Custom Capture Street View Imagery

City of Philadelphia
Office of Innovation and Technology
March 8, 2017

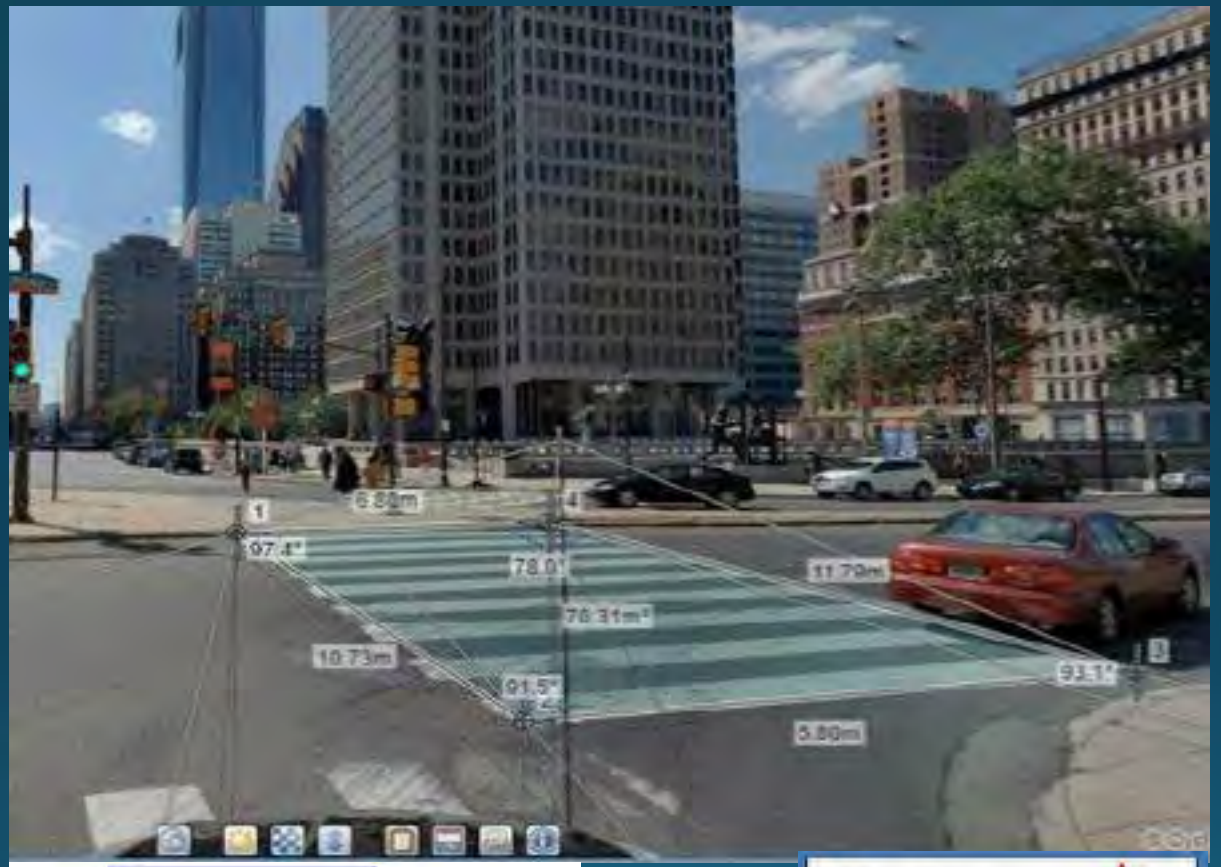
History

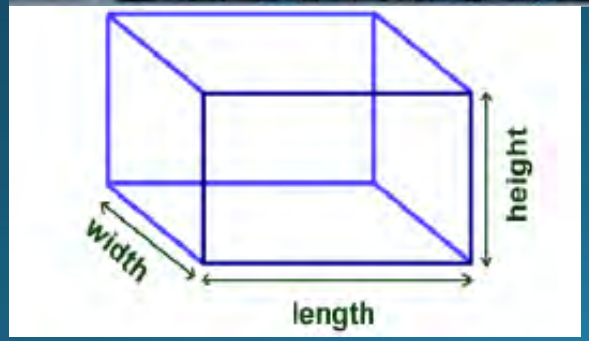
- Cyclomedia Technology, Inc. (Berkeley, CA). Esri business partner.
- 1-year pilot in 2015 including 2,575 miles imagery.
- Accessed via:
  - Globespotter – browser-based web app
  - Streetsmart add-on for both ArcGIS Desktop and ArcGIS Online
- 2016 City purchased a full year of service w/ PGW, PHA, PIDC, PPA and UPenn Facilities.

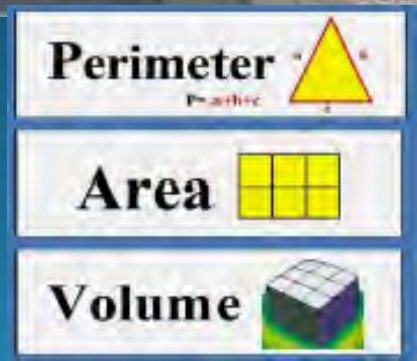
Why Use the Cyclomedia Solution?

- High definition, 360° seamless photography
- No blurring of house addresses
- Each image is date and time stamped + Unique ID
- No downgrade in quality for local/residential streets
- Measure tools – height, length, area
- 100% integration with City's GIS (Esri) platform – desktop + web

