



# Home Drainage & Causes of Basement Flooding

# Understanding Drainage

There are two separate sewer systems



## Wastewater System Stormwater System

- ▶ Overland (Surface) Flow
- ▶ Underground sewers
- ▶ Outlets to watercourses
  - ▶ Storms
  - ▶ Floor drains

# How Does my House Connect to the City Sewers?

Household plumbing should connect to sanitary sewer only



# How Does my House Connect to the City Sewers?

Historically, roof drains (downspouts) connected underground to storm sewer



# How Does my House Connect to the City Sewers?

**Weeping tiles (foundation drains) connected to either storm or sanitary sewer**



# How Does my House Connect to the City Sewers?

- Newer homes no longer connect weeping tiles to the sewer, instead a sump pump discharges to surface
- Also, downspouts now flow to surface



# How Are Sewers Sized?

- Sanitary Sewers - sized to take all wastewater from contributing homes, businesses and industries + an allowance for extraneous water
- Storm Sewers - sized to take average frequent rainfall events only; surface to take remainder
- Cannot be sized to capture every possible rainfall
- Drainage system generally operates as intended under normal conditions and average rainfalls

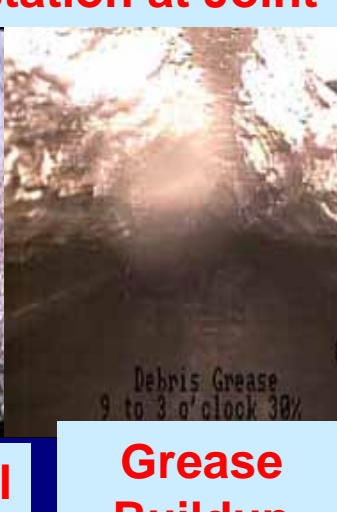
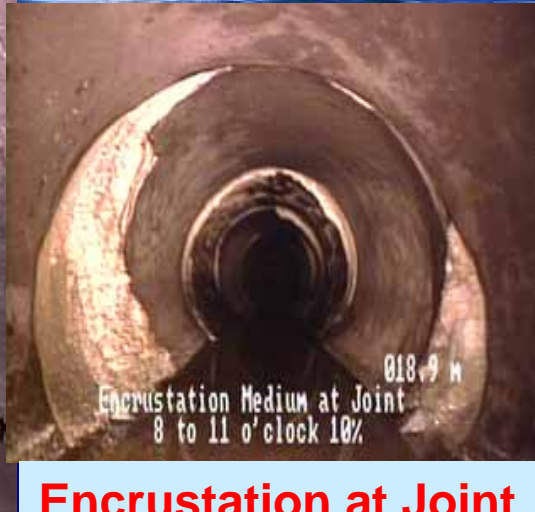
# What is Source of Problem?

- **Extreme Events**

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- Sewer physical structural problems

