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Beech Drive Drainage Study Edgewood, KY

PREPARED FOR

City of Edgewood, Kentucky

385 Dudley Road
Edgewood, KY 41017
859.331.5910

ISSUED: 7.10.2023

PROJECT: 220398-05

PREPARED BY: Isaac Ekstrom, E.I.T.

CHECKED BY: Marty Hellmann, P.E.

CONTENTS PAGE

INTRODUCTION

The residents on Edgewood Road have identified recurring flooding problems at three (3) points between Edgewood Road and Beech Drive: 50 & 54 Edgewood Road, 64 & 65 Edgewood Road, and 74 Edgewood Road. There are low points in Beech Drive uphill of these properties.

The low point uphill of 50 & 54 Edgewood Road and bordering 51 & 57 Beech Drive will be referred to as "Low Point 1" in this study. The low point uphill of 64 & 68 Edgewood Road and bordering 69 Beech Drive will be referred to as "Low Point 2" in this study. The low point uphill of 74 Edgewood Road and bordering 75 Beech Drive will be referred to as "Low Point 3" in this study. The low point uphill of 80 & 82 Edgewood Road and bordering 85 & 87 Beech Drive will be referred to as "Low Point 4" in this study. The low point at the intersection of Beech Drive and Buckner Road will be referred to as "Low Point 5" in this study.

Edgewood Road was reconstructed in 2015 and 2016, with new storm sewer installed under the project title *Edgewood/Lyndale Storm Sewer* to manage the runoff within the right-of-way at that time. Per preliminary field observations and Sewer District 1 (SD1) mapping, there are two storm pipes that run from Beech Drive, downslope, to the storm sewer in Edgewood Road. Inlets at the upstream ends of these pipes drain Low Point 1 and 4. The inlets primarily catch runoff from uphill of Beech Drive because the road is not curbed to channel the drainage from the roadway into the existing inlets. Furthermore, the inlet capacity provided by the single inlets at these locations is limited.

There is also a culvert across Beech Drive at Low Point 2, with inlets on either side. The culvert simply allows water from the roadway and area uphill to drain under Beech Drive, then flow on the surface down to Edgewood Road.

The runoff that reaches Low Point 3 is not intercepted and simply flows overland until it reaches the storm system at Edgewood Road.

The storm sewer at Low Point 5 was updated in 2018 and there have not been recorded complaints of flooding from that area.

METHODOLOGY

The Hydraflow Storm Sewers Program was used to model the storm water system. The locations and inlet elevations of the study section were obtained from SD1's GIS information and the As-built construction drawing for the *Edgewood/Lyndale Storm Sewer* Project. 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

Criteria

The existing system was modeled using calculated drainage areas and pipe sizes per SD1 GIS information and the As-built construction drawing for the *Edgewood/Lyndale Storm Sewer* Project.

The system was evaluated for the following:

- Pipe Size: Evaluate the pipes in the system to see if they are undersized
- Pipe Configuration: changes in pipe size and direction can cause hydraulic losses and raise the hydraulic grade line.

Analysis - See Appendix A.

Based on modelling the existing system, the following was observed:

The existing system along Edgewood Road has capacity issues during 25-year storm events but alterations to this system are outside the scope of this study.

The existing pipe draining Low Point 1, has capacity issues during 10-year storm events. There is a large drainage area to Low Point 1. Runoff bypasses this inlet during heavy rain events which causes the flooding across 50 & 54 Edgewood Road, and 51 & 57 Beech Drive. This is due to a combination of low capacity of the existing storm pipe, low inlet capacity of the single storm structure, and the lack of curb or significant grading to channel the runoff into the storm structure. Furthermore, the existing pipe for Low Point 1 is diverted around a sanitary manhole with a short jog of 12" pipe before it crosses Edgewood Road. This pipe is smaller than the 15" pipe upstream and introduces an extra bend and structure to the system. Each of these factors introduce hydraulic losses to the system.

The model predicts that the pipe draining Low Point 4 provides adequate capacity for a 25-year storm event. Consistent with the model, there were no issues reported downhill from the inlet for this pipe.

As described above, the other problem areas: 64 & 65 Edgewood Road, and 74 Edgewood Road, do not have any storm sewer in place uphill of them at Low Points 2 and 3 to intercept the stormwater runoff and convey it to the downstream sewer system.

There is an existing asphalt curb along 69 Beech Drive, but it only serves to direct runoff into the culvert inlets at Low Point 2 where it is released it onto 69 Beech Drive.

The storm sewer draining Low Point 5 at Buckner Road has adequate capacity for the runoff that it intercepts.

PROPOSED CONDITIONS:

Criteria

The storm sewer system along Edgewood Road was not designed to convey the 25-year storm. It was designed for the largest possible pipe that could fit in the with the existing conditions, which is somewhere around the 10-year event storm. The systems were analyzed for the 10- and 25-year storm events to determine the impact on the existing Edgewood Road system at the 10-year event and to adequately size the Beech system for the 25-year event if possible. Proposed modeling results are provided in Appendix B.

The purpose of this analysis is to alleviate the overland flooding that has been occurring at 50 & 54, 64 & 65, and 74 Edgewood Road.

Inlet capacity calculations were completed on the curb inlets to determine how many inlets are needed to adequately intercept the runoff at Low Points 1-4.

Recommendation - Upsize the Pipe Draining Low Point 1 and Add Structures Upstream Along Beech Drive - See Appendix B.

Two storm inlets are proposed at Low Point 2 and four inlets at Low Point 3 to intercept runoff before it causes flooding on 64 & 65 Edgewood Road, and 74 Edgewood Road. 15" storm sewer is proposed to drain Low Points 2 and 3 towards the storm sewer at Low Point 1 where it is then conveyed down to the storm sewer system in Edgewood Road.

Low Points 2 and 3 are routed to Low Point 1 instead of Low Point 4 because Low Point 1 will need its pipe to be upsized regardless of where the flow from Low Points 2 and 3 is routed. It is easier to add capacity by including the flow for Low Points 2 and 3 when sizing the proposed pipe for Low Point 1, than disturb the pipe of both Low Points 1 and 4. Drainage Analysis indicates that upsizing the pipe between Low Point 1 and Edgewood Road to 24" pipe, with 18" pipe for the last segment, will provide adequate capacity to convey runoff from the area it currently serves, along with the added flow from the additional structures at Low Points 2 and 3.

Inlet Capacity analysis indicates that additional inlets will be needed at Low Point 1 and Low Point 4, so an arrangement of six inlets is proposed for Low Point 1, and Low Point 4 is proposed to have the single inlet replaced with four inlets.

Finally, the 12" pipe and accompanying structure were eliminated from the system where the pipe from Low Point 1 ties into the Edgewood Road system.

Upsizing the pipe from Low Point 1 and adding the structures to Beech drive would impact the yards of the residences on 50 & 54 Edgewood Road and wooded area behind them. The yard, driveway, and possibly deck of the home at 57 Beech Drive will be impacted, as well as approximately 550' of Beech Drive.

Although these improvements would decrease the hydraulic grade line of the system draining Low Point 1, it does not completely eliminate the overflow of water, and there could still be issues during heavy rain events. The storm system in Edgewood Road has limited capacity and may also experience overflows during heavy rains.

Results

The existing storm system in Edgewood Road exhibited similar results under the proposed conditions as under the existing conditions. The hydraulic grade line was predicted to be slightly higher under proposed conditions, likely due to the increased flow velocity of runoff from Low Points 2 and 3 where it is conveyed in pipes instead of overland.

Under proposed conditions, the pipes draining Low Points 1-3 have adequate capacity to convey the flow from the upstream drainage areas. The proposed system is still predicted to be surcharged where it reaches the existing storm system in Edgewood Road, but as mentioned previously, alterations to this part of the system are outside the scope of this study. Furthermore, this is a low priority area and stormwater is free to flow along the right-of-way to the nearby open channel system with minimal impact to residences.

The branch from the existing storm system in Edgewood Road in front of 70 and 74 Edgewood Road exhibits a lower hydraulic grade line under proposed conditions. The structures furthest upstream are within capacity under 10-year conditions where they were previously surcharged.

The pipes from Low Points 4 and 5 are predicted to have adequate capacity under both existing and proposed conditions.

Preliminary Opinion of Project Cost:

A preliminary opinion of cost was prepared to include upsizing the storm sewer from Edgewood Road to Low Point 1, installing new storm sewer from Low Point 1 to Low Points 2 and 3, and installing inlets at Low Points 1-4 to provide adequate inlet capacity as predicted by the model. This opinion also includes items for resurfacing and trench repair in Beech Drive, and the addition of concrete curb to better contain the runoff and channel it into the proposed inlets.

The preliminary opinion of total project cost is: $736,500

SUMMARY

Identified Issues Contributing to Flooding Downstream of Beech Drive:

1. Low Point 1: Outlet pipe to Edgewood Road is undersized for the existing drainage area. Inadequate catch basin placement and capacity results in surface water not being able to enter the system efficiently. Lack of curb allows runoff and overflow to enter onto the properties downstream where it flows overland toward Edgewood Road
2. Low Point 2 and 3: No outlet pipes downstream. Runoff is directed on to the property downstream where it flows overland toward Edgewood Road.
3. Low Point 4: Outlet pipe has the necessary capacity, but lack of curbs and proper catch basin placement allows surface runoff to enter onto the property downstream rather than into the storm sewer system.
4. In general, the lack of curbs and poor catch basin placement allows water to bypass the storm sewer system and enter onto neighboring properties rather than being directed into a storm sewer system.

Recommended Improvements:

1. Make adjustments on Beech Drive to properly collect the runoff and convey it to the storm system on Edgewood Road
2. Construct curbs throughout to retain runoff on the street and direct it to a storm sewer.
3. Reprofile the road to properly direct runoff to catch basin locations.
4. Add additional inlets at the low points as needed to achieve proper inlet capacity to allow the runoff into the storm sewer system.
5. Upsize the pipe downstream of Low Point 1 to Edgewood Road.
6. Redirect the outlet at low points 2 and 3 to a storm sewer system rather than allowing them to outlet onto the neighboring property.
7. Piping Low points 2 and 3 to the storm sewer at Low Point 1 was selected because the pipe at Low Point 1 needs to be reconstructed under current conditions so it can easily be properly sized to accept flow from Low Points 2 and 3 with minimal increase to cost. This avoids having to put in new storm sewer downstream of these low points where there currently isn't any or disturbing the area down stream of Low Point 4 since it is currently correctly sized.

Benefits of this approach:

1. Collect runoff on Beech Drive and conveys it to the system on Beech Drive
2. Minimizes the construction impact on private property.
3. Redirects runoff from the upper part of the Edgewood Road storm sewer system and deposits it into the system further downstream. This has minimal impact on the hydraulic grade line of the system in the lower parts, but decreases the

hydraulic grade line (increases capacity) in the upper sections. This will result in a lowered risk for overflows along Edgewood Road in areas where the homes are lower than the road and at greater risk for flooding concerns.

4. Incorporates improvements to Beech Drive including new curbs and pavement resurfacing.

Downsides:

1. Reconstruction of the pipes through side and rear yards on private property always presents a challenge with impacts to the property (loss of trees/landscaping, having to navigate around obstructions in the yards etc.)
2. Piping Low Points 2 and 3 to Low Point 1 results in running pipe against the grade of the road and the pipe will be approximately 11 feet deep under the road at it's deepest point (this is still preferable to adding another run of pipe through private property).

It is our opinion that the city should proceed with the recommendation as described above. This will eliminate the overflow of Low Point 1 under 25-year flow conditions, and intercept surface flow from Low Points 2 and 3 that has been causing flooding across 69 and 74 Edgewood Road. It eliminates one storm structure and sharp bend and provides larger diameter pipes to convey the flow. The storm line that runs through 80 Edgewood Road will remain, as it provides adequate capacity and there have not been complaints about it overflowing.

Next steps will be to the survey the project limits, confirm pipe sizes and locations and prepare construction drawings.

