Hartford MDC

Blue Hills/Granby Area Drainage Study

July 18, 2024

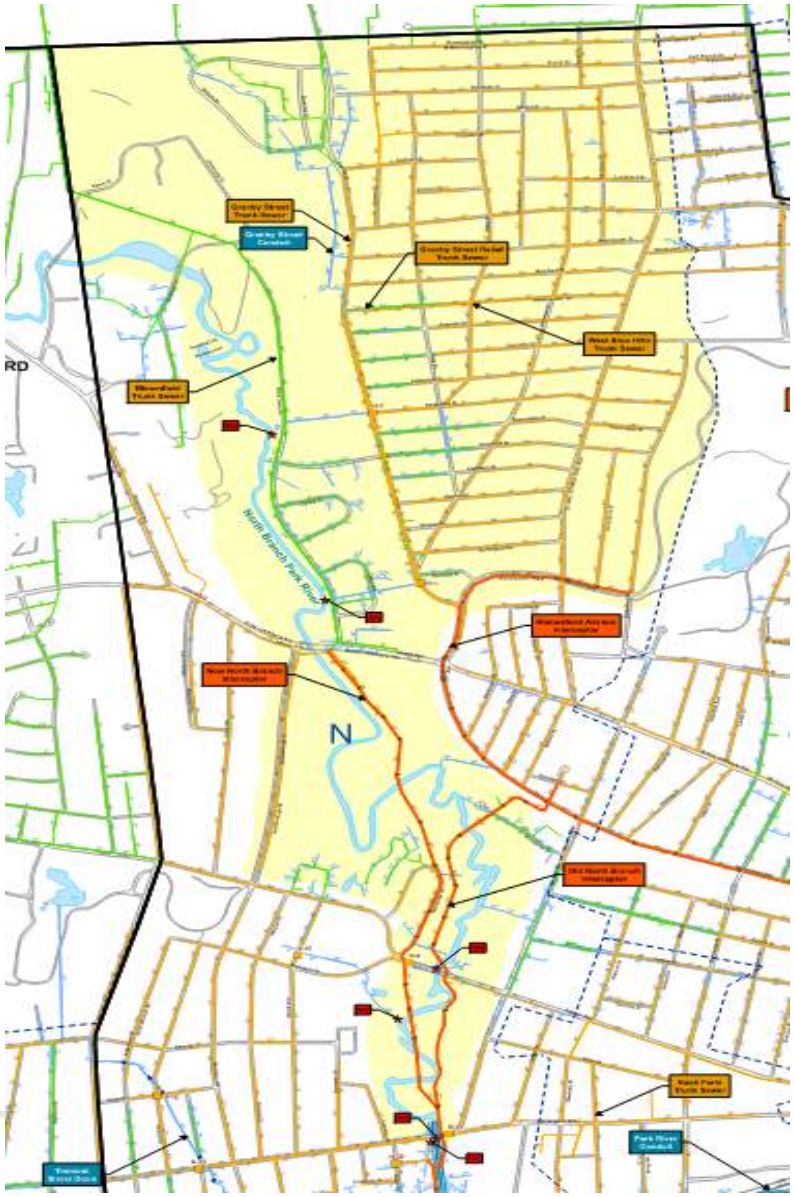
Introductions & Agenda

- Introductions
- Project Overview & Scope
- Flooding
- Field Investigation Findings & Recommendations
- Sewer Separation Considerations
- Next Steps

Project Overview/Scope

Project Overview

- Project established in response to flooding in the Granby/Blue Hills area of Hartford (in yellow on figure)
- Two main components:
  - Evaluation of North Branch Park River (NBPR) for City
  - Sewer Separation Preliminary Design for MDC



Project Scope

- Evaluation of North Branch Park River (for City)
  - Review past reports
  - Walk NBPR from Farmington Ave (PRC entrance) to UHART bridge to document existing conditions and identify deficiencies
  - Collect sediment samples for environmental & geotechnical testing
  - Develop memo to document existing conditions & make recommendations
- Sewer Separation Preliminary Design (for MDC)
  - CCTV and meter existing drains
  - Perform hydraulic modeling of pipe network
  - Develop plans & profiles for proposed drains (including outfalls) to separate storm flow out of existing combined sewers

Why Are We Doing This?

- Several large storms in recent years have caused major flooding
- Impacts to residents, schools, businesses and other properties
- MDC's Long-Term Control Plan requires elimination of Combined Sewer Overflows (CSOs)

https://www.fox61.com/article/news/local/outreach/awareness-months/mdc-releases-statement-on-recent-hartford-flooding-that-left-people-stuck-in-flood-waters/520-602e6be2-fd71-41c8-96e4-3f240f67ed96

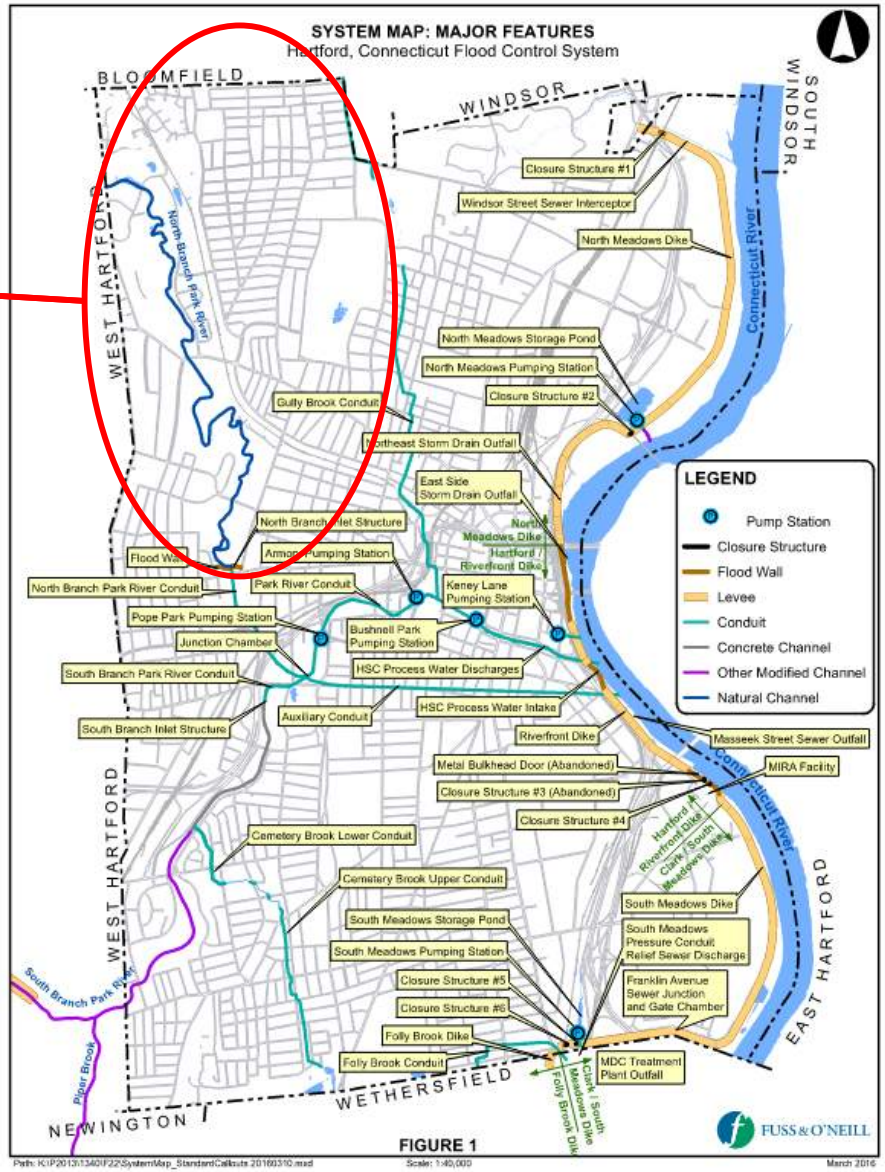
What is causing the flooding in the Granby Area?

- Development in the flood plain
- Railroad swale
  - Ponding between railroad berm and Granby St
- Maintenance issues
  - NBPR
  - Unnamed stream from Granby St Conduit to NBPR
  - Catch basin cleaning, street sweeping
- Culverts under-sized
- Lack of storm drain system

Flooding

Flood Control

- No flood control measures located within project area
- Pump stations in many other locations throughout the city

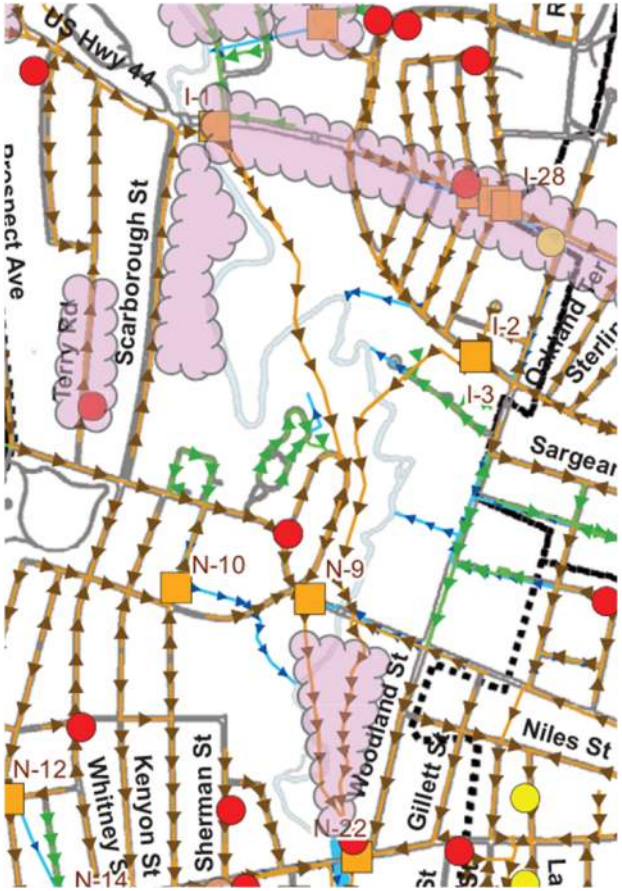


Flood Commission 1959 Report

Future Development. Much of the land along the North Branch which is now undeveloped is fairly level and adaptable for building in the future. It may be expected that if the area is allowed to develop on an unrestricted basis it will gradually be filled up with residences and possibly some small business establishments and industries. Such encroachment should not be allowed to occur since increased losses from future floods would result. To protect against such losses, considerable future construction of flood walls or dikes would be required. This construction would be very expensive and in addition much of the present overbank storage would be lost. For this reason it appears essential to establish encroachment lines within which no private development or land filling could take place. These lines should be as close to the design flood line of Project Storm "A", shown on Plate 18, as is considered practicable after careful study of land costs, taxes, existing buildings, probable flood damages, future streets, and the location of the proposed expressway. The relative volume of overbank storage which would be lost in establishing these lines should be considered also. The land thus reserved would continue to be useful for truck farming or other purposes. Part of it might advantageously be developed as a recreational area with parks and playgrounds contributing to the welfare of the surrounding population.

