GPI

Engineering | Design | Planning | Construction Management

KEYSER VALLEY STORMWATER AND FLOOD MITIGATION STUDY

Prepared for:

City of Scranton
Lackawanna County

Date:
Preliminary Submission: September 24, 2021

340 N. Washington Avenue
Scranton, PA 18503

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1 EXECUTIVE SUMMARY

The Merrifield Pump Station has been problematic for the City of Scranton and residents for many years. Based on the local testimony, major flooding events seriously increased since 2006, but the area has been prone to flooding as far back as the 1950's. There are many factors which increase the probability of flooding within the area including, in recent years, storm intensities have increased, additional development within the area and dated infrastructure. GPI has been hired by the City of Scranton to research and identify possible solutions to help alleviate the issue.

As a part of this study, GPI has spoken with local stakeholders, researched existing plans within the area, observed the site during Tropical Storm Ida, and surveyed and modeled the watershed to the pump station. During Tropical Storm Ida, GPI observed the drainage issues across the watershed which are common for the area and contribute to the flows to the Merrifield Pump Station as described by the stakeholder testimony. The hydrology model was used to quantify the drainage issues identified and determine possible solutions.to help alleviate the interior flooding during storm events.

The proposed system improvements include multiple options throughout the drainage area to divert stormwater away from inadequately sized systems, correct existing drainage issues and increase the pumping capacity of the existing station. The following improvements are discussed in further detail in the study:

1. Additional conveyance outfall to Keyser Creek to reduce interior surcharging
2. Existing system upgrades to create a more efficient conveyance system.
3. A new conveyance system in the upper portions of the watershed to divert stormwater from reaching the pump station.
4. Improvements of an existing detention basin to help attenuate surcharging flows.
5. A new pump system with increased capacity and storage volume.

In addition to the above noted improvements, the required permitting and reviewing agencies have been identified.

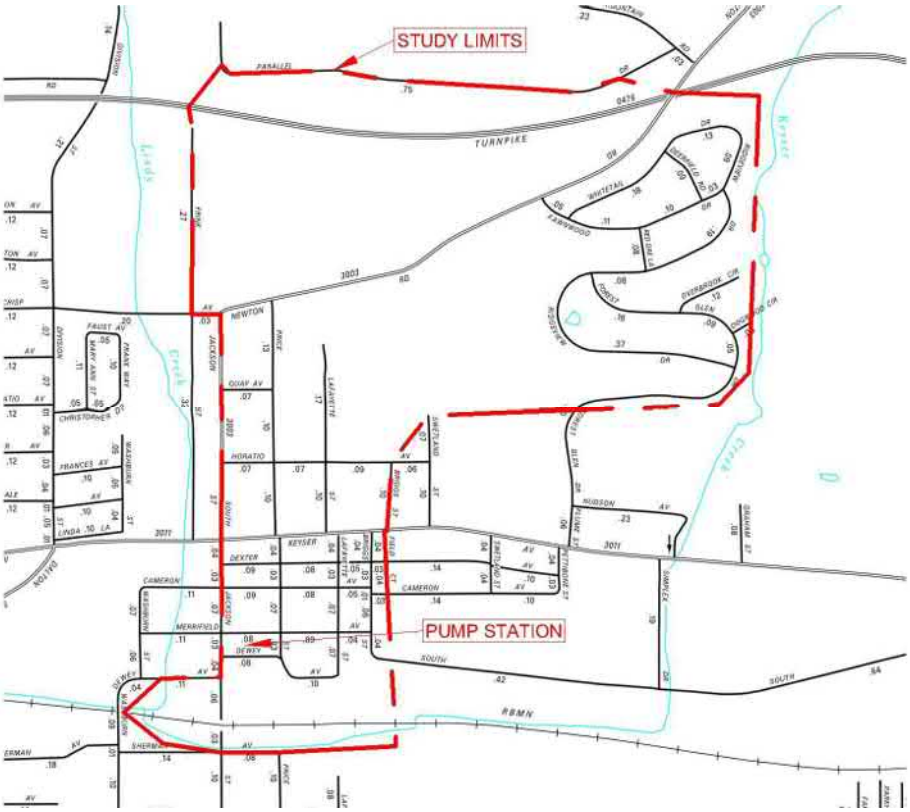
2 INTRODUCTION

The Merrifield Pump Station has been problematic for the City of Scranton and residents for many years. Based on the local testimony, major flooding events seriously increased since 2006, but the area has been prone to flooding as far back as the 1950's. There are many factors which increase the probability of flooding within the area including, in recent years, storm intensities have increased, additional development within the area and dated infrastructure. GPI has been hired by the City of Scranton to research and identify possible solutions to help alleviate the issue. As a part of this study, GPI has spoken with local stakeholders, researched existing plans within the area, observed the site during a large storm event, surveyed and modeled the watershed to the pump station and have identified possible solutions to help alleviate the interior flooding during storm events.

3 EXISTING CONDITIONS

3.1 STUDY LIMITS

The primary area of concern centers around the Merrifield Pump Station and the drainage area which contributes to the inundation of the pump station during rainfall events. The area of study begins at the outfall to Keyser Creek from the pump station in the location of the Lindy Creek confluence and extends toward I-476, PA Turnpike Northeast Extension. GPI mapped the existing conveyance systems within the area and inspected both under dry and inundated conditions. Additional detail of the mapping of the existing system has been included in Appendix A. In addition to the Merrifield Pump Station, the Fawnwood Heights was identified to be problematic and having drainage issues. The drainage paths and conveyance of Fawnwood Heights was also considered during the mapping.



3.2 Data Collection

Data collection within the Study Limits included research of existing records provided by the City of Scranton, Pennsylvania Department of Transportation (PennDOT) and the PA Turnpike Commission (PTC), testimony from landowners, observed dry and inundated conditions, and conventional survey methods. The survey portions were conducted over multiple field days throughout August and September of 2021. Survey included collecting the elevation of the structures and the surface and inverts of the conveyance system, including documentation of the pipe sizes.

3.3 Stakeholder Testimony

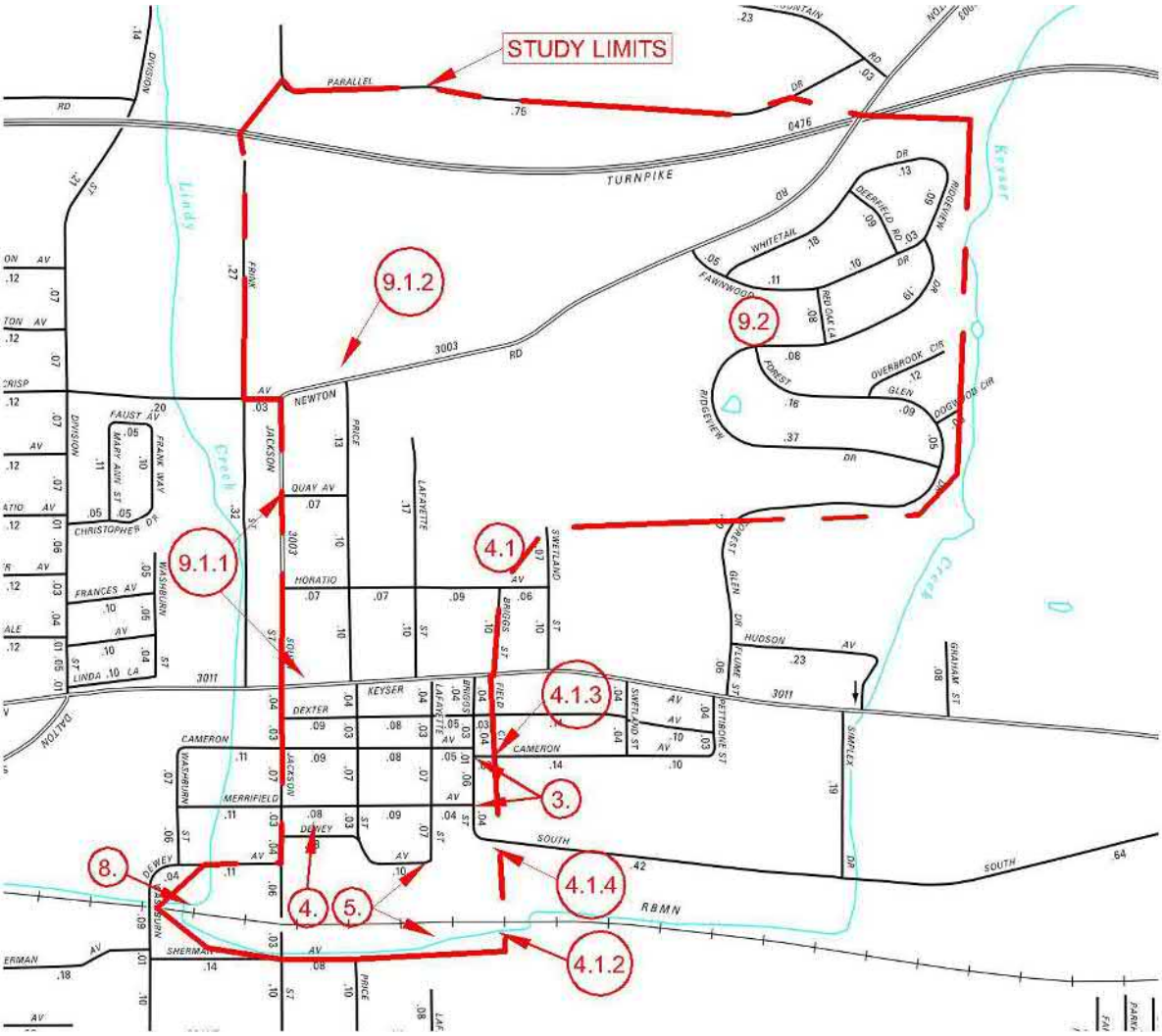
The stakeholders for this project included the City of Scranton, PennDOT, PTC and the local property owners who have been affected by the increased runoff events over the years. The city, PennDOT and PTC currently own and operate conveyance systems within the Study Limits. These systems are a mixture of piping and channels which currently show signs of being undersized based on the current level of development in the area.

In addition to discussing the drainage with the city, GPI also spoke to local property owners who all provided consistent testimony of the following:

1. It has been reported by the local owners nearest to the Merrifield Pump Station that the major flooding events have increased significantly since 2006.
2. Keyser Creek has not generally been a contributing factor to the interior flooding. Creek depths have been reported as not being deep enough to cause backwater issues.
3. The existing conveyance system surcharges along Briggs Street at the Cameron and Merrifield Avenue intersections. Overtopping has been reported as high as two feet.
4. The surcharging flows from the Briggs Street system travels down the roads and alleys to the Merrifield Pump Station which includes a small detention area that residents state has been poorly maintained and silted in. The pump station outlets near the bend in the Lindy Creek high speed channel.
    4.1. Residents mostly discuss a “Dry Dam” area at the top of Briggs Street and Horatio Avenue as a contributing factor to the surcharging of the Briggs Street system.
        4.1.1. It is unclear of the term “Dry Dam” but was a generally accepted term. This appears to be a detention basin with a large drainage area.
        4.1.2. The outlet from the Dry Dam previously ran through its own conveyance system along Field Court, across private properties through an easement, across North South Road, again through private property and beneath the existing railroad bed to Keyser Creek.
        4.1.3. In 2006, the conveyance system between Field Court and North South Road was disconnected and rerouted to a parallel system in Briggs Street which is undersized.
        4.1.4. The Briggs Street system enters the Spott Property (Lackawanna County Parcel 144.12-050-027.01) and connects to the storm line which runs between Lafayette Street and Dewey Avenue.
5. The pipe between Lafayette Street and Dewey Avenue which discharges directly to Keyser Creek was installed by the Spott property owner to create additional usable area on the property. There was a channel in this area previously. It was reported that the pipe was installed poorly and contributes to the flooding.
6. During flooding events, the Merrifield Pump Station is generally inundated and requires City workers and emergency responders to provide additional pumping capacity to the station.
7. On two occasions since 2018, the pump station lost power and the pumps were idle until power could be restored.

8. Lindy Creek, which converges into Keyser Creek beyond the Merrifield Pump Station has previously been improved and includes a high-speed channel which has effectively conveyed the flows without major incidents.
9. In addition to the immediate area of the pump station, drainage issues have been identified:
   9.1. Along Newton Road and Price Street due to runoff from the turnpike.
      9.1.1. A property owner at the intersection of Quay Avenue and Jackson Street stated they typically require sandbags on the corner to stop the gutter flow along Jackson Street from jumping the curb on their property. The flows split at the intersection and run along the gutter further down Jackson Street or along Quay Avenue and flood the Community Center at the bottom of the hill.
      9.1.2. A property owner along Newton Road stated they get water in more intense storms when the stormwater gets out of the channel and runs along their property line out onto Newton Road.
   9.2. Throughout the Fawnwood Heights development.

The below image shows the areas described above corresponding to the outline number above.



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3.4 Document Research

In addition to documents provided within the Study Area by the City of Scranton, GPI also requested plans from PennDOT and PTC regarding the infrastructure in the area. The plans have been reduced in size and included as Appendix A. Below is a summary of the plans which were utilized for this report:

1. Resident provided backup including newspaper articles, videos, and plans of the Delaware Lackawanna & Western RR
2. "Drawings for Construction of a Sanitary Sewer, Force Main, Pump Station and Creek Relocation in the Keyser Valley Urban Renewal Area, Project No. Penna R-160" prepared by Bellante and Clauss, Inc., signed by the Mayor March 16, 1965.
   2.1. Includes the channel relocation and typical section of Keyser Creek.
3. "Scranton Redevelopment Authority Penn Anthracite Parcel #5" prepared by John R. Hennemuth, dated June 6, 1969.
   3.1. Boundary survey of the industrial parcel bound by Briggs Street and North-South Road showing the 24" Storm Sewer Easement from the Dry Dam between Field Court and North-South Road.
4. "Keyser Creek City of Scranton", Investigated by W.B.B., dated March 19, 1976
   4.1. Plan shows an open ditch at the intersection of Lafayette St and Dewey Ave, consistent with homeowner's testimony regarding installation of a 36" pipe across the Spott property.
   4.2. Plan shows open ditch to a 24" reinforced concrete pipe which outfalls to Keyser Creek.
5. Drawings C-2 and C-4 of "Fawnwood Heights" by Patrick J. McLaine, dated October 27, 1986.
   5.1. Drawing C-2 shows the utilities and grading of the site which includes flow arrows indicating stormwater drainage.
   5.2. Drawing C-4 shows channels as a part of the Typical Roadway Section.
6. Drawings 2, 3 and 9 of "Fawnwood Heights, Phase 3" by William G. Karam Associates, Inc., dated October 1989.
   6.1. Drawings 2 & 3 both show channels at 1.0'+ depths along all roads.
   6.2. Drawing 9 shows channels as a part of the Typical Sections.
7. Sheets 85-89 of the PennDOT ECMS No. 8212, "Drawings for Construction of State Route 3011, Section 203 & 271 in Lackawanna County", prepared by Clough Harbour & Associates, LLP and signed by the Secretary of Transportation on February 9, 2012
   7.1. Sheets show the conveyance system within the PennDOT right-of-way.
8. Additional plans and reports have been provided by the City including Hydraulic Studies of Keyser Creek and development throughout the industrial park as well.
9. FEMA Flood Insurance Rate Map for Lackawanna County, Map Number 42069C0212D, Effective August 5, 2020
   9.1. Based on the FEMA FIRM map, the area is inundated during the 100-year storm event with over ten feet of water.
10. A Right-to-Know Request No. 2724 has been made for the turnpike conveyance system within the area of the Study Limits. No plans have been received at this time but will be amended once received.
11. No record plans or information on the Merrifield Pump Station were available.
12. No record plans or information on the Dry Dam were available. No ownership, functions or maintenance requirements could be determined at this time.

3.5 Existing Conditions

Based on the survey findings, testimony of stakeholders and document research, GPI has created a hydrology model for the area with all contributing drainage areas to Keyser Creek within the Study Limits. The overall drainage area reaching Keyser Creek from within the Study Limits is 230 acres. There are four primary open channels which pass stormwater beneath the Northeast Extension and multiple smaller 15" pipes which connect to discharge flows from the roadway. The open channels all pass beneath Newton Road through pipe culverts. The southernmost channel is conveyed to a system which runs along an unnamed alley to Quay Avenue which crosses beneath Price Street and into a channel system to a 48" corrugated metal pipe (CMP) beneath Lafayette Street and to the Dry Dam. The next channel beneath the Northeast Extension travels beneath Newton Road in a 36" smooth lined corrugated plastic pipe (SLCPP) which discharges to an open channel and joins the first channel prior to the 48" CMP. The third channel crosses Newton Road through a 36" CMP and into the wooded area which meanders to the Dry Dam. The fourth channel crosses Newton Road through a 24" SLCPP which joins stormwater from Fawnwood Heights to the forested area and meanders to the Dry Dam.

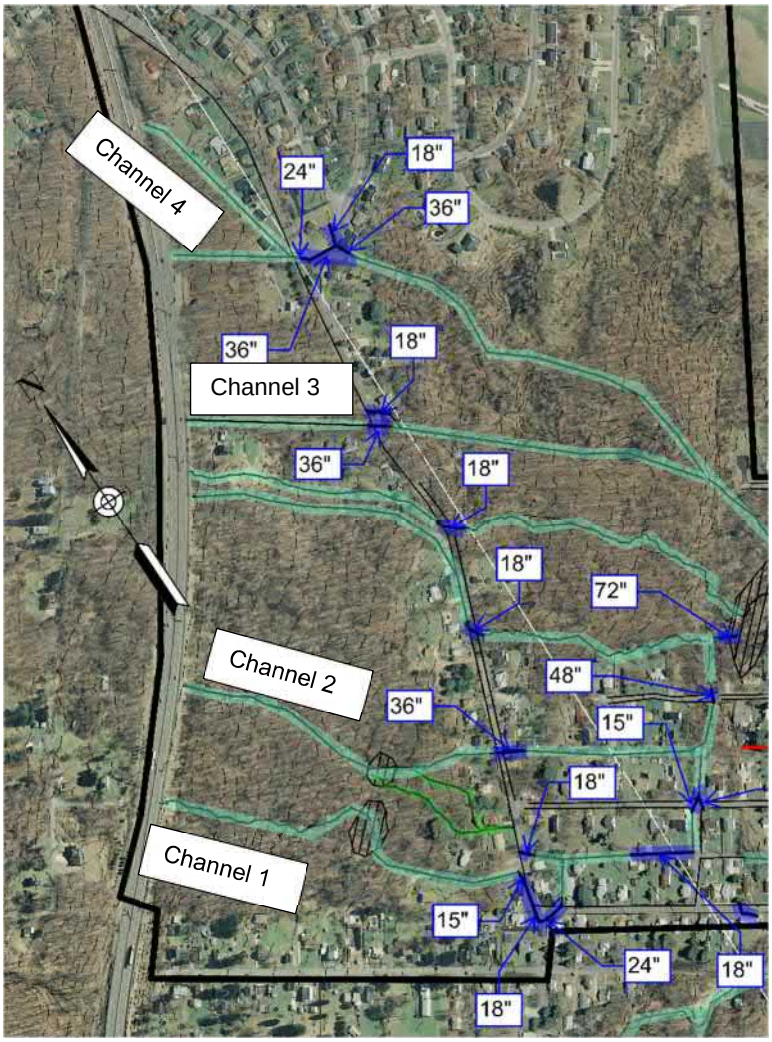


Figure 1 - Channel Outfalls from Northeast Extension

The majority of the drainage area,120 acres, is through the Dry Dam. The conveyance system directs flows from the Dry Dam to Keyser Creek via the Briggs Street system which outlets under the Spott Property. The Briggs Street system was not intended to add flows to the Merrifield Pump Station. The

drainage area to the Dry Dam is a system of pipes and open channels. The Dry Dam is a stacked stone wall, approximately eleven feet high with a hand operated slide gate which has been locked in the open position. The outlet from the Dry Dam is a 24" CMP prior to reaching the Briggs Street system. The Dry Dam originally was not connected to the Briggs System. It originally discharged through a separate system located on Field Court which has since been abandoned. The Briggs Street system where the Dry Dam connects is an 18" SLCPP which runs along Briggs Street and beneath North South Road with multiple structures onto the Spott Property. The conveyance system becomes a 36" pipe on the Spott Property which travels to the rear of the property above the Reading, Blue Mountain & Northern (RBMN) Railroad. The 36" pipe then turns 90 degrees to the southwest and runs parallel with the railroad, then turns another 90-degrees and ties into another 36" pipe which runs between the intersection of Dewey Avenue and Lafayette Street to Keyser Creek. Based on the stakeholder testimony, it is thought the Dewey Avenue and Lafayette Street pipe was poorly installed. It was confirmed during the survey that the invert at the 90-degree bend and outfall to Keyser Creek was installed on a reverse slope by 5", which limits the capacity of the pipe. Other drainage within the Study Limits includes roadway gutter flows, pipes and channels from below Newton Road to Keyser Avenue which directs water through an 18" SLCPP conveyance system on Lafayette Street which is then reduced to a 12" polyvinyl chloride (PVC) and back to an 18" CMP where it discharges near the inlet of the Dewey Avenue and Lafayette Street pipe culvert beneath the Spott Property.

3.6 Tropical Storm Ida, September 1, 2021

On September 1, 2021, the remnants of Hurricane Ida moved through Scranton. The rainfall depth was measured at over 5" of rainfall between a 12–24-hour period which indicates a 25–50-year probable storm. GPI was on-site days prior, during and after to document the storm and confirm areas which have been described as flooding and inundated.

Prior to the storm, the City of Scranton inspected the pump station for readiness and prepared for the storm by setting up a portable auxiliary pump. During the day of the storm, GPI was on site in the early afternoon at the beginning stages and later in the night when the pump station was inundated.

In the early afternoon, approximately 2pm, GPI observed:

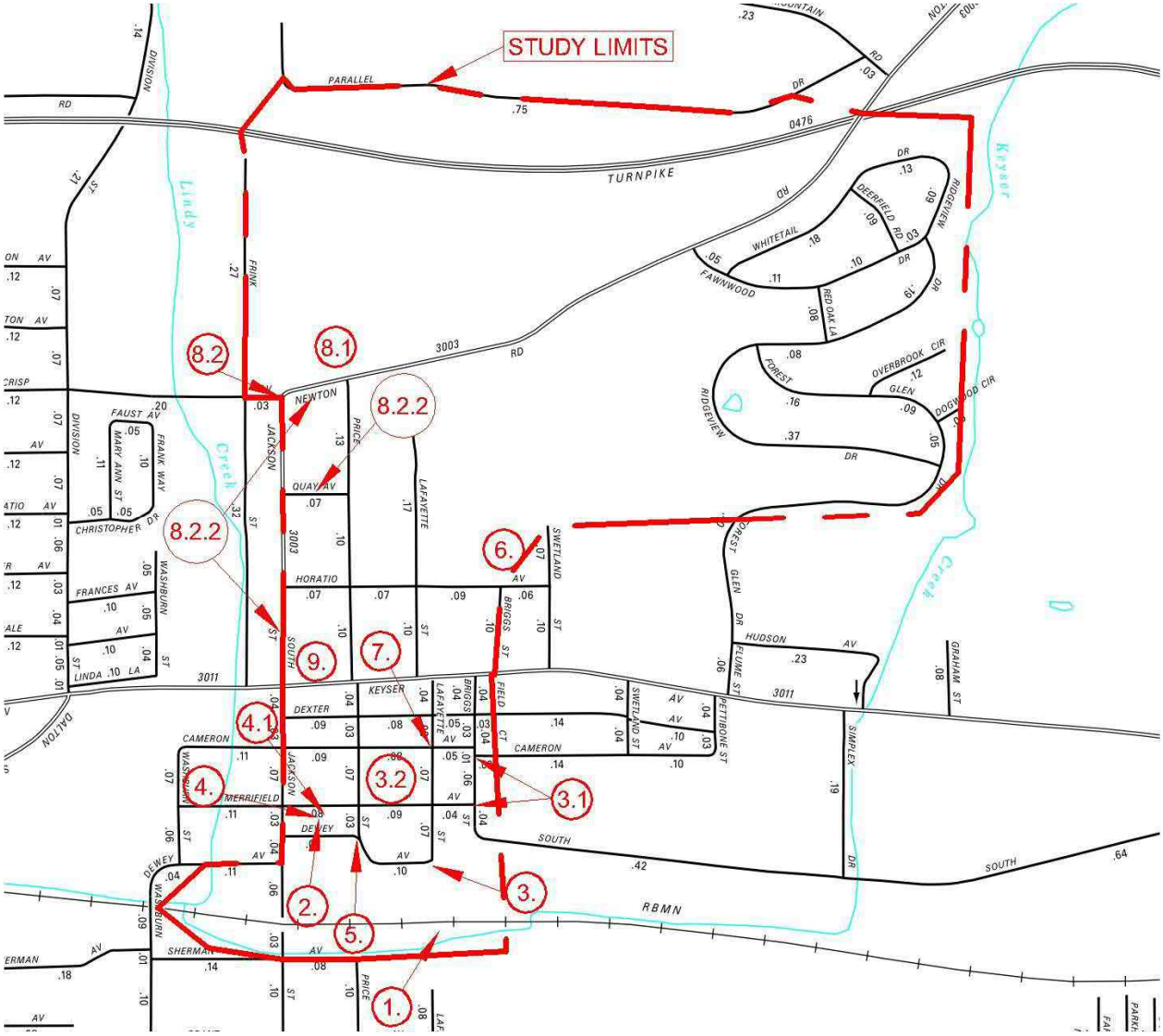
1. The outfall of the 36" SLCPP from the Spott Property to Keyser Creek was in a tailwater condition and approximately 50% filled with water.
2. The inlet of the 36" SLCPP at Dewey Avenue and Lafayette Street to the Spott Property was approximately 75% full of slowly swirling water.
3. Surcharging of the Briggs Street system at Cameron and Merrifield Avenue intersections.
   3.1. Surcharged flows were running overland down Merrifield Avenue via gutter flow to the pump station inlet in Merrifield Avenue. Flowing water was estimated at 2" deep.
4. The pump station was operating both pumps at that time. The auxiliary pump was not required. Little to no ponding water was observed in the detention basin.
5. Flooding at the intersection of Dewey Avenue and Price Street was approximately 2" in depth.
6. The Dry Dam was inundated with an estimated 5' of stormwater.
7. Surcharging flows and flooding appeared to be minimal along Newton Road at that time.

In the late evening, approximately 8pm, GPI received a call from a nearby property owner that the Merrifield Pump Station's pond was full. GPI was on site and observed:

1. The outfall of the 36" SLCPP from the Spott Property to Keyser Creek was fully submerged with water. Pipe outfall was reduced to little to no flow.

2. Local testimony on the day stated that the pond filled drastically between 5 and 7 pm. It is GPI's opinion the pump station saw a major surcharge of water within the interior area due to the tailwater conditions of Keyser Creek. These conditions restricted the outfalls from allowing water to drain from the interior areas.
3. The inlet of the 36" SLCPP at Dewey Avenue and Lafayette Street to the Spott Property was 100% full.
   3.1. Continued / intensified surcharging of the Briggs Street system at Cameron and Merrifield Avenue intersections.
   3.2. Surcharged flows were running overland down Merrifield Avenue via gutter flow to the pump station detention basin. Flowing water was estimated at 4" deep.
4. The pump station was operating both pumps at that time and the auxiliary pump as well. A second auxiliary pump was called for, delivered and operable shortly after.
   4.1. The pump station pond was full and ponded water onto Merrifield Avenue at an approximate depth of 4".
5. Flooding at the intersection of Dewey Avenue and Price Street was estimated to be approximately 8" in depth.
6. No observation of the Dry Dam was made on this visit.
7. Additional surcharging was observed at the intersection of Lafayette Street and Cameron Avenue, directly below Keyser Avenue. Ponding was estimated at 6" at the time.
8. Flows were observed between two houses on Newton Road.
   8.1. Based on local testimony after the storm, flows within the channel from the Northeast Extension, overflow the bank and discharge between the houses.
   8.2. The flow between the houses flowed onto Jackson Street into multiple directions, but all contributed to the ponding at the Community Center along Keyser Avenue.
      8.2.1. Portions of the flow entered the Quay Avenue system and contributed to the surcharging toward Price Street.
      8.2.2. Portions of the flow traveled via gutter flow along both sides of Newton Road to Jackson Street and toward the Community Center by turning on Quay Avenue.
9. The ponding at the community center eventually reaches the Keyser Ave system and worsens the surcharging at Cameron Avenue and Lafayette Street.
10. Additionally, it was observed outside of the Study Limits an uncontrolled flow from a local manufacturing area. The flow was directed to Keyser Avenue. At the curb line, the flow jumped into and across the travel lane creating a hazardous condition. The City has indicated prior this is a known issue from a detention basin above the manufacturing site.

The below image shows the areas described above corresponding to the outline number which corresponds to the observations from the 8pm site visit.



The following photos show the performance of the system as described above during Tropical Storm Ida:

Figure 2 - Keyser Creek Outfall @ 2pm

Figure 3 - Keyser Creek Outfall @ 8pm

Figure 4 - Keyser Creek Outfall Showing Tailwater Condition @ 2pm

Figure 5 - Keyser Creek Outfall Showing Tailwater Condition @ 8pm

Figure 6 - 36" Pipe at N Dewey Ave and Lafayette St @ 2pm

Figure 7 - 36" Pipe at N Dewey Ave and Lafayette St @ 8pm

Figure 8 - Surcharging at Briggs St and Cameron Ave at 2pm

Figure 9 - Surcharging at Briggs St and Merrifield Ave at 2pm

Figure 10 - Surcharging Flows down Merrifield Ave @ 2pm

Figure 11 - Surcharging Flows at Merrifield Pump Station Inlet @ 2pm

Figure 12 - Merrifield Pump Station Looking Towards Jackson Street @ 2pm

Figure 13 - Merrifield Pump Station Looking Towards Jackson Street @ 8pm

Figure 14 - Merrifield Pump Station @ 2pm

Figure 15 - Merrifield Pump Station @ 8pm

Figure 16 - Flooding at N Dewey Ave and Price St @ 2pm

Figure 17 - Flooding at N Dewey Ave and Price St @ 8pm

Figure 18 - Dry Dam Conditions @ 2pm

Figure 19 - Dry Dam Conditions @ 2pm

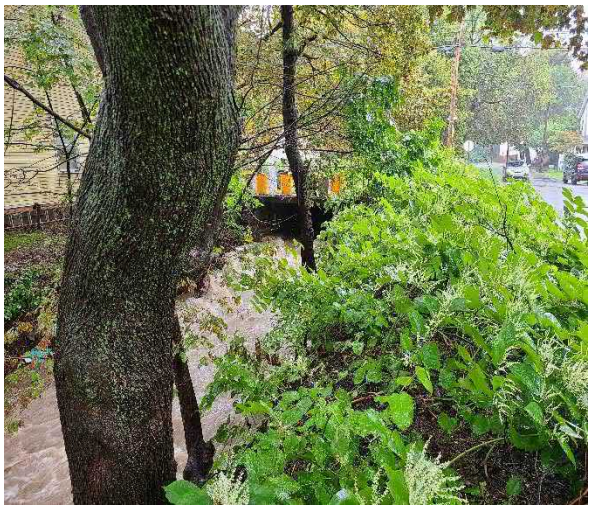


Figure 20 - Keyser Creek at Sherman Ave Crossing @ 2pm

Figure 21 - Keyser Creek at Sherman Ave Crossing @ 8pm

Figure 22 - Merrifield Pump Station Outfall @ 2pm

Figure 23 - Keyser Creek and Lindy Creek Confluence @ 2pm

Figure 24 - 48" CMP to Dry Dam @ 2pm

Figure 25 - Newton Road @ 2pm looking Northeast

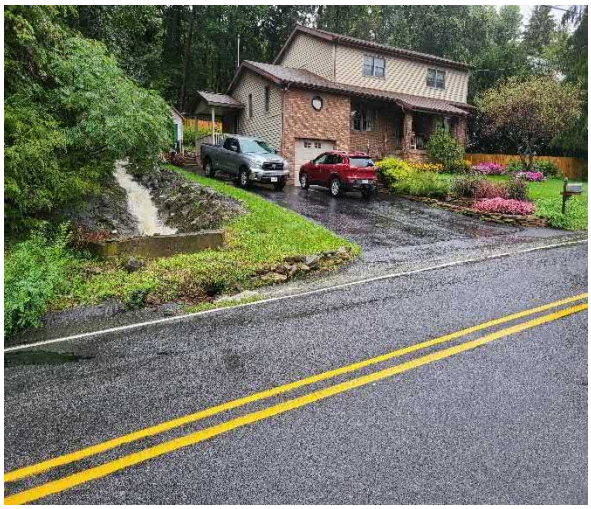


Figure 26 - Pipe Culvert at Newton Road @ 2pm looking North

Figure 27 - Pipe Culvert at Newton Road @ 8pm

Figure 28 - Surcharging at Lafayette St and Cameron Ave @ 8pm

Figure 29 - Flooding at Lafayette St and Cameron Ave @ 8pm

Figure 30 - Flooding Along Property Line at Newton Road @ 8pm

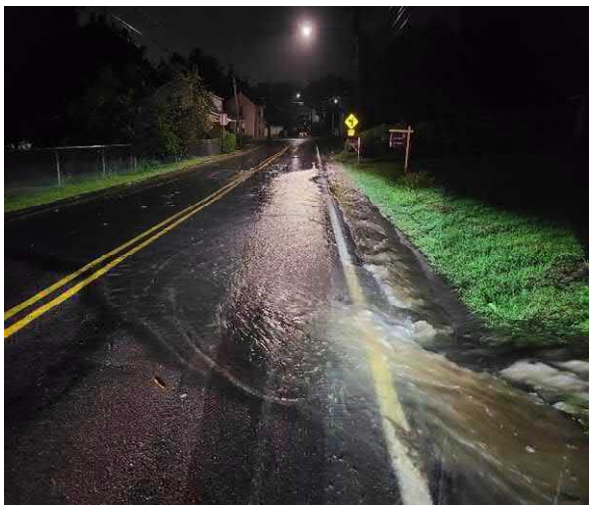


Figure 31 - Flooding Along Property Line Running Down Newton Road @ 8pm

Figure 32 - Gutter Flow along Jackson Street @ 8pm

Figure 33 - Gutter Flow along Quay Ave @ 8pm

Figure 34 - Overland Flow along Quay Ave to Price St @ 8pm

Figure 35 - Overland Flow from Price St to Horatio Ave @ 8pm

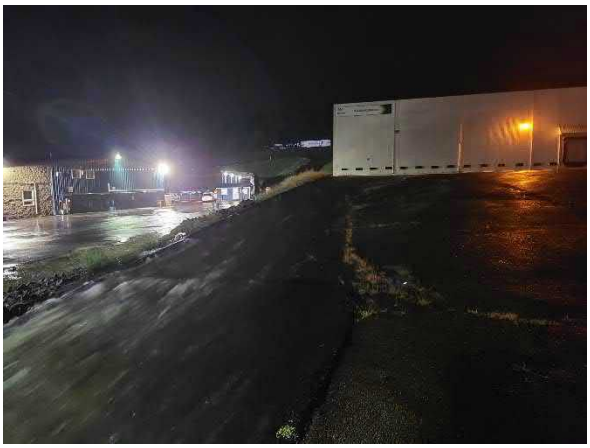


Figure 36 - Uncontrolled Flows to Keyser Ave (Outside Study Limit)

Figure 37 - Uncontrolled Flows to Keyser Ave (Outside Study Limit)

3.7 Pipe Investigation and Cleaning

GPI and their subconsultant Koberlein Environmental Services, are under contract to camera and clean pipes within the lower portions of the system. The first pipe identified to be cleaned is the pipe beneath the Spott property from the intersection of Dewey Avenue and Lafayette Street and outlets to Keyser Creek. The work will continue to inspect the other pipes within the Spott Property and an additional pipe which was noted to be filled with debris.

The purpose of this work is to inspect select pipes within the lower portions of the work which are difficult to maintain due to the pipe's depth. If sediment or any blockage is found, work will be performed to reestablish the capacity of the pipe.

This work is currently being scheduled and this report will be amended with the findings of the work upon completion.

4 STORMWATER ANALYSIS

4.1 Basin Modeling

To evaluate the existing drainage condition and performance of the system an Existing Condition Model was created. Due to the size of the contributing drainage area to the Dry Dam, design flows to the storage area were calculated using TR-55 methodology in HydroCAD 10.0. Flooding events were then calibrated to match conditions observed during Tropical Storm Ida. Smaller drainage areas south of the detention facility were calculated using the rational method. A 10-year storm was used as the design storm for the local drainage system, while the 10-year, 25-year, 50-year, and 100-year storms were analyzed for the Dry Dam.

Hydraulic calculations for the existing and proposed conditions were completed using Bentley's InRoads Storm and Sanitary software. Pipe data (size, material, invert), inlet configurations (size, orientation), utility hole connections, and roadway data (longitudinal and cross slopes, elevations) were coded into the software to represent the existing conditions to complete the drainage analysis. Design flows were coded into the model at the appropriate locations to calculate the network hydraulics. Pipe hydraulics were calculated using Manning's Equations, while inlet efficiency was calculated using the orifice/weir equations.

A tailwater condition was applied to the calculations based on flood elevations from the Keyser Creek. These elevations were obtained from the HEC-2 data readouts used to establish flood elevations for Keyser Creek as shown on the Flood Insurance Rate Map. This was added to determine the impact of flood elevations on the local drainage system.

4.2 Areas of Concern

Results for the Existing Condition Model confirmed that the existing drainage systems were generally substandard. Below is a summary of the drainage deficiencies identified in the project area.

1. **Dry Dam** – Northwest of the Horatio Avenue and Briggs Street intersection, an eleven feet tall, stacked stone wall is in the woods. This feature referred to as the "Dry Dam" is below a large, closed depression that appears to be a former pond. A 24" CMP pipe controls the flow from the dam. The outlet pipe discharges into the municipal drainage system along Briggs Street and eventually discharges to the Keyser Creek.

1.1. Approximately 120 acres of wooded and residential land northwest of the dam appears drain to and through the dam. Based on the observations during Tropical Storm Ida, upper portions of the watershed are not being conveyed to the Dry Dam through the intended conveyance system.
  1.1.1. Portions of the upper watershed, up to 30 acres, may not get to the dam, but leave the upstream channel north of Newton Road.
  1.1.2. Potentially, 65 cfs (80%) of the upper watershed leaves the channel northwest of Newton Road.
1.2. Based on the 120 acres of drainage to the Dry Dam, the peak 10-year flows to the dam are estimated to be approximately 120 cfs.
  1.2.1. The dam is estimated to have sufficient storage and capacity to convey up to the 25-year runoff without overtopping.

2. **Fields/Briggs Street Drainage Network** – The 24" CMP from the Dry Dam discharges to the City Storm Sewer. The 24" pipe continues southeast under Field Street to two inlets stopping at North Cameron Avenue. A former connection to a 24" pipe downslope of Cameron Avenue received the drainage from the storm sewer and discharged it to Keyser Creek. Sometime, around 2006 the downstream 24" pipe was disconnected from this system and an 18" pipe was connected to tie the system into the Briggs Street network. This network flowed south along Briggs Street before ultimately discharging to Keyser Creek.
  2.1. Design calculations indicate that the 24" CMP segment of pipe from the Dry Dam to Cameron Avenue is approximately able to convey the 10-year discharge, estimated to be approximately 28 cfs, from the Dry Dam along with the collection of the drainage area upslope of Cameron Avenue.
  2.2. The local municipal drainage system along Briggs Street can convey the 10-year flow upstream of the connection with the Dry Dam discharge at the intersection of Briggs and Cameron Avenue.
  2.3. Downstream of the terminal end of the 24" CMP Pipe at Cameron Avenue the entire system is undersized not capable of conveying the upstream flow for the 10-year event due to the reduction in pipe size to an 18" SLCPP.
  2.4. The outlet pipe from the drainage network, located at the bend in Dewey Avenue is also a 36" pipe. This pipe has a negative slope which impedes flow.
3. **Keyser Creek** – Tailwater conditions at Keyser Creek are also an impediment to flow.
  3.1. Drainage Calculations were initially run with no tailwater conditions. Results indicated that every inlet was surcharging during the 10-year event indicating that the system as designed is undersized.
  3.2. A tailwater condition was applied to the calculations based on flood elevations from the Keyser Creek. These elevations were obtained from the HEC-2 data readouts used to construct the Flood Insurance Rate Map. Results indicated that the surcharging at every inlet was worse due to the tailwater conditions. Based on the stakeholder testimony, tailwater from Keyser Creek does affect the interior drainage.
  3.3. The pipe located at the intersection of Dewey Avenue and Lafayette Street which runs beneath the Spott Property was calculated to be flowing backwards into the municipality during the high tailwater conditions. Water in the system can surcharge and flood the surrounding areas by approximately 3'.
  3.4. Based on the current FEMA Flood Insurance Rate Map for the area, the 100-year flood elevation is over 10' above the elevations at the pump station.

