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# When Green Infrastructure Isn't an Option

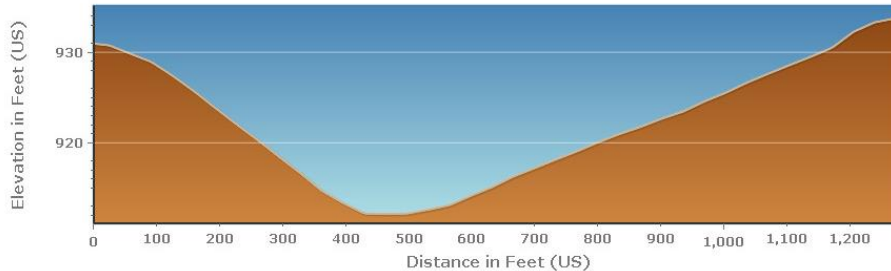
Retrofits in Tight Spaces





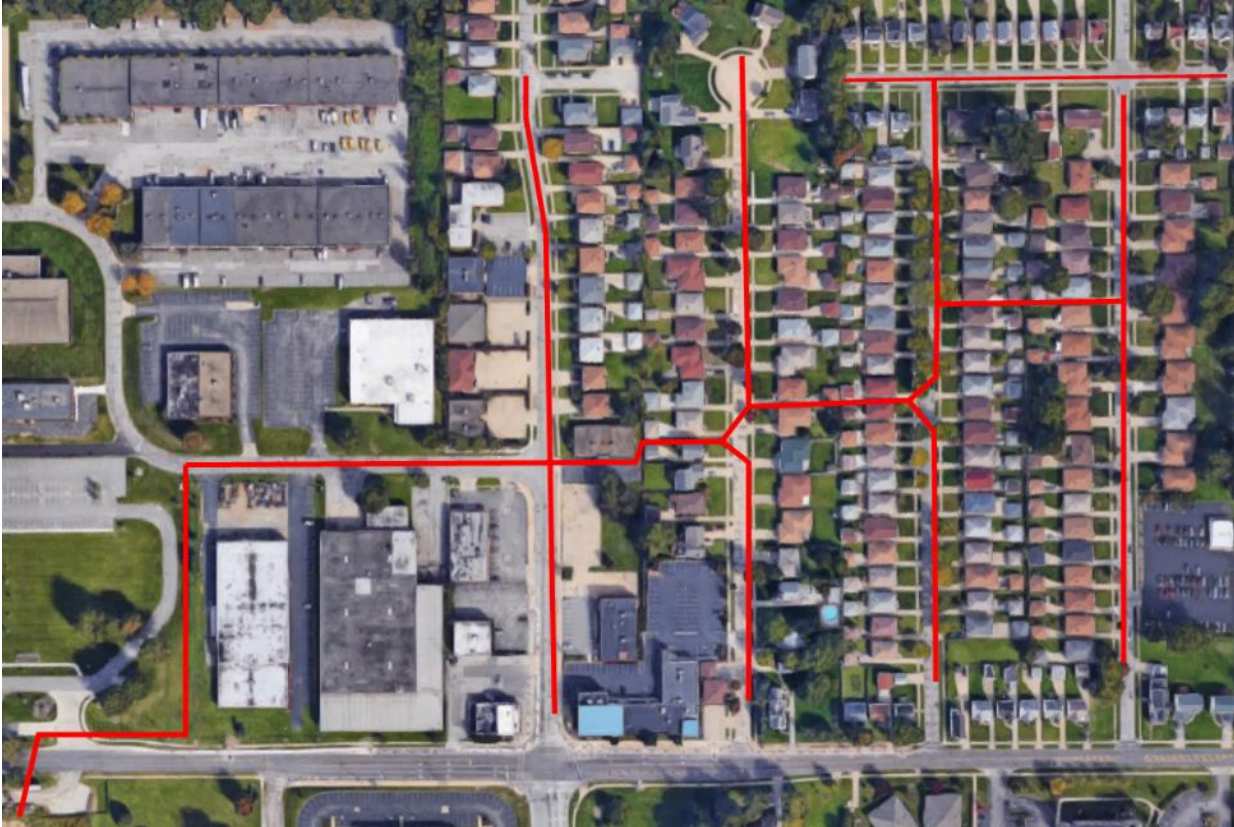
DRAINAGE AREA  
~60 ACRES  
137 Homes  
AVG LOT ~1/8 AC.  
50' FRONTAGE  
CLASS D SOIL  
40' R/W

## MIDWEST NEIGHBORHOOD





# SEWER ALIGNMENT



# EXTRA! EXTRA!



# 2014 PRELIMINARY STUDY

- ✓ Step #1 - Investigation
- ✓ Step #2 - Hydraulic Analysis
- ✓ Step #3 - Locate Cross Connections

