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# Ashley Drive Drainage Study Edgewood, KY

PREPARED FOR  
City of Edgewood, Kentucky

385 Dudley Road  
Edgewood, KY 41017  
859.331.5910

ISSUED: 10.18.2021  
REVISED: 04.10.2023

PROJECT: 210767

PREPARED BY: Marty Hellmann, P.E.



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## INTRODUCTION

The residents on Ashley Drive have identified a recurring flooding problem at the low point in Ashley Drive near 3079 Ashley Drive. The storm sewer system originates on Arbor Drive with two curb inlets. The system then winds its way through the side and rear yards of 3083 and 3085 Arbor Drive and 3076 and 3078 Ashley Drive, toward Ashley Drive. There are four (4) curb inlets on Ashley Drive that add runoff to the system, before the pipe exits through the side and rear yard of 3079 Ashley Drive and outletting into a wooded swale in the back yard.

The resident at 3078 Ashley Drive (John Lyons) has indicated that during heavy rains there is a large amount of runoff that runs through his back yard before accumulating in the low spot in Ashley Drive, more than a foot deep. Eventually the water that can't enter the storm system overtops the curb and surrounds the home and overflows into the yard of 3079 and 3081 Ashley Drive.

## ANALYSIS

Hydraflow Storm Sewers was used to model the storm water system. The locations and inlet elevations of the study section were obtained from SD1's GIS information. Hydraflow Storm Sewers uses the Rational Method to calculate the peak runoff into each storm sewer inlet, and can be used to evaluate any frequency storm event. GIS topography and visual observations were used to determine the drainage area to each structure. Weighted runoff coefficients were calculated for all of the drainage areas. Times of concentration were calculated using TR55. See Existing Drainage Area Map for an overall drainage area map. An n-value of 0.012 was used for all pipes in the system.

### **Existing Conditions Analysis:**

#### **See Appendix A.**

The existing system was modelled using calculated drainage areas and pipe sizes per SD1 GIS information. Based on this modelling the system can handle the 2-year storm event, but begins backing up during the 10-year storm event. The back up begins at the lowest pipe in the system (the outlet pipe). This outlet pipe is 15 inches in diameter, which is smaller than the 18 inch pipe in the system upstream. The system was evaluated for the following:

- Pipe Size: Evaluate the pipes in the system to see if they are undersized
- Pipe Configuration: The existing storm system goes through four 90 degree bends throughout it's run. Each of these bends causes a loss in flowrate, which could be causing the system to back up. The system will be evaluated to determine if eliminating some of these bends can improve the flow through the system.

### **Proposed Condition Analysis:**

Since the existing system does not have adequate capacity, the system was analyzed to determine the required pipe sizes and/or configuration for the 25-year storm event. Inlet capacity calculations were completed on the curb inlets and it was determined that there is an appropriate number of inlets on the streets.

There is a large drainage area to catch basin 7 (in the rear yards of 3076 and 3078 Ashley Drive). Due to lack of capacity in the system, runoff bypasses this inlet during heavy rain events which causes the flooding in the rear yard of 3078 Ashley Drive. The purpose of this analysis is to alleviate the flooding of Ashley Drive during heavy rain events and to determine its impact to the water bypassing catch basin 7.

### **Option 1: Upsize Pipe to 24 inches.**

**See Appendix B.**

An analysis determined that replacing the pipes downstream of the inlets on Ashley Drive with 24 inch pipe would alleviate the flooding on Ashley Drive for the 25 year storm event. This would require that the pipe is replaced through the front and side yards of the home at 3079 Ashley Drive, including through the driveway and some wooded areas.

Although this decreases the hydraulic grade line up to catch basin 7. It does not completely eliminate the overflow of water at this catch basin, and there could still be issues during heavy rain events. Ultimately the pipe downstream of catch basin 7 needs to be upsized. Due to the location of the catch basin and pipe and the presence of driveways, trees and landscaping, replacing this pipe would turn this project into a much larger project. This could be an option which could be used to eliminated flooding in the roadway, with the understanding that a second phase would need to take place upstream at a future date.

Preliminary Opinion of Project Cost: \$123,000 (Replacement Downstream of Ashley only)

### **Option 2: Reconfigure Pipes and Upsize Downstream**

This option evaluates a configuration of the storm sewer system that would eliminate a couple of the 90 degree bends. The purpose of this option was to see if the downstream pipes could be replaced with pipes smaller than 24 inches as described in option 1, and also to see if the reconfiguration could achieve capacity in the pipe downstream of catch basin 7, without the need to replace it.

The proposed configuration is to the extend the pipe straight out into Ashley Drive and run it down Ashley Drive to where the pipe goes over the hill in the side yard of 3079. This would eliminate two 90 degree bends at structures 2 and 5, and would add two inlets on Ashley Drive.

This would allow the pipe through the side yard of 3079 Ashley to be replaced with an 18 inch, instead of a 24 inch, but still does not completely solve the issue at catch basin 7. Therefore the upsize would continue up to structure 7 to fully eliminate the overflows.

Preliminary Opinion of Project Cost: \$284,500 (Replacement Downstream of Ashley Only)

### **Recommendations:**

After discussion with the City, It is our opinion that the City should proceed with Option 2. This will eliminate the flooding both in the street and on private property, it eliminates two 90 degree bends in the system and adds two inlets on the street. It is recommended that the existing pipe stay in place and be used to added even more capacity in the system.

Next steps will be to the survey the project limits, confirm pipe sizes and locations and prepare construction drawings. The alignment of the existing pipe through the yard at 3079 is less than ideal as it passes through the driveway and wooded areas. It may be worth investigating an alternate alignment to the outlet point that limits the impact. Changing the alignment would create the need for a new easement and could potentially get into the property at 3081 Ashley Drive. The alignment should be determined based on the field survey and a conversation with the property owner at 3079.