Accurate Measurements +/- 10 cm

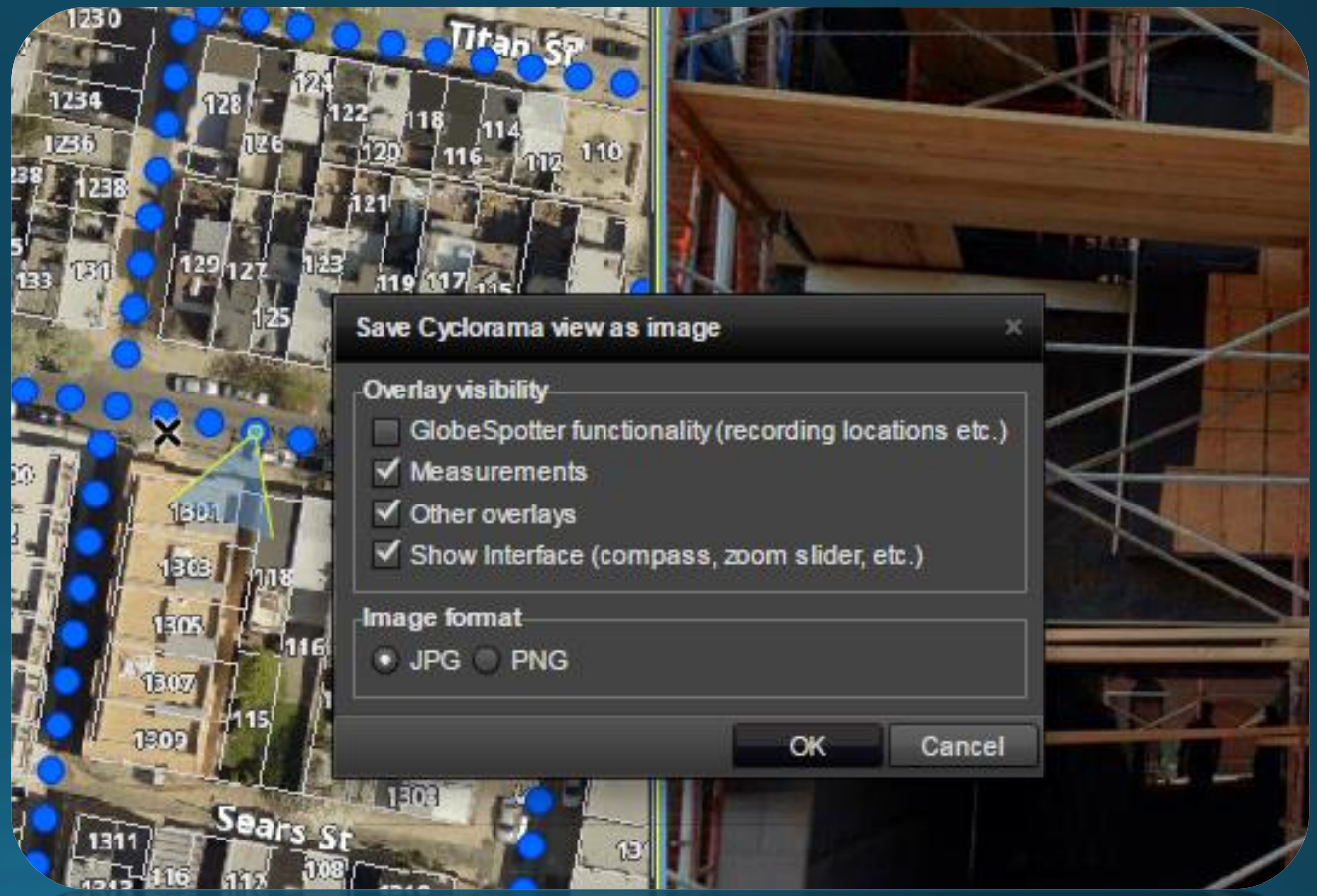




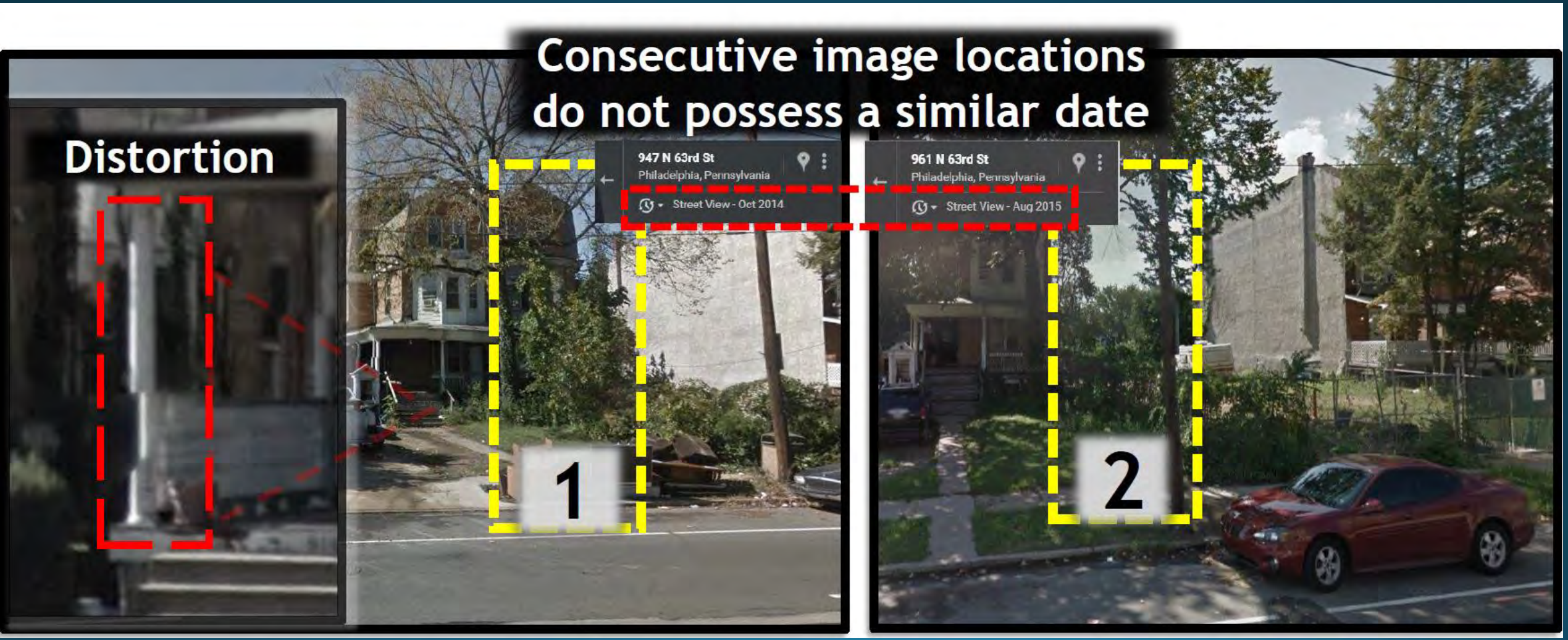


Save and Share Imagery

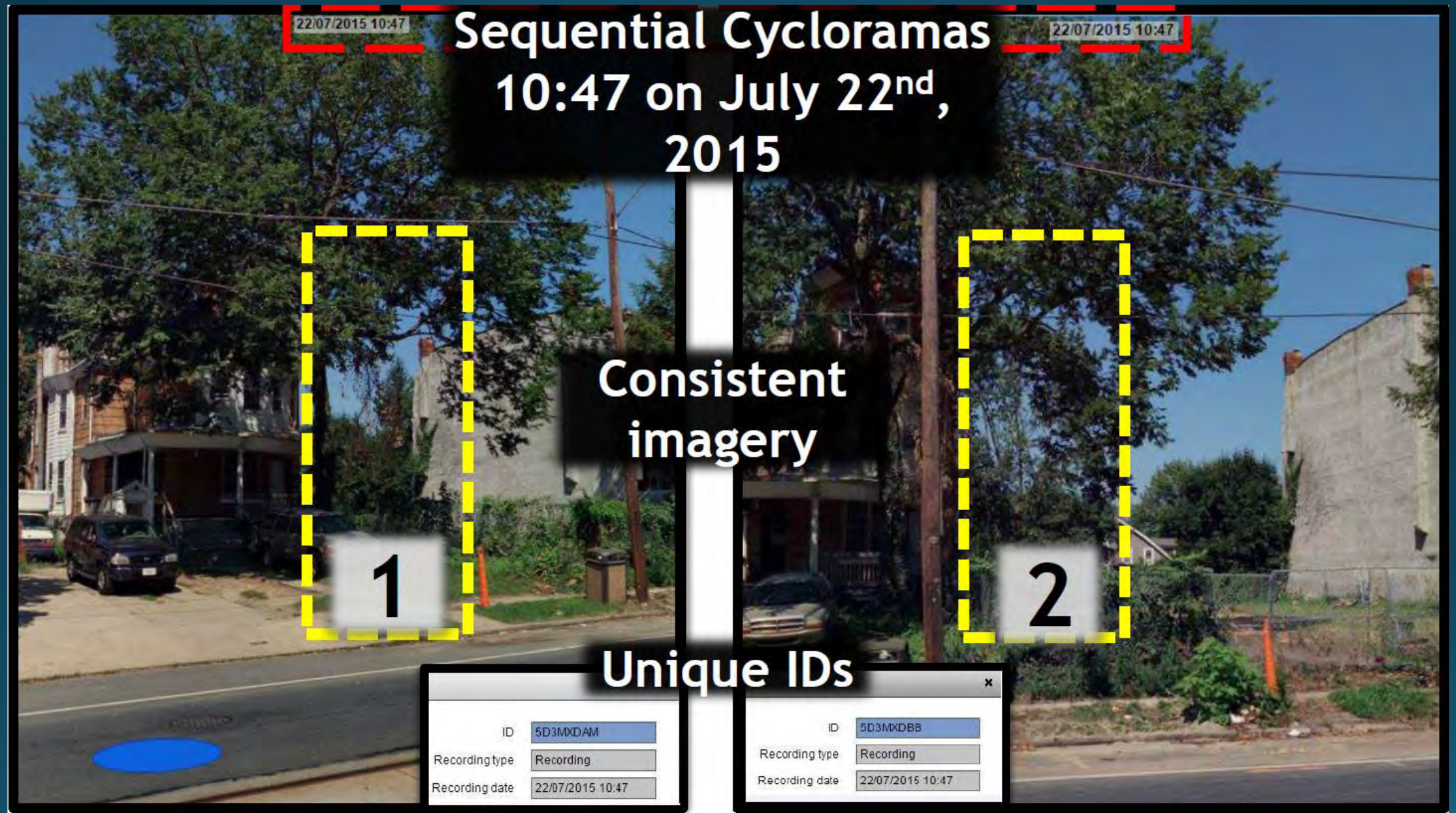
- Unique image ID and URL
- Save as PDF report or to JPG
- Build Play List of locations for demonstrations and site reviews
- Save measures and drawings in images/reports



Google Street view is useful, but…



Custom Capture = Confident Date/Time



By the Numbers

Agency	Globespotter Accounts	Staff Trained On-site or Webinar* on Globespotter
PGW	139	21
PHA	10	2
PIDC	2	1
PPA	39	18
UPenn Real Estate	22	4
City total	545	103

Fastest adoption rate of a new technology at City government outside MS Office and Internet.

*Webinar counts are under-reported

City Use Cases

- Parks and Recreation – 111,000 street trees inventoried.
- Fire – building height measurement, asset inventory, condition assessment.
- Streets – bridge height measurement, infrastructure checks.
- Licenses + Inspections – pre-inspection planning and prioritization, vacant building verification, court case documentation, building height measurement.
- Law, DA, Administrative Review, Risk Management, Property Assessment, Planning agencies – address verification, condition assessment.
- Planning + Water – parking inventory, ROW asset measurements for $ estimates.

New Captures and Funding

- City is budgeting for a new capture in 2017.
- Annual captures each year after proposed for operating budget. Strong support by departments (Licenses + Inspections).
- Continue and expand upon partnership collaboration.
- Will not be made publicly accessible – internal use only.

Demo

Contact Information

- Mark Wheeler, Geographic Information Officer
  mark.wheeler@phila.gov

- Brian Ivey, OIT GIS Manager
  brian.ivey@phila.gov

Sharing is Caring

A Study of Citi Bike's Discounted Annual Membership Program for New York City Housing Authority Residents

Thom Stead, Transportation Planner,
Delaware Valley Regional Planning Commission

Project Components

Demographic Analysis

NYCHA Resident Survey:

- Opinions
- Experiences
- Knowledge
- Obstacles
- Improvements

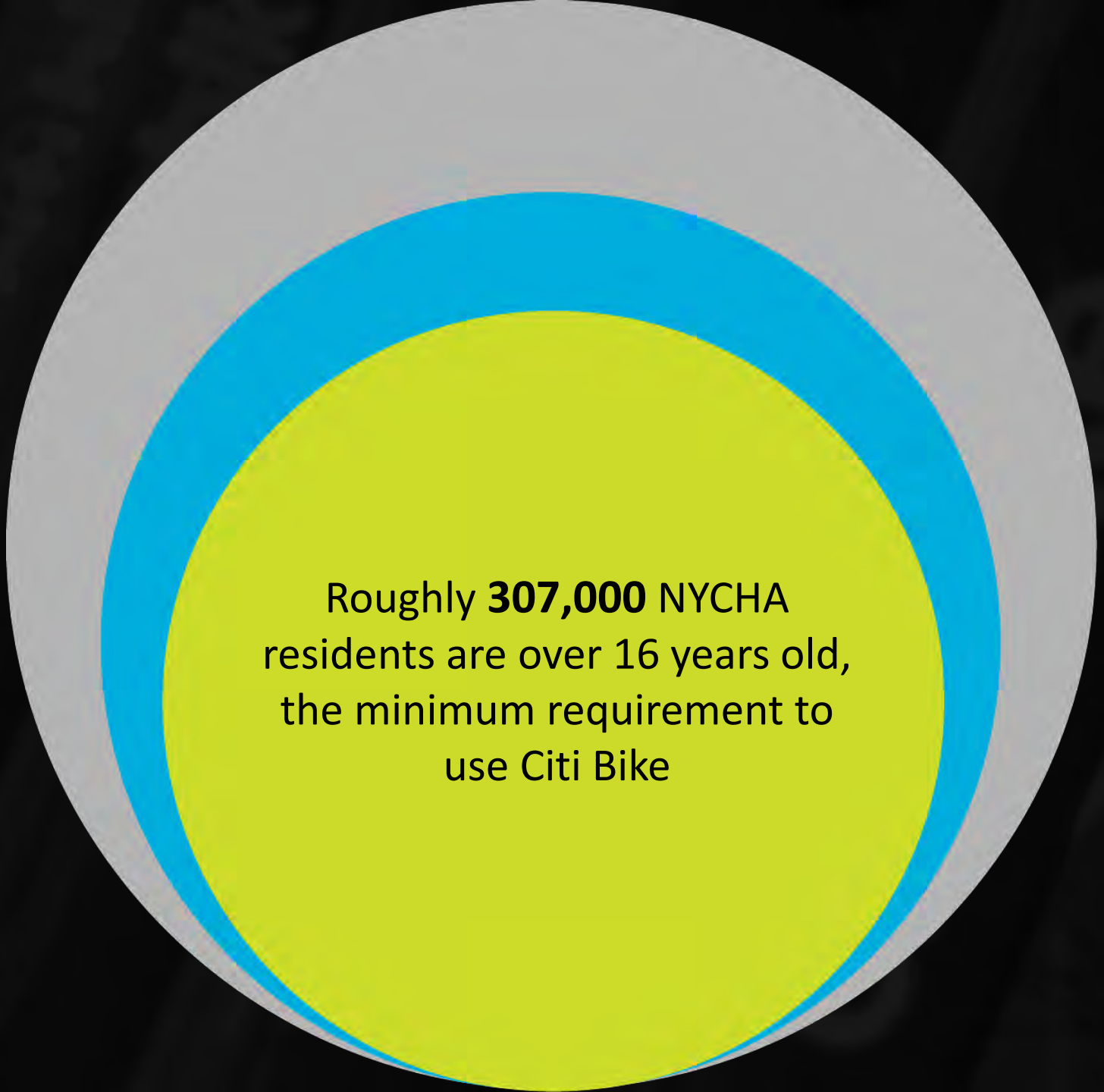
Who lives in NYCHA?

NYCHA's official population is about

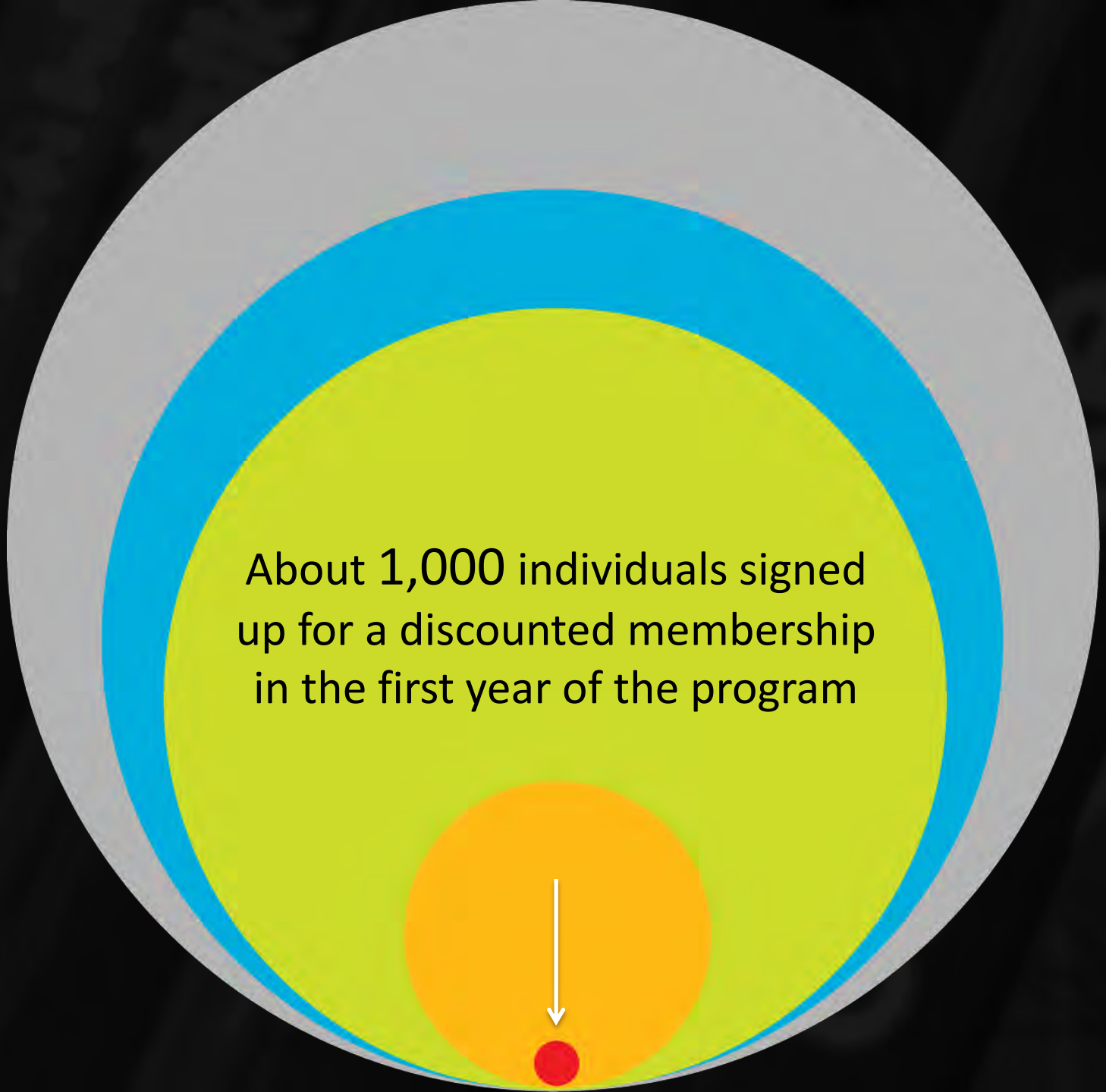
403,000

Experts think there are around **200,000** people living “off lease” in NYCHA, bringing the total population closer to **600,000**

