

Bowling Green 4 - Phase Stormwater Management Project



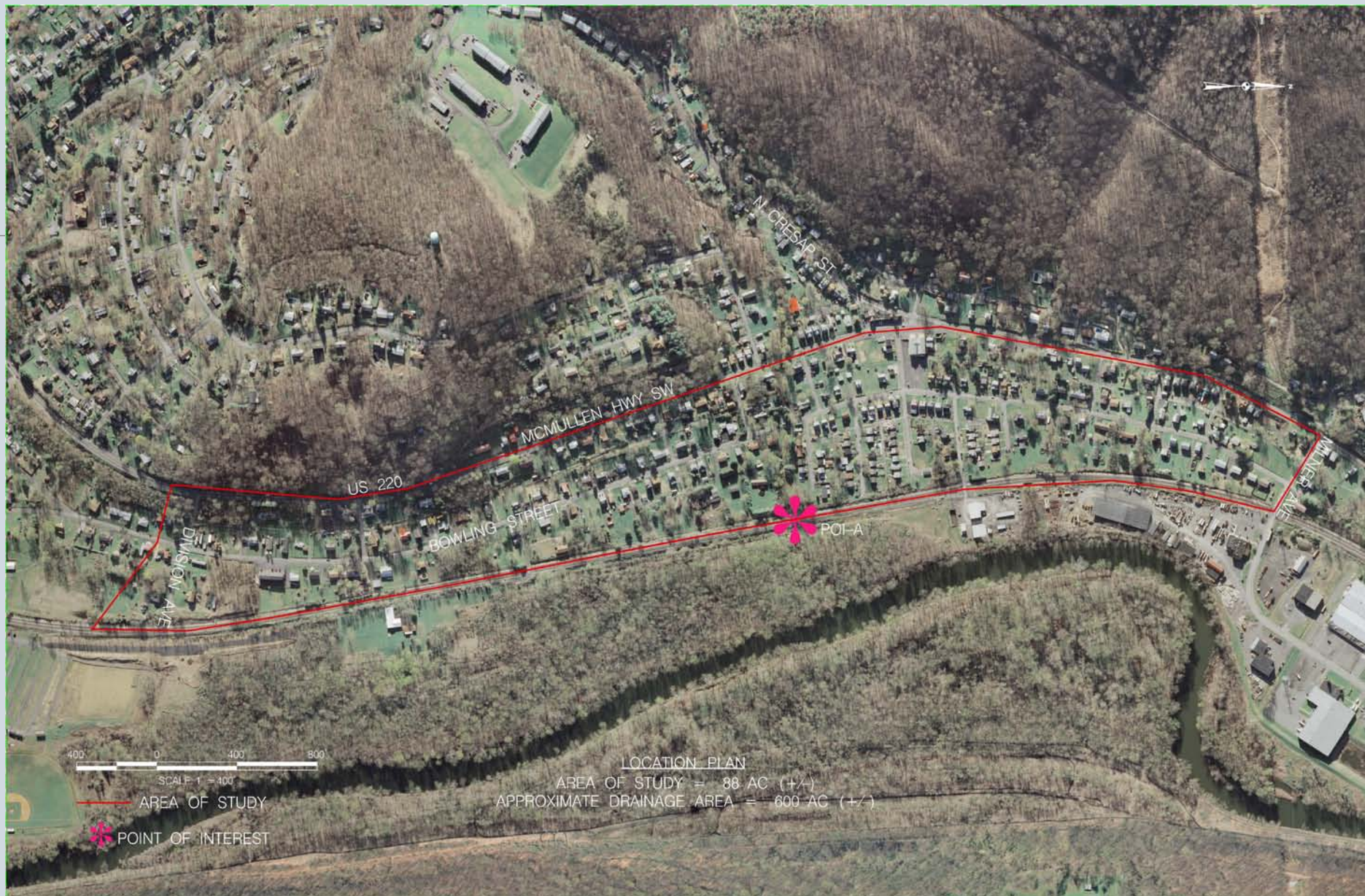
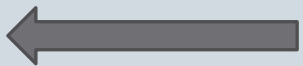
**MARYLAND ASSOCIATION OF FLOODPLAIN
AND STORMWATER MANAGERS**

JUNE 19, 2019

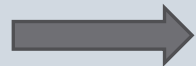
ROCKY GAP RESORT & CASINO



ALLEGANY COUNTY
FAIRGROUNDS –
CREASAPTOWN, MD

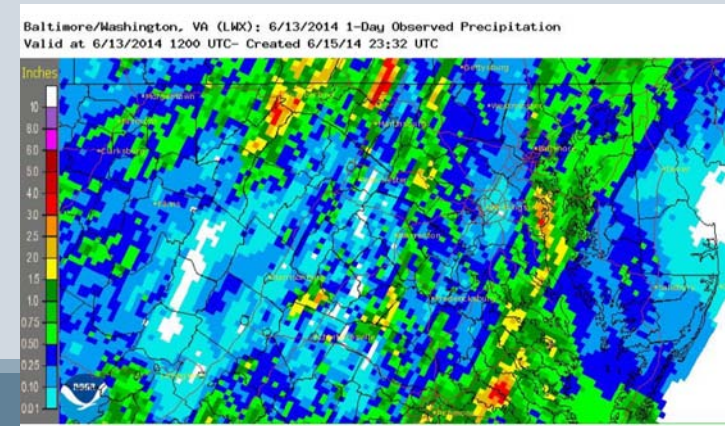
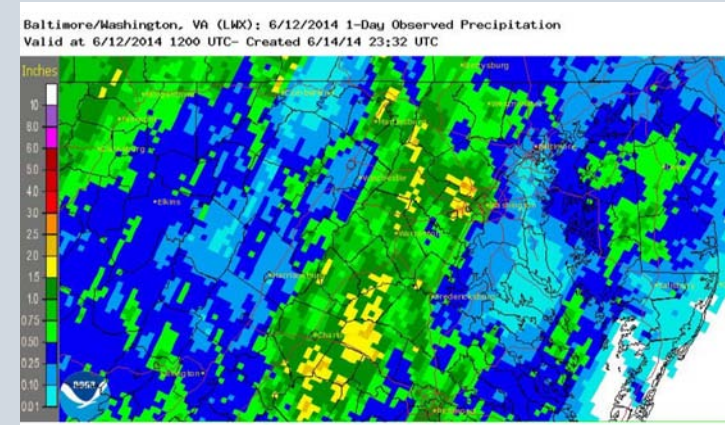
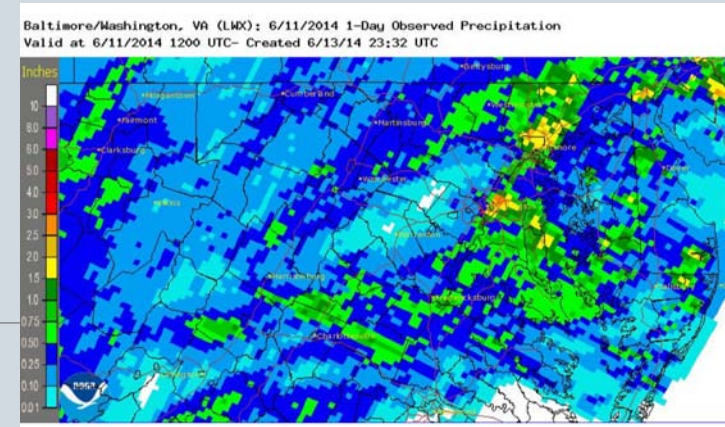


