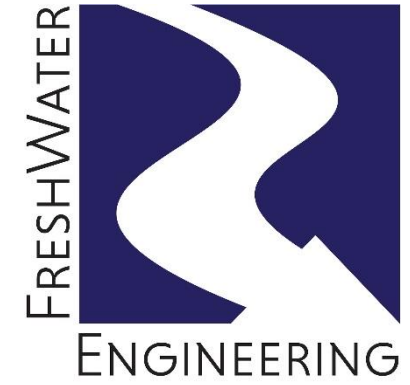


MEQUON STORMWATER MODELING



FRESHWATERENG.COM

Outline

- FreshWater Engineering overview
- 1999 CDM study & long-term plan
- Site visit & model development
- Alternative analysis
- Results
- Discussion

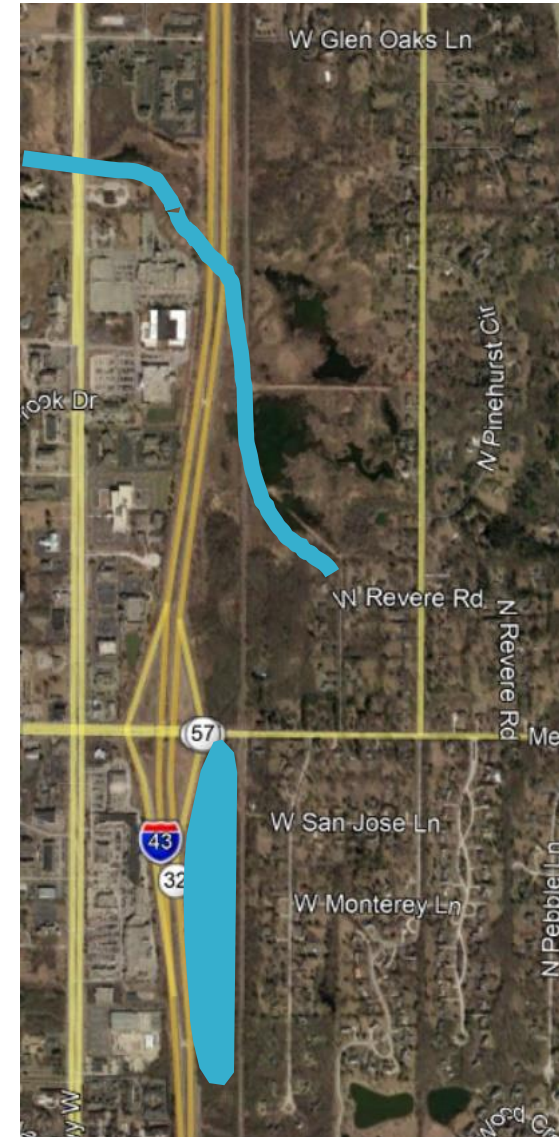
FreshWater Engineering

- Woman-owned small business with offices in Milwaukee and Madison, Wisconsin
- Specialize in:
 - Water resources engineering
 - Stormwater management
 - Green infrastructure
 - Field data collection
- Stormwater modeling projects
 - Parks
 - Housing developments
 - Watershed analyses



1999 Study by CDM

- Large-scale stormwater management study for Mequon
- Created stormwater model
- Determined increasing storage was most effective management strategy
- Developed long-term management recommendations
 - Large detention basin along I-43
 - Stream channel rehabilitation