# Sewer Physical Structural Problems



Debris Buildup

Protruding Lateral

Grease Buildup

# What is Source of Problem?

- Extreme Events
- Sewer physical structural problems
- **Surface flooding**

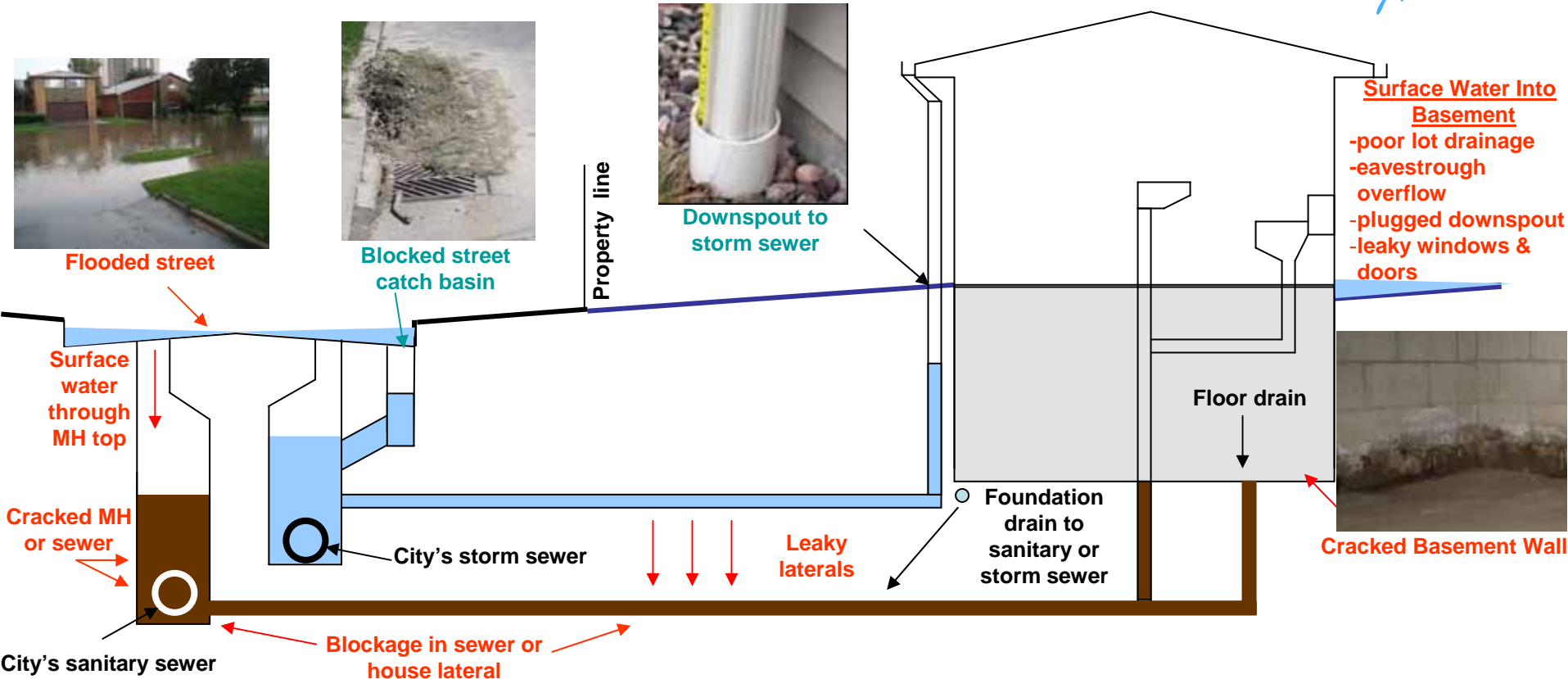
# What is Source of Problem?

- Extreme Events
- Sewer physical structural problems
- Surface flooding
- **Excess storm water entering sanitary sewer**

# Excess Stormwater Entering Sanitary Sewer

- **Sources of high flows to sanitary sewers:**
  - Illegal cross-connections
  - Foundation drains
  - Infiltration
    - Joints and pipe connections
    - Broken pipes
    - Cracks in the sewer system and maintenance holes
  - Inflow
    - Holes in maintenance covers (low areas)
    - Stormwater-flooded basement (floor drain)

