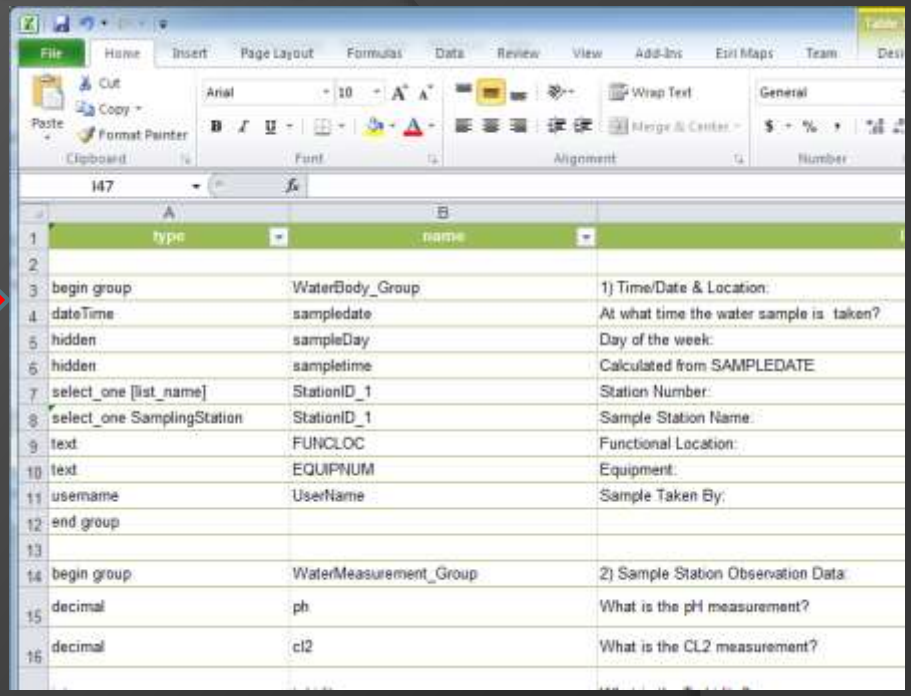
SURVEY 123 SOLUTION

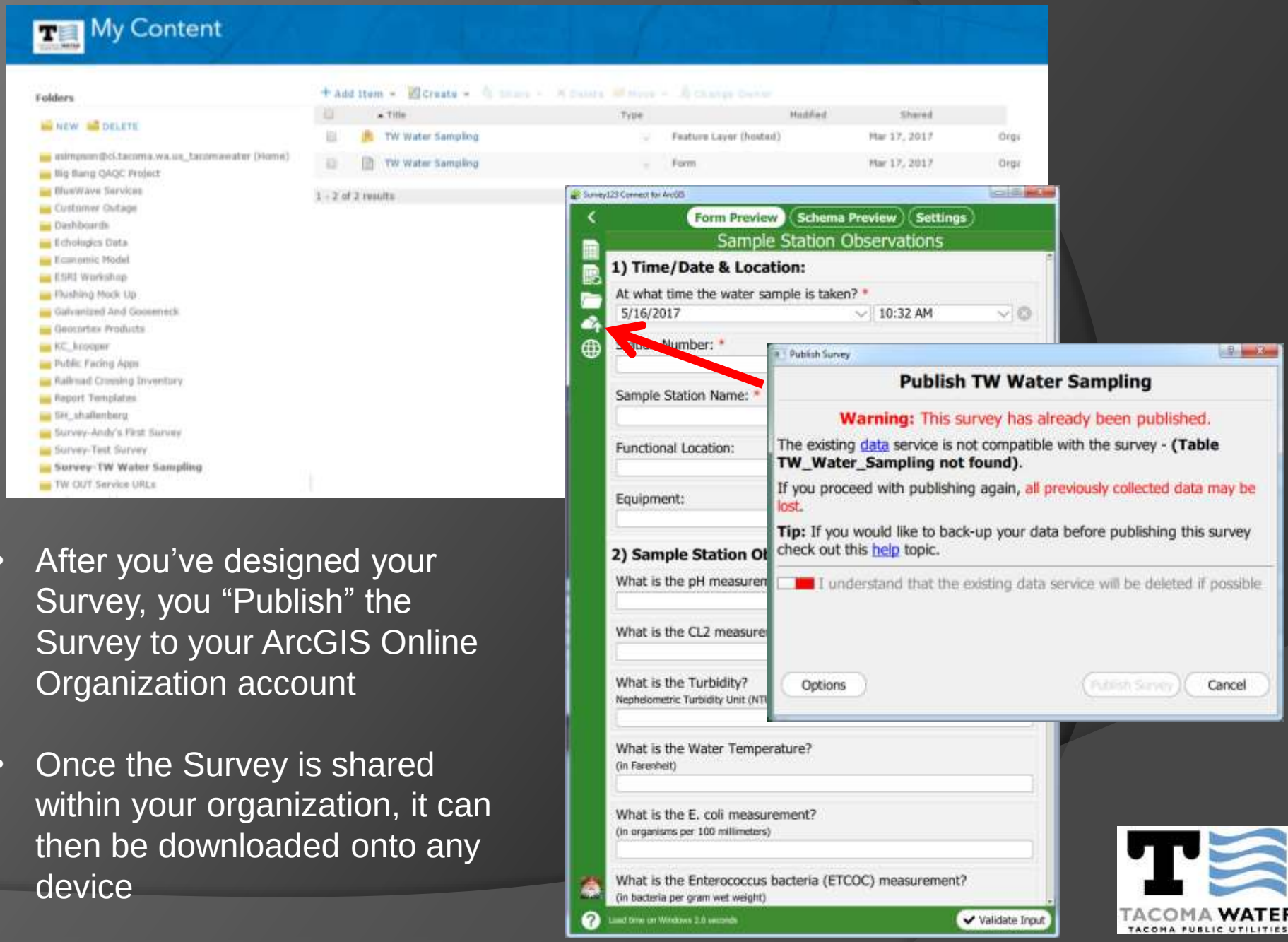




	A	B	C
1	type	name	
2			
3	begin group	WaterBody_Group	1) Time/Date & Location:
4	dateTime	sampledate	At what time the water sample is taken?
5	hidden	sampleDay	Day of the week:
6	hidden	sampletime	Calculated from SAMPLEDATE
7	select_one [list_name]	StationID_1	Station Number:
8	select_one SamplingStation	StationID_1	Sample Station Name:
9	text	FUNCLOC	Functional Location:
10	text	EQUIPNUM	Equipment:
11	username	UserName	Sample Taken By:
12	end group		
13			
14	begin group	WaterMeasurement_Group	2) Sample Station Observation Data:
15	decimal	ph	What is the pH measurement?
16	decimal	cl2	What is the CL2 measurement?