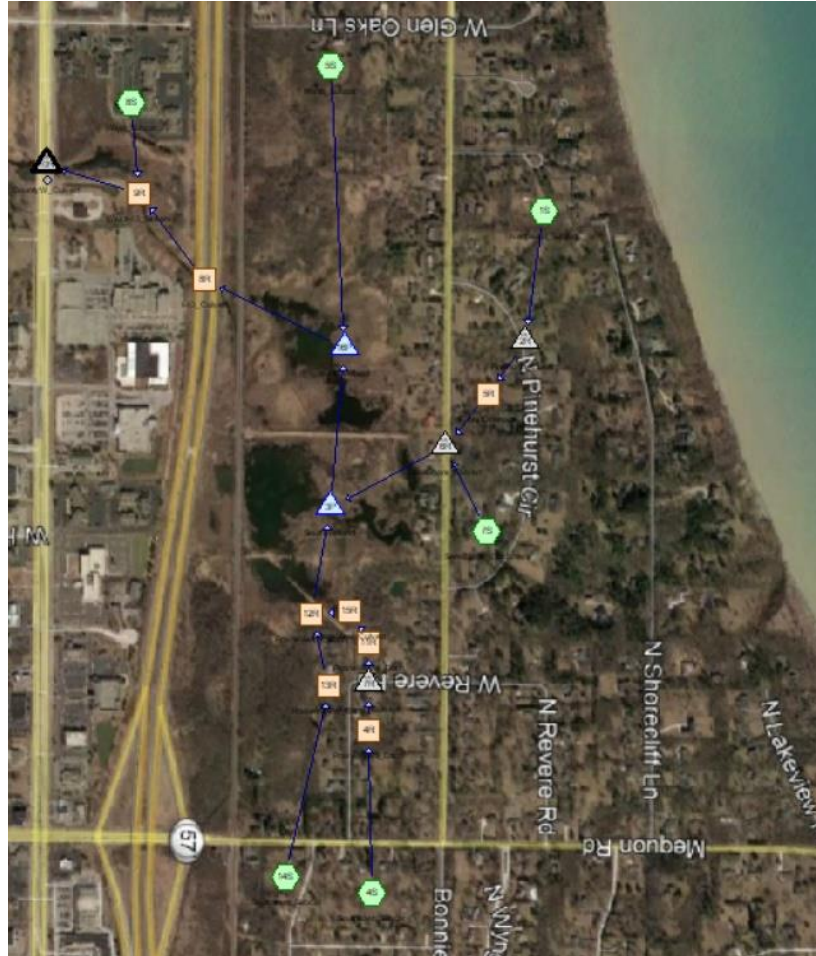
Site Visit



- Visited site 02 SEP 20
 - Gathered elevation point data
 - Measured culvert dimensions
 - Photographed site conditions



