Reinventing CSO Solutions

City of South Bend, Indiana

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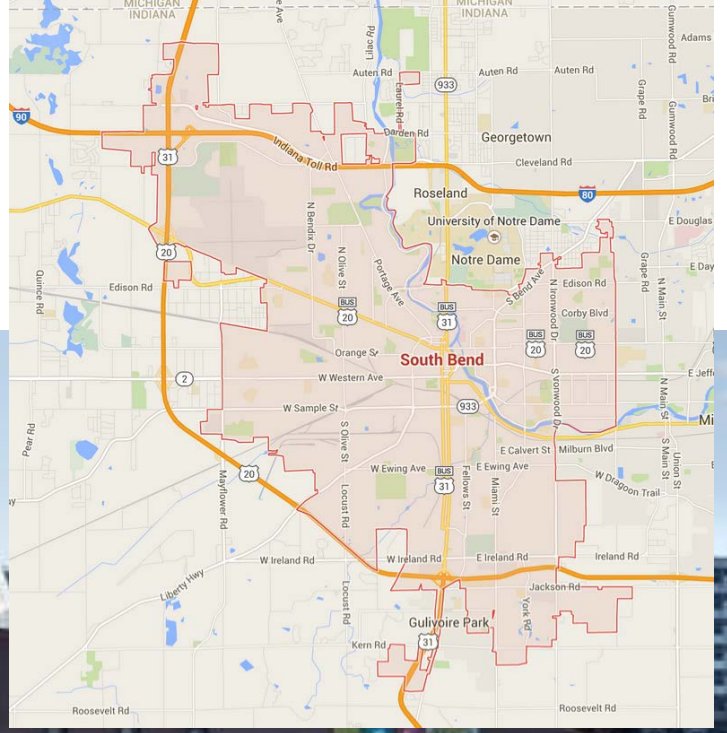
Kieran Fahey
Environmental Scientist
Chartered Engineer

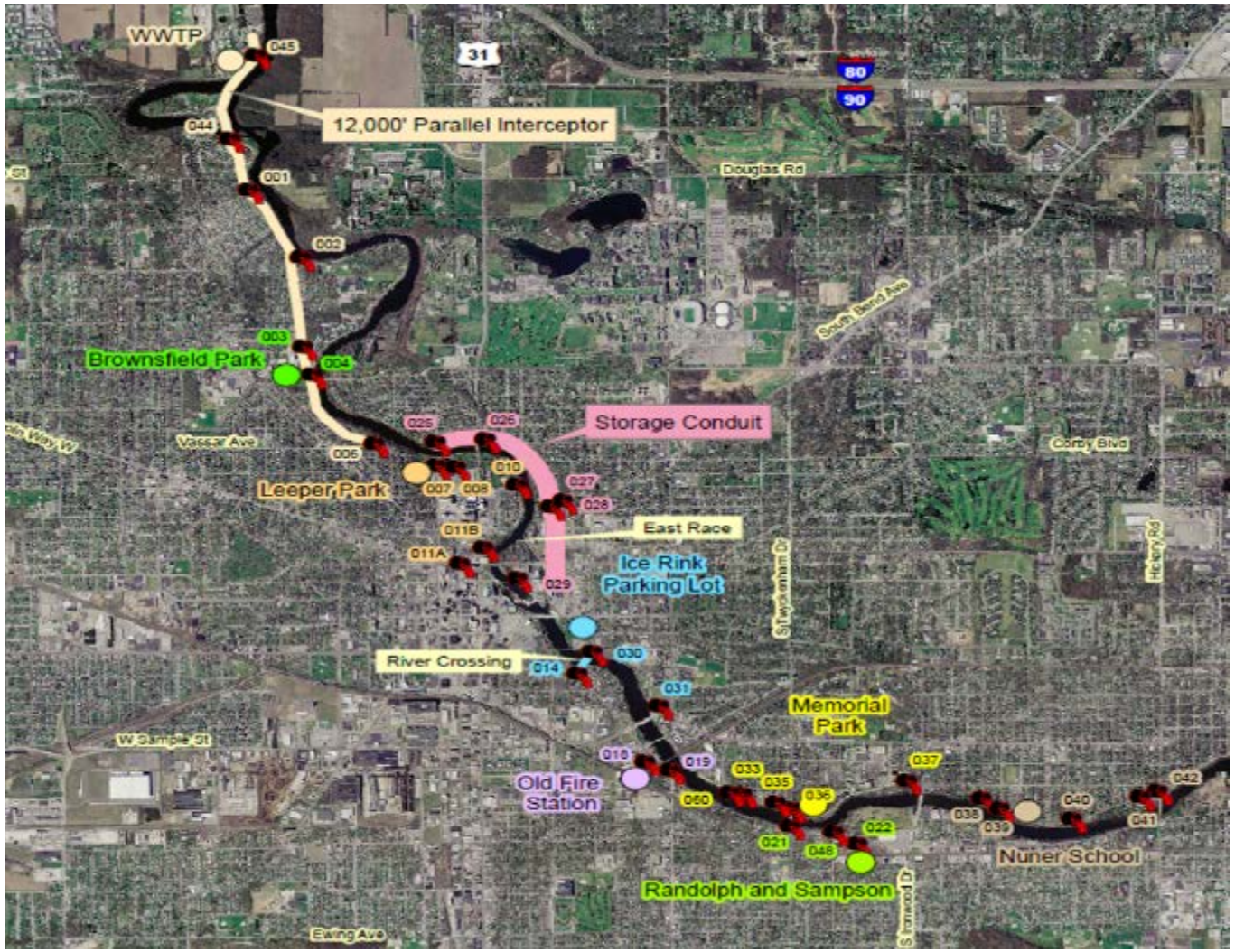
CITY OF SOUTH BEND
PUBLIC WORKS

South Bend, Indiana



Population:	101,516
Established:	1865
Treatment Plants:	1 (70MGal/day)
Outfalls:	35
CSO Overflow:	1-2 BGal/year
Abatement Plan:	$860MM