APPENDIX A

EXISTING

PRELIMINARY

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planners

NO	REVISION	DATE

ISSUED FOR: PRELIM REPORT	
ISSUE DATE:	10/1/18
SCALE:	AS SHOWN ON 22X34
DESIGNED BY:	MHEL
DRAWN BY:	IEKS
CHECKED BY:	MHEL

EDGEWOOD DRAINAGE STUDIES
BEECH DRIVE
- KENTON COUNTY, KY -

EXISTING DRAINAGE

DUDLEY ROAD
BEECH DRIVE
BUCKNER ROAD
OPEN CHANNEL
EDGEWOOD ROAD
LYNDALE ROAD
LYNDALE COURT
ELMWOOD DRIVE
ASHLEY DRIVE
EDGEWOOD ROAD

LOW POINT 1
LOW POINT 2
LOW POINT 3
LOW POINT 4
LOW POINT 5

AREA: 5.56 AC
FLOW PATH: 621'
Tc: 21.08 MIN

AREA: 1.98 AC
FLOW PATH: 432'
Tc: 20.267 MIN

AREA: 2.11 AC
FLOW PATH: 645'
Tc: 12.95 MIN

AREA: 2.17 AC
FLOW PATH: 452'
Tc: 23.95 MIN

AREA: 1.18 AC
FLOW PATH: 401'
Tc: 15.06 MIN

AREA: 3.31 AC
FLOW PATH: 525'
Tc: 24.9 MIN

AREA: 4.60 AC
FLOW PATH: 626'
Tc: 16.22 MIN

AREA: 2.27 AC
FLOW PATH: 482'
Tc: 15.79 MIN

AREA: 1.31 AC
FLOW PATH: 333'
Tc: 14.5 MIN

AREA: 0.47 AC
FLOW PATH: 318'
Tc: 11.23 MIN

AREA: 26.13 AC
FLOW PATH: 1930'
Tc: 45.6 MIN

EXIST. STORM SEWER
DRAINAGE AREA
SURFACE FLOW PATH
00 STRUCTURE NUMBER

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

PROJECT NO.	
220398-05	
DISCIPLINE	
CIVIL	
SHEET NAME	
EX-COND	
SHEET	OF
1	2

\\CTC.LOCAL\CT_DATA\PROJECTS\2022\220398\DWG\BASE\BEECH\220398005 BEECH STUDY DRAINAGE AREA.DWG - BEECH EX - 7/10/2023 10:04:41 AM - ISAAC EKSTROM

INADEQUATE INLET CAPACITY
FROM A SINGLE GRATE INLET
LACK OF CURB ALLOWS RUNOFF
TO FLOW INTO ADJACENT PROPERTIES

LOW POINT 1

NO CURB PRESENT
ALONG BEECH

PIPE IS UNDERSIZED

BEECH DRIVE

RUNOFF IS NOT INTERCEPTED
AND FLOWS OVERLAND

LOW POINT 2

LOW POINT 3

INADEQUATE INLET CAPACITY
FROM A SINGLE GRATE INLET
LACK OF CURB ALLOWS RUNOFF
TO FLOW INTO ADJACENT PROPERTIES

LOW POINT 4

LOW POINT 5

RUNOFF IS NOT INTERCEPTED
AND FLOWS OVERLAND

PIPE HAS CAPACITY

EDGEWOOD ROAD

EXIST. STORM SEWER
PR. STORM SEWER
00 STRUCTURE NUMBER

0' 40' 80'
SCALE: 1" = 40

PRELIMINARY

your trusted advisor
consultants
engineers
architects
planners

NO	REVISION	DATE

ISSUED FOR: PRELIM REPORT
ISSUE DATE: 10/1/18
SCALE: AS SHOWN ON 22X34
DESIGNED BY: MHEL
DRAWN BY: IEKS
CHECKED BY: MHEL

EDGEWOOD DRAINAGE STUDIES
BEECH DRIVE
- KENTON COUNTY, KY -

EXISTING CONDITIONS

PROJECT NO.
220398-05
DISCIPLINE
CIVIL
SHEET NAME
EX-COND
SHEET 2 OF 2

\\CTC.LOCAL\CT_DATA\PROJECTS\2022\220398\DWG\BASE\BEECH\220398005 BEECH STUDY DRAINAGE AREA.DWG - BEECH EX-COND - 7/10/2023 10:04:41 AM - ISAAC EKSTROM

Storm Sewer Tabulation

EX. 10-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	44.314	0.13	47.03	0.95	0.12	27.15	6.0	49.2	2.3	103.6	190.9	11.91	36 x 60 e	1.87	831.82	832.65	834.50	835.65	835.15	837.98	55
2	1	107.164	0.83	46.90	0.40	0.33	27.03	20.1	49.0	2.3	103.5	105.1	8.32	38 x 60 e	0.49	832.48	833.00	837.99	838.49	837.98	838.15	56
3	2	138.507	0.00	46.07	0.00	0.00	26.70	0.0	48.7	2.3	103.0	111.0	8.28	38 x 60 e	0.54	833.00	833.75	840.11	840.75	838.15	840.00	57
4	3	93.205	0.05	34.80	0.58	0.03	19.43	6.4	48.4	2.3	86.39	100.0	6.95	38 x 60 e	0.44	833.75	834.16	842.88	843.19	840.00	841.16	60
5	4	161.606	0.00	34.75	0.00	0.00	19.40	0.0	48.0	2.3	86.58	104.8	6.96	38 x 60 e	0.48	834.16	834.94	844.32	844.85	841.16	844.61	61
6	5	109.400	0.00	33.44	0.00	0.00	18.67	0.0	47.8	2.3	85.05	204.0	6.77	48	1.72	834.94	836.82	845.89	846.22	844.61	846.82	64
7	6	60.000	0.00	33.44	0.00	0.00	18.67	0.0	47.6	2.3	85.15	169.3	6.78	48	1.18	836.82	837.53	846.32	846.50	846.82	848.53	67
8	7	180.000	0.00	28.02	0.00	0.00	15.80	0.0	47.1	2.3	78.70	172.8	6.26	48	1.23	837.70	839.92	847.22	847.68	848.53	854.75	68
9	8	218.696	0.00	23.77	0.00	0.00	13.04	0.0	46.8	2.4	72.37	99.65	10.24	36	1.90	839.75	843.91	848.29	850.48	854.75	853.19	70
10	9	60.115	0.00	21.10	0.00	0.00	11.56	0.0	46.7	2.4	68.94	92.72	9.75	36	1.65	843.91	844.90	852.11	852.66	853.19	853.90	72
11	10	183.640	0.00	17.62	0.00	0.00	9.56	0.0	23.2	3.7	61.82	108.0	8.75	36	2.23	844.90	849.00	854.14	855.48	853.90	864.00	76
12	11	203.820	0.00	14.53	0.00	0.00	7.58	0.0	22.4	3.8	55.09	50.61	7.79	36	0.49	851.00	852.00	856.67	857.86	864.00	861.00	50
13	12	97.870	0.00	14.01	0.00	0.00	7.35	0.0	22.3	3.8	54.31	75.15	11.81	30	2.86	856.50	859.30	858.61	861.65	861.00	869.80	32A
14	13	145.280	0.00	8.65	0.00	0.00	4.43	0.0	20.6	3.9	44.06	35.55	8.98	30	0.64	858.80	859.73	861.65	863.08	869.80	864.73	34
15	14	157.046	0.00	6.47	0.00	0.00	3.37	0.0	20.3	4.0	39.96	41.19	8.14	30	0.86	859.73	861.08	864.33	865.60	864.73	870.36	37
16	15	365.020	0.00	1.85	0.00	0.00	1.13	0.0	17.1	4.4	4.91	15.07	4.61	15	4.64	863.86	880.80	866.63	881.70	870.36	887.30	43
17	16	6.720	0.28	1.12	0.47	0.13	0.54	8.6	17.1	4.4	2.37	11.45	3.23	15	2.68	880.80	880.98	881.70	881.60	887.30	886.98	44
18	17	144.308	0.14	0.84	0.59	0.08	0.41	9.5	15.6	4.6	1.88	15.01	3.39	15	4.60	880.98	887.62	881.60	888.17	886.98	893.62	45
19	18	86.066	0.20	0.70	0.47	0.09	0.33	7.7	14.5	4.7	1.56	14.49	3.24	15	4.29	887.62	891.31	888.17	891.80	893.62	897.31	46
20	19	104.361	0.50	0.50	0.47	0.24	0.24	12.7	12.7	5.1	1.19	14.41	2.91	15	4.24	891.31	895.74	891.80	896.17	897.31	901.74	47
21	16	14.663	0.73	0.73	0.80	0.58	0.58	6.0	6.0	6.8	3.95	7.75	4.46	15	1.23	880.80	880.98	881.70	881.78	887.30	886.98	42
22	13	49.662	0.00	5.36	0.00	0.00	2.92	0.0	22.2	3.8	11.02	12.20	10.17	15	3.04	863.80	865.31	864.73	866.51	869.80	872.31	31

Project File: 22039805_Ex-cond_calculations.stm

Number of lines: 64

Run Date: 7/5/2023

NOTES:Intensity = 65.69 / (Inlet time + 9.80) ^ 0.82; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

EX. 10-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	260.828	0.00	1.98	0.00	0.00	1.13	0.0	21.0	3.9	4.40	11.19	4.30	15	2.56	865.31	871.98	866.51	872.83	872.31	878.98	28
24	23	6.943	0.10	0.10	0.95	0.10	0.10	6.0	6.0	6.8	0.64	11.26	3.82	15	2.59	875.48	875.66	875.68	875.97	878.98	878.66	Pipe - (1122)
25	23	14.495	1.88	1.88	0.55	1.03	1.03	20.9	20.9	3.9	4.04	7.80	4.67	15	1.24	871.98	872.16	872.83	872.97	878.98	878.66	27
26	11	160.753	0.00	2.63	0.00	0.00	1.66	0.0	22.5	3.8	6.22	28.84	9.10	18	6.43	856.75	867.08	857.22	868.04	864.00	874.58	Pipe - (1171)
27	26	7.219	1.24	1.24	0.63	0.78	0.78	22.4	22.4	3.8	2.94	10.73	5.85	15	2.35	871.08	871.25	871.53	871.94	874.58	874.25	78
28	22	38.536	0.70	3.31	0.52	0.36	1.72	6.0	16.9	4.4	7.55	19.45	6.44	15	7.73	865.31	868.29	866.51	869.38	872.31	872.04	30A
29	28	23.056	2.61	2.61	0.52	1.36	1.36	16.8	16.8	4.4	5.97	7.28	5.50	15	1.08	868.29	868.54	869.38	869.53	872.04	872.04	30
30	22	12.797	0.07	0.07	0.95	0.07	0.07	6.0	6.0	6.8	0.45	14.10	3.83	15	4.06	867.81	868.33	867.96	868.59	872.31	872.33	32
31	26	14.219	1.39	1.39	0.63	0.88	0.88	11.8	11.8	5.2	4.57	7.65	4.77	15	1.20	867.08	867.25	868.04	868.12	874.58	874.25	80
32	15	6.719	4.43	4.43	0.47	2.08	2.08	20.3	20.3	4.0	8.27	22.25	11.95	15	10.12	866.36	867.04	866.89	868.17	870.36	870.04	38
33	15	14.745	0.19	0.19	0.82	0.16	0.16	6.0	6.0	6.8	27.65	5.15	22.54	15	0.54	861.08	861.16	866.63	868.94	870.36	870.12	36
34	33	137.628	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	26.60	17.35	8.47	24	0.50	861.16	861.85	872.89	874.51	870.12	864.01	81
35	14	6.719	0.40	0.40	0.58	0.23	0.23	10.6	10.6	5.5	1.27	11.45	1.04	15	2.68	860.73	860.91	864.33	864.33	864.73	864.41	35
36	14	14.709	1.78	1.78	0.47	0.84	0.84	15.9	15.9	4.5	3.79	7.74	3.09	15	1.22	860.73	860.91	864.33	864.37	864.73	864.41	33
37	11	8.255	0.26	0.26	0.69	0.18	0.18	8.2	8.2	6.1	1.09	25.42	6.70	15	13.20	859.00	860.09	859.18	860.50	864.00	863.59	75
38	11	14.024	0.20	0.20	0.72	0.14	0.14	6.0	6.0	6.8	0.97	7.36	4.83	12	3.64	858.00	858.51	858.25	858.92	864.00	864.01	77
39	10	13.219	1.31	3.48	0.45	0.59	2.00	14.6	46.6	2.4	19.71	25.21	6.28	24	1.06	846.40	846.54	854.14	854.22	853.90	853.54	73
40	9	8.218	2.20	2.20	0.53	1.17	1.17	16.1	16.1	4.5	5.24	10.06	4.27	15	2.07	849.66	849.83	852.11	852.16	853.19	852.83	69
41	9	13.219	0.47	0.47	0.65	0.31	0.31	14.2	14.2	4.8	1.46	7.93	1.19	15	1.29	845.66	845.83	852.11	852.12	853.19	852.83	71
42	7	29.277	0.00	5.42	0.53	0.00	2.87	0.0	23.7	3.6	10.46	11.12	5.92	18	0.96	840.14	840.42	847.22	847.46	848.53	846.92	66
43	5	16.227	0.96	1.31	0.49	0.47	0.73	13.4	16.1	4.5	3.28	43.75	1.86	18	14.79	835.96	838.36	845.89	845.90	844.61	844.69	62
44	43	24.561	0.35	0.35	0.74	0.26	0.26	15.7	15.7	4.6	1.18	14.04	0.96	15	4.03	838.96	839.95	845.93	845.94	844.69	844.90	63