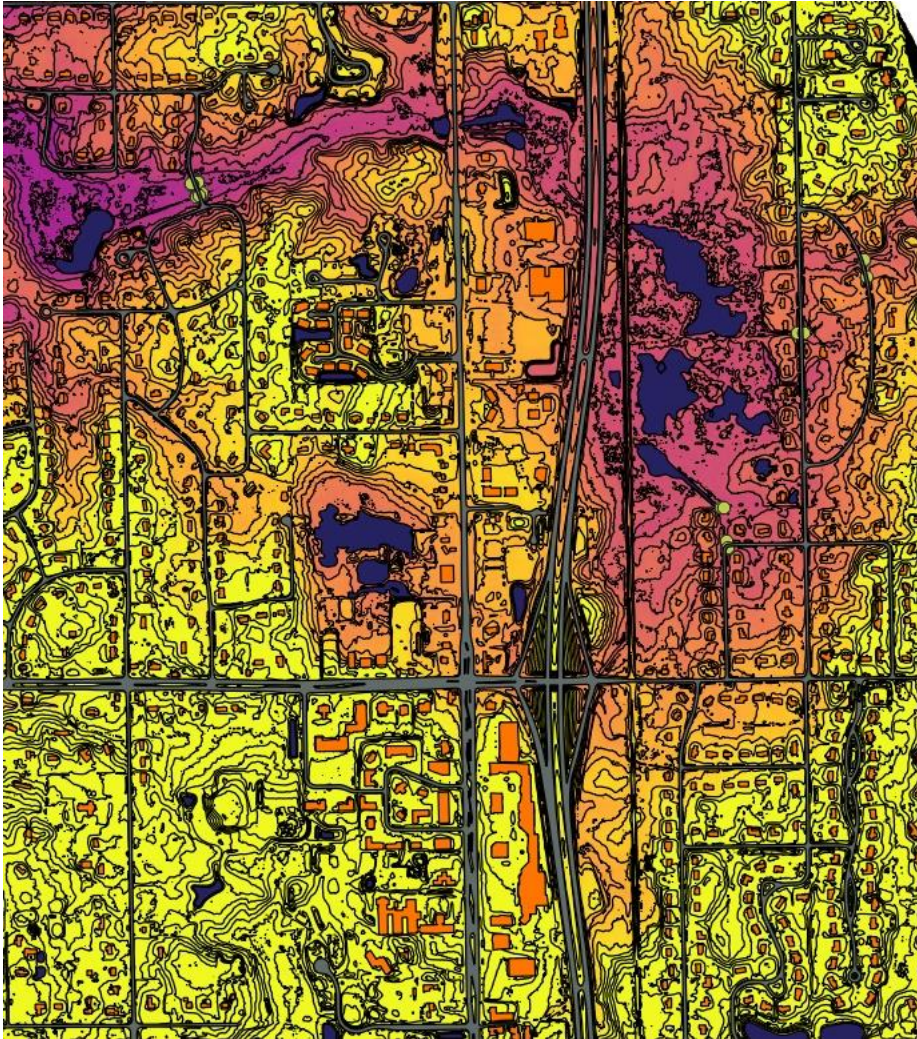
Model Setup



HydroCAD Stormwater Model

- 20 Nodes
 - 6 Sub-catchments
 - 8 Reaches
 - 4 Catchbasins
 - 2 Ponds
- 4 Rainfall events (from [NOAA's Milwaukee North Side, Station #47-5477](#))
 - 2-year 2.64 in
 - 10-year 3.75 in
 - 25-year 4.60 in
 - 100-year 6.16 in

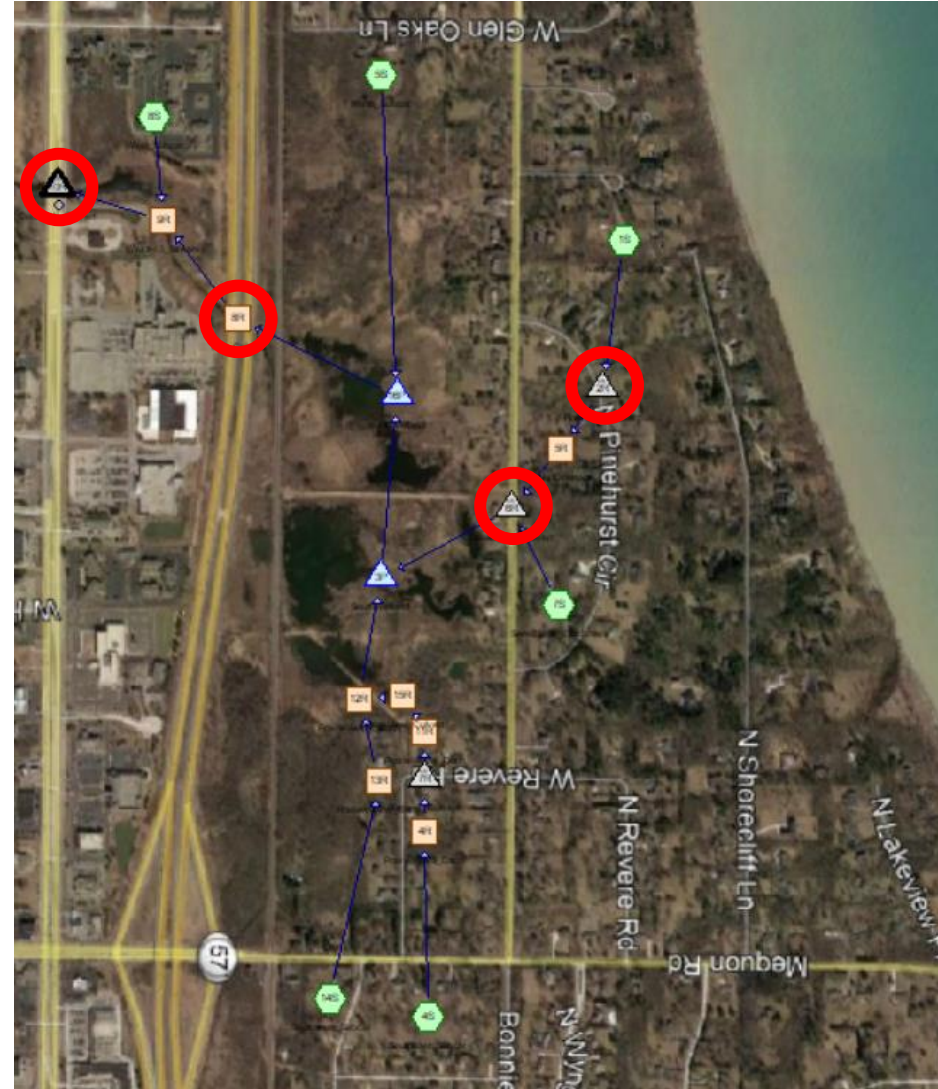
Model Data



- Elevations
 - Culvert inverts from RTK-GPS data
 - Other information from 2010 LiDAR
- Lengths
 - Aerial photographs in GIS software for ditches, streams
- Drainage Areas
 - Measured from topographic data in GIS software
- Slopes
 - Lengths and elevations from LiDAR and GIS software