## APPENDIX A

### EXISTING



0' 100' 200'  
SCALE: 1" = 100'

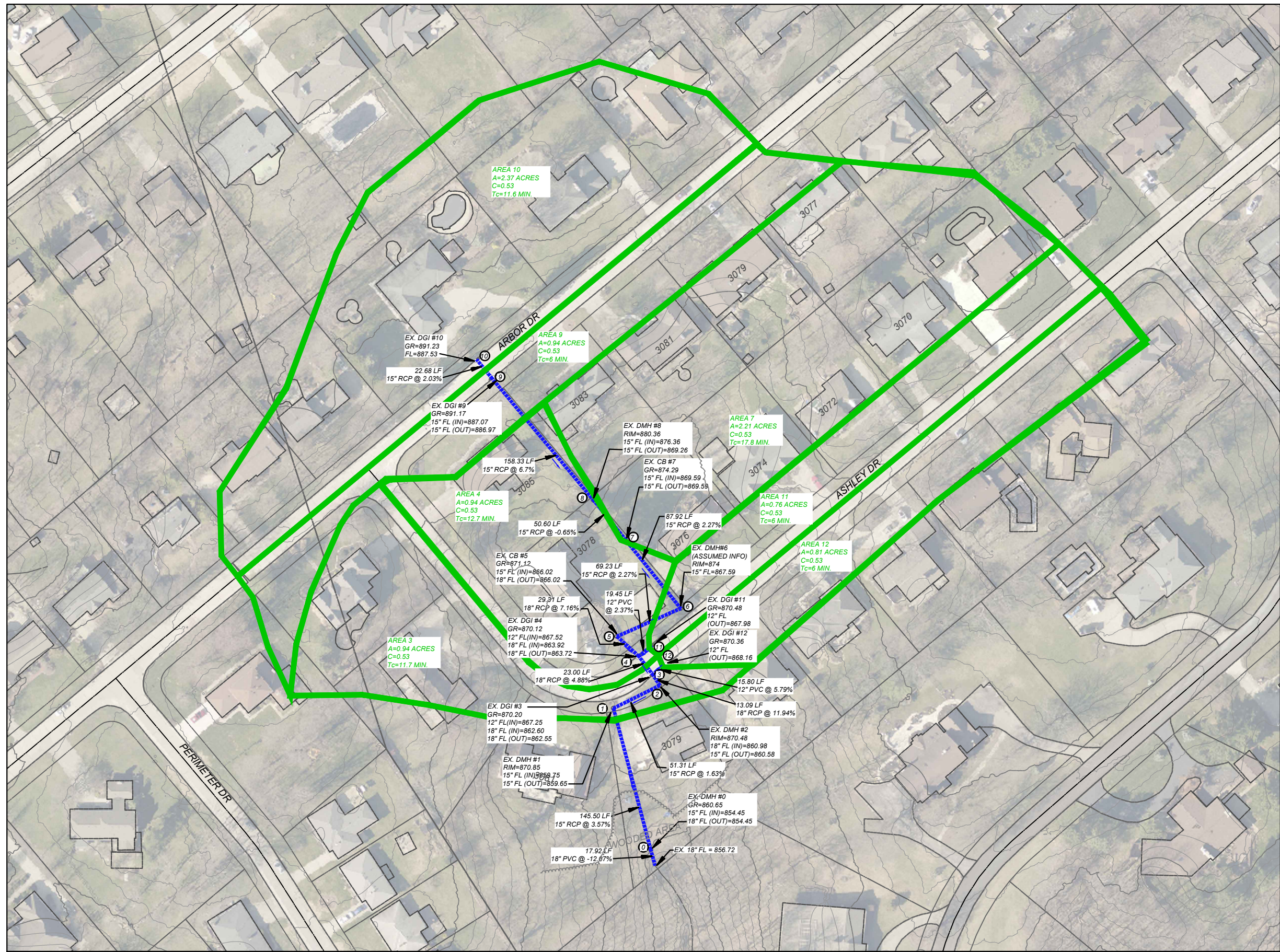
**PRELIMINARY**



NO.	ISSUED FOR	ISSUE DATE	SCALE	DESIGNED BY	DRAWN BY	CHECKED BY

PROJECT NO.	<b>210767</b>
DISCIPLINE	<b>CIVIL</b>
SHEET NAME	
SHEET	<b>1</b>
OF	

PROJECT NO.	<b>210767</b>