I - 68
EXIT 42



Introduction

- Location of Project:
 - Bowling Green (unincorporated), Allegany County, Maryland
- What prompted this project?
 - 100 year storm event – June 12, 2014
 - 2.5 inches/hour of rainfall within a 90 – 120 minute period
 - Consistent rainfall for a 2-day period of time = 3 – 5 inches overall
 - Major flooding within the Bowling Green area & Cresaptown area
- Remedial response from:
 - Maryland Local Delegates
 - Maryland State Highway Administration
 - Allegany County Department of Public Works





Pecan Avenue - During Storm Event





Pecan Avenue – Before Storm Event & Current Conditions

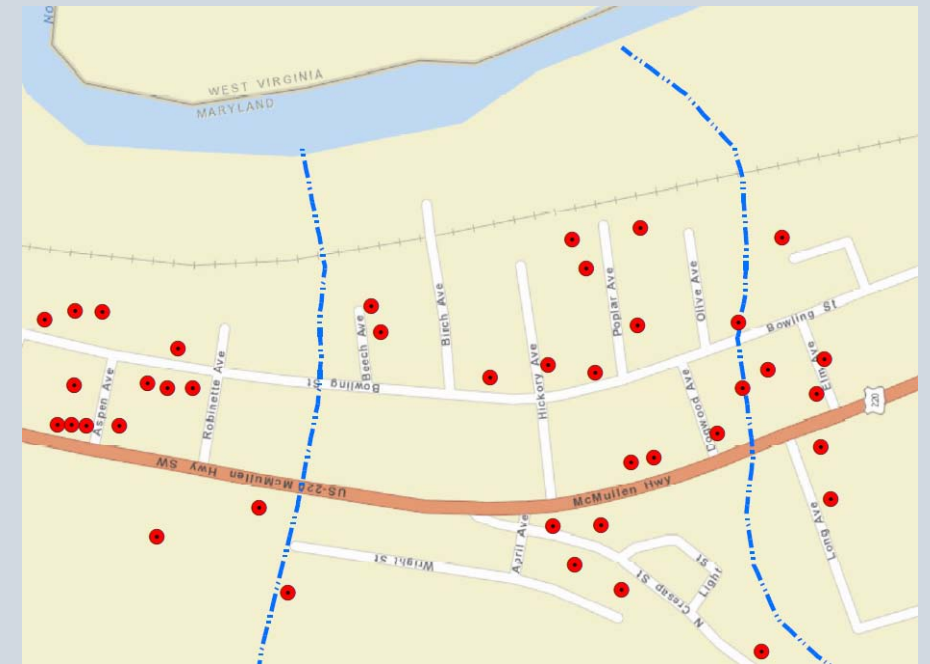




US 220 McMullen Highway – Damage from Storm Event

Response

- Maryland State Highway Administration (SHA) conducted a public meeting on September 25, 2014.
- From the public meeting SHA received:
 - Flood surveys from residents
 - Photos from residents
 - General information letters from residents
- Results:
 - SHA initiated a Hydraulic & Hydrology Study for the area of Bowling Green from Milnor Avenue (North) to Moss Avenue (South) along US 220 McMullen Highway to be completed by Whitney Bailey Cox & Magnani, LLC (WBCM) .