- The flow of questions in the Survey is determined inside the accompanying worksheet
- Red "*" means that this is a required field
- Drop down Domain like Values are "hard coded" into the worksheet

SURVEY 123 SOLUTION



- After you've designed your Survey, you "Publish" the Survey to your ArcGIS Online Organization account
- Once the Survey is shared within your organization, it can then be downloaded onto any device

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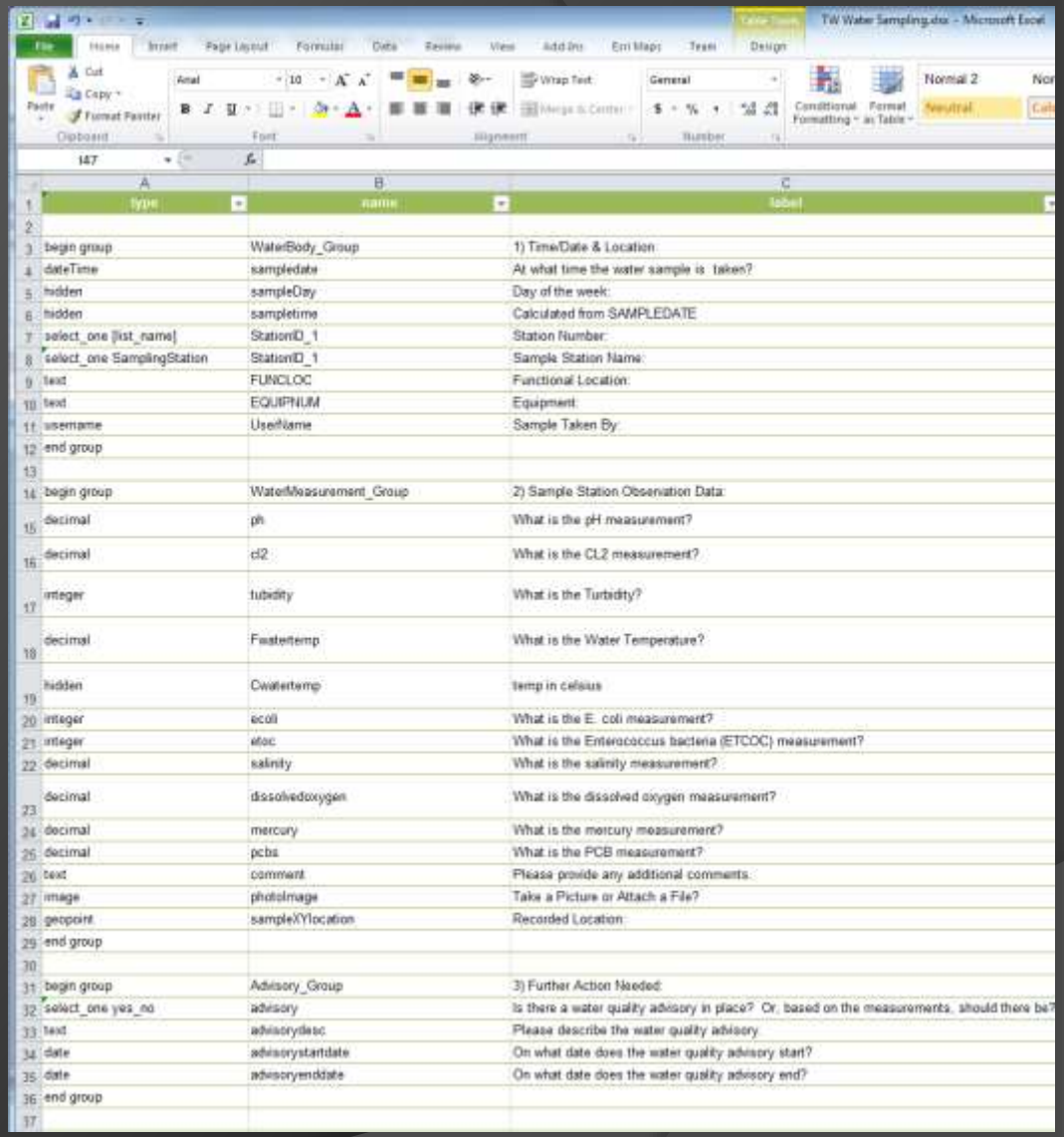
SURVEY 123 SOLUTION

- Survey Templates are easily configured using MS Excel
- Notes on the specific data structures are helpful in designing the Survey.
- Controlling which values are hidden from the user but are being auto-populated in the survey is very useful
  - Ex: SAP Station Equipment Number



	A	B	C
1	type	name	label
2			
3	begin group	WaterBody_Group	1) Time/Date & Location:
4	dateTime	sampledate	At what time the water sample is taken?
5	hidden	sampleDay	Day of the week:
6	hidden	sampletime	Calculated from SAMPLEDATE
7	select_one [list_name]	StationID_1	Station Number:
8	select_one SamplingStation	StationID_1	Sample Station Name:
9	text	FUNCLOC	Functional Location:
10	text	EQUIPNUM	Equipment:
11	username	UserName	Sample Taken By:
12	end group		
13			
14	begin group	WaterMeasurement_Group	2) Sample Station Observation Data:
15	decimal	ph	What is the pH measurement?
16	decimal	cl2	What is the CL2 measurement?
17	integer	tubidity	What is the Turbidity?
18	decimal	Fwatertemp	What is the Water Temperature?
19	hidden	Cwatertemp	temp in celsius
20	integer	ecoli	What is the E. coli measurement?
21	integer	etoc	What is the Enterococcus bactena (ETCOC) measurement?
22	decimal	salinity	What is the salinity measurement?
23	decimal	dissolvedoxygen	What is the dissolved oxygen measurement?
24	decimal	mercury	What is the mercury measurement?
25	decimal	pcbs	What is the PCB measurement?
26	text	comment	Please provide any additional comments.
27	image	photoImage	Take a Picture or Attach a File?
28	geopoint	sampleXYlocation	Recorded Location:
29	end group		
30			
31	begin group	Advisory_Group	3) Further Action Needed:
32	select_one yes_no	advisory	Is there a water quality advisory in place? Or, based on the measurements, should there be?
33	text	advisorydesc	Please describe the water quality advisory
34	date	advisorystartdate	On what date does the water quality advisory start?
35	date	advisoryenddate	On what date does the water quality advisory end?
36	end group		
37			

