December 15, 2014

Mayor Thomas Freeman
Village of Avon
74 Genesee Street
Avon, New York 14414

RE: DRAINAGE IMPROVEMENTS
MRB GROUP PROJECT NO. 0110.14003.000

Dear Mayor Freeman,

In late July of this year, the Village received a rainfall event that totaled almost 6-inches in approximately 12-hours. This extreme storm event caused overflowing and flooding throughout the southern half of the Village, affecting many homes and commercial businesses. In response, the Village requested MRB Group to find effective, economical solutions to reduce the impact of short-duration, high intensity storms.

The purpose of this letter report is to describe the observations and potential improvements to reduce flooding impacts in each of the following areas:

- Pole Bridge Road near Five Lot Farm
- Genesee and Spring Street area
- Sackett Road near the Hayes Property
- CVS Plaza and the Martin Property
- Hal-Bar Road Pond

MRB Group walked these problem areas with Village personnel to observe upstream and downstream field conditions, gain an understanding of the issues, and consider potential solutions. Base mapping was developed based on digital data and these observations, to help determine the general extent of contributing watersheds for use in the conceptual design of potential improvements.

Attached to this letter is a brief overview of each problem area and a suggested potential improvement along with any alternatives. Exhibits are provided to convey the concepts, along with opinions of probable cost, and a brief overview of any environmental concerns or potential permitting issues where applicable.

Sincerely,

Kurt M. Rappazzo, P.E.
Civil Engineer III

POLE BRIDGE ROAD NEAR FIVE LOT FARM

Pole Bridge Road is the eastern border of the Village south of NYS route 5 & 20. Five Lot Farm is a residential subdivision in the Village approximately 1,200 feet north of Lake Road. Stormwater runoff from the Town of Avon that crosses Pole Bridge Road near this location becomes the gully or drainage channel that flows along Pineview Heights towards Genesee and Spring Streets. During the extreme storm event in late July 2014, stormwater runoff overtopped the road near 320 Pole Bridge Road and at the Genesee Street/Spring Street intersection, and caused damage along Pineview Heights.

The upland portion of the watershed in the Town is approximately 123 acres, consisting mostly of row crops with single-family residential along Pole Bridge Road. Stormwater runoff from this area is channelized into swales, and crosses Pole Bridge Road in three (3) separate locations: at 1957 (18" SICPP), 1937 (2x 12" CMPs), and 1917 Pole Bridge Road (1x 24" SICPP and 1x 12" CMP). The 18" SICPP and 2x 12" CMPs combine at 360 Pole Bridge Road (Alexander Crossing Lot 2) into a 36" SICPP that is the start of the drainage channel. During the extreme storm event in late July, flow was pipe full and projected into the channel approximately 10 to 12 feet downstream. There was no flooding associated with this storm system during this event.

The 12" CMP at 1917 Pole Bridge Road is part of a system of 12" diameter piping that was designed to carry stormwater runoff around the house at 320 Pole Bridge Road. It crosses the street, entering a manhole in the front yard, then takes two 90-degree bends into the back yard, and a third bend to discharge into the drainage channel. Flooding has been an issue at this location for a number of years, most likely due to the inefficiency of the piping. A number of years ago, the Village DPW installed the 24" SICPP to eliminate the two of the 90-degree bends, which presumably eliminated most of the nuisance flooding experienced by the Village resident. However, during the extreme storm event in July the system was overwhelmed, and runoff flooded over the road and out of the manhole covers. In August 2014, the Village DPW installed a 12" overflow pipe to hopefully alleviate the problem.

The Village should consider replacing or reconfiguring the entire system and abandoning or removing the erroneous piping. The material cost for the 24" diameter piping needed to carry flow from the first manhole to the channel is approximately $3,000.

Once in the channel, stormwater runoff enters the Five Lot Farm stormwater management system, which is two detention ponds in series. The first pond is located behind 22 Carriage Lane and is controlled by a 6-foot diameter pre-cast concrete manhole outfall structure with a 36" diameter inlet and a 26" by 36" overflow grate. This first pond has a storage volume of approximately 439,000 gallons at the overflow, but only about 144,000 gallons before detained water floods neighboring residents. The second pond is located behind 22 Bridge Circle and is controlled by 6-foot square pre-cast concrete manhole outfall structure with a 48" diameter inlet and a 26" by 36" overflow grate. The second pond has a storage volume of approximately 438,000 gallons at the overflow, with no foreseeable impact on the neighboring residents. The

combined functional volume of both facilities is about 582,000 gallons, based upon preliminary survey conducted by MRB Group in October 2014. The ponds are the last structures before the drainage channel hits Genesee Street and the Village storm sewer system. It is our understanding that the ponds did little detention of the extreme storm event in July. Most likely due to the large (36" and 48") inlets on the outfall structures and small storage capacities of the ponds.

