

Sanitary Sewer Wet Weather Evaluation Project (SSWWEP) Compiled List of Questions and Answers

Last updated: 12/8/14

Table of Contents

| | |
|---|------------|
| CATEGORY 1: SWWEP DATA AND PRESENTATIONS | 2 |
| CATEGORY 2: Qs RELATED TO CAC's RECOMMENDATIONS (STORAGE, EXPANSION, FDD INSTALLATIONS)..... | 50 |
| Category 3: OTHER PROJECTS AND/OR CITY FUNCTIONS..... | 121 |

CATEGORY 1: SWWEP DATA AND PRESENTATIONS

Q. 1.1 What is the total estimated project costs of the three studies – Upper Malletts, Stormwater Model Calibration and the Sanitary Sewer Wet Weather project?

- A. Upper Malletts Drainage Study - \$215,000
Stormwater Hydraulic Model Calibration & Analysis Project - \$900,000
Sanitary Sewer Wet Weather Evaluation Project - \$1,250,000

Q. 1.2 How many sewer backups were reported in the June 5/6, 2000 storm event?

- A. Approximately 200 homes reported basement flooding.

Q. 1.3 How many sewer backups were reported during the June 27, 2013 event?

- A. 34 backups were reported. Following investigation by City Field Operations, 9 of the 34 were determined to have possibly been caused by an issue with the city's sanitary system.

Q. 1.4 How many homes have reported sewer backups since FDD work was completed in their homes?

- A. As of 2012, approximately 2500 single family homes have been disconnected as part of the FDD program.

From 2001-2012, 70 homes have reported suspected sewer backups since they had FDD work completed in their home. It is not clear whether these reported incidents were a result of the city's sanitary sewer being overwhelmed during a storm event or if the incidents were caused by something different (blockage, tree roots, issue with private lead, etc.).

2014 update: Following the results of the 2013 FDD Survey, the City contracted with an experienced construction engineer to investigate all reports of sanitary sewer backups mentioned in the survey. The construction engineer investigated those homes and found no instances of an FDD causing sanitary sewer backups. Causes of the sanitary sewer backups were typically failed sewer leads or broken pipes under the basement.

Q. 1.5 The Washtenaw County Water Resources Commissioner and the Sanitary Contractor has indicated dilution rates of 2% to 7% from footing drains, and 40% from leaking pipes. Why is the City focusing efforts on FDDs rather than leaking pipes?

A. The purpose of the FDD project was to reduce the incidents of basement backups in the five neighborhoods that had experienced 50% of all reported basement backups in the City during wet weather. The next phase of the SSWWE project will investigate the system's hydraulic performance and will determine whether infiltration is a concern. That information will inform the recommendations made to City Council.

In addition, Evan Pratt, PE, Water Resources Commissioner, Washtenaw County, provided this information:

“Thank you for taking the lead on this item, and thank you to the CAC members for volunteering the time.

The list looks pretty comprehensive, and although I have not reviewed in detail since the sewers are not our area, it looked like Question #43 warrants response from this office, and subsequent clarification, as the numbers being questioned are unrelated. In summary, the smaller number is about flow in a large storm pipe, and the other is most likely about clean water entering a much smaller sewage pipe. Although I do not know the exact size of the sewer pipes in this neighborhood, they are much smaller than stormwater pipes, as detailed below. It is a point of fact that a flow component that eats up 36% of a 1' pipe will only eat up 1% of a 6' pipe. This is not an obvious point to folks who do not deal with these things on a daily basis, so the confusion is understood as I have clarified similar questions many times. Many of the other questions look similar to what people in other communities have raised when they are going through the process of learning the cause and potential solution to wet weather issues in sewage systems.

I would also like to clarify that my number was estimated to ensure conceptual cost estimates would not need to be revisited regardless of how the sewer study turns out. I was taught long ago to keep the initial concepts conservative, as spending less money on final design and installation is not usually an obstacle. Since the sewer study is not complete, we are providing a conceptual recommendation that will achieve and slightly exceed the stated goals the County's Upper Mallett's Creek Study to address flooding in the neighborhood, regardless of the outcome of the sewer study.

So there is no purpose to comparing capacities of different sized pipes designed for totally different purposes in determining the best strategies for sanitary sewer. As appropriately identified in the last sentence of Question #43, the important issue is to determine where the clean water that gets into the sanitary sewer is coming from. I presume that the City's study will at some point include discussion on the breakdown between footing drain water, groundwater, and rainwater entering the sewer system through cracks or otherwise. While “leakage” may not be quite the right term, it sounds

like folks have incorrectly interpreted the numbers in Question #43 as evidence that the majority of clean water entering the sewers is coming in through cracks and openings in pipes and manholes. I do not know the facts on this breakdown, so I will leave it to the City to present those facts.

I also offer the following detailed clarification in case there are CAC members who might like to see more back-up for the statements I have made above:

1. These numbers are unrelated in three ways. First, the numbers (2-7%) attributed to me are not a dilution rate for clean water in a sewage pipe, they reflect a very conservative estimate of how much capacity of the stormwater pipes only in Upper Malletts might be utilized if all 1700 homes in our study area were disconnected and discharged into a storm pipe in this neighborhood. The concern raised at the first public meeting for the stormwater study was that during a flood situation, full pipes could not handle any more water, a very reasonable concern in my opinion, so I promised we would account for that concern in any recommendation. I do not know what the 40% specifically references, but from prior discussion with Mr. Bill Higgins, I infer that the 40% may be a number in a sanitary sewer report identifying what percent of flows in the sanitary sewer system are attributed to rainwater, possibly on a City-wide basis, but it is also possibly a representation of plant capacity vs average pipe capacity – again, I don't know the source of the number so will leave it to the City to clarify. I presume that this 40% is also based on some actual field data collection during storms, and is a measure of the capacity used up for one particular type of storm (like the 25 year, 24 hour or the 10 year, 2 hour, etc) – typically, I understand this percent of the pipe or plant consumed by rain will vary depending on the amount of rainfall in a given storm, and whether or not the pipes are filled to capacity.
2. Secondly, while this may not be obvious to the layperson, it sounds like the response may need to explain that capacity design for sewage pipes and stormwater pipes (or other aspects of the respective systems) are unrelated. Sewage flows are predictable and much smaller than the massive amounts of water resulting from the wide range of rain events we see in the Midwest. The 10 States' standard design manual for sanitary sewers is used throughout the Midwest because sewer flows are generally the same throughout. But just in Michigan alone, there are 10 different zones of varying rainfall, and the amount of rain for all recurrence frequencies (10-year, 100-year, etc.) varies within each zone. The net result is that a sewage pipe is much smaller, so the same volume of water will take up a greater percentage of pipe capacity in a smaller sewage pipe than the much larger stormwater pipe. The example I used in talking to Mr. Higgins is the County storm pipes in Upper Malletts are mostly from 4' to 6' diameter. I don't know the size of the sanitary sewers, but 1' to 1.5' diameter might be typical. Due to the

exponential relationship between diameter and cross-sectional area, along with the direct relationship between area and capacity, that the 4' pipe can carry 16 times as much water as a 1' pipe, although the diameter is 4 times larger. And the 6' pipe can carry 36 times as much water as a 1' pipe, 16 times as much as a 1.5' pipe. Obviously the same multiplier goes with the percentages of capacity – a flow component that eats up 36% of a 1' pipe will eat up 1% of a 6' pipe.

3. Third, the numbers attributed to me are rough conservative estimates to ensure there is space at each site for the worst case scenario flowing to our proposed solutions, so our calculated FDD volume is intended to be greater than what is calculated from real field data when the City's sewer study is complete. When the sewer study is complete, I would expect that regardless of the recommendations of that study, the size of the basins could be reduced a bit to account for only the groundwater component of footing drain flows in this neighborhood, because our stormwater calculations and modeling already account for rain that hits rooftops or other areas that may route rain into footing drains. Using more accurate numbers from the sewer study would allow us to still meet the stated goals of full protection for an event like 3/15/12. As noted above, I was taught long ago to keep the initial concepts conservative, as spending less money on final design and installation is not usually an obstacle. Since the sewer study is not complete, we are providing a conceptual recommendation that will achieve and slightly exceed the stated goals to address flooding in the neighborhood regardless of the outcome of the sewer study.

The main point of this email is to clarify that the numbers compared in Question #43 are unrelated, and what really matters is how the clean water is getting into the sewer so the best strategies can be compared.

If I understand the last question of #43, I would suggest that #43 could be restated to say that folks are looking to understand where the clean water is coming from so they can understand and debate the most effective strategies to get water out of the sewer. The detailed point that I felt warranted a response from this office is that our purpose and method of arriving at an estimated FDD volume is different from the City's, and should not be used for the purpose of sanitary sewer evaluation, because I directed our consultant to over-estimate the impact on the stormwater volumes from FDDs. Again, the purpose was to ensure conceptual feasibility for recommendations to address flooding in the neighborhood, specifically with respect to the area and preliminary cost estimates needed for storage basins regardless of the outcome of the sewer study.

I trust this is helpful, if a bit lengthy, understanding that these are not issues that folks deal with on a daily basis. You all are asking good questions that frequently come up in

communities with wet weather issues in their sewer and stormwater systems, and I appreciate the time volunteers are putting in to help the decision making process, since I live in the City and will no doubt help fund whatever the solution is through my utility bill!”

Q. 1.6 Are you accessing all of the historical data from previous studies?

A. Yes, all the data from the previous studies will be used to determine the baseline conditions for the current study.

1.7 What is the actual capacity of our sanitary sewers? Is development overloading our sewers? Are you accounting for future development in your model?

A. The capacity of the sanitary sewer system and its ability to handle existing and projected future flows is part of the scope of this evaluation study. We’ll address these items during the alternatives evaluation and will account for future development.

2014 update: Based on the metering and hydraulic analysis performed during the SSWWE Study, the City’s sanitary sewer system has adequate capacity even with future growth, with the exception of five specific areas. Each of these areas shows a hydraulic anomaly that should be investigated further with on-site flow metering to determine the cause of the problem (such as a pipe blockage, or a crumbling manhole.)

Q. 1.8 How would changes in sanitary flow be accounted in terms of building permits, water sales, etc.?

A. We can quantify historic changes in the base sanitary flow from building permits, vacancies, and commercial/industrial changes with the flow metering data. We will also identify how projected trends in populations will impact future base flows. The future base flows will be accounted for during the alternatives evaluation.

Q. 1.9 How do you account for student populations changes in summer?

A. Changes in student populations in the summer will have an effect on the base sanitary flow and this effect can be quantified from the flow metering data. This changing student population will not have an effect on the wet weather flows in the sanitary sewer system.

Q. 1.10 How does your model track soil wetness?

A. The antecedent moisture model tracks the soil wetness using two techniques:

- The first technique uses the rainfall immediately preceding the storm to track the soil wetness conditions from recent storms.

- The second technique uses the air temperature to account for seasonal wetness conditions. (Cooler temperature periods tend to retain more moisture).

These techniques were identified and validated through extensive analysis of actual system flows from many systems around the state and the Midwest.

Q. 1.11 How did you come up with meter selection in 2013 versus prior years?

A. The 2013 metering sites were selected based on the 2001 study and the 2007 study meter locations. We also added several meters to monitor specific areas of concern along the City's trunk sanitary sewer lines and to measure flows from the Townships.

Q. 1.12 Why are there seven meters in Pittsfield Township?

A. Portions of Pittsfield Township discharge to the City's sanitary sewer system. Because of that, it is important to understand the wet weather flows coming from those areas when evaluating the City's sanitary sewer system capacity.

Q. 1.13 Are you measuring rainfall that is in ground before a rain event?

A. The antecedent moisture model that we will use to perform the system modeling does account for the wetness conditions in the soils before and during a rainfall event.

Q. 1.14 The rain gauges are very useful for data collection. Can you keep them in place?

A. There are already several permanent rain gauges located around the city. The City will consider the possibility of adding additional permanent rain gauges and flow meters during this study.

Q. 1.15 Are you considering stormwater retention system overflows in your model?

A. Yes, but not as part of this project. Stormwater retention systems that overflow or cause surface flooding issues will be evaluated as part of the City's Stormwater Model Calibration project.

Q. 1.16 How will you measure storm flows that come from the County?

A. Storm flows from the County are relevant to the Stormwater Model Calibration project and will be accounted for there.

Q. 1.17 Are you accounting for the addition of sump pump flows in the storm sewer system?

A. Yes, but not as part of this project. The Sanitary Sewer Wet Weather Evaluation project is focused on quantifying the effectiveness of the flows removed from the

sanitary collection system. The City's Stormwater Model Calibration project will evaluate the impacts of dumping water from sump pumps into storm sewers.

2014 update: Per the Stormwater Model Calibration project, flows from footing drains have minimal effect on the City's stormwater system (noting that stormwater pipes are typically many times larger than sanitary pipes.) Analysis showed that stormwater flows generated by FDD installations generally contribute less than 2% of the pipe capacity and less than 2% of peak storm flows.

Q. 1.18 How are you measuring flows from/to the Wastewater Treatment Plant (WWTP)? For what years?

A. Flows at the WWTP are measured using a system of flume flow meters. We will use flow data from the WWTP for the years 2000 through 2013. This time frame corresponds to the period of pre- and post-FDD flow metering.

Q. 1.19 How are you factoring in high groundwater into your model?

A. The groundwater level affects how quickly groundwater seeps into the sanitary sewer system. Ground water levels are recorded in the flow metering data. The antecedent moisture model specifically simulates the ground water infiltration flow component in the sanitary sewer system.

Q. 1.20 How are you measuring the 3 different flows (rainwater inflow, rainwater infiltration and ground water infiltration)?

A. In two ways: First, the flow metering records a single wet weather flow pattern from each storm. Second, we break down the wet weather flow pattern. The antecedent moisture model uses digital signal processing to separate the flow pattern into three wet weather flow components: rainwater inflow, rainwater infiltration and ground water infiltration. Each flow component reacts differently to rainfall, so each needs to be modeled independently.

Q.1.21 Will you take data from other studies?

A. Yes. In this study we will use flow metering data from past studies - including the flow data collected in 2000 and 2007 - to evaluate the effectiveness of the FDD program.

We will also coordinate with the other studies the City is performing to make sure that we are pooling and using all the relevant information. For an organization chart of the related wet weather studies that the City and/or County are currently performing, paste this url into your web browser <http://bit.ly/19WgWsM>.

Q. 1.22 The Malletts Creek surface water study is happening simultaneously, could it address the sanitary flows in those neighborhoods?

A. The Malletts Creek Stormwater Conveyance Study is being administered by the Washtenaw County Water Resources Commissioner who does not have jurisdiction with the city's sanitary sewer system. However, the study is aware of the City's Footing Drain Disconnection Program and is taking into account the impacts the FDD program has on the existing stormwater system within the study area.

Q. 1.23 Are you addressing key environmental issues – like sanitary sewer overflows into the Huron River?

A. Understanding the risk and frequency of sanitary sewer backups and overflows is a key goal of this project. The level of service, risk and frequency of sanitary sewer overflows will be addressed during the alternatives evaluation.

Q. 1.24 What is your criteria for determining whether or not FDD is working?

A. Determining the effectiveness of the FDD program is one of the major pillars of the SSWWE project. First, we are measuring the amount of stormwater/groundwater that enters the City's sanitary sewer system now. Then, we will compare it with the amounts that entered the system before the FDD program began. Finally, we will compare the amount of stormwater/ groundwater that was removed to the goal that was set for the FDD program.

Q. 1.25 Why only a 6 month flow monitoring period? Winter is very unpredictable regarding rainfall.

A. The wetness conditions of the soils vary significantly from spring to summer, and monitoring from March through August is typically adequate to measure the impact that this variation has on wet weather flows in the sanitary sewer system. We also have a long period of record at the WWTP (over 10 years) to assess long-term system performance. Winter events are not usually used in the analysis because there are enough other events during the six-month period to accurately quantify the flows.

Q. 1.26 Does the dry March that we had impact the credibility of your study?

A. Although March was dry, it was cool, and April was relatively wet. Together, these conditions preserved the typical spring wet weather flows that we hoped to record, and we believe there will be enough data to perform the flow evaluation.

December 2013 update: Over the six month monitoring period there were ample wet weather flows to record, including large rain events in June and August 2013.

Q. 1.27 How do all five districts compare in before FDD/after FDD storm response?

A. See the comparative graphs OHM developed for the five districts for the June 2000 storm, the June 27, 2013 storm and the August 12, 2013 storm; [CAC October meeting materials and summary](#).

Q. 1.28 The March 15, 2012 rain in the Lawton area was a very significant event. Are climate change and large rain events going to be considered in your process?

Q. Are you taking into account long-term weather forecasts (climate change)?

A. Quantifying the impacts of climate change on long-term weather is a very complex technical issue. This item can be addressed by the CAC during the alternatives evaluation phase of the project. For example, the CAC can consider the cost versus the risk of failure (i.e. a larger storm overwhelming the system), where the risk includes an allowance for larger rainfalls as a result of climate change. We are reviewing the most up-to-date rainfall statistics and will consider these when making recommendations.

Large rain events produce very valuable data for a study like this and will be evaluated in this process. It is difficult to forecast the impacts of climate change on rainfall patterns. This study does not include a specific task to address climate change as part of the measurement. However, there is a phase of the study called “alternatives evaluation” where the project team will gather and evaluate different approaches to manage wet weather flows to the sanitary sewer system. During this alternatives evaluation phase, the project team, together with the Citizens Advisory Committee, will have the opportunity to consider the impacts of climate change when setting the future level of service for the system through the risk-based design approach. This item can be taken up by the Citizens Advisory Committee working with the subject matter experts in the Technical Oversight Advisory Group.

Q. 1.29 Has the City prioritized the disconnect studies to justify the 2001 decision?

A. A study of the effectiveness of the Footing Drain Disconnection program in reducing basement backups during wet weather has been in the City’s Capital Improvement Program for several years. With the FDD program in place for ten years and City Council’s partial suspension of the program, requesting further study, the City’s Project Management team undertook the Sanitary Sewer Wet Weather Evaluation Study in 2013.

Q. 1.30 Have you put monitors in homes that have participated in the Footing Drain Disconnection Program?

A. Yes, sump pump monitoring has been happening since 2002. Over 75 homes have been monitored to date. You can download and [view the monitoring data](#) [52MB file]. It is available on the City’s project website www.a2gov.org/SSWWE > Library.

Q. 1.31 Did you make a prediction in advance about the results?

A. Yes. We estimated peak flows of 3 to 5 gallons per minute per house – the same estimate made at the outset of the Footing Drain Disconnection program. This value is consistent with generally accepted standards for peak flows from footing drains. It should be noted that this is an accepted peak flow rate averaged over many houses. For any individual house, the actual peak flow from the footing drain can vary significantly.

Q. 1.32 Are you studying how the flow from the recently installed sump pumps increases surface flooding?

A. Yes, this will be studied as part of the Stormwater Hydraulic Model Calibration & Analysis Project.

Q. 1.33 Have you considered measuring flow directly on the curb line to determine the flows from FDDs? (The “curb line” is the small PVC pipe that is installed to collect the FDD flow from several houses and connect it to a storm inlet.)

A. Subsequent to this comment, we contacted Martin Control Services (MCS), the City’s flow metering contractor, to inquire about metering these connections. The best way to meter the flow from a pipe like this is a direct measurement with a bucket and stop watch during a rain event, because the flow and pipe size are too small for traditional continuous metering. MCS mobilized on the morning of October 31, 2013 during a moderate rainfall event (approximately 1-inch of rain over 12 hours) to make a direct measurement of the flow in a sample curb line in the Orchard Hills subdivision. The curb line they metered collects sump pump flow from 5 houses. MCS also made a measurement of the flow in the 10-inch pipe that was metered during the flow-metering program. These measurements, and subsequent analysis, show that approximately 66% of the total flow generated (i.e. the total of the flow in the 10-inch sanitary pipe and the footing drain flow in the curb line) is from footing drains. Additional information on this measurement was presented to the CAC at its December 12, 2013 meeting.

Q.1.34 OHM has indicated that the October 31, 2013, flow test performed on the horizontal bored curb line included 5 total FDD homes. It has also been stated that the location of many existing catch basins is such that only a limited number of homes (5,6,7,8) are connected to the new curb line before being discharged into the nearest catch basin. On Winsted Blvd, there is only one catch basin to handle the entire cul de sac. There are 10 to 12 homes per each side of the street. Will the capacity of the new horizontal bored curb line be adequate to accept the simultaneous flow from 10 to 12 FDD sump pumps?

There are 4 separate curb drains installed on Winsted to serve the existing homes located along this street. The curb drains on Winsted were installed with the intention of serving no more than 5 homes per curb drain. However, using the average peak flow of 4 gpm per home, a curb drain pipe at minimum slope (1%), can serve 68 homes (see below). If we use a sump pump maximum discharge rate of 30 gpm, a curb drain has the capacity to serve 9-10 homes.

-Pipe capacity for a 6" diameter HDPE at 1% slope, capacity is 0.61 cfs.

-Peak FDD production for 1 single-family FDD = 4 gpm = 0.009 cfs

-Maximum FDD equivalent for each curb drain run = curb drain capacity / peak FDD production = 0.61 cfs / 0.009 cfs = **68** single-family FDDs.

Q. 1.34b What is the impact to the flow of the horizontal curb line IF the catch basin is totally surcharged from storm surface water flowing into it from along the curbs? Note, this total surcharging DID occur during the March 2012 event, and it is also "substantially" full during most heavy storm events.

A. The air gap outside a home is designed to allow for water to escape/discharge from a sump pump in case of an event where the downstream storm lead and/or curb drain is not flowing due to blockage, high flow conditions, etc.

Q. 1.35 What refined data exists in quantifying footing water volume and duration?

Q. I also need a source for the 70-90% figure for total volume in the sanitary sewer system supposedly from connected footing drains. I'd like to see what CDM has to say about the basis for that number, which has been stated to be studies. I need a study to back up the figures. The SSO Report has no source for those numbers, as far as I know. Others documents have said 'studies have shown.' Are there studies?

Q. What is the backup for the claimed 90% dilution rate and annualization justification?

A. Note that the percentages typically mentioned are 70% to 90%. In addition to the flow monitoring analysis presented during October CAC meeting, and curb line monitoring data from previous question, see response below for multiple measurements conducted. The final results of the flow monitoring and engineering analysis will be presented to the CAC at the December 12 meeting and to the public at the January 16 meeting, as well.

This question was posed to CDM (who did the 2001 study), and their response is pasted below in italics. The key take away is that they were estimates – very soon we will have the actual values computed.

Tables 6 & 7 and Figures 6-8 in the Duluth paper “Was it Worth the Price” that was presented to the “Best Practices” sub-group has some good study results. We also provided the sub-group with the Auburn Hills report. These studies both show fairly significant flow removal rates from FDD. There is not much dispute in the industry that FDD can be very effective at removing flows.

The key questions for Ann Arbor is how much did their FDD program remove, and then given that knowledge, the current state of the system, and the desire of the public, what is the best way to move forward from here? Those items will be our focus for the next several months of the study. The first piece (how much flow was removed) will be ready very soon, and tabulated using multiple techniques and multiple measurements. The second piece (where to go from here) will be performed over the winter and spring. All options are on the table and will be explored, and the City has made it clear that they hope and expect that the CAC will make a recommendation.

Message from Mark TenBroek, CDM dated 11-7-13

The SSO report presented an estimate that 70%-90% of the observed I/I during wet weather was likely from connected footing drains in the study areas. This estimate was largely based on the following data sources:

- **Direct Storm Measurements** – CDM Smith identified 20 house leads in Ann Arbor during the SSO project that discharged directly to manholes. During two rain events, 14 of these locations in 4 of the study areas were measured using a bucket and stopwatch method while flow metering was concurrently taking place in sanitary sewers. A comparison of these measurements led to the conclusion that 70% to 90% of the I/I flows were sourced from connected footing drains.
- **Pilot FDD Monitoring** – Pilot FDD work was performed after the flow metering was completed to establish the range of expected flows generated by disconnected footing drains. These monitored sump pump flows were consistent with the directly monitored house leads, which estimated peak flows in the range of 3-5 gpm/home for large storm events.
- **Peer Community Observations** – Footing drain disconnection work had been performed in West Lafayette Indiana, Canton Township, and Auburn Hills prior to the Ann Arbor SSO study. These peer communities had observed reductions in I/I after the disconnection of these footing drain sources, but the percentage of I/I flow from these sources had not been quantified at the time of the SSO study.

After the SSO project was completed, additional data was collected as the FDD program proceeded to develop additional evidence of the source of I/I that was observed in the sanitary sewers, as described below:

- **Southeast Michigan Sump Pump Monitoring** – After the SSO project was completed, CDM Smith deployed a number of sump monitors in homes around SE Michigan that were of a similar vintage as the Ann Arbor homes, but where sump pumps had been installed. This was done as part of the DWSD Wastewater Master plan. The monitored sump pump flows were similar to that observed in the pilot FDD installations in Ann Arbor.
- **Continuing Ann Arbor FDD Sump Pump Monitoring** – CDM Smith installed a large number of sump pump monitors that were moved to new sump pumps as the FDD work was performed in Ann Arbor. This data collection was performed from 2001 until present. The results of that work show that while the peak footing drain flows are variable for individual homes, the average of the peak flows generated by footing drains was typically in the range of 3-5 gpm/home during large storm events.

Q. 1.36 The only dispute I have ever had with the volume and rate of footing water is in using either a dry weather number or a wet weather number and extrapolating them beyond the storm event. If you look at the "spike" chart, the peak might be shown as producing high volume for, say, three minutes. During the event the volume rises from a "normal" flow to that peak then drops back toward that normal level. Yet in almost every instance, the elevated level is multiplied for a duration of an hour or longer. It is the peak/storm duration volumes we have to deal with, and that is what points to short term retention. This can be clarified. It does not make sense to me, to burden over 18,000 households (plus an unknown post disconnect number) with a sump pump penalty instead of retention, if a projection of new water/sanitary/surface customers is considered. We have serious surface water problems. With all the technology available to us, we need to develop a means of determining which business or resident has a high volume footing drain problem, and resolve them and not impose sump pumps in low volume instances. If you recall the initial SSWWE meeting, there were accusations that the CAC's were biased and not necessarily representative of the public. Possibly their responsibility and duties need to be more clearly explained. For this reason I will remain independent. Thank you though for your inclusive mail, especially for your retention work.

A. Each sanitary collection system that we have studied is unique and has unique characteristics that drive the cost-effective engineering solution. The engineering options depend on the magnitude of the wet weather flows, the location that wet weather flows are generated, the location of hydraulic bottlenecks in the system, and many other factors. Examining these characteristics is the next step in the process -

hydraulic capacity and alternatives evaluation. The first step was to quantify the impacts of FDD on the sanitary sewer flow. We had to understand that impact first, before we can evaluate further alternatives.

Storage is a very common method of addressing peak wet weather flow, and we will be including many examples in our presentation to the Best Practices sub-group of the CAC next week. A few things to keep in mind about storage:

- As you pointed out, storage can be very effective for systems with “spiky” peak flows and the timing of the peak flows has a tremendous impact on the storage size. That is why it is very important to understand the flow characteristics of the system (the step we are in now, and will be reporting on Dec 12).
- The viability of storage depends on the location of the bottlenecks, relative to the location of the wet weather flow generation. For example, if high wet weather flows and bottlenecks are upstream in the system, building storage downstream won’t help. The storage has to be located upstream of the bottlenecks to work. That is why it is critical that we understand the hydraulic capacity of the system - that’s the next step.
- For a traditional storage tank, a large amount of land has to be available near the location the storage is needed (very common for 2-5 acres or more needed). That can be a significant challenge in a built-out area. We understand that it was a concern with the SSO task force in 2001 - we have heard stories of concerns by the task force about putting tanks in parks and wooded areas and negatively impacting these natural resources.
- There are other alternatives to traditional storage tanks to store flow - linear storage and storage shafts. Linear storage can be accomplished by constructing an oversized pipe - perhaps on the order of 6-12 feet in diameter for a length of several thousand feet to store the flow. Often, these are constructed by tunneling, which can reduce the surface impacts. One disadvantage of tunneling is that it can be more expensive than a traditional storage tank. We will be including several examples of tunnels in our material for the Best Practices group. Some communities have also built deep shafts for storage. Tunnels and shafts have the added risk of complex, deep underground construction. There are many examples of failed tunnels and storage shafts.
- Depending on the depth of pipes, and conflicts with other utilities, it may be possible to build linear storage with “open-cut” construction techniques. This has a short-term disturbance to the surface during construction, but can be less costly and have less risks than tunneling. The viability of this option depends on the location, the

depth of the sewer, the presence of conflicting utilities, the extent of surface restoration impacts and other items.

As you can see, evaluating alternatives is complex and entails many competing decisions and values. The City and the OHM team can present engineering costs and impacts, but the optimal engineering solution is not necessarily the best solution for the community. Hence the need for a Citizens Advisory Committee to weigh these options and recommend what is best for the community to balance the ever competing challenges. These are the types of discussions we plan on having as part of the next step with the CAC.