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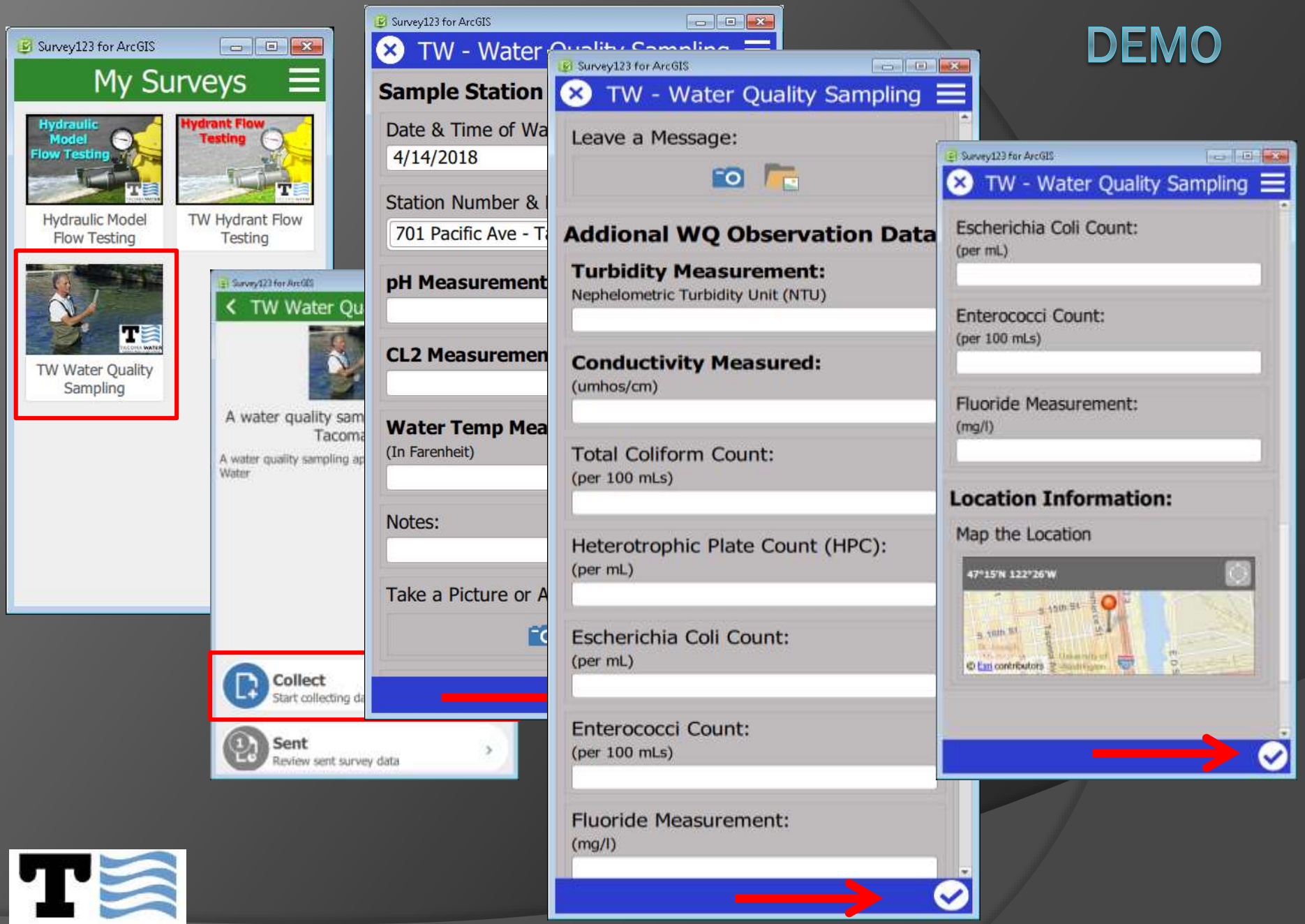
DEMO



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