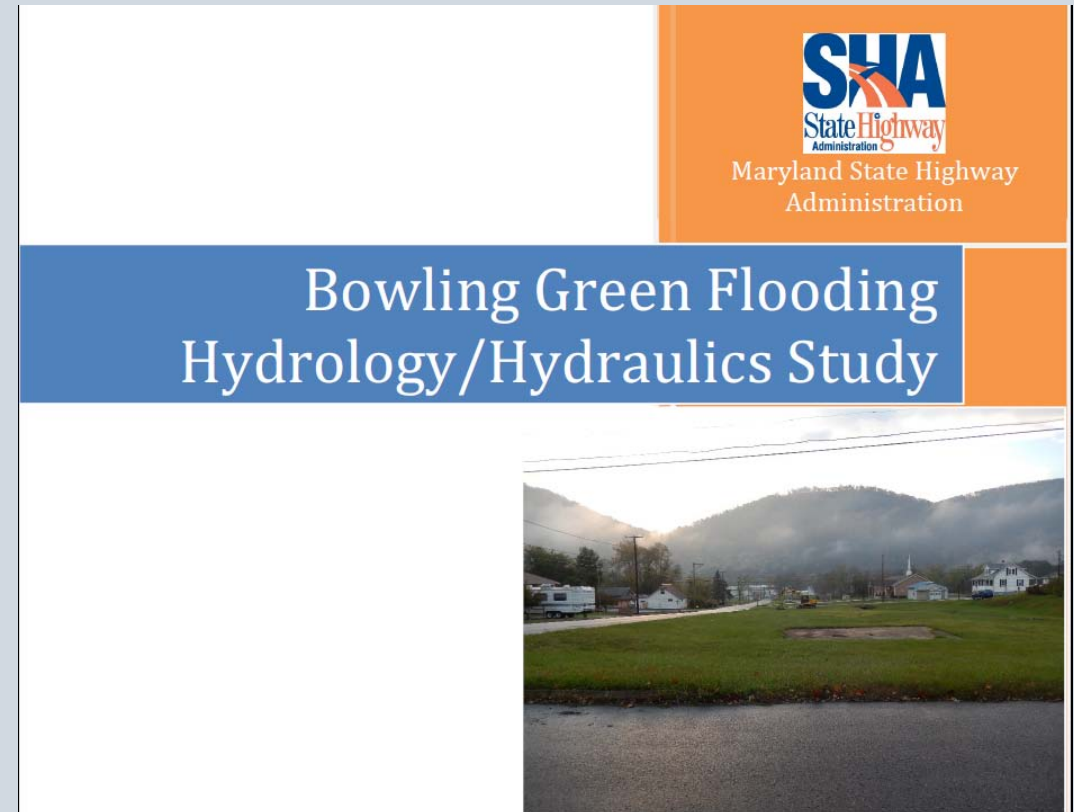


Hydrology/Hydraulic Study

Purpose of Study:

To identify and quantify flood hazards within the study limits and to develop short-, mid-, and long-term solutions for mitigating these problems.

- The drainage study area consisted of approximately 1184 acres.
- Existing drainage corridors (pipe systems and open channels) were recorded and analyzed.
- Preliminary/conceptual solutions were established.



Study Details

Storm Event Data	
Allegheny NOAA_B County, MD (NRCS)	
Storm Event	Rainfall Amount (inches/24hr)
2 - Year	2.47
10 - Year	3.63
50 - Year	5.15
100 - Year	5.95

Flooding Survey

SHA created a database of flooding surveys received from homeowners. This database was reviewed to identify frequency and type of flooding at each property.

Field Assessment

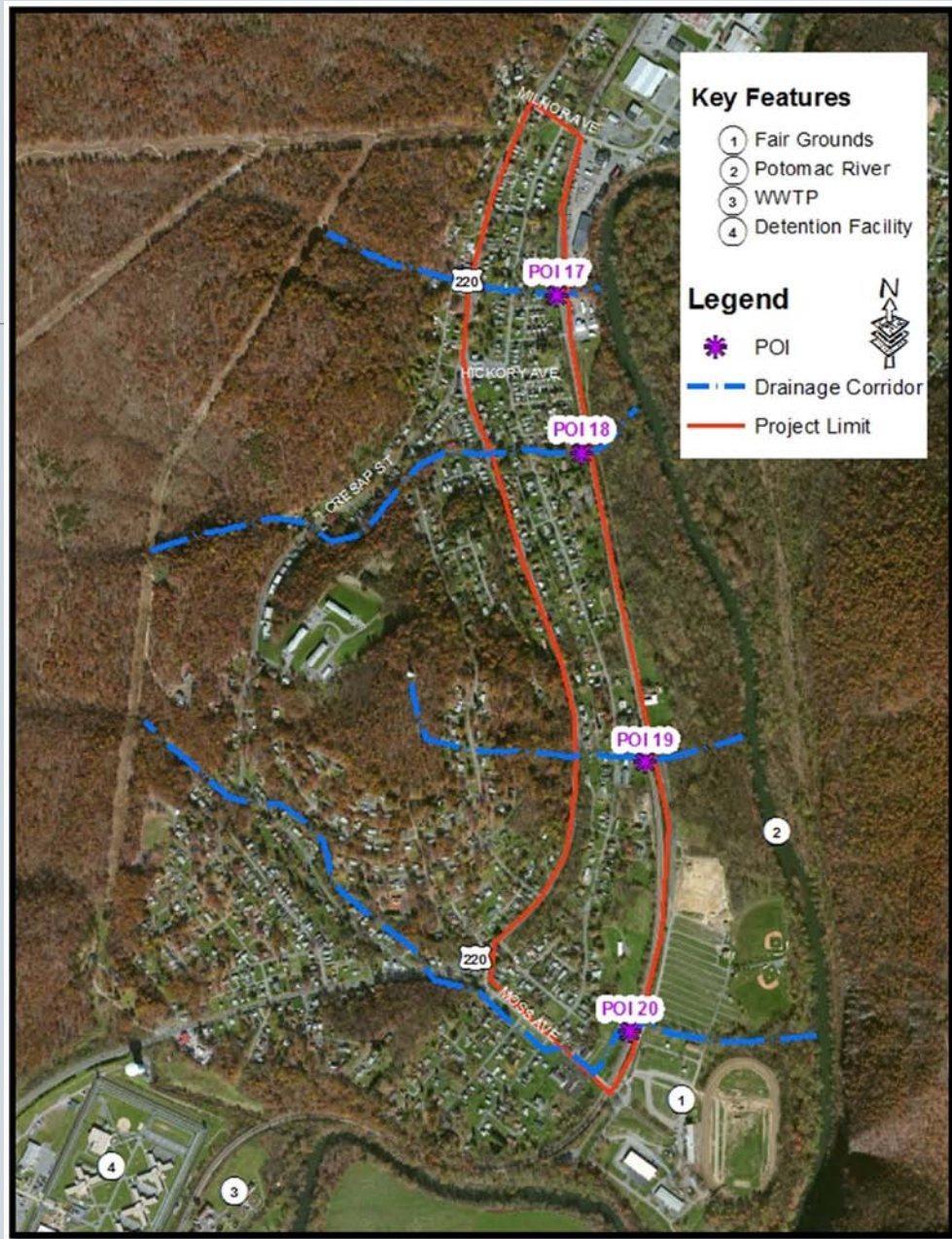
SHA tasked Whitney Bailey Cox & Magnani, LLC (WBCM) to review the flood surveys received from the residents and to investigate each property individually. WBCM was able to identify and classify areas of needed drainage improvements.