The Five Lot Farm ponds, and the drainage channel between, are located on Village owned lands, or within drainage easements, from Pole Bridge Road to the Avon Central School District property downstream of the 2nd outfall structure. The drainage channel is the natural divide between the Five Lot Farm subdivision, and the previously approved Alexander Crossing subdivision to the south.

Design of the Alexander Crossing subdivision included a regional stormwater management facility to mitigate stormwater runoff from the upland areas. The design volume of this facility was approximately 1.9 million gallons (6 acre-feet), and reduced the peak runoff flow rate during a 5.5-inch 24-hour storm event by 40%. It was proposed to be constructed offline from the drainage channel on lands dedicated to the Village. Unfortunately, the developer abandoned the subdivision before the facility could be constructed and dedicated to the Village. Eventually, another developer may become interested in the property, and a regional facility could still be constructed.

It seems clear that a regional stormwater facility in this area would be a benefit, as it would provide stormwater mitigation for the surrounding development and protect downstream properties and infrastructure. At the onset, there seems to be three (3) possible locations for such a facility to be located, each with its benefits and shortcomings.

1. Construct a stormwater management facility in the farm fields upstream of Pole Bridge Road in the Town of Avon.
2. Modify the existing Five Lot Farms detention facilities to better mitigate stormwater runoff.
3. Construct the designed Alexander Crossing regional stormwater management facility.

As stated, stormwater runoff from the Town portion of the watershed crosses Pole Bridge Road at three (3) separate locations. The one with the flooding issue (320 Pole Bridge Road) is actually the smallest of the three sub-areas, but immediately upstream is a low area located adjacent to a hedgerow where a facility could be constructed. This facility would reduce the possibility of runoff overtopping Pole Bridge Road, but would have little benefit of reducing total flows further downstream (ie. Genesee Street). When considering the negotiations and agreements with the landowner(s) in the Town to construct and access the facility, and the future maintenance, the Village would be better served by improving the storm piping at 320 Pole Bridge Road.

MRB Group modeled the existing Five Lot Farms ponds to determine whether simple modifications to the existing outfall structures would have an impact on peak flow rates

during large storm events. Modification would include restricting the inlet pipe to lengthen detention time and reduce peak flow rate.

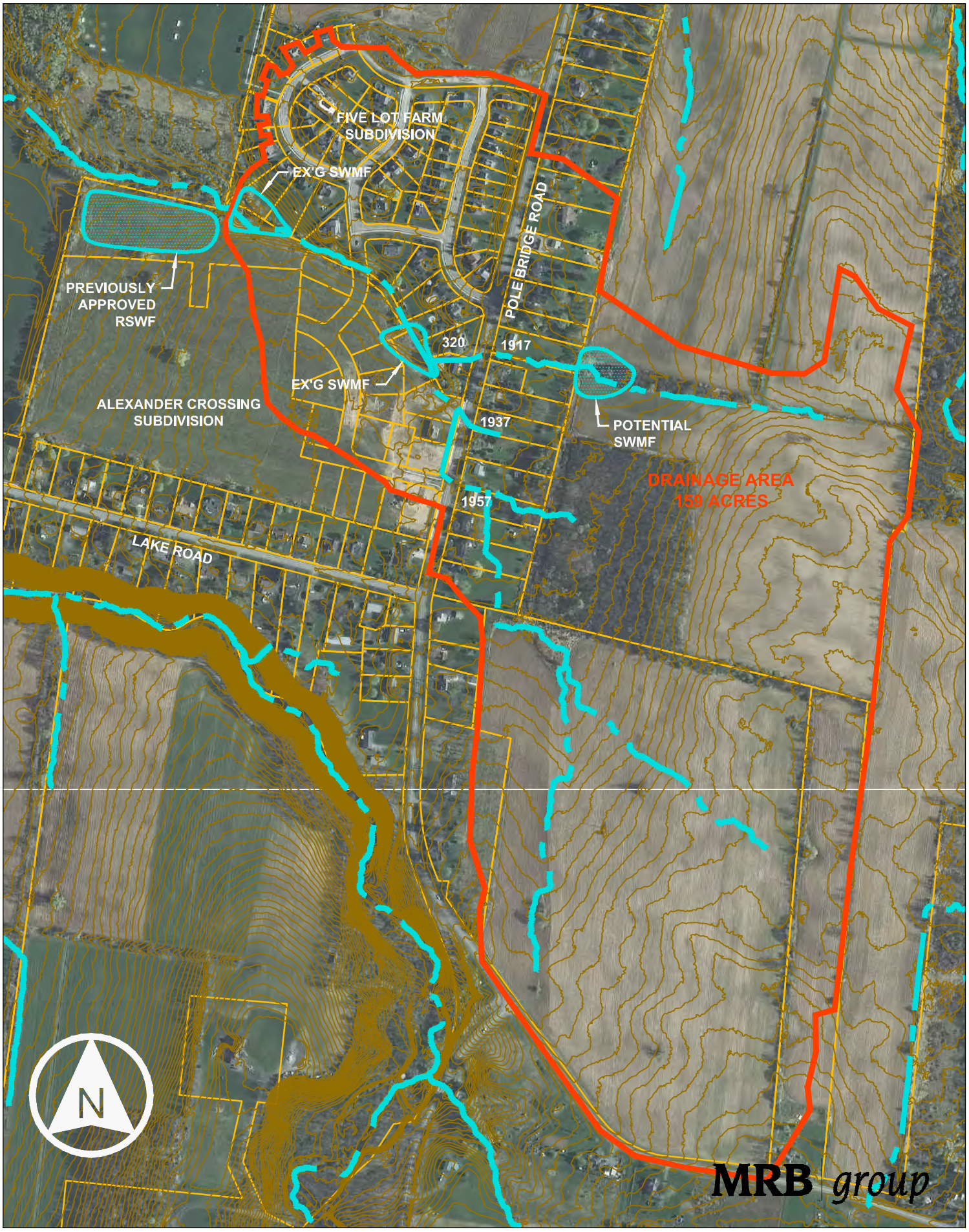
Unfortunately, the ponds are too small, and restriction of the inlets only caused the ponds to overflow resulting in localized flooding with no reduction in peak flow rate. For the ponds to be effective regional facilities, they would have to be enlarged with the excavation extending beyond the lands and easements the Village holds currently.