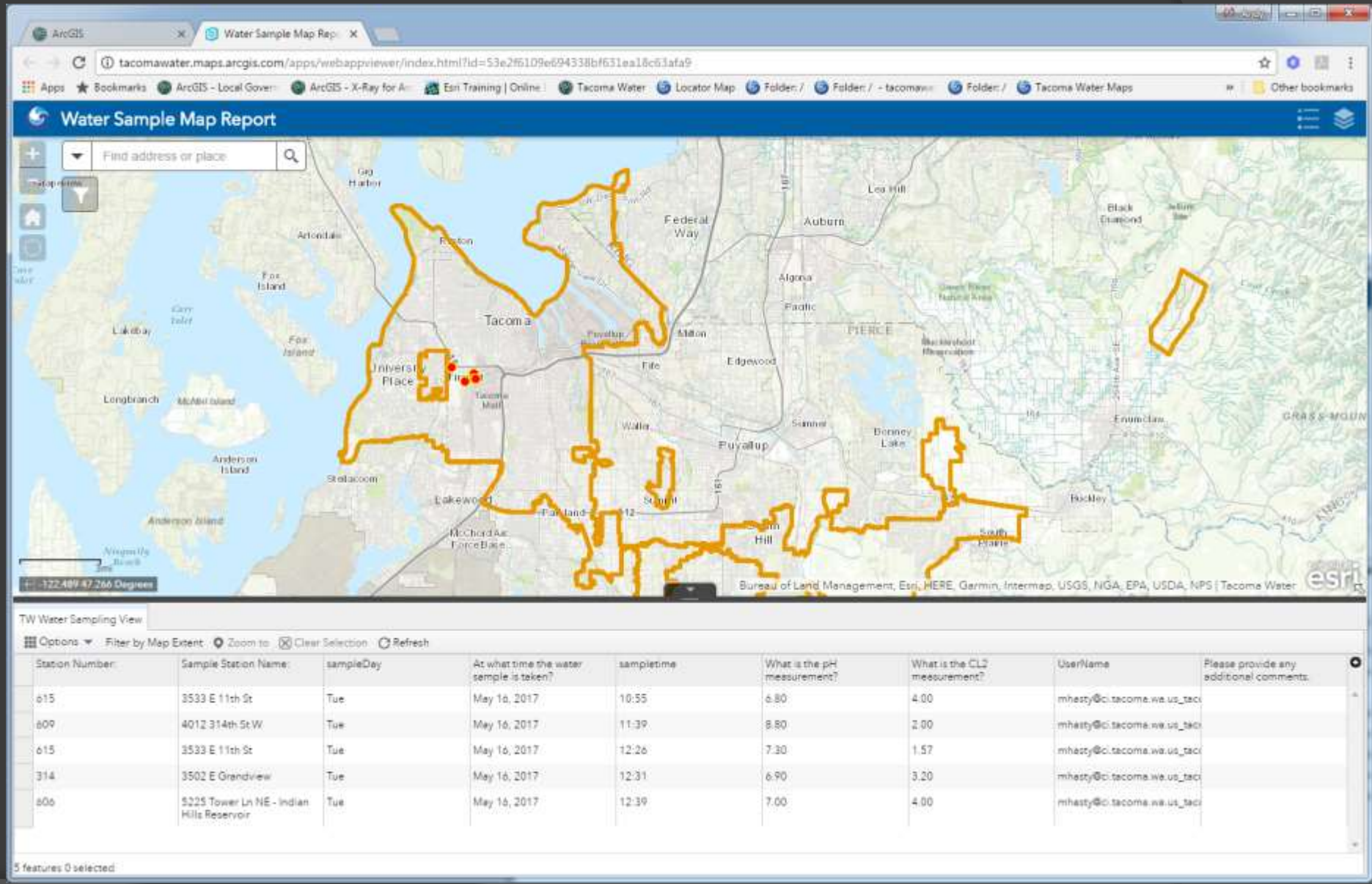
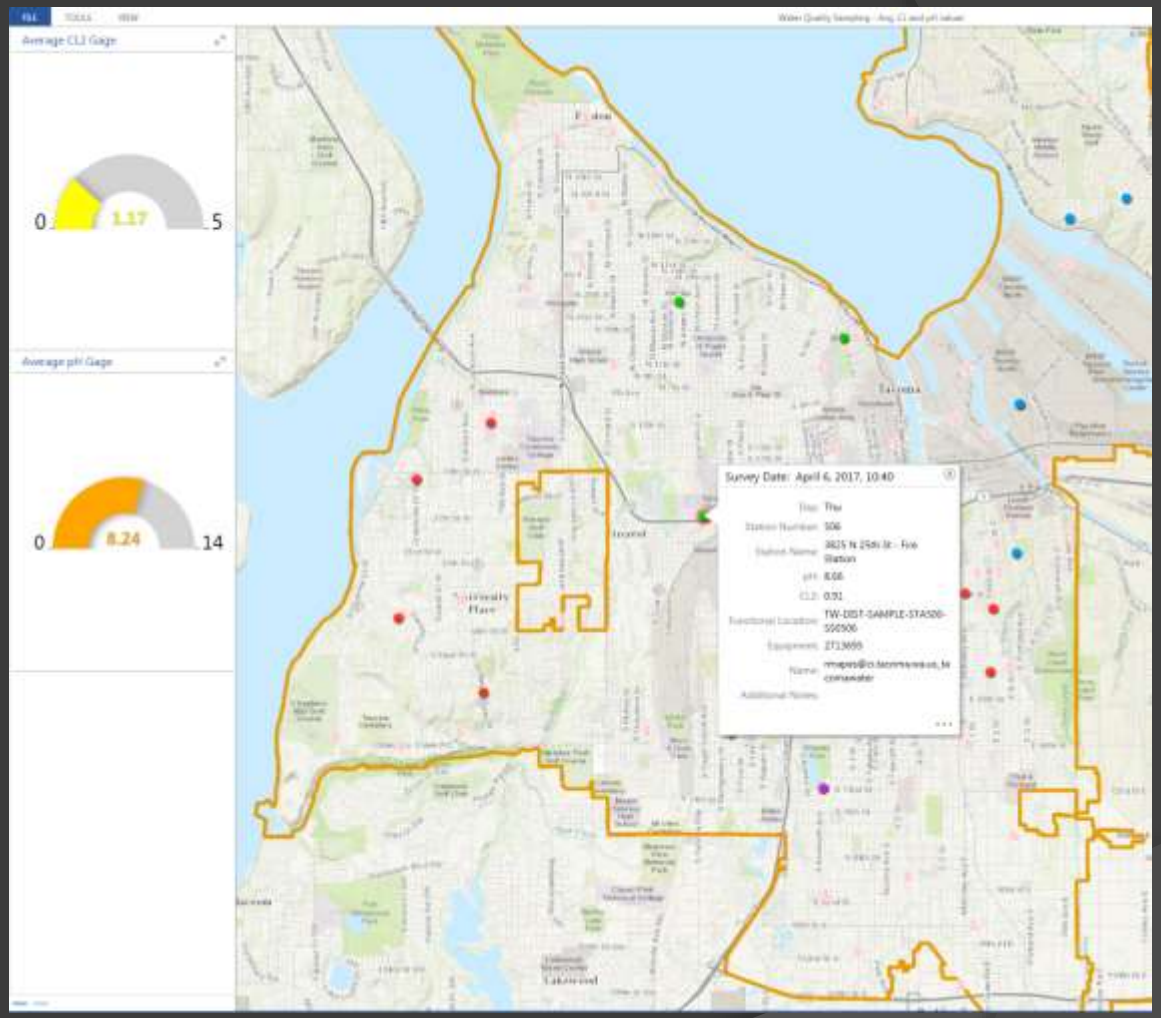
MAPS WITH SURVEYS FILTERED



