Howard county Legislation

Ta01-fy2019

Testimony for Ron Peters in support of the Countys plan

My name is Ron Peters, I own three properties in Historic Ellicott City, one in upper west end and one on Merryman street , these two I bought from my grandfather John Baker over 40 years ago. The third property is on main street at Columbia pike which my wife and I purchased about 9 years ago . I was here in 72 cleaning up after Agnes on lower main . Again in 75 on lower main . In 2011 I experienced minor flood damage in the 8600 block of the west end . In 2016 I had major flood damage to all three properties , two vehicles smashed into the front porch of the Howard House and , a foundation wall collapsed on Merryman street, the first floor of both units in the westend had to be gutted . everything replaced . 2018 was a repeat with damage at all three properties .

I was asked to join the Historic Ellicott city flood work group in June of 2015, looking for ideas to help mitigate flooding . I learned at that time the counties former administration was not interested in installing any new Slow the flow detention areas after the 2011 flood ,saying there was not enough damage in Ellicott city to justify the expense.

Then the flood of 2016 came and McCormick Taylor did a second study of the whole water shed, while this was happening I did my own studying , taking dozens of walks in the Hudson, Tiber, Autumn Hill and the

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Newcut, I was constantly looking for areas to add additional Storm water management . I walked the BGE right of way multiple times, pin pointing areas that I thought would be good places between the towers, that could capture runoff if dention holding areas were built , suggesting ideas such as the old roger carter center for an under ground pipe storage area and two valleys along Court ave both of which drain to lot F. I've gone to other areas of Howard County and looked at storm water management that is working , Waverly woods I and Waverly woods two off Marriottsville road , Millers Grant off 144 , I went to Baltimore county and Carroll county looking at their storm water management, observing how a new section of Owings mills blvd has 5 storm water detention areas just for the road . I continued to believe that if we could add enough storage we could really make a difference . The problem was always , where can we put these storage areas in a watershed that was mostly developed before 1990. The McCormick Taylor analysis of 2016 came up with 18 projects that would ultimately give us 428 acre feet of storage in addition to the 84 acre feet we currently have in the 64 current detention areas . That's if they were all permitted ,funded designed and built. Many are located on BGE right of way property , geting permission to construct those could be a problem. So if we did build

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all of these in the next 10-20 years for over 80 million dollars they won't be enough .

In the 2018 storm we had 8 inches of rain fall which is 1564 acre feet of water in our 2370 acre watershed . There is 325,851 gallons per acre foot that's like having 63,703 tanker trucks full of water empty out on the Ellicott city watershed ,There could have been more or less in each of the subwatersheds , the USGS preliminary results showed the newcut had a flow of 6160 cfs which was 85 % higher than 2016, the tiber and hudson were also higher. When I saw my video of the Newcut-Tiber intersection , I said to myself "we are screwed, there is no way we can ever retain that volume of water, the island that was left after 2016 was destroyed in 2018. Tons of trees ,rocks, lumber, and even a culvert from a half mile away came down, The buildings over the Tiber had no chance for the second time in 22 months and this time it was worse . For the second time in 22 months over 200 people were trapped in the buildings on lower main . The fear and terror that these people experienced should never happen again, I suggest that all of you listen and watch the 911 Audio/video that Ryan Miller shared at UMBC two weeks ago , I would never want to put my friends in that situation again. I measured the depth of the water behind the white bank building , just up from Caplan's it

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measured 21.5 feet deep, there is only clearance for 8.5 feet under Caplan's , that's when no trees are blocking it. The buildings on lower main are acting like damns until they give blow out , which only took minutes.

I changed my thinking that day from total detention areas to control the flooding , to where I realized that's not possible , so we have to open the channels from South Rogers and main all the way to the Patapsco river to allow the water to flow unobstructed , without culverts, pipes, parking lots and buildings in the way. We have to keep all debris , dumpsters and cars out of the channels . Where culverts are required , they must be made larger.

The climate has changed to where these extreme rainfall events are happening more often , the videos have shown how fast the flooding occurs, once the channel fills and backs up at the culverts , you have minutes to make a life and death decision.

The county's plan will take care of the majority of flooding from the Westend to mid-main where the lower portion of main will continue to have flooding , but velocity and depts will be greatly reduced , it will remove several hundred people from harms way. It will be an opportunity to create a new look to lower main and construct wider more people friendly and safer

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sidewalks. The plan will eliminate out of control cars and trucks from washing down main street from Court ave down to the bank building . The plan will eliminate the flooding in lot D and in front of the Brew pub , The plan will greatly reduce the flooding in westend.

This plan must go forward , we need no more studies , we are out of time. I support the Counties plan

Ron Peters
2427 ridge road
Windsor mill md 21244
443-802-6681

Testimony of Ron Peters

Property Owner

Before the

Committee on Environment and Public Works

Subcommittee on Transportation and Infrastructure

United States Senate

Oversight Hearing on Repeated Flooding in Ellicott City, MD:

Reviewing the Federal Role in Preventing Future Events

August 20, 2018

The Honorable James M. Inhofe

Chairman

Subcommittee on Transportation

And Infrastructure

Committee on Environment and Public Works

United States Senate

Washington, DC 20510

The Honorable Benjamin L. Cardin

Ranking Member

Subcommittee on Transportation

and Infrastructure

Committee on Environment and

Public Works

United States Senate

Washington, DC 20510

To all concerned:

My name is Ron Peters. I own three properties in the Historic District of Ellicott City, MD. I started coming to Ellicott City 55 years ago when I was eight. My Grandfather, John Baker, would bring me along with him as he collected rent from his many properties in the area. I grew up three miles outside of Ellicott City, where my friends and I would ride our bikes to the town of Daniels, where there was a thriving mill, a post office and a general store. That was before Hurricane Agnes in 1972. Agnes caused the Patapsco river to rise over 20 feet and overflow its banks, causing great devastation to all the communities, businesses, homes and bridges in the surrounding area. Six bridges crossing the Patapsco were destroyed. The Hollofield bridge was spared only because of its height above the river. The river did crest nearly 3 feet over the road surface.

The river flowed into Ellicott City's Main Street and rose to just past Caplan's Dept. Store. I helped my Grandfather with the clean up at his Main Street and Maryland Ave. properties. It consisted mostly of washing mud from the buildings, sidewalks and streets.

I have a scrapbook of pictures I took, along with articles from all the newspapers I could find.

There was no flooding in the upper portions of the town and no flooding in the upper watershed. I have a tenant at 8637 Frederick Road in the West End who was living there in 1972 and she tells me there was no flooding then or in 1975 when Hurricane Eloise flooded lower Main Street. In fact, she never had flooding until 2011 and she has lived there for nearly 50 years. In 2011 the flooding from the upper watershed came within six inches of entering the house. In 2016 it was 20 inches deep in the house and in 2018 it was 14 inches deep.

In 2016, the water rose so fast they didn't have time to move their cars to safety and lost both vehicles. Mrs. Lillian Shifflett had to be rescued from her car as the water submerged the hood at South Rogers and Frederick Road.

The Hudson river flows behind my house and is one of the four streams that merge and flow through the City.

You may ask yourself, how can the Patapsco River rise quickly over 20 feet, washing cars and buildings and people away in 1972when there was no flooding caused by the New Cut, Autumn Hill, Tiber and Hudson rivers? There was no flooding in the West End, The Brewery (at that time known as Tolbert Lumber), or at the Howard House.

I will now give you my thoughts, being a member of the Ellicott City Flood Works Group since 2015 and having experienced first hand five floods. Two from the Patapsco River up and three from the watershed down.

In the 1970's when both of the floods hit, there was no storm water runoff mitigation requirements. Developments, farm fields, roads and shopping centers had no STFDA's (Slow the Flow Detention areas.) The Patapsco river would rise from all this unmitigated runoff coming from Carroll, Howard, and Baltimore counties. The river would stay muddy for days. As kids we would wait over a week for the water to clear enough to fish.

Beginning in the late 1980's and 1990's storm water mitigation requirements where put in place. Developments replaced fields along the Patapsco watershed. The Donaldson, Stirn, Bakers and Riddle farms, all in Howard County, and dozens of others have been developed with storm water mitigation (STFDA's). Carroll and Baltimore counties have seen the same type of development with added STFDA's. The Patapsco River no longer rises as fast or as high as it did in the 1970's. You can see the clarity of the water return in days instead of weeks after heavy rainfall. Trout now live in the river.

So, my observation is that when the proper size storm water retention areas are installed, flooding can be reduced and almost eliminated. I have the following thoughts on what has happened in the Tiber/Hudson watershed and the solutions I believe need to be implemented to reduce the flooding in Ellicott City.

Ellicott City is located where four small streams, the Hudson Branch, which drains 981.4 acres, starting at Route 70 and Route 29, the Tiber/Catrock branch, which drains 341.8 acres, starting west of Route 29

by St. John's Lane, the Autumn Hill branch, which drains 416.5 acres and starts at Montgomery Road and the New Cut/Wildcat branch which drains 576.4 acres and starts at the southeast portion of Montgomery Road. A total of 2370 acres. They all meet in downtown Ellicott City. The drainage is comprised of steep slopes which causes the runoff to gather very quickly. In the 1970's when the Patapsco flooded there was much less development in the EC watershed. There weren't as many shopping centers and Route 29 was one third the size that it is now. Route 40 was also only one half the size and Route 100 didn't exist. The George Howard building, Roger Carter Center and Burgess Mills I and II didn't exist. There were no worries of flooding from the above town. In fact, in 1985 the county chose to reduce the size of the West End culvert from 108 inches in diameter to 84 inches in diameter, reducing its flow capacity by over 30%. I guess the engineers who approved this figured there would never be any additional building or road development in the upper water shed. There were also no storm water management areas to capture runoff from the existing commercial properties, developments or roads. In the late 1980's and 1990's the storm water mitigation requirements did require new developments to install small detention areas. The expansion of Routes 40, 29 and 100 seemed to be exempted from storm water retention requirements. These roads, which are state and federal funded, have no storm water retention areas. Why is it that state highways, MDE, and the EPA have neglected the major runoff from these roads? They drain directly into EC with no mitigation. Some one needs to step up and fix the problem!

The existing 64 STFDA's that are in the watershed need to be inspected by an independent, unbiased engineering firm to make recommendations on how to increase the storage capacity of what already exists. I have visited many of these sites and they are in horrible condition. They are grown over with vegetation and filled with sediment. They don't drain properly. I have videos that show rain water from an office building at Ridge Road and Route 40 draining directly into the Hudson, instead of into the large STFDA located on the other side of the parking lot.

The BGE right of way is another area that consists of over 100 acres and has the best potential for installing more STFDA's in the EC watershed. There are over 600 acres above the watershed that drains through more than 2 miles of BGE right of way. There are multiple locations in that right of way that STFDA's could be installed using earth dams in alignment with some of the streams and capturing runoff from many of the acres above the right of way. There would only be water in these STFDA's for a short period of time. The following day the water will have drained out and the area would return to a water quality area, the best of both worlds. The dams would provide better access for BGE/Exelon to access the power line towers, a bonus for them as well. The BGE retention areas could also capture runoff from Routes 29,40 and 100. None of these roads have storm water detention, and all have runoff going into Ellicott City. There are areas in the watershed that could be used for STFDA's, but are located on private property. The most recent H&H Study avoids looking at private property for retention areas. We need to change our thinking on private/public partnerships to install STFDA's. or enlarge existing ones.

There are many old shopping centers, car dealerships, cemeteries and developments, built in the 1950's and 1960's that have little or no STFDA's. We have to come up with solutions on how to retrofit these areas. We could use drywells or rain gardens to capture runoff from houses and yards and underground pipe farms to store water runoff from parking lots. I've pointed out two areas near the old court house on Courthouse Drive that could be converted to STFDA's. The road would be the dam. There is already a 20" pipe under the road. We could attach a riser to the pipe, with a small flow through the pipe in the bottom of the riser. This would allow small storms to drain like it does now and a large storm would

back up and form a storage pond which would drain slowly until it was empty. Probably by the next day. This area drains about 20 acres. It would be the lowest cost detention area in the watershed, but because it involves getting permission and easements from private property owners, the H&H Study didn't consider it.

I installed 15 cameras in the Historic District of Ellicott City and have retained over 50 hours of footage showing the flood from beginning to end, starting at the EC Colored School and continuing all the way to Tiber alley on lower Main Street. The real time footage showing how quickly the flood water rose in lower Main street, from cars turning around at 4:19 PM and cars being swept away at 4:23PM and then the Miss Fit gym exploding apart at 4:34 PM. Then 6 feet of water rushing down Main Street. They also show the flooding at the intersection of South Rogers and Main Street. I shared the camera views with Howard County OEM and was starting to share with local residents and property owners the week before the last flood occurred. I had one neighbor in West End text me that she was viewing the camera near her house and saw the Hudson getting ready to crest. She grabbed her son, got in her car and left her house minutes before the road was flooded, possibly saving her and her son. I have shared the recorded flood footage with the National Weather Service, the USGS, Howard County OEM, Storm Center Communications and Maryland Public TV. I would like to offer the footage to the Army Corp of Engineers if they could use it to come up with solutions. The Corp of Engineers said they need to do another study. I would hope they could get it right once and for all. The community is tired of studies. I have hundreds of pages of studies that date back to 2010. There are flaws in the most recent study by McCormick and Taylor. They modeled the culvert in West End as 108" in diameter. When I pointed out that it was only 84", I was told that over 3300 cfs was coming down the Hudson at Court Ave. in 2016. I asked how many cfs will fit through the arched culvert under Main Street located 50 yards down stream from Court Ave. They said they didn't model that. When I asked how many cfs will fit under Maryland Ave., they hadn't modeled that either. The arched culvert under Main Street is the most restricted spot in EC. It clogged up in 2011, 2016 and 2018. This forced the water out of the channel and floods down Main Street, impacting all of the buildings and washing cars and trucks away. There is currently 3 feet of sediment under the arched bridge. I'm told that MDE won't allow dredging of the channel and it would just fill back in. If the dredging was done properly, that shouldn't happen.

I'm currently working with Dave Jones, owner of Storm Water Communications, on expanding my EC camera project so citizens could pull up a map of the EC watershed which would have the cameras pin pointed, along with the stream gauges and weather service radar. Citizens would be able to click on the camera and see a live view and the current weather conditions. Dave is currently working on a video for NOAA promoting the new JPSS weather satellite. He is planning on including some Ellicott City footage in the video.

My list of solutions include:

1a. The channel from the EC Colored School to the Patapsco river has to be opened up.

1b. Buildings, culvert pipes and parking lots covering the channel have to be removed.

2. All road crossings have to use bridges or large box culverts.

3. The channel needs to be dredged deeper where possible.

4. Dead trees and debris along the four streams in the watershed need to be removed. They acted as

2 ton battering rams in the recent storm, smashing through buildings.

5. The current 64 detention ponds need to be inspected by the Corp of Engineers and improved to Maximum efficiency through clean out, enlargement and re-directing building and parking lot runoff Into them.
6. Bio-Char test project needs to be funded. Lori Lilly will provide testimony on Bio-Char.
7. The 18 identified projects by McCormick Taylor should be re-evaluated for cost benefits. I believe There are less expensive STFDA's that could be built using earth dams instead of expensive and Inefficient pipe farms. Earth dams STFDA's offer retention and quality potential.
8. Every homeowner could be offered a tax credit for putting in retention on their property. For Example: drywells, rain gardens and rain barrels.
9. The Federal and State governments and Exelon should meet to come up with a solution for runoff Retention for Routes 29,40 and 100, and the BGE right of way.
10. Commercial properties with no storm water retention need to be given incentives to install SWM on Their properties.
11. Federal funding is needed in addition to funding provided by the State and County.
12. Funding for better warning systems to alert citizens. Such as, stream gauges and better access to the Watershed cameras shown on interactive geo-collaborative map.

My great uncle Franklin Baker once told me, "Ron, watch your pennies and your dollars will take care of themselves." I feel if we watch our gallons of runoff, our acre feet of storage will take care of itself. It has to be a Federal, State, County and Community effort to fix this flooding problem.

Thank you Senator Cardin, Senator Van Hollen and Congressman Cummings for coming to Ellicott City and offering your help looking for solutions to mitigate the on going flooding in Ellicott City.

Please feel free to contact me with any questions about my suggestions.

Ron Peters

rpeters@peters-bodyshop.com

443-802-6681

Supporting documents

Section one

1) 9 camera view on May19,2018 before the flood
2) 9 camera view on May27,2018 4.55 pm during the flood
3) 6 camera view on May 27,2018 5.03 pm during the flood
4) Tiber-Hudson year built, homes and buildings, dark green shows No storm water mitigation, this includes rte29,rte40,and rte 100
5) Rainfall totals for Ellicott City Md. May27, 2018, shows 3 inches Between 3.20 and 5.00 pm
6) Tiber Hudson watershed map, BGE right of way
7) Proposed Homeland Security stream gage locations
8) May 2, 2018 storm map
9) May 27,2018 rainfall intensity map
10) Tiber/Hudson/Newcut topographic map
11) National Weather Service report for May 27, 2019

Section two

1) Individual Camera views approximate, 15 minute intervals
    1) Rogers and Main Street at Ellicott City Colored School
    2) 108/84 pipe in 8600 block main street
    3) Court ave at Main Street, 8300 block
    4) Lot D behind Lapalapa, Tiber Hudson intersection
    5) Tiber-Newcut west behind ECpops
    6) EC POPS , Main street east, 8143 main street
    7) Portali's East, 8085 Main street
    8) Tiber Alley, Tea on the Tiber, Great Panes , 8069 main street

Section three

1) Tiber Hudson Stream Channel improvement recommendations
    1) Tiber-Newcut after flood behind EC Pops 8143 main street
    2) Arched culvert at 8300 main street
    3) 108-84 culvert in the Westend , 8600 block
    4) Logs and debris lodged in Caplan's
    5) Tiber culvert in lot D
    6) Ellicott Mills drive
    7) Log jams along the Autumn Hill branch
    8) 64 current SWM facilities need inspections

Section four

1) BGE right of way SWM recommendations
    1) There are many areas shown on the maps in the BGE right of way
    2) Examples of STFDA's that could be installed in the BGE right of way
        A) Lyons Mill road, Owings Mills,Md
        B) Uniontown Road , Westminster

Section five

1) EC Strong Volunteers doing flood cleanup
    A) EC Pops building -9ft of mud & water in basement full of inventory, 5 ft on first floor , took over 4 weeks to clean out ,one bucket at a time
    B) Seventeen Seventy Two,the old bank building, 8 ft of mud and water in the basement , 3 feet of dirt and mud on first floor, water was 8 feet high on first floor , three weeks to clean out
    C) A-Diva, 8 feet in the basement , six feet on first floor , shop owner tied herself to the sprinkler pipes while standing on the front counter and waited one hour to be rescued
    D) Great Panes glass shop had 8ft in basement, 9 feet on first floor , 3 feet of dirt and mud
    E) Joan Eve antiques, 9 feet of water, 3 feet of dirt and mud, Shop owner Joan Eve and friend Gary had to escape the building by breaking a window, it took them over 25 minutes to reach safety holding onto a fence as they made their way to higher ground , the water up to their chest. If they had waited a few minutes longer the outcome may have been different
    F) Portali's restaurant complete demo, basement full, first floor gutted, all equipment ,fixtures, flooring destroyed.
    G) 8637-8639 main street in the Westend , both units gutted of furniture,flooring , kitchens , drywall , tenants relocated for repairs.

    This is the second time in 22 months that all the above locations have gone thru this along with dozens of others .

We have to look at improving our current SWM locations
Now! We don't need a study to do that!

We have to improve the flow capacities of the channels now!
We don't need a study to do that!

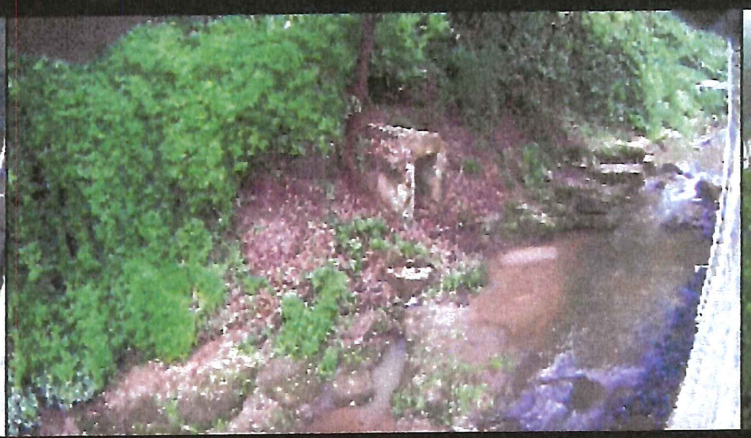
We need to add new detention areas as soon as possible !
We don't need to study that!
Studies are a way for prolonging doing Nothing!
We have done enough studies over the last 8 years!