A few technical items to address a few of your other comments:

- It is fairly straightforward to show that stormwater flows are much, much larger than FDD flows, and that FDD flows are much larger than normal sanitary flow. The conclusion is the same whether the computation is done based on stormwater volume or peak flows. This is not unique to Ann Arbor - it is a very common observation from systems around the Country. I'd be happy to review the basis of this conclusion with you.
- In making computations of stormwater volume, the duration should be matched with the duration of the rainfall being applied. Often, for stormwater computations, a peak-hour rainfall is used (something like 1.8-inches in an hour), and so the volumetric computations are made on an hourly basis. This is often done to simplify the computations to illustrate basic concepts. You are correct that the impact depends on the pattern of the rise from the base condition to the peak condition and back to the base again. This is called a hydrograph. We examine the impact of the full hydrograph on the sewer system, and will often summarize the results in terms of the "peak flow" or hydrograph "volume" to provide some simple metrics for comparison. Underlying these metrics are the detailed hydrographs. I'd be happy to review the underlying hydrographs with you, or the CAC. We will have hydrographs available for viewing at the Dec 12 CAC meeting if there is interest, and time depending.
- The City did indeed target the "wettest" area of the system with the five priority districts for FDD. The metering is showing that these five priority areas had peak flows that were 20-30 times average during wet weather events in 2000 before the FDD, when more common rates are 3-8 times average. As we presented in the October CAC, the post-FDD flows in these districts from 2013 appear to have been reduced to the more common range of peak flows during large rain events. On December 12, we will be reviewing the results of the full-

evaluation of these flows, including the application of three scientific methods to quantify the impact of the FDD on sanitary flows.

- We are not aware of a technology that can determine which specific houses or businesses will have high FDD flow. It is very challenging to meter the flows from an individual footing drain before it is disconnected. While there are some indicators, the flow variations from house to house are very sporadic. There are instances of a very high flow FDD right next to a house that is very low. The best technique that we are aware of is to perform flow metering at the neighborhood level, and target those areas with the highest flow. Areas with a high propensity for basement backups are also an obvious target area. Pilot FDD with sump monitoring is then an effective method of verifying the appropriate areas. We understand that these techniques were the basis of the five priority areas identified in 2001.

Please note that I have intentionally kept this message at a summary level. I'd be happy to get into more details, but it is not effective to do so via email. If you would like to get into more details, I would be happy to meet with you. I did this a few weeks ago with a CAC member with a pad of paper, pencil and calculator, and I think it was very helpful.

Q. 1.37 If you were to measure footing water and household water during a rain event and also during a time of day when the household use is very low, naturally most of the water will be from the footings, even though the amount and rate of flow is low. Thus large percentage numbers could be flashed without qualification.

A. Peak flows during rain events drive the design of sanitary sewer systems, and high peak flow can overload the system and cause basement backups and sanitary sewer overflows (SSOs). One objective of the SSWWEP is to identify alternatives to address basement backups and SSOs. For this reason, it is critically important that we understand the impact of FDDs on peak flows and the volumes generated from rain events. These will be the focus of the FDD evaluation phase of the SSWWEP.

Q. 1.38 Craig Hupy was quoted in the Ann Arbor.com article on 4/20/2012 as follows: "When we started the FDD program, we were concerned about the additional load on the stormwater system," he said. "And even in the largest events, the modeling we did showed that it was a fraction of an inch — between an eighth and a quarter inch more water in the street — so it's diminutive compared to the water falling in the big events."

"If we didn't have the FDDs in that rain event, we would have had basement backups downstream of them. We didn't have any," Hupy added. "Given the intensity of that storm, she would have had surface flooding whether we had done or not done FDD, so I feel very comfortable saying FDD did not have a material effect on the surface flooding. "

The above Craig Hupy quote implies, on one hand, that the flow from FDDs is relatively small or "diminutive compared to water falling in the big events." The quote also implies that FDDs prevented sanitary back ups from some basements. How can the claim of "70% to 90% of total sanitary flow caused by footing drains" (as previously presented to the CAC) be reconciled with the "diminutive" statement above?

Q. Can the City provide a "lay man's" diagram that illustrates OHM's analysis of storm and sanitary flows?

A. Craig Hupy was speaking about the impacts of FDD flow on the stormwater system. Stormwater flows are much, much larger than the flows from the FDD, and the "diminutive" statement was in reference to that comparison. The statement that 70-90% of the total sanitary flows is caused by footing drains is a comparison of the flows in the separate sanitary sewer pipe. These are comparisons and percentages of flow in different systems. Because stormwater flows are much larger than FDD flows, and FDD flows are much larger than normal sanitary flow, the FDD flows are a relatively large component of the flow in the sanitary system, but a relatively small component of the flow in the stormwater system.

To further illustrate this point, we have outlined below a comparison between the flow generated from a single house from typical sanitary sewer flow, footing drain flow and stormwater flow. We have also prepared a comparison between a typical sanitary sewer pipe and a typical storm sewer pipes in the figure below.

Comparison of stormwater runoff volume to FDD volume - a simple example:

Ann Arbor characteristics from 2010 census (from semcog.org):

- 6,345 acres of single family housing
- 19,725 single family units
- 0.32 acres per avg single family parcel
- 43,560 square feet (sf) per acre
- results in 13,940 sf per avg single family parcel

Runoff from 1.8-inches of rain in an hour (common storm sewer design rainfall):

- 1.8 inches / 12 = 0.15 feet
- rain volume from average parcel = 0.15 ft x 13,940 sf = 2,091 cubic feet (cf)
- fairly common for residential area for 35% - 50% of rain to runoff as stormwater.
- **stormwater runoff range of 732 - 1046 cf**

Compare to sump pump volume:

- 3-5 gpm from a sump pump
- 180 gallons - 300 gallons in an hour

- 7.48 gallons per cubic foot
- **sump runoff range is 24 - 40 cf**

Compare to typical sanitary volume:

- 100 gallons per person per day typical (see reference below on typical household use)
- 2.2 people per household in Ann Arbor (from semcog.org)
- 2.2 people per house x 100 gallons results in 220 gallons per day per house
- That is 9 gallon per hour
- 7.48 gallons per cubic foot
- **Typical sanitary flow in an hour is about 1.2 cf**

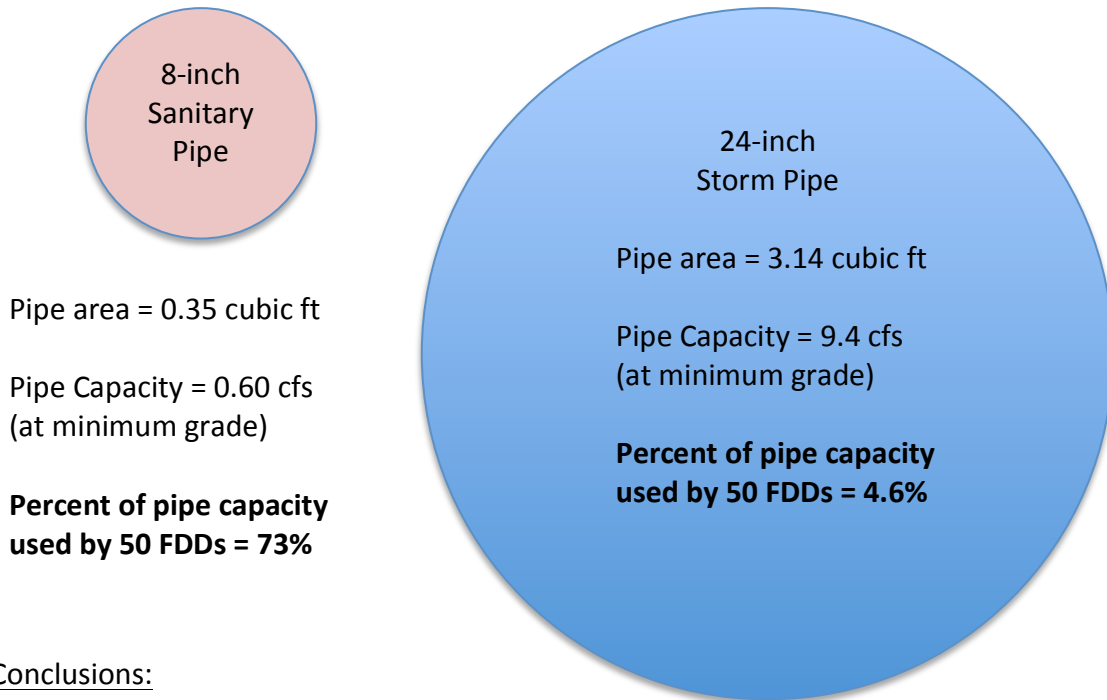
Note: the sump pump volume is probably a little over estimated, as 3-5 gpm is more typical for a larger storm in the 2-4 inch range over more than an hour. The rule of thumb for FDD flow is about 1 gpm per inch of rain on average. So for this example, 1.8 inches in an hour might produce something like 2 gpm. I used 1.8-inches of rain in an hour because that is a common storm sewer design rainfall, and keeping everything to the volume in an hour made the computations simple. Actual hydrograph computations of runoff would be more complex and more precise, but would show the same conclusions.

Comparison between a typical sanitary pipe and a typical stormwater pipe:

Because storm water flows are much larger than sanitary flows (as demonstrated above), the stormwater pipe tends to be much larger than the sanitary pipe in a typical street. Storm and sanitary pipes can have a tremendous range in sizes depending on the size of the area served and the slope or grade of the pipes. To illustrate the different carrying capacities, we have provided the illustration below that compares an 8-inch sanitary pipe to a 24-inch storm pipe, which are very common pipes sizes for city streets. We have also compared the capacity of the pipe to the flow from 50 footing drains, which would be a very common number of houses serves by pipes of this size.

Notes:

- These illustrations are to scale (the 24-inch pipe is three times the size of the 8-inch pipe in the illustration).
- The percent of pipe capacity used by 50 FDDs was based on 4 gpm per FDD, which results in a flow of 0.44 cubic feet per second (cfs) from 50 FDDs.



Conclusions:

1. Sump pump volume is a small fraction of stormwater runoff volume. Footing drain volume is a large portion of sanitary sewer wet weather volume.
2. Typical storm pipes have a much larger carrying capacity than typical sanitary pipes (15 times more in this examples).
3. Footing drain flow rates are a large fraction of the capacity of a typical sanitary sewer pipe. Footing drain flow rates are a small fraction of the capacity of a typical storm sewer.

Q. 1.39 Do we have a control to other neighborhoods for the 2000 storm?

Q. Is there a control for the three graphs OHM put up at the October 29 SSWWE CAC meeting? Robert C. (OHM) said that the whole City can act as a control because the FDDP has not had much impact on the volume of the system citywide. If so, doesn't that contradict the premise of the FDD program--which is to reduce sewer backups and avoid overflows into the Huron?

A. There is not an “ideal” control meter on a small upstream neighborhood without FDDs. However, the wastewater treatment plant (WWTP) is working as a suitable control district with some limitations. The limitations include changes in the system over the last 13 years such as new development (baseflow), and the fact that the flows at the WWTP may have decreased slightly themselves as a result of FDD. Because houses with FDD comprise only about 5% of the total houses in the City, the WWTP is functioning as a suitable control, despite these limitations. It should be noted that a decrease in flows

at the WWTP as a result of FDD would tend to result in the underestimation of FDD flow removals in the priority neighborhoods, when the WWTP is used as a control.

Q. 1.39 What are the details of the 30-30 sump pump counters?

A.22. A pump test is performed when the sump pump monitor is installed. The data collected from the pump test is used to calibrate the monitor. The monitor records when the pump cycles on and when it cycles off. When the data is collected (the monitors can store several weeks of data) it is then converted to an approximate gallons per minute of water pumped from the sump pump, based on how often the pump cycles "on".

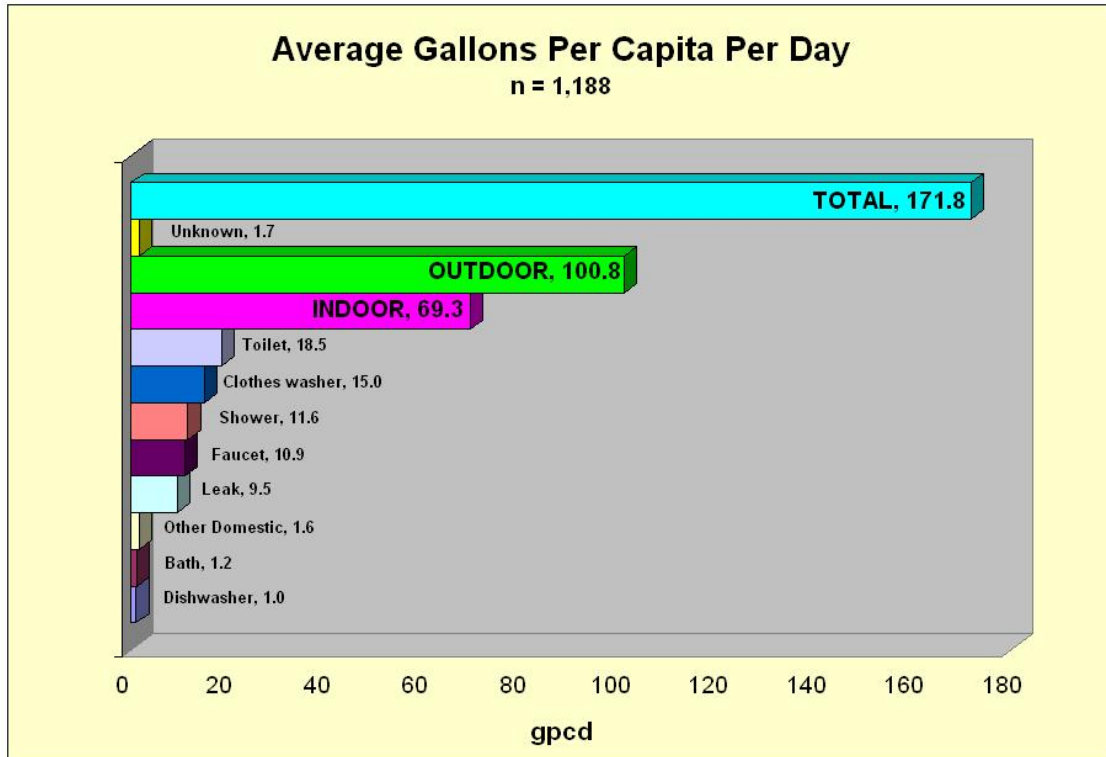
Q. 1.40 How many counters are in place in Lansdowne and Churchill?

A. There are currently six sump pump monitors in the Lansdowne and Churchill areas.

Q. 1.41 What kind of impact does personal use have on storms and flows? (Showers, laundry, etc.) Could it be skewing the data?

A. The chart below shows typical water demand in a household. Note that this figure tabulates household water use, and it is reasonable to assume that this water use would be discharged to the sanitary sewer, except the "outdoor" component. The "outdoor" use component in the table below is for lawn sprinkling and other irrigation, and this water use generally does not make its way to the sanitary sewer.

For reference, the peak flow rates from the year 2000 metering (pre-FDD conditions) ranged from 1,900 to 7,600 gallon per capital per day for the five priority districts. Other studies and FDD programs have estimated that the peak flow generation of a footing drain from a rain event is in the range of 3 – 5 gallons per minute per footing drain, which equates to approximately 1,950 to 3,300 gallons per capita per day.



source: Residential End Uses of Water, AWWA Research Foundation, 1999
<http://www.allianceforwaterefficiency.org/residential-end-uses-of-water-study-1999.aspx>

Q. 1.42 What impact did the postponement of the City’s curbside fall leaf pick up have on the performance of the Storm and Sanitary sewer functions?

A. One focus of this study is the impact of the FDD program on the flows in the sanitary sewer system. As part of this study, the results will be quantified with statistical confidence from a statistical regression analysis. It is common to set a threshold of 95% statistical confidence or greater to have statistically significant results. For districts that meet this threshold, it means that there is a 95% or greater chance that the flow reductions are the result of the FDD program, and a 5% or less chance that the flow reductions are the result of some other effect such as the curbside fall leaf pickup schedule, variations in rainfall volume or intensity, variations in wetness conditions, or other variations. Statistical confidence values will be published with the FDD flow evaluation results.

The impacts on the stormwater system from the FDD program or other items such as the City’s leaf pick up are not the focus of this study and would have to be taken up by other City initiatives or other studies.

Q. 1.43 We want to make sure that what appears to be a footing drain success story also includes mention of what else could be causing those reductions.

A. Variations from different rainfall amounts, rainfall patterns and antecedent moisture conditions can “mask” the underlying changes in flows due to FDD. A scientific “control” for these items will be done with the FDD flow evaluation using three independent techniques that include scatter plots, meter correlations to a control, and continuous hydrologic modeling.

Q. 1.44 It appears that 100% disconnecting in some neighborhoods doesn’t necessarily lead to better outcomes than those with 50% FDDs. Is that true?

A. It is very possible that the findings will show different effectiveness for flow removals from FDDs for the different districts, due to variations in the sub-surface, ground water conditions, and other differences between the districts. It is premature to draw those conclusions at this point, because the flow data presented has not yet been controlled for different rainfall amounts, rainfall patterns and antecedent moisture conditions. Those results will be ready at the next CAC meeting.

Q. 1.45 Correlation of all this water data with actual basement flooding?

A. Maps of basement backup locations were displayed at the 12/12/13 CAC meeting.

Q. 1.46 Is there a meter in 2013 that was on a control district that you can show us?

A. Yes, there are two. Although these meters were not installed in 2000, so we cannot use them for control comparisons, we can examine the 2013 flows and compare them to the post-FDD flows of the other districts. This information will be available at the next CAC meeting.

Q. 1.47 Recent conversations with OHM indicate prelim info that some neighborhoods are showing greater footing drain flow than others. One idea is that some areas have homes with only one set of footing drains, (i.e.: exterior or interior of the footing, but not both). Can the approved contractors be contacted to provide their observations during the actual FDD installations?

A. CDM has investigated the occurrence of “bleeder type” footing drains in the various priority FDD areas based on their work on the FDD program. They have found the following:

- Approximately 55% of the houses in Glen Leven have “bleeder type” footing drains
- Approximately 5% of the houses in Dartmoor have “bleeder type” footing drains
- None of the houses in Orchard Hills, Bromley and Moorhead have “bleeder type” footing drains

The sump pump monitoring data that CDM collects was evaluated to see if the high occurrence of “bleeder type” footing drains may have an impact on the sump pump flows measured, and no difference was observed in the data. An analysis of statistical significance was not performed on this conclusion, but the results suggest that differences in the FDD flows are likely from other impacts besides “bleeder type” footing drains.

Q. 1.48 How many FDDs have been done in Ann Arbor?

A. Approximately 2,800 FDDs have been completed since the start of the program in 2001. This includes the City’s program and those performed under the Developer Offset Mitigation (DOM) program.

Q. 1.49 What is the distribution of FDDs throughout the city? Can we see a color map, a heat map? Additional map – backups in 2000 vs. 2013 comparison.

A. These FDD maps were displayed at the December 12 CAC meeting, and are posted on the project webpage at www.A2gov.org/SSWWE > Library. [Click here](#) to download and view the locations of FDDs performed under the City’s program and the Developer Offset Mitigation program (DOM.)

Q. 1.50 Why are there backups in homes without footing drains?

A. A house without a footing drain may experience a sanitary sewage backup with the sanitary sewer backs up to a level above an adjacent basement floor elevation. One potential cause occurs when the sanitary sewer system is overwhelmed with infiltration and inflow during a large storm event and cannot keep up with the flows discharged to the sanitary sewer. In that case, the sewer flow becomes pressurized and sewage will leave the sewer systems at the low points in the system. If the low point in the system is a basement (or several basements), the sewage will back up in those basements. Another cause of a backup could simply be due to blockage in the sanitary sewer or the sanitary lead to the house.

Q. 1.51 How much more FDDs are needed when we’re getting such good results from these 2600? What’s the goal?

A. One aspect of the current study is the evaluation of system hydraulic deficiencies during a design rain event. The results of this analysis are anticipated to include an identification of additional capacity needs, if any.

Q. 1.52 If all footing drains were disconnected, would we have enough sanitary capacity?

A. We don't have enough information to determine that right now. Disconnecting footing drains has returned some capacity to the sanitary sewer system, and this study will measure how much.

Q. 1.53 The FDD Survey that was sent to all locations with a FDD indicates that the survey could be "Completed in Person" at focus group locations on lap stop stations. In addition these focus group meeting dates were to be announced on AnnArborNews.com, AnnArborChronicle.com, Treetown Log, and neighborhood newsletters. Were any of these focus group meetings actually held? What locations? How many participants? Did the announcements as noted above actually occur?

A. Announcements of the survey and its purpose were distributed to the media outlets. At the start of the survey we projected a need for focus groups because we were not confident about achieving our goal – 500 surveys returned (which would yield a 95% confidence/4% margin of error result). We have received more than 800 responses, creating statistically valid results. The project team has submitted the full results to the City, which is determining next steps.

Q. 1.54 Is there another group model to consider other than a Citizens Advisory Committee?

A. The Citizens Advisory Committee group model is based on a high performing team model developed by Project Innovations. The hallmarks of this model are: unified purpose, clear roles and responsibilities, consensus decision-making, transparent communications, collaborative goal setting/problem solving, and self-accountability. We considered a model based on appointments by our council members, but we believe that an open team based model is more appropriate in this situation.

Q. 1.55 Will the Advisory Committee be open to everyone?

A. Yes.

Q. 1.56 Who is the Advisory Committee accountable to?

A. The Citizens Advisory Committee will be self-accountable. This means that it will establish decision-making criteria and measure its decisions against these "standards." But, the Citizens Advisory Committee is not the final decision maker. Our City Council will make the final decision on the recommendations that emerge from the Citizens Advisory Committee. This is appropriate given the potential investment and citizen interest that will follow from the study's conclusions.

Q. 1.57 Representatives of the City have shown a chart of four concurrent sewer system and stormwater management related projects (<http://bit.ly/19WgWsM>). The chart shows an Over-Arching Technical Oversight & Advisory Group. Who are the

members of this group?

Q. The City bubble chart describing the four water infrastructure projects and their five citizen- type subgroups- is headed by an Overarching Technical & Advisory Group plus a Technical Working Group. It is important for us to know who are they are.

Q. Also, if we continue to divert water from the Sanitary to the Surface system, some effect on the Huron would be counterproductive. I am asking the HRWC to join your studies.

Q. What is the role of the Technical Oversight & Advisory Group, who are the members and is Huron River Watershed Council involved?

A. The purpose of this group is to:

- . Provide technical expertise, coordination, review, guidance, process overview, and quality assurance on all of the Wet Weather Projects.
- . Ensure consistency and act as a liaison between the various Wet Weather Projects.
- . Act as a resource for the community related to the Wet Weather Projects.

A. The Technical Working Group is an internal group of City & County Staff that meets to make sure that we are all up to date on what the other projects are doing. It consists of Cresson Sloten, Nick Hutchinson, Jennifer Lawson, Troy Baughman, Anne Warrow, and Harry Sheehan (County). The Technical Oversight & Advisory Group (TOAG) is essentially what you are describing above. The group just getting started up, and is made up of experts in many of the fields you mention, including the HRWC. We will be sending out more information on the TOAG in the near future to all of the CAC groups.

Q. 1.58 The FDD Survey was mailed on Tuesday 12/3 with deadline date of Friday 12/20. Due to this short duration and time frame during the Holiday Season, will the Survey Results, if received after 12/20, be tabulated in the data?

A. We received over 750 responses to the survey within the survey response period, which is about three times the typical response rate for surveys. Survey best practice advises that the highest volume of responses are received within *the first seven days* of the survey period and fall off sharply after that. This was our experience as well. Surveys received after the 12/20 deadline (about 80 additional surveys) were also tabulated in the data.

Q. 1.59 The FDD Survey was announced to the local media via a press release. As no actual "news" outlets provided coverage for this "story," what other attempts were

made by the City or the Consultants to the media, to solicit survey results from the FDD residents.

A. Because of the high response rate we received for the survey, there was no need to further solicit the media.

Q. 1.60 Research has revealed that sanitary storage capacity may have been installed since 2001 in the Plymouth Road corridor. Is this correct? What impact DID this have on the Flow data recently presented by OHM and on the reduction of Sanitary Backups since 2001?

A. There was no detention installed since 2001. In the last 1960s, there was some detention installed in the Georgetown/Bluett area. It consists of a 58" x 94" arch pipe installed in 1969, which can handle 149,012 gallons of storage, and is still in service. In the late 1990's and early 2000's the area still experience numerous basement backups, which resulted in this area becoming one of the FDD study areas. So, it appears that this detention was insufficient to prevent basement backups.

Q. 1.60b Storage facilities that have been installed near Georgetown/Bluett, and one near Yost Blvd?

The questions / info would be:

What are the size of these ?

When were they installed?

How effective were they?

What maintenance challenges or issues do they cause?

What lesson learned were gleaned from these?

If this storage capacity is in the street, buried somewhere, does it interfere with other utility pipes and lines when work needs to be done on one? I would think that some lines would need to cross over it or under it. If it is down deeper, then it would be hard to place such a system in a street that has existing lines and pipes.

Where exactly are these storage pipes located? In a street or in a field somewhere?

A: The facility near Yost Blvd (not Yost arena) & Salem Ct was installed in the late 60's to provide relief for the Swift Run trunkline. The facility consists of three 54"x85" arch pipes which can handle 118,613 gallons of storage, and is still in service. Refer to the attached record drawing ([Swift Run Storage Drawing](#)) for more information. The facility is located in open area adjacent to the Swift Run drain. The need for additional relief was identified in the late 1990's which led to the construction of a relief sewer further downstream from this existing storage facility.

The facility in Bluett & Georgetown consists of a 58" x 94" arch pipe installed in 1969, which can handle 149,012 gallons of storage, and is still in service. The facility is located

in the road right-of-way. Refer to the attached record drawing ([Bluet Storage Drawing](#)) for more information. In the late 1990's and early 2000's the area still experience numerous basement backups, which resulted in this area becoming one of the FDD study areas.

Conflict with existing utilities is a valid concern and will need to be considered during the alternative analysis phase when looking at storage as a possible alternative.

Q. 1.60c Do these facilities [sanitary storage in the Georgetown/Bluett and Yost Blvd area, referenced in Question 1.60, 1.60b] need periodic clean out or other special maintenance beyond what an ordinary sanitary main requires?

A: These facilities do require more frequent maintenance beyond the typical periodic cleaning and maintenance cycles needed for ordinary sanitary mains.

Q. 1.61 The Upper Mallet CAC has announced a Public Meeting for January 22, 2014. The SSWWE CAC has schedule a Public Meeting for January 16, 2014. It is assumed that participation at both meetings will be negatively impacted due to the close date proximity of both meetings. Is it intention of the City to maximize citizen participation and involvement for both of these meetings? What measures will be taken to accomplish this?

A. The SSWWE Public Meeting was rescheduled for Thursday, February 6 at Slauson Middle School Auditorium. All the FDD Survey respondents were invited by mail and email. A news release was sent to media outlets. The meeting is posted on the City's webpage for this project: www.A2gov.org/SSWWE, as well as the FDD project website, www.A2FDD.com.

Q. 1.62 What else in the last 13 years might have affected the results observed from FDD? System maintenance and repairs, etc.?

A: See response to Q. 2.38 as well. All the electronic records of repair work performed on the storm and sanitary systems are shown on the "[Citywide Sanitary System Improvements.PDF](#)" & "[Citywide Storm System Improvements.PDF](#)" maps. Both documents are available on the project webpage: www.A2gov.org/sswwe > Library page.

Q. 1.63 How relevant are the various detention and retention projects being done to the results observed? When were the water clearances in the Pioneer/Allens Creek/Malletts Creek area done and could those have an impact?

A. These projects are projects related to the stormwater management system, not the sanitary sewer system. As such, these projects do not have an impact on the results observed.

Q. 1.64 Was account taken of the differences in soil conditions in saturation?

A. Yes, the project team members used a model designed specifically to account for differences in soil saturation (antecedent moisture.)

Q. 1.65 Could fixing bad manholes and sewer pipes in some areas account for the flow removal results?

A. It is possible that sewer and manhole repairs could impact system flows. Typically a substantial program is needed to make a significant impact on wet weather flows, and the City did not conduct a substantial program.

The City has electronic records of all sanitary sewers that have been televised since summer of 2006. Please see referenced report ([Q.2.38 Report of CCTV Work Since 2006.xls](#)). Prior to summer of 2006, records were not kept electronically. Records are archived and are less easily searchable. The same applies for repair work performed on the system. All the electronic records of repair work performed on the system is shown on the referenced "[Citywide Sanitary System Improvements.PDF](#)" map, posted on the City's project page at www.A2gov.org/SSWWE > Library

Q. 1.66 In Morehead, there's hard packed clay, which creates a bathtub effect around each house. It's the same when you disturb the earth to install sewer pipes. How does that impact the differences in flows, pre and post FDD?

A. Prior to FDD, this "bathtub" effect can drive a lot of flow to the sanitary sewer through the footing drain. This flow is removed from the sanitary sewer by FDD.

Q. 1.66b. The same linear bath tub affect occurs at all sewer pipes. Hence if there is a leak or crack in an existing buried pipe, the same phenomena occurs. The linear bath tub of an undefined length of pipe can drive the same surface flow down to the bottom of the trench and into sanitary sewer. Can the city provide a history of all efforts to "camera inspect" and repair existing sanitary sewers since 2001?

A. The City has electronic records of all sanitary sewers that have been televised since summer of 2006. Please see referenced report ([Q.2.38 Report of CCTV Work Since 2006.xls](#)). Prior to summer of 2006, records were not kept electronically. Records are archived and are less easily searchable. The same applies for repair work performed on the system. All the electronic records of repair work performed on the system is shown on the referenced "[Citywide Sanitary System Improvements.PDF](#)" map posted on the City's project page at www.A2gov.org/SSWWE > Library

Q. 1.67 Houses are close in some neighborhoods; are there things that individual residents might have done, like install drains that could account for the lower flows?