DASHBOARDS

- Results can be shared with the rest of the organization quickly through ArcGIS Online Maps, Web Apps and Dashboards.
- Problems can spotted quicker and values can be analyzed more graphically.
- A single location over a defined period of time or across all of the locations in one view.



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FIELD DATA COLLECTION USING SURVEY123

- Hydrant Flushing and Flow Reporting

SURVEY 123 SOLUTION

Hydrant Flushing:

- Flow Testing needed to verify Fire Flows
- Usually completed at night or early morning
- 3-4 man crews
- 1-2 flow tests per month
- Results usually written on paper sheet and then manually entered into an excel worksheet several day later
- Observed Values plugged into equations and recorded

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USE CASE - CURRENT SAMPLING METHOD

What we realized about the current Hydrant Flow Testing method:

- Paper Based recording of Values does work but is time consuming
- A lot of data entry occurring at each step of the current process here
- Easy to make mistakes and write down the wrong values
- Equations could be automated with Values from Survey
- Results are not easily communicated to the rest of the organization quickly or at all

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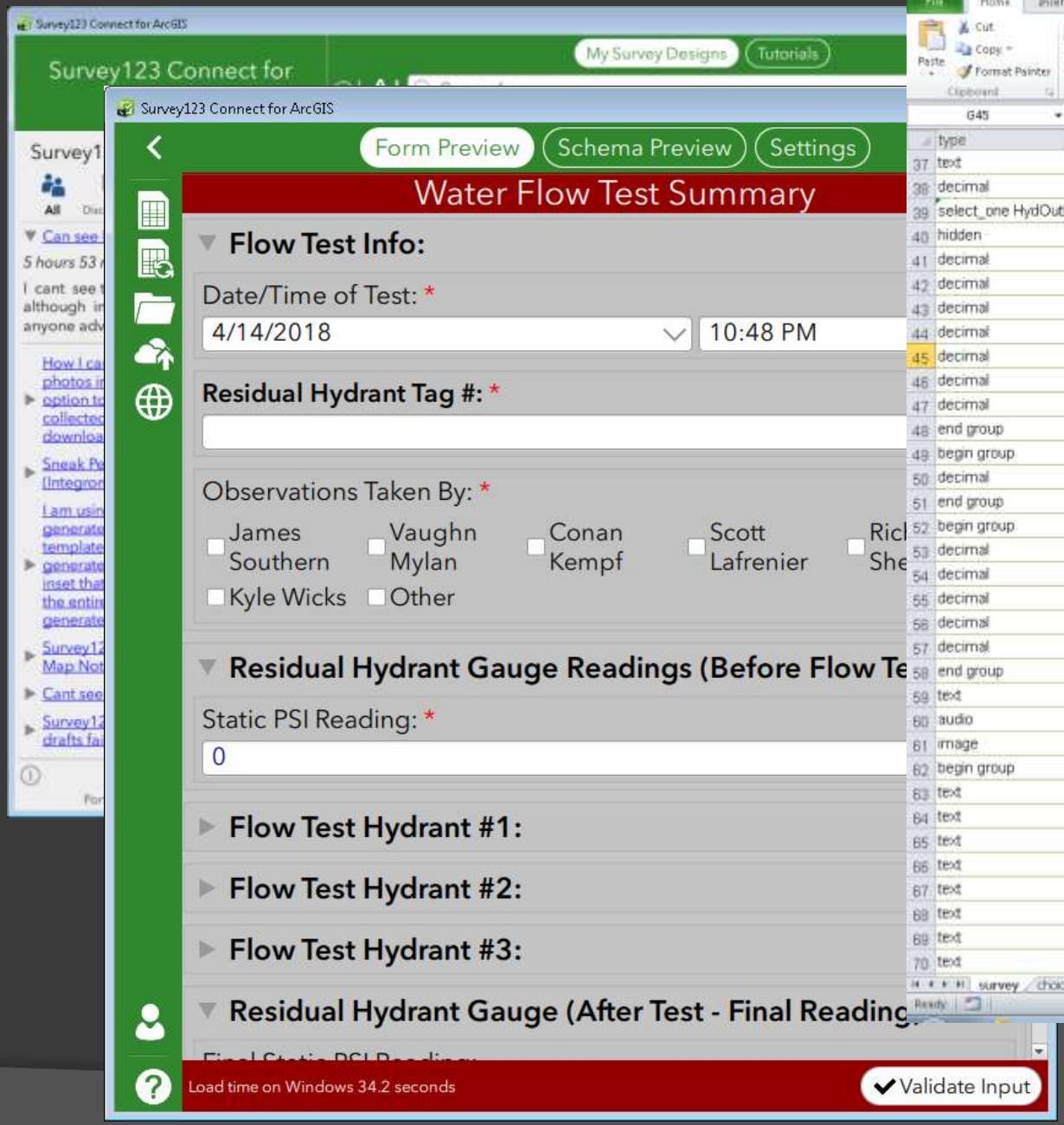
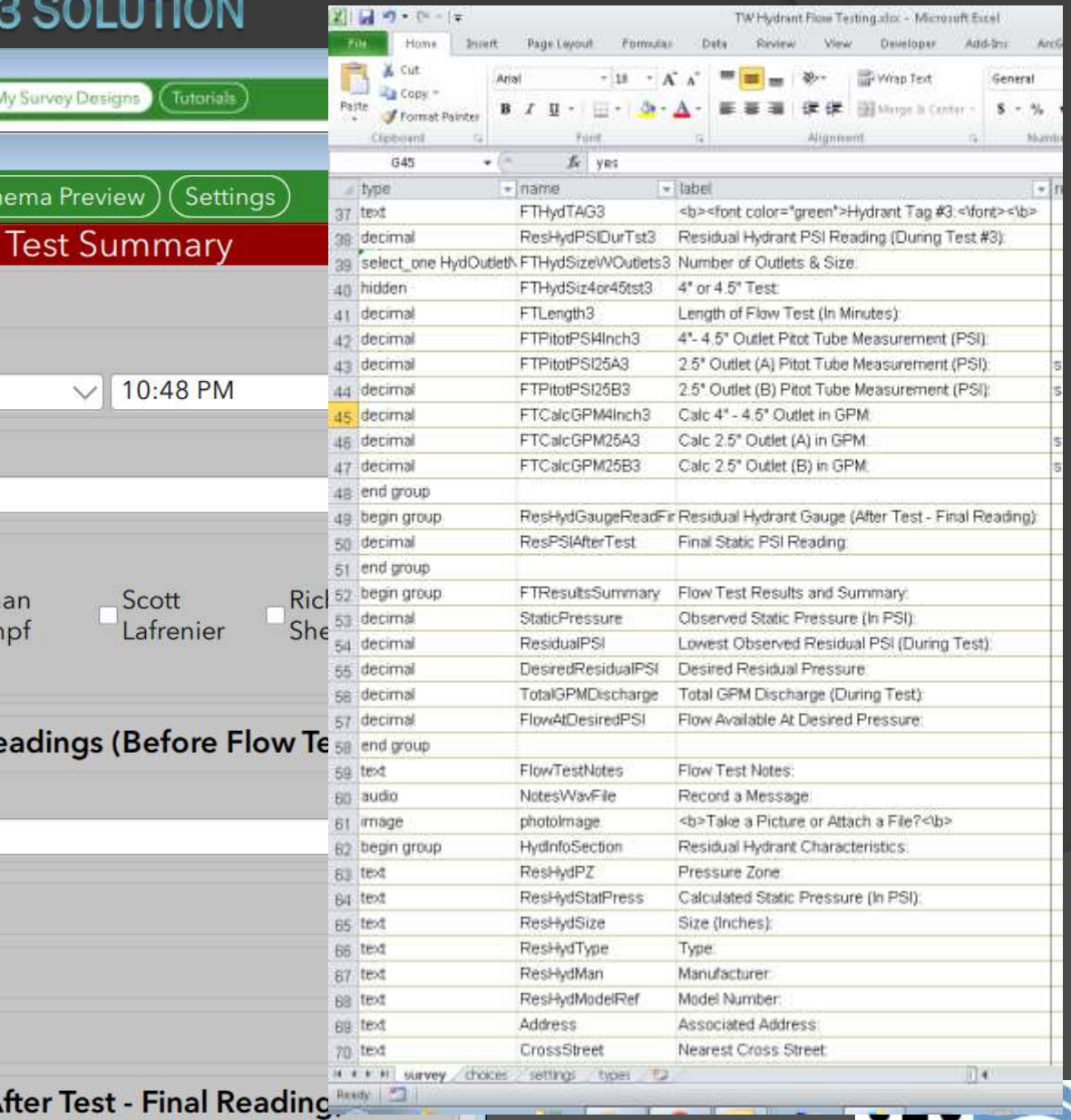
SURVEY 123 SOLUTION





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Survey123 for ArcGIS

My Surveys

Hydraulic Model Flow Testing

TW Hydrant Testing

TW Water Quality Sampling

Survey123 for ArcGIS

Water Flow Test Summary

Flow Test Info:

Date/Time of Test: *

4/14/2018 10:16 PM

Residual Hydrant Tag #: *

7880

Observations Taken By: *

- [x] James Southern
- [ ] Vaughn Mylan
- [ ] Conan Kempf
- [ ] Scott Lafrenier
- [ ] Richard Shepherd
- [ ] Kyle Wicks
- [ ] Other

Associated Address:

4300 CENTER ST

Nearest Cross Street:

S MASON AVE / CENTER ST

Location Description:

WLMG @ ENTR TO 4302 CENTER ST

Residual Hydrant Gauge Readings:

PSI Reading #1 (Before Test): *

0

PSI Reading #2 (During Test): *

0

Survey123 for ArcGIS

Wate

Residual Readings

PSI Readin

45

PSI Readin

35

PSI Readin

45

Flow Test

Hydrant T

3154

Number of

(2) x 2.5"

Length of

-

4"- 4.5" Ou

Measureme

28.5

Calc 4" - 4.

2290.8739

2.5" Outlet

Survey123 for ArcGIS

Water Flow Test Summary

Flow Test Results and Summary:

Observed Static Pressure (In PSI): *

45

Observered Residual PSI (During Test): *

35

Desired Residual Pressure: *

20

Total GPM Discharge (During Test): *

4245.489097023848

Flow Available At Desired Pressure: *

6963.303660128636

Flow Test Notes:

Take a Picture or Attach a File?