Report to Greater Hartford Flood Commission upon Control of Floods in Park River, Part 2 Flood Control Works, August 1959, by Metcalf & Eddy

Reported Flooding – South of Albany Ave

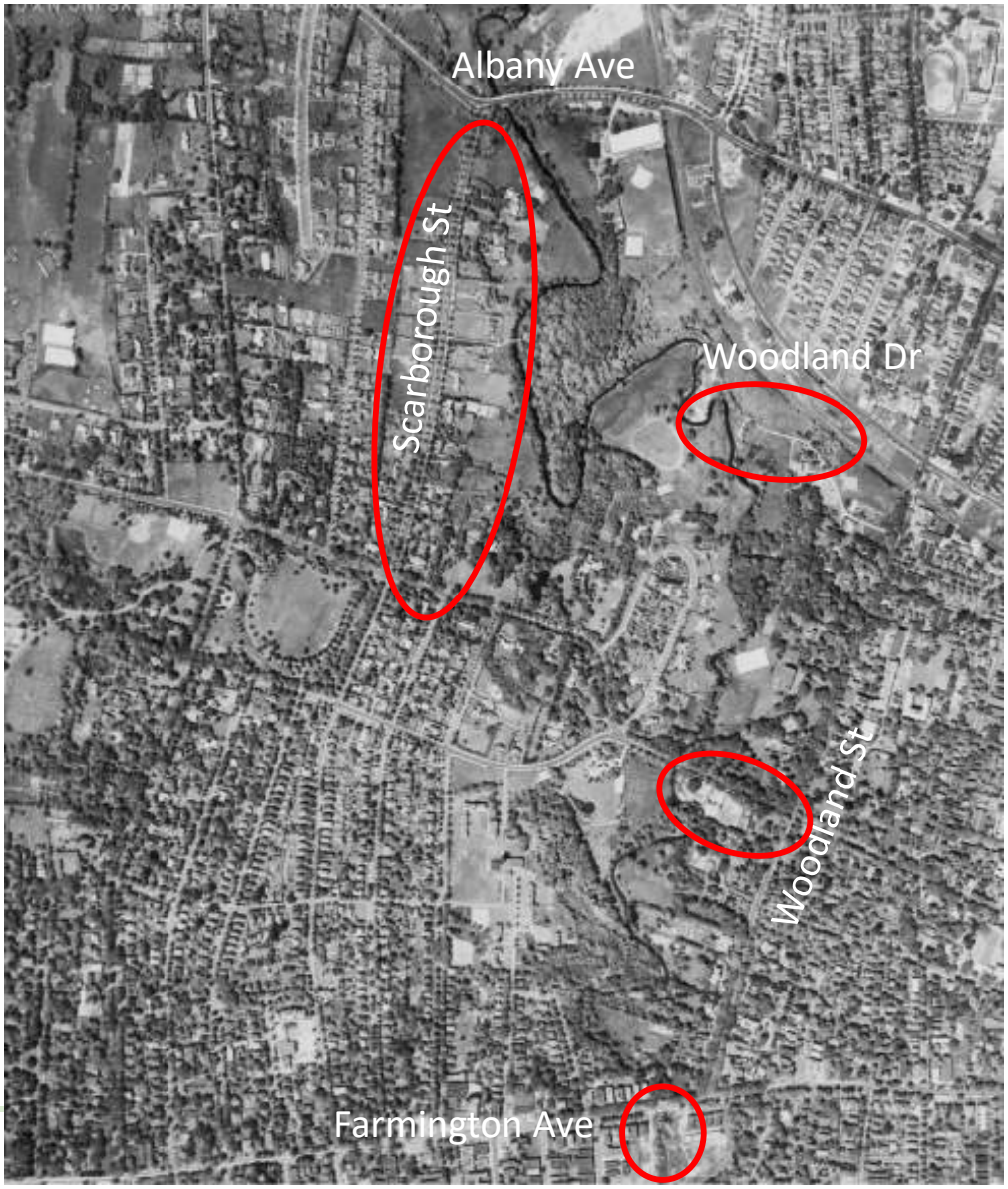


Frequently reported flooding areas:

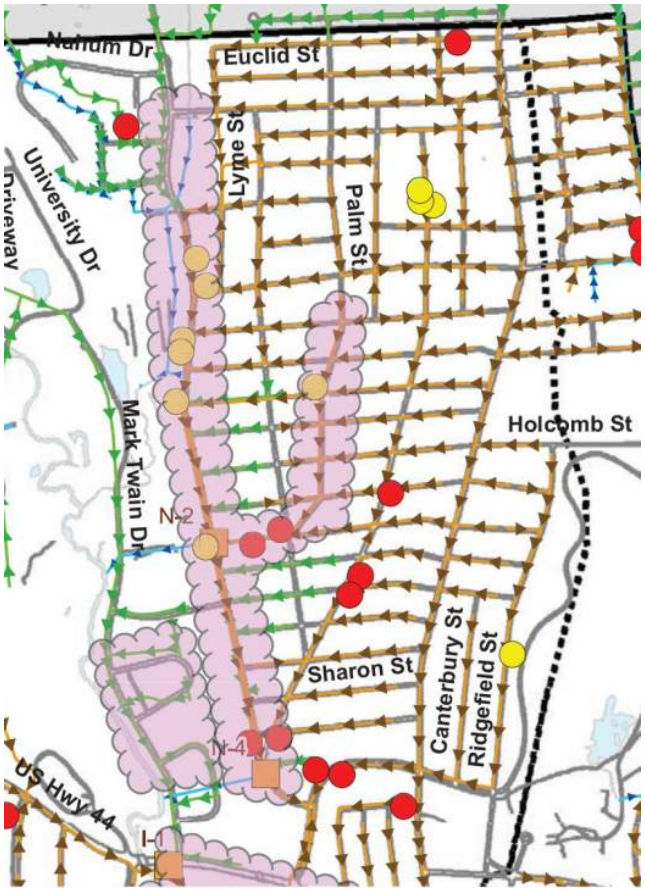
- Scarborough St
- Woodland Dr – public housing
- Woodland St – parking lot

1934 Photo
South of Albany Ave

- Scarborough St – houses
- No Woodland Dr (public housing)
- Woodland St parking area – developed but no buildings
- Park River Conduit (PRC) built in the 1940s



Reported Flooding – North of Albany Ave



Command center calls reporting wet-weather sewer surcharge (since 2020)

Areas prone to flooding per MDC or COH Staff

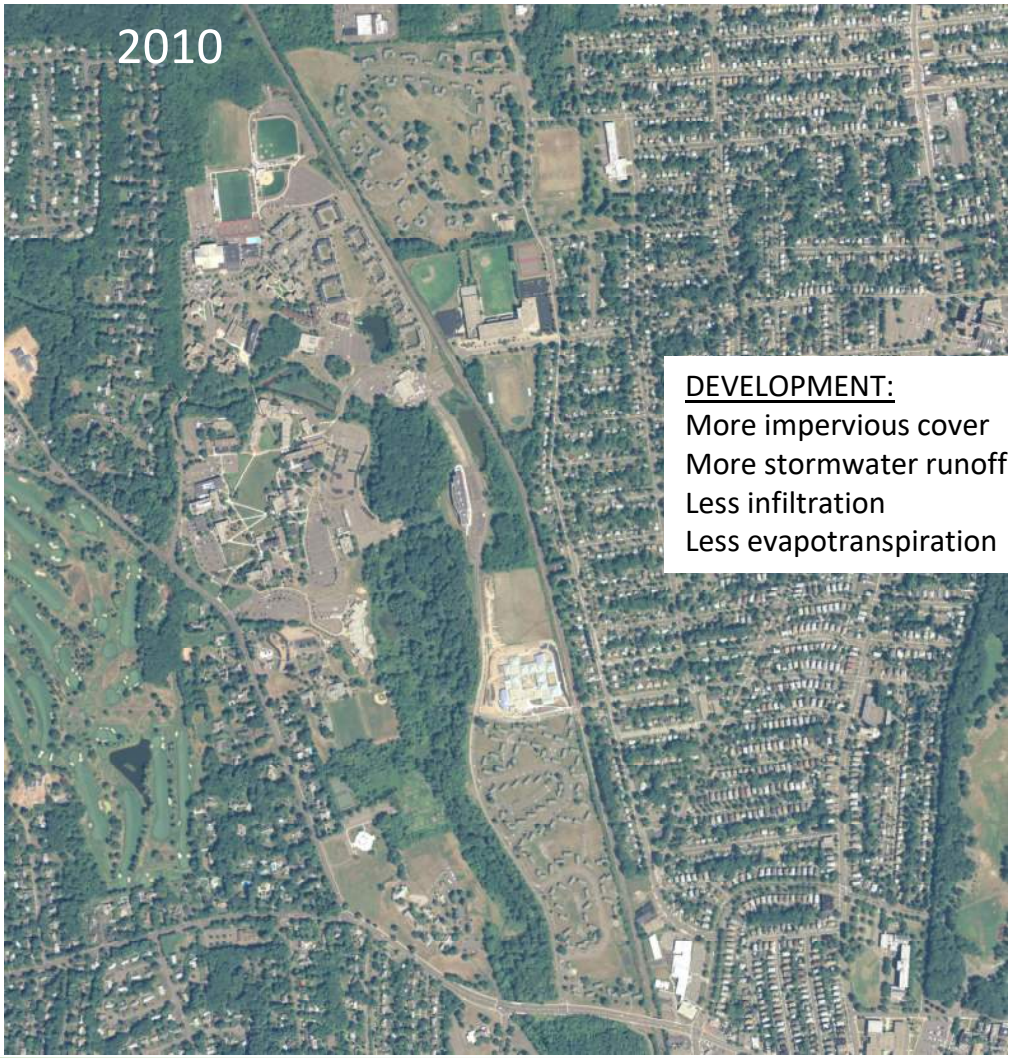
Command center calls reporting wet-weather street flooding or groundwater in basement (since 2020)