# Typical Causes of Basement Flooding



Cracked Sewer



Sewer Blockage



Sewer Protrusion



Reverse-slope Driveway



Poor Lot Grading



# What Happens When It Rains?

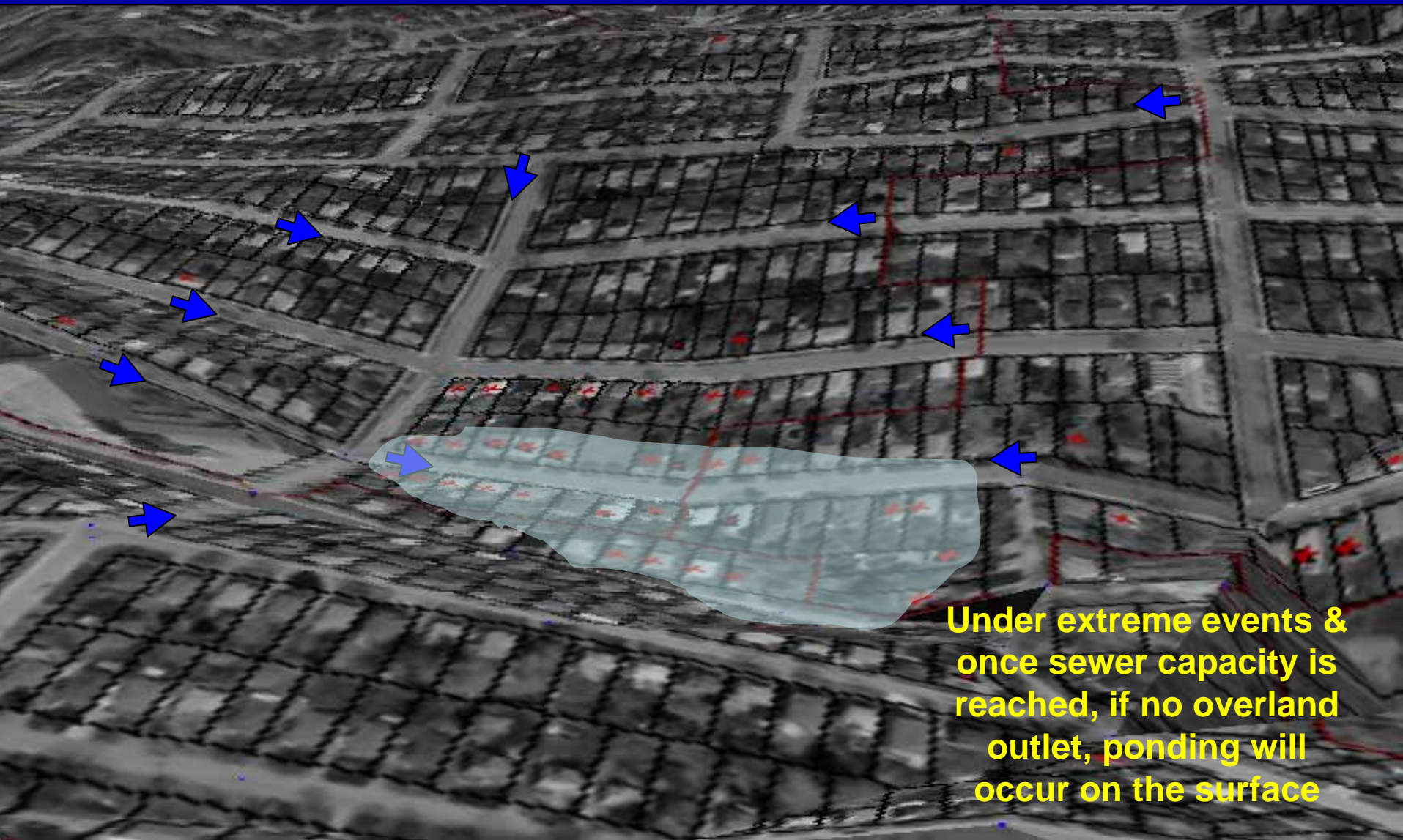
## Rainwater on the Surface

# Storm Drainage System

- **Extreme rainfall events are not supposed to enter storm sewer, instead flow overland to outlet (creeks, ponds, lakes, etc)**
- **Where no outlet exists (road low points), excess surface water will pond which can enter the sanitary sewer system**

# Examples of Surface Conditions





Under extreme events & once sewer capacity is reached, if no overland outlet, ponding will occur on the surface