We recommend that the Village approach the owner of the former Alexander Crossing subdivision about easements to either construct the approved regional stormwater management facility, or modify the existing Five Lot Farms ponds. Alternatively, the Village could work with the School District about constructing a regional facility on their property. A similar discussion with the School District was held earlier this year to construct facilities farther downstream.

Costs of constructing a regional facility will depend upon the arrangement with the land owner, the scope of the facility, and the intended use of the excavated material. However, the Village can anticipate

Work within the drainage way would not require any permits as the channel is not classified as a stream and therefore not regulated by the New York State Department of Environmental Conservation. There are also no apparent wetlands in the area.

Attached to this report is an overall map of the watershed, including the location of the existing Five Lot Farm ponds, and the discussed alternatives.


FIVE LOT FARM SUBDIVISION
EX'G SWMF
PREVIOUSLY APPROVED RSWF
POLE BRIDGE ROAD
320
1917
EX'G SWMF
ALEXANDER CROSSING SUBDIVISION
1937
POTENTIAL SWMF
DRAINAGE AREA 159 ACRES
1957
LAKE ROAD
N
MRB group

GENESEE AND SPRING STREETS

The gully or drainage channel that begins at Five Lot Farms enters the Village storm sewer system at the Genesee and Spring Street intersection. During the extreme storm event in late July 2014, stormwater runoff overtopped the road at this intersection causing flooding and damage to adjacent Village and resident property. Construction of a regional stormwater management facility in the Five Lot Farm/Pole Bridge Road area would have a positive impact on flooding at Genesee Street, but there are some other issues along Spring Street and in the Village in general that should be considered.

During the extreme storm event in July 2014, the high water in the channels picked up debris from the banks and carried it downstream. At Genesee Street, the debris caused damage to the culvert pipe, and clogged the manhole downstream. The debris restricted the manhole outlet pipe, backing up the storm sewer system and causing water to pop out of manholes and flood Spring Street. The Village should consider installing an angled rebar grate (as shown on the right) on the system inlet at Genesee Street, and any other system inlet subject to potential debris. An angled grate would have kept the larger debris from entering and clogging the system, potentially diminishing the flood impacts at Genesee and Spring Streets. Grating can be manufactured, or constructed from rebar. Cost will vary depending on the construction and size of the culvert.

Approximately 700-feet down Spring Street from Genesee Street is a rail road trestle. The tracks run north-south, and carry drainage from the rear yards of homes on Genesee Street north towards Spring Street. According to Village DPW, the flow normally off the embankment onto Spring Street is a nuisance and not an issue; but during the extreme storm event in July 2014, the flow scoured the embankment, causing a deep rill and depositing debris onto Spring Street. To reduce the impact of flow over the embankment, the Village could consider providing a stabilized channel down the embankment to a drop inlet that is connected to the storm sewer system along Spring Street.

The picture showed a manufactured plastic system used on a highway at an overpass. Common construction would use rip-rap. Material cost is loosely estimated at $5,000 for the rip-rap, the drop inlet and miscellaneous piping.