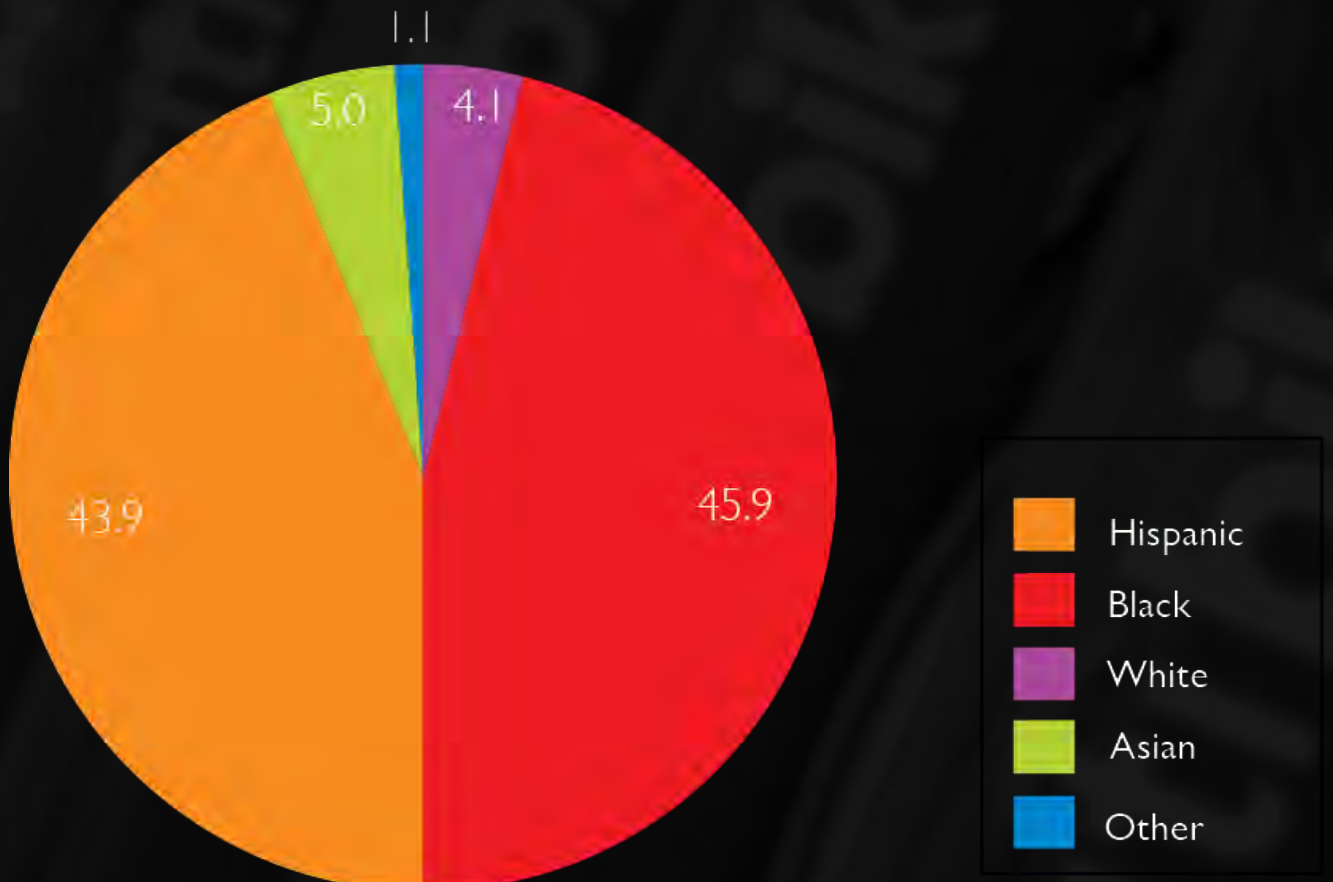
Only people on NYCHA leases qualify for Citi Bike's annual membership discount*


Roughly **307,000** NYCHA residents are over 16 years old, the minimum requirement to use Citi Bike


48,000 residents live ¼ mile walk of Citi Bike


About 1,000 individuals signed up for a discounted membership in the first year of the program

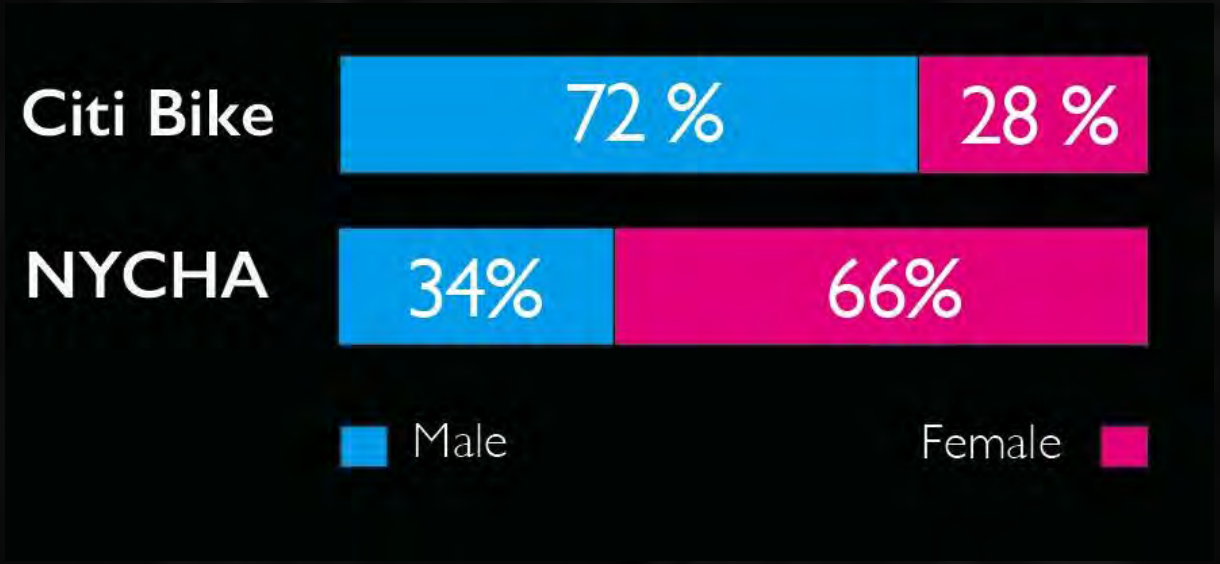
Race + Ethnicity



Source: Special Tabulation of Resident Characteristics 2013

Gender

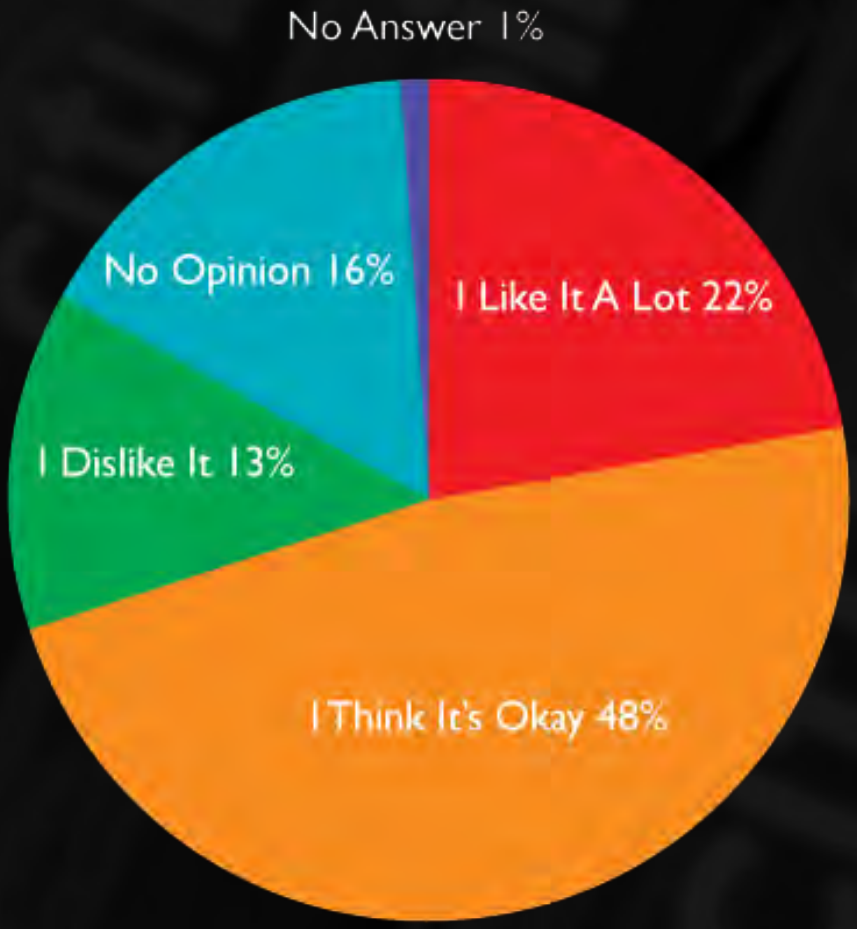
Citi Bike Members vs. Eligible NYCHA Residents



Survey Findings

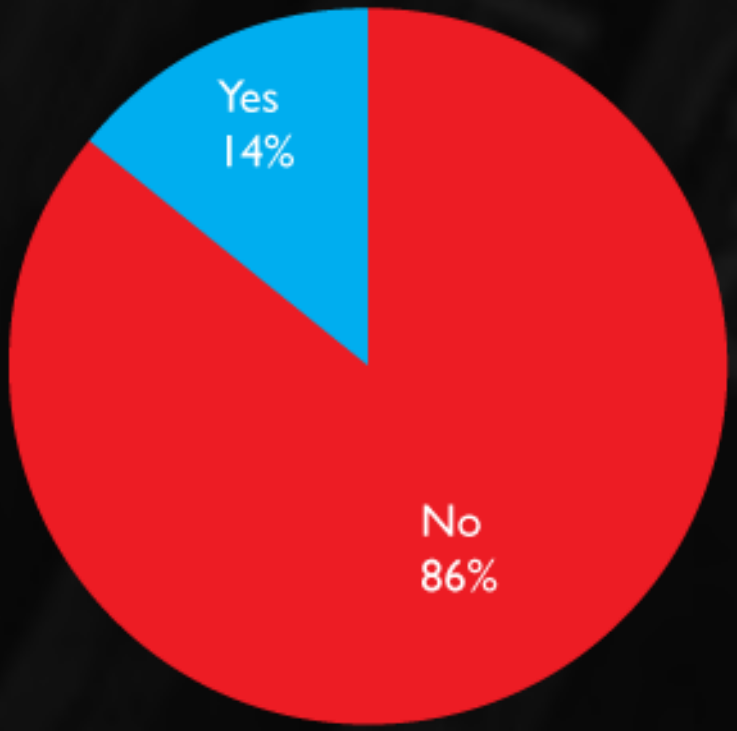
Opinions

What's your opinion of the Citi Bike Program?



