AGREEMENT BETWEEN
ORCHARD, HILTZ & MCCLIMENT, INC.
AND THE CITY OF ANN ARBOR
FOR PROFESSIONAL SERVICES

The City of Ann Arbor, a Michigan municipal corporation, having its offices at 301 E. Huron Street, Ann Arbor, Michigan 48104 ("City"), and Orchard, Hiltz & McCliment, Inc. (“Consultant”) a Michigan Corporation with its address at 34000 Plymouth Road, Livonia, MI 48150 agree as follows on this 4th day of February, 2013.

The Consultant agrees to provide professional services to the City under the following terms and conditions:

I. DEFINITIONS

Administering Service Area/Unit means Project Management Services Unit.

Contract Administrator means Nicholas Hutchinson, P.E., Interim Manager, acting personally or through any assistants authorized by the Administrator/Manager of the Administering Service Area/Unit.

Deliverables means all Plans, Specifications, Reports, Recommendations, and other materials developed for or delivered to City by Consultant under this Agreement.

Project means Sanitary Sewer System Flow Monitoring and Wet Weather Evaluation Project, RFP 819.

II. DURATION

This Agreement shall become effective on February 4, 2013, and shall remain in effect until satisfactory completion of the Services specified below unless terminated as provided for in this Agreement.

III. SERVICES

A. The Consultant agrees to provide professional engineering services ("Services") in connection with the Project as described in Exhibit A. The City retains the right to make changes to the quantities of service within the general scope of the Agreement at any time by a written order. If the changes add to or deduct from the extent of the services, the contract sum shall be adjusted accordingly. All such changes shall be executed under the conditions of the original Agreement.

B. Quality of Services under this Agreement shall be of the level of professional quality performed by experts regularly rendering this type of service. Determination of acceptable quality shall be made solely by the Contract Administrator.

C. The Consultant shall perform its Services for the Project in compliance with all statutory, regulatory and contractual requirements now or hereafter in effect as may be applicable to the rights and obligations set forth in the Agreement.

D. The Consultant may rely upon the accuracy of reports and surveys provided to it by the City except when defects should have been apparent to a reasonably competent professional or when it has actual notice of any defects in the reports and surveys.

IV. COMPENSATION OF CONSULTANT

A. The Consultant shall be paid on the basis of reasonable time spent and materials used at the rates and prices specified in Exhibit B for acceptable work performed and acceptable Deliverables received. The total fee to be paid the Consultant for the Services shall not exceed $914,077. Payment shall be made monthly following receipt of invoices submitted by the Consultant, and approved by the Contract Administrator.

B. The Consultant will be compensated for Services performed in addition to the Services described in Section III, only when those additional Services have received prior written approval of the Contract Administrator. Compensation will be on the basis of reasonable time spent and reasonable quantities of materials used, according to the schedule of rates in Exhibit B. The Contract Administrator shall be the sole arbitrator of what shall be considered “reasonable” under this provision.

C. The Consultant shall keep complete records of time spent and materials used on the Project so that the City may verify invoices submitted by the Consultant. Such records shall be made available to the City upon request and submitted in summary form with each invoice.

V. INSURANCE/INDEMNIFICATION

A. The Consultant shall procure and maintain during the life of this contract, such insurance policies, including those set forth below, as will protect itself and the City from all claims for bodily injuries, death or property damage which may arise under this contract; whether the acts were made by the Consultant or by any subcontractor or anyone employed by them directly or indirectly. The following insurance policies are required:

1. Professional Liability Insurance protecting the Consultant and its employees in an amount not less than $1,000,000.

2. Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be

obtained in the following minimum amounts:

Bodily Injury by Accident - $500,000 each accident
Bodily Injury by Disease - $500,000 each employee
Bodily Injury by Disease - $500,000 each policy limit

3. Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 07 98. The City of Ann Arbor shall be an additional insured. There shall be no added exclusions or limiting endorsements including, but not limited to: Products and Completed Operations, Explosion, Collapse and Underground Coverage or Pollution. Further, the following minimum limits of liability are required:

$1,000,000	Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined
$2,000,000	Per Job General Aggregate
$1,000,000	Personal and Advertising Injury

4. Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, equivalent to, as a minimum, Insurance Services Office form CA 00 01 07 97. The City of Ann Arbor shall be an additional insured. There shall be no added exclusions or limiting endorsements. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. Further, the limits of liability shall be $1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.

5. Umbrella/Excess Liability Insurance shall be provided to apply in excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of $1,000,000.

B. Insurance required under V.A.3 and V.A.4 of this contract shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the City.

C. In the case of all contracts involving on-site work, the Consultant shall provide to the City, before the commencement of any work under this contract, documentation demonstrating it has obtained the above mentioned policies. Documentation must provide and demonstrate an unconditional 30 day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number; name of

insurance company; name and address of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which shall be approved by the City, in its sole discretion; (c) that the policy conforms to the requirements specified. An original certificate of insurance may be provided as an initial indication of the required insurance, provided that no later than 21 calendar days after commencement of any work the Consultant supplies a copy of the endorsements required on the policies. Upon request, the Consultant shall provide within 30 days a copy of the policy(ies) to the City. If any of the above coverages expire by their terms during the term of this contract, the Consultant shall deliver proof of renewal and/or new policies to the Administering Service Area/Unit at least ten days prior to the expiration date.

D. Any insurance provider of Consultant shall be admitted and authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-admitted insurance companies are not acceptable unless approved in writing by the City.

E. To the fullest extent permitted by law, for any loss not covered by insurance under this contract, the Consultant shall indemnify, defend and hold the City, its officers, employees and agents harmless from all suits, claims, judgments and expenses including attorney's fees resulting or alleged to result, to its proportionate extent, from any negligent, grossly negligent, reckless and/or intentional wrongful or tortious acts or omissions by the Consultant or its employees and agents occurring in the performance of this Agreement.

VI. COMPLIANCE REQUIREMENTS

A. Nondiscrimination. The Consultant agrees to comply with the nondiscrimination provisions of Chapter 112 of the Ann Arbor City Code and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate any inequality based upon race, national origin or sex. The Consultant agrees to comply with the provisions of Section 9:161 of Chapter 112 of the Ann Arbor City Code, Exhibit C.

B. Living Wage. The Consultant is a "covered employer" as defined in Chapter 23 of the Ann Arbor City Code and agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. The Consultant agrees to pay those employees providing Services to the City under this Agreement a "living wage," as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3) and specified in Exhibit D; to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Agreement are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23. A copy of selected provisions of Chapter 23 of the Ann Arbor City Code is attached as Exhibit D.

VII. WARRANTIES BY THE CONSULTANT

A. The Consultant warrants that the quality of its Services under this Agreement shall conform to the level of professional quality performed by experts regularly rendering this type of service.

B. The Consultant warrants that it has all the skills, experience, and professional licenses necessary to perform the Services specified in this Agreement.

C. The Consultant warrants that it has available, or will engage, at its own expense, sufficient trained employees to provide the Services specified in this Agreement.

D. The Consultant warrants that it is not, and shall not become overdue or in default to the City for any contract, debt, or any other obligation to the City including real and personal property taxes.

VIII. TERMINATION OF AGREEMENT

A. If either party is in breach of this Agreement for a period of fifteen (15) days following receipt of notice from the non-breaching party with respect to a breach, the non-breaching party may pursue any remedies available to it against the breaching party under applicable law, including but not limited to, the right to terminate this Agreement without further notice.

B. The City may terminate this Agreement if it decides not to proceed with the Project by notice pursuant to Article XII. If the Project is terminated for reasons other than the breach of the Agreement by the Consultant, the Consultant shall be compensated for reasonable time spent and reasonable quantities of materials used prior to notification of termination.

C. Consultant acknowledges that, if this Agreement extends for several fiscal years, continuation of this Agreement is subject to appropriation of funds for this Project. If funds to enable the City to effect continued payment under this Agreement are not appropriated or otherwise made available, the City shall have the right to terminate this Agreement without penalty at the end of the last period for which funds have been appropriated or otherwise made available by giving written notice of termination to the Consultant. The Contract Administrator shall give the Consultant written notice of such non-appropriation within thirty (30) days after it receives notice of such non-appropriation.

D. The remedies provided in this Agreement will be cumulative, and the assertion by a party of any right or remedy will not preclude the assertion by such party of any other rights or the seeking of any other remedies.

IX. OBLIGATIONS OF THE CITY

A. The City agrees to give the Consultant access to the Project area and other City-owned properties as required to perform the necessary Services under this Agreement.

B. The City shall notify the Consultant of any defects in the Services of which the Contract Administrator has actual notice.

X. ASSIGNMENT

A. The Consultant shall not subcontract or assign any portion of any right or obligation under this Agreement without prior written consent from the City. Notwithstanding any consent by the City to any assignment, Consultant shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under the Agreement unless specifically released from the requirement, in writing, by the City.

B. The Consultant shall retain the right to pledge payment(s) due and payable under this Agreement to third parties.

XI. NOTICE

All notices and submissions required under this Agreement shall be by personal delivery or by first-class mail, postage prepaid, to the address stated in this Agreement or such other address as either party may designate by prior written notice to the other. Notice shall be considered delivered under this Agreement when personally delivered to the Contract Administrator or placed in the U.S. mail, postage prepaid to the Administering Service Area/Unit, care of the Contract Administrator.

XII. CHOICE OF LAW

This Agreement will be governed and controlled in all respects by the laws of the State of Michigan, including interpretation, enforceability, validity and construction. The parties submit to the jurisdiction and venue of the Circuit Court for Washtenaw County, State of Michigan, or, if original jurisdiction can be established, the United States District Court for the Eastern District of Michigan, Southern Division, with respect to any action arising, directly or indirectly, out of this Agreement or the performance or breach of this Agreement. The parties stipulate that the venues referenced in this Agreement are convenient and waive any claim of non-convenience.

XIII. OWNERSHIP OF DOCUMENTS

Upon completion or termination of this Agreement, all documents (i.e., deliverables) prepared by or obtained by the Consultant as provided under the terms of this Agreement shall be delivered to and become the property of the City. Original basic survey notes, sketches, charts, drawings, partially completed drawings, computations, quantities and other data shall remain in the possession of the Consultant as instruments of service unless specifically incorporated in a deliverable, but shall be made available, upon request, to the City without restriction or limitation on their use. The City acknowledges that the documents are prepared only for the Project. Prior to completion of the contracted Services the City shall have a recognized proprietary interest in the work product of the Consultant.

Unless otherwise stated in this Agreement, any intellectual property owned by Consultant prior to the effective date of this Agreement (i.e., preexisting information) shall remain the exclusive property of Consultant even if such Preexisting Information is embedded or otherwise incorporated in materials or products first produced as a result of this Agreement or used to develop Deliverables. The City's right under this provision shall not apply to any Preexisting Information or any component thereof regardless of form or media.

XIV. CONFLICT OF INTEREST

Consultant certifies it has no financial interest in the Services to be provided under this Agreement other than the compensation specified herein. Consultant further certifies that it presently has no personal or financial interest, and shall not acquire any such interest, direct or indirect, which would conflict in any manner with its performance of the Services under this Agreement.

XV. SEVERABILITY OF PROVISIONS

Whenever possible, each provision of this Agreement will be interpreted in a manner as to be effective and valid under applicable law. However, if any provision of this Agreement or the application of any provision to any party or circumstance will be prohibited by or invalid under applicable law, that provision will be ineffective to the extent of the prohibition or invalidity without invalidating the remainder of the provisions of this Agreement or the application of the provision to other parties and circumstances.

XVI. EXTENT OF AGREEMENT

This Agreement, together with any affixed exhibits, schedules or other documentation, constitutes the entire understanding between the City and the Consultant with respect to the subject matter of the Agreement and it supersedes, unless otherwise incorporated by reference herein, all prior representations, negotiations, agreements or understandings whether written or oral. Neither party has relied on any prior representations, of any kind or nature, in entering into this Agreement. This Agreement may be altered, amended or modified only by written amendment signed by the Consultant and the City.

For Consultant

By_____

Its_____

For City of Ann Arbor

By_____
John Hieftje, Mayor

By_____
Jacqueline Beaudry, City Clerk

Approved as to form and content

By_____
Stephen K. Postema, City Attorney

Approved as to substance

By_____
Steven D. Powers, City Administrator

By_____
Craig Hupy,
Public Services Area Administrator

EXHIBIT A
SCOPE OF SERVICES

The services to be performed by Orchard, Hiltz & McCliment, Inc. (OHM) include the following Scope of Work and OHM's proposed Work Plan:

SCOPE OF WORK

I. Perform System Flow Monitoring:
   a. Install, maintain, and gather necessary flow monitoring and rainfall information to properly evaluate the flow removal from the 5 priority areas from the 2001 study.
   b. Replicate original *Sanitary Sewer Overflow Prevention Study Report* (2001) monitoring plan as detailed in section E of the report.
   c. Recommend additional flow monitoring of trunk lines and Downtown Development Authority (DDA) area including ten (10) previously identified trunkline deficiencies listed in Table A below:
      i. Utilize City rain gauge data (via web) http://www.a2gov.org/government/publicservices/systems_planning/waterresources/dataandinformation/Pages/Rain.aspx
   d. Submit flow monitoring plan, schedule, and data:
      i. Data must be compatible with City's Telog Enterprise software system
      ii. Coordinate flow monitoring efforts with Martin Control Services Inc. for current Citywide Storm Sewer Modeling project
   e. Prepare technical memorandum detailing procedures and findings

Table A

Project ID	**Project Name**
UT-SN-08-12	High Level Relief Sewer
UT-SN-91-12	Huron West Park (Phase II)
UT-SN-91-16	Huron West Park (Phase III)
UT-SN-01-19	Liberty-Washington Relief (Phase I)
UT-SN-01-20	Liberty-Washington Relief (Phase II)
UT-SN-01-21	Miller West Park Sanitary – Low Level
UT-SN-08-16	North main Submain Relief Sanitary Sewer – AARR to M-14
UT-SN-08-19	North Main Submain Relief Sanitary Sewer – Bird Road past Warring
UT-SN-01-25	Pittsfield Valley Submain Relief
UT-SN-93-26	Pittsfield Valley Trunkline Relief Sewer

II. Update, Calibrate and Validate Existing Sanitary Sewer System Model
   a. Update model with the current GIS data
   b. Review existing dry weather flow (DWF) allocations and update as necessary
      i. Update development flows since 2003
      ii. Update township flows (current and contracted maximum flows)
   c. Update wet weather flows and rainfall database with calibrated rainfall and flow monitoring data
   d. Evaluate model parameters for growing season vs. dormant season, ground

conditions and antecedent moisture conditions

e. Calibrate and validate sanitary sewer model
    i. Innovyze (formerly MWH Soft) InfoSWMM Software shall be used
f. Evaluate system operations and identify any system deficiencies or constraints
g. Prepare technical memorandum detailing findings, procedures, and recommendations

III. Evaluate Effectiveness of Current FDD Program

a. Evaluate flow monitoring data from Task Ib, providing a comparative analysis of study areas evaluated in 2001 SSO study with current flow data for flow removals based on event size and intensity
b. Re-analyze previously identified trunkline capacity deficiencies listed in Table A based on current system conditions
c. Evaluate previously collected sump pump monitoring data.
d. Estimate typical FDD flow removal by priority area.
e. Prepare technical memorandum detailing findings and recommendations

IV. Provide Recommendations for reducing and eliminating wet weather flow impacts

a. Review previously reviewed basement backup mitigation alternatives and identify new technologies/alternative approaches to reduce wet weather basement backup risks in the sanitary sewer system to an acceptable level of service
b. Evaluate approaches based on:
    i. Anticipated effectiveness in alleviating the ten (10) previously identified trunkline deficiencies
    ii. Ability or inability to alleviate any system deficiencies or constraints identified in Task II
    iii. Anticipated costs
    iv. Anticipated quality of life impacts
    v. Anticipated construction impacts
c. Develop alternatives analysis and alternative rankings based on current community values
d. Prepare technical memorandum detailing findings and recommendations

V. Perform Public Engagement & Outreach

Develop and implement a “Public Engagement Strategy” in order to facilitate interaction and input with all interested and relevant stakeholders throughout the duration of the project.

a. Prepare Public Engagement Strategy that includes, at a minimum:
    i. Pre-data collection input for consideration in developing the data collection plan (i.e. public observations and concerns)
    ii. Presentation(s) and outreach to public following data collection and analysis
    iii. Presentation(s) and outreach to public to evaluate alternatives in addressing the effects wet weather flows in the sanitary sewer system
    iv. Ongoing public updates and collaboration, possibly including public workshops with key stakeholders
    v. Presentation(s) of final study alternatives and recommendations

vi. Update project website throughout the project

b. Engage the Public, at a minimum, through the following pre-determined groups throughout the project:
   i. A Working Group consisting of City of Ann Arbor staff, other public agencies, and the Consultant, will review the progress of the project and community engagement multiple times throughout the project
   ii. An Advisory Committee, consisting of one representative from each of approximately nine previously identified geographical areas
   iii. A Technical Oversight Committee consisting of the following:
      - Washtenaw County Water Resources Commissioner
      - Huron River Watershed Council
      - Academic expertise
      - A professional plumber not involved in current program
      - City Staff
   iv. A Focus Group of stakeholders that will provide input on presented materials at key stages in the process. This may also include one-on-one interviews.
   v. Presentations to identified boards, commissions, and City Council
   vi. Citizen at-large groups shall be engaged at City-wide public meeting(s)

c. Prepare support Public Engagement Materials, including any or all of the following elements:
   i. Press releases~~,~~ Email Distribution, Social media, Tree Town Log, City meetings, A2 City News Resident newsletter, WaterMatters Newsletter, Public Meeting Display Case at Larcom City Hall, Educational Materials, Project Web Page, Project Newsletter/Fliers, Direct Mail/Flier Distribution, Online Survey, Presentation at Commission Meetings, Presentations to Groups, Council/Administrator Communications, Working Sessions, Public Meetings, Feedback Forms, Citywide Meetings, Community Workshops
   ii. Consultant may utilize a third party communication vehicle at the discretion of the City

d. Document all outreach and engagement activities in a written, summary document. This includes the documentation of all meetings, one-on-one interviews, phone calls, email exchanges, and any additional public outreach activities.