Frequently reported flooding areas:

- Mark Twain Dr
- Weaver HS
- Granby St Conduit Inlet
  (Nahum Dr /Burnham St / Granby St)
- UHART
- Granby St
- Cornwall St
- Lyme St
- Palm St

1934 Photo
North of Albany Ave

- Unnamed stream currently in 108” pipe (Granby St Conduit) was a natural channel
- No development between river and railroad tracks
- No development between Granby St and railroad tracks
- No Mark Twain Drive
- No UHART



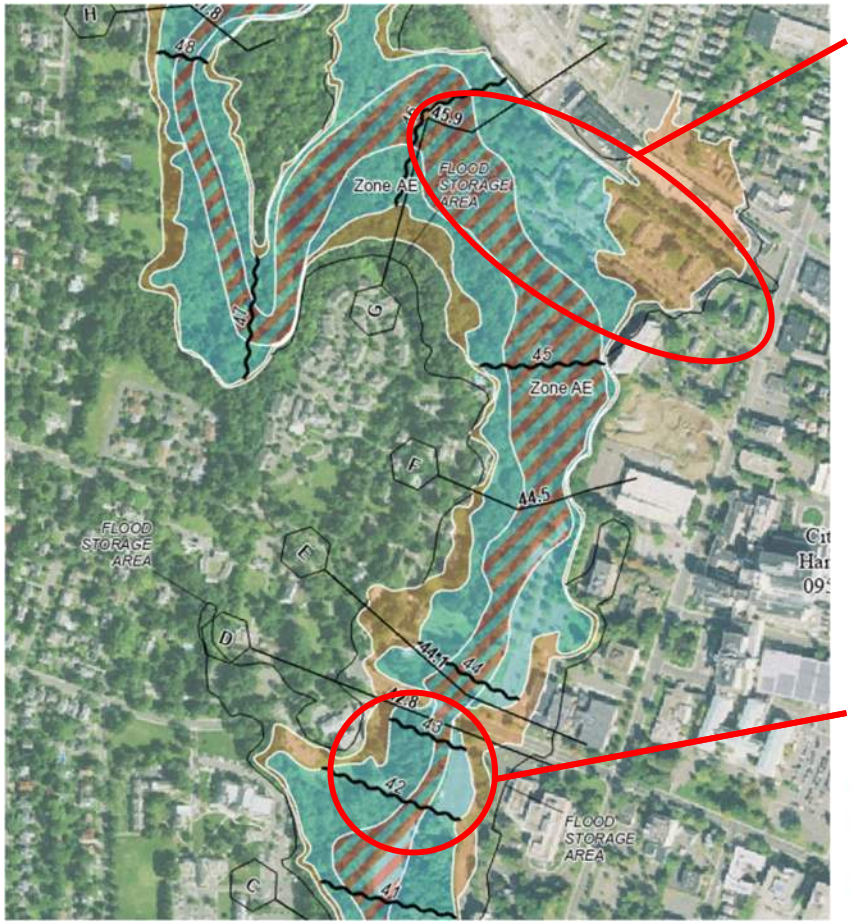
DEVELOPMENT:
More impervious cover
More stormwater runoff
Less infiltration
Less evapotranspiration

CDM Smith

North of Albany Ave

Flooding Adjacent to NBPR

Woodland St Parking Lot, Woodland Dr Apartments



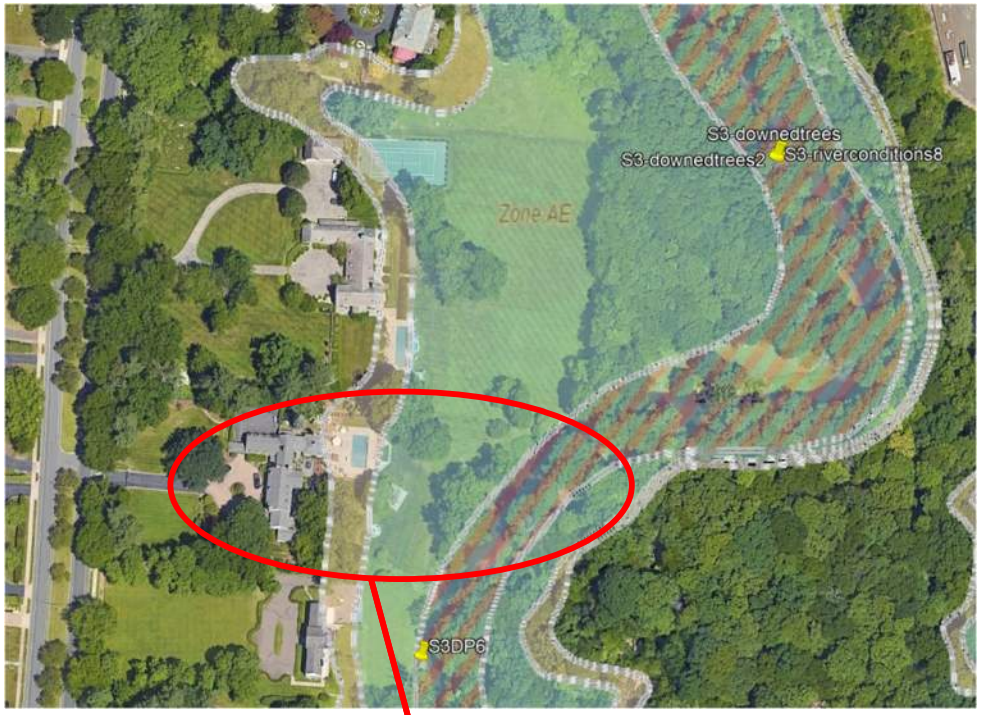
Woodland Dr Apartments

Woodland St Parking

Flood Hazard Zones
- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard

Scarborough St Flooding

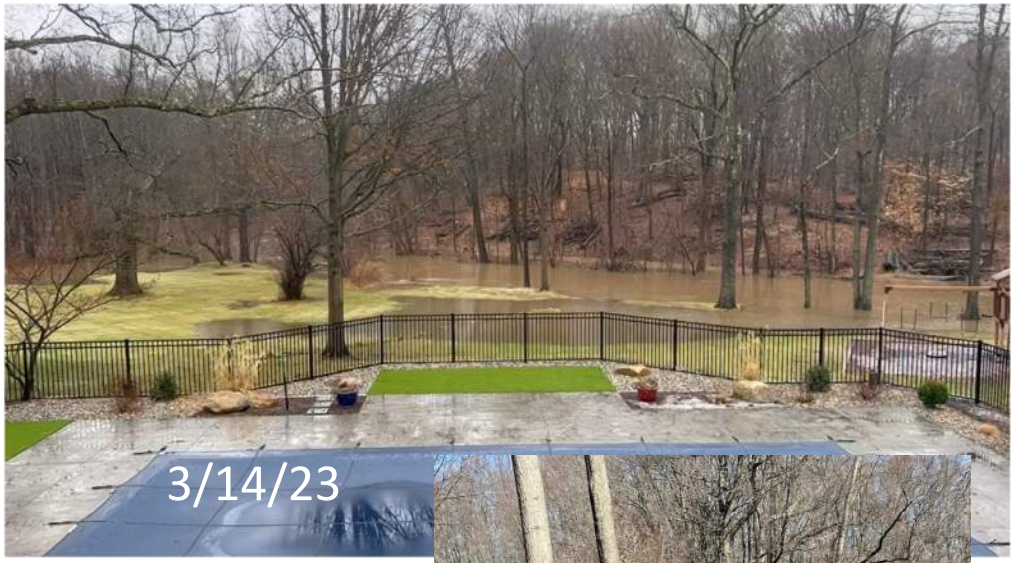
- NBPR floods on to properties
- Buildings built in 500-year flood plain
- Yards, pools, tennis court built in 100-year flood plain