Project File: 22039805_Ex-cond_calculations.stm

Number of lines: 64

Run Date: 7/5/2023

NOTES:Intensity = 65.69 / (Inlet time + 9.80) ^ 0.82; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

EX. 10-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	3	15.000	0.85	11.27	0.58	0.49	7.27	12.9	22.2	3.8	27.45	37.43	8.74	24	2.33	833.53	833.88	841.82	842.01	840.00	840.13	58
46	45	21.000	5.16	10.42	0.65	3.35	6.77	16.7	22.2	3.8	25.60	24.20	14.49	18	4.52	836.74	837.69	842.60	843.67	840.13	840.13	59
47	12	9.630	0.52	0.52	0.45	0.23	0.23	13.9	13.9	4.8	1.13	22.30	0.64	18	3.84	856.75	857.12	858.61	858.61	861.00	860.08	49
48	39	85.400	0.00	2.17	0.00	0.00	1.41	46.5	46.5	2.4	18.32	17.63	10.37	18	2.40	852.97	855.02	854.84	857.05	853.54	858.67	1281
49	46	6.600	0.00	5.26	0.00	0.00	3.42	0.0	22.2	3.8	12.93	6.72	16.46	12	3.03	838.22	838.42	845.30	846.04	840.13	840.56	48A
50	49	354.308	0.00	5.26	0.00	0.00	3.42	0.0	21.6	3.8	13.12	11.52	10.69	15	2.71	837.89	847.49	846.67	859.14	840.56	851.87	48A(2)
51	50	110.000	0.00	5.26	0.00	0.00	3.42	0.0	21.4	3.9	13.18	9.43	10.74	15	1.82	848.75	850.75	859.41	863.31	851.87	853.77	48A(2)
52	51	223.000	5.26	5.26	0.65	3.42	3.42	21.1	21.1	3.9	13.30	17.66	10.84	15	6.37	850.85	865.06	863.69	871.76	853.77	870.38	48A(2)(2)
53	8	40.000	2.27	4.25	0.65	1.48	2.76	15.4	23.2	3.7	10.18	1.57	8.30	15	0.05	845.94	845.96	848.29	849.13	854.75	854.15	52A
54	53	52.600	0.00	1.98	0.00	0.00	1.29	0.0	22.9	3.7	4.78	9.10	3.89	15	1.69	845.96	846.85	850.21	850.45	854.15	853.34	52A(2)
55	54	86.200	0.00	1.98	0.00	0.00	1.29	0.0	22.4	3.8	4.84	9.14	3.94	15	1.71	846.85	848.32	850.50	850.91	853.34	852.14	52A(2)
56	55	72.700	0.00	1.98	0.00	0.00	1.29	0.0	22.0	3.8	4.89	2.46	3.98	15	0.12	848.42	848.51	851.15	851.51	852.14	851.26	52A(2)(2)
57	56	88.400	0.00	1.98	0.00	0.00	1.29	0.0	21.5	3.8	4.95	23.07	4.63	15	10.87	848.42	858.03	851.55	858.93	851.26	0.00	
58	57	206.000	1.98	1.98	0.65	1.29	1.29	20.7	20.7	3.9	5.06	17.61	5.60	15	6.33	858.11	871.16	858.93	872.07	0.00	0.00	
59	42	35.000	2.11	2.11	0.53	1.12	1.12	13.0	13.0	5.0	5.60	4.58	16.03	8	12.23	841.52	845.80	848.01	854.41	846.92	846.90	
60	42	89.000	0.00	3.31	0.00	0.00	1.75	0.0	23.3	3.7	6.45	22.04	3.65	18	3.75	842.29	845.63	848.01	848.29	846.92	848.28	
61	60	6.630	3.31	3.31	0.53	1.75	1.75	23.2	23.2	3.7	6.46	9.41	5.26	15	1.81	845.88	846.00	848.50	848.56	848.28	847.89	
62	48	198.697	0.00	2.17	0.00	0.00	1.41	0.0	24.3	3.6	5.05	16.10	4.70	15	5.30	855.02	865.55	859.11	866.46	858.67	869.35	
63	62	15.300	0.00	2.17	0.00	0.00	1.41	0.0	24.3	3.6	5.06	6.93	5.28	15	0.98	865.55	865.70	866.46	866.61	869.35	0.00	
64	63	83.000	2.17	2.17	0.65	1.41	1.41	24.0	24.0	3.6	5.10	7.00	5.31	15	1.00	865.70	866.53	866.61	867.44	0.00	0.00	

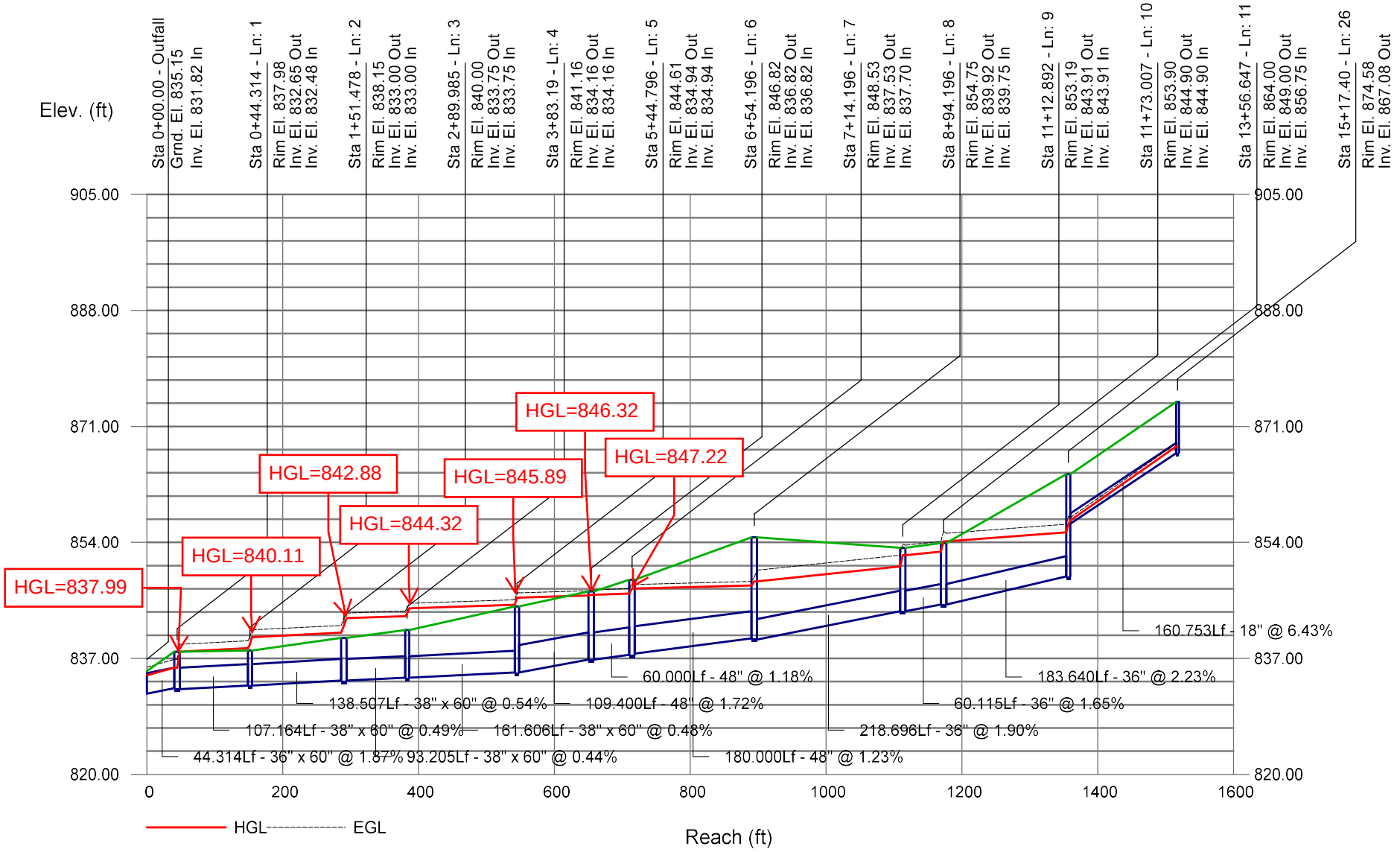
Project File: 22039805_Ex-cond_calculations.stm

Number of lines: 64

Run Date: 7/5/2023

NOTES:Intensity = 65.69 / (Inlet time + 9.80) ^ 0.82; Return period =Yrs. 10 ; c = cir e = ellip b = box