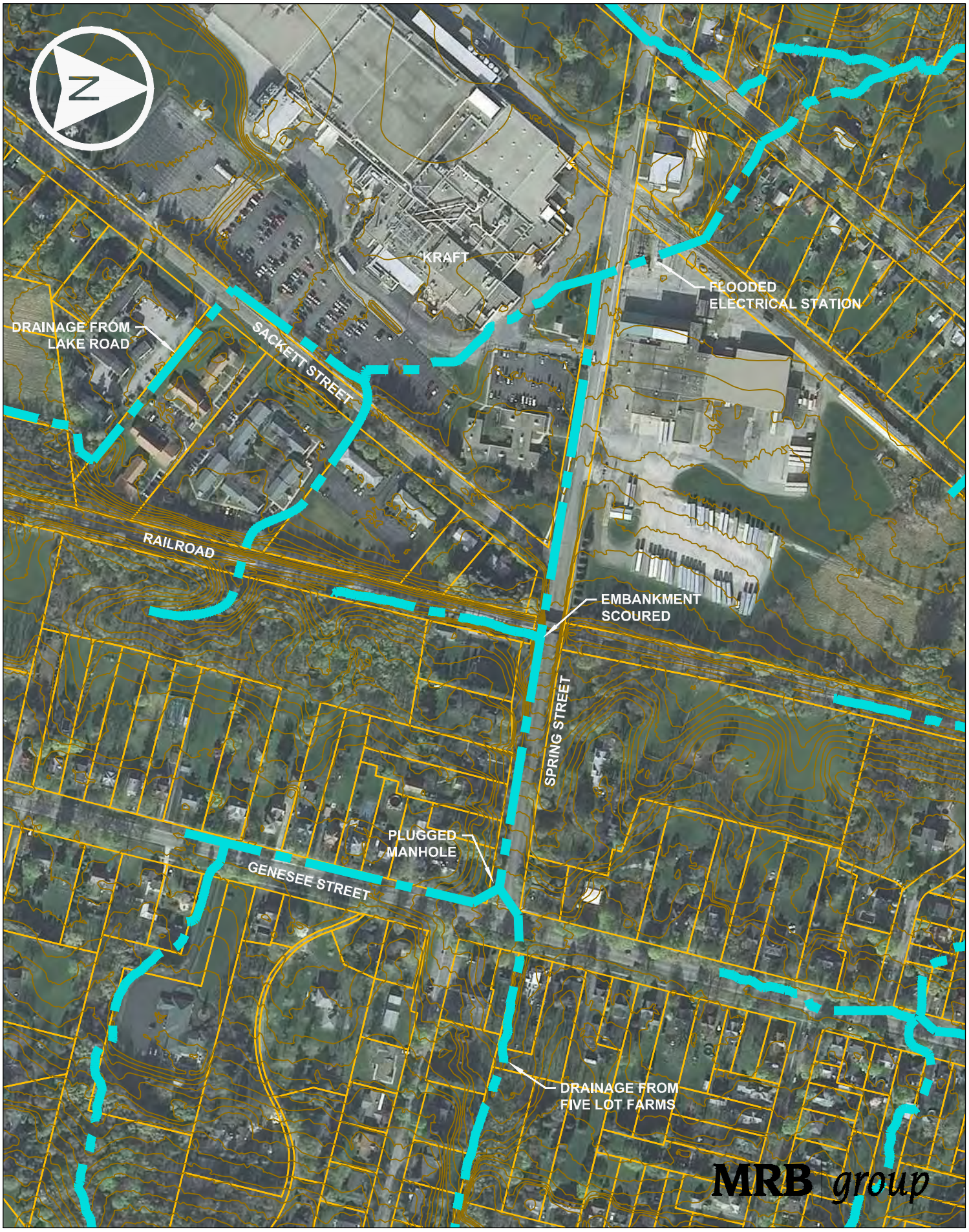
Finally, there is a 36" culvert that crosses Spring Street near the Kraft factory. During the extreme storm event in July 2014, the culvert overflowed and flooded the electrical station across the street. A large volume of storm water flows through this location, whose contributing watershed consists of everything captured by the Spring Street system (which includes Genesee Street up to Five Lot Farm and Pole Bridge Road), the Sackett Road system (which pickups drainage from Lake Road), and stormwater runoff off the Kraft campus. The total watershed area is approximately 500 acres.

Since both areas are combine at this location, the improvements recommended in the Pole Bridge Road near Five Lot Farm and Sackett Road near the Hayes Property would have a positive impact on flooding. To further reduce the potential for flooding, the Village could also reroute the Sackett Road storm sewer to flow towards Little Conesus Creek and discuss onsite stormwater detention with Kraft.

During the extreme storm event in July 2014, the ditch line on the west side of Sackett Road overflowed, flooding the Kraft parking lot. Rerouting the Sackett Road storm sewer would involve the replacement/construction of approximately 2,000 linear feet of ditches, piping and structures from the apartment complex driveway to the Little Conesus Creek gully. This, in concert with the Oak Hill Road interceptor, would significantly decrease flow rates and volumes in the Sackett Road ditch and at the Spring Street culvert. The cost of rerouting the Sackett Road storm sewer depends upon how much of the system could be ditched, and whether or not the Village proceeded with the Oak Hill Road interceptor. The Village would save money by coinciding the rerouting with any improvements or reconstruction of Sackett Road.