Tiber Alley

8637 Hudson River View

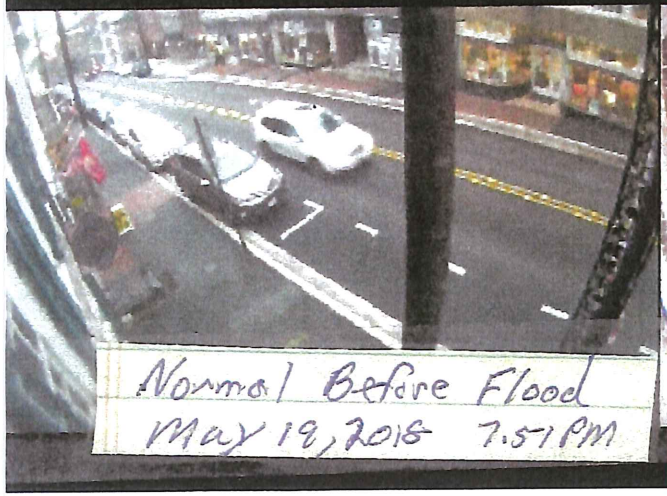
Rogers & Main

Howard House East



Tiber - Newcut East

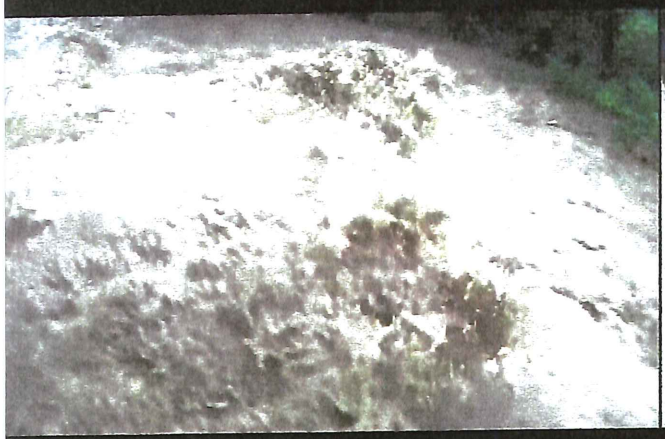
Tiber Hudson Lot D



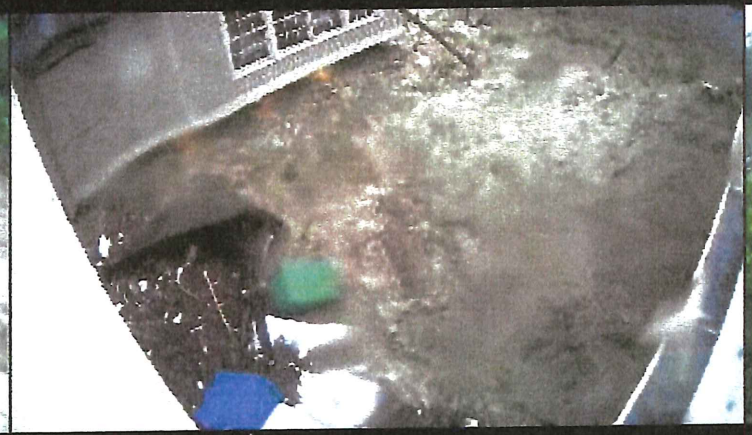
Tiber - Newcut East

Tiber Alley

Rogers & Main

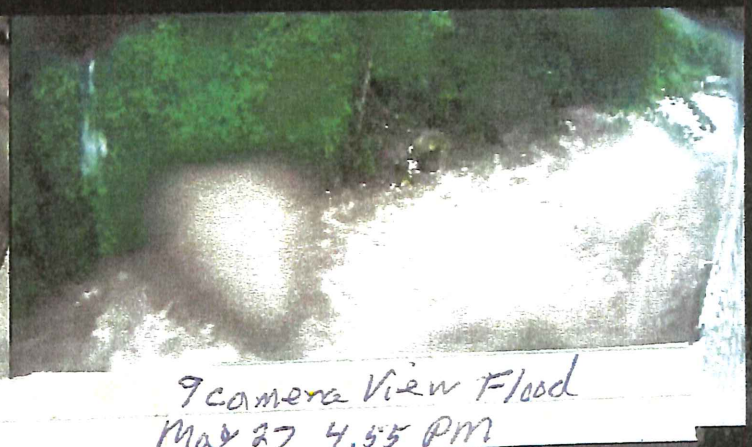


Howard House East

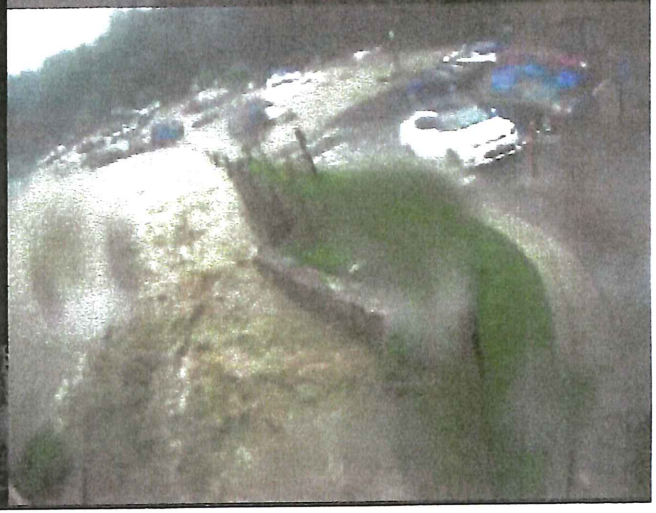


8637 Hudson River View

Tiber Hudson Lot D



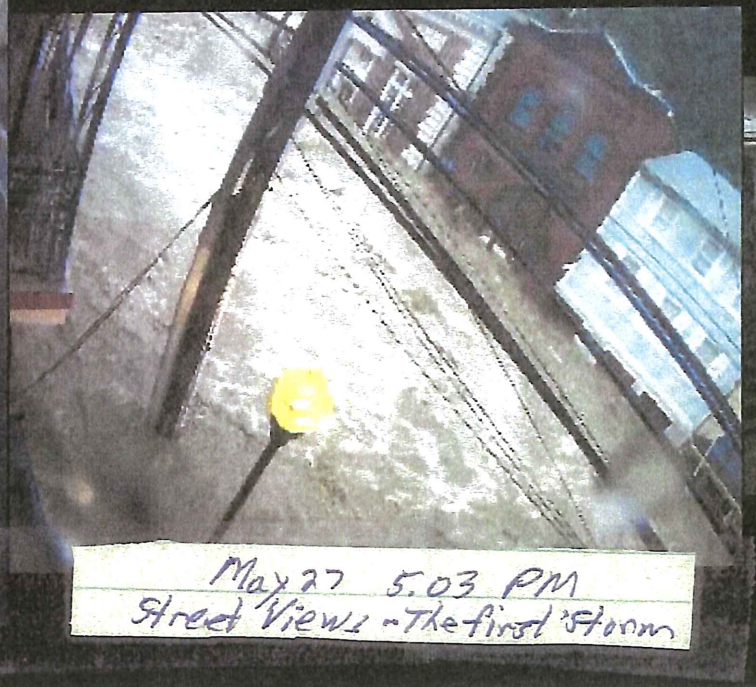
9 camera View Flood
May 27 4.55 PM

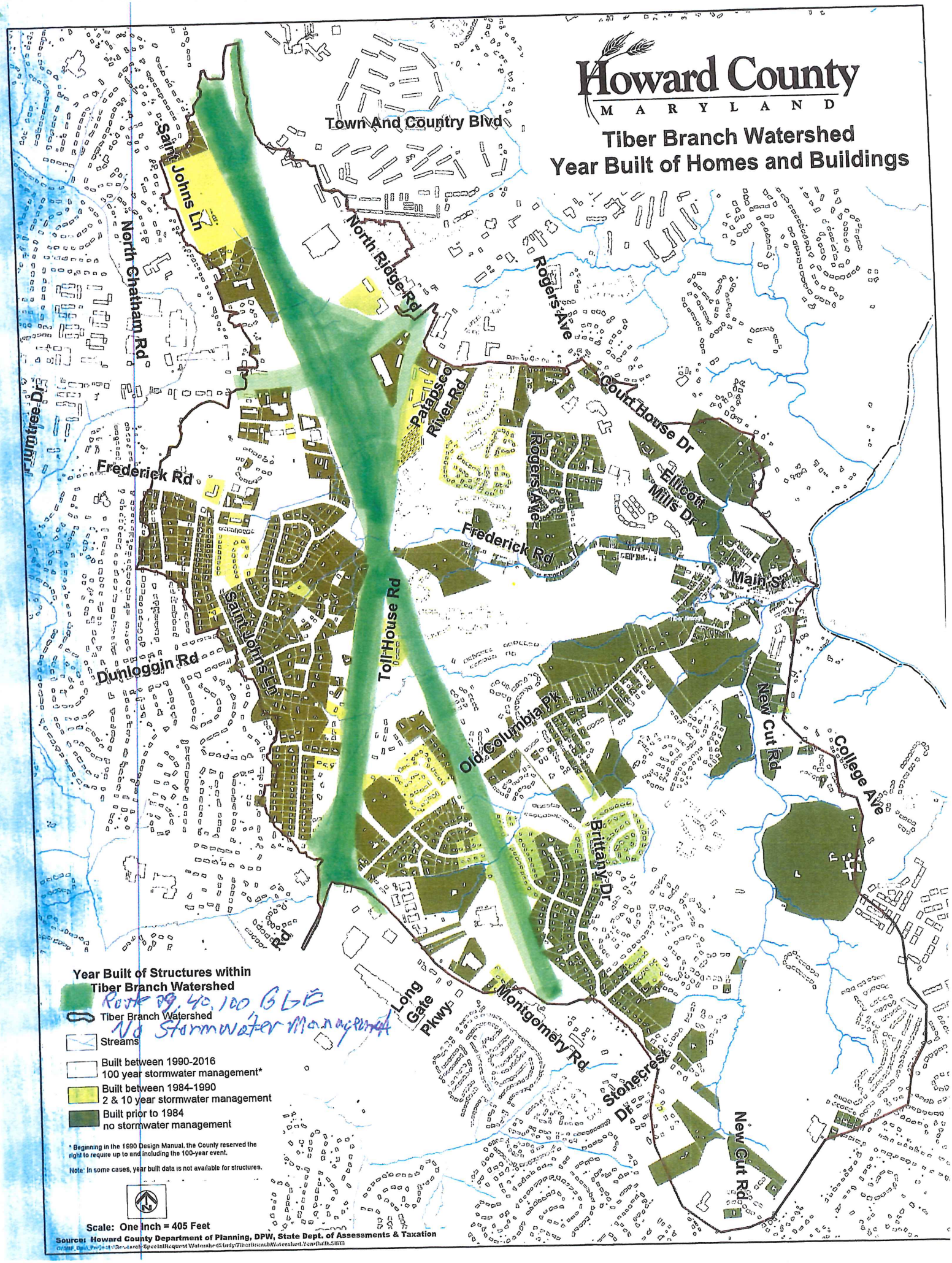


Portallis East

Portallis West

West End West




Howard County
MARYLAND
Tiber Branch Watershed
Year Built of Homes and Buildings
Town And Country Blvd
Saint Johns Ln
North Ridge Rd
North Chatham Rd
Rogers Ave
Court House Dr
Patapsco River Rd
Frederick Rd
Ellicott Mills Dr
Main St
Toll House Rd
Saint Johns Ln
Dunloggin Rd
Old Columbia Pk
New Cut Rd
College Ave
Brittany Dr
Long Gate Pkwy
Montgomery Rd
Stonecrest Dr
Year Built of Structures within Tiber Branch Watershed
Route 99, 40, 100 BLE
Tiber Branch Watershed
No Stormwater Management
Streams
Built between 1990-2016
100 year stormwater management*
Built between 1984-1990
2 & 10 year stormwater management
Built prior to 1984
no stormwater management
* Beginning in the 1990 Design Manual, the County reserved the right to require up to and including the 100-year event.
Note: In some cases, year built data is not available for structures.
Scale: One Inch = 405 Feet
Source: Howard County Department of Planning, DPW, State Dept. of Assessments & Taxation

...t City Floods – Indirect Computations

	July 30, 2016 Flood (cfs)	May 27, 2018 Flood (cfs)
Hudson Branch	**2,750** *(0.6% AEP, 165 RI)**	**3000***
Tiber Branch	**2,100** *(0.2% AEP, <500 RI)**	**3,320***
New Cut Branch	**3,320** *(0.4% AEP, 250 RI)**	**6,160*** 12,480

8170

Peak flows in 2018: 10 – 85% greater than 2016 flood

babilities estimated off regional Urban Peak Flow regression equations due to lack of

subject to revision until they have been thoroughly reviewed and received final approva

To view the evolution of this rainfall, you can click below to view three loops showing the accumulation of Storm Total Precipitation over time. These loops correspond to the same three timeframes of the radar loops above.

2:46pm | 4:26pm | 4:26pm | 6:03pm | 6:03pm | 7:39pm

As with the 2016 event in Ellicott City, Howard County's rain gauge at the Howard County government facility provided real-time rainfall observations.

Ellicott City, MD – May 27, 2018

Duration	Max Rainfall in Duration	Time of Occurrence
1 minute	0.16"	4:15pm-4:16pm
5 minutes	0.56"	4:15pm-4:20pm
10 minutes	0.96"	4:11pm-4:21pm
15 minutes	1.44"	4:06pm-4:21pm
30 minutes	1.84" 1.84"	3:53pm-4:22pm 5:20pm-5:50pm
60 minutes	* 2.68" * 2.84"	3:20pm-4:20pm 5:00pm-6:00pm
2 hours	5.00"	3:53pm-5:53pm
3 hours	6.56"	3:15pm-6:15pm

Rainfall in Ellicott City 3.20 – 5.00pm 3 inches

Information obtained from the Ellicott City (ELYM2) rain gauge.
Data is preliminary and subject to correction. This gauge reports in 0.04" increments.

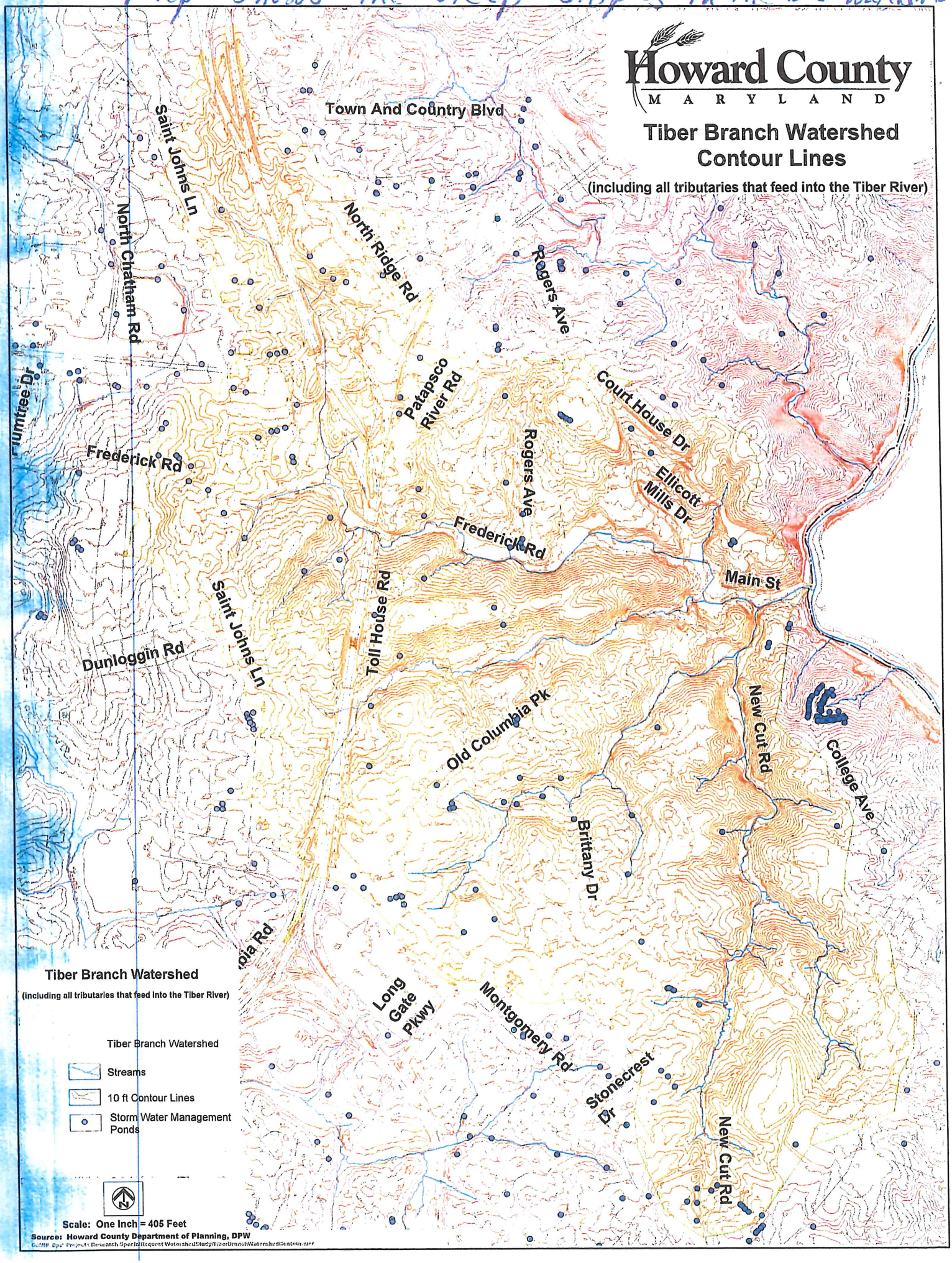
As you can see from the 30 and 60 minute durations, there were two distinct waves of heavy rain in Ellicott City, with a bit of a lull in between (only 0.32" was observed between 4:22pm and 5:00pm, with little or no measurable rain observed between 4:22pm and 4:33pm or between 4:50pm and 4:59pm). **As noted in the rainfall estimates, heavier rain was estimated to have fallen to the south of this gauge's location, so this gauge was not within the heaviest rainfall area.**

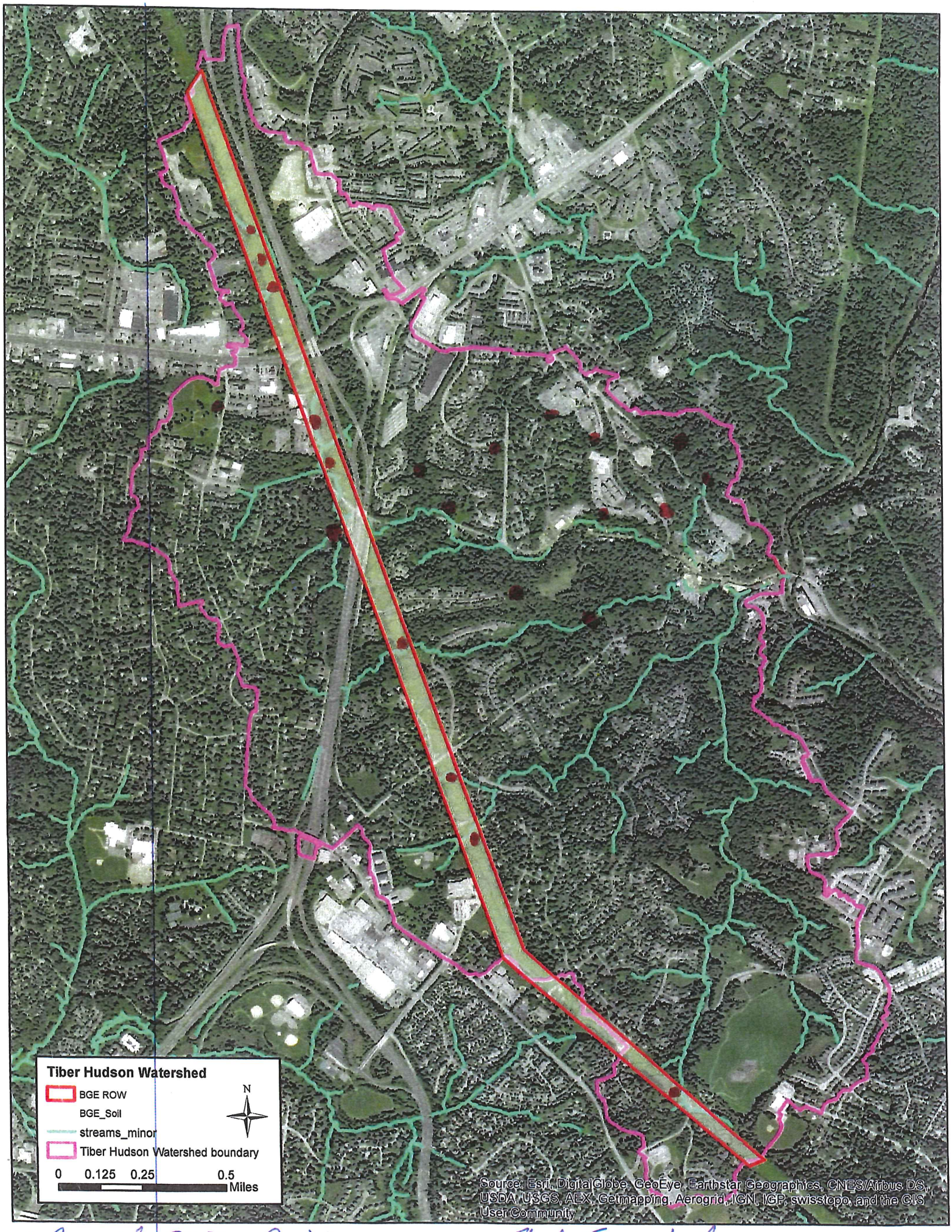
An image with selected observed rainfall totals on a background map of estimates is available here. A comparison of the 2018 rainfall to the 2016 rainfall can be found later in this review.

Stream Response / Flooding

The heavy rain was reflected in sharp rises on area streams monitored by the NWS. The gauges shown in the map below are referenced on this page.

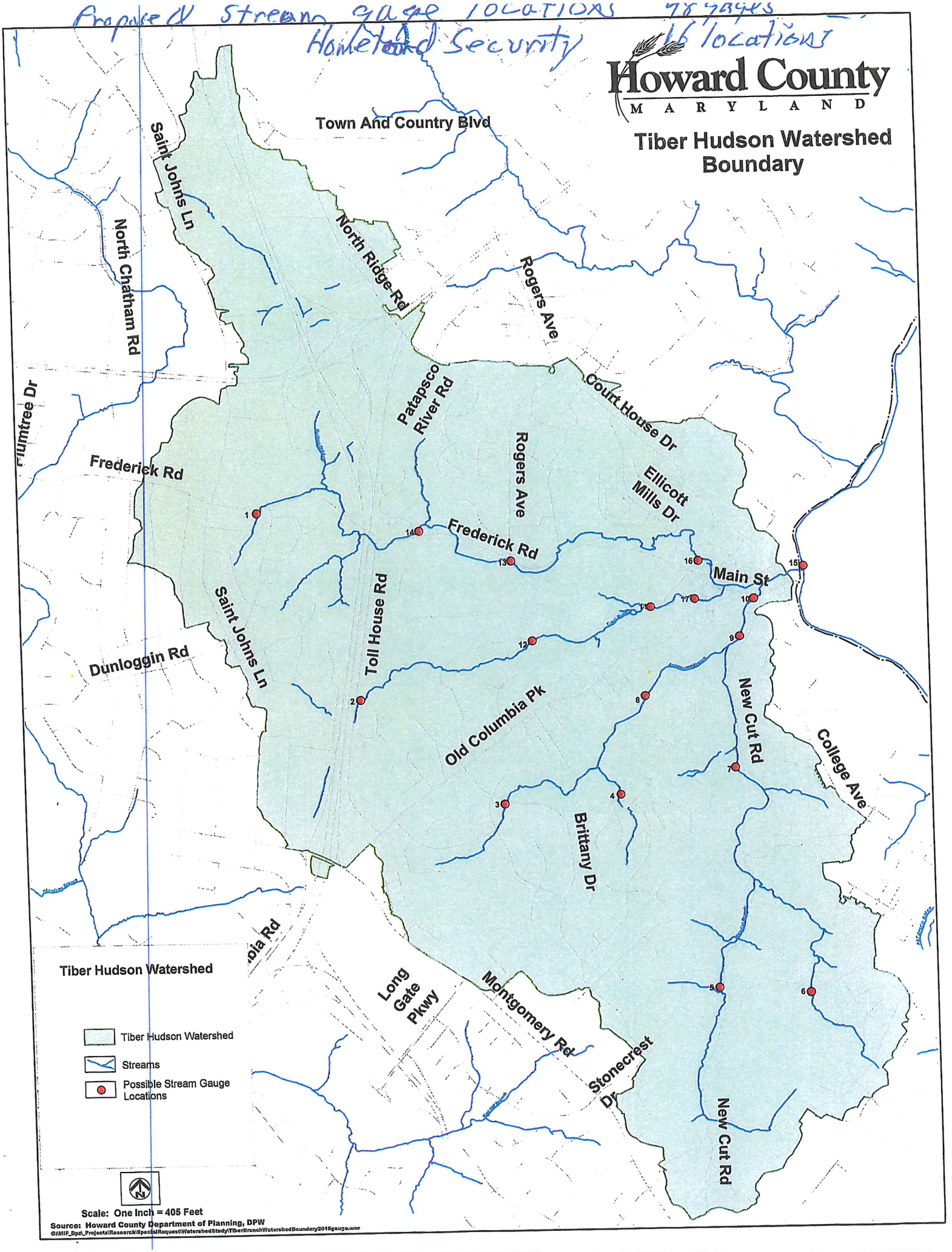
Map shows the steep slopes in the EC watershed





● Proposed SWM Route 2 and Flood Impact Area

Proposed Stream Gage Locations 78 gages
Homeland Security 16 locations



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May 27th, 2018 Flooding - Ellicott City & Catonsville, MD

Baltimore/Washington
Weather Forecast Office

Ellicott City & Catonsville, Maryland -- Heavy Rain and Flash Flooding of May 27th, 2018
(Last updated 6/28/2018)

Overview

For the second time in just 22 months, torrential rain fell in the Ellicott City and Catonsville areas of Howard and Baltimore Counties. The heavy rainfall, between 6 and 12 inches in the heaviest band, caused catastrophic damage, especially in Historic Ellicott City. One person -- 39-year old Eddison Hermond, died while trying to help a woman who was seeking assistance after the first flood wave. Many buildings were damaged and dozens of vehicles experienced flood damage. Hundreds of people were addressed by first responders during the event, with around 1100 separate 911 calls reported in to Howard County. Some roads were washed out and land erosion and localized landslides were reported.

Timeline

The National Weather Service (NWS) began highlighting the potential for flooding in the Hazardous Weather Outlook (link) beginning on Friday morning, May 25th:

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Thunderstorms capable of producing locally heavy rain may lead to isolated incidents of
flooding on Saturday and Sunday.
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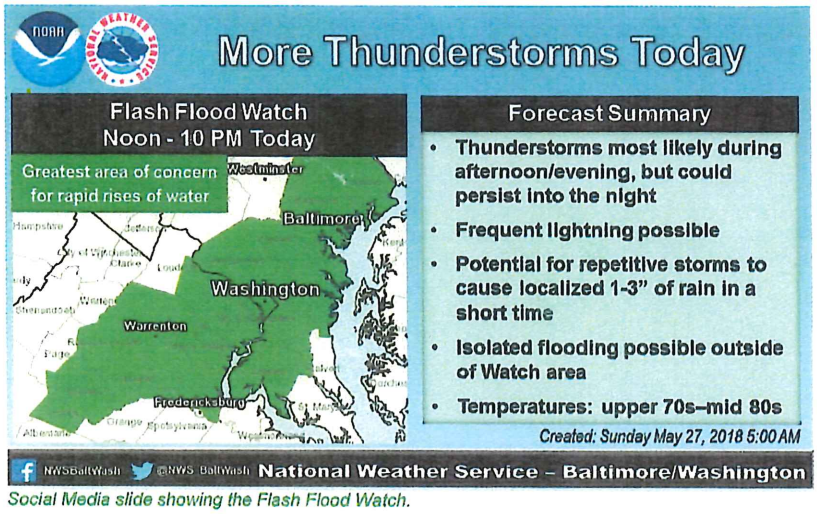
On Sunday morning, May 27th, a Flash Flood Watch was issued for the Baltimore/Washington corridor, highlighting the potential for showers and thunderstorms capable of producing heavy rain during the afternoon and evening.



Social Media slide showing the Flash Flood Watch.