**MIDWEST NEIGHBORHOOD  
SMOKE TEST RESULTS**

[Yellow Box] - SMOKE FROM ROOF DRAIN  
(CONNECTED TO SANITARY)  
 [Blue Box] - NO SMOKE FROM STACK  
(BACKFLOW PREVENTION DEVICE?)  
 [Red X] STM MH/CB - SMOKE FROM STORM  
SEWER STRUCTURE  
(CONNECTED TO SANITARY)

# CONCEPT PLAN

- GET NEORSO MCIP FUNDING
- PROPERTY ACQUISITIONS
- INCREASE STORM SEWER CAPACITY
- SEPARATE CROSS-CONNECTIONS
- INCORPORATE GREEN  
STORMWATER INFRASTRUCTURE



# MIDWEST PHASE I : TROUBLE OUT OF THE GATES

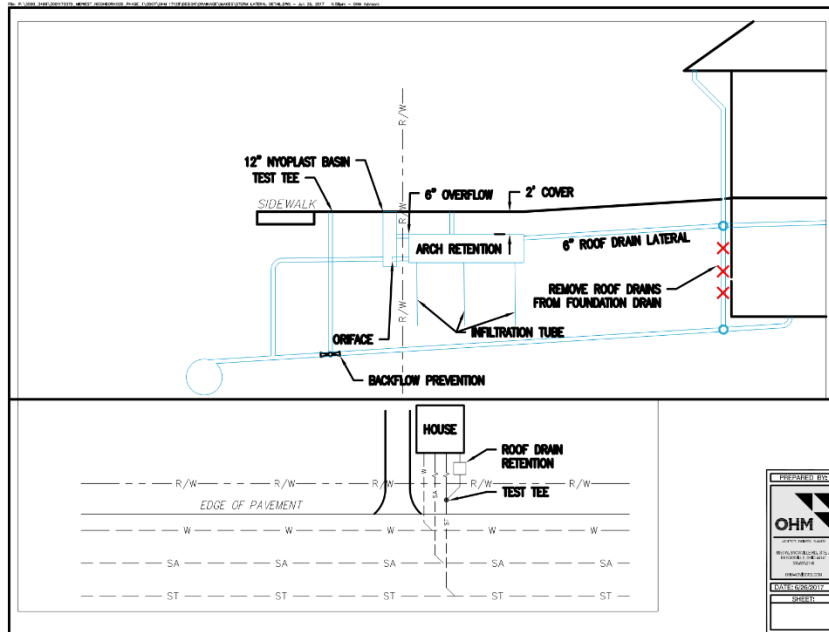
- PROPERTY ACQUISITION  
NOT FEASIBLE
- BOTTLENECKS BETWEEN  
STREETS LIMIT ABILITY TO  
UPSIZE PIPE
- ONLY OPTION IS STORAGE  
– BUT WHERE?