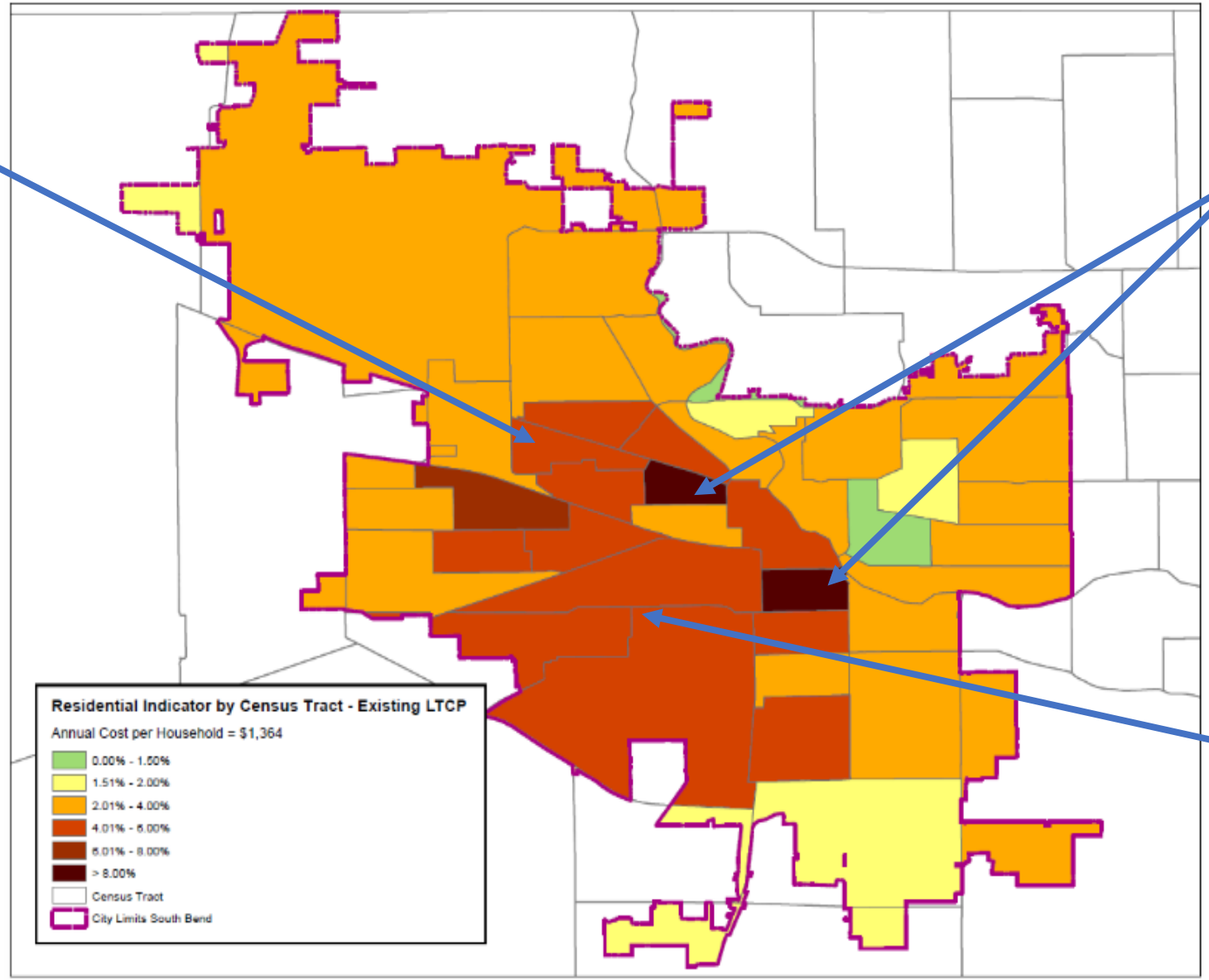
LTCP Phase 2



Phase 2 is an exclusively grey infrastructure approach. Unfortunately no smart or green technology.