DISCIPLINE	<b>CIVIL</b>
SHEET NAME	
SHEET	<b>1</b>
OF	

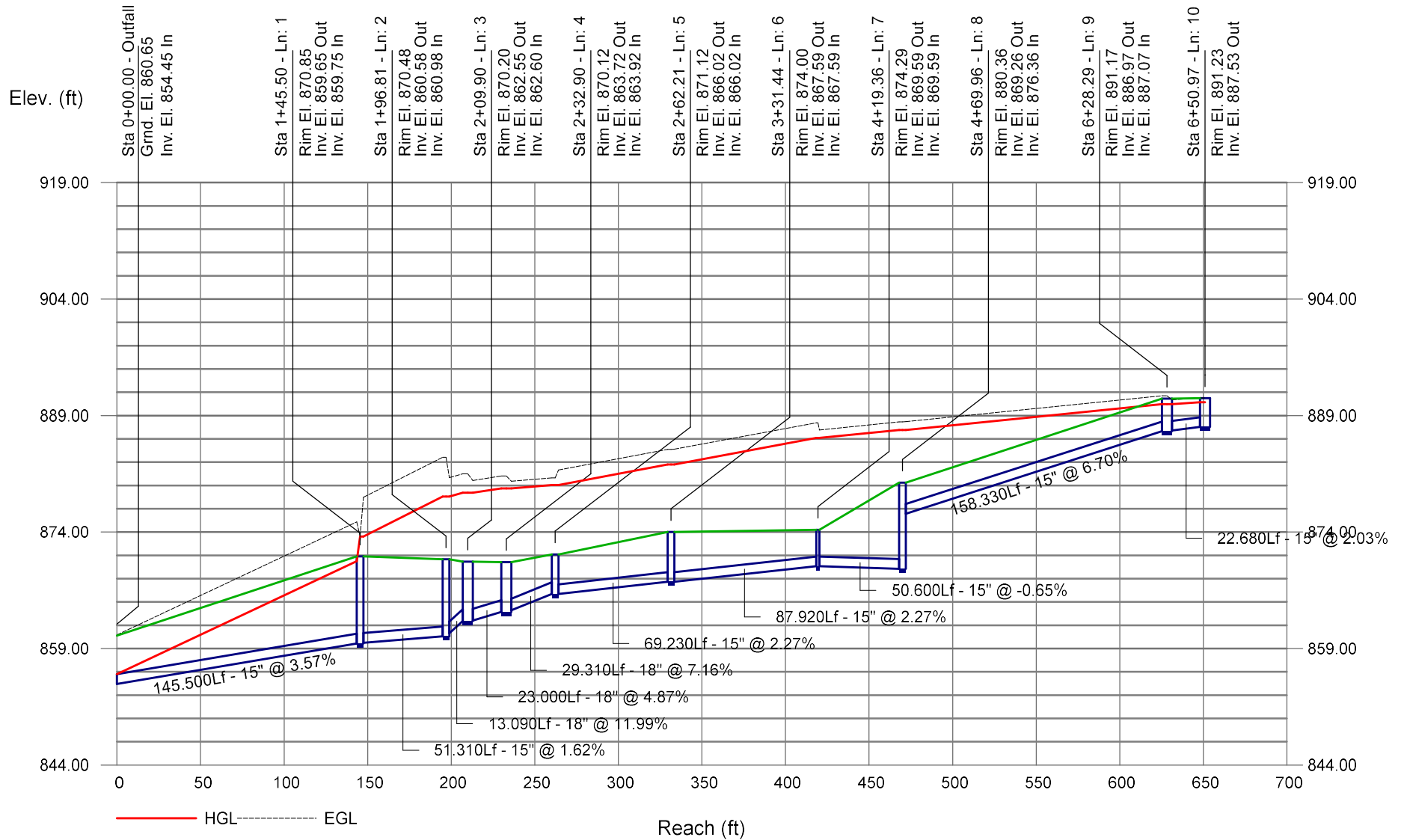


**LEGEND**  
——— DRAINAGE AREA  
- - - - - EXISTING STORM

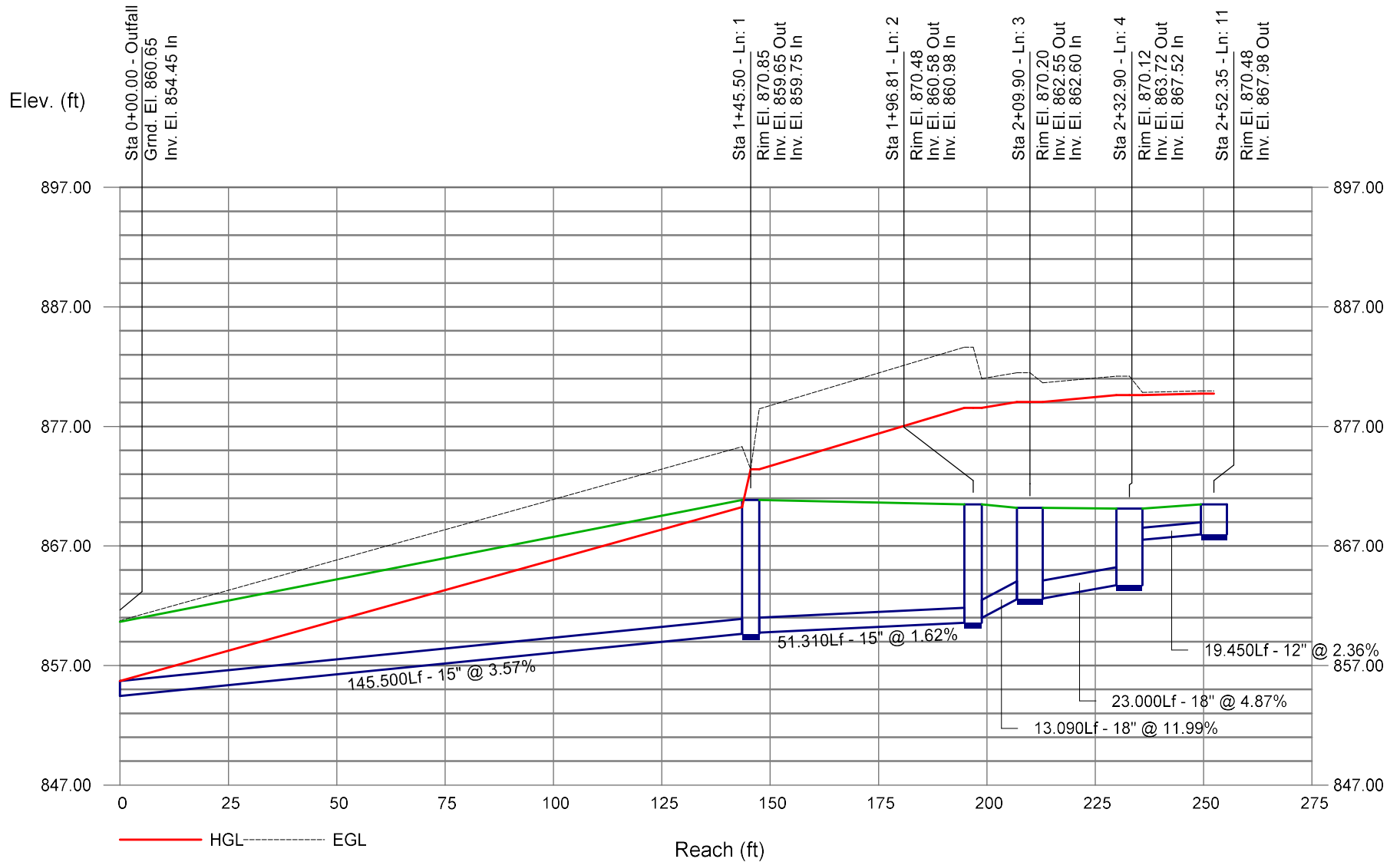
NOTE: PIPE SIZES, SLOPES AND DEPTHS BASED ON SD1 GIS INFORMATION, AND HAVE NOTE BEEN CONFIRMED WITH A SURVEY.