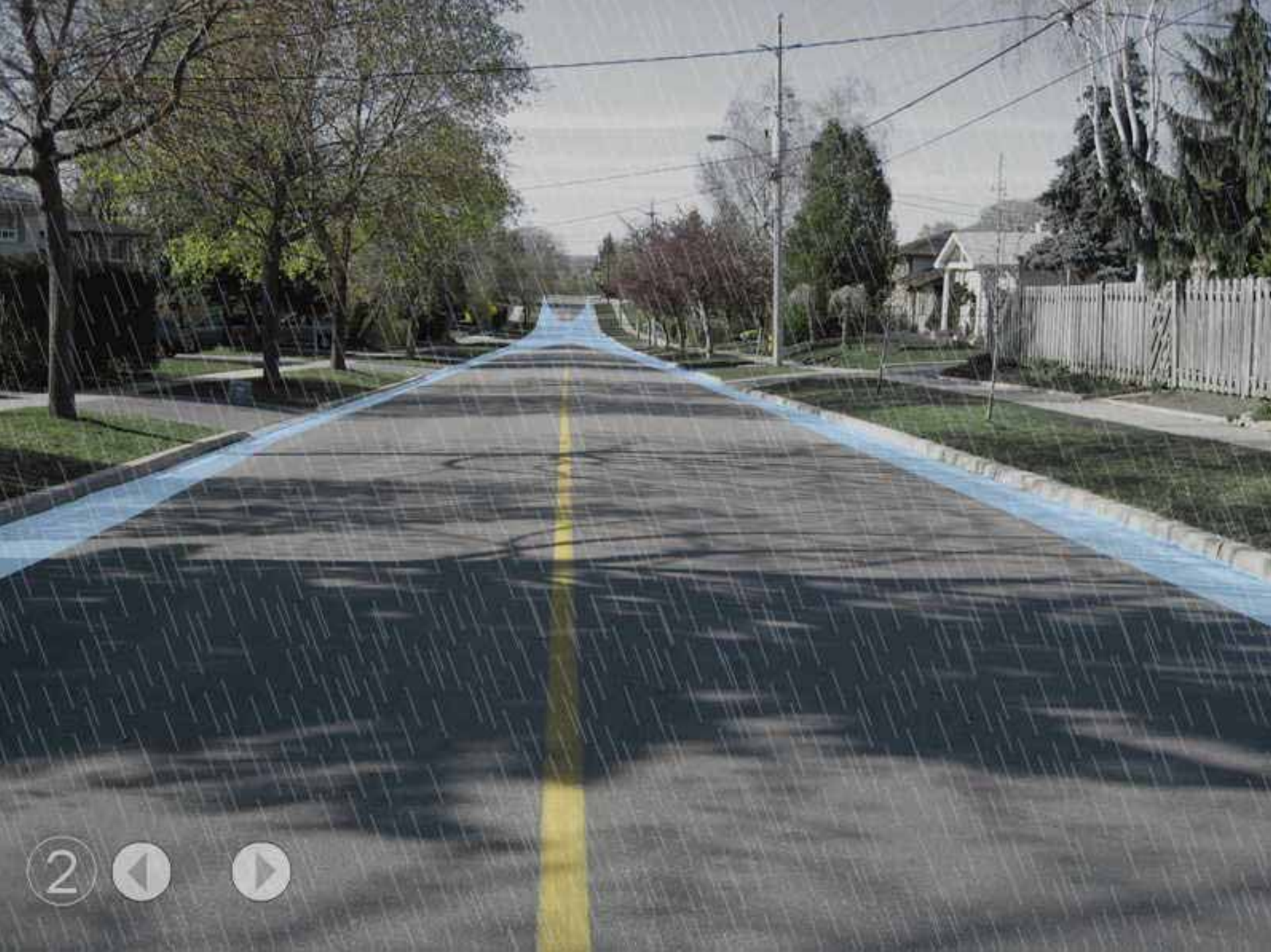
# Overland Flow Paths & Cause of Surface Flooding