5 PROPOSED IMPROVEMENTS

Several Different Alternatives were proposed to address the local drainage issues. The Areas of Concern identified above will likely require multiple approaches to help alleviate flooding within the Study Limits, but given the topography and FEMA mapping, this area is modeled by FEMA to be inundated during large storm events. Issues like tailwater and overtopping of the creek require a larger reaching study which considers the creek and contributing drainage. Below is a summary of some of the potential solutions to alleviate the interior inundation issues:

5.1 ADDITIONAL CONVEYANCE OUTFALL

The 18" connection to the Dry Dam into the Briggs Street Drainage Network is currently undersized. To reduce the pipe from surcharging within the system, a new outfall to Keyser Creek was considered. Restoring the original configuration of an isolated system from the Dry Dam to Keyser Creek was determined the best option since it is a primary factor of surcharging. It is estimated that the isolated system could remove 80 cfs of flow from the Briggs Street system.

Routing of the additional outfall could include work on public and private properties, including RBMN Right-of-Way (ROW), and Pennsylvania Department of Transportation (PennDOT) ROW.

Two options were considered including:

1. A new system to isolate the flows from the Dry Dam at the existing inlet box on North Cameron Avenue directly to Keyser Creek.
   1.1. This would eliminate the Dry Dam and two inlets located on Keyser Street and Cameron Avenue, from reaching the Briggs Street system.
   1.2. This work will require approximately 1,000 linear feet of new 42" pipe from the existing inlet located on North Cameron Avenue to a new discharge point beneath the railroad bed.
   1.3. This new system would still be limited by the 24" outlet pipe from the Dry Dam and would only be able to convey the 10-year storm.
   1.4. Surcharging would still be an issue due to tailwater in Keyser Creek. Surcharges were calculated at several feet above the grate at both Keyser and Cameron Avenues.
2. A new system to isolate the flows from the Dry Dam directly to Keyser Creek.
   2.1. Surcharging can be eliminated through this option by replacing the existing inlets on Keyser and Cameron Avenues with utility holes.
   2.2. This new system could potentially be able to convey the discharge from the Dry Dam's 50-year storm.
   2.3. To replace the entirety of this system, the outlet pipe from the Dry Dam would need to be modified. Modifications of the existing Dry Dam would need to be extensive since record drawings to determine ownership, maintenance, purpose, and design criteria are not available. Based on the drainage area to the Dry Dam being over 100 acres, this facility would be considered an operable dam. Any modifications would require stringent permitting requirements and lifetime maintenance and inspections to ensure downstream safety.

Although removal of the flow from the Dry Dam system from the Briggs Street System would improve the design capacity downstream of Cameron Avenue, some of the existing pipes in this network will still not pass the 10-year design storm. Surcharging may still be observed unless the entire system below Keyser Avenue is replaced with appropriate pipe sizes.

5.2 Existing System Upgrades

Replacement of the last section of pipe between North Dewey Avenue and Lafayette Street that discharges to Keyser Creek with a 36" pipe constructed at minimum slope will help and improve the local hydraulics. The pipe is currently installed at a negative slope which reduces the capacity of the system. Reconfiguring the outlet and adding a flap gate would also prevent water from flowing backwards into the system during high tailwater conditions. The outfall would need to be constructed beneath the RBMN railbed and coordination will be required.

Additionally, replacing all pipes within the system which have shown surcharging and are known to be undersized should be replaced to eliminate stormwater in events from escaping the intended design path. This would require upgrades along Quay Avenue and the associated pipe network to the Dry Dam, a new system which can convey the flows which pond in the Community Center from Quay Avenue into the Lafayette Street system, including working within Keyser Avenue.

Replacement of the existing outfall could include work on public and private properties, including PennDOT and RBMN ROW.

5.3 New Conveyance System

Instead of diverting water bypassing the Dry Dam back to the detention facility, another potential solution would be to capture this water with a separate drainage system. The system would start at Newton Road and would convey the water west past Jackson Street to Frink Street. The network would be conveyed down Frink Street to discharge to Lindy Creek, a tributary to the Keyser Creek, north of Keyser Avenue.

Routing of the new conveyance could include work on public and private properties, including PennDOT ROW.

1. The system was designed to convey the upstream portions of the watershed only and not local drainage. As such all connections were made using utility holes, preventing any local surcharging.
2. Approximately 2,500 linear feet of 36" smooth lined pipe is required to convey the approximate100-year flow of 95 cfs through the system.
3. Due to the steep raising grade between Jackson and Frink Streets, the pipe would have to be 10-12 feet deep to maintain positive drainage.
4. The ultimate point of connection in Lindy Creek cannot be determined at this time due to the required review and approvals by the Pennsylvania Department of Environmental Protection (PA DEP), US Army Corps of Engineers (US ACOE) and coordination with FEMA. The proposed conveyance system may need to be extended below Keyser Avenue if the existing Lindy Creek channel does not have capacity to convey the added flow or creates flooding potential at the Keyser Avenue Crossing. The provided cost analysis shows a range of estimated values for this work.

5.4 Channel / Dry Dam Improvements

Several locations in the wooded area between the Northeast Extension and Newton Road were observed where flow would leave the drainage channels and bypass the Dry Dam Facility. This water flows overland and cause flooding at local residences. One idea considered was to resize and armor the channel to eliminate overtopping of a contributing drainage channel to allow the additional flow to enter the Dry Dam and be detained. It is unclear of the ownership and maintenance of this channel. It is possible private property acquisition will be required for both temporary and permanent easements.

Channel and Dry Dam Improvements could include work on public and private properties. Permitting, design and construction of the Dry Dam will be crucial to address public safety as this area will likely be considered as a high hazard area.

1. Adding additional flows which have bypassed the Dry Dam historically back into the system could create a negative effect on the dam itself. Reconnecting the upstream areas would add significantly more water to the Dry Basin and reduce the hydraulic performance. Adding the estimated 65 cfs of stormwater which currently bypasses the Dry Dam back into the Dry Dam during the 10-year storm would create an overtopping event of the 11-foot retaining wall.
2. Modifications of the existing Dry Dam would need to be extensive as stated in the Section 5.1, but additional detention could be designed to accommodate the redirected flows.

5.5 Pump Station Improvements

During large rainfall events, the pump station is not capable of keeping up with the surcharging from the surrounding systems. The current Briggs Street system is undersized for the flows which it conveys, and multiple other systems show similar signs of hydraulic inefficiencies and poor design and maintenance. It is unclear what the original pump station was designed to convey and if it was sized for surcharging as described in the systems above. The current configuration is a duplex pump system which is designed to cycle between pumps during events. The existing configuration of the pumps is inefficient with multiple fittings and reducers which decrease the pump's efficiency during operation. Based on the City's testimony, during an event, the pumps are overridden to both be on full time. The pumps were replaced in 2019 and are expected with routine maintenance to have an additional 10-15 years of service life left.

Based on GPI's model, it is estimated that a flow of 260cfs is reaching the pump station during the 100-year storm event. This estimate considers the new conveyance system and outfalls to be in place. Based on the calculated flow, it is estimated that a new duplex system of with (2) pumps capable of removing 25,000 gallons per minute (GPM) would alleviate the flooding. Both pumps would be required to run during the 50- and 100-year design storms, but under the 25-year design storm and below, the pumps will alternate to extend the life cycle. New outlet pipes for the pumps will be required due to the increased size. 30" pipes capable of withstanding the pressures of the pumping will be required to outfall to Keyser Creek.

Additional storage will be required as the current basin is undersized during storms. Based on the estimated flows, the basin would need to be approximately 1 acre and 6.5' in depth. The existing vacant lots within the immediate area of the pump station would be a suitable location to expand the storage without displacement of existing residents.

Due to the recent history of power grid failures during pumping, GPI is recommending a generator be sized to supply back-up power to the pump station with the capability of running the pumps for up to 24-hours. Generator sizing would need to be completed during the design phase since power requirements and specific equipment are not known at this time.

The upgrades to the pump station could include work on public and private properties, including RBMN ROW.

5.6 Sediment Removal Devices

Large scale sediment removal devices for the Study Area were considered such as hydrodynamic separators. During rainfall events, it was observed that stormwater carried a large amount of suspended solids including dirt and debris which could decrease system efficiencies and the creek's hydraulic radius.

These systems are typically costly and require consistent heavy equipment maintenance. Although these systems could provide a water quality benefit, they are not recommended by this study for the purpose of alleviating surcharges and flooding.

5.7 Fawnwood Heights Drainage

Based on the historic documents of Fawnwood Heights, stormwater within the development was designed to be conveyed through a channel and pipe system. The channels should be located just off the shoulders of the road. These channels appear to have been filled in by residents with decorative stone and landscaping. The absence of a conveyance system has increased overland and gutter flows creating property damage. At a minimum, these channels should be restored to the original design, but additional capacity should be considered as well.

5.8 Approvals and Permitting

The options detailed above include work on both public and private properties. Detailed boundary research was not included as a part of this study. Further boundary information will be required prior to design and construction. Private property acquisition will be required for both temporary and permanent easements.

All design shall be in accordance with the City of Scranton Stormwater Ordinance.

Both Keyser Creek and Lindy Creek are considered Cold Water Fisheries and Migratory Fish. Neither creek is classified as a Class A Wild Trout stream, Stocked Trout or supports Natural Trout Reproduction. Any construction, including phased work, with disturbance over one acre would be governed by a General National Pollution Discharge Elimination System (NPDES) permit.

Connections to Keyser and Lindy Creeks will be subject to PA DEP and US Army Corps of Engineers regulations and requirements.

Work within designated floodways and floodplains shall be in accordance with FEMA.

Both Keyser Creek and Lindy Creek are non-navigable waters.

Any work within the Dry Dam area should be in accordance with Pennsylvania Department of Environmental Protection (PA DEP) Division of Dam Safety.

All work within the right-of-way (ROW) of Keyser Avenue (SR-3011), Jackson Street (SR-3003) and Newton Road (SR-3003) shall be in accordance with Pennsylvania Department of Transportation (PennDOT).

All work within the Reading, Blue Mountain & Northern Railroad shall be in accordance with the railroad regulations and requirements.

5.9 Maintenance Requirements

Each proposed improvement will require periodic maintenance. Generally, pipe systems as discussed in Sections 5.1 through 5.4 are very efficient to self-clean in intense storms, but dirt and debris can reduce efficiency or clog the pipe entirely. Annual inspections would be recommended.

Any modifications and upgrades to the Dry Dam will require maintenance and yearly inspections to verify all dam appurtenances are functioning property. These inspections are required to be reported to PA DEP and maintenance logs shall be recorded.

Pump station improvements will require constant maintenance similar to the current maintenance schedule as is being performed regularly and prior to storms.

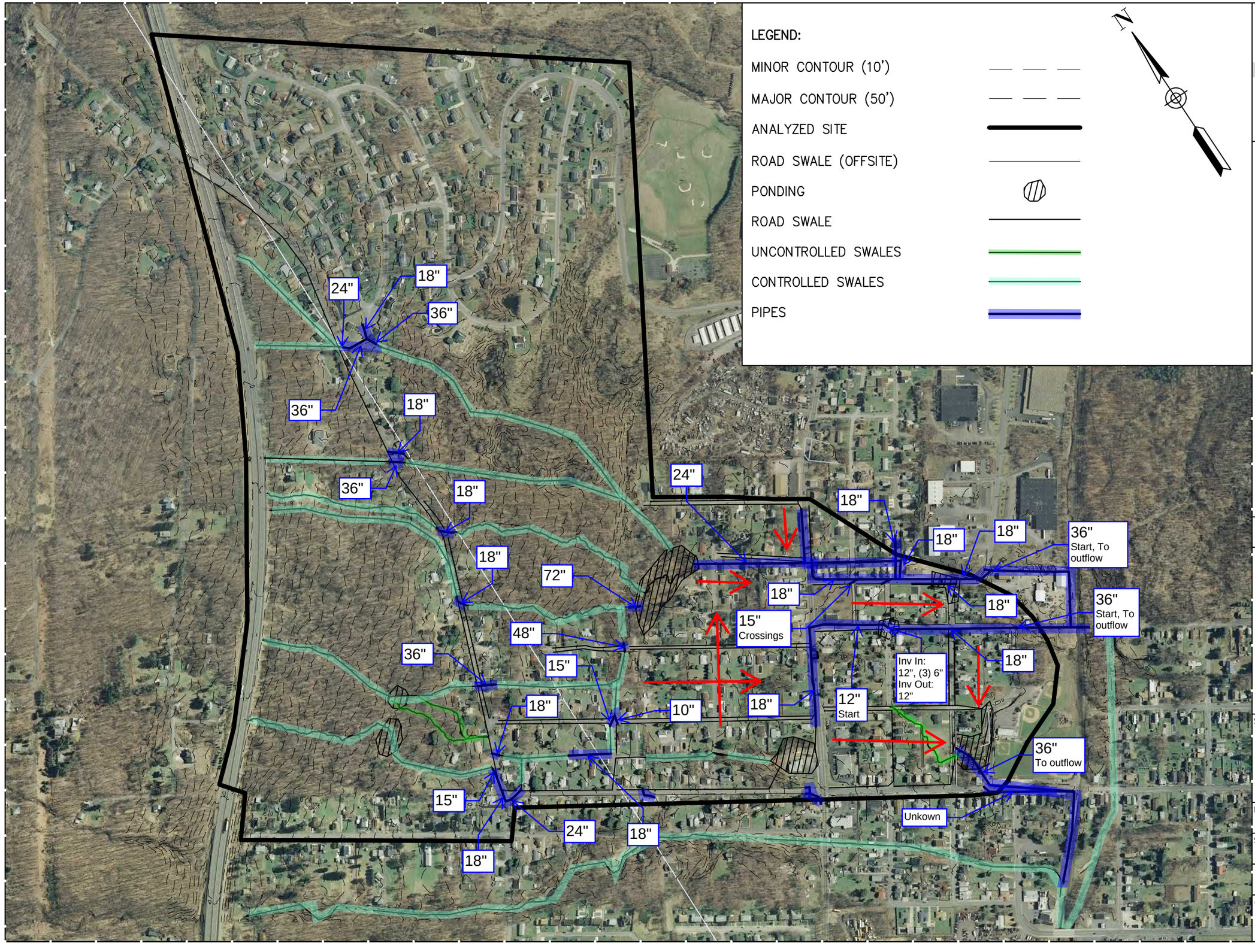
6 COST ESTIMATE

A cost estimate for each recommended improvement is provided below. Detailed breakdowns of each individual iteration are included in Appendix C. The estimates were created based on current industry pricing and quantities as described in the summaries above.

PROPOSED IMPROVEMENT		ESTIMATED CONSTRUCTION COST
5.1.1	Additional Conveyance Outfall, Cameron Avenue to Keyser Creek	$347,674.50
5.1.2	Additional Conveyance Outfall, Dry Dam to Keyser Creek	$658,573.95
5.2	Existing System Upgrades	$901,739.44
5.3.1	New Conveyance System to Upper Reach of Lindy Creek	$534,405.00
5.3.2	New Conveyance System to Lower Reach of Lindy Creek	$953,580.00
5.4	Channel / Dry Dam Improvements	$740,887.50
5.5	Pump Station Improvements	$3,615,901.88
5.7	Fawnwood Heights Drainage	$935,180.00

APPENDIX A

- Conveyance System Mapping
- Referenced Documents



LEGEND:

- MINOR CONTOUR (10')
- MAJOR CONTOUR (50')
- ANALYZED SITE
- ROAD SWALE (OFFSITE)
- PONDING
- ROAD SWALE
- UNCONTROLLED SWALES
- CONTROLLED SWALES
- PIPES

N

GPI
Engineering
Design
Planning
Construction Management
570.342.3700 GPINET.COM
Greenman-Pedersen, Inc.
52 Glenmaura National Blvd.
Suite 302, P.O. Box 5777
Scranton, PA 18505

Signature and Seal

Professional License No.

Project

KEYSER VALLEY STORMWATER & FLOOD MITIGATION STUDY

Sheet Title

EXISTING STORM PLAN

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 3.5
Drawn: RHH	
Checked: MC	

October 8, 2013

James P. Burne Jr.
103 N. Merrifield Avenue
Scranton, PA 18504

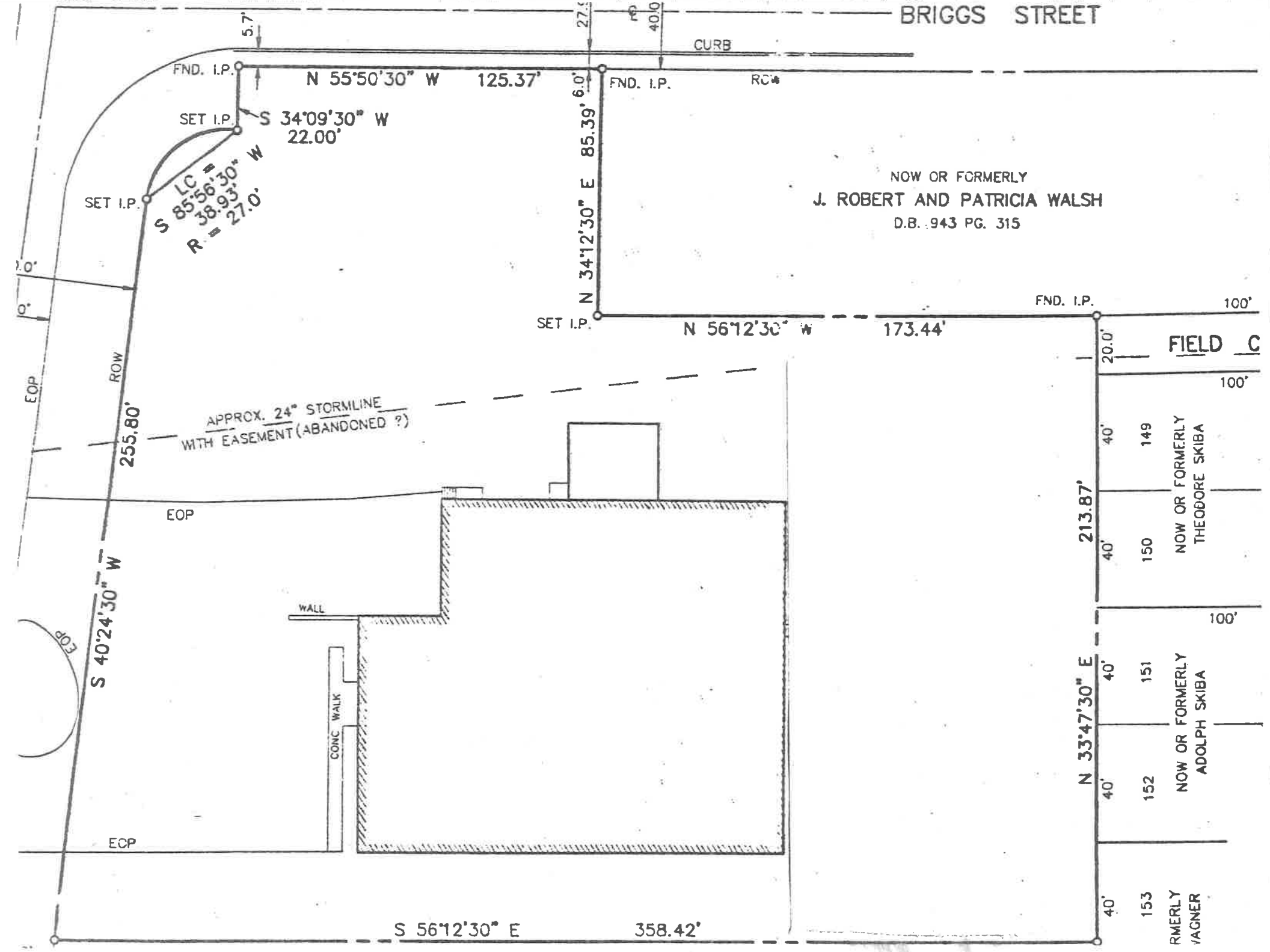
Kirk Kreider
DEP
P.O. Box 8460
Harrisburg, PA 17105-8460

Dear Mr. Kreider

Enclosed are the maps of which I spoke. There are more maps to be viewed which are in the custody of the Lackawanna Historical Society.

Mr. Foley of the Lackawanna County Assessors Office thought the dam in question is owned by the City of Scranton. The City claimed other ownership. If that is their belief, then the City is negligent in not referring this matter to your office.

Sincerely,


BRIGGS STREET
CURB
5.7'
27.5'
40.0'
FND. I.P.
N 55°50'30" W 125.37'
SET I.P.
S 34°09'30" W
22.00'
LC = S 85°56'30" W 38.93'
R = 27.0'
SET I.P.
6.0'
FND. I.P.
ROW
N 34°12'30" E 85.39'
NOW OR FORMERLY
J. ROBERT AND PATRICIA WALSH
D.B. 943 PG. 315
SET I.P.
N 56°12'30" W 173.44'
FND. I.P.
100'
FIELD C
20.0'
100'
EOP
ROW
255.80'
APPROX. 24" STORMLINE
WITH EASEMENT (ABANDONED ?)
EOP
S 40°24'30" W
WALL
CONC WALK
EOP
EOP
213.87'
40'
149
150
NOW OR FORMERLY
THEODORE SKIBA
100'
N 33°47'30" E
40'
151
152
NOW OR FORMERLY
ADOLPH SKIBA
40'
153
RMERLY
AGNER
S 56°12'30" E 358.42'

1-22-1959
SCRANTON times

r Inspects Flood Scene and Promises to Correct onditions in Area

(Photo by Baroff)

Mayor James T. Hanlon was on the scene of flooded Merrifield Avenue at Jackson Street in West Scranton early this afternoon for a personal inspection of the area. Mayor Hanlon, second from left, is shown as William Kennedy, 103 Merrifield Avenue, third from left, points to his home, the basement of which was flooded. On the extreme left is James Lydon, general foreman of the Department of Public Works. On the extreme right is John Washo, foreman in the department.

Mayor Hanlon, who ordered Fire Department pumps to the scene, told The Times he intends to remedy the condition in that section of the city during the coming year. "There is no reason why something can't be done about it. The residents of this section deserve consideration," the Mayor said.

Heavy rains washing down from the West Mountain and off Keyser Avenue consistently flood basements in that section.

103rd Year
World News Coverage,
Associated Press
United Press International
News Service and Telephotos

The Scranton Tribune

Sixteen Pages | Scranton, Pa., Thursday, January 22, 1959 | Seven Cents

Snow, Colder
Rain changing to snow, windy and colder with a high of 40 and a low of 25. Yesterday's high was 52; the low, 36.
Further details on page 11.

Heavy Rains Inundate Keyser Valley

Dynamite Loosens Leggetts Creek Ice

North End Water Peril Eliminated

6 Blasts Set Off By DPW Personnel; Rain Swells Stream

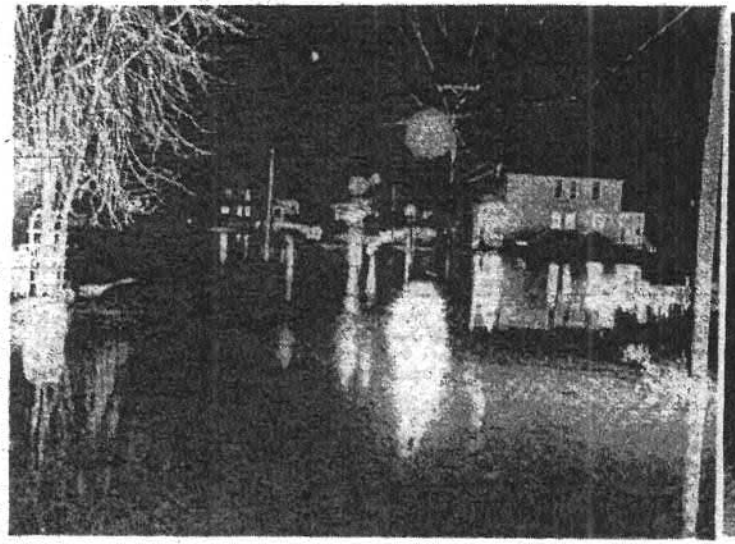
Six lusty dynamite blasts shook loose an ice jam in Leggetts Creek at Watkins St. last night—erasing a flood threat in that area.

Three members of the Department of Public Works touched off the blasts.

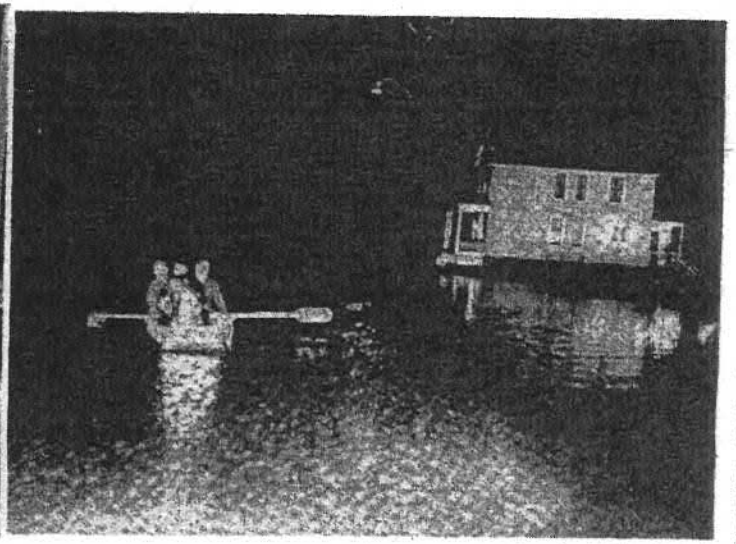
When they concluded their work at 9 p. m. they expressed satisfaction that the danger of flooding had been wiped out.

Earlier in the day, the trio dynamited an ice jam at the Leggetts Street Bridge, farther upstream.

The huge ice mass at W...



KEYSER VALLEY FLOOD—Street and house lights create sparkling patterns on flood waters that inundated a section of Keyser Valley last night. Depth of the water reached five feet along the 100 block of North Merrifield Ave., detailed in the picture. The view is north, from Jackson St. toward Lafayette St. Water climbed to first-floor levels along this block.



ROWING TO RESCUE—Neighbors man a boat furnished by police to row to the aid of William McGrail, 120 North Merrifield Ave., whose house (right) was flooded last night. Mr. McGrail declined police offer to evacuate his home but welcomed aid from neighbors in moving furniture to upper floors. (Tribune Photos, Rocco Bochicchio)

Pump Unit Fails to Cope With Water

Police Rowboats At Scene; Prepare For Evacuations

By TOM CASEY

A large section of Keyser Valley was flooded last night as water cascaded off West Mountain and collected in low points of that area.

Hardest hit was the area bounded by Jackson and Lafayette Sts. and North Cameron and North Dewey Aves.

Sewers were unable to draw off the overflow and a pumping station at North Dewey Ave. also failed to cope with the rising water.

Police were at the scene and called for rowboats and oars in the event evacuation of families would be required.

Water filled cellars in many homes and knocked out furnace fires. Many residents moved first-floor and basement furniture to higher levels as the water continued to rise.

Mrs. Agnes T. Riddle, 120 North Marrifield Ave., was evacuated from her home in early evening. Neighbors assisted the elderly woman, who is in ill health, to a

CITY

The Scranton Times

THE WEATHER
Much colder, windy, snow flurries today, tonight, tomorrow.

90TH YEAR—NO. 18 A B C SCRANTON, PA., THURSDAY AFTERNOON, JANUARY 22, 1959. 34 PAGES SEVEN CENTS

Winter Onslaughts Claim 54 Lives Across Nation

Damage High in State Floods

REMOVED FROM FLOOD: Residents of area near Jackson St. and North Merrifield Ave. are taken from their homes by rowboat after water flowing off West Mountain inundated parts of Keyser Valley. Most residents remained, although in some cases water reached first-floor levels.

HE STAYED: William McGrail, 120 North Merrifield Ave., casts worried look at water around home. He declined evacuation, was aided by neighbors in moving furniture to upper floor.

Times Photos by Hafler and Hudon

EMERGENCY PUMPERS: Firemen from two companies work knee deep near North Merrifield Ave. and Jackson St. in an effort to draw off water which cascaded down West Mountain into Keyser Valley. Pumpers were used when pumping station at North Dewey Ave. was taxed beyond capacity.

3 Dead, 30 Feared Trapped in Mine

Slope Collapses At Port Griffith

May Shaft Is Unit

Police Maintain Patrols on Streams

Several City Residents Evacuated From Homes as Result of Heavy Rain

Warning Given On Cold Wave

Hawley Gets Water After Main Is Fixed

Several Areas Affected

Swollen Streams Pose Pittsburgh Area Threat

TION

By the Associated Press

Cler's worst storms eased ...ay, but intense cold

STATE

By the Associated Press

Western Pennsylvania rivers and streams—loaded by heavy

May Shaft of the Knox Coal Co., near the Pittston Hospital, in Port Griffith, it was reported unofficially early this afternoon.

Michael Grace, Scranton Times Pittston representative, on the scene, said officials of the mining company are "far too busy" to talk with reporters.

However, he said engineers at the site told bystanders earlier that three men have been drowned and "about 30 were feared trapped" when a section of the slope caved in under heavy pressure from the Susquehanna River.

The shaft is on the banks of the river at the intersection of Rose and Hospital Sts., only a short distance from Pittston Hospital.

Lending credence to the reports was an order from Pennsylvania Mine Inspector Andrew Wilson, Wilkes-Barre, who appealed to the Lehigh Valley Railroad and Lehigh Coal Co. to rush all possible cars, and other heavy material into the area where it could be dumped into the cave area in an attempt to stem the rush of water and silt from the river.

A telephone call direct from The Times newsroom to the May shaft drew a hurried response from a worker there who said, "We have an emergency situation here and can not talk now."

Meanwhile, Wyoming Barracks of State Police dispatched

(Continued on Page 8)

Asylum in France Sought by Batista

PARIS (UPI) — President Charles de Gaulle's government has received a request for asylum from former Cuban President Fulgencio Batista and will give it careful consideration, informed sources said today. Batista is living in exile in the Dominican Republic.

INDEX

Brennan Has Virus

Gilboy Counsel's Illness Halts Tobyhanna Trial

By GEORGE E. CLARK
Times Staff Writer

LEWISBURG—Illness of a defense counsel at the trial of seven men charged with conspiracy to defraud the government has forced a recess of the case until Monday at 10 A.M.

Attorney Joseph P. Brennan, Scranton, counsel for John P. Gilboy Jr., one of the defendants, is suffering from virus infection and was unable to appear in court today.

Federal Judge Frederick V. Follmer ordered the recess because Mr. Brennan is the sole legal representative of Mr. Gilboy at the trial and, by coincidence, testimony at this stage of the case pertains directly to Mr. Gilboy.

Mr. Brennan's illness was described as of a temporary nature and it is felt certain he will be able to resume at the usual hour Monday.

Key man at this stage of the trial, is Clarence F. Wicker, chief of the engineering division, Philadelphia office, Army Signal Corps.

Mr. Wicker was summoned to the stand yesterday by Oliver Dibble, special assistant to the attorney general and chief prosecutor.

Through the witness the government began, step by step, to introduce exhibits upon which the success or failure of the case depends.

Up until yesterday, over bitter and frequent objections, Mr. Dibble had 14 exhibits entered. All concerned the "architect-engineer questionaire" and numerous brochure submitted to the Army Signal Corps by the firm of Gilboy, O'Malley & Stopper and which were the basis for

(Continued on Page 5)

2 O'Clock Quotations

Quotations furnished by REYNOLDS & CO., Members New York Stock Exchange, 211 North Washington Ave., Scranton, Pa.

American Can	49
American Radiator	17
American Tel. & Tel.	232
American Tobacco	108¼
Anaconda Copper	67½
Atlantic Refining	49¾
Atlas Corp.	7½
Baltimore & Ohio	45¾
Bethlehem Steel	53
Chesapeake & Ohio	72⅝
Chrysler	53¾
Container Corp.	29¼
Continental Can	54½
Curtiss-Wright	28¾
Daystrom	37⅞
D&H	29¼
DL&W	12½
Du Pont	214½
Eastman Kodak	144¼
Federal Pacific Electric	27
General Dynamics	62¼
General Electric	78⅝
General Motors	49¾
Gulf Oil	127
International Harvester	42¼
International Nickel	89⅞
International Paper	119¾
International Tel. & Tel.	32⅞
Johns-Manville	54
Korvette	18¼
Lehigh Valley Coal	2
Montgomery Ward	41½
National Dairy Products	47¾
National Gypsum	62¾
New York Central	28¾
Olin Mathieson	46⅞
Pennsylvania Power & Light	56⅝
Pennsylvania Railroad	18½
Pepsi-Cola	29⅜
Radio Corporation of America	48¾
Republic Steel	74¼
Revlon	51⅞
Reynolds Metals	74
Schenley Distillers	40⅞
Sears, Roebuck	44⅝
Sinclair Oil	66
Southern Pacific Railroad	68⅝
Standard Oil of New Jersey	58⅝
Socony Mobil Oil	48
Sperry Rand Corp.	24
Studebaker	14⅞
Trane Co.	64
Union Carbide	125⅝
Union Pacific	36⅞
U.S. Rubber	52⅝
U.S. Steel	97
Westinghouse Electric	73⅝
Western Union	34½
Woolworth	56½

A little less than 1½ inches of rain fell in 24 hours but temperatures soared to Spring-like levels melting the recently fallen snow mantle and boring into ice packs along river and stream banks.

The resultant runoff sluiced over the frozen ground which was unable to absorb the watery onslaught and sent water gushing over banks and cascading down hillsides.

City police maintained a night-long patrol of the Lackawanna River, Stafford-Meadow Brook, Roaring Brook and Leggetts Creek. Rowboats were kept on a standby basis in Keyser Valley and other precautions were taken.

Detective Lt. Willard Beynon,

(Continued on Page 11)

temperature had dropped to the freezing mark at noon and was expected to continue plunging to near zero readings by tomorrow morning.

The increasing cold is in sharp contrast with Springlike conditions which prevailed last night when the mercury hit a high of 64, just three degrees short of the record of 67 for the date set in 1906.

The cold wave accompanied by strong northwesterly winds ranging from 20 to 40 miles an hour will bring scattered snow flurries which will continue tonight and tomorrow in mountain areas.

The snow is expected to be light, providing no more than ground cover in most locations.

Wind gusts up to 40 miles an hour were recorded at the weather bureau shortly before midnight but later diminished. After a reading of 60 degrees at 4 A.M. the temperature began plunging rapidly. It nosedived 13 degrees to 47 at 5 A.M. and had dropped to 35 degrees at 9.

The mercury will sag to about eight degrees in Scranton over night and may go down to zero

(Continued on Page 8)

mented by [illegible] from the Honesdale Consolidated Water Co. restored service to [illegible] of the borough by 11 a.m. The remainder of the firm's 500 customers looked for full service later today.

Storm damage was reported throughout Wayne County as tons of ice moved down rivers and streams after being broken into huge chunks by yesterday's heavy rains and unseasonably warm temperatures.

The Pennsylvania Department of Highways reported six roads in Wayne County closed by high water and ice. One small bridge was being threatened by the overflow from a creek and 20-feet of water backed up behind the partially completed Dyberry River flood control dam near Honesdale.

The Federal-State Flood Forecasting Service advised its river watcher at Hawley to notify local authorities of the possibility of minor flooding after the Lackawaxen rose seven feet in 24 hours. The stream was reported receding slowly this afternoon.

David Williams, manager of the Hawley Water Co., said service was restored by filling mains with water from a recently-drilled artesian well in

(Continued on Page 34)

that extended from the southwest to the Atlantic seaboard.

Arctic air spread south and east. It increased the misery of residents of the storm zones, but it checked the runoff of waters into flooded streams.

Flood damage ran into many millions.

The bitter cold checked Ohio's worst flood in 25 years. Thousands of evacuees began trickling back to their homes. But thousands of others stayed in schools and other emergency quarters.

The crisis was over in Mount Vernon, a city of 16,000 population that experienced the worst inundation of Central Ohio communities. Flood waters began to recede in other sections.

The cold air mass moving in from the West also was a break to the flooded areas of New York state.

Buffalo Hit Hard

Hundreds of families were forced from their homes in the Buffalo section Wednesday night and today. States of emergency were declared in Salamanca and Lackawanna. In South Buffalo, an ice jam in Cazenovia Creek broke and sent a five-foot wall of water through residential streets. Several persons were injured.

The swirling Hoosac River undermined the supports of two bridges in North Adams, Mass., and they tilted at dangerous angles.

Martial law was declared in Madison, Ind., where 100 families were forced from their homes by overflows from the Ohio River.

Disaster plans were put into effect and National Guard troops joined civilian workers in some of the inundated sections.

Small streams in the Wheeling, W.Va., area were out of their banks.

It was the wind that wrought the havoc in the South. Hail the size of baseballs shattered school and church windows and damaged automobiles in Hartselle, Ala.

Skies cleared in the Midwest in the wake of snows that reduced traffic to a crawl and sleet that snapped power and communication lines and cut off many communities from the rest of the world.

small, [illegible] French [illegible] last night. The [illegible] fed by steady rain and deep snow that melted in 60-degree temperatures. It was one of the worst floods on the Allegheny.

"If it is generally u[illegible]

Particularly hard-hit was the Allegheny River community of Kittanning, where 20 per cent of the streets were inundated early today. Hundreds were evacuated from their homes.

At least one death was attributed to the high water. Many industrial plants near swollen streams were forced to suspend operations. Scores of roads were blocked by high water.

The river forecasting service in Pittsburgh said the swollen tributaries will cause the Ohio River to rise to about 30 or 31 feet—about six feet above

(Continued on Page 8)

Tire Explosion Fatal to Worker

YORK, PA. (AP)—A tire exploded today, killing the workmen who was welding the rim.

The victim was William Burgard, 37, employed by his father, M. B. Burgard, at a farm equipment supply house located on the York-East Berlin Highway.

William Lyon, deputy coroner, said the rim of the tire struck Lyon on the head. He died of a fractured skull.

U.S. TREASURY BALANCE

WASHINGTON (AP)—The cash position of the Treasury Jan. 19, 1959. Balance, $2,661,774,013.53.

Satellite Attempt In West Delayed

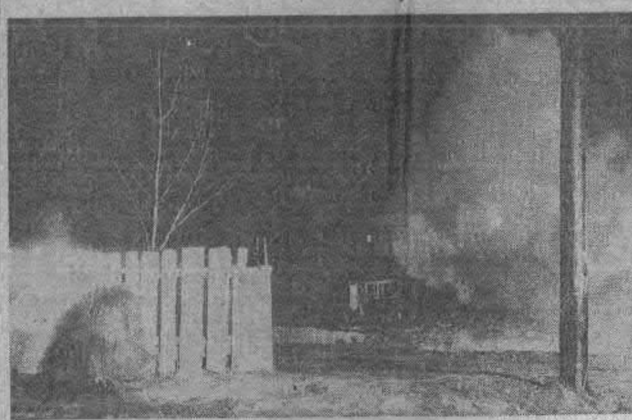
VANDENBERG AIR FORCE BASE, CAL. (AP)—Launching of the first satellite from this West Coast base has been postponed for technical reasons.

The launching, scheduled for yesterday, was set back more than 24 hours, but the advanced research projects agency gave no further details.