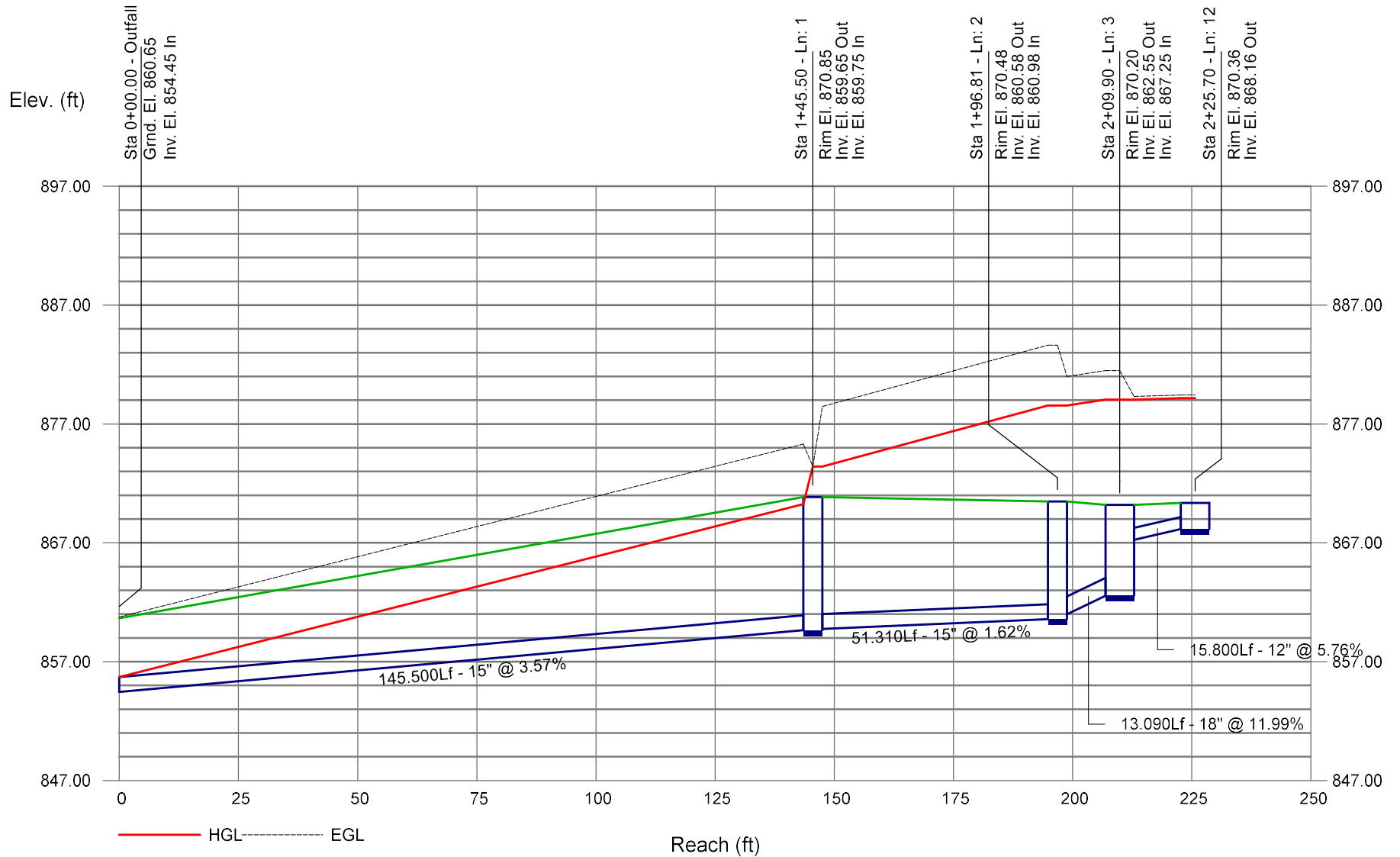
# Storm Sewer Profile



# Storm Sewer Profile



# Storm Sewer Profile



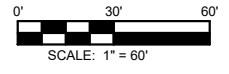
## APPENDIX B

### OPTION #1

NO.	REVISION	DATE