A. The flows were measured at the neighborhood level, at the sanitary outlet from each neighborhood, so small changes in drainage between houses are unlikely to impact the results.

Q. 1.68 Is the CAC responsible for recommending solutions to reduce sanitary sewer basement backups or for also recommending solutions to reduce sanitary sewer overflows?

A. Per Craig Hupy's discussion at the January 9th meeting, the CAC's charge is to *make recommendations regarding wet weather capacity within the sanitary sewer system.*

To accomplish this, the CAC is to:

1. Review the results from the flow analysis (delivered in December)
2. Review the results from the upcoming hydraulic analysis, which will reveal what impacts are affecting the sanitary sewer system. (Expected in May.)
3. Review alternatives.
4. Based on the engineering analysis, the alternatives available and community values, determine recommendations.

Q. 1.69 StormCorp looked for storms and noted flooding, as part of the Upper Malletts Study. The Chaucer Court neighborhood flooded badly during the 2012 storm, but had none this year. More catch basins were added this year, along with two manholes for sewer systems. In very high storm rate events, manholes can make a big difference. Morehead and Glen Leven both raise questions about phenomenology.

A. Regarding the Chaucer Court ponding differences in 2012 vs. 2013: we didn't just look at large storms, we also measured and analyzed for small storms, every single storm, large and small. Taken together, with the multiple scientific methods of analysis, and the high level of statistical confidence, the results are correct in this neighborhood.

Q. 1.70 On Page 8 of the presentation slides handout, confidence levels on the slide for the summary results are lower than the confidence levels of single methods. Why is Glen Leven so low?

A. There are differences in results in Morehead and Glen Leven. From both analysis and experience, we know that results are not linear; completing 50% of the FDDs in a neighborhood doesn't necessarily mean a 50% reduction in flow. Glen Leven homes are older, closer together. Each house has a smaller drainage area, which makes for smaller flows. The next phase of the project, the hydraulic analysis of the sanitary sewer system in these neighborhoods may reveal other factors that have impacted the results in the Glen Leven area.

Q. 1.71 What are the basic number of houses/sump pumps per neighborhood?

A. This information was tabulated in the hand-out tables presented at the December CAC meeting. They are now part of the [December CAC meeting handouts](#), posted in the Library of the www.A2gov.org/sswwe website.

Q. 1.72 If it's all working so well, why are people still experiencing wetness in their basement?

A. Wetness in basement could be caused by a multitude of issues ranging from stormwater, groundwater seepage through the walls, sanitary sewage backing up into the basement, or other causes. The next phase of the study will evaluate the risk of sanitary sewer backups.

2014 update: Following the results of the 2013 FDD Survey, the City contracted with an experienced construction engineer to investigate reports of wetness in basements following an FDD. The engineer's investigations found that the primary cause of wetness in the basement was external grading. Also, about 2% of installations were not performed according to specifications, which caused wetness in the basement.

Q. 1.73 Check Valves. The OHM PowerPoint Presentation on 12Dec13, page 8, last graph indicates 52 reported basement flooding incidents from sanitary sewers in year 2000 and only 1 in year 2013. How many of these previously sanitary sewer flooded homes were remedied with a check valve in addition to their sump pump, or in lieu of a sump pump. This data needs to be assembled by the City and entered into a comparison spreadsheet to indicate if the check valve was *likely/considered* as the primary reason for the "Fix" to the former sanitary sewer flooding.

A. Our records indicate 43 of the 52 homes located in the 5 study areas, who reported basement flooding in 2000, have had check valves installed.

Q. 1.73a Aren't check valves the reason that basement backups from sanitary sewers have dropped so dramatically? (43 of the 52 homes in the 5 study areas who reported basement flooding in 2000 had check valves installed.)

A. No, check valves are not the reason that the number of reported basement backups dropped so dramatically. The flow metering data collected in the priority districts during 2013 shows that the flow depths were contained within the pipes at these locations during all of the storm events. This means that the water could not have reached a level where the check valves would activate. Therefore, the presence of check valves is not relevant to the evaluation of flows from the 2013 metering data.

Q. 1.74 Based on the hydraulic modeling results, can you say that any of the FDD study neighborhoods will have surcharging or flooding?

A. The model shows that the interceptor is full in certain areas, but does not show beyond-capacity flow in the neighborhood pipe. Project team members caution that without meters in all the pipes, there's no way to know whether an individual pipe might have a root intrusion or other obstruction.

At a future meeting, the project team will show maps of the system model with SSOs and historic basement backups overlaid.

Q. 1.75 How many flow meters are there in the City?

A. Currently, there are no flow meters, except for the one at the WWTP. As part of the project, the team had about 34 flow meters installed in the same areas as were installed in the 2001 SSO Study. While the City does not have flow meters, they do have about 21 pressure stage recorders that measure the maximum amount of surcharging that the pipe experienced at the event. If the CAC felt that it were important, they could a recommendation that the City buy and install permanent flow meters.

Q. 1.76 How much would a flow meter cost if the City were to install one permanently?

A. About \$1000/month. That includes monitoring, maintenance, and periodic data recording and processing.

Q. 1.77 Looking at the map, can we say whether homes in the red areas will have basement backups?

A. A project team member opened the model and zeroed in on a particular red area, which shows that the sewer flows extend beyond the pipe (surcharging.) Any areas where flows extend beyond the pipe are problems for which the CAC will make recommendations to resolve. Basically there are two ways to fix these areas: take the flow out upstream or put in storage. The project team and the CAC will determine what types of projects can be done, the costs of those projects and how they mesh with community values.

Q. 1.78 A CAC member comments that the model may not show every problem. In an informal survey in his neighborhood, almost 50% of homeowners said that they'd had basement backups.

A. Showing the model together with the reported basement backups should help with this evaluation.

Q. 1.79 How large are the sanitary sewer pipes?

A. The pipes in the neighborhoods are typically 8" or 12", which make up about 80% of the pipes in the system The transmission mains, however are about 48" or larger.

Q. 1.80 Regarding OHM's experience with projects in other community – do other communities typically account for growth, or climate change in determining future sanitary sewer improvement projects?

A. The consultant project manager says that most communities perform a study of their system as a result of an enforcement action. They then design the solution to meet MDEQ's 10-year standard. If the community is undertaking a study as a result of basement backups, it may design a solution that's more robust than the 10-year standard. To date, few or no communities have included climate change as factors in their design, probably because the EPA only recently released its modeling protocols for climate change rainfall data.

Q. 1.81 How was growth factored into the hydraulic model? Why was 10% selected?

A. There were many complex ways to predict impacts of growth; population change, water consumption change, employment change. The 10% factor was selected to give the CAC a baseline to judge impacts.

Q. 1.82 If townships exceed sewage contract capacity, does the City have to accept it? Are the contracts open ended?

A. Typically, the acceptor of the flow can require that the community adding flows build storage.

Q. 1.83 If all the choke points in the sanitary sewer pipe network in the neighborhoods were removed, could that have a negative impact on the WWTP?

A. It's possible that it could allow the flows to rush to the plant, with the possibility of overwhelming it.

Q. 1.84 Are the township contracts open ended or perpetual?

A. Robert Czachorski, OHM project manager, says that in general these municipal contracts are long-term and require multiple years notice before either party can terminate the contract.

Q. 1.85 Is a 50-year rain the same as a 50-year flow frequency?

A. No, the 50-year flow frequency refers to a chance of recurrence. The antecedent moisture can have a big impact on how much flow is generated by the same rain event.

Q. 1.86 The backbone model shows few problems, but looking at the neighborhood scenarios may not give enough information to accurately evaluate the issues.

A. The modeler may be able to extend the backbone model to include all the red pipes.

Q. 1.87 Can we determine whether the areas with red pipes shown on the maps are having a problem for only a minute or for hours?

A. The maps are showing the peak hour, the highest one-hour of flow in the system, running over two days.

Q. 1.88 Are we [the CAC] possibly spinning our wheels here? Is City Council going to say, “we don’t care about a 50-year plan you’re recommending, we want a 25-year plan”?

A. We can’t predict what City Council will do with recommendations, however we can give the CAC mitigation options and related costs, which will help to understand the costs, the level of protections that projects may afford and help create the case for making any particular decision.

Q. 1.89 Can CAC members get a copy of the model maps for a longer review?

A. Because of Homeland Security restrictions, the City may not be able to distribute the model maps as they were shown during the meeting, but the project team will explore ways to convey the modeling results to the CAC without violating security restrictions.

Q. 1.90 Can we get information regarding what is known about the existence of public sources I&I and the extent it has been corrected? Some examples of what might be public I&I were roof drains, parking lot or ramp drains, etc.

A. A number of changes to the collection system have been made through the years to address the observed basement backup problems, including the following:

a. Smoke Testing Georgetown Area – 1998

This study detailed the results of smoke testing performed in the Bromley and Orchard Hills study areas. The work was performed to document potential sources of rainwater inflow and infiltration that may have been the cause of basement backups in August, 1998. It also included a list, by address, of the number of downspouts potentially connected to the sanitary collection system. This report contained an inspection log of manholes in the two study areas. The inspection included cover type, manhole type and condition, wall type and condition, observed infiltration, and potential infiltration. Individual field inspection forms for each manhole are available.

b. Lansdowne Investigations – 1987

Three related reports prepared by Soil and Materials Engineers, Inc., McNamee Porter & Seeley, and Harza, document contributing factors to basement backups in the Morehead area. These reports provide boring logs that document area geology, groundwater elevation data, and a recommendation for three relief sewer projects. These reports include information on the impacts of the August 22, 1987 storm event, a summary table listing the impacted residences, and a discussion of flow monitoring performed in the area.

c. Northeast Ann Arbor - Ann Arbor Internal Memoranda – 1982

This document provides a detailed review of the Bromley and Orchard Hills study areas and documents the basement backups that took place during a June 28, 1982 storm event. There is information regarding roof drain downspouts connected to the sanitary system and reference is made to a basement elevation survey conducted in 1970 for some homes in the study areas. There is also a reference, including some technical information, concerning the retention basin constructed in the Orchard Hills area in 1970. While there is mention of a flow meter installed in the Bromley area, data from that meter was not included in the document.

A program was conducted in the 1980's to disconnect roof drains from the sanitary sewer system. At this time, it is believed that most of the roof drains in the City have now been disconnected from the sanitary system. If areas where roof drain connections are suspected are located in the future, further investigation will be performed. Other sources of I&I may include leakage through manholes and manhole covers, aging sewer pipes, and leaking sanitary sewer leads from private properties. Although a comprehensive program does not currently exist, leakage through manhole covers in flood prone areas are addressed with temporary plugs in manhole pickholes as they are discovered. Also, the City has a biannual sewer-lining program to repair aging sewer pipes.

Q. 1.91 The City posted field records of the sewer pipe cleaning and video inspection performed in the FDD study neighborhoods in 2011, 2012, 2103. As a follow-up to the video inspections and cleanings: Were any problems found? If so, what?

A: The sewer videos that are performed are evaluated by staff. Typically in any sewer system various degrees of deficiencies are noted. Major issues (such as partially collapsed pipe) are typically prioritized and addressed by Field crews. Other issues (such as root intrusion and varying degrees of pipe cracking or displaced joints) that need to be addressed in the system are prioritized and included in the Capital Improvements Plan (CIP) as future projects.

Q. 1.92 How will the public know that exports from Basecamp, the online messaging tool used by the Citizens Advisory Committee is available for viewing? Will there be a link on the project homepage?

A. Yes, the City can include the link on the project's webpage. The export file from Basecamp will include all the messages posted from the time the CAC began using Basecamp in December 2013. The first export file will be published on the City's SSWWE project website on June 1, 2014.

Q. 1.93 Do return flow frequencies correlate with rainfall frequency?

A. No, they do not correlate because the same amount of rainfall can have vastly different impacts on the sewer system, depending on the amount of antecedent moisture (wetness conditions) at the time of the rainfall. A return flow frequency of 25 years means that, in any given year, there is a 4% chance of that level of flow occurring within the system.

Q. 1.94 Does flow refer to what we flush or run down the drain? What's included?

A. Flow refers to personal and commercial use (what we flush, etc.) as well as the water that enters the sewer system through infiltration.

Q. 1.95 Does the base flow in the hydraulic model include wet weather?

A. The base flow component includes the daily use, plus the groundwater infiltration that occurs year round. The wet weather component refers to the amount of inflow that enters the system after a rain event through footing drains, manhole covers, etc.

Q. 1.96 The April 2014 preliminary hydraulic presentation showed 50-year flows, why the change to 25-year flows?

A. When the contract limits from townships were added, growth was added and climate change, the 50-year system assessment showed many problems and also represents a very high level of service when you've already included both growth and climate change. The 25-year flows, with the added flows from growth and climate change are similar to 50-year flows without those conditions. If, after reviewing the results from the two proposed scenarios, the CAC wishes to evaluate a 50-year return flow frequency, the project team will do so.

Q. 1.97 Given that water usage in the City is decreasing even though the population has increased, does it make sense to use lower growth numbers in the scenarios?

A. Yes, by using a 10% flow increase, you can allow for a range of impacts, whether those are from growth or climate change or some other factor.

Q. 1.98 Scenario A shows a base of 29 cfs, with a wet weather inflow of 60 cfs, but you do not account for where it's coming from. Can you account for the sources of infiltration as well as how difficult the different sources might be to remove?

A. Yes, the project team expects to be able to show that analysis to the CAC in July. At this meeting [May], Murat can show the geographic areas contributing the additional wet weather flow, but not the component sources.

Q. 1.99 Is Scenario B the same as a 50-year return frequency?

A. Yes, it's similar. Scenario B covers several different conditions: a certain amount of climate change or growth in the City or climate change.

Q. 1.100 The U of M stadium was lowered to be below the flood plain; it may be constantly pumping water. Could that contribute to problems in Iroquois area?

A. Robert comments that the issues in the Iroquois area are very strange; the situations do not match the metering data, which do not show flow exceeding the capacity of the pipe. More investigation is required.

Q. 1.101 How might the stormwater impacts affect flows in particular neighborhoods?

A. At the August 2014 meeting, the CAC will have a presentation on the results of the stormwater study.

Q. 1.102 Who is responsible for uncovering the anomalies that were shown in the model?

A. The City. Field crews are investigating now, based on the model results, but the City cannot predict what it will find or when. Sometimes there is no obvious cause, such as a large obstruction.

Q. 1.103 Is the reason the Scenario B does not include any increase from the townships that City Council would have to vote to approve any increases to contract limits and would not, without townships funding improvements?

A. Correct.

Q. 1.104 How does the 8 MGD storage volume given as an example compare with that of Michigan Stadium?

A. If you assume that Michigan Stadium was a rectangle with dimensions of 300 feet by 500 feet and was 100 feet tall, that would be 112.2 million gallons (MG). For

comparison purposes, a 10 MG storage tank that was 20 feet deep would be a square with an edge length of 260 feet.

Q. 1.105 Can the townships' contractual limits be increased arbitrarily, or must they be negotiated and voted on by Council?

A. These types of contracts typically require approval from the elected officials and involve lengthy negotiations for any changes, and allow for the accepting entity to require improvements as a condition of the contract.

Q. 1.106 How much can the City grow? You've used 10% in your model, but is it built out?

A. Ann Arbor has little greenfield development areas, some in the northeast Nixon Road area. To give perspective, during Cresson Slotten's 27 years with the City, there has been very little population growth. What has grown is Ann Arbor's employment base, however that has a small impact on water/sewer usage compared to residents.

Q. 1.107 If a developer in a neighboring township wants to build a development and incorporate into the City of Ann Arbor, is the City obligated to accept the flow?

A. The geographic boundaries for which the City is contracted to service with municipal utilities have already been determined and in the modeling, the project team has assumed all those areas to be contributing their full contracted daily amounts.

Q. 1.108 At the joint FDD SSWWE CAC meeting, an FDD CAC member asked when will the SSWWE CAC look forward?

A. Looking forward is the focus of the SSWWE project, evaluating the sanitary sewer conditions and function and recommending the solutions for the wet weather issues.

Q. 1.109 At the joint FDD SSWWE CAC meeting, an FDD CAC member asked if SSWWE members have seen the hydraulic and hydrologic risk analysis. What is the SSWWE CAC members' opinion of that analysis?

A. One SSWWE CAC member says that he is reserving judgment until the entire picture is presented. Another says that the data is clear from the flow analysis that the FDD project removed significant flows in the five study neighborhoods, however there are still a few areas across the City that show problems. Analysis is still being done to uncover the issues. A couple of members comment that they feel the high ground water in Lawton/Churchill neighborhood contributes to the surface water issues. FDD CAC member comments that he is impressed to the results of the risk analysis and that there's been a vast improvement in the reduction of the risk. Wants to see the final report.

Q. 1.110 How is climate change being considered in the modeling and hydraulic analysis of Ann Arbor’s sanitary sewer system? How did you determine that 10% increase in peak flows was adequate to account for climate change in the future?

A. Response from consultant project manager, Robert Czachorski, PE:

The impact of climate change on rainfall is complex, and there is a lot of variability, depending on which scenario or even time of the year is considered. This variability has led to many generalizations in the CAC meetings, with varying ranges discussed. Because of this large variability, it is probably best to examine the data from the EPA and output from our hydrologic (flow) model directly to understand the impacts. I have outlined the results below. I believe that these show a strong basis for the CAC to recommend a 10% increase in peak flows to account for climate change.

EPA Rainfall Data

We computed the climate change impacts on rainfall using the EPA’s National Stormwater Calculator, which was recently updated to include climate variability based on the Intergovernmental Panel on Climate Change protocols. The program has a low and high range, which varies from projecting less rainfall for the region to more rainfall for the region. The rainfall data shows that the annual average precipitation ranges from a decrease of 6% to an increase of 8.4%, depending on which scenario is selected. Below is a summary of the output from the program.

- **Attachment 1 – Fact Sheet on EPA’s National Stormwater Calculator** – This is a reference for the program from EPA that we used to compute the climate change impacts on rainfall. Page 7 of the program was used to compute climate change impacts.
- **Attachment 2 – Near-term (2020-2049) “wet/warm” scenario for the near-term (6 – 35 years)** – This shows output from the EPA program for Ann Arbor for the near-term (6 – 35 years) using the wet/warm scenario, which is the high rainfall scenario. Page 2 of the document shows the annual rainfall changing from 34.70 to 36.28-inches, which is a 4.5% increase in annual precipitation. Note that 20-30 years is a common window for utility master planning.
- **Attachment 3 – Far-term (2045-2074) “wet/warm” scenario** – This shows output from the EPA program for Ann Arbor for the far-term (31 – 60 years) using the wet/warm scenario, which is the high rainfall scenario. Page 2 of the document shows the annual rainfall changing from 34.70 to 37.60-inches, which is an 8.4% increase in annual precipitation. Note that 30-60 years is beyond the common

window used in utility master planning.

- **Attachment 4 – Near-term (2020-2049) “hot/dry” scenario** – This shows output from the EPA program for Ann Arbor for the near-term (6 – 35 years) using the hot/dry scenario, which is the low rainfall scenario. Page 2 of the document shows the annual rainfall changing from 34.70 to 33.55-inches, which is a 3.3% decrease in annual precipitation. This shows the wide variability in projected precipitation from the EPA program, depending on which scenario is used.
- **Attachment 5 – Far-term (2045-2074) “hot/dry” scenario** – This shows output from the EPA program for Ann Arbor for the far-term (31 – 60 years) using the hot/dry scenario, which is the low rainfall scenario. Page 2 of the document shows the annual rainfall changing from 34.70 to 32.61-inches, which is a 6.0% decrease in annual precipitation. This shows the wide variability in projected precipitation from the EPA program, depending on which scenario is used.
- **Attachment 6 – Near-term (2020-2049) Monthly Change in Precipitation** – This shows the output from the EPA program for Ann Arbor for the near-term change in monthly precipitation for the hot/dry scenario, the wet/warm scenario and the “median” scenario. Note that there is a large variability in the precipitation changes from month to month. For the wet/warm scenario, the monthly values vary from a 12% increase in March to a 3% decrease for August. For the hot/dry scenario, the monthly values vary from a 5% increase in March to a 13% decrease for August.
- **Attachment 7 – Far-term (2045-2074) Monthly Change in Precipitation** – This shows the output from the EPA program for Ann Arbor for the far-term change in monthly precipitation for the hot/dry scenario, the wet/warm scenario and the “median” scenario. Note that there is a large variability in the precipitation changes from month to month. For the wet/warm scenario, the monthly values vary from a 22% increase in March to a 6% decrease for August. For the hot/dry scenario, the monthly values vary from a 10% increase in March to a 24% decrease for August.

Impacts on Peak Flow in the Sanitary Sewer

There is a lot of variability in projected rainfall due to climate change. For the SSWWEP, we are most interested in how this change in rainfall may affect the peak flows in the sanitary sewer system. The sanitary sewer tends to have a larger reaction to rainfall in the spring when the ground is wet, and a smaller reaction in the summer when the

ground is dry. This effect will tend to amplify the higher climate change rainfalls projects in the spring months.

For this reason, we re-ran our 60-year continuous hydrologic model of the system, but with the revised monthly rainfalls suggested by the EPA program (i.e. we changed each month in the 60-year historic rainfall by the percentage from the EPA program). To represent the worst-case scenario, we selected the scenario with the highest rainfall, which is the far-term, wet/warm scenario, even though the forecast period for this run (31-60 years) goes beyond the normal planning window for master plans. We did this to illustrate the worst-case impacts on peak flows, to give the CAC an upper-limit to consider for climate change impacts. The results are tabulated in Attachment 8, which is described below:

- **Attachment 8 – Output from frequency analysis for far-term wet/warm scenario –** This shows the output from 60-year continuous hydrologic model for the five downstream metering points. The impacts from climate change vary from meter to meter and for the various recurrence intervals. The bottom line total shows an increase of 10.4% for the 25-year flow and 11.4 % for the 50-year flow due to climate change. These increases in peak flows are greater than the annual increase in precipitation due to climate change (8.5% for the long-term wet/warm), because there is a greater increase in precipitation from climate change in the spring when the ground is wet, and the sanitary sewer has a larger reaction to rain in the spring.

Because the above peak flow increases represent the worst-case for the wet/warm scenario for the far term (31-60 year) period, and the increases are in the range of 10.4% to 11.4%, we recommend that the CAC consider a 10% increase in future peak flows for climate change. This represents a reasonable mid-range value for the far-term, and is most likely well beyond the worst-case scenario for the near term (6-35 years), which is a reasonable planning window for this study.

TOAG Review of Methodology and Concurrence

The TOAG's reviewed the climate change methodology used to evaluate risk for the SSWWEP. The TOAG issued their review comments on June 17, and they are contained in Attachment 9. Amongst other things, this memo outlines the TOAG's conclusions that:

- The methodology used to assess impacts of climate change seems appropriate and standard.
- The methodology used is relatively standard and is similar to other stormwater assessments that have been conducted.

- The other Wet Weather studies being undertaken by Ann Arbor should similarly acknowledge and recognize the importance of climate change as a factor, which affects the City's infrastructure.

Conclusions

The methodology that we have used to assess the impacts of climate change on the sanitary sewer are based on sound science, that are consistent with the values published by EPA in their National Stormwater Calculator Program. The TOAG has reviewed the methodology and found it to be appropriate and standard. Based on these results, we are comfortable recommending that the CAC consider a 10% increase in peak flows to account for climate change. This value reflects the high-end of the ranges that have been published, and should provide a reasonable basis for evaluating the impacts of climate change on Ann Arbor's sanitary sewer system.

Q.1.111 Will all the recommendations be posted on Basecamp for the public to review?

A. All the recommendations and presentation documents are posted on the project website's [Library page](#).

Q. 1.112 Do TOAG member have veto powers?

A. No, they are an advisory body.

Q. 1.112 Are the TOAG findings posted for the public?

A. Yes, the TOAG's reviews and recommendations are shared with the project managers, who then post them on the project websites. (This applies to the City's projects; the TOAG facilitator does not know if the Washtenaw County Water Resources office posted TOAG comments on Malletts Creek.)

Q. 1.113 How often does the TOAG post its Basecamp content to the public?

A. It does not. The TOAG shares its findings with the project managers, who may do with it as they wish. As mentioned in the previous question, for City projects, the respective Project Managers have posted the TOAG's findings on project webpages.

Q. 1.114 Does the TOAG have a consensus on climate change impacts and the SSWWE project?

A. The TOAG asked its climate change expert, Dan Brown, for comments on climate change and Dick shared highlights from a [Dan Brown memo on the SSWWE project's appropriate consideration of climate change](#)

Q. 1.115 The model used in SSWWE project uses a 10% increase for climate change; does the TOAG feel that is appropriate?

A. The TOAG agrees that the range used is appropriate; however, the level of service design storm has not yet been evaluated. It will be reviewed and evaluated later in the project.

Q. 1.116 What about coordination between the Stormwater Calibration Project and the SSWWE project? If the stormwater system does not work properly, then more water collects around the house, and is collected by the footing drains and then enters the system. If the stormwater system were tackled, it might take care of sanitary sewer issues.

A. The TOAG has looked at the impact of the disconnected footing drains and their impact on the storm system as part of the Stormwater Modeling Calibration project, and found that amount of stormwater contributed by footing drains is a relatively small percentage of the overall flows in the stormwater system. However the TOAG has not looked at the impact of connected footing drains on the sanitary sewer system, or whether flooding from an overwhelmed stormwater system is overburdening the sanitary.

Q. 1.117 What would happen if Scio Township wanted to send more flow? Would Scio or Ann Arbor have to pay to build a bigger pipe?

A. The model used to evaluate sanitary sewer system capacity in the SSWWE project already assumes all the townships are at their contract capacity; however, in the event of a renegotiated contract, Scio would typically pay to upgrade infrastructure.

Q. 1.118 In the July 9, 2014 CAC meeting [presentation of preliminary evaluation of alternatives](#), you list a cost for storage, what kind of storage is it? A tank, a large pipe?

A. The estimates were based on the total volume to be stored, not a particular type. They are intended to provide reference points only.

Q. 1.119 When you monitor the depth of flows in sanitary sewer pipes, do you monitor only flow or also depths in manholes?

A. Both.

Q. 1.120 What does it mean to re-distribute metered flow in an area?

A. [In Area A, for example](#), the metering shows that there's a significant flow coming from the area; however, it's unknown whether it originates from the north or the south.

Additional meters located in upstream in the problem areas are needed to determine where the flows originate.

Q. 1.121 Where will the additional funding for the reconnaissance and targeted metering come from?

A. From the sanitary sewer fund that is designated for repair and upgrades.

Q. 1.122 In looking at the [analysis for Area B](#), it looks like there's something significant blocking and backing up the flow.

A. Yes, we have depth sensors that prove that the flow reached a certain height in the pipes; however, according to the model, it should not have. Rather than spending millions of dollars to build a storage tank, the problem might be solved by reconstructing a couple of manholes. The same is true of Area C.

Q. 1.123 How would anecdotal flooding data be entered into the model?

A. The best data to collect for a particular area that's having issues, like Glendale, would be to put depth sensors in the sanitary pipe. Troy Baughman believes the City does still have some peak flow recorders in place.

Q. 1.124 Having 3 sewer lines blocked at one time in a 5 block area is totally unacceptable. Having modeling that does not catch this is also an issue. It is presented as a means to indicate basement backup potential but did not provide this in the Glendale neighborhood due to blockages. I agree that the model should be looked at by the TOAG with the [Glendale map](#). The problem we are having is the lack of permanent gauging in the city to detect and prevent sewer backups. It is a much less expensive and better method to deal with backups. The cost of these gauges, which do not need to be accurate to a 1/10 of an inch, have come down and could send data directly or picked up by garbage trucks on weekly rounds, to city hall to be used as an early warning system for repair assignments. Data could also be used to determine the effects of changes on the system such as new development or city efforts to reduce flows thru a special program, like new low flow toilet subsidies.

A. I totally concur that having multiple lines blocked at the same time in such a small area is unacceptable and that better tools are needed to proactively detect and correct these issues.

Metering is one technique to detect some of these blockages. Some of the issues with metering for detecting blockages is that it can be very expensive to completely meter every pipe in the City, it is reactionary (i.e. it detects a problem after a failure has occurred), and processing and managing the data generated by a large metering network can be onerous.

One challenge with metering to detect blockages is that the meter must be located upstream of the blockage, within the zone of influence of the backup from the blockage. "Within the zone of influence" is the critical element for a meter to be used for detection. Standards for sewer pipe design dictate that to maintain adequate scouring or self-cleaning velocities, the smaller pipes upstream in neighborhood are sloped steeper than the larger downstream interceptors. The smaller the pipe, the higher the steepness that is required. This means that the "zone of influence" is shorter in the smaller pipes in the upstream neighborhoods due to the higher steepness of the pipe, thus requiring many meters to provide full coverage for all of the upstream pipes. We are potentially talking about a very large number of meters to cover every pipe in the City (hundreds or maybe thousands of meters - for reference we had 30 meters in for 3-5 months for this SSWWE project at a cost of about \$200,000). This goes beyond the typical application for metering, and is the reason that meters are more applicable to detect issues in the downstream interceptors, where the pipes are flatter and the zones of influence are much longer, thus requiring less metering, and making metering more practical for the interceptors.