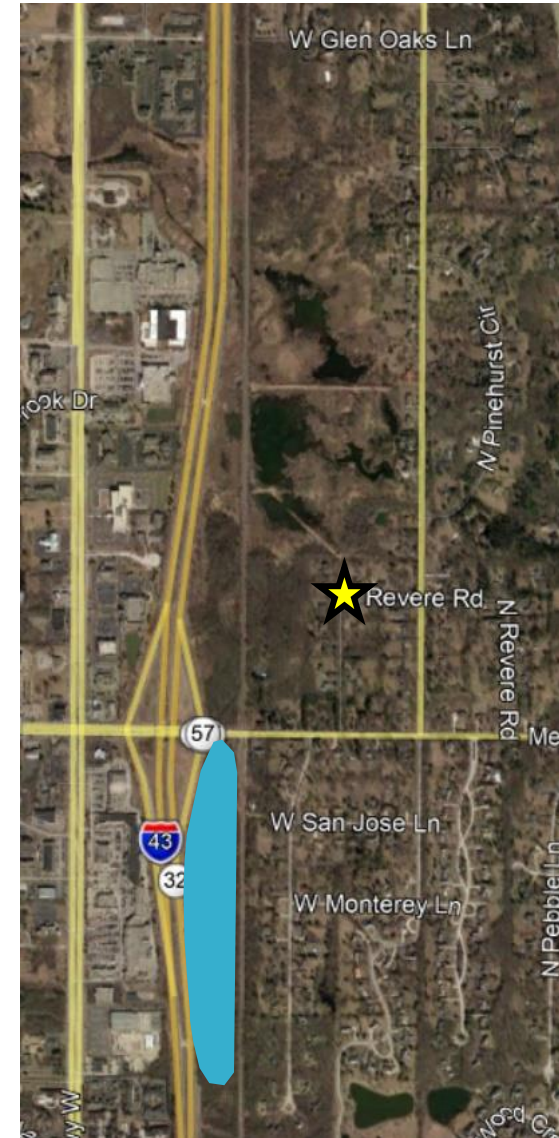
Model Calibration

- 4 culvert locations with reported data from previous study
 - Pinehurst Circle
 - Lake Shore Drive
 - I-43
 - Port Washington Road



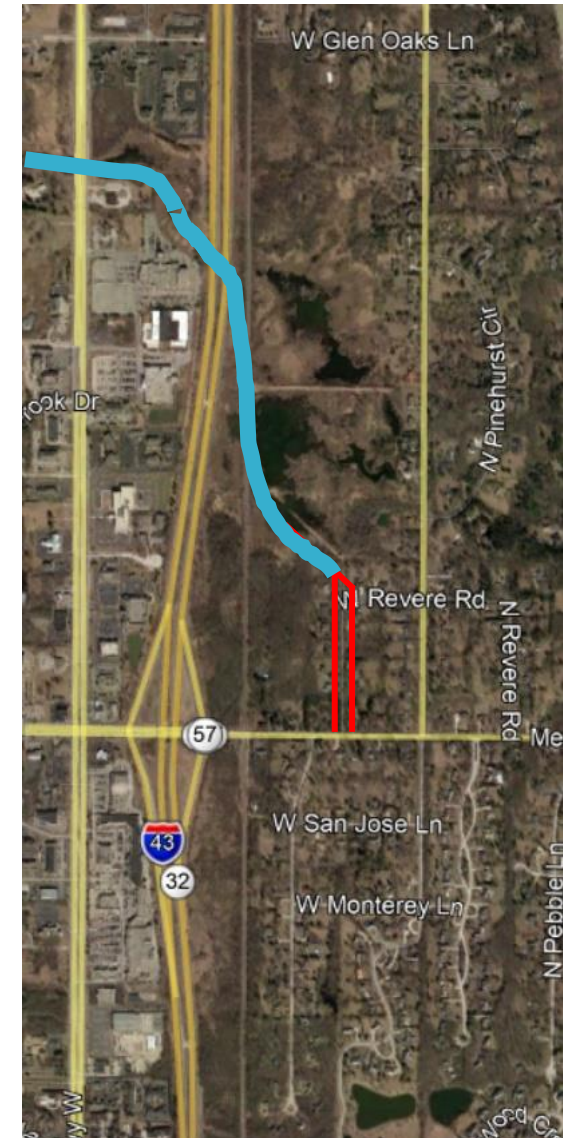
Effective Management Alternatives

- Adding large detention pond
- Opening culvert at Revere Rd & Prairie View Ln



Ineffective Management Alternatives

- Additional options
 - Widening stream channel
 - Opening ditches
 - Adding small detention ponds