The Village should also discuss with Kraft the possibility of adding stormwater detention on to their campus. It appears that at least the portions of the campus to the east (parking lots and administrative building) and north (loading docks) of the factory building drain towards Spring Street and the impacted culvert. Depending on how internal roof drains and onsite storm piping are connected, other portions of campus, including the factory building, might as well. To further reduce the impact to the Spring Street culvert and the flooding of their property, Kraft could consider providing onsite detention through traditional detention ponds or underground pipe storage.

Attached to this report is a map of the general area, detailing the location of the discussed items.


N
KRAFT
FLOODED
ELECTRICAL STATION
DRAINAGE FROM
LAKE ROAD
SACKETT STREET
RAILROAD
EMBANKMENT
SCOURED
SPRING STREET
PLUGGED
MANHOLE
GENESEE STREET
DRAINAGE FROM
FIVE LOT FARMS
MRB group

Scoured banks around system inlet at Genesee Street.

Scoured embankment on Spring Street at railroad tressle.

SACKETT ROAD NEAR THE HAYES PROPERTY

The Hayes property is located at 170 Sackett Road immediately south of the apartment complex (168 Sackett Road). During the smaller flash flood events, stormwater runoff would flood the Hayes' backyard and basement. MRB Group walked the property and surrounding area with the Village DPW and observed the following:

1. Behind the Hayes property is a small drainage swale flowing north to a small culvert pipe that extends into the adjacent apartment complex (168 Sackett Road). It is unknown where the culvert leads, or if it requires any maintenance.
2. The small drainage swale is a short section of ditch that mostly picks up surface runoff from the adjacent field (233 and 235 Linden Street) to the east.
3. On the east side of 235 Linden Street is another ditch that carries flow from the east north towards the Community Manor apartments at 158-164 Sackett Road. This ditch is not very well defined, and carries drainage from the rail road, Genesee Street, and Lake Road.
4. Along the south side of the Community Manor apartments is a culvert installed by Village DPW that directly connects to the Sackett Road storm sewer.

It is our belief that during flash floods, the ditch along the east side of 235 Linden Street overflows across the field towards the Hayes property. In order to reduce the flooding impacts to the Hayes property and the general area, we propose the following options:

1. Improve the ditch line along the east side of 235 Linden Street to adequately convey the anticipated flows.
2. Construct a small detention facility in the basin created by the rail road embankment.
3. Install a storm sewer interceptor along Oak Hill Road.

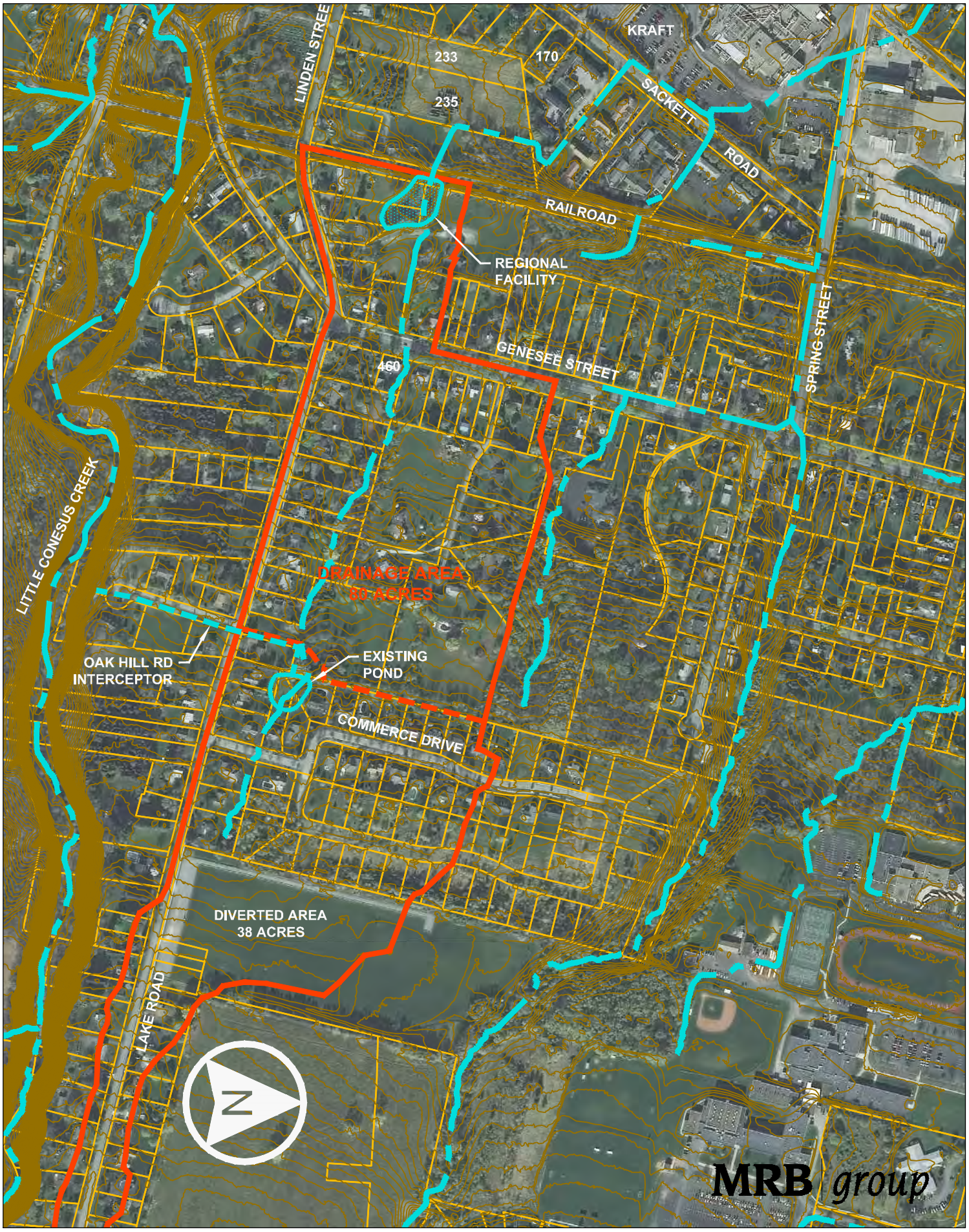
The watershed affecting the Hayes property during flash floods extends to the Lake Road/Pole Bridge Road intersection. Flows travel down two parallel systems, the storm sewer system along Lake Road, and the drainage path that flows through the Commerce Drive stormwater detention facility to a culvert behind 460 Genesee Street. That culvert along with the Lake Road storm sewer system, connect to the southern Genesee Street system that discharges into a ditch that runs westerly between 443 and 475 Genesee Street to the rail road embankment. At the embankment, the watershed area exceeds 80 acres.

