Sanitary Sewer Improvements

Preliminary Engineering Project

Arbor Woods/Allen School Area Public Meeting Summary

Allen Elementary School

Tuesday, December 5, 2017 - 6:30 p.m. to 8:00 p.m.

1. Participant List – See Attachment #1

2. Welcome and Introduction to Project Team -- Brian Slizewski, City of Ann Arbor Project Manager
    a. Fieldwork findings and options for improving the sanitary sewer system in this area will be presented at this meeting.

3. Meeting Desired Outcomes
    a. Provide background on sanitary sewer system and previous projects
    b. Provide overview of the SSIPE project
    c. Explain the findings in the Arbor Woods area neighborhood
    d. Present sanitary sewer improvement options and gather feedback

4. Project Team Introduction
    a. Brian Slizewski, City of Ann Arbor, Project Manager
    b. Troy Baughman, City of Ann Arbor, Systems Planning
    c. Robert Czachorski, Engineering Consultant
    d. Mackenzie Johnson, Engineering Consultant
    e. Lori Byron, Public Engagement Consultant

5. Project Background – Troy Baughman
    a. City of Ann Arbor has two separate collection systems: a storm water system and a sanitary system.
    b. The storm water system conveys most of the storm water runoff from buildings and streets. Storm water flows into catch basins to trap debris before it enters the drainage pipes. The roof drains convey storm water from the roof to the storm sewer or retaining area.
    c. The sanitary system conveys sewage, as well as some groundwater and storm water that finds its way into the system. Footing drains are buried around a structure to move groundwater away from the structure, and houses built prior to the building code changes in the 1980s often had their footing drains connected directly to the sanitary sewer. Rainwater and groundwater leak into sanitary pipes as they age. As more rainwater enters the sanitary sewer system, the pipes may become overwhelmed and may back-up into basements.

d. The property owner is responsible for maintenance and cleaning of the footing drain, cleanout, and sanitary sewer lateral connection, all the way until it taps into the sanitary main in the street.
e. City of Ann Arbor has 360+ miles of sewer pipes. In the Arbor Woods neighborhood, most pipes were installed in the 1950s and 1960s.
f. Current and Recent Wet Weather Projects:
    - Sanitary Sewer Wet Weather Evaluation Project
    - Footing Drain Disconnection Program
    - Storm Water Model Calibration and Analysis
    - Upper Mallets Drainage Study
    - Sanitary and Storm Water Systems Asset Management Plan
    - Green Streets Program – when roads are completely reconstructed, the construction takes into account infiltration of rainwater and incorporates rain gardens, porous foundations and surfaces to reduce storm water runoff.
g. This project is a follow-up to the Sanitary Sewer Wet Weather Project done in 2013 and 2014. Any capital improvement projects that are identified as part of this monitoring, investigation and analysis will not occur until at least 2019.
h. Sanitary Sewer Wet Weather Evaluation (SSWWE) Project Findings
    - Evaluated the overall sanitary sewer system capacity and the past Footing Drain Disconnection (FDD) program to assess the future risk of sewer backups in the City.
    - Recommended methods to further reduce wet weather impacts to the sanitary sewer system.
    - Identified five areas with potential capacity issues during wet weather. These five areas were analyzed in depth in the current project. After concluding the engineering and analysis in the Darlington neighborhood, the project was expanded to include the Arbor Woods area.
i. Overview of Sanitary Sewer Improvements Preliminary Engineering Project:
    - The study in 2013-14 involved computer modeling of the sanitary sewer system in Ann Arbor. Five areas with potential capacity or hydraulic issues were identified, plus one area where the City wishes to reroute part of the flow to reduce the amount that must be pumped to the Wastewater Treatment Plant (WWTP.)
    - Project Goals:
        1. Use field engineering techniques to determine if capacity issues exist.
        2. Analyze field data and determine the cause of the capacity issues.
        3. Determine the best solution based on public input and solution effectiveness.
j. Arbor Woods Area – Mackenzie Johnson
    - Computer modeling showed that sanitary sewer pipes are overloaded during wet weather.
    - Field investigation was performed to answer the following questions:
        1. Is the computer model reflecting what is occurring in the real world? (Flow metering)