The satellite will be the first of a dozen or more in the Discoverer series aimed at gaining information to pave the way for man to venture into space.

Never Dredged in 40 Years, Says One

Channel Too Shallow, Flood Area Folk Declare



Times Photo by Refice

BREAKING ICE JAM: Dynamite blasts were touched off to smash ice jam which clogged Leggetts Creek, creating flood threat in area near Watkins and Wells Sts. Department of Public Works crewmen crouch against fence after setting off charge. Jam sent water into several cellars in the area.

Leggetts Creek Old Complaint

As city employes labored to clear a dangerous ice jam in Leggetts Creek at Watkins St. last night, Marvine Section residents murmured complaints that the creek should have been dredged long ago.

"If the channel had been deep enough, this wouldn't have happened," one anxious woman said as dynamite blasts thundered nearby.

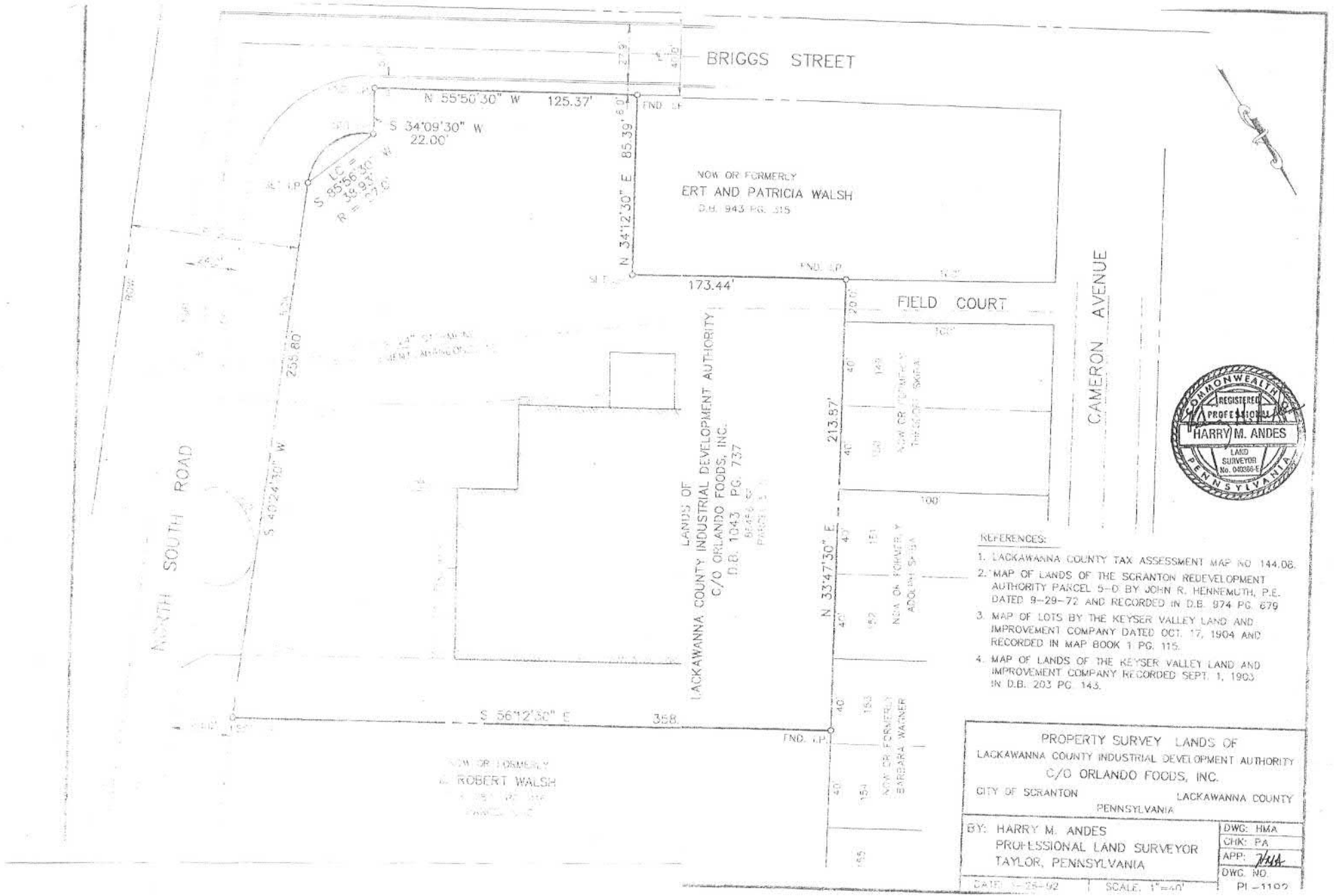
Other persons viewing the demolition task echoed the sentiments, saying that the creek is too shallow, that trees growing in the stream itself and many small "islands" serve as catch-alls for rubbish and garbage that have polluted the creek.

Typical of the comments was that of Peter Lepo, 116-118 Wells St., who lives next to the Wells Street Bridge, a wood-steel structure which for a time

(Continued on Page 5)

Famed Soviet Woman Taken by Death at 46

LONDON (AP)—Pasha Angelina, 46, one of Russia's most famous women, died yesterday, Moscow Radio announced. Pasha, as she was known universally, was organizer of the first Soviet Women's Brigade of Tractor Drivers and at one time was a deputy of the Supreme Soviet.



REFERENCES:

1. LACKAWANNA COUNTY TAX ASSESSMENT MAP NO. 144.06.
2. MAP OF LANDS OF THE SCRANTON REDEVELOPMENT AUTHORITY PARCEL 5-D BY JOHN R. HENNEMUTH, P.E. DATED 9-29-72 AND RECORDED IN D.B. 974 PG. 679
3. MAP OF LOTS BY THE KEYSER VALLEY LAND AND IMPROVEMENT COMPANY DATED OCT. 17, 1904 AND RECORDED IN MAP BOOK 1 PG. 115.
4. MAP OF LANDS OF THE KEYSER VALLEY LAND AND IMPROVEMENT COMPANY RECORDED SEPT. 1, 1903 IN D.B. 203 PG. 143.

PROPERTY SURVEY LANDS OF
LACKAWANNA COUNTY INDUSTRIAL DEVELOPMENT AUTHORITY
C/O ORLANDO FOODS, INC.
CITY OF SCRANTON LACKAWANNA COUNTY
PENNSYLVANIA

BY: HARRY M. ANDES
PROFESSIONAL LAND SURVEYOR
TAYLOR, PENNSYLVANIA

DWG: HMA
CHK: PA
APP: HMA
DWG. NO.
PI-1102

DATE: 1-25-92 SCALE: 1"=40'

THE CITY OF SCRANTON

LACKAWANNA COUNTY, PENNA.

DRAWINGS FOR

THE CONSTRUCTION OF A SANITARY SEWER, FORCE MAIN,
PUMP STATION AND CREEK RELOCATION
IN THE
KEYSER VALLEY URBAN RENEWAL AREA

PROJECT NO. PENNA. R-160

APPROVED _____ 1965 BY _____

APPROVED MARCH 16 1965 BY _____
EXECUTIVE DIRECTOR SCRANTON REDEVELOPMENT AUTHORITY

APPROVED March 15 1965 BY _____
CITY ENGINEER

APPROVED MARCH 16 1965 BY _____
DIRECTOR OF PUBLIC WORKS

APPROVED March 24 1965 BY _____
MAYOR

BELLANTE AND CLAUSS INC.
BELLANTE & CLAUSS BLDG.
SCRANTON PENNSYLVANIA

WILLIAM G. KAHAN
PROFESSIONAL ENGINEER
PENNSYLVANIA

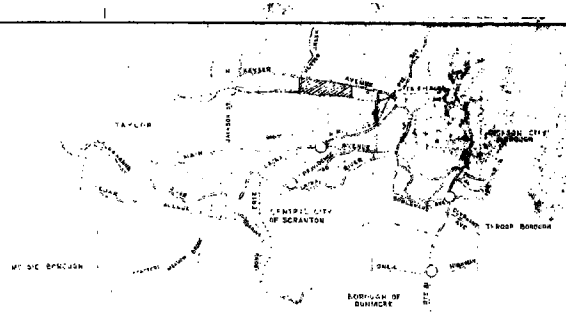
ROBERT E. KOLB
PROFESSIONAL ENGINEER
PENNSYLVANIA

William G. Kahan
Jan. 22, 1965

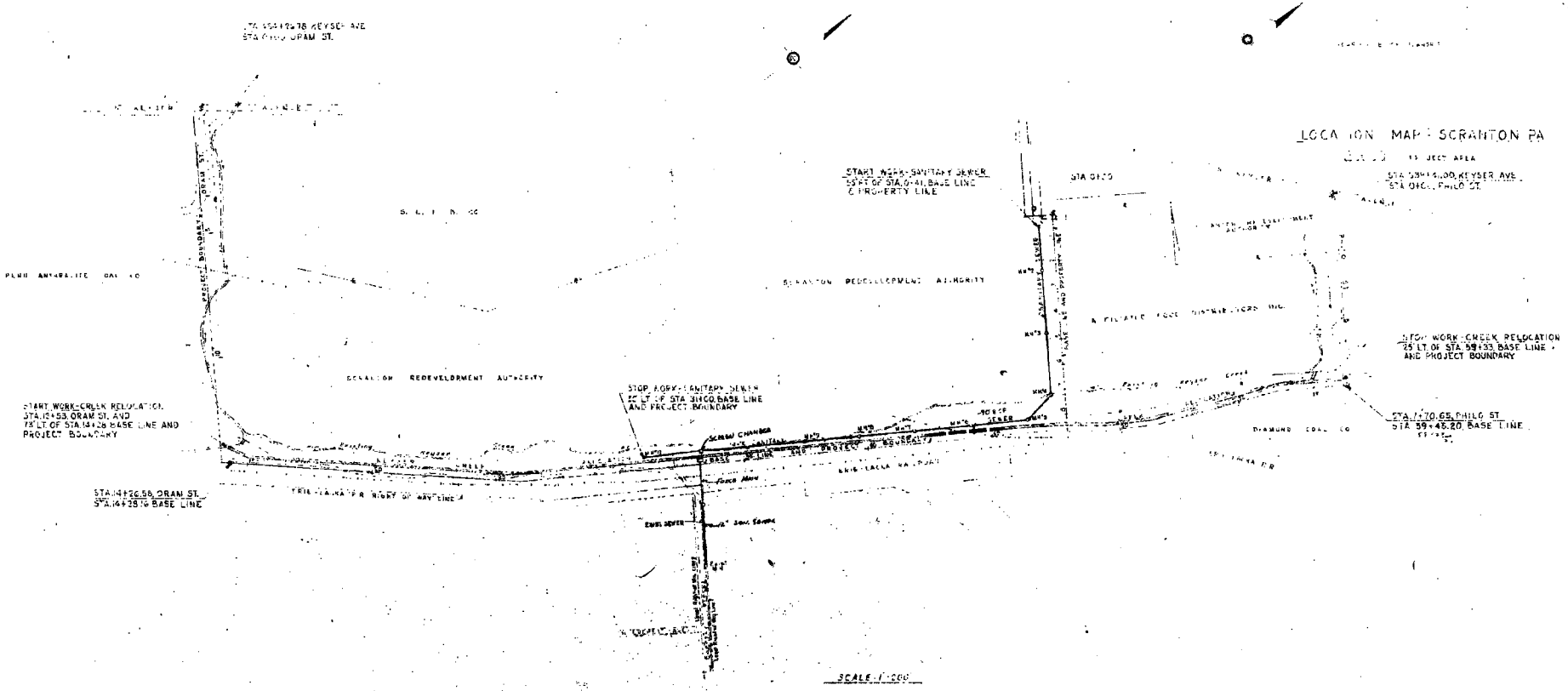
Robert E. Kolb
Jan 22 1965

DRAWINGS

TITLE	SHEET NO. 1
INDEX	SHEET NO. 2
GENERAL CONSTRUCTION	SHEETS NO. 3-5
PUMP STATION.	SHEET NO. 6
CREEK PROFILE.	SHEETS NO. 7-8
SANITARY SEWER PROFILE	SHEET NO. 9
CROSS SECTIONS	SHEETS NO. 10-42



LOCATION MAP - SCRANTON PA



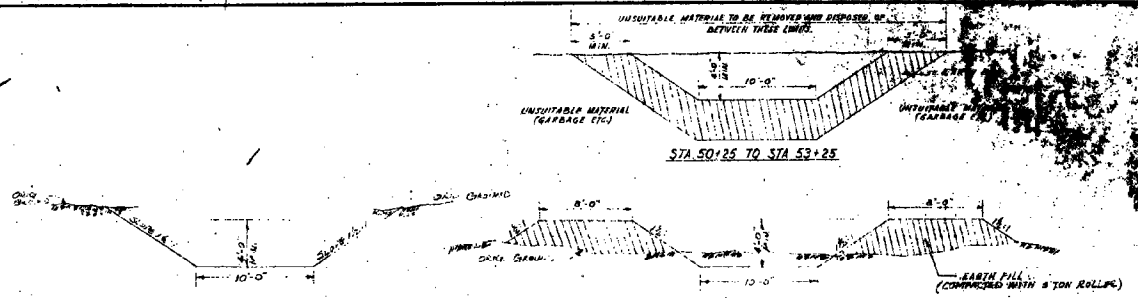
SANITARY SEWER, PUMPING STATION AND CREEK RELOCATION FOR THE KEYSER VALLEY URBAN RENEWAL AREA
CITY OF SCRANTON, LACKA. COUNTY, PENNA.
PROJECT NO. PENNA R-160

INDEX MAP

BELLANTE AND CLAUSS

10/16/64
As Shown
1051-2
SHEET 2 OF 42

PENN ANTHRACITE COAL COMPANY



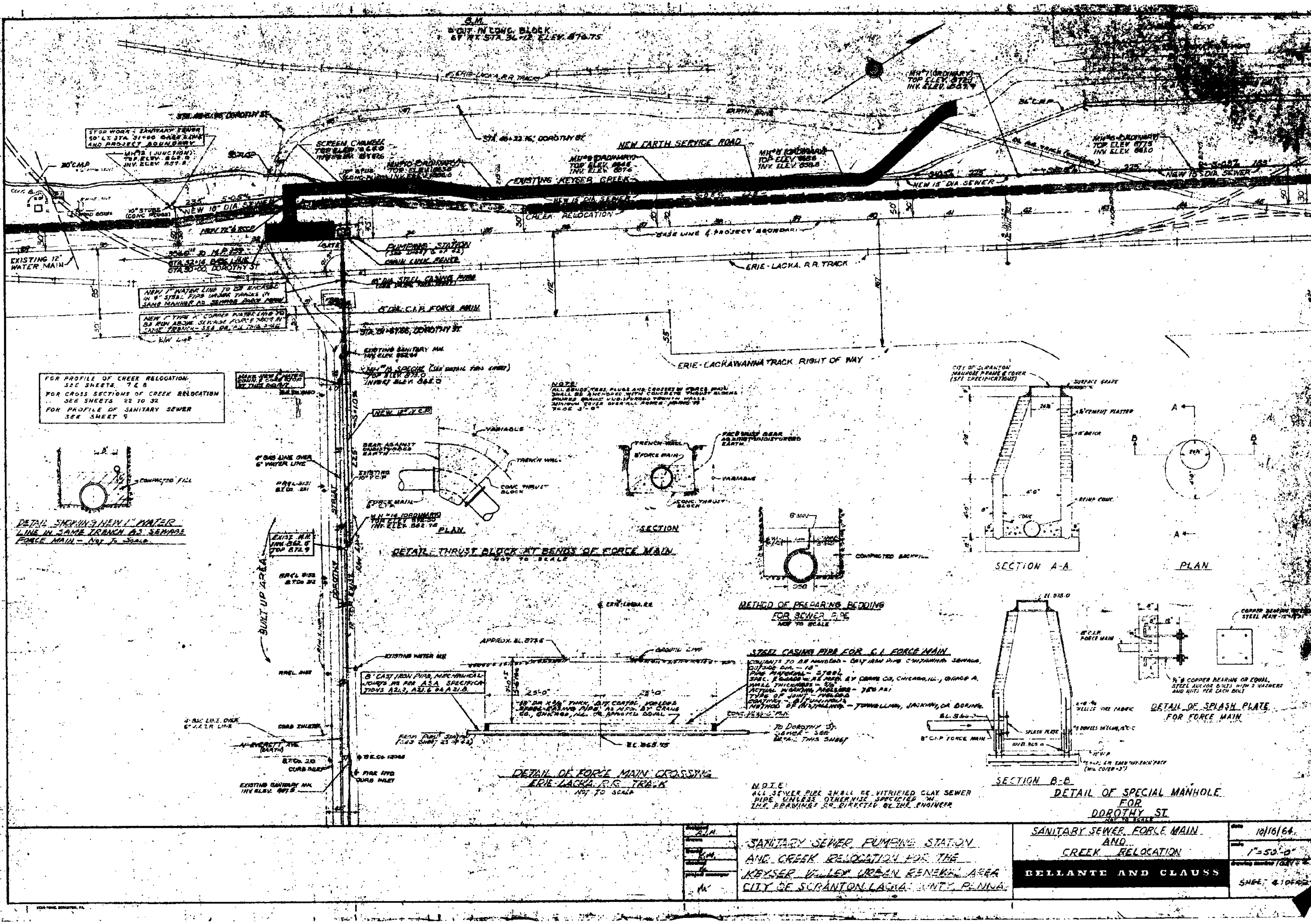
TYPICAL SECTIONS FOR CHANNEL RELOCATION
NO. 7TH SCALE

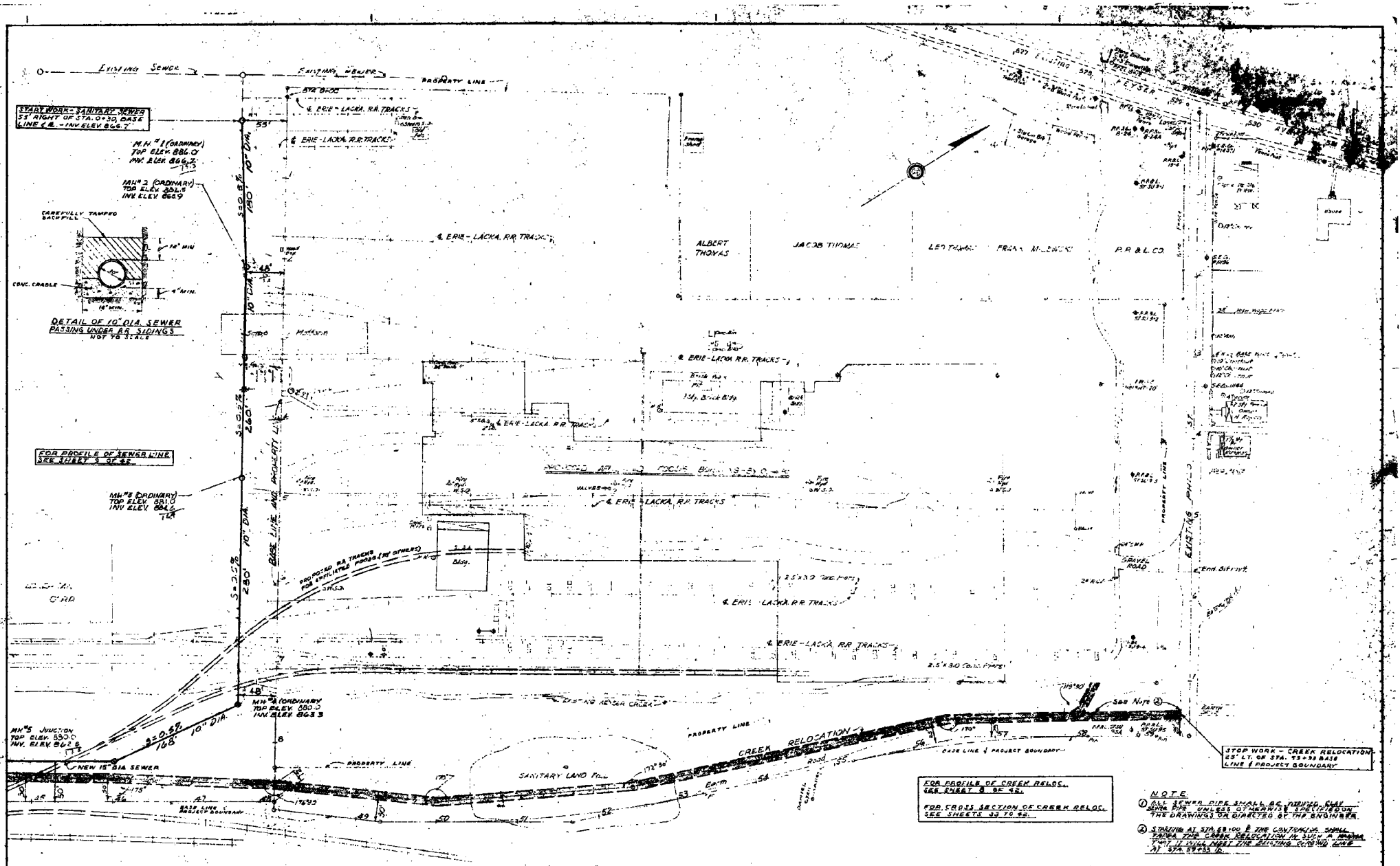
SANITARY SEWER, PUMPING STATION AND CREEK RELOCATION FOR THE KEYSER VALLEY URBAN RENEWAL AREA
CITY OF SCRANTON, LACKA. COUNTY, PENNA.

CREEK RELOCATION

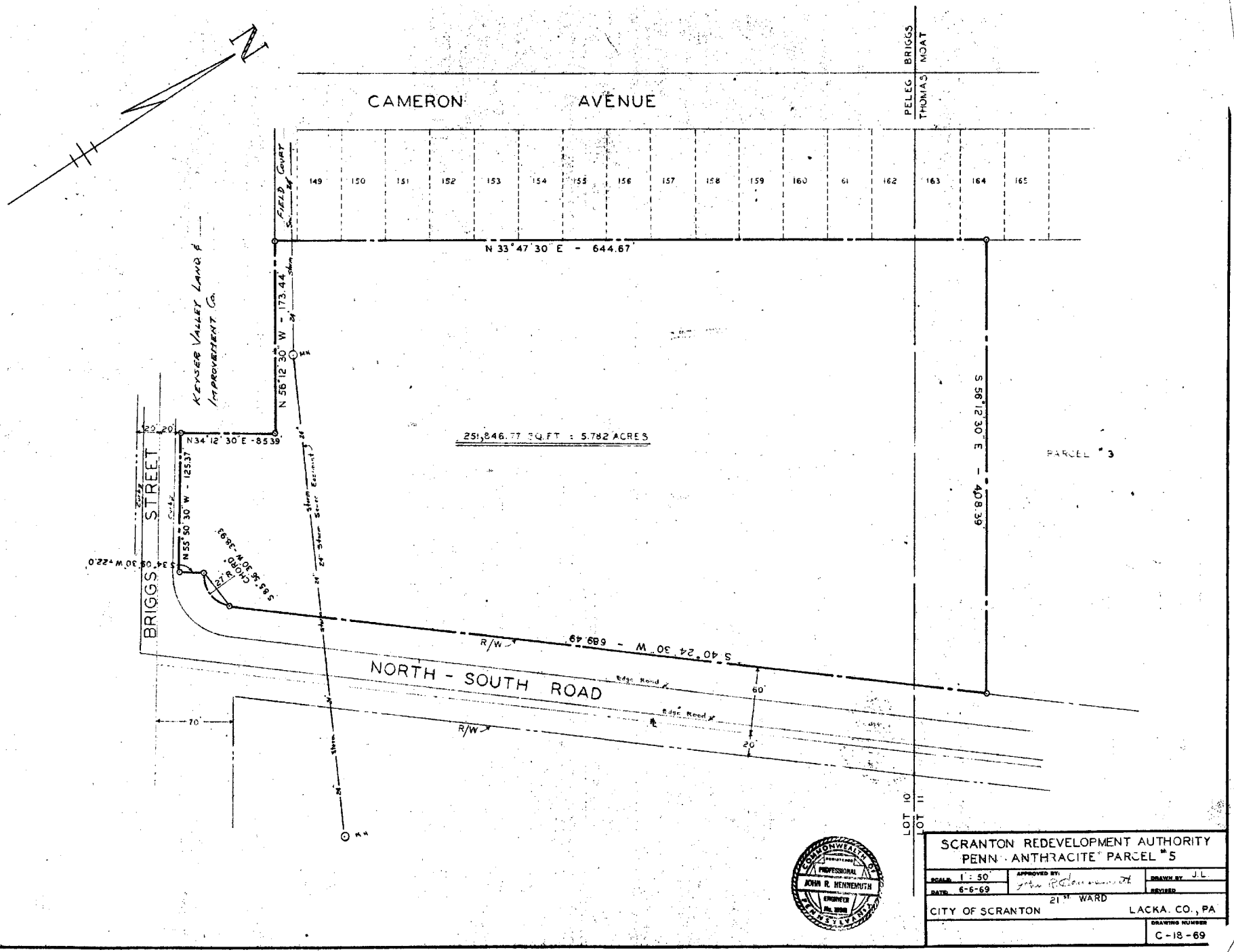
BELLANTE AND CLAUSS

10/16/64
1"=50'-0"
SHEET 3 OF 42


NEW EARTH SERVICE ROAD
EXISTING KEYSER CREEK
NEW 15" DIA. SEWER
CREEK RELOCATION
BASE LINE & PROJECT BOUNDARY
PUMPING STATION
ERIE-LACKA. R.R. TRACK
ERIE-LACKAWANNA TRACK RIGHT OF WAY
EXISTING 12" WATER MAIN
8" DIA. C.I.P. FORCE MAIN
FOR PROFILE OF CREEK RELOCATION SEE SHEETS 7 & 8
FOR CROSS SECTIONS OF CREEK RELOCATION SEE SHEETS 22 TO 32
FOR PROFILE OF SANITARY SEWER SEE SHEET 9
NEW 12" V.C.P.
BUILT UP AREA
DETAIL SHOWING NEW 1" WATER LINE IN SAME TRENCH AS SEWAGE FORCE MAIN - NOT TO SCALE
PLAN
SECTION
DETAIL - THRUST BLOCK AT BENDS OF FORCE MAIN
NOT TO SCALE
METHOD OF PREPARING BEDDING FOR SEWER PIPE
NOT TO SCALE
SECTION A-A
PLAN
STEEL CASING PIPE FOR C.I. FORCE MAIN
DETAIL OF FORCE MAIN CROSSING ERIE-LACKA. R.R. TRACK
NOT TO SCALE
SECTION B-B
DETAIL OF SPLASH PLATE FOR FORCE MAIN
DETAIL OF SPECIAL MANHOLE FOR DOROTHY ST
NOT TO SCALE
NOTE:
ALL SEWER PIPE SHALL BE VITRIFIED CLAY SEWER PIPE UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS OR DIRECTED BY THE ENGINEER
SANITARY SEWER PUMPING STATION AND CREEK RELOCATION FOR THE KEYSER VALLEY URBAN RENEWAL AREA CITY OF SCRANTON, LACKA. COUNTY, PENNA.
SANITARY SEWER FORCE MAIN AND CREEK RELOCATION
BELLANTE AND CLAUSS
10/16/64
1"=50'-0"



designed K.J.M.	SANITARY SEWER, PUMPING STATION AND CREEK RELOCATION FOR THE KEYSER VALLEY URBAN RENEWAL AREA CITY OF SCRANTON, LACKA. COUNTY, PENNA.	SANITARY SEWER AND CREEK LOCATION	date 12/16/68
drawn			scale 1" = 50'-0"
checked		BELLANTE AND CLAUSS	drawing number 1051-5
project manager M.W.			SHEET 5 OF 42

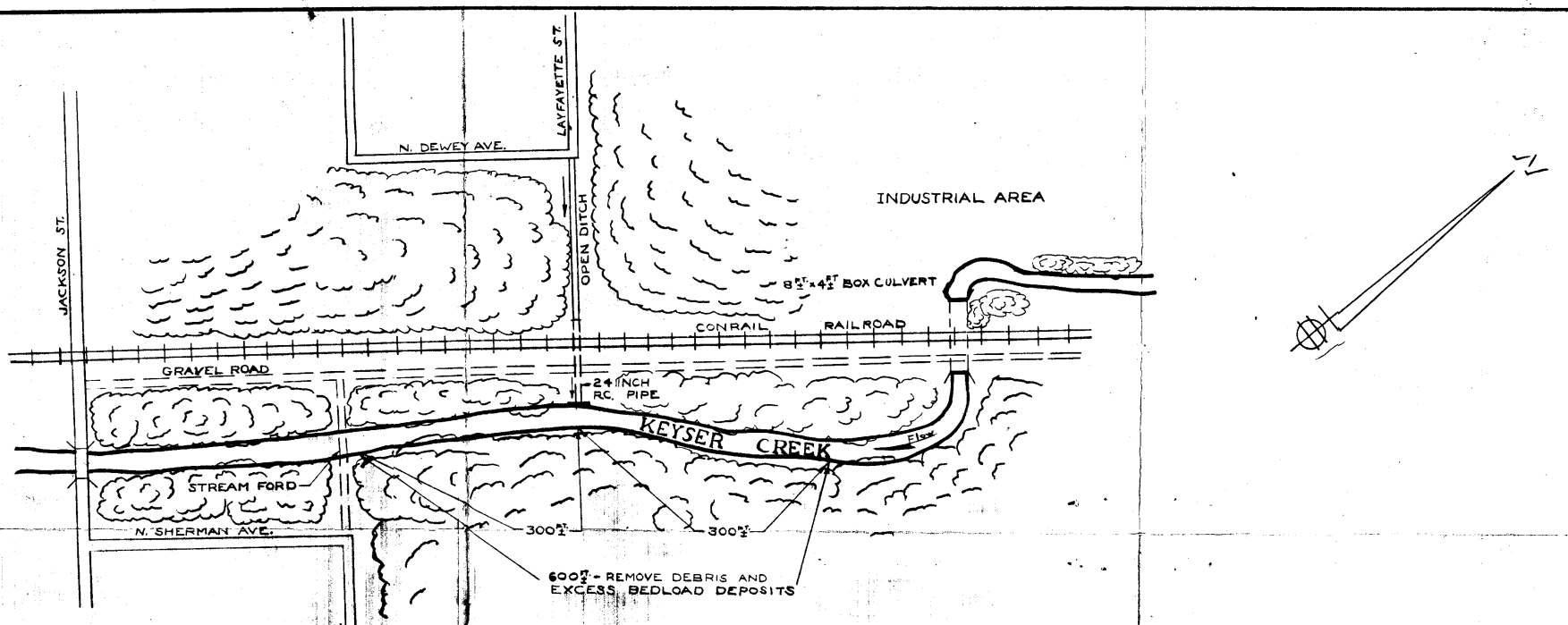


SCRANTON REDEVELOPMENT AUTHORITY
PENN ANTHRACITE PARCEL "5"

SCALE 1" = 50'	APPROVED BY: John R. Hennemuth	DRAWN BY J.L.	
DATE 6-6-69		REVISED	

21ST WARD
CITY OF SCRANTON LACKA. CO., PA

DRAWING NUMBER C-18-69

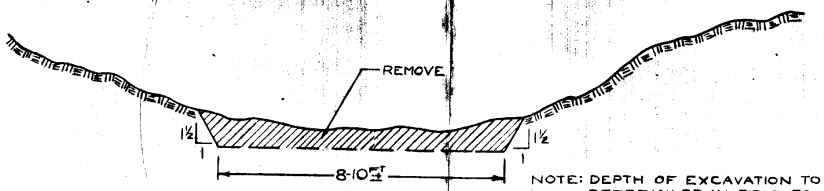


PROPOSED REMEDIAL WORK

1) REMOVE DEBRIS AND EXCESS BEDLOAD DEPOSITS, AS SHOWN IN TYPICAL SECTION A-A, EXTENDING 300'-0" UPSTREAM AND 300'-0" DOWNSTREAM FROM 24 INCH R.C. PIPE OUTLET.

NOTE: OTHERS TO BE RESPONSIBLE TO REMOVE TRASH AND DEBRIS ABOVE AND BELOW PROPOSED WORK AREA, CAP OPEN JOINTS OF 24 INCH R.C. PIPE, AND DO ANY NECESSARY MAINTENANCE OF APPROACH DITCH.

TYPICAL SECTION A-A

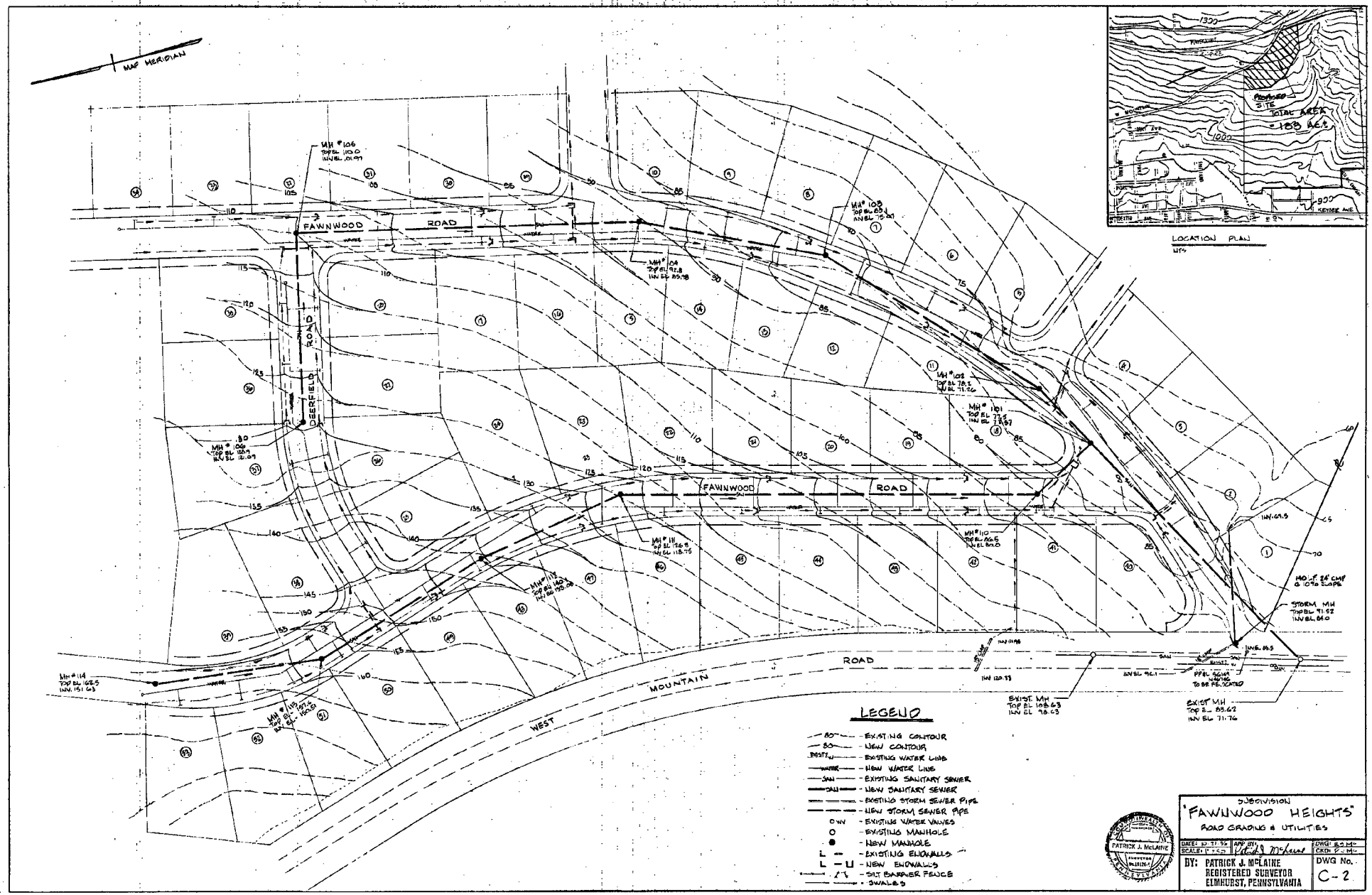


NOTE: DEPTH OF EXCAVATION TO BE DETERMINED IN FIELD TO MEET EXISTING GRADE AT BOX CULVERT AND JACKSON STREET.

NOTE: SKETCH IS NOT TO SCALE TOPOGRAPHY, AS SHOWN, IS FOR ILLUSTRATITE PURPOSES ONLY

S35:100F
KEYSER CREEK
CITY OF SCRANTON
LACKAWANNA COUNTY

INVESTIGATED BY: W.B.B. 3-19-76
J.C.A.



SUBDIVISION

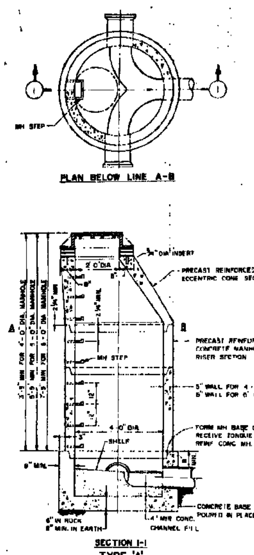
"FAWNWOOD HEIGHTS"

ROAD GRADING & UTILITIES

DATE: 12-21-92
SCALE: 1" = 50'
APP. BY: Patrick J. McLaine
DWG: R.G.M.
CKD: P.J.M.