VI. Perform Project Coordination and Peer Review
   a. Coordinate and communicate data and findings among other related City projects and their teams, including:
      - City of Ann Arbor Stormwater Model Calibration and Analysis Project

- Washtenaw County Water Resources Commissioner Upper Malletts Creek Improvements Opportunities Study
- City of Ann Arbor Footing Drain Disconnection Program

b. Participate in a Peer Review of the project and its findings
    i. The City shall identify a professional peer to review and provide feedback to the City regarding the quality and performance of the Consultant through this project
c. An allowance of two-hundred and fifty (250) hours for these two items is to be utilized in the proposal. The consultant shall outline the project team member(s) who will be utilized, including their anticipated allocation of time in each of these tasks.

Statement of Understanding

Historically, certain areas within Ann Arbor have experienced recurring basement flooding during large wet weather events. After careful analyses and deliberations, including a significant public engagement process, in 2001 the City embarked on a footing drain disconnection program.

Significant progress has been made over the past decade, with a near-100% disconnection rate in two priority areas. However, recent basement flooding has raised concerns about the overall effectiveness of the program. Therefore, it is an appropriate time to evaluate the results achieved to date, determine if any adjustments to the program are needed, and engage the public on the appropriate strategies to successfully complete these objectives.

The objectives of the study are:

- Evaluate, quantify and document the effectiveness of the program on reducing the impacts of wet weather events on the public and private components of the sanitary sewer system.
- Assess the risk of basement backup from the sanitary sewers remaining in original priority areas and identify other areas in the City that may require mitigation of their sanitary basement backup risk.
- As advances in technology and wet weather control methodologies have occurred over the past decade, review, evaluate, and recommend the complete range of method(s) to further reduce these wet weather impacts.
- Engage and involve the public during the entire study in order to facilitate interaction and determine a preferred course of action consistent with community values.
- Develop a successful strategy that achieves buy-in from City staff, residents, other local stakeholders, and elected officials. The finished product will be a plan that allows this issue to be fully-resolved, technically defensible, and easy for the public to comprehend.

The Work Plan provides our proposed strategy for achieving the desired objectives. Our unique approach is highlighted in the figure on the next page.

Overview of Work Plan Approach

The tasks identified in the RFP convey a logical sequence of activities for achieving our objectives. This section provides an overview of the aspects of the project that we believe will be the most challenging and our approach for addressing them.

Public Engagement

Our local familiarity informs us about the most effective public involvement approaches, what works, and what does not. Project Innovations, the leader of our public engagement team, facilitated the public engagement portion of Ann Arbor's WTP Facilities Master Plan and Water Resources Plan. Because of that, we know that public involvement in Ann Arbor is not a façade, but involves truly listening and honoring the thoughts of each individual. Past public involvement success has set the bar high and we need to build on that success with new methodologies, like the latest advances in social media and digital communications, to further engage the public. We also know stakeholders and the general public hold consultants, city staff, the business community, and ultimately its leaders accountable. We know that people in Ann Arbor don't want to be snowed with technical gobbledygook. People in Ann Arbor come prepared, often showing up at meetings with a copy of "the report" in hand and ask pointed questions that need common sense answers. **Our approach to public involvement taps into a variety of cognitive and emotionally engaging techniques to maximize participation through a wide variety of venues so that all voices will be heard and participants will know we listened.**

Public engagement tie-ins are highlighted throughout our proposal with this symbol

Comparison of Flows

It sounds relatively simple to compare flow data from before and after inflow and infiltration (I/I) removal (footing drain disconnections). **However, evaluating the effectiveness of footing drain disconnections can be challenging due to the variability of antecedent moisture wetness conditions**

OUR *UNIQUE* APPROACH ANSWERS KEY QUESTIONS:

HOW effective has the FDD Program been?
WHAT is the risk of basement flooding?
HOW to effectively build trust and consensus with stakeholders?

AT ALL STEPS.

PUBLIC ENGAGEMENT

Intellectual and emotional engagement of stakeholders to work with team to find optimal solutions

Create a safe environment and opportunities for citizens to voice their opinions, respect those opinions in the process, and reflect community values in the final product.

1. Flow Metering

Draft metering plan created to achieve multiple objectives.
(we've done our homework)

2. Evaluate FDD Effectiveness

Multiple approaches (belt & suspenders) to evaluate the results.

3. Calibrate / Validate Model

Rigorously demonstrate the model's predictive capability to instill confidence in technical experts as well as the public & key stakeholders.

4. Evaluate Risk of Basement Backup

We are going to capture all risks of basement backup, not just those in our study.

5. Provide Wet Weather Recommendations

Comprehensive development of alternatives (e.g. green and grey infrastructure) and evaluation using community values.

on the system flows. Wetness conditions can change the flow response by an order of magnitude (i.e. two events with similar rainfall amounts can vary in flow response tenfold just based on antecedent moisture conditions). Antecedent moisture conditions can change rapidly from season to season and even from back-to-back storms over the course of several days or weeks. This makes it very difficult to isolate the impacts of footing drain removals from the constantly changing wetness conditions.

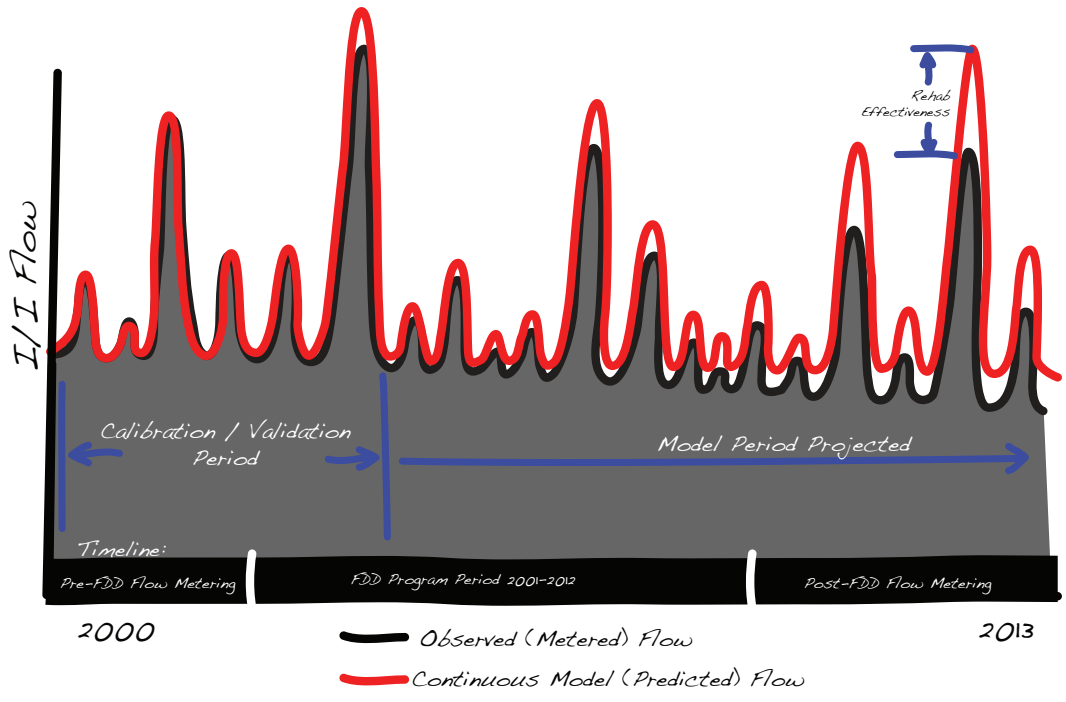
Because of these complexities, we have proposed three techniques to quantify I/I removal, providing a "belt & suspenders" approach to the evaluation. The most robust approach, which we have applied successfully in several similar studies, is to use a continuous model that tracks the wetness condition of the system as climatological conditions change. This technique is show in the figure below. This will allow the City to isolate the impacts of the footing drain disconnections from the flow variations caused by antecedent moisture conditions. Once we isolate the hydrologic response of the footing drain disconnections, we can generate metrics on the effectiveness of the program that are independent of the wetness conditions that occurred during the flow metering. Correctly accounting for antecedent moisture conditions is a critical prerequisite to an effective evaluation of the effectiveness of the City's footing drain disconnection program. **The continuous antecedent moisture model is the most effective technique, but it is also relatively complex. For this reason, we have included a fairly detailed description of this process in the work plan below.**

Risk of basement Backup

Unfortunately, we cannot eliminate the risk of basement backup, since there's always a larger storm that can occur. However, by utilizing a continuous modeling approach, we can estimate the ***frequency of occurrence*** for critical conditions utilizing different alternatives. This allows the project team to make reasonable choices about the risk versus the costs.

Understanding the risk of basement backup requires a thorough understanding of both the system flows (hydrology) and the depth of water in the sewers (hydraulics). An accurate and predictive hydrologic model is essential to generate this understanding. In order to assess risks, the model needs to go beyond simply extrapolating observed flows to a design rainfall event, like a 25-year, 24-hour storm, for a specified wetness condition. It has to accurately address more advanced questions such as:

- What flow rate can the system handle before basements backups occur?
- How often are these peak flows likely to occur?
- What is the likelihood of larger peak flows occurring and what are the impacts on the system?
- What modifications are necessary to the system to handle these peak flows?



Example of I/I Removal Evaluation with a Continuous Model

The continuous model is calibrated to the flows before I/I removal and run forward through the post I/I removal period. Direct comparison between the model flows and observed flows can then be made to assess the effectiveness of the I/I removal

Once these questions are answered, the City can evaluate the risks of basement backup against the costs of the improvements to eliminate them. This will be accomplished with a frequency analysis of peak flows that incorporates the system capacity, the probability of rainfall and the probability of varying wetness conditions. **A risk-based approach that uses a frequency analysis for peak flows is critical for assessing the risk of basement backup from the sanitary sewers.**

Calibration and Validation

Model calibration and validation is necessary to maximize the confidence in the results. Calibration is the process of tuning model parameters so that the model matches system observations, and validation is the process of testing the model to prove that the parameters selected accurately represent the system so that the model can be trusted to make accurate predictions. Calibration and validation of both the hydraulics and hydrology will help to generate more trust and buy-in from residents and key stakeholders.

The best way to bolster this trust and buy-in in the model is to perform a rigorous model validation in which the model's predictive capability is tested using data that was not used to calibrate the model. When the model validates well (i.e. predicts both depths and flows well), it will generate a lot of confidence. **Using a calibrated and rigorously validated model is a critical component of accurately assessing basement flooding risk and providing confidence in the results to the City and the public.**

Introduction

A complete and detailed Work Plan provides the foundation for a successful project. We have carefully evaluated the tasks necessary to achieve the desired objectives in a cost-efficient manner and our Work Plan reflects our unique and thorough approach. All the work items requested in the RFP have been addressed; however, the order of the tasks in this Work Plan have been revised based on the project priorities and order of completion. Specifically, we have started with the Public Engagement Task 5 as it integrates communications throughout the project. To emphasize the importance we attach to engaging the Ann Arbor community, we not only describe the public engagement tasks entirely, we also have identified ideal opportunities for public engagement throughout the technical work plan. We have also reversed the order of Task 2 (Evaluate Effectiveness of Current Footing Drain Disconnection Program) and Task 3 (Update, Calibrate, and Validate Existing Sanitary Sewer System Model) to facilitate the Work Plan discussion.

We have provided a table at the end of the work plan that defines resources (for both consultant and city staff) needed for each task (title and individual hours). In addition, a timeline schedule depicting the sequence and duration of tasks is provided at the end of the work plan.

A. Perform Public Engagement & Outreach (Task 5 from RFP)

The key to any successful public planning process must affirm these three questions:

1. Did the process create a safe space for citizens to raise issues?
2. Did the process create sufficient opportunities to be heard?

3. Did the citizens believe that their opinions were respected and in some sense, actually used by the project team?
4. Can the Public Engagement subconsultant to effectively convert our highly-technical output to a format that can be easily digested by public stakeholders and used in a productive manner.

Our philosophy is to emotionally and intellectually engage the public early and often. Successful public engagement builds trust on the two levels: trust in the project team's technical competence and in the project team's willingness to truly listen to the community. A well publicized timeline, clearly established milestones, and

easily accessible digital records offer some transparency. Competently facilitated meetings and fruitful conversations will develop emotional connections between the project team and the community. The result? An acclaimed public engagement process.

The City of Ann Arbor (City) has a rich and progressive history of engaging its citizens in the challenge of eliminating basement flooding. The 1999 SSO Prevention Advisory Task Force (Task Force) included homeowners in the definition of the scope of work and identification of solutions to basement flooding. The Task Force solicited broader feedback from the public, which resulted in the solidification of the project's core values: protect Ann Arbor's natural features and eliminate long term impacts to the environment. Then, as the footing drain disconnection project unfolded, the engagement team focused its efforts on establishing two way communications with the impacted (priority) neighborhoods, e.g. Bromley, Orchard Hills, Dartmoor, Glen Leven, and Morehead. The communications process included neighborhood meetings, awareness and educational efforts, establishing a web-site, surveys, etc. As for the effectiveness of the communications effort, a Five Year Post-Installation Survey showed that a majority of the homeowners were satisfied with the footing drain disconnection project, although a significant minority raised concerns about both equipment maintenance and the overall benefit of the project.

Despite its history of success, unlike so many other Michigan institutions, the City has not deluded itself into believing history guarantees the future. For this Wet Weather Evaluation Project, we assume that the City seeks to not only replicate the success of its prior public engagement effort, but to also improve it. Some questions might include: Can we increase accessibility by leveraging the most current social media tools? Can we increase the ratio of "message transmitted:message received?" Can we create a powerful group of citizen champions to validate the study's conclusions?

To answer these questions and to develop and implement a Public Engagement Strategy that facilitates interaction and input from Ann Arbor stakeholders during and throughout the project, OHM is partnering with Project Innovations, Inc., a Farmington Hills based consulting firm that not only specializes in public engagement but also has the talent and experience to build a high powered collaborative Advisory Committee. How do you create and facilitate a process where the more people you involve, the more value you create? How do you uncover the hidden emotional issues and address them? The Project Innovations team has the answer in "unrational leadership," developed through twenty years of designing and facilitating community involvement processes. Unrational leadership integrates emotions and logic. To quote Fyodor Dostoevsky: "If everything on earth was rational, nothing would ever change." To this end, Charlie Fleetham, the founder and President of Project Innovations, and author of "The Search for Unrational Leadership," will be the lead facilitator. Lori Byron, the founder of Famous in Your Field, will take the lead on establishing an accessible digital environment as well as creating top-flight public engagement materials. Lori has more than 20 years experience in creating awareness and communicating clear messages to achieve desired outcomes. Having worked in regulatory and engineering industries for more than a decade, she is highly skilled at conveying technical information to a non-technical audience, and well-versed in using the latest digital communication tools.

1. Prepare Public Engagement Strategy

First and foremost, we propose integrating a strong digital component to the Public Engagement Program. In addition to communication channels used in previous footing drain projects, such as printed brochures, project newsletters and direct mail, we will incorporate digital communication channels such as short videos, social media, SMS text messaging, Livestreaming and online meetings. Incorporating tools and modes of communication that people already use in their personal and professional lives will increase participation, allow for more robust dialogue and be more cost effective and green, as well. Key tasks in this effort include:

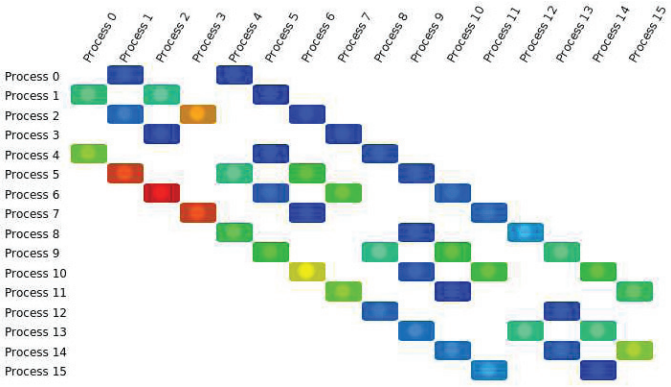
a. Situation Analysis: Identify key issues the Public Engagement Program will address.

b. Objectives: Clarify objectives of the public engagement efforts in support of the City's objectives.

c. Develop Message Model: Identify the five to seven key messages that must be communicated to build trust in the project team's competence.

d. Target Audience Lists: Develop an expanded list of stakeholders, including the RFQ's listed groups and appropriate press contacts (on-line and print, newsletters, business, local, and broadcast), and other influencers.

e. Engagement Matrix: Create a matrix to be used to determine which stakeholder groups will be targeted at each communication point.



f. Establish a shared project management site for the Public Engagement Program. This could be set up using a tool like Asana or Basecamp and would provide a central site, accessible from any web-enabled device for all project team members (including City Staff, Working Group, Advisory Committee, Technical Oversight Committee and Focus Group, if the City wished.)

g. Develop a social media strategy.

h. Using the overall project timeline and information gleaned from the aforementioned tasks, create a detailed communication plan, with milestones for each element; for example, collecting input (public observations and concerns) for the data collection plan.

i. Our Community FDD expert will be actively involved in the development of the Public Engagement Strategy through review of key strategy documents and active participation in key public meetings.

2. Engage the Public throughout the Project

PUBLIC ENGAGEMENT

The City's objective is to engage a wide variety of groups, including a Project Working Group, consisting of City of Ann Arbor staff, other public agencies, and the Consultant; an Advisory Committee, consisting of nine representatives, a Technical Oversight Committee; stakeholders that will provide input on presented material at key stages in the process, and Citizen-at-large groups that will be engaged at City-wide public meetings. Our strategy in accomplishing this task is two-fold: deliver excellent meeting facilitation and build a high performing Advisory Committee.

Our preliminary estimates of the frequency and number of formal meetings that will require facilitation are as follows:

- Advisory Committee – 8 to 10 meetings, interval based on project progress.
- Focus Groups – 4 to 6 meetings, interval based on project progress.
- Presentations to City Council, Boards and Commissions – 3 to 4.
- Note: In addition to these meetings, we estimate up to 30 one-on-one interviews may be required throughout the project to define agenda topics and surface critical issues.