At the rail road embankment is a stone box culvert. It measures approximately 18-inches wide by 24-inches wide, and is constructed by laid up stones. The Village should approach the rail road and the neighboring property owners about placing an outlet structure on the culvert to restrict flow, and using the natural, depressed gully area as temporary detention during larger storm events. The outlet structure could be a catch basin, or upended pipe section with cored holes. The stone box culvert could be improved by lining it with a smaller diameter corrugated plastic pipe. This would extend the life of the culvert, while providing stormwater detention and reducing drainage impacts downstream.

Additionally, the Village could reduce drainage impacts through interception. One specific location where this would be a benefit is on Oak Hill Road in the Town of Avon. Oak Hill Road is a short residential street that runs south from Lake Road to the Little Conesus Creek gully. It is approximately 500 feet west of Chamber Drive. An interceptor storm sewer installed here would reduce the watershed area at the rail road embankment from 80 acres to 42. Conceptual design shows the Village would need to install approximately 1,000 feet of 24" and 36" piping, and four (4) structures. Cost of these materials is roughly $38,000. Little Conesus Creek is a regulated stream, and the New York State DEC and Army Corps of Engineers would have to be consulted regarding permitting.

Finally, the Village should improve the ditch along the east side of 235 Linden Street. The ditch is not very well defined, and could be enlarged to carry the necessary flow to the culvert at the Community Manor apartments.

Attached to this report is a map of the general area, detailing the location of the discussed items.


KRAFT
LINDEN STREET
233
170
235
SACKETT
ROAD
RAILROAD
REGIONAL
FACILITY
GENESEE STREET
460
SPRING STREET
LITTLE CONESUS CREEK
DRAINAGE AREA
80 ACRES
OAK HILL RD
INTERCEPTOR
EXISTING
POND
COMMERCE DRIVE
DIVERTED AREA
38 ACRES
LAKE ROAD
N
MRB group

Stone box culvert under rail road.


CONNECT TO
OUTLET PIPE
EX'G DETENTION
FACILITY
LAKE ROAD
CHAMBER DRIVE
INTERCEPT LAKE ROAD
STORM SEWER
INTERCEPTOR
PIPING
OAK HILL ROAD
OUTLET TO
CREEK
N
LITTLE CONESUS CREEK
MRB group

CVS PLAZA AND THE MARTIN PROPERTY

The CVS drug store is located at the southeast corner of the intersection of NYS Route 5 & 20, and Dream Valley Boulevard. The site was developed with an underground pipe storage system to mitigate the increase in storm water runoff resulting from the development. During flash storm events, such as the extreme event that occurred in July 2014, the underground pipe storage system overflows, flooding the parking lot and Dream Valley Boulevard. MRB Group walked the property and surrounding area with the Village DPW and observed the following:

1. Between CVS and the Tom Wahl's restaurant to the east is a shallow drainage ditch leading to a 12" corrugated metal pipe inlet to the storm sewer system along NYS Route 5 & 20.
2. The ditch is part of a drainage system whose watershed originates on the east side of Pole Bridge Road.
3. The drainage crosses Pole Bridge Road in three (3) separate culverts along the frontage of the school property.
4. The drainage then flows northwesterly through the Avon Central School District property, and into the Martin property.
5. Through the Martin property, the drainage is in a wooded area that extends along the eastern side of the plaza, and into the ditch between CVS and Tom Wahl's.
6. Through the storm sewer system, runoff from the ditch eventually ends up in the large detention facility due west of Tops. There have been previous concerns about the size of the pipe crossing NYS Route 5 & 20.