150 Scarborough St

Flooding Example:
150 Scarborough St - Backyard

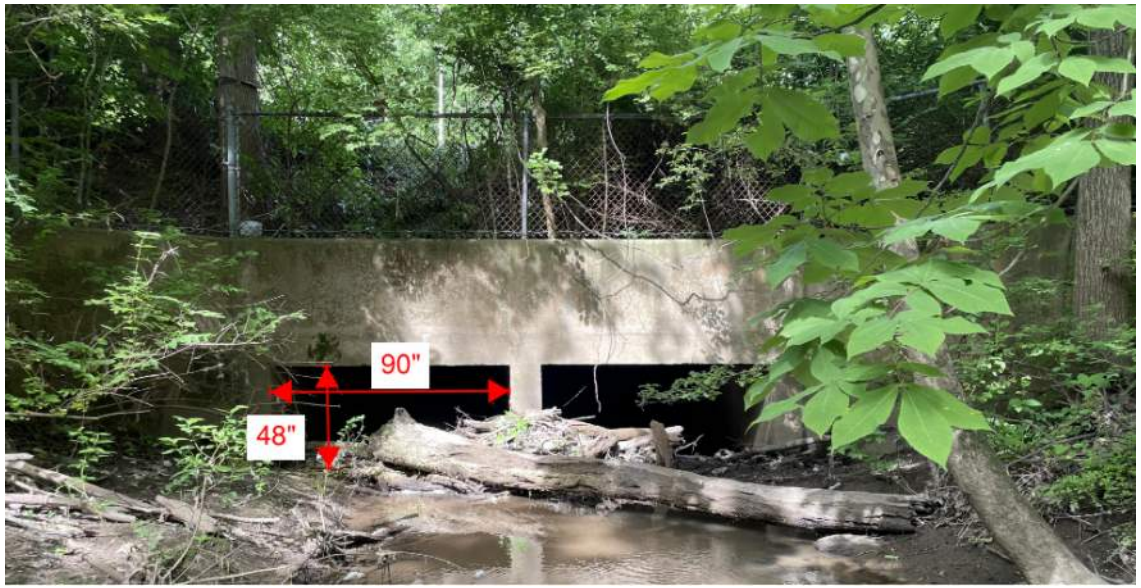
- NPBR flooding into yard
- Riverbank erosion
  - Property owner claims a 5-10’ loss of property
- NBPR section owned by private properties
- If NBPR improved and regularly maintained, up to 2-foot reduction of flooding height
  - Less frequent
  - Smaller impact area



Mark Twain Drive Flooding

- Flood plain of NBPR
- Unnamed stream through Mark Twain Drive Culvert
  - Size and maintenance

Mark Twain Drive Culvert – Maintenance



Looking downstream, toward Mark Twain Drive
Field Visit June 3, 2024

University of Hartford (UHART) Flooding

- Lower-lying parking lots flood
- UHART policy that owners are parking at their own risk

Flash Flood at the University of Hartford 2011

UNIVERSITY OF HARTFORD
DEPARTMENT OF PUBLIC SAFETY

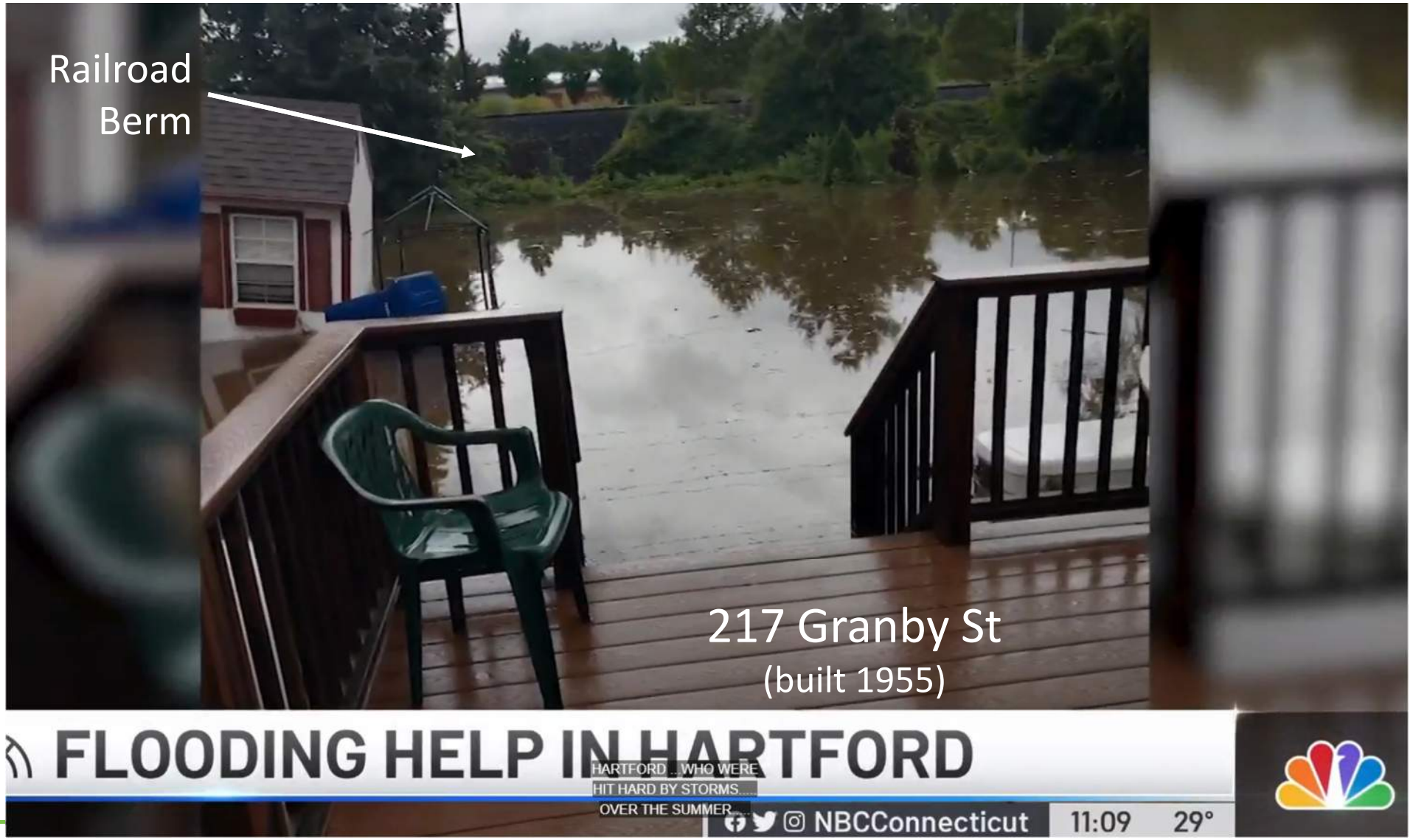
Certain Areas of campus are prone to flooding in heavy rains and weather events, including parking areas. The University of Hartford is not responsible for any damage or loss of motor vehicles or personal property contained in any motor vehicle on campus. Vehicle operators are responsible for familiarizing themselves with current parking rules and regulations. If you are assigned to a parking area that is prone to flooding in heavy rains, it is your responsibility to remove your vehicle from the area in the event of an actual or anticipated flooding occurrence. The University reserves the right in its full discretion to

Flooding between Railroad Tracks and Granby St

Flooding Between Granby St and Railroad

- Railroad tracks built before homes on Granby St
- Depressed area between the tracks and the houses does not have proper drainage
- Residents experience flooding on their private property
- In TV report, residents state that is not a new problem, but something that has been prevalent for decades

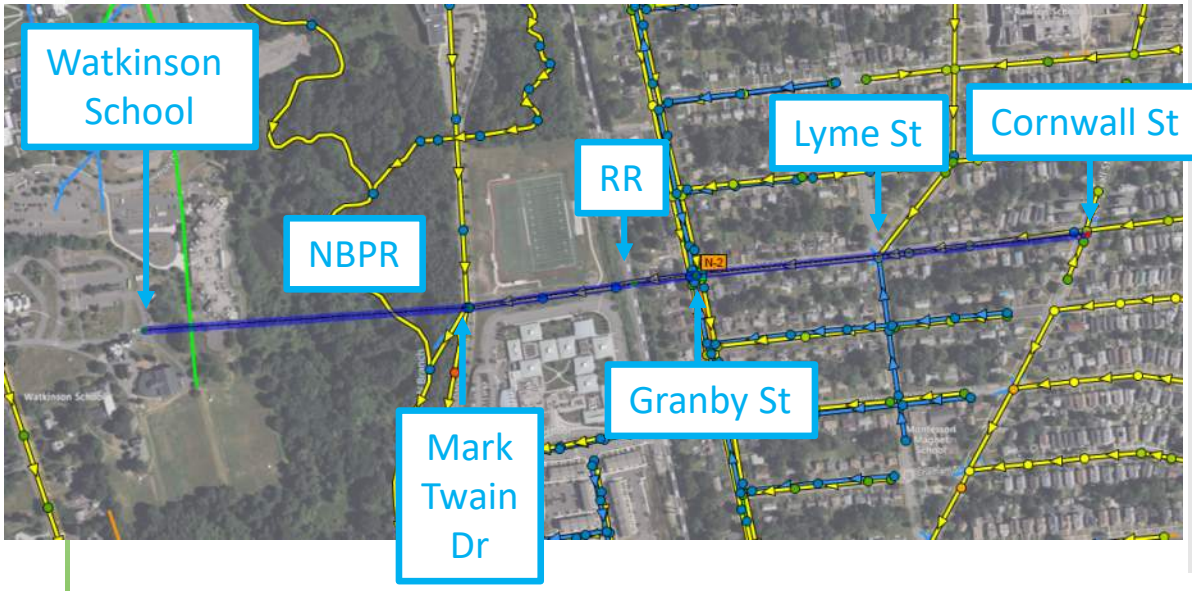
https://www.nbcconnecticut.com/news/local/hartford-fund-offers-residents-help-with-flooding/2661640/
Published Nov 29, 2021