Corridor Capacities

WBCM investigated the hydraulic capacities of the four major drainage corridors within the Bowling Green study area. The runoff drainage capacity was conceptually calculated to size proposed pipes and channels that would effectively convey the 10-year, 50-year, and 100-year storm events if flow was channelized.

Existing Drainage Corridors

- The four (4) existing major drainage corridors within the Bowling Green area are defined by the drainage crossings under the CSX Railroad Tracks.
 - Beech Avenue (Study Name POI 17)
 - Olive Avenue (Study Name POI 18)
 - Division Street (Study Name POI 19)
 - Moss Avenue – At Fairgrounds (Study Name POI 20)
- All runoff is collected through storm water pipes and open channel systems that outlet to the drainage ditch along the CSX Railroad. The drainage flow then crosses at four different locations and ultimately flows to the North Branch Potomac River.



Drainage Corridors – Channel Capacity

POI	10 year Storm			50 Year Storm			100 Year Storm		
	Flow (cfs)	Depth (ft)	Top Width (ft)	Flow (cfs)	Depth (ft)	Top Width (ft)	Flow (cfs)	Depth (ft)	Top Width (ft)
17	175	1.3	17.9	352	1.9	21.5	542	2.4	24.4
18	311	1.8	20.8	603	2.5	25.2	705	2.7	26.4
19	71	0.8	14.8	96	1.0	15.7	107	1.0	16.0
20	461	2.2	23.2	713	2.9	21.8	812	2.9	27.6

Drainage Corridors – Culvert Capacity

POI	10 Year Storm			50 Year Storm			100 Year Storm		
	Flow (cfs)	Pipe Size (inches)	# of Pipes	Flow (cfs)	Pipe Size (inches)	# of Pipes	Flow (cfs)	Pipe Size (inches)	# of Pipes
17	175	42	1	352	42	2	542	48	2
18	311	48	1	603	60	1	705	54	2
19	71	30	1	96	30	1	107	36	1
20	461	54	1	713	54	2	812	54	2

*SHA and Allegany County then used these results to develop conceptual drainage solutions from US 220 to the CSX right of way

Proposed Drainage Corridors

- Allegany County and SHA reviewed the final study areas (POIs) and proposed new intermediate corridors to channel runoff in a more efficient manner through Bowling Green.
- Combined Study Drainage Areas reducing 16 points of interest down to 6 intermediate corridors:
 - POI 1A Milnor Avenue = POI 1 and POI 2
 - POI 4A Aspen Avenue = POI 3 and POI 4
 - POI 5A Robinette Avenue = POI 5 and POI 6
 - POI 8A Oliver Avenue = POI 7, POI 8, and POI 15
 - POI 11A Pecan Avenue = POI 9, POI 10, and POI 11
 - POI 13A Division Street = POI 12, POI 13, and POI 14
- These intermediate corridors would be sized to carry the capacity of a 50 year storm event and to keep the 100 year storm event to minimal overtopping.

Bowling Green Drainage Improvement Project Phases I - IV

Bowling Green Drainage Improvement Project Phases I - IV

■ Project Objective:

- To improve the drainage system outfalls from US 220 throughout Bowling Green to reduce flooding to homes and properties

■ Project Cost Sharing:

- Between Maryland State Highway Administration and Allegany County Department of Public Works.

■ Project Phasing Considerations:

- Phased construction approach due to cost sharing constraints
- Required permitting and estimated timeframe for obtaining permits
- Required property owner permission (i.e. easements/right of way)
- Number of properties receiving benefit as a result of the construction improvement

Bowling Green Drainage Improvement Project

Phase I – POI 1A, POI 4A, & POI 5A

Milnor Ave., Aspen Ave., & Robinette Ave.