It is our belief that during flash floods, the ditch along the east side of the CVS property overflows and floods the parking lot. In order to reduce the flooding impacts to the CVS property and the general area, we propose the following:

1. Improve the ditch line along the east side of the CVS property to adequately convey the anticipated flows.
2. Work with Mr. Martin or the Avon Central School District to construct a regional detention facility to reduce stormwater runoff rates and provide stormwater mitigation for potential development.
3. Install an interceptor swale along the rear of Pole Bridge Road properties in the Town of Avon.

The watershed affecting the CVS property extends south and east, across Pole Bridge Road and into the Town of Avon, totaling approximately 75 acres. The area of agricultural field along the rear of properties on Pole Bridge Road is approximately 34 acres. According to LIDAR contour data, it appears possible to extend approximately 1,200-feet of swale along the western edge of the field, intercepting the drainage and re-directing it towards an existing culvert that crosses NYS Route 5 & 20. The interceptor swale would reduce the total areas contributing drainage to the CVS ditch to 41 acres, greatly reducing the volume of runoff. Since the NYS culvert, which is about 200-feet east of Pole Bridge Road, discharges into the same unnamed tributary of the Genesee

River as the Tops detention facility, re-direction of runoff from the farm fields would not have a negative effect upon the watershed. However, the culvert, and another private culvert downstream, would have to be analyzed to ensure that the additional runoff would not have a negative effect.

Additionally, the Village could also work with the Avon Central School District to construct a regional stormwater detention facility on their property. A farm lane runs along the northern boundary of the property and could be used by the Village for access to a facility that would reduce flows downstream. The facility would be created by replacing the existing culvert, raising the farm lane and excavating the pond to the south. An outlet structure would be installed reduce flows during varying rainfall events.

Alternatively, the Village could work with Mr. Martin, the neighbor to the north. A facility on Mr. Martin's property would provide more benefit, but the facility should then also take into consideration the water quality and quantity mitigation required for any future development intended by Mr. Martin, making the resulting facility much larger in scope than what is needed by the Village.

Whether a facility is constructed on the school or Mr. Martin's property, it could be sized to reduce the flows regardless of whether or not the interceptor is installed. If the interceptor is not installed, the facility would have to be larger to reduce the flows from the larger contributing area.

Lastly, the Village should improve the ditch line along the east side of the CVS property, berming up the west side to carry additional flow, and reduce the amount of flow overflowing into the parking lot. Piping of the ditch may be possible, but would have to take into consideration runoff from the Tom Wahl's parking lot.

There was little consideration into improving the storm system along NYS Route 5 & 20 for two reasons:

1. The design, permitting, and costs associated with working within the NYS right-of-way.
2. No guarantee that enhanced capacity in the NYS storm system would prevent runoff from overflowing the ditch bank into the CVS parking lot.

Attached to this report is a map of the general area, detailing the location of the discussed items.


MAIN STREET
CVS
TOM WAHLS
HAL-BAR POND
RSWF OPTION 2
MARTIN PROPERTY
POLE BRIDGE ROAD
DRAINAGE AREA 75 ACRES
FARM LANE
RSWF OPTION 1
INTERCEPTOR SWALE
SCHOOL PROPERTY
DIVERTED AREA 34 ACRES
N
MRB group

HAL-BAR ROAD POND

In 1997, the Village and Avon Central School District collaborated on a detention facility located north of Clinton Street Extension behind the homes on Hal-Bar Road. The main purpose of the facility was to reduce flooding impacts on the school from the runoff generated by the farm lands to the east. An interceptor system was installed that routed that flow around the school property to the Hal-Bar pond. The system consists mostly of a trench drain along the perimeter of the school pavement areas that outlets into a ditch on the north side of Clinton Street Extension. The stormwater then travels through a shallow ditch into the Hal-Bar pond.

During the extreme storm event in July 2014, the pond worked successfully, and prevented any flooding of the adjacent neighbors on Hal-Bar Road. However, there was flooding of the lands north of the pond toward NYS Route 5 & 20, including the electrical station.