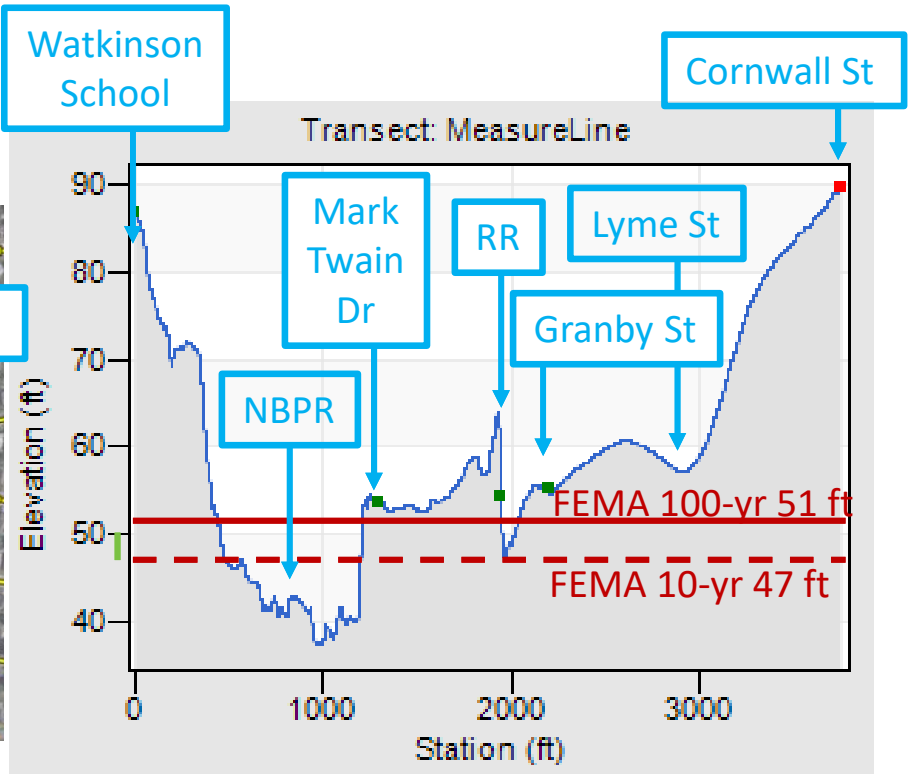


https://www.nbcconnecticut.com/news/local/hartford-fund-offers-residents-help-with-flooding/2661640/ - Published Nov 29, 2021

River Transect near N-2/Granby 1 Outfalls

Transect Location

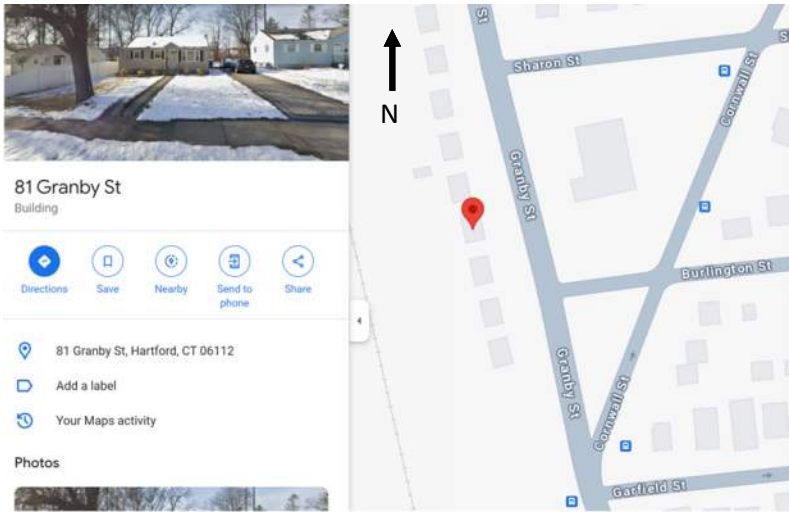


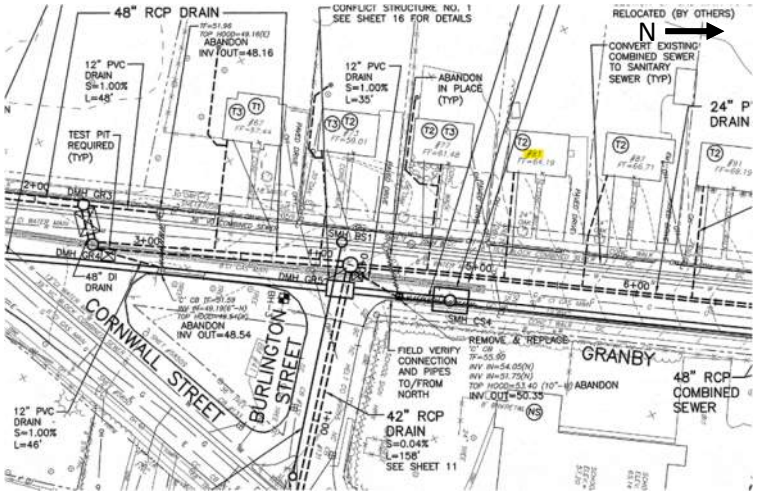


Elevations from Hartford 1-ft DEM
NBPR bottom ~33-36 ft

81 Granby St

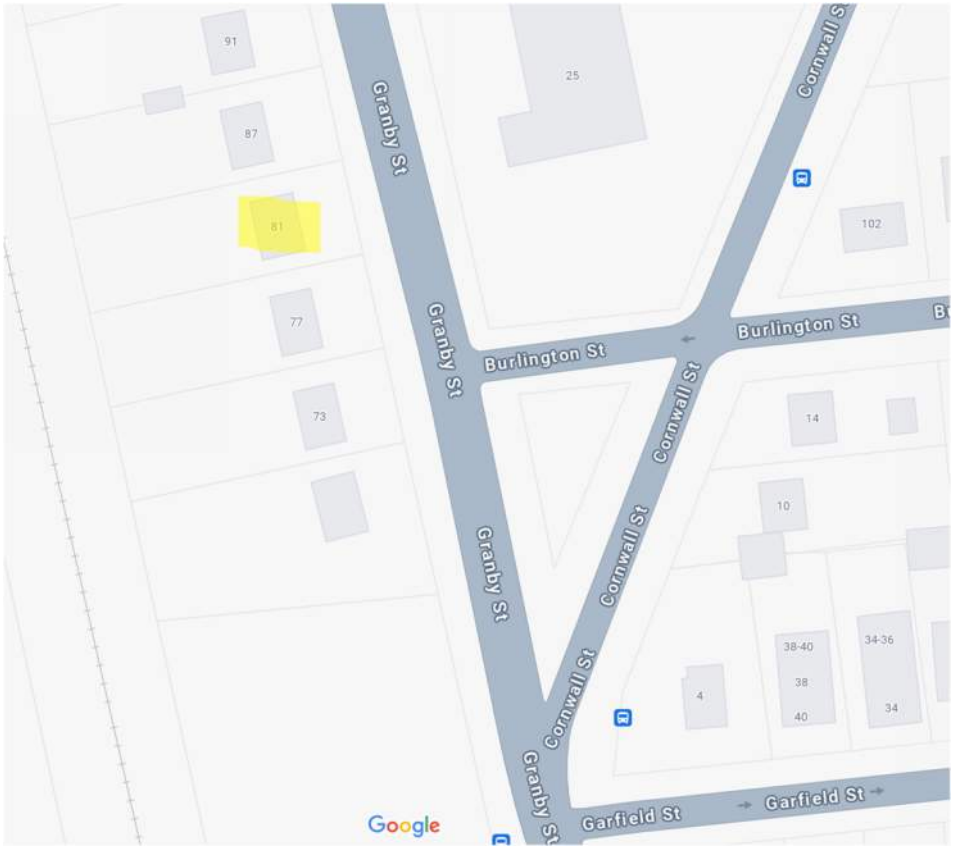
- Located near the intersection of Granby St /Cornwall St / Burlington St
- Separated area with drains connected to N-4 outfall (MDC Granby 5 project)
- Railroad tracks berm in the backyard contributing to flooding (tracks higher than Granby St)
- City hired Freeman Engineers to design storm drainage system to relieve backyard flooding and connect to Westbrook Village
- DOT requested drainage study to determine capacity and license agreement for maintenance
- City needs to coordinate with MDC on where to discharge drainage
- Similar localized flooding as previous backyard flooding example





Burlington St / Cornwall St / Granby St

- Fire department rescue people from cars
- Reports of flooded basements
- Made the national news Aug 2019



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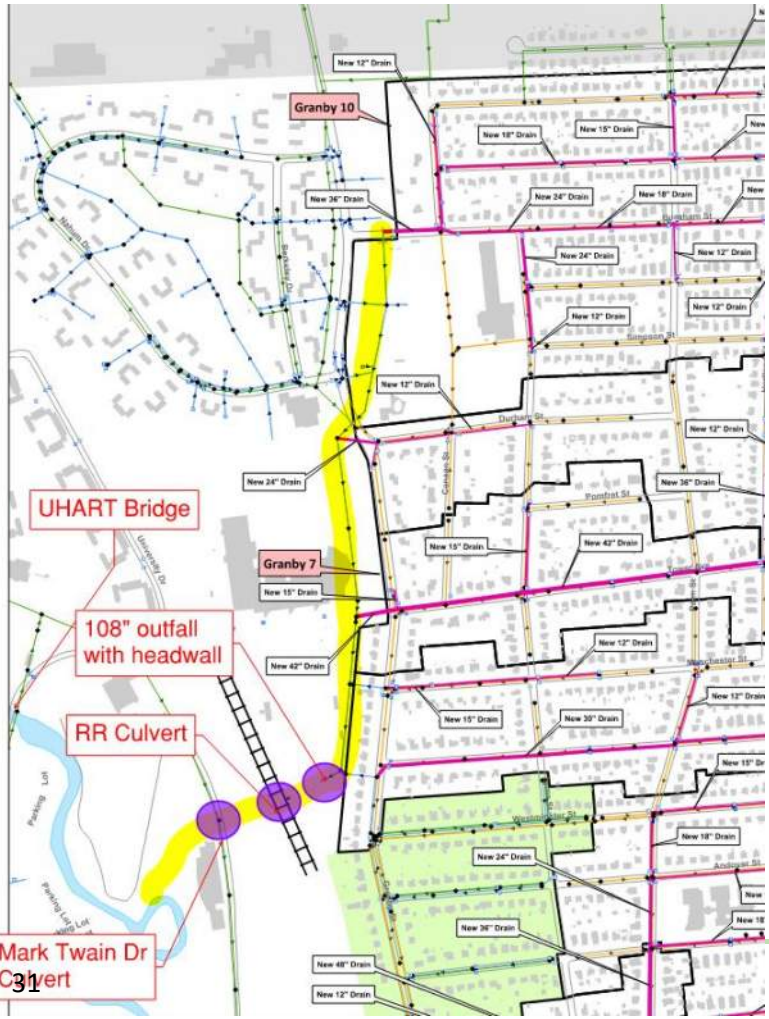
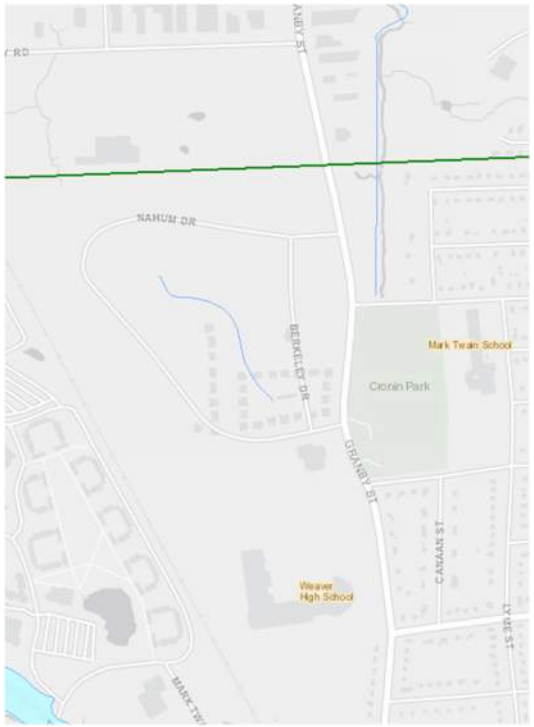
Cornwall Street / Granby Street Flooding