BID PROJECT: DECEMBER 2017

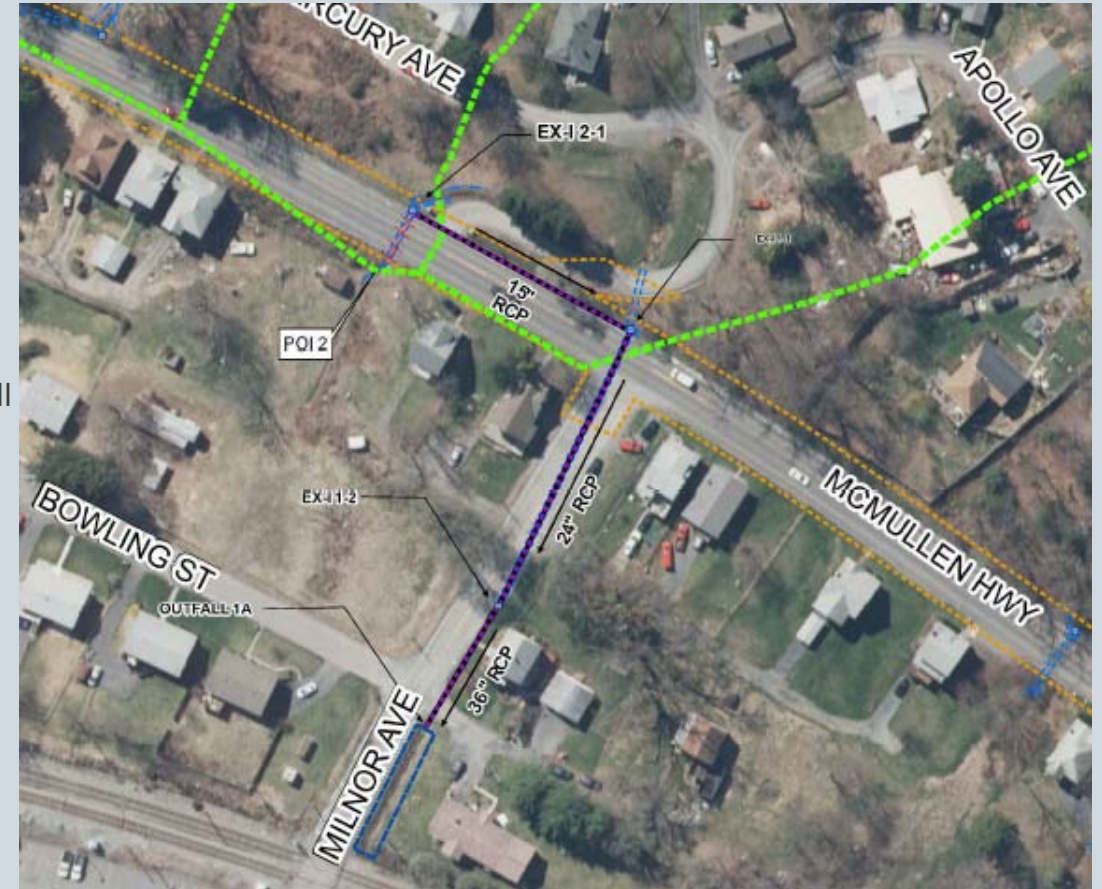
AWARDED PROJECT: DECEMBER 2017

CONSTRUCTION TIME: SPRING 2018 – SPRING 2019 (DELAY)

Phase I – POI 1A, POI 4A, & POI 5A Milnor Ave., Aspen Ave., & Robinette Ave.

■ Milnor Avenue POI 1A Project (Conceptual Plan)

- Two (2) MD SHA Inlets will be replaced and pipe sizes will be upgraded on US 220.
- Pipe sizing upgrades will continue down the north side of Milnor Avenue and outlet to an existing open channel.
- The existing pipe that crosses Milnor Avenue at the CSX Railroad Tracks will be upgraded to handle the capacity of runoff from the above system.
- Existing US 220 pipe outfalls eliminated:
 - POI 2 outfall between 12102 & 12110 McMullen Hwy
- Improvement for Bowling Green Residents:
 - This will eliminate direct storm water discharge from US 220 to properties along Bowling Street and improve channelization of drainage to the CSX Railroad right of way.



Phase I – POI 1A, POI 4A, & POI 5A

Milnor Ave., Aspen Ave., & Robinette Ave.

■ Milnor Avenue POI 1A

■ Proposed Plan for Construction

- Two (2) MD SHA Inlets replaced on US 220
- One (1) MD SHA Inlet added on US 220
- Added two (2) new Manholes on Milnor Ave.
- One (1) Inlet replaced on Milnor Ave.
- Pipes Sizes range 18" to 36" HDPE
- Utilized existing stream channel along Milnor Avenue for outfall to CSX Railroad Ditch
- Three (3) Permanent Easements & Two (2) Temporary Const. Easements Acquired



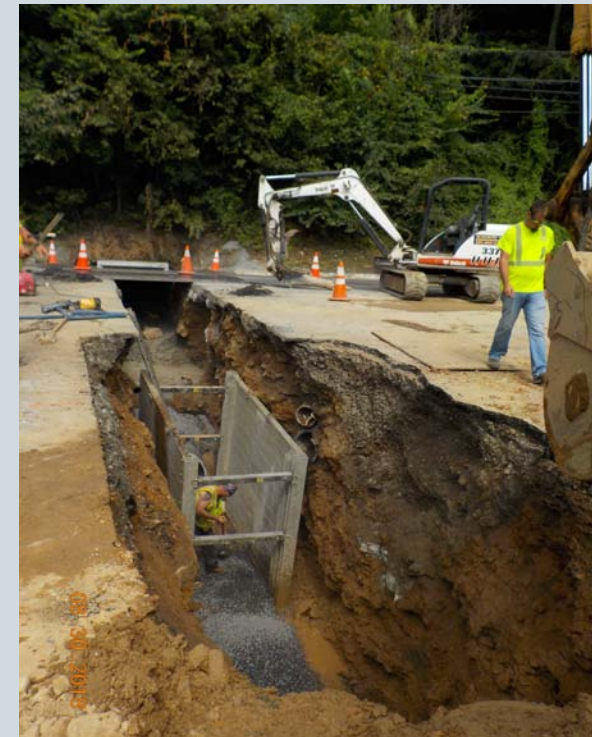
POI 1A – Construction Photos



Milnor Avenue
New MH_1-1 Manhole
Approx. 12.5 Foot Depth



Milnor Avenue
MH_1-1 Manhole to New I_1-1 Inlet
for US 220 Culvert Crossing.
Crossing depth 11.75 feet
under 20" water main line



POI 1A – Completion Photos

1.



2.



3.



4.



5.