SYSTEM ALONG EDGEWOOD ROAD

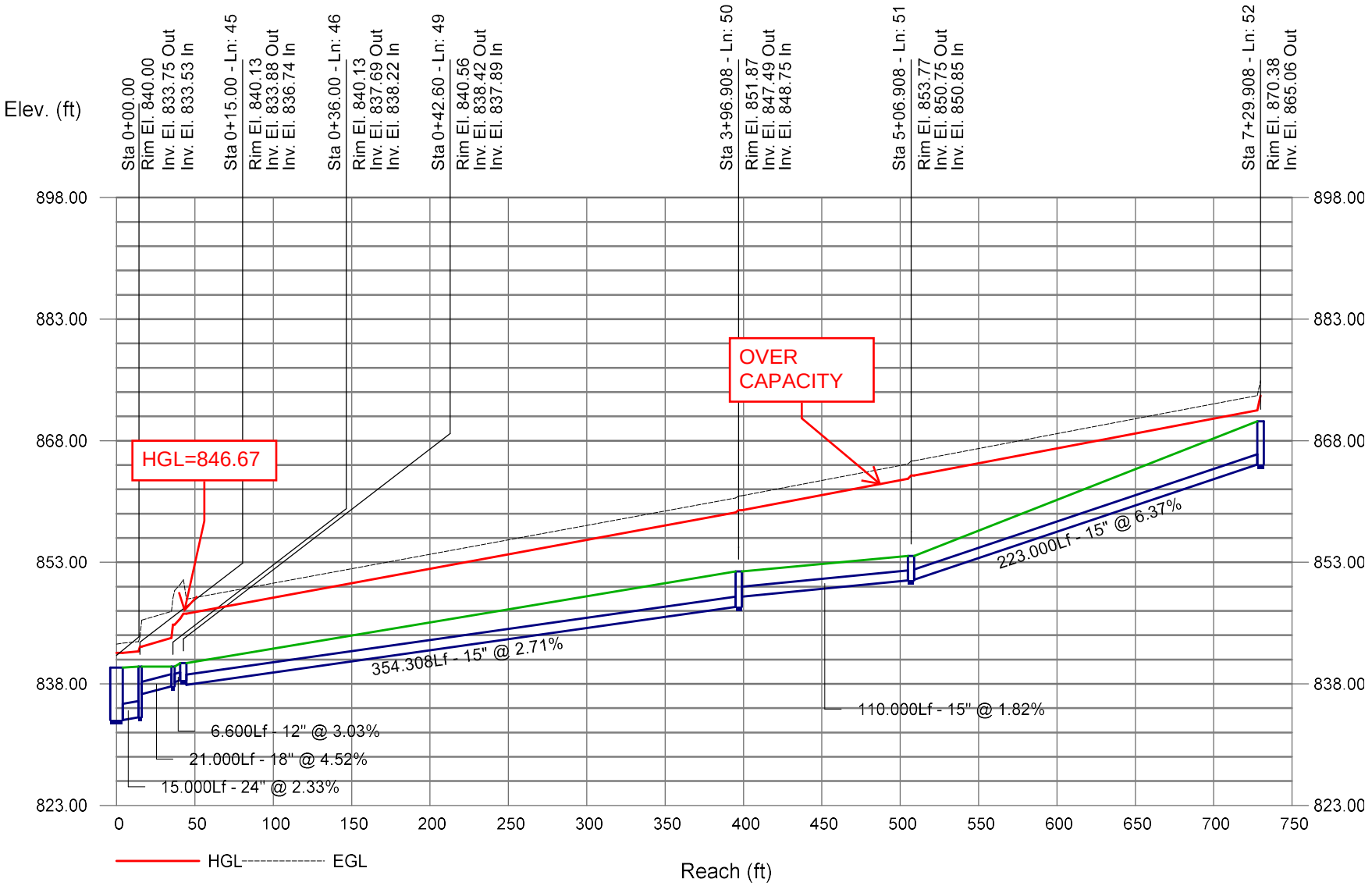


Storm Sewer Profile

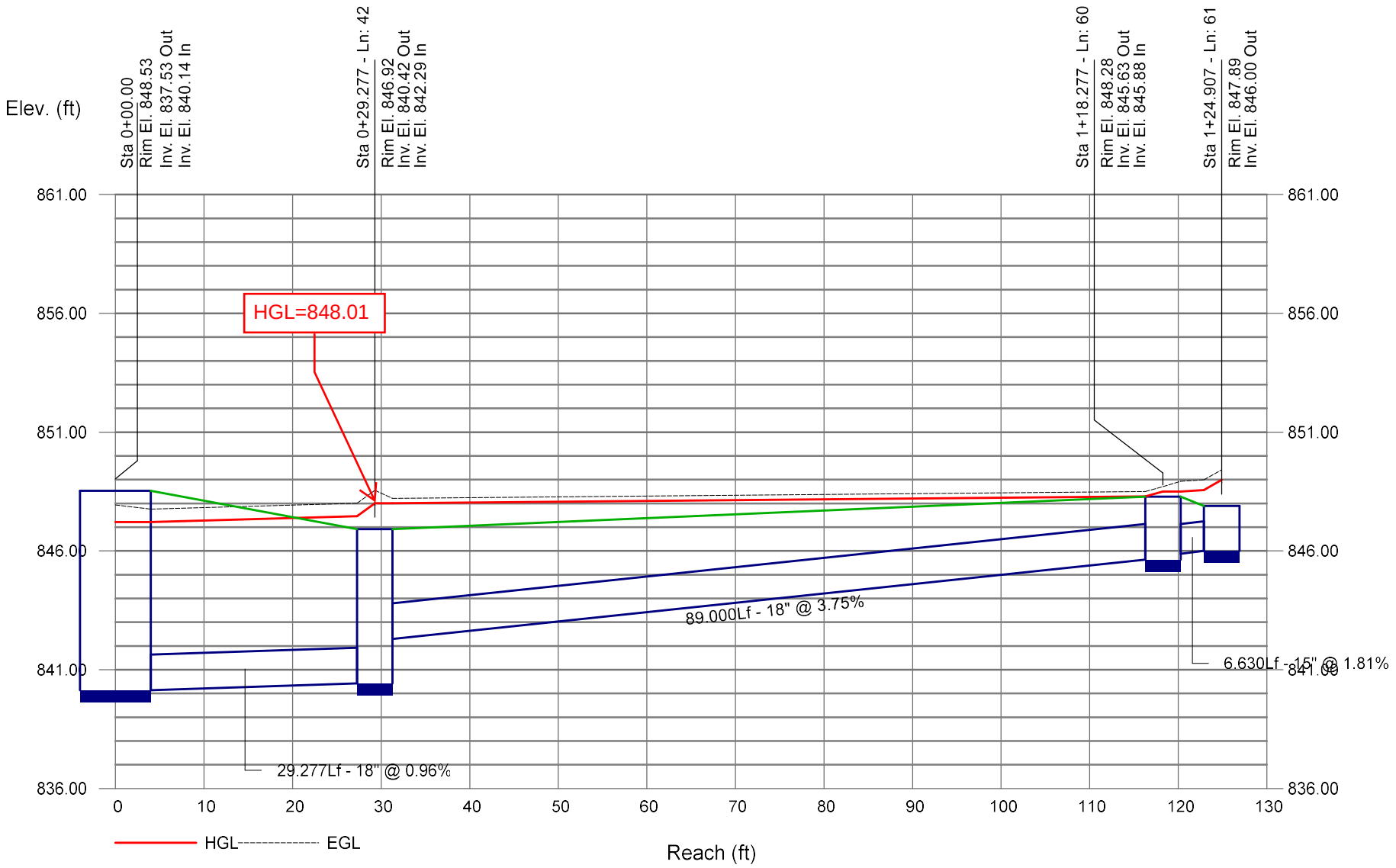
EX. 10-YEAR

Proj. file: 22039805_Ex-cond_calculations.stm

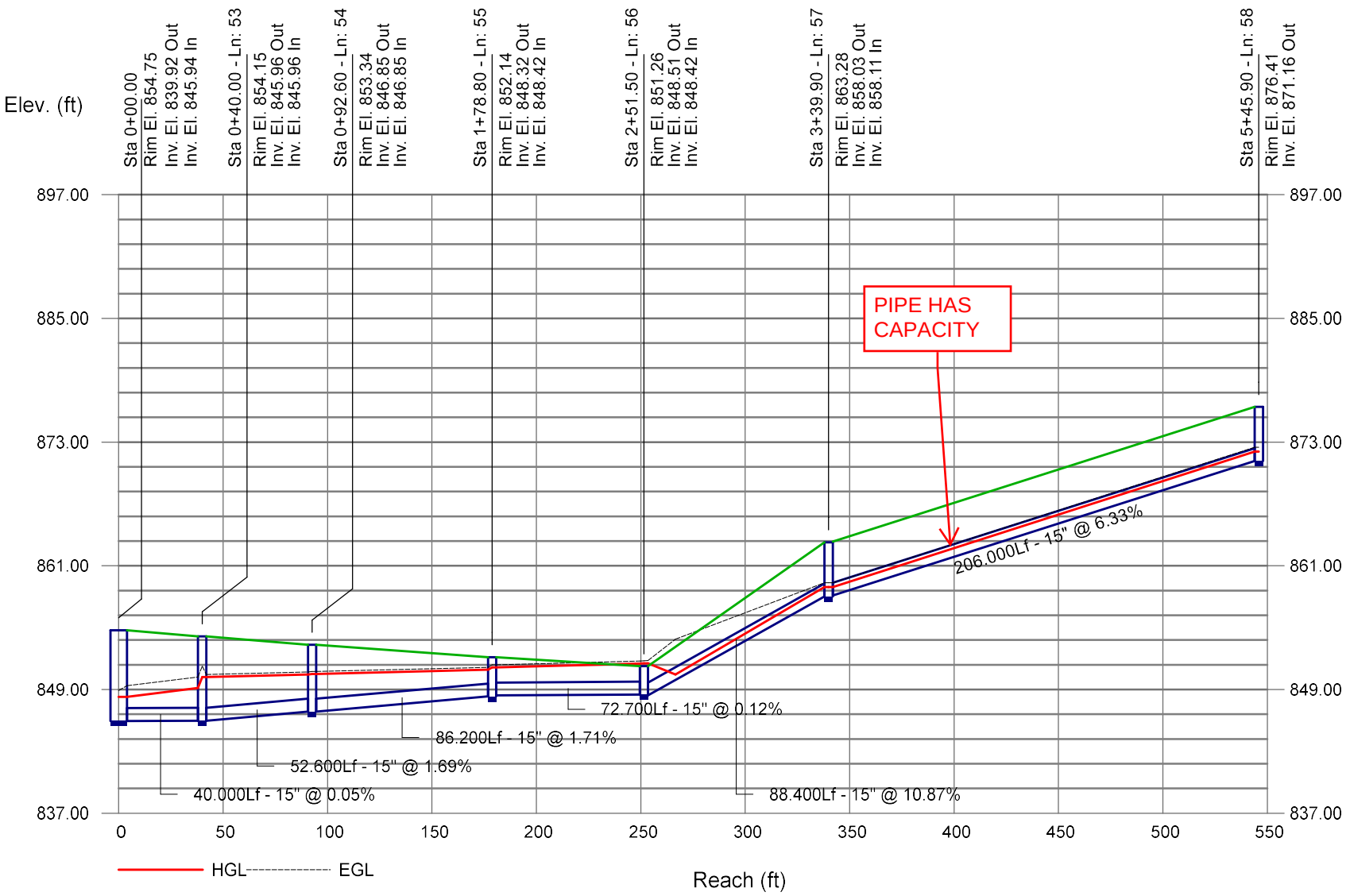
DRAINAGE FROM LOW POINT 1



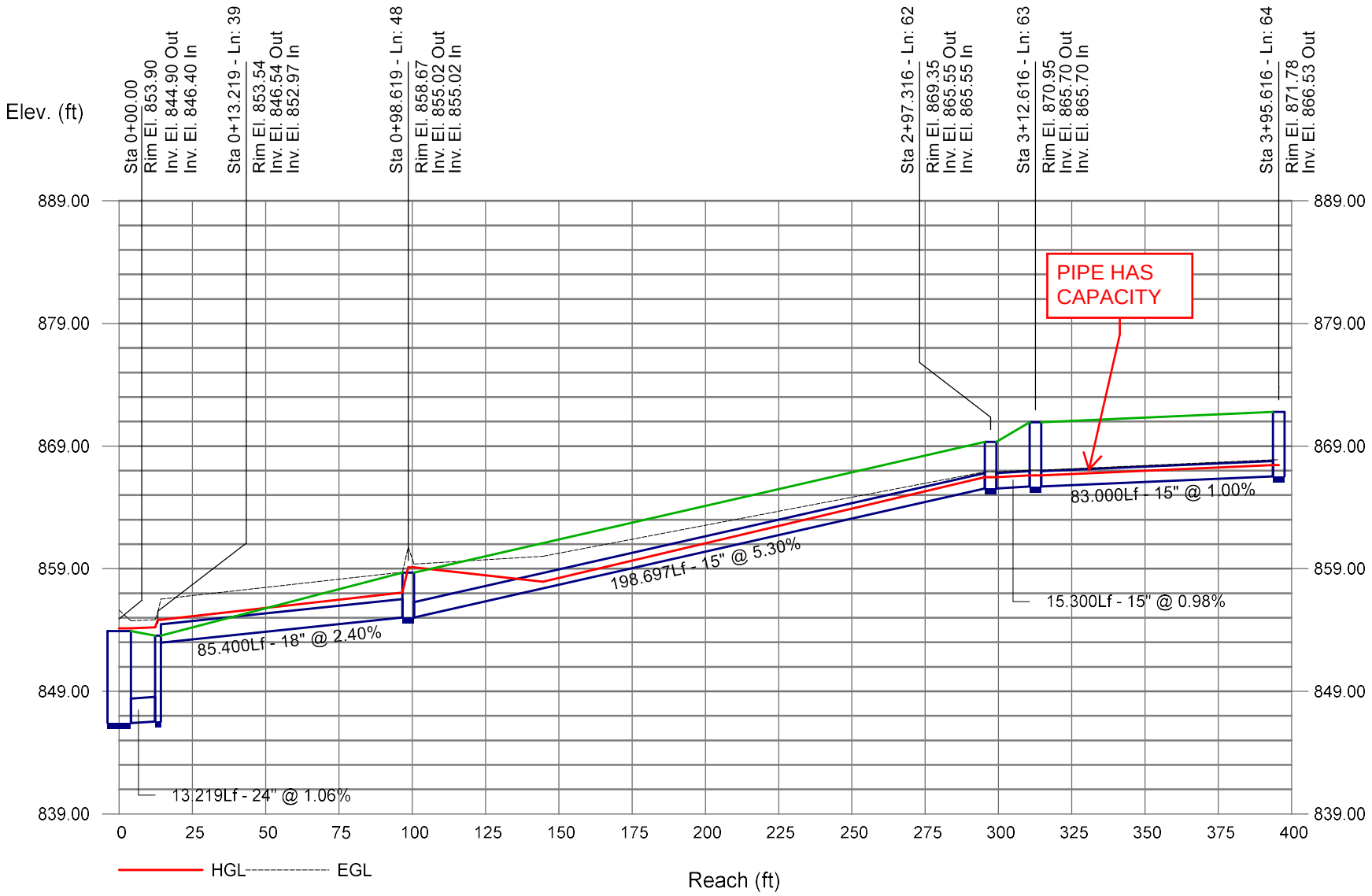
DRAINAGE IN FRONT YARD OF 70/74 EDGEWOOD