Flooding at Granby St Conduit

Unnamed Stream / City-owned 108” Granby St Conduit

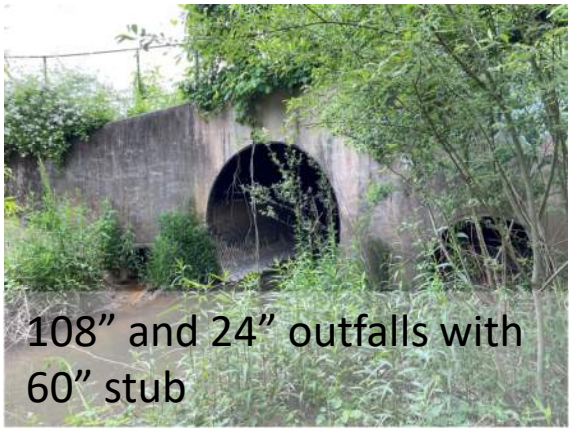




Two unnamed streams were culverted in the Granby St Conduit from south of the Bloomfield Town line to an outlet south of Weaver HS fields, pipe diameter from 90” to 108”

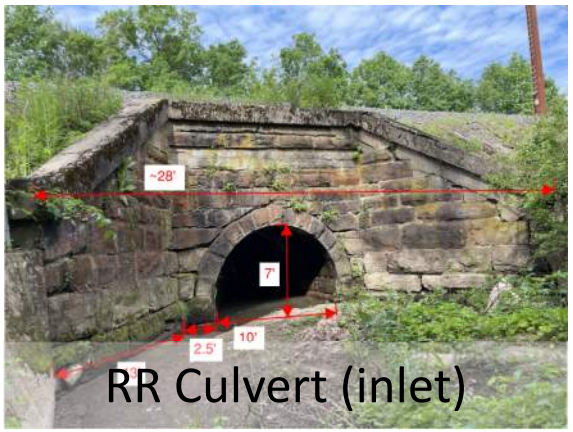
Granby Street Conduit – 108” Outfall and Trapezoidal Channel


Interior of 108” pipe


108” and 24” outfalls with 60” stub


Looking towards 108”


Looking toward RR culvert



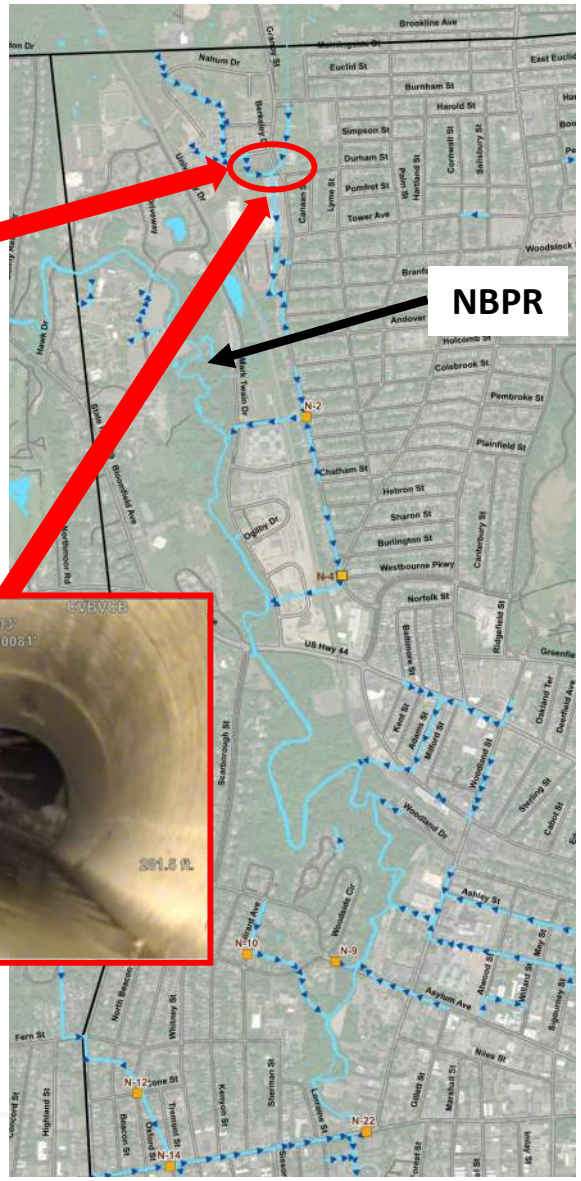
RR Culvert (inlet)


RR culvert outlet (rip-rap)

Field Visit June 3, 2024

Granby Street Conduit – upstream end

- Located in Granby Street near Nahum Drive/ Boys and Girls Club (area that frequently floods)
- City removed large trees from 96” pipe
- Sediment was not removed

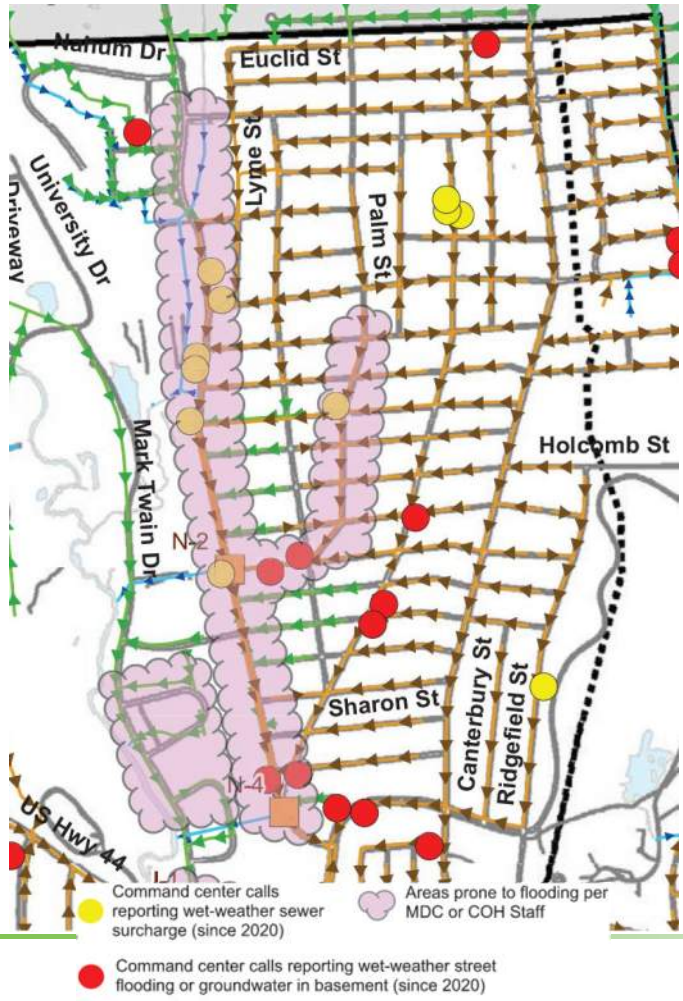


Flooding Granby St Conduit Inlet

Nahum Dr / Granby St / Burnham St Area

Upland Flooding

Upland Flooding Reports – MDC combined sewer



Flooding Reports on Cornwall St, Lyme St, Morningside St, Palm St

- MDC Sewer Separation will improve conditions
  - New storm drain pipes for a 10-year design storm (DOT standard)
  - New storm drain lateral to each property for sump pump connection
  - Will not provide yard drain connections
  - Will still require regular catch basin cleaning and street sweeping

Field Investigation Findings and Recommendations

Field Work Summary

- Walked the river within limits
  - Between 8/23/23 – 10/2/23
  - Identified erosion, bank collapses, sedimentation, tree dams, etc.
  - See handouts for more info, photos
- Drone flyover
  - Between 9/8/23 – 9/22/23
  - Identified tree and debris dams
- Sediment Sampling
  - Between 11/13/23 – 11/16/23
  - Collected 22 sediment samples

Field Investigation Findings - PRC Entrance

- Entrance blocked by debris
- Sedimentation and submerged vegetation
- Most significant sediment depth found here

Park River Conduit (PRC) Inlet

Debris dam at start August 23, 2023

PRC during cleaning, Nov 6, 2023

Debris dam after cleaning, May 28, 2024

Field Investigation Findings

- Tree Dams:
  - Lots of tree dams and downed trees, collecting trash (see handout, Figure 2)
  - North of Albany Ave had the most tree dams within the project area, and most tree canopy

Field Investigation Findings

- Undercut banks: undermines trees on the banks causing them to eventually fall in and mobilize downstream

