

# It All Flows Downhill

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Creating a Digital  
Representation of  
the City of Milford's  
Sanitary Sewers

By  
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# Topics

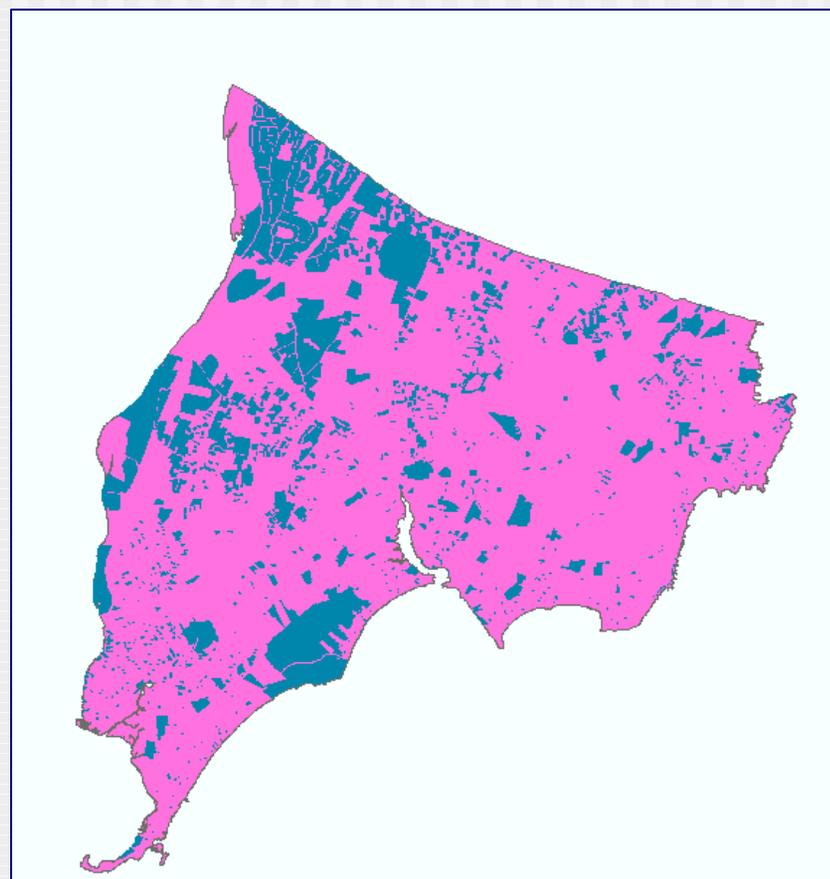
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- Why we need to digitize
- Creating a strong platform to start from
- Opening lines of communication
- Our database process
- Using the information
- Plans for the future