Just as the rain began, a Flood Warning was issued at 3:19pm for portions of Howard County, Baltimore County, and Baltimore City, including Ellicott City, Catonsville, Dundalk, and Baltimore City, all of which experienced significant flooding during this event. This initial rain pushed south of Ellicott City after causing an estimated 1.5 to 2 inches of rain, but by 4:00pm, had built back over both Ellicott City and Catonsville. At 4:00pm, video footage showed a small amount of flowing water near the curbs on Main Street in Ellicott City, with rain increasing in intensity. Video shows Main Street was still passable until around 4:20pm.

Between 4:00pm and 4:30pm, the heavy rain persisted, quickly dropping an estimated two inches of rain in a band just south of Ellicott City to near Catonsville. This heavy rain caused a major rise in the New Cut Branch (click here for an annotated map of the watershed), and the added water pushed the Tiber River out of its banks at 4:18pm near Tiber Alley. Two minutes later, at 4:20pm, the water level in the Tiber further increased, exceeding the capacity of the channel in the 8100 block of Main Street and near Tiber Alley, sending water both into nearby structures and down the Alley onto Main Street.

As initial reports of this more significant water came in to the National Weather Service, the Flood Warning was upgraded to a Flash Flood Warning, at 4:26pm. Remarkably, conditions continued to worsen throughout the Ellicott City area between 4:30pm and 5:00pm as the rain shifted just south of the city, with overland flooding occurring in West End as well as even more significant water coming down the Tiber and through both Tiber Alley and the buildings on the south side of Main Street. The highest water -- up to the top of the first floor of buildings -- was observed between 4:40pm and 5:00pm, then water levels began to recede somewhat.

At the time of this highest water (4:40pm), a Flash Flood Emergency was declared by the National Weather Service, in coordination with Howard County Emergency Management, due to the ongoing catastrophic flooding, and the heaviest rain was still falling at that point. Total rainfall estimates reached six inches by 5:15pm just south of Old Town Ellicott City, and in the Oella and Catonsville areas.

A second round of heavy rain pushed across Ellicott City between 5:00pm and 6:00pm, with the heaviest rain occurring between 5:20pm and 5:50pm. This second round was of nearly equal intensity to the first, and had equal or greater impacts. This second round of heavy rain prompted even stronger statements in the Flash Flood Emergency:

HEAVY RAIN HAS MOVED BACK INTO THIS AREA. THOSE CURRENTLY RESPONDING TO EARLIER FLASH FLOODING MUST SEEK HIGHER GROUND IMMEDIATELY AS A NEW ROUND OF FLOODING IS IMMINENT! THIS NEW FLOODING COULD BE MORE SIGNIFICANT THAN THE INITIAL ROUND! YOU MUST GO TO THE HIGHEST POSSIBLE LOCATION IMMEDIATELY AND STAY AWAY FROM ANYWHERE WHERE THERE IS WATER OR COULD BE WATER!!!

On the Hudson Branch, water levels were higher than the first round by 5:35pm, going over a deck near Court Street by 5:40pm. Water levels on the Hudson Branch peaked at 5:53pm at a level almost equal to the 2016 flood. Downstream at Tiber Alley, the relative lull ended around 5:40pm as well, with floodwaters rising back up to the top of the first floor of buildings for about half an hour, until 6:10pm.

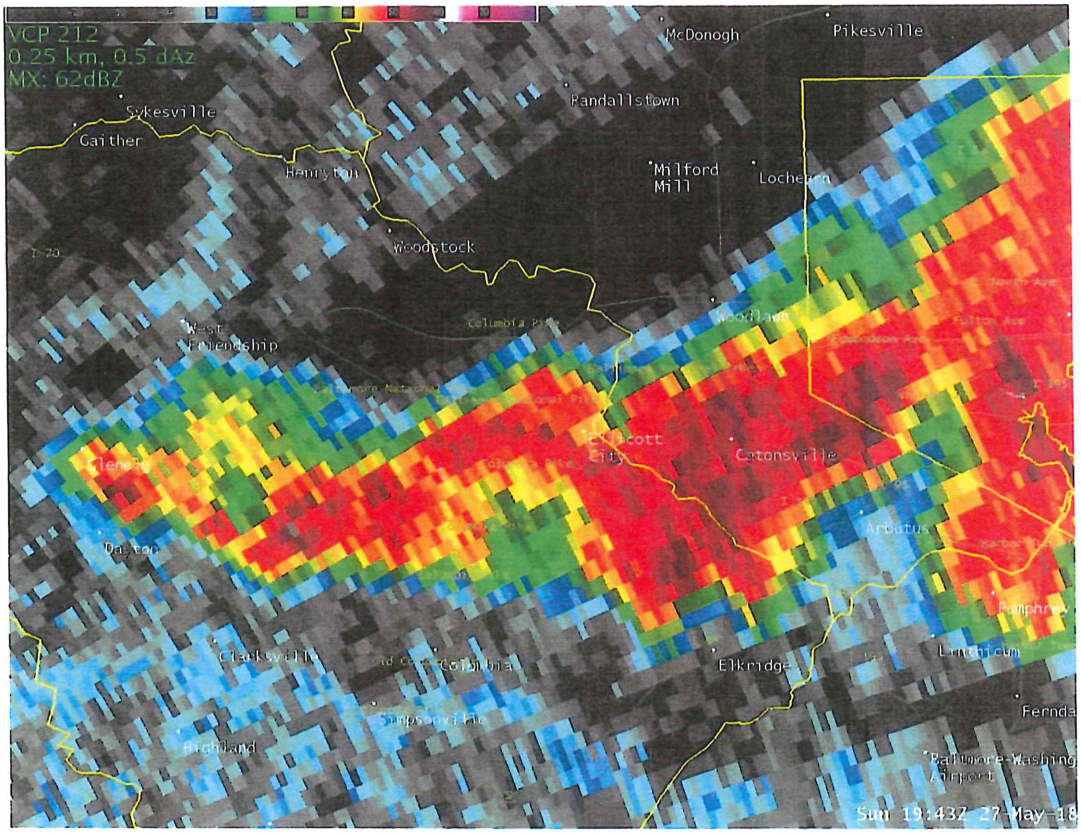
The second round of rainfall shifted south by 6:00pm, but another round of heavy rain, which caused flash flooding in the Sykesville area, was moving toward the affected region. Luckily, it weakened as it approached Ellicott City, sparing the area from a third flood wave. Therefore, all the small streams in the Tiber-Hudson basin were back within their banks by around 6:45pm.

Radar

This radar loop of the full event **(Warning: Very large file!)** shows conditions from approximately 2:00pm to 7:00pm on Sunday. Multiple low-level boundaries (moving blue lines to the west) can be seen which aided in forming new showers and storms to move over the same areas repeatedly.

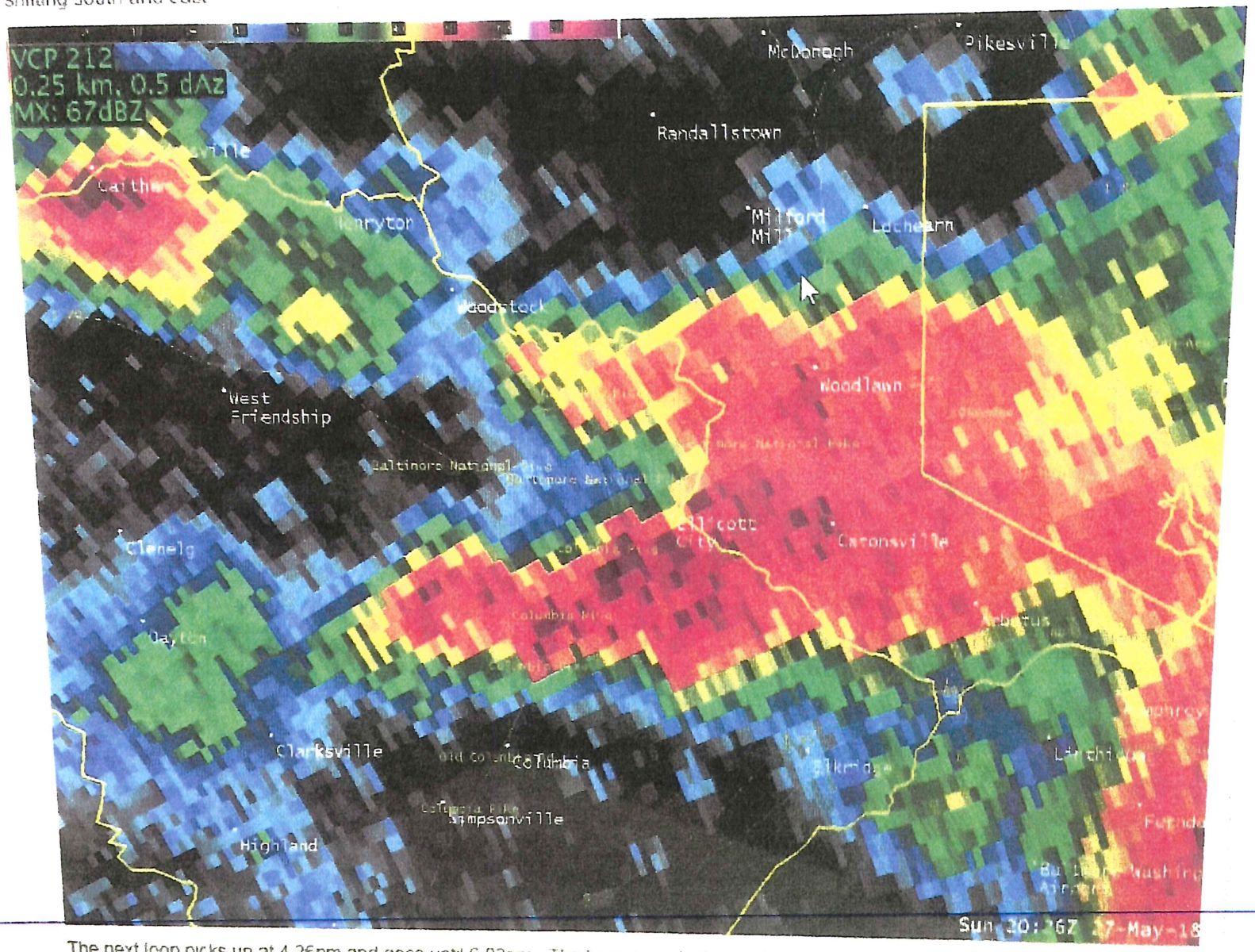
Zoomed Radar Loops

The first loop shows the time period from 2:46pm to 4:26pm. The initial rain shown caused minor street flooding between 3pm and 4pm. The heavier rain toward the end of the loop sparked the more significant flooding which began around the time this loop ends. Note that at the end of the loop -- 4:26pm -- a lull in the heavy rain is occurring in Ellicott City proper, with much of the rain area shifting south and east.



The next loop picks up at 4:26pm and goes until 6:03pm. The heavy rain to the south backbuilds over Ellicott City and persists for at least an hour, with a second round of heavy rainfall. Across the river in Catonsville and Oella, the brief break in the rain observed over Howard County never occurs, with persistent torrential rain throughout.

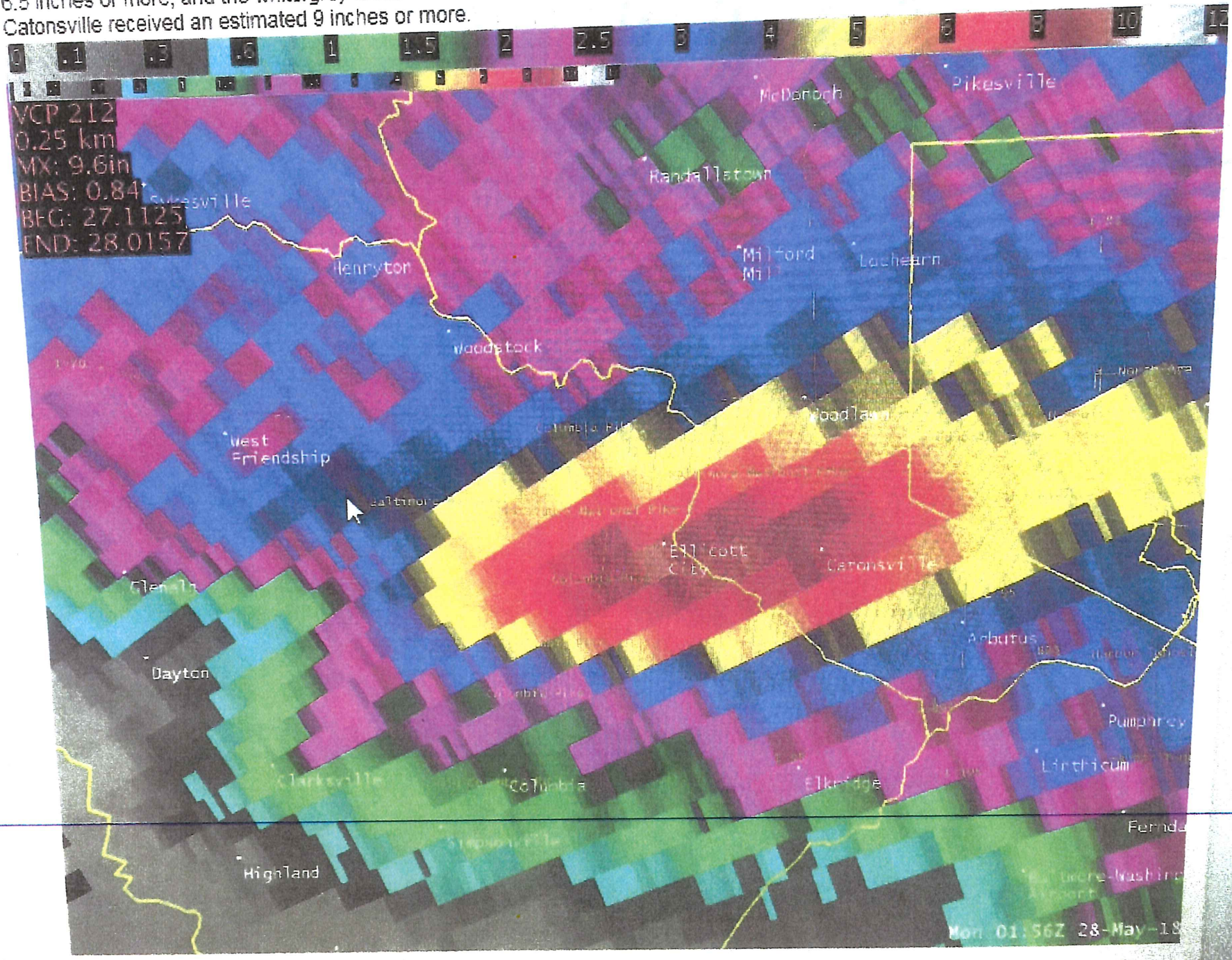
shifting south and east



The next loop picks up at 4 26pm and goes until 6 03pm The heavy rain to the south backbuilds over Ellicott City and persists for at least an hour, with a second round of heavy rainfall Across the river in Catonsville and Oella, the brief break in the rain observed over Howard County never occurs, with persistent torrential rain throughout

Total Rainfall

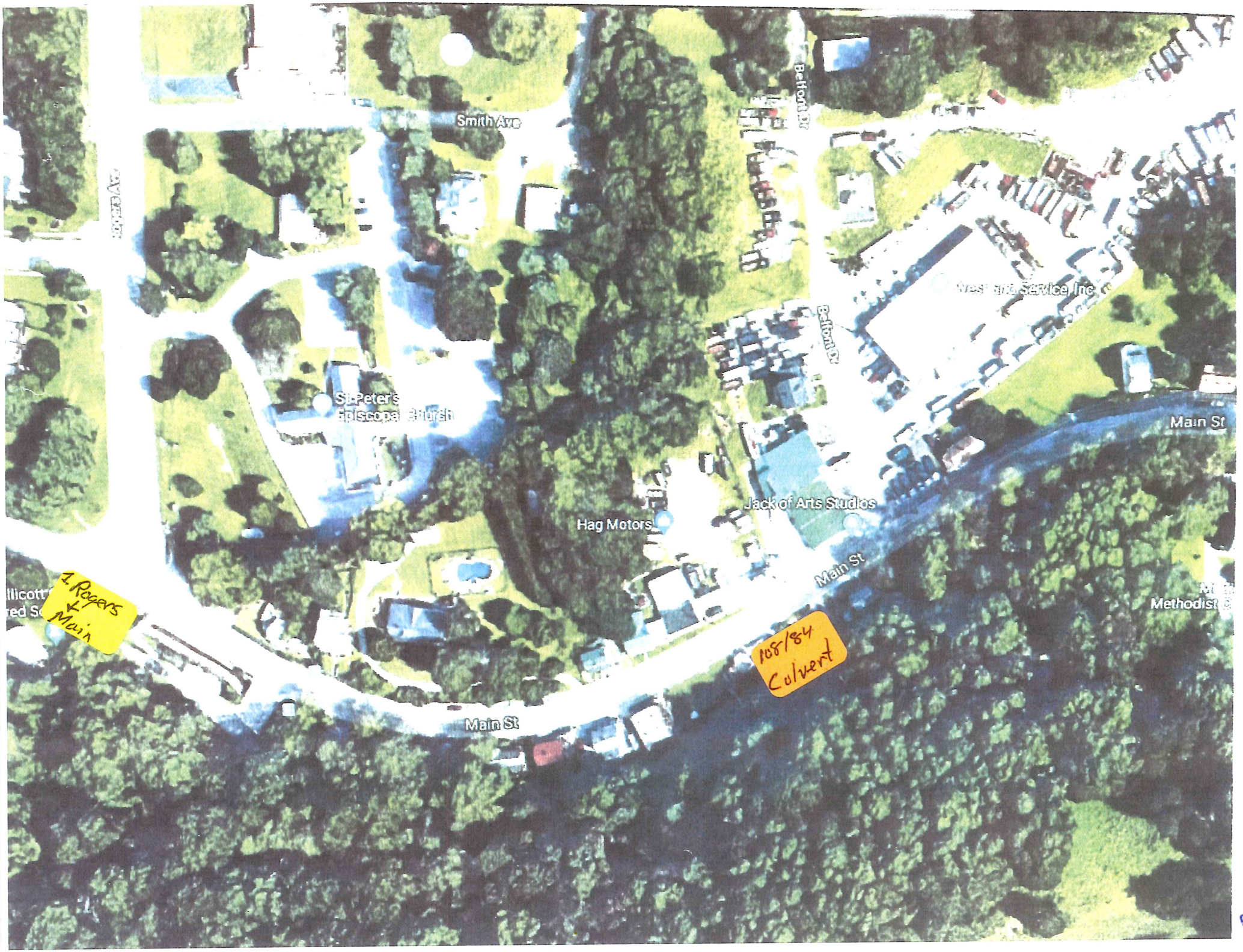
The image below shows radar rainfall estimates from the entire event. Radar estimated an unusually large area which received 4.5 inches or more, as indicated by the yellow, red, and white colors in the image. Areas colored in red were estimated to have received 6.5 inches or more, and the white/grey areas near and southwest of Old Town Ellicott City as well as across the river toward Catonsville received an estimated 9 inches or more.

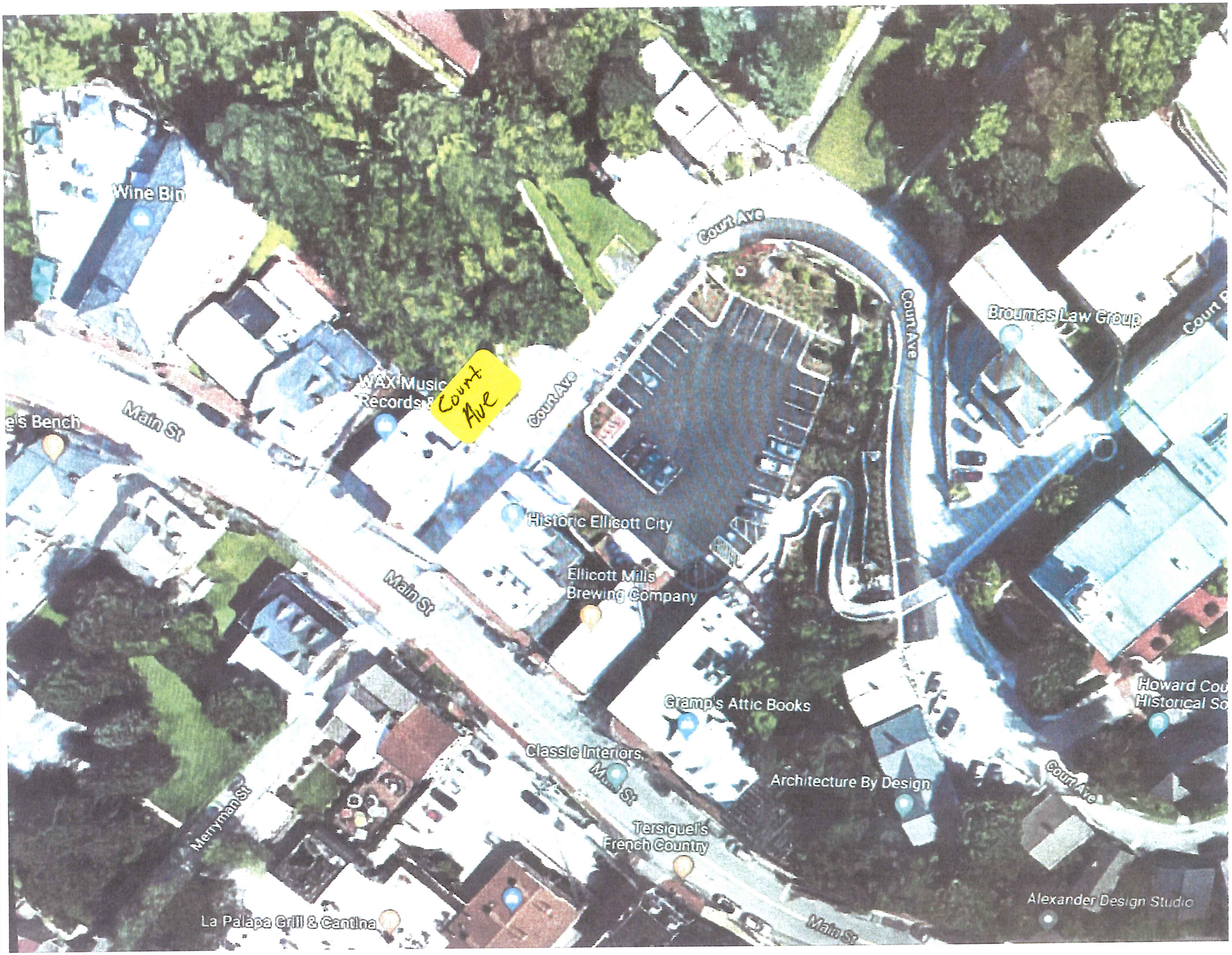


To view the evolution of this rainfall, you can click below to view three loops showing the accumulation of Storm Total Precipitation over time. These loops correspond to the same three time

Summary

- Development in the headwaters almost certainly contributed to the fl
but is probably only a contributing factor. Eight inches of rain in less th
three hours will overwhelm any stormwater management. Only
extraordinary measures would mitigate runoff from that much rain a
success would be uncertain.
- The 2017 McCormick-Taylor study identified a range of possible miti
efforts with cumulative cost estimate of $145 million but an uncerta
upper limit, a time frame of years to decades for full implementatio
a warning that mitigation of upland flooding would not protect agai
Agnes-type flood on the mainstem Patapsco. The 2018 flood was ev
larger than the 2016 flood.
- The scientific community is becoming increasingly concerned that
probabilities of extreme rainfall and extreme floods are increasing.
borne out by looking at our flood records in other nearby small url
watersheds.