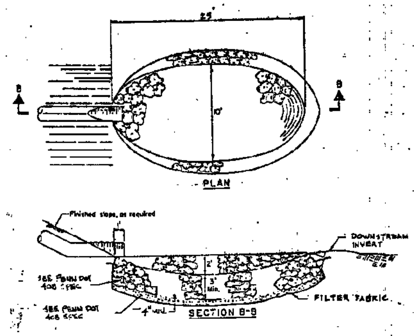
BY: PATRICK J. McELAINE
REGISTERED SURVEYOR
ELMHURST, PENNSYLVANIA

DWG No. C-2



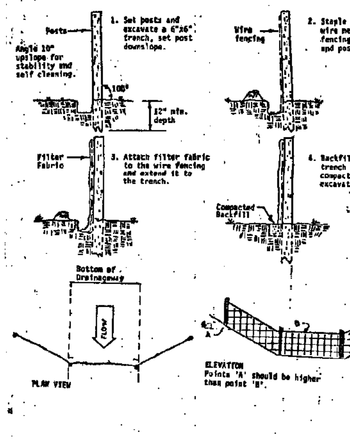
NOTES

1. THE DEPTH OF THE INVERT CHANNEL SHALL BE EQUAL TO 3/4 OF THE DIAMETER OF THE SEWER
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT A RATE OF 1" PER FOOT
3. TYPE "B" MANHOLES (SHALLOW TYPE) TO BE PROVIDED WHERE REQUIRED BY DEPTH CONDITIONS ALL OTHER MANHOLES TO BE TYPE "A".
4. THE WALL THICKNESS IN A 4'-0" DIA. PRECAST BASE SHALL BE AS FOLLOWS FOR PIPES 18" AND SMALLER, 5" WALL; FOR PIPES 18" AND LARGER, 8" WALL.
5. ALL MANHOLE FRAMES SHALL BE BOLTED TO THE CONE SECTION OR CONCRETE SLAB WITH 2-3/4" DIA BOLTS WITH WASHERS AND NUTS. BOLTS TO BE AT 180° ON A 36" DIA. BOLT CIRCLE.
6. FOR SIZE OF OPENINGS SEE THE SPECIFICATIONS
7. FOR MANHOLES HAVING 5'-0" DIA. AND 6'-0" DIA BASES, REDUCTION IN DIAMETER TO 4'-0" SHALL START AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL, WHERE DEPTH IS SUFFICIENT
8. SEE THE SPECIFICATIONS FOR LENGTH OF PIPE CONNECTIONS TO MANHOLES

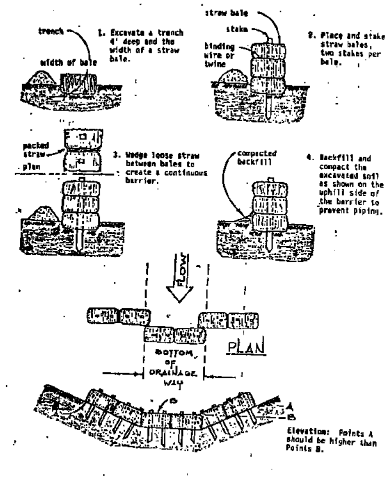


TYPICAL OUTLET PROTECTION DETAIL

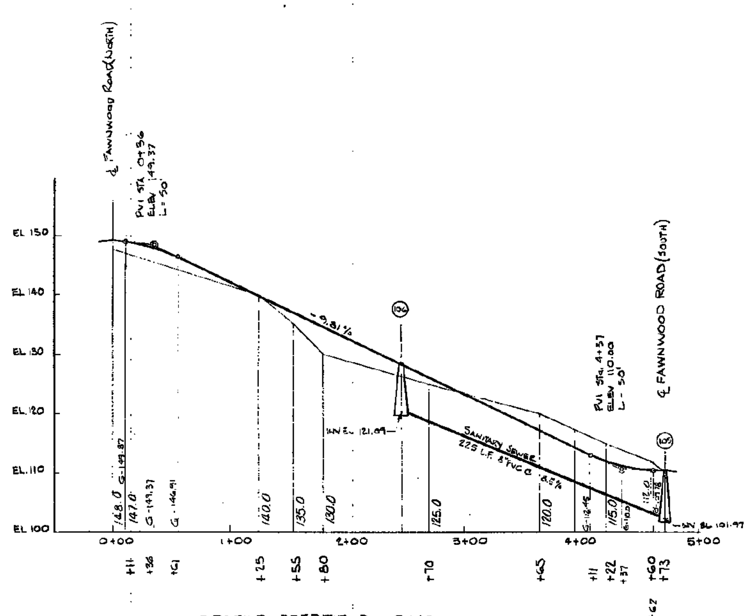
NOT TO SCALE



SILT FENCE BARRIER

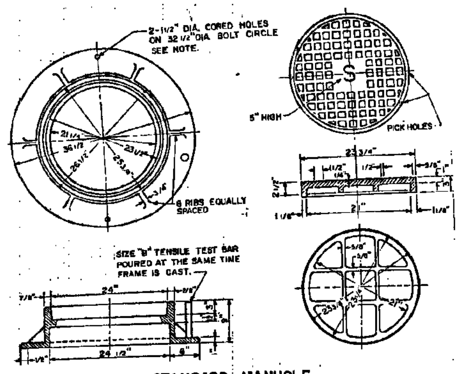


STRAW BALE BARRIER



PROFILE - DEERFIELD ROAD

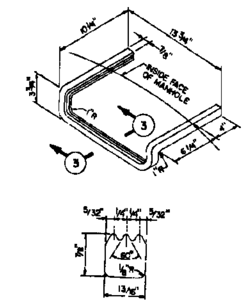
Horiz: 1" = 50' Vert: 1" = 10'



STANDARD MANHOLE FRAME & COVER

NO SCALE

NOTE: ALL MANHOLE FRAME & COVER DIMENSIONS SHALL BE CONSIDERED MINIMUM WITH THE EXCEPTION OF THE PICK HOLE, BOLT HOLE AND CORED HOLE DIMENSIONS.
ALL MANHOLE FRAMES & COVERS SHALL BE FOR HEAVY DUTY TRAFFIC.
ALL MANHOLE FRAMES SHALL BE BOLTED TO THE CONE SECTION OR CONCRETE SLAB WITH 2-3/4" DIA. BOLTS WITH WASHERS AND NUTS. BOLTS TO BE AT 180° ON A 36" DIA. BOLT CIRCLE.

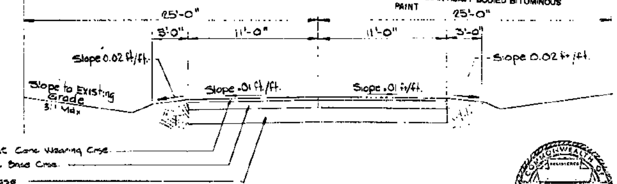


SECTION 3-3

ALUMINUM MANHOLE STEP

NOTE: STEPS TO BE FABRICATED OF ALUMINUM ALLOY 6061-T6
PORTIONS OF STEPS TO BE EMBEDDED IN WALLS OF MANHOLES OR CHAMBERS TO BE DIPPED IN HEAVY BODIED BITUMINOUS PAINT

NOTE: REFERENCE SPECIFICATION & STANDARD DETAILS PENNSYLVANIA DEPARTMENT OF TRANSPORTATION 1983 408 SPECIFICATIONS



TYPICAL ROADWAY SECTION

NTS

FAWNWOOD HEIGHTS
SECTIONS & DETAILS

PATRICK J. McLAINE SURVEYOR

BY: PATRICK J. McLAINE
REGISTERED SURVEYOR
ELMHURST, PENNSYLVANIA

DWG No. C-2

FAWNWOOD HEIGHTS

PHASE 3

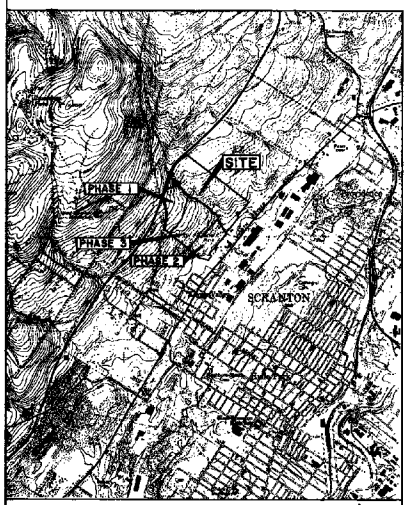
CITY OF SCRANTON

LACKAWANNA COUNTY, PENNSYLVANIA

OWNER-DEVELOPER

E. DECKER & SONS, INC.

c/o GENE DECKER
RD. 1 BOX 165
DALTON, PA. 18414



LOCATION MAP

FAWNWOOD HEIGHTS
PHASE 3
CITY OF SCRANTON
LACKAWANNA COUNTY, PA.

SCALE: 1"=2000'

WILLIAM G. KARAM ASSOCIATES, INC.
CONSULTING ENGINEERS
CLARKS SUMMIT, PENNSYLVANIA

OCTOBER 1989

GENERAL NOTES

1. TOTAL ACREAGE: 165.25 (PHASE 3: 50.12 AC.)
2. ZONING DISTRICT: R-1
3. NUMBER OF LOTS: 95
4. ALL STREET RIGHTS-OF-WAY ARE INTENDED TO BE DEDICATED TO PUBLIC USE.
5. CONTOURS ARE BASED ON USC & GS., 1927 DATUM.
6. ALL LOTS WILL BE SERVED WITH PUBLIC SANITARY SEWERS, NATURAL GAS, WATER AND UNDERGROUND ELECTRIC, TELEPHONE AND CABLE T.V.
7. A CLEAR SIGHT TRIANGLE AT INTERSECTIONS IS HEREBY ESTABLISHED WHICH IS THIRTY (30) FEET MEASURED ALONG THE RIGHT-OF-WAY OF EACH STREET FROM ITS INTERSECTION.
8. BUILDING SET-BACK LINES SHALL BE AS FOLLOWS:
   FRONT YARD ... 30'
   REAR YARD ... 30'
   ONE SIDE YARD ... 10'
   BOTH SIDE YARDS COMBINED ... 25'
9. FOR CURVE DATA SEE DRAWING NO. 3
10. SANITARY SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD CONSTRUCTION & MATERIAL SPECIFICATIONS OF THE SEWER AUTHORITY OF THE CITY OF SCRANTON.
11. THE DEVELOPER OF THIS NEW SUBDIVISION ACCEPTS FULL RESPONSIBILITY FOR ANY AND ALL STORMWATER RUNOFF DAMAGE WHICH MIGHT OCCUR TO ANY ADJOINING LAND OWNERS, INCLUDING CITY OWNED LAND & STREETS, & HE WILL BE FULLY RESPONSIBLE TO REPAIR THIS DAMAGE. IF DEVELOPER CONVEYS ANY OR ALL OF THIS LAND TO OTHERS, DEVELOPER ATTESTS THAT HE WILL HAVE INFORMED ANY OTHERS OF THIS RESPONSIBILITY & WHICH WILL PASS ON TO THEM.
12. FIRE HYDRANT PLACEMENT IS AS DIRECTED BY CITY FIRE OFFICIALS.
13. FINAL LOCATION OF WATER & ELECTRIC LINES TO BE VERIFIED BY UTILITY CO. ENGINEERS.
14. UTILITY EASEMENTS & OTHER RESTRICTIONS ARE CONTAINED IN THE "FAWNWOOD HEIGHTS PROTECTIVE COVENANT" WHICH IS RECORDED IN THE LACKAWANNA COUNTY COURT HOUSE.
15. THE CITY OF SCRANTON & DECKTON INC. RESERVE A 50 FOOT MINIMUM WIDE EASEMENT ALONG THE BACK OF LOTS 92, 93, 94, 120, 121, 124, 126, 127, 128, 152, 153, 154 & 155 FOR THE PURPOSE OF DRAINAGE & OR ANY OTHER REASON THAT MAY BE NECESSARY AS DETERMINED BY THEM.
16. NO BUILDING, CUTTING OF TREES, OR DISTURBANCE OF THE NATURAL GROUND IN ANY WAY SHALL BE PERMITTED FOR A DISTANCE OF AT LEAST 50 FEET ON EITHER SIDE OF THE TOP OF THE BANK OF KEYSER CREEK ALONG THE BACK OF LOTS 92, 93, 94, 120, 121, 124, 125, 127, 128, 152, 153, 154 & 155.

PHASE 2

LEGEND

	EXISTING	PROPOSED
PAVEMENT		
PROPERTY LINE		
RIGHT-OF-WAY LINE		
CENTERLINE		
CONTOUR LINE	390	390
STORM DRAIN		
PIPE END SECTION		
INLET		
ENDWALL		
DRAINAGE SWALE		
ROCK LINING		
PLUNGE POOL		
SANITARY SEWER		
SANITARY LATERAL		
MANHOLE		
GUIDE RAIL		
SILT FENCE		
FILTER FABRIC SEDIMENT TRAP		
SOIL DELINEATION AND SYMBOL		
HORIZONTAL CURVE NO.		
SWALE DIKE		
LEVEL SPREADER		
ROCK DAM		
WATER LINE	8"W	8"W
FIRE HYDRANT	F.H.	F.H.

REVISED: 12-6-89

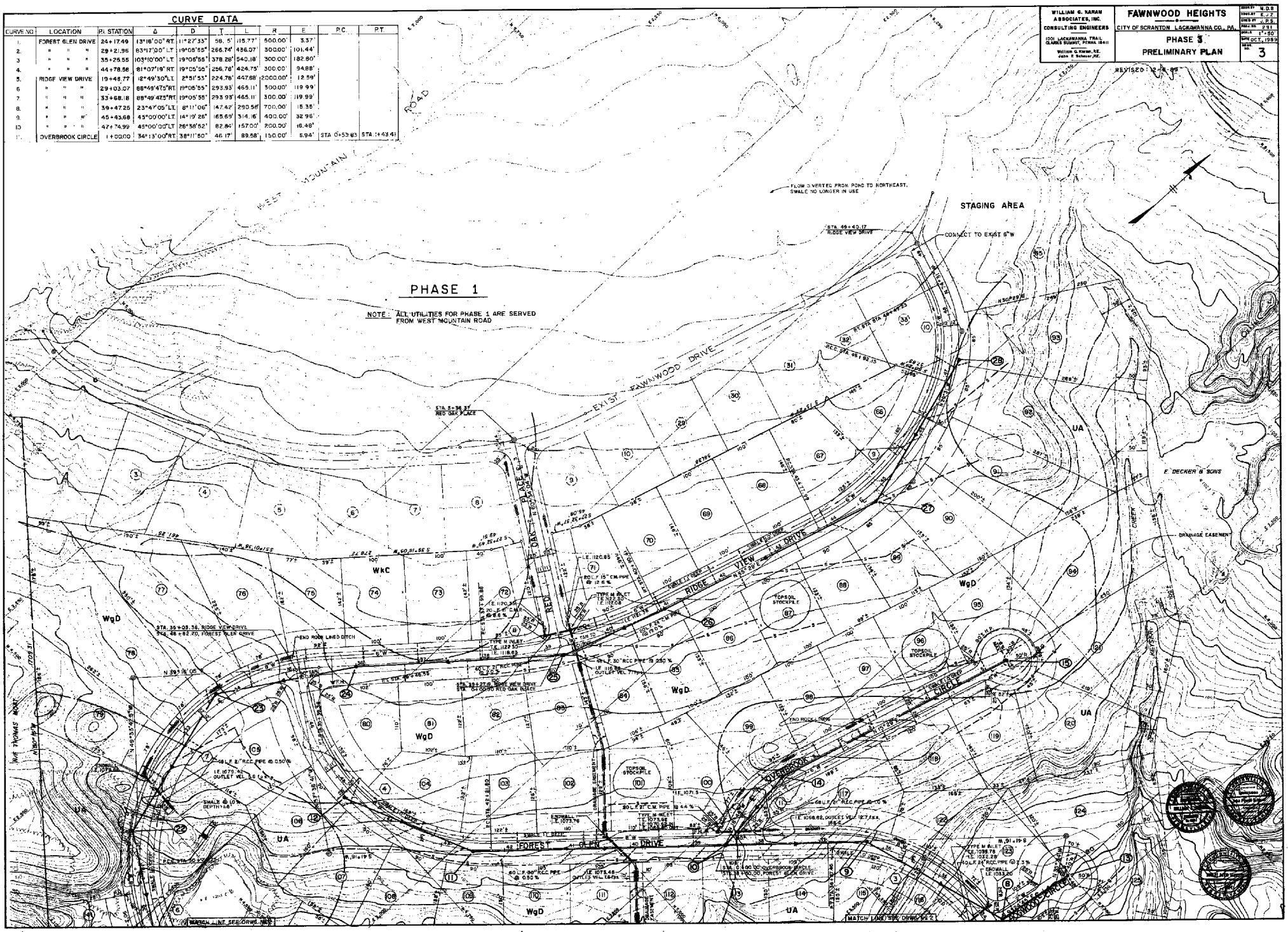
WILLIAM G. KARAM ASSOCIATES, INC.
CONSULTING ENGINEERS
1001 LACKAWANNA TRAIL
CLARKS SUMMIT, PENNA. 18411
William G. Karam, P.E.
John P. Schnarr, P.E.

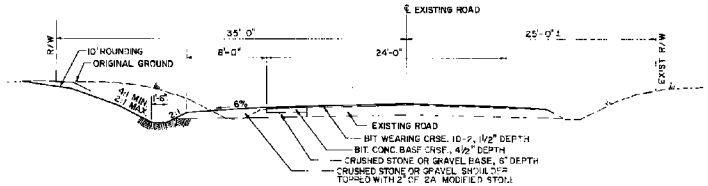
FAWNWOOD HEIGHTS

CITY OF SCRANTON LACKAWANNA CO., PA.

PHASE 3
PRELIMINARY PLAN

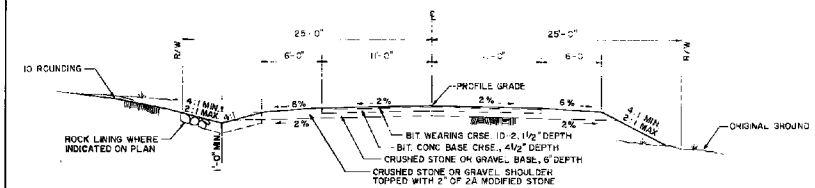
DESIGN BY M.D.B.
DRAWN BY E.J.Z.
CHECKED BY J.P.S.
PROJ. NO. 291
SCALE 1" = 50'
DATE OCT. 1989
DRWG NO. 2


CURVE DATA
CURVE NO | LOCATION | P.I. STATION | Δ | D | T | L | R | E | P.C. | P.T.
1. | FOREST GLEN DRIVE | 24+17.49 | 13°16'00" RT. | 11°27'33" | 58.5' | 115.77' | 500.00' | 3.37' | |
2. | " " " | 29+21.96 | 63°17'00" LT | 19°05'55" | 266.74' | 486.07' | 300.00' | 101.44' | |
3 | " " " | 35+26.56 | 103°10'00" LT | 19°05'55" | 378.28' | 540.18' | 300.00' | 182.80' | |
4. | " " " | 44+78.56 | 81°07'19" RT | 19°05'55" | 256.76' | 424.75' | 300.00' | 94.88' | |
5. | RIDGE VIEW DRIVE | 19+48.77 | 12°49'30" LT | 2°51'53" | 224.76' | 447.68' | 2000.00' | 12.59' | |
6 | " " " | 29+03.07 | 88°49'47.5" RT. | 19°05'55" | 293.93' | 465.11' | 300.00' | 119.99' | |
7. | " " " | 33+68.18 | 88°49'47.5" RT. | 19°05'55" | 293.93' | 465.11' | 300.00' | 119.99' | |
8. | " " " | 39+47.25 | 23°47'05" LT. | 8°11'06" | 147.42' | 290.58' | 700.00' | 15.35' | |
9. | " " " | 45+43.68 | 45°00'00" LT | 14°19'26" | 165.69' | 314.16' | 400.00' | 32.96' | |
10 | " " " | 47+74.99 | 45°00'00" LT | 26°38'52" | 82.84' | 157.00' | 200.00' | 16.48' | |
11. | OVERBROOK CIRCLE | 1+00.00 | 34°13'00" RT. | 38°11'50" | 46.17' | 89.58' | 150.00' | 5.94' | STA 0+53.83 | STA 1+43.41
WILLIAM G. KARAN ASSOCIATES, INC.
CONSULTING ENGINEERS
1001 LACKAWANNA TRAIL
CLARKS SUMMIT, PENNA 18411
William G. Karan, P.E.
John F. Schaar, P.E.
FAWNWOOD HEIGHTS
CITY OF SCRANTON LACKAWANNA CO., PA.
PHASE 3
PRELIMINARY PLAN
DESIGN BY N.D.B
DRAWN BY E.J.C
CHKD BY W.P.S.
PROJ. NO. 291
SCALE 1"=50'
DATE OCT. 1989
SHEET NO. 3
REVISED 12-8-89
PHASE 1
NOTE: ALL UTILITIES FOR PHASE 1 ARE SERVED FROM WEST MOUNTAIN ROAD
WEST MOUNTAIN ROAD
EXIST. FAWNWOOD DRIVE
STAGING AREA
FLOW DIVERTED FROM POND TO NORTHEAST, SWALE NO LONGER IN USE
CONNECT TO EXIST 8"W
STA. 49+40.17 RIDGE VIEW DRIVE
STA. 5+36.97 RED OAK PLACE
RED OAK PLACE
RIDGE VIEW DRIVE
FOREST GLEN DRIVE
OVERBROOK CIRCLE
E. DECKER & SONS
DRAINAGE EASEMENT
TOPSOIL STOCKPILE
WkC
WgD
UA
MATCH LINE SEE DRWG. NO. 2
MATCH LINE SEE DRWG. NO. 2



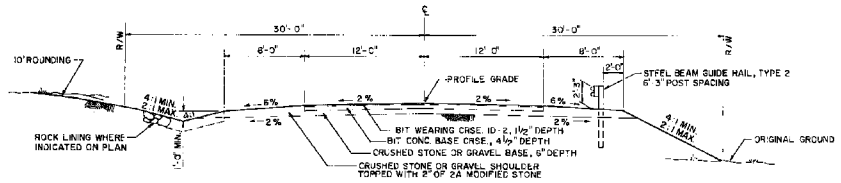
TYPICAL SECTION – EXISTING FOREST GLEN DRIVE

SCALE: 1" = 5'-0"
STA 10+12± TO STA. 19+65.49



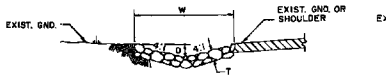
TYPICAL SECTION – MINOR STREET

SCALE: 1" = 5'-0"
FOREST GLEN DRIVE, STA. 31+07.55 TO STA. 46+82.70
OVERBROOK CIRCLE, & DOGWOOD CIRCLE



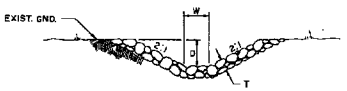
TYPICAL SECTION – COLLECTOR STREET

SCALE: 1" = 5'-0"
FOREST GLEN DRIVE, STA. 19+65.49 TO STA. 31+07.55
RIDGE VIEW DRIVE, STA 15+25.00 TO STA 49+40.17



ROCK LINED SWALE

NOT TO SCALE

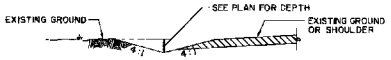


ROCK LINED DITCH

NOT TO SCALE

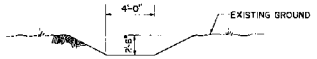
LOCATION	STATION	SIDE	W	D	T	AASHTO ROCK SIZE
FOREST GLEN DRIVE	25+68 TO 30+55	LT.	9.0'	1.1'	1.0'	R-4
FOREST GLEN DRIVE	31+55 TO 33+80	LT.	8.0'	1.0'	1.0'	R-4
FOREST GLEN DRIVE	34+13 TO 37+90	RT.	8.0'	1.0'	1.0'	R-4
RIDGE VIEW DRIVE	25+70 TO 27+90	RT.	9.0'	1.1'	1.0'	R-4
OUTLET FROM POND	27+90	RT.	6.0'	0.7'	1.0'	R-4
OVERBROOK CIRCLE	0+33 TO 3+00	LT.	6.0'	0.7'	1.0'	R-4
RED OAK PLACE	0+40 TO 3+10	LT.	6.0'	0.65'	1.0'	R-4
RED OAK PLACE	0+40 TO 2+50	RT.	6.0'	0.7'	1.0'	R-4
RIDGE VIEW DRIVE	32+00 TO 35+00	LT.	8.0'	0.8'	1.0'	R-4

LOCATION	W	D	T	AASHTO ROCK SIZE
BETWEEN LOTS 83 & 84	2.0'	1.0'	1.5'	R-6
BETWEEN LOTS 101 & 102	2.0'	1.0'	1.5'	R-6
BETWEEN LOTS 111 & 112	2.0'	1.0'	1.5'	R-5
BETWEEN LOTS 134 & 135	2.0'	1.0'	1.5'	R-5
BETWEEN LOTS 146 & 149	2.0'	1.0'	1.5'	R-5
BETWEEN LOTS 157 & 158	2.0'	1.0'	1.5'	R-5
FOREST GLEN DRIVE, STA. 25+68 RT.	2.0'	1.0'	1.5'	R-5
FOREST GLEN DRIVE, STA. 27+50 RT.	2.0'	1.0'	1.5'	R-6
FOREST GLEN DRIVE, STA 24+00 TO STA. 26+05 RT.	4.0'	1.0'	1.5'	R-5



VEGETATED SWALE

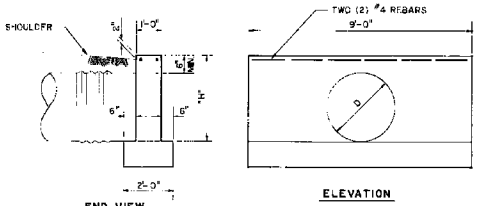
NOT TO SCALE



VEGETATED DITCH

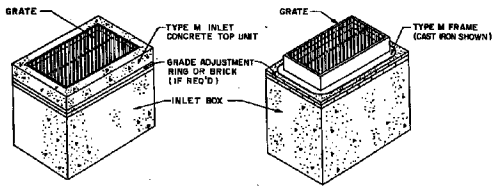
NOT TO SCALE
FOREST GLEN DRIVE, STA 26+05 TO STA. 27+00, RT.

	D	PIPE	'H'
FOREST GLEN DRIVE STA 21+40 LT	33"	C.M.P.	2" ABOVE SHOULDER
" " " STA. 27+10 RT.	36"	C.M.P.	4'-2"
LOT 111 AND 112	30"	C.M.P.	3'-0"



TYPE D ENDWALL

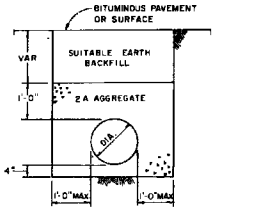
SCALE: ½" = 1'-0"



TYPE M INLET

N.T.S.

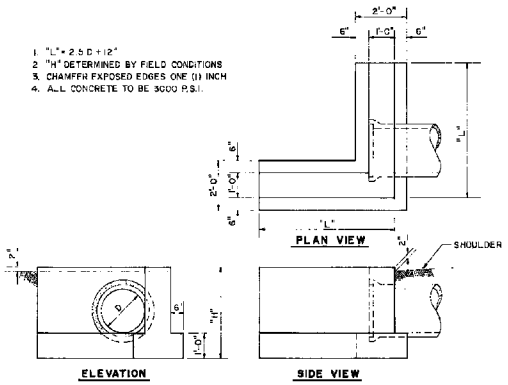
NOTE:
1. INLETS TO BE PENN DOT TYPE M WITH EITHER CAST IRON OR PRECAST TOP UNITS.
2. GRATE MAY BE EITHER CAST IRON OR FABRICATED STRUCTURAL STEEL



TYPICAL STORM DRAIN TRENCH DETAIL

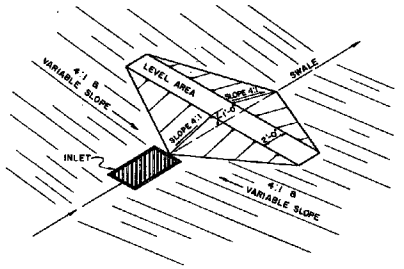
SCALE: ⅜" = 1'-0"

1. "L" = 2.5 D + 12"
2. "H" DETERMINED BY FIELD CONDITIONS
3. CHAMFER EXPOSED EDGES ONE (1) INCH
4. ALL CONCRETE TO BE 3000 P.S.I.



TYPE E-S ENDWALL

SCALE: ½" = 1'-0"



DETAIL OF SWALE DIKE

NO SCALE

REVISED: 12-6-69

WILLIAM S. KARAM ASSOCIATES, INC.
CONSULTING ENGINEERS
1001 LACKAWANNA TRAIL
CLARKS SUMMIT, PENNA. 18411
William S. Karam, P.E.
John P. Scheuer, P.E.

FAWNWOOD HEIGHTS
CITY OF SCRANTON LACKAWANNA CO., PA.
TYPICAL ROADWAY SECTIONS & MISCELLANEOUS DETAILS

DRWN BY	M.C.B.
REVD BY	E.K.
CHK'D BY	J.P.S.
PROJ. NO.	291
SCALE	AS NOTED
DATE	OCT. 1969
SHEET NO.	9

FEDERAL PROJECT NO. X042-311-H210, K114-003-5590

HSIP STP SXF	DISTRICT	COUNTY	CITY	BOROUGH	ROUTE	SECTION	TOTAL SHEETS
	4-0	LACKAWANNA	SCRANTON	TAYLOR	3011	203&271	138

WBS ELEMENT																						
T/P	SYS	WO					SPUR	PHA	SECTION			ORG.				PRG.		P_C	
P	5	0	3	0	1	1	0	7	2	0	3	0	4	2	0	3	7	3	1
P	5	0	3	0	1	1	0	7	2	7	1	0	4	2	0	3	6	1	1

S.R. 3011 PREVIOUSLY KNOWN AS L.R. 35013
ECMS NO. 8212

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF TRANSPORTATION

DRAWINGS
FOR
CONSTRUCTION
OF

STATE ROUTE 3011 SECTION 203 & 271

IN LACKAWANNA COUNTY

FROM STA. 347+10.00 TO STA. 549+55.00 LENGTH 20145.00 FT. 3.815 MI.
FROM SEG. 0090 OFFSET 0793 TO SEG. 0170 OFFSET 1090

ALSO
CONTINENTAL STREET
FROM STA. 30+21.00 TO STA. 38+14.00

ALSO INCLUDED:

TRAFFIC CONTROL PLAN	20 SHEETS
SIGNING AND PAVEMENT MARKING PLAN	33 SHEETS
TRAFFIC SIGNAL PLAN	28 SHEETS
EROSION AND SEDIMENT POLLUTION CONTROL PLAN	42 SHEETS
POST CONSTRUCTION STORMWATER MANAGEMENT PLAN	6 SHEETS
CROSS SECTIONS	271 SHEETS
STRUCTURES	
S-28070	12 SHEETS
S-28071	11 SHEETS
EXISTING STRUCTURE PLANS NONE AVAILABLE	

HORIZONTAL 0 25 50 FT

VERTICAL 0 5 10 FT

DESIGN DESIGNATION

HIGHWAY CLASSIFICATION	SUBURBAN CORRIDOR COMMUNITY ARTERIAL
DESIGN SPEED	40 MPH
PAVEMENT WIDTH	22'
SHOULDER WIDTH	8'-LT+RT

TRAFFIC DATA

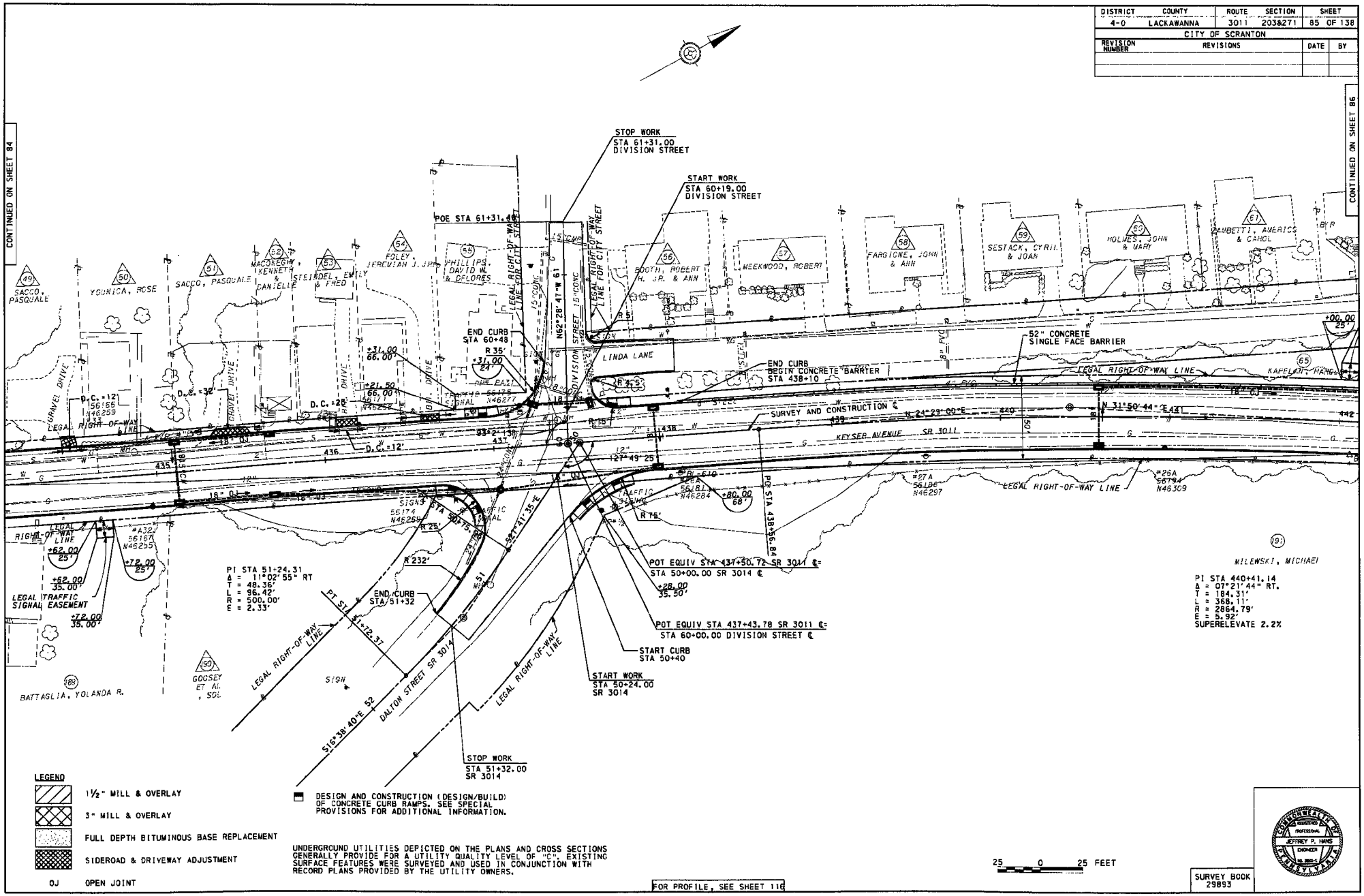
CURRENT A.D.T.	17020 (2011)
DESIGN YEAR A.D.T.	24317 (2031)
D.H.V.	2675
D	50%
T	8%

CHA
CLOUGH HARBOUR & ASSOCIATES LLP
GARY W. ROBINSON ENGINEER
DATE: 11/12/10

RECOMMENDED DATE: 10/12/11
DISTRICT EXECUTIVE

RECOMMENDED DATE: 2/9/12
DEPUTY SECRETARY

APPROVED DATE: 2/9/12
SECRETARY OF TRANSPORTATION
(ON BEHALF OF THE GOVERNOR AS WELL AS HIMSELF)

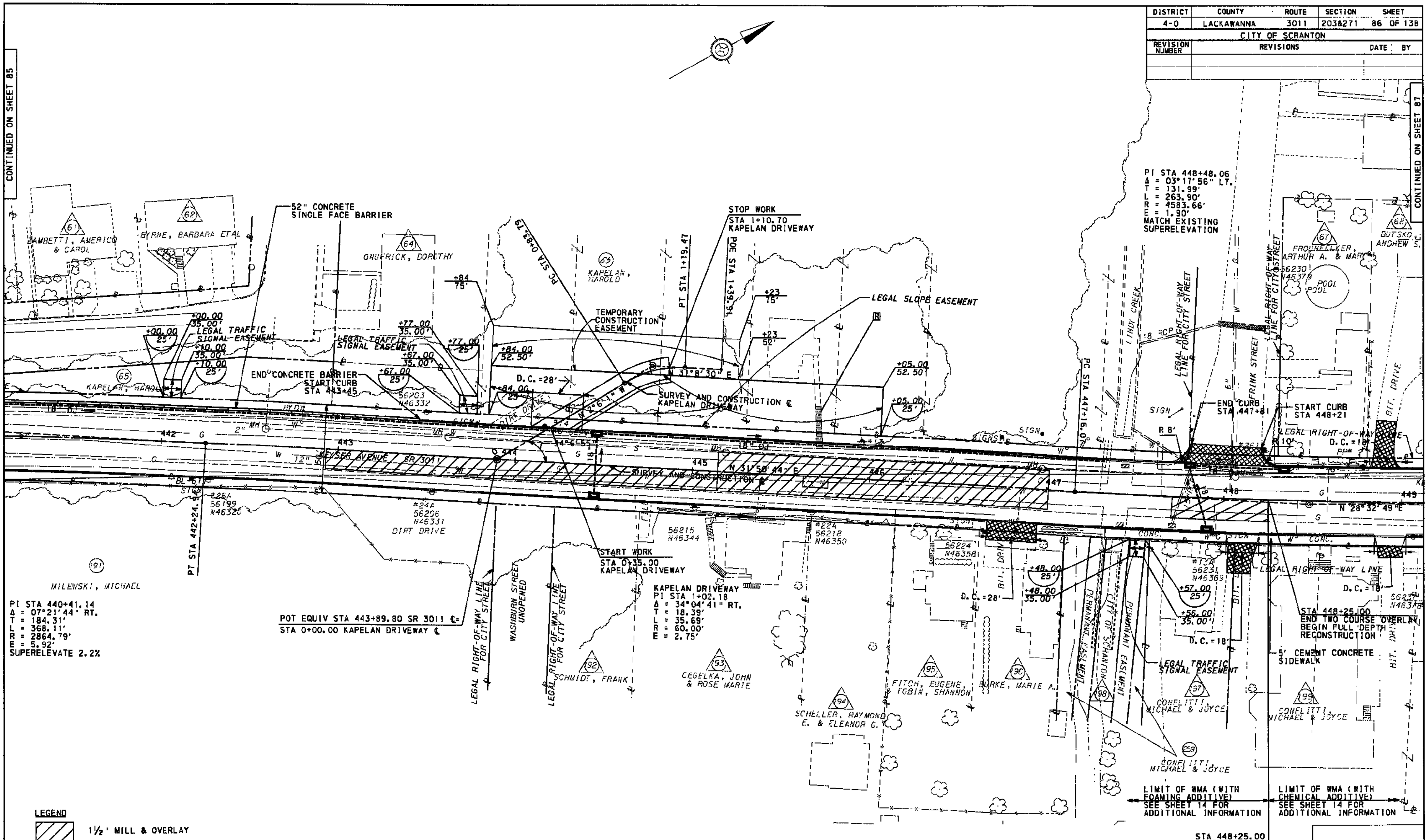

DISTRICT 4-0
COUNTY LACKAWANNA
ROUTE 3011
SECTION 203&271
SHEET 85 OF 138
CITY OF SCRANTON
REVISION NUMBER
REVISIONS
DATE
BY
CONTINUED ON SHEET 84
CONTINUED ON SHEET 86
STOP WORK
STA 61+31.00
DIVISION STREET
START WORK
STA 60+19.00
DIVISION STREET
POE STA 61+31.48
END CURB
STA 60+48
BEGIN CONCRETE BARRIER
STA 438+10
52" CONCRETE
SINGLE FACE BARRIER
LINDA LANE
KEYSER AVENUE SR 3011
SURVEY AND CONSTRUCTION ℄
N 24°23'00"E 440
N 31°50'44" E 441
LEGAL RIGHT-OF-WAY LINE
POT EQUIV STA 437+50.72 SR 3011 ℄
STA 50+00.00 SR 3014 ℄
POT EQUIV STA 437+43.78 SR 3011 ℄
STA 60+00.00 DIVISION STREET ℄
START CURB
STA 50+40
START WORK
STA 50+24.00
SR 3014
STOP WORK
STA 51+32.00
SR 3014
END CURB
STA 51+32
PI STA 51+24.31
Δ = 11°02'55" RT
T = 48.36'
L = 96.42'
R = 500.00'
E = 2.33'
PI STA 440+41.14
Δ = 07°21'44" RT.
T = 184.31'
L = 368.11'
R = 2864.79'
E = 5.92'
SUPERELEVATE 2.2%
DALTON STREET SR 3014
S16°38'40"E 52
LEGAL TRAFFIC SIGNAL EASEMENT
SACCO, PASQUALE
YOUNICA, ROSE
MACGREGOR, KENNETH & CANTELLE
STEINDEL, EMILY & FRED
FOLEY, JEREMIAH J. JR.
PHILLIPS, DAVID W. & DFLORES
BOOTH, ROBERT H. JR. & ANN
WEEKWOOD, ROBERT
FARGIONE, JOHN & ANN
SESTACK, CYRIL & JOAN
HOLMES, JOHN & MARY
LAMBETTI, AMERICO & CAROL
KAPELAN, HARRY
MILEWSKI, MICHAEL
BATTAGLIA, YOLANDA R.
GOOSEY ET AL, SOL
LEGEND
1½" MILL & OVERLAY
3" MILL & OVERLAY
FULL DEPTH BITUMINOUS BASE REPLACEMENT
SIDEROAD & DRIVEWAY ADJUSTMENT
OJ OPEN JOINT
DESIGN AND CONSTRUCTION (DESIGN/BUILD) OF CONCRETE CURB RAMPS. SEE SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
UNDERGROUND UTILITIES DEPICTED ON THE PLANS AND CROSS SECTIONS GENERALLY PROVIDE FOR A UTILITY QUALITY LEVEL OF "C". EXISTING SURFACE FEATURES WERE SURVEYED AND USED IN CONJUNCTION WITH RECORD PLANS PROVIDED BY THE UTILITY OWNERS.
FOR PROFILE, SEE SHEET 116
25 0 25 FEET
SURVEY BOOK 29893
JEFFREY P. HANS
PROFESSIONAL ENGINEER
PLOTTED: 6/25/2012
D-9012 CADD (12-90) REV1503 (10-04)
OPERATOR: 3223
FILE NAME: ...\DESIGN\WSTN\353011203.p114

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
4-0	LACKAWANNA	3011	203&271	86 OF 138

CITY OF SCRANTON

REVISION NUMBER	REVISIONS	DATE	BY

PLOTTED: 6/25/2012
D-9012 CADD (02-90) REVISED (10-04)
OPERATOR: 3229
FILE NAME: ...\DESIGN\MSTN\35301I203.p115


CONTINUED ON SHEET 85
CONTINUED ON SHEET 87
52" CONCRETE SINGLE FACE BARRIER
STOP WORK
STA 1+10.70
KAPELAN DRIVEWAY
LEGAL SLOPE EASEMENT
TEMPORARY CONSTRUCTION EASEMENT
LEGAL TRAFFIC SIGNAL EASEMENT
END CONCRETE BARRIER
START CURB
STA 443+45
SURVEY AND CONSTRUCTION ℄
KAPELAN DRIVEWAY
N 31°8'30" E
N 31°50'44" E
N 28°32'49" E
KEYSER AVENUE SR 3011
PC STA 0+83.79
PT STA 1+19.47
POE STA 1+39.97
PT STA 442+24.97
PC STA 447+16.07
START WORK
STA 0+35.00
KAPELAN DRIVEWAY
KAPELAN DRIVEWAY
PI STA 1+02.18
Δ = 34°04'41" RT.
T = 18.39'
L = 35.69'
R = 60.00'
E = 2.75'
PI STA 440+41.14
Δ = 07°21'44" RT.
T = 184.31'
L = 368.11'
R = 2864.79'
E = 5.92'
SUPERELEVATE 2.2%
POT EQUIV STA 443+89.80 SR 3011 ℄ =
STA 0+00.00 KAPELAN DRIVEWAY ℄
PI STA 448+48.06
Δ = 03°17'56" LT.
T = 131.99'
L = 263.90'
R = 4583.66'
E = 1.90'
MATCH EXISTING SUPERELEVATION
LEGAL RIGHT-OF-WAY LINE FOR CITY STREET
WASHBURN STREET UNOPENED
FRINK STREET
LINDY CREEK
END CURB
STA 447+81
START CURB
STA 448+21
STA 448+25.00
END TWO COURSE OVERLAY
BEGIN FULL DEPTH RECONSTRUCTION
5' CEMENT CONCRETE SIDEWALK
LEGAL TRAFFIC SIGNAL EASEMENT
PERMANENT EASEMENT
CITY OF SCRANTON
LIMIT OF WMA (WITH FOAMING ADDITIVE)
SEE SHEET 14 FOR ADDITIONAL INFORMATION
LIMIT OF WMA (WITH CHEMICAL ADDITIVE)
SEE SHEET 14 FOR ADDITIONAL INFORMATION
GAMBETTI, AMERICO & CAROL
BYRNE, BARBARA ETAL
ONUFRICK, DOROTHY
KAPELAN, HAROLD
FROUNFELKER, ARTHUR A. & MARY
BUTSKO, ANDREW S.
MILEWSKI, MICHAEL
SCHMIDT, FRANK
CEGELKA, JOHN & ROSE MARIE
SCHELLER, RAYMOND E. & ELEANOR G.
FITCH, EUGENE
TOBIN, SHANNON
BURKE, MARIE A.
CONFLITTI, MICHAEL & JOYCE
DIRT DRIVE
POOL

STA 448+25.00

LEGEND

(hatch)	1½" MILL & OVERLAY
(cross-hatch)	3" MILL & OVERLAY
(stipple)	FULL DEPTH BITUMINOUS BASE REPLACEMENT
(dark cross-hatch)	SIDEROAD & DRIVEWAY ADJUSTMENT
OJ	OPEN JOINT

UNDERGROUND UTILITIES DEPICTED ON THE PLANS AND CROSS SECTIONS GENERALLY PROVIDE FOR A UTILITY QUALITY LEVEL OF "C". EXISTING SURFACE FEATURES WERE SURVEYED AND USED IN CONJUNCTION WITH RECORD PLANS PROVIDED BY THE UTILITY OWNERS.