DRAINAGE AT LOW POINT 4



DRAINAGE @ LOW POINT 5 (BUCKNER)



Storm Sewer Tabulation

EX. 25-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	44.314	0.13	47.03	0.95	0.12	27.15	6.0	49.0	2.6	112.9	190.9	12.99	36 x 60 e	1.87	831.82	832.65	834.50	835.65	835.15	837.98	55
2	1	107.164	0.83	46.90	0.40	0.33	27.03	20.1	48.8	2.6	112.8	105.1	9.07	38 x 60 e	0.49	832.48	833.00	838.43	839.03	837.98	838.15	56
3	2	138.507	0.00	46.07	0.00	0.00	26.70	0.0	48.5	2.6	112.1	111.0	9.02	38 x 60 e	0.54	833.00	833.75	840.95	841.72	838.15	840.00	57
4	3	93.205	0.05	34.80	0.58	0.03	19.43	6.4	48.3	2.7	93.08	100.0	7.48	38 x 60 e	0.44	833.75	834.16	844.24	844.60	840.00	841.16	60
5	4	161.606	0.00	34.75	0.00	0.00	19.40	0.0	48.0	2.7	93.24	104.8	7.50	38 x 60 e	0.48	834.16	834.94	845.91	846.52	841.16	844.61	61
6	5	109.400	0.00	33.44	0.00	0.00	18.67	0.0	47.7	2.7	91.47	204.0	7.28	48	1.72	834.94	836.82	847.73	848.11	844.61	846.82	64
7	6	60.000	0.00	33.44	0.00	0.00	18.67	0.0	47.6	2.7	91.56	169.3	7.29	48	1.18	836.82	837.53	848.23	848.44	846.82	848.53	67
8	7	180.000	0.00	28.02	0.00	0.00	15.80	0.0	47.1	2.7	84.12	172.8	6.69	48	1.23	837.70	839.92	849.26	849.79	848.53	854.75	68
9	8	218.696	0.00	23.77	0.00	0.00	13.04	0.0	46.8	2.7	76.84	99.65	10.87	36	1.90	839.75	843.91	850.49	852.96	854.75	853.19	70
10	9	60.115	0.00	21.10	0.00	0.00	11.56	0.0	46.7	2.7	72.90	92.72	10.31	36	1.65	843.91	844.90	854.80	855.41	853.19	853.90	72
11	10	183.640	0.00	17.62	0.00	0.00	9.56	0.0	23.1	4.1	65.72	108.0	9.30	36	2.23	844.90	849.00	857.07	858.59	853.90	864.00	76
12	11	203.820	0.00	14.53	0.00	0.00	7.58	0.0	22.3	4.2	58.26	50.61	8.24	36	0.49	851.00	852.00	859.93	861.26	864.00	861.00	50
13	12	97.870	0.00	14.01	0.00	0.00	7.35	0.0	22.1	4.2	57.39	75.15	11.69	30	2.86	856.50	859.30	862.10	863.74	861.00	869.80	32A
14	13	145.280	0.00	8.65	0.00	0.00	4.43	0.0	20.6	4.4	45.90	35.55	9.35	30	0.64	858.80	859.73	865.86	867.41	869.80	864.73	34
15	14	157.046	0.00	6.47	0.00	0.00	3.37	0.0	20.3	4.4	41.37	41.19	8.43	30	0.86	859.73	861.08	868.77	870.13	864.73	870.36	37
16	15	365.020	0.00	1.85	0.00	0.00	1.13	0.0	16.7	4.9	5.48	15.07	4.98	15	4.64	863.86	880.80	871.24	881.75	870.36	887.30	43
17	16	6.720	0.28	1.12	0.47	0.13	0.54	8.6	16.7	4.9	2.64	11.45	3.37	15	2.68	880.80	880.98	881.75	881.63	887.30	886.98	44
18	17	144.308	0.14	0.84	0.59	0.08	0.41	9.5	15.3	5.1	2.09	15.01	3.51	15	4.60	880.98	887.62	881.63	888.20	886.98	893.62	45
19	18	86.066	0.20	0.70	0.47	0.09	0.33	7.7	14.3	5.2	1.73	14.49	3.34	15	4.29	887.62	891.31	888.20	891.83	893.62	897.31	46
20	19	104.361	0.50	0.50	0.47	0.24	0.24	12.7	12.7	5.6	1.31	14.41	2.99	15	4.24	891.31	895.74	891.83	896.19	897.31	901.74	47
21	16	14.663	0.73	0.73	0.80	0.58	0.58	6.0	6.0	7.5	4.40	7.75	4.68	15	1.23	880.80	880.98	881.75	881.83	887.30	886.98	42
22	13	49.662	0.00	5.36	0.00	0.00	2.92	0.0	22.1	4.2	12.24	12.20	9.98	15	3.04	863.80	865.31	865.86	867.38	869.80	872.31	31

Project File: 22039805_Ex-cond_calculations.stm

Number of lines: 64

Run Date: 7/5/2023

NOTES:Intensity = 43.97 / (Inlet time + 6.33) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

EX. 25-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	260.828	0.00	1.98	0.00	0.00	1.13	0.0	21.0	4.3	4.87	11.19	4.58	15	2.56	865.31	871.98	868.93	872.87	872.31	878.98	28
24	23	6.943	0.10	0.10	0.95	0.10	0.10	6.0	6.0	7.5	0.72	11.26	3.95	15	2.59	875.48	875.66	875.69	875.99	878.98	878.66	Pipe - (1122)
25	23	14.495	1.88	1.88	0.55	1.03	1.03	20.9	20.9	4.3	4.47	7.80	4.87	15	1.24	871.98	872.16	872.87	873.02	878.98	878.66	27
26	11	160.753	0.00	2.63	0.00	0.00	1.66	0.0	22.4	4.2	6.89	28.84	4.66	18	6.43	856.75	867.08	859.93	868.10	864.00	874.58	Pipe - (1171)
27	26	7.219	1.24	1.24	0.63	0.78	0.78	22.4	22.4	4.2	3.25	10.73	6.03	15	2.35	871.08	871.25	871.55	871.98	874.58	874.25	78
28	22	38.536	0.70	3.31	0.52	0.36	1.72	6.0	16.9	4.8	8.32	19.45	6.96	15	7.73	865.31	868.29	868.93	869.42	872.31	872.04	30A
29	28	23.056	2.61	2.61	0.52	1.36	1.36	16.8	16.8	4.8	6.58	7.28	5.86	15	1.08	868.29	868.54	869.42	869.57	872.04	872.04	30
30	22	12.797	0.07	0.07	0.95	0.07	0.07	6.0	6.0	7.5	0.50	14.10	1.47	15	4.06	867.81	868.33	868.93	868.61	872.31	872.33	32
31	26	14.219	1.39	1.39	0.63	0.88	0.88	11.8	11.8	5.8	5.04	7.65	4.99	15	1.20	867.08	867.25	868.10	868.16	874.58	874.25	80
32	15	6.719	4.43	4.43	0.47	2.08	2.08	20.3	20.3	4.4	9.14	22.25	7.45	15	10.12	866.36	867.04	871.24	871.35	870.36	870.04	38
33	15	14.745	0.19	0.19	0.82	0.16	0.16	6.0	6.0	7.5	27.77	5.15	22.63	15	0.54	861.08	861.16	871.24	873.57	870.36	870.12	36
34	33	137.628	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	26.60	17.35	8.47	24	0.50	861.16	861.85	877.55	879.17	870.12	864.01	81
35	14	6.719	0.40	0.40	0.58	0.23	0.23	10.6	10.6	6.0	1.40	11.45	1.14	15	2.68	860.73	860.91	868.77	868.77	864.73	864.41	35
36	14	14.709	1.78	1.78	0.47	0.84	0.84	15.9	15.9	5.0	4.17	7.74	3.40	15	1.22	860.73	860.91	868.77	868.82	864.73	864.41	33
37	11	8.255	0.26	0.26	0.69	0.18	0.18	8.2	8.2	6.7	1.21	25.42	2.22	15	13.20	859.00	860.09	859.93	860.52	864.00	863.59	75
38	11	14.024	0.20	0.20	0.72	0.14	0.14	6.0	6.0	7.5	1.09	7.36	1.38	12	3.64	858.00	858.51	859.93	859.94	864.00	864.01	77
39	10	13.219	1.31	3.48	0.45	0.59	2.00	14.6	46.6	2.7	20.40	25.21	6.49	24	1.06	846.40	846.54	857.07	857.16	853.90	853.54	73
40	9	8.218	2.20	2.20	0.53	1.17	1.17	16.1	16.1	5.0	5.78	10.06	4.71	15	2.07	849.66	849.83	854.80	854.86	853.19	852.83	69
41	9	13.219	0.47	0.47	0.65	0.31	0.31	14.2	14.2	5.3	1.61	7.93	1.31	15	1.29	845.66	845.83	854.80	854.81	853.19	852.83	71
42	7	29.277	0.00	5.42	0.53	0.00	2.87	0.0	23.6	4.0	11.61	11.12	6.57	18	0.96	840.14	840.42	849.26	849.57	848.53	846.92	66
43	5	16.227	0.96	1.31	0.49	0.47	0.73	13.4	16.1	5.0	3.62	43.75	2.05	18	14.79	835.96	838.36	847.73	847.75	844.61	844.69	62
44	43	24.561	0.35	0.35	0.74	0.26	0.26	15.7	15.7	5.0	1.30	14.04	1.06	15	4.03	838.96	839.95	847.78	847.79	844.69	844.90	63

Project File: 22039805_Ex-cond_calculations.stm

Number of lines: 64

Run Date: 7/5/2023

NOTES:Intensity = 43.97 / (Inlet time + 6.33) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