# PRIVATE SIDE STORAGE

- INDIVIDUAL ARCH TYPE RETENTION

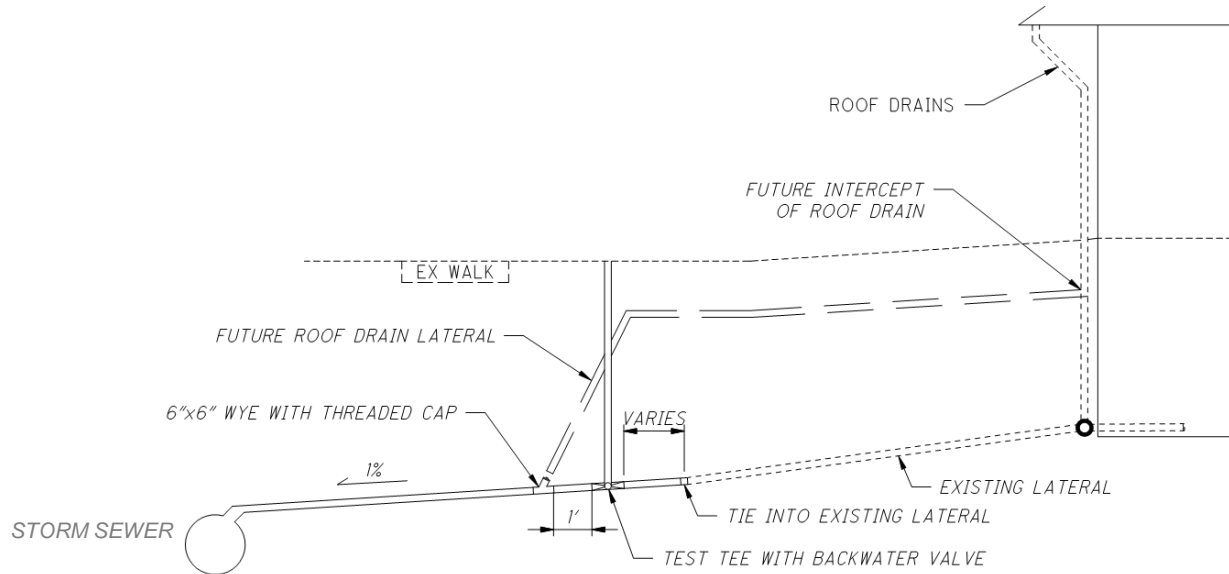


GREAT IDEA IN THEORY,  
BUT A POLITICAL  
NIGHTMARE

ULTIMATELY SCRAPPED  
DUE TO AND  
CONSTRUCTION BUDGET  
CONSTRAINTS

# SAVING IT FOR LATER...

- ADDED BACKFLOW PREVENTION ON SANITARY AND STORM
- INCLUDED A WYE ON STORM LATERAL



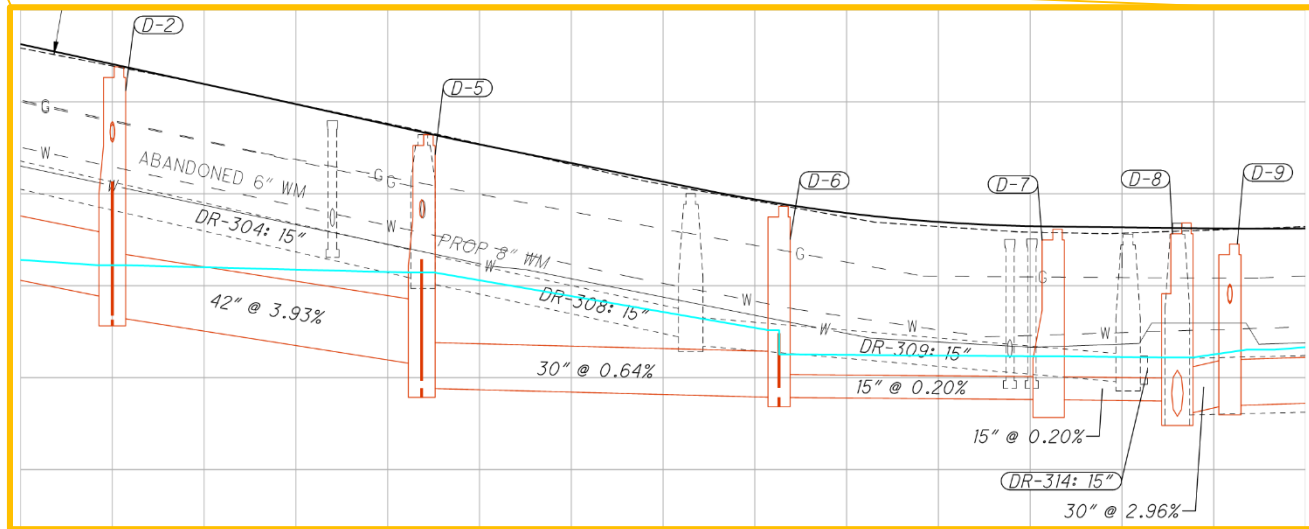
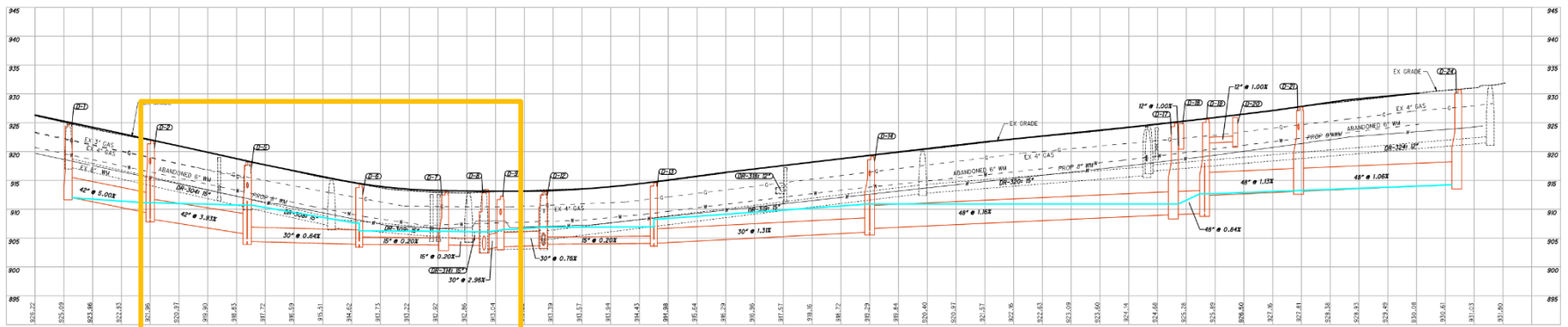
# PHASE 2 : STORAGE IN THE RIGHT-OF-WAY

- REALLOCATED PROPERTY ACQUISITION FUNDS TO PROVIDE STORAGE
- BUT WHAT KIND OF STORAGE?
  - PRIVATE SIDE STILL A HARD POLITICAL SELL
  - EXISTING UTILITIES LIMIT SPACE
  - ROAD IS TOO STEEP FOR LINEAR ARCH RETENTION
  - UPSIZING STORM SEWER WILL CONFLICT WITH SANITARY LATERALS UNLESS...