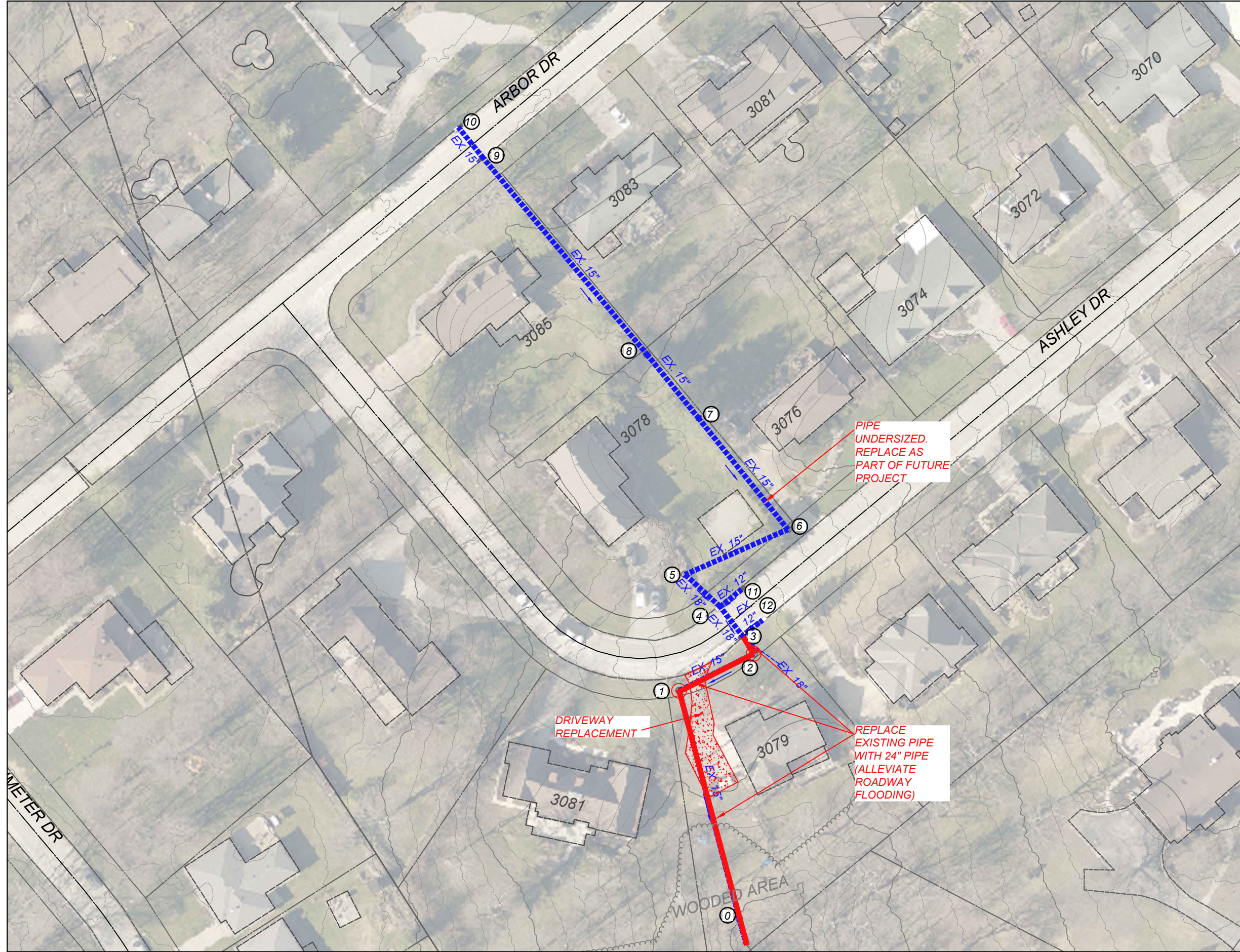
**ASHLEY DRIVE  
DRAINAGE STUDY**  
EDGEWOOD, KENTUCKY  
OPTION 1

PROJECT NO.	210767
DISCIPLINE	CIVIL
SHEET NAME	
SHEET	OF
1	1



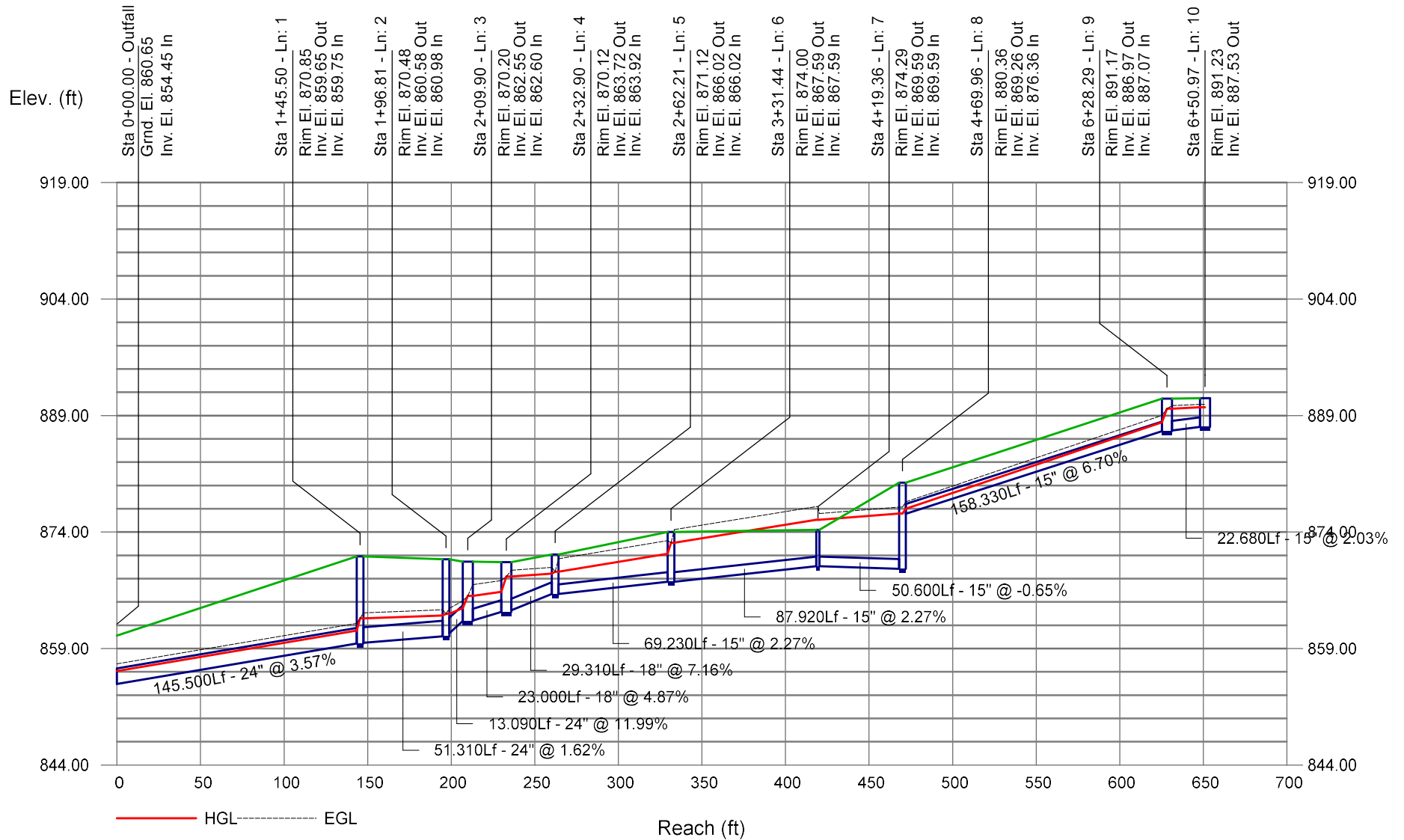