- 7 Storage tanks
- 1 Storage conduit
- 1 parallel interceptor

Residential Indicator across South Bend



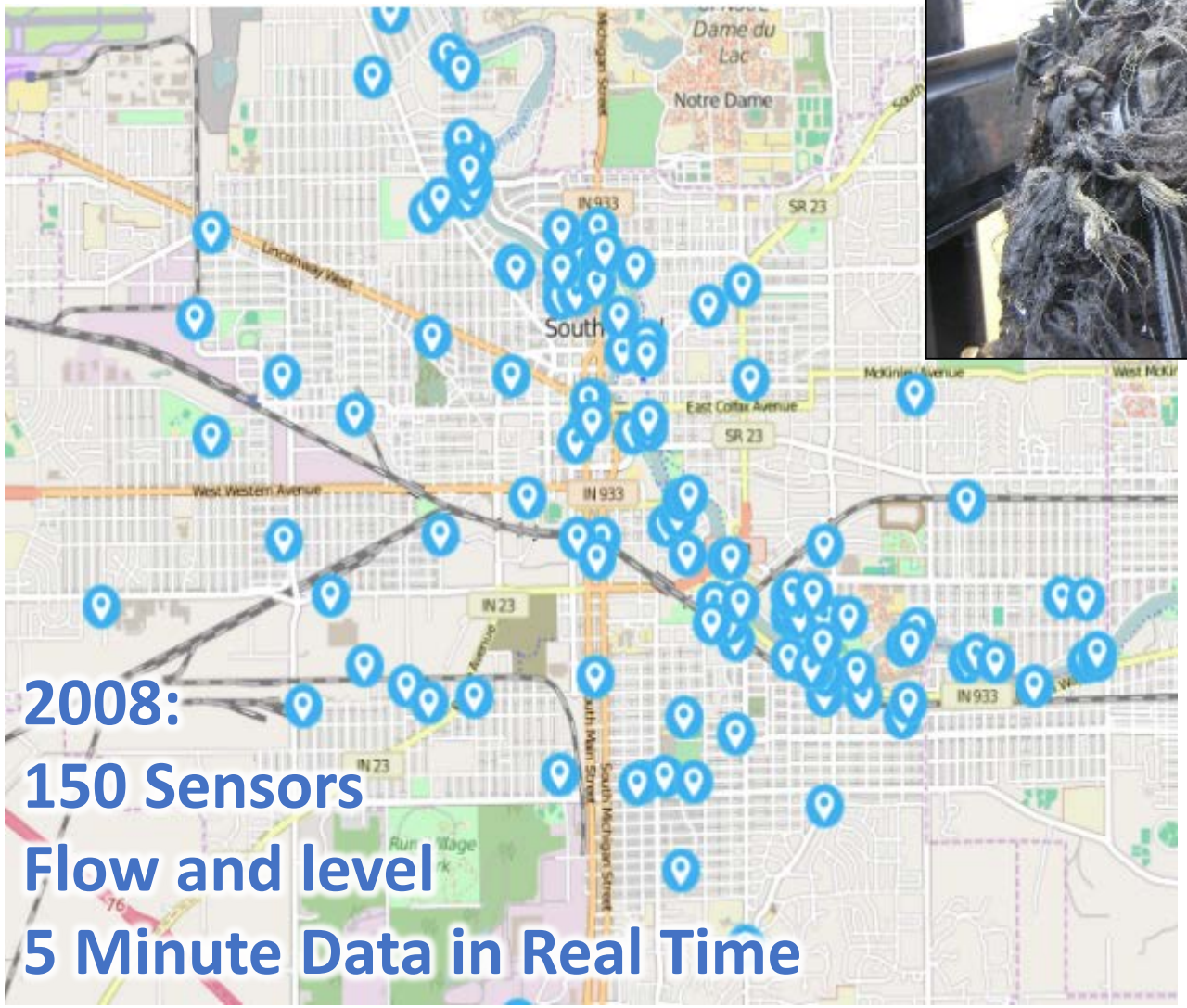
- MHI 35% below National Average
- 1 in 5 Residents over 10% of MHI