Detecting blockages in the smaller upstream pipes is more commonly done through sewer video inspection and manhole inspection. There are processes for inspecting and tracking the condition of sewer pipes over time, so that a proactive replacement and repair process can be put in place. Just like roads, sewer pipes generally don't fail all at once, although sometimes they do if you have ever tracked some of the sewer sinkholes that have occurred in the region. But more generally, just like roads, they deteriorate over time, and by using a regular inspection program on a rotating basis (every 3-10 years), the condition of a pipe can be tracked so that it can be repaired before a catastrophic failure and blockage occurs. NASCO's Pipeline Assessment and Certification Program (PACP) provides a very common framework that is used to do this (reference: http://nassco.org/training_edu/pdfs/pacp-macp_overview.pdf).

For a system like Ann Arbor that does not have a rotating program in place for video inspection, it might be desirable to do "one full lap" fairly quickly (perhaps in a year or two) in the high priority areas. This would establish a baseline condition, identify places where failure is imminent, fix those high priority areas, and then identify the appropriate time frame for a rotating program, based on the condition and risks associated with pipes in specific areas. Such a process is proactive, likely cost effective compared to metering every pipe in the City, and generates valuable video data that can be used to track pipe conditions over time. This is currently the industry standard process for monitoring and maintaining sewers, and is the program we would generally recommend to address the risk of frequent sewer failures in the upstream pipes. That being said, a smaller number of permanent meters on the interceptors and perhaps on several key neighborhood connections may also be a good idea. Permanent metering of the downstream interceptors would provide information on blockages where the meter is in the "zone of influence" of the blockage, but more importantly, it

would provide a long-term record of flow data from the system which can be useful for assessing impacts from growth, changes from system deterioration leading to new inflow and infiltration sources, the effectiveness of a DOM program (if continued), and important operational data to understand how the system handles future large storm events.

Q. 1.125 Q. What about homes where the footing drains outlet to the yard? How do those impact the [stormwater calibration project] model results?

A. The model result is more conservative (worst case scenario), because modelers assumed that each FDD home contributed 4gpm to the stormwater system. In reality, some of the stormwater being outlet to yards would infiltrate the ground before reaching the stormwater system.

Q. 1.126 The [stormwater calibration project] model is based on 4gpm. The ACO report uses 10 gpm. What would happen if your model used 10 gpm?

A. We don't know the impacts of a 10 gpm flow, but we do know that from the flow monitoring and direct sump pump measurements that some homes contribute less than 4 gpm, others contribute more. Because of these measurements, the City and the technical consultants are comfortable using the 4gpm figure.

Q. 1.127 Do the [stormwater calibration project] modeling results validate the estimates that were made of the flows from footing drains when the program began?

A. Yes, in footing drain disconnection programs across the country, a flow of 3 to 5 gpm from each home is standard and our analysis supports similar findings.

Q. 1.128 There are homes where, during the March 2012 storm, the curb drains were full and the sump pumps could not pump the FDD flows into them.

A. Yes, that is why the air gap is important. The purpose of the air gap is to provide an outlet for the footing drain flows, in the event that the curb drain is blocked or full.

Q. 1.129 If the neighborhoods that have flooding problems and connected footing drains had better drainage, would that eliminate some of the sanitary sewer capacity issues? It seems that there's a gap between the two studies [SSWWE and Stormwater Calibration.]

A. Footing drain flow is generated from an area near the house where stormwater runoff and ground water are captured and drained to the footing drain. For stormwater runoff, this is generally a small area directly around the house, perhaps on the order of 5-20 feet from the foundation, depending on the grading and slopes around the house.

This is why proper grading and extension of roof downspouts away from the house is so important.

There may be some homes where, in a large enough storm, surface flooding reaches the contributing area of a house that generates footing drain flows. However, it is not uncommon for backyard drainage from a number of homes to contribute to footing drain flows at the home located at the lowest elevation if this water cannot flow to the street and enter the stormwater system. In those locations, preventing stormwater from reaching the footing drain contributing area through better grading around these types of homes would reduce the flows to the footing drains during an extensive surface flooding event. However, the number of houses that occasionally experience this condition are small compared to the large number of houses with footing drains. The majority of footing drain flows are generated from houses without extensive surface flooding issues, where the footing drain flow is generated from the regular house contributing area.

The City has not studied in detail the impact of improving the stormwater system on reducing sanitary sewer flows. However, we do have some anecdotal observations that we may draw conclusions from. Prior to the FDD program, there were several areas around the City that experienced sanitary basement backups without extensive reports of surface flooding occurring (such as the **Orchard Hills and Bromley areas**). The significant footing drain flows in these areas were generated from the normal stormwater runoff captured from around the house. Now that FDDs have been completed in these target areas, the risk of sanitary basement backups has been greatly reduced, to the point where additional FDDs are not recommended. Additionally, on June 27, 2013, the City experienced a very large storm that produced extensive stormwater surface flooding, and there were very few reports of sanitary basement backups in the City.

Another contributor of flow into the sanitary sewer system is surface flooding in the streets above the sanitary manholes through holes that are used for removing these manholes. This source of additional flow into the sanitary sewer system was identified several years ago, and the City has installed plugs in many of these manhole holes in locations where flooding has been observed or the official City floodplain map showed flooding should occur for large storms to very cost effectively remove this source of wet weather flow in the sanitary sewer system. An ongoing study of the stormwater system is identifying additional localized surface flooding locations where these manhole holes should be plugged. The City is also installing better sealing manholes and solid manhole covers in areas where they are needed as street reconstruction or resurfacing is being performed.

These observations suggest that the footing drain flow generated from surface flooding that approaches the house is not a significant source of wet weather flows into the sanitary sewer system. That is not to say that these surface flooding issues are

not important - it simply means that the main driver for addressing them should be to address the surface flooding problems, and not because of excessive flows in the sanitary sewer system.

While the reduction of surface flooding in some areas may cause a small reduction in the flows into the sanitary sewer system, the flow evaluation and modeling performed has shown that sufficient flows have been removed, and that additional FDDs are not necessary in these areas.

Q. 1.130 What about FDD homes that are high producers of storm water flows, where those flows can't enter the stormwater system because it's overwhelmed. Those high producing homes may have graded their property and done everything possible to mitigate stormwater impacts but can still potentially cause sanitary backups in homes downstream, requiring FDDs in other homes. However, if the stormwater system were able to handle the larger rain events, the FDDs would not be required. Isn't the City failing its responsibility to ensure that the stormwater system has adequate capacity?

A. There's an important difference in level of service results between the sanitary sewer system and the stormwater system that may not be widely understood. In general, the level of service for the sanitary sewer system is expected to be higher (greater capacity, less frequent surcharging) because of the health, safety and regulatory issues related to sewage. It's different for the stormwater system; a community cannot economically or physically build a stormwater system that absorbs every drop of water from every inch of the City and prevents it from settling into homeowners' yards or the street. The capacity of a street to temporarily hold rain water is factored into the level of service for storm systems. When people complain about water in the streets, they don't realize that the streets function as a temporary storage device. Much of the stormwater system was designed to handle a storm of a size that recurs about once every five years, while some of the newer sections were designed to handle larger storms that have a 10% chance of occurring each year.

Q. 1.131 The Malletts Creek Study developed several recommendations to address flooding in certain neighborhoods, like Lansdowne. If those projects were constructed, it could solve some of the stormwater issues in those areas.

A. Yes, the Malletts Creek Study developed its project recommendations based on the March 15, 2012 storm, an event that has a 10% chance of occurring every ten rains. That's a level of service that the stormwater system was not designed to meet, because of the relative infrequency of those storms, combined with the large capital costs. The Stormwater Calibration project includes modeling several different storms, to develop a standard for the stormwater system that meets community values for both level of service and economics.

Q. 1.132 Will development in outlying townships (like Scio Township) that will increase impervious surfaces, increase flooding in Ann Arbor?

A. Developments throughout Washtenaw County must follow the County's stormwater management mandates, which require developers to use stormwater management best practices so as to not negatively impact the stormwater flows in the area.

Q. 1.133 Does the City have available budget to complete the SSWWE study's six recommended projects, or will these be deferred until later, like the Malletts Creek Study projects?

A. These six projects are being entered into the current CIP process, and will be evaluated and programmed in comparison to all other projects funded from the Sanitary Sewer Fund. While City staff can't say for sure where they will end up, the Sanitary Fund is larger than the Storm Fund, and we anticipate they will be programmed.

Q. 1.134 Has the City performed a comprehensive inventory of the sanitary sewer system condition? If not, should doing so be a recommendation on the Final Report. This would establish a "baseline."

A. The City is currently programming into its Capital Improvement Plan a citywide asset management program for the sanitary system. This project will include performing a comprehensive condition analysis on the sanitary system.

Q. 1.135 Will the Final Report include the CAC's recommendations on FDDs and mitigation? Concerned that Council is so overwhelmed with material, that the Executive Summary should be as brief as possible.

A. Yes, the team will create a 1-page overview of the recommendations and include in the front.

Q. 1.136 Be sure to include information in the report about stormwater as well as installing permanent meters. Make it a more robust effort, City-wide, not just in target areas. Will be important in the Lawton and possible Glendale areas.

A. Yes, the recommendations are prominently included in the Executive Summary.

Q. 1.137 An earlier response about the composition of flows in the sanitary sewer system is that 48% of the flow in the system comes from inflow and infiltration. Should we be trying to find out what is causing it?

A. Yes, in areas that are experiencing problems it makes sense to find out what's causing those high flows. In other areas, where there are no capacity issues, it's not as pressing an issue to remove the flow. In most systems throughout the Midwest, 25% to 60% of

the sanitary sewer flows are from I & I (inflow and infiltration.) It's also a matter of weighing the cost of finding and removing the source of the infiltration against the benefits doing so would bring. The City's rotating maintenance program is intended to find some of those sources and remove them.

Q. 1.138 In 2000, if you had measured flow in the five problem areas identified, would you have found those same areas [as having problems]? Wouldn't it have been better to save the money spent on the FDD Program and instead fix those issues?

A. In 2000, the flow was measured, in the five areas and across the city. There were many more problems across the sanitary sewer system in 2000 than there are today. The City's sanitary sewer system has fewer problems and more capacity as a result of the FDD program.

Q. 1.139 What percent of the flow removal can be attributed to manhole repairs and other maintenance?

A. The City did not have major repair or maintenance programs in the target areas, so the flow removals cannot be attributed to those things.

Q. 1.140 It appears that the FDD Program didn't work in Glen Leven.

A. Yes, the FDD program was less effective in the Glen Leven target area.

Q. 1.141 Can the results in Dartmoor be attributed to the higher percentage of multi-family homes?

A. That could contribute to the results.

CATEGORY 2: Qs RELATED TO CAC's RECOMMENDATIONS (STORAGE, EXPANSION, FDD INSTALLATIONS)

Q. 2.1 How does stormwater get into the sanitary sewer system?

A. The role of the sanitary sewers is to transport wastewater from homes and businesses to the treatment plant. Along the way, some stormwater enters the sewer pipes. Some common sources of stormwater include – cracks in pipes or manholes, cross connections to the storm sewers or drains, and pick holes or vent holes in the manhole covers. The 2001 Task Force identified that 70 to 90% of the total sewer flow – in some portions of the system – was coming from footing drains during storm events.

Q. 2.2 City representatives have stated that all recommendations will be considered in resolving the Storm Water and FDD programs. Is this the City's position?

A. Yes.

Q. 2.3 What are the approximate ages of the houses in the target neighborhoods?

A.

| Study Area | Average Age of Home |
|-------------------|---|
| Bromley | 50 |
| Dartmoor | 42 (52 if not counting the newer development on W Liberty west of I-94) |
| Glen Leven | 56 |
| Morehead | 42 |
| Orchard Hills | 47 |

Q. 2.3 In what era were homes constructed where their footing drains were connected to the sanitary sewer system?

A. Most homes constructed between 1935 and 1980 have footing drains connected to the sanitary sewer system.

Q. 2.5 What's the benefit of doing FDDs, if you can get the same stormwater reduction result from fixing the pipes? Or if pipes are deteriorating at a rate to offset any reductions from FDDs?

A. It is not clear that the same flow removals can be achieved by rehabilitation of the pipes. The analysis of effectiveness of the FDD program on flow removals will identify how much flow was removed from FDD's and how much remains from other sewer defects in the five priority areas. This information can then be used to answer this question, and assess the feasibility of non-FDD flow removal in the future.

Q. 2.6 What about the strategy of doing FDDs throughout the City, rather than just in certain neighborhoods? Would that give you a better outcome?

A. Recall that the objective of the FDD program in the five priority districts was to address basement backups within those neighborhoods. To be effective in this objective, the FDDs had to target the neighborhoods with the basement backups. Evaluation of future FDDs as an alternative must consider the location of the FDDs relative to the capacity of the sanitary collection system and the risk of future basement backups. This evaluation, together with the evaluation of other options such as storage, will be evaluated in the next phase of the study.

Q. 2.7 Can the committee see maps with the number of houses in each neighborhood, along with pipe dimensions in each neighborhood?

These maps were available for viewing at the December CAC meeting. For security reasons, maps of the sewer system cannot be disseminated publically.

Q. 2.8 How old are the pipes in each of these neighborhoods and could infiltration via cracks, roots, etc. be causing stormwater to enter the sanitary sewer system? (Meaning that footing drains do not comprise as much of the flow as estimated.)

A. We prepared plots for the December CAC meeting that includes flow components, e.g. inflow, infiltration, base flow, etc., which will help assess how much stormwater is coming from other sources, and what these sources look like in the flow data. The decade of installation for the sanitary pipes in the 5 study areas are shown below

Orchard Hills & Bromley – 1960's

Dartmoor – 1950's to 2000's

Morehead – 1960's to 1990's

Glen Leven – 1950's to 1980's

Q. 2.9 What are the allowable flow rates for 2", 4", 6", and larger sanitary and surface water pipes?

A. The allowable flow rate of a pipe is dependent on not only its diameter, but also its slope and material. The pipe slope affects the velocity and carrying capacity of a pipe, and the material affects the friction in the pipe, which affects the carrying capacity. There are standard publications that tabulate the carrying capacity of standard concrete pipes laid at minimum slope, where the minimum slope is established to prevent the settling of sediment and debris in the pipe (maintain sufficient scouring velocity). One such standard publication is shown below. It is uncommon to build new sanitary sewer pipes that are smaller than 8-inch, and for that reason, the enclosed standard publications begins at 8-inch diameter pipes. Carrying capacities for smaller pipes can be determined through a hydraulic computation, and will be performed with the hydraulic model where relevant and necessary. We can provide that data where relevant for specific pipes in the City's system.

MINIMUM GRADES FOR SEWERS

Velocities calculated from formulas:

$V = \sqrt{D} + 0.8$ (for sanitary sewers).

$V = 1.2 \sqrt{D} + 1.3$ (for storm sewers).

$V = 1.1 \sqrt{D} + 1.0$ (for combined sewers).

when V = minimum permissible velocity "flowing full", in feet per second.

D = diameter of sewer in feet.

Grades and discharges calculated from Kutter's formula for circular conducts flowing full, with n = 0.013.

| Diameter of sewer in inches | Sanitary Sewers* (See 10 State Stds.) | | | Storm Sewers | | | Combined Sewers | | |
|-----------------------------|---------------------------------------|---------------------------------------|--------------------------------|-------------------------------|-----------------|--------------------------------|------------------------------|-----------------|-------------------------------|
| | Minimum Velocity Ft. per sec | Minimum Grade % Mich. Dept. of Health | Discharge at Min. Grade c.f.s. | Minimum Velocity Ft. per sec. | Minimum Grade % | Discharge at Min. Grade c.f.s. | Minimum Velocity Ft. per sec | Minimum Grade % | Discharge at Min Grade c.f.s. |
| 8 | 1.6 | .40 | 0.60 | | | | | | |
| 10 | 1.7 | .30 | 1.0 | 2.4 | .40 | 1.3 | 2.0 | .27 | 1.0 |
| 12 | 1.8 | .22 | 1.4 | 2.5 | .33 | 2.0 | 2.1 | .22 | 1.6 |
| 15 | 1.9 | .16 | 2.4 | 2.6 | .25 | 3.2 | 2.2 | .18 | 2.8 |
| 18 | 2.0 | .13 | 3.6 | 2.8 | .22 | 4.9 | 2.3 | .16 | 4.2 |
| 20 | 2.1 | .11 | 4.4 | 2.8 | .20 | 6.0 | 2.4 | .14 | 5.0 |
| 22 | 2.2 | .10 | 5.7 | 2.9 | .18 | 7.6 | 2.5 | .13 | 6.5 |
| 24 | 2.2 | .10 | 7.2 | 3.9 | .17 | 9.4 | 2.6 | .12 | 8.0 |
| 27 | 2.3 | .09 | 9.0 | 3.1 | .16 | 12.5 | 2.6 | .12 | 10.8 |
| 30 | 2.4 | .08 | 12.2 | 3.2 | .15 | 16.5 | 2.7 | .11 | 14.0 |
| 33 | 2.5 | .08 | 15.0 | 3.3 | .14 | 20.0 | 2.8 | .10 | 17.2 |
| 36 | 2.5 | .07 | 17.8 | 3.4 | .13 | 24.0 | 2.9 | .09 | 20.0 |
| 39 | 2.6 | .07 | 22.0 | | | | 3.0 | .09 | 25.0 |
| 42 | 2.7 | .06 | 25.0 | 3.5 | .11 | 34.0 | 3.1 | .09 | 31.0 |
| 45 | 2.7 | .06 | 30.0 | | | | 3.1 | .08 | 36.0 |
| 48 | 2.8 | .06 | 36.0 | 3.7 | .10 | 47.0 | 3.2 | .08 | 42.0 |
| 51 | 2.9 | .05 | 38.0 | | | | 3.3 | .08 | 48.0 |

Q. 2.10 Do most sanitary sewers work by gravity?

A. Gravity sewers serve nearly all of the houses and businesses in Ann Arbor. Most sanitary sewers work by gravity, and the sanitary sewer pipes usually follow existing land contours to reduce pumping. Sometimes, we have to pump sewage from a low area or over a hill via pump station. Because of the topography of Ann Arbor, the City has very few pump stations.

Q. 2.10 What is the capacity of our sanitary sewer system (minus the plant)?

A. The capacity of the sanitary sewer system, minus the plant, varies depending on location. Upstream pipes serving individual neighborhoods (typically 8-inch diameter

sewers) have a capacity large enough to meet the needs of a smaller area, and downstream interceptors serving large portions of the City have a higher capacity. The key item is the capacity of the pipe, compared to the expected design flow under wet weather conditions. These values will be developed for the trunk sewers and interceptors in the Sanitary Sewer Wet Weather Evaluation (SSWWE) project.

Q. 2.12 What is the capacity of our storm system?

A. For a given area, the storm sewers generally have a much larger capacity than the sanitary sewers. This is because the flow generated from a property from stormwater runoff is significantly larger than the sanitary sewage generated, and the range of flows within a storm sewer system are much higher than that of a sanitary sewer system. Please note: storm systems are not designed to handle all storm events! In large events, surcharging into the streets is expected. The streets hold the water until it can enter back into the storm water system. The Stormwater Model Calibration and Analysis Project will determine the capacity and effectiveness of our storm sewer system.

Q. 2.13 What are the current and planned normal and peak capacities?

A. The current present day average flow into the treatment plant is 19.2 mgd. The projected need in 2025 is 24.3 mgd. The annual average daily design capacity of the City's current wastewater treatment facility is 29.5 mgd.

Also, see Q 2.16 below for more information about WWTP capacity.

Q. 2.14 What is the percent usage of capacity?

A. See previous response for inputs – on an average day about 66% of the plant's capacity is used.

Q. 2.15 How often does the plant get at capacity during these large rain events?

A. Reports of overflows at the plant can be viewed at:
<http://www.deq.state.mi.us/csosso/>

Q. 2.16 Does the waste water treatment plant operator log events which exceed these limits (excerpt from the WWTP Facilities Master Plan prepared by Black & Veatch in 2003 contains design parameters of the plant - see Q 2.16)?

If so, what is the recent history (last several years)? Please provide summaries of events when any of these limits were exceeded. I am also interested in learning more about situations described in the response to Q2.16: "...typically because plant flow increases faster than plant operators can react to bring equipment on-line that is not needed at the lower flow rates...."

This is to understand how issues involving wet weather events at the WWTP are related to plant capacity, or other parameters, such as rate of change in flow rates or other operational challenges.

A. A listing of WWTP overflows since 1999 is [linked here](#) and can be found on the project website at www.a2gov.org/SSWWE > Library.

Here is additional information about plant capacity from the 2004 WWTP Facility Master Plan and current capacities:

The capacity of the retention and equalization facility is a function of the intensity and duration of a given storm event. With a total retention and equalization volume of 16.76 million gallons (including chlorine contact volume), it is possible to formulate how many days of storage is available based on a given peak day flow. Assuming the plant can handle incoming flows of 2.5-times the 2025 AADF of 24.3 MGD (or 60.75 mgd) and the 2025 peak hour flow of 72.7 MGD, a total of 11.95 MGD would need to be diverted to the flow Equalization and Retention Facility (72.7 mgd – 60.75 mgd). At this rate of diversion the peak hour design flow of 72.7 mgd could be sustained for approximately 1.4 days (16.7 mg/11.95 mgd) before the capacity of the equalization facility is exceeded.

Since that master plan was developed, the disinfection process was changed to ultra-violet (UV) light. The hydraulic capacity of the UV system is around 48 MGD or so. Doing the same analysis that B&V performed for the WWTP Facility Master Plan but using 48 MGD as the amount “the plant can handle”, the storage is around 16 hours. Treatment plant staff consider this as a worst-case scenario, and would characterize our storage as being from 16 hours to 1.4 days.

Q. 2.16b Does the discussion of the capacities relate to the current situation with the West plant down for refurbishment, or is it the combined system, assuming both plants are in service? How does the answer change given the status of the West plant?

A. Below are the responses from the WWTP Services staff:

- The projections would not have taken into account the west plant being off line for replacement.
- The flow estimate was based on a projection of growth which the plant is presently not near.
- The west plant would be available if and when the 2025 projection is met
- If the flows were at the projected rate and the west plant is out of service, it is expected the time estimate to be reduced by about 1/3.

Q. 2.17 What is the expected growth in capacity usage (as well as growth in usage since the initial studies in 2000)?

A. Ann Arbor [2004 WWTP Facility Master Plan](#) conducted in 2004 forecasted continuing population growth. That Master Plan, predicted a 27% increase in flow between today's average flow and 2025, however, the state's economy has changed dramatically since 2004 and such large increases are no longer expected. In fact, data shows that water usage and sanitary sewer production is actually decreasing, not increasing.

Q. 2.18 What are the sources for earlier estimated growth in flows?

A. Ann Arbor [2004 WWTP Facility Master Plan](#) conducted in 2004 forecasted continuing population growth.

Q. 2.19 If the current study by OHM reveals that there are now only select areas with potential sanitary sewer "back ups" due to surcharging of the existing sewer pipes, is it possible to remedy this with auxiliary pumping stations located in manholes in the right-of-way, near these selected areas, in lieu of performing more FDDs?

A.4 Once we have completed the risk assessment portion of the project, then we will be exploring all options to mitigate sanitary surcharging.

Q. 2.20 What are the other industry means of reducing the Sanitary dilution?

Q. With the larger Sanitary Advisory group, it might be possible for sub-committee volunteers to undertake some of the history or research into other ideas.

Q. What local fixes have or could be employed, in "target" or other problem areas?

A. Other [methods of performing sanitary sewer rehabilitation and other options for addressing wet weather flows](#) were presented in the examples from other communities requested by the "Best Practices" sub-group, which were distributed to the CAC at the December 12 meeting. Further details will be discussed during alternative evaluation portion of the project.

Q. 2.21 Has/will the City investigated the possibility of utilizing the Ypsilanti Treatment for Storage?

Q. Could Ypsilanti Sanitary System (YCUA) which borders the Ann Arbor System and is of a lower elevation, has large capacity, does not exit to the Huron, services adjacent townships, etcetera; be contracted to accept Ann Arbor Sanitary Overflow?

A. Purely from a technical standpoint, there are constraints that would make this very challenging to implement. A major issue is that the YCUA plant is on the wrong side of the river, and the flow would need to be pumped in order to get under the river and back up to their plant.

Q. 2.22 Why was sanitary storage rejected in favor of disconnects and pumps?

A. This was a recommendation made by the SSO Task Force, and is documented in the report found at this link: <http://www.a2fdd.com/SSORpt.htm>. We encourage you to review that report so that you can get the complete information directly, rather than receiving a paraphrased version here

Q. 2.23 - Have we discussed any other alternatives yet, such as increasing sanitary sewer storage?

A. The study includes an alternatives evaluation beginning Feb/Mar 2014, which will evaluate several alternatives to alleviate potential hydraulic system deficiencies, including storage.

Q. 2.24 I would assume that the City and your resources are looking into Storage Projects in SE Michigan and elsewhere. In quick look at www.dwsd.org there seems to be a predominance of Retention Basin projects ongoing in the area. A quick look will not reveal much on sump pumps.

Q. Will the City and their Consultants provide data on every sanitary treatment on the high priority pollution reduction goals on the Huron River. This data should include which communities have accepted or rejected FDDs and which communities control peak flow emergencies with Sanitary Storage.

A. This is exactly the kind of work that OHM and the “Best Practices” subcommittee of the SSWWEP CAC will be doing.

Q. 2.25 [What about storage] somewhere downstream, closer to the Treatment Plant, the idea being to avoid spills/EPA fines...The resolution of upstream flow capacity was quite completely covered in the 1997 report, showing pipes in red needing upsizing, and pipes in blue considered satisfactory. These pipes were shown regionally, within the City. In the 2001 Report, Sanitary storage was ranked at 100% in several regions, and 95% in others (losing out to Disconnects). Your mail reiterates that probable solutions will be regional (or localized). I completely agree with this because it means we could spare much of the grandfathered residences and possibly new ones from what I consider a nightmare of new problems associated with pumps. And, at a rate of 600-700 disconnects per year (including homes with very low footing flow), it would take over 30 years before running out of Mitigation possibilities. Meanwhile we are supplying Sanitary service in alarming numbers within and outside

of the City with no plan for increased Treatment Capacity (and \$145,000,000 to just modernize but stay even in capacity?) The City/City Council selected the Disconnect process because there were more 100% areas than 95% areas; the ranking system being arbitrary and not scientific. (some current Councilpersons like Consultants because they can choose to ignore their conclusions and recommendations. They have that right, but they are elected by us. I wonder how many of them or City Staff have sump pumps and are in a position to judge?

A. Thanks for the feedback. I think a lot of these items will come up and be examined during the alternative evaluation. We will be preparing a similar map as the 2001 study color-coding the pipes by capacity available, with the impacts of the FDDs done to date reflected on the map. That should bring a lot of things into focus.

With respect to storage, if we find that it is needed, it will be a balancing act on where to locate it. Pushing it downstream closer to the plant will mean that added pipe capacity in the form of relief sewers are needed to get the flows from the neighborhood where the flow is generated to the storage tank, and that adds cost to the storage as an alternative. If you push it upstream closer to the source, you run into limited land availability. One option that might be a good idea to examine is the notion of “linear storage”, whereby flow is stored in an oversized pipe. This might allow us to get the storage closer to the source. Linear storage has its own disadvantages that we will have to review with the CAC and the City. The evaluation of all of this is really going to depend on the outcome from the hydraulic evaluation, and input from the public.

One item that I feel is necessary to set the record straight on is your comment that "The City/City Council selected the Disconnect process because there were more 100% areas than 95% areas; the ranking system being arbitrary and not scientific." As I understand the history, that is not an accurate depiction of how the decision was made. It is my understanding that the City formed an SSO task force and conducted several public meetings, where the citizens on the task force examined the options and decided that they would rather disconnect FDDs than place storage tanks in the parks, woodlands and wetlands that were available for tank sites. The public made this recommendation to Council, and the City implemented the recommendation. It was a very similar process to the one being followed now.

Q. 2.26 Can the treatment plant be expanded?

A. No. The wastewater treatment plant size is constrained by its physical location. It is surrounded by railroad tracks, a creek, and the river.

Q. 2.27 What plans are underway to accommodate future expansion of City sewer/water services?

A. For the sanitary sewer system, the SSWWE project will be evaluating the current capacity of the sanitary sewer system, including a risk analysis of capacity concerns. Depending on the results of this study, it could lead to future proposed projects.

Q.2.28 What long range City/county Plans exist for new regional facilities?

A.35. For the City of Ann Arbor sanitary system, there are currently no planned or proposed new regional facilities. *

*Note from the consultant Project Manager: There are several detailed questions in the log pertaining to the WWTP. Due to the complexity and details required in the answers about the WWTP, it can be challenging to provide a sufficient answer in a short Q&A format. We suggest that a more detailed workshop or breakout group that meets with the City and WWTP staff may be a more appropriate way to address these inquiries.

Q. 2.29 Should there be an on-going County or Metro area infrastructure study, to accommodate growth?

A. An undertaking such as this would require substantial time and effort, and would require the consent and cooperation of all the involved municipalities. We recommend contacting the Southeast Michigan Council of Governments (SEMCOG), of which the City is a member, to learn more about what would be needed to undertake such a regional study.

Q. 2.30 What are the details of the 2001 Sanitary Storage option especially for the Morehead area?

A. Sanitary storage was considered and evaluated by the SSO Task Force, which ultimately recommended the Footing Drain Disconnection program. It is documented in the report found at this link: <http://www.a2fdd.com/SSORpt.htm>. We encourage you to review that report so that you can get the complete information directly, rather than receiving a paraphrased version here.