LEGEND

- EXISTING STORM
- PROPOSED STORM

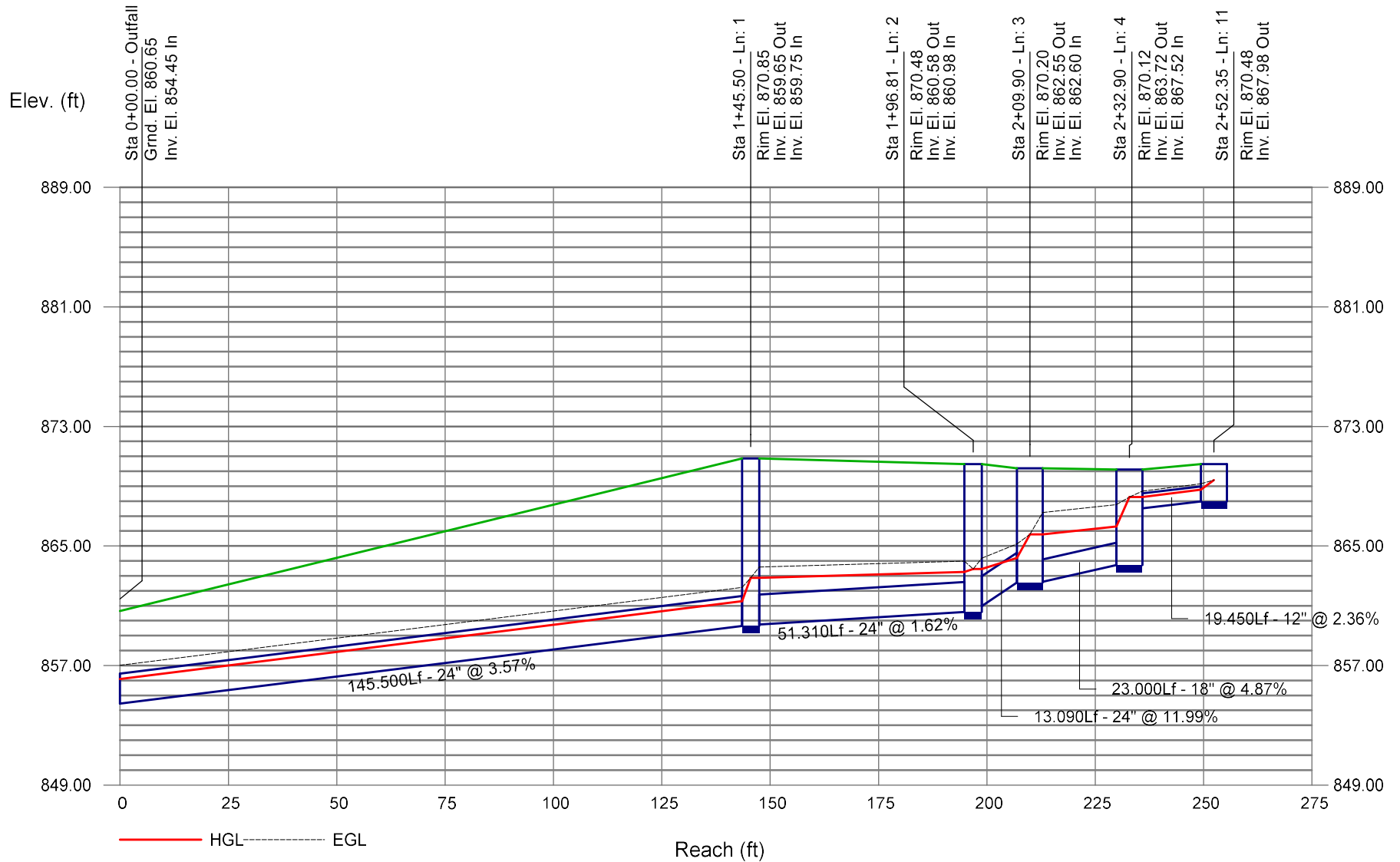


NOTE: PIPE SIZES, SLOPES AND DEPTHS BASED ON SD1 GIS INFORMATION, AND HAVE NOTE BEEN CONFIRMED WITH A SURVEY.