Per Capita Income $19K

>20% residents make <$15K

Phase 2 cost $713m. That's $10K for man, woman and child

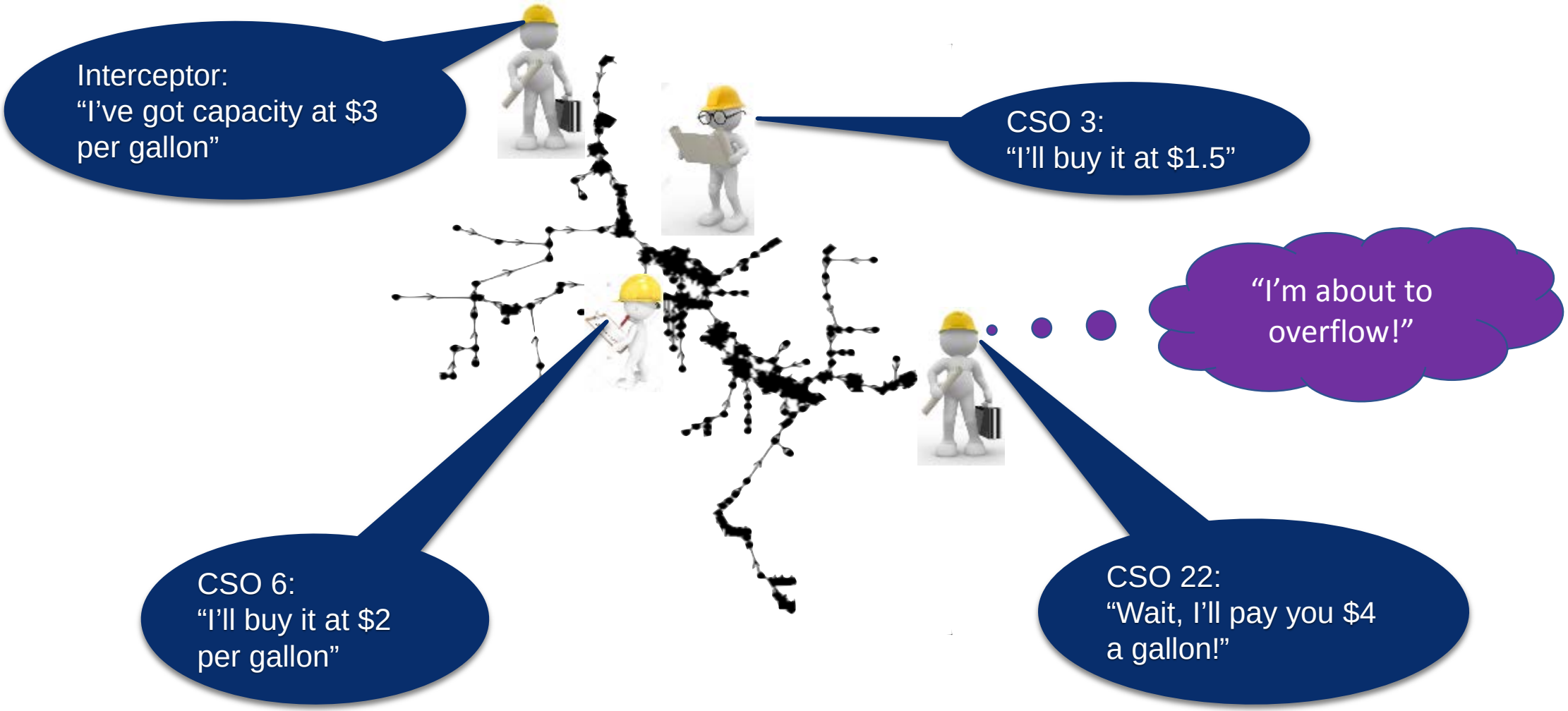
#1 Turn on the lights



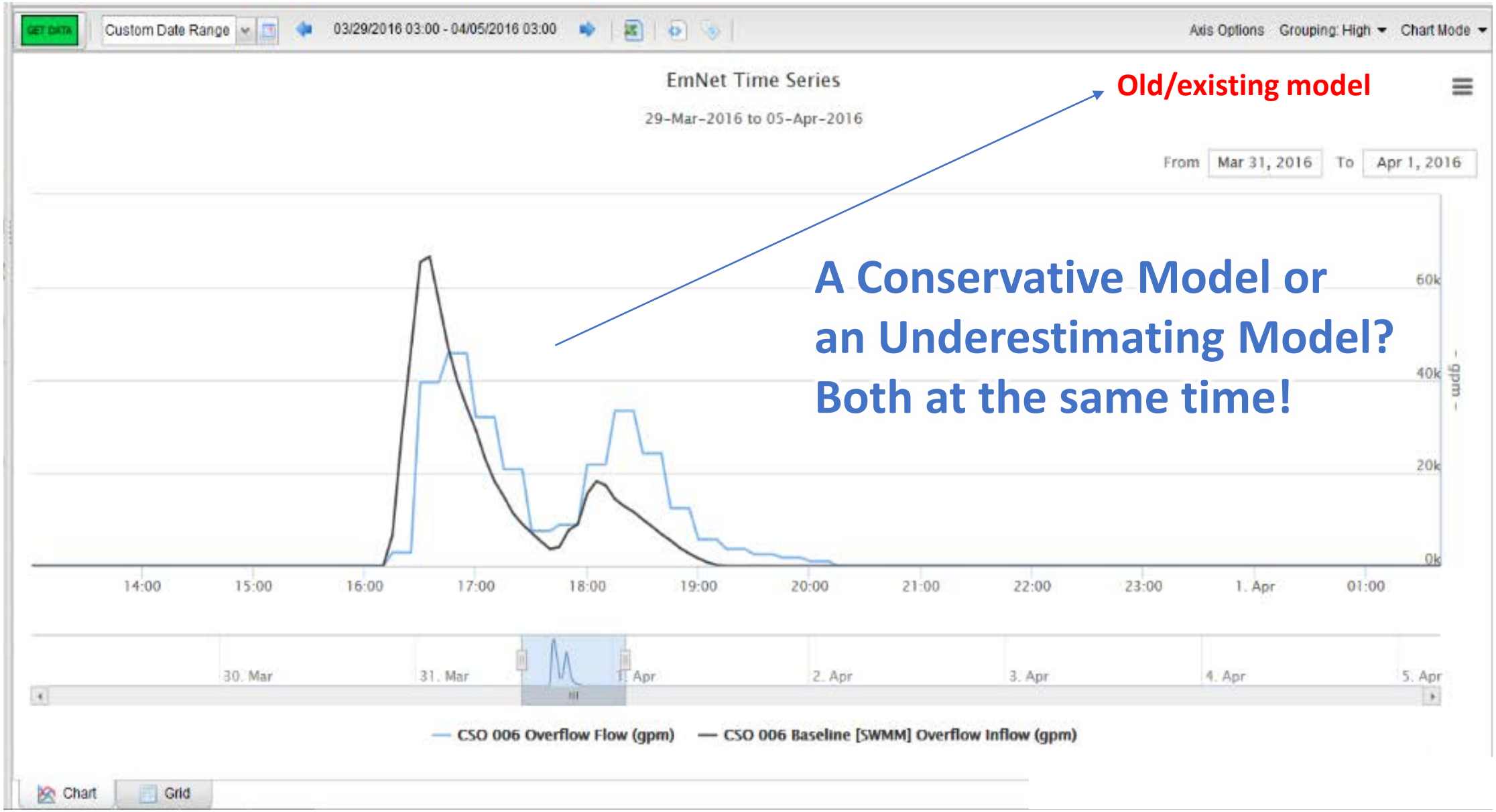
2008:
150 Sensors
Flow and level
5 Minute Data in Real Time