25 0 25 FEET

FOR PROFILE, SEE SHEET 117

SURVEY BOOK 29893

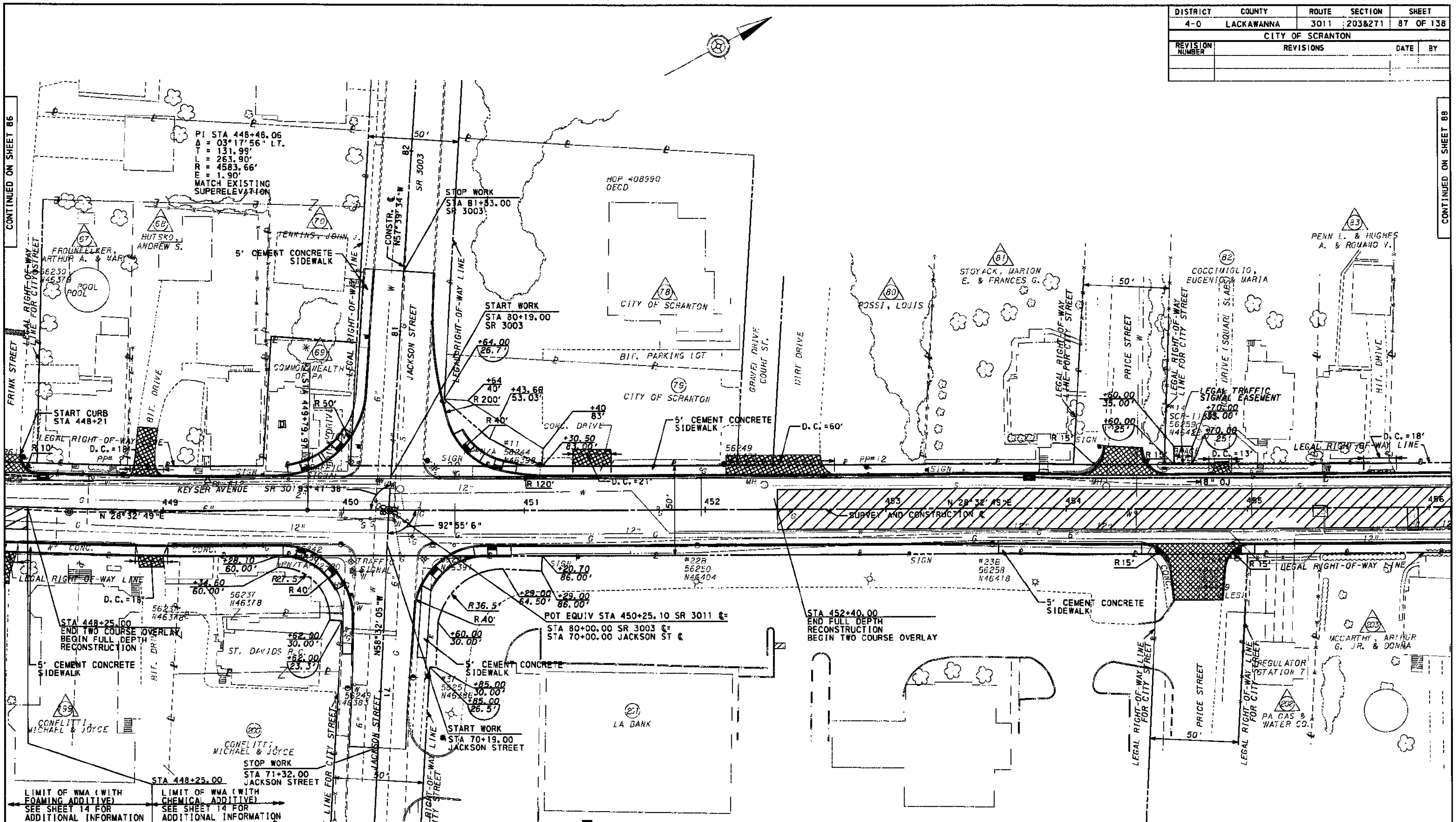
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL JEFFREY P. HANS ENGINEER

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
4-0	LACKAWANNA	3011	203&271	87 OF 138
CITY OF SCRANTON				

REVISION NUMBER	REVISIONS	DATE	BY

CONTINUED ON SHEET 86

CONTINUED ON SHEET 88



PI STA 448+48.06
Δ = 03°17'56" LT.
T = 131.99'
L = 263.90'
R = 4583.66'
E = 1.90'
MATCH EXISTING SUPERELEVATION
STOP WORK STA 81+83.00 SR 3003
START WORK STA 80+19.00 SR 3003
5' CEMENT CONCRETE SIDEWALK
CONSTR. ℄ N57°39'34"W
SR 3003
JACKSON STREET
LEGAL RIGHT-OF-WAY LINE
CITY OF SCRANTON
BIT. PARKING LOT
GRAVEL DRIVE COURT ST.
DIRT DRIVE
ROSSI, LOUIS
STOYACK, MARION E. & FRANCES G.
COCCIMIGLIO, EUGENIO & MARIA
PENN L. & HUGHES A. & ROMANO V.
PRICE STREET
LEGAL TRAFFIC SIGNAL EASEMENT
FRINK STREET
FROUNFELKER, ARTHUR A. & MARY
BUTSKO, ANDREW S.
JENKINS, JOHN J.
COMMONWEALTH OF PA
START CURB STA 448+21
KEYSER AVENUE SR 3011
N 28°32'49"E
SURVEY AND CONSTRUCTION ℄
D.C.=60'
92°55'6"
POT EQUIV STA 450+25.10 SR 3011 ℄=
STA 80+00.00 SR 3003 ℄=
STA 70+00.00 JACKSON ST ℄
STA 452+40.00
END FULL DEPTH RECONSTRUCTION
BEGIN TWO COURSE OVERLAY
STA 448+25.00
END TWO COURSE OVERLAY
BEGIN FULL DEPTH RECONSTRUCTION
ST. DAVIDS R.C.
CONFLITTI, MICHAEL & JOYCE
LA BANK
START WORK STA 70+19.00 JACKSON STREET
STOP WORK STA 71+32.00 JACKSON STREET
N58°32'05"W
McCARTHY, ARTHUR G. JR. & DONNA
REGULATOR STATION 7
PA GAS & WATER CO.
LIMIT OF WMA (WITH FOAMING ADDITIVE) SEE SHEET 14 FOR ADDITIONAL INFORMATION
LIMIT OF WMA (WITH CHEMICAL ADDITIVE) SEE SHEET 14 FOR ADDITIONAL INFORMATION

LEGEND

- 1½" MILL & OVERLAY
- 3" MILL & OVERLAY
- FULL DEPTH BITUMINOUS BASE REPLACEMENT
- SIDEROAD & DRIVEWAY ADJUSTMENT
- OJ OPEN JOINT

DESIGN AND CONSTRUCTION (DESIGN/BUILD) OF CONCRETE CURB RAMPS. SEE SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

UNDERGROUND UTILITIES DEPICTED ON THE PLANS AND CROSS SECTIONS GENERALLY PROVIDE FOR A UTILITY QUALITY LEVEL OF "C". EXISTING SURFACE FEATURES WERE SURVEYED AND USED IN CONJUNCTION WITH RECORD PLANS PROVIDED BY THE UTILITY OWNERS.

25 0 25 FEET

FOR PROFILE, SEE SHEET 118

SURVEY BOOK 29893

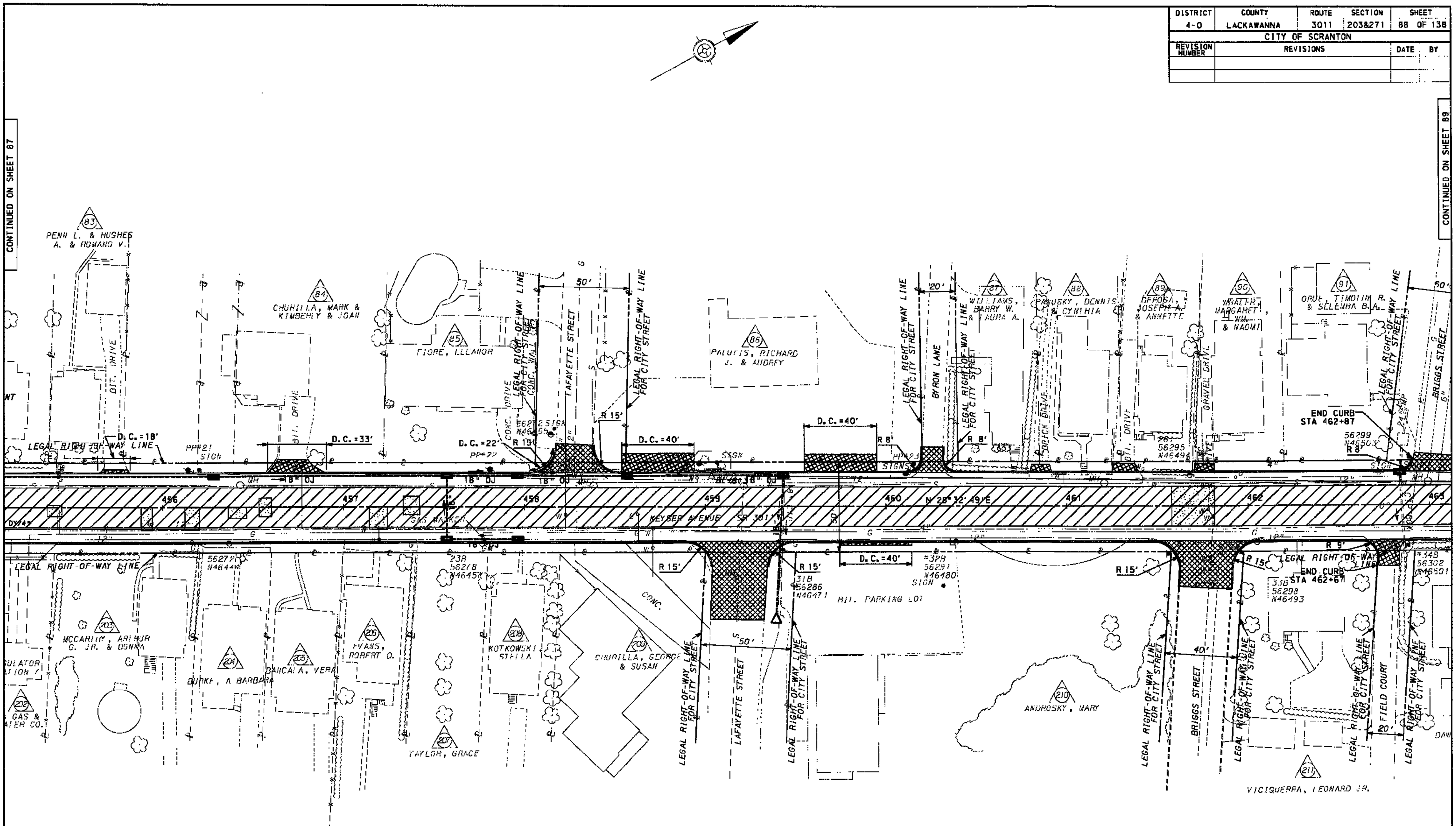
JEFFREY P. HANS, PROFESSIONAL ENGINEER, COMMONWEALTH OF PENNSYLVANIA

PLOTTED: 6/25/2012
D-9012 CADD (02-90 REVISED 10-04)
OPERATOR: 3229
FILE NAME: ...\DESIGN\MSTN\35301\203.p116

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
4-0	LACKAWANNA	3011	203&271	88 OF 138

CITY OF SCRANTON

REVISION NUMBER	REVISIONS	DATE	BY



LEGEND

- 1½" MILL & OVERLAY
- 3" MILL & OVERLAY
- FULL DEPTH BITUMINOUS BASE REPLACEMENT
- SIDEROAD & DRIVEWAY ADJUSTMENT
- OJ OPEN JOINT

UNDERGROUND UTILITIES DEPICTED ON THE PLANS AND CROSS SECTIONS GENERALLY PROVIDE FOR A UTILITY QUALITY LEVEL OF "C". EXISTING SURFACE FEATURES WERE SURVEYED AND USED IN CONJUNCTION WITH RECORD PLANS PROVIDED BY THE UTILITY OWNERS.

25 0 25 FEET

FOR PROFILE, SEE SHEET 119

SURVEY BOOK 29893

JEFFREY P. HANS ENGINEER

OPERATOR: 3229
FILE NAME: ...\des\gn\msrn\35301203.p117

PLOTTED: 2/5/2012

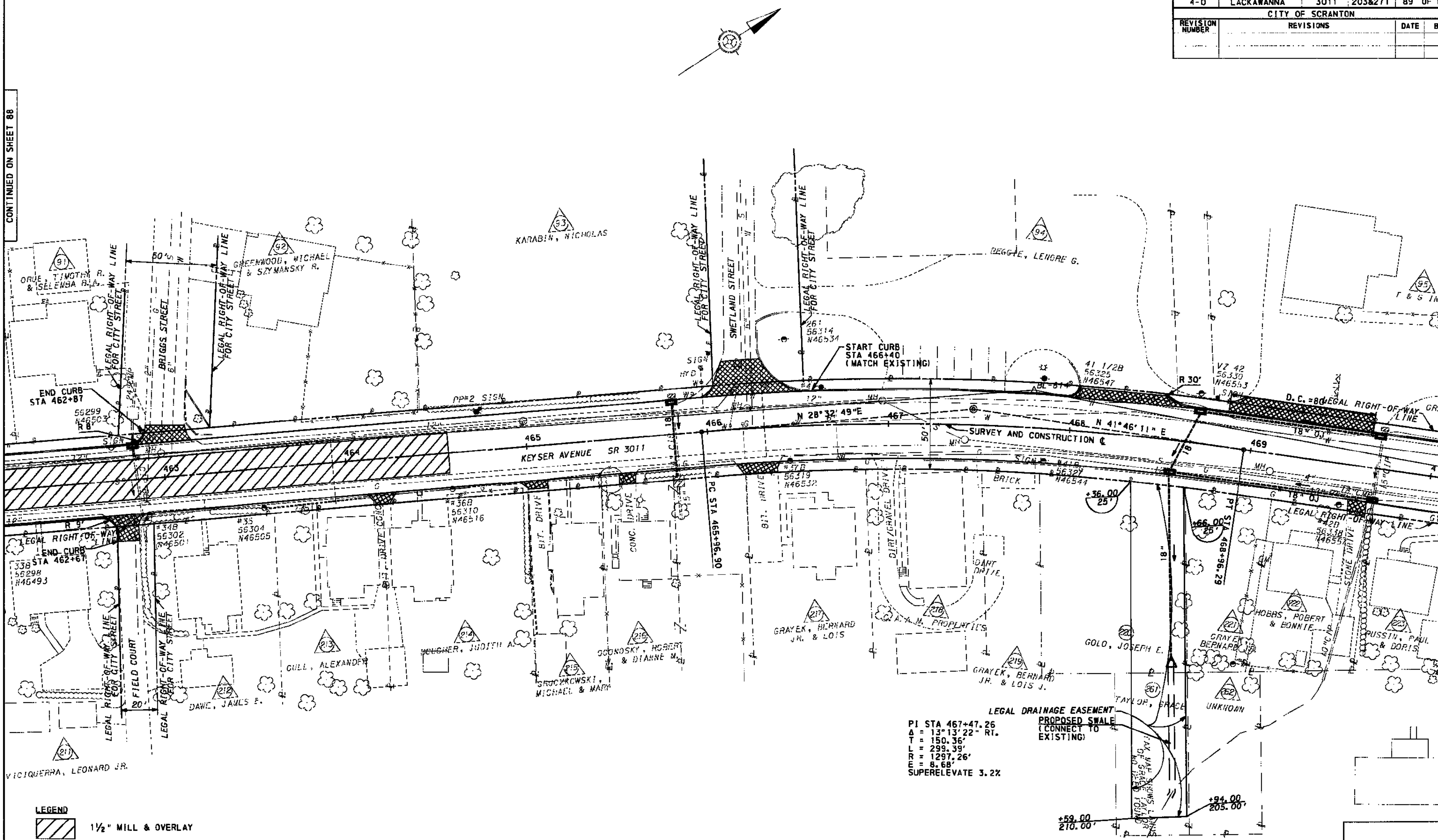
DISTRICT	COUNTY	ROUTE	SECTION	SHEET
4-0	LACKAWANNA	3011	203&271	89 OF 138

CITY OF SCRANTON

REVISION NUMBER	REVISIONS	DATE	BY

CONTINUED ON SHEET 88

CONTINUED ON SHEET 90



LEGEND

- 1½" MILL & OVERLAY
- 3" MILL & OVERLAY
- FULL DEPTH BITUMINOUS BASE REPLACEMENT
- SIDEROAD & DRIVEWAY ADJUSTMENT
- OJ — OPEN JOINT

UNDERGROUND UTILITIES DEPICTED ON THE PLANS AND CROSS SECTIONS GENERALLY PROVIDE FOR A UTILITY QUALITY LEVEL OF "C". EXISTING SURFACE FEATURES WERE SURVEYED AND USED IN CONJUNCTION WITH RECORD PLANS PROVIDED BY THE UTILITY OWNERS.

25 0 25 FEET

FOR PROFILE, SEE SHEET 120

SURVEY BOOK 29893

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL JEFFREY P. HANS ENGINEER

PLOTTED: 7/6/2012

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OPERATOR: 3229
FILE NAME: ...\design\msin\353011203.p118

Pennsylvania Turnpike Commission
PO Box 67676
Harrisburg PA 17106-7676
717.939.9551

Office of Chief Counsel
Phone: 717-831-7381
Fax: 717-986-9654
lvangorder@paturnpike.com

August 31, 2021

Via e-mail
mchorba@gpinet.com

Matthew Chorba
52 Glenmaura National Blvd., Suite 302
Scranton, PA 18505

RE: Right-to-Know Law Request No. 2724

Dear Mr. Chorba:

This letter acknowledges receipt by the Pennsylvania Turnpike Commission (hereinafter "Commission") of your written request for public records. The Commission shall respond to your request in accordance with the Pennsylvania Right-to-Know Law, 65 P.S. § 67.101 *et seq*., as amended (hereinafter "RTKL"). Your request was received on August 24, 2021. Therefore, under the RTKL, a written response to your request is due on or before August 31, 2021. This letter is provided pursuant to that requirement.

You are hereby notified that, for the reason(s) set forth below, this agency will require an additional thirty (30) calendar days, i.e., until September 30, 2021, in which to provide a final written response to your request:

1. A response within five (5) business days of receipt of your letter could not be accomplished due to bona fide staffing limitations; and

2. A legal review is necessary to determine whether the record is a record subject to access under the RTKL.

If you have any questions regarding this letter, please contact me at (717) 831-7831.

Very truly yours,

L. Evan Van Gorder
L. Evan Van Gorder
Assistant Open Records Officer

APPENDIX B

- Tropical Storm Ida Rainfall Data
- Tailwater Calculations
- Existing Stormwater Calculations
- Proposed Stormwater Calculations
- Proposed Improvements Drawings
- Pump Sizing

Climatological Data for WILKES-BARRE/SCRANTON INTERNATIONAL AIRPORT, PA - September 2021

Date	Temperature				HDD	CDD	Precipitation	New Snow	Snow Depth
	Maximum	Minimum	Average	Departure					
2021-09-01	69	61	65.0	-4.2	0	0	5.09	0.0	M
2021-09-02	73	53	63.0	-6.0	2	0	0.00	0.0	M
2021-09-03	69	54	61.5	-7.2	3	0	0.00	0.0	M
2021-09-04	77	52	64.5	-3.9	0	0	0.00	0.0	M
2021-09-05	71	60	65.5	-2.7	0	1	0.88	0.0	M
2021-09-06	79	57	68.0	0.1	0	3	0.00	0.0	M
2021-09-07	78	52	65.0	-2.6	0	0	0.00	0.0	M
2021-09-08	83	64	73.5	6.2	0	9	0.64	0.0	M
2021-09-09	72	58	65.0	-2.0	0	0	0.04	0.0	M
2021-09-10	74	53	63.5	-3.2	1	0	0.00	0.0	M
2021-09-11	76	50	63.0	-3.3	2	0	0.00	0.0	0
2021-09-12	79	57	68.0	2.0	0	3	0.00	0.0	M
2021-09-13	81	67	74.0	8.3	0	9	0.06	0.0	M
2021-09-14	83	64	73.5	8.2	0	9	T	0.0	M
2021-09-15	86	66	76.0	11.0	0	11	1.16	0.0	M
2021-09-16	76	64	70.0	5.4	0	5	0.48	0.0	M
2021-09-17	81	66	73.5	9.3	0	9	0.00	0.0	M
2021-09-18	84	65	74.5	10.7	0	10	T	0.0	M
2021-09-19	76	56	66.0	2.5	0	1	0.00	0.0	M
2021-09-20	80	52	66.0	2.9	0	1	0.00	0.0	M
2021-09-21	74	54	64.0	1.3	1	0	0.00	0.0	M
2021-09-22	M	M	M	M	M	M	M	M	M
2021-09-23	M	M	M	M	M	M	M	M	M
2021-09-24	M	M	M	M	M	M	M	M	M
2021-09-25	M	M	M	M	M	M	M	M	M
2021-09-26	M	M	M	M	M	M	M	M	M
2021-09-27	M	M	M	M	M	M	M	M	M
2021-09-28	M	M	M	M	M	M	M	M	M
2021-09-29	M	M	M	M	M	M	M	M	M
2021-09-30	M	M	M	M	M	M	M	M	M
Sum	1621	1225	-	-	9	71	8.35	0.0	-
Average	77.2	58.3	67.8	1.6	-	-	-	-	0.0
Normal	76.8	55.6	66.2	-	46	70	2.88	0.0	-

Above Normals represent the month through 2021-09-21.

Observations for each day cover the 24 hours ending at the time given below (Local Standard Time).
Max Temperature : midnight
Min Temperature : midnight
Precipitation : midnight
Snowfall : midnight
Snow Depth : unknown

Table 7A.4(b). Five (5) minute through twenty-four (24) hour storm totals for Region 3 (U.S. Customary).

Region 3 Rainfall Total								
	1-Yr Storm	2-Yr Storm	5-Yr Storm	10-Yr Storm	25-Yr Storm	50-Yr Storm	100-Yr Storm	500-Yr Storm
Duration (Min)	in	in	in	in	in	in	in	in
5	0.32	0.39	0.46	0.51	0.59	0.65	0.71	
10	0.50	0.60	0.71	0.80	0.91	0.99	1.06	
15	0.62	0.74	0.88	0.98	1.12	1.22	1.32	
30	0.82	0.99	1.20	1.37	1.59	1.75	1.92	
60	1.01	1.23	1.53	1.77	2.08	2.32	2.57	
120	1.19	1.44	1.81	2.10	2.51	2.85	3.26	
180	1.31	1.58	1.98	2.30	2.77	3.16	3.62	
360	1.64	1.98	2.48	2.89	3.48	3.95	4.45	
720	2.03	2.44	3.03	3.55	4.33	4.97	5.66	
1440	2.44	2.92	3.61	4.20	5.10	5.90	6.83	9.57

At the Scranton International Airport, the rainfall data during Tropical Storm Ida was 5.09 inches.

This corresponds with the rainfall between the 12-hr/50-100-Year Return Storm and 24-hr/25-50-Year Return Storm as according to the NOAA Point Precipitation Frequency Estimates.

Additionally, this corresponds with the rainfall for the 25-year 24 hour storm for Region 3, where the Keyser Valley Floodplain Project is located.

Based on these facts, GPI has estimated Tropical Storm Ida to be between the 25-and 50-Year Return Storm.

NOAA Atlas 14, Volume 2, Version 3
Location name: Scranton, Pennsylvania, USA*
Latitude: 41.4209°, Longitude: -75.6962°
Elevation: 809.24 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.300** (0.270-0.332)	**0.355** (0.320-0.394)	**0.420** (0.377-0.466)	**0.470** (0.423-0.521)	**0.535** (0.478-0.593)	**0.588** (0.524-0.653)	**0.642** (0.568-0.714)	**0.702** (0.617-0.781)	**0.789** (0.685-0.881)	**0.859** (0.738-0.963)
10-min	**0.466** (0.420-0.516)	**0.555** (0.500-0.615)	**0.652** (0.586-0.724)	**0.725** (0.653-0.805)	**0.818** (0.732-0.907)	**0.891** (0.794-0.990)	**0.967** (0.855-1.07)	**1.05** (0.921-1.17)	**1.16** (1.01-1.30)	**1.25** (1.08-1.40)
15-min	**0.571** (0.514-0.633)	**0.678** (0.611-0.752)	**0.801** (0.720-0.889)	**0.893** (0.803-0.990)	**1.01** (0.904-1.12)	**1.10** (0.982-1.23)	**1.20** (1.06-1.33)	**1.30** (1.15-1.45)	**1.45** (1.26-1.62)	**1.56** (1.34-1.75)
30-min	**0.755** (0.681-0.837)	**0.908** (0.818-1.01)	**1.10** (0.986-1.22)	**1.24** (1.12-1.38)	**1.43** (1.28-1.58)	**1.58** (1.40-1.75)	**1.73** (1.53-1.93)	**1.90** (1.67-2.12)	**2.14** (1.86-2.40)	**2.34** (2.01-2.63)
60-min	**0.922** (0.831-1.02)	**1.11** (1.00-1.24)	**1.38** (1.24-1.53)	**1.58** (1.42-1.75)	**1.85** (1.66-2.05)	**2.08** (1.85-2.31)	**2.32** (2.05-2.58)	**2.58** (2.27-2.87)	**2.97** (2.58-3.31)	**3.29** (2.83-3.69)
2-hr	**1.09** (0.984-1.21)	**1.30** (1.18-1.45)	**1.62** (1.47-1.81)	**1.89** (1.70-2.10)	**2.28** (2.04-2.53)	**2.63** (2.34-2.92)	**3.02** (2.67-3.37)	**3.48** (3.04-3.88)	**4.18** (3.60-4.69)	**4.80** (4.09-5.42)
3-hr	**1.21** (1.10-1.33)	**1.44** (1.31-1.60)	**1.79** (1.63-1.98)	**2.08** (1.89-2.30)	**2.53** (2.27-2.79)	**2.93** (2.61-3.24)	**3.39** (2.99-3.76)	**3.92** (3.42-4.36)	**4.75** (4.08-5.32)	**5.51** (4.67-6.20)
6-hr	**1.52** (1.38-1.68)	**1.81** (1.65-2.01)	**2.23** (2.02-2.47)	**2.59** (2.34-2.86)	**3.14** (2.81-3.47)	**3.64** (3.23-4.02)	**4.21** (3.70-4.65)	**4.88** (4.24-5.41)	**5.94** (5.07-6.63)	**6.89** (5.80-7.73)
12-hr	**1.84** (1.66-2.05)	**2.19** (1.98-2.44)	**2.71** (2.44-3.02)	**3.15** (2.84-3.51)	**3.85** (3.44-4.28)	**4.48** (3.96-4.98)	**5.22** (4.56-5.80)	**6.08** (5.24-6.77)	**7.44** (6.30-8.33)	**8.68** (7.24-9.76)
24-hr	**2.14** (1.96-2.36)	**2.56** (2.35-2.83)	**3.17** (2.91-3.50)	**3.71** (3.40-4.09)	**4.58** (4.15-5.01)	**5.38** (4.84-5.86)	**6.34** (5.64-6.87)	**7.47** (6.58-8.07)	**9.31** (8.08-10.00)	**11.0** (9.44-11.8)
2-day	**2.52** (2.33-2.77)	**3.02** (2.78-3.32)	**3.74** (3.43-4.09)	**4.37** (4.00-4.77)	**5.39** (4.89-5.86)	**6.33** (5.70-6.85)	**7.44** (6.64-8.02)	**8.77** (7.75-9.42)	**10.9** (9.51-11.7)	**12.9** (11.1-13.8)
3-day	**2.68** (2.47-2.94)	**3.20** (2.95-3.51)	**3.94** (3.62-4.31)	**4.59** (4.21-5.01)	**5.63** (5.12-6.12)	**6.60** (5.96-7.14)	**7.74** (6.93-8.34)	**9.09** (8.05-9.76)	**11.3** (9.85-12.1)	**13.3** (11.5-14.2)
4-day	**2.84** (2.61-3.10)	**3.38** (3.12-3.71)	**4.14** (3.81-4.53)	**4.81** (4.41-5.25)	**5.88** (5.36-6.39)	**6.87** (6.22-7.43)	**8.04** (7.21-8.65)	**9.41** (8.36-10.1)	**11.6** (10.2-12.4)	**13.7** (11.9-14.6)
7-day	**3.33** (3.07-3.65)	**3.97** (3.66-4.35)	**4.82** (4.44-5.27)	**5.58** (5.12-6.08)	**6.76** (6.17-7.34)	**7.84** (7.12-8.50)	**9.11** (8.20-9.84)	**10.6** (9.46-11.4)	**13.0** (11.4-13.9)	**15.1** (13.2-16.1)
10-day	**3.86** (3.58-4.20)	**4.59** (4.25-4.99)	**5.51** (5.10-5.99)	**6.32** (5.83-6.84)	**7.57** (6.95-8.16)	**8.69** (7.94-9.35)	**9.98** (9.06-10.7)	**11.5** (10.3-12.3)	**13.8** (12.3-14.8)	**15.9** (14.0-17.0)
20-day	**5.30** (4.94-5.72)	**6.25** (5.82-6.74)	**7.31** (6.79-7.86)	**8.22** (7.63-8.82)	**9.60** (8.87-10.3)	**10.8** (9.95-11.6)	**12.2** (11.2-13.0)	**13.7** (12.5-14.6)	**16.1** (14.5-17.1)	**18.1** (16.3-19.3)
30-day	**6.62** (6.22-7.07)	**7.76** (7.29-8.28)	**8.93** (8.37-9.52)	**9.93** (9.30-10.6)	**11.4** (10.7-12.1)	**12.7** (11.8-13.5)	**14.1** (13.1-15.0)	**15.7** (14.5-16.6)	**18.0** (16.5-19.1)	**20.0** (18.3-21.3)
45-day	**8.46** (8.00-8.99)	**9.86** (9.32-10.5)	**11.2** (10.5-11.8)	**12.3** (11.6-13.0)	**13.9** (13.0-14.7)	**15.2** (14.3-16.1)	**16.7** (15.6-17.7)	**18.3** (17.1-19.4)	**20.7** (19.2-21.9)	**22.7** (20.9-24.0)
60-day	**10.2** (9.68-10.8)	**11.9** (11.3-12.6)	**13.3** (12.6-14.1)	**14.6** (13.8-15.4)	**16.4** (15.5-17.3)	**17.9** (16.9-19.0)	**19.6** (18.4-20.7)	**21.4** (20.0-22.6)	**24.0** (22.3-25.3)	**26.1** (24.2-27.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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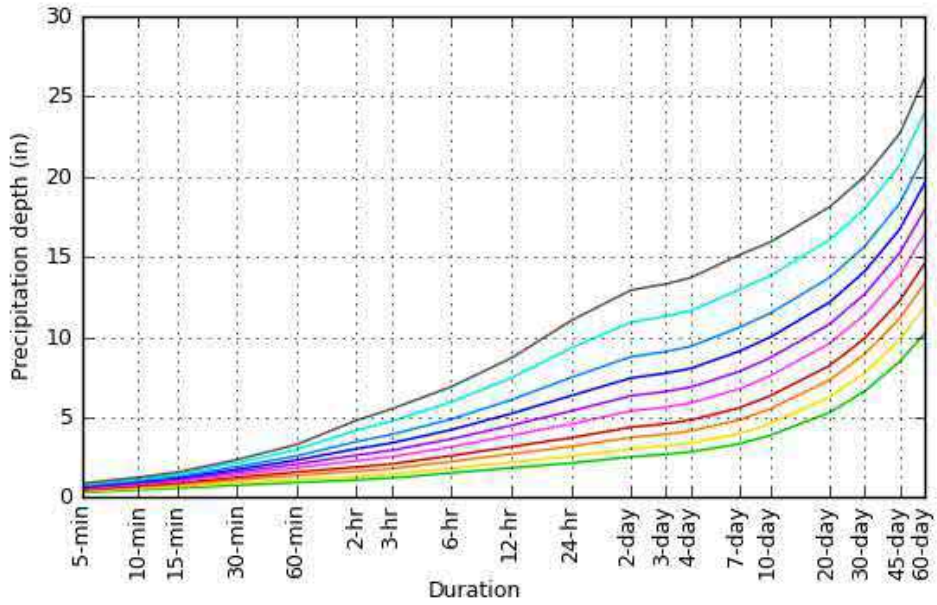
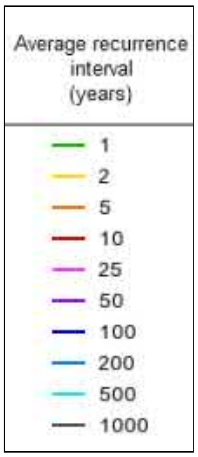
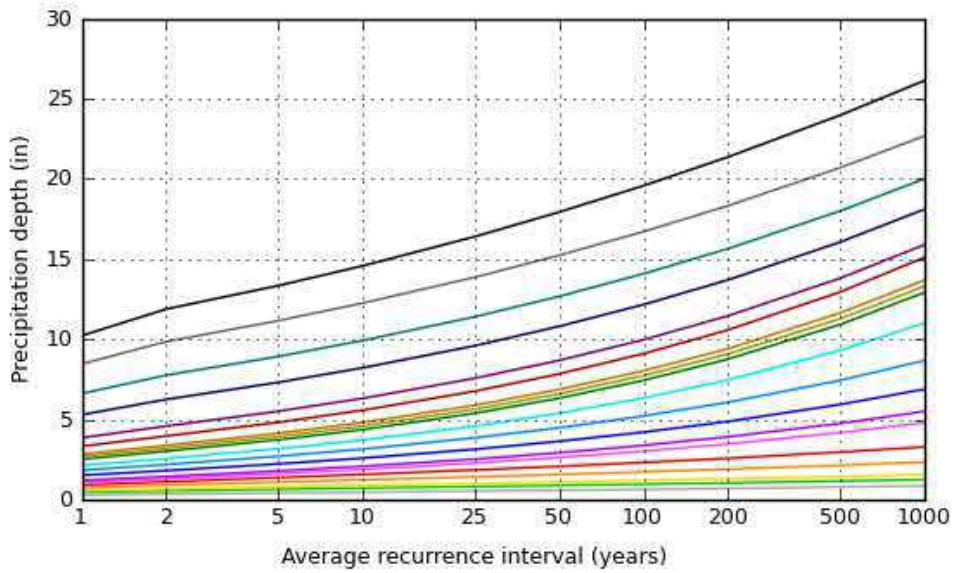
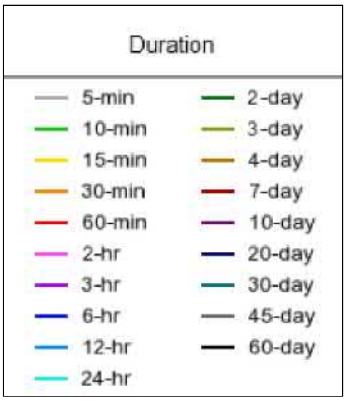
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.4209°, Longitude: -75.6962°









NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Fri Sep 24 00:22:34 2021

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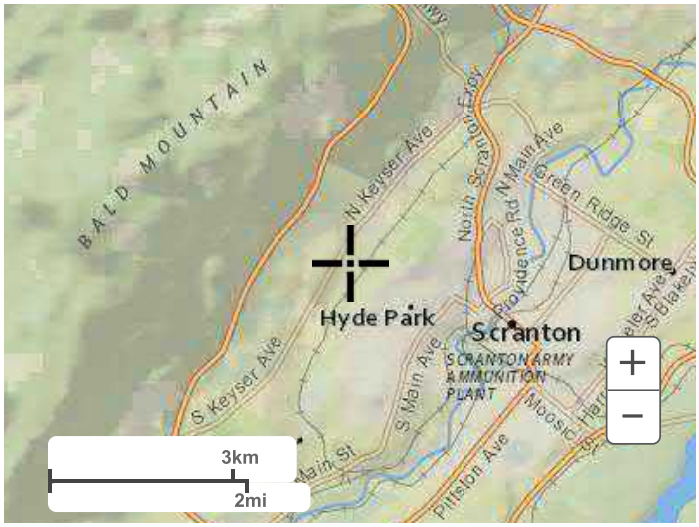
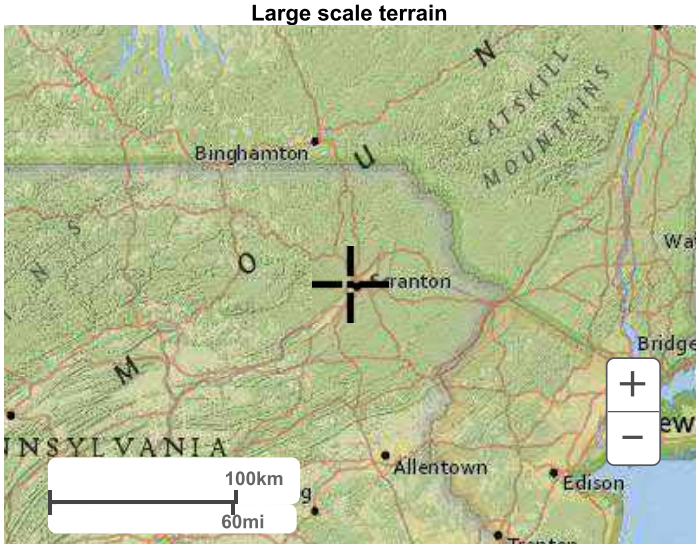
Maps & aerials

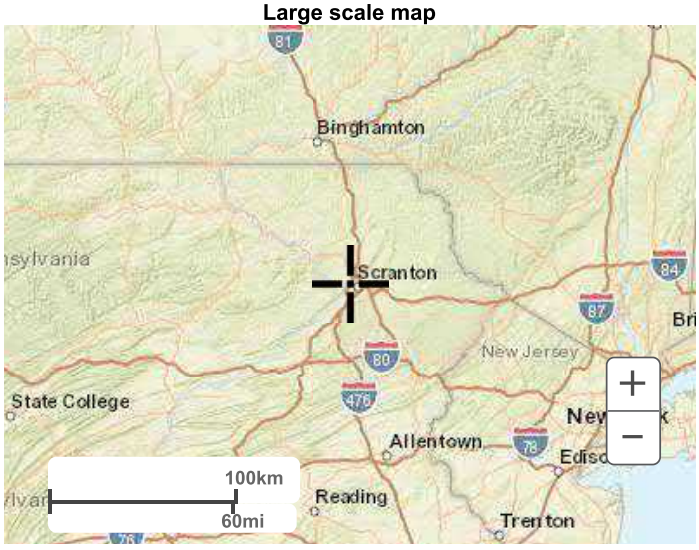
Small scale terrain



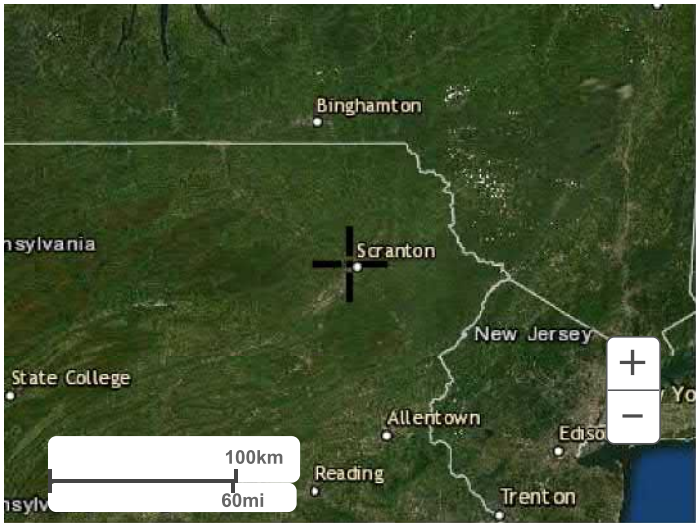
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Pennsylvania State Plane, North zone (FIPS Zone 3701). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at https://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current **elevation**, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at https://www.ngs.noaa.gov.