# WE GO DEEP

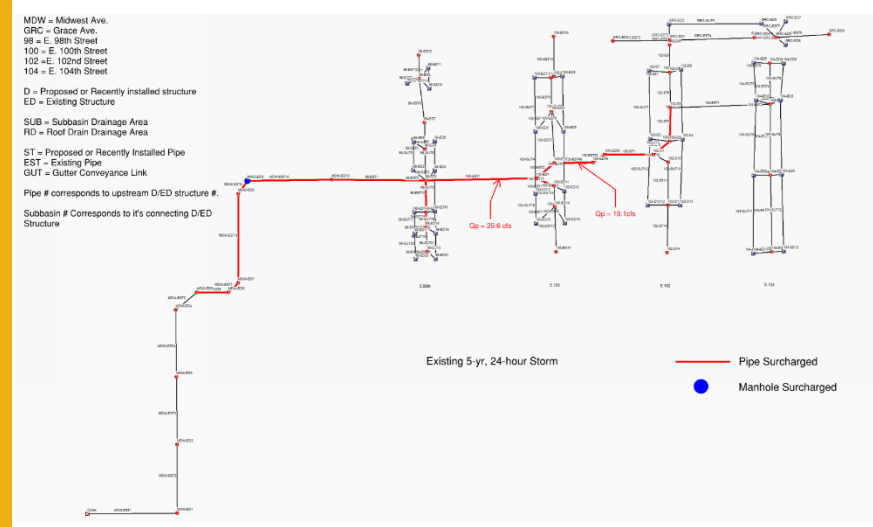
- LOWER THE STORM TO MATCH THE SANITARY CROWN
  - NOW WE CAN UPSIZE
  - STILL GOVERNED BY STORM OUTLET
- HGL CAN STILL MATCH EXISTING STORM CROWN
- MANHOLE WEIR WALLS





# RESULTS

- MODELLLED USING  
AUTODESK STORM AND  
SANITARY ANALYSIS 2015



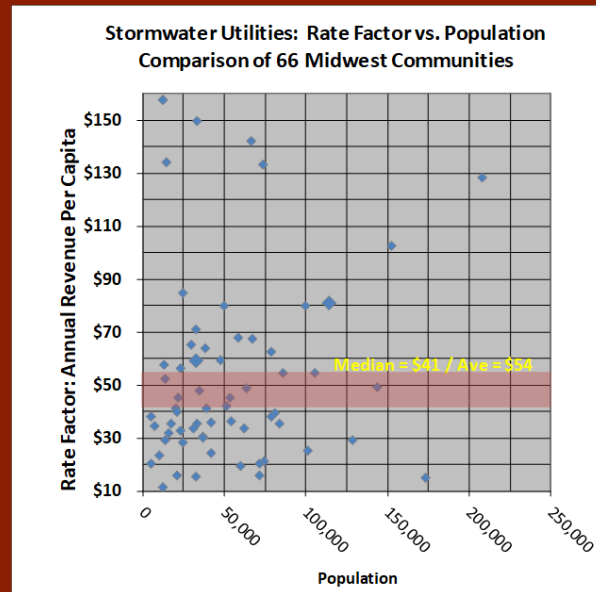
	UPSTREAM PEAK FLOW		DOWNSTREAM PEAK FLOW		100TH ST. PEAK FLOW		% PEAK FLOW REDUCTION	
	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED	OVERALL	100TH ST
	(CFS)		(CFS)		(CFS)			
1-YEAR	13.7	13.7	20.9	19.1	7.2	5.4	8.6%	25.0%
2-YEAR	16.1	16.1	24.7	22.9	8.6	6.8	7.3%	20.9%
5-YEAR	19.1	19.1	29.6	27.8	10.5	8.7	5.9%	17.3%

# EYE CANDY



# NEXT STEPS

- LONG-TERM URBAN MASTER PLANNING
- FUTURE PROPERTY ACQUISITIONS
- INCREASING REVENUE
  - GH COMMUNITY COST SHARE IS ~\$294,000 PER YEAR
  - JUST OVER \$10/CAPITA/YEAR
  - NECESSARY CAPITAL TO MAINTAIN STORM SEWERS IS ABOUT \$50-\$100/CAPITA/YEAR OR \$2-\$3 MILLION







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