Weeping Tile Disconnection to Reduce the Impact of Basement Flooding

London, Ontario

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Today’s presentation

- Document a pilot project involving weeping tile disconnection, initiated by the City of London

- Objective to decrease Inflow and Infiltration in the sanitary sewers to reduce the risk of basement flooding

- Project undertaken Summer 2013
Outline

• Terminology

• Background:
  • What causes basement flooding?

• Pilot Project: Sherwood Forest Subdivision
Terminology
Sump Pump Diagram

Courtesy of ICLR
Basement Flooding

- What is Inflow/Infiltration (I/I)?
  - Stormwater and/or groundwater entering sanitary sewers
- Excessive I/I can lead to surcharged/overloaded sanitary main
  - Widespread issue, generally affects multiple homes on a street
Sources of I/I

• Weeping tile connections
  • Lot grading sloped towards house
  • Downspout discharge location (at or near foundation wall).
• Clay soils
• Combined sewers
• Old pipes, cracks, etc
London’s Weeping Tile History

• Prior to 1985:
  • weeping tile connected to sanitary sewer

• 1985-1995:
  • weeping tile connected to sump pit; sump pump discharge to surface

• 1995-present:
  • weeping tile connected to sump pit; sump pump discharge to storm sewer PDC
Sherwood Forest Subdivision

- Subdivision developed late 1970s to early 1980s
- Historical basement flooding prone area
Flow Monitors

- Blanchard Crescent, May 2009
Flow Monitors

• Ardsley Crescent, May 2009
What’s Happening?

• **Weeping tile connected to sanitary** → most homes pre 1985
• **Clay soils** → do not absorb water
• **Lot grading** has settled over the years →
  • water falling from the sky is draining towards houses
• **Zero lot line** homes →
  • Closely spaced together = high % of roof and hard surface
• Poorly placed **downspout discharge** locations
Aerial Photos
Downspouts
Private Side Alternative: Advantages

- Disconnecting the weeping tile from sanitary:
  - Removes I/I at the source
  - Saves pumping and treatment costs
  - Reduces risk of overwhelming system with ‘next big storm’
  - Significantly more cost effective:
    - only 20% of the cost of public side alternative
Existing Grant Program

• Voluntary (Current Practice):
  • 75% Grant Program for Basement Flooding Protection (includes sump pump, backwater valve, weeping tile disconnection, storm PDC)
  • Very low uptake; ‘dry basement’ homeowners have no interest, even though they are contributing.
Proposed Pilot Project

• Pilot Disconnection on Blanchard (up to 65 homes)
• City pays 100% cost + provides additional $1,000 for future maintenance;
  • Includes disconnection of weeping tile, installation of sump pump, backwater valve, and private storm sewer lateral (PDC)
Proposed Pilot Project

- Voluntary signup; 50% of homeowners participation required
  - Computer modeling determined that we needed 50% buy in to ensure that enough stormwater was removed from the sanitary system (to prevent basement flooding)

- Individual site visits to each home to determine retrofit feasibility
Getting Buy In

• Homeowner Buy In
  • Public meeting to inform and educate homeowners; introduce them to our proposed solution
  • Initially had 27 homes signed up for full disconnection
  • Ended up with 32 home disconnections + 5 storm PDC installs
Tendering Project

1. External works tender
   • installation of storm PDCs from sewer main to house; included restoration, road resurfacing

2. Internal works tender
   • Very unique tender from City prospective
   • Included all items necessary for disconnection of weeping tile from sanitary, installation of sump pump, installation of backwater valve
   • Tender items for electrical, laminate flooring removal and replacement, drywall, etc.
Project Cost

External Works
• Tender bid $305,000 ($8,245 per house)

Internal Works:
• Tender bid: $172,000 ($5,375 per house)

Total = $477,000

Note:
• external works include asphalt resurfacing
• only one Internal bid received; interested capable plumbing contractors were not familiar with City contract bonding requirements
Project Logistics

• Major difference from all other City led projects: we were proposing to undertake work on private property AND inside private homes!

• Legal concerns:
  • contractor required to have police records checks for all workers
  • Additional liability insurance
  • Comprehensive Dishonesty, Disappearance and Destruction Coverage ($20,000 per employee)
Project Coordination

City’s Building Division:
• Required to obtain building permits for each house (contractor’s responsibility)
• Contractor needs to acknowledge that inspections can impact their schedule
Project Coordination

Homeowners:
• Consent to enter agreements from each homeowner
• Site visits before, during, and after project
• Contractor needed a flexible schedule to accommodate homeowner work schedule, appointments, etc.
External Works

- Protect lawns
- Many PDCs installed using directional drilling method
- Minimized impact to lawns, gardens, etc
External Works – Tight work spaces

- Working in between fences
External works – landscaping considerations

- Storm PDC with cleanout
- Working beside nice rose bushes, other landscaping features important to homeowner
External Works

- Adjacent to gas meters, plants/shrubs
Internal Works

- Tight work spaces
Retrofit - Sump Pumps
Retrofit –
Sump Pump and Backwater Valve
Retrofit –
sump pump and backwater valve
Retrofit - Hardwood floors
Homeowner Challenges

- Anticipated Challenges
  - Scheduling
  - Duration of work in house
  - Clean up
  - Late sign ups – people wanting to sign up only after construction began
  - Exempt fully finished basements; logistically too difficult to retrofit and restore
Optics

• Some Concerns from Homeowners;
  • Why aren’t you replacing the sidewalk/curb/driveway apron/road?
  • Some had the expectation that since “The City” was coming to do work, that the entire streetscape would be replaced to brand new
  • Reality: we were using sewer $ to fix a basement flooding issue; did not have the $ to focus on curb/sidewalk, etc.
• What impact will the sump pump have on my home?
• Are you installing a backup system?
Post Construction

• To date, pilot project is a success; homeowners generally pleased with work

• Real test will be significant rain event

• Flow monitor in sanitary sewer directly downstream of project

• Ongoing monitoring will take place
Post construction – Preliminary flow monitoring

Blanchard Sanitary Pipe Level - September 11 2013

Pipe Level (m)

Rainfall (mm/hr)

9/11/13 12:00 PM - 9/12/13 12:00 AM

Blanchard Level

Rainfall - 6/mm

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Preliminary Results

• No wet weather impacts appear for Blanchard Crescent in comparison to Ardsley Crescent, which had a large wet weather response

• Initial monitoring suggests the Blanchard disconnection program is a success
Next Steps

• Present the project findings to homeowners

• Initiate another street of disconnections given our success

• Investigate geotechnical conditions to determine if more targeted weeping tile disconnections can be done; are soil conditions and groundwater levels only in certain pockets of a given street?
Thank You

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