Experiences

Have you tried Citi Bike?



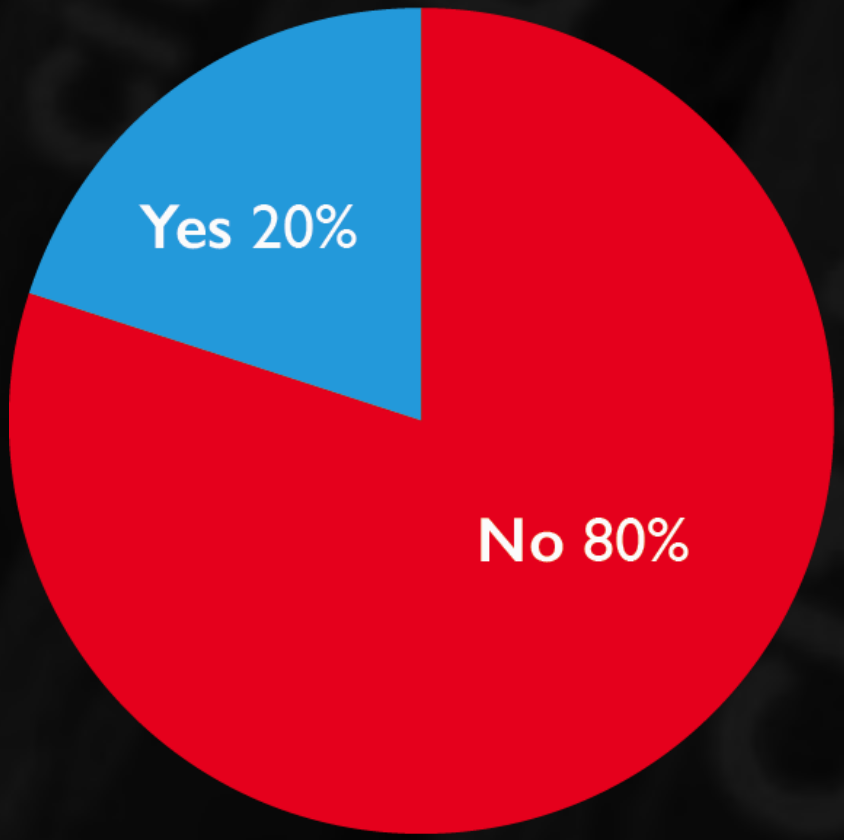
Have you considered joining?

Experiences

What did you use Citi Bike for?

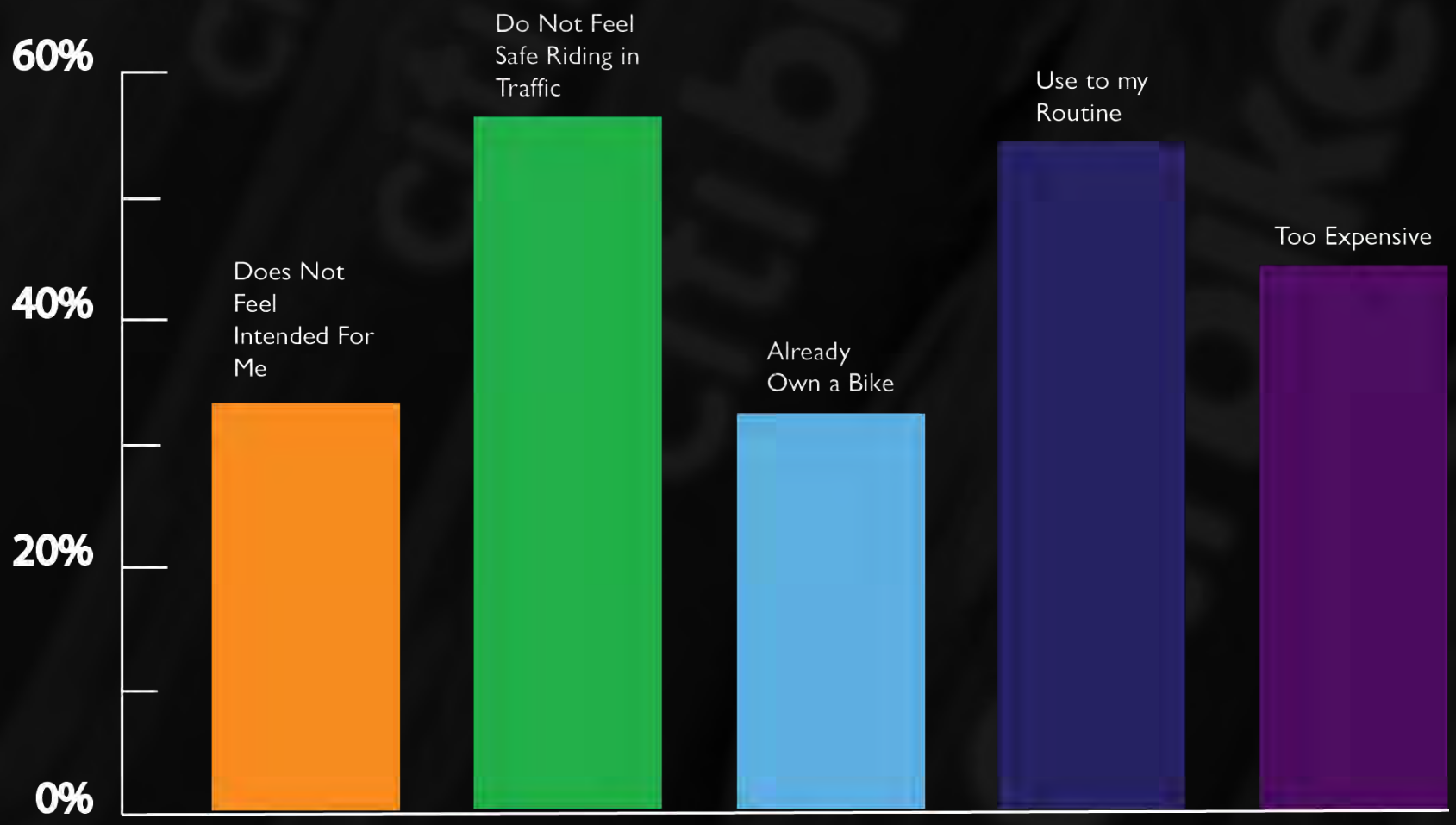
Knowledge

Did you know there was a discount for NYCHA residents?



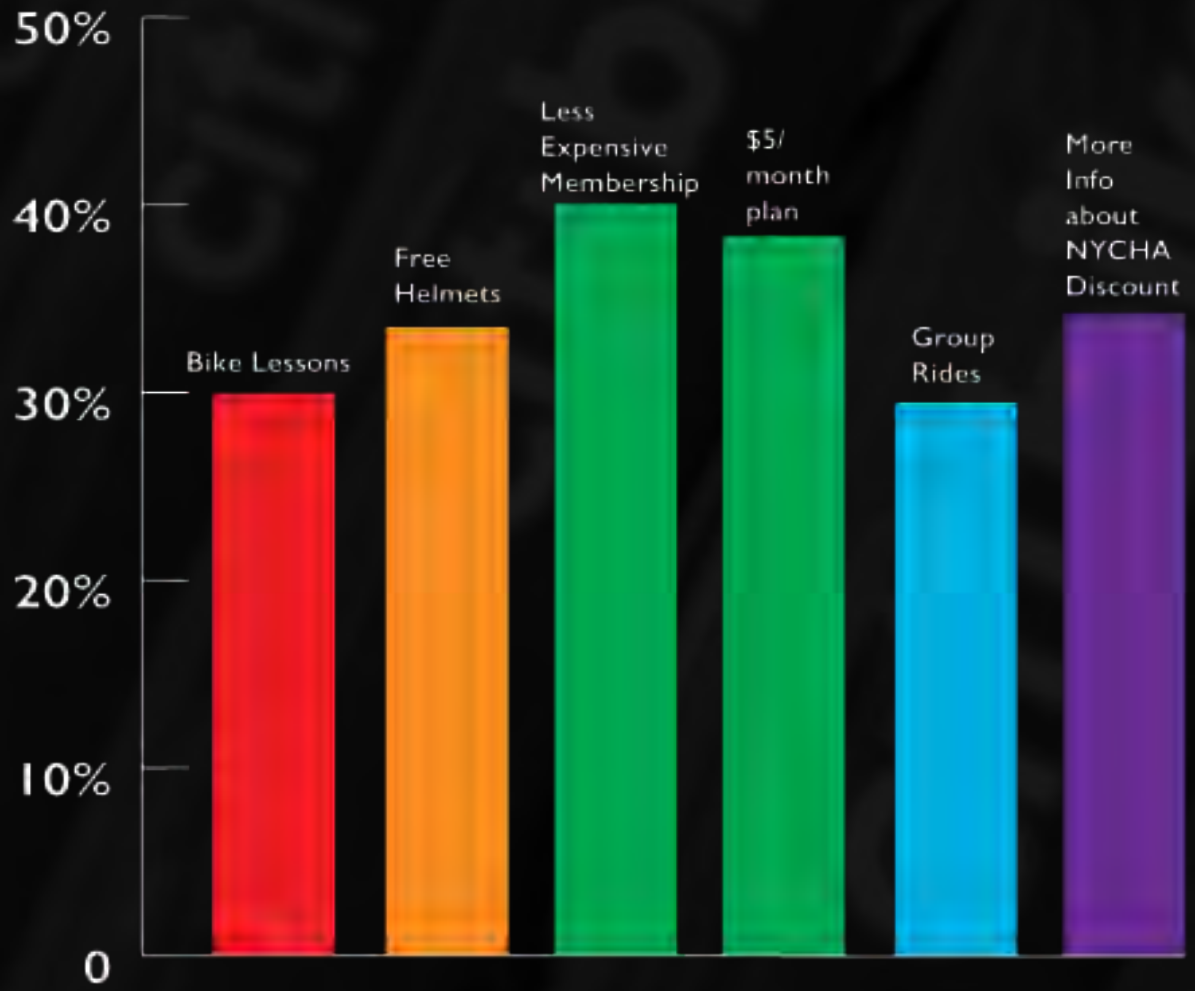
Obstacles

Why Have You Not Used Citi Bike?



Improvements

What Would It Take to Get You on a Citi Bike?