As part of this project, we will be evaluating alternatives for addressing the risk of future basement backups from wet weather flows, and that alternative evaluation will consider options within all three fundamental alternatives, including a) source removal, b) transport and treat, and c) storage. Information about approaches other communities have put in place were researched, compiled and distributed to the CAC at the Dec 12 meeting.

Q. 2.31 Where is the position paper describing the Sanitary Treatment upgrade?

A.29. The need for the sanitary treatment upgrades at the wastewater treatment plant can be found in the 2004 Ann Arbor WWTP Facilities Master Plan.*

*There are several detailed questions in the log pertaining to the WWTP. Due to the complexity and details required in the answers about the WWTP, it can be challenging to provide a sufficient answer in a short Q&A format. We suggest that a more detailed workshop or breakout group that meets with the City and WWTP staff may be a more appropriate way to address these inquiries.

Q. 2.32 Why doesn't the upgrade of the AA WWTP increase capacity with the second treatment plant activation?

A. The current dry weather average daily flow into the treatment plant is 19.2 mgd. The projected need in 2025 is 24.3 mgd. The annual average daily design capacity of the City's current wastewater treatment facility is 29.5 mgd. The wastewater treatment plant size is also constrained by its physical location. It is surrounded by railroad tracks, a creek, and the river.

Q. 2.33 Can the city make storm sewers overflow into sanitary sewers?

A. No. Discharge of stormwater sources into the sanitary sewer system is prohibited by local ordinance. Why? Flows from the storm sewer system would quickly overwhelm the sanitary sewer system and lead to sewer overflows and backups into basements.

Q. 2.34 During the June 27, 2013 storm, the treatment plant had an overflow. How many gallons?

A. Estimated 10,000 gallons. Note: the plant treats an average 19.2 million gallons per day (mgd).

Q. 2.35 Has the EPA contacted the City about the June 27 overflow?

A. The City notified the Michigan Department of Environmental Quality (MDEQ) of the incident.

Q. 2.36 How does the City learn about sewer backups?

A. Sewer backups are reported to our Field Services Unit at 734-794-6350 or www.a2gov.org/crs during normal business hours. For after hours, weekends and holidays, backups are reported to our Water Treatment Plant at 734-994-2840.

Q. 2.37 How much does it cost to treat stormwater vs. sanitary sewage?

A. There is no cost to treat stormwater at the pipe outlet, as this water is collected by a separate storm sewer pipe system, which ultimately discharged to the Huron River without an end-of-pipe treatment. Treatment and management of stormwater is

handled through other mechanisms such as source control, street sweeping, public education programs and stormwater collection system maintenance. Stormwater does not make its way to the wastewater treatment plant, unless it enters the sanitary sewer system through defects, in the sanitary sewer system or private property sources like footing drains. The cost for treating sewage at the wastewater treatment plant is approximately \$1400 per million gallons. Therefore, when any stormwater enters into the sanitary sewer system, unnecessary cost is incurred because all the flow which enters into the sanitary sewer pipes goes to the wastewater treatment plant.

Q. 2.38 Can the City provide a history of all efforts to "camera inspect" and repair existing sanitary sewers since 2001?

A. Yes. Maintenance records are on file with the City's Field Operations Unit. This information will be reviewed in conjunction with the next phase of the project, investigating and analyzing the hydraulic condition of the sanitary sewer system.

The City has electronic records of all sanitary sewers that have been televised since summer of 2006. Please see attached report (Q2.38 Report of CCTV Work Since 2006, also available on the website: www.A2gov.org/SSWWE > Library.) Prior to summer of 2006, records were not kept electronically. Records are archived and are less easily searchable. The same applies for repair work performed on the system. All the electronic records of repair work performed on the system is shown on the attached "[Citywide Sanitary System Improvements.PDF](#)" map, also available on the website: www.A2gov.org/SSWWE > Library page.

Q. 2.39 Do the sewer, water, and surface disposal customer rates compensate by area? (Twps pay more)

A. Township islands within the City service area pay two times the City rate, unless other site-specific agreements are in place. Outside the City service area, the City contracts with Ann Arbor, Pittsfield, and Scio Townships for utility services on a sale for re-sale basis.

Q. 2.40 Does the city have a formal program for sealing the existing sanitary sewers from storm water surface leaks and ground water infiltration (similar to Scio Township)?

A. Maintenance is routinely performed on the sanitary sewer system, which includes cleaning and televising, lining of existing sewer pipes, spot repairs, and repair or replacement of manholes.

Q. What are the experiences in other areas, including out-of-state?

A.26. The project team has researched and provided reports of communities that have undergone FDD projects, as well as other approaches to mitigate wet weather effect on sanitary sewer systems. [That document was provided to the CAC in preparation for its December 12 meeting.](#) CAC members are also encouraged to contact the communities referenced to conduct their own interviews.

Q. Was FDD adopted by the state?

A. The State of Michigan does not have a specific requirement that communities must perform FDDs. FDD removals have been accepted by the State as a means of source removal for sanitary sewer overflows. Ann Arbor’s Administrative Consent Order (ACO) with the State of Michigan required that the City perform 799 FDDs to control sanitary sewer overflows.

The State requires that participants in the State Revolving Fund (SRF) low-interest loan program implement the most cost-effective alternatives. Cost-effectiveness varies by systems and depends on the feasibility of all options including source removal, storage and transport and treatment.

Q. 2.42 What is the legal justification (ordinance) behind the FDD program?

Q. What State or Universal code is the basis for the City Ordinance requiring homes constructed before 1982 to have footing drains disconnected from the City’s sanitary sewer system and sump systems installed?

A. The Michigan Home Rule City Act was amended in 2002 to add Section 5j:

“A city, in order to protect the public health, may adopt an ordinance to provide for the separation of storm water drainage and footing drains from sanitary sewers on privately owned property. The legislative body of a city may determine that the sewer separation authorized by this section is for a public purpose and is a public improvement and may also determine that the whole or any part of the expense of these public improvements may be defrayed by special assessment upon lands benefited by the public improvement or by any other lawful charge. A special assessment authorized by this section shall be considered to benefit only land where the separation of storm water drainage and footing drains from sanitary sewers occurs.” MCL 117.5j (emphasis added).

Although the City Council adopted Section 2:51.1 of the Ann Arbor City Code, which governs the current footing drain disconnection program, in 2001, the amendment to the Home Rule City Act in 2002 makes clear that the ordinance and footing drain program are authorized under Michigan law.

Amendments in 1987 to the federal Clean Water Act require municipalities to take steps to prevent sanitary sewer overflows. Such overflows, resulting in the discharge of

pollutants into the rivers and streams, would violate the City's National Pollution Discharge Elimination System (NPDES) permit. Since the early 1980s the state construction code, which the City is obligated to follow, has prohibited connections of downspouts and footing or foundation drains to the sanitary sewer system. The City's footing drain disconnections are consistent with those obligations. The sump pumps that are installed with the connections to the storm sewer system are no different than the sump pumps builders or contractors install – and have installed – in properties constructed since the construction code change in the early 1980s.

A quick search has found that other states and municipalities have adopted similar statutes and ordinances requiring properties to disconnect historic connections to the sanitary systems and connect with storm sewer systems. Some ordinances impose criminal penalties if a property owner does not disconnect stormwater discharge to a sanitary sewer; other provide that the municipality can shut off the water supply to the property if the property owner does not disconnect.

After searching case law, we have not found any administrative agency or court decision that has found a footing drain disconnection program to be illegal.

Q. 2.43 How can a local ordinance in 2001 (that doesn't mention the words "building code" or "construction code") make a STATE building code suddenly retroactive 19 years after the fact? If so, the FDD Ordinance would have purported in 2001 to retroactively modify a 1982 STATE building code to make that code also retroactive from 1982 to 1966.

A. See response above, particularly Clean Water Act requirements and state construction code obligations.

Q. 2.44 Why are lawfully connected footing drains described as "illicit," "improper" and out-of-code in Ann Arbor by the City Attorney and chief code enforcement official while they are legal, proper and in-code in Jackson, please indicate, from the standpoint of uniformity of codes, how this complies.

Q. Why do footing drains connected to the sanitary sewer system violate building codes in Ann Arbor, but not in other cities, like Jackson, Ypsilanti or Pittsfield Township?

A. The Building Code was not the impetus for the Footing Drain Disconnection program in Ann Arbor. The 2001 SSO Committee recommended an FDD program to reduce the number of sewage backups in the five neighborhoods where 50% of all sanitary sewer backups had been reported.

Q. 2.45 The initial SSOE CAC report listed concerns of the CAC on the legality of entering private property to install sump pumps. These concerns, and other legal

concerns, have recently been submitted to the City. Has the current Rebuttal as submitted by an Ann Arbor resident, reviewed by the current SWWE CAC, been reviewed by the City Attorney? If so, is the FDD program still considered to have legal backing to proceed?

Q. Does the City have legal authority to continue with the FDD program? Is there a private property issue that would make the FDD program illegal?

A. Yes, the FDD program is legal. Private property issues do not apply to this situation, as the sump pump installation belongs to the homeowner, not the City or a commercial operation. On January 9, 2014, the CAC met with Asst. City Attorney Abigail Elias, who responded to legal questions raised by an Ann Arbor resident.

Q. 2.46 Per the review of 2001 SSO Report, legal concerns were raised regarding the FDD program and private property rights. What were the actual legal concerns of the SSO during the formulation of the report in 2001?

A. At the January 9, 2014 CAC meeting, a CAC member posed this question to Asst. City Attorney Abigail Elias. Ms. Elias responded that task force members were asking what legal actions needed to be taken to enact a Footing Drain Disconnection program.

Q. 2.47 FDD installations create a path for sanitary back up flooding to enter the sump pump "container" and be pumped back out to the new horizontal storm line at the curb and ultimately direct to the River. The lids on these containers are not always 100% watertight due to the penetrations required for pipes and wires, and due to periodic maintenance. How can this potential sanitary pollution of the storm system be legal and tolerated?

A. Sanitary pollution of the storm system is not legal. The goal of the SSWWE project is to evaluate the effectiveness of the FDD to date in removing wet weather flow from the sanitary sewer system and thereby reducing the potential of such occurrences.

Q. 2.48 What is the legal justification of the developer mitigation program?

A. The interface between the Developer Offset Mitigation Program and property owners who may take advantage of the program to fund their footing drain disconnect is simply a funding mechanism. It is purely voluntary for any property owner who is offered funding by a developer. The property owner is free to accept or refuse the offer. The ability of a property owner to accept or reject a developer's offer is distinct from an obligation to disconnect that the City might impose under Sec. 2:51.1 of the City Code.

While there might be disagreement as to the best way to minimize or limit the impact of a new development on the sanitary sewer system, the City is not legally required to pick the best option. This choice also has benefit of reducing risks of storm water overflows

from combined sanitary and storm flows in the sanitary sewer system. In addition, property owners who take advantage of a developer's offer are not subject to the same subsidy limits as property owners whose footing drain disconnects are funded by the City.

Q. 2.49 How does the Developer Offset Mitigation Program work? Are the disconnections mandatory?

A: Developer Offset Mitigation (DOM) is performed by, and at the expense of, the developer. The developer covers all of the costs for the mitigation work. Developers are required to offset any new flow to the sanitary sewer added by the development. While FDD is an option, and is the most common method chosen by developers, other methods to remove flow can be proposed and reviewed. All footing drain disconnections made under the DOM program are voluntary.

Q. 2.50 How do you determine if a house has footing drains connected to the sanitary sewer?

A. An on-site assessment of each home is performed by the FDD Construction Manager to determine if the footing drains are connected to the sanitary sewer system.

Q. 2.51 If significant structural work is done on a home, does the footing drain have to be disconnected?

A. Disconnection is required for any work done on a home that involves replacing or altering the existing footing drains such as foundation and/or basement wall work.

Q. 2.51 Why was the FDD program suspended?

A. See City Council resolution R-12-435 Link:
[http://www.a2fdd.com/documents/Temporary Suspension of FDD.pdf](http://www.a2fdd.com/documents/Temporary%20Suspension%20of%20FDD.pdf)

Q. 2.52 Administrative Consent Order entered into by the City with the Michigan Department of Environmental Quality (MDEQ) in 2003 indicates that the City would perform Footing Disconnects on 620 homes in the targeted areas. Those were completed between 2007 and 2009. Why, then, is the MDEQ ACO document continually referenced as justification to proceed with ADDITIONAL FDDs?

A. The ACO actually required the City to perform 799 equivalent FDDs, which have been completed. The ACO requirement has been cited when giving a history of the program.

Q. 2.53 How many homeowners have opted out of FDD?

A. Three homeowners have opted out.

Q. 2.54 What's the impact of wetlands on FDD?

A. Wetlands, if they function properly, tend to store surface runoff and gradually infiltrate the stored flow into the soil. Therefore, such flows would manifest themselves in the infiltration or groundwater component of flow metering flow data. The next CAC meeting will include a presentation on flow data and the inflow, infiltration, and baseflow components of flow data.

Q. 2.55 FDDs remove stormwater flow from the sanitary sewer system and redirect it to the storm sewer system. What if the storm sewer system is already at capacity?

A. When the storm sewer system reaches its capacity, storm water flows onto ground surfaces, such as roads and yards. Once the flow that had filled the storm sewer passes, the surface flow (the water in roads and yards) will enter the storm sewer. In homes with a sump pump, there is a pipe outside the home, constructed with an air gap. The air gap allows the flow to drain onto the ground, if the discharge line is full.

Q. 2.56 Why can't the Offset Mitigation Program pay for storage instead of the disconnect/sump pumps?

A. The developer Offset Mitigation Program does not specify or require footing drain disconnections as the only option for peak flow mitigation.

Q. 2.57 Are you looking at what happens in our basements/to us when our electricity fails?

A. Yes, the City and the FDD Citizen Advisory Committee want to know about property owners' experiences, positive and negative, with the FDD program. This is important and was the reason the FDD project team conducted surveys of property owners' FDD experiences.

Ongoing, we encourage property owners to report any issues with FDDs. When locations with issues are reported, program staff contacts the property owner to determine if the problem is related to the FDD program and requires modification or correction, or if the issue is a private property matter unrelated to the program.

We will continue to work with homeowners to resolve problems resulting from FDD installations. If property owners feel they have an issue with a disconnection, we ask that the owner report it, so that program staff can identify, investigate and resolve the issues. To report an issue, visit the FDD program webpage at www.a2fdd.com, click on the Contact Us link on the left side of the main page and let program staff know how to contact you.

Q. 2.58 How are you going to deal with our sump pump issues?

A. If, after the SSWWE study is complete, the Citizens Advisory Committee recommends that FDD should be continued, alone or along with other methods of reducing sanitary sewer backups, the experiences of the current FDD participants with sump pumps will be carefully considered in the design of any new program. To that end, we have implemented the SSWWEP CAC's suggestion to conduct a survey of all property owners who've had an FDD. We've reviewed the results and are investigating the issues reported to determine the course of action.

Q. 2.59 Some homes have experienced new flooding and seepage as a result of the FDD installation. Many basements are "finished" with carpet, drywall perimeter walls, etc. What measures have been, or will be done, by the City to alert the homeowners of black mold that can be concealed by the "finish" materials in the basement? Refer to the following link: <http://www.poison.org/current/indoor%20mold.htm>

A. The Footing Drain Disconnection Survey conducted on behalf of the SSWWE CAC includes several questions about flooding and seepage. Based on the results, the City will investigate further and determine what measures to take.

Q. 2.60 Has the operating cost of a sump pump for an individual homeowner been evaluated?

A. Yes, power costs were estimated at less than \$2/yr for the average homeowner (these would vary) and that the sump pump would need to be replaced from time to time. It was estimated that the life of a sump pump was 7 years with a replacement cost of approximately \$300.

Q. 2.61 Some homeowners are on a fixed income (such as social security or retirement savings). Does the City expect these homeowners to pay for all the back up systems, maintenance, etc.? This is an unfair burden.

Q. What if the homeowner can't afford the replacement of pumps (some pumps have only lasted 1 year), back up batteries, generators, as well as additional costs of electricity?

A. As mentioned in August CAC meeting summary, electricity costs to run the sump pump average \$2.00 per year. A replacement sump pump costs around \$300 and is expected to last about seven years on average. These are costs that owners of homes built after 1982 already bear, as part of normal home ownership and maintenance. After receiving results of the 2013 FDD survey, the City is looking into information provided by residents to determine what FDD homeowners' experiences have been.

Q. 2.62 The City is requiring the installation of the sump pumps. These are ultimately reducing the home's value due to new inherent flooding. Why should the homeowners be required to pay for additional costs for back up systems, revised (more distant) locations within the basements, and repairs to finishes and landscaping not completed by the contractor? Why doesn't the City cover all the related costs for the homeowner?

A. The existence of a sump pump does not reduce a home's value. If there are damages caused by an FDD installation, we urge the resident to report any incidents to the City. The City is looking into the legality of supplying backup systems for homeowners who've experienced frequent power outages, etc. This must be reviewed because backup systems are not required by State Building Code.

Update (11/6/14)

As the City has considered the matter of providing backup pumps to past City FDD participants, the following concerns were identified:

1. Recommendation requires all rate payers to pay for backup systems for FDD program participants, although backups are not required by Code.
2. Property owners typically pay for backup systems when building a new home or installing a sump for other reasons.
3. Differential treatment for different properties raises policy and community relations concerns.

Q.2.63 How many times has the City compensated a homeowner for stormwater damage from the sump after a mandated FDD?

Q. 2.64 How many times has the City fixed the problem of a FDD causing stormwater flooding from the sump, or compensated the homeowner for these sump pump or other repairs?

A. In a few instances where the City was aware of a sump pump installation not working as intended, the City has fixed the problem, such as upgrading the sump pump or adding a second pump. Investigation of city records was able to go back to 2007. During this timeframe 12 claims were identified as being at a property at which either a City FDD or a DOM FDD were performed. Of the 12 claims, one was approved.

More information about the claims received:

The City has not compensated any property owner for sump pump or other FDD system related repairs done by the property owner. Nor has the City compensated any property owner for system redesign or adjustment.

In situations where issues have arisen following installation regarding the design of a system, the City has worked with the property owner and contractor within the FDD program, including covering additional system costs where required. When an installation issue has been brought to the City's attention, the City has helped with getting the contractor to take care of the issue.

Unless discussed or included in the list below, none of those has been submitted to the City as a claim that would have been reviewed by the Board of Insurance Administration.

One property, previously identified as the one claim that was approved, came through as a claim involving a system design issue as well as other factors that resulted in a decision to pay the claim and to cover the cost of the redesigned system, which included installation of a sump pump (the original design did not have a sump pump).

Aside from that location, only 5 properties with claims to the Board of Insurance involved issues with installation and/or operation of an element of an FDD installation. The City did not pay any of these claims. The City does not know what the contractors did in terms of compensation to property owners for damages. Not all involved stormwater flooding in the basement:

- Claim in 2014 – referred to the plumbing contractor who installed the system to handle. The claim does not include a request for compensation; just for a broken sump pump fixture to be fixed, along with a request for a battery backup.
- Claim in 2011 – the check valve failed, resulting in a sanitary sewer backup – NOT stormwater flooding.
- Claim in 2010 – the claim was for a sanitary sewer backup. The City had previously worked with the property owner to get an additional sump pump and had covered that cost.
- Claim in 2008 – the plumbing contractor installed a temporary drain pipe (during winter installation) that didn't extend far enough from the house so water drained too close to the house; property owner installed a B-Dry system and wanted the City to cover 50% of the B-Dry system. The City denied the claim; the plumbing contractor was responsible for fixing the installation. (Not a sump pump issue.)
- Claim in 2008 – faulty operation of sump pump (frozen in "on" position so ran constantly). A different contractor fixed the check valve and the property owner wanted the City to cover the \$200 repair. Although the property owner reported they had flooding in 2004 due to improper location of the drain by the plumbing contractor, the property owner did not submit a claim to the City. The original plumbing contractor

relocated the drain and adjusted the sump pump. Poor workmanship in 2004 may have contributed to the problem in 2008. There was no flooding in 2008.

Q. 2.65 The current FDD program imposes a \$100 per month (\$1200 per year) penalty on homeowners who chose NOT to have a FDD or sump pump installed in their homes. This is a tax on homeowners in targeted neighborhoods, only. How is it that the City can impose a new tax without the approval of all voters in the city?

A. The \$100 per month charge is a utility surcharge, not a tax. Voter approval is not required.

Q. 2.66 The initial SSOE CAC report listed concerns for periodic maintenance and inspections for the sump pump equipment. Is this or will this be done by the City?

A. Periodic maintenance and inspection of a sump pump is considered part of normal home ownership and maintenance, and is not performed by the City.

Q. 2.67 What are the sump pump experiences on post-code new houses? i.e.: lifespan of sump pumps and check valves.

A.25. The City does not have information in this.

Q. 2.68 Why can't the FDD be done out at the street level rather than in residents' homes? Couldn't a separate storm line (for FDD water only) be constructed?

A. For a typical house with a footing drain connected, the footing drains beneath a house and the sanitary sewer lines in the house merge at a confluence point beneath the house foundation, and a single sanitary sewer service lead transports both flows to the sanitary sewer. Therefore, separation of the footing drain flow from the sanitary flow requires construction within the basement of the house.

That construction in the house entails the installation of sump pump and a sump pump discharge line transports the footing drain flows to a pipe in the street. Often, there is not a convenient location to connect this sump pump discharge line into the storm sewer system, so a curb-line drain is installed within the right-of-way behind the curb to collect the sump pump flow several houses. This curb line drain then connects to the storm sewer system at the next convenient storm manhole or curb inlet. Therefore, disconnection of the footing drains entails both construction within the homes and construction within the right-of-way at the street.

Q. 2.69 FDD installations disturb the floor slab. What is the impact of this on radon in the home?

A. During installation a section of the floor slab is removed to provide access to the plumbing beneath the floor. The new sump is installed in this space and completely sealed around the perimeter of the sump with new concrete. This prevents the movement of gasses around the sides of the sump. The sump itself, which is connected to the area below the basement floor, by the footing drains, includes a sealed and gasketed lid that will also prevent the movement of any gas from under the floor to the basement. Together, these two measures prevent gas from moving from the under floor area to the basement space.

Q. 2.70 Has any before and after radon testing been done on homes where the FDD has been performed?

A. This is not done as part of the City program. The City is not aware if this has been done as part of the Offset Mitigation Program.

Q. 2.71 FDD installations disturb the aged waterproofing on the exterior of the foundations. Has the City quantified the cost impact for owners with FDDs?

A. The disconnection of the footing drains from the sanitary sewer does not typically disturb the waterproofing on the exterior of the foundation, as the sump discharge pipe comes out of the house above the level of the exterior waterproofing. If there is damage to the waterproofing, it will be restored at no additional cost.

Q. 2.72 Why does the City not require re-waterproofing prior to back fill?

A. The disconnection of the footing drains from the sanitary sewer does not typically disturb the waterproofing on the exterior of the foundation, as the sump discharge pipe comes out of the house above the level of the exterior waterproofing. If there is damage to the waterproofing, it will be restored at no additional cost.

Q. 2.72b Who inspects the excavation and waterproofing prior to backfill. Is there a typical Inspection Card that can be retrieved from City Records for each home?

A: The City plumbing inspector inspects the installation of the FDD discharge pipe. Documentation can be found on the City's E-Trakit system at: <http://etrakit.a2gov.org/>

Q. 2.73 FDD installations can be destructive to existing finishes in some homes. Why does the city not require a "before and after" inspection / photos, of all existing and final conditions?

A. The FDD program staff does perform a pre and post inspection of every home that may include photos.

Q. 2.74 FDD installations rely solely on the sump pump to get rid of footing water that is now allowed "into the house" at the sump pump location in lieu of staying on the exterior of the house at the former sanitary connection. Did the original designers of the FDD program consider the fact that pre-1982 homes were not built nor waterproofed with the critical function of a future sump pump installation?

A. There is no functional difference between a house built with a sump pump and one built without.

Q. 2.75 FDD installations have the sensors and electronics installed close to the floor and susceptible to damage or "shut offs" from kids, pets, or common movements of storing/moving items in these basements. Why are these sensitive parts not installed up high and out of harms way?

A. The FDD Survey conducted December 2013-14 included questions about installations. If the issues mentioned were reported, the City will address those with the contractors.

Q. 2.76 The current failure of many FDD sump pumps has caused NEW flooding in basements. Flooding is something that must be disclosed on Real Estate Disclosure forms. In addition, formally usable square footage in these home's basements have now been rendered unusable due the uncertainty of the operation of the sump pump and the inherent potential for unforeseen flooding. Is it the position of the City that it is acceptable to devalue these homes?

A. The 2013 FDD survey includes questions about flooding that may have occurred after the FDD and sump pump installation. This information will help us determine the extent of this issue. Investigations into wetness issues are underway. After we have that information, we can make a determination about a course of action. We confirmed with the City's Assessor that a sump pump by itself does not have an impact on the assessed value of a home.

Q. 2.77 Has the City studied the cost of reverse engineering of FDDs should that become necessary?

A. No.

Q. 2.78 It is presumed, that the footing drain piping that was initially installed when the house was built, is laid with a slight slope so that it will "drain" or flow to the lowest point. The existing clean-outs and connection to the existing sanitary sewer, and FDD required sump pump presumably occur at this lowest point. In the event that a new FDD sump is not positioned at this lowest point, (ie: another location in the basement) due to the Homeowners' request, or due to other obstructions or restrictions, what is currently included in the FDD design to prevent sediment, sand,

and other obstructions from "gathering" at the former low point in the footing pipe, and ultimately blocking the footing drain "upstream" of new FDD sump pump?

A. It is a misconception that the footing drains are sloped. Typically, they are not sloped to a low point. The only sloped sections may be those that lead from the perimeter to a connection, and often that may be to get to the elevation of the connection to the sanitary lead. Even so, in the alternate sump location scenario presented, there is a risk that the footing drain system will not function as effectively as before, or that the footing drains are configured in a way that causes sediment build-up. This is explained to the homeowner before an alternate sump location is approved and the reason the alternate sump location release form must be signed.

Q. 2.79 Existing FDDs as designed, allow approximately 3" of standing water to remain in the bottom of the sump container. This water contains decomposed, organics, fertilizers, and other unknown substances. The water is only "pumped" out of the container when the water level reaches the flow setting on the pump (approx 7" depending on the pump design). Does this standing water in the sump container represent a health hazard? In your response please also consider the following: 1. Fresh air infiltration in homes is being substantially reduced for energy savings purposes. New windows and other energy saving efforts are making homes more "tight" and the residents more susceptible to airborne contaminants in the home. 2. FDD sump pumps with this standing water are installed in basements where the most furnaces with "air intakes" are also installed. In some cases, the new sump pump locations are very near the furnaces.

A. No, we are not aware of health hazards relating to the standing water in the bottom of sump containers. Installation of sump pumps follow all current Michigan building and plumbing codes.

Q. 2.80 Existing FDDs as designed require maintenance for a wide variety of issues related to the continued operation of the sump pump and check valve. Considering the 3" of standing water in Item 71 above, what prevents this standing water from getting further contaminated with dust, sand, other debris, creating sludge that can possibly cause the pump or check valve to fail?

A. The sump is installed with a sealed cover to prevent debris from entering the sump.

Q. 2.81 Existing FDDs include a plastic lid or cover that is "sealed" with silicone caulk upon the initial installation. This lid must be removed to perform some of the "Operations and Maintenance Instructions" provided to the Homeowner, as well as the need to clean out the sludge mentioned in the questions above. The same lid is removed if the pump needs to be replaced. What assurance can the City provide that:
a. Proper Radon infiltration protection can be maintained? b. Airborne contaminants and odor do not enter the home. c. (Per a previous question, that potential Sanitary

sewer back ups from nearby sanitary floor drains, do not get discharged to Storm system via the FDD sump pump?)

A. After maintenance is complete, it is recommended that the sealed cover is replaced. Homeowners are responsible for determining their own radon risks.

Q. 2.82 Does the City consider that a homeowner (in lieu of a Certified /Licensed/Trained Contractor) should be responsible to perform the periodic re-installation of this lid, considering the environmental and Health/Safety concerns noted above?

A. It is the homeowner's decision as to whether or not they wish to hire a contractor to perform maintenance on their sump system or perform that maintenance themselves.

Q. 2.83 A review of the 2001 SSO Report and input from a Citizen that was involved in the initial implementation of the FDD program, indicates that the initial program included an inspection of each new FDD home to examine drainage from roofs, possible floor drains in stairwells that were contributing to the load, window-well drainage, poor foundation drainage, poor sloping of the ground near the foundation, and poor gutter and drainpipe discharges. This pre-install inspection was apparently all part of the FDD program. Each home was inspected to identify and rectify such faults as part of and prior to sump pump installation. Can the City provide evidence that these inspections have occurred on all subsequent 2700 FDD installations as well as evidence that the proper corrections to the drainage issues were rectified at each of the 2700 FDD home locations?

A. See the standard pre-inspection checklist ([Exhibit Q2.83 Pre-inspection Checklist](#), also available on the SSWWE > Library webpage) that was developed by the FDD CAC, which is based on the recommendations of people that have been through the FDD program.