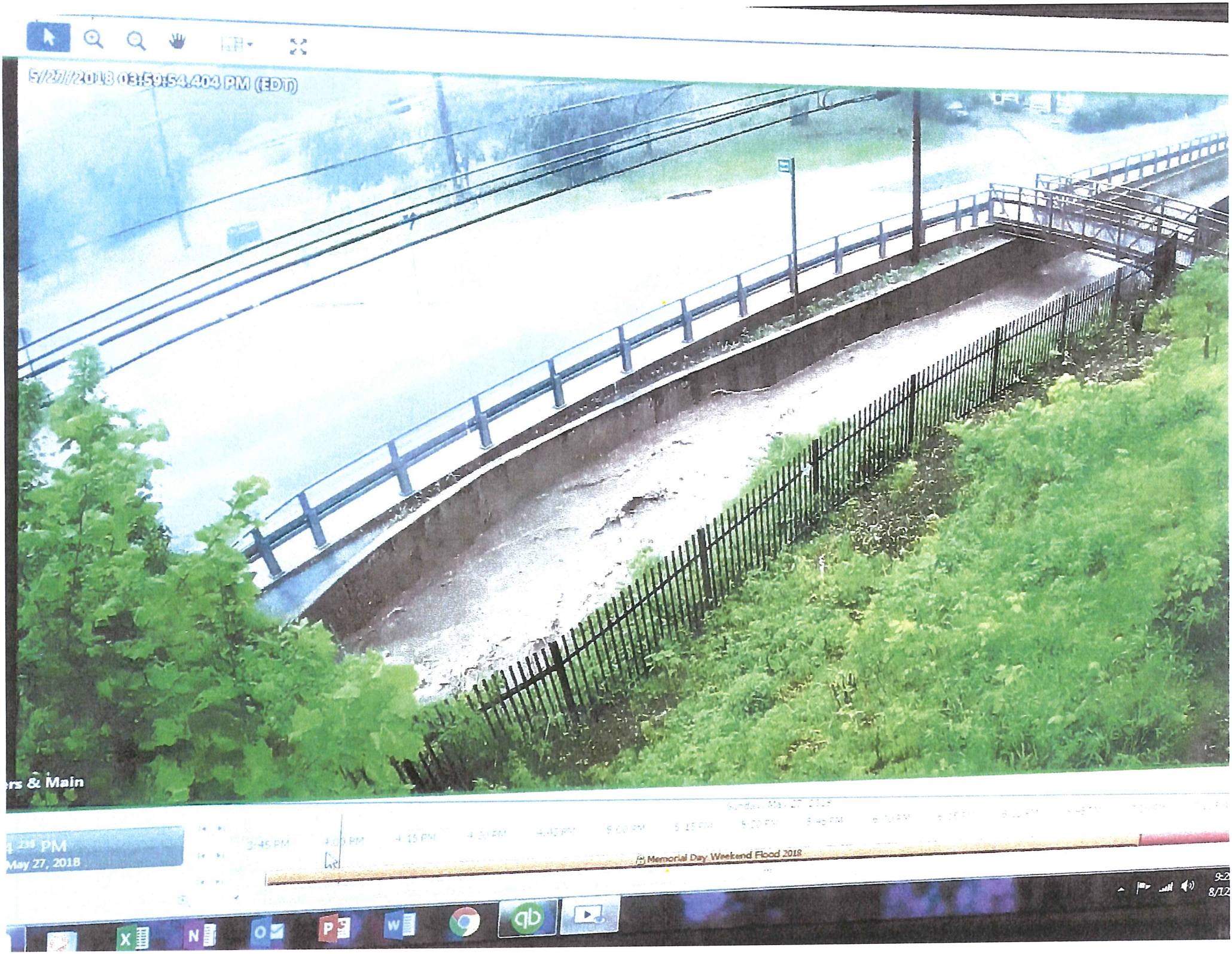

Smith Ave
Bellomo Dr
Bellomo Dr
Main St
Main St
Main St
St Peter's
Hag Motors
Jack of Arts Studios
1. Rogers & Main
108/84 Culvert


Wine Bin
Court Ave
Court Ave
Broumas Law Group
WAX Music
Records
Court Ave
Court Ave
Main St
Historic Ellicott City
Ellicott Mills
Brewing Company
Main St
Howard Cou
Historical So
Gramp's Attic Books
Classic Interiors
Main St
Court Ave
Architecture By Design
Merryman St
Tersiguel's
French Country
Alexander Design Studio
La Palapa Grill & Cantina
Main St

Lot D
Old Columbia Pike
Rousay Lane
Manor Hill Tavern
Envy Salon
Old Columbia Pike
Hi Ho Silver Co
LittleMarket Café
Hamilton St
Howard County Welcome Center
Main St
Sweet Elizabeth Jane
Alexander Design Stu
Architecture By D

Tiber Newcut
EC pops Main St
Portalli Loft
Tiber Alley
Main St
Culture Lab
Portallis
Tiber Alley
Tiber Park
Tiber Alley
Antiquel Depot
Main St
Trading Post Alley
Main St
Main St
Art Glass Studio
Phoenix Emporium
Main St
Maryland Ave

South Rogers & Main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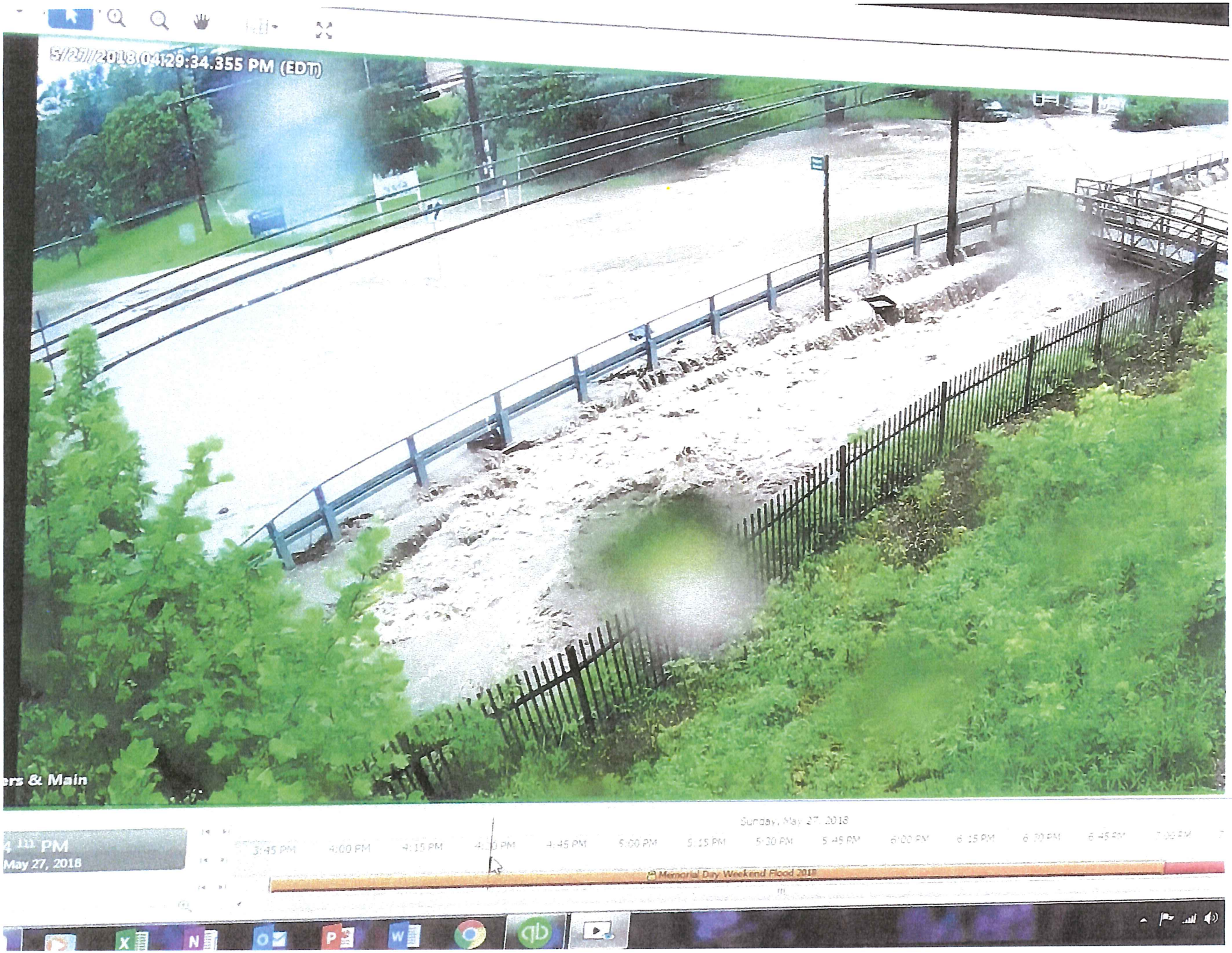
Memorial Day Weekend Flood 2018


/2018 04:14:51.379 PM (EDT)
Memorial Day Weekend Flood 2018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May 27, 2018
Sunday, May 27, 2018
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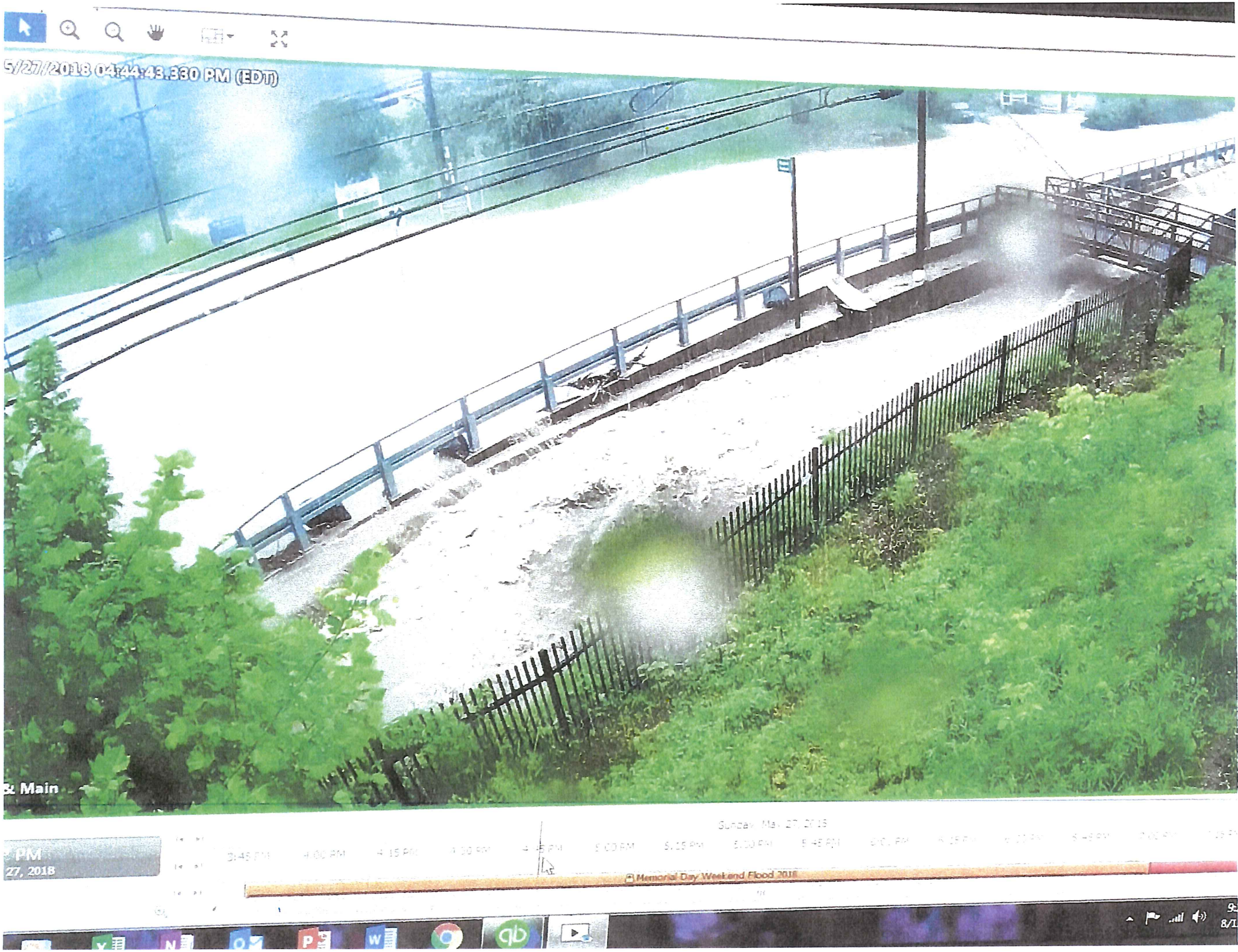
Memorial Day Weekend Flood 2018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& Main
Memorial Day Weekend Flood 2018

Memorial Day Weekend Flood 2018


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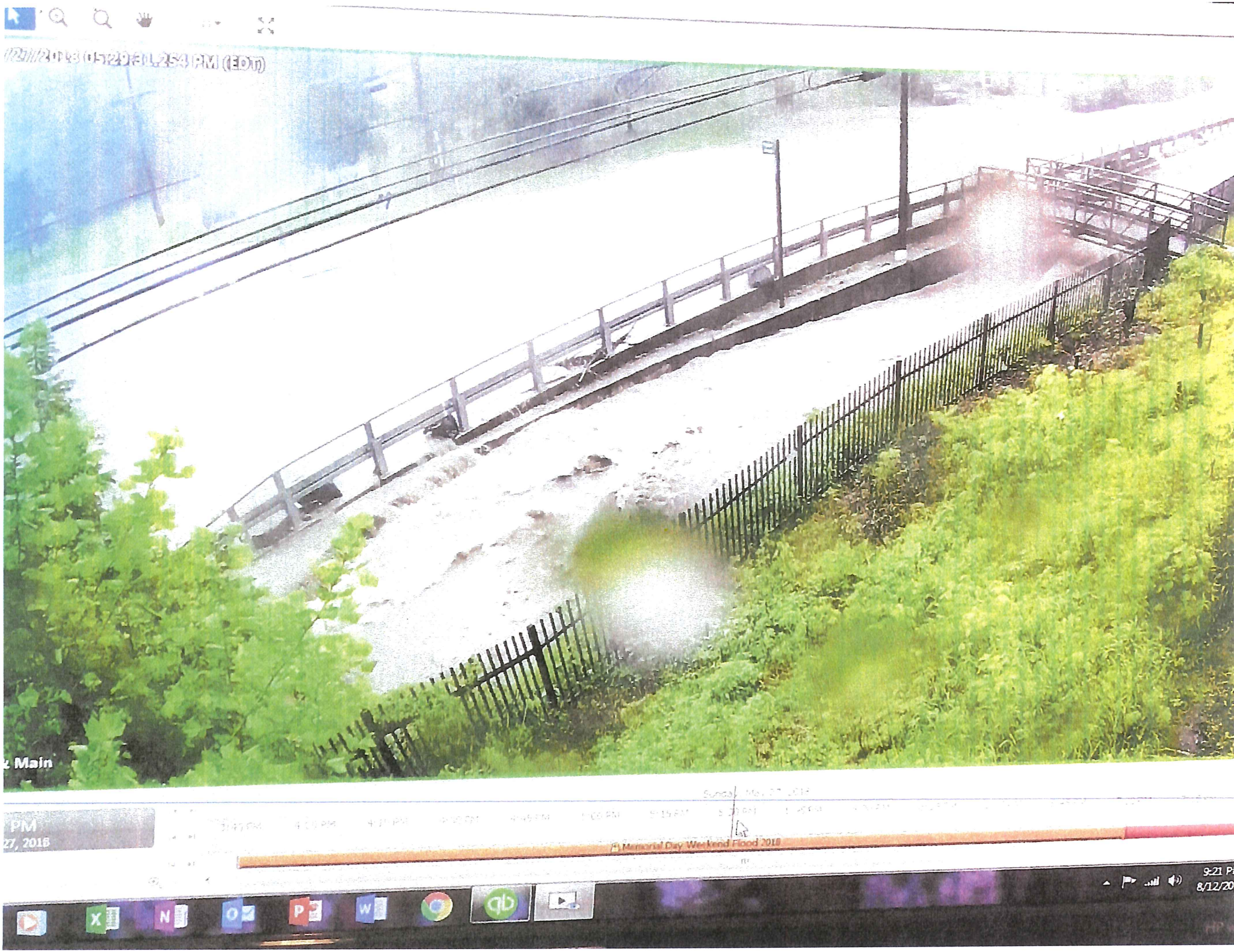
2018
Memorial Day Weekend Flood 2018
9:21 PM
8/12/2018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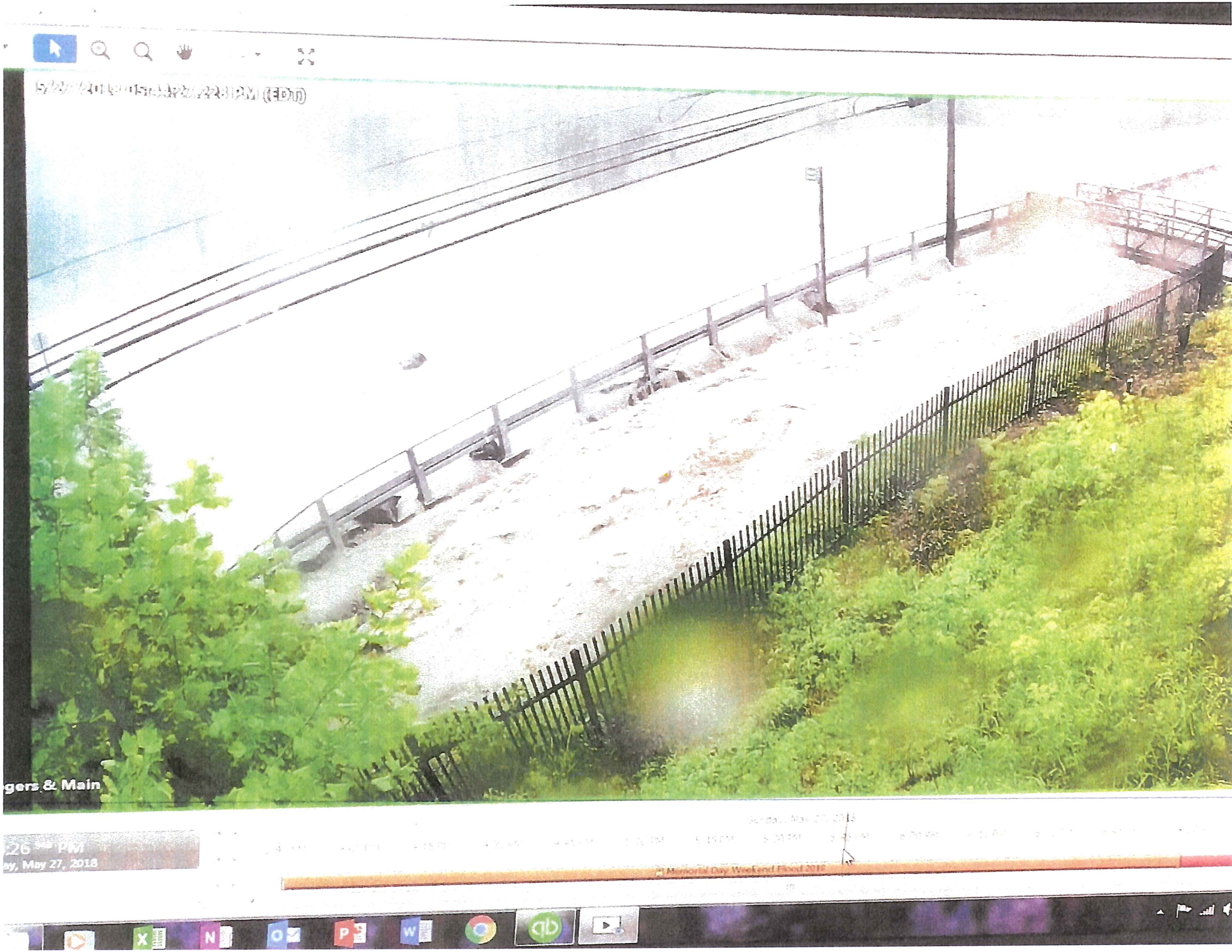
Memorial Day Weekend Flood 2018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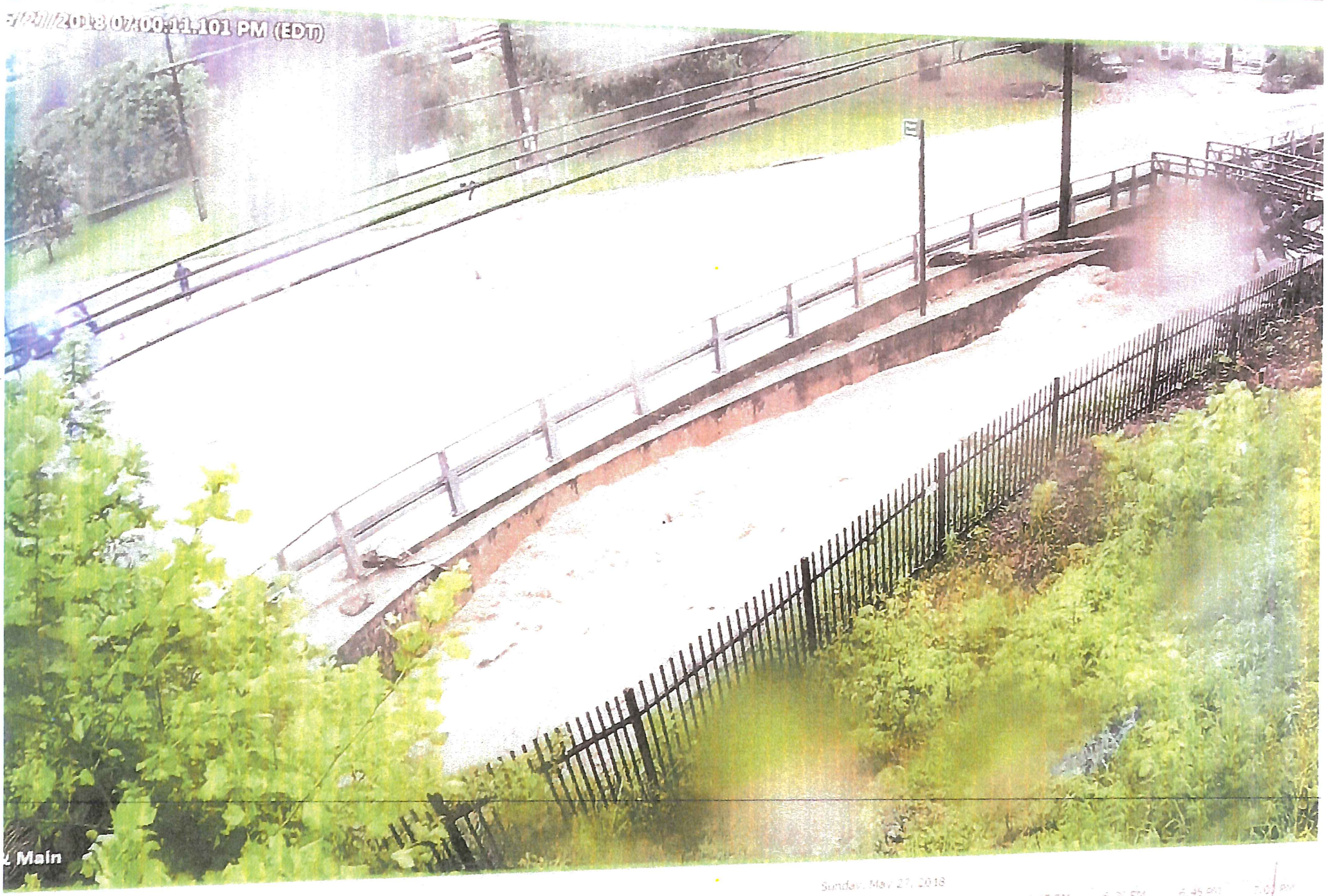
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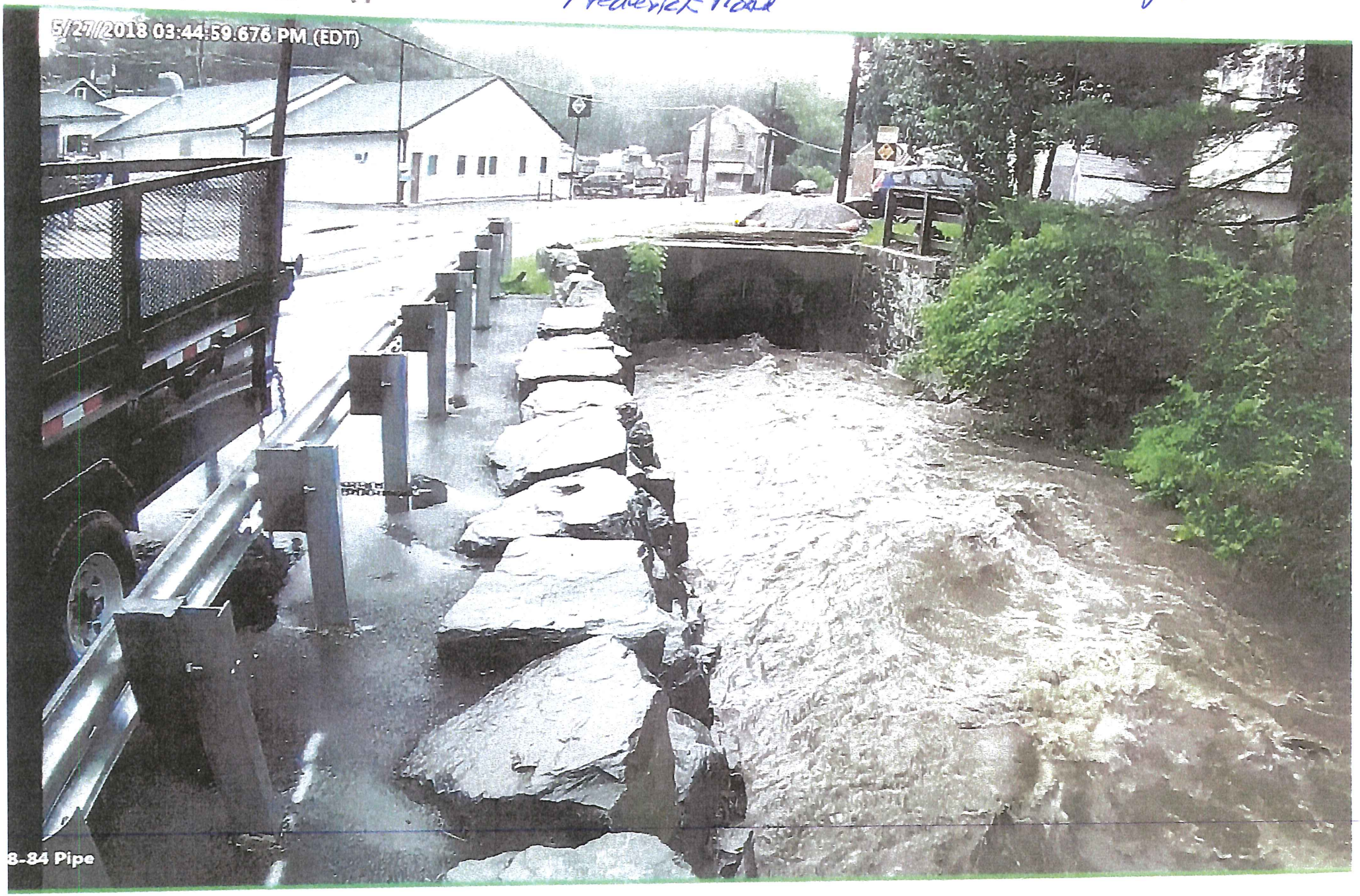
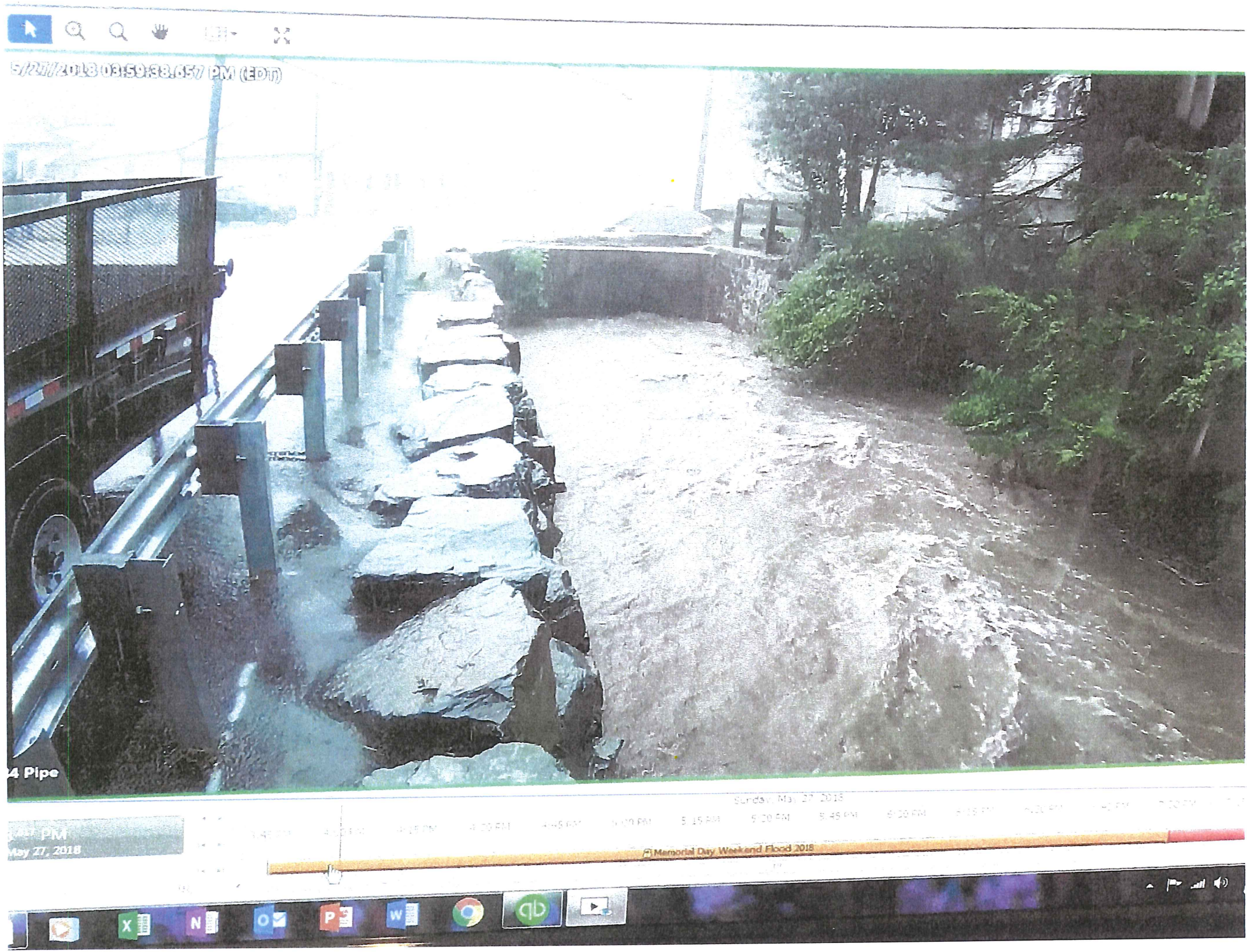
Main
Sunday, May 27, 2018
Memorial Day Weekend Flood 2018