Take Aways and Recommendations

- Create accessible / relatable advertisements and program information.
- Allow for payment in installments
- Provide cycling groups and lessons
- Work with communities to develop equity measures that address their needs
- Employ or work with community champions
- Create a NYCHA working group to understand what is and is not working

Ammonia Toxicity Calculator

Interactive Web Application using R & Shiny

3/8/2017

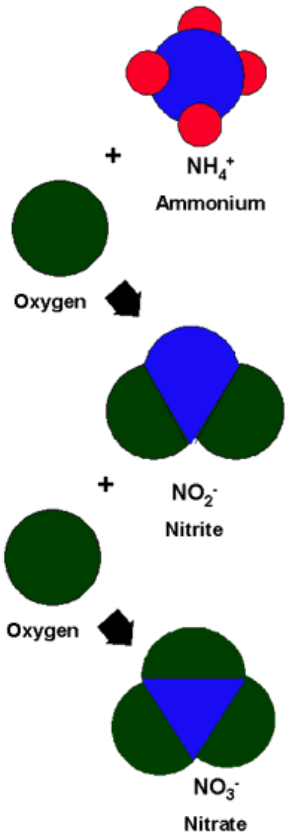
PHILADELPHIA WATER DEPARTMENT

PHILADELPHIA WATER DEPARTMENT

1. Background
2. Calculation spreadsheet
3. PWD Shiny Web Application

Background – Ammonia in Water

NBOD



(1mg/L TKN ~ 4.57 mg/L NBOD)

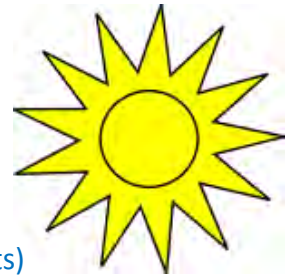
Nutrient

+

P

Si

(other nutrients)



Algae Bloom

Toxicant

(un-ionized NH_3)

Aquatic Life Impacts

Background

USEPA Ammonia Water Quality Criteria Update

- Toxicity is function of pH and temperature
- ↑pH | ↑temperature = ↑toxicity

Problem - pH of mixture of two flows cannot be solved as simple average (mass balance)

- Carbonate buffering system
- Inorganic carbon equilibrium chemistry

Problem Statement

Stakeholders need a commonly understood method for evaluating ammonia criteria under proposed implementation policy conditions (*i.e.*, varying temperature, pH and alkalinity)

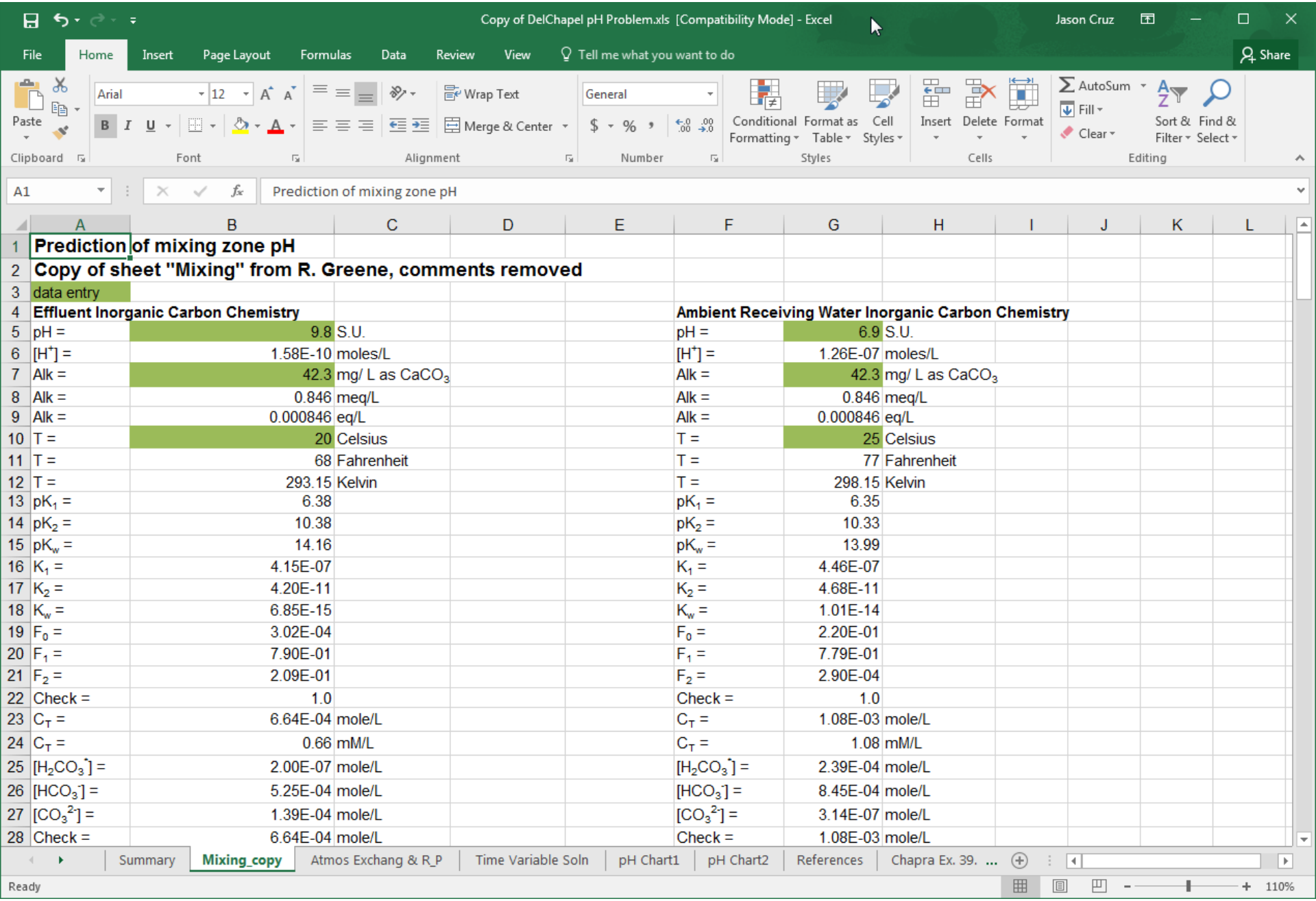
DNREC pH Calculation Spreadsheet

Calculations Developed by Rick Greene (DNREC) for 2006 contaminated groundwater study

Inputs (each flow):

- Temperature
- Alkalinity
- pH
- Proportion of total flow (dilution)

pH solved iteratively- 4th order polynomial in [H+]


Copy of DelChapel pH Problem.xls [Compatibility Mode] - Excel
Jason Cruz
File Home Insert Page Layout Formulas Data Review View Tell me what you want to do Share
Paste Arial 12 Wrap Text General Conditional Formatting Format as Table Cell Styles Insert Delete Format AutoSum Fill Clear Sort & Filter Find & Select
Clipboard Font Alignment Number Styles Cells Editing
A1 Prediction of mixing zone pH
Prediction of mixing zone pH
Copy of sheet "Mixing" from R. Greene, comments removed
data entry
Effluent Inorganic Carbon Chemistry
Ambient Receiving Water Inorganic Carbon Chemistry
pH = 9.8 S.U.
[H+] = 1.58E-10 moles/L
Alk = 42.3 mg/ L as CaCO3
Alk = 0.846 meq/L
Alk = 0.000846 eq/L
T = 20 Celsius
T = 68 Fahrenheit
T = 293.15 Kelvin
pK1 = 6.38
pK2 = 10.38
pKw = 14.16
K1 = 4.15E-07
K2 = 4.20E-11
Kw = 6.85E-15
F0 = 3.02E-04
F1 = 7.90E-01
F2 = 2.09E-01
Check = 1.0
CT = 6.64E-04 mole/L
CT = 0.66 mM/L
[H2CO3*] = 2.00E-07 mole/L
[HCO3-] = 5.25E-04 mole/L
[CO3 2-] = 1.39E-04 mole/L
Check = 6.64E-04 mole/L
pH = 6.9 S.U.
[H+] = 1.26E-07 moles/L
Alk = 42.3 mg/ L as CaCO3
Alk = 0.846 meq/L
Alk = 0.000846 eq/L
T = 25 Celsius
T = 77 Fahrenheit
T = 298.15 Kelvin
pK1 = 6.35
pK2 = 10.33
pKw = 13.99
K1 = 4.46E-07
K2 = 4.68E-11
Kw = 1.01E-14
F0 = 2.20E-01
F1 = 7.79E-01
F2 = 2.90E-04
Check = 1.0
CT = 1.08E-03 mole/L
CT = 1.08 mM/L
[H2CO3*] = 2.39E-04 mole/L
[HCO3-] = 8.45E-04 mole/L
[CO3 2-] = 3.14E-07 mole/L
Check = 1.08E-03 mole/L
Summary Mixing_copy Atmos Exchang & R_P Time Variable Soln pH Chart1 pH Chart2 References Chapra Ex. 39. ...
Ready 110%

Spreadsheet Shortcomings

Seven inputs, more than 30 intermediate unit conversions, constants and calculations

Individual calculations are simple but keeping track of cells, versions of spreadsheet for different scenarios is cumbersome

Excel is “stateful”, not very reproducible making it hard to share and validate data


SCIENCE CAT SAYS
MILK
WRITE SHIT DOWN
memegenerator.net

PWD Shiny Web Application

Spreadsheet calculations re-written in R

Shiny Web Application Framework (RStudio) used to share R code interactively on the web

No HTML, Javascript or CSS knowledge needed

Reactivity - functions change output on-the-fly based on changes to inputs

Background

USEPA Ammonia Water Quality Criteria Update

- Toxicity is function of pH and temperature
- ↑pH | ↑temperature = ↑toxicity

Problem - pH of mixture of two flows cannot be solved as simple average (mass balance)

- Carbonate buffering system
- Inorganic carbon equilibrium chemistry

PWD Shiny Web Application

Draft version of Shiny app shared here:

http://104.236.74.130/shiny/ammonia/

Stack: Digital Ocean – VM host

OS – Ubuntu 16.04LTS

Web Server – NGINX

Applications – R, Shiny Server Open Source

References

- http://deanattali.com/2015/05/09/setup-rstudio-shiny-server-digital-ocean/
- R Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/
- USEPA 2013 Freshwater Ammonia Toxicity Criteria
- Winston Chang, Joe Cheng, JJ Allaire, Yihui Xie and Jonathan McPherson (2017). Shiny: Web Application Framework for R. R package version 1.0.0. https://CRAN.R-project.org/package=shiny
- *pH calculation was based on a spreadsheet created by Rick Greene (DNREC) for solving the pH of two flows.*