Modification Results

- Focused primarily on flood reduction near Revere Road & Prairie View Lane
 - Most effective at reducing flood levels was culvert modification
 - Small change with large detention pond

Flood Level Reduction from Existing Conditions [ft]			
Model	Large Pond	Culvert	Combined
2-Year Event	0.0	1.3	1.7
10-Year Event	0.1	0.1	0.3
25-Year Event	0.0	0.1	0.2
100-Year Event	0.1	0.1	0.3

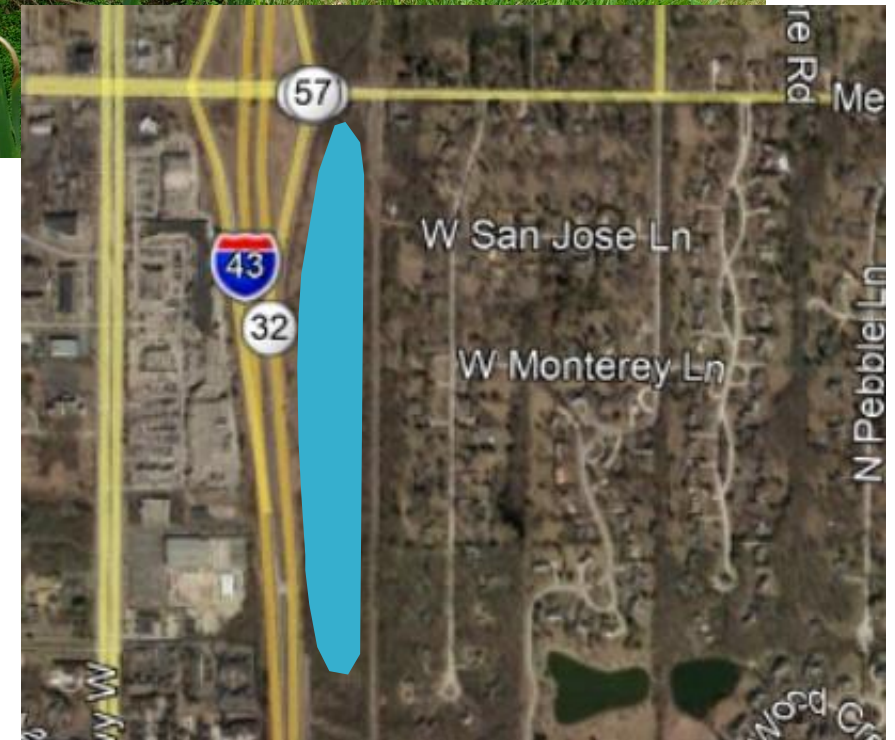
Modification Results

- Evaluated peak discharge near Revere Road & Prairie View Lane
 - Large detention pond provided significant reduction in peak flows
 - Other options had limited or no effect individually
 - Combined effects further decreased peak discharge

Model	Existing	Lg Pond	Combined
2-Year Discharge [cfs]	16.6	12.5	11.6
10-Year Discharge [cfs]	44.7	33.5	31.3
25-Year Discharge [cfs]	71.8	53.9	50.3
100-Year Discharge [cfs]	129.3	97.0	90.5

Discussion

- Culvert Modification – Highest Priority
 - Allows flow through what is currently chokepoint
 - Still overwhelmed at 10-year event or larger
 - Could be coupled with ditch modifications
- Large Detention Pond – Second Priority
 - Has significant impact on peak discharge
 - Would require substantial excavation
 - Inflow ~671 ft NAVD88
 - Most of area is above that level, max ~677 ft NAVD88
- Stream Modification – Third Priority
 - Limited effect on flooding, peak discharge
 - Potentially difficult to obtain permitting
- Small Detention Ponds – Not Feasible
 - Limited effect on flooding, peak discharge
 - Would require support from many residents



Summary

- 1999 CDM study suggested two long-term solutions
 - Large detention pond
 - Stream rehabilitation
- FreshWater developed stormwater model
- Evaluated CDM recommendations & other alternatives
- Most effective flood-reduction is culvert modification at Revere Rd and Prairie View Ln
- Detention pond would reduce flood flows, no significant reduction in flood elevations
- Other alternatives have limited effect on flooding at project site