8600 Block Westend Frederick Road

108/8" pipe

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4 Pipe
Sunday, May 27, 2018
Memorial Day Weekend Flood 2018

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y 27, 2018

Memorial Day Weekend Flood 2018


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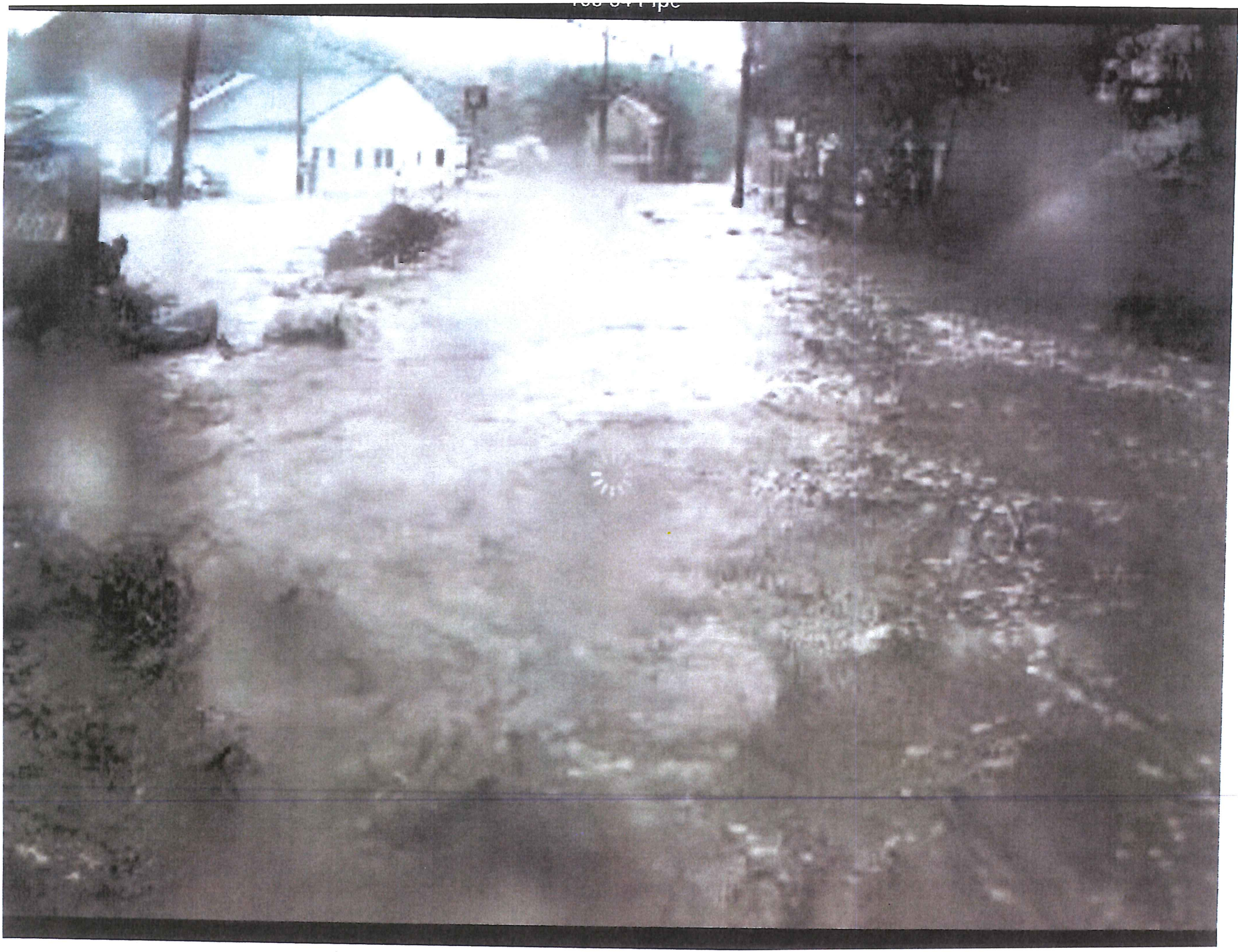


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108-84 Pipe

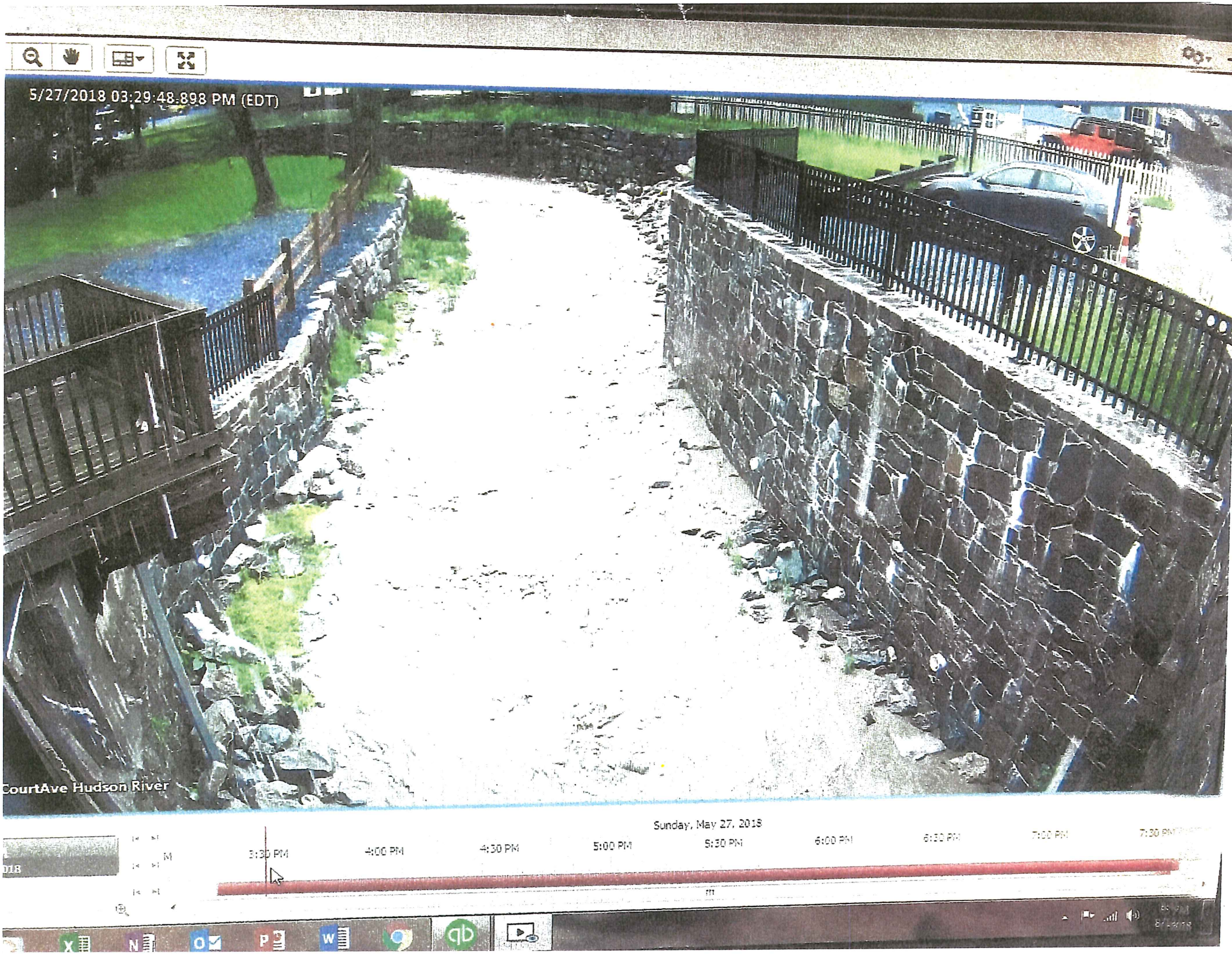

5/27/2018 05:29:52.539 PM (EDT)
8-84 Pipe
Sunday, May 27, 2018
Memorial Day Weekend Flood 2018

PM
May 27, 2016

Memorial Day Weekend Flood 2016


5/27/2018 05:59:57.493 PM (EDT)
84 Pipe


5/27/2018 07:15:16.380 PM (EDT)
Pipe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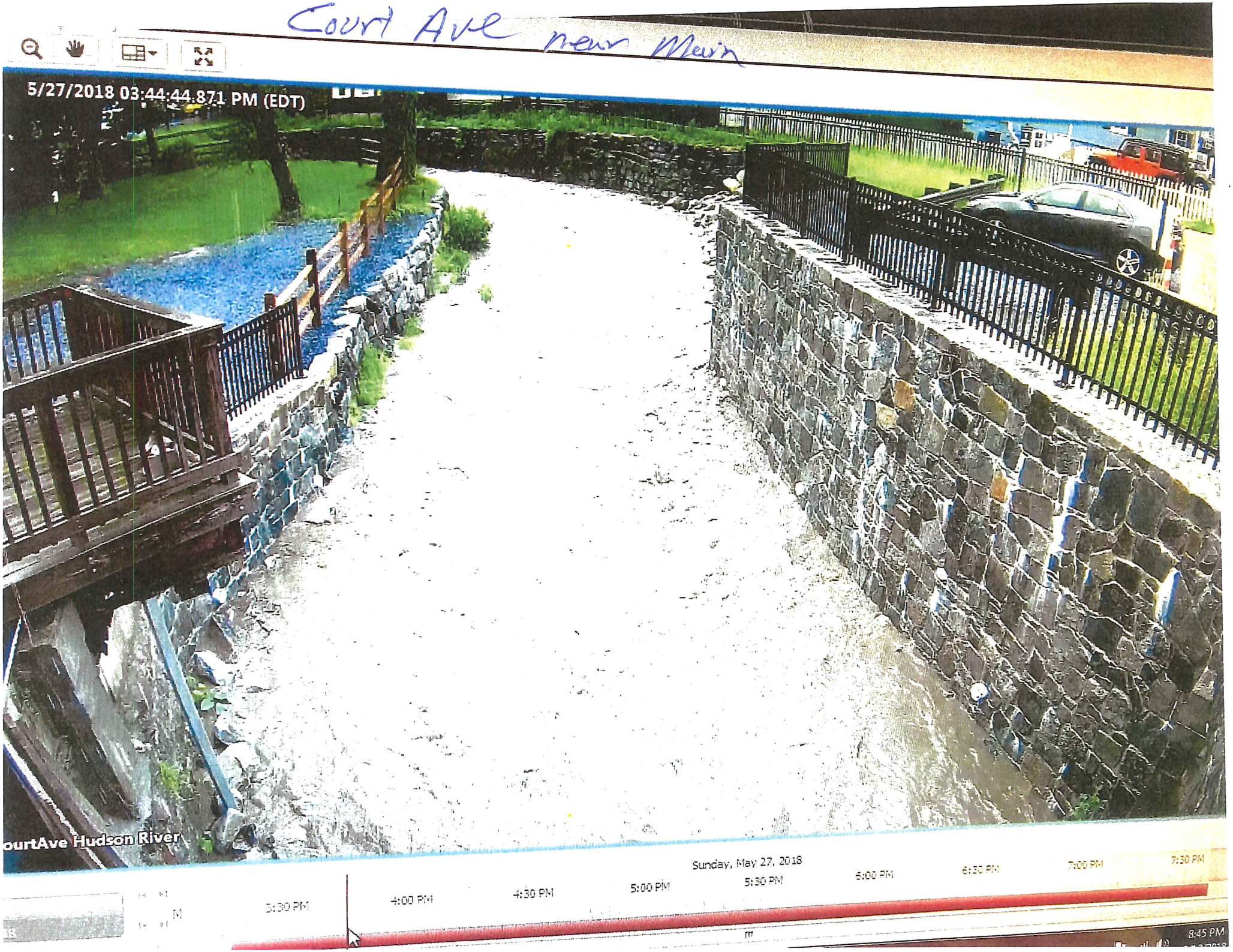
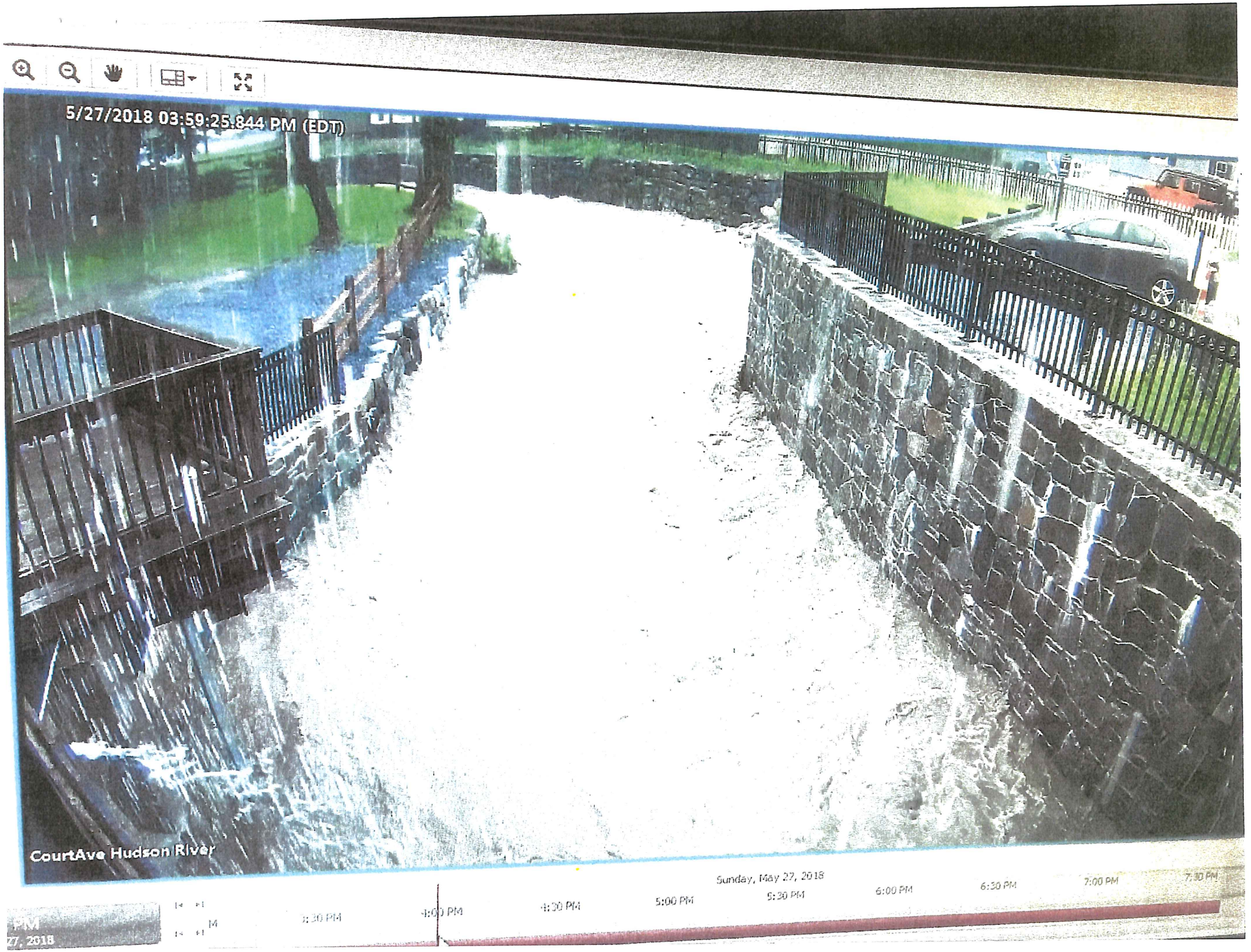
Court Ave near Main

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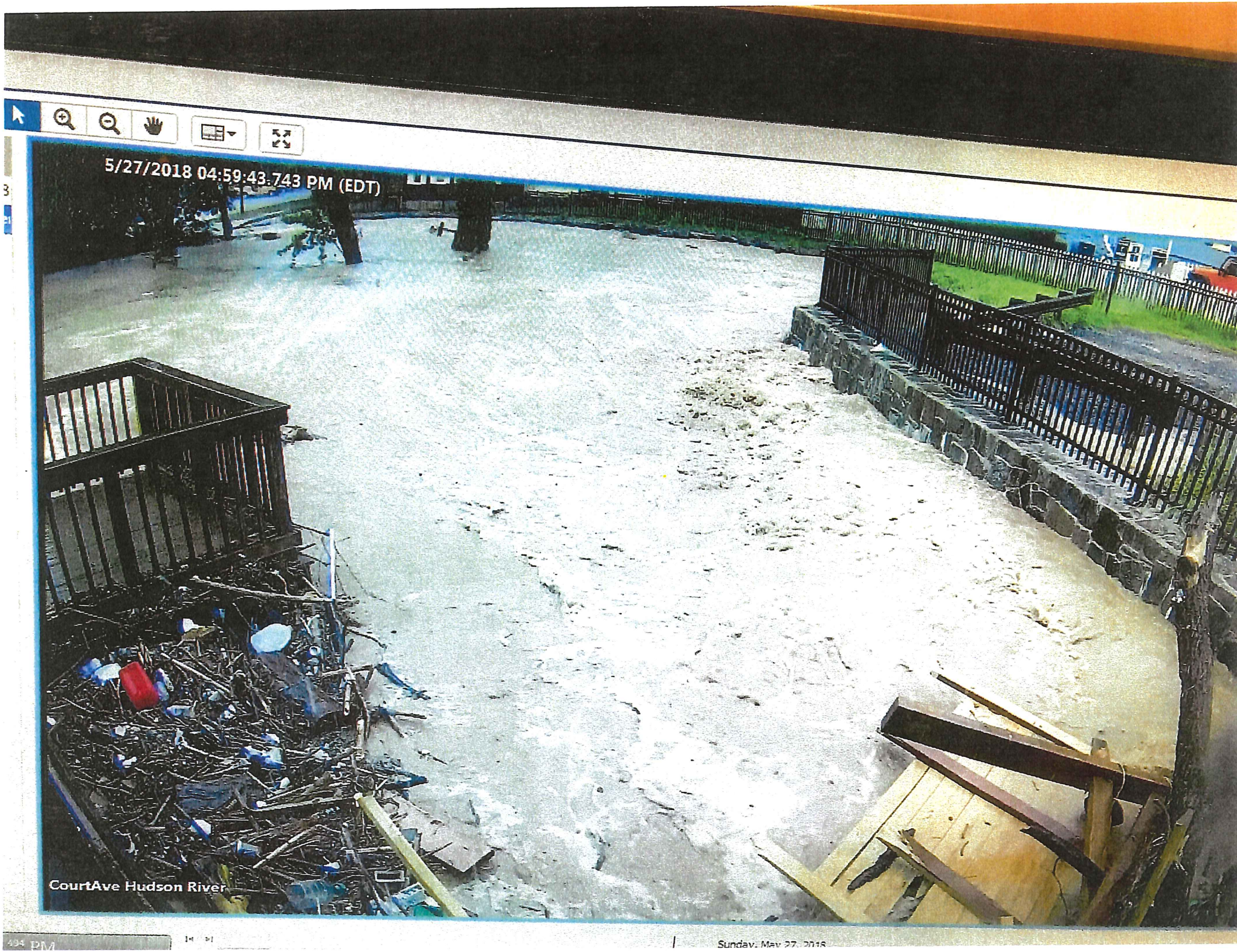
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Sunday, May 27, 2018