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SURVEY 123 SOLUTION

pulldata("HydSizeData", "HydPortSize","HydOutletSizeDim", ${FTHydSizeWOutlets3})

0

0

0

0

((29.8*0.9)*(pow(${FTHydSiz4or45tst3},2))) * sqrt(${FTPitotPSI4Inch3})

167.625 * sqrt(${FTPitotPSI25A3})

167.625 * sqrt(${FTPitotPSI25B3})

0

${ResPSIBeforeTest}

if((${StaticPressure} > 0) and (${ResHydPSIDurTst1} > 0) , min(${StaticPressure},${ResHydPSIDurTst1},${ResHydPSIDurTst2},${ResHydPSIDurTst3}), ${StaticPressure})

20

${FTCalcGPM25A1} + ${FTCalcGPM25B1} + ${FTCalcGPM4Inch1}+${FTCalcGPM25A2} + ${FTCalcGPM25B2} + ${FTCalcGPM4Inch2}+${FTCalcGPM25A3} + ${FTCalcGPM25B3} + ${FTCalcGPM4Inch3}

pow(((${StaticPressure} - ${DesiredResidualPSI}) div (${StaticPressure} - ${ResidualPSI})), 0.54) * ${TotalGPMDischarge}

Calculation
Perform calculations using the values of preceeding questions (e.g., ${number}*100). Reference the calculate field to display the result (e.g., The answer is ${calc}).

pulldata("GISHydrantSAPData_10312017", "PZONE","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "CALCPSI","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "SIZEDIMEQ","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "OBJTYPETEXTEQ","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "MANUFACTUREREQ","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "MODELNOEQ","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "ADDRESSFL","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "NearestCrossStreets","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "LocDesc","HYDTAG", ${ResHydTagNum})

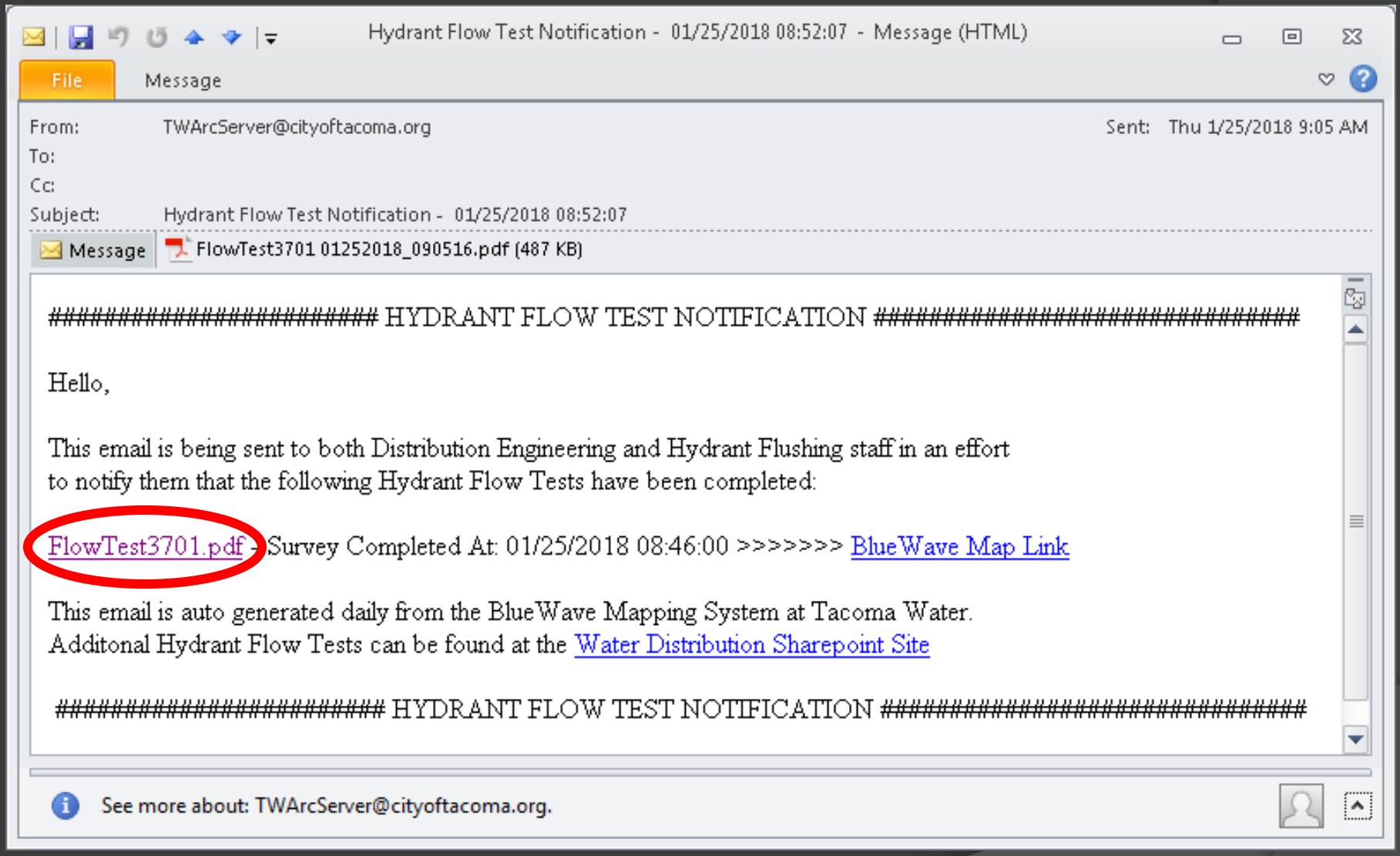
pulldata("GISHydrantSAPData_10312017", "FUNCLOC","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "EQUIPNUM","HYDTAG", ${ResHydTagNum})

pulldata("GISHydrantSAPData_10312017", "FACILITYID","HYDTAG", ${ResHydTagNum})

property('deviceid')

SURVEY 123 SOLUTION


Hydrant Flow Test Notification - 01/25/2018 08:52:07 - Message (HTML)

File Message

From: TWArcServer@cityoftacoma.org
Sent: Thu 1/25/2018 9:05 AM
To:
Cc:
Subject: Hydrant Flow Test Notification - 01/25/2018 08:52:07

Message FlowTest3701 01252018_090516.pdf (487 KB)

########## HYDRANT FLOW TEST NOTIFICATION ##########

Hello,

This email is being sent to both Distribution Engineering and Hydrant Flushing staff in an effort to notify them that the following Hydrant Flow Tests have been completed:

FlowTest3701.pdf - Survey Completed At: 01/25/2018 08:46:00 >>>>>>> BlueWave Map Link

This email is auto generated daily from the BlueWave Mapping System at Tacoma Water.
Additonal Hydrant Flow Tests can be found at the Water Distribution Sharepoint Site

########## HYDRANT FLOW TEST NOTIFICATION ##########

See more about: TWArcServer@cityoftacoma.org.

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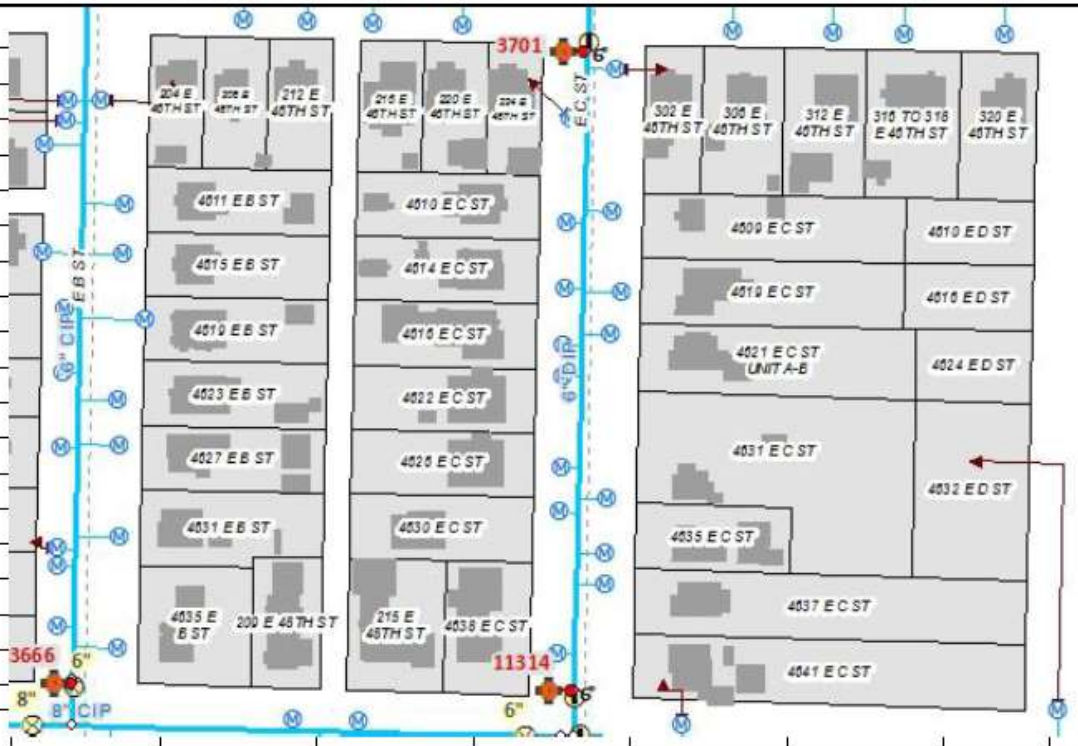
TACOMA PUBLIC UTILITIES