The Advisory Committee will play a pivotal role in the project. The Advisory Committee must feel connected to the Project Working Group and must endorse the project results. If the Advisory Committee feels disenfranchised from the Project Working Group or feels that it is a merely a rubber stamp for the technical experts, the public engagement effort will not succeed. Therefore, our strategy is to develop the Advisory Committee into a high performing team. Key tasks include:

a. Interview committee members to identify desired/expected mode of operating within the Advisory Committee.

b. Foster/strengthen working relationships between committee members by cultivating mutual trust and confidence through routine team building exercises.

c. Confirm roles and responsibilities of committee members, including leadership responsibilities as appropriate.

d. Identify and provide appropriate technical education for committee members. Translating difficult and complex technical language will be a critical success factor in creating a high powered Advisory Committee.

e. Determine communication processes and how committee will surface problems early in the project cycle, make decisions, and resolve issues between committee members.

f. Creating a Partnering Agreement will serve as one of our key, continuously reviewed, benchmarks to ensure we're all rowing in the same direction to make sure the Advisory Committee ad the Project Working Group start off on the right foot.

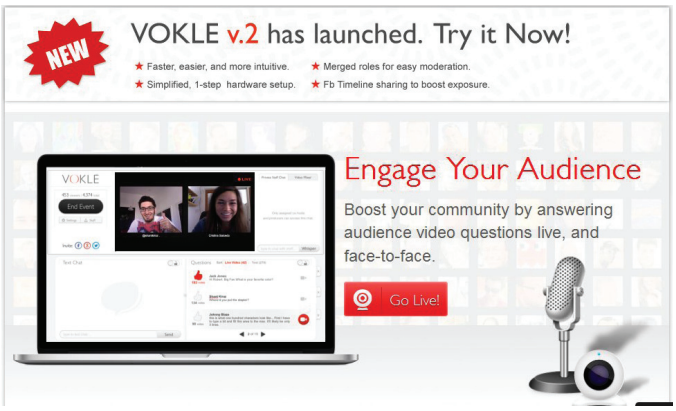
g. We will design and facilitate a half day partnering session between the Advisory Committee and the Project Working Group to confirm goals, working relationships, communication patterns and decision-making processes. The meeting will result in a formal, non-contractual, agreement.

The strategy for delivering excellent meeting facilitation is to follow these meeting design specifications:

1. Agendas that provide relevant information.
2. Meeting processes that create a safe space for citizens to express their concerns.
3. Creative exercises that give citizens an opportunity to understand and solve problems in the moment.
4. A steady and confident hand in the front of the room that knows when to let people talk and when to move on.
5. Simple and easy to digest meeting documentation.

3. Prepare Public Engagement Materials

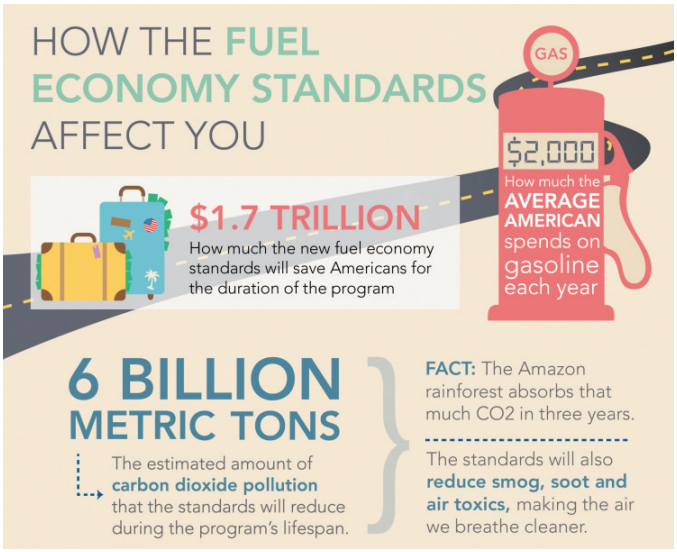
Our team is ready to produce and deliver the presentation material listed in the RFQ, including press kits and fact sheets, press releases, Q & A pieces or tip sheets on the project, Tree Town Log, A2 City News Resident Newsletter, WaterMatters Newsletter, public meetings display case at Larcom City Hall, educational materials, project newsletter/fliers, direct mail/flier distribution, online surveys, and feedback forms. After assent from



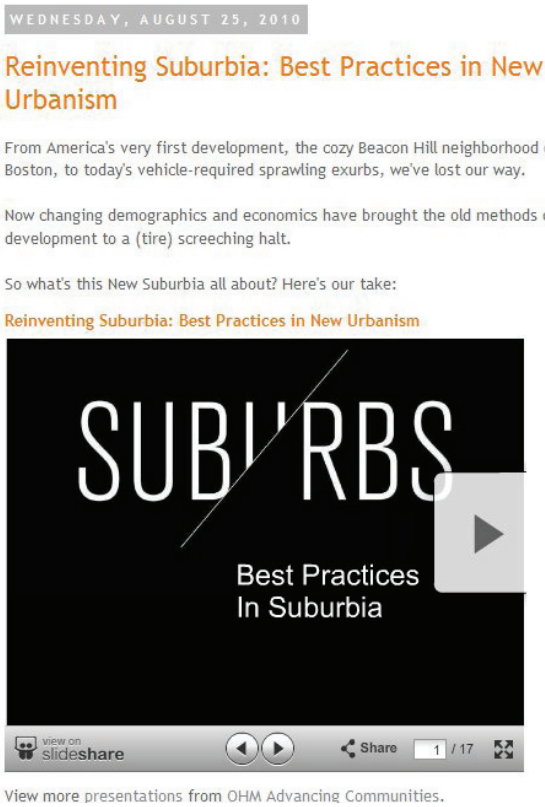
City Staff and project stakeholders, we propose to increase the level of engagement with the public by combining traditional communication methods with digital channels. Here are a few examples:

- In addition to holding in person public meetings to solicit input and provide updates, **we would use a real-time web livestreaming tool**, such as LiveStream, Ustream or Vokle to increase the level of interaction. This allows stakeholders who can't be physically present to participate in the meeting via the web, including commenting and asking questions. One of the Public Engagement professionals would monitor the stream's feed (the comments portion) to ensure that all input in collected, and that the conversation remains focused on the topic and respectful.
- In addition to written communication about the project, **we would use a multi-user online video meeting tool like Google Hangout to capture project update presentations**, which are then stored on YouTube, allowing stakeholders to access information as desired. These can be open to the public, or limited to an invitation-only group.
- In addition to fliers, direct mail and website updates, **we would use social media tools like Facebook and Twitter and SMS (text) messaging** to provide brief information and links, driving people to the City's project web page for more detailed information. This allows for the repetition, immediacy and multiple communication channels that facilitate greater engagement.
- **Create an interactive webpage for the project using a tool like Wordpress** that would allow for Facebook-style threaded commenting, calendars and embedded video.

- In addition to standard engineering schematics, we would use infographics (data displayed visually) to convey information in an easy-to-understand manner.



- Use audio visual presentation tools like Slideshare or Google Presentation to create informative slideshows that can be easily embedded on stakeholder websites to explain elements of the project, how to provide input or action to be taken.



4. Document All Outreach & Engagement Activities in a Summary Document

As a part of the final engagement report, OHM will include a separate report that documents outreach activities. A preliminary outline of this report is shown below:

I. Executive Summary
II. Public Engagement Activities/Events/Publications
III. Advisory Committee Members/Processes/ Recommendations
IV. Learnings from Social Media Outreach
V. Appendices
   a. Participants
   b. Meeting Summaries
   c. Survey Results

Information Needed from the City:

Public engagement materials used in previous FDD project

Task A Deliverables:

1. Public Engagement Strategy
   a. Situation Analysis
   b. Communication Objectives
   c. Message Model
   d. Target Audience Lists
   e. Engagement Matrix
   f. Share Project Management site
   g. Social Media Strategy
   h. Communication Plan with Milestones

2. Plan, Facilitate, Document Meetings
   a. Advisory Committee (8-10)
   b. Focus Groups (4-6)
   c. Presentations to City Council, Commissions, Boards, etc. (5-7)
   d. Interviews (30)

3. Prepare Public Engagement Materials
   a. Project information kits for stakeholders and media, social media profiles
   b. Project overview engagement materials (presentation, informational handout, and press release)
   c. Project website wireframe, content plan and launched site
   d. Survey instrument created

4. Public Engagement Closing Report

We propose to expedite this project by ensuring that public engagement professionals receive and review all public engagement materials used in previous FDD project, and by conducting brief interviews with City staff member(s) regarding the most effective and most challenging public engagement issues from recent similar projects. This allows our team to build on past successes without recreating similar items and focus more of our efforts on advanced outreach programs and tools.

B. Perform System Flow Monitoring (Task 1 from RFP)

OHM has thoroughly reviewed Ann Arbor's existing system studies and flow metering strategies. **Our proposed approach for the 2013 flow monitoring is based on our review of the collection system and existing wet weather responses (we've done our homework).** As such, we are confident that our monitoring strategy will provide the most direct and cost-efficient path towards effective FDD program evaluation. At the project start meeting we anticipate going over our reasoning in more detail and obtaining input on the programs. The City may also wish to involve the existing consultant, CDM, in this task to ensure that we're benefitting from their past experience.

OHM will work with our sub consultant, Martin Controls Services (MCS), to obtain appropriate data, including field evaluations, to select suitable metering sites. This task will involve a review of system mapping to assist in proper site selection to meet the goals of system-wide calibration of the model and measuring effectiveness of footing drain removals. The flow monitoring plan from the 2001 Sanitary Sewer Overflow Prevention Study Report (2001 Study) will be duplicated as part of this task. The 2007 Citywide Sanitary Sewer Hydraulic Model and GIS Data Collection Project Report (2007 Study) metering locations also provide a reasonable basis for site selection of additional metering.

Share metering sites with City staff and Advisor Committee. Show locations on project website.

For the selected metering sites, the same metering manholes will be used for this study as were used in the 2001 and 2007 reports in an effort to maintain consistency between metering periods and to ensure that the same tributary area is being measured. A specific metering site will only be relocated if adverse hydraulic conditions are observed at the metering site during the pre-installation field evaluations. Once the metering sites have been selected, the OHM/MCS team will perform installation, maintenance, data downloading and removal for flow meters and rain gauges. The metering installations for the project will be coordinated directly with the City of Ann Arbor Stormwater Model Calibration and Analysis Project.

We propose the following flow monitoring strategy in order to measure the effectiveness of the footing drain disconnection program, evaluate the need for the trunk line deficiencies, and update the model calibration based on these system changes. It is important to note that Developer Mitigated Parcels (DMP) footing drain disconnections (FDDs) were performed in areas other than the five (5) priority districts. Based on a review of the data, it appears that approximately 200 of these DMP FDDs were completed in the northwest area of the City and approximately 200 were completed in the southerly portion of the City. While the number of DMP FDDs is significant, these parcels are spread out over large areas and across multiple meter districts. We do not expect these FDDs to have a strong impact on the aggregated flows in the system. Therefore, we don't recommend detailed metering for these portions of the system; However, OHM will use the InfoSWMM model and the results from the FDD effectiveness analysis to estimate the flow removal rates resulting from the DMP FDDs such that these disconnected parcels can be reflected in the updated model.

1. **Direct Metering to Evaluate Effectiveness of Footing Drain Disconnections**
   The recommended metering to evaluate the effectiveness of the FDD program will replicate the 2001 Study, which measures outflow from each of the five (5) FDD Districts. The replication of the 2001 study will involve installation of seven (7) flow meters, nineteen (19) peak level recording devices, and five (5) rain gauges. The City has indicated that forty (40) sump pump monitors are still deployed throughout the priority districts and that this data would be available for use in this study. OHM will use

this data to replicate the 2001 Study. The locations of these measurement devices will be consistent with the locations listed in Tables E-1, E-2, and E-3 from the RFP.

2. **Metering to Evaluate Regional Impacts of Footing Drain Disconnections**
   In addition to the meters from the 2001 Study, we recommend three (3) additional trunk sewer meters at locations downstream of the five (5) target FDD districts to provide aggregated measurement of the flows downstream of the districts. The effect of the flow reductions may be diminished further downstream due to attenuation effects and downstream inputs. This metering will help to ensure that the model is accurately quantifying those effects.

3. **Metering to Evaluate Ten (10) Trunk Line Deficiencies**
   Upon our review of the sewer trunk line deficiencies listed in the RFP, it appears that eight (8) of these locations were identified as having capacity limitations and that the City desired to examine these areas with the updated model after post-FDD system monitoring was performed. The other two (2) locations are downstream of Skyline High School, where portions of the sewer have been upgraded. Because of the high capital costs of these projects and the apparent change in flow conditions in the system (due to new users and footing drain disconnections), the City desires to confirm the post-FDD flows to these priority areas.

   Our assessment of the metering needs for the ten (10) deficiencies yielded a list of additional recommended flow meters (as illustrated in the figure on the next page), as well as using some of the same meter locations from the 2007 study. A more detailed description of the strategy for each identified trunk line deficiency is included in the Appendix under the heading ***Trunk Line Deficiency Metering Strategy.*** The table below provides a summary of trunk line metering.

   Based on our review of the ten (10) sites listed above, we recommend installing nine (9) meters to evaluate the deficiencies listed in Table A of the RFP. Actual meter locations will be confirmed as part of the meetings with City staff.

4. **Metering to Evaluate Areas Unchanged Since 2003 for Control Districts**
   A useful tool to measure the effectiveness of the FDD program is to compare the flows from the FDD Districts to flows from control districts in which no I/I removal program occurred (this methodology is described in more detail under Task C). In order to perform this analysis, it will be necessary to install flow monitoring equipment for metering districts that did not change at all since 2003. This effort will include the installation of two (2) flow meters on trunk sewers within districts that are relatively unchanged since 2003. The locations will be selected in close proximity to the three (3) Citywide rain gauge locations or the five (5) FDD District rain gauges such that additional

Summary of Metering for Trunk Line Deficiencies

No.	Name	Meters Recommended	Description
a.	UT-SN-08-12 High Level Relief Sewer/ UT-SN-01-20 Liberty-Washington Relief (Phase II)	A_1	Near the intersection of Third Street and West Washington Street
b.	UT-SN-91-15 Huron West Park (Phase II)/ UT-SN-91-16 Huron West Park (Phase III)	B_1	Near the intersection of Armada Street and West Huron Street
c.	UT-SN-01-19 Liberty-Washington Relief (Phase I)	C_1/C_2	Near the intersection of First Street and Miller Avenue
d.	UT-SN-01-21 Miller West Park Sanitary – Low Level	D_1	Near the intersection of Miller Avenue and Maple Ridge Street
e.	UT-SN-08-16 North main Submain Relief Sanitary Sewer – AARR to M-14	1A	We recommend additional metering at the 1A metering site from the 2007 Study.
f.	UT-SN-08-19 North Main Submain Relief Sanitary Sewer – Bird Road past Warring	E_1	This site is well upstream of meter 1B from the 2007 Study
g.	UT-SN-01-25 Pittsfield Valley Submain Relief	9B	This site is located along Esch Avenue just north of Eisenhower Parkway
h.	UT-SN-93-26 Pittsfield Valley Trunkline Relief Sewer	9C	This site is located southeast of the Eisenhower Parkway and Stone School intersection

rainfall monitoring is not needed for this analysis. For this effort, we preliminarily recommend the North Main (meter 1A) and Traver Creek (meter 3B) meter districts, as these areas do not appear to have undergone any significant flow removal projects since 2003.

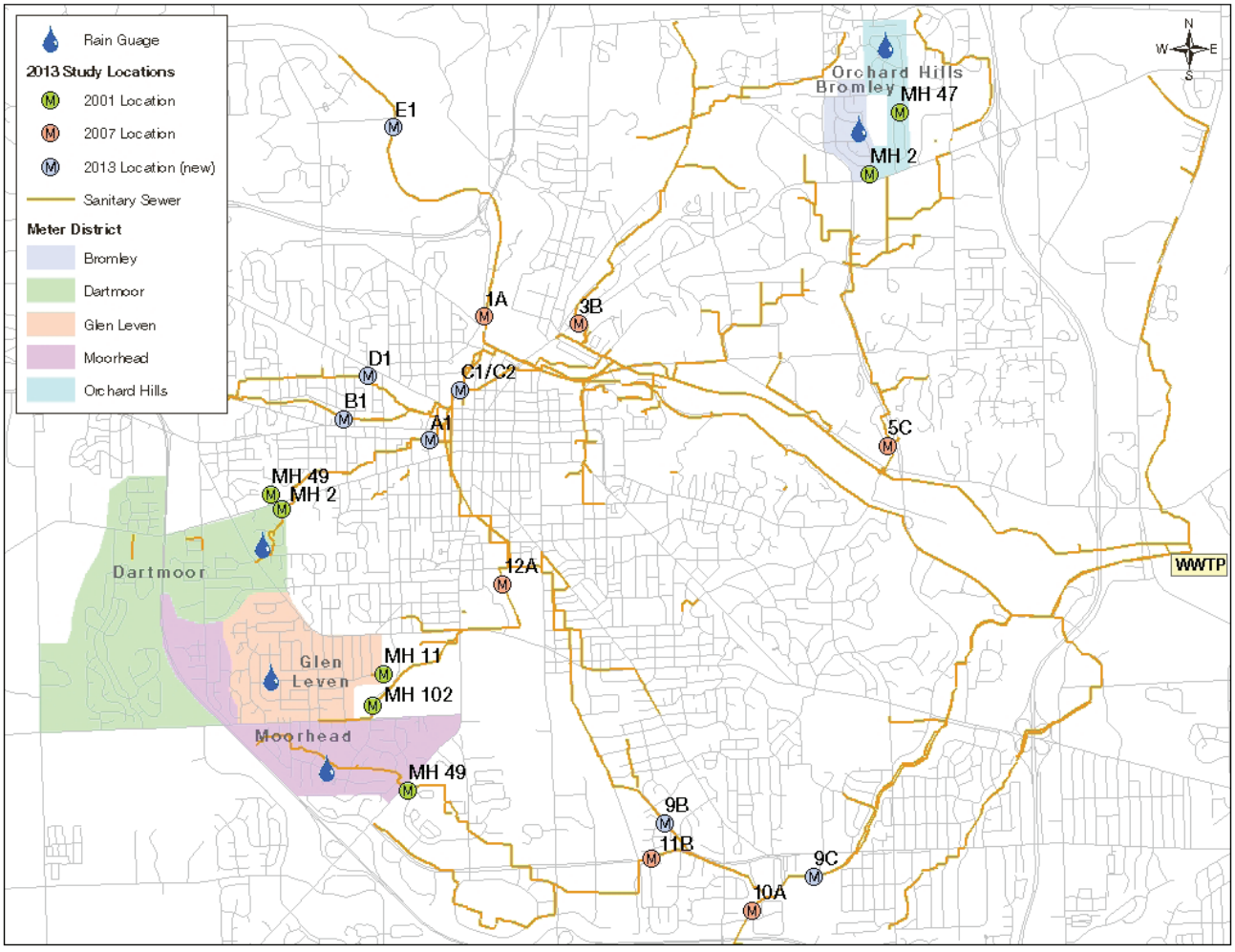
5. **Metering to Evaluate Areas with Significant Change Since 2003**

We recommend obtaining flow meter data from areas with significant change to evaluate the flow changes that may have occurred since 2003 due to growth or other system improvements that have occurred since 2003. We will work with the City to identify these areas and have included an allowance of one (1) meter for this, because it is anticipated that extensive metering is already available from Scio Township, representing a very significant area of change.