EX. 25-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	3	15.000	0.85	11.27	0.58	0.49	7.27	12.9	22.1	4.2	30.48	37.43	9.70	24	2.33	833.53	833.88	842.98	843.21	840.00	840.13	58
46	45	21.000	5.16	10.42	0.65	3.35	6.77	16.7	22.1	4.2	28.42	24.20	16.09	18	4.52	836.74	837.69	843.94	845.26	840.13	840.13	59
47	12	9.630	0.52	0.52	0.45	0.23	0.23	13.9	13.9	5.3	1.25	22.30	0.71	18	3.84	856.75	857.12	862.10	862.10	861.00	860.08	49
48	39	85.400	0.00	2.17	0.00	0.00	1.41	46.5	46.5	2.7	18.81	17.63	10.64	18	2.40	852.97	855.02	857.81	860.15	853.54	858.67	1281
49	46	6.600	0.00	5.26	0.00	0.00	3.42	0.0	22.1	4.2	14.35	6.72	18.27	12	3.03	838.22	838.42	847.27	848.18	840.13	840.56	48A
50	49	354.308	0.00	5.26	0.00	0.00	3.42	0.0	21.5	4.3	14.54	11.52	11.85	15	2.71	837.89	847.49	848.96	864.27	840.56	851.87	48A(2)
51	50	110.000	0.00	5.26	0.00	0.00	3.42	0.0	21.4	4.3	14.59	9.43	11.89	15	1.82	848.75	850.75	864.59	869.38	851.87	853.77	48A(2)
52	51	223.000	5.26	5.26	0.65	3.42	3.42	21.1	21.1	4.3	14.71	17.66	11.99	15	6.37	850.85	865.06	869.84	879.71	853.77	870.38	48A(2)(2)
53	8	40.000	2.27	4.25	0.65	1.48	2.76	15.4	23.1	4.1	11.31	1.57	9.22	15	0.05	845.94	845.96	850.49	851.53	854.75	854.15	52A
54	53	52.600	0.00	1.98	0.00	0.00	1.29	0.0	22.8	4.1	5.31	9.10	4.32	15	1.69	845.96	846.85	852.85	853.16	854.15	853.34	52A(2)
55	54	86.200	0.00	1.98	0.00	0.00	1.29	0.0	22.3	4.2	5.37	9.14	4.37	15	1.71	846.85	848.32	853.22	853.73	853.34	852.14	52A(2)
56	55	72.700	0.00	1.98	0.00	0.00	1.29	0.0	21.9	4.2	5.42	2.46	4.42	15	0.12	848.42	848.51	854.02	854.46	852.14	851.26	52A(2)(2)
57	56	88.400	0.00	1.98	0.00	0.00	1.29	0.0	21.4	4.3	5.49	23.07	4.98	15	10.87	848.42	858.03	854.51	858.98	851.26	0.00	
58	57	206.000	1.98	1.98	0.65	1.29	1.29	20.7	20.7	4.3	5.60	17.61	5.85	15	6.33	858.11	871.16	858.98	872.12	0.00	0.00	
59	42	35.000	2.11	2.11	0.53	1.12	1.12	13.0	13.0	5.5	6.16	4.58	17.65	8	12.23	841.52	845.80	850.24	858.00	846.92	846.90	
60	42	89.000	0.00	3.31	0.00	0.00	1.75	0.0	23.3	4.1	7.15	22.04	4.05	18	3.75	842.29	845.63	850.24	850.59	846.92	848.28	
61	60	6.630	3.31	3.31	0.53	1.75	1.75	23.2	23.2	4.1	7.16	9.41	5.83	15	1.81	845.88	846.00	850.85	850.92	848.28	847.89	
62	48	198.697	0.00	2.17	0.00	0.00	1.41	0.0	24.3	4.0	5.61	16.10	5.07	15	5.30	855.02	865.55	862.31	866.51	858.67	869.35	
63	62	15.300	0.00	2.17	0.00	0.00	1.41	0.0	24.2	4.0	5.62	6.93	5.56	15	0.98	865.55	865.70	866.51	866.66	869.35	0.00	
64	63	83.000	2.17	2.17	0.65	1.41	1.41	24.0	24.0	4.0	5.66	7.00	5.59	15	1.00	865.70	866.53	866.66	867.49	0.00	0.00	

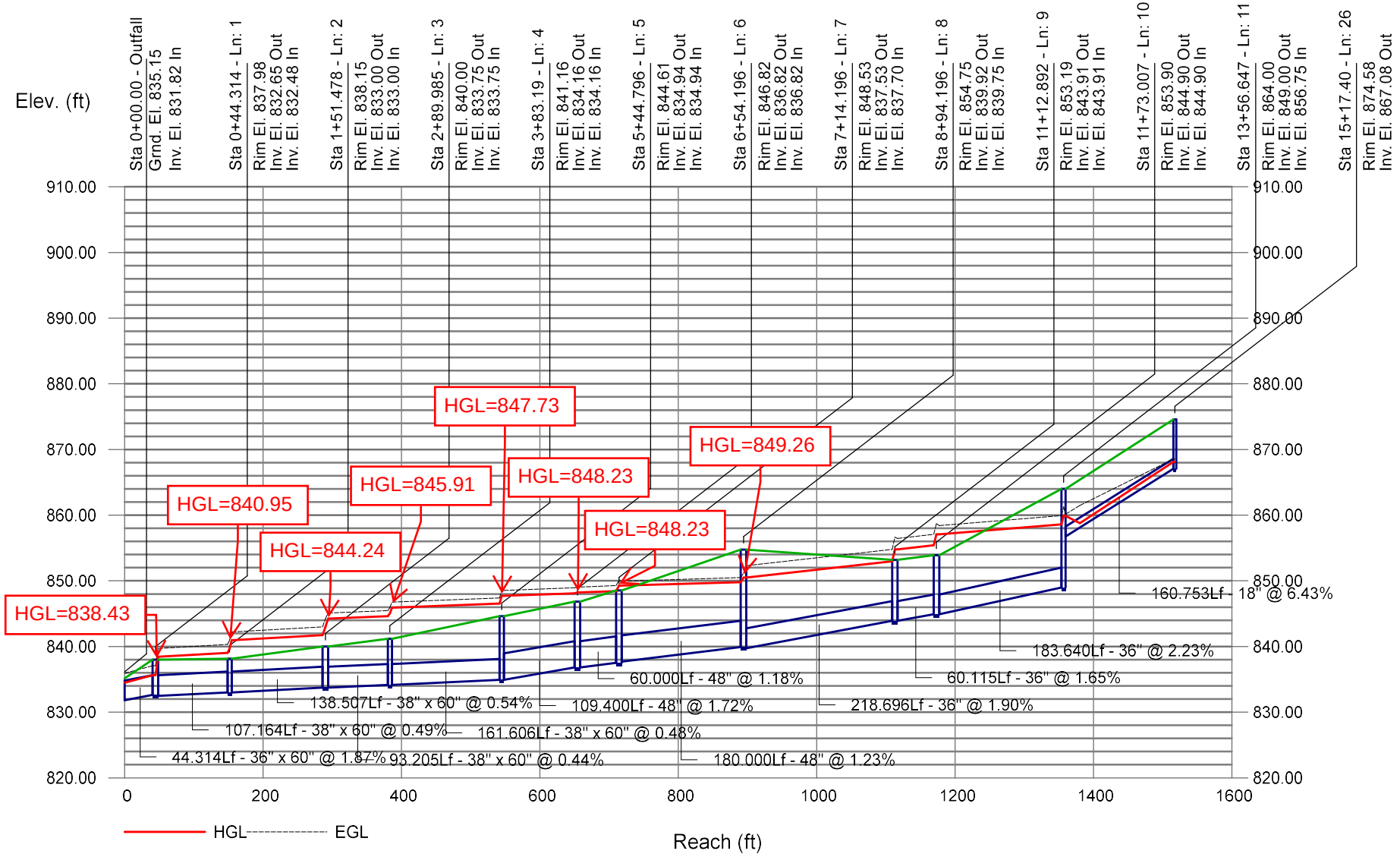
Project File: 22039805_Ex-cond_calculations.stm

Number of lines: 64

Run Date: 7/5/2023

NOTES:Intensity = 43.97 / (Inlet time + 6.33) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