# Examples of Surface Conditions



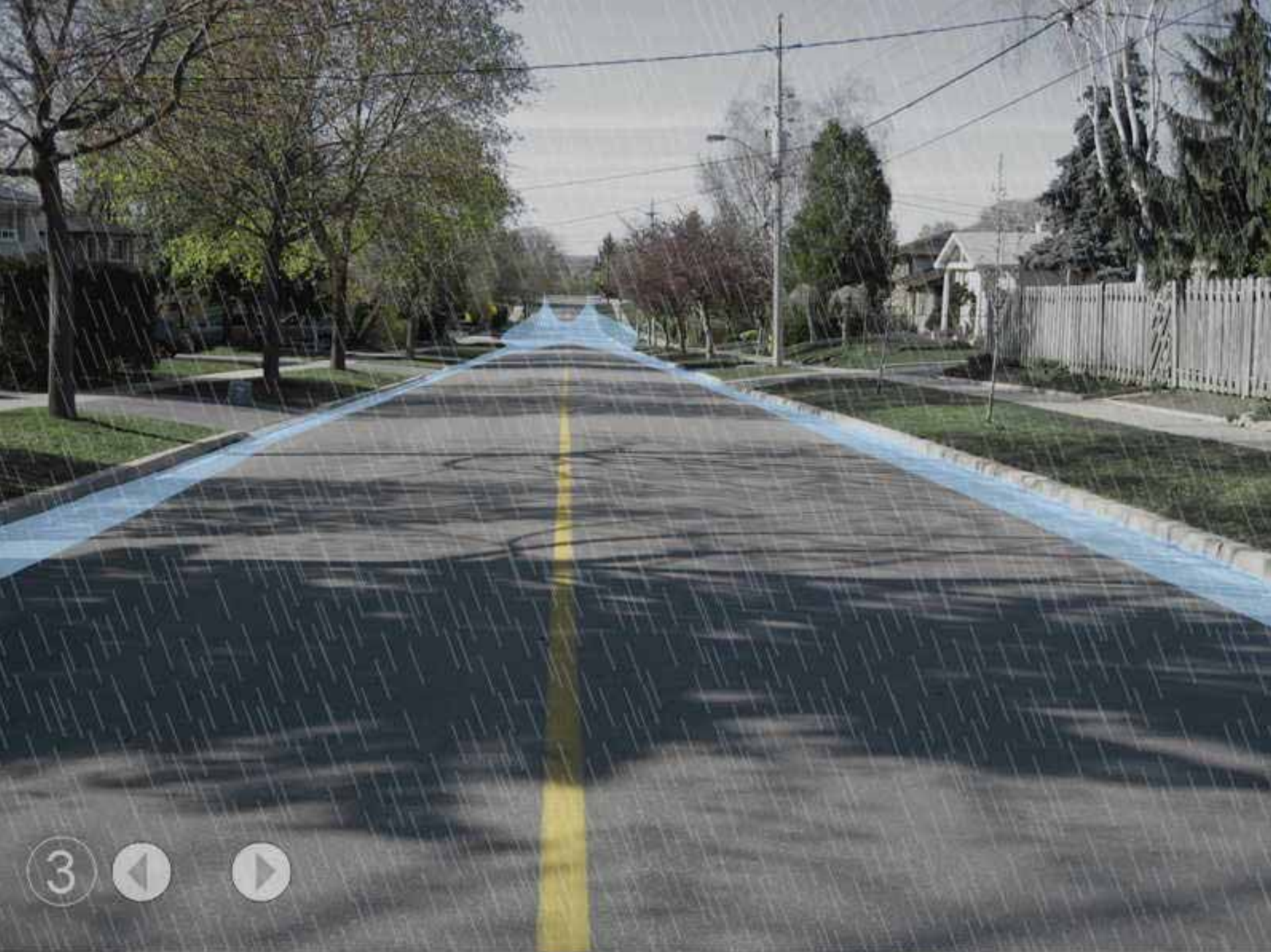
Low Point





2





3





# **What Happens When It Rains?**

## **Interaction of Surface Water with the Sewer Systems Resulting in Basement Flooding**











# Elsewhere Along the Sewer System





**Thank You**

**Staff are available tonight to discuss  
this information further**

# Understanding Drainage