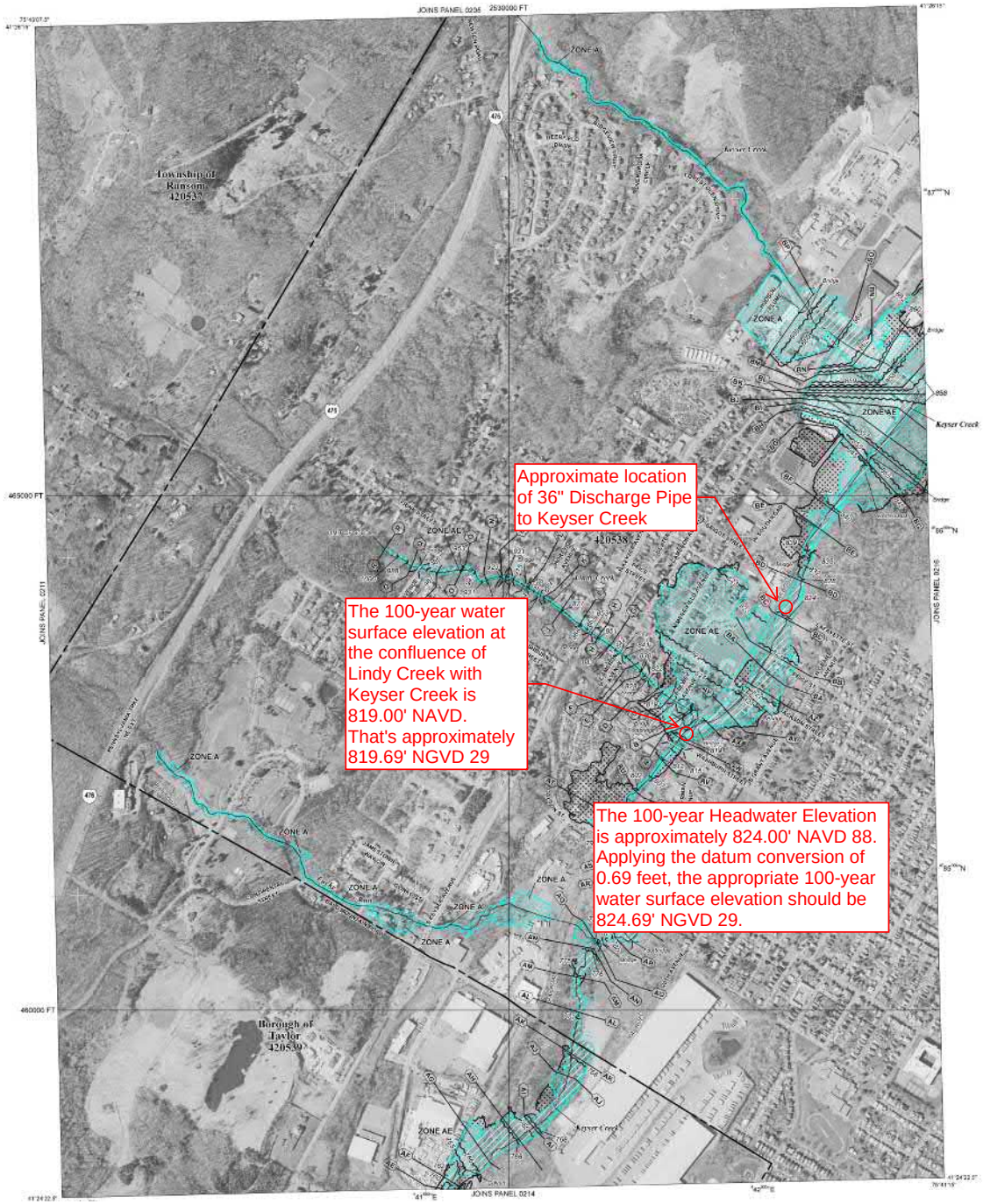
Base map information shown on this FIRM was derived from PAMAP Program, Bureau of Topographic and Geologic Survey, PA Department of Conservation and Natural Resources at a scale of 1" = 1,200 from photography dated 2005 or later.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Information eXchange** at 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Information eXchange may also be reached by Fax at 1-800-358-9620 and their website at https://www.msc.fema.gov/



The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No base flood elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually shallow flooding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Limit of Moderate Wave Action

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

B — B — Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

1000-meter Universal Transverse Mercator grid values, zone 18N

600000 FT — 1000-foot grid values: Pennsylvania State Plane coordinate system, North zone (FIPSZONE 3701), Lambert Conformal Conic projection

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 3, 2022

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0212D

FIRM

FLOOD INSURANCE RATE MAP

LACKAWANNA COUNTY, PENNSYLVANIA
(ALL JURISDICTIONS)

PANEL 212 OF 427
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RANSOM, TOWNSHIP OF	420533	0212	D
SCRANTON, CITY OF	420535	0212	D
TAYLOR, BOROUGH OF	420539	0212	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
42069C0212D

EFFECTIVE DATE

adjacent communities may be referenced to NGVD29. This may result in differences in BFEs across corporate limits between the communities.

As noted above, the elevations shown in the FIS report and on the FIRM for Lackawanna County are referenced to NAVD88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a standard conversion factor. The conversion factor from NGVD29 to NAVD88 for Lackawanna County is **-0.654** foot. The locations used to establish the conversion factor were USGS 7.5-minute topographic quadrangle corners that fell within the County, as well as those that were within 2.5 miles outside the County. The bench marks are referenced to NAVD88.

Conversion locations and values for Lackawanna County are shown below in Table 9, "Vertical Datum Conversion Values."

Table 9 – Vertical Datum Conversion Values

USGS 7.5-minute Quadrangle Name	Corner	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Conversion from NGVD29 to NAVD88 (foot)
Avoca	SE	41.250	-75.625	-0.580
Carbondale	SE	41.500	-75.500	-0.610
Clifford	SE	41.625	-75.500	-0.627
Dalton	SE	41.500	-75.625	-0.666
Factoryville	SE	41.500	-75.750	-0.671
Hop Bottom	SE	41.625	-75.750	-0.659
Lenoxville	SE	41.625	-75.625	-0.651
Moscow	SE	41.250	-75.500	-0.665
Olyphant	SE	41.375	-75.500	-0.724
Ransom	SE	41.375	-75.750	-0.650
Scranton	SE	41.375	-75.625	-0.690
			Average Conversion	**-0.654 foot**

The BFEs are shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in this FIS to NGVD29 should apply the conversion factor to elevations shown on the Flood Profiles and supporting data tables in this FIS report, which are shown at a minimum to the nearest 0.1 foot.

NAVD88 = NGVD29 + conversion factor

For additional information regarding conversion between the NGVD29 and NAVD88, visit the National Geodetic Survey website at http://www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202

Table 7 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGES (CFS) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
HULL CREEK					
At the confluence with the Lackawanna River	3.22	580	1,260	1,690	3,460
At the corporate limits between the Township of Scott and the Borough of Blakely	2.26	*	*	780	*
Above Green Grove Road	2.00	*	*	710	*
At private access bridge, approximately 2,600 feet upstream of Green Grove Road	1.00	*	*	430	*
KEYSER CREEK					
At the confluence of the Lackawanna River	8.59	1,300**	2,460**	3,100**	8,020**
At the ponding area upstream of the railroad crossing between cross sections C and D	8.55	1,350	3,060	4,160	8,300
At the railroad crossing between cross sections AF and AG	6.55	1,220	2,710	3,660	7,560
Above the confluence of Lucky Run	4.46	823	1,585	2,079	3,766
At Luzerne Street	*	580	690	750	950
At the railroad bridge just upstream of Luzerne Street	*	950	2,100	2,880	6,000
Above the confluence of Lindy Creek	3.29	950	2,200	3,050	6,260
LACKAWANNA RIVER					
At the Lackawanna - Luzerne County Boundary	348.00	14,400	24,000	29,000	45,200
At Interstate 476	264.00	10,900	17,800	21,300	32,000

* Data Not Available

** Reduced discharge due to storage upstream of the railroad crossing

	SECNO	Q	CWSEL	EG	XLCH	ELMIN	ELLC	ELTRD	CASE	HV	VCH	WSELK	.01K
*	67.000	950.00	808.70	810.22	395.00	804.20	0.0	0.0	11.00	1.52	10.18	0.0	88.07
*	67.000	2100.00	810.89	813.18	395.00	804.20	0.0	0.0	11.00	2.29	12.85	0.0	215.29
*	67.000	2880.00	812.07	814.73	395.00	804.20	0.0	0.0	11.00	2.66	14.06	0.0	306.80
*	67.000	6000.00	815.62			804.20	0.0	0.0	11.00	2.83	15.83	0.0	752.16
*	69.010	950.00	812.03			806.70	0.0	0.0	11.00	1.69	10.42	0.0	79.57
*	69.010	2100.00	814.49			806.70	0.0	0.0	11.00	2.48	12.63	0.0	185.33
*	69.010	2880.00	816.10	818.57						2.47	12.72	0.0	294.05
*	69.010	6000.00	819.43	822.26						2.84	14.73	0.0	700.85
	69.020	950.00	812.68	813.88						1.20	8.80	0.0	101.50
	69.020	2100.00	814.62	817.10						2.48	12.64	0.0	185.24
*	69.020	2880.00	816.24	818.73	10.00	806.70	842.70	838.50	4097.00	2.49	12.82	0.0	278.92
*	69.020	6000.00	819.52	822.44	10.00	806.70	842.70	838.50	4097.00	2.92	15.01	0.0	566.64
	69.030	950.00	813.48	814.30	58.00	806.70	842.70	838.50	0.0	0.81	7.24	0.0	133.36
	69.030	2100.00	816.46	817.67	58.00	806.70	842.70	838.50	0.0	1.21	8.98	0.0	293.78
	69.030	2880.00	818.08	819.25	58.00	806.70	842.70	838.50	0.0	1.18	9.18	0.0	423.46
	69.030	6000.00	821.54	823.03	58.00	806.70	842.70	838.50	0.0	1.49	11.18	0.0	801.39
	69.040	950.00	813.62	814.35	10.00	806.70	0.0	0.0	0.0	0.74	6.89	0.0	142.77
	69.040	2100.00	816.72	817.73	10.00	806.70	0.0	0.0	0.0	1.01	8.25	0.0	351.78
	69.040	2880.00	818.32	819.31	10.00	806.70	0.0	0.0	0.0	0.99	8.48	0.0	538.74
	69.040	6000.00	821.72	823.08	10.00	806.70	0.0	0.0	0.0	1.36	10.68	0.0	1114.30
	69.000	950.00	814.10	814.63	45.00	807.10	0.0	0.0	0.0	0.53	5.82	0.0	110.79
	69.000	2100.00	817.62	817.92	45.00	807.10	0.0	0.0	0.0	0.31	4.72	0.0	460.21
	69.000	2880.00	819.22	819.47	45.00	807.10	0.0	0.0	0.0	0.25	4.46	0.0	788.19
	69.000	6000.00	822.96	823.26	45.00	807.10	0.0	0.0	0.0	0.30	5.18	0.0	1858.60
	71.010	950.00	814.47	815.24	148.00	807.40	0.0	0.0	0.0	0.77	9.56	0.0	210.54
	71.010	2200.00	817.61	818.46	148.00	807.40	0.0	0.0	0.0	0.85	11.41	0.0	523.89
	71.010	3050.00	819.13	819.97	148.00	807.40	0.0	0.0	0.0	0.84	12.02	0.0	757.03
	71.010	6260.00	823.01	823.48	148.00	807.40	0.0	0.0	0.0	0.48	11.23	0.0	2016.90
	71.020	950.00	819.09	819.17	57.00	807.40	812.90	817.60	0.0	0.08	3.78	0.0	748.94
	71.020	2200.00	819.85	820.14	57.00	807.40	812.90	817.60	0.0	0.29	7.40	0.0	923.87
	71.020	3050.00	820.19	820.65	57.00	807.40	812.90	817.60	0.0	0.45	9.49	0.0	1016.92
	71.020	6260.00	823.01	823.48	57.00	807.40	812.90	817.60	0.0	0.47	11.22	0.0	2019.40
	71.000	950.00	819.18	819.21	157.00	808.10	0.0	0.0	0.0	0.03	1.39	0.0	890.04
	71.000	2200.00	820.18	820.27	157.00	808.10	0.0	0.0	0.0	0.09	2.63	0.0	1175.13
	71.000	3050.00	820.71	820.85	157.00	808.10	0.0	0.0	0.0	0.14	3.28	0.0	1357.05
	71.000	6260.00	823.49	823.68	157.00	808.10	0.0	0.0	0.0	0.19	4.23	0.0	2570.05
	72.000	950.00	819.22	819.24	215.00	811.40	0.0	0.0	0.0	0.03	1.81	0.0	643.56
	72.000	2200.00	820.29	820.36	215.00	811.40	0.0	0.0	0.0	0.07	3.19	0.0	930.31
	72.000	3050.00	820.87	820.98	215.00	811.40	0.0	0.0	0.0	0.10	3.88	0.0	1108.85
	72.000	6260.00	823.72	823.83	215.00	811.40	0.0	0.0	0.0	0.10	4.29	0.0	2479.16
*	73.010	950.00	820.67	821.29	215.00	814.10	0.0	0.0	11.00	0.63	8.11	0.0	155.06
*	73.010	2200.00	821.59	822.30	215.00	814.10	0.0	0.0	11.00	0.72	10.56	0.0	301.67
*	73.010	3050.00	822.01	822.80	215.00	814.10	0.0	0.0	11.00	0.79	11.79	0.0	388.82
	73.010	6260.00	823.79	824.34	215.00	814.10	0.0	0.0	0.0	0.55	11.76	0.0	917.29

Flow change for 50-year, 100-year, and 500-year events

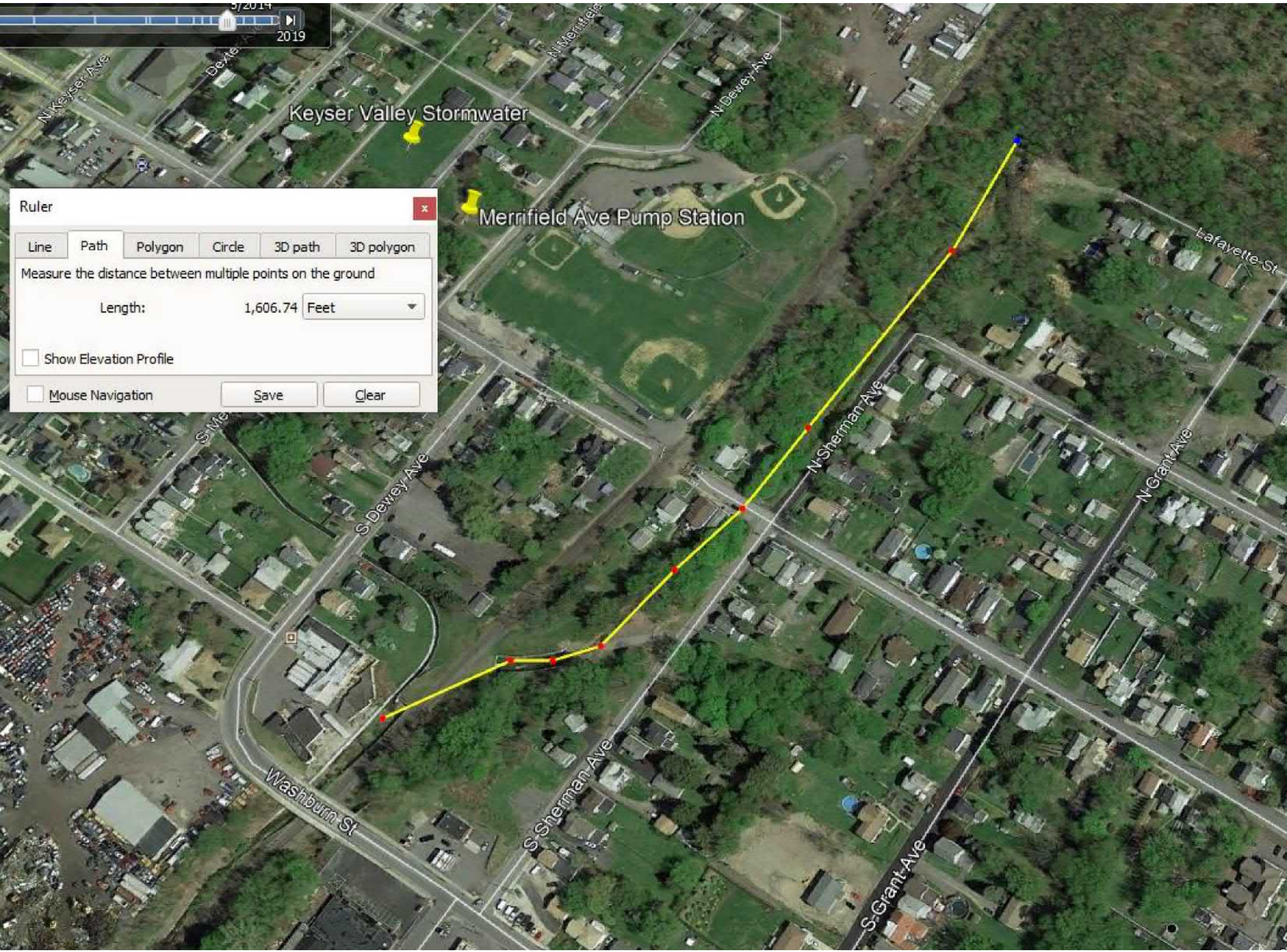
CROSS SECTION WITH 100-YR ELEV CLOSE TO 819.69 (819+0.690).

	SECNO	Q	CWSEL	EG	XLCH	ELMIN	ELLC	ELTRD	CASE	HV	VCH	WSELK	.01K
	73.020	950.00	821.46	821.50	10.00	814.10	819.30	819.30	0.0	0.04	2.68	0.0	181.07
	73.020	2200.00	822.45	822.54	10.00	814.10	819.30	819.30	0.0	0.08	3.56	0.0	378.91
	73.020	3050.00	822.94	823.05	10.00	814.10	819.30	819.30	0.0	0.11	4.04	0.0	498.81
	73.020	6260.00	824.35	824.50	10.00	814.10	819.30	819.30	0.0	0.15	4.80	0.0	1028.67
	73.100	950.00	821.59	821.63	50.00	814.10	819.30	819.30	0.0	0.04	2.45	0.0	203.62
	73.100	2200.00	822.62	822.69	50.00	814.10	819.30	819.30	0.0	0.07	3.31	0.0	418.47
	73.100	3050.00	823.12	823.22	50.00	814.10	819.30	819.30	0.0	0.10	3.76	0.0	549.51
	73.100	6260.00	824.54	824.68	50.00	814.10	819.30	819.30	0.0	0.13	4.47	0.0	1129.23
	73.200	950.00	821.55	821.69	10.00	814.10	0.0	0.0	0.0	0.14	4.65	0.0	294.89
	73.200	2200.00	822.57	822.79	10.00	814.10	0.0	0.0	0.0	0.22	6.64	0.0	521.50
	73.200	3050.00	823.07	823.33	10.00	814.10	0.0	0.0	0.0	0.26	7.58	0.0	658.02
	73.200	6260.00	824.49	824.78	10.00	814.10	0.0	0.0	0.0	0.29	9.06	0.0	1249.04
ZF	74.000	950.00	821.73	821.75	65.00	814.20	0.0	0.0	0.0	0.02	1.74	0.0	665.64
	74.000	2200.00	822.83	822.89	65.00	814.20	0.0	0.0	0.0	0.06	3.00	0.0	999.78
	74.000	3050.00	823.37	823.45	65.00	814.20	0.0	0.0	0.0	0.08	3.68	0.0	1186.47
	74.000	6260.00	824.77	824.93	65.00	814.20	0.0	0.0	0.0	0.16	5.38	0.0	1858.03
ZG	75.000	950.00	821.77	821.79	197.00	814.90	0.0	0.0	0.0	0.02	1.61	0.0	676.76
	75.000	2200.00	822.93	822.98	197.00	814.90	0.0	0.0	0.0	0.05	2.72	0.0	1052.55
	75.000	3050.00	823.50	823.58	197.00	814.90	0.0	0.0	0.0	0.07	3.31	0.0	1268.65
	75.000	6260.00	824.99	825.14	197.00	814			.0	0.14	4.87	0.0	2005.45
ZH	76.000	950.00	821.81	821.86	178.00	816			.0	0.05	2.72	0.0	372.48
	76.000	2200.00	823.02	823.10	178.00	816			.0	0.08	3.84	0.0	706.53
	76.000	3050.00	823.62	823.72	178.00	816			.0	0.10	4.39	0.0	911.88
	76.000	6260.00	825.19	825.36	178.00	816.10	0.0	0.0	0.0	0.17	5.97	0.0	1583.54
ZI	77.000	950.00	822.24	822.55	340.00	820.00	0.0	0.0	0.0	0.32	6.35	0.0	79.54
	77.000	2200.00	823.54	823.99	340.00	820.00	0.0	0.0	0.0	0.44	7.65	0.0	223.50
	77.000	3050.00	824.17	824.72	340.00	820.00	0.0	0.0	0.0	0.55	8.59	0.0	312.17
	77.000	6260.00	825.84	826.66	340.00	820.00	0.0	0.0	0.0	0.82	11.09	0.0	638.22
ZJ	78.000	950.00	826.98	827.93	39					0.95	8.38	0.0	86.34
*	78.000	2200.00	828.42	829.90	39					1.47	11.05	0.0	197.75
*	78.000	3050.00	829.15	830.93	39					1.78	12.37	0.0	271.16
*	78.000	6260.00	831.50	833.89	39					2.39	15.02	0.0	589.53
*	78.100	950.00	832.02	833.41	289.00	825.40	0.0	0.0	11.00	1.39	11.62	0.0	167.13
*	78.100	2200.00	834.29	837.16	289.00	825.40	0.0	0.0	11.00	2.87	17.63	0.0	311.17
*	78.100	3050.00	835.93	839.03	289.00	825.40	0.0	0.0	11.00	3.10	18.99	0.0	448.64
*	78.100	6260.00	840.08	842.66	289.00	825.40	0.0	0.0	11.00	2.58	20.16	0.0	1084.02
	78.200	950.00	837.99	838.13	32.00	824.50	829.20	837.10	0.0	0.14	4.26	0.0	718.97
	78.200	2200.00	838.99	839.48	32.00	824.50	829.20	837.10	0.0	0.49	8.33	0.0	895.67
	78.200	3050.00	839.44	840.22	3					0.78	10.73	0.0	983.89
	78.200	6260.00	840.42	842.66	3					2.24	18.86	0.0	1200.48
ZK	80.000	950.00	838.04	838.25	2					0.21	4.60	0.0	314.24
	80.000	2200.00	839.26	839.78	2					0.52	7.87	0.0	462.05
	80.000	3050.00	840.00	840.67	269.00	827.30	0.0	0.0	0.0	0.67	9.23	0.0	571.08
	80.000	6260.00	843.03	843.85	269.00	827.30	0.0	0.0	0.0	0.82	11.11	0.0	1141.68

Total Channel distance is approximately 1500 feet. This matches the distance in Google Earth.

So 822.24' NGVD should be used for the tailwater condition for the 10-year storm. Converting to NAVD, that value would be 821.55' NAVD.

CROSS SECTION WITH 100-YR ELEV CLOSE TO 824.69 (824+0.690).


2019
Keyser Valley Stormwater
Merrifield Ave Pump Station
N Keyser Ave
N Dewey Ave
Lafayette St
N Sherman Ave
N Grant Ave
S Dewey Ave
Washburn St
S Sherman Ave
S Grant Ave
Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the distance between multiple points on the ground
Length:
1,606.74
Feet
Show Elevation Profile
Mouse Navigation
Save
Clear

EXISTING STORMWATER CALCULATIONS

Drainage Reports

Element Type: Pipe
Date: Thursday, September 23, 2021 10:53:56 AM
Drainage Data File: Keyser Valley Drainage

ID	US-Station	DS-Station	Shape	Height (in)	Width (in)	Material	Manning "n"	PipeLength (ft)	InvertIn (ft)	InvertOut (ft)	Slope (%)
EXISTING NETWORK STARTING AT DRY BASIN											
P-A1	0+00	0+00	Circular	24	24	CMP	0.024	610	892.32	858.96	5.47
P-A2	0+00	0+00	Circular	24	24	CMP	0.024	526	858.87	840.63	3.47
CAMERON AVENUE CONNECTION											
P-A3	0+00	0+00	Circular	18	18	CPP	0.013	89	837.19	833.90	3.70
EXISTING BRIGGS STREET NETWORK											
P-A4	0+00	0+00	Circular	18	18	CPP	0.013	7	834.04	832.65	20.90
P-A5	0+00	0+00	Circular	24	24	CPP	0.013	148	834.94	834.53	0.28
P-A6	0+00	0+00	Circular	24	24	CPP	0.013	65	834.34	833.78	0.86
P-A7	0+00	0+00	Circular	15	15	CPP	0.013	17	833.73	833.16	3.38
P-A8	0+00	0+00	Circular	18	18	CPP	0.013	87	853.72	852.95	0.88
P-A9	0+00	0+00	Circular	18	18	CPP	0.013	22	852.95	852.43	2.41
P-A10	0+00	0+00	Circular	18	18	CPP	0.013	224	852.19	842.57	4.29
P-A11	0+00	0+00	Circular	15	15	RCP	0.012	47	844.95	842.87	4.43
P-A12	0+00	0+00	Circular	18	18	CPP	0.013	181	842.42	833.79	4.76
P-A13	0+00	0+00	Circular	18	18	RCP	0.012	54	836.69	833.79	5.35
P-A14	0+00	0+00	Circular	18	18	RCP	0.012	25	833.29	833.05	0.97
P-A15	0+00	0+00	Circular	18	18	RCP	0.012	18	833.02	832.75	1.48
P-A16	0+00	0+00	Circular	18	18	CPP	0.013	6	832.75	832.52	3.57
P-A17	0+00	0+00	Circular	18	18	RCP	0.012	214	832.44	831.09	0.63
P-A18	0+00	0+00	Circular	18	18	RCP	0.012	158	832.29	831.16	0.72
P-A19	0+00	0+00	Circular	18	18	RCP	0.012	77	831.96	831.11	1.11
P-A20	0+00	0+00	Circular	18	18	RCP	0.012	24	831.63	831.27	1.52
P-A21A	0+00	0+00	Circular	18	18	RCP	0.012	215	831.07	830.00	0.50
P-A21B	0+00	0+00	Circular	18	18	RCP	0.012	70	829.62	829.27	0.50
P-A22	0+00	0+00	Circular	18	18	CPP	0.013	36	830.13	829.27	2.39
P-A23	0+00	0+00	Circular	36	36	RCP	0.012	317	829.02	828.00	0.32
P-A24	0+00	0+00	Circular	36	36	CPP	0.013	103	827.84	827.33	0.50
P-A25A	0+00	0+00	Circular	36	36	CPP	0.013	305	827.00	817.24	3.20
P-A25B	0+00	0+00	Circular	36	36	CPP	0.013	291	818.62	816.96	0.57
P-A26	0+00	0+00	Circular	36	36	CPP	0.013	97	816.66	817.07	-0.42

Number of items reported: 28

10-YEAR STORM EVENT

Element Type: Pipe

Date: Thursday, September 23, 2021 10:53:50 AM

Drainage Data File: Keyser Valley Drainage

ID	Flow Depth (ft)	Velocity (ft/s)	Design Flow (cfs)	Capacity (cfs)
EXISTING NETWORK STARTING AT DRY BASIN				
P-A1	2.00	8.5	26.70	28.67
P-A2	2.00	9.5	29.87	22.81
CAMERON AVENUE CONNECTION				
P-A3	1.50	17.6	31.03	20.22
EXISTING BRIGGS STREET NETWORK				
P-A4	1.50	18.1	31.99	48.02
P-A5	2.00	0.4	1.30	11.90
P-A6	2.00	0.7	2.35	20.93
P-A7	1.25	2.6	3.22	11.88
P-A8	1.50	1.6	2.88	9.86
P-A9	1.50	2.9	5.17	16.29
P-A10	1.50	3.9	6.88	21.75
P-A11	1.25	0.4	0.46	14.73
P-A12	1.50	5.1	8.93	22.91
P-A13	1.50	0.3	0.53	26.33
P-A14	1.50	6.1	10.77	11.22
P-A15	1.50	8.7	15.41	13.83
P-A16	1.50	27.8	49.10	19.86
P-A17	1.50	28.5	50.30	9.04
P-A18	1.50	0.3	0.54	9.63
P-A19	1.50	0.2	0.41	11.99
P-A20	1.50	0.8	1.50	14.03
P-A21A	1.50	30.0	52.93	8.05
P-A21B	1.50	30.0	52.93	8.05
P-A22	1.50	4.2	7.45	16.25
P-A23	3.00	8.7	61.52	40.96
P-A24	3.00	9.1	64.30	47.16
P-A25A	1.60	17.3	66.20	119.33
P-A25B	3.00	1.5	10.56	50.39
P-A26	3.00	11.5	81.06	43.47

Number of items reported: 28

HGL/EGL Computations:

Warning: System surcharged at UH-A2.
Warning: System surcharged at I-A21.
Warning: System surcharged at I-A17.
Warning: System surcharged at I-A16.
Warning: System surcharged at I-A4.
Warning: System surcharged at I-A3.
Warning: System surcharged at I-A2.
Warning: System surcharged at I-A21.
Warning: System surcharged at I-A20.
Warning: System surcharged at I-A18.
Warning: System surcharged at I-A16.
Warning: System surcharged at I-A15.
Warning: System surcharged at I-A14.
Warning: System surcharged at I-A12.
Warning: System surcharged at I-A10.
Warning: System surcharged at I-A9.
Warning: System surcharged at I-A8.
Warning: System surcharged at I-A20.
Warning: System surcharged at I-A19.
Warning: System surcharged at I-A15.
Warning: System surcharged at I-A7.
Warning: System surcharged at I-A6.
Warning: System surcharged at I-A5.
Warning: System surcharged at I-A14.
Warning: System surcharged at I-A13.
Warning: System surcharged at I-A12.
Warning: System surcharged at I-A11.