- Near vertical banks: cuts off river from flood plains and causes flows to reach downstream much quicker, **increasing the chances of flooding and erosion**

Field Investigation Findings

- <u>Structures in Floodplain:</u> Many adjacent properties have structures (pools, playsets, patios, etc.) located within floodplain, and no forested buffer; grass right up to banks

Backyard of 150 Scarborough St

Field Investigation Findings

- Sediment Sampling:
  - 23 samples collected for geotechnical and environmental testing
  - Depths range from 4"-18"
  - See handout Figure 4
  - Highest accumulation near PRC, and other localized areas

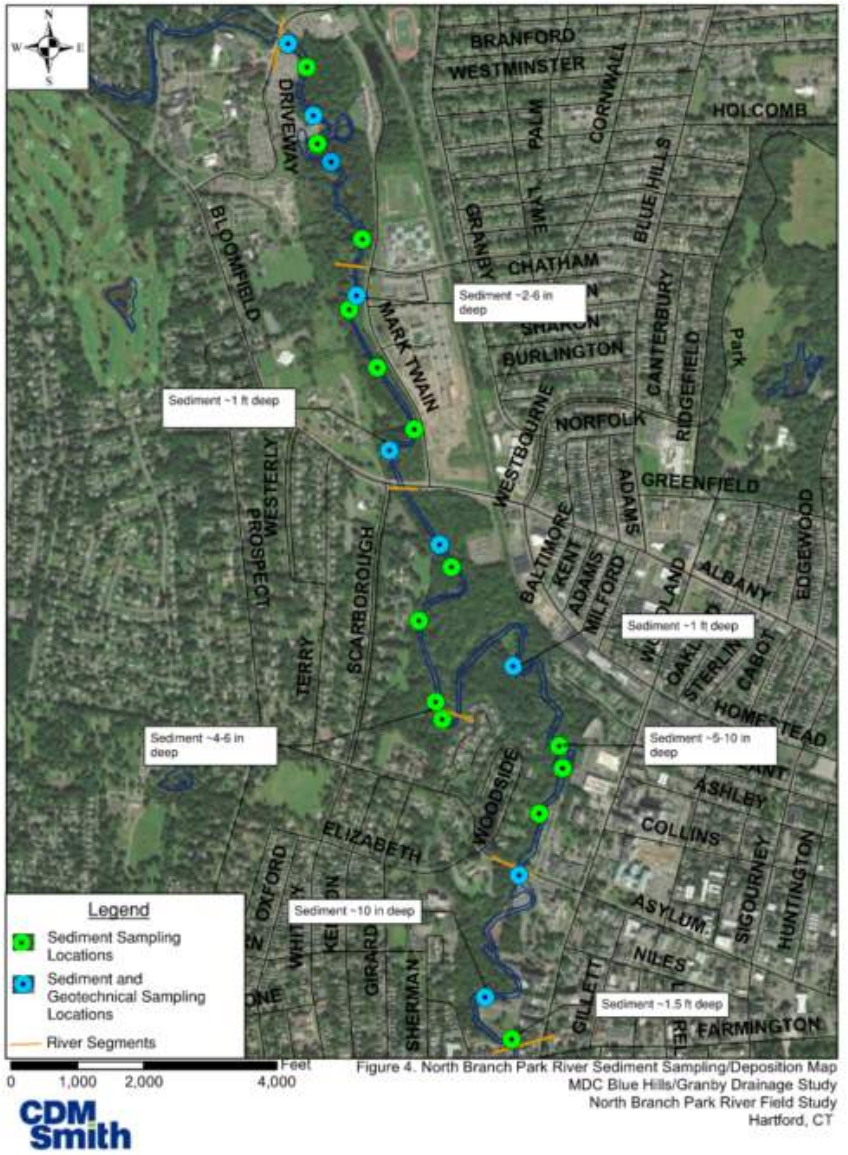


Figure 4. North Branch Park River Sediment Sampling/Deposition Map
MDC Blue Hills/Granby Drainage Study
North Branch Park River Field Study
Hartford, CT

CDM Smith

Recommendations for City

Further Study:

- Complete bathymetry survey
- Model river with HEC-RAS
- Install more stream gauges (currently only 1 at Albany)
- Install WaterCAST sensors at PRC, Asylum, UHART bridge

Regular Maintenance:

- Remove trees/debris dams regularly (especially at PRC entrance)
- Remove leaning trees on banks
- Clean existing pipes, culverts, channels

Recommendations for City

River Improvements:

- Grade back banks to restore near-dynamic equilibrium
- Widening banks and dredging in selected locations
- Reinforce actively eroding sections with root wads or rip rap
- Increase natural floodplain storage by excavating basins
- Increase woodland floodplains by removing parking lots (Woodland St, UHART), MS4 benefit
- Construct berms around flood prone properties (ex: University High School of Science & Engineering on Mark Twain Dr)

Education and Planning:

- Educate property owners on floodplains and forested buffers (Scarborough St)
- Do not allow further development in floodplain
- Relocate housing out of floodplain via land purchases (Woodland Dr), MS4 benefit

WaterCAST - River Monitoring

- Install sensors at various locations to monitor river elevation
- If sensors detect abnormal/ rising river elevation, automatic alert sent to City to have the area checked for blockages and cleaned
- Can correlate with weather
- Potential locations:
  - PRC entrance
  - Bridges (UHART, Albany, Asylum)

Sewer Separation

Sewer Separation

- Current MDC system is combined sewers – a single pipe for both sewage and storm
- Proposing installation of new drains to separate the systems

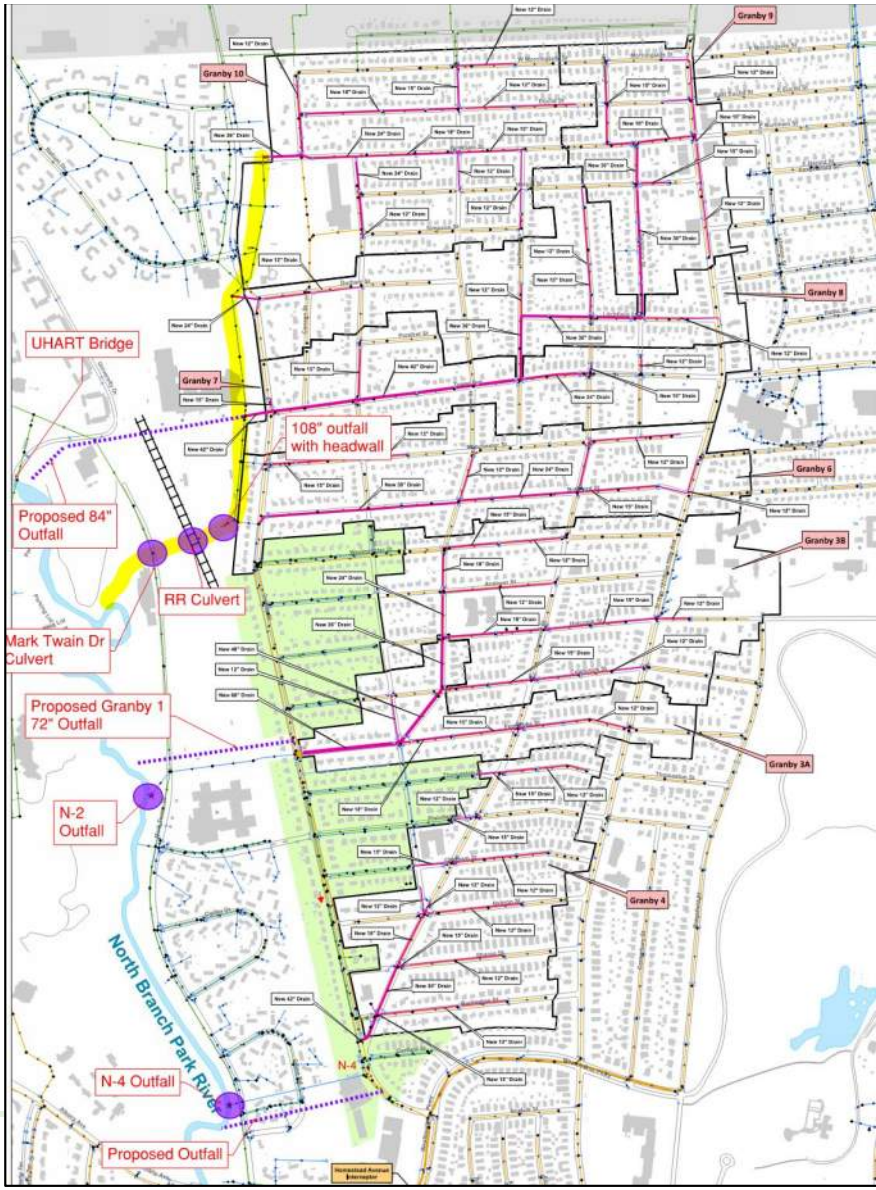
Separated System

Addressing flooding between RR tracks and houses may require improvements to existing private systems and/or connections to outfall pipes