The figure below depicts the recommended locations for metering on a system map. The table on the following page contains a detailed matrix of the proposed metering sites. The matrix summarizes the meter locations by purpose. Whenever possible, metering locations were selected such that the meter could be used for multiple purposes in an effort to minimize metering costs.

We have assumed 3 months of metering during the spring period (March 1st - June 1st) for the nine (9) meters used to evaluate the Trunk Line deficiencies (meters 11-19). We have assumed 6 months of metering (March 1st - September 1st) for all other meter locations. If the metering period does not produce enough good observations for wet weather flow conditions, the City can elect to re-deploy the meters and rain gauges for the fall of 2013 or spring of 2014 to collect additional observations of wet weather flow conditions. If needed, we will prepare a cost for additional metering at that time.

Proposed Meter Locations



Meter Matrix by Meter Purpose

Meter Matrix - by Meter Purpose

Meter locations are depicted on Figure 1

Shaded Yellow Cells Indicates Primary Meter Purpose

Meter No.	Meter Location	Pipe Diameter (inches)	1. Direct Metering to Evaluate Effectiveness of Footing Drain Disconnections (2001 Study Replication)	2. Metering to Evaluate Regional Impacts of Footing Drain Disconnections	3. Metering to Evaluate Ten (10) Trunk Line Deficiencies	4. Metering to Evaluate Areas Unchanged Since 2003 for Control Districts	5. Metering to Evaluate Growth Areas Since 2003
1	Orchard Hills (Manhole 47 from Table E-1 in RFP)	10	●				
2	Bromley (Manhole 2 from Table E-1 in RFP; Meter also used to monitor project UT-SN-01-20)	10	●		●		
3	Dartmoor (Manhole 2 from Table E-1 in RFP)	15	●				
4	Glen Leven 1 (Manhole 11 from Table E-1 in RFP)	15	●				
5	Glen Leven 2 (Manhole 102 from Table E-1 in RFP)	18	●				
6	Morehead (Manhole 49 from Table E-1 in RFP)	18	●				
7	Liberty Washington (Manhole 49 from Table E-1 in RFP; Meter also used to monitor project UT-SN-01-20)	12	●		●		
8	Meter 12A (Location from 2007 Study)	18		●			
9	Meter 11B (Location from 2007 Study)	30		●			
10	Meter 5C (Location from 2007 Study)	30		●			
11	Meter A_1 (New meter location - monitors project UT-SN-08-12 & Project UT-SN-01-20)	24			●		
12	Meter B_1 (New meter location - monitors project UT-SN-91-15 & UT-SN-91-16)	12			●		
13	Meter C_1 (New meter location - monitors project UT-SN-01-19)	20			●		
14	Meter C_2 (New meter location - monitors project UT-SN-01-19)	24			●		
15	Meter D_1 (New meter location - monitors project UT-SN-01-21)	12			●		
16	Meter 1A (Location from 2007 Study; monitors project UT-SN-08-16)	15			●	●	
17	Meter E_1 (New meter location - monitors project UT-SN-08-19)	15			●		
18	Meter 9B (Location from 2007 study - monitors project UT-SN-01-25)	24		●	●		
19	Meter 9C (Location from 2007 study - monitors project UT-SN-93-26)	36		●	●		
20	Meter 10A (Location from 2007 study - monitors Pittsfield Township flows)	21					●
21	Meter 3B (Location from 2007 study)	30				●	

Metering Data Already Available

A	Scio Township Metering Data - Jackson Road and WISD Districts
B	City of Ann Arbor WWTP Data

The OHM/MCS team will perform bi-weekly site visits for meter maintenance and data download at the proposed metering sites. OHM will perform data QA/QC of the flow metering and rain gauge data on a bi-weekly basis. Once the monitoring period is complete, OHM will deliver the flow and rainfall data. Specific work efforts for this task include the following:

A. Perform pre-installation site reconnaissance of flow metering sites.

B. Prepare and submit a Flow Monitoring Plan (tech memo). This document will provide the metering and rain gauge locations and the basis for site selections. These site selections will include meters at the downstream end of the five (5) FDD areas as well as city-wide metering updates necessary to perform overall model calibration updates. The metering plans will also include any additional metering sites needed to assess the identified trunk line deficiencies. Seek feedback from City staff and others as appropriate and adjust the plan as necessary.

C. Install flow meters and rain gauges at the specified sites listed in the Flow Monitoring Plan.

D. Perform preventative maintenance on the meters and rain gauges on a bi-weekly basis. For this proposal, we have assumed that 50 percent of the site visits would require a confined-space entry to perform preventative maintenance on the meter.

E. Use a mass flow balance procedure to identify problems with the metering equipment.

F. Perform a diurnal characteristics analysis between the 2003 data and 2013 data to evaluate consistency of meter performance between monitoring periods and to verify that there haven't been any significant changes to dry weather flows that would otherwise corrupt the pre- vs. post-rehabilitation comparison.

G. Perform ongoing QA/QC throughout the metering period and notify MCS and the City of any preventative maintenance issues.

H. Use City rain gauge data to assist in analysis, as needed.

I. Submit final data (compatible with telog) with flow monitoring tech memo to City for review.

J. Coordinate with MCS for redundant monitoring locations (rainfall) with storm sewer modeling project.

Provide regular updates on project website and social media outlets. Include rain event summaries with peak flow statistics for select locations.

K. Upload flow hydrograph plots to project web site on bi-weekly basis.

Information Needed from the City:

- Calibrated radar rainfall data
- City rainfall data
- Historical hourly WWTP flow data since 1999
- Any rainfall data available from WWTP

Task B Deliverables

- Flow Monitoring Plan
- Flow Monitoring
- Compiled Flow Meter Data with Summary Memorandum

C. Evaluate Effectiveness of Current Footing Drain Disconnection Program (Task 3 from RFP)

Our Public Engagement effort will be used to collect specific information from property owners to establish a link between observed conditions and those studied as described in Task A.

Evaluating the effectiveness of footing drain disconnections can be challenging due to the variability of antecedent moisture conditions on the system flows. These wetness conditions can change the flow response by an order of magnitude. A detailed overview of the challenges of antecedent moisture effects, and why they are critical in understanding the impacts of the City's FDD program, is outlined in this section.

Develop online survey to collect the latest information on basement backups and overall system performance, and Geocode results.

Proposed Work Plan

The continuous antecedent moisture model is the most effective technique, but it is also relatively complex. For this reason, we have included a fairly detailed description of this process in the work plan below. We have successfully applied this process to over 30 systems and hundreds of sewersheds around the Country and found it to provide the most valuable insights into system performance.

We will evaluate the FDD program effectiveness using three different methodologies because of the complexities introduced by varying antecedent moisture effects. These three methodoliges are:

1. **Scatter Plots**
2. **Control Districts**
3. **Continuous Model**

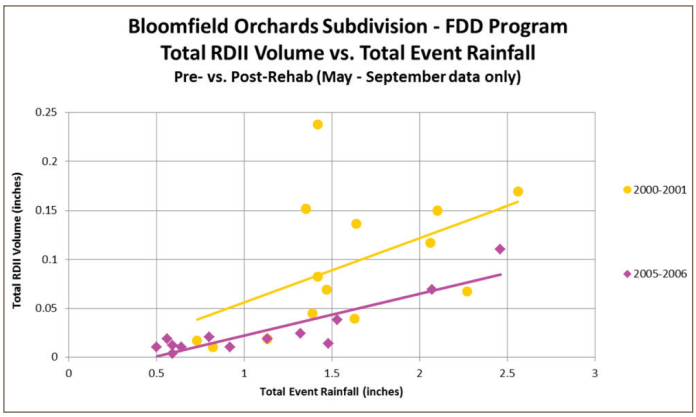
These methodologies are explained in more detail below. **Having three methodologies provides multiple approaches (belt & suspenders) to evaluating FDD effectiveness, bolstering confidence in the results.** This will be especially important, considering the complexity of I/I and the confounding impacts of antecedent moisture effects.

Each of these tools can be used to assess the effectiveness of footing drain removals. We will perform all three methods for each district to develop a robust evaluation of the FDD program. A technical description of each methodology is included in the following paragraphs. The specific work items and deliverables for Task C are described in the section following this methodology overview.

Scatter Plot Methodology

This is the traditional methodology used to evaluate I/I removal. A system metric such as peak flow or I/I volume is plotted against the storm rainfall volume for both pre- and post-rehabilitation conditions. Curves are fit to both the pre- and post-rehabilitation data points and the I/I reduction is estimated by the difference between the curves. Multiple regression analysis can be performed to determine whether the I/I removal is statistically significant. Sometimes it can be difficult to discern the difference between the curves due to varying wetness conditions, so it is common to segregate the analysis by growth season and dormant season.

Widely varying antecedent moisture effects can make it difficult to discern I/I removal in typical scatter plots, even for systems that have undergone significant rehabilitation. The following figure illustrates a scatter plot of rainfall versus observed I/I volume for the Auburn Hills Bloomfield-Orchards Subdivision, which had 600 footing drains removed (99% of houses within the metered district) between 2001 and 2005, with about 50% of the I/I removed from the district. The figure shows that the pre- and post-removal data is widely scattered due to varying antecedent moisture effects for each storm, making it challenging to quantify the effectiveness. A multiple regression analysis was used to verify that the I/I removal due to the FDD program was statistically significant, controlling for rainfall depth. While this methodology can demonstrate the impacts of an FDD program at the meter district level, the use of techniques such as control districts and the AM model will provide more confidence in I/I removal as measured further downstream or along interceptor sewers representing a larger share of the service area.



Example of Scatter Plot for FDD Program Area

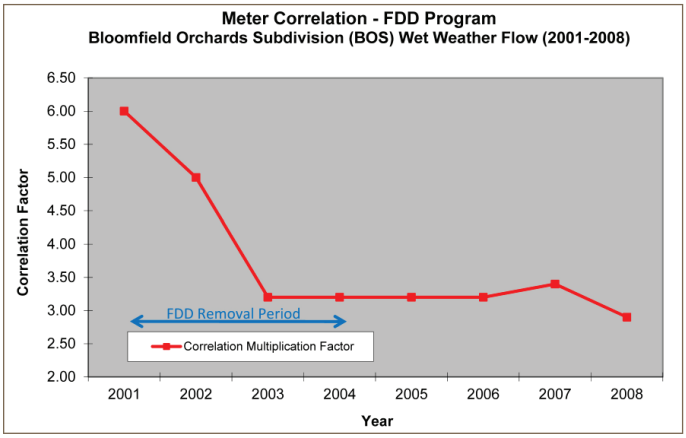
Control District Methodology

Control districts are a simple way to quantify flow removals under varying wetness conditions. A control district which had no I/I removed is used as a benchmark to evaluate the flow reduction in districts where I/I removal has been performed. Comparisons are made between the control district flows and the I/I removal district flows for the same storms, so that the I/I removal can be evaluated independent of varying wetness conditions. This can be an effective technique to quantify I/I removal effectiveness. However, the methodology is not predictive because it relies on past flow observations, and therefore additional tools must be used to model the system and assess future basement flooding risks.

Our experience using control district comparisons in the Auburn Hills Bloomfield-Orchards subdivision demonstrates the usefulness of this tool. The Auburn Hills Bloomfield-Orchards Subdivision (FDD district) was compared to a control district that had no I/I removal projects for this same period.

For this analysis, a Correlation Multiplication Factor (CMF) was developed to correlate the flows between the two meter districts. The figure below illustrates the CMF for the Bloomfield-Orchards Subdivision meter correlation. This figure demonstrates that there was a significant reduction in the wet weather response from the Bloomfield-Orchards system as compared to the response from the control district. The period of flow reduction also correlates to the period of known footing drain disconnections.

While this analysis illustrated a reduction in flows due to FDD, it is difficult to quantify the magnitude of RDII volume and peak flow removed using this method. For this reason, the use of a continuous model was needed to quantify the amount of I/I removal.



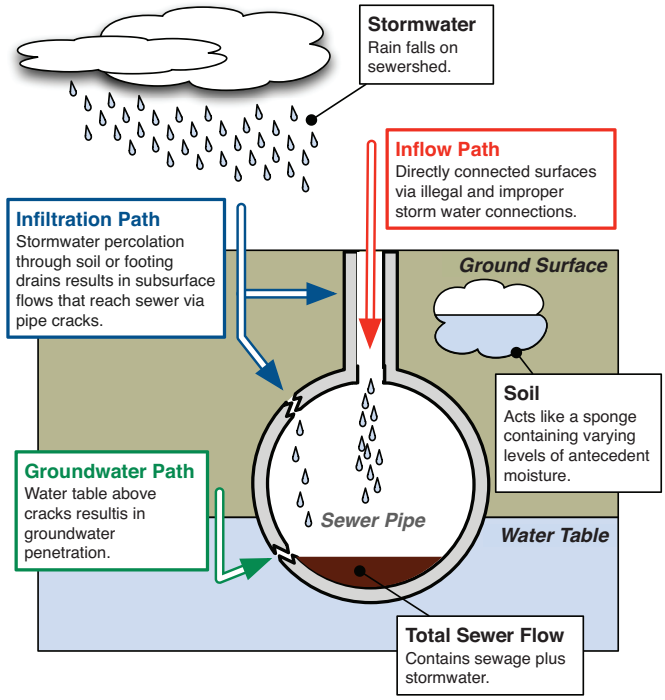
Example Meter Correlation to Control District

The meter correlation to a control district illustrates a reduction in flows due to FDD within the BOS meter district between 2001 and 2005.

Continuous Model (Antecedent Moisture Model) Methodology

A continuous model that simulates the impacts of antecedent moisture effects can be used to isolate the impacts of I/I removal. The continuous model is calibrated and validated to a period before I/I removal and run forward through the post I/I removal period. Direct comparisons between the model and the metered flows after I/I removal can be made to quantify the I/I removal, because the model represents how the system would have performed without the I/I removal. The process is very robust because it not only quantifies I/I removal effectiveness, but also results in a predictive model that can be used to assess risks and understand the potential for future basement flooding.

Antecedent moisture conditions can change the flow response by an order of magnitude (i.e. two events with similar rainfall amounts can vary in flow response sometimes by tenfold or more just based on antecedent moisture conditions), as shown in the figure below. This is especially true for footing drains, which are highly sensitive to antecedent moisture conditions. For this reason, our approach to evaluating the system is focused on understanding antecedent moisture effects so that the impacts of the FDD program can be isolated and evaluated.



I/I Paths

I/I response is highly affected by the wetness conditions preceding storms due, especially for footing drains due to the infiltration and groundwater flows paths.

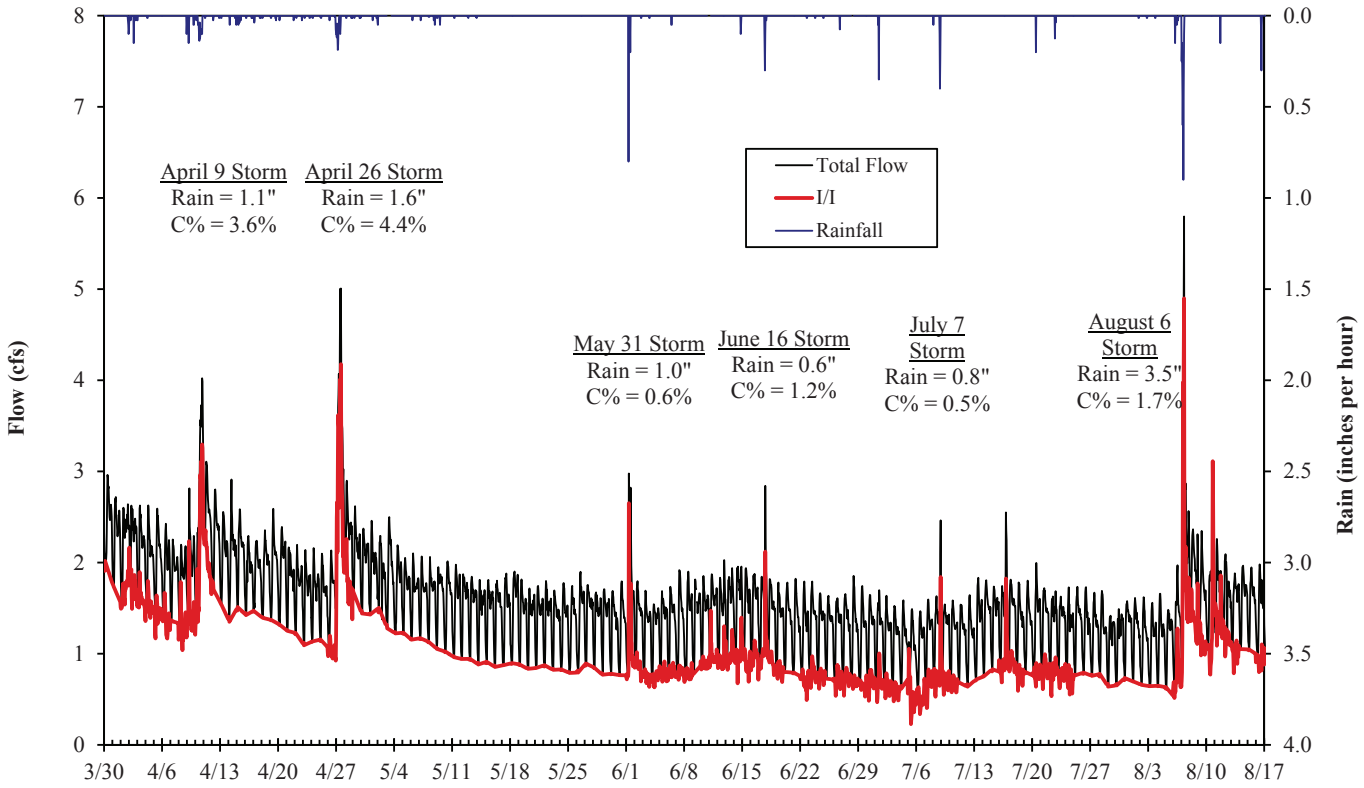
Proposed Work Plan

The continuous antecedent moisture model is the most effective technique, but it is also relatively complex. For this reason, we have included a fairly detailed description of this process in the work plan below. We have successfully applied this process to over 30 systems and hundreds of sewersheds around the Country and found it to provide the most valuable insights into system performance.