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CourtAve Hudson River
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May 27, 2018
Sunday, May 27, 2018
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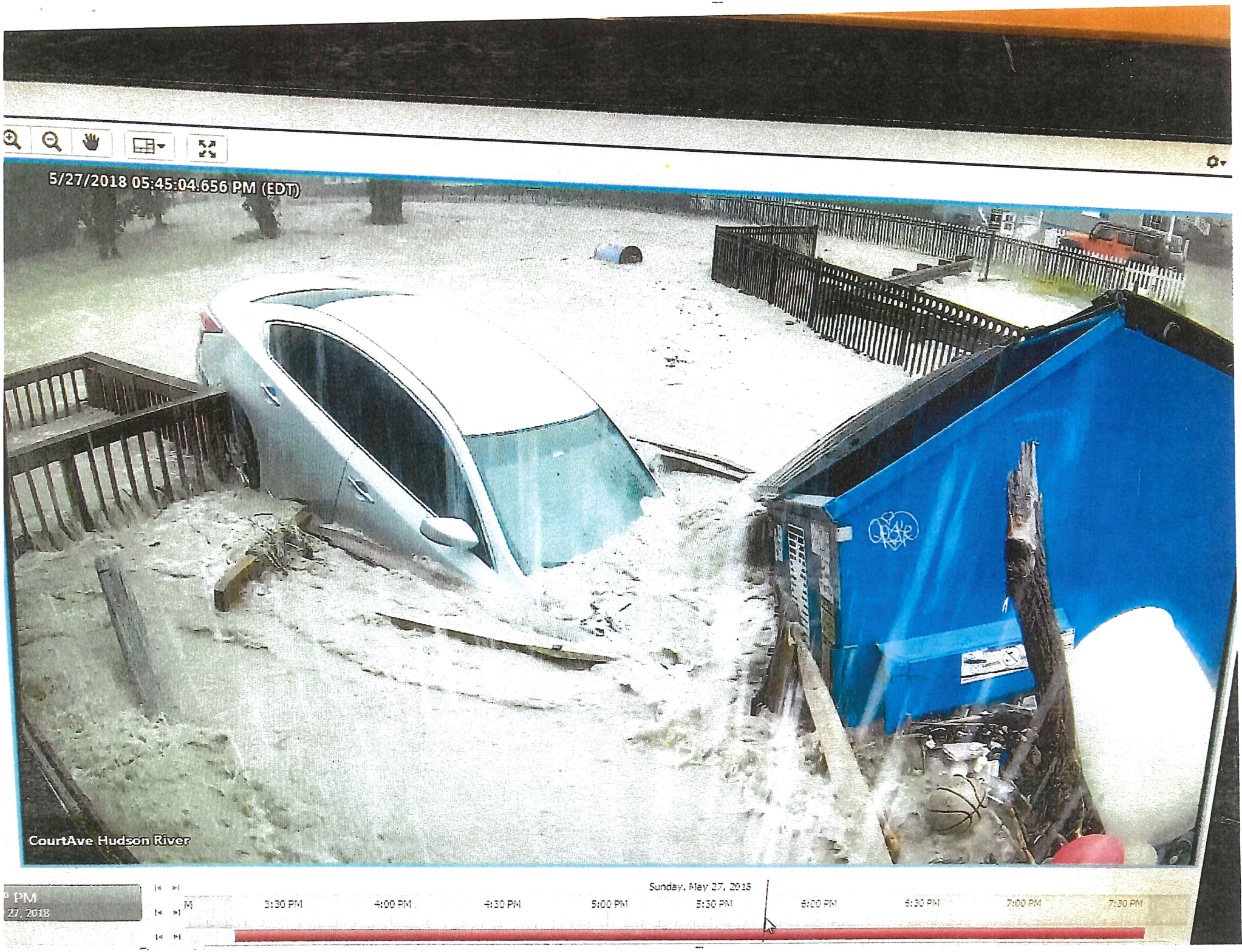
May 27, 2018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CourtAve Hudson River

Lot D

7:26 AM
8/13/2018


5/27/2018 03:59:38.495 PM (EDT)
Tiber Hudson Lot D
Sunday, May 27, 2018
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Tiber Hudson Lot D


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5/27/2018 04:44:54.947 PM (EDT)

5/27/2018 04:59:53.428 PM (EDT)

Tiber Hudson Lot D


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Tiber Hudson Lot D


Tiber Hudson Lot D
Sunday, May 27, 2018
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Tiber Hudson Lot D
Sunday, May 27, 2018
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New Cut / Tiber 75 yards west of Caplans


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Sunday, May 27, 2018


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Sunday, May 27, 2018
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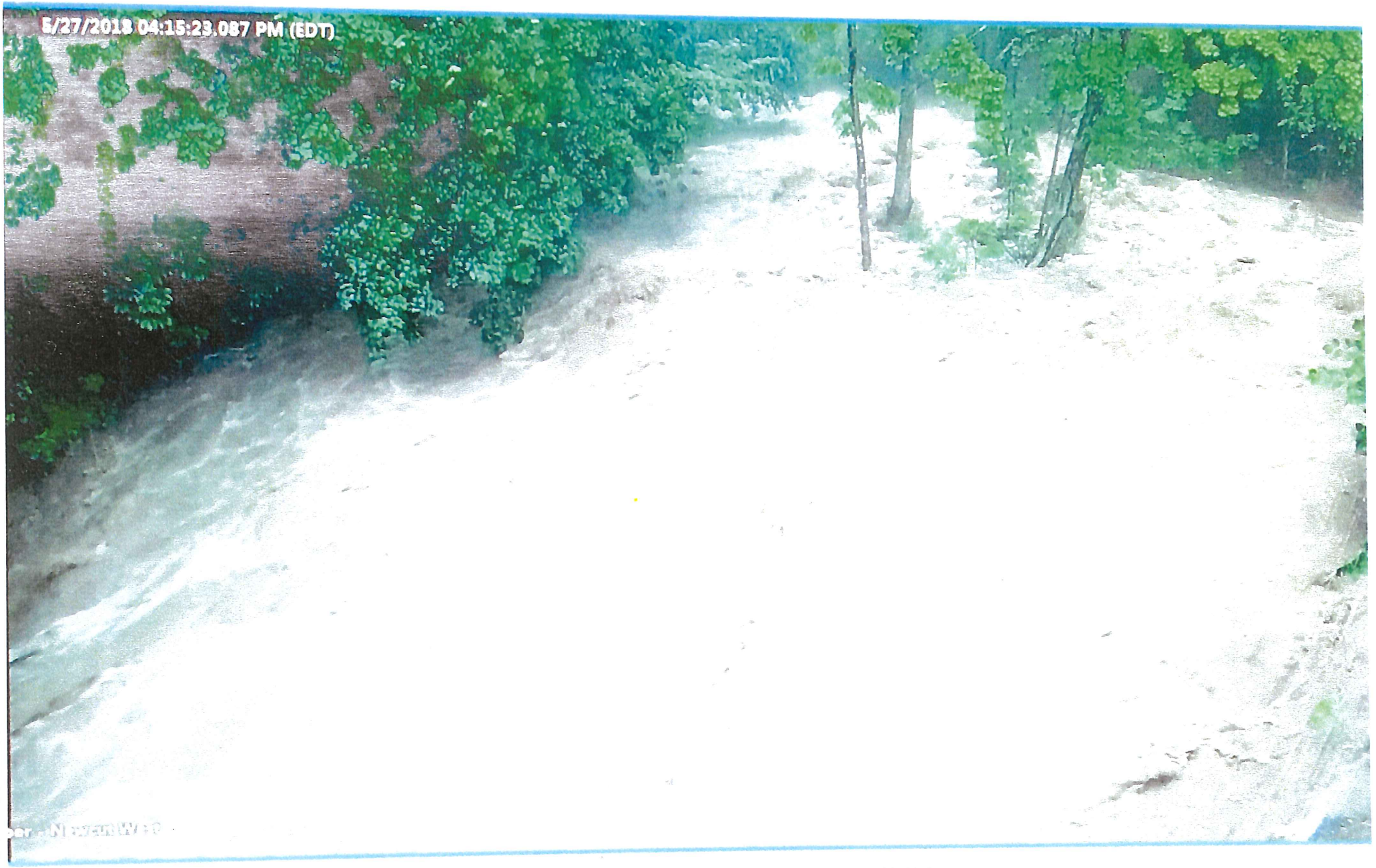
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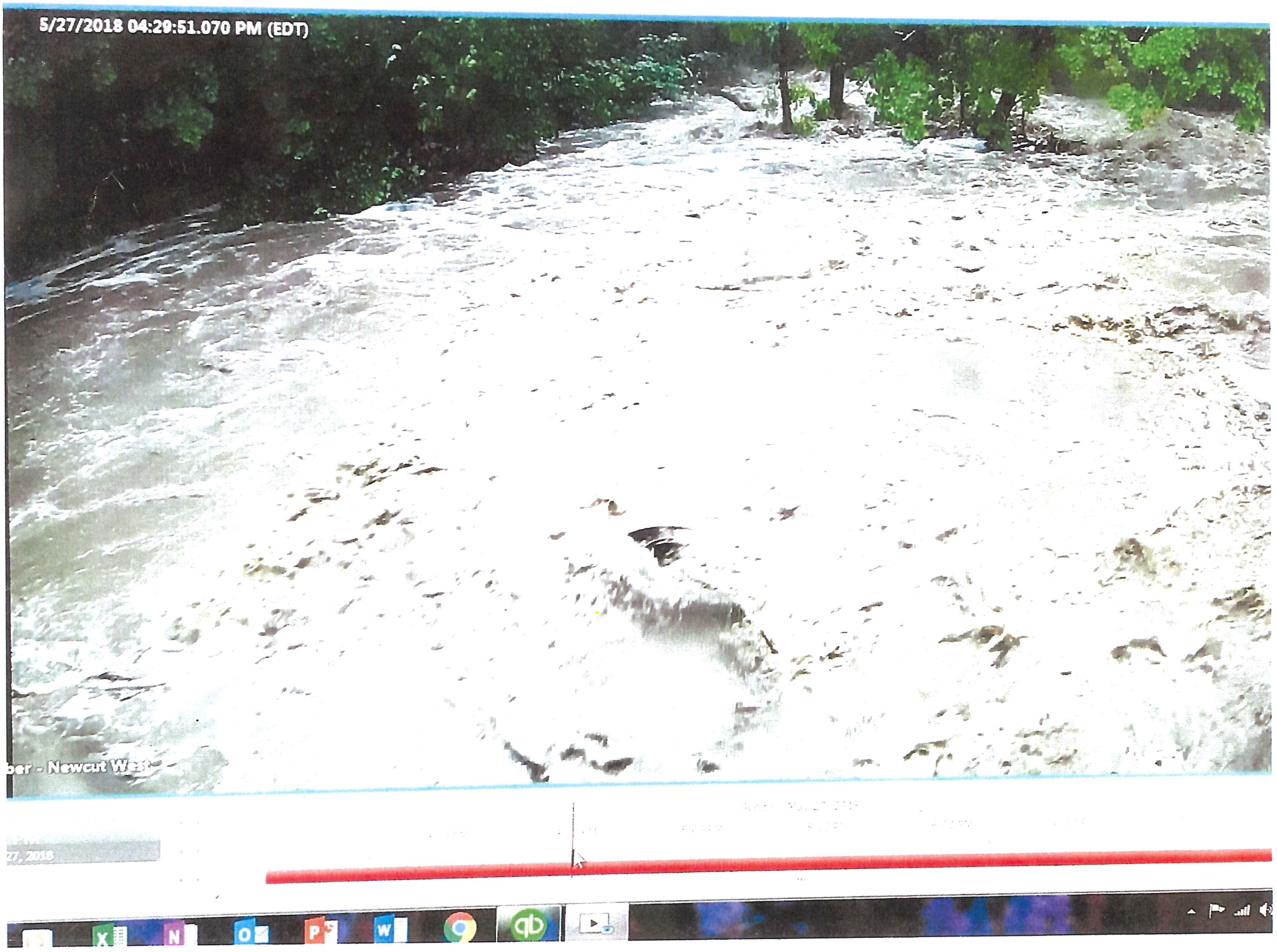
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r - Newcut West
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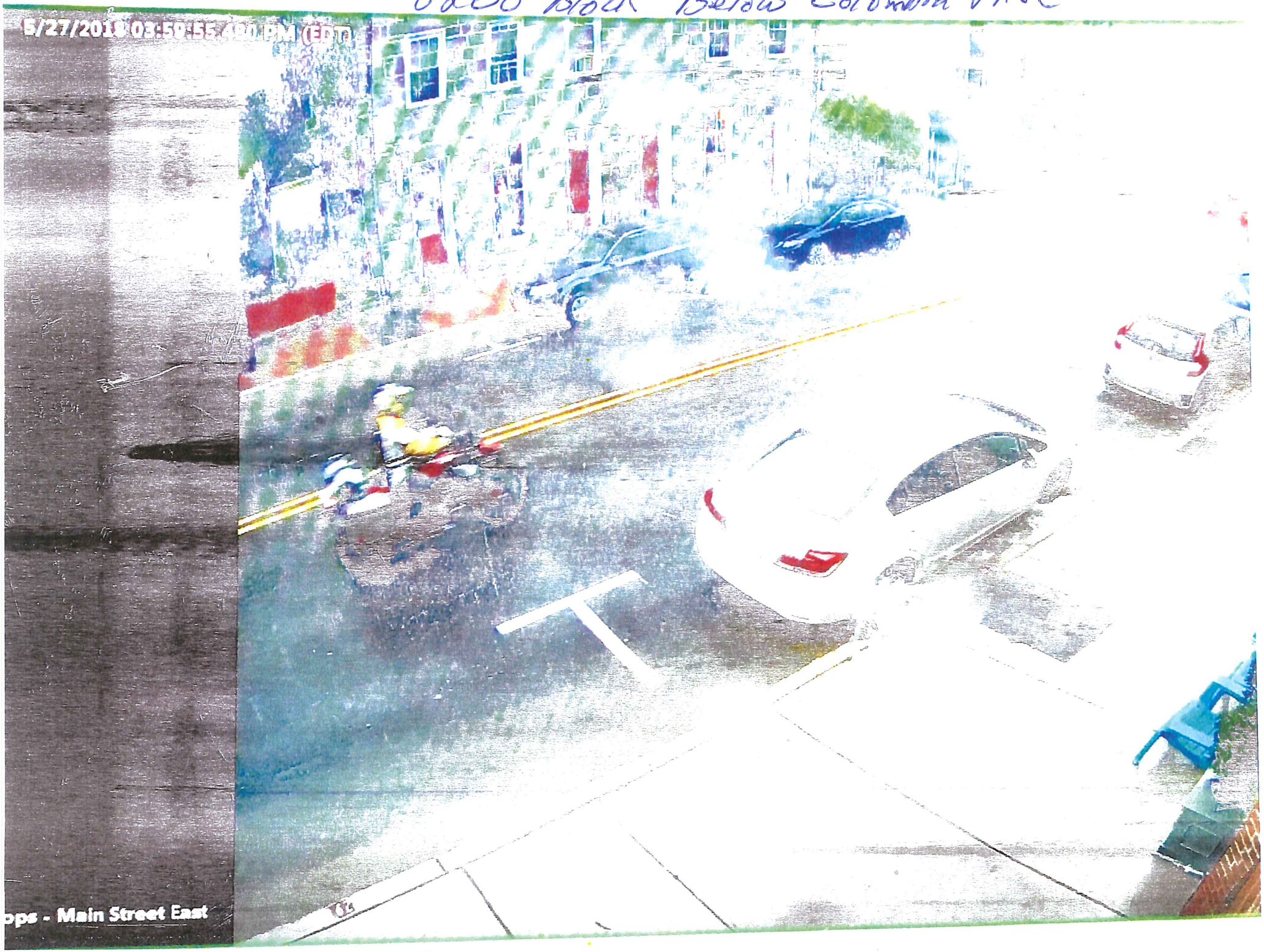
27/2018 05:14:47.985 PM (EDT)


5.30


06/08/2018

8200 Block Below Columbia Pike

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Street East


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Monday, May 27, 2018


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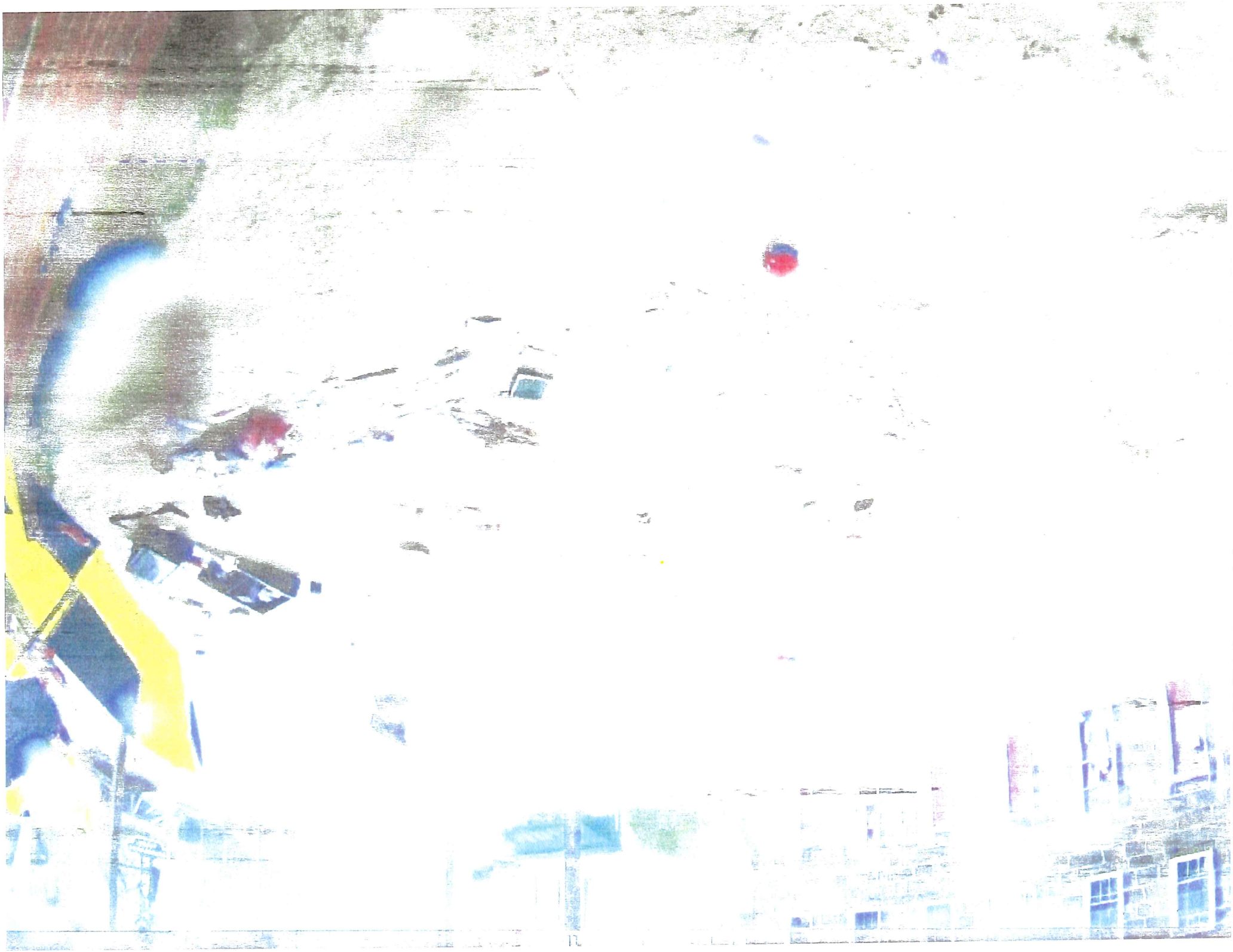
Main Street East
Sunday, May 27, 2018


5/27/2018 04:44:56.923 PM (EDT)


5/27/2018 05:00:05.901 PM (EDT)
Main Street East

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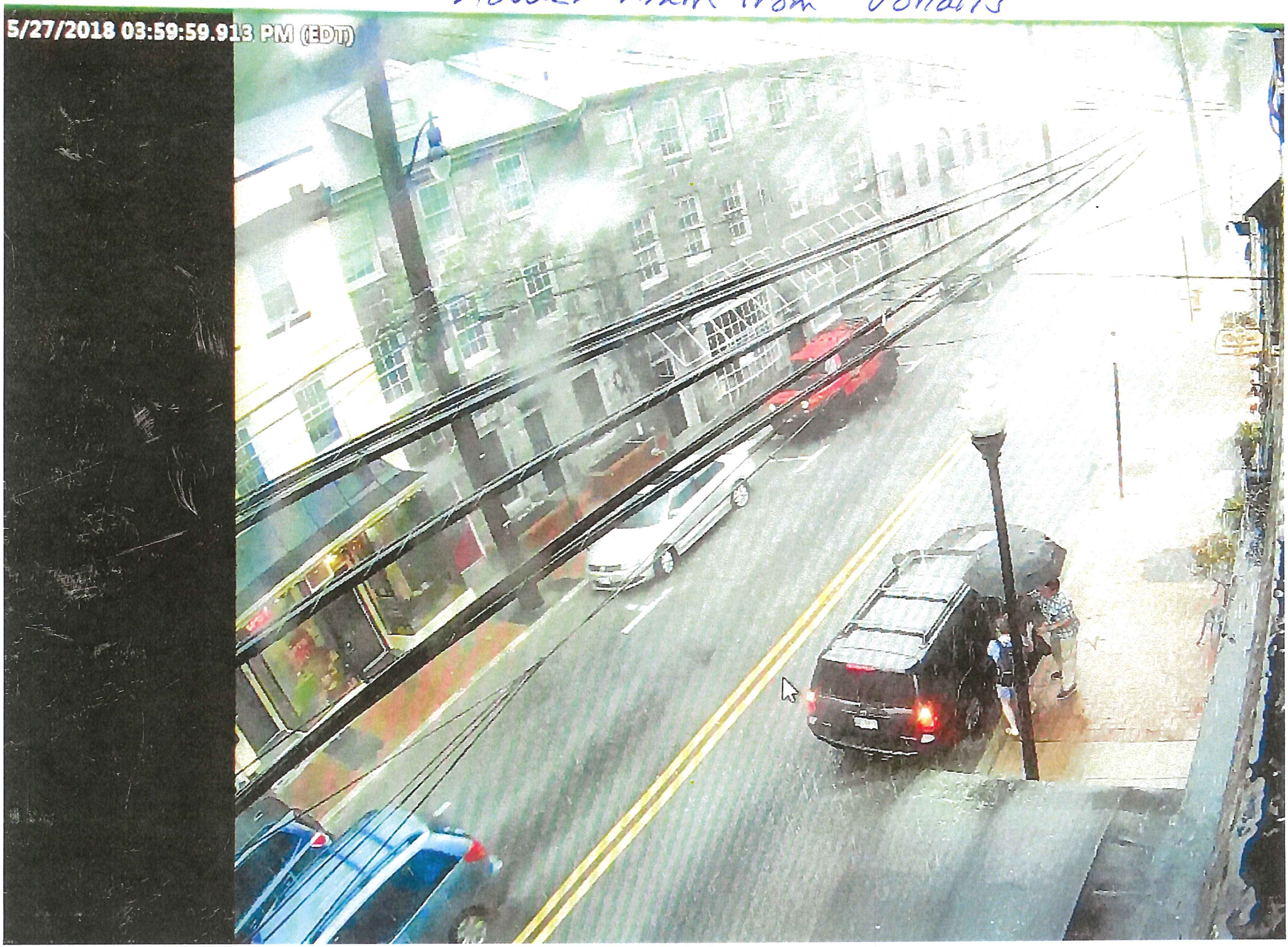
May 27, 2018