Most densely monitored Sewer System in the World
11,826,000 hours or 1,350 years of data

#2 Operate the Sewershed

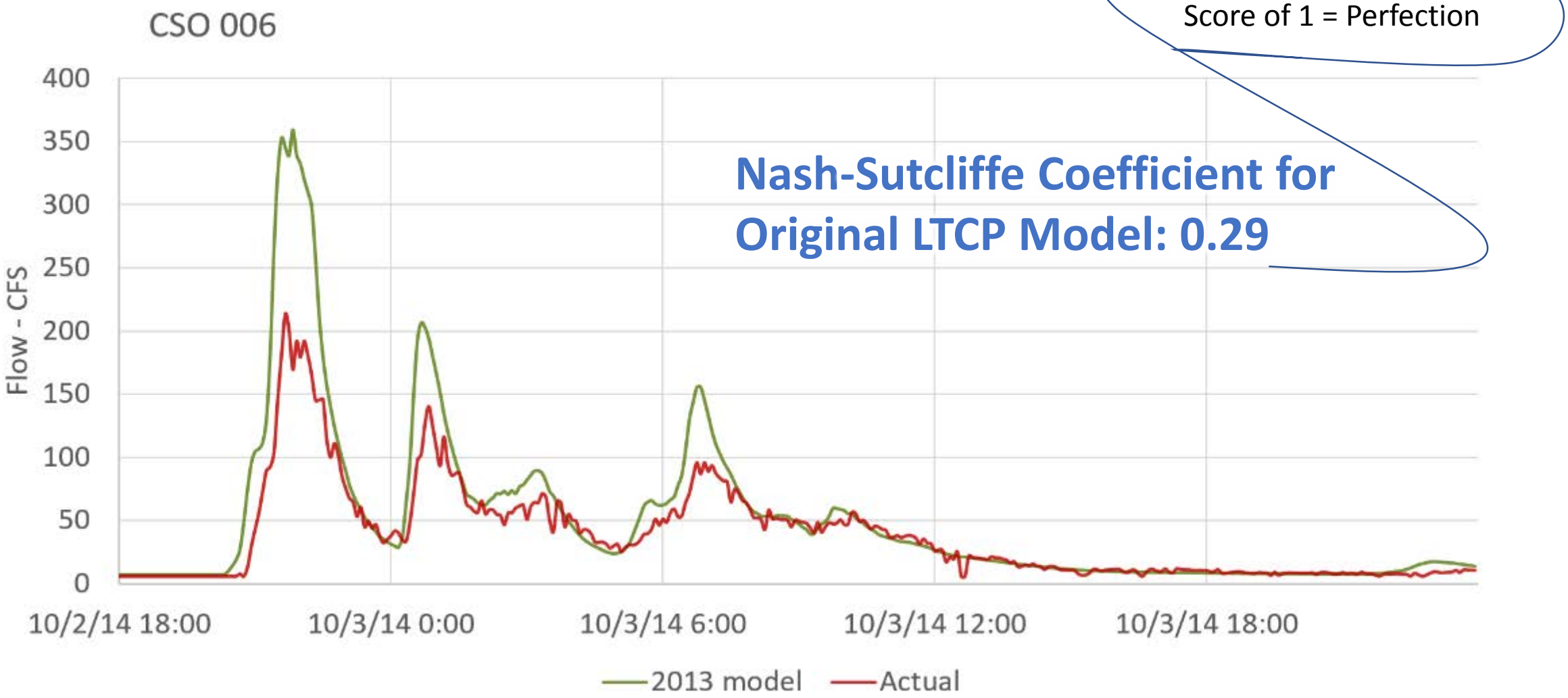


#3 Modeling; the basis of any LTCP



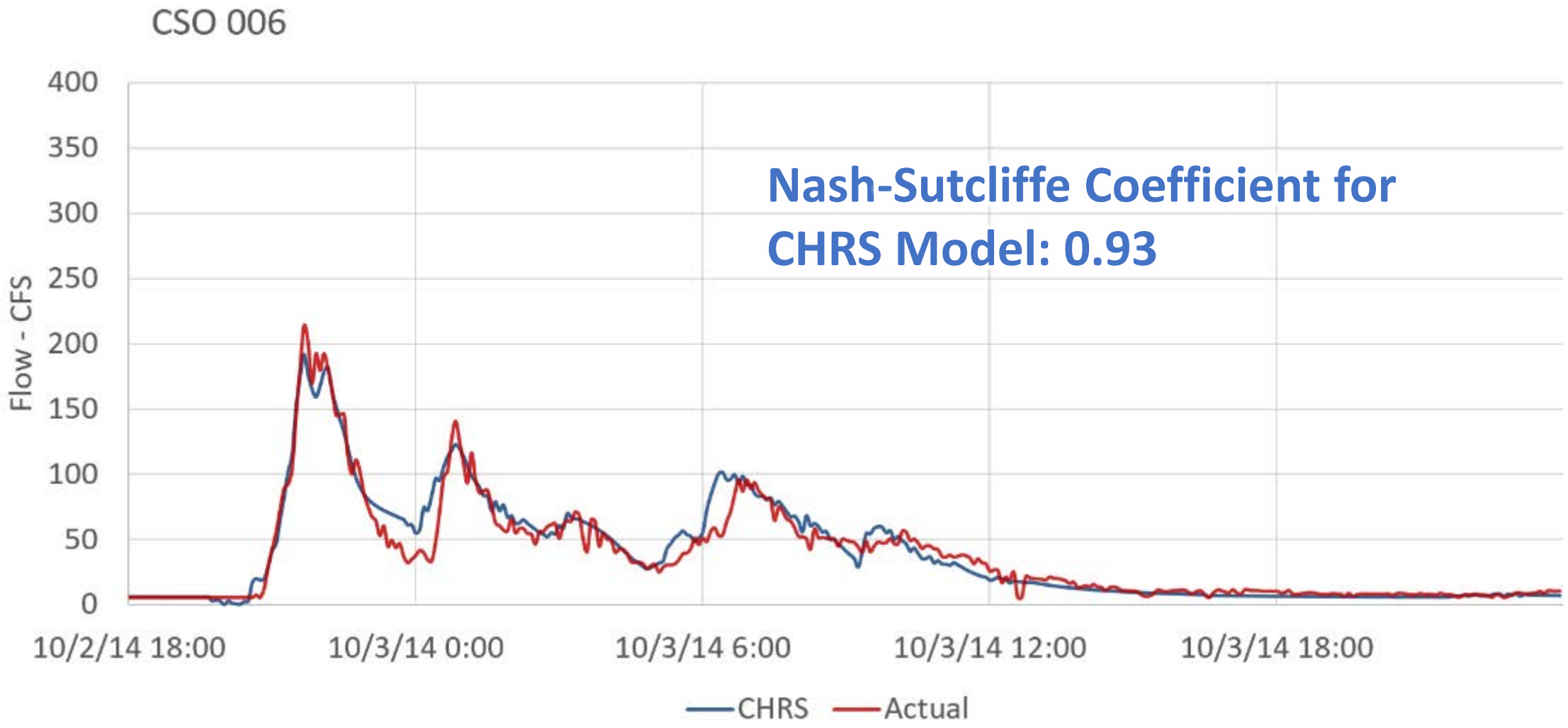
#3 Old/Existing LTCP Model

Score of 1 = Perfection



Nash-Sutcliffe Coefficient for Original LTCP Model: 0.29

#3 New Data Driven Model



Revising the LTCP- summary of previous slides

1. Data-driven maintenance created increased capacity;
2. Real Time Control exceeded expectations in reducing overflows;
3. New hyper-accurate model shows deficiencies in old LTCP model;
4. Original LTCP builds infrastructure but would not address the problem.

Novel South Bend Proposal:

We use our smart sewer data and new model to optimize the LTCP in the cloud!

Revising the LTCP: OptiSWMM

Previously we described how we came up with a better model- meaning, from a quality perspective, it was a better, more quality, product.

The next step regards the frequency of ‘running’ that new model.

Introducing OptiSWMM- allows us to run 1000s upon 1000s of model runs, not just a few scenarios like before. This allows many more permeations of LTCP alternatives to be considered.

LTCP update- how we were able to change

Sewer sensors + time = system knowledge

System knowledge → informing model with real data (CHRS data)