Q. 2.84 Per the review of 2001 SSO Report, page L-2 "Final Recommended Program," the following items were recommended to be FUNDED from the Sewage Collection Systems Users Fee: *Sump and sump pumps, *Back up systems (both water power or battery) check valves at specific houses, *basement restoration, * Radon gas testing and remediation, exterior discharge piping and *exterior site restoration*. The current FDD program requires the homeowner to fund these (*) and other costs involved with the FDD. Interior and exterior restorations do not fully restore the area back to the initial condition prior to the FDD installation. Why does the current FDD program NOT FUND 100% of the cost for the items noted with an asterisk (*) above and full restoration of interior and exterior conditions?

A. The program does fund exterior and interior site restoration. The question of backup systems was answered previously (the City is evaluating and determining whether it can do so, legally, as backup systems are not required by code.) Regardless of what was

determined to be implemented as part of the original FDD program, all of these things can be considered as part of the alternatives analysis for the SSWWE study.

Q. 2.85 Who is responsible for updating the FDD page of the City's website? Why are there no recent updates?

A. The FDD page is maintained by CDM, in their role as consultants managing the FDD project. Project updates are posted each week. There has been little new information to report since the program was partially suspended.

Q. 2.86 University of Michigan, MUNGER Graduate Dormitory (former Blimpie Burger location) Questions: a - d.

- a. **What are the results of the FDD (Footing Drain Disconnect) Calculation Work Sheet for the Munger dormitory building? Please provide the calculations, number of FDD credits, and distribution of credits for this development.**
- b. **What is the ratio of residents to the number of toilets/showers in the proposed design?**
- c. **What is the anticipated peak flow output of sanitary discharge from this building?**
- d. **What was the estimated total peak flow output from the structures formally occupying the footprint of the new proposed Munger dormitory.**

A. 35 FDD required. The calculations were provided to the requestor and were posted as a link on the project website: www.A2gov.org/SSWWE

Q. 2.87 City website indicates the existence of FDD CAC? Who are these members and why have they not been a part of the current SSWWE CAC?

Q. Is the FDD CAC an active group--ie, are they currently meeting? Why are their meetings not listed on the a2gov.org website as other CAC meetings are? Why are there no agendas, handouts or meeting notes from the FDD CAC meetings?

Q. Why is information not being shared more closely between the SSWWE CAC and the FDD CAC?

A. The members of the FDD CAC are:

- William Collins (from the Orchard Hills Study Area)
- George Johnston (from the Dartmoor Study Area)
- Robert White (from the Glen Leven Study Area)
- Deloris Mortimer (Ann Arbor at-large)
- Sonia Manchek (Ann Arbor at-large)

The FDD CAC is supported by staff from the City's Project Management and Systems Planning Units and staff of CDM Smith.

The FDD CAC meetings are held approximately every 6 - 8 weeks, and are currently held on Thursday mornings beginning at 7:30 am in Conference Room B at the W. R. Wheeler Service Center, located at 4251 Stone School Road. The meetings generally last approximately 90 minutes

As for meeting notes and agendas, we have not had requests for those items in the past, so we have not been posting them on the FDD website, but they are certainly available for your information and review. [FDD CAC meeting minutes for 2013 were provided to SSWWEP CAC members for review.]

Q. 2.88 If the FDD CAC is currently meeting, does it fall under the Michigan Open Meetings Act?

A. Citizens Advisory Committees do not fall under the Michigan Open Meetings Act. ("Advisory committees and the OMA – the OMA does not apply to committees and subcommittees composed of less than a quorum of the full public body if they "are merely advisory or only capable of making 'recommendations concerning the exercise of governmental authority.'"") Open Meetings Act Handbook, Michigan.gov.

Non-committee members are welcome to attend these Citizens Advisory Committee meetings to observe the work and to provide comments at the end of the meeting, as they have done at the SSWWEP CAC meetings.

Q. 2.89 Why is the interchange of information between CACs discouraged?

A. The purpose of the FDD CAC is to provide input into the operation of the FDD program. The purpose of the SSWWE CAC is to review technical information regarding the sanitary sewer system's performance in wet weather and make recommendations to council to mitigate the future risk of basement backups. The two CACs are not discouraged from interchanging information; FDD CAC members have attended SSWWE CAC meetings and SSWWE project team members have attended FDD CAC meetings to facilitate information exchange.

Q. 2.90 See the sketch of a backup system, created by Frank Burdick, and email to Ralph Welton for 6 specific questions regarding this sketch, as follows:

Q. The SSWWE CAC has submitted a suggested "gravity fed" back up system with backflow preventer for the new sump pumps. The CAC has requested a "plain English" code interpretation for this sketch because the first interpretation provided by the Building department was not decipherable.

Q. Please note, as the current FDDs are designed, this same sump crock "LID" is the only protection preventing sanitary back ups from adjacent floor drains from entering the sump crock and, hence, being discharged into the storm system. Why can't it be used as a protection from reverse flow?

Q. Is there a way to modify this sketch to comply?

Q. Could another sump crock be installed next to the sump pump crock in order to separately monitor and/or shut off the flow of potential sanitary back ups from being discharged to the storm system via the sump pump?

Q. Is the trap as drawn required and, if so, will an H2O trap primer be required?

Q. Is the "one paragraph" interpretation, citing code section P3302.1 Subsoil drains, as provided by Ralph Welton, negotiable or something that can be addressed with the State Plumbing Code Officials?

Q. How does Ralph Welton interpret the phrase..." approved location..." as noted in the above referenced Code (P3302.1)? Sump pumps were only one of the options listed.

Q. If the "gravity fed" back up system (as shown on the CAC submitted sketch and as noted in item 6 above) can be made to comply with applicable codes, will all existing homes with now existing FDDs be eligible for their sump locations to be modified so as to be equipped with a gravity fed back up system? Will the City pay ALL costs for these modifications to these existing FDDs?

A. At the close of our August 21st meeting, Mr. Frank Burdick submitted a drawing that proposed a backup mechanism in the event of sump pump failure. This drawing was included in the August CAC meeting summary. The core idea was to allow for a gravity feed backup to the sanitary sewer system in case of sump pump failure. Mr. Burdick requested the City to review the drawing for potential code issues. The City has now completed its review and has determined that the gravity feed backup to the sanitary sewer would be prohibited by the Michigan Plumbing Code, Section 1103.3 which states: "Storm water shall not be drained into sewers intended for sewage only." The Ann Arbor City Plumbing Code (Section 8:122) provides more specific language that would prohibit such a gravity feedback backup connection: "Sump pump discharges - footing drain: Discharges from sump pumps may not be connected to the sanitary sewer. Such discharges must connect directly to the storm sewer or be discharged in an alternative, approved manner. Such alternative drainage shall not create a drainage nuisance, and if so, must be handled in accordance with section 8:120 of this chapter."

Mr. Burdick also asked for the City to review whether or not any applicable codes could be changed by the City to allow for a gravity feed backup. As the City's code is

supporting a State code which would prohibit such a connection, the City has indicated it will not ask the State to modify its Plumbing Code.

Q. 2.91 Why can't the common household emergency overflow be applied to the sump pump?

A. We are not sure what the question is referring to by "common household emergency overflow." Sump pump installations are required to be performed in accordance with Michigan Building & Plumbing Codes, and are inspected for compliance.

Q. 2.92 What will be done (if anything) to remedy the "air gap" problem present in most of the EXISTING FDDs? The air gap allows the sump pump to discharge water right next to the home's foundation allowing it to eventually soak back down to the footing drains to be constantly just re-circulated. This excessive water is then allowed to permeate the un-compacted permeable freshly excavated soil caused by the tie-in of the discharge piping. In addition the waterproofing on the exterior of the foundation is compromised by both the excavation and exposure during the tie-in steps. This compromised waterproofing allows the water to enter the foundation. What does the City intend to do remedy this issue on existing FDDs?

Q. What design changes are being considered for potential new FDDs to remedy the air gap / discharge issue as described above.

A. The air gap is installed to allow for an emergency overflow, if the discharge line from the house to the storm sewer were to become blocked or if the storm sewer were to become blocked. Water only exits from the air gap in the rare occurrence when it is prevented from flowing freely through the discharge line into the storm sewer and prevents the sump pump water from flowing back into the sump.

The installation of the discharge pipe, at the air gap, requires a minimal area of excavation ranging in depth of 2-3 feet adjacent to the outside wall of the home. This excavation is backfilled and compacted by the contractors. In addition, if the contractor damages any waterproofing within this excavation, they are required to repair it.

We are unaware of any locations where there is compromised waterproofing. If such instances exist, they should be brought to the City's attention and will be investigated.

Q. 2.93 H2O water supplied "back up" systems are the best back up systems available with the current technology. Why should homeowners be required to pay for additional water usage to "back up" City required sump pumps.

A. The cost of a reliable backup system is an issue that can be addressed in the future, if an FDD program is considered as an alternative going forward.

Q. 2.94 Per the question above, the domestic water siphon "back up" system for sump pumps is more reliable than a 12 volt battery back-up system. The City's website states the following: *(This system) "Uses about 2 gallons of pressurized fresh water to pump out 1 gallon of sump water. Water usage will show up on the water bill."* What would the estimated flow rate be, to the Storm Sewer system, during PEAK FLOW periods, for one Target Neighborhood, such as Orchard Hills, if ALL of the ("99% of homes in this Target Area are equipped with FDDs per OHM") WERE equipped with water siphon back up systems? What would be impact to the Peak Flow rates to the Storm Sewer systems to the Morehead and Churchill areas? Can the City justify the "sustainability" impact of using this quantity of domestic water for the purposes of satisfying the goals of the FDD program?

A. The 2 to 1 computation is a relatively easy computation to make, but that condition only occurs in the rare condition of the failure of the sump pump. I can think of two primary failure modes of a sump pump: 1) when the pump itself burns out, and 2) power failure. Presumably in condition 1 - sump pump failure, the impacts on the storm system would be negligible, as it is not likely that very many would occur simultaneously. In condition 2 - power failure, the impact on the storm system would depend on the extent and frequency of power failures. It is this piece that is not so easy to quantify with our current information in hand. Perhaps the survey might help us understand this piece, by examining the answers to the questions about water in basement. I would suggest that we wait for those results before commenting further.

Q. 2.95 Can this water from a water-supplied back up system be metered separately for credit negotiations with the Water Department?

A. This question can be addressed in a future rate study, however, it would require a second separate meter.

Q. 2.96 What is the anticipated target date to receive collated results from the upcoming survey of homeowners with FDDs?

A. Survey results were received throughout December and early January. Preliminary results were presented to the CAC at its January 9, 2014 meeting and were presented to the public at the February 7 Public Meeting. The 2013 FDD Survey Summary Report is posted on the project website at the following link:

http://www.a2gov.org/Documents/012414_FDD_Survey_Summary_Report.pdf

Q. 2.97 How many times has a previously dry basement had stormwater flooding from the sump or along the seam of the wall and floor, after a FDD?

A. The December 2013 survey asked property owners about flooding, seepage and dampness in basements after a footing drain disconnection. This information is reported in the 2013 FDD Survey Summary Report is posted on the project website at the

following link: [http://www.a2gov.org/Documents/012414 FDD Survey Summary Report.pdf](http://www.a2gov.org/Documents/012414_FDD_Survey_Summary_Report.pdf).

Q. 2.98 Did the 2001 Sanitary Sewer Overflow Study consider what the impact to the stormwater system would be as a result of the flows being added by the sump pumps?

A. The analysis performed in 2001 estimated footing drain disconnection could increase the volume of flow discharging to the storm drainage system by up to 3-5%. However, during the largest storms that cause basement flooding, the storm drainage system is not designed to convey these peak flows downstream, but instead temporarily stores some of this water in the streets. It was determined the increase stormwater volume from the sump pumps would not be noticeable because it would only increase the depth of the water in the streets by a few percent.

Q. 2.98b If the above response is true, then why are certain areas of the city under a moratorium to halt further discharges of FDD water into the storm system?

A. The existing suspension is on performing City-required FDDs in the Morehead and Glen Leven study areas only; there is no moratorium on discharging FDD water into the storm system.

Q. 2.99 How does AA fund the FDDs that they mandate in the target areas? Does the city ever receive any payments for mitigation? From developers or from the townships?

The FDD program is funded from the Sanitary Sewer Fund, which is funded from user rates or bond sales. Developer Offset Mitigation (DOM) is performed by, and at the expense of, the developer. The developer covers all of the costs for the mitigation work. Developments within Townships that contribute flow to the City's system are required to perform developer mitigation in the same manner.

The single exception was for one project by the University of Michigan, which had at the time, constraints against use of its capital funds off-site. Because they owned no sites within the required mitigation area for the Michigan Stadium Renovation Project, they were unable to perform the FDDs themselves; so, the University contributed funds to the City to cover the costs of the FDDs for its required offset mitigation.

Q 2.100 The SSOE report, Section Q, portrays an Implementation Plan Flow Chart for implementation of the FDD program the first "box" or step in the process states, "Create legal framework for Footing Drain Disconnection (FDD) Program." During A. Elias presentation at the 9Jan14 CAC meeting, the CAC was told that the City created a "Law" or Ordinance at that time in order create the legal framework. What were the actual legal precedents, and court cases utilized to create the new Ordinance?

A. As these were developed over a decade ago, the City's Attorney's office cannot recreate what precedents or court cases were used. They would be the same ones that are available today, barring those that were decided after the City's ordinance.

Q. 2.101 FDDs and air gaps as currently designed are susceptible to freeze ups. During the recent extreme cold temperatures, water continued to flow into some sump pits and be discharged. Many of the "air gap" locations were buried beneath snow drifts. What prevents the occasional pump discharge water from ice build up on the inside of the exterior discharge pipe near the grade and below grade? Is the lateral pipe that takes the discharge to the curb, or other areas, buried below 42'? (ie the frost line in this region.) If not what prevents this lateral from freeze ups? In your response, please consider the current code for allowable exposed plumbing vent pipes that vent thru the roof of a structure, as this code should apply equally to the FDD piping near grade.

A. Water from sump discharges is typically around 50 degrees. The discharge pipe is installed with adequate slope, which prevents the water from standing and therefore freezing.

Q. 2.102 There are a number of possible fixes to reduce peak footing drain water particularly in a target area like Lansdowne, with external grading, if it can be shown that preventing surface water from entering the backfill is effective. (The two lakes adjacent to my house must have had a major dilution effect...) A possible "on-the-table" candidate?

A. This idea, as well as many others will be considered during the alternatives evaluation portion of the project.

Q. 2.102 Provide information on the existing sanitary storage facility located near Yost Blvd at Salem Ct/Margaret Drive.

A: This facility was installed in the late 60's to provide relief for the Swift Run trunkline. The facility consists of three 54"x85" arch pipes which can handle 118,613 gallons of storage, and is still in service. The need for additional relief was identified in the late 1990's which led to the construction of a relief sewer further downstream from this existing storage facility.

Q. 2.103 Please provide copies of the letters and post cards that were sent to homeowners informing them of the FDD program, and that their neighborhood was going to be part of the FDD program.

A. The homeowner packet is available online at the FDD Program website: www.a2fdd.com. Here's the direct link: http://www.a2fdd.com/Documents/FDD_Packet_v8.4_Master.pdf

Q. 2.104 After funding the 1997 Black & Veatch study, did the city add any storage and increase pipe size due to results of that study

A. The 1997 Black & Veatch was a stormwater master plan and not related to the sanitary sewer system.

Q. 2.105 Westland RPO and run-times Table 1, run times versus volumes - seems like a very high flow rate discharged. See 8341 Terri. 1 gallon per second? Many others are high too. Why? Was a bigger pump put it? How is this possible?

A. Information provided by consultant Project Manager, Robert Czachorski:

I would cite these reasons and comments for the difference:

The Westland project did use a Series 98 (1/2 HP) instead of the later Series 53 (1/3 HP). The Westland project did not use a line splitter for mounting the logger, and thus we figured out during it that sometimes the current was not enough to activate the logging device (that's why some houses had no data). There was likely lost time in the logging as it may have been a matter of split seconds at the start and the end not recorded by the logger. Another way to evaluate the loggers is by recording number of events and using a drawdown of each event (usually 6.5 gallons). Total run time is just another metric, however in the Westland case, it may be on the conservative side since the logging system was still in a testing phase and was likely missing some of each event. I think the loggers likely missed split seconds at the beginning and end of the run cycle as the current was not high enough yet to activate the logger (a problem we corrected with the next pilot program by adding a line splitter to amplify the signal 10X). There is also rounding error in that the logger only records to the half-second, potentially losing up to one second each run cycle.

I also think that 1 gallon per second is not out of normal. The pump curve for the series 98 with 10 feet of head is 60 gallons per minute. See attached catalog sheet. My experience also supports that a cycle is about 6 seconds long to pump 6.5 gallons.

A catalog spec sheet on the Series 98 pump used in Westland is available on the City's project web page at www.A2gov.org/sswwe > Library.

Q. 2.106 \$100 monthly fee for refusing a FDD, how was this figure calculated?

A) The charge is based on the operational costs at the WWTP, combined with the cost of additional conveyance capacity and conveyance O&M that would be required to handle flow generated by connected footing drains.

Q. 2.107 Was this \$100 fee applied to all homes in Ann Arbor? Or just in these targeted areas of homes complaining of basement backups?

A. The fee is only applicable to the targeted FDD Program homes that did not complete the work within the stated timeframe.

Q. 2.108 Can a City apply these ... let's call them fees for now... to just a PORTION of the City's homes? Or is that a neighborhood association fee?

A. The City can only charge to properties that it applies to.

Q. 2.109 And how is the homeowner charged? Is this "fee" or "fine" found on their tax bill? Or their water bill? Or does it come altogether separately?

A) The amount is charged monthly, and is billed quarterly on the homeowner's city utility bill.

Q. 2.110 I would like to know the relative costs of the various approaches being considered.

A: Relative costs will be provided to the CAC as part of the detailed review and discussion of the various approaches later in the process.

Q. 2.111 I want to see how many total FDDS have been installed in each target neighborhood, and how many were installed in non-target neighborhoods. This data could be provided /collated in an "area summary" and that would satisfy the primary intent of the question, without revealing the actual addresses.

A: Completed FDD equivalents as of Nov, 2013:

| | |
|---------------|-------|
| Bromley | 229 |
| Dartmoor | 297* |
| Glen Leven | 537 |
| Morehead | 352 |
| Orchard Hills | 346 |
| | |
| Other Areas | 1356* |

*include multi-family FDD equivalents

A [citywide map of the locations where FDD has been performed](#) is posted on the City's project web page at www.a2gov.org/SSWWE > Library

Q. 2.112 We have seen pieces for the cost information for a typical FDD installation. To evaluate this option going forward, we should get an estimate of the "all in" present value of the cost to perform an individual FDD. This would include contractor cost, city costs, the installation related costs, average maintenance and repair/replacement costs going forward, and average remediation and cleaning costs associated with a pump failure (multiplied by failure rate). We will need this if we are considering further FDD as a possible recommendation.

A: This will be included in the review and consideration of alternatives. Based on the total costs of the FDD program to date and the number of FDDs performed, it is estimated that the total cost per FDD would be \$9,000 to \$11,000 per installation. This would not include annual maintenance costs after installation, or cleanup costs if a sump pump should fail. Annual costs for maintenance, replacement costs, and costs of unnecessary treatment of groundwater at the treatment plant will be estimated in the near future as part of the alternatives analysis.

Q. 2.113 Has the current FDD CAC read the survey comments?

A: The [Footing Drain Disconnect FDD Survey Results](#) were provided to the FDD CAC in late January 2014 and discussed a number of times at CAC meetings.

Q. 2.114 Upon review of the attached [Citywide Sanitary System Improvements.pdf](#) map, very little work is indicated as having been completed in targeted areas. Why is that?

A: The work that has been performed in the five study areas has been FDDs. The condition of the sewers in these areas has not required other work.

Q. 2.115 Cresson [Slotten] informed us that public officials in other communities have told him that Ann Arbor's water system is "tight". In some other place on Basecamp another CAC has asked after the practice of scoping the pipes in this system for leaks. I did not actually look at the answer, but I did read the response which seemed to imply that very little scoping had been done within a certain time frame. Cresson, on what basis have these public officials in other communities formed their professional approval?

A: This opinion has been offered by past consultants working on projects related to the City's system who have also worked in other communities, not officials from other communities.

In order to quantify the “tightness” of the Ann Arbor system, the consultant team will be benchmarking the A2 system to other sewer systems around the Midwest that have been analyzed by the consultant on other projects. This will show how the A2 system performs relative to other systems, and also help rank or prioritize the various districts within the city that have been modeled. This analysis is in progress and will be shared when completed.

Q. 2.116. Is there a norm, a standard, or code (City, County, or State) for how Ann Arbor is responsible for surveying their system?

A: There is no standard or code requirement for a utility to survey (i.e., video inspect) its sanitary sewer system. The City’s goal is to video inspect its sanitary sewers within a 7-year period, based on available resources, to monitor their condition.

Q. 2.117 Suggest you take a look at this SVFM 5.0 Area-Velocity Monitor from Greyline <http://greyline.com/pdf/AVFM%205.0%20Brochure.pdf>. There are probably other pouch- like sensors which could be placed down the footing drain clean-out and left there for long periods, memory card/recorder on the pipe cap. Worth a try on suspected high-volume residences? (If a Torpedo using a controlled-flow plug can be installed without breaking concrete or modifying pipes, then something like this might be worthwhile.) Unit is for 6" or larger pipe, but sensor is about 1 1/2 x 6 and believe it could be inserted same as Torpedo plug.

A. Flow velocity is measured with an ultrasonic Doppler signal continuously injected into the water. This high frequency sound (640 KHz) is reflected back to the sensor from particles or bubbles suspended in the liquid. If the fluid is in motion, the echoes return at an altered frequency proportionate to flow velocity. With this technique the instrument measures flow velocity with accuracy of $\pm 2\%$.

Such a sensor requires a minimum solids content to reflect sound waves off for the doppler measurement. This is typically around 100 parts per million (ppm) solids. Raw sewage has around 300 ppm, and footing drain flow could be well below 100 ppm. There are also some issues with installation and maintenance outlined below. If it was possible to use a meter like this to measure FDD flows, we would already be doing it.

The Greyline meter is a standard Area-Velocity flow meter we use in our municipal applications. It will likely be in the \$2000 to 3000 range for the equipment and \$1200 range for deployment, collection, and interpretation of data. The equipment could be cheaper since we do not need hazardous environment box for this since it would be in someone’s basement (a technical issue listed below).

This installation will have the technical issues of:

- Virtually impossible to mount in a 4" pipe on a 90 degree turn without the creation of an automated system using an insert able placement tool and a band to hold the sensor that is not currently available
- The velocity sensor will likely not have enough solids to read the flow over the sensor to read velocity and we would likely not get velocity readings
- The pressure sensor will likely be intermittent as flow levels will not be high enough to accurately read
- The box will be outside the cleanout, the clean out cap will have to be retrofitted with something that lets the wire through

Q. 2.118 When the FDD program was first started, could you have done a smaller study first or testing to make sure it would work before going into a HUGE program that was going to cover a large part of the city?

A. Prior to the implementation of the FDD program, a pilot test with 11 homes was performed to evaluate the installation methods and expected effectiveness of the FDD work which lead to developing standards for the FDD Program.

Q. 2.119 If you hook up a back flow preventer to a basement and sewage can't now backup to the basement; as the sewage pipe fills up; there no place for sewage to go. What happens in this case?

A. When the check valve is closed preventing sewer backup, but also sewage flow from the house cannot drain out to the city's sewer system. The homeowner will not be able to flush toilets, use sinks, etc.

Q. 2.120 Is there a maintenance schedule for sump pump or do you only find out they are not working when there is water in the basement?

A. Pumps manufacturers have recommended maintenance practices. The contractor installing the sump pump should provide this information to the property owner. Additionally, a general maintenance guide can be found on www.a2fdd.com.

Q. 2.121 [In our first SSWWE handout OHM Advisors stated] *In the City's sanitary collection system, it was estimated in 2000 that 70-90% of the wet weather flow was coming from footing drains. Tackling that item first is very prudent and a reasonable course of action. By addressing the 70-90% of the problem, it is very likely that the City significantly reduced the risk of basement flooding,*

So, if a homeowner choses to have an FDD and sump pump installed, is it not a logical conclusion that the SEWER portion of the utility bill that is based on water use, should be reduced by 70% to 90% each month if the home now has reduced it's flow to the sanitary system by 70% to 90%?

A. The key term in the 70-90% removal rates is "wet weather flow." This is peak flow during large, design rainfall events. It typically rains about 150 hours out of 8,760 hours in a year in Michigan. So the vast majority of the time, the sanitary sewer system is not collecting wet weather flow.

We often find that although the wet weather inflow and infiltration sources like footing drains dominate the peak design flow, over the course of an entire year, it is common for them to be in the 2-5% range of total sanitary flow. So these wet weather flows are very short, intense bursts of flow that drive the performance and design conditions of a sanitary sewer system.

If I were to peg a typical sanitary sewer system, I would say the following:

Over the course of a **whole year**: (numbers picked not for precision, but to get the total to add to 100%)

3% of the flow is wet weather inflow and infiltration

60% of the flow is sewage from water consumption

37% is ground water infiltration

During **peak wet weather flow**: (numbers picked not for precision, but to get the total to add to 100%)

80% of the flow is wet weather inflow and infiltration

12% of the flow is sewage from water consumption

8% is ground water infiltration

Hope this helps illustrate the flow components. It also sheds some light on the potential for water conservation measures to make a significant dent in the peak flow. We published some information about these flow components in the [flow metering report](#).

Q. 2.122 At least one of the FDD 'pilot' homes, in the Dicken school area, got a water back up. Did they all? And also could give us the usage for the last 10+ years.

A: According to the 2001 SSO Report, water-powered backup pumps were installed on the 11 pilot homes. We're unclear on the usage question.

Q. 2.123 How many FDDs have been done since the summer of 2012?

A: The following FDDs have been done between 6/4/12 and 2/6/14:

Completed FDDs = 35

Developer Mitigation FDDs = 161

Dartmoor Multi-family FDD equivalents = 62.5

Q. 2.124 I would like the City to provide to the CAC the data from the State Revolving Fund application from 2010 as it relates to Federal Funding.

A. There is no application form for State Revolving Funds; an agency seeking State Revolving Funds must submit an SRF Project Plan which is reviewed and rated by the State. The [2010 SRF Project Plan for stormwater funding is linked here](#) and has been added to the City's webpage at www.A2gov.org/SSWWE > Library.

Q. 2.125 I am curious about what "FDD credits" are. How does this translate into reducing sanitary peak flow, or at least not increasing it? One of my concerns is that this implied expansion of demand on the sanitary system will be offset by *mandatory* disconnects under the city program, rather than *voluntary developer* disconnects. This leads to the idea that the mandatory FDDs will be used to make room for future development.

A. The goal of the mandatory FDD program is to reduce the risk of potential basement backups in certain areas in the city where homes have experienced past backups. The developer offset mitigation is in place so that new flows generated by developments do not exacerbate or negatively impact the system during wet weather events. Staff created an FAQ regarding the City's mandatory FDD program vs developer offset mitigation program. The [document is linked here](#) and can be found on the City's SSWWE website > Library page.

Q. 2.126 When the Stadium was expanded and the University paid for 140 FDDs (\$1,405,600), were any of these FDDs done in the Target Areas? If not, where were they done?

A. The FDDs performed were upstream of the Michigan Stadium, which happened to include the Glen Leven area.

Q. 2.127 Would a targeted approach make sense? Consider going after areas where streets are expected to flood during major rain events. Sealing sanitary manholes in these areas may help "cut the top off" I&I (inflow and infiltration) during the worst events.

A: The City has sealed manholes in the past in areas of know street flooding issues, and is continually reviewing and implementing sealing measures, where possible. This is something that can be considered as part of the alternatives analysis.

Q. 2.128 During a storm event, when a street is flooded, how much water can flow thru a pick hole in a manhole cover?

A. See the [Manhole Pickhole Computations spreadsheet](#) [also available in the www.a2gov.org/SSWWE > Library] using the orifice equation to compute flow rates through pick holes of various sizes, varying standing water head and hole count. Most

pick holes are either 3/4" or 1" in diameter, and most manholes have 2 pick holes. We used these for the computations, but you can vary the assumptions in the spreadsheet.

Q. 2.129 What is the City currently doing about this?

Q. 2.130 Does the City have a program of plugging pick holes in sanitary sewer manhole covers? If so, what results have you seen?

A. The City has sealed manholes in the past in areas of known street flooding issues, and is continually reviewing and implementing sealing measures, where possible. This is something that can be considered as part of the alternatives analysis.

Q. 2.131 Re: clogged holes in stormwater manhole covers. Does the City dedicate any resources to going out and doing this themselves in big water events? It is ice now, but there are also leaves, etc. If not, why not?

A. Yes, when a large storm event is forecasted, city field crews will visit a number of key locations throughout the city to ensure the inlets are clear of debris. Unfortunately, with over 15,000 inlets located citywide, not all locations can be visited.

Q. 2.132 Gasketed manhole covers: why can't we include the installation of these in the CAC's final recommendation? These should at least be installed in low-lying areas, in all targeted neighborhoods, and at manholes affected by new road construction.

A. The City has begun to implement the gasketed manhole covers in the city. In addition, additional funding is being programmed into the City's Capital Improvement Program for the implementation of a citywide program for sealing lids and other manhole repairs/rehabilitation in flood prone and high-risk areas. The potential of hydrogen sulfide gas accumulation is an issue that will need to be evaluated as part of the program.