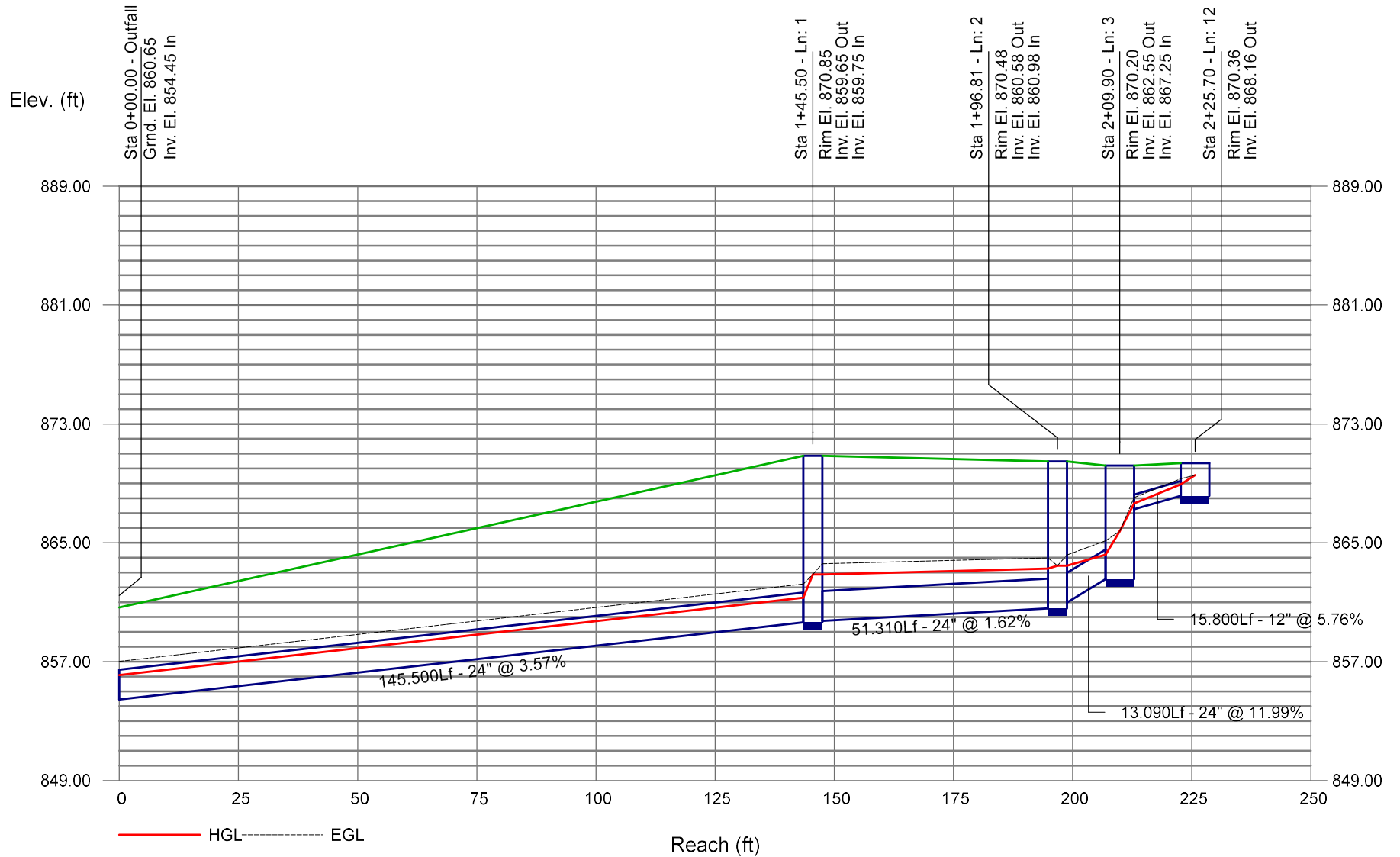
# Storm Sewer Profile



# Storm Sewer Profile

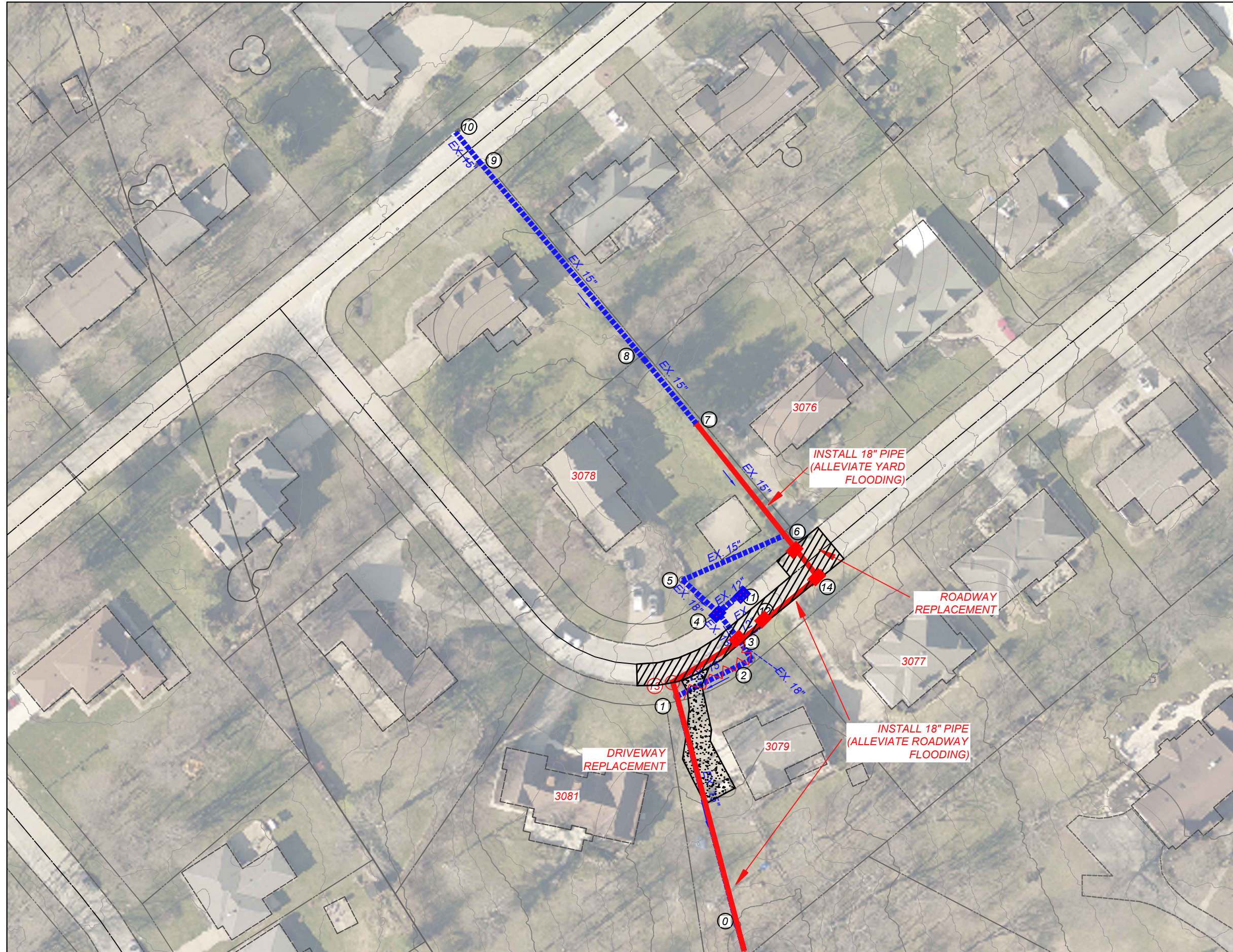


# Storm Sewer Profile



## APPENDIX C

### OPTION #2



LEGEND  
 EXISTING STORM SEWER  
 PROPOSED IMPROVEMENTS

**PRELIMINARY**

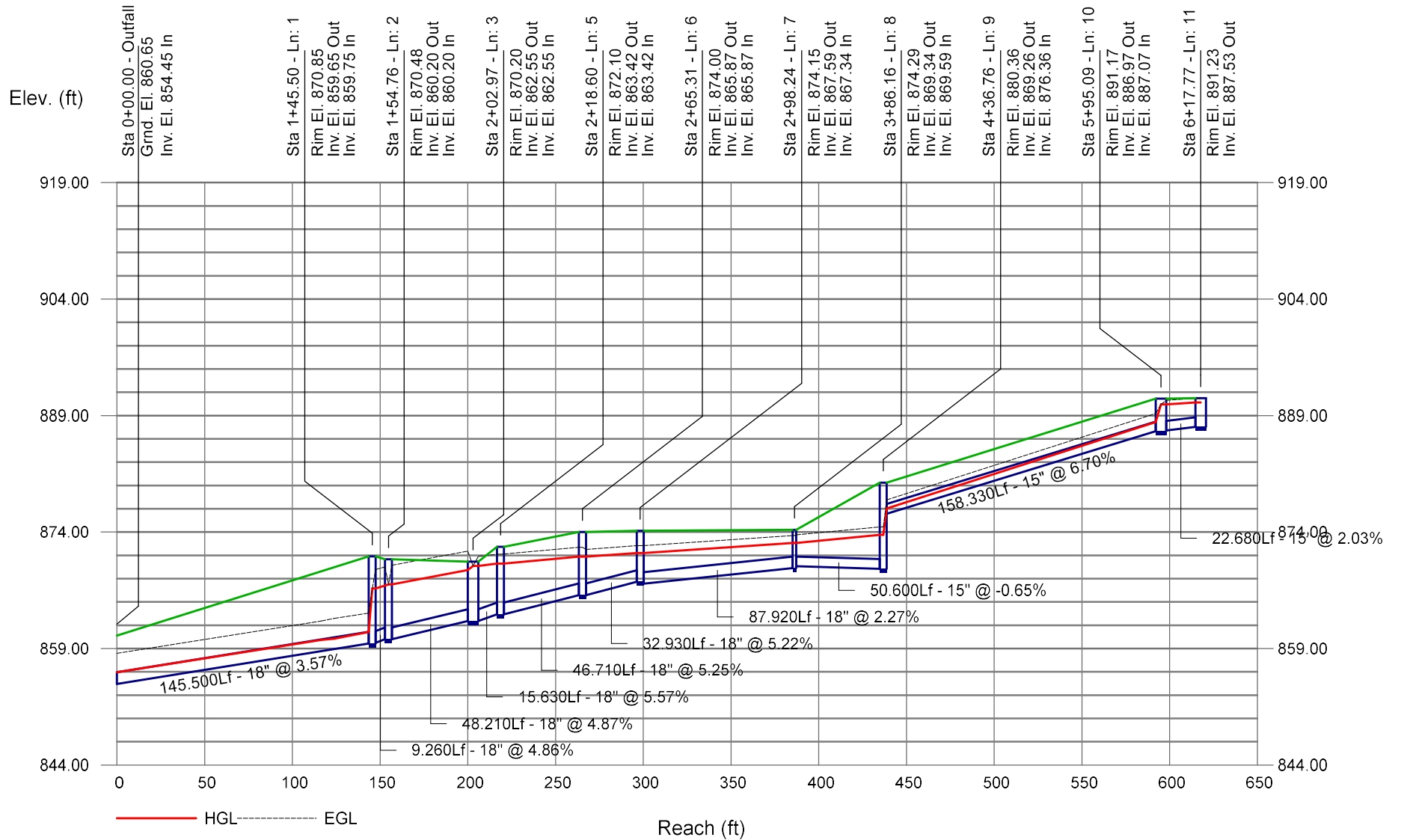


ISSUED FOR:	DATE:	NO.	REVISION:
ISSUE DATE: 9/22/21			
SCALE: AS SHOWN			
DESIGNED BY: MHEL			
DRAWN BY: MHEL			
CHECKED BY: MHEL			

**ASHLEY DRIVE  
DRAINAGE STUDY**  
 EDGEWOOD, KENTUCKY  
 OPTION 2

PROJECT NO.	210767
DISCIPLINE	CIVIL
SHEET NAME	
SHEET	OF
	1

# Storm Sewer Profile



# Storm Sewer Profile