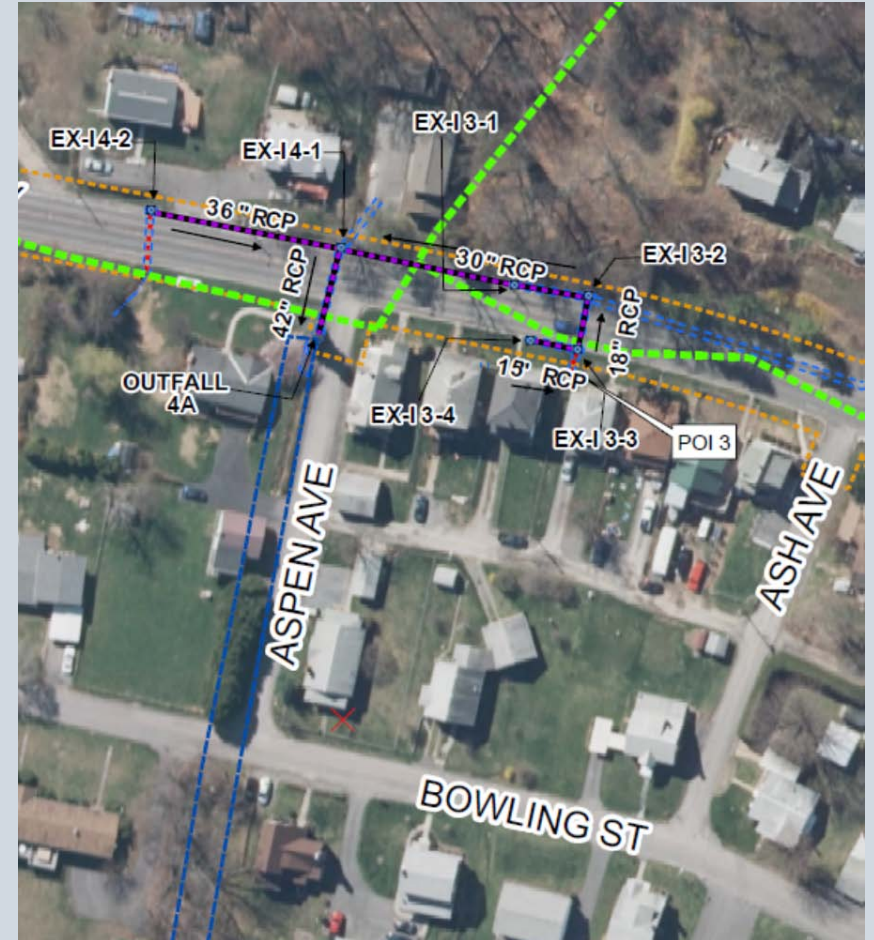


US 220 McMullen Hwy – Final Project
1. US 220/Apollo Ave. Southbound
2. US 220/Milnor Ave. Southbound
3. New I_1-1 Inlet (Replacement)
4. Milnor Ave. CSX Crossing to US 220
5. Bowling Street Crossing to Outfall
36" HDPE Pipe to ex. stream channel

Phase I – POI 1A, POI 4A, & POI 5A Milnor Ave., Aspen Ave., & Robinette Ave.

■ Aspen Avenue POI 4A Project (Conceptual Plan)

- Six (6) MD SHA Inlets will be replaced and pipe sizes will be upgraded on US 220.
- US 220 pipe system will outlet to the existing open channel along Aspen Avenue. The open channel will be modified to accommodate additional storm water.
- The existing pipe crossing Bowling Street will be upgraded and the open channel to the CSX Railroad ditch will be modified to accommodate additional storm water.
- Existing US 220 pipe outfalls eliminated:
 - POI 3 outfall between 12206 & 12208 McMullen Hwy
 - Pipe outfall @ 12216 McMullen Hwy (south of residence)
- Improvement for Bowling Green Residents:
 - This will eliminate direct storm water discharge from US 220 to properties along Bowling Street and improve channelization of drainage to the CSX Railroad right of way.



Phase I – POI 1A, POI 4A, & POI 5A

Milnor Ave., Aspen Ave., & Robinette Ave.

■ Aspen Avenue POI 4A

■ Proposed Plan for Construction

- Six (6) MD SHA Inlets replaced on US 220
- Four (2) MD SHA Inlet added on US 220
- Two (2) Inlets added on Aspen Ave.
- Pipes Sizes range 24” to 42” HDPE
- Utilized existing stream channel from Bowling Street to CSX Railroad Ditch for outfall
- One (1) Permanent Easement & Two (2) Temporary Const. Easements Acquired



POI 4A – Construction Photos



US 220 McMullen Hwy
Southbound Lane

New I_4-1 Inlet (11' depth)
for culvert crossing under
US 220 to New I_4-3 Inlet at
Aspen Avenue



Aspen Avenue
New I_4-3 Inlet
Modified SHA COG Inlet
Approx. 11 Foot Depth

US 220 McMullen Hwy
Southbound Lane
New I_3-2 Inlet
Modified SHA COG Inlet
Approx. 8 Foot Depth



POI 4A – Construction Photos



US 220 McMullen Hwy – Northbound Lane
Installation of New I_3-3 to New I_4-3
18" HDPE Pipe – 6 - 12 foot depth (average)
Concrete curb replaced
Residential sidewalks replaced

POI 4A – Completion Photos

1.



2.



3.



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5.