Assessing Performance of Philadelphia's GSI

gSIM.db: A shiny-based R analysis tool

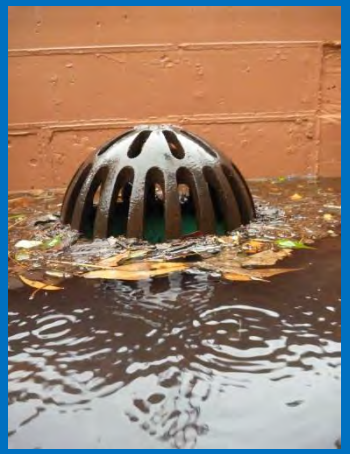
3/8/2017

PHILADELPHIA WATER
EST. 1801

PHILADELPHIA WATER DEPARTMENT

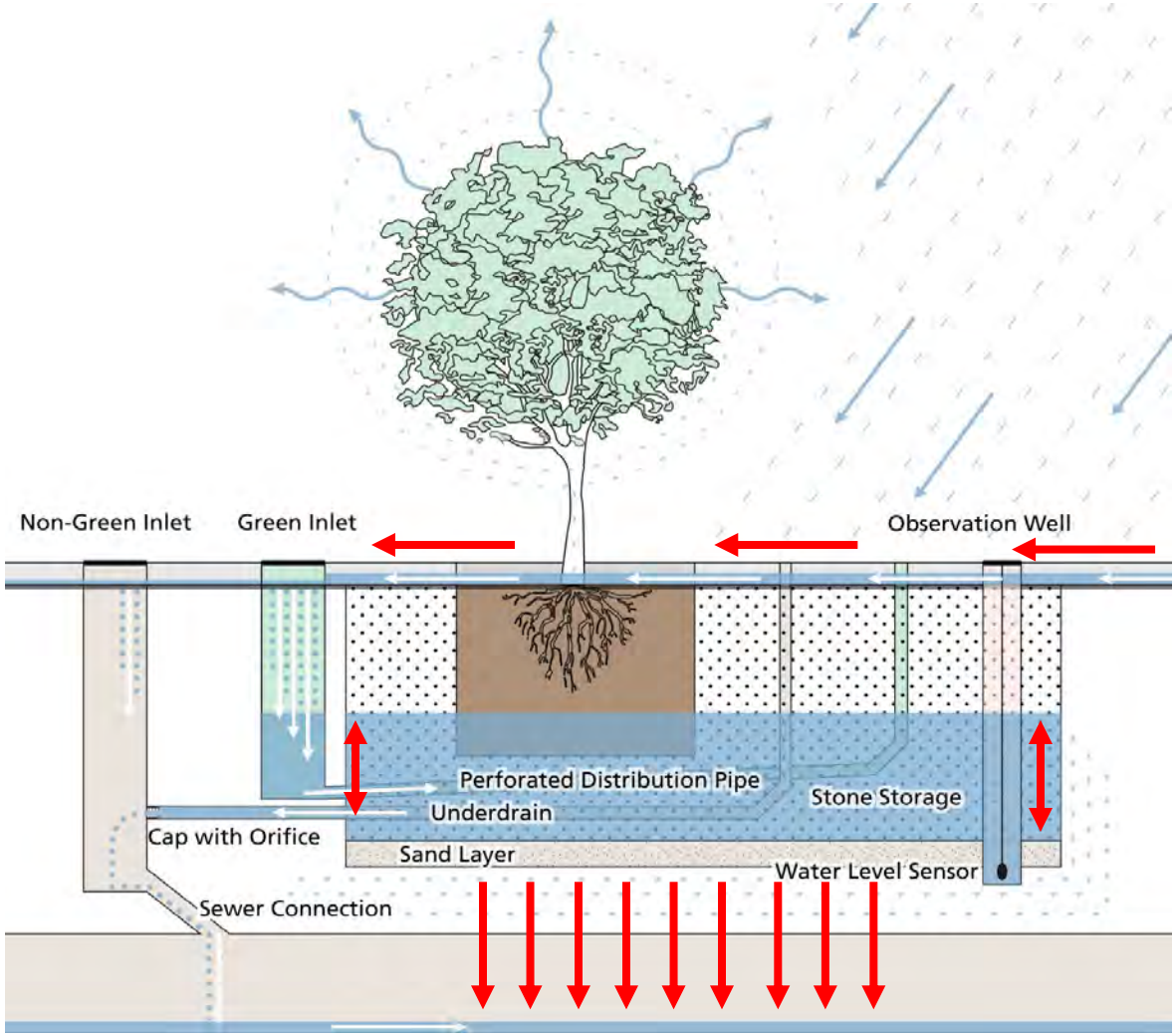
Overview

1. Data Collection
2. Analysis Methods
3. Analysis Tools
4. gSIM.db Tool
5. Results



	2011 to 2015 (4 years)	Sep 2016 to Jan 2017 (5 months)
Projects	28	56
Systems	48	131
Sensors	78	157

Typical Tree Trench: cross section



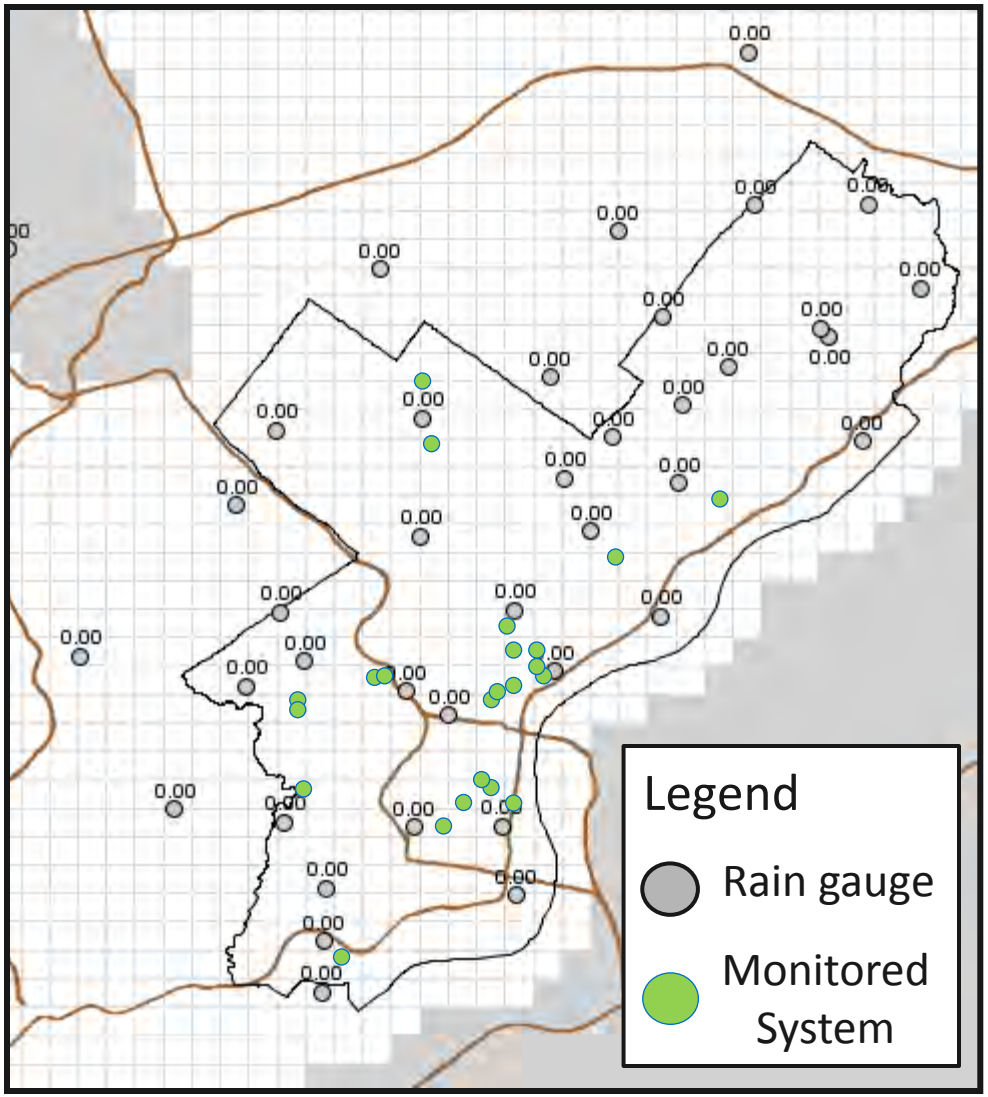
1. Drainage Area
2. Stage-storage Curve
3. Orifice Size & Height
4. Pre-construction Infiltration Rate

Collecting Water Level Data

Rainfall

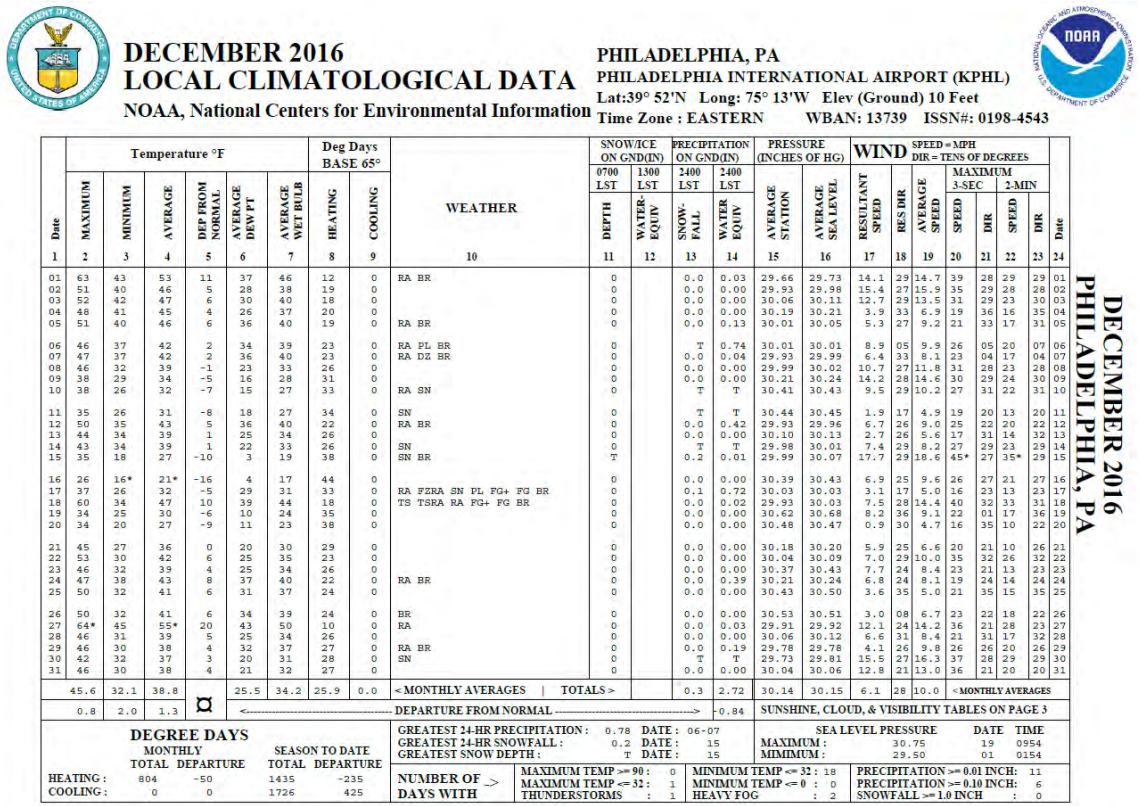
Rain gauge adjusted radar rainfall

- 1 km² grid radar rainfall from Vieux, Inc.
- 35 PWD rain gauges
- 15 minute interval



Snowfall

- NOAA monthly local climatological reports
- PHL airport



DECEMBER 2016
LOCAL CLIMATOLOGICAL DATA
NOAA, National Centers for Environmental Information

PHILADELPHIA, PA
PHILADELPHIA INTERNATIONAL AIRPORT (KPHL)
Lat:39° 52'N Long: 75° 13'W Elev (Ground) 10 Feet
Time Zone : EASTERN WBAN: 13739 ISSN#: 0198-4543