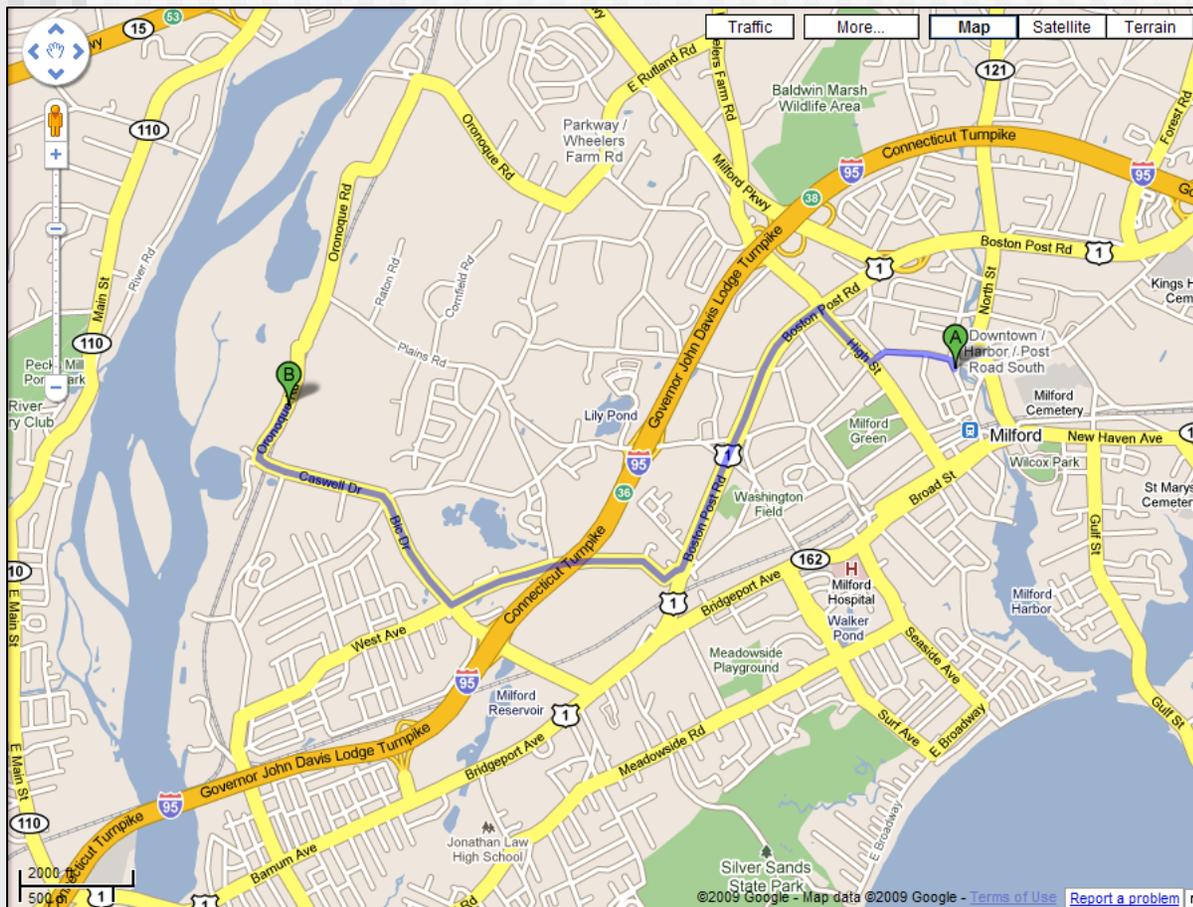


# Getting a Feel for Milford

- Approximately 53,000 residents
- Over 230 miles of sewer pipes
- 18,500 sewer use bills



# In the beginning...



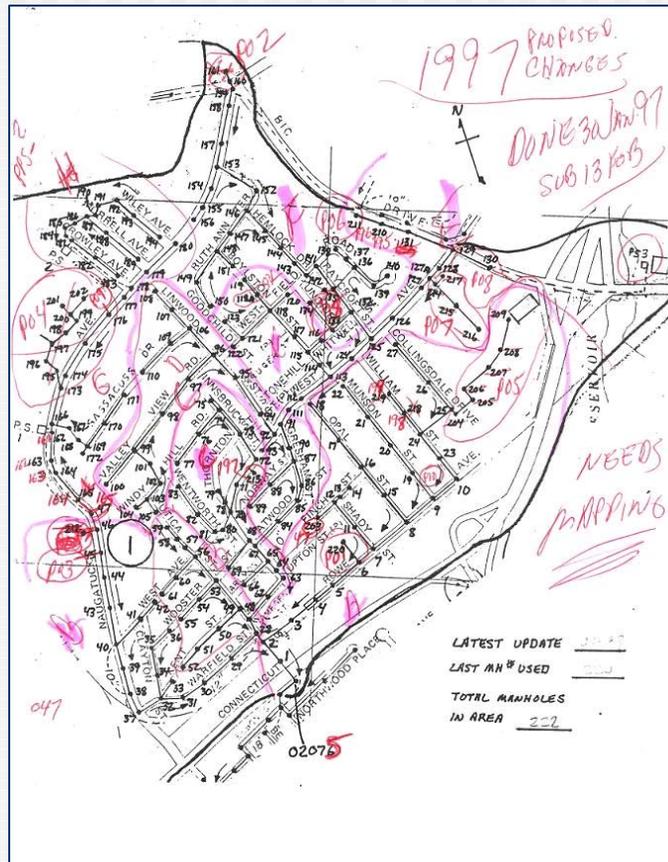
- Sewer records are being housed in 2 different locations – 3.5 miles apart

# Breaking the Code

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- Wastewater information management consisted of hand drawn maps, coded information and lots and lots of paper in 3 ring binders