2. Are residents seeing impacts of overloaded pipes? In what areas? (Resident survey)
3. Where are the flows coming from? (CCTV, manhole inspections, smoke testing)

- Meters were installed in the areas identified as potentially having issues to determine flows in the pipes and confirm the computer modeling results.
- A survey of residents was completed to understand what is being experienced in this area. 500 surveys were mailed with 111 responses (22% response rate)
  1. 53% have a full basement
  2. 14% have experienced a sanitary sewer back-up in the last 10 years
  3. 30% experienced basement flooding in the last 10 years
  4. 34% have their service leads cleaned or rodded in the last 5 years
  5. Several mentioned tree roots
  6. Several reported that they had no issues after the service leads were replaced

k. Project Results:

- Field analysis was performed over the summer season:
  1. Flow metering – measure flows during wet weather events.
  2. CCTV review – closed circuit TV inspection of sewer pipes using a robotic device with a camera.
  3. Manhole inspections – crews inspect the condition of the manhole looking at depth and condition.
  4. Smoke testing – method to find ways that groundwater and storm water are entering the sanitary sewer system. Non-toxic mist travels through the system identifying problems such as leaks, connected downspouts and roof drains.
- Field data was analyzed. Results show:
  1. Flow metering from August 16, 2016 rain event shows flows increasing to 10-15 times the normal dry weather flow in some areas, suggesting there is a significant amount of inflow and infiltration into the sanitary sewer system.
  2. CCTV is used to inspect and rate pipe defects on a scale of 1-5, with 5 being the most severe. A map of spot issues found shows a concentration of mostly grade 4 defects and one grade 5 defect.
  3. Manhole inspections found few manhole defects.
  4. Smoke testing found a few uncapped cleanouts and some areas where the manhole may have small cracks, allowing storm water to migrate to the sanitary sewer system. These items should be corrected or repaired, but are not likely to cause large amounts of inflow and infiltration.
  5. The Arbor Woods neighborhood has about 500 parcels, with an estimated 302 connected footing drains. Footing drains collect groundwater and storm water and reroute it away from the house to prevent basement flooding. Many footing drains are connected to the sanitary sewer system contributing a significant amount of flow into the sanitary system. One

method of reducing I&I into the sanitary sewer system is to disconnect footing drains. Approximately 25 footing drains have been disconnected from the sanitary sewer system through the developer offset mitigation (DOM) program.

6. The project team developed a water budget, or an allocation of the components that make up the inflow and infiltration (I&I) in a system. In this area, the I&I sources are:
    a. Manhole defects – 3%
    b. Pipe defects – 10%
    c. Smoke testing – 1%
    d. Connected footing drains – 86%
7. Computer modeling – the project engineers performed computer modeling of the sanitary sewer system using design flows recommended by the 2013-2014 Sanitary Sewer Wet Weather Evaluation project's Citizens Advisory Committee (CAC):
    - 25 year event frequency
    - + 10% additional flow (for climate change, growth, etc.)
    - + system conditions observed in the field

Modeling results show most pipes in the neighborhood have capacity to handle the flows, except for about 2000 feet of pipe in the northwestern area of the neighborhood. According to the model, the flow exceeds the capacity in these pipes during significant rain events.

l. Sanitary Sewer Improvement Options – 2 options presented:
    - Option A: Upsizing the pipe using the pipe bursting technique. Replace pipes with insufficient capacity. Approximately 2000 feet, at a cost of $500/foot = $1,000,000 or $1M.
    - Option B: Disconnect footing drains. Disconnect approximately 30% (100) of footing drains to eliminate surcharging with the current pipe capacity. Cost is approximately $10,000 - $15,000 per FDD, for a rough estimate of $1M - $1.5M.

m. Group Discussion of Improvement Options:

Option A – Upsizing Sewers using the "pipe bursting" method. Pipe bursting is a method of replacing buried pipelines without open trenches.