Lower Main from Portal's

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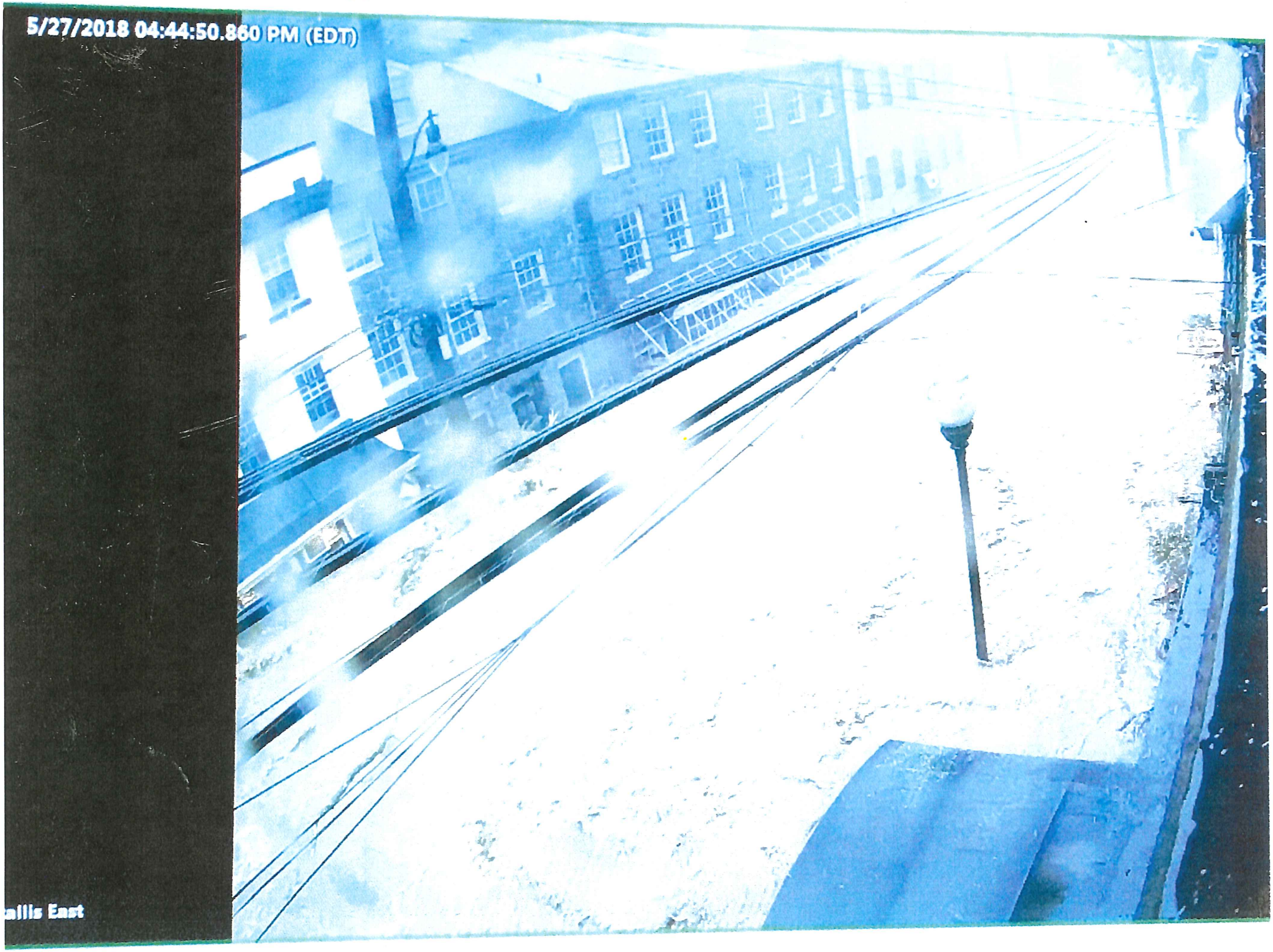
5/27/2018 04:44:50.860 PM (EDT)
allis East


/27/2018 04:59:59.838 PM (EDT)


Portallis East


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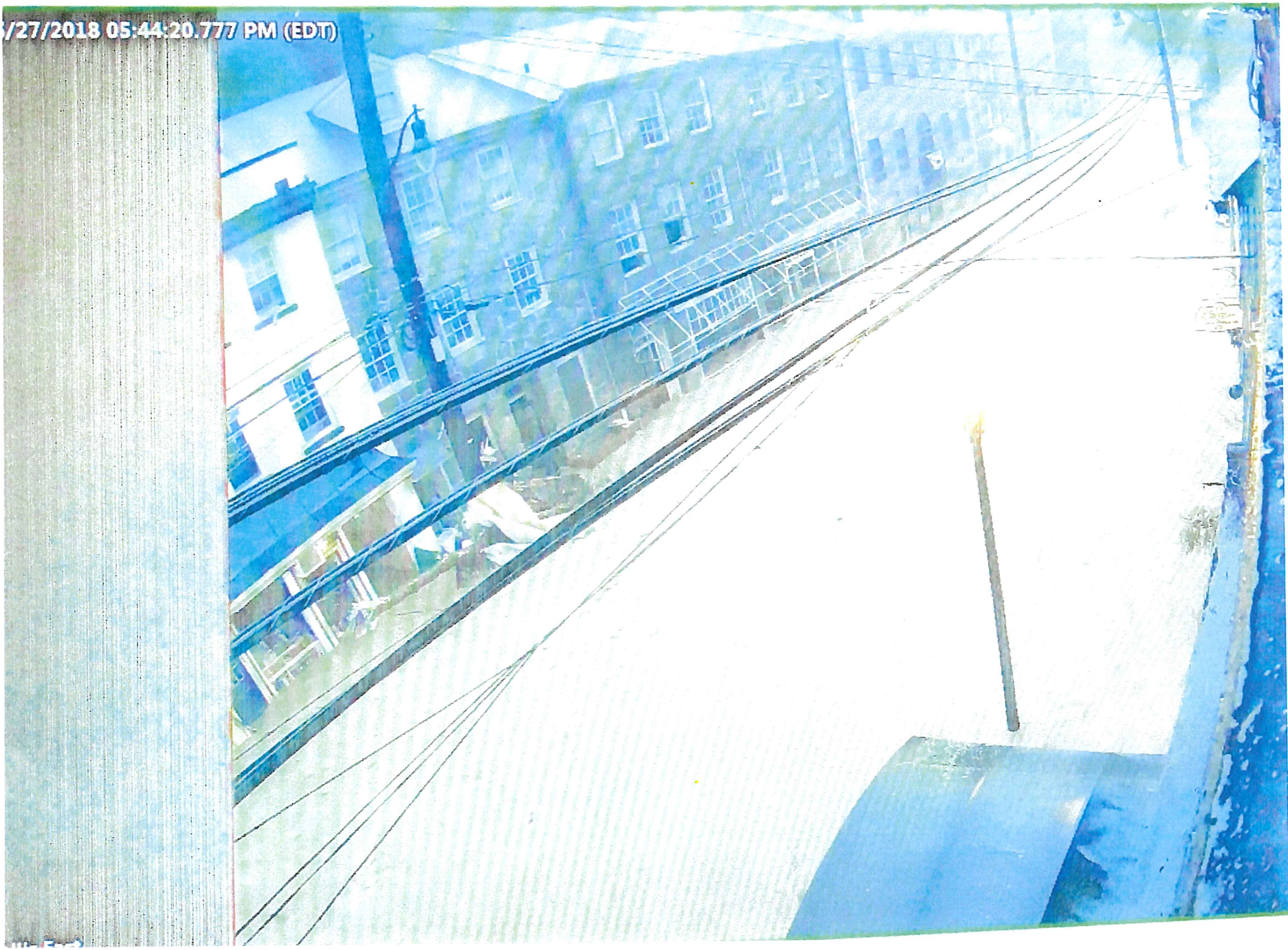
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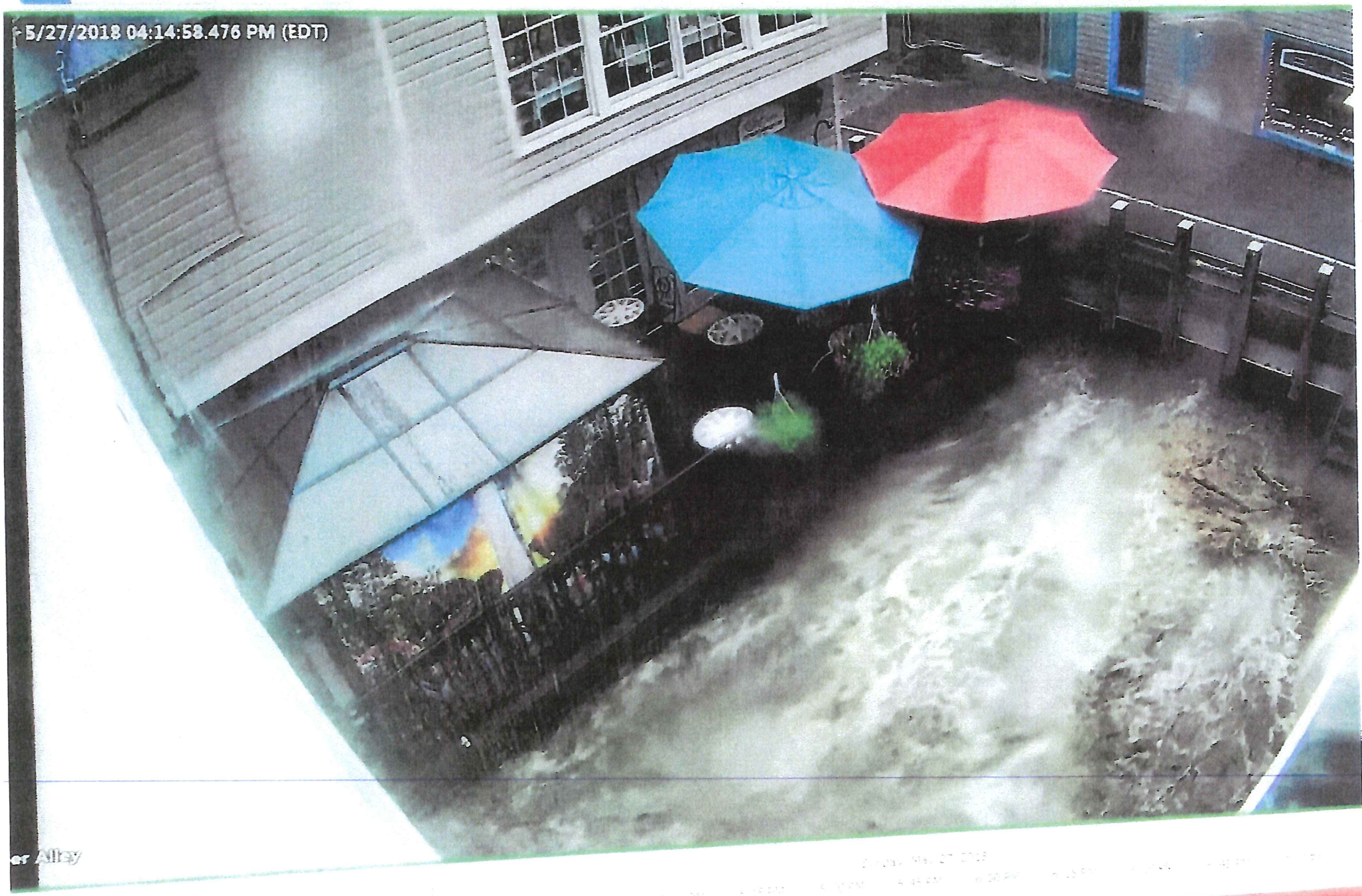
East

Tiber Alley → Tea on Tiber


5/27/2018 04:14:58.476 PM (EDT)


7/2018 04:29:54.453 PM (EDT)
Sunday, May 27, 2018
PM
7, 2018
9:24 PM


5/27/2018 04:44:50.429 PM (EDT)
Sunday, May 27, 2018
4:00 PM
4:15 PM
4:30 PM
5:15 PM
5:45 PM
PM
27, 2018


5/27/2018 04:59:46.406 PM (EDT)
Alley
Sunday, May 27, 2018
May 27, 2018


5/27/2018 05:14:29.384 PM (EDT)


27/2018 05:30:05.361 PM (EDT)


27/2018 05:44:47.335 PM (EDT)
Sunday, May 27, 2018


5/27/2018 06:00:10.310 PM (EDT)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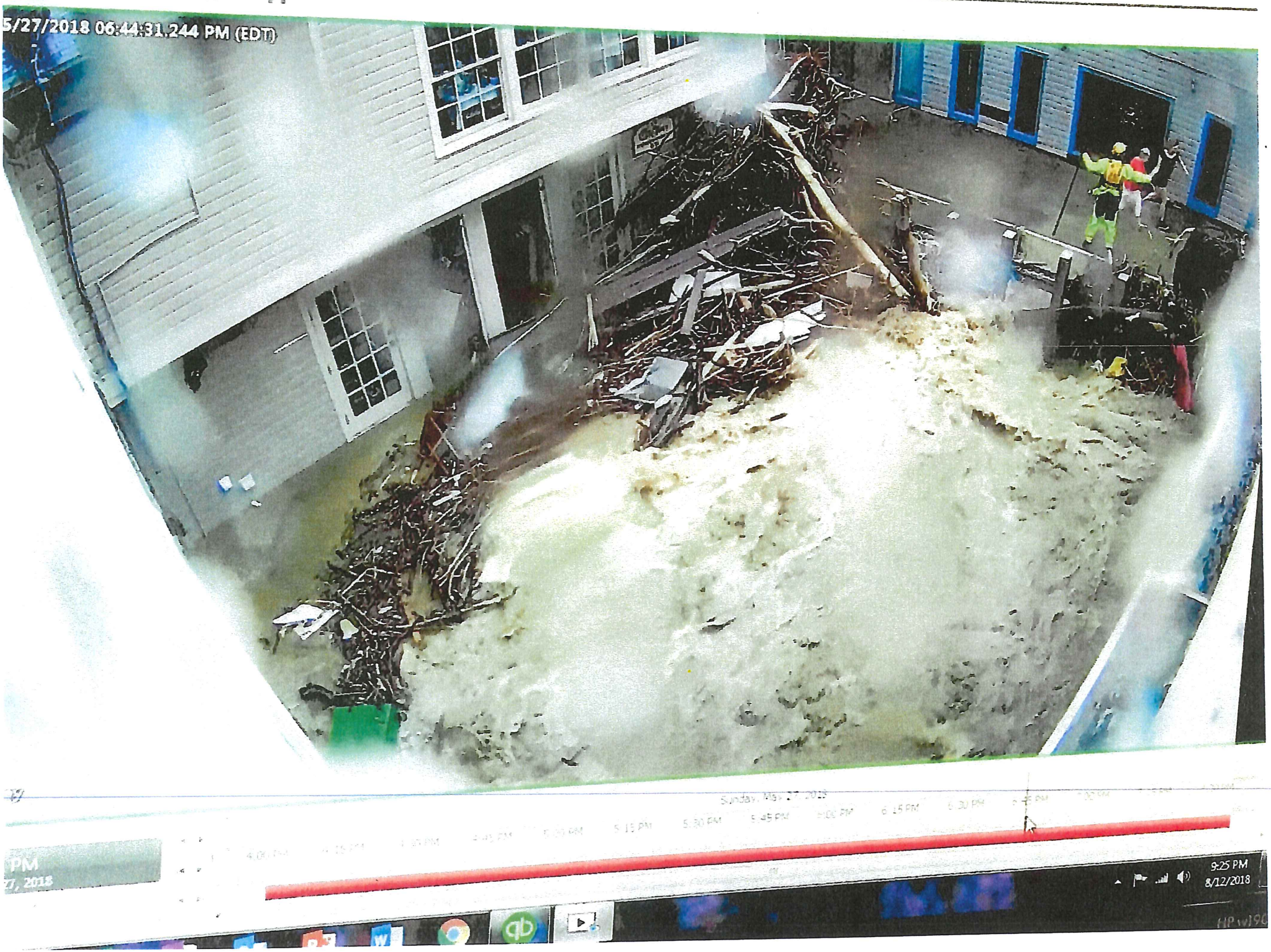
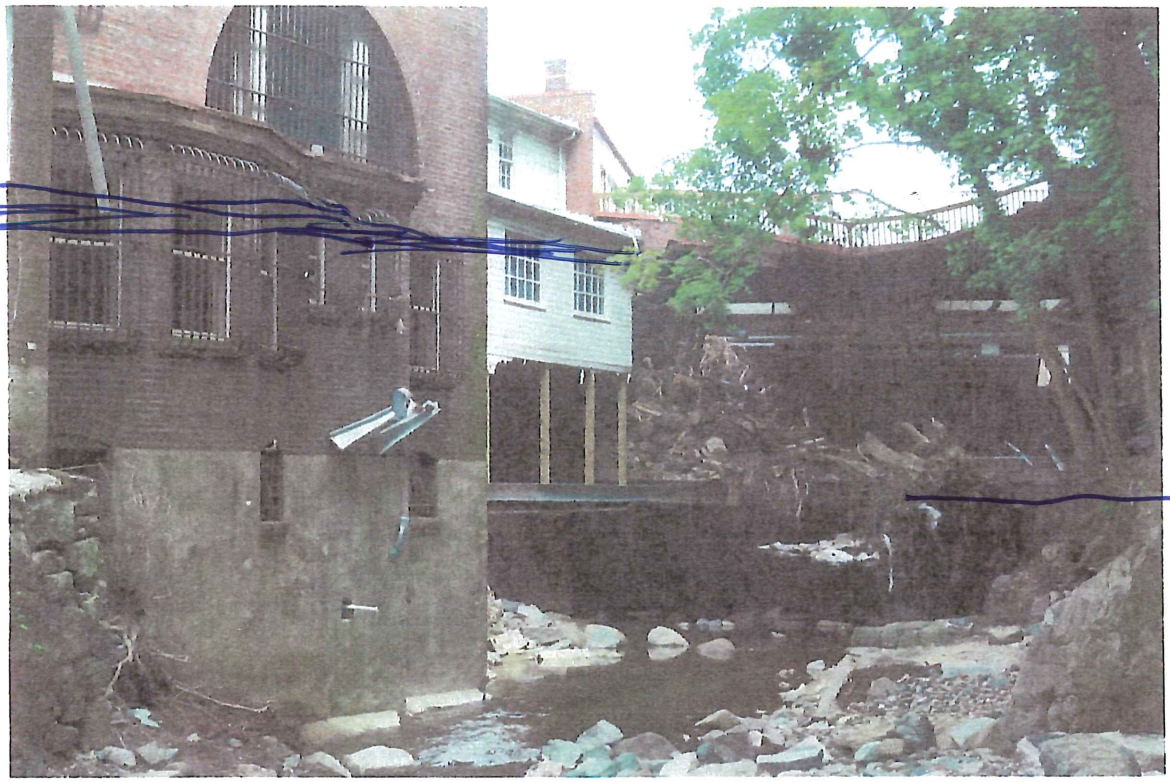

5/27/2018 06:44:31.244 PM (EDT)
9:25 PM
8/12/2018

7/2018 07:29:46.165 PM (EDT)

3

This shows the rock debris field that was left after the 2018 flood, 50 yards upstream from Caplan's. This whole channel from the river up to the New cut and on up to Ellicott Mills drive needs to be dredged and cleaned out



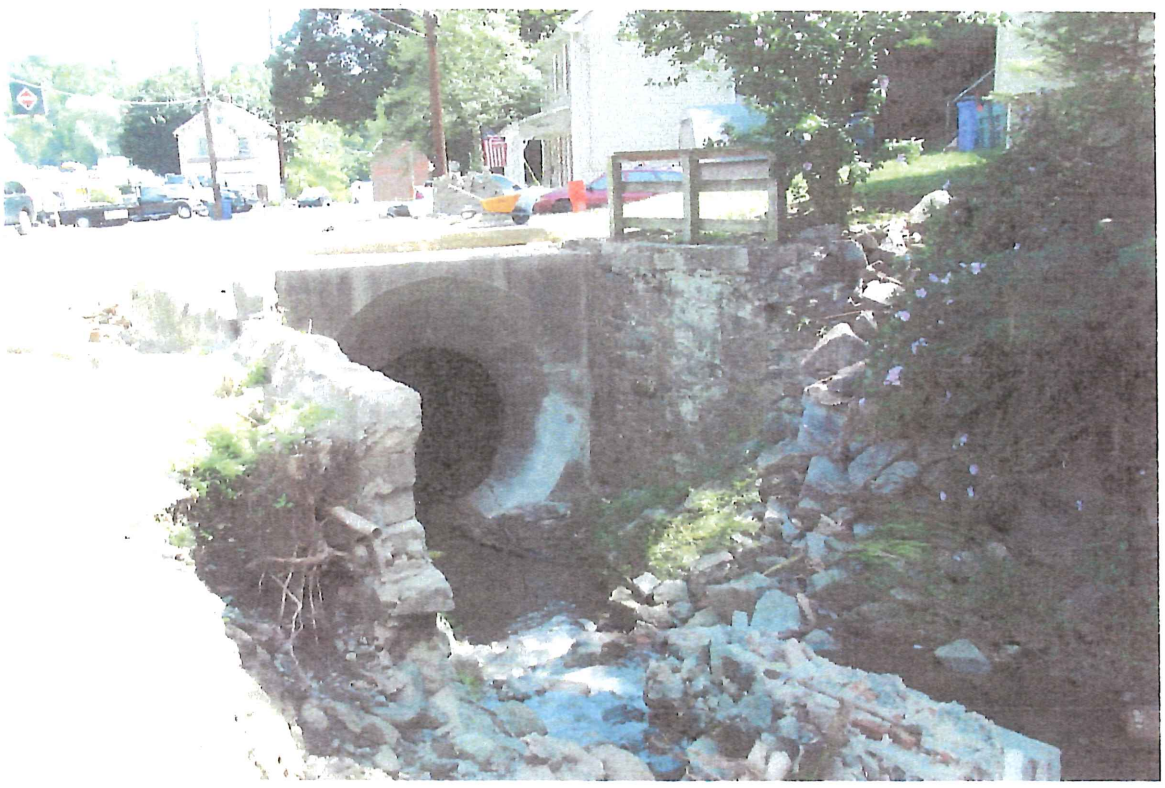
This photo shows the logs and trees that broke thru Caplans wall , the water level was at the top of the windows of the old bank building , about 20 feet deep . This is the beginning of where the Tiber goes under the buildings on lower mainstreet. The County has recommended taking these 10 buildings down to open the channel and improve the flow of the Tiber to the Patapsco river, this would also remove several hundred people from harms way when the next flood happens . The flood happened on Sunday, if it had been Saturday, MS Fit would have had a class of women exercising in this building, while children were being watched in the provided day care. This could have been a horrible tragedy. The removal of these buildings is necessary of which only one is historic and could be taken down and rebuilt .