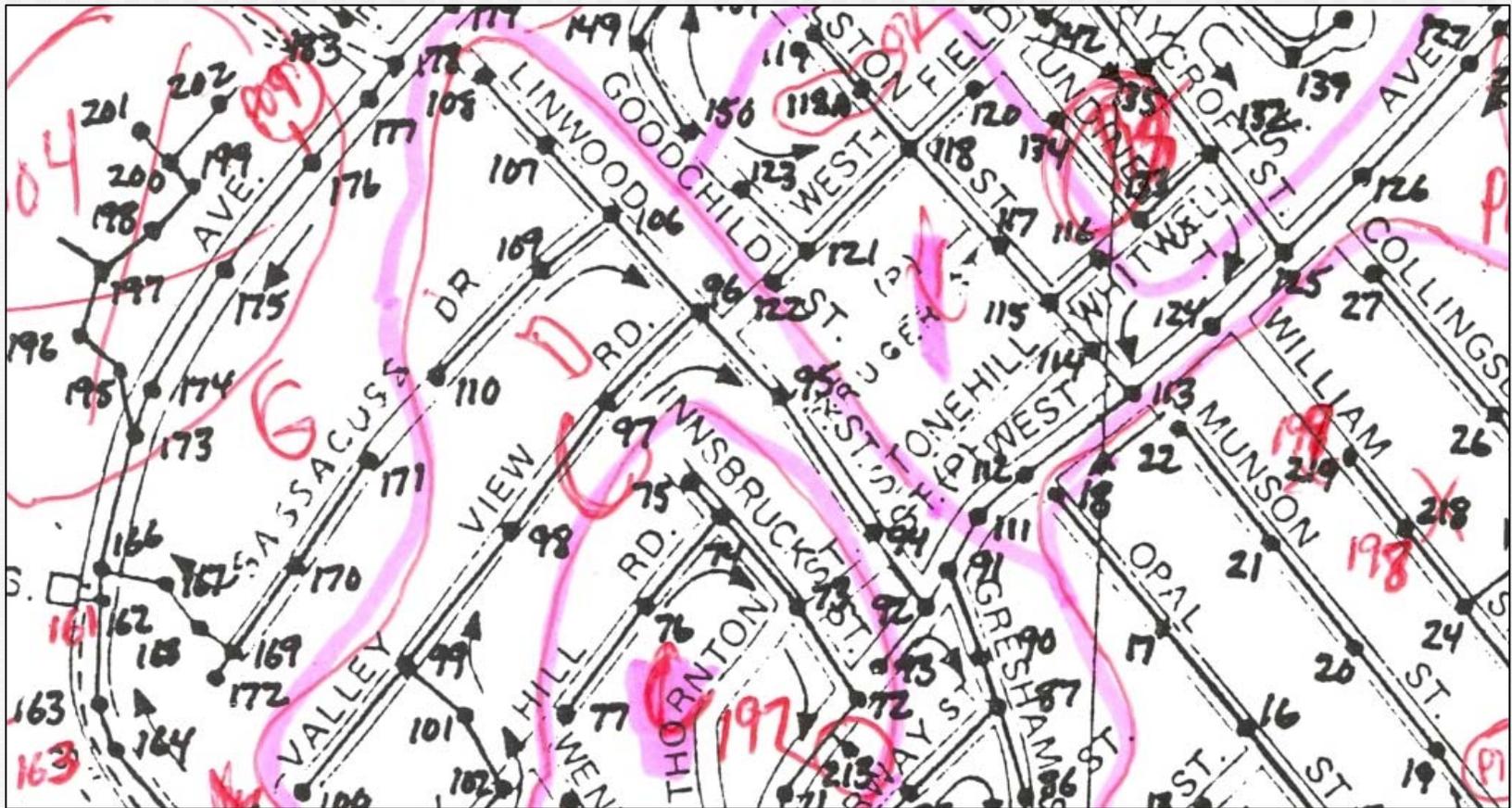
# Records "Management" at the Wastewater Treatment Plan