Graphic source amwua.org

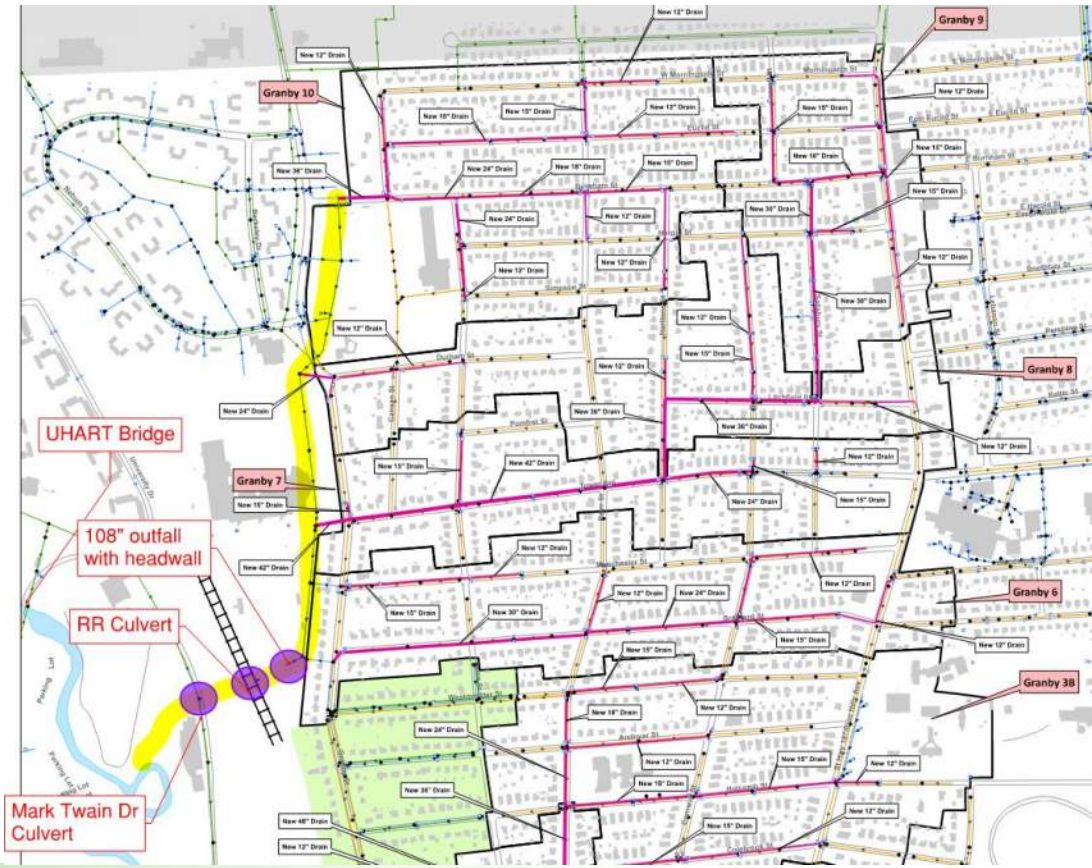
Granby Area Separation

- Existing Outfalls:
  - 108” Granby St Conduit
  - Combined sewer overflow (CSO) N-2
  - Combined sewer overflow (CSO) N-4
- *Additional* Stormwater Outfalls:
  - 84” outfall near Tower Ave / Weaver HS
  - 72” outfall between 227 and 233 Granby St (previously designed and permitted “Granby 1”)
  - 72” to 84” outfall from 45 Granby St: Westbrook Village easement or pumping station with force main



Unnamed Stream / Granby St Conduit / 108”

- MDC’s Long-Term Control Plan proposed connecting new drains to 108” Granby St Conduit
- CCTV maintenance recommendations
- Site Visit maintenance recommendations

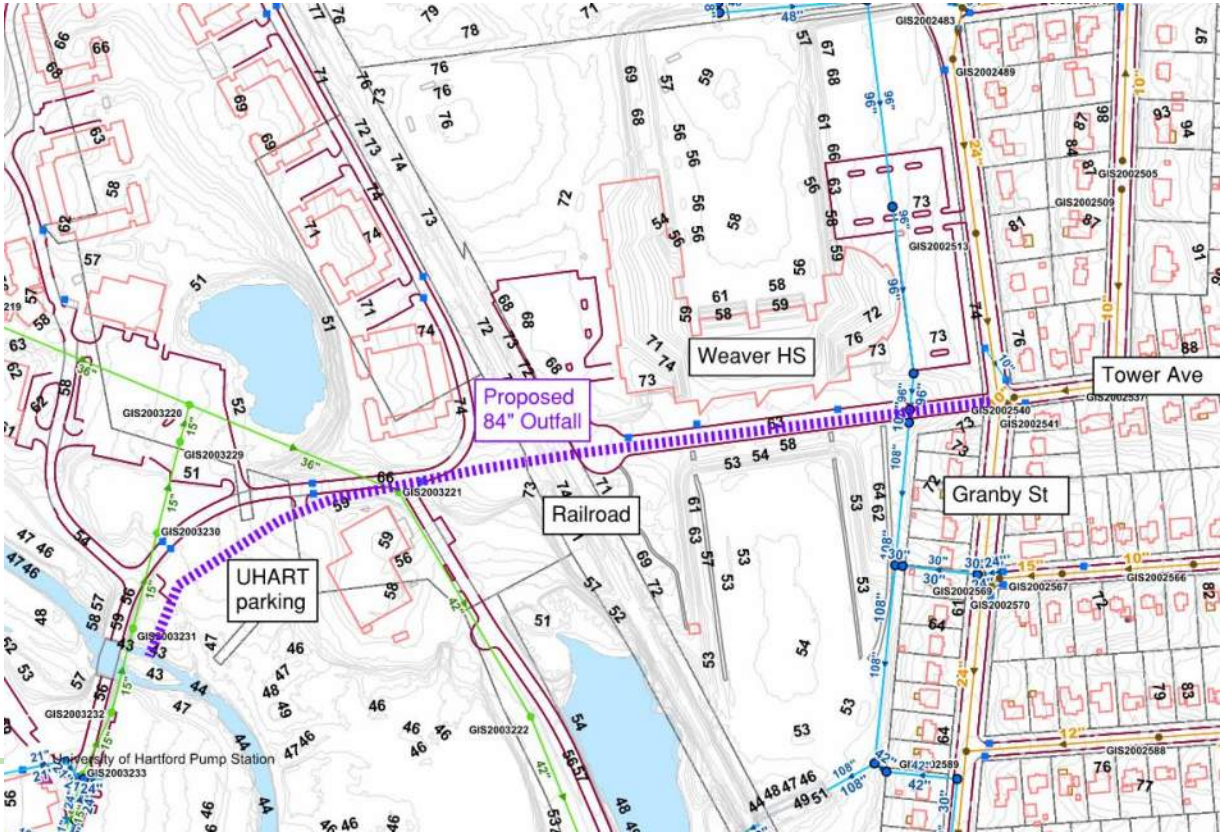


Unnamed Stream, 108” Granby St Conduit

- Needs maintenance to address current flooding issues
- New drains could connect to this conduit if the pipe was better maintained and not already causing flooding
- Currently proceeding with **new drain outfall** for this area unless City can clean and improve the existing pipe because don’t want to exacerbate flooding
- Will cause delay to schedule for separation in area as outfall would need to be built first

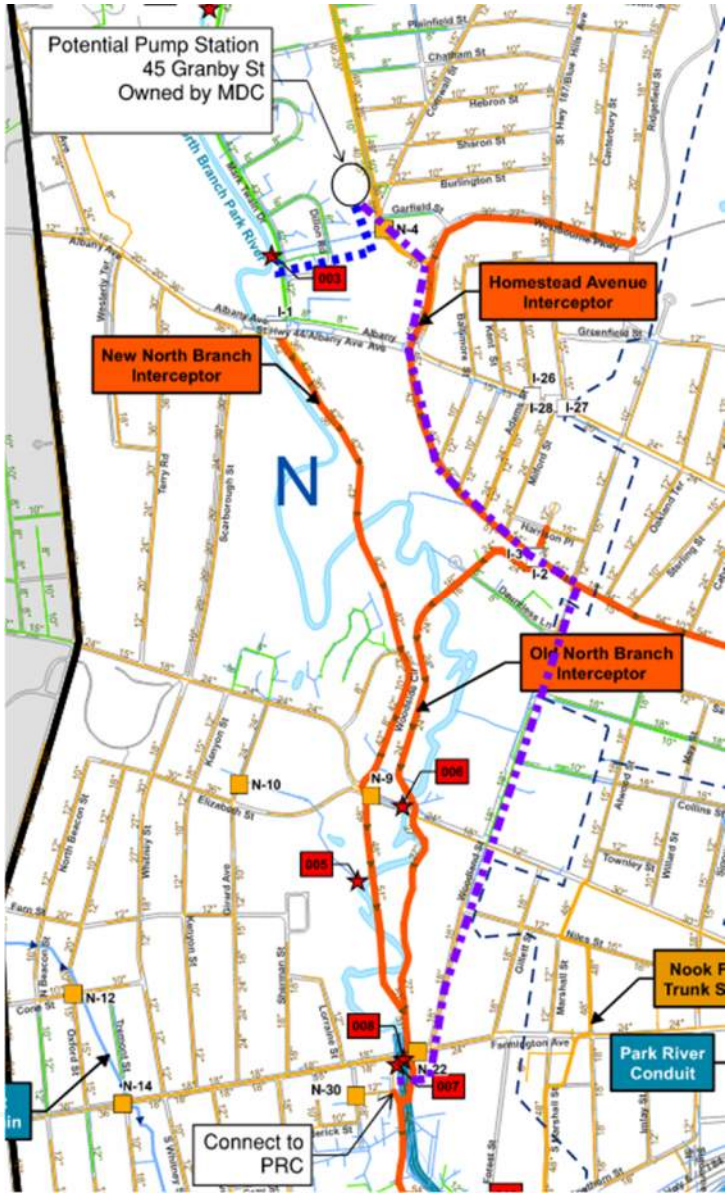
Potential New Northern Outfall

- Convey flow from Granby 7, 8, 9, 10 to NBPR by gravity
- 84” pipe and new outfall



Stormwater Pumping Station

- Separation could worsen flooding along river
- If river improvements are not made, pump station (PS) may be needed
- PS Location: 45 Granby St, owned by MDC and adjacent to N-4
- Force main Option 1: 45 Granby St to NBPR through Westbrook Village
- Force main Option 2: 45 Granby St to Park River Conduit south of Farmington Ave (1.6 miles)



Next Steps

Next Steps

- Finalize river recommendations and costs for NBPR and Unnamed Stream (108” Granby St Conduit) for City
  - NBPR and unnamed stream improvements
  - Perform regular maintenance
- Sewer separation preliminary design for MDC
  - Finalize outfall locations
  - Layout new drain pipes