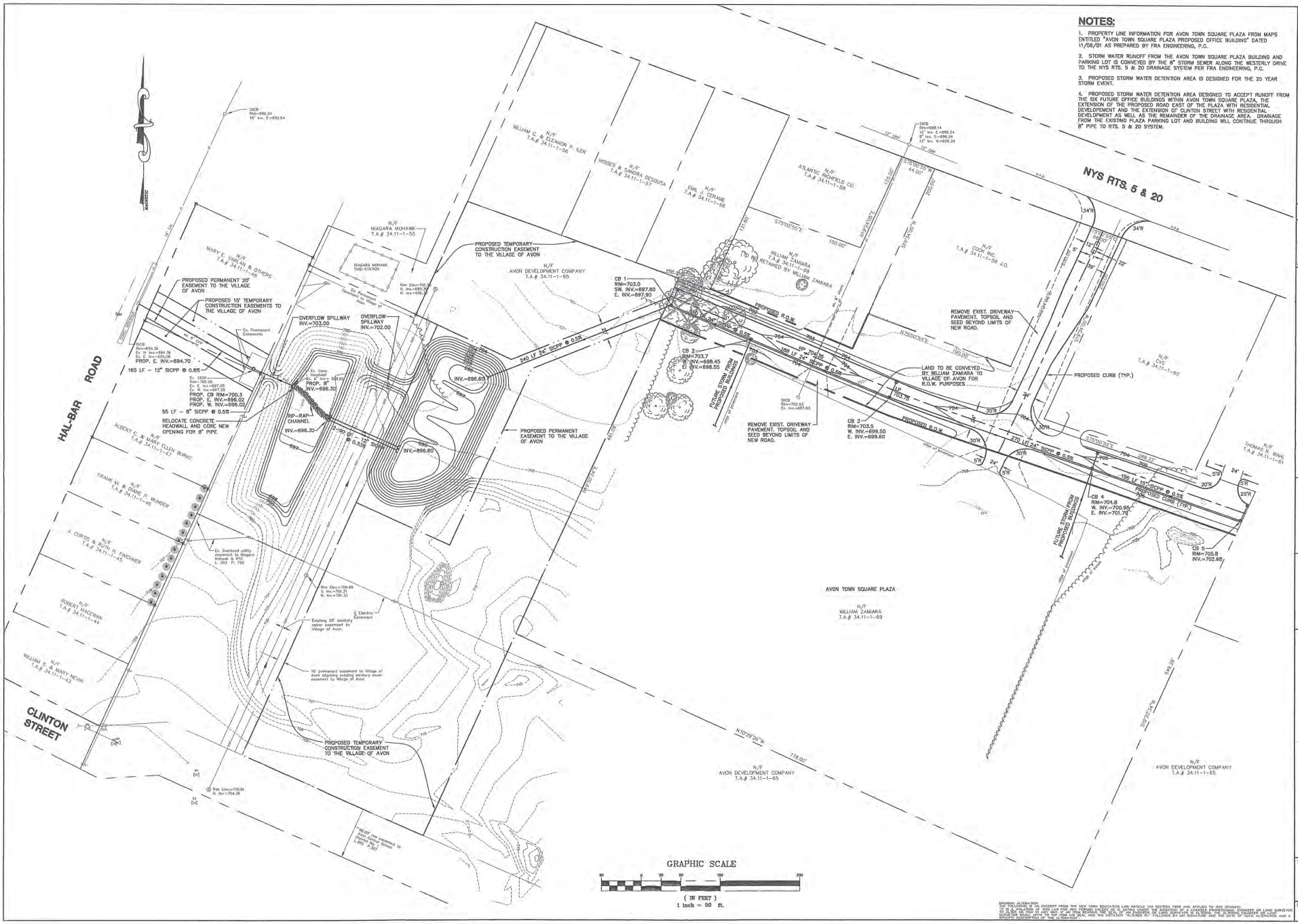
The eastern side of the pond is slightly bermed, and cuts off the natural flow of runoff from an approximately 6-acre area that would have flowed westerly towards Hal-Bar Road. It is also possible that during the extreme storm event that the interceptor system and ditch leading to the Hal-Bar pond was overrun, and additional flow bypassed the pond and flooded towards the nearby electrical station and businesses.

To eliminate this problem, the Village should consider enlarging the Hal-Bar pond to take on the additional drainage area and diverting all of the flow to the Village storm system along Hal-Bar Road.

In 2002, this idea of enlarging the Hal-Bar pond was investigated in response to some conceptual development proposed at the Plaza and surrounding lands currently owned by Mr. Martin. The resulting conceptual design mitigated runoff generated during a 25-year storm event from these areas. It is our recommendation that this potential expansion of the Hal-Bar pond be revisited to address the flooding concerns.

Attached to this report is a map of the general area, detailing the location of the discussed items.


CVS
PROPOSED EXPANSION
AVON TOWN SQUARE PLAZA
HAL-BAR ROAD
HAL-BAR POND
BYPASSING AREA 6 ACRES
DRAINAGE AREA 29 ACRES
AVON CENTRAL SCHOOL DISTRICT
POLE BRIDGE ROAD
FIVE LOT FARM SUBDIVISION
N
MRB group



By	Date	Revisions and Descriptions
		No.

Drawn By: DDD
Checked By: SWS
Scale: 1" = 50'
Date: 06/03/02

Project Title: ACCESS ROAD & DRAINAGE PLAN VILLAGE OF AVON LIVINGSTON COUNTY

Drawing Title: CONCEPT PLAN

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Sheet No. G-1
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Project No. 011135

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