DECEMBER 2016
PHILADELPHIA, PA

Date	Temperature °F MAXIMUM	MINIMUM	AVERAGE	DEP FROM NORMAL	AVERAGE DEW PT	AVERAGE WET BULB	Deg Days BASE 65° HEATING	COOLING	WEATHER	SNOW/ICE ON GND(IN) 0700 LST DEPTH	1300 LST WATER-EQUIV	PRECIPITATION ON GND(IN) 2400 LST SNOW-FALL	2400 LST WATER EQUIV	PRESSURE (INCHES OF HG) AVERAGE STATION	AVERAGE SEA LEVEL	WIND SPEED=MPH DIR=TENS OF DEGREES RESULTANT SPEED	RES DIR	AVERAGE SPEED	MAXIMUM 3-SEC SPEED	3-SEC DIR	2-MIN SPEED	2-MIN DIR	Date
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
01	63	43	53	11	37	46	12	0	RA BR	0		0.0	0.03	29.66	29.73	14.1	29	14.7	39	28	29	29	01
02	51	40	46	5	28	38	19	0		0		0.0	0.00	29.93	29.98	15.4	27	15.9	35	29	28	28	02
03	52	42	47	6	30	40	18	0		0		0.0	0.00	30.06	30.11	12.7	29	13.5	31	29	23	30	03
04	48	41	45	4	26	37	20	0		0		0.0	0.00	30.19	30.21	3.9	33	6.9	19	36	16	35	04
05	51	40	46	6	36	40	19	0	RA BR	0		0.0	0.13	30.01	30.05	5.3	27	9.2	21	33	17	31	05
06	46	37	42	2	34	39	23	0	RA PL BR	0		T	0.74	30.01	30.01	8.9	05	9.9	26	05	20	07	06
07	47	37	42	2	36	40	23	0	RA DZ BR	0		0.0	0.04	29.93	29.99	6.4	33	8.1	23	04	17	04	07
08	46	32	39	-1	23	33	26	0		0		0.0	0.00	29.99	30.02	10.7	27	11.8	31	28	23	28	08
09	38	29	34	-5	16	28	31	0		0		0.0	0.00	30.21	30.24	14.2	28	14.6	30	29	24	30	09
10	38	26	32	-7	15	27	33	0	RA SN	0		T	T	30.41	30.43	9.5	29	10.2	27	31	22	31	10
11	35	26	31	-8	18	27	34	0	SN	0		T	T	30.44	30.45	1.9	17	4.9	19	20	13	20	11
12	50	35	43	5	36	40	22	0	RA BR	0		0.0	0.42	29.93	29.96	6.7	26	9.0	25	22	20	22	12
13	44	34	39	1	25	34	26	0		0		0.0	0.00	30.10	30.13	2.7	26	5.6	17	31	14	32	13
14	43	34	39	1	22	33	26	0	SN	0		T	T	29.98	30.01	7.4	29	8.2	27	29	23	29	14
15	35	18	27	-10	3	19	38	0	SN BR	T		0.2	0.01	29.99	30.07	17.7	29	18.6	45*	27	35*	29	15
16	26	16*	21*	-16	4	17	44	0		0		0.0	0.00	30.39	30.43	6.9	25	9.6	26	27	21	27	16
17	37	26	32	-5	29	31	33	0	RA FZRA SN PL FG+ FG BR	0		0.1	0.72	30.03	30.03	3.1	17	5.0	16	23	13	23	17
18	60	34	47	10	39	44	18	0	TS TSRA RA FG+ FG BR	0		0.0	0.02	29.93	30.03	7.5	28	14.4	40	32	33	31	18
19	34	25	30	-6	10	24	35	0		0		0.0	0.00	30.62	30.68	8.2	36	9.1	22	01	17	36	19
20	34	20	27	-9	11	23	38	0		0		0.0	0.00	30.48	30.47	0.9	30	4.7	16	35	10	22	20
21	45	27	36	0	20	30	29	0		0		0.0	0.00	30.18	30.20	5.9	25	6.6	20	21	10	26	21
22	53	30	42	6	25	35	23	0		0		0.0	0.00	30.04	30.09	7.0	29	10.0	35	32	26	32	22
23	46	32	39	4	25	34	26	0		0		0.0	0.00	30.37	30.43	7.7	24	8.4	23	21	13	23	23
24	47	38	43	8	37	40	22	0	RA BR	0		0.0	0.39	30.21	30.24	6.8	24	8.1	19	24	14	24	24
25	50	32	41	6	31	37	24	0		0		0.0	0.00	30.43	30.50	3.6	35	5.0	21	35	15	35	25
26	50	32	41	6	34	39	24	0	BR	0		0.0	0.00	30.53	30.51	3.0	08	6.7	23	22	18	22	26
27	64*	45	55*	20	43	50	10	0	RA	0		0.0	0.03	29.91	29.92	12.1	24	14.2	36	21	28	23	27
28	46	31	39	5	25	34	26	0		0		0.0	0.00	30.06	30.12	6.6	31	8.4	21	31	17	32	28
29	46	30	38	4	32	37	27	0	RA BR	0		0.0	0.19	29.78	29.78	4.1	26	9.8	26	26	20	26	29
30	42	32	37	3	20	31	28	0	SN	0		T	T	29.73	29.81	15.5	27	16.3	37	28	29	29	30
31	46	30	38	4	21	32	27	0		0		0.0	0.00	30.04	30.06	12.8	21	13.0	36	21	20	20	31
	45.6	32.1	38.8		25.5	34.2	25.9	0.0	<MONTHLY AVERAGES | TOTALS>			0.3	2.72	30.14	30.15	6.1	28	10.0	<MONTHLY AVERAGES				
	0.8	2.0	1.3	¤	<---------- DEPARTURE FROM NORMAL ---------->								-0.84	SUNSHINE, CLOUD, & VISIBILITY TABLES ON PAGE 3								

DEGREE DAYS

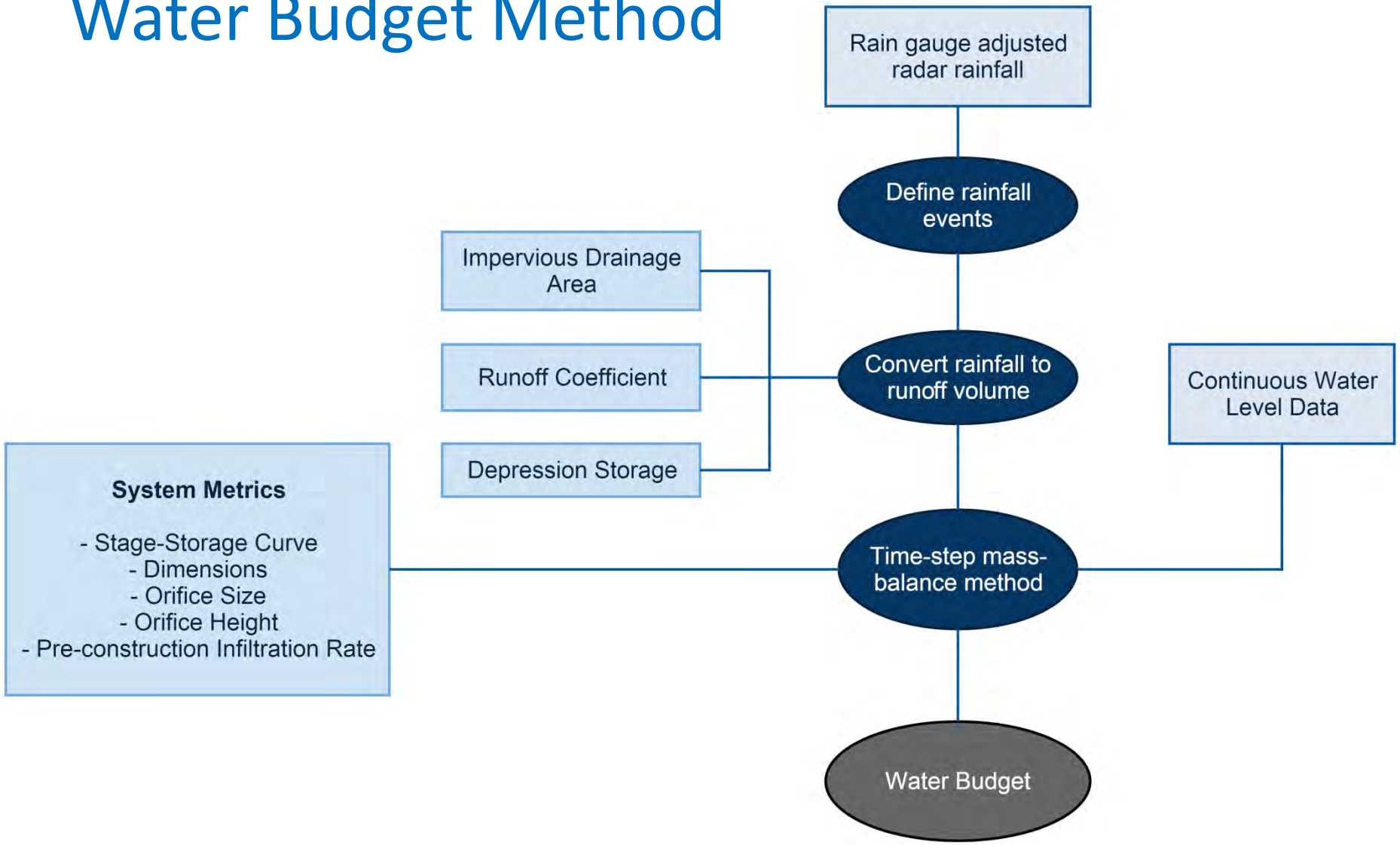
	MONTHLY TOTAL	MONTHLY DEPARTURE	SEASON TO DATE TOTAL	SEASON TO DATE DEPARTURE
HEATING :	804	-50	1435	-235
COOLING :	0	0	1726	425

GREATEST 24-HR PRECIPITATION : 0.78 DATE : 06-07
GREATEST 24-HR SNOWFALL : 0.2 DATE : 15
GREATEST SNOW DEPTH : T DATE : 15

SEA LEVEL PRESSURE — DATE — TIME
MAXIMUM : 30.75 19 0954
MIMIMUM : 29.50 01 0154

NUMBER OF DAYS WITH
MAXIMUM TEMP >= 90 : 0
MAXIMUM TEMP <= 32 : 1
THUNDERSTORMS : 1
MINIMUM TEMP <= 32 : 18
MINIMUM TEMP <= 0 : 0
HEAVY FOG : 2
PRECIPITATION >= 0.01 INCH: 11
PRECIPITATION >= 0.10 INCH: 6
SNOWFALL >= 1.0 INCH : 0

Water Budget Method



Programming

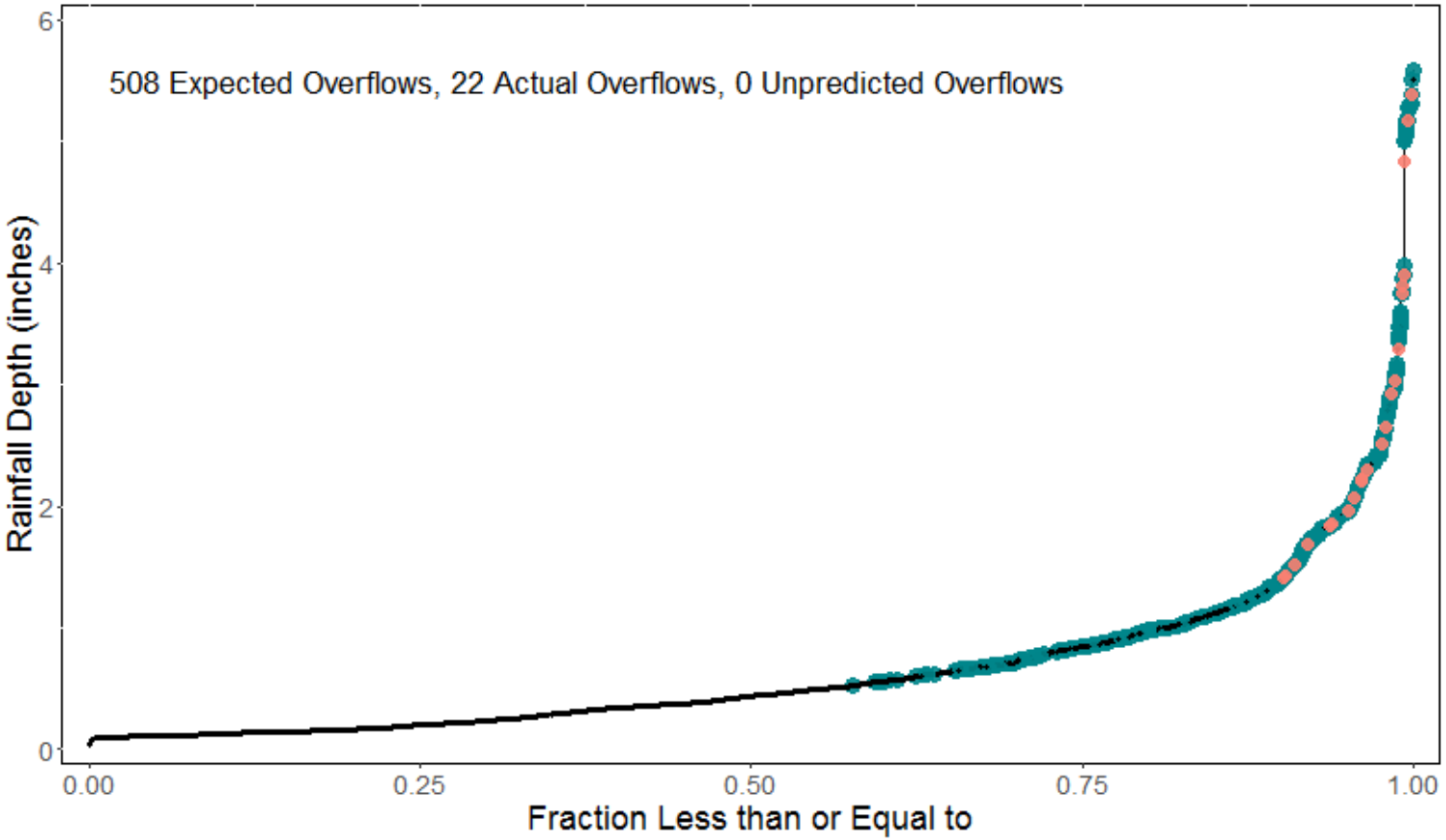
R: Statistical software

Amazon Web Services (AWS): Cloud computing service

GitHub: Online project hosting with revision control and source code management

Take me to the app!