Tacoma Public Utilities Water Division - **Water Flow Test Summary Sheet** 1/25/2018 - 9:05 AM

Date/Time:	01/25/2018 08:46:00
Res Hyd ID (R1):	**3701**
Location Desc:	4600 E C ST
	8 FT S OF SLMG
Res Hyd Size:	6"
Res Hyd Type:	Compression Hydrants
Flow Test Types:	1x4
PZone ID:	581
Res SAP FL:	TW-DIST-HYDRNT-003701
Calc'd Static:	87.9 PSI
Observers:	Jsouthern,Ckempf,VMylan,SLaFrenier



Hydrant Test Sequence:		Time (mins.)	PSI
3701 (R1)	Static		84
11314 (F1)	1x4	6	34
3701 (R1)	Static		84

Flow Hydrant Discharge Data:

Hydrant Tag ID	Outlet Diameter	Pitot PSI	GPM
11314	4"	12	1,486.5
		Total:	**1,486.5**

Remarks:

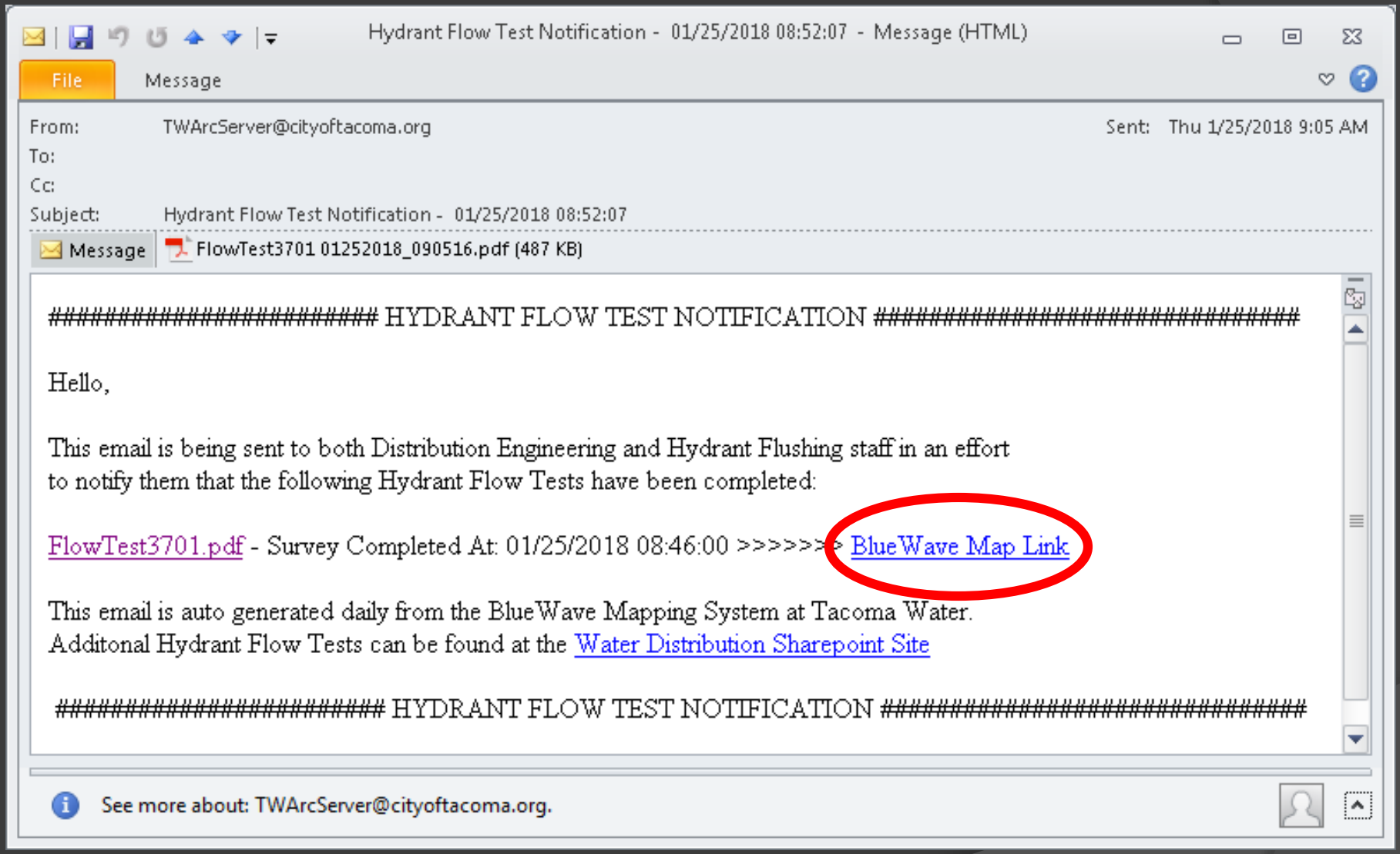
lot of dirty water and had 50psi drop

Summary and Results:

Static PSI	Lowest Residual PSI	Discharge GPM	Desired PSI	Flow (GPM) Available At Desired PSI	Notes on Supply:
84	34	1,486.5	20	1,698.5	**1,698.5 GPM Available @ 20 PSI.**

Survey Taker:	*slafreni@ci.tacoma.wa.us*	*Survey Date/Time:*	*01/25/2018 08:52:07*	*Dev ID:*	*c637dda0532a47f1ac443c54695fbb45*

SURVEY 123 SOLUTION



Hydrant Flow Test Notification - 01/25/2018 08:52:07 - Message (HTML)

File | Message

From: TWArcServer@cityoftacoma.org
Sent: Thu 1/25/2018 9:05 AM
To:
Cc:
Subject: Hydrant Flow Test Notification - 01/25/2018 08:52:07

Message | FlowTest3701 01252018_090516.pdf (487 KB)