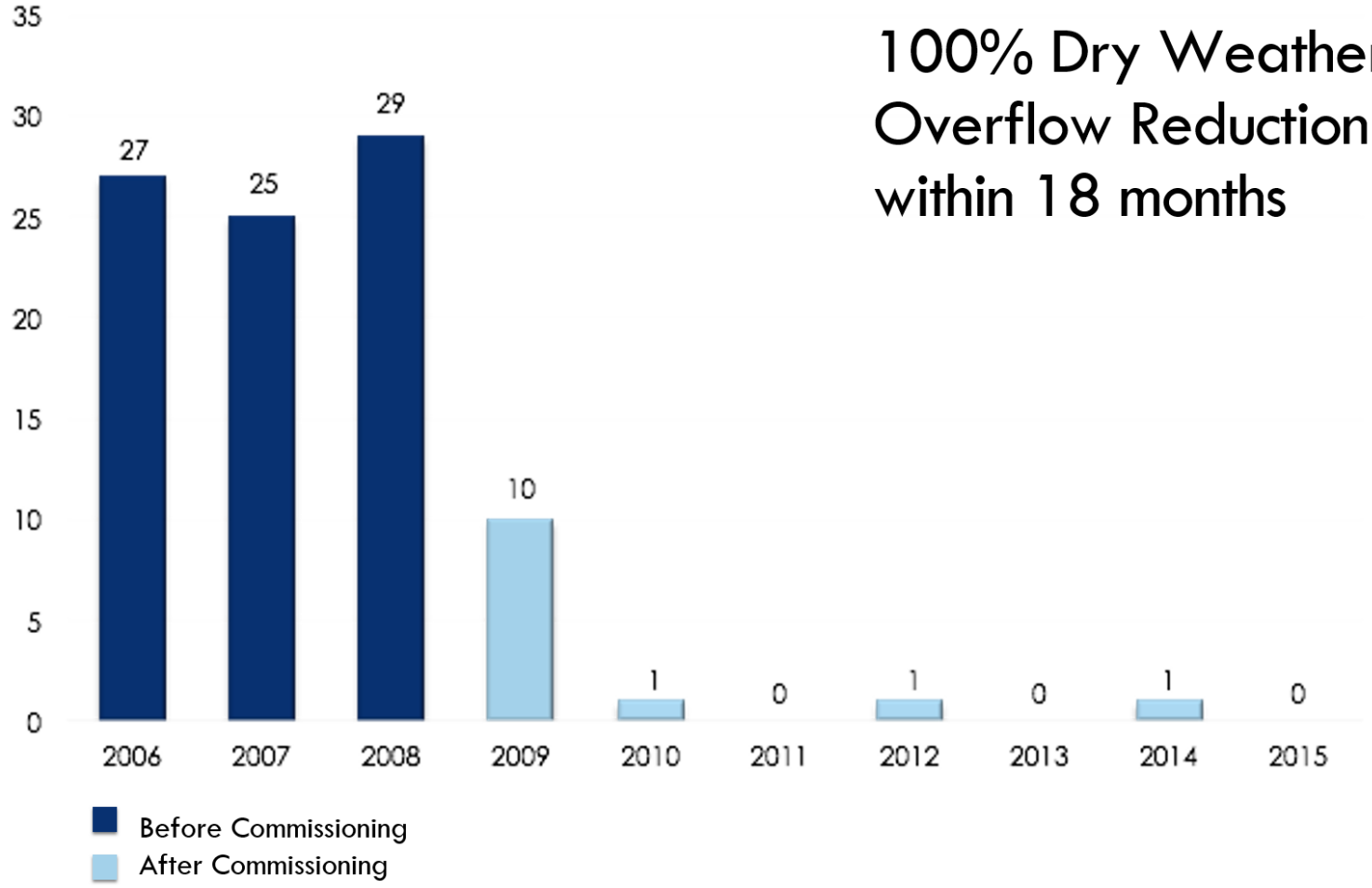
Real Data (CHRS data) + Optimization modelling x 10,000's runs (via OptiSWMM)

→ Next Generation Data Driven alternative

Smarter Alternative for a Greener Alternative

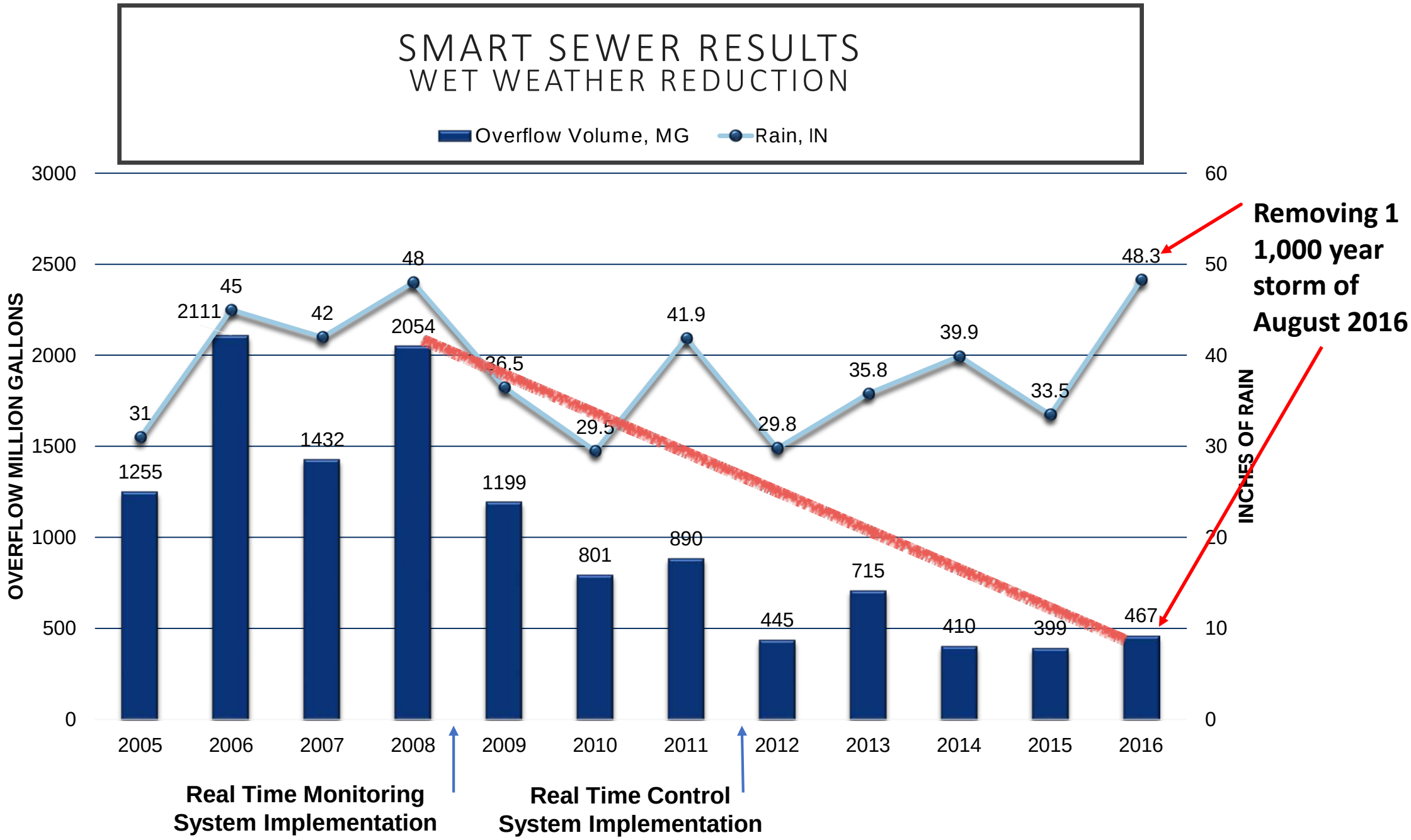
\+ **Plus Green stormwater Infrastructure**