Q. 2.134 How many man-hole covers are in each target neighborhood?

A. Number of sanitary manholes located in each target neighborhood:

Dartmoor – 216
Bromley – 55
Orchard Hills – 90
Morehead – 260
Glen Leven – 259
TOTAL – 880

Q. 2.135 A CAC member asks to have a City representative attend the March CAC meeting to discuss the City's budget availability for alternatives: "the City should

present some cost/ budget data to us. It's possible that we could include in our final recommendation that the City increase fees on both the sewer and surface water portion of the Utility bills to each resident to help increase the budgets for our proposed solution.”

A. The April 17 CAC meeting will focus on the hydraulic analysis at the neighborhood level, WWTP functions and capacity, FDD survey follow up and community values discussion. A budget presentation is planned for the May CAC meeting.

Q. 2.136 Are the 620 FDDs that were required by the MDEQ Administrative Consent Order accounted for in the number of FDDs performed under the City’s program or the Developer Offset Mitigation program? If so, in which category?

A. The FDDs required by the consent order are included in the total for the City program.

Q. 2.137 What is the range of confidence interval in the flow results?

A. Statistics confidence levels were averaged for the 3 methods used to determine the flow removals. Those average confidence ranges varied from 38.1% to 99.8. Values above 95% are considered statistically significant. This was the base for 3 of the 5 priority districts – Orchard Hills, Bromely and Moorhead. While not statistically significant, Dartmoor was close at 90.1%. Glen level had the lowest value at 38.1%, and also had the lowest computed rate of flow removals.

Q. 2.138 What is the City’s view on a flow preventer or check valve? How many houses in 2000 that had backups didn’t have check valves? How many check valves have been installed?

A. The City does not have any knowledge of check valves existing on homes prior to the start of the FDD Program. Of the 52 homes located in one of the 5 priority areas that reported a basement backup during June 2000, 44 of these homes have had check valves installed as part of the FDD Program.

Q. 2.139 If you hook up a back flow preventer to a basement and sewage can’t now backup to the basement; as the sewage pipe fills up; there no place for sewage to go. What happens in this case?

A. When the check valve is closed preventing sewer backup, but also sewage flow from the house cannot drain out to the city’s sewer system. The homeowner will not be able to flush toilets, use sinks, etc.

Q. 2.140 How often would storage pipes fill up with a sustained rain?

A. The MDEQ requires that storage designed to address sanitary sewer overflows be designed to have overflows not more than once in ten (10) years. The City may elect to provide a higher level of service than this.

Q. 2.141 130 people are in the first triage [of survey respondents whose issues are being investigated], but 353 people had water issues. Why only 130?

A. The most significant issues reported are being investigated first.

Q. 2.142 I am concerned about mandates. Remember the sidewalks? I am frustrated. There is a \$100 a month fee if you decided not to do an FDD. Is there a maintenance schedule for sump pump; you only find out they are not working when there is water in the basement.

A. Pumps manufacturers have recommended maintenance practices. The contractor installing the sump pump should provide this information to the property owner. Additionally, a general maintenance guide can be found on www.a2fdd.com.

Q. 2.143 Did surveys indicate if the flooding was caused by disconnect or is it something we don't know?

A. Respondents were asked about flooding, dampness or seepage. The causes of those instances aren't known unless the person reported more details in the comments section.

Q. 2.144 Regarding flooding in basement – did the surveys collect details on the cause of the flooding?

A. As mentioned in the previous question, respondents were asked about flooding, dampness or seepage. The causes of those instances aren't known unless the person reported more details in the comments section.

Q. 2.145 Were there flooding issues identified to or related to changes regarding impervious surfaces surrounding the homes over time and whether there could be backups anticipated and prevented by sump pumps?

A. Unclear on the question, however the Citywide Stormwater Modeling Calibration & Analysis project will be studying the city's stormwater system and possible improvements.

Q. 2.146 Is there explanation on why there is flooding after disconnection?

A. A number of factors can cause flooding after disconnection. For sanitary backups, the number of houses in the area that have had footing drains disconnected is important,

because it can take many houses in an area to reduce the risk of basement backups from the sanitary sewer. The size and patterns of rainfall and the preceding wetness of the soils also plays a factor. Water seepage or stormwater issues can occur after footing drain disconnection depending on the extent of surface flooding or ground water levels. There is also the potential of a mechanical failure or power failure that can cause the sump pump not to operate.

Q. 2.147 Why is there not an explanation on sanitary flooding after sump pump installation? What does the sump pump installation have to do with these issues? Why are people having to have multiple sump pumps installed? The people that have never had flooding before are the most concerned.

A. A critical mass of disconnections is necessary in an area before the risk of sanitary basement backup is significantly reduced. Once a critical mass has been achieved, it is likely that the frequency of sanitary backups will be greatly reduced. That appears to be the case in Ann Arbor, and will be verified with the risk evaluation. Some potential explanations for why someone who has never had flooding problems before might be experience flooding after FDD was contained in the previous answer. It is difficult to determine why some people need multiple pumps installed without examining the specifics of each case. Doing that is part of the work that OHM is performing with the follow up to the survey.

Q. 2.148 When the FDD program was first started, could you have done a smaller study first or testing to make sure it would work before going into a HUGE program that was going to cover a large part of the city?

A. Prior to the implementation of the FDD program, a pilot test with 11 homes was performed to evaluate the installation methods and expected effectiveness of the FDD work which lead to developing standards for the FDD Program.

Q. 2.149 What type of study was done to get the desired results? What I'm hearing is that we did not get the desired results; some people that didn't have sanitary sewage backups before now have sanitary backups as a result of the footing drain disconnection and sump pump installed. That is not what we expected to happen; so why would we do that if we couldn't interpret that before we spend a lot of money?

A. The City conducted a sanitary sewer study in 2000 and 2001 and conducted a pilot footing drain disconnection program before embarking on the current program. For 4 out of 5 districts, the flow removal rates from the sanitary sewer system are meeting the goals of the program. However, there have been a significant number of issues identified after the program. The City is working to understand and correct those issues.

Q. 2.150 Wouldn't installation of low flow fixtures (aerators, shower heads, toilets, and clothes washer) which in my house over last 5 years reduced on average daily

water usage to approximately 100 gallons/day, be a significant factor in reducing peak flow in sanitary sewer and factor into whether a home should be forced to participate in FDD in that neighborhood?

A. Any reductions to base flows from low flow fixtures would be helpful in addressing the peak flows in the sanitary sewer system. However, this solution alone is probably not sufficient to fully address the issue. For example, some of the peak wet weather flows in the sanitary sewer in the priority districts prior to FDD were 30 times the levels of the sewage base flows. That means that even if the water consumption and resulting sewage base flows were reduced to zero during wet weather events, the remaining wet weather flow that is 30 times the level of the base flow would still have to be dealt with.

Q. 2.151 Regarding FDDs performed: I do believe a "backflow preventer" is required as part of the installation of the water powered backup pump. This is to protect the city water supply, I think. I was informed that the city requires periodic testing of this backflow preventer. The implication was that a licensed plumber is required to do this. When I asked a plumbing company, they estimated this testing would cost about \$125 if no repair was needed. Is it possible to get confirmation of this requirement, confirmation or estimation of the testing costs, and whether there are associated city inspection costs?

A: There is a backflow valve as part of the water powered back-up system that requires inspection by a certified plumber every 3 years (this inspection ensures that sump water is not mixing with the pressurized potable water). The estimated cost for this inspection is \$90-\$100. There are no associated City inspection costs.

Q. 2.152 Can we get a cost so far for the City's FDD program? The SSO report listed the project with a projected cost of \$80-130 million. Would be nice if this was broken down with what city paid for and what developers have paid for.... and how much money the city has collected from them; an example was the file sent recently with UM's payment.

A: As of 2/8/14, the City costs for the City's FDD program are \$20,020,569.40. Developer Offset Mitigation (DOM) is performed by, and at the expense of, the developer. The developer covers all of the costs for the mitigation work. The City does not have record of what these costs have been.

The single exception was for one project by the University of Michigan, where the University contributed funds to the City to cover the costs of the FDDs for its required offset mitigation. The contributed amount was \$1,405,600.

Q. 2.153 What process did the city use to determine the four pre-qualified FDD contractors? Or, put another way, how does a company become a pre-qualified contractor for the city of Ann Arbor?

Q. Is there documentation that proves that the pre-qualified contractors met the pre-qualification requirements (such as a bidding process)?

Q. Did other contractors try to become pre-qualified? If so, what disqualified them? And, if any contractors were disqualified, who were they?

A. The City of Ann Arbor has developed a process for pre-qualifying contractors so that it is clear that they understand the methods and materials needed for a complete installation. The Request for Qualifications, RFQ-568 Prequal 2003b - Part 1.pdf [available on the City's project webpage at www.a2gov.org/sswwe > Library] was administered thru the City's Purchasing Office at the start of the program and is distributed to contractors seeking pre-qualification upon request. The RFQ requires letter of qualifications, along with information on the program specifications and asbestos tile removal requirements.

There were two contractors who were removed from pre-qualification due to performance. Landscape Construction and Michael Gross Contracting (MGC). MGC started with the FDD program in 2002 but had performance issues on the very first FDD installation. This was corrected by another contractor and MGC was removed from the prequalification list.

Q. 2.154 Where (newspapers, trade web sites) was the RFQ publicly posted to attract applicants? [re: pre-qualified FDD contractors]

A: This went through the City's Procurement Office processes, following the solicitation policies in place at the time. Contractors inquiring about becoming pre-qualified have been allowed to apply throughout the program.

Q. 2.155 On Lohr Road, 1/2 mile north of Textile, 2miles south of Ellsworth, on the west side of the road, there is a sewage pumping plant, and a large one. It also has natural gas powered generators. I noticed tonight that on the maps, a red line, or "pipe" ran from it due east south of the airport, and then stops. Why? Where does all of this stuff go from that pumping plant? To Ann Arbor's WWTP, or to one in Belleville? And, why were some of these pipes not connected on the map?

A. The flow from the pump station does not connect to the City's WWTP. We assume it flows to YCUA's (Ypsilanti Community Utilities Authority) system.

Q. 2.156 For the DOM program, has anything else been done, besides FDDs?

A. Yes, as was mentioned in the DOM FAQ and video, some developers have mitigated flows through other methods, such as:

- Renovating buildings and replacing old fixtures with low flow fixtures
- Disconnecting swimming pools from the sanitary sewer system
- Demolishing or disconnecting buildings from the system

Q. 2.157 There has been discussion that some of the building & growth out on Jackson Ave, is not being required to 'offset'. Is this because they paid something towards the WWTP or is there another reason?

A: In prior years, Scio Twp has paid for improvements that have occurred in the collection system to specifically serve the township's contact capacity for the Jackson Road corridor. Until the actual flows from the Jackson Rd corridor exceed the contracted capacity, the township is not required to mitigate flows from this particular corridor. The township is required to mitigate new flows coming from other township connection points.

Q. 2.158 If so, how large is the area? And are there other areas that are exempt?

A: The area is made up of the properties along Jackson Rd between Baker Road and Wagner Road. All other township areas are required to follow the DOM requirements.

Q. 2.159 Are all the developers providing backups to the sump pumps they install for FDD volunteers?

A. The developers negotiate with homeowners, City staff does not know what they negotiate.

Q. 2.160 Are most DOM FDDs performed by the prequalified contractors?

A. They don't have to be, any licensed plumber can do the work.

Q. 2.161 Is CDM involved in the DOMP?

A. Yes, CDM makes an inspection, verifying that the disconnection has been performed. This cost is paid by the FDD program.

Q. 2.162 Homeowners in the DOMP videos mentioned that the sump pump dried up flooding in their basements, how does that work?

A: A sump pump usually stands in a sump pit -- a hole with a gravel base about 2 feet deep and 18 inches wide -- dug in the lowest part of your basement or crawlspace. As the pit fills with water, the pump turns on. It moves the liquid out of the pit through pipes that run away from your home to the storm sewer or to a spot where the water

can drain away from your foundation. Digging down under the floor will draw the water level down.

Q. 2.163 I would like to know what complaints are about the DOM program? What are the major issues that people have with that?

A. We can use the survey data to parse out the respondents who had developer-sponsored disconnections.

Q. 2.164 Were the DOM homes surveyed in the FDD survey?

A. Yes.

Q. 2.165: Feels that the City made a profit on the Developer Offset Mitigation FDD installations paid for by the University of Michigan, relating to its Stadium expansion.

A. While the City's FDD program covers \$4,200 as reimbursement to the homeowner for footing drain disconnections and sump pump installation, this amount does not include the costs to design and construction the curb drains needed to reroute stormwater flows to the storm sewer system.

Based on the total costs of the FDD program to date and the number of FDDs performed, it is estimated that the total cost per FDD is about \$9,000 to \$11,000 per installation. This would not include annual maintenance costs after installation, or cleanup costs if a sump pump should fail. Annual costs for maintenance, replacement costs, and costs of unnecessary treatment of groundwater at the treatment plant will be estimated in the near future as part of the alternatives analysis.

Q. 2.166 Have any homeowners been turned down for the DOM? Say, if they wanted too much?

A. While the City staff is not involved in developer/homeowner negotiations and cannot say if this is true, a construction engineer from a consulting engineering company reported that contractors have told him that they've declined homes where it was too costly (difficult) to pipe to the storm drain.

Q. 2.167 Nice work on the DOM video. I think it cleared up some persisting misconceptions. It sounded like the people who had DOM disconnections got really good results and dryer basements. This is not consistent with the FAQs on the FDDP web site. It specifically says that FDD won't fix basement dampness. Have a look at FAQ 4 at this link: <http://www.a2fdd.com/faq.htm> Why is there a discrepancy?

A. The difference here is one of scale. The people on the video indicated that they had serious issues with water in their basement – i.e. problems with standing water, as some

mentioned inches of standing water. Sump pumps can remedy that issue. What they don't do much for is minor seepage and "dampness" – a dehumidifier would probably be needed to address that.

Q. 2.168 What can we learn from the outcome of the FDD program in Warren, Michigan?

A. The Warren program consulted with City of Ann Arbor's FDD program manager, Anne Warrow leading into the formation of their pilot project. The Warren pilot program was performed in 2008 and planned to construct inside three areas with a history of backups, 15-20 houses with torpedo pumps in each area. The cleanouts were to be plugged in the traps and a torpedo pump installed. The 1" discharge was put on a splash block outside the house.

In the process of the program, 50 residents in each of the three areas were petitioned. The City received one response. They then offered to pay their water bill for one year, and received 3 responses. They expanded the offer to other parts of the City and ended up constructing 60 randomly. Three contractors were chosen with each being assigned 20. A total of 50 were done. No battery backups were installed, the cost for them was to be borne by the homeowners and no homeowner elected to purchase them. The agreement was for the homeowner to leave the system in place for one year and then they could do whatever they wanted with the system.

The pumps were metered and the results showed that 15,000+ of 45,000 homes would need to be disconnected for the program to be successful. Based on the lack of interest in the pilot and the high cost for the work, Warren's City Council moved forward with the OMI (Oakland Macomb Interceptor), relief sewer, and treatment plant upgrade plans which are all under construction and in the process of negotiating a user agreement to discharge excess to the OMI.

Q. 2.169 How was the 2001 SSO Task Force's list of community values developed? Did they create it themselves or get it from some other source?

A. During the SSO project a variety of evaluation factors were developed by the CDM Smith team as well as by City staff and were presented to the Citizen Task Force.

Following is a series of questions about building codes as well as an alternate sump pump design, submitted by a citizen for consideration in use in the City's Footing Drain Disconnection Program.

Unless identified as a reference to the 2009 Michigan Plumbing Code, references below to TABLES and SECTIONS beginning with "P" are references to the 2009 Michigan Residential Code. Per the Stille-Derossett-Hale Single State Construction Code Act, the

2009 Residential and Plumbing Codes are part of Michigan's Uniform State Construction Code. See MCL 125.1504.

Q 2.170 Check on any proximity setbacks between a sump pump and a floor drain.

A. There are no measurement restrictions. A floor drain is a Plumbing Fixture. See SECTION P2719. Under Section P2601.2, a floor drain must be connected to the sanitary sewer system:

P2601.2 Connection. Plumbing fixtures, drains and *appliances* used to receive or discharge liquid wastes or sewage shall be connected to the sanitary drainage system of the building or premises in accordance with the requirements of this code. This section shall not be construed to prevent indirect waste systems.

The floor drain cannot be set up to act as a sump pit overflow drain because 2009 Michigan Plumbing Code section 1104.2 states:

The sanitary and storm drainage systems of a structure shall be entirely separate except where combined *sewer* systems are utilized. Where a combined *sewer* is utilized, the building *storm drain* shall be connected in the same horizontal plan through a single-wye fitting to the combined *sewer* not less than 10 feet (3048 mm) downstream from any soil *stack*.

The flow from the sump pump cannot flow into the sanitary drainage system. Sanitary drainage system is defined in the Plumbing Code as:

A drainage system that carries sewage and excludes storm, surface and ground water. In addition, City Code Chapter 28, Section 2:42.3(8) prohibits both direct and indirect discharge from footing or foundation drains into the sanitary sewer system:

(8) No person(s) shall make connection of roof downspouts, foundation drains, areaway drains, or other sources of surface runoff or groundwater to a building sewer or building drain which in turn is connected directly or indirectly to the POTW [Publicly Operated Treatment Works].

City Code Chapter 28, Section 2:41.2f(1) defines the City's sanitary sewer system as "a sewer which carries wastewater and to which storm water and ground water are not intentionally admitted."

City Code Chapter 28, Section 2:43.2(1)(m) also prohibits discharge to the POTW of, (m) . . . stormwater, groundwater, or surface water, unless separate POTW facilities are available and identified for the discharges or unless the Administrator gives written permission to the user for a temporary discharge of the waters based on hydraulic capacity and treatment impacts.

City Code Chapter 33, Section 2:203(16) defines “stormwater” to include “footing drain discharges.”

Q 2.171 Check on venting distance requirements for a floor drain. Indicate code requirements for plumbing vents thru the roof for these floor drains.

A. See attached TABLE P3105.1, venting distance from trap to vent. SECTION P3101.2.1, Methods of venting required.

P3101.2.1 Venting required. Every trap and trapped fixture shall be vented in accordance with one of the venting methods specified in this chapter.

Q 2.172 Check on any issues with depressing the floor by an inch or two between the sump and a floor drain.

A. See the response to Question #2.170, above. A floor drain is a plumbing fixture, which must connect to the sanitary sewer and may not be a means for a foundation or footing drain to discharge to the sanitary sewer system.

Q 2.173 Provide a look-up table for service lead size requirements. This is to help verify curb drain sizes with multiple connected sump pumps running concurrently.

A. The attached TABLE P3005.4.2 contains maximum DFUs allowed down drains, by size. TABLE P3201.7 has some info about maximum GPMs flowing down certain size traps. However, Plumbing Code is not appropriate to use for the design of curb drains. Please refer to the Q.1.35 of the Q and A log for curb drain basis of design.

Q 2.174 What is the City’s building inspectors’ experience with the reliability of a check valves. Do they prevent back ups? Do they prevent the use of the sanitary system in the house? How often do they need maintenance?

A. City plumbing inspectors indicated they only have experience in new installation inspections. Longevity, maintenance and reliability questions would need to be directed to plumbing contractors. The Plumbing Code requires that they conform to certain standards upon installation. SECTION P3008.

In the event that there is a sanitary sewer surcharge situation causing the check valve to close to prevent back-ups as designed, any plumbing fixture or appliance upstream of the check valve will not be able to drain until the surcharge has ended and the check valve has once again opened; and in the case of a home with a whole house check valve, no plumbing fixture will be able to drain until the surcharge has subsided and the valve has once again moved to the open position.

Q 2.175 Ralph Welton responded to my [Frank Burdick's] question about his

enforcement of retroactive codes. He indicated that his charter or obligation is to enforce the codes and "regulations" of the city. He indicated that he is using the 2001 City Ordinance for his justification.

A. Mr. Welton clarified the above statement by stating the City's Construction Services only oversees installation methods based on City system requirements.

R102.2 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

City Code Chapter 28, Section 2:42.3(8), added in 1994, prohibits foundation or footing drain discharge to the sanitary sewer system. Statutes, regulations and City Code provisions governing sanitary and storm sewer systems govern those connections and discharges. The Chapter 28 amendment in 1994 was to bring City Code provisions into compliance with federal regulations.

Q. 2.176 He [Ralph Welton] indicated that if we could change the Ordinance than he would enforce the language of the change. The consultant Project Manager directly asked him if the ordinance was changed, is there anything in the State Plumbing Code that would not allow the gravity supported back up system. Mr. Welton said that there was not anything in the Code that would prevent this. (Note, it is possible, that Mr. Welton misunderstood the question and thought that the consultant Project Manager was referring to the idea of installing a sanitary floor drain within a few feet of the sump pump.)

Will the city consider a modification to the ordinance?

A. As it is documented that the City has recognized the negative impacts of footing drains flows to the sanitary sewer system dating back to at least 1987, it is unlikely that City staff will support a modification to the City ordinance that would allow footing drain flows to enter the sanitary system.

Q 2.177 Will the gravity supported back up system meet State Code?

A. The 2009 Michigan Plumbing Code's section 1104.2 requires "entirely separate" sanitary and storm drainage systems within a structure, thus disallowing the use of the discussed gravity supported back-up system.

Q. 2.178 Is the FDD CAC ongoing or does it have a project end date like the SSWWE CAC?

A. The FDD CAC is open ended and its work depends somewhat on the recommendations of the SSWWE CAC. If FDDs are not recommended to go forward,

then the FDD CAC's role will be to oversee the follow up work that results from the survey and investigation, but might not continue beyond that.

Q. 2.179 Why wasn't the SSO consent agreement with the EPA mentioned in the WWTP video?

A. Because the City is no longer under the consent agreement.

Q.2.180 How is plant capacity is affected by the West plant being out of commission?

A. The 29.5 MGD capacity number mentioned in the video and FAQ doesn't take into account the storage capacity of the equalization basin, which is not impacted by the construction.

Q. 2.181 Will the West plant be rebuilt or is it permanently out of commission?

A. Yes, rebuilding the West plant is the purpose of the \$120M capital improvement project discussed in the video and FAQ.

Q. 2.182 What is current capacity at the WWTP while the West plant is out of commission? And what will it be when the reconstruction of the West plant is complete?

A. It's 20.0 MGD currently and will be 29.5 MGD once construction is complete.

Q. 2.183 Is it correct that even with future growth, the City will be using less water?

A. Yes, water usage is and has been decreasing in recent years.

Q. 2.184 Are lift stations and pump stations the same thing?

A. Yes, they are devices used to raise sewage over low lying areas.

Q. 2.185 A CAC member asks how future predicted 2025 WWTP daily flows of 24.5 MGD reconcile with SEMCOG population growth of 4%?

A. The 2025 predicted flow of 24.5 MGD came from a 2004 Black & Veatch WWTP Facility Master Plan, which used SEMCOG (Southeast Michigan Council of Governments) data from an earlier point in time. However, since that master plan was developed, the economic and population situation in Michigan has changed significantly and we no longer expect to reach those projections by 2025.

Q. 2.186 A CAC member looked up a report of a May 2011 SSO that caused sewage to come from several manholes. What caused it? Was there any follow up?

A. The May 2011 SSO was investigated and no defects in the pipe were found at that time. It's the City's practice to jet clean and TV after an SSO.

Q. 2.187 The 10,000 SSO reported in 2013 – was that an operational issue or a capacity issue?

A. It was an operational issue. In addition to the large, sudden amount of rain that fell, there was a lot of flooding around the plant itself. An amount of sewage discharged from the plant's headworks during about a 10-minute period; operators noticed it and followed SSO reporting and clean up procedures.

Q. 2.188 Is it possible to find out when a sewer pipe was cleaned in a particular neighborhood?

A. Yes, the City keeps records of the cleaning and televising.

Q. 2.189 Regarding the follow up to the FDD Survey, why would homes where the homeowner was handy and did not experience significant problems be on the list for follow up?

A. Any homeowners who reported sump pump failures, water or sewage in the basement or requested a visit were put on the Survey triage list.

Q. 2.190 Does the City keep records of when it reviews manholes and plugs any openings?

A: As part of routine maintenance activities, City crews will plug pickholes in manhole covers in areas where street flooding is observed. Formal records have not been kept in the past. These plugs are viewed as a stop gap measure until a formal policy is put in to place. The City's Stormwater Modeling project will be used as the basis for developing a formal policy on manhole sealing.

Q. 2.191 After funding the 1997 Stormwater Master Plan, did the city add any storage and increase pipe size due to results of that study?

A: Many stormwater improvement projects (eg. regional detention, oversized storm sewer pipes for providing detention under roadways, etc.) have occurred since the 1997 B&V study. These project locations are identified on the Citywide Storm System Improvements map located in the website library. http://www.a2gov.org/Documents/Citywide_Storm_System_Improvements.pdf

In addition, the project team for the Citywide Stormwater Modeling & Analysis project is performing an analysis of the FDD impacts to the city's stormwater system. These findings will be shared with the CAC when completed.

Q. 2.192 Regarding back flow preventers and required periodic testing by licensed plumbers, why can't the city get a bulk rate deal in a similar way to how AAA does with tow truck drivers? It should not need to cost \$100 for an inspection. It doesn't take half a day.

A. Currently, the homeowner is responsible for having the inspections performed, not the City, therefore there is not an opportunity for a "bulk discount" under the current system. If the City were to coordinate the inspection effort in order to obtain such a discount, it would require additional City resources, and therefore additional administrative cost.

Q. 2.193 Regarding Ann Arbor's WWTP capacity – it appears that the facility lost capacity when it switched to ultraviolet light from chlorine. Is this a true statement? If so, why was this done, and why was the chlorine equipment not kept to augment the ultraviolet during peak rain days?

A. The WWTP has the ability to fully treat 48 million gallons of wastewater per day on an average annual basis, including disinfection using the ultra violet (UV) light system. This does not mean 48 million gallons per day is the maximum flow that could be sent through the plant. Both prior to and following the conversion from chlorine to UV disinfection, the WWTP might have to bypass some of the treatment processes for a prolonged high flow, depending on specific plant conditions (e.g., storage available, equipment out of service, duration and volume of flow entering the plant, etc.). The decision to eliminate the chlorine disinfection system was based on the risks to human health and the environment that would result if one or more of the one-ton chlorine cylinders ruptured and leaked.

Q. 2.194 In total, how many contractors applied to be pre-qualified contractors for the FDD program?

A: The Request for Qualifications (RFQ) was sent out at program initiation to several contractors. In addition, other contractors have applied for pre-qualification over the years. At least 6 contractors have gone thru the pre-qualification process.

Q. 2.195 Also, how would potential plumber applicants learn of the opportunity to apply?

Q. Where and how did the city advertise that there was an opportunity to apply to be a pre-qualified FDD contractor?

A: In the past, the RFQs were sent to many local contractors directly. Presently and in the future, the City would post such requests on an electronic bidding network (called Bidnet). Most contractors are subscribers to this system, and it has worked well in recent years for soliciting qualified contractors.

Q. 2.196 Why does the City require pre-qualified contractors for the FDDP but not for the DOM? It seems that this could create issues with the DOM not doing the work to the City's specifications.

A. The intent of pre-qualified contractors is to provide residents options for selecting a contractor that can perform the work and has a good understanding of the City's FDD program. DOM contractors are required to be licensed and the inspection/permitting process of the FDD is the same for the City's program and the DOM program.

Q. 2.197 An earlier response to a question about plugging pick holes in manhole covers said that they are plugged "as they are discovered". Is there a systematic check system in place?

A. Not at this time, however the City plans to use the stormwater model (when project is completed) as a tool for developing a formal program. In addition, implementing a formal program is a likely recommendation that will come out of the CAC.

Q. 2.198 Were any problems found in the target areas [when the sewer pipes were inspected and televised]?

A. Tree root issues were found just downstream of Dartmor, otherwise no major deficiencies were noted for the target areas. The area downstream of Dartmor was cleaned and is being programmed to be lined in the near future which will prevent future tree root intrusion.

Q. 2.199 How did City Council's recent postponed vote on approving a contract extension for CDM [the consultant on the City's FDD program] affect this project?

A. The vote was on a contract with CDM for some portions of the FDD program that were not suspended and doesn't affect the SSWWE project.

Q. 2.200 What about SRF loans, that the City has gotten in the past, where all or a portion of the loan was forgiven?

A. Yes, that's true, the City has obtained some SRF loans, of which a portion was forgiven, typically those that involved improvements to water quality. Those were funded by the U.S. government's Stimulus Program and at some point, that program will no longer be available. The City cannot count on any portion of a loan being forgiven in the future.

Q. 2.201 Are there SRF loans available for the sanitary sewer system also, or only for stormwater?

A. Yes, there are SRF loans available for sanitary sewer systems and the City mainly uses them for the water treatment plant. Each source of funding has different rules that govern how it can be used. The State's sanitary SRF program is much larger than its stormwater program.

Q. 2.202 Are different capital improvement projects competing for the same funds? Say roads vs. sewers?

A. No, road funding and revenue sources can only be used for transportation projects and sewer revenue for sewer system projects.

Q. 2.203 What's the size of the pot for road funding?

A. There isn't time to respond to that during the CAC meeting, as the time is needed to cover material that is directly related to the SSWWE project, but anyone who wishes to discuss it with City staff outside the meeting is welcome to do so.

Q. 2.204 If a project is on the CIP, does that mean it will be performed?

A. Often they are, but occasionally there are other influences at a higher decision making level that impact whether the project is performed when programmed.