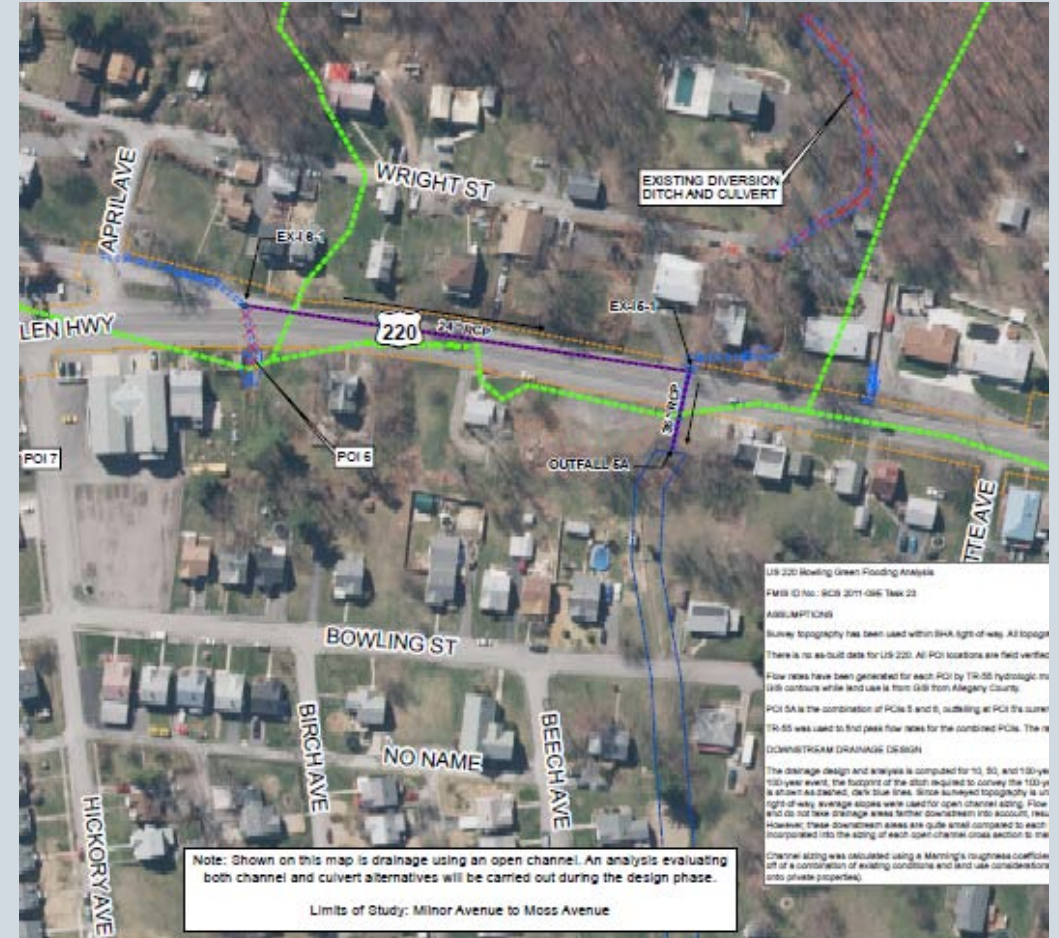
US 220 McMullen Hwy – Final Project

1. US 220 Southbound
2. US 220/Aspen Ave. New I_4-3
3. US 220 Northbound
4. New I_4-4 Inlet @ Aspen Ave. Alley
5. Bowling Street Crossing to Outfall
42" HDPE Pipe to ex. stream channel

Phase I – POI 1A, POI 4A, & POI 5A Milnor Ave., Aspen Ave., & Robinette Ave.

■ Robinette Avenue POI 5A Project (Conceptual Plan)

- Two (2) MD SHA Inlets will be replaced and pipe sizes will be upgraded on US 220.
- US 220 pipe system will outlet to the existing open channel south of Robinette Avenue. The open channel will be modified to accommodate additional storm water.
- The existing pipe crossing Bowling Street and continuing in north of residents along Beech Avenue will be upgraded and the open channel to the CSX Railroad right of way will be modified to accommodate additional storm water.
- Existing US220 pipe outfalls eliminated:
 - POI 6 outfall between 12410 & 12418 McMullen Hwy
- Improvement for Bowling Green Residents:
 - This will eliminate direct storm water discharge from US 220 to properties along Bowling Street and improve channelization of drainage to the CSX Railroad right of way.



Phase I – POI 1A, POI 4A, & POI 5A

Milnor Ave., Aspen Ave., & Robinette Ave.

■ Robinette Avenue POI 5A

■ Proposed Plan for Construction

- Three (3) MD SHA Inlets replaced on US 220
- Five (5) MD SHA Inlets added on US 220
- One (1) Manhole added on US 220 & One (1) Manhole added in yard area below Bowling Street.
- Pipes Sizes range 18” to 42” HDPE
- Utilized existing stream channel from US 220 to CSX Railroad Ditch for outfall
- Five (5) Permanent Easement & Three (3) Temporary Const. Easements Acquired



Bowling Green Drainage Improvement Project

Phase II – POI 11A

Pecan Avenue

CONSTRUCTION TIME: SUMMER 2019 – SUMMER 2020

Phase II – POI 11A

Pecan Avenue

■ Preliminary Plan for Construction

- Five (5) MD SHA Inlets replaced on US 220
- Four (4) MD SHA Inlet added on US 220
- Six (6) Inlets replaced/added on Pecan Ave.
- Pipes Sizes range 15” to 48” HDPE
- Outfall system into a proposed channel that flows into the CSX Railroad Ditch 400 Feet from Crossing POI 18A
- All work is within SHA or County ROW
 - No Permanent Easements to acquire



Bowling Green Drainage Improvement Project

Phase III – POI 8A & POI 15A

Olive Avenue & Jade Street

CONSTRUCTION TIME: SUMMER 2021 – SUMMER 2022

Phase III – POI 8A, & POI 15A

Olive Avenue & Jade Street

■ Olive Avenue POI 8A Project

- One (1) MD SHA Inlet will be replaced, one (1) new manhole will be installed, and pipe sizes will be upgraded on US 220.
- US 220 pipe system will outlet upstream of the existing US 220 concrete box culvert and flow to the existing open channel to Bowling Street. The open channel will be modified to accommodate additional storm water.
- Drainage from Long Avenue will be diverted through a proposed pipe system to outfall upstream of the existing US 220 concrete box culvert.
- The existing pipe crossing Bowling Street and existing open channel will be upgraded/modified to accommodate additional storm water to the CSX Railroad right of way.
- Existing US 220 pipe outfalls eliminated:
 - POI 7 outfall @ 12502 & 12504 McMullen Hwy (south of residence)
 - Pipe crossing under US 220 from Long Avenue to between 12608 & 12612 McMullen Hwy
- Improvement for Bowling Green Residents:
 - This will eliminate direct storm water discharge from US 220 to properties along Bowling Street and improve channelization of drainage to the CSX Railroad right of way.