ve		26194.0127696	var
		161.8456449	std
UPS NBR	UP STREET	MANHOLE#	LENGTH MANHOLE#
I95-RR	EASEMENT-NAUG GARDENS	01001	200.0000000 02075
JX	EASEMENT-NAUG GARDENS	01002	200.0000000 01001
	ROWE AVENUE (PAPER ST)	01003	281.0000000 01002
END RD	ROWE AVENUE	01004	259.0000000 01003
KENNEL	ROWE AVENUE	01005	178.0000000 01004
	ROWE AVENUE	01006	294.0000000 01005
JX	ROWE AVENUE	01007	139.0000000 01006
JX	ROWE AVENUE	01008	350.0000000 01007
JX	ROWE AVENUE	01009	298.0000000 01008
JX	ROWE AVENUE	01010	254.0000000 01009
X	SHADY STREET	01011	239.0000000 01007
JX	SHADY STREET	01012	264.0000000 01011
43	FINCH STREET	01013	60.0000000 01012
55 END	FINCH STREET	01014	108.0000000 01013
90-92	OPAL STREET	01015	284.0000000 01008
SIDE35	OPAL STREET	01016	292.0000000 01015
40	OPAL STREET	01017	292.0000000 01016
12	OPAL STREET	01018	346.0000000 01017
81	MUNSON STREET	01019	270.0000000 01009
59	MUNSON STREET	01020	287.0000000 01019
36	MUNSON STREET	01021	296.0000000 01020
14	MUNSON STREET	01022	317.0000000 01021
RR 90	EASEMENT-WILLIAM STREET	01023	220.0000000 01010
X	EASEMENT-WILLIAM STREET	01024	248.0000000 01023
X	EASEMENT-COLLINGSDALE	01025	287.0000000 01024
43	COLLINGSDALE DRIVE	01026	300.0000000 01025
14	COLLINGSDALE DRIVE	01027	394.0000000 01026
X	EASEMENT-NAUG GARDENS	01028	114.0000000 01002
60	WARFIELD STREET	01029	239.0000000 01028
37	WARFIELD STREET	01030	302.0000000 01029
15	WARFIELD STREET	01031	284.0000000 01030
X	WARFIELD STREET	01032	179.0000000 01031
29	KENT STREET	01033	171.0000000 01032
1	CLAYTON STREET	01034	177.0000000 01032
X	CLAYTON STREET	01035	203.0000000 01034
14	WOOSTER STREET	01036	199.0000000 01035
X	KENT STREET	01037	213.0000000 01032
735	NAUGATUCK AVENUE	01038	167.0000000 01037
756	NAUGATUCK AVENUE	01039	231.0000000 01038
X	NAUGATUCK AVENUE	01040	260.0000000 01039
X	WEST AVENUE	01041	272.0000000 01040
35	WEST AVENUE	01042	177.0000000 01041
806	NAUGATUCK AVENUE	01043	300.0000000 01040
834	NAUGATUCK AVENUE	01044	269.0000000 01043
856-88	NAUGATUCK AVENUE	01045	200.0000000 01044
861	NAUGATUCK AVENUE	01046	201.0000000 01045
85	FINCH STREET	01047	156.0000000 01012
X	UTICA STREET	01048	153.0000000 01028
X	UTICA STREET	01049	99.0000000 01048
72	KENT STREET	01050	240.0000000 01049
56	KENT STREET	01051	246.0000000 01050
36	KENT STREET	01052	222.0000000 01051
X	UTICA STREET	01053	322.0000000 01049
47	WOOSTER STREET	01054	173.0000000 01053

I didn't flip through the book and take the worst one, this just happened to be the first page