Table A:

Struct_ID	D (in)	Q (cfs)	L (ft)	V (ft/s)	d (ft)	dc (ft)	V^2/2g (ft)	Sf (ft/ft)	Dn_Soffit (ft)	EGLdn (ft)	HGLdn (ft)	Tot_Loss (ft)	EGLup (ft)	HGLup (ft)	Rim_Elev. (ft)	
Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	820.07	-	
(Alternate HGL and EGL Used)													822.11	820.07		
P-A26	36	81.06	96.51	11.47	-	-	2.04	0.0148	820.07	822.11	820.07	1.43	823.54	821.50	-	
I-A26	-	-	-	-	-	-	-	-	-	823.54	821.50	1.42	824.96	822.91	839.34	
P-A25A	36	66.20	305.07	17.31	-	-	4.65	0.0099	820.24	824.96	822.91	-	833.25	828.60	-	
I-A25	-	-	-	-	-	-	-	-	-	833.25	828.60	2.31	832.19	830.90	840.48	
P-A24	36	64.30	102.94	9.10	-	-	1.29	0.0093	830.33	832.19	830.90	0.96	833.15	831.86	-	
I-A24	-	-	-	-	-	-	-	-	-	833.15	831.86	0.12	833.27	831.98	840.49	
P-A23	36	61.52	317.49	8.70	-	-	1.18	0.0072	831.00	833.27	831.98	2.30	835.57	834.39	-	
I-A23	-	-	-	-	-	-	-	-	-	835.57	834.39	0.78	836.34	835.17	837.87	
P-A21B	18	52.93	72.37	29.95	-	-	13.94	0.2164	830.77	836.34	835.17	15.66	852.00	838.06	-	
UH-A2	-	-	-	-	-	-	-	-	-	852.00	838.06	15.97	867.97	854.03	838.28*** Surcharged ***	
P-A21A	18	52.93	216.75	29.95	-	-	13.94	0.2164	831.50	867.97	854.03	46.89	914.87	900.92	-	
I-A21	-	-	-	-	-	-	-	-	-	914.87	900.92	3.89	918.75	904.81	835.07*** Surcharged ***	

P-A17	18	50.30	214.01	28.46	-	-	12.59	0.1954	832.59	918.75	904.81	41.81	960.56	947.97	-
I-A17	-	-	-	-	-	-	-	-	-	960.56	947.97	3.26	963.82	951.23	836.82*** Surcharged ***
P-A16	18	49.10	6.44	27.79	-	-	12.00	0.2185	834.02	963.82	951.23	1.41	965.22	953.22	-
I-A16	-	-	-	-	-	-	-	-	-	965.22	953.22	10.84	976.06	964.06	837.20*** Surcharged ***
P-A4	18	31.99	6.79	18.11	-	-	5.09	0.0928	834.15	976.06	964.06	0.63	976.69	971.60	-
I-A4	-	-	-	-	-	-	-	-	-	976.69	971.60	3.53	980.22	975.13	837.19*** Surcharged ***
P-A3	18	31.03	88.89	17.56	-	-	4.79	0.0872	835.40	980.22	975.13	7.76	987.98	983.19	-
I-A3	-	-	-	-	-	-	-	-	-	987.98	983.19	3.24	991.22	986.42	840.42*** Surcharged ***
P-A2	24	29.87	526.57	9.51	-	-	1.40	0.0594	842.63	991.22	986.42	31.28	1022.50	1021.10	-
I-A2	-	-	-	-	-	-	-	-	-	1022.50	1021.10	0.30	1022.80	1021.39	858.84*** Surcharged ***
P-A1	24	26.70	610.45	8.50	-	-	1.12	0.0475	860.96	1022.80	1021.39	28.98	1051.78	1050.66	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	823.54	821.50	-
I-A26	-	-	-	-	-	-	-	-	-	823.54	821.50	0.34	823.88	821.84	839.34
P-A25B	36	10.56	290.79	1.49	-	-	0.03	0.0003	819.96	823.88	821.84	0.07	823.96	823.92	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	835.57	834.39	-
I-A23	-	-	-	-	-	-	-	-	-	835.57	834.39	0.41	835.97	834.80	837.87
P-A22	18	7.45	35.94	4.22	-	-	0.28	0.0050	830.77	835.97	834.80	0.18	836.16	835.88	-
I-A22	-	-	-	-	-	-	-	-	-	836.16	835.88	-	836.16	835.88	837.98
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	914.87	900.92	-
I-A21	-	-	-	-	-	-	-	-	-	914.87	900.92	0.48	915.35	901.41	835.07*** Surcharged ***
P-A20	18	1.50	23.67	0.85	-	-	0.01	0.0002	832.77	915.35	901.41	0.00	915.35	915.34	-
I-A20	-	-	-	-	-	-	-	-	-	915.35	915.34	0.01	915.36	915.35	835.16*** Surcharged ***
P-A18	18	0.54	157.84	0.31	-	-	0.00	0.0000	832.66	915.36	915.35	0.00	915.36	915.36	-
I-A18	-	-	-	-	-	-	-	-	-	915.36	915.36	-	915.36	915.36	836.24*** Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	965.22	953.22	-
I-A16	-	-	-	-	-	-	-	-	-	965.22	953.22	5.66	970.89	958.89	837.20*** Surcharged ***
P-A15	18	15.41	18.28	8.72	-	-	1.18	0.0183	834.25	970.89	958.89	0.34	971.22	970.04	-
I-A15	-	-	-	-	-	-	-	-	-	971.22	970.04	0.42	971.64	970.46	837.80*** Surcharged ***
P-A14	18	10.77	24.70	6.10	-	-	0.58	0.0090	834.55	971.64	970.46	0.22	971.86	971.29	-
I-A14	-	-	-	-	-	-	-	-	-	971.86	971.29	0.19	972.05	971.47	838.24*** Surcharged ***
P-A12	18	8.93	181.64	5.05	-	-	0.40	0.0072	835.29	972.05	971.47	1.31	973.36	972.97	-
I-A12	-	-	-	-	-	-	-	-	-	973.36	972.97	0.13	973.50	973.10	846.37*** Surcharged ***
P-A10	18	6.88	224.61	3.90	-	-	0.24	0.0043	844.07	973.50	973.10	0.96	974.46	974.23	-
I-A10	-	-	-	-	-	-	-	-	-	974.46	974.23	0.27	974.73	974.50	- *** Surcharged ***
P-A9	18	5.17	21.62	2.93	-	-	0.13	0.0024	853.93	974.73	974.50	0.05	974.79	974.65	-
I-A9	-	-	-	-	-	-	-	-	-	974.79	974.65	0.16	974.95	974.81	857.80*** Surcharged ***
P-A8	18	2.88	87.36	1.63	-	-	0.04	0.0008	854.45	974.95	974.81	0.07	975.01	974.97	-
I-A8	-	-	-	-	-	-	-	-	-	975.01	974.97	-	975.01	974.97	859.42*** Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	915.35	915.34	-
I-A20	-	-	-	-	-	-	-	-	-	915.35	915.34	0.00	915.36	915.35	835.16*** Surcharged ***
P-A19	18	0.41	76.58	0.23	-	-	0.00	0.0000	832.61	915.36	915.35	0.00	915.36	915.36	-
I-A19	-	-	-	-	-	-	-	-	-	915.36	915.36	-	915.36	915.36	835.40*** Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	971.22	970.04	-
I-A15	-	-	-	-	-	-	-	-	-	971.22	970.04	0.71	971.93	970.75	837.80*** Surcharged ***

P-A7	15	3.22	16.87	2.63	-	-	0.11	0.0025	834.41	971.93	970.75	0.04	971.97	971.87	-
I-A7	-	-	-	-	-	-	-	-	-	971.97	971.87	0.02	971.99	971.88	837.88*** Surcharged ***
P-A6	24	2.35	65.43	0.75	-	-	0.01	0.0001	835.78	971.99	971.88	0.01	972.00	971.99	-
I-A6	-	-	-	-	-	-	-	-	-	972.00	971.99	0.00	972.00	971.99	840.88*** Surcharged ***
P-A5	24	1.30	148.26	0.41	-	-	0.00	0.0000	836.53	972.00	971.99	0.00	972.01	972.00	-
I-A5	-	-	-	-	-	-	-	-	-	972.01	972.00	-	972.01	972.00	843.39*** Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	971.86	971.29	-
I-A14	-	-	-	-	-	-	-	-	-	971.86	971.29	0.54	972.41	971.83	838.24*** Surcharged ***
P-A13	18	0.53	54.25	0.30	-	-	0.00	0.0000	835.29	972.41	971.83	0.00	972.41	972.41	-
I-A13	-	-	-	-	-	-	-	-	-	972.41	972.41	-	972.41	972.41	839.97*** Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	973.36	972.97	-
I-A12	-	-	-	-	-	-	-	-	-	973.36	972.97	0.62	973.99	973.59	846.37*** Surcharged ***
P-A11	15	0.46	47.01	0.37	-	-	0.00	0.0000	844.12	973.99	973.59	0.00	973.99	973.99	-
I-A11	-	-	-	-	-	-	-	-	-	973.99	973.99	-	973.99	973.99	848.05*** Surcharged ***

PROPOSED STORMWATER CALCULATIONS

PROPOSED MPROVEMENT 5.1 - CONVEYANCE OUTFALL

Element Type: Pipe Physical Characteristics
Date: Monday, September 20, 2021 3:45:35 PM
Drainage Data File: PROPOSED_Kesyer Valley Drainage

ID	US-Station	DS-Station	Shape	Height (in)	Width (in)	Material	Manning "n"	PipeLength (ft)	InvertIn (ft)	InvertOut (ft)	Slope (%)
REVISED NETWORK DOWNSTREAM OF NORTH CAMERON STREET TAKING DRY BASIN FLOW ONLY											
P-A1	0+00	0+00	Circular	42	42	RCP	0.012	610	892.32	858.96	5.47
P-A2	0+00	0+00	Circular	42	42	RCP	0.012	526	858.87	840.63	3.47
P-A3-A	0+00	0+00	Circular	42	42	RCP	0.012	480	835.50	831.70	0.79
P-A3-B	0+00	0+00	Circular	42	42	RCP	0.012	554	831.00	822.00	1.62
EXISTING BRIGGS STREET NETWORK WITH REMOVED FLOW											
P-A4	0+00	0+00	Circular	18	18	CPP	0.013	7	834.04	832.65	20.90
P-A5	0+00	0+00	Circular	24	24	CPP	0.013	148	834.94	834.53	0.28
P-A6	0+00	0+00	Circular	24	24	CPP	0.013	65	834.34	833.78	0.86
P-A7	0+00	0+00	Circular	15	15	CPP	0.013	17	833.73	833.16	3.38
P-A8	0+00	0+00	Circular	18	18	CPP	0.013	87	853.72	852.95	0.88
P-A9	0+00	0+00	Circular	18	18	CPP	0.013	22	852.95	852.43	2.41
P-A10	0+00	0+00	Circular	18	18	CPP	0.013	224	852.19	842.57	4.29
P-A11	0+00	0+00	Circular	15	15	RCP	0.012	47	844.95	842.87	4.43
P-A12	0+00	0+00	Circular	18	18	CPP	0.013	181	842.42	833.79	4.76
P-A13	0+00	0+00	Circular	18	18	RCP	0.012	54	836.69	833.79	5.35
P-A14	0+00	0+00	Circular	18	18	RCP	0.012	25	833.29	833.05	0.97
P-A15	0+00	0+00	Circular	18	18	RCP	0.012	18	833.02	832.75	1.48
P-A16	0+00	0+00	Circular	18	18	CPP	0.013	6	832.75	832.52	3.57
P-A17	0+00	0+00	Circular	18	18	RCP	0.012	214	832.44	831.09	0.63
P-A18	0+00	0+00	Circular	18	18	RCP	0.012	158	832.29	831.16	0.72
P-A19	0+00	0+00	Circular	18	18	RCP	0.012	77	831.96	831.11	1.11
P-A20	0+00	0+00	Circular	18	18	RCP	0.012	24	831.63	831.27	1.52
P-A21A	0+00	0+00	Circular	18	18	RCP	0.012	215	831.07	830.00	0.50
P-A21B	0+00	0+00	Circular	18	18	RCP	0.012	70	829.62	829.27	0.50
P-A22	0+00	0+00	Circular	18	18	CPP	0.013	36	830.13	829.27	2.39
P-A23	0+00	0+00	Circular	36	36	RCP	0.012	317	829.02	828.00	0.32
P-A24	0+00	0+00	Circular	36	36	CPP	0.013	103	827.84	827.33	0.50
P-A25A	0+00	0+00	Circular	36	36	CPP	0.013	305	827.00	817.24	3.20
P-A25B	0+00	0+00	Circular	36	36	CPP	0.013	291	818.62	816.96	0.57
P-A26	0+00	0+00	Circular	48	48	CPP	0.013	97	816.66	816.32	0.35

PROPOSED MPROVEMENT 5.3 - NEW CONVEYANCE SYSTEM

PROPOSED SYSTEM STARTING AT NEWTON STREET											
P-CBYPASS	0+00	0+00	Circular	36	36	RCP	0.012	43	986.15	986.00	0.35
P-C1	0+00	0+00	Circular	36	36	RCP	0.012	444	986.00	975.00	2.48
P-C2-A	0+00	0+00	Circular	36	36	RCP	0.012	211	975.00	972.00	1.42
P-C2-B	0+00	0+00	Circular	36	36	RCP	0.012	1661	973.00	860.00	6.80
P-C3	0+00	0+00	Circular	36	36	RCP	0.012	51	860.00	856.00	7.90

10-YEAR STORM EVENT

Element Type: Pipe Flow Characteristics
Date: Monday, September 20, 2021 3:41:01 PM
Drainage Data File: PROPOSED_Kesyer Valley Drainage

ID	Flow Depth (ft)	Velocity (ft/s)	Design Flow (cfs)	Capacity (cfs)
REVISED NETWORK DOWNSTREAM OF NORTH CAMERON STREET TAKING DRY BASIN FLOW ONLY				
P-A1	1.29	23.0	73.97	254.98
P-A2	1.50	19.6	77.14	202.92
P-A3-A	2.38	11.2	78.30	96.99
P-A3-B	1.88	14.9	78.30	138.88
EXISTING BRIGGS STREET NETWORK WITH REMOVED FLOW				
P-A4	1.50	0.5	0.97	48.02
P-A5	2.00	0.4	1.30	11.90
P-A6	2.00	0.7	2.35	20.93
P-A7	1.25	2.6	3.22	11.88
P-A8	1.50	1.6	2.88	9.86
P-A9	1.50	2.9	5.17	16.29
P-A10	1.50	3.9	6.88	21.75
P-A11	1.25	0.4	0.46	14.73
P-A12	1.50	5.1	8.93	22.91
P-A13	1.50	0.3	0.53	26.33
P-A14	1.50	6.1	10.77	11.22
P-A15	1.50	8.7	15.41	13.83
P-A16	1.50	10.2	18.08	19.86
P-A17	1.50	10.9	19.27	9.04
P-A18	1.50	0.3	0.54	9.63
P-A19	1.50	0.2	0.41	11.99
P-A20	1.50	0.8	1.50	14.03
P-A21A	1.50	12.4	21.90	8.05
P-A21B	1.50	12.4	21.90	8.05
P-A22	1.50	4.2	7.45	16.25
P-A23	1.93	6.3	30.49	40.96
P-A24	1.86	7.2	33.27	47.16
P-A25A	1.11	14.7	35.17	119.33
P-A25B	3.00	1.5	10.56	50.39
P-A26	4.00	4.0	50.03	84.98
PROPOSED SYSTEM STARTING AT NEWTON STREET				
P-CBYPASS	3.00	13.5	95.19	42.75
P-C1	2.10	18.0	95.19	113.70
P-C2-A	3.00	13.5	95.19	86.17
P-C2-B	1.51	26.7	95.19	188.44
P-C3	1.44	28.3	95.19	203.04

Design Log

==
InRoads Storm & Sanitary Design Log

Drainage File: X:\SCR-2021234.00_Keyser Valley Stormwater & Flood Mitigate Study\InRoads\Drainage\PROPOSED_Keyser Valley Drainage.sdb

Design File: X:\SCR-2021234.00_Keyser Valley Stormwater & Flood Mitigate Study\EngWaterRes\Base Files\Keyser Valley_BASE_P-DRAIN.dgn

Display Log: X:\SCR-2021234.00_Keyser Valley Stormwater & Flood Mitigate Study\EngWaterRes\Base Files\design.log

Date: Monday, September 20, 2021 3:40:36 PM
==

HGL/EGL Computations:

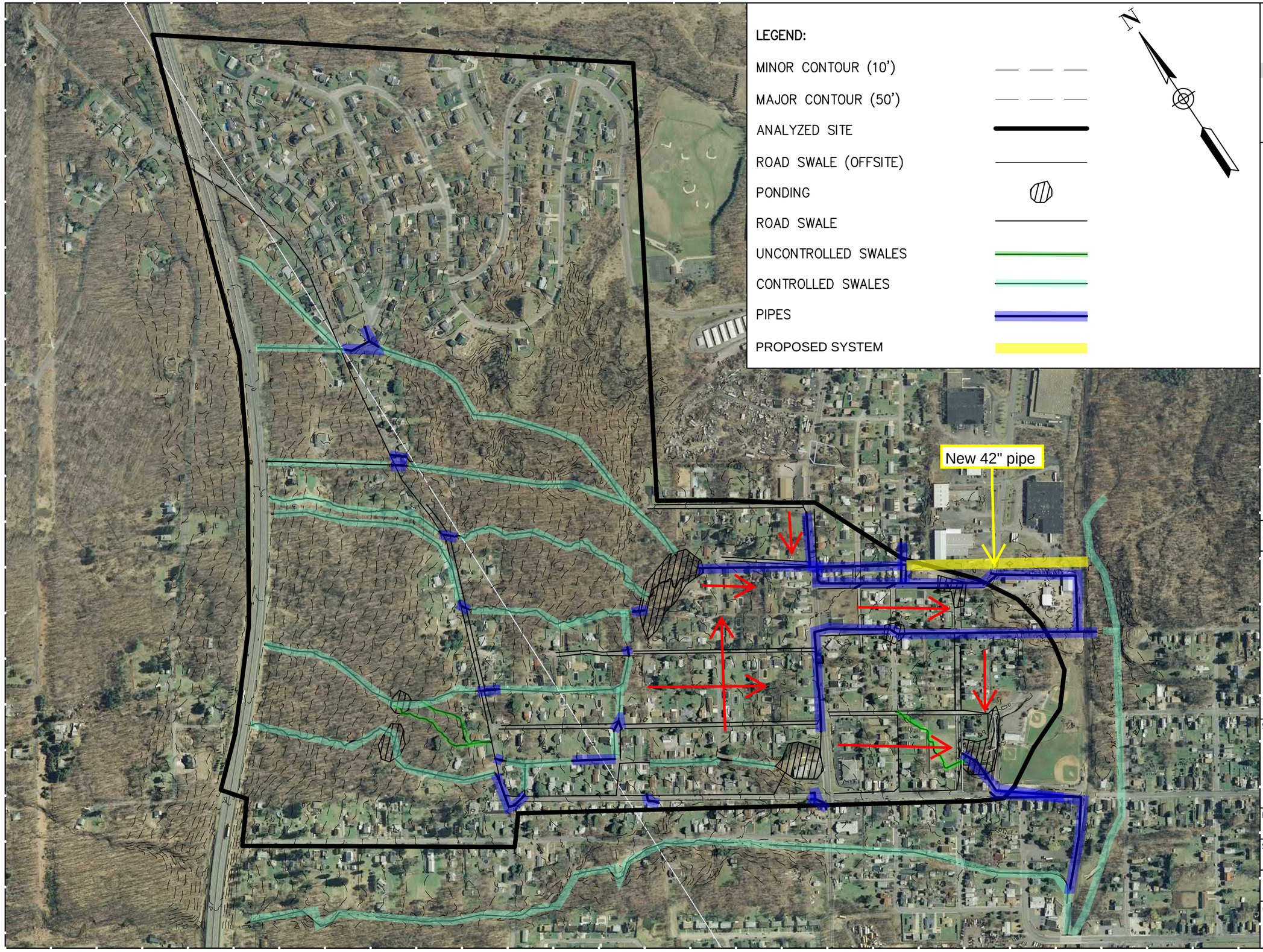
Warning: System surcharged at I-A21.
Warning: System surcharged at I-A17.
Warning: System surcharged at I-A16.
Warning: System surcharged at I-A15.
Warning: System surcharged at I-A14.
Warning: System surcharged at I-A12.
Warning: System surcharged at I-A10.
Warning: System surcharged at I-A21.
Warning: System surcharged at I-A20.
Warning: System surcharged at I-A18.
Warning: System surcharged at I-A16.
Warning: System surcharged at I-A4.
Warning: System surcharged at I-A15.
Warning: System surcharged at I-A7.
Warning: System surcharged at I-A6.
Warning: System surcharged at I-A5.
Warning: System surcharged at I-A14.
Warning: System surcharged at I-A13.
Warning: System surcharged at I-A12.
Warning: System surcharged at I-A11.
Warning: System surcharged at I-A20.
Warning: System surcharged at I-A19.

Table A:

Struct_ID	D (in)	Q (cfs)	L (ft)	V (ft/s)	d (ft)	dc (ft)	V^2/2g (ft)	Sf (ft/ft)	Dn_Soffit (ft)	EGLdn (ft)	HGLdn (ft)	Tot_Loss (ft)	EGLup (ft)	HGLup (ft)	Rim_Elev. (ft)
Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	821.55	-

P-A26	48	50.03	96.51	3.98	-	-	0.25	0.0012	820.32	821.80	821.55	0.12	821.91	821.67	-	
I-A26	-	-	-	-	-	-	-	-	-	821.91	821.67	0.12	822.03	821.78	839.34	
P-A25A	36	35.17	305.07	14.68	-	-	3.35	0.0028	820.24	822.03	821.78	-	831.47	828.12	-	
I-A25	-	-	-	-	-	-	-	-	-	831.47	828.12	-	831.47	828.12	840.48	
P-A24	36	33.27	102.94	7.23	1.86	1.87	0.81	-	830.33	830.00	829.18	-	830.51	829.70	-	
I-A24	-	-	-	-	-	-	-	-	-	830.51	829.70	0.05	830.56	829.75	840.49	
(Alternate HGL and EGL Used)													831.02	830.39		
P-A23	36	30.49	317.49	6.35	1.93	1.78	0.63	0.0032	831.00	831.02	830.39	1.02	832.04	831.41	-	
I-A23	-	-	-	-	-	-	-	-	-	832.04	831.41	0.24	832.28	831.65	837.87	
P-A21B	18	21.90	72.37	12.39	-	-	2.39	0.0370	830.77	832.28	831.65	2.68	834.96	832.57	-	
UH-A2	-	-	-	-	-	-	-	-	-	834.96	832.57	2.05	837.01	834.62	838.28	
P-A21A	18	21.90	216.75	12.39	-	-	2.39	0.0370	831.50	837.01	834.62	8.03	845.04	842.65	-	
I-A21	-	-	-	-	-	-	-	-	-	845.04	842.65	0.72	845.76	843.38	835.07***	Surcharged ***
P-A17	18	19.27	214.01	10.90	-	-	1.85	0.0287	832.59	845.76	843.38	6.14	851.90	850.05	-	
I-A17	-	-	-	-	-	-	-	-	-	851.90	850.05	0.48	852.38	850.53	836.82***	Surcharged ***
P-A16	18	18.08	6.44	10.23	-	-	1.63	0.0296	834.02	852.38	850.53	0.19	852.57	850.94	-	
I-A16	-	-	-	-	-	-	-	-	-	852.57	850.94	0.55	853.11	851.49	837.20***	Surcharged ***
P-A15	18	15.41	18.28	8.72	-	-	1.18	0.0183	834.25	853.11	851.49	0.34	853.45	852.27	-	
I-A15	-	-	-	-	-	-	-	-	-	853.45	852.27	0.42	853.87	852.69	837.80***	Surcharged ***
P-A14	18	10.77	24.70	6.10	-	-	0.58	0.0090	834.55	853.87	852.69	0.22	854.09	853.52	-	
I-A14	-	-	-	-	-	-	-	-	-	854.09	853.52	0.19	854.28	853.70	838.24***	Surcharged ***
P-A12	18	8.93	181.64	5.05	-	-	0.40	0.0072	835.29	854.28	853.70	1.31	855.59	855.20	-	
I-A12	-	-	-	-	-	-	-	-	-	855.59	855.20	0.13	855.73	855.33	846.37***	Surcharged ***
P-A10	18	6.88	224.61	3.90	-	-	0.24	0.0043	844.07	855.73	855.33	0.96	856.69	856.46	-	
I-A10	-	-	-	-	-	-	-	-	-	856.69	856.46	0.25	856.95	856.71	-	*** Surcharged ***
P-A9	18	5.17	21.62	2.93	-	-	0.13	0.0024	853.93	856.95	856.71	0.05	857.00	856.86	-	
I-A9	-	-	-	-	-	-	-	-	-	857.00	856.86	0.14	857.14	857.01	857.80	
P-A8	18	2.88	87.36	1.63	-	-	0.04	0.0008	854.45	857.14	857.01	0.07	857.21	857.17	-	
I-A8	-	-	-	-	-	-	-	-	-	857.21	857.17	-	857.21	857.17	859.42	
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	821.91	821.67	-	
I-A26	-	-	-	-	-	-	-	-	-	821.91	821.67	0.03	821.94	821.69	839.34	
P-A25B	36	10.56	290.79	1.49	-	-	0.03	0.0003	819.96	821.94	821.69	0.07	822.01	821.98	-	
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	832.04	831.41	-	
I-A23	-	-	-	-	-	-	-	-	-	832.04	831.41	0.13	832.16	831.54	837.87	
P-A22	18	7.45	35.94	4.22	-	-	0.28	0.0050	830.77	832.16	831.54	0.18	832.34	832.07	-	
I-A22	-	-	-	-	-	-	-	-	-	832.34	832.07	-	832.34	832.07	837.98	
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	845.04	842.65	-	
I-A21	-	-	-	-	-	-	-	-	-	845.04	842.65	0.20	845.24	842.85	835.07***	Surcharged ***
P-A20	18	1.50	23.67	0.85	-	-	0.01	0.0002	832.77	845.24	842.85	0.00	845.24	845.23	-	
I-A20	-	-	-	-	-	-	-	-	-	845.24	845.23	0.01	845.25	845.24	835.16***	Surcharged ***
P-A18	18	0.54	157.84	0.31	-	-	0.00	0.0000	832.66	845.25	845.24	0.00	845.25	845.25	-	
I-A18	-	-	-	-	-	-	-	-	-	845.25	845.25	-	845.25	845.25	836.24***	Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	852.57	850.94	-	
I-A16	-	-	-	-	-	-	-	-	-	852.57	850.94	0.28	852.85	851.22	837.20***	Surcharged ***
P-A4	18	0.97	6.79	0.55	-	-	0.00	0.0001	834.15	852.85	851.22	0.00	852.85	852.84	-	
I-A4	-	-	-	-	-	-	-	-	-	852.85	852.84	-	852.85	852.84	837.19***	Surcharged ***

New Branch	-	-	-	-	-	-	-	-	-	-	-	-	853.45	852.27	-	
I-A15	-	-	-	-	-	-	-	-	-	853.45	852.27	0.71	854.16	852.98	837.80***	Surcharged ***
P-A7	15	3.22	16.87	2.63	-	-	0.11	0.0025	834.41	854.16	852.98	0.04	854.20	854.09	-	
I-A7	-	-	-	-	-	-	-	-	-	854.20	854.09	0.02	854.22	854.11	837.88***	Surcharged ***
P-A6	24	2.35	65.43	0.75	-	-	0.01	0.0001	835.78	854.22	854.11	0.01	854.23	854.22	-	
I-A6	-	-	-	-	-	-	-	-	-	854.23	854.22	0.00	854.23	854.22	840.88***	Surcharged ***
P-A5	24	1.30	148.26	0.41	-	-	0.00	0.0000	836.53	854.23	854.22	0.00	854.23	854.23	-	
I-A5	-	-	-	-	-	-	-	-	-	854.23	854.23	-	854.23	854.23	843.39***	Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	854.09	853.52	-	
I-A14	-	-	-	-	-	-	-	-	-	854.09	853.52	0.54	854.64	854.06	838.24***	Surcharged ***
P-A13	18	0.53	54.25	0.30	-	-	0.00	0.0000	835.29	854.64	854.06	0.00	854.64	854.63	-	
I-A13	-	-	-	-	-	-	-	-	-	854.64	854.63	-	854.64	854.63	839.97***	Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	855.59	855.20	-	
I-A12	-	-	-	-	-	-	-	-	-	855.59	855.20	0.62	856.21	855.82	846.37***	Surcharged ***
P-A11	15	0.46	47.01	0.37	-	-	0.00	0.0000	844.12	856.21	855.82	0.00	856.22	856.21	-	
I-A11	-	-	-	-	-	-	-	-	-	856.22	856.21	-	856.22	856.21	848.05***	Surcharged ***
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	845.24	845.23	-	
I-A20	-	-	-	-	-	-	-	-	-	845.24	845.23	0.00	845.25	845.23	835.16***	Surcharged ***
P-A19	18	0.41	76.58	0.23	-	-	0.00	0.0000	832.61	845.25	845.23	0.00	845.25	845.25	-	
I-A19	-	-	-	-	-	-	-	-	-	845.25	845.25	-	845.25	845.25	835.40***	Surcharged ***



LEGEND:

- MINOR CONTOUR (10')
- MAJOR CONTOUR (50')
- ANALYZED SITE
- ROAD SWALE (OFFSITE)
- PONDING
- ROAD SWALE
- UNCONTROLLED SWALES
- CONTROLLED SWALES
- PIPES
- PROPOSED SYSTEM

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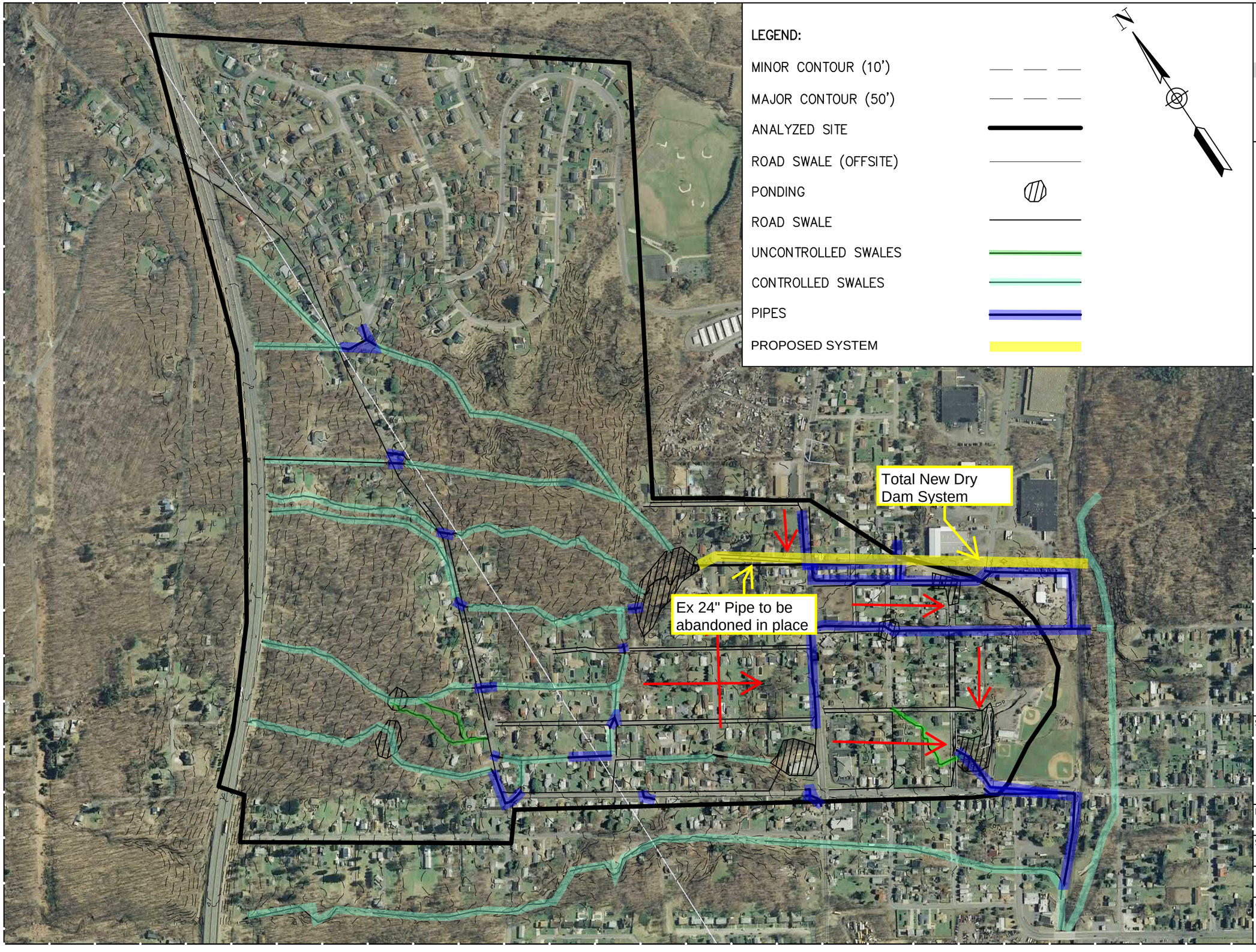
KEYSER VALLEY STORMWATER & FLOOD MITIGATION STUDY

Sheet Title

ADDITIONAL CONVEYANCE OUTFALL

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.1.1
Drawn: RHH	
Checked: MC	



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ADDITIONAL CONVEYANCE OUTFALL

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.1.2
Drawn: RHH	
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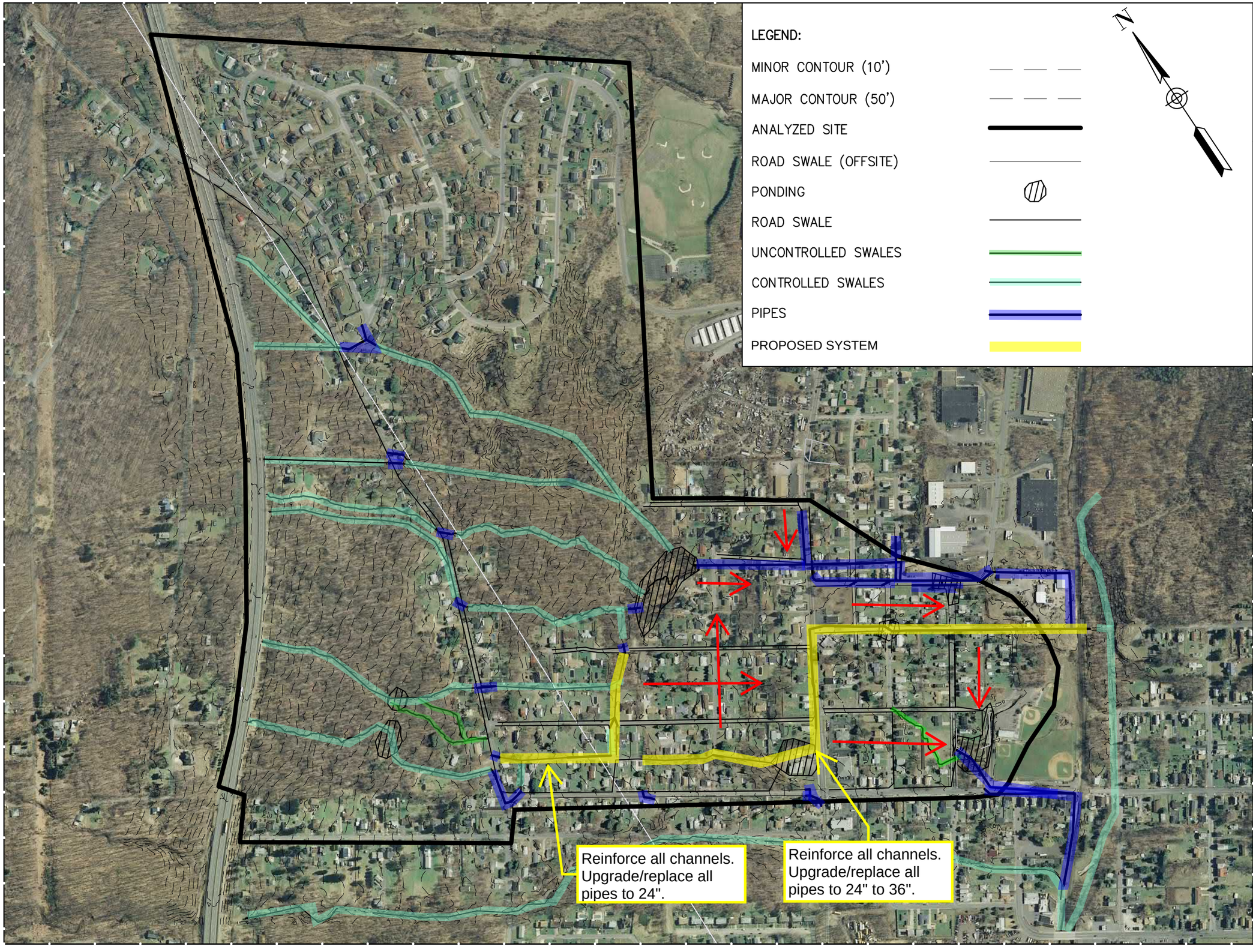

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Sheet Title

EXISTING SYSTEM UPGRADES

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.2
Drawn: RHH	
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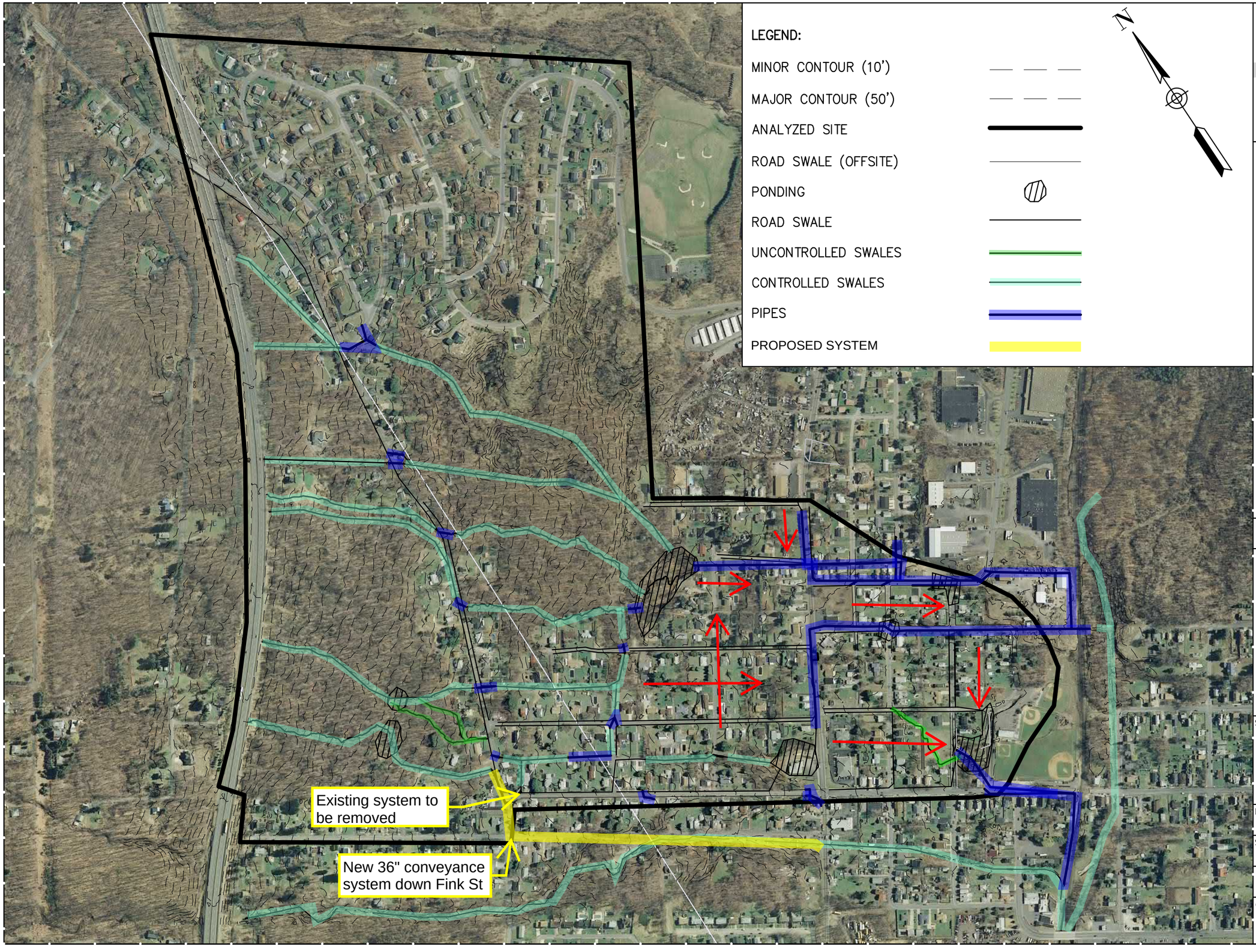

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Sheet Title

NEW CONVEYANCE SYSTEM

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.3.1
Drawn: RHH	
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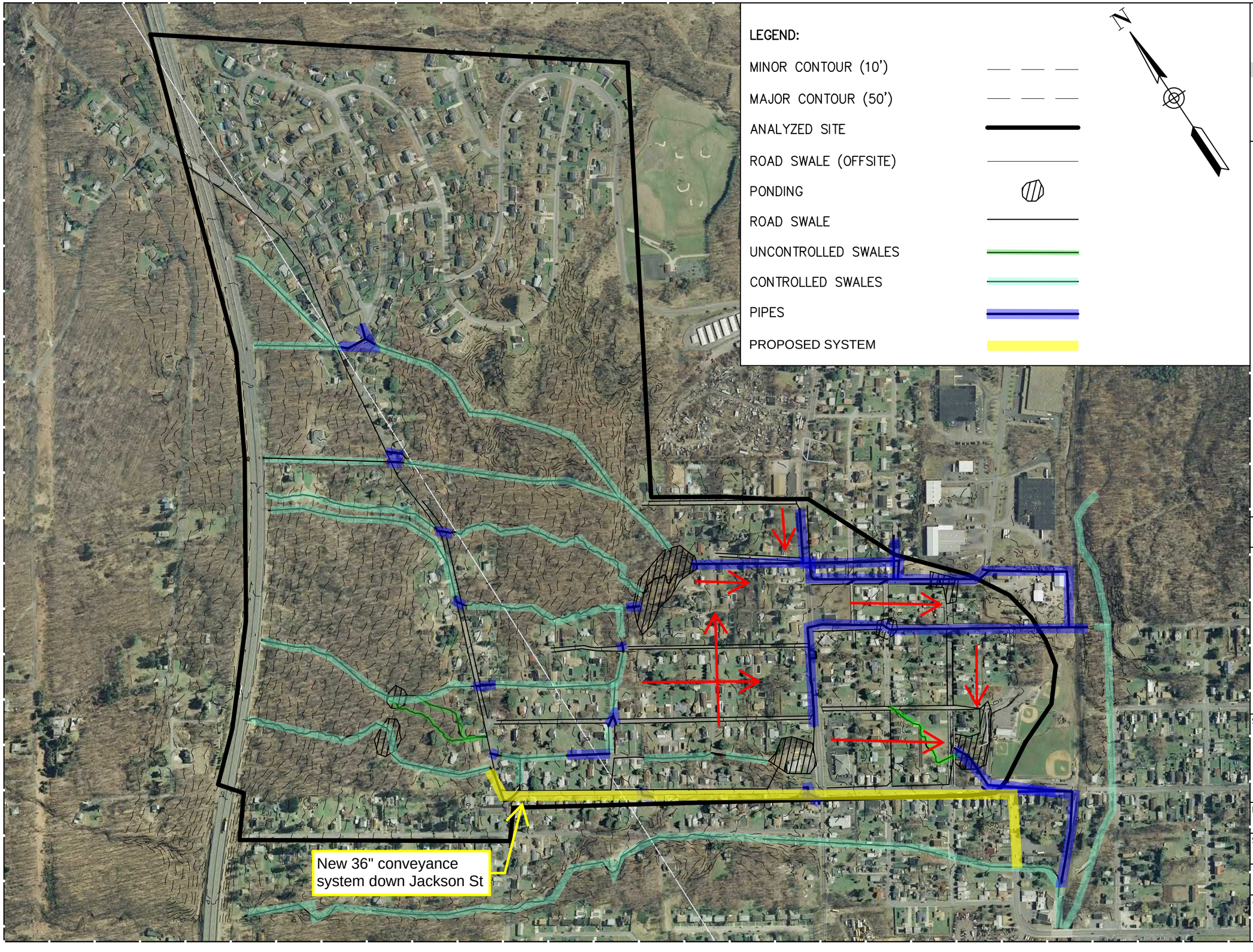