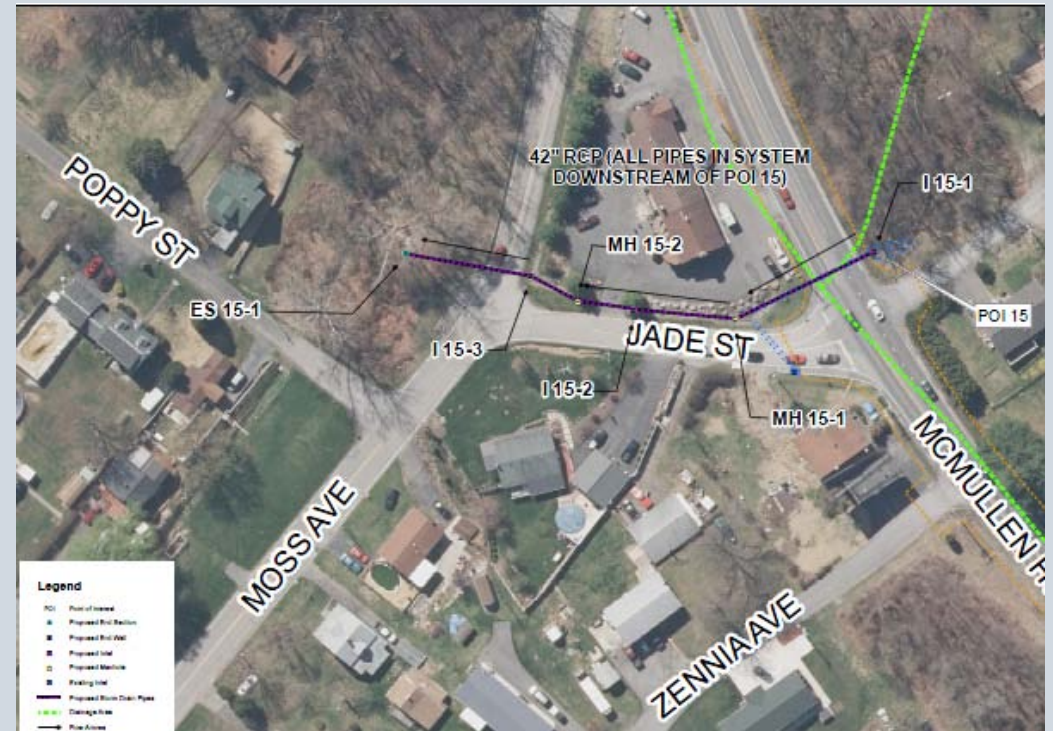


Phase III – POI 8A, & POI 15A

Olive Avenue & Jade Street

■ Jade Street POI 15A Project

- One (1) pipe crossing will be replaced and upgraded on US 220.
- US 220 pipe system will outlet to a new pipe system to be installed along Jade Street. This system will consist of pipes and manholes conveying storm water across Moss Avenue to the existing stream above Poppy Street. Existing pipe systems that drained into the existing open ditch will be connected to the new system.
- Improvement for Bowling Green Residents:
 - This will eliminate flooding along Jade Street and at the corner of Moss Avenue.



Bowling Green Drainage Improvement Project

Phase IV – POI 13A

Division Street

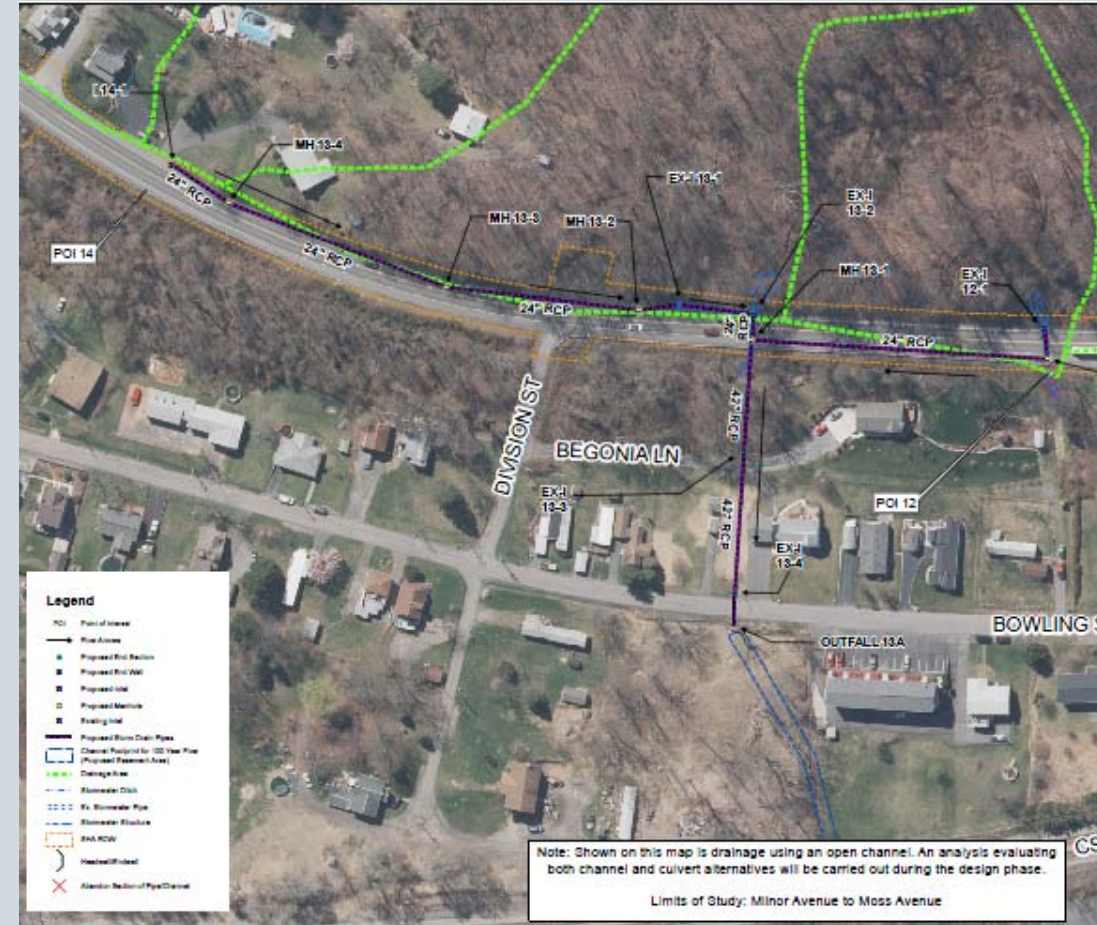
CONSTRUCTION TIME: SUMMER 2020 – SUMMER 2021

Phase IV – POI 13A

Division Street

Division Street POI 13A Project

- Four (4) MD SHA Inlet will be replaced, five (5) new manhole will be installed, and pipe sizes will be upgraded on US 220.
- US 220 pipe system will outfall to an existing pipe system that will be upgraded to handle additional storm water. This will include two (2) inlets and increased pipe size.
- The existing pipe crossing Bowling Street will be upgraded and the existing open channel will be shifted and designed to accommodate additional storm water to the CSX Railroad right of way.
- Existing US 220 pipe outfalls eliminated:
 - POI 12 outfall @ 13109 McMullen Hwy (north of residence)
 - POI 14 outfall @ 13305 Pershing Street (behind residence, along US220)
- Improvement for Bowling Green Residents:
 - This will eliminate direct storm water discharge from US 220 to properties along Bowling Street and improve channelization of drainage to the CSX Railroad right of way.



?? **QUESTIONS** ??

CONTACT INFORMATION:

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!! THANK YOU !!