An example of the impacts of antecedent moisture effects is illustrated in the figure below, which shows flow metering data for a 6-month period from spring through summer. Note that the capture coefficients (percentage of rainfall captured in the sanitary sewer) are five to eight times higher in the spring versus the summer. Also note that the peak observed flow for the August 6 storm is about the same as the April 26 storm, despite the fact that about twice as much rainfall occurred on August 6. These effects are the result of varying antecedent moisture conditions.

An examination of the flow data from the Ann Arbor WWTP contained in the 2001 Sanitary Sewer Overflow Prevention Study shows how preceding wetness conditions significantly impact the I/I flow from the City. Table G1 from the 2001 report (on the following page) shows the I/I volume measured at the WWTP for numerous rain events. We have added the capture coefficient for each storm in the right column. In the growing season, the capture coefficient varies from 0.8% to 6.3%, or an eight-fold variation. In the dormant season, the capture coefficient varies from 0.7% to 16.9%, or a 24-fold variation. Also, the 4/27/99 storm has an RDII volume that is about 6 times the 5/19/99 storm, despite the fact that the storms have a similar rainfall volume and only occur a few weeks apart. These observations are a common occurrence in collection systems due to the different wetness conditions preceding each storm.

Our strategy to apply the Antecedent Moisture Model to the City's flow meter data will ensure that we can quantify this dynamic and provide relevant and defensible conclusions.



Example of Antecedent Moisture Effects

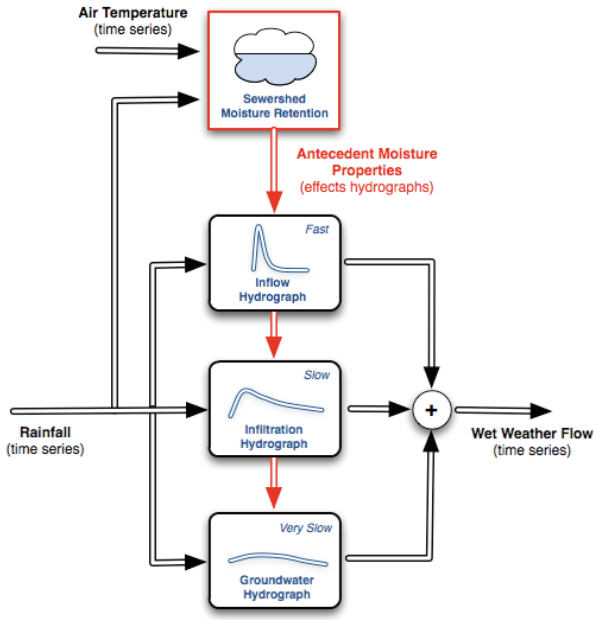
The May-July storms have a similar rainfall volume and higher rainfall intensities than the April storms, yet produced much smaller I/I volumes and peaks. The August storm has three times the rain as the April storms, yet produces a similar peak flow and volume.

Table G-1 Rainfall Events and RDI/I Volumes

Date	Rainfall (in.)	RDI/I Volume (c.f.)	RDI/I Volume (in.)	Capture Rate (%) (RDII / rain)	
Growing Season					
7/5/97	1.00	2,475,539	0.0342	3.4%	
7/13/97	0.60	2,193,427	0.0303	5.0%	
7/19/97	0.40	930,972	0.0129	3.2%	
7/23/97	0.30	486,645	0.0067	2.2%	
7/30/97	1.90	1,890,156	0.0261	1.4%	
8/8/98	4.83	3,312,840	0.0458	1.2%	
6/18/99	2.25	1,358,771	0.0188	0.8%	
8/3/99	2.99	6,125,149	0.0847	2.8%	8x
8/21/99	0.63	2,873,708	0.0397	6.3%	
9/11/99	1.17	4,539,471	0.0628	5.4%	
10/2/99	1.90	1,820,594	0.0252	1.3%	
6/23/00	3.71	7,514,620	0.1039	2.8%	
Dormant Season					
4/10/97	1.10	2,531,962	0.0350	3.2%	
4/23/97	0.30	2,330,957	0.0322	10.7%	
4/30/97	0.20	402,011	0.0056	2.8%	
5/11/97	1.30	4,147,058	0.0574	4.4%	
3/13/98	1.70	4,785,338	0.0662	3.9%	
3/17/98	0.20	2,441,915	0.0338	16.9%	
3/28/98	1.70	8,245,327	0.1140	6.7%	
4/4/98	1.00	3,704,335	0.0512	5.1%	
4/13/98	1.00	2,641,281	0.0365	3.6%	
4/21/98	0.30	1,898,972	0.0263	8.8%	
5/1/98	1.70	3,466,461	0.0479	2.8%	
4/27/99	1.60	3,731,950	0.0516	3.2%	24x
5/19/99	1.31	668,708	0.0092	0.7%	
5/24/99	1.11	57,394	0.0008	0.7%	
4/18/00	2.54	4,512,776	0.0624	2.5%	
5/6/00	0.90	2,993,835	0.0414	4.6%	
5/15/00	2.43	7,581,357	0.1049	4.3%	

Table G1

This table from the City's 2001 study demonstrates the significant impacts that preceding wetness conditions have on wastewater flows. Understanding this dynamic will be critical when evaluating the FDD program.



i3D Model Structure

This figure shows a block diagram of the H2Ometrics model. Note that the antecedent moisture block continuously alters the parameters within the separate groundwater, inflow and infiltration blocks.

How does the continuous Antecedent Moisture (AM) model work?

The best way to address varying antecedent moisture conditions is to use a continuous model that tracks the wetness condition of the system as climatological conditions change. We will use the H2Ometrics Antecedent Moisture Model to accomplish this. A schematic of the program is illustrated in the figure to the right.

The model uses unit hydrographs for the flow responses from ground water flow, infiltration and inflow. These unit hydrographs are continuously adjusted in the model based on tracking the sewershed moisture levels, which are a function of preceding rainfall and air temperature. The air temperature is used a surrogate variable for season effects.

The unit hydrographs and moisture retention characteristics of each sewershed are identified through model calibration, and then tested and verified through a model validation process.

Continuous Modeling – Importance of Model Validation

The AM modeling process will include model validation, which is a key element to the model update. Model calibration and validation is necessary to maximize the confidence in the results. Calibration is the process of tuning model parameters so that the model matches system observations, and validation is the process of testing the model to prove that the parameters selected accurately represent the system so that the model can be trusted to make accurate predictions. Each model developed will be calibrated, validated and the accuracy of fit for both calibration and validation will be quantified.

For flow data sets for which we have multiple years of data, such as the Ann Arbor WWTP, we propose to calibrate to odd years of data and validate the model to even years of data. For flow data sets for which we only have a single year of data for pre- and post-FDD, such as the FDD districts, we propose to calibrate the model to every other spatially uniform rainfall event and validate the model to the remaining spatially uniform rainfall events. This method of validation will enhance confidence that the model reflects the underlying inflow and infiltration dynamics of the system; thus providing a solid basis for making decisions

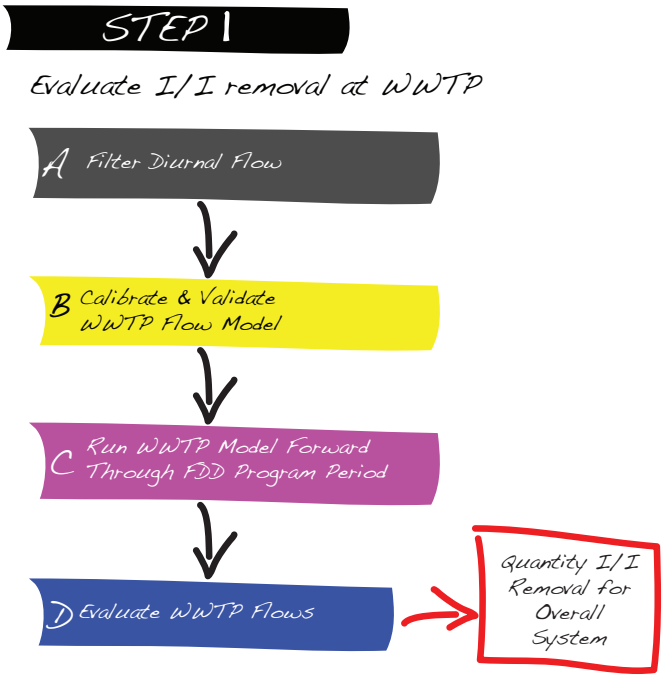
about the system. Additionally, this type of model confidence will play well in the public involvement process and will help to convince stakeholders of the efficacy of the FDD program

We have utilized the Antecedent Moisture (AM) model on hundreds of sewersheds throughout the United States and have developed a robust and defensible process for evaluating the effectiveness of I/I removal, even with the presence of significant antecedent moisture effects. We propose to use the methodology outlined below to isolate the impacts of the FDD program from antecedent moisture conditions.

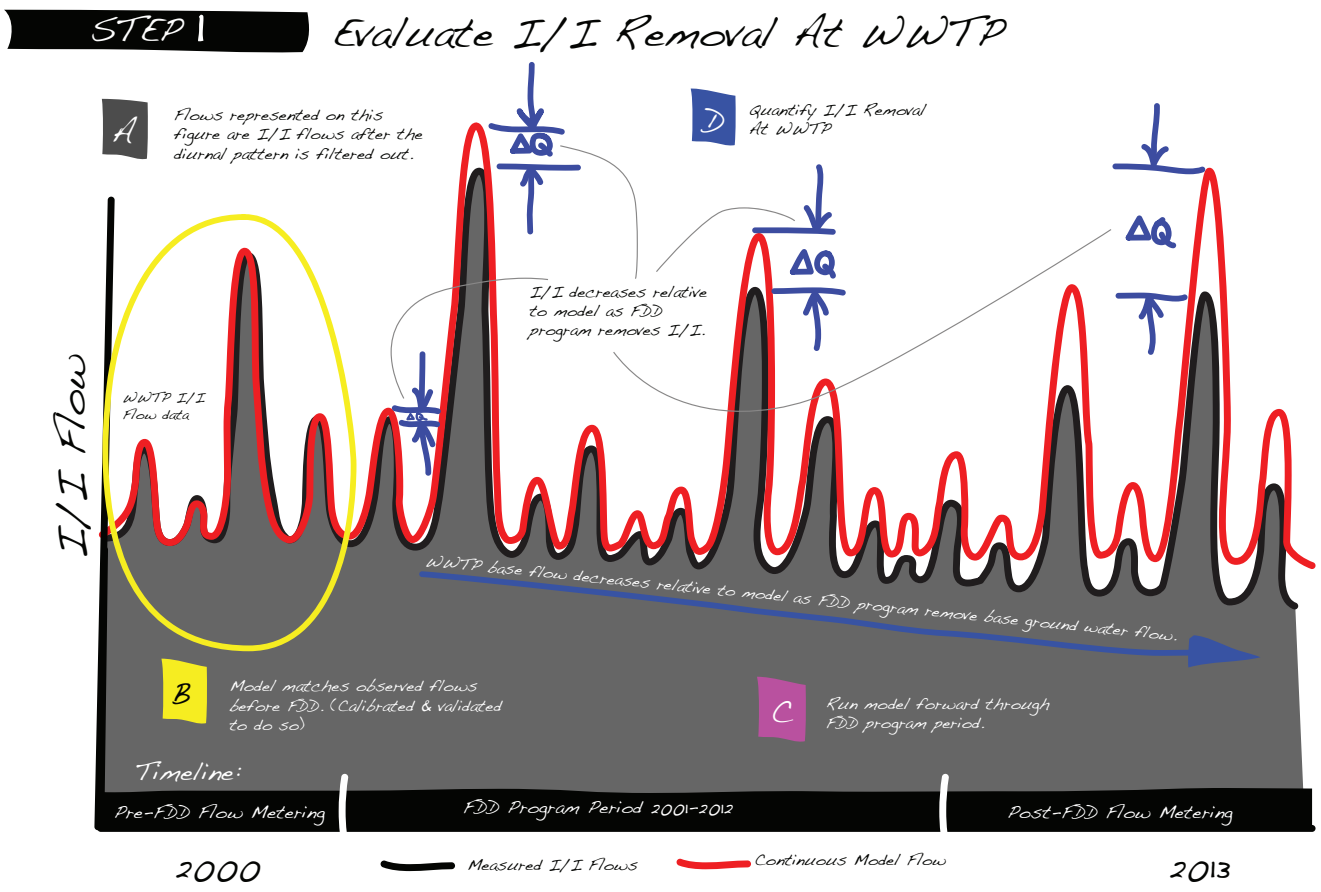
Model Step 1 – Evaluate I/I Removal at the WWTP

The first step will be to evaluate the impacts of the FDD program on the flows at the WWTP. This process is depicted in the following figures.

Process Flow Chart of Step 1 – Evaluate I/I Removal at the WWTP



Step 1 – Evaluate I/I Removal at the WWTP



- **Step 1A – Filter Diurnal Flow –** Sanitary sewer flows contain a repeating diurnal flow pattern from normal domestic, commercial and institutional uses. This pattern must be filtered from the observed flow data so that we can focus on the inflow and infiltration flow signals.

- **Step 1B – Calibrate and Validate WWTP Flow Model –** Observed flows at the WWTP from prior to the FDD program (year 2000 and prior) will be used to calibrate and validate a pre-FDD flow model for the WWTP. The WWTP model will serve as a base model for evaluating the system performance. The long-term record (several years) at the WWTP will allow us to identify the impacts that AM effects have on the overall system flows. This understanding will be useful when developing AM models for the sub-districts when the period of record for the flow metering data is shorter.

- **Step 1C – Run WWTP Model Forward through FDD Program Period –** The base model established in Step 1B represents how the system reacts to rainfall and varying wetness conditions prior to the FDD program. Running this model forward through the FDD period will predict how the system flows would have behaved without the FDD program.

- **Step 1D – Evaluate WWTP Flow Reductions –** Comparing the model flows to the actual (observed) system flows allows us to quantify the flow removal at the WWTP due to the FDD program. The expectation is that as the FDD program proceeded, the system flows gradually fell below the pre-FDD model flows, indicating a reduction in inflow/infiltration due to the FDD program. Direct comparison between the model-simulated flows and the actual observed WWTP flows will be performed to quantify the removal effectiveness on a system-wide basis. Note that such a model comparison is only possible with a predictive continuous AM model that has been calibrated and validated.

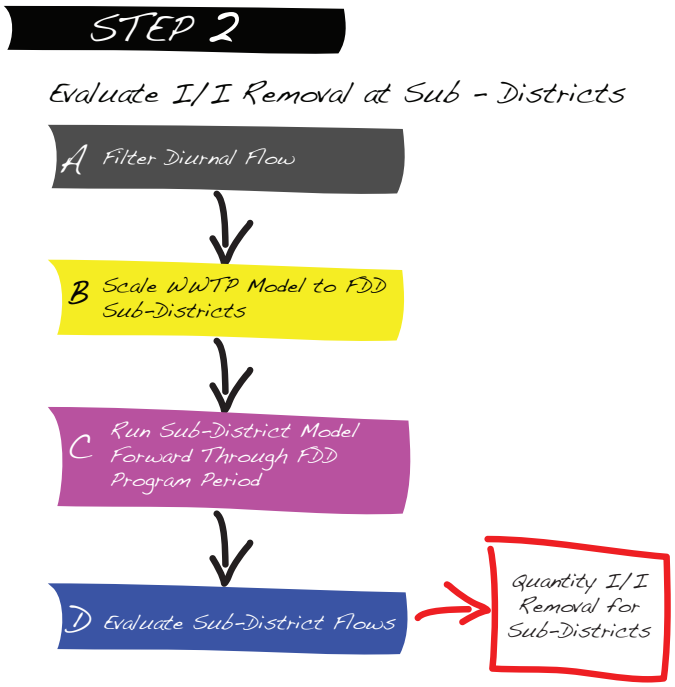
PUBLIC ENGAGEMENT

Provide updates to project website and social media outlets on early findings from I/I evaluation. Prepare non-technical handout for Focus Group.

