Using ArcHydro to Improve Drainage in Monroe County

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Agenda

► Introduction to ArcHydro
► Why the Model was Created
► Data Needed For Analysis
► Data Model
► Process and Analysis
► Limitations of Analysis
► Methods of Improvement
► Conclusions
Background of the GIS Division

- Division started in 1999 with Parcels
- The division is within Environmental Services, which primarily deals with the Rochester Sewer System
- Supports all other departments
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Introduction to ArcHydro

ArcHydro is a tool from esri developed as a hydrological modeling add on
It uses the Spatial and 3D Analyst Extensions
Creates a Tool Box and Tool Bar for Use in ArcMap
Can also be combined with Army Corps of Engineers Hec-GeoRAS and Hec-geoHMS tools for more complex Hydrological Modeling
ArcHydro Data Model

Why the Model was Created

- The area of interest has a problem with flooding
- Understanding the flow is key for the area since it is a complicated collection system area
  - Comprised of Three Different Collection Systems which are maintained by different agencies
  - Not all of the underground infrastructure is mapped for the area
- The area was built during the 1920s and many of the sewers have not been updated since
- Also there are 629 catch basins in the area
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Data Needed For Analysis

- **Area of Interest**
- **Catch Basins**
  - Total of 629
  - Some were GPSed and others come from Record Drawings
- **Elevation**
  - 2006 Monroe County LiDAR Data
  - 5ft per Pixel
- **Size of Drainage Area for a “Stream”**
  - This was the tricky one since we had not tried it before
- All Steps were done using ArcGIS Model Builder
The next few slides go over the process that the model goes through. The results are created in the background but you do get some interesting visuals about what is going on in the system. The processing time for the entire model is about 30 hours using the 5 ft per pixel LiDAR data.
Area of Interest
Flow Direction
Flow Accumulation
Stream Links
Watersheds
Why Some Sewersheds look Small
Drainage Path Analysis
Limitations of the Analysis

- The LiDAR data was a big limiting factor
  - The elevation model, while much better than traditional DEM still does not show enough detail
  - Issues with trees covering catch basins
- Catch Basins not aligned with flow lines
  - Catch Basins were not placed at optimized areas
Other Uses From The Analysis

- Improves the sewer improvement process by allowing for surface flow directions
- Much quicker than traditional methods
- Reduces the need for die testing surface flow
  - Can be done without rain events
- Also flow directions and area can be estimated during the winter months
Methods of Improvement

► Currently Field Crews are surveying each catch basin with the RTK GPS equipment
  ▪ Collecting points around the catch basins
► These new points will be added to the terrain and then a new surface will be created
► Gather the records from the other organizations to better see where the flow goes
► Future project includes getting the sewer network into the model to estimate capacities
Conclusions

► ArcHydro’s Flow Line and Drainage Path Analysis is very useful for assessing the issues of the Area

► LiDAR data improves the analysis but not enough to get to the catch basin level
  ▪ With improved technology it is possible though

► Streets and Catch Basins were not entirely designed to optimize storm water
QUESTIONS

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