- Construction in the right of way
- City would evaluate water system, road condition in the area for potential joint projects
- Does not include "life cycle" cost of transport and treat nor does it remove the storm water at its source.

Option B – Footing Drain Disconnect

- Construction on the homeowner's property
- Could be more expensive

- Would still have old pipes to deal with
- City has a voluntary program to help address this topic

n. Q &A
   - Q: Residents whose homes back up to Malletts Creek see the creek rising after rain events. What's being done? Are there any plans to widen the creek? A: the Washtenaw County Water Resources Commissioner has jurisdiction over Malletts Creek, however the City is not aware of any plans to widen the creek. The City is sealing manholes in that area.
   - Q: Homeowner had downspouts piped away from her house and into her yard. Are her footing drains still contributing flow to the sanitary system? A: By piping her downspouts to the yard, she is removing some, but not all of the groundwater that would be collected by her home's footing drains.
   - Q: What kind of sanitary sewer pipes are these and what would the new pipes be? A: The pipes in this neighborhood are made of vitrified clay. The new pipe would be HDPE or high-density polyethylene. Clay pipes are very strong, but also have many joints which allow roots to enter pipes and block flows or create cracks.
   - Q: How large is the current pipe and what's the size of the new pipe? A: Current pipe is an 8". The new upsized pipe would be 12", which has double the capacity of an 8" pipe.
   - Q: What effect would it have to do more preventative maintenance (i.e. cleaning the pipes on a schedule)? A: The City is working on a preventative maintenance plan, customized based on the problems observed in certain areas. For example, newer pipes might be inspected every 10 years, while older, cracked pipes might be inspected every 3 years.
   - Q. If Option A, Upsizing Sewers, were selected, would the City also make any necessary repairs to the storm and water pipes in the neighborhood at the same time? There have been a number of broken water mains in the neighborhood. A. Yes, when the City embarks on a project to repair sanitary sewer pipes, it also evaluates the storm and water pipes, as well as the streets in that area.
   - Q: Is there a way to measure the groundwater flow from a home's footing drain to determine which parcels are the highest contributors? Unfortunately, it is very difficult to measure the footing drain flows from individual homes. Typically, measurements are made of the flow through neighborhood pipes and averaged across the number of homes connected to that pipe.

6. Recommendations
   a. All meeting participants (15) voiced their support for Option A-Upsizing Sewers, citing the condition of the surcharging pipes. No participants objected to this conclusion, although one participant supported both Option A and Option B, in order to repair the pipes and remove the storm water flow at the source. The rationale cited by participants is that the pipes with the grade 4 and 5 defects must be repaired in either scenario and because of the age of the system in the area, would likely need to be replaced in the next 20 years

anyway. Residents also supported recommending the voluntary DOM program to those who were interested in footing drain disconnections.

7. Next Steps

    a. Ongoing maintenance – clean, repair pipes with structural defects. City will perform spot repairs of these defects as a priority.

    b. Fix inflow sources found via smoke testing – manhole structures, uncapped cleanouts.

    c. Voluntary Developer Offset Mitigation program is available now.

    d. Capital Improvement Programming – More significant repairs, such as Option A-Upsizing Sewers, will have to be programmed as part of the CIP and evaluated to be performed in conjunction with other capital improvements.

ATTACHMENT #1 – Public Meeting Attendees

Last name	**First name**
Nelly	Ullman
Evelyn	Smith
Charley	Bonnell
Jan	Taylor
Diane	McIntyre
Mary	Krasny
Ron	Emaus
Fred	Castenholz
Gary	Mortensen
Patricia	Sonntag
Bob	Conlin
John	Klausmeyer
Kelly	Sullivan
Bruce	Salinger