Q. 2.205 Can funds be "stockpiled" in order to fund larger projects than what is allocated each year?

A. Yes, in fact, the City stockpiled annual revenues to fund the work at the WWTP.

Q. 2.206 Because FDDs were put on hold for the last two years, were those funds stockpiled?

A. A portion of the FDD program continued, some of the funds went to pay for the SSWWE study and others, and some were diverted to other projects within the same asset.

Q. 2.207 Will there be a point where studies are no longer included on CIP, but instead all the funds are used to pay for infrastructure projects?

A. Studies are included on the CIP list, just as construction projects are included. But yes, the asset teams could determine that they want to stockpile funds for construction. There's a balancing act between building and infrastructure repairs and funding studies

to determine how to solve a particular, more global issue. That what's happening right now, with the three related wet weather studies Those can be thought of as similar to a master plan; developing a global solution to wet weather problems.

Q. 2.208 Would the City think about bonding this [recommendations that might come out of the SSWWE project]?

A. Yes, it could happen. The City's current WWTP upgrades (\$120M) were 7 or 8 years in the decision-making process.

Q. 2.209 How many different contractors installed the curb drains in Ann Arbor?

A. There have been 3 different contractors.

Q. 2.210 What was the specified depth for burial of the curb drains?

A: The curb drain is to be installed, using an approved directional drilling (trenchless) method for the specified pipe at a depth 2-6 feet between existing storm sewer catch basins or other approved structures as directed by the Project Engineer. A minimum grade of 1% (one percent) shall be maintained for each curb drain section. Bellies, dips, and non-sloped sections will not be allowed.

Q. 2.211 City workers who came and cleared the curb drain with pressurized water, told the homeowners on Avondale that this was not the only place where this had happened. In how many locations was there freezing of curb drains?

A: In three locations, impacting four homes.

Q. 2.212 What could be done to prevent the freezing? Are there warming devices (similar to those people put on roofs to prevent ice dams) that could be installed to correct this problem?

A: See response below.

Q. 2.213 The frost line in Michigan is much lower than 1.5 -2 feet. Why were the curb drains not installed deeper--ie, at 42+ inches?

A: (Answer both questions 2.212, 2.213)

Questions have been raised regarding the burial of the sump discharge lines at 24-inches deep, and whether this is indicative of a systemic defect in the City's FDD program. The City's 24" burial depth (minimum) standard is based on the following requirements and assumptions:

a) The sump discharge lines in the ROW and on private property is required to be constructed with a positive slope meeting the project specifications and the building code based on the size of the pipe. Each construction installation has been verified and approved by Planning & Development Services.

b) With the required slope, the pipes will not have standing water in them.

c) Sump pump discharge water is typically “warm” at about 55 degrees and will not have time to cool down and freeze in the sump lead or curb drain if positive slope is present.

d) The exiting storm sewer infrastructure that the curb drains connect to is often shallower than frost depth, making deeper curb drains infeasible.

These requirements and resulting conditions promote effective functioning of the sump discharge line and curb drain, even under extreme cold conditions like those experienced last winter. The specifications themselves are not indicative of any systematic defect in the City’s system.

It is possible that in some cases, such as the houses along Avondale that the sump leads may have “dips” or flat sections in them where the water could collect and cool. When it was pushed downstream with the next pumping cycle it became susceptible to freezing in the curb drain due to the “icicle” effect. If such sump discharge line and curb drain collector line dips exist, they do not meet the City’s specifications.

The City plans to investigate the reported cases of pipe freezing and identify any necessary corrective work.

Q. 2.214 An earlier response to a question about the FDD Program said that the Request for Qualifications (RFQ) for the was sent out at program initiation to several contractors. How many is several?

A. See below

Q. 2.215 Who were the contractors who received RFQ’s at program initiation?

A. We are unable to locate a listing of the contractors solicited at the start of the program, however a 2nd request for qualifications was sent out in 2003. A listing of those contractors can be found on the project website at www.a2gov.org/SSWWE > Project Library.

Q. 2.216 How were the contractors who received the RFQ at program initiation selected?

A. Based on their submitted qualifications, interview and performance on a pilot home.

Q. 2.217 I am interested in why the DOM is not held to pre-qualified contractors as those in the FDDP are? I understand the response, the "A" to another CAC member's question, but it does not actually answer why. "DOM contractors are required to be licensed and the inspection/permitting process is the same for the City's program and the DOM program" appears to justify why the same process was not used, but then that raises the question of why pre-qualified contractors were required for the FDDP if they were in fact licensed and would go through the inspection/permitting process.

A. The intent of providing a list of pre-qualified contractors for the City's FDDP was to assist residents in selecting a contractor from a list of contractors who are already familiar with the methods and materials of the FDDP program as opposed to putting the burden entirely on the resident to find a qualified contractor on their own. In addition, a resident does have the ability to hire a contractor not on the pre-qualified; however the reimbursement process is different. The property owner must contract with and pay the non-prequalified contractor and then the property owner would need to submit to City for reimbursement.

Q. 2.218 In a response to a previous question about public sources of I&I (inflow and infiltration), a recommendation for three relief sewer projects was made for the Lansdowne area, based on a 1987 investigation. What were they? Were these projects done?

A. Here's an excerpt from the earlier response to a question about public sources of I&I:

"Lansdowne Investigations - 1987

Three related reports prepared by Soil and Materials Engineers, Inc., McNamee Porter & Seeley, and Harza, document contributing factors to basement backups in the Morehead area. These reports provide boring logs that document area geology, groundwater elevation data, and a recommendation for three relief sewer projects *alternatives* [not a recommendation for three projects.] These reports include information on the impacts of the August 22, 1987 storm event, a summary table listing the impacted residences, and a discussion of flow monitoring performed in the area."

The recommendations from the study led to the "Southwest Sanitary Relief Sewer" project, which was constructed in 1988. The project included a construction of a relief sewer in Scio Church Road extending across Pioneer High School to a sewer in Stadium Blvd.

Q. 2.219 I would like to know what type of drilling fluid/lubricant was used when the curb drains were dug?

A. Water and bentonite.

Q. 2.220 Please provide all the product information that is available.

A. Following is the specification on for the bentonite drilling fluid:

Drilling Fluid

A drilling fluid of water and bentonite clay or a polymer shall be used. The fluid shall be inert. The fluid should remain in the tunnel to ensure the stability of the tunnel, reduce drag on the pulled pipe, and provide backfill within the annulus of the pipe and tunnel.

Leakage of drilling fluid through the soil shall be minimized. The Contractor will immediately clean up any drilling fluid that surfaces through fracturing. The Contractor is responsible for transporting all excess fluids to a disposal site and paying all disposal costs. Disposal shall be performed in compliance with all applicable environmental regulations, right-of-way, and work space agreements. Drilling fluid is not to be placed in storm drains or the sanitary sewer. The Contractor is responsible for all costs associated with mitigating the accidental release of drilling fluid on to private property, including but not limited to, lawns, footing drains, and basements.

Q. 2.221 What information did the contractors who did this work have to provide to the City regarding this drilling fluid?

A. See above.

Q. 2.222 Did different contractors do this work?

A. Yes, 3 different contractors.

Q. 2.223 Was there a difference between what method and/or products were used before 2006 and after 2006?

A. No, the same specification has been used.

Q. 2.224 Please explain why it's recommended that there be a small hole in the discharge line of a sump pump.

A. The pump manufacturer's instruction manual recommends a hole in the discharge line. As an example, see the installation instructions for Zoeller pumps, on the project website: www.A2gov.org/SSWWE > Library. (Highlights added.)

The manufacturer instructions identify the hole as necessary in assemblies with check valves to purge the unit of trapped air. They state agitation and/or a dry basin cause trapped air. In laymen terms, without the hole, a column of water can be present between the check valve and top of the pump and an air bubble can form or be drawn to the area where the impeller is trying to spin to eject water, thus the impellers will spin in air and not water, heating up and eventually burning up the motor. This is also known in the industry as “vapor lock”.

The manufacturer’s engineer has also said that if there is no hole present, a water column can be present from the impeller all the way through the check valve to the top of the discharge where it becomes gravity. That head of water puts pressure on the impellers during start up and increases the amperage necessary to get the impeller rotating. This will decrease the total number of cycles of the pump over its lifetime. A vent hole relieves this pressure after each pumping cycle to minimize any head on the impellers during start up as well as provide a way for any trapped air to rise through the impellers and escape.

Q. 2.225 Was there an effort to look at other communities with FDD programs?

A. Yes, Greg Marker (OHM Advisors) has personally acted as the Field Engineer for community programs in five communities (Farmington’s Chatham Hills Subdivision, Auburn Hills’ Bloomfield Orchards Subdivision, Westland, Romulus, Livonia.) Additionally, he researched two others, which were included in a report provided a provided to the CAC and [posted on the project website](#).

Q. 2.226 Did Chatham subdivision meter every home? And what was the cost? Did Ann Arbor meter homes?

A. Yes, all the homes in Chatham were metered. The estimated cost to meter a home is about \$400 per home, and the metering period should be at least 8-10 months in order to capture multiple significant rain events. Anne Warrow and Mark TenBroek respond that the City metered about 40 homes for about a ten-month period, on a rotating basis, resulting in about 150 homes being metered.

Q. 2.227 Does the hilliness of a community affect the stormwater flows?

A. Greg Marker believes that soil types have more impact on stormwater flows than elevation. Says that Michigan has the most widely varied soils in the country.

Q. 2.228 Have you [Greg Marker] discovered problems similar to what Ann Arbor has experienced?

A. In Greg’s experience, about 1% of homeowners have a problem that he cannot resolve.

Q. 2.229 Does Ann Arbor have more problems than other communities?

A. In his experience, yes. He notes that the programs he's been involved in have had a field engineer on site for each installation as well as every contact between the homeowner and the contractor, which is a significant investment. Ann Arbor's program was larger in scale than the other communities and has been in place for more than a decade.

Q. 2.230 Is it common for homes to have issues with a sanitary backup after a disconnection?

A. In all the cases Greg Marker has investigated so far, he has not found a backup caused by an FDD. All have been related to non-City sanitary issues.

Q. 2.231 Does the City keep a record of homes that were metered?

A. Yes, the City keeps a record. The City metered about 40 homes for about a ten-month period, on a rotating basis resulting in about 150 homes being metered.

Q. 2.232 If a home's footing drains are not connected to an external collection system, what are the options?

A. The owner can pipe the stormwater collected in the footing drains to a rain garden, to the yard, a cistern or to the public system (with a right of way permit.)

Q. 2.233 To prevent mineral buildup, should homeowners be instructed to clean their pumps?

A. Greg Marker says that while pumps can be disassembled and cleaned, it's unlikely that homeowners would remove, disassemble and clean their pumps. Instead, there should be a small hole in the discharge line.

Q. 2.234 Are homes with external grading issues not related to FDDs?

A. No, those are issues that are not part of the FDD program, which was put in place to solve a sanitary sewer backup issue, but if the CAC wishes to consider FDDs in any form going forward, external grading should be part of the program.

Q. 2.235 Could a home with grading issues be fitted with a larger pump?

A. That may not solve the problem long term, because a larger pump pumps faster, but the problem of large amounts of water running along the basement walls remains.

Q. 2.236 What is the purpose of the air gap?

A. The purpose of the air gap is to provide an outlet for the footing drain in the event of an issue in the external discharge or the curb collection system or the stormwater system.

Q. 2.237 Regarding air gap issues, what are the indications of a problem?

A. If the pump is running frequently 8-24 hours after a rain event, and water is splashing out of the air gap, the FDD installation has a problem and the homeowner should report it to the City.

Q. 2.238 If the footing drain lead fails between the house and the sidewalk...who is responsible, homeowner or City?

A. The homeowner is responsible.

Q. 2.239 Prior to 2000, when people had a footing drain failure and replaced the footing drain, were they required to put a sump pump in?

A. This depends highly upon the individual circumstances, such as:

- Whether or not storm sewer was available to connect to
- Whether or not there is an acceptable discharge point
- Whether or not a gravity draining system is feasible
- Potential sump discharge point relative to lot dimensions
- Groundwater level
- Soil Conditions
- Extent of footing drain replacement/addition
- Whether or not the footing drain work was part of the original project or if the issue was discovered later

It should be noted that in many such cases, there would not have been storm infrastructure available to connect to, so many of the above factors presume that the sump would have to discharge to grade rather than connect to a curb drain like the system that was build with the FDD program.

Q. 2.240 What is the GPM of these sump pumps?

A. A half-horsepower pump will pump 60 GPM.

Q. 2.241 What is a Fernco?

A. It's the name brand of the fitting that holds the check valve in place.

Q. 2.242 Define head analysis.

A. It's the amount of pressure that water or the pumping system exerts on the system. Every 2.31' of water = 1lb of pressure.

Q. 2.243 The head is determined by the head of the sump?

A. The head is increased by each bend because each bend increases the friction of the flow.

Q. 2.244 Are these homeowner situations [from the post 2013 FDD Survey investigation] too different or are there common themes that can be addressed?

A. Yes, there are some common themes, for example alternate sump pump locations, lack of hole in the discharge line and external grading issues.

Q. 2.245 It seems like the better use of our [the joint CAC FDD investigation subcommittee] time would be to address issues with those who've had FDD installations.

A. Agreed, the major focus of the group would be devoted to the plan for resolving problems.

Q. 2.246 How many more houses in the City still have footing drains?

A. Based on the assumption that houses built between 1941 and 1980 have footing drains connected to sanitary sewer, the remaining potential FDD equivalents is approximately 15,000. Note: this includes both single family and multi-family properties.

We've discovered during our investigation work throughout the course of the program that, although some houses built prior to 1941 have connected footing drains, the majority do not have connected footing drains. Therefore, these homes are excluded from the above estimate.

Q. 2.247 Can OHM clarify why "install backup pumps" is not one of their Best Practices for Footing Drain Disconnection Program suggestions? Did it not work out when other municipalities installed them?

A. In FDD Subcommittee meetings, Greg Marker, OHM construction engineer, was asked this question. He responded that installing a backup up pump isn't a unilateral recommendation because a back up pump is another mechanical device that brings

additional operations and maintenance responsibilities. Homeowners should determine for themselves whether they wish to add a backup pump. In some communities where Greg has worked on FDD projects, the municipality offered backup pumps as an inducement to volunteers, however not all homeowners opted to have them installed.

For more detailed information on the approach taken by other municipalities, refer to the [Backup Systems Summary from other programs 10.28.14.pdf](#) document, located on the SSWWE website > Library page > Project Materials.

Q. 2.248 Is there is enough mitigation opportunity left; are there enough flows to offset or will a DOM (Developer Offset Mitigation) mandate throttle development?

A. There are still pockets of the City with high flows. There are also mitigation approaches other than performing FDDs, such as disconnecting swimming pools. And finally, if payment or construction work in lieu is determined to be acceptable, developers could opt to fund or complete one of the six SSWWE projects to fulfill mitigation obligations.

Q. 2.249 If developers could continue to solicit homeowners for FDDs, would the City still use the 4GPM figure in the calculation?

A. As we look at the details of the Developer Offset Mitigation program going forward, City staffers will evaluate that.

Q. 2.250 Developers who are considering purchasing a specific parcel would benefit from knowing whether that parcel is located in an area of the sanitary sewer system that has issues. Currently, the sanitary sewer system map is not made public, due to Homeland Security concerns.

A. It's true that the City does not publish the sanitary sewer system map details due to security concerns, however developers are welcome to meet with City staff to review specific properties and learn more about their sanitary sewer conditions. In addition, the City is moving forward with creating maps indicating the parcels upstream of the 5 project areas recommended by the SSWWEP study for use by developers.

Q. 2.251 It is my understanding that some of the initial FDDs performed for the city included backup pumps (water powered, I believe). Can the city provide information about this? I am specifically interested in any available information regarding the following:

- Were any backup pumps included in city provided FDDs?
- If so, how many?
- When were these performed?

- **Why did they stop?**
- **How were they funded?**
- **What type of backup (water, DC, other)?**
- **Any other information that might improve the understanding of this issue.**

A. As part of the initial Sanitary Sewer Overflow Study performed in 1999-2000, there were approximately 10 pilot footing drain disconnections performed to review the removal efficiency of removing flow from disconnected footing drains in residential homes. These homes had disconnections performed and sump pumps and monitors installed with data reviewed for 6 months to assist with the project review and preparation of the report. Initially, these homes had their sump pump discharges directed to the lawn outside the homes. These were subsequently directed to the storm drainage system the next summer.

This work was done under the CDM Smith SSO project contract, and included installation of backup sump pumps in many cases as an enticement to volunteers to have the work performed. This work was done as a data gathering effort.

Q. 2.252 Were there claims for the frozen pipes on Avondale and did the city pay them?

A. No, the City did not receive any claims for 1511 or 1515 Avondale.

Q. 2.253 Is installing a floor drain with a sump pump in an attempt to have sump water discharge to the sanitary system?

A. The team understood the City's building official to say that installing a floor drain with an FDD would be viewed as an attempt to have sump water discharge to the sanitary system and would not pass inspection State Plumbing Code.

Q. 2.254 Is it true that City-wide, stormwater flows play a small role in overall flooding, but in areas with high water tables, removing excess stormwater may relieve localized flooding problems?

A. It may be the case, but that issue has not been studied. The Comment section is a great place for CAC members to emphasize their opinion of the high importance of the issue.

Q. 2.255 What is the intent of a rate study?

A. During a Citizens Advisory Committee meeting, Craig Hupy clarifies that City staff would recommend to Council that a rate study be conducted. When a rate study occurs the rate consultant would be asked to examine creating a separate class of ratepayers.

Q. 2.256 Will the rate study incentivize homeowners to get FDDs?

A. That's not the intent of the rate study and there's no recommendation to continue FDDs as a tool for City programs.

Q. 2.257 Would the rate study cover sanitary and storm?

A. No, the rate study would cover sanitary and water.

Q. 2.258 Will we discuss radon tonight? Why were radon inspections mentioned in the 2001 SSO Report, but not performed for FDD homes?

A. Cresson responds that between the time the SSO Study was conducted and the FDD program was launched, the City consulted with radon mitigation experts, which resulted in the spec including a sealed cover on the sump pump. Notes that radon enters a home from many locations. Also notes that Washtenaw County is a pocket of high radon levels, with as many 40% of homes having radon issues.

Q. 2.259 Regarding in lieu payments recommendation in the revised DOM proposal, would the City staff determine which projects would be required to perform immediate, specific mitigation?

A. Yes, largely. City staff reviews the developer's plans, negotiates with the developer regarding the specifics of the development and then makes recommendations, which are then sent to Council for final approval.

Q. 2.260 What is Table A in the DOM Program?

A. Table A is a table of flow values used to calculate the flows that a development will generate. Table A is now a dated document, and the City and the development community both believe that it should be updated. The development community will be engaged in modifying the flow rates used in Table A.

Q. 2.261 What does "robust, incentivized" FDD program solution mean in the CAC recommendation?

A. Robust means a high quality pump, and includes a back up pump.

Q. 2.262 Will the City correct all FDD installations that are out of spec, or only those that caused water damage?

A. The City's mitigation program will address homes who's owners believe their FDD installation may be out of spec.

Q. 2.263 Are you expecting any action by Council regarding the FDD ordinance [as a result of the findings of the SSWWE Study]?

A. Yes, we think it's likely that the ordinance would have to be modified, based on the results of the SSWWE Study, but we don't yet know the specifics.

Q. 2.264 Is it anyone's intention to evaluate the FDD spec to see if they comply with code?

A. The FDD spec was developed with the input of building officials and other specialists, to be code compliant.

Q. 2.265 By a show of hands, how many engineers here think that burying curb lines at 24" have no chance of freezing?

A. The specification has been reviewed when it was created and has been reviewed several times since it was developed. The specific issue about burial depths has been reviewed and a pipe with a positive slope, carrying sump pump water, which is typically about 50 degrees should not freeze. However, if there is a belly, or a small dip in the line, that can trap a small amount of water that could freeze; that is what happened on Avondale.

Q. 2.266 How do I know if I have an out of spec installation?

A. If you have a concern, such as water in the basement, you can let the City know and when the mitigation project begins, your home can be investigated.

Q. 2.267 I'm new to the area, my home is on Weldon. Did my home have an FDD?

A. Based on where you live, it's likely that your home had an FDD. Please give your address to one of the project team members and that individual will check the records and let you know.

Q. 2.268 How do you know who the FDD homeowners are?

A. The City has a record of each address that underwent an FDD.

Q. 2.269 I'd like to think that the City should review the specifications.

A. Thank you for your suggestion. The specifications have been reviewed multiple times. If there were to be an FDD program going forward, the specification would be reviewed again for continued code compliance and to incorporate the most recent best practice suggestions.

Q. 2.270 Do you have a prediction as to how many people who have had FDDs will have problems in the future?

A. No, we don't have a prediction; however, when we begin the program to correct out of spec installations, there will be a notification for homeowners who have concerns.

Q. 2.271 Can you speak to the fact that you integrated a developer into the committee and that you removed a member?

A. Early in the process, the Committee set the standard that any resident would be able to join the committee at any time, as long as they were able to bring themselves up to speed. A resident who happens to work for a developer asked to join the CAC after it had started and did so, as did another resident. And yes, one member was removed the committee. This occurred after the committee established norms and that member violated the norms of conduct. There was a clear process for removal, which was communicated to that member.

Q. 2.272 What's the capacity of the plant before the upgrade and what will it be in the future?

A. The plant's capacity is a more complex concept than a single number because the plant has capacity to accept and treat flows, as well as store flows for a period of time for treatment later. The current WWTP has a design capacity of 29.5 million gallons per day (MGD). Additionally, the plant has storage that can handle short peaks in flow rate that, if extrapolated to a daily rate, would be the equivalent of about 70 million gallons in a day. On average, the plant treats about 18.5 MGD, or about 60% of its capacity. The treatment capacity will not change with the plant upgrades; the upgrades are renovating old buildings and equipment, not increasing capacity. On the project website (www.a2gov.org/SSWWE) you can see [a short video that explains the plant's functions and capacity](#).

Q. 2.273 With all the development in the last ten years, how can you know that the treatment plant has capacity in the future?

A. Ten years ago, the plant was not operating at capacity and over the last decade, the City has required that developers offset any flow they expect to add to the sanitary sewer system, removing even more flow from the system than the new development would add. This added capacity. This practice, as well as an overall reduction in water consumption mean that the plant has adequate capacity now and in the future. Additionally, the CAC recommended continuation of the Developer Offset Mitigation program, with a few modifications.

Q. 2.274 Wasn't doing a survey of the FDD households in your scope of work?

A. Doing a survey of this level was not; detailed paper surveys were mailed to 2300 homes and then data entered manually.

Q. 2.275 Do you have an estimation of the expected lifetime of a pump is?

A. Each home has its own rate of flow that determines the life expectancy of the pump. Manufacturers offer general guidelines that pumps last ten years on average.

Q. 2.276 Regarding the 10 homes that had problems because they were out of spec, did you find any patterns? Any particular contractors? How soon after the installation was made did you discover the failures?

A. We could not find any geographic patterns to the problems, nor any concentrations among particular contractors. Of the 100+ homes investigated, most had had footing drains disconnected and sump pumps installed between 2004 and 2008. The investigation was conducted in 2014.

Q. 2.277 Did you find problems with any particular contractors?

A. Three ways that an installation can be out of spec: out of compliance with building code, out of the manufacturer's installation instructions or out of industry standard best practices. None of the ten instances were out of building code, which is what the City inspector staff evaluates. These ten did not follow manufacturer's installation instructions or industry standard best practices.

Q. 2.278 What is a good, reliable backup system?

A. The most common backup system is battery backup. The second most popular is water-powered backup pump. The third type is a generator, to replace power sources. Each of these is progressively more expensive.

Q. 2.279 You need to let people know about the radon issue. If you don't want to pay for the test, it's \$10, but you need to let people know. I had to pay \$800 for a mitigation system. Let people know.

A. Some of the CAC discussions on radon were that Washtenaw County has a naturally high level of radon. Anyone who lives in Washtenaw County should be aware of that risk and determine whether they wish to have a radon test. Another aspect the CAC discussed related to radon was that the City's spec required that the sump pump lid be sealed. There are also many other sources in a basement where radon can enter the home, such as cracks in the walls or around windows.

Q. 2.280 Can you tell us the cost of the FDD Program to date?

A. I don't have the exact figures, but in recent years, the Capital Improvement Program has had about \$2.5M per year allocated to the FDD program.

Q. 2.281 How much would it have cost to enlarge the sanitary sewer pipes rather than intruding into the integrity of our homes? Why wasn't that option more seriously considered? Even if the cost was double, it might have been better than to expose citizens to pump replacements forever.

A. SSO Task Force weighed those issues and examined enlarging pipes, as well as FDDs and storage. Because the storage locations would have disrupted large swathes of green space and would have only pushed the problem further down the system, the Task Force ultimately recommended the FDD Program.

Q. 2.282 How many people on the CAC had sump pumps?

A. I think about half of the citizens on the committee had sump pumps. Others were interested because they had had basement backups or water in their basement.

Q. 2.283 Do you know how many people put in gas generators?

A. We did ask that question in the survey, however we don't know the number on the spot.

Q. 2.284 My basement is flooded and I reported it to the City, but they said that they don't know why. I've got about a \$6000 bill.

A. Please give me your information after the meeting and someone from the City will look into it.

Q. 2.285 Air gaps don't comply with code. Your specs are not code. What's your intention to remedy the problem with the air gaps not up to code?

A. We are not aware of any air gaps that do not comply with code.

Category 3: OTHER PROJECTS AND/OR CITY FUNCTIONS

Q. 3.1 Was the installation of the horizontal bored storm sewer lines recently installed along the curbs in target areas (for the purpose of connecting subsequent FDDs) paid for by Federal Stimulus grant funding?

A. No.

Q. 3.2 Are the new Surface Water Impounds as proposed by the Upper Mallets CAC being justified by the City, the County, the Consultants, or the CAC (in part or in anyway) because of this "diminutive" flow from FDDs?

A. No. The recommendations from the Upper Malletts study address a need for stormwater retention in the Upper Malletts drainage area. Further analysis will be completed through the Stormwater Model Calibration & Analysis project.

Q. 3.3 Can the City sponsor a blog location for residents to post comments on the Storm Water Management and FDD programs?

A. The City's website requires strict security protocol to protect its function from cyber attacks, which makes it challenging to add functions that allow for input from unsecure networks. However, we worked with the City's IT department and explored online tools that would allow the SSWWEP CAC to post questions and comments with a date stamp and to be notified of responses. Basecamp and wiki tools were two options explored. After reviewing the options, functions and solicit desired capabilities at the December 12 meeting, we selected and implemented Basecamp.

As for non-CAC members, the City does encourage residents to provide comments on the City's GovDelivery email list, to continue to email City personnel and to provide comments at public meetings. Additionally, all project documents and an extensive Q & A are posted on the City's project website at: www.a2gov.org/SSWWE.

Q. 3.4 Extensive site development is currently being performed in Pittsfield Township on Oak Valley Drive, near the Pittsfield Branch Library / Target. Does the storm water from this area flow to Upper Mallets Creek through the Churchill / Morehead neighborhoods? If so, what enforcement mechanisms are in place to prevent the same clogged and failed detention ponds that occurred at the A2 Ice Cube facility in April of 2013?

A. Developments in that area are outside the City boundaries and are under the enforcement responsibilities of Pittsfield Township.

Q. 3.5 Will the City consider the use of porous pavements and porous unit paving for replacement streets especially at the work proposed by the Upper Mallets CAC for Scio Church and Mershon streets?

A. Any street reconstruction project will follow the City's Green Streets Policy. As part of this policy, engineers will evaluate the feasibility of using various infiltration methods.

Q. 3.6 Could the use of porous pavements and porous unit paving be beneficial for the highly impacted streets near Churchill Park?

A. Any street reconstruction project will follow the City's Green Streets Policy. As part of this policy, engineers will evaluate the feasibility of using various infiltration methods.

Q. 3.7 Was the use of porous pavements and porous unit paving considered for the new street construction on Madison between 7th and Main St?

A. Yes, it was. There were some areas where soils were suitable for infiltration and various infiltration methods were incorporated into the design.

Q. 3.8 In Scio Township, does the new Menards store or any future project have to pay the MITIGATION fees similar to Mitigation fees for new projects in the City of Ann Arbor?

A. There are no mitigation fees. Scio Township developments that contribute flow directly to the City's sewer system are required to perform offset mitigation, unless the Township has purchased or constructed capacity in the City's sanitary system.

Q. 3.9 When the City did the storm water tank project at Pioneer HS, can CAC get a copy of the evaluation of the effectiveness?

A. A copy of the [Pioneer High School BMP Water Quality Monitoring Program report](#) dated March 30, 2012 can be found on the City's project webpage at www.A2gov.org/SSWWE > Library.

Q. 3.10 Regarding a new project at 2250 Ann Arbor Saline Road – will DOM FDDs be required for this project? How many?

A: Yes, mitigation will be required. Plans have not been submitted yet, so no calculations can yet be performed.

Q. 3.11 When does the Stormwater Modeling Study end?

A. November 2014.

Q. 3.12 Is the Malletts Creek project complete?

A. Yes, the project is complete and the City just received the final report.

Q. 3.13 What were the Federal Funds that were received in 2010, 2012 via the State Revolving Fund application actually used for as it relates to the FDD program per the application?

A: There were no federal funds used for any aspect of the FDD Program. The FDD program did use Strategic Water Quality Initiative Funds (SWQIF), which take the form of low interest loans from the State of Michigan, with no origination from Federal sources. The SWQIF funds were used to offset the costs of the in-home FDD work.