Smart Infrastructure Results



100% Dry Weather Overflow Reduction within 18 months

SMART SEWER RESULTS
WET WEATHER REDUCTION



Cost of Compliance

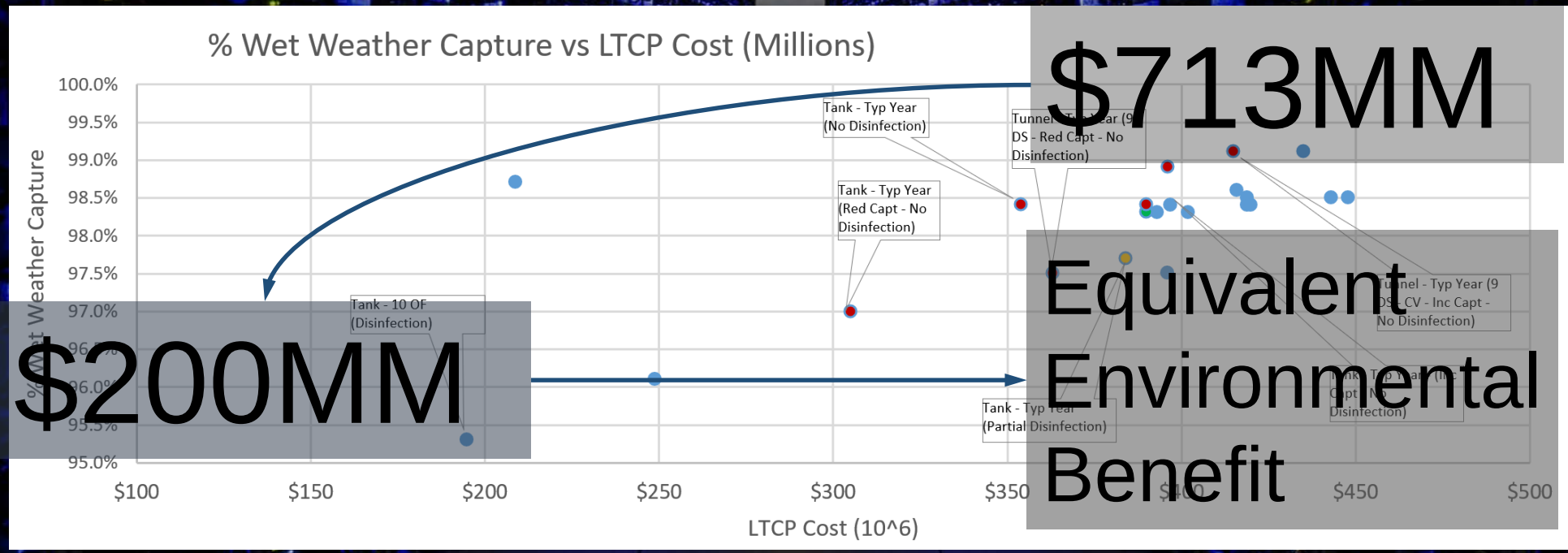
Conditions	Typical Year Overflow (MG)	Reduction (MG)	Cost (MM)	Cost/Gal ($/Gal)
Baseline (no improvements)	2,000			
Now	607	1,393 (all projects) 462 (non-CSOnet) 931 (only CSOnet)	115 105 10	0.08 0.23 0.01

Note: South Bend separated approximately 3K acres of its 13K acres of combined sewers. Non CSOnet-attributed CSO reductions estimated as Dec 17 of baseline overflow volume or 462MG.

Revising the LTCP: Optimization

Try every possible grey, green, and smart infrastructure option.

$608 savings per household/year



$200MM

$713MM

Equivalent Environmental Benefit