Performance: Overflows

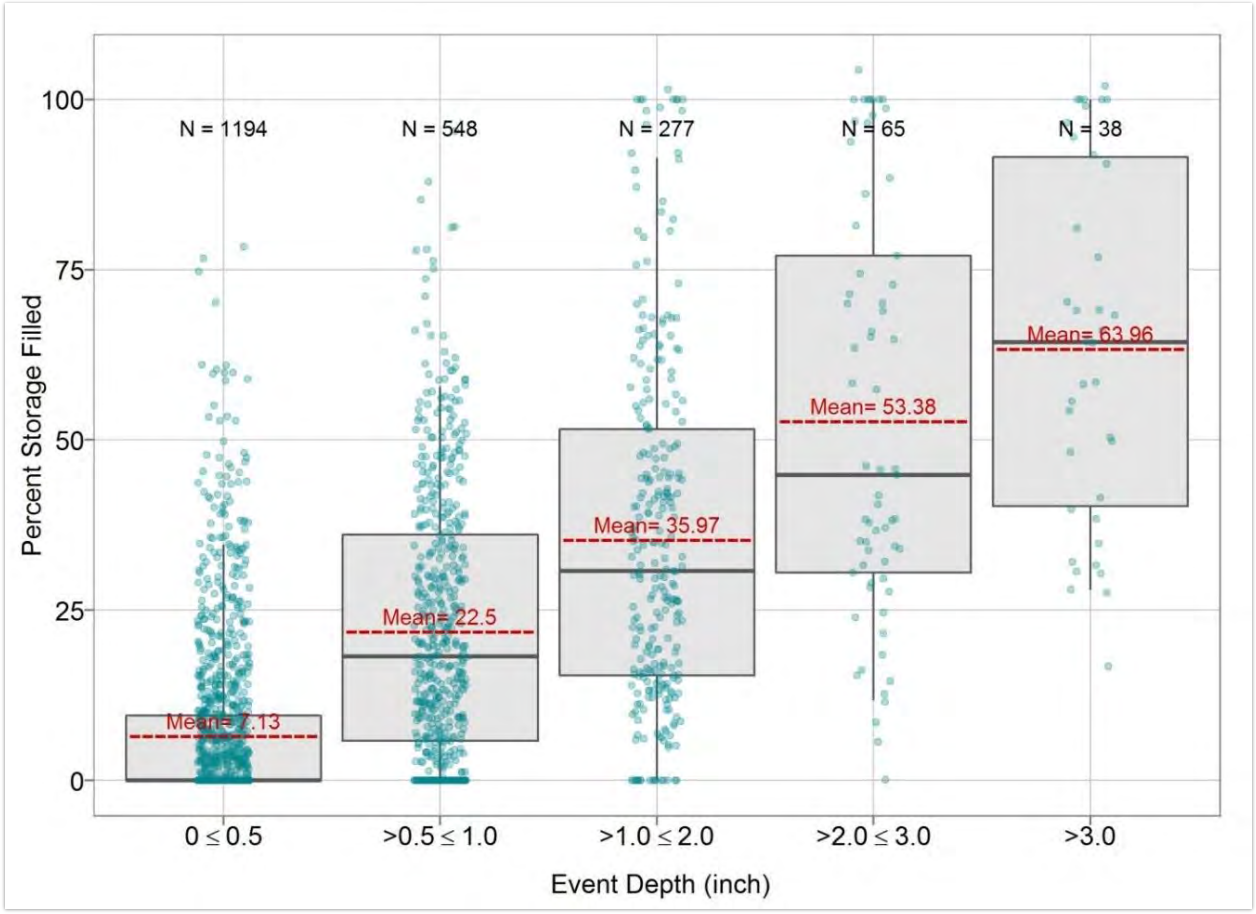


Event

Expected Overflow

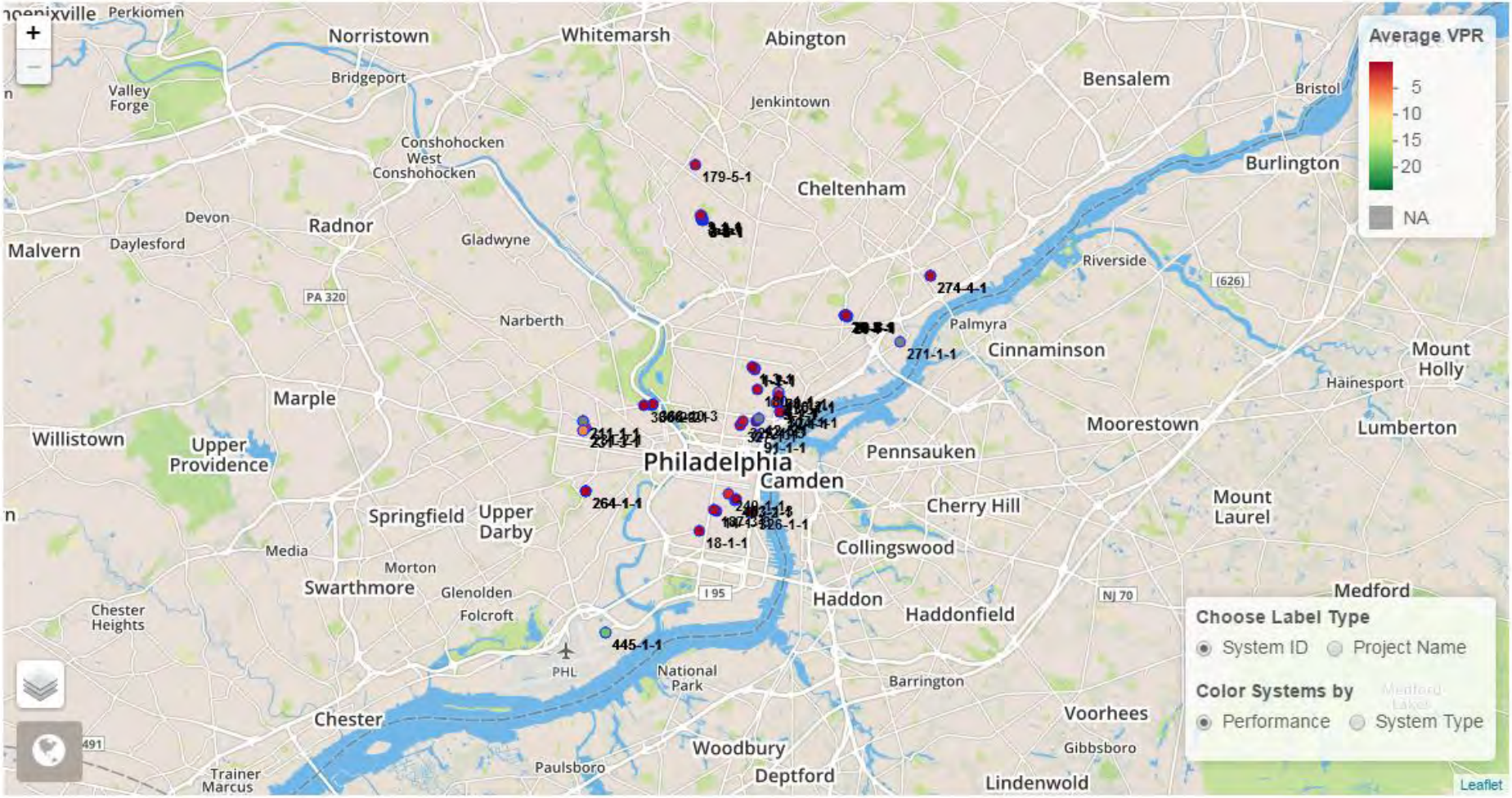
Actual Overflow

Performance: Storage Used



Questions?

Extra Slides


Average VPR
5
10
15
20
NA
Choose Label Type
System ID
Project Name
Color Systems by
Performance
System Type
Leaflet
Norristown
Whitemarsh
Abington
Bensalem
Bristol
Burlington
Jenkintown
Bridgeport
Valley Forge
Conshohocken
West Conshohocken
Cheltenham
Devon
Radnor
Malvern
Daylesford
Gladwyne
Riverside
Palmyra
Cinnaminson
Mount Holly
Hainesport
Lumberton
Moorestown
Narberth
Marple
Willistown
Upper Providence
Philadelphia
Camden
Pennsauken
Springfield
Upper Darby
Cherry Hill
Mount Laurel
Media
Morton
Swarthmore
Glenolden
Folcroft
Collingswood
Haddon
Haddonfield
Medford
Chester Heights
PHL
National Park
Barrington
Chester
Voorhees
Woodbury
Gibbsboro
Deptford
Paulsboro
Trainer
Marcus
Lindenwold
PA 320
I 95
NJ 70
(626)
179-5-1
274-4-1
271-1-1
264-1-1
18-1-1
445-1-1

Select an SMP

396-3-1_ow1 (Connell Park)

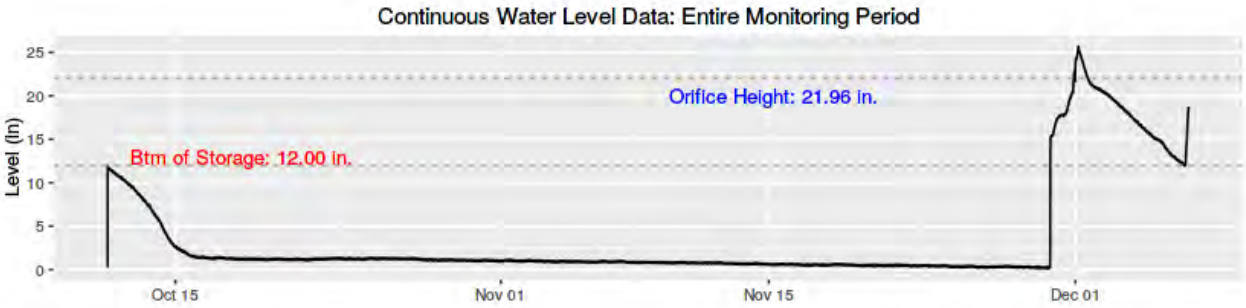
Previous Next

System Metrics

System Type	Tree Trench
System Function	Slow Release (unlined)

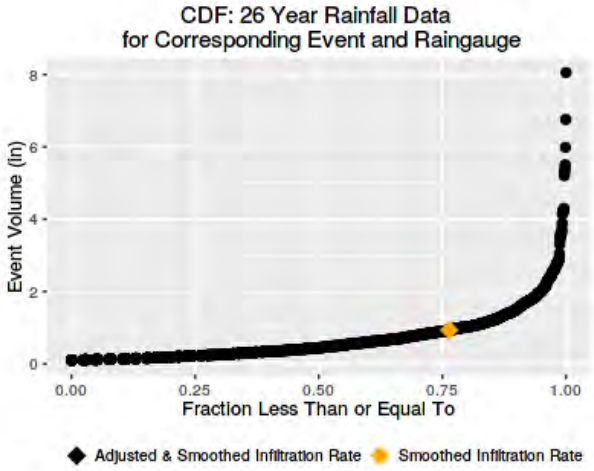
Design Parameters

DCIA (sf)	23,437
Loading Ratio	12.75
Greened Acres (ac-in)	0.89
Infiltration Footprint (sf)	1,838
Storage Footprint (sf)	1,838
Vegetated Footprint (sf)	0
Ponded Volume (cf)	0
Soil Volume (cf)	0
Total Volume (cf)	3,229
Maximum System Depth (ft)	4.00
Infiltration Rate (in/hr)	0.00
Credited Storage (in)	1.15
Slow Release Volume (cf)	2244.00
Volume Below Orifice (cf)	985.00
Maximum Head on Orifice (ft)	3.17
Orifice Diameter (in)	0.75
Peak Release Rate (cfs)	0.03



Compliance Event Summary

Event ID	35103
Event Start	2016-11-30 09:00:00
Total Rainfall (in)	0.93
Rainfall Duration (hrs)	19
Peak Intensity (in/hr)	1.01



Recession Event

2016-11-30 09:00

Previous Next

Quality Assurance

Flag

Good

Secondary Flag

None

Recession Event Notes

QA Approved

Compliance Event

Update QA

Event Definition Settings

Significant Rainfall Threshold (in)

0.05

Level Plot | Volume Plot