Model Step 2 – Evaluate I/I Removal at Subdistrict

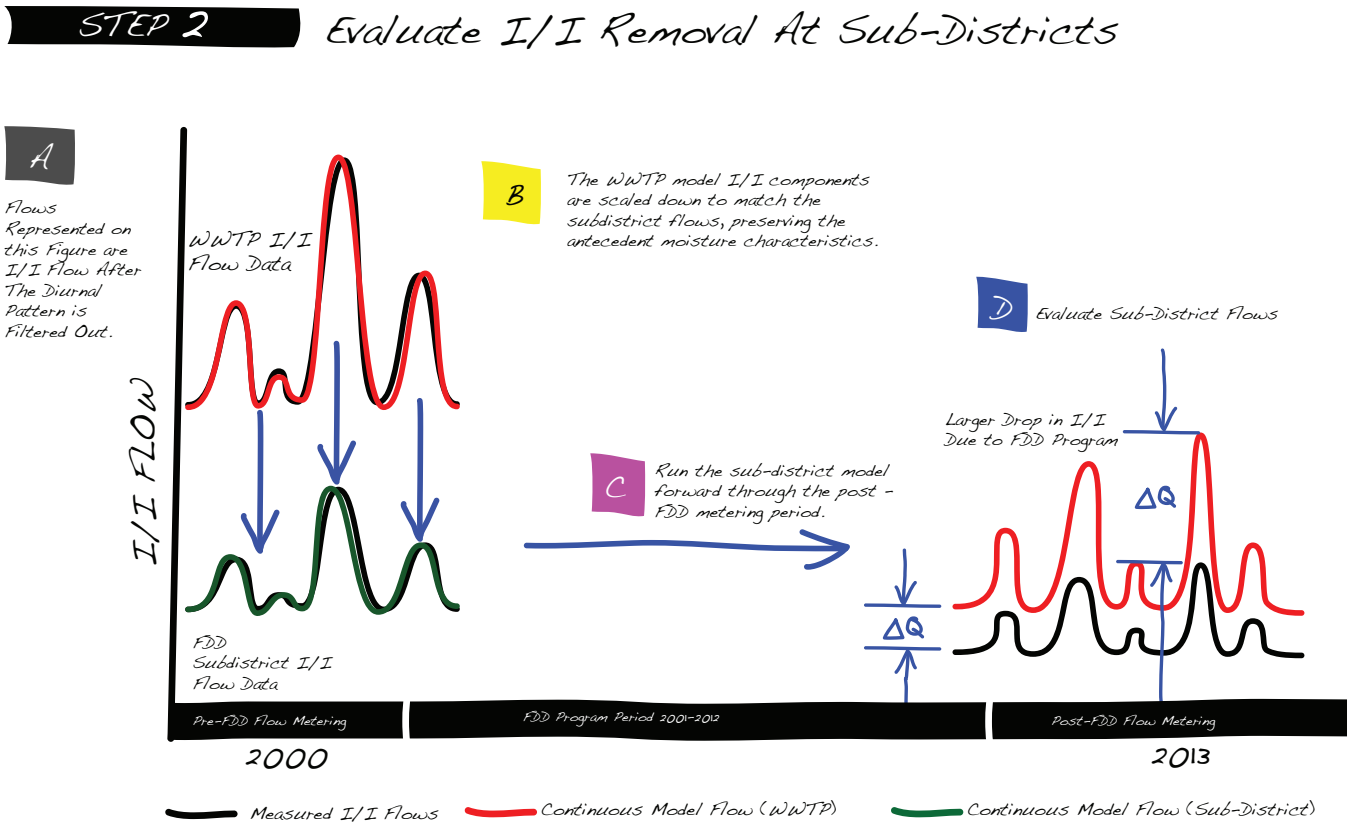
The second step of this methodology is to evaluate the impacts of the FDD program on the flows from each FDD sub-district. This process is depicted in the figure below and on the next page.

- **Step 2A – Filter Diurnal Flow –** Sanitary sewer flows contain a repeating diurnal flow pattern from normal domestic, commercial and institutional uses. This pattern must be filtered from the observed flow data so that we can focus on the inflow and infiltration flow signals.
- **Step 2B – Scale WWTP Model Down to FDD Sub-districts –** Once the WWTP flow model has been identified and the system wide-evaluation of FDD effectiveness has been performed, the sub-districts can be evaluated directly following a similar process. The WWTP model will be used as a "parent model" for the sub-district models to preserve the understanding of the long-term AM effects from the long-term record at the WWTP. The base flow, infiltration and inflow components of this model will be scaled down to match the year 2000 flow metering data for the sub-districts.
- **Step 2C – Run Sub-district models forward through FDD Program Period –** The models developed in Step 2B represent a continuous model



Process Flow Chart of Step 2 – Evaluate I/I Removal at the Sub-Districts

Step 2 – Evaluate I/I Removal at the Sub-Districts



of how the system reacts to rainfall prior to the FDD program. Similar to the WWTP, the sub-district models will be run forward through the 2013 metering data to predict how the sub-district flows would have behaved without the FDD program.

- **Step 2D – Evaluate I/I Reductions in Sub-Districts from FDD Program –** Similar to the WWTP, comparing the sub-district model flows to the actual system flows in 2013 allows a quantification of the flow removal due to the FDD program for each sub-district.

Additional details included in the approach are:

A. Through the Public Engagement process, collect information on known problem areas to corroborate the technical (model) data developed in this Task (on-line survey).

PUBLIC ENGAGEMENT

Collect on-line survey data about known problem areas.

B. As part of the continuous model calibration/ validation, we will:
   a. Calibrate hydrology to odd-number year data prior to 2001.
   b. Validate hydrology to even-number year data prior to 2001.
   c. Perform accuracy of fit analysis for calibration and validation datasets.
   d. Tabulate portion of I/I for pre- and post-FDD model from base flow, inflow, and infiltration.
   e. Use continuous model prediction to estimate WWTP overflows. Compare model predictions to actual overflow statistics to validate model.

C. Evaluate previously-collected sump pump data to estimate the potential flow removal by priority area.

D. Based on our technical review of the three (3) methods used to evaluate the effectiveness of the FDD activities, an estimate will be made of the flow removal by area. The estimated flow removal will be compared to the sump pump estimates to corroborate findings.

E. Prepare a Technical Memorandum summarizing findings and recommendations. Coordinate with the Public Engagement subconsultant to develop a non-technical summary page that can be used for Advisory Committee meetings and web-based outreach.

Summarize analysis of FDD program and compare to online survey results. Share results during public meetings and online.

F. Our Community FDD expert will provide a review of the findings and recommendations documented in the technical memorandum. The Community FDD expert will provide a national perspective on FDD effectiveness to verify that the results of the analysis make sense based on observations from other systems.

Information Needed from the City:

- Previous peak level recorder data
- Previous sump pump logger data collected as part of 2001 Study
- GIS parcel layer containing database of FDD parcel sites.
- Previous flow and rainfall data collected as part of 2001 and 2007 Studies
- Previous studies of the City's system (e.g. – Studies completed between 2001 to present)

Task C Deliverables

- Final Data with Technical Memorandum
- Advisory meetings (2-4) to review findings and recommendations; determine next course of action for Public Engagement program, communication and exhibit materials developed, based on stakeholder input. (Could include infographics, videos, direct mail, email, fact sheets, newsletters, decision flow chart and press releases, depending on City and Advisory Committee's input.)
- Project website and social media accounts updated with findings, task and timeline information on a weekly basis.
- Tabulate results from online survey(s) and summarize in a brief memorandum, including a GIS shapefile with geocoded results.

D. Update, Calibrate, and Validate Existing Sanitary Sewer System Model (Task 2 from RFP)

Calibration and validation of the continuous hydrologic model was included in Task C – Evaluate effectiveness of Current FDD Program. For this reason, this task focuses on the hydraulic model and developing design hydrographs to evaluate overall system performance.

For this task, the InfoSWMM hydraulic model will be updated based on metering data collected as part of this project and based on any system upgrades that have taken place since 2003 as reflected in the GIS. The InfoSWMM model will be used as the base model and wet weather parameters (RTK parameters) will be adjusted within the InfoSWMM model to reflect the design hydrograph conditions as computed under Task C.

The Antecedent Moisture (AM) model will be used to evaluate wet weather flows as it relates to key hydrologic parameters such as seasonal groundwater variations (growing season versus dormant season), ground conditions, and antecedent moisture conditions. The AM model will also be used to evaluate the risk of exceeding the design wet weather hydrograph. **With a good understanding of the risk of exceeding the design flow rate, the City and the public can evaluate the costs of addressing deficiencies identified with the hydraulic model and weigh those costs against the expected risks.**

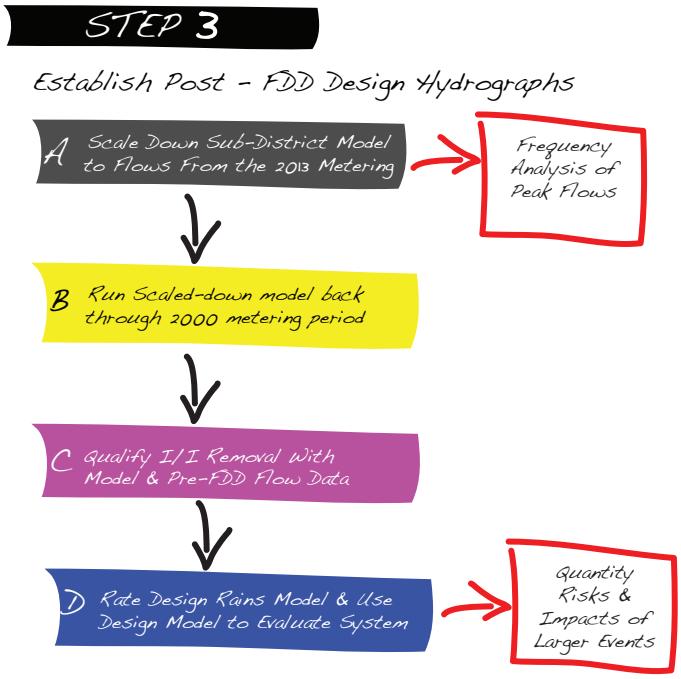
Model Step 3 – Establish Post FDD Design Hydrograph

Building off the analysis completed in Task C, the OHM team will establish post-FDD removal design hydrographs. The process is illustrated in the figures on the next page and described in the following text. Once these design hydrographs are developed, they can be used to assess system hydraulic capacity and evaluate alternatives.

- **Step 3A – Scale Down the Sub-District Model to Match the 2013 metering –** The previously developed sub-district model (from Step 2B in Task 2) will be scaled down to match the 2013 metering data. This will be done by adjusting the base flow, infiltration and inflow components of the model to represent the sub-district flows after the FDD program. The resulting model can be used to perform a frequency analysis of

peak flows for each sub-district. This will quantify the probability (risk) of various peak flows occurring, and will be used to evaluate alternatives and the consequences of a storm larger than the design event.

Figure X – Process Flow Chart of Step 3 – Establish Design Hydrographs

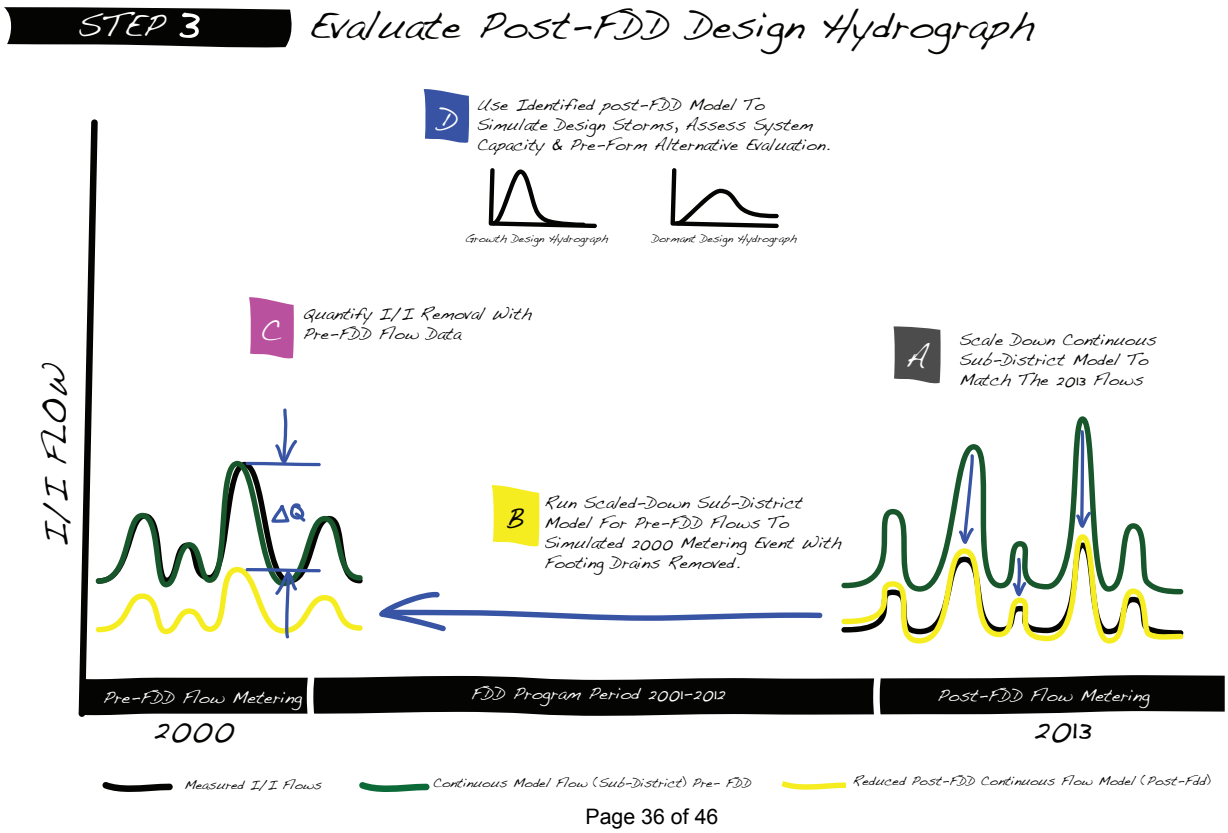


- **Step 3B – Run the 2000 Metering Period Through the Scaled-Down Sub-District Model –** The model developed in Step 3A represents how the district would have responded to the storms in 2000 had the FDD program already been performed. This allows us to simulate what the system flows would have been in 2000, had the FDD program already been performed. This will help the City and key stakeholders understand the impact of the FDD program on historic storms of significant magnitude, such as the June 2000 event.

- **Step 3C – Quantify I/I Removal with Pre-FDD Flows –** The pre-FDD program flows recorded in 2000 will be compared to the continuous model prediction developed in Step 3B in order to further demonstrate the effectiveness of the FDD program.

- **Step 3D – Use the Hydraulic Model to Evaluate the System –** Design hydrographs will be established by routing design rainfalls through the continuous model during dormant and growth season conditions. The previously developed frequency analysis in Step 3A will be used to quantify the return frequency of these design events, and evaluate the risks and impacts of storm events associated with those flow rates.

Step 3 – Establish Design Hydrographs



Assessing the risk of basement flooding

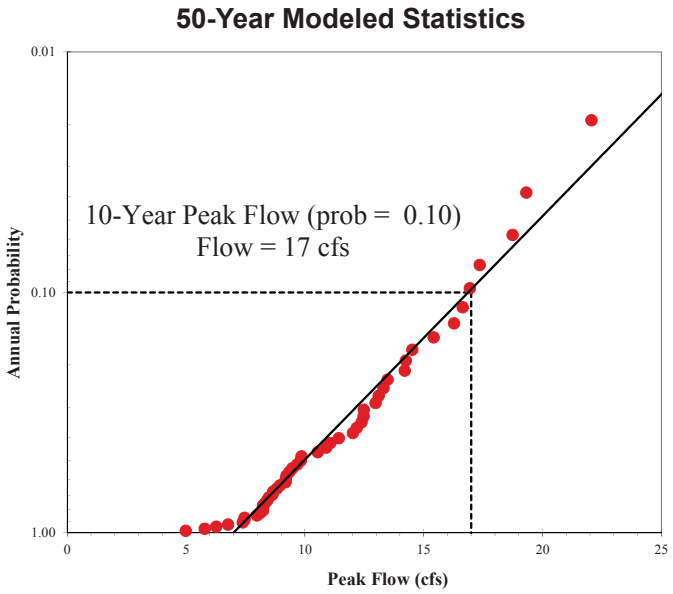
Unfortunately, we cannot eliminate the risk of basement backup since there's always a potentially-larger storm than that used to design the collection system. It is not cost effective or practical to design collection systems to handle rare (i.e. 50-year or 100-year) storm events. Therefore, it is important to understand the risks involved with the decisions being made. The continuous AM model can be used to assess this risk and understand the likelihood and consequences of larger events that may negatively impact residents within the service area.

Basement flooding can also be a direct result of deficiencies in the stormwater collection system. OHM will coordinate with CDM to identify specific locations where the storm sewer is projected to have excessive hydraulic surcharge and compare this to the findings from this study. It will be important to differentiate between the need for storm sewer and sanitary sewer investment in certain neighborhoods.

Basement backup risk will be evaluated by using the continuous model to perform a peak flow frequency analysis. A long-term (50 year) climatologic record of rainfall and air temperature will be obtained from a nearby National Weather Service gauge and routed through the continuous model. A frequency analysis will be performed on the flows using the Log-Pearson statistical methodology, which is the same process used by USGS and FEMA for evaluating recurrence interval flow rates for gaged watersheds. The result of the analysis is a statistical plot of peak flows like that shown in the figure to the right. The figure depicts the probability of various peak flows occurring in any given year.

Once the frequency plot is created, it can be used to determine the average return period for a given flow rate. For example, if the hydrographs generated (in Step 3D above) for growing and dormant season conditions indicate peak flows of 12 cfs and 21 cfs, respectively, the risk of exceeding these flow rates can be evaluated using the frequency plot. The growing season peak flow has a risk (probability) of exceedance of 0.30, indicating that the flow will be exceeded (on average) once every 3 years, while the dormant season peak flow has a risk (probability) of exceedance of 0.04, indicating that the flow will (on average) once every twenty-five (25) years. The average return periods of any flow rate can also be determined.

With this tool in hand, the City and the public can evaluate the costs of addressing system deficiencies and weigh those costs against the expected return period (risk), to determine if the costs are worth the risk. Our scope of work includes discussions with City staff and stakeholders (residents and other involved public representatives) to discuss the costs versus risk implications.