########## HYDRANT FLOW TEST NOTIFICATION ##########

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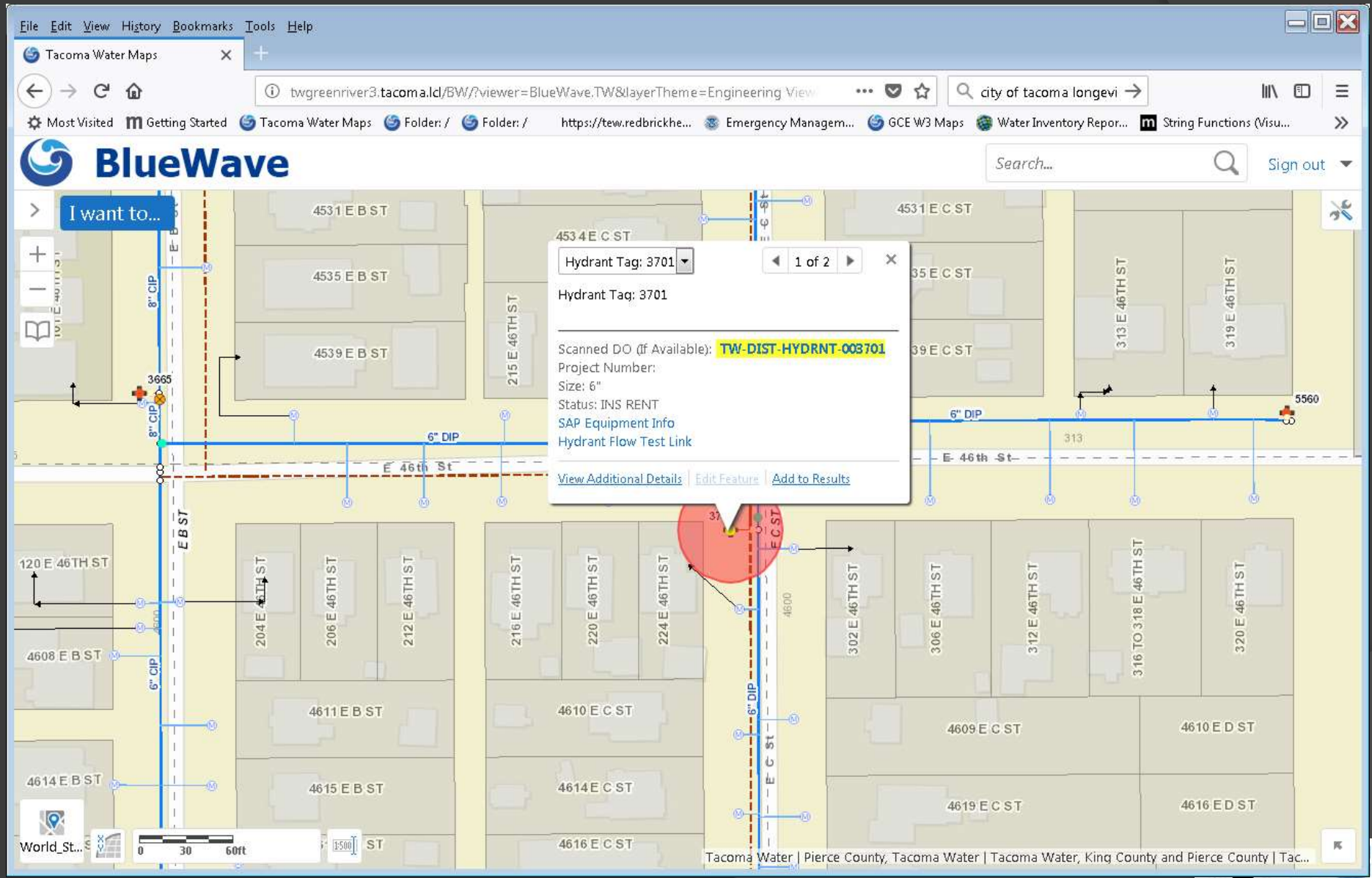
SURVEY 123 SOLUTION



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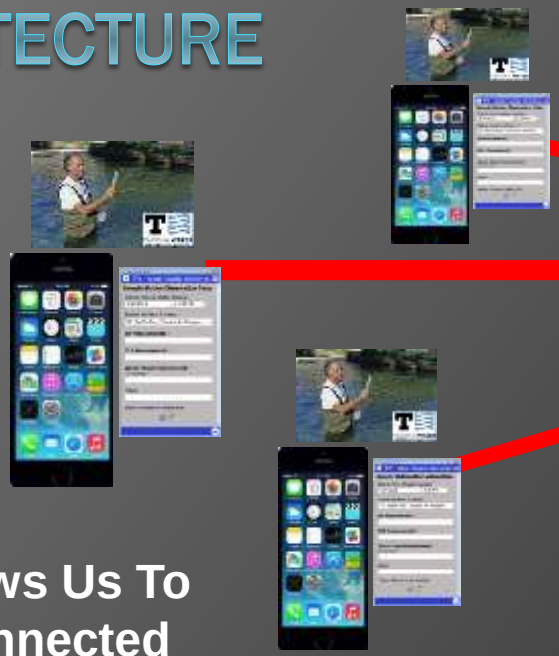
ARCHITECTURE

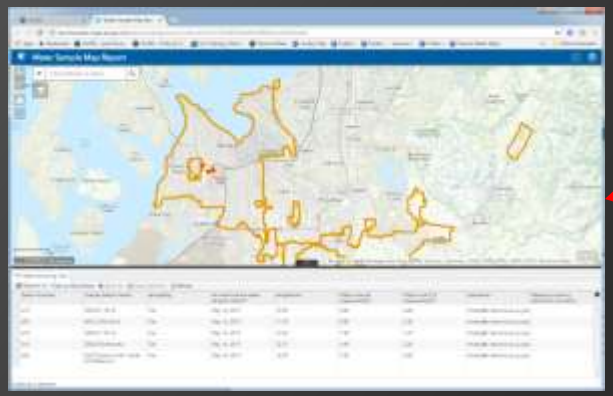


ArcGIS Online

Python Scripting

- -AGOL Allows Us To Have Disconnected Editing
- -User SSO to AGOL
- -Python Moves Survey Data To Corporate LAN
- -Data to Enterprise GIS Database

TW Corporate Network



Dashboard Apps For Analysis

TW Enterprise GIS Database

GIS Data Editors

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SUMMARY

Lessons Learned:

- Don’t be afraid or reluctant to try and fail a few times when designing and publishing a survey.
- Try and gather as much end user input upfront on the work flow that Survey may replace because you can’t make substantial changes to survey once it is deployed
- Plan on completely replacing or republishing your survey a few times.
- Go to the Survey 123 Blog for information and help, chances are someone has run into the same issue that you have:
  - https://geonet.esri.com/groups/survey123/blog
  - Like how to delete a survey from a device

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SUMMARY

Major Benefits:

- Easy to get started using predesigned templates
- Works on any device
- Can be shared quickly through ArcGIS Online and communicated out to other business units in a more graphical way
- Reduces our reliance on paper and creates better overall data
- Allows You to work disconnected from the Corporate Network
- Free and Easy to use with lots of configurability
- Saves staff time and makes data collection easier

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SUMMARY & NEXT STEPS

- We recently cut over to the Survey123 method in April
- Converted all of the existing MS Access observation
- More Dashboards and Reports
- Improved data collection method is going to save time and money
- Better Data = Better Decision Making!!

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Questions?

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asimpson@cityoftacoma.org