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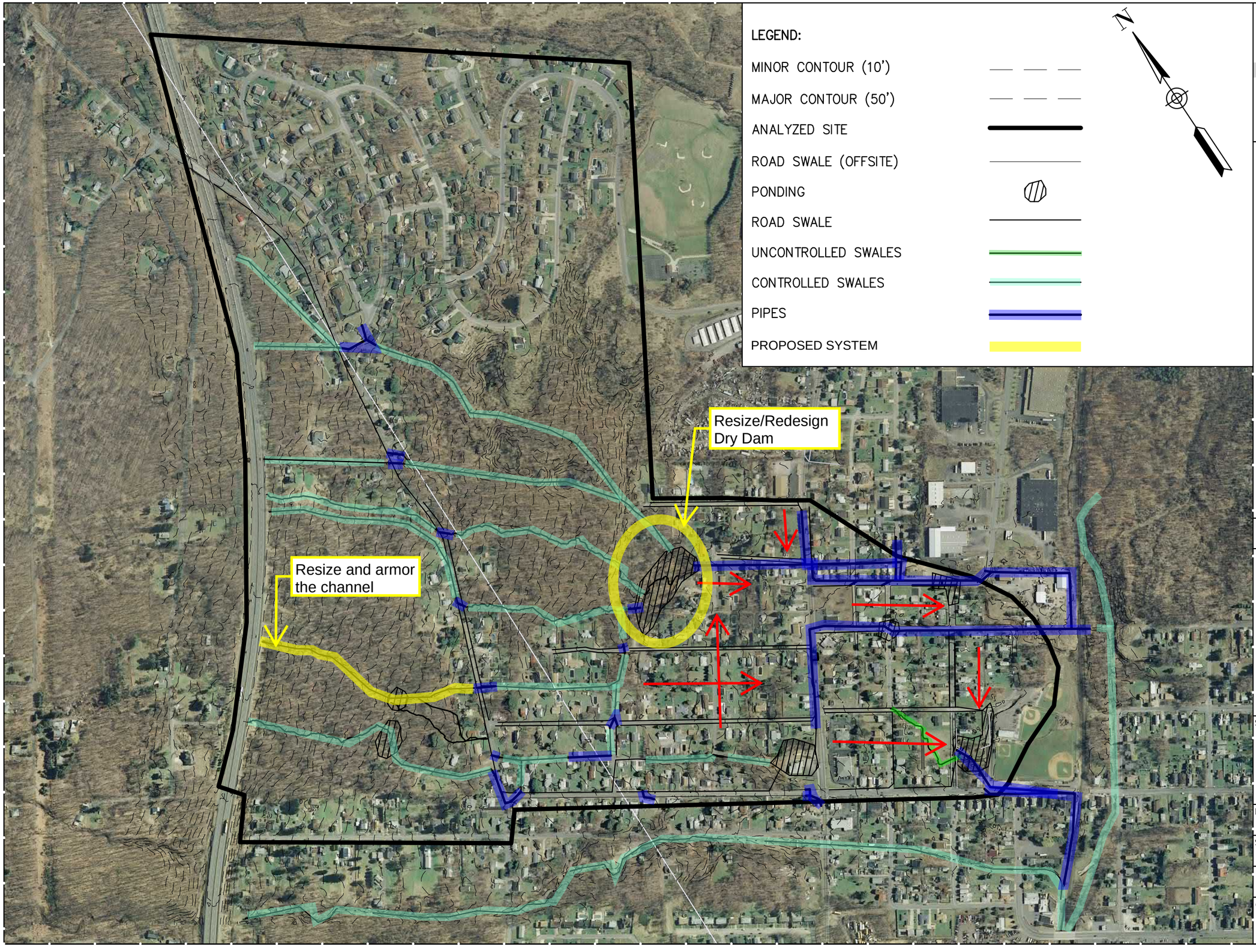
Sheet Title

NEW CONVEYANCE SYSTEM

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.3.2
Drawn: RHH	
Checked: MC	



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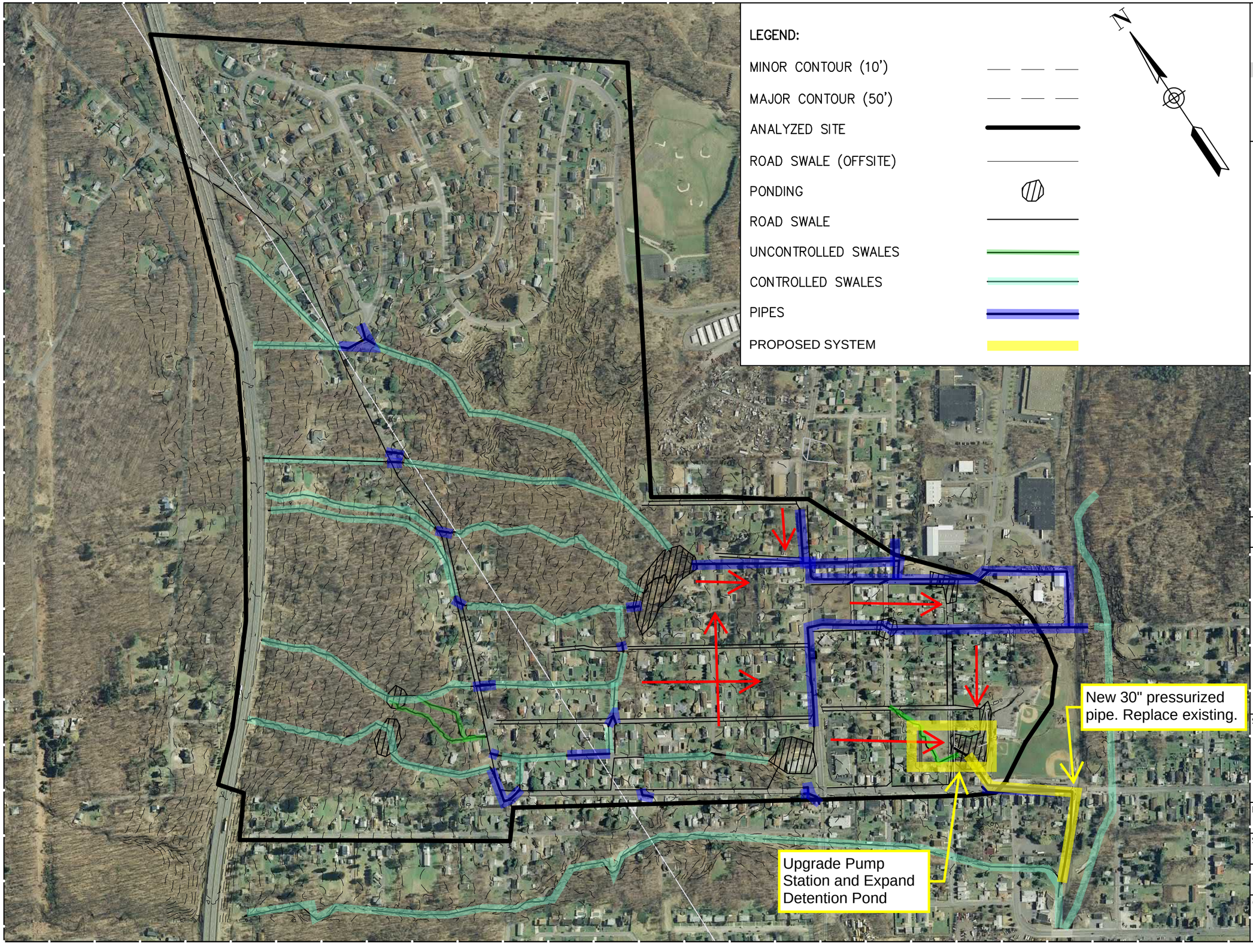
Sheet Title

CHANNEL/ DRY DAM IMPROVEMENT

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.4
Drawn: RHH	
Checked: MC	



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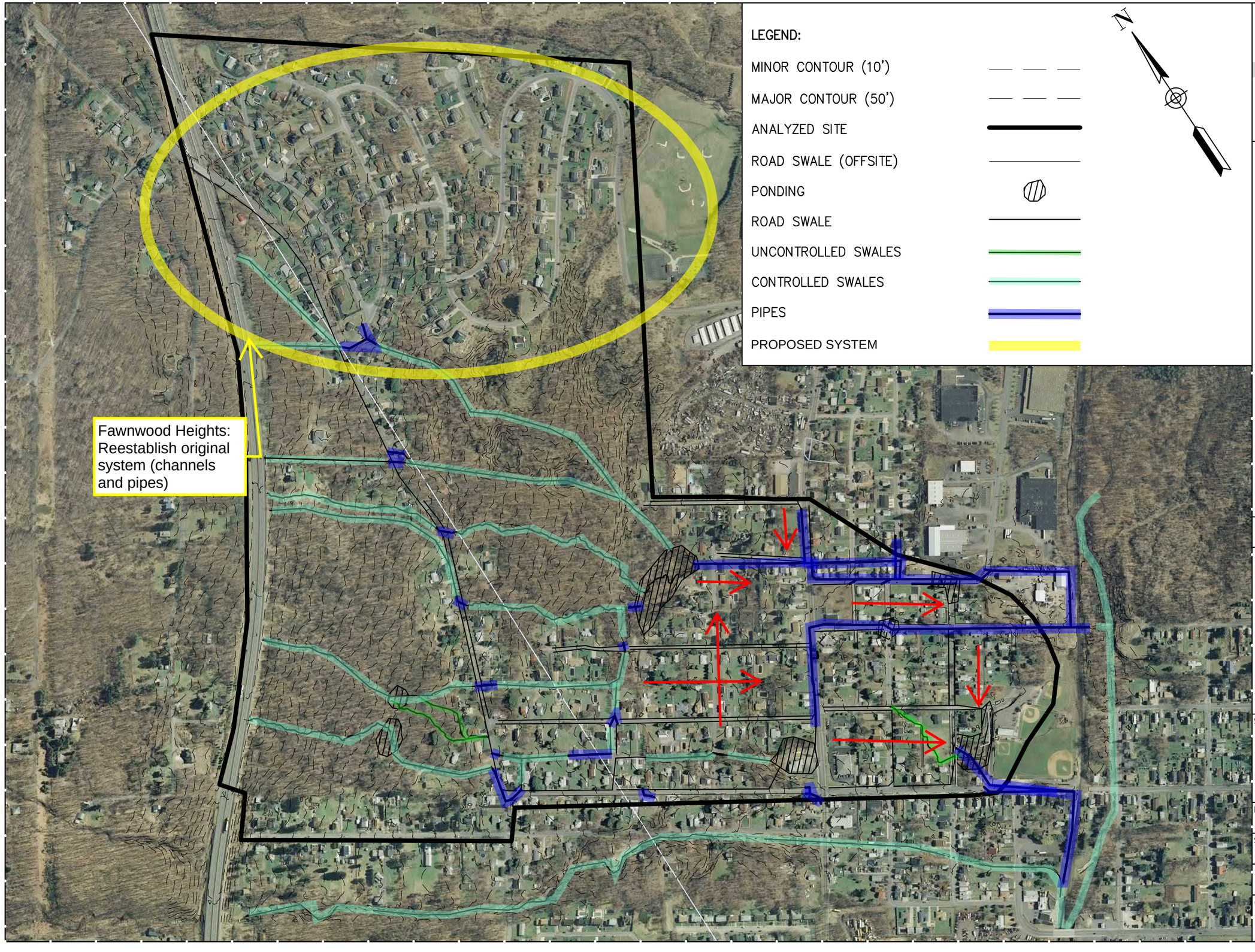
Sheet Title

PUMP STATION IMPROVEMENTS

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.5
Drawn: RHH	
Checked: MC	



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KEYSER VALLEY STORMWATER & FLOOD MITIGATION STUDY

Sheet Title

FAWNWOOD HEIGHTS DRAINAGE

Date	Project No.
09.23.2021	SCR-2021234
Scale: NTS	Sheet No. 5.7
Drawn: RHH	
Checked: MC	

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	65.93	-------	95.25	122.25	166.75	208.42	258.64	Flow to Merrifield
2	Diversion1	1	-------	65.93	-------	95.25	110.00	110.00	110.00	110.00	To Pump
3	Diversion2	1	-------	0.000	-------	0.000	12.25	56.75	98.42	148.64	Storage

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	65.93	2	740	345,489	------	------	------	Flow to Merrifield
2	Diversion1	65.93	2	740	345,489	1	------	------	To Pump
3	Diversion2	0.000	2	n/a	0	1	------	------	Storage

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	95.25	2	740	493,248	------	------	------	Flow to Merrifield
2	Diversion1	95.25	2	740	493,248	1	------	------	To Pump
3	Diversion2	0.000	2	n/a	0	1	------	------	Storage

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	122.25	2	740	631,018	------	------	------	Flow to Merrifield
2	Diversion1	110.00	2	732	623,858	1	------	------	To Pump
3	Diversion2	12.25	2	740	7,160	1	------	------	Storage

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	166.75	2	738	860,184	------	------	------	Flow to Merrifield
2	Diversion1	110.00	2	724	788,688	1	------	------	To Pump
3	Diversion2	56.75	2	738	71,496	1	------	------	Storage

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	208.42	2	738	1,077,565	------	------	------	Flow to Merrifield
2	Diversion1	110.00	2	720	922,200	1	------	------	To Pump
3	Diversion2	98.42	2	738	155,364	1	------	------	Storage

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

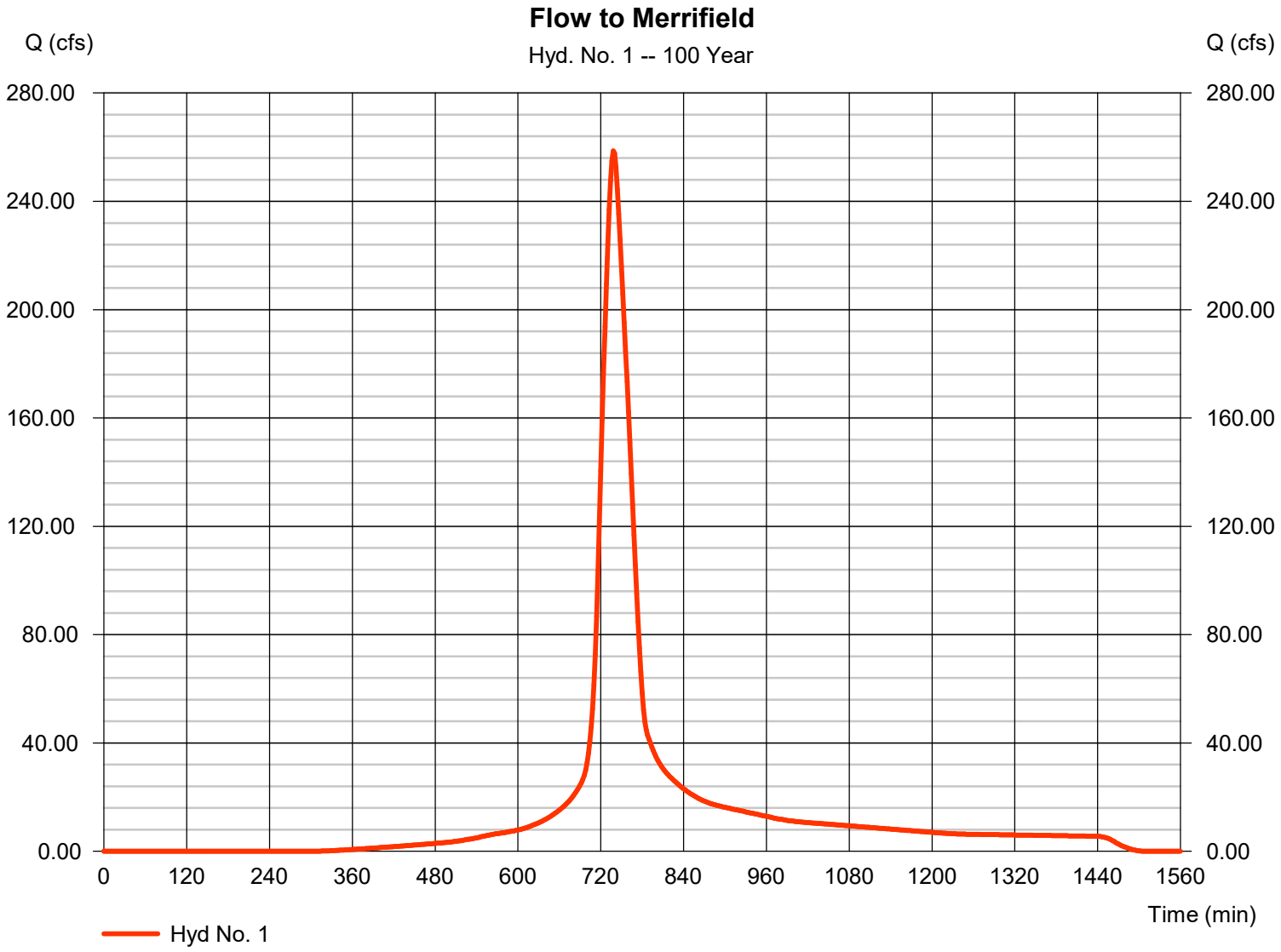
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	258.64	2	738	1,343,286	------	------	------	Flow to Merrifield
2	Diversion1	110.00	2	718	1,073,080	1	------	------	To Pump
3	Diversion2	148.64	2	738	270,205	1	------	------	Storage

Hydrograph Report

Hyd. No. 1

Flow to Merrifield

Hydrograph type	=	SCS Runoff	Peak discharge	=	258.64 cfs
Storm frequency	=	100 yrs	Time to peak	=	738 min
Time interval	=	2 min	Hyd. volume	=	1,343,286 cuft
Drainage area	=	80.000 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	41.60 min
Total precip.	=	6.41 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



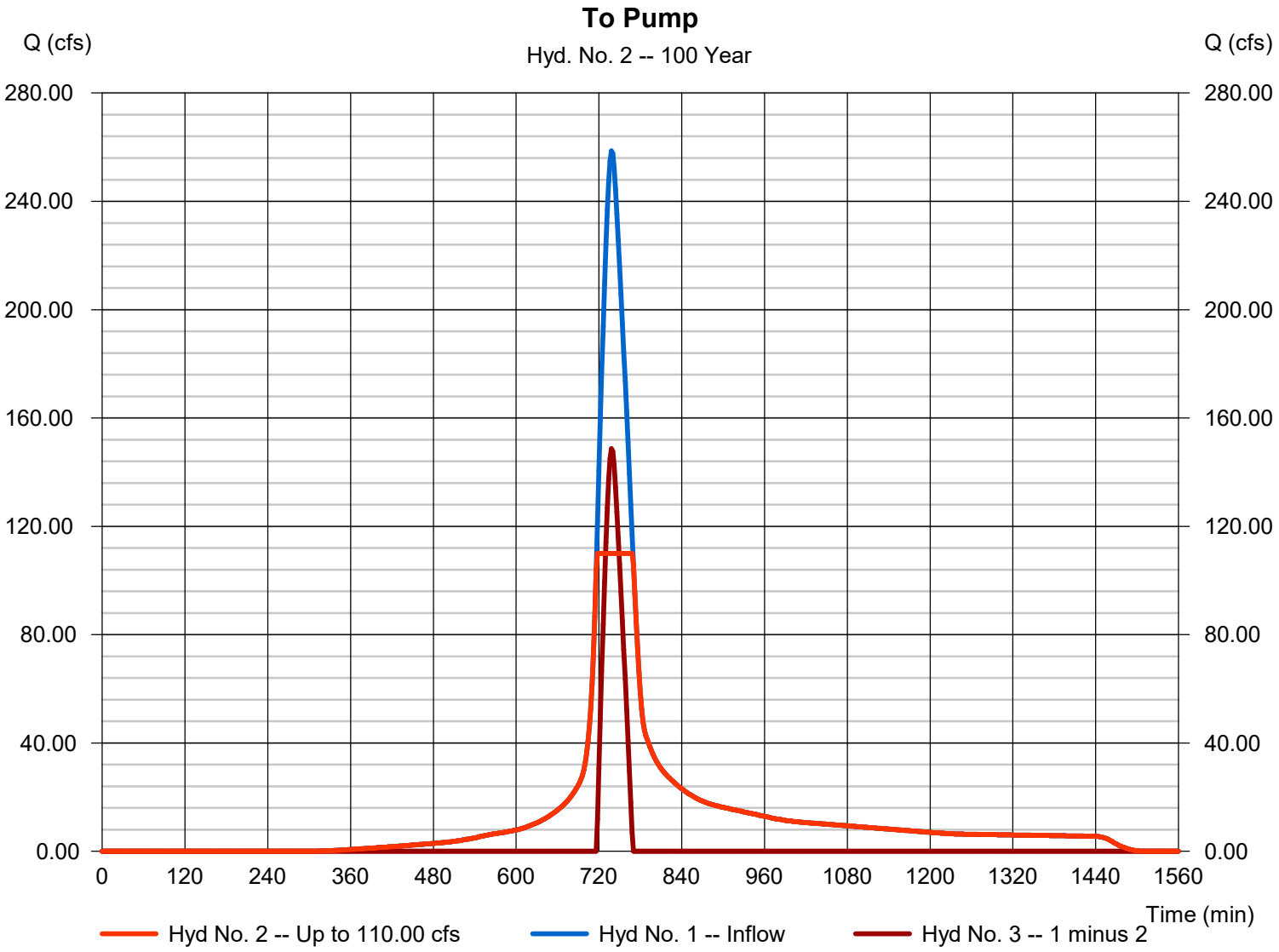
Hydrograph Report

Hyd. No. 2

To Pump

Hydrograph type	= Diversion1		Peak discharge	= 110.00 cfs
Storm frequency	= 100 yrs		Time to peak	= 718 min
Time interval	= 2 min		Hyd. volume	= 1,073,080 cuft
Inflow hydrograph	= 1 - Flow to Merrifield		2nd diverted hyd.	= 3
Diversion method	= Constant Q		Constant Q	= 110.00 cfs

CONVERSION FROM CFS TO GPM
1 CFS = 448.80 GPM
110.00 CFS * 448.80 = 49,368 ~ 50,000 GPM



Hydrograph Report

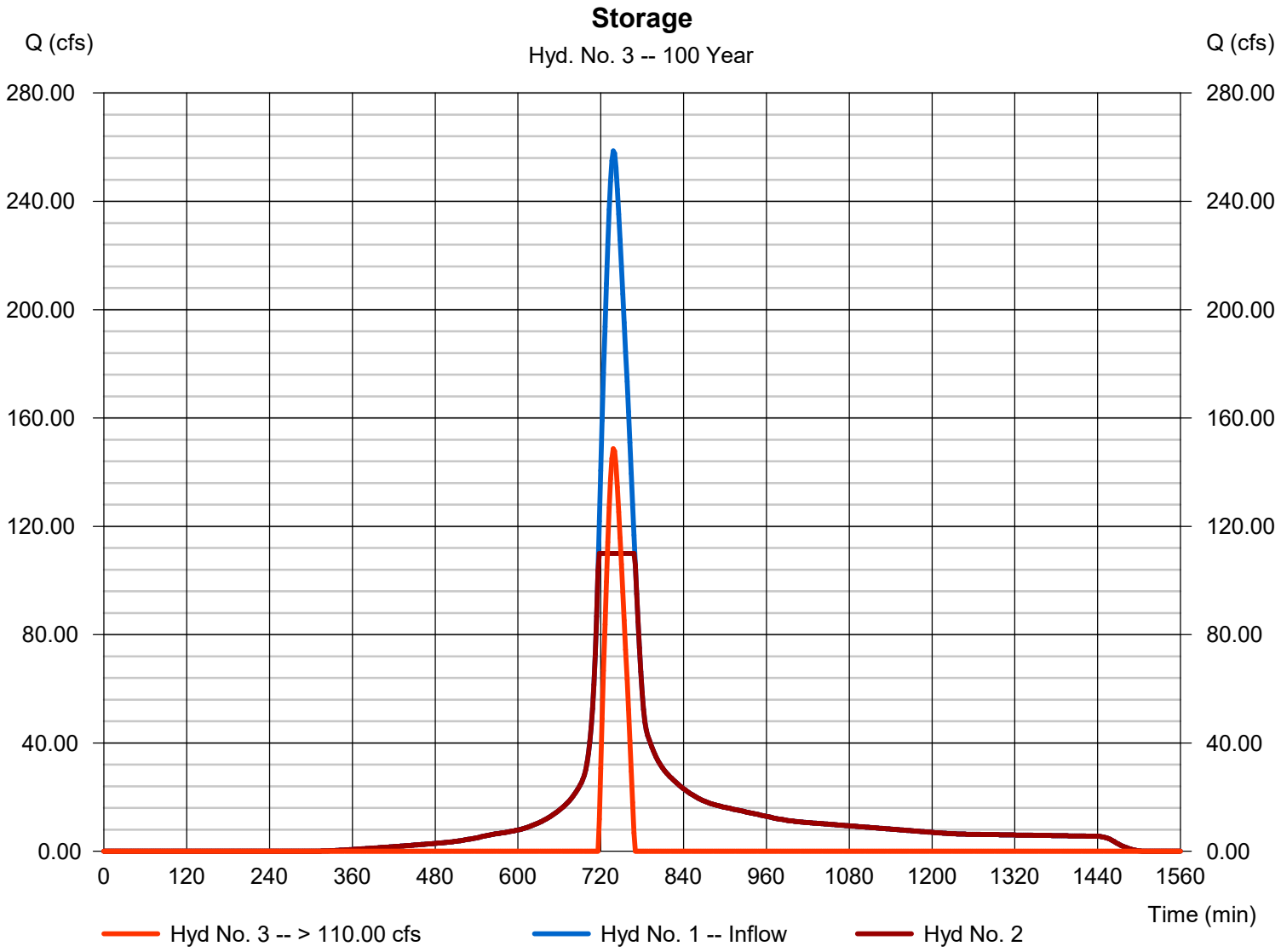
Hyd. No. 3

Storage

Hydrograph type	=	Diversion2	Peak discharge	=	148.64 cfs
Storm frequency	=	100 yrs	Time to peak	=	738 min
Time interval	=	2 min	Hyd. volume	=	270,205 cuft
Inflow hydrograph	=	1 - Flow to Merrifield	2nd diverted hyd.	=	2
Diversion method	=	Constant Q	Constant Q	=	110.00 cfs

REQUIRED STORAGE DEPTH:
1 ACRE = 43,560 SQ FT

270,205 CU FT / 43,560 SQ FT = 6.2 FT STORAGE DEPTH REQURIED.



APPENDIX C

- Cost Estimates

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.1.1
ADDITIONAL CONVEYANCE OUTFALL, CAMERON AVE TO KEYSER CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 9,900.00	$ 9,900.00
2	1	LS	Erosion Control Measures	$ 19,800.00	$ 19,800.00
3	1	EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ 4,000.00
4		EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ -
7		LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ -
8		LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ -
9		LF	30" D.I.P. (Pump Line)	$ 200.00	$ -
10		LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ -
11	1050	LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ 183,750.00
12	1	LF	Type "D" Endwall	$ 4,000.00	$ 4,000.00
13	1	EA	Flap Gate Outlet	$ 1,200.00	$ 1,200.00
14	1	EA	Rock Energy Dissipators	$ 3,000.00	$ 3,000.00
15	1	LS	Maintenance and Protection Traffic	$ 4,000.00	$ 4,000.00
16		LF	Channel Restoration	$ 25.00	$ -
17		SY	Rip Rap Armoring	$ 80.00	$ -

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.1.1
ADDITIONAL CONVEYANCE OUTFALL, CAMERON AVE TO KEYSER CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18		LF	6" Chain Link Fence	$ 28.00	$ -
19		CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ -
20	20	SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ 200.00
21	20	SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ 460.00
22	20	SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ 300.00
23	0.138	AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ 1,173.00
24		SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ -
25		CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ -
26		LS	Utility Relocations Allowance	$ -	$ -
27		LS	Duplex Pump System, including Outlet Pipe Connection	$ -	$ -
28		LS	Emergency Power Generator	$ -	$ -
			ESTIMATED CONSTRUCTION COST		**$ -**
			15% CONTINGENCY		**$ 115,891.50**
			TOTAL ESTIMATED BUDGET		**$ 347,674.50**

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.1.2
ADDITIONAL CONVEYANCE OUTFALL, DRY DAM TO KEYSER CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 24,000.00	$ 24,000.00
2	1	LS	Erosion Control Measures	$ 47,500.00	$ 47,500.00
3	11	EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ 44,000.00
4	2	EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ 5,000.00
7		LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ -
8		LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ -
9		LF	30" D.I.P. (Pump Line)	$ 200.00	$ -
10		LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ -
11	2200	LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ 385,000.00
12	1	LF	Type "D" Endwall	$ 4,000.00	$ 4,000.00
13	1	EA	Flap Gate Outlet	$ 1,200.00	$ 1,200.00
14	1	EA	Rock Energy Dissipators	$ 3,000.00	$ 3,000.00
15	1	LS	Maintenance and Protection Traffic	$ 24,000.00	$ 24,000.00
16		LF	Channel Restoration	$ 25.00	$ -
17		SY	Rip Rap Armoring	$ 80.00	$ -

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.1.2
ADDITIONAL CONVEYANCE OUTFALL, DRY DAM TO KEYSER CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18		LF	6" Chain Link Fence	$ 28.00	$ -
19		CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ -
20	600	SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ 6,000.00
21	600	SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ 13,800.00
22	600	SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ 9,000.00
23	0.138	AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ 1,173.00
24		SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ -
25		CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ -
26	1	LS	Utility Relocations Allowance	$ 5,000.00	$ 5,000.00
27		LS	Duplex Pump System, including Outlet Pipe Connection	$ -	$ -
28		LS	Emergency Power Generator	$ -	$ -
ESTIMATED CONSTRUCTION COST					**$ 572,673.00**
15% CONTINGENCY					**$ 85,900.95**
TOTAL ESTIMATED BUDGET					**$ 658,573.95**

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.2
EXISTING SYSTEM UPGRADES

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 32,500.00	$ 32,500.00
2	1	LS	Erosion Control Measures	$ 65,000.00	$ 65,000.00
3	2	EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ 8,000.00
4	17	EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ 42,500.00
7		LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ -
8	2410	LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ 228,950.00
9		LF	30" D.I.P. (Pump Line)	$ 200.00	$ -
10	1500	LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ 225,000.00
11		LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ -
12	1	LF	Type "D" Endwall	$ 4,000.00	$ 4,000.00
13	1	EA	Flap Gate Outlet	$ 1,200.00	$ 1,200.00
14	1	EA	Rock Energy Dissipators	$ 3,000.00	$ 3,000.00
15	1	LS	Maintenance and Protection Traffic	$ 32,500.00	$ 32,500.00
16	1175	LF	Channel Restoration	$ 25.00	$ 29,375.00
17		SY	Rip Rap Armoring	$ 80.00	$ -

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.2
EXISTING SYSTEM UPGRADES

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18		LF	6" Chain Link Fence	$ 28.00	$ -
19		CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ -
20	1780	SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ 17,800.00
21	1780	SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ 40,940.00
22	1780	SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ 26,700.00
23		AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ -
24	525	SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ 656.25
25	275	CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ 11,000.00
26	1	LS	Utility Relocations Allowance	$ 15,000.00	$ 15,000.00
27		LS	Duplex Pump System, including Outlet Pipe Connection	$ -	$ -
28		LS	Emergency Power Generator	$ -	$ -
ESTIMATED CONSTRUCTION COST					**$ 784,121.25**
15% CONTINGENCY					**$ 117,618.19**
TOTAL ESTIMATED BUDGET					**$ 901,739.44**

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.3.1
NEW CONVEYANCE SYSTEM TO UPPER REACH OF LINDY CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 19,362.50	$ 19,362.50
2	1	LS	Erosion Control Measures	$ 38,725.00	$ 38,725.00
3	1	EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ 4,000.00
4	10	EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ 25,000.00
7		LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ -
8		LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ -
9		LF	30" D.I.P. (Pump Line)	$ 200.00	$ -
10	1975	LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ 296,250.00
11		LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ -
12		LF	Type "D" Endwall	$ 4,000.00	$ -
13	1	EA	Flap Gate Outlet	$ 1,200.00	$ 1,200.00
14		EA	Rock Energy Dissipators	$ 3,000.00	$ -
15	1	LS	Maintenance and Protection Traffic	$ 19,362.50	$ 19,362.50
16		LF	Channel Restoration	$ 25.00	$ -
17		SY	Rip Rap Armoring	$ 80.00	$ -

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.3.1
NEW CONVEYANCE SYSTEM TO UPPER REACH OF LINDY CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18		LF	6" Chain Link Fence	$ 28.00	$ -
19		CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ -
20	1100	SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ 11,000.00
21	1100	SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ 25,300.00
22	1100	SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ 16,500.00
23		AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ -
24		SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ -
25		CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ -
26	1	LS	Utility Relocations Allowance	$ 8,000.00	$ 8,000.00
27		LS	Duplex Pump System, including Outlet Pipe Connection	$ -	$ -
28		LS	Emergency Power Generator	$ -	$ -
ESTIMATED CONSTRUCTION COST					**$ 464,700.00**
15% CONTINGENCY					**$ 69,705.00**
TOTAL ESTIMATED BUDGET					**$ 534,405.00**

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.3.2
NEW CONVEYANCE SYSTEM TO LOWER REACH OF LINDY CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 34,500.00	$ 34,500.00
2	1	LS	Erosion Control Measures	$ 69,000.00	$ 69,000.00
3	1	EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ 4,000.00
4	18	EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ 45,000.00
7		LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ -
8		LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ -
9		LF	30" D.I.P. (Pump Line)	$ 200.00	$ -
10	3500	LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ 525,000.00
11		LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ -
12		LF	Type "D" Endwall	$ 4,000.00	$ -
13	1	EA	Flap Gate Outlet	$ 1,200.00	$ 1,200.00
14		EA	Rock Energy Dissipators	$ 3,000.00	$ -
15	1	LS	Maintenance and Protection Traffic	$ 34,500.00	$ 34,500.00
16		LF	Channel Restoration	$ 25.00	$ -
17		SY	Rip Rap Armoring	$ 80.00	$ -

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.3.2
NEW CONVEYANCE SYSTEM TO LOWER REACH OF LINDY CREEK

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18		LF	6" Chain Link Fence	$ 28.00	$ -
19		CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ -
20	2000	SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ 20,000.00
21	2000	SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ 46,000.00
22	2000	SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ 30,000.00
23		AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ -
24		SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ -
25		CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ -
26	1	LS	Utility Relocations Allowance	$ 20,000.00	$ 20,000.00
27		LS	Duplex Pump System, including Outlet Pipe Connection	$ -	$ -
28		LS	Emergency Power Generator	$ -	$ -
ESTIMATED CONSTRUCTION COST					**$ 829,200.00**
15% CONTINGENCY					**$ 124,380.00**
TOTAL ESTIMATED BUDGET					**$ 953,580.00**

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.4
CHANNEL / DRY DAM IMPROVEMENTS

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 27,500.00	$ 27,500.00
2	1	LS	Erosion Control Measures	$ 55,000.00	$ 55,000.00
3		EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ -
4		EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ -
7		LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ -
8		LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ -
9		LF	30" D.I.P. (Pump Line)	$ 200.00	$ -
10		LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ -
11		LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ -
12		LF	Type "D" Endwall	$ 4,000.00	$ -
13		EA	Flap Gate Outlet	$ 1,200.00	$ -
14		EA	Rock Energy Dissipators	$ 3,000.00	$ -
15	1	LS	Maintenance and Protection Traffic	$ 10,000.00	$ 10,000.00
16	1300	LF	Channel Restoration	$ 25.00	$ 32,500.00
17	575	SY	Rip Rap Armoring	$ 80.00	$ 46,000.00

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.4
CHANNEL / DRY DAM IMPROVEMENTS

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18	1250	LF	6" Chain Link Fence	$ 28.00	$ 35,000.00
19	15000	CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ 225,000.00
20		SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ -
21		SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ -
22		SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ -
23	5	AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ 42,500.00
24	7000	SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ 8,750.00
25	4050	CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ 162,000.00
26		LS	Utility Relocations Allowance	$ -	$ -
27		LS	Duplex Pump System, including Outlet Pipe Connection	$ -	$ -
28		LS	Emergency Power Generator	$ -	$ -
ESTIMATED CONSTRUCTION COST					**$ 644,250.00**
15% CONTINGENCY					**$ 96,637.50**
TOTAL ESTIMATED BUDGET					**$ 740,887.50**

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.5
PUMP STATION IMPROVEMENTS

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 130,000.00	$ 130,000.00
2	1	LS	Erosion Control Measures	$ 260,000.00	$ 260,000.00
3		EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ -
4	3	EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ 7,500.00
7		LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ -
8		LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ -
9	1250	LF	30" D.I.P. (Pump Line)	$ 200.00	$ 250,000.00
10		LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ -
11		LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ -
12		LF	Type "D" Endwall	$ 4,000.00	$ -
13	2	EA	Flap Gate Outlet	$ 1,200.00	$ 2,400.00
14	1	EA	Rock Energy Dissipators	$ 3,000.00	$ 3,000.00
15	1	LS	Maintenance and Protection Traffic	$ 130,000.00	$ 130,000.00
16		LF	Channel Restoration	$ 25.00	$ -
17		SY	Rip Rap Armoring	$ 80.00	$ -

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.5
PUMP STATION IMPROVEMENTS

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18	1000	LF	6" Chain Link Fence	$ 28.00	$ 28,000.00
19	10000	CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ 150,000.00
20	550	SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ 5,500.00
21	550	SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ 12,650.00
22	550	SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ 8,250.00
23	1	AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ 8,500.00
24	4850	SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ 6,062.50
25	810	CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ 32,400.00
26	1	LS	Utility Relocations Allowance	$ 10,000.00	$ 10,000.00
27	1	LS	Duplex Pump System, including Outlet Pipe Connection	$ 1,500,000.00	$ 1,500,000.00
28	1	LS	Emergency Power Generator	$ 600,000.00	$ 600,000.00
ESTIMATED CONSTRUCTION COST					**$ 3,144,262.50**
15% CONTINGENCY					**$ 471,639.38**
TOTAL ESTIMATED BUDGET					**$ 3,615,901.88**

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.7
FAWNWOOD HEIGHTS DRAINAGE

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
1	1	LS	Mobilization includes Construction Survey	$ 34,000.00	$ 34,000.00
2	1	LS	Erosion Control Measures	$ 68,000.00	$ 68,000.00
3		EA	Install 4' Dia. Storm Manhole	$ 4,000.00	$ -
4		EA	Install Type 'M' Storm Inlets	$ 2,500.00	$ -
7	3200	LF	18" Storm Sewer - N12 HDPE	$ 46.00	$ 147,200.00
8		LF	24" Storm Sewer - N12 NDPE	$ 95.00	$ -
9		LF	30" D.I.P. (Pump Line)	$ 200.00	$ -
10		LF	36" Storm Sewer - N12 HDPE	$ 150.00	$ -
11		LF	42" Storm Sewer - N12 HDPE	$ 175.00	$ -
12		LF	Type "D" Endwall	$ 4,000.00	$ -
13		EA	Flap Gate Outlet	$ 1,200.00	$ -
14		EA	Rock Energy Dissipators	$ 3,000.00	$ -
15	1	LS	Maintenance and Protection Traffic	$ 34,000.00	$ 34,000.00
16	21000	LF	Channel Restoration	$ 25.00	$ 525,000.00
17		SY	Rip Rap Armoring	$ 80.00	$ -

ENGINEER'S COST ESTIMATE FOR PROPOSED IMPROVEMENT 5.7
FAWNWOOD HEIGHTS DRAINAGE

ITEM NO.	APPROX. QUANTITY	UNITS	DESCRIPTION	UNIT PRICE	TOTAL
18		LF	6" Chain Link Fence	$ 28.00	$ -
19		CY	Earth Excavation and Haul Excess Offsite	$ 15.00	$ -
20		SY	Install of 8" Deep of Crushed Subbase for Bituminous Pavement Areas/Shoulder	$ 10.00	$ -
21		SY	6.0" 25mm, Superpave Bituminous Concrete Base Course, PG-64-22, 0.3 to <3 Million ESALS	$ 23.00	$ -
22		SY	1.5" 9.5mm, Superpave Wearing Course, PG-64-22, 0.3 to <3 Million ESALS, SRL-G, for bituminous pavement areas	$ 15.00	$ -
23		AC	Clearing and Grubbing/Tree Removal	$ 8,500.00	$ -
24	4000	SY	Seeding, Soil Supplements, and Mulch	$ 1.25	$ 5,000.00
25		CY	Import Topsoil blended placement to be 6 inches thick	$ 40.00	$ -
26		LS	Utility Relocations Allowance	$ -	$ -
27		LS	Duplex Pump System, including Outlet Pipe Connection	$ -	$ -
28		LS	Emergency Power Generator	$ -	$ -
ESTIMATED CONSTRUCTION COST					**$ 813,200.00**
15% CONTINGENCY					**$ 121,980.00**
TOTAL ESTIMATED BUDGET					**$ 935,180.00**