SYSTEM ALONG EDGEWOOD ROAD

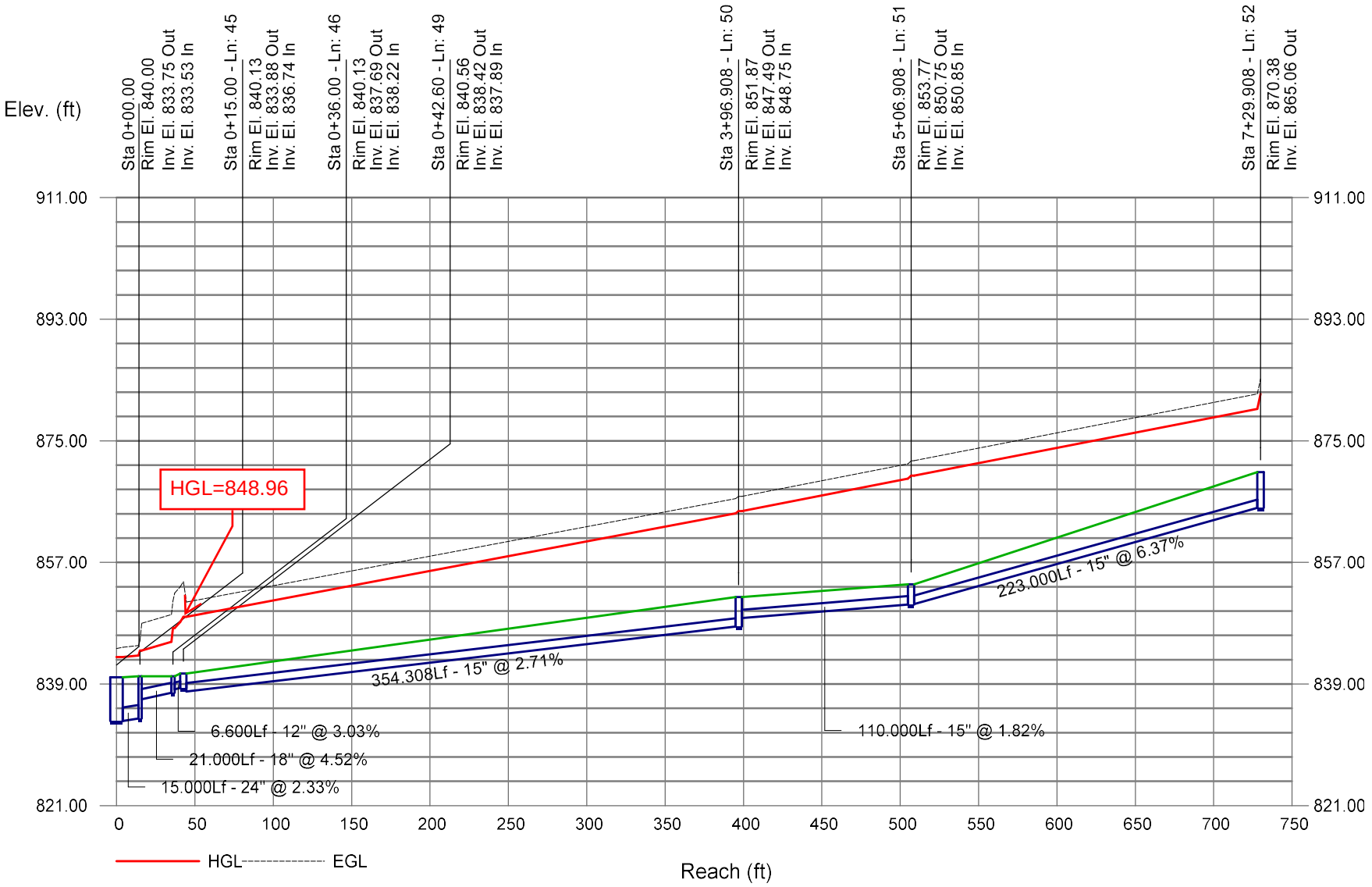


Storm Sewer Profile

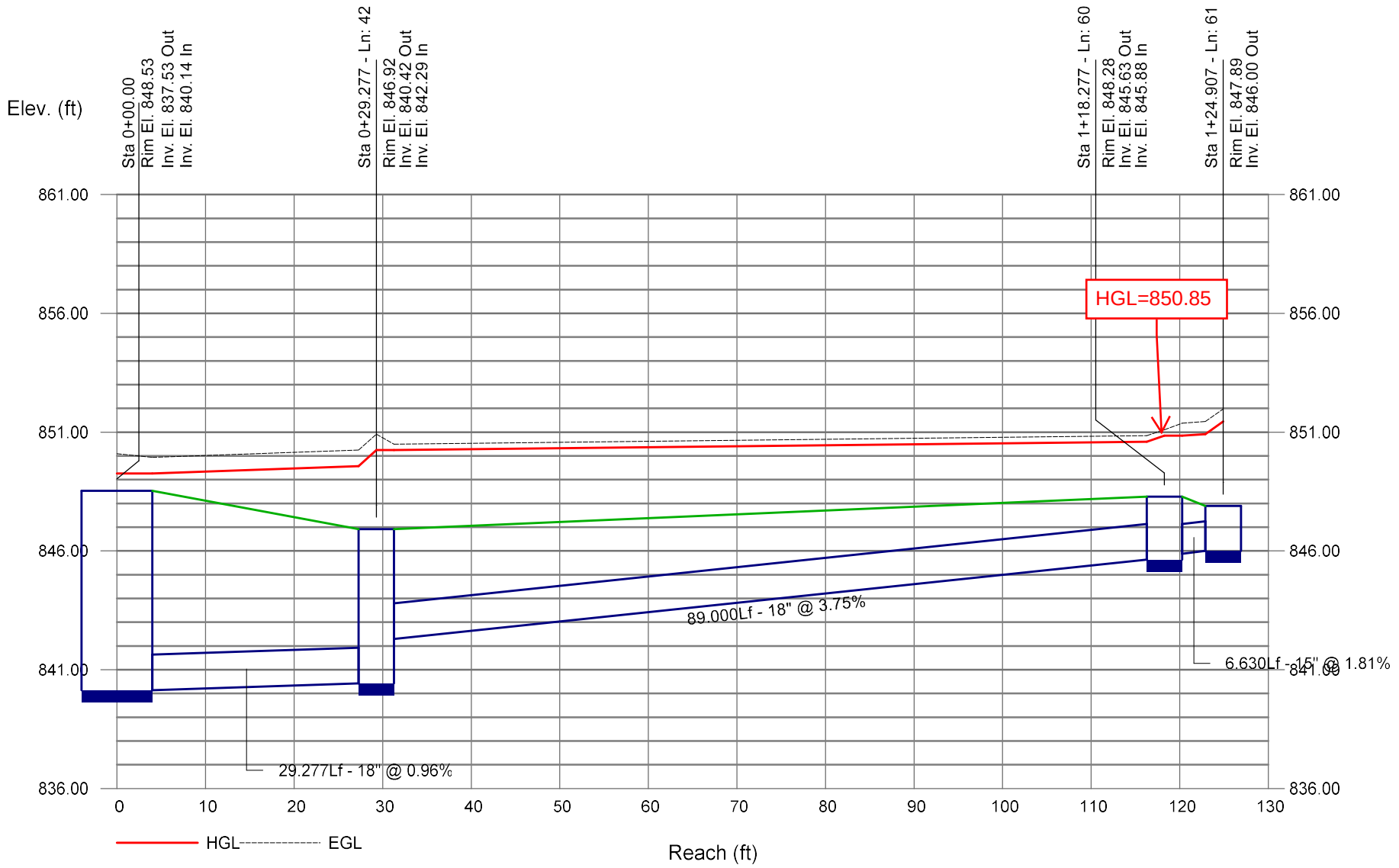
EX. 25-YEAR

Proj. file: 22039805_Ex-cond_calculations.stm

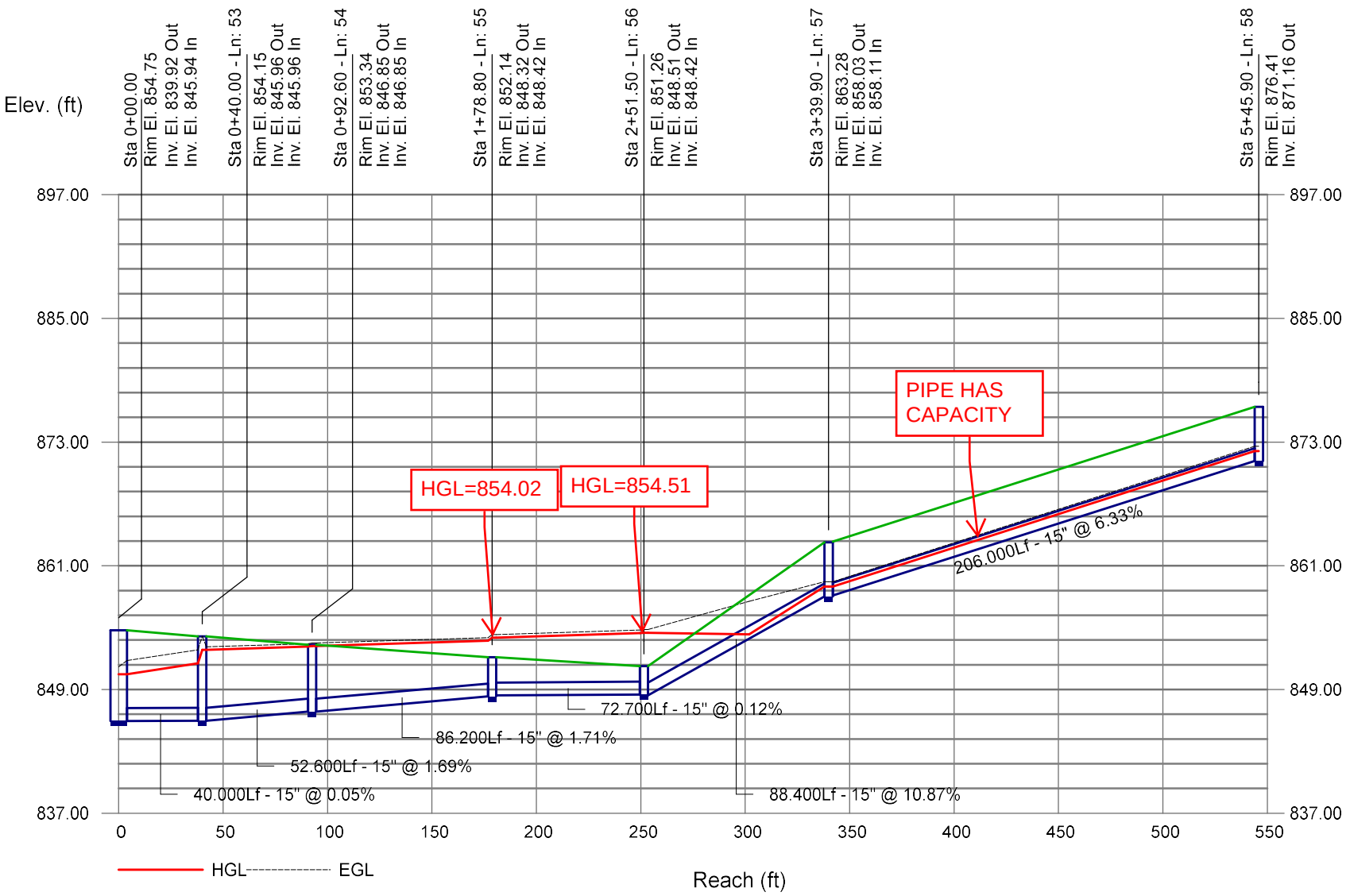
DRAINAGE FROM LOW POINT 1



DRAINAGE IN FRONT YARD OF 70/74 EDGEWOOD



DRAINAGE @ LOW POINT 4

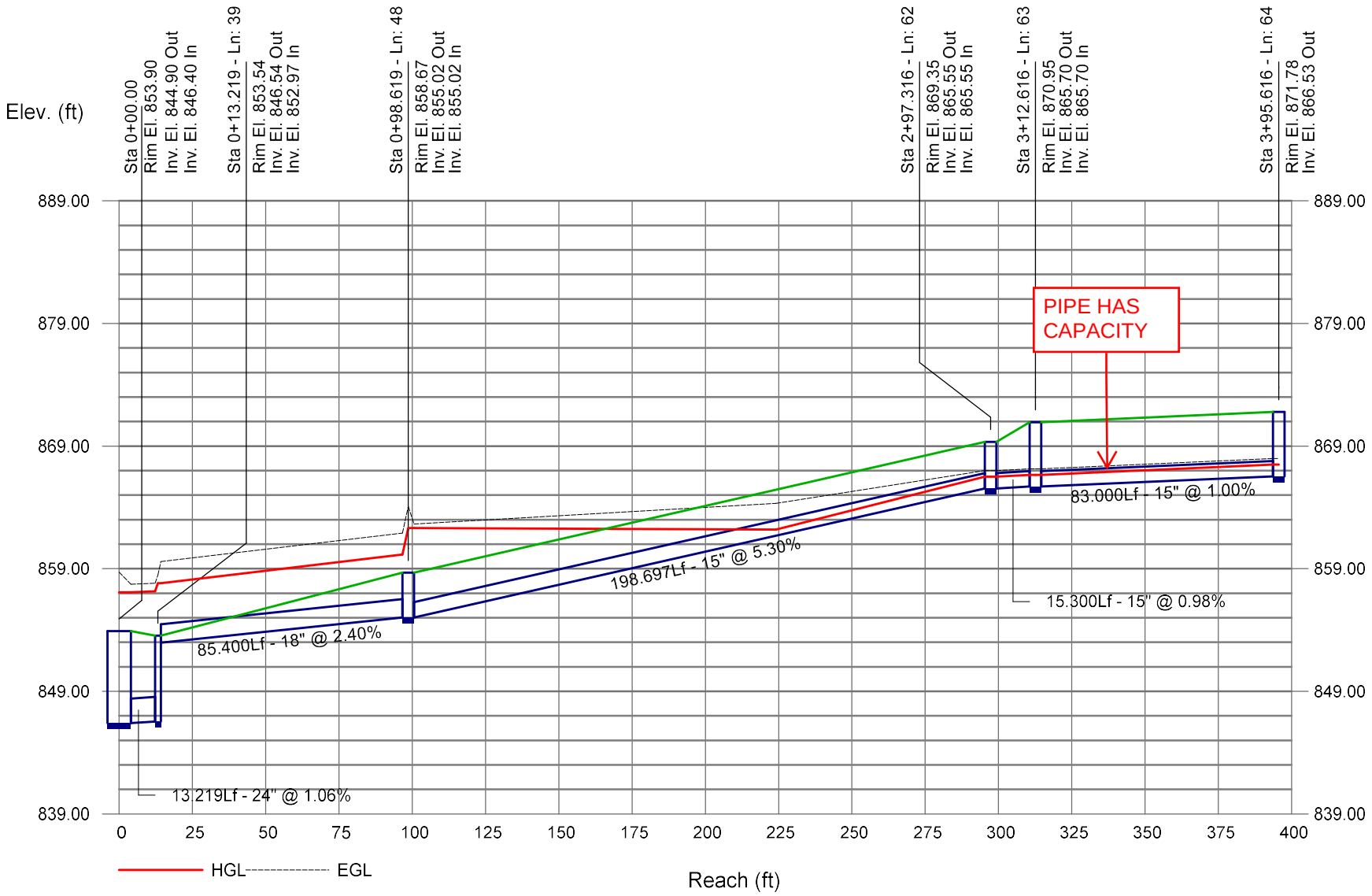


Storm Sewer Profile

EX. 25-YEAR

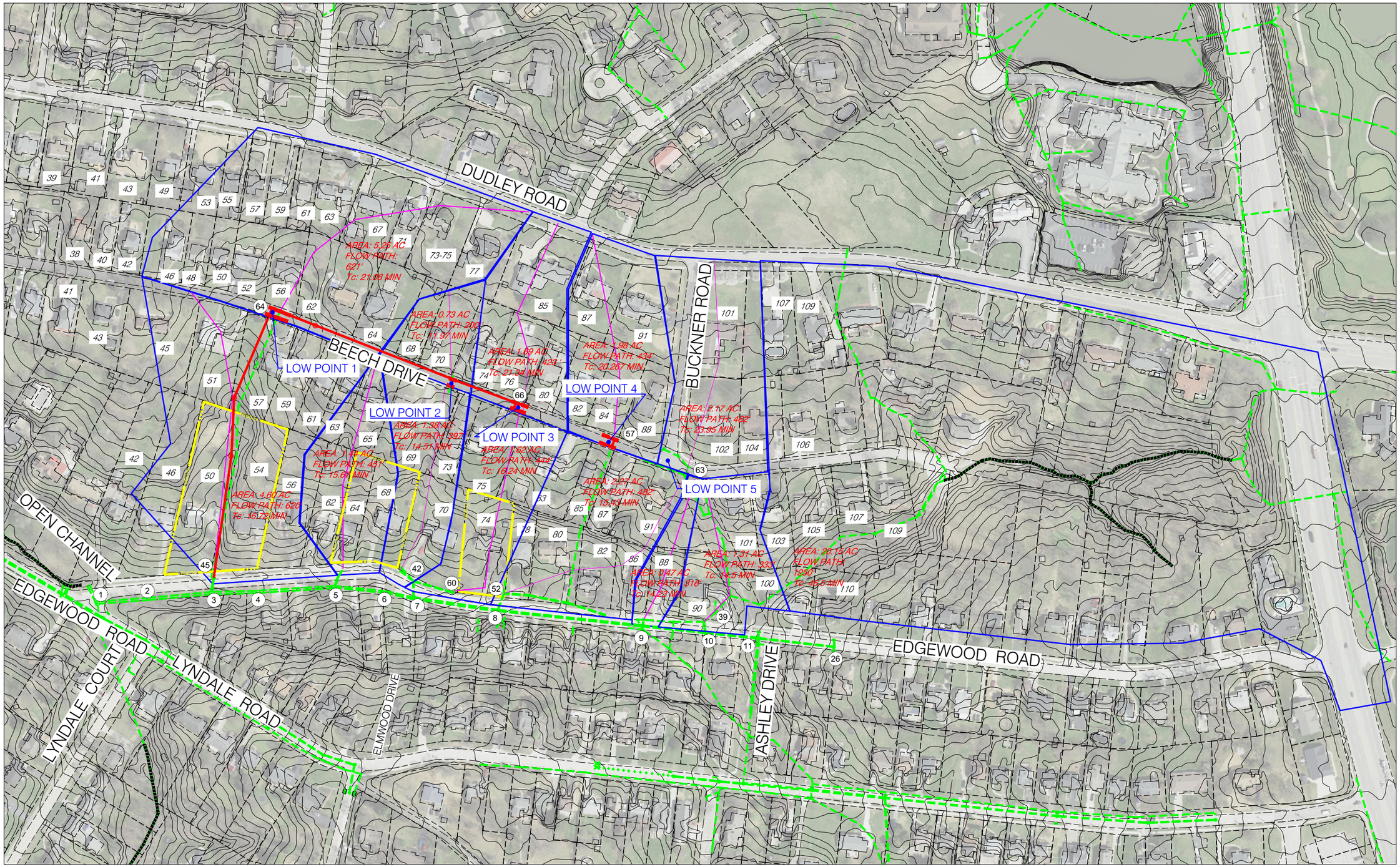
Proj. file: 22039805_Ex-cond_calculations.stm

DRAINAGE @ LOW POINT 5 (BUCKNER)



APPENDIX B

PROPOSED



EXIST. STORM SEWER
PR. STORM SEWER
DRAINAGE AREA
SURFACE FLOW PATH
(00) STRUCTURE NUMBER

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

PRELIMINARY

your trusted advisor consultants — engineers architects planners

NO	REVISION	DATE

ISSUED FOR PRELIM REPORT	
ISSUE DATE:	10/1/18
SCALE:	AS SHOWN ON 22X34
DESIGNED BY:	MHEL
DRAWN BY:	IEKS
CHECKED BY:	MHEL

EDGEWOOD DRAINAGE STUDIES
BEECH DRIVE
- KENTON COUNTY, KY -

PROPOSED DRAINAGE

PROJECT NO.	220398-05
DISCIPLINE	CIVIL
SHEET NAME	PR-DRAIN
SHEET	1
OF	3

REMOVE EX INLET

INSTALL 81 LF NEW 15" STORM SEWER PIPE

INSTALL 6 NEW INLETS AND 30 LF 15" STORM PIPE

INSTALL NEW STANDARD STORM MANHOLE

ASPHALT PAVEMENT RESURFACING 1500 SYD

CONCRETE PAVEMENT RESTORATION 80 SYD

LOW POINT 1

INSTALL 163 LF NEW 15" STORM SEWER PIPE

REPLACE EX 15" STORM PIPE WITH 220LF OF NEW 18" PIPE

INSTALL 313 LF NEW 15" STORM SEWER PIPE

BEECH DRIVE

INSTALL 1800 LF OF 4" CONCRETE ROLL CURB

REPLACE STANDARD STORM MANHOLE

REPLACE 2 INLETS AND INSTALL NEW 15" STORM PIPE AT LOCAL LOW POINT

LOW POINT 2

REPLACE EX 15" STORM PIPE WITH 105 LF OF NEW 24" PIPE

INSTALL 4 NEW INLETS AND 40 LF 15" STORM PIPE AT LOW POINT IN BEECH DR.

LOW POINT 3

LOW POINT 4

REPLACE STANDARD STORM MANHOLE