Water 21.5 feet High

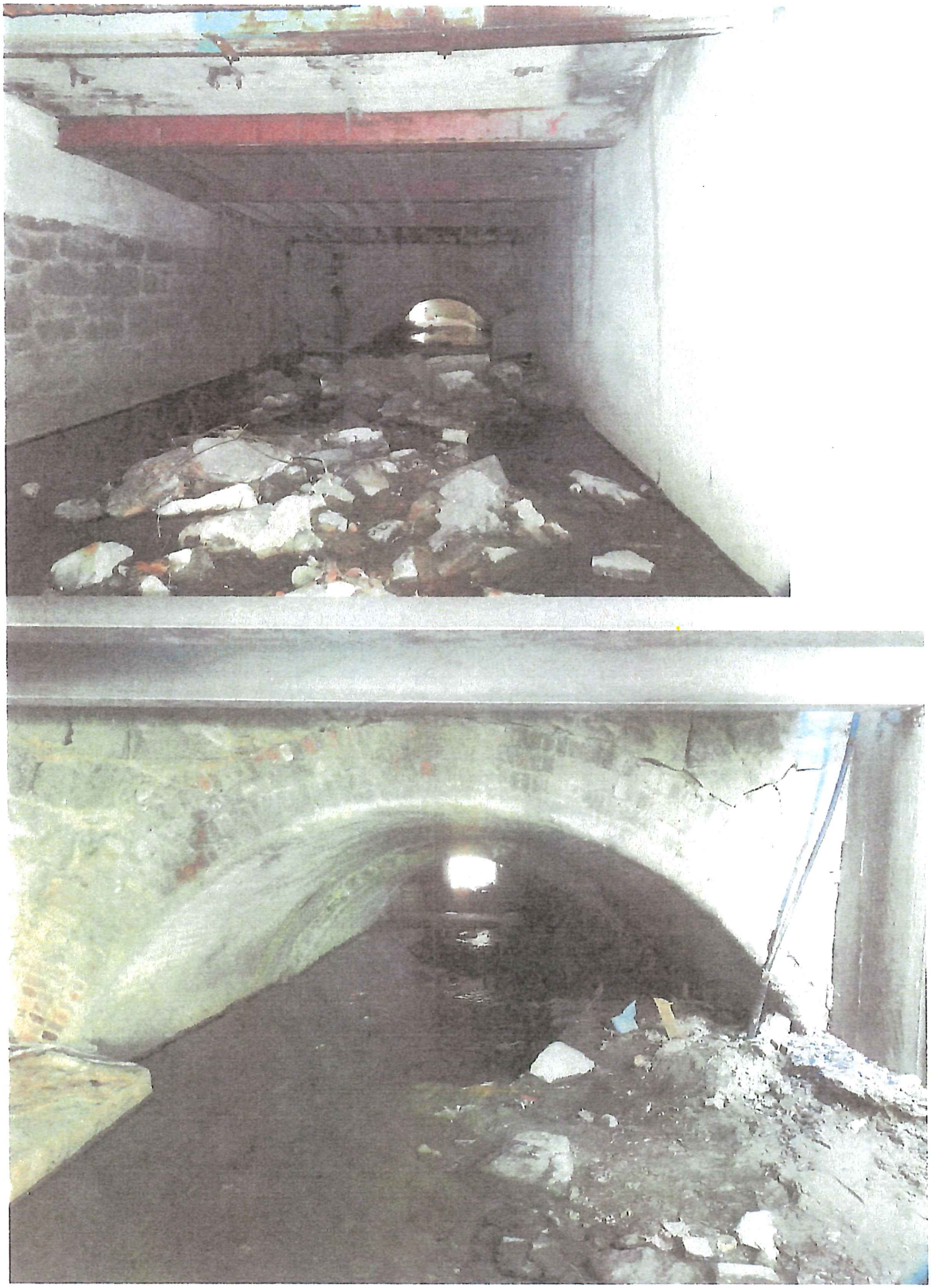

Exp 3
1772 / Bant-
Building
21.5 feet
Caplan
shorter
brick


8.5 ft

3



This is the 108-84 culvert , once 108 inches in diameter it was reduced in size in 1985, to 84 inches , it will not handle the current runoff volume , which includes the extreme amounts of UNMITIGATED water coming off of route 40 and routes 29 , these roads have been enlarged and widen several times with no SWM added by the State. All that runoff floods into Ellicott City. This is located in the 8600 block of Westend. It is scheduled for removal starting late next year and replaced with a bridge, and the lower 500 feet of culvert removed and the channel day lighted . There is a camera viewing this area and shows how severe the flooding was in 2018

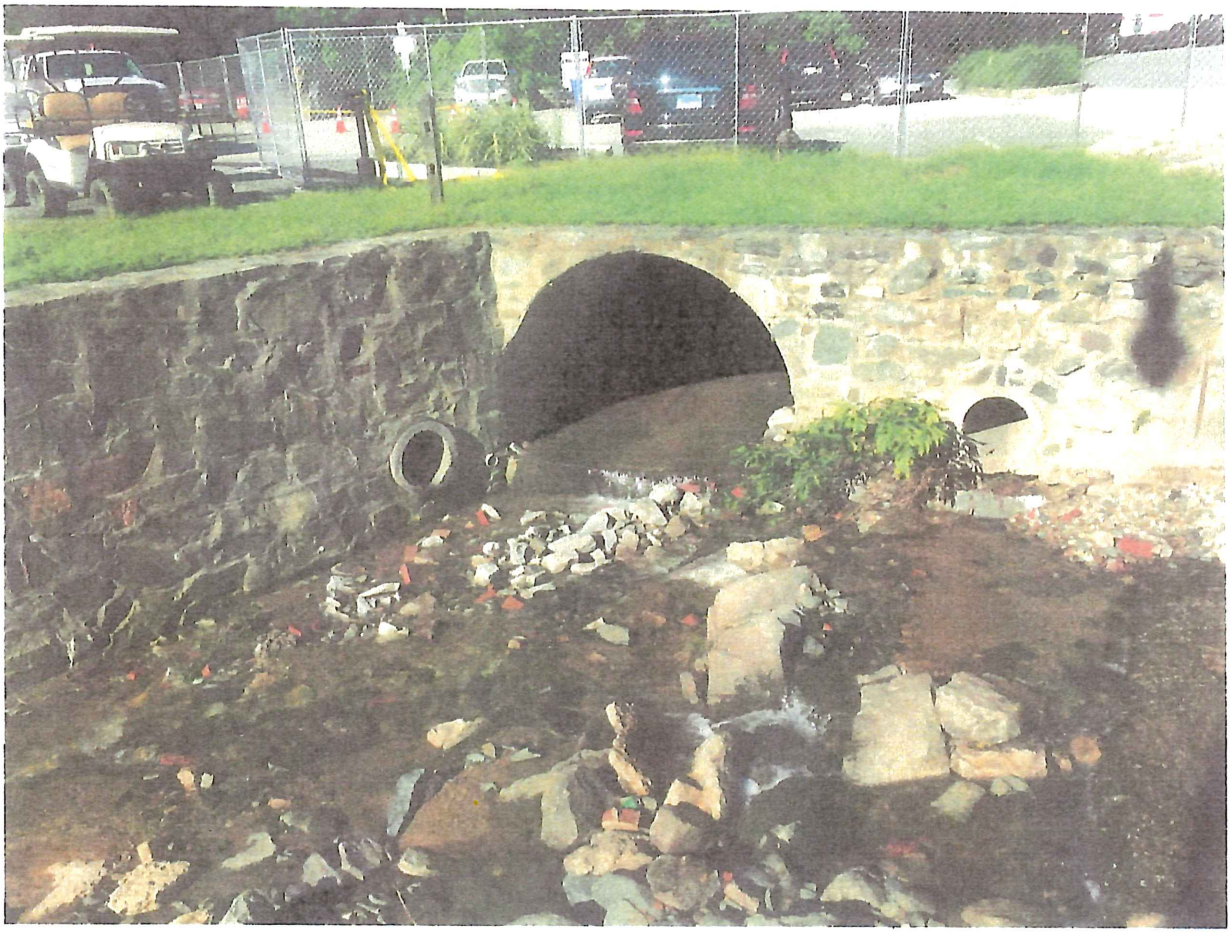


This is the channel and Arched culvert under main street. The culvert restricts the volume of water flowing thru the Hudson channel , it clogs

up with debris and causes extreme flooding starting at Court Ave and rushing down main street taking vehicles with it and is the main cause of flooding into the buildings in this area . This needs to be removed and the channel day lighted and dredged to deepen the channel , there is more than 3 feet of sediment under the culvert now , along with rocks and bricks , it all needs to be cleaned out for maximum flow

This is where the Tiber Branch joins the Hudson in parking lot D behind Lapalapa. The culvert is too small to handle the large runoff volume coming from route 29, tollgate road and part of the BGE right away, all which is unmitigated . This culvert needs to be removed , replaced with a day lighted channel that is wider and deeper with an open grated bridge for building and pedestrian access .

THIS IS THE MARYLAND AVE. CULVERT AT THE PATAPSCO
IT IS 18FT WIDE BY 8.5 FEET TALL = 153 SQUARE FEET
THIS WILL ALLOW 1683 CFS OF WATER TO PASS THROUGH AT A VELOCITY OF 11FPS . THERE WAS A TOTAL OF 8170 CFS IN 2016 FLOWING THROUGH THIS AREA . IN 2018 THERE WAS 12,480 CFS FLOWING THROUGH THIS AREA . THERE WOULD HAVE TO BE 8 CULVERTS THIS SIZE TO CARRY ALL THAT FLOW . THERE IS NOWHERE TO PUT 8 CULVERTS THIS SIZE TO THE RIVER . SO THERE WILL ALWAYS BE WATER FLOODING LOWER MAIN STREET , WHETHER FROM TOP DOWN FLOODING OR RIVER UP. REMOVING THE BUILDINGS WILL ALLOW THE WATER TO SPREAD OUT AND SLOW DOWN DECREASING DAMAGE DONE TO THE REMAINING BUILDINGS



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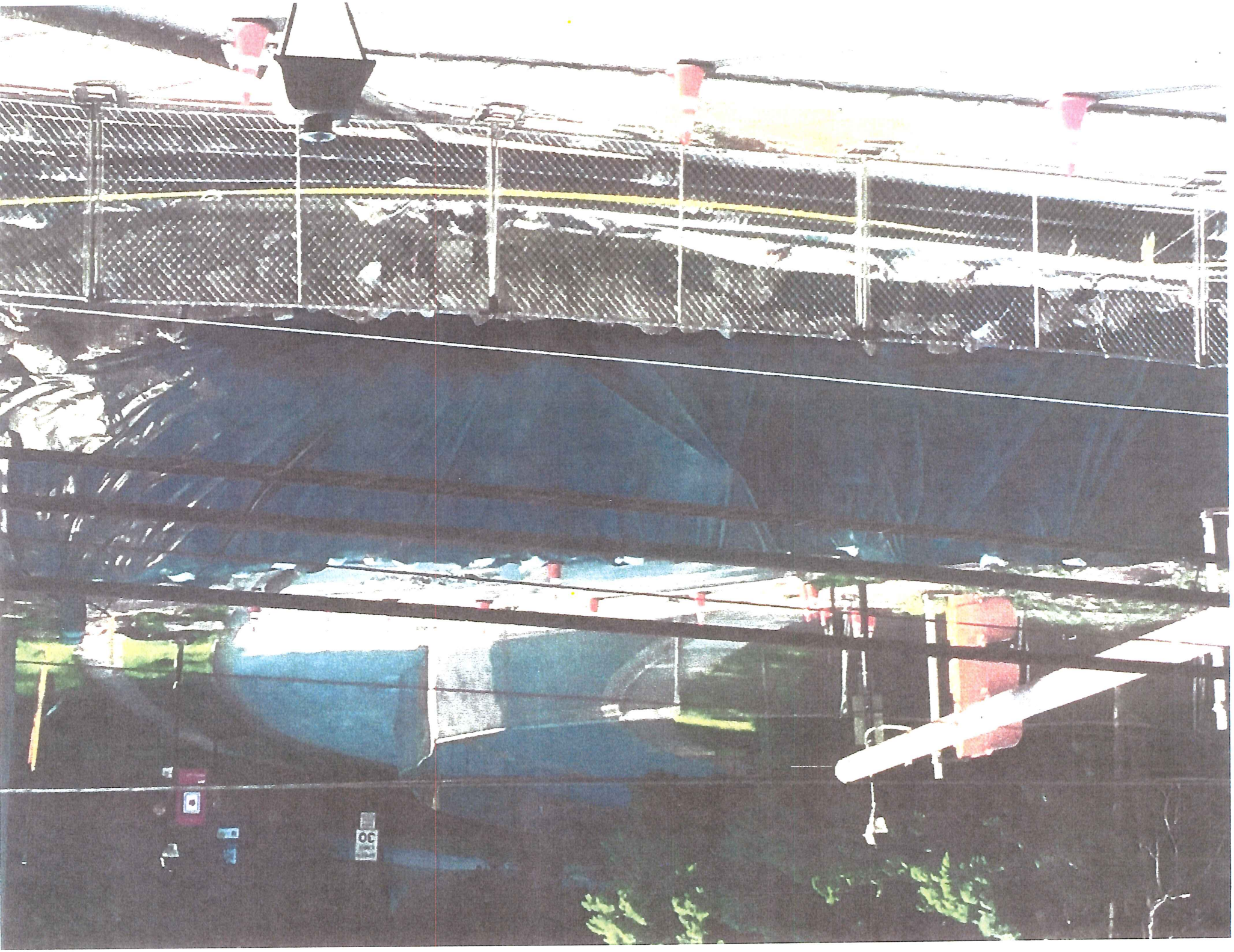


This is a log jam along the Autumn hill branch about 400 yards above the New Cut branch , these are the type of debris that took out the upstream wall at Caplans. They need to be removed , photo taken Aug 12,2018

Photo 1

This is another example of fallen trees and logs in the Autumn hill branch
That needs to be cleaned up. 8-12-2018

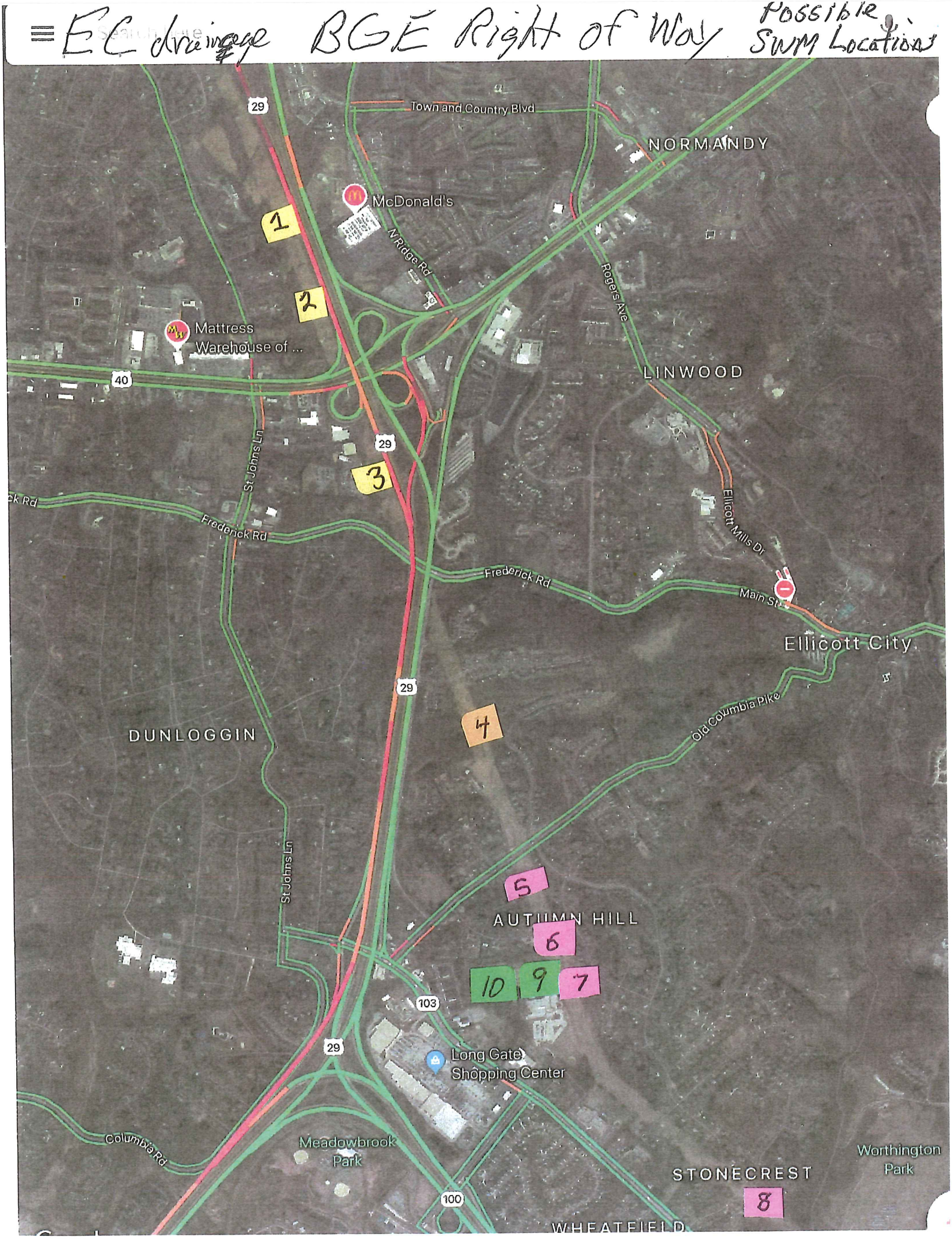
The above photos show two SWM facilities in the Hudson watershed , one is full , not working properly and the other is located 100 yards away and is hard to locate and not maintained properly . The 64 current SWM facilities need to be inspected and recommendations given to improve their function

4

The Ellicott City water shed has about 2400 acres , most has been developed , either with commercial properties built in the sixties and seventies or housing developments also built in the sixties and seventies before SWM laws came about . There are very few of the 64 current SWM facilities that are sized to the current SWM 100 year regulations. With the increased size of rte29, rte40 and rte100 and connecting merge lanes all of which have no mitigation , Ellicott City becomes overrun with flood water with a little over 3 inches of rain in one hour. There are only a few places where I'm told new detention ponds can be built. The BGE/EXELON right away which has over 100 acres in the EC Water shed and has over 640 acres of watershed draining thru it has the best locations in the watershed to add new storm water detention areas. Many SWM could be added in their right of way, they could be built as dry detention areas , being wet during extreme rain events. In some locations the damn for the detention area would give BGE better access to their towers. They already have water running under their wires everyday, there would be no change , except for a few days a year. I took a photo today showing a tower which has two legs on one side of the creek and two legs on the other side and has been that way for over 50 years with no adverse effects. Help from BGE/EXELON is the only way we can get enough SWM to minimize the flooding in Ellicott City. I hope our federal partners can reach out to Exelon and bring them on board with the Federal government, the State of Md. Howard County, and the citizens of Ellicott City to come up with solutions . We need your help.

The above two pictures show dry temporary detention areas that could be built in the BGE right of way, The top one is on Union town road , a three acre mowed field , the road is the damn , the risor is in the middle left , 12 acre feet of storage ,efficient and inexpensive compared to the ones I've seen in the Hydrology study.
The bottom is in front of Lyons Mill elementary in Owings Mills , both only become wet in heavy rain , hours later they are dry.

This shows the dry SWM on Lyons Mill road working during a very rainy day


EC drainage
BGE Right of Way
Possible SWM Locations
Town and Country Blvd
NORMANDY
McDonald's
N Ridge Rd
Rogers Ave
1
2
3
4
5
6
7
8
9
10
Mattress Warehouse of ...
LINWOOD
St Johns Ln
Frederick Rd
Ellicott Mills Dr
Main St
Ellicott City
Old Columbia Pike
DUNLOGGIN
AUTUMN HILL
Long Gate Shopping Center
Meadowbrook Park
Columbia Rd
STONECREST
Worthington Park
WHEATFIELD
29
40
103
100

1

ropped Pin

ear 2, Ellicott City, MD

Directions

SAVE LABEL SHARE DOWNLOAD

Measure distance

BGE Right of way

(39.2824575,-76.8238541)

Upper Hudson

75JG+XF Ellicott City, Maryland

Possible STFDA

Add a missing place

Drains to Hudson

2

ropped Pin

ar 2, Ellicott City, MD

Directions

SAVE LABEL SHARE DOWNLOAD

Measure distance

BGE Right of Way

(39.2800330,-76.8226427)

Possible STFDA

75JG+2W Ellicott City, Maryland

Drains to Hudson

Add a missing place

3

ropped Pin

ear 2, Ellicott City, MD

BGE
Right of way

Directions

SAVE LABEL SHARE DOWNLOAD

Dam would create

Measure distance

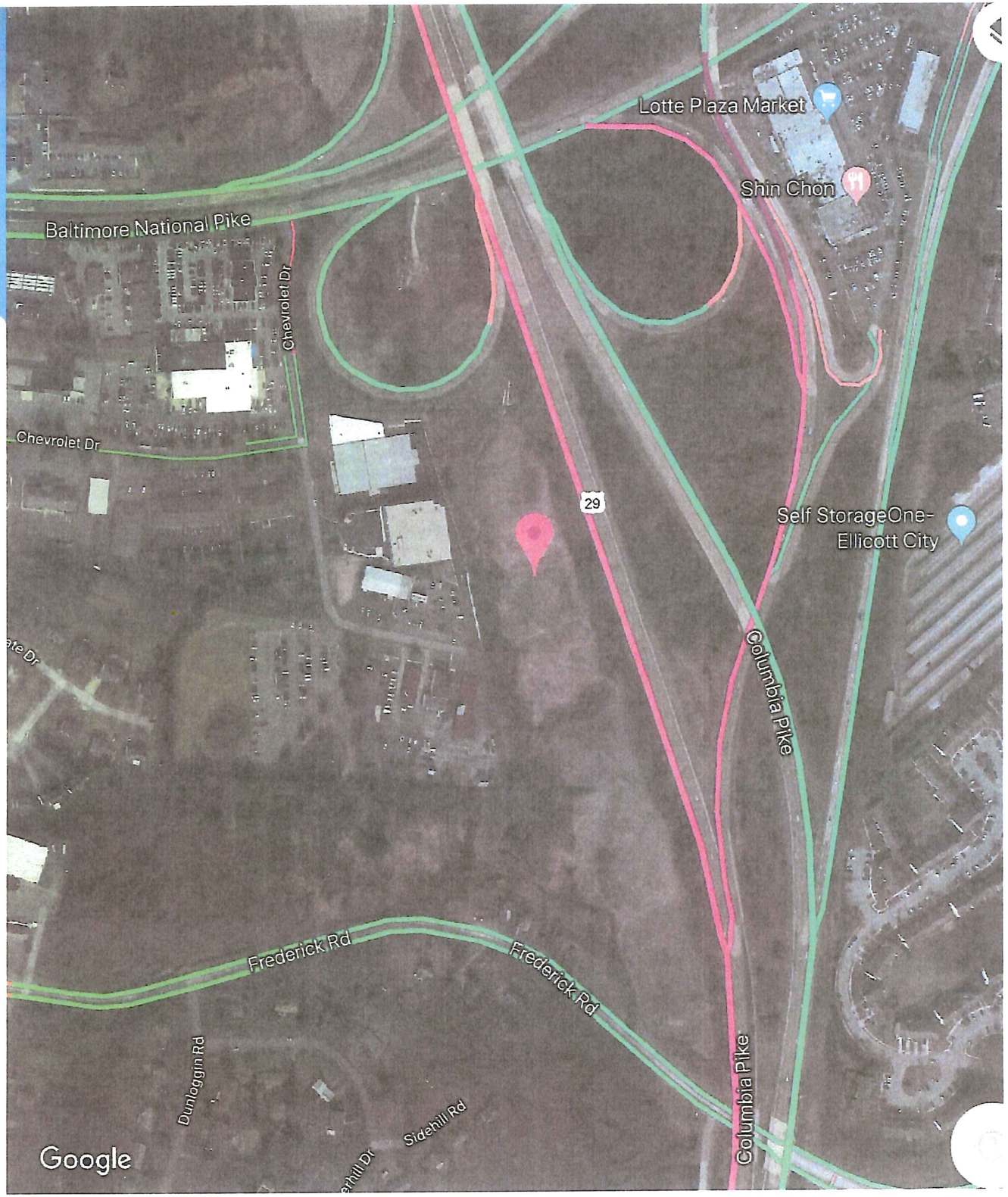
Easy Access to BGE towers

(39.2743173,-76.8202693)

75FH+PV Ellicott City, Maryland

Drains to Hudson

Add a missing place



4

ropped Pin

ear 2, Ellicott City, MD

Directions

SAVE LABEL SHARE DOWNLOAD

BGE Right of Way

Measure distance

(39.2644578,-76.8156834)

757M+QP Ellicott City, Maryland

Add a missing place

Drains to Tiber Lot D
Could also Expand existing
SWM [redacted] into BGE
right of way to enlarge
Storage.

ropped Pin

ar 2, Ellicott City, MD

Directions

SAVE LABEL SHARE DOWNLOAD

Measure distance

BGE Right of way

(39.2592171,-76.8131960)

Possible STFDA

755P+MP Ellicott City, Maryland

Drains to Autumn Hill/ Newcut

Add a missing place

ropped Pin

ear 2, Ellicott City, MD

Directions

SAVE LABEL SHARE DOWNLOAD

Measure distance

BGE Right of way
(39.2564645,-76.8120527)
Possible STFDA

754Q+H5 Ellicott City, Maryland

Drains to New Cut

Add a missing place

ropped Pin

ear 1402416182, Ellicott City, MD 21043

Directions

SAVE LABEL SHARE DOWNLOAD

Measure distance

(39.2548375,-76.8114287)

753Q+WC Ellicott City, Maryland

Bali Road, Veterans School

Add a missing place

BGE Right of way

SWM Possible Location

Drains to New Cut

ropped Pin

ear 2, Ellicott City, MD

Directions

SAVE LABEL SHARE DOWNLOAD

Measure distance

(39.2464675,-76.8023418)

65WX+H3 Ellicott City, Maryland

Possible SWM

Add a missing place

BGE Right of Way

Stonecrest Drive

Drains to New Cut

Possible Existing SWM Improvement

Dropped Pin

ear 1402416782, Ellicott City, Maryland

Directions

SAVE LABEL SHARE DOWNLOAD

By digging this SWM Deeper by 10 feet you could get 11 Acre Feet of additional Storage

Measure distance

(39.2550367,-76.8127890)

Drains to Autumn Hill

754P+2V Ellicott City, Maryland

New Cut

Add a missing place

This is the SWM at Veterns Elementary, It is over 1 Acre in size, but only captures 2.5' Feet of water of depth before it runs over Riser.

Needs to Be Deeper!!

5

Volunteers spending many ,many hours doing cleanup

Volunteers working thousands of hours on the cleanup, in some of the worst conditions I have ever worked in , the basement of EC POPS took over a month to clean out , wet, muddy inventory one bucket at a time .


STOP

ENTERPRISES, INC.
410-242-8949

MD