# Closeup

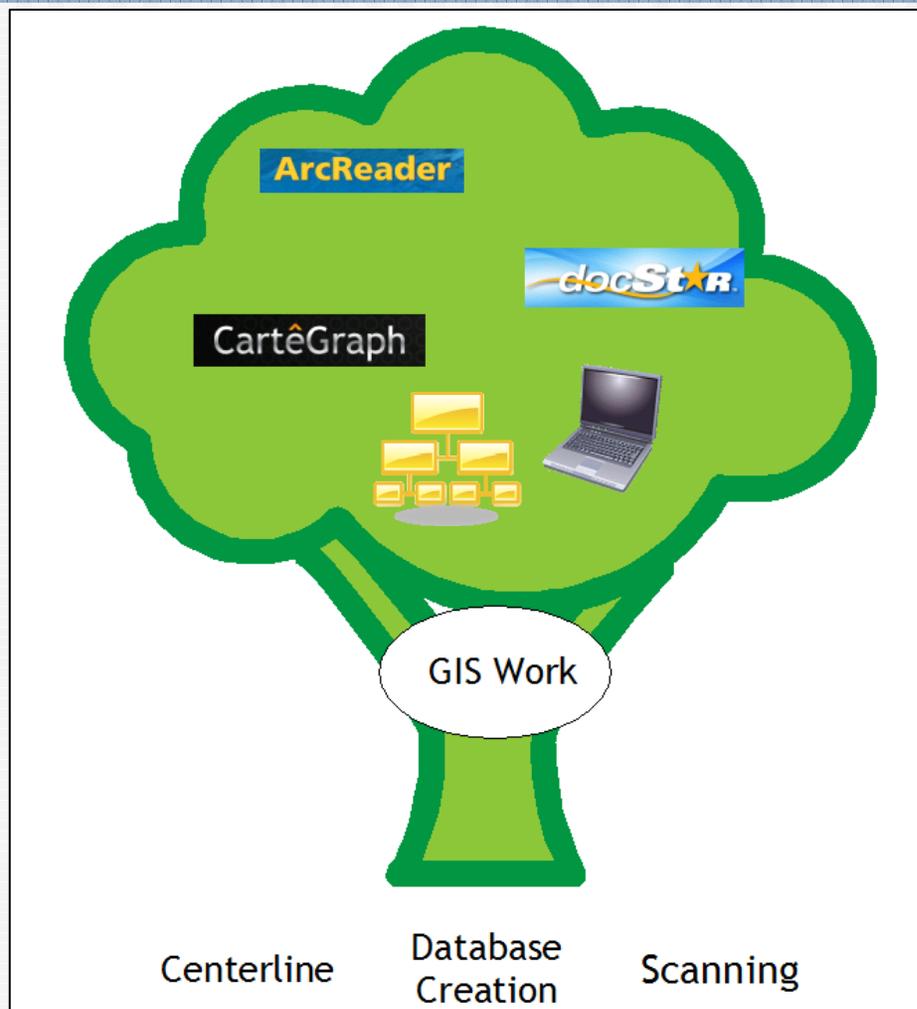


# Data Storage



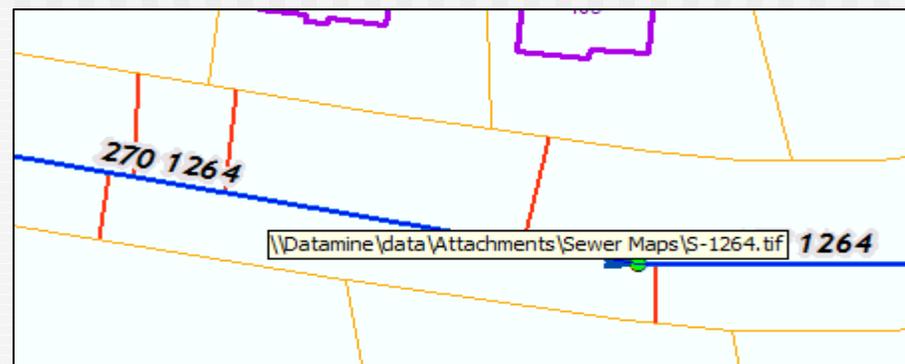


# Defining Goals



# Laying the foundation

- Each sewer map was reviewed and scanned onto the server
- Centerlines were tagged with sewer map ID's – extremely helpful prep work by the Engineering tech
- These tags were then turned to hyperlinks
- Each sewer map is georeferenced



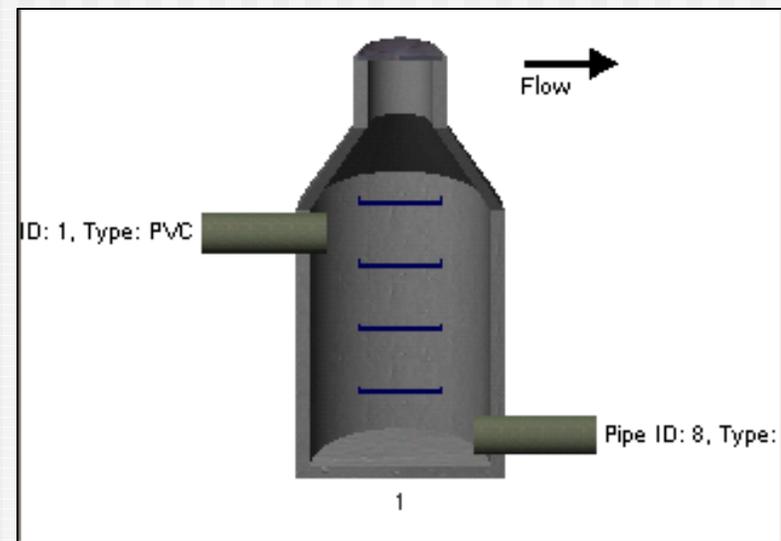
# Selecting Data

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- Keeping the goals in mind, particularly data modeling and the integration with Cartegraph, the geodatabase was constructed
- Looked at schema databases and decided to create our own