Frequency Analysis

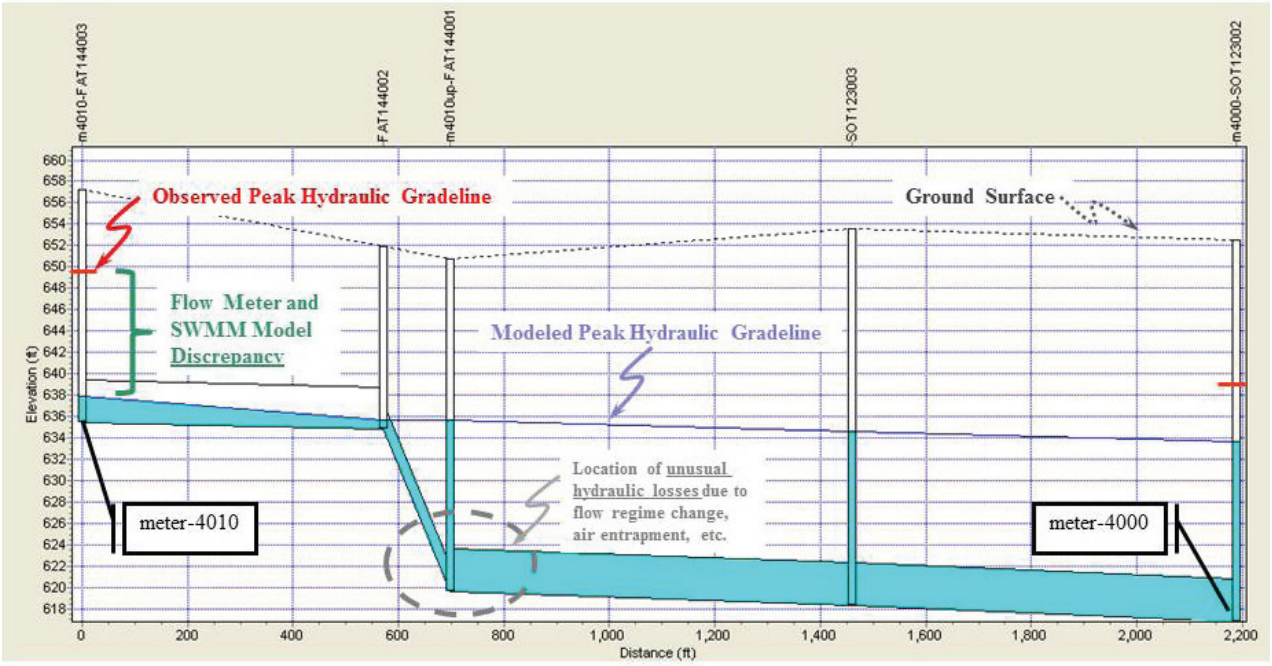
A frequency analysis like that depicted here can be used to understand the risk of various peak flows, and weigh the cost of addressing higher peak flows against the probability, or risk, of flooding basements.

Calibrating and Validating the Hydraulic Model

Once the hydrology is updated based on the new meter data, it will be important to use the observed flow and depth data to calibrate and validate the hydraulic model such that the City has confidence that the model is accurately predicting water surface elevations throughout the system.

In past projects, we have found it to be good practice to route observed flows through the hydraulic model and compare the model-predicted depths to the associated observed depths. Concurrence between modeled depths and observed depths for a given flow rate provides confidence in the hydraulic model. When modeled and observed depths do not concur, it also provides an

Proposed Work Plan



Hydraulic Anomaly Investigation

Air binding caused a large discrepancy between observed depths and model depths, which we identified through hydraulic model validation.

opportunity to evaluate system dynamics that typical hydraulic models do not take into account.

One such hydraulic anomaly was observed when OHM was involved in the hydraulic model calibration for the Oakland County Evergreen Farmington Sewage Disposal System (EFSDS). The figure above illustrates a hydraulic profile for one of the key interceptors in the system during an extreme event: the May 25, 2011 event. The modeled flow depths were not matching the observed depths for several on this section of the interceptor. As shown in the figure, in some locations the system was surcharging by ten feet, whereas the model was showing the depth should have been contained within the pipe. A review of the observed depth-velocity relationship for the meter location suggested that the flow and depth measurements were reliable at that some other factor was affecting flow depths along this interceptor. Upon further investigation, we found that many of the manholes along this interceptor were sealed at the surface and that there was a potential for air binding within the sewer, which can create large, unusual losses. Typical hydraulic models do not account for these types of dynamics; thus the importance of calibrating and validating the hydraulic model to observed conditions.

Detailed Work Plan – Hydraulic Modeling

The proposed methodology to determine the design event hydrograph is provided above. This following text provides a detailed work plan for the InfoSWMM model update. Specific work efforts for this task include the following:

A. The InfoSWMM model will be updated with the City's latest GIS collection system data. System components modified since the 2007 Citywide GIS project will be updated in the InfoSWMM model. A cursory review of the GIS database indicates that many of the model parameters, such as Manning's "n" roughness coefficients, are already contained in the GIS database. Many other model parameters appear to have fields within the GIS data base, which will streamline the model update procedure. Once the model is updated, a check on InfoSWMM continuity, model error, and model stability will be performed to verify model performance.

B. Dry weather flow allocations will be updated, which will include flows from land development since the 2007 metering period. A mass flow balance of average flows will be performed to check system

continuity. This task will also include an evaluation of diurnal components of flow for Pittsfield Township to determine the increase in flow attributable from high growth areas. The data from meters that measure flows from Pittsfield Township (proposed meter 10A) and Scio Township (data provided by Scio Township) will be used for this analysis. The current and contracted flows for each Township will be considered as part of this subtask.

C. Verify average flows within each meter district for which new meter data is available.

D. The design event wet weather flows will be updated in the InfoSWMM hydraulic model for metering districts for which new meter data was collected. The evaluation of model parameters will have been completed as part of Task B and will guide the design flow selection. Design hydrographs will be established by routing design rainfalls through the continuous model during dormant and growth season conditions.

E. Meet with City staff to discuss the risk assessment of basement flooding. Based on the design hydrographs for dormant and growing season conditions, the risk of exceedance versus the cost to manage a specific design flow will be discussed and concurred upon.

F. The R,T, & K model parameters will be modified in the InfoSWMM model to reflect the design hydrographs concurred upon as part of this task.

G. Coordinate with CDM to get information related to storm sewer hydraulic surcharging. Identify areas where changes to both the wastewater and stormwater collection systems may be necessary to reduce flooding risk.

H. Work with the Public Engagement subconsultant to prepare non-technical materials that can be used to communicate flooding risk. See Task A for additional detail.

Summarize results of hydraulic modeling and illustrate areas of known concern. Include results on website and social media outlets.

I. Calibrate and validate the hydraulic model, as described above, to evaluate predicted depths in the model such that they match reasonably well with the observed depths. The hydraulic model will be calibrated and validated with two separate large events. Calibration parameters will include Manning's n values and entrance/exit loss coefficients at manholes.

J. Evaluate system operations and identify any system deficiencies or bottlenecks for the design flow rate selected by City staff and public stakeholders.

   a. Evaluate system capacity by routing design hydrographs through the hydraulic model to identify capacity bottlenecks

   b. Prepare maps showing system deficiencies

K. Prepare a Technical Memorandum of findings, methods, and recommendations.

Information Needed from the City:

- Available GIS layers as listed in RFP
- InfoSWMM sanitary hydraulic model
- As-built plans for adjacent public streets, storm, and sanitary sewers

Task D Deliverables

- Meetings to discuss design flows with the City and public stakeholders
- Updated design event hydraulic model
- Preliminary model findings and recommendations
- Model update technical memorandum
- Conduct 2-3 presentations to City Staff to share findings, relate and evaluate proposed solutions.
- Conduct 1 meeting with stakeholder advisory committee to collect input on public meeting; project communication materials.
- Public meeting materials including exhibits, information packets and digital information tools.
- Attend public meetings as part of the Public Engagement process to share findings, relate and evaluate proposed solutions.
- Post project status updates, presentations, and next steps on project website and through social media on a weekly basis.

E. Provide Recommendations for Reducing and Eliminating Wet Weather Flow Impacts (Task 4 from RFP)

For this task, OHM will provide an evaluation of key approaches to manage design wet weather flow rates that were evaluated as part of Task C. A key component of this analysis will include the review of previously-reviewed basement backup mitigation alternatives in the context of new or alternative approaches for handling wet weather flow. The different approaches will be evaluated based on a key set of criteria, such as ability to alleviate deficiencies, anticipated costs, quality of life impacts, and construction impacts. The criteria will be developed as part of a workshop between the OHM team, City staff and public stakeholders. The approaches will be ranked and recommendations will be developed based on these rankings.

PUBLIC ENGAGEMENT

Meet with City staff and public to discuss and seek feedback on innovative wet weather flow reduction techniques.

We offer specific examples of innovative approaches to reducing and eliminating wet weather flow impacts. Although this is not an exhaustive list, these examples illustrate some of the innovative concepts that have been developed and tested in other communities since the City last evaluated wet weather strategies in 2001.

Green infrastructure as an Innovative Approach

The Environmental Protection Agency (EPA) has issued an integrated planning framework by which efficiencies can be identified from implementing coordinated Stormwater and Wastewater projects. This integrated approach includes the concept of green infrastructure, which has the potential to manage stormwater flows, while at the same time isolating runoff and reducing the potential for I/I into the sanitary system. **Links to the EPA information are provided below and the EPA integrated approach framework is attached in the Appendices section.**

- http://cfpub.epa.gov/npdes/integratedplans.cfm
- http://www.epa.gov/npdes/pubs/integrated_planning_framework.pdf

Green infrastructure improvements are frequently used with combined sewer systems as the stormwater and sanitary flows are connected by direct flow paths. However, the same concepts can be applied to separate sanitary sewer systems. For example, if much of the system I/I is from footing drain connections to the sanitary sewer system, there is a potential through green infrastructure, to divert drainage along the edge of the home (that typically seeps into the footing drain) to an infiltration trench away from the home such that the potential for I/I through the footing drain is greatly reduced.

Isolating Stormwater Runoff from Footing Drain Connections

Typical Stormwater best management practices (BMPs), such as the bio-infiltration trench that OHM designed for the Village of Pinckney, can be used as a shared resource between stormwater and wastewater systems. The bio-infiltration trench promotes infiltration to reduce flows in the stormwater system, while diverting flows away from the building to reduce the potential for footing drain flows from entering the wastewater collection system.

Innovative Approaches in Reducing Basement Backup Issues

OHM will also evaluate different innovative technologies that have the potential to mitigate basement backups and reduce wet weather flows. One such technology is

the Parjana® New Energy-Passive Groundwater Recharge Pump (EGRP), which has been used throughout Southeast Michigan to manage groundwater flows around building foundations. The system has traditionally been used to waterproof basements, but there is anecdotal evidence to suggest that this system may be useful in reducing the volume of stormwater flows to the footing drains of buildings. The system consists of a groundwater recharge pump that does not require a separate power source to operate. The system relies on the expansion and contraction of the soils to activate the pump and form a syphon to the soil layers below the building foundation. If this system could be implemented to minimize foundation drainage to the footing drain, it could greatly reduce the impacts of footing drain connections to the sanitary sewer. OHM will evaluate the potential for this system to help reduce the impacts of footing drain connections throughout the system. More information on this innovative technology can be found at the Parjana website: http://www.parjana.com.

This Task will also include evaluation of traditional approaches to wet weather controls such as system storage, conveyance, and in-system treatment, that may be needed in conjunction with innovative approaches in order to handle design flow rates.

The following outline provides a step-by-step approach to implement the evaluate recommendations for reducing and eliminating wet weather flow impacts.

A. Review previously reviewed basement backup mitigation alternatives.

B. Identify innovative approaches or technologies for reducing wet weather basement backup risks. These approaches include, but are not limited to, some of the example approaches provided above. Coordinate with City staff and the Peer Review consultant prior to recommending specific strategies.

C. Evaluate approaches to manage wet weather flows based on key criteria identified by the City, which includes the following:
   a. Effectiveness to alleviate capacity deficiencies, including the ten (10) previously identified trunkline deficiencies.
   b. Estimated cost
   c. Quality of life impacts
   d. Construction impacts
   e. Any other criteria that the City and stakeholders feel is relevant.

D. Develop alternatives analysis and alternatives rankings based on community values.

E. Prepare technical memorandum summarizing detailed findings and recommendations.

F. As part of this task, OHM will compile a comprehensive report that will bring together the individual technical memorandums into a cohesive reference that fully documents the project.

Information Needed from the City:

- Documentation on previous basement backup mitigation alternatives
- Previous (2001 Study) alternative ranking documentation.

Task E Deliverables

- Documented Summary Report of all outreach and engagement activities

F. Perform Project Coordination and Peer Review (Task 6 from RFP)

The City has several ongoing projects that may impact (or be impacted by) this analysis. OHM staff will be available to provide updates to the City (and the respective project teams) as our efforts on this project yield significant findings that may impact these projects. It is critical to ensure that all related projects are conveying a consistent message. Therefore, it will be important to identify varying opinions and agree on the messages. Coordination with ongoing City projects will include:

1. **Model Coordination with CDM and City Staff**
   OHM will be working with the InfoSWMM model of the City's wastewater collection system. During this process, our staff may need to confirm utility layout and identify discrepancies in the model structure (if they exist). Furthermore, as our team begins to develop proposed solutions for the collection system hydraulics, it will be necessary to coordinate with City/CDM staff to determine if these changes would impact the storm sewer system or any related planned improvements to the storm sewer system.

2. **WCWRC – Upper Malletts Creek Improvement Opportunities Study**
   OHM will review materials related to the Malletts Creek Study and work with City and WCWRC staff to identify potential strategies that could benefit both the City's wastewater collection system and the Upper Malletts Creek watershed.

3. **City of Ann Arbor FDD Program**
   As the OHM team develops early findings on the effectiveness of the FDD program, those results will be communicated to the City for their use in ongoing program strategy.

Peer Review:

1. Miscellaneous Peer Review Coordination

OHM staff will meet with the City's peer review consultant to review key project strategies prior to committing project resources. It is assumed that a total of four (4) mid-project peer review meetings will be necessary to establish appropriate methodology for the following key efforts:

- Flow metering locations and strategy
- Evaluation methodology for FDD program effectiveness
- Review of 2013 meter data
- Draft report strategy session

2. Peer Review – Draft Report Review Meeting

OHM staff will meet with the City's peer review consultant for a final meeting following their review of the draft report to discuss final changes necessary to verify the report serves as a useful communication tool and is technically sound. OHM will prepare a Peer Review Summary to document the key items discussed at this meeting.

3. Peer Review – Final Response and Documentation

Following our meeting with the City's peer review consultant, OHM will address the outstanding items as necessary to complete the final report. The peer reviewer's comments and responses will appear as an appendix in the final report.

Regular coordination with City staff and other project teams is necessary to assure consistency between projects and a unified approach to solving the City's infrastructure issues.

Optional Task G. Optional Additional Metering

This task offers optional metering in the event that the 2013 metering period does not produce enough good observations for wet weather flow conditions. As part of this optional task, the City can elect to re-deploy the flow monitoring devices for the fall of 2013 or spring of 2014 to collect additional observations of wet weather flow conditions. If the City elects to perform additional metering as part of this project, OHM and MCS will provide a fee proposal for the additional metering at that time. The fee and effort for the additional metering will be consistent with the fee and effort proposed as part of the base scope.

Task F Deliverables

- Documentation on peer review

Resources Needed for Each Task

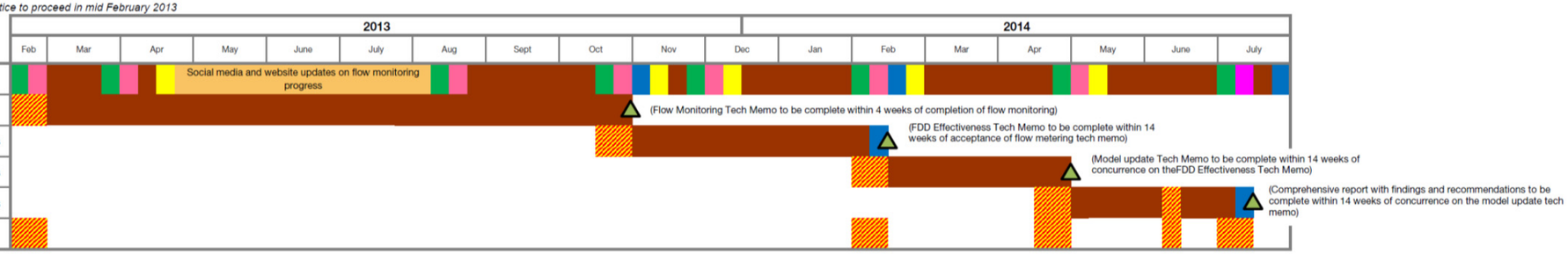
Task		Robert Czachorski, PE	Charlie Fleetham (PI)	Teresa Weed Newman (PI)	Admin (PI)	Lori Nash Byron (FIYF)	TBD	Vyto Kaunelis, PE	Vicki Putala, PE	Greg Kavinsky, PE	Tim Kuhns, PE	Murat Ulasir, PE	Bryan Dage / Colleen Walsh	Hours per Task:
	Role on Project:	Project Manager, Recommendations	Public Engagement, Peer Review	Public Engagement	Administration	Public Engagement	Community FDD Expert	Validation & Support Committee, Recommendations	Validation & Support Committee	Validation & Support Committee	FDD Evaluation, Modeling	FDD Evaluation, Modeling, Recommendations	FDD Evaluation / Modeling	
A	**Perform Public Engagement and Outreach** (Task 5 from RFP)	130	450	150	140	760	40	40	140	0	100	0	0	1950
B	**Perform System Flow Monitoring** (Task 1 from RFP)	34	0	0	0	0	0	8	0	0	96	8	184	330
C	**Evaluate Effectiveness of Current Footing Drain Disconnection Program** (Task 3 from RFP)	84	0	0	0	0	40	52	0	104	228	0	709	1217
D	**Update, Calibrate, and Validate Existing Sanitary Sewer System Model** (Task 2 from the RFP)	56	0	0	0	0	0	48	0	0	20	124	576	824
E	**Provide Recommendations for Reducing and Eliminating Wet Weather Flow Impacts** (Task 4 from RFP)	176	0	0	0	0	20	152	112	0	422	64	240	1186
F	**Perform Project Coordination and Peer Review** (Task 6 from RFP)	80	0	0	0	0	0	0	0	0	85	85	0	250
	Hours per Person:	560	450	150	140	760	100	300	252	104	951	281	1709	Total Hours: 5757