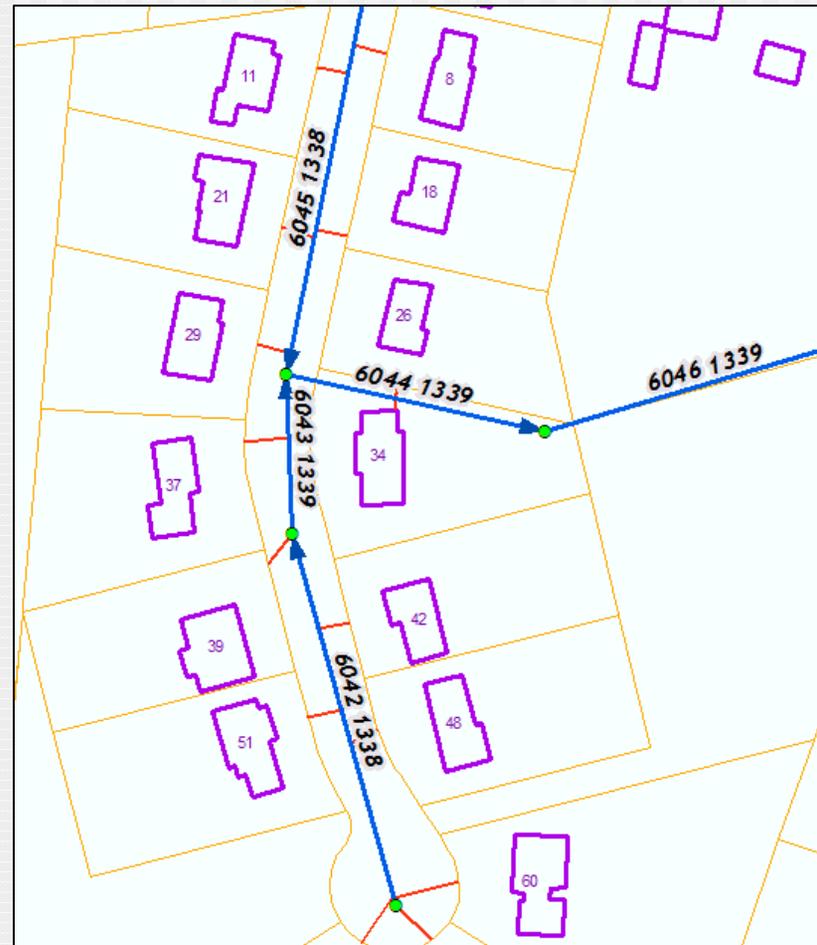
# Elements of the System

- Pipes – keeping track of material, length, diameter
- Assign Unique Ids
- Manholes – inverts from all directions
  - Keeping track of which pipe relates to which manhole
  - Laterals
  - Pump stations



# Important considerations

- Digitizing pipes:
  - No intermediate vertices
  - Draw following flow direction
  - Force mains, easements, private systems and gravity lines
  - Domains where applicable
  - Comments section



# Important Considerations

- Manholes
  - Only 1 outgoing invert (most of the time)
  - Match pipe ID to invert
  - Keep track of source – from our planimetric data or from the sewer map source

Property	Value
OBJECTID	6570
SMAP	1338
Comment	<Null>
Matching	Added from map source
Inv_IN	<Null>
PIPE_IN	<Null>
Inv_OUT	149.33
PIPE_OUT	6044
INV_N	149.61
PIPE_N	6045
INV_S	149.67
PIPE_S	6043
INV_E	<Null>
PIPE_E	<Null>
INV_W	<Null>
PIPE_W	<Null>
INV_NE	<Null>
PIPE_NE	<Null>
INV_SE	<Null>
PIPE_SE	<Null>
INV_SW	<Null>
PIPE_SW	<Null>

# Important Considerations

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## ■ Laterals

- Used to create a “bridge” between permits stored by address and the pipe which serves that property
- Our parcels and the sewer maps don't always match. More important than an accurate location of the lateral is tying that parcel to the permit and pipe so error has been built into the laterals

# How we're using the information

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- ArcReader is our primary platform
- 7 users have access to the same data
- Acting engineer has a laptop for night calls

# Looking to the future

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- Data to be imported into Cartegraph
- Waiting for an engineer to use create the network analysis