Note: Martin Control Services fees are provided as lump sum fee per meter, so hours are not provided for this summary table
I3DLab Antecedent Moisture (AM) model licensing fees are provided as lump sum fee per model, so hours are not applicable to this table

Timeline Schedule

Assuming notice to proceed in mid February 2013

Task		Duration
A	Public Engagement & Outreach	17.5 months
B	Flow Monitoring	~ 8 months
C	Evaluate Effectiveness of FDD Program	~ 3.5 months
D	Update, Calibrate, Validate Hydraulic Model	~ 2.5 months
E	Recommendations for Reducing and Eliminating Wet Weather Flows	~ 2.5 months
F	Project Coordination / Peer Review	17.5 months



Meeting / Coordination Legend

PUBLIC ENGAGEMENT

- Working Group Meetings
- Council / Commission Presentations
- Advisory Committee / Technical Oversight Committee Meetings
- Public Meetings / Focus Groups
- City Project Coordination and Peer Review

Allocation of City Hours*

Task		Role on Project:	Warrow FDD Program	Hutchinson Project Management	Slotten Project Oversight	Baughman Modeling Review	Lawson Public Engagement	Hupy Project Oversight	Hours per Task:
A	**Perform Public Engagement and Outreach** (Task 5 from RFP)		40	150	40	8	150	40	428
B	**Perform System Flow Monitoring** (Task 1 from RFP)		16	40	4	24	4	4	92
C	**Evaluate Effectiveness of Current Footing Drain Disconnection Program** (Task 3 from RFP)		16	40	4	24	4	4	92
D	**Update, Calibrate, and Validate Existing Sanitary Sewer System Model** (Task 2 from the RFP)		16	40	4	24	4	4	92
E	**Provide Recommendations for Reducing and Eliminating Wet Weather Flow Impacts** (Task 4 from RFP)		16	40	4	24	4	4	92
F	**Perform Project Coordination and Peer Review** (Task 6 from RFP)		8	40	4	8	4	4	68
		Hours per Person:	112	350	60	112	170	60	Total Hours: 864
		Percent of time allocation over 18 month project (%)**	4%	12%	2%	4%	6%	2%	

Note:
*Estimate of hours and project roles for City staff are preliminary and based on anticipated involvement. The level of effort and project role may be refined upon project inception.
**This percentage assumes 40 hour work week for 72 week (18 month project duration) for total work hours available during project (e.g. – 350 hours needed for the project and 2880 hours available = 350/2880 = 12%)

EXHIBIT B
FEE SCHEDULE

Ann Arbor, MI
Sanitary Sewer Flow Monitoring and Wet Weather Evaluation Project
OHM Budget
DATE: 12/21/2012

Task	Czachorski Project Manager $150	Fleetham Project Innovations $200	Newman Project Innovations $150	Admin Project Innovations $45	Byron Famous in Your Field $125	National Wet Community FDD Expert $150	Kaunelis Validation Team - FDD Evaluation $160	Putala Validation Team - Public Engagement $150	Kacvinsky Validation Team - FDD Evaluation $140	Kuhns Project Engineer $118	Ulasir Project Engineer $124	Dage/Walsh Modeling Engineer $95	i3D Lab	Martin Control Services	Applied Science	Total hours	Total budget
A. Perform Public Engagement and Outreach (Task 5 from RFP)	130	450	150	140	760	40	40	140	0	100	0	0	$0	$0	$0	**1,950**	**$278,500**
B. Perform System Flow Monitoring (Task 1 from RFP)	34	0	0	0	0	0	8	0	0	118	8	184	$0	$190,826	$12,071	**352**	**$241,716**
C. Evaluate Effectiveness of Current Footing Drain Disconnection Program (Task 3 from RFP)	84	0	0	0	0	40	52	0	104	244	0	709	$36,000	$0.00	$0.00	**1,233**	**$173,796**
D. Update, Calibrate, and Validate Existing Sanitary Sewer System Model (Task 2 from the RFP)	56	0	0	0	0	0	48	0	0	20	140	576	$0.00	$0.00	$0.00	**840**	**$90,657**
E. Provide Recommendations for Reducing and Eliminating Wet Weather Flow Impacts (Task 4 from RFP)	176	0	0	0	0	20	152	112	0	422	64	240	$0.00	$0.00	$0.00	**1,186**	**$151,109**
F. Perform Project Coordination and Peer Review (Task 6 from RFP)	80	0	0	0	0	0	0	0	0	85	85	0	$0.00	$0.00	$0.00	**250**	**$32,570**
Task Hours	**560**	**450**	**150**	**140**	**760**	**100**	**300**	**252**	**104**	**989**	**297**	**1709**	**NA**	**NA**	**NA**	**5811**	
Task Cost	**$84,000**	**$90,000**	**$22,500**	**$6,300**	**$95,000**	**$15,000**	**$48,000**	**$37,800**	**$14,560**	**$116,702**	**$36,828**	**$162,762**	**$36,000**	**$190,826**	**$12,071**		**$968,348**

Notes:
Martin Control Services fees are provided as lump sum fee per meter, so hours are not provided for this portion of work
I3DLab fees are provides as lump sum fee per model, so hours are not applicable.

Contingency	Incremental Contingency Cost	Notes
Contingency No 1 w reduced rates	$ 48,000.00	Adjusted 3 month metering to 6 month for 9 deficiency meters & contingency for meter re-installs
Contingency No 2 w reduced rates	$ 124,000.00	Adjust all monitoring to 9 month duration & contingency for meter re-installs
Contingency No 3 w reduced rates	$ 20,000.00	Additional 2 contingency meters at City's discrection

EXHIBIT C
FAIR EMPLOYMENT PRACTICE

The consultant, its agents or sub-contractors, shall comply with all requirements of Chapter 112 of Title IX of the Code of the City of Ann Arbor and in particular the following excerpts therefrom:

9:161 NONDISCRIMINATION BY CITY CONTRACTORS

(1) All contractors proposing to do business with the City of Ann Arbor shall satisfy the nondiscrimination administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All contractors shall receive approval from the Director prior to entering into a contract with the City, unless specifically exempted by administrative policy. All City contractors shall take affirmative action to insure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon race, national origin or sex.

(2) Each prospective contractor shall submit to the City data showing current total employment by occupational category, sex and minority group. If, after verifying this data, the Director concludes that it indicates total minority and female employment commensurate with their availability within the contractor's labor recruitment area, i.e., the area from which the contractor can reasonably be expected to recruit, said contractor shall be accepted by the Director as having fulfilled affirmative action requirements for a period of one year at which time the Director shall conduct another review. Other contractors shall develop an affirmative action program in conjunction with the Director. Said program shall include specific goals and timetables for the hiring and promotion of minorities and females. Said goals shall reflect the availability of minorities and females within the contractor's labor recruitment area. In the case of construction contractors, the Director shall use for employment verification the labor recruitment area of the Ann Arbor-Ypsilanti standard metropolitan statistical area. Construction contractors determined to be in compliance shall be accepted by the Director as having fulfilled affirmative action requirements for a period of six (6) months at which time the Director shall conduct another review.

(3) In hiring for construction projects, contractors shall make good faith efforts to employ local persons, so as to enhance the local economy.

(4) All contracts shall include provisions through which the contractor agrees, in addition to any other applicable Federal or State labor laws:

(a) To set goals, in conference with the Human Resources Director, for each job category or division of the work force used in the completion of the City work;

(b) To provide periodic reports concerning the progress the contractor has made in meeting the affirmative action goals it has agreed to;

(c) To permit the Director access to all books, records and accounts pertaining to its employment practices for the purpose of determining compliance with the affirmative action requirements.

(5) The Director shall monitor the compliance of each contractor with the nondiscrimination provisions of each contract. The Director shall develop procedures and regulations consistent with the administrative policy adopted by the City Administrator for notice and enforcement of non-compliance. Such procedures and regulations shall include a provision for the posting of contractors not in compliance.

(6) All City contracts shall provide further that breach of the obligation not to discriminate shall be a material breach of the contract for which the City shall be entitled, at its option, to do any or all of the following:

(a) To cancel, terminate, or suspend the contract in whole or part and/or refuse to make any required periodic payments under the contract;

(b) Declare the contractor ineligible for the award of any future contracts with the City for a specified length of time;

(c) To recover liquidated damages of a specified sum, said sum to be that percentage of the labor expenditure for the time period involved which would have accrued to minority group members had the affirmative action not been breached;

(d) Impose for each day of non-compliance, liquidated damages of a specified sum, based upon the following schedule:

Contract Amount	Assessed Damages Per Day of Non-Compliance
$ 10,000 - 24,999	$25.00
25,000 - 99,999	50.00
100,000 - 199,999	100.00
200,000 - 499,999	150.00
500,000 - 1,499,999	200.00
1,500,000 - 2,999,999	250.00
3,000,000 - 4,999,999	300.00
5,000,000 - and above	500.00

(e) In addition the contractor shall be liable for any costs or expenses incurred by the City of Ann Arbor in obtaining from other sources the work and services to be rendered or performed or the goods or properties to be furnished or delivered to the City under this contract.

EXHIBIT D
LIVING WAGE REQUIREMENTS

If a "covered employer," Contractor will comply with all the requirements of Chapter 23 of the Ann Arbor City Code (Sections 1:811 B 1:821), in particular but not limited to the following sections thereof:

1:813. Definitions.

For purposes of this Chapter, the following definitions shall apply:

(1) "Contractor/vendor" is a person or entity that has a contract with the City primarily for the furnishing of services where the total amount of the contract or contracts with the City exceeds $10,000 for any 12month period. "Contractor/vendor" does not include a person or entity that has a contract with the City primarily for the purchase of goods or property, or for the lease of goods or property to or from the City.

(2) "Covered Employee" means a person employed by a covered employer to perform services which are covered or funded by the contract with or grant from the City; provided, however, that persons who are employed pursuant to federal, state or local laws relating to prevailing wages shall be exempt from this Chapter.

(3) "Covered Employer" means a contractor/vendor or grantee that has not been granted an exemption from this Chapter pursuant to Section 1:817.

(4) "Employee" means an individual who provides personal services performed for wages under any contract calling for the performance of personal services, whether written or oral, express or implied. The term "employee" does not include any individual who volunteers to perform services for an employer if

(a) The individual receives no compensation or is paid expenses, reasonable benefits, or a nominal fee to perform the services for which the individual volunteered; and

(b) Such services are not the same type of services which the individual is employed to perform for such employer.

(5) "Employee Health Benefits" or "Health Benefits" means providing health care benefits for employees (or employees and their dependents) at employer cost or making an employer contribution toward the purchase of such health care benefits for employees (or employees and their dependents), provided that the employer cost or contribution equals no less than $1 an hour for the average work week of such employee, and provided further that any employee payment or contribution

toward health care shall not exceed 50 cents an hour for the average work week for such employee.

(6) "Grant" means any form of financial assistance to a "Grantee" as set forth and defined in Section 1:813(7). "Grant" does not include financial assistance used for the purchase or lease of property or other nonpersonnel costs.

(7) "Grantee" is a person or entity that is a recipient of any financial assistance from the City in the form of any federal, state or local grant program administered by the City, revenue bond financing, tax increment financing, tax abatement, tax credit, direct grant, or any other form of financial assistance that exceeds $10,000 for any 12month period, including any contractors, subcontractors, or leaseholders of the grantee whose contract, subcontract or lease with the grantee exceeds $10,000 for any 12month period.

(8) "Living Wage" means a wage equal to the levels established in Section 1:815.

(9) "Person" means any individual, copartnership, corporation, association, club, joint adventure, estate, trust, and any other group or combination acting as a unit, and the individuals constituting such group or unit.

(10) "$10,000 for any 12 month period" is computed by taking the total amount of the contract, grant or loan and dividing it by the number of months the contract, grant or loan covers.

1:814. Applicability.

(1) This Chapter shall apply to any person that is a contractor/vendor or grantee as defined in Section 1:813 that employs or contracts with five (5) or more individuals; provided, however, that this Chapter shall not apply to a nonprofit contractor/vendor or nonprofit grantee unless it employs or contracts with ten (10) or more individuals.

(2) This Chapter shall apply to any grant, contract, or subcontract or other form of financial assistance awarded to or entered into with a contractor/vendor or grantee after the effective date of this Chapter and to the extension or renewal after the effective date of this Chapter of any grant, contract, or subcontract or other form of financial assistance with a contractor/vendor or grantee.

1:815. Living Wages Required.

(1) Every contractor/vendor or grantee, as defined in Section 1:813, shall pay its covered employees a living wage as established in this Section.

(a) For a covered employer that provides employee health care to its employees, the living wage shall be $8.70 an hour, or the adjusted amount hereafter established under Section 1:815(3).

(b) For a covered employer that does not provide health care to its employees, the living wage shall be $10.20 a hour, or the adjusted amount hereafter established under Section 1:815(3).

(2) In order to qualify to pay the living wage rate for covered employers providing employee health care under subsection 1:815(1)(a), a covered employer shall furnish proof of said health care coverage and payment therefor to the City Administrator or his/her designee.

(3) The amount of the living wage established in this Section shall be adjusted upward no later than April 30, 2002, and every year thereafter by a percentage equal to the percentage increase, if any, in the federal poverty guidelines as published by the United States Department of Health and Human Services for the years 2001 and 2002. Subsequent annual adjustments shall be based upon the percentage increase, if any, in the United States Department of Health and Human Services poverty guidelines when comparing the prior calendar year's poverty guidelines to the present calendar year's guidelines. The applicable percentage amount will be converted to an amount in cents by multiplying the existing wage under Section 1.815(1)(b) by said percentage, rounding upward to the next cent, and adding this amount of cents to the existing living wage levels established under Sections 1:815(1)(a) and 1:815(1)(b). Prior to April 1 of each calendar year, the City will notify any covered employer of this adjustment by posting a written notice in a prominent place in City Hall, and, in the case of a covered employer that has provided an address of record to the City, by a written letter to each such covered employer.

1:816. Employees Covered.

A covered employer shall pay each of its employees performing work on any covered contract or grant with the City no less than a living wage as defined in Section 1:815.

1:817. Exemptions.

Notwithstanding any other provisions in this Chapter, the following exemptions shall apply:

(1) Sweat equity contracts for home construction or rehabilitation grant will not subject the grantee to coverage under this Chapter. Housing construction or rehabilitation grants or contracts that are passed through to a contractor in their entirety are exempt from the provisions of this Chapter, even when the City participates in the selection of the contractor.

(2) For any contract or grant, the City Council may grant a partial or complete exemption from the requirements of this Chapter if it determines one of the following:

(a) To avoid any application of this Chapter that would violate federal, state or local law(s); or

(b) The application of this Chapter would cause demonstrated economic harm to an otherwise covered employer that is a nonprofit organization, and the City Council finds that said harm outweighs the benefits of this Chapter; provided further that the otherwise covered nonprofit employer shall provide a written plan to fully comply with this Chapter within a reasonable period of time, not to exceed three years, and the City Council then agrees that granting a partial or complete exemption is necessary to ameliorate the harm and permit the nonprofit organization sufficient time to reach full compliance with this Chapter.

(3) A loan shall be considered a grant under this ordinance only to the extent that a loan is provided at below market interest rates and then only the difference between the amount of the loan and the present value of the payments thereunder, discounted over the life of the loan, shall be treated as financial assistance under this ordinance.

(4) A payment of funds for the purpose of purchasing services, property, or goods on behalf of individuals being assisted by a covered employer or potentially covered employer (sometimes known as a "pass through" grant) that is used for said purchases shall not be considered a grant; such funds shall be considered a grant only to the extent that any such funds are retained by the covered employer or potentially covered employer to provide financial assistance and support to its own operations.

1:818. Monitoring and Enforcement.

(1) Every covered employer shall agree to the payment of a living wage as a condition of entering into or renewing a covered contract or grant with the City, shall agree to post a notice regarding the applicability of this Chapter in every work place or other location in which employees or other persons contracted for employment are working, and shall agree to provide payroll records or other documentation as deemed necessary within ten (10) business days from the receipt of the City's request. All City contracts and grants covered by this Chapter shall provide that a violation of the living wage requirements of this Chapter shall be a material breach of the contract or grant. The Human Rights Office of the City shall monitor the compliance of each contractor/vendor or grantee under procedures developed by the Human Rights Office and approved by the City Administrator.

(2) Each covered employer shall submit to the Human Rights Office of the City information regarding number of employees and applicable wage rates of its employees covered by this Chapter in such manner as requested by that office. At the request of the Human Rights Office, any contractor/vendor or grantee shall provide satisfactory proof of compliance with the living wage provisions of this Chapter.

(3) Any person may submit a complaint or report of a violation of this Chapter to the Human Rights Office. Upon receipt of such a complaint or report, the Human Rights Office shall investigate to determine if there has been a violation.

1:819. Penalties and Enforcement.

(1) A violation of any provision of this Chapter is a civil infraction punishable by a fine of not more than $500.00 plus all costs of the action. The Court may issue and enforce any judgment, writ, or order necessary to enforce this Chapter, including payment to the affected employee or employees of the difference between wages actually paid and the living wage that should have been paid, interest, and other relief deemed appropriate.

(2) Each day upon which a violation occurs shall constitute a separate violation.

(3) In addition to enforcement under Subsections (1) and (2), the City shall have the right to modify, terminate, and/or seek specific performance of any contract or grant with an affected covered employer or to cancel, terminate or suspend the contract in whole or in part and/or to refuse any further payments under the contract or grant;

(4) Nothing contained in this Chapter shall be construed to limit in any way the remedies, legal or equitable, which are available to the City or any other person for the correction of violations of this Chapter

* * * * *

1:821. Other Provisions.

(1) No affected covered employer shall reduce the compensation, wages, fringe benefits, or leave available to any covered employee or person contracted for employment in order to pay the living wage required by this Chapter.

* * * * *

(3) No employee covered by a federal, state or local law requiring the payment of prevailing wages shall be covered by this Chapter.

(4) This Chapter shall not be construed to apply to any person or entity that is a tax exempt religious, educational or charitable organization under state or federal law, but is not a contractor/vendor or grantee as defined in Section 1:813.

(5) This Chapter shall not be applicable to the establishment and/or continuation of the following if developed specifically for high school and/or college students:

(a) A bona fide training program;
(b) A summer or youth employment program;
(c) A work study, volunteer/public service, or internship program.

* * * * *