INSTALL 4 NEW INLETS AND 40 LF 15" STORM PIPE AT LOW POINT IN BEECH DR.

LOW POINT 5

REMOVE EX INLET

REPLACE EX 15" STORM PIPE WITH 260 LF OF NEW 24" PIPE

CONNECT TO EXISTING INLET

EDGEWOOD ROAD

EXIST. STORM SEWER

PR. STORM SEWER

00 STRUCTURE NUMBER

0' 40' 80'

SCALE: 1" = 40

PRELIMINARY

your trusted advisor consultants engineers architects planners

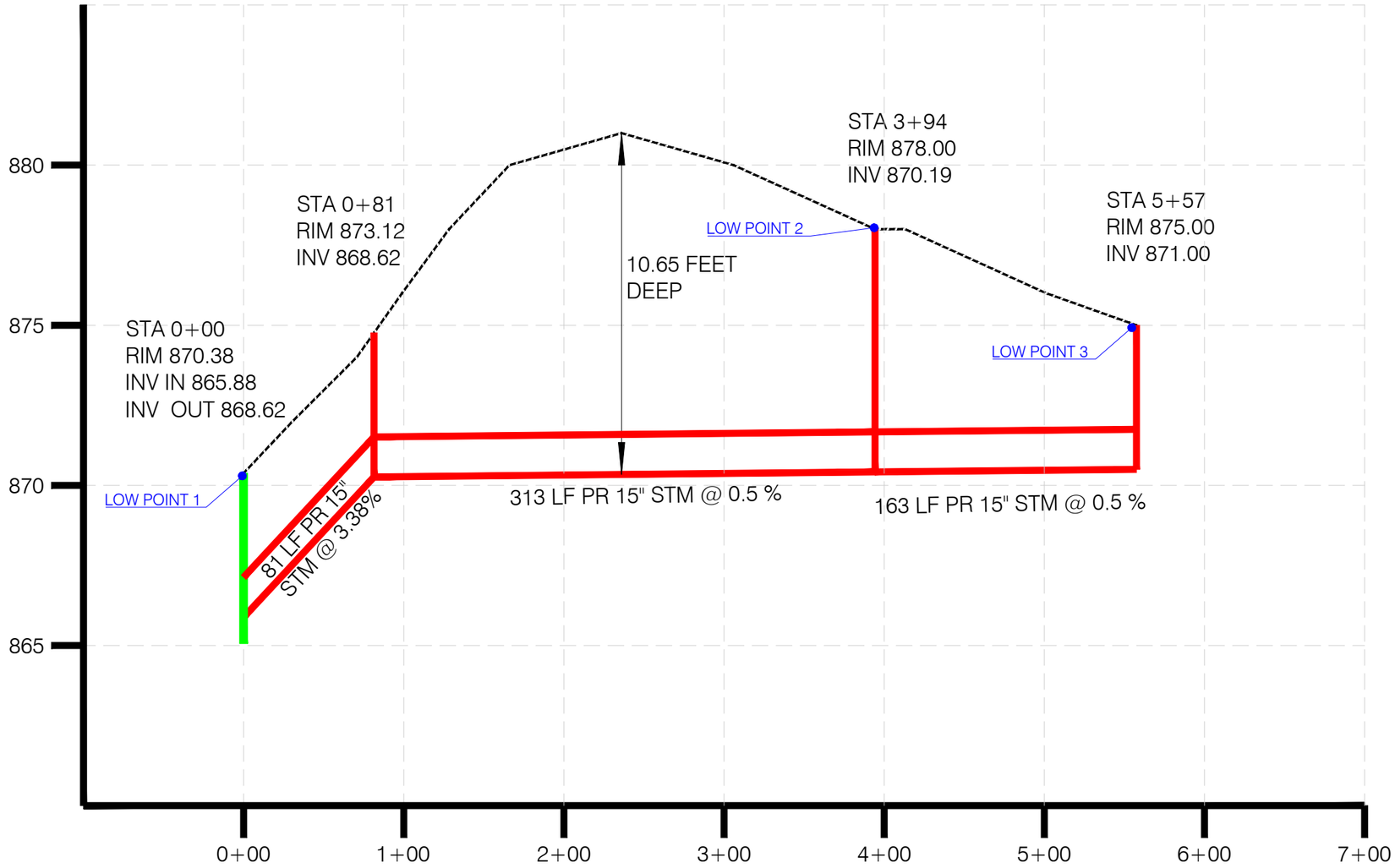
NO	REVISION	DATE

ISSUED FOR:	PRELIM REPORT
ISSUE DATE:	1/01/18
SCALE:	AS SHOWN ON 22X34
DESIGNED BY:	MHEL
DRAWN BY:	IEKS
CHECKED BY:	MHEL

EDGEWOOD DRAINAGE STUDIES
BEECH DRIVE
- KENTON COUNTY, KY -

PROPOSED CONDITIONS

PROJECT NO.	220398-05
DISCIPLINE	CIVIL
SHEET NAME	PR-COND
SHEET	2
OF	3



EXIST. STORM SEWER
PR. STORM SEWER
EX. GROUND

PRELIMINARY

your trusted advisor consultants
engineers
architects
planners

NO	REVISION	DATE

ISSUED FOR: PRELIM REPORT
ISSUE DATE: 1/01/18
SCALE: AS SHOWN ON 22X34
DESIGNED BY: MHEL
DRAWN BY: IEKS
CHECKED BY: MHEL

EDGEWOOD DRAINAGE STUDIES
BEECH DRIVE
- KENTON COUNTY, KY -

PROPOSED PROFILE - BEECH

PROJECT NO.
220398-05
DISCIPLINE
CIVIL
SHEET NAME
PROFILE
SHEET **3** OF **3**

Storm Sewer Tabulation

PR 10-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	44.314	0.13	47.03	0.95	0.12	27.44	6.0	49.2	2.3	104.2	190.9	11.98	36 x 60 e	1.87	831.82	832.65	834.50	835.65	835.15	837.98	55
2	1	107.164	0.83	46.90	0.40	0.33	27.32	20.1	49.0	2.3	104.1	105.1	8.37	38 x 60 e	0.49	832.48	833.00	838.02	838.53	837.98	838.15	56
3	2	138.507	0.00	46.07	0.00	0.00	26.99	0.0	48.7	2.3	103.6	111.0	8.33	38 x 60 e	0.54	833.00	833.75	840.16	840.82	838.15	840.00	57
4	3	93.205	0.05	32.38	0.58	0.03	18.15	6.4	48.5	2.3	83.42	100.0	6.71	38 x 60 e	0.44	833.75	834.16	842.97	843.26	840.00	841.16	60
5	4	161.606	0.00	32.33	0.00	0.00	18.12	0.0	48.1	2.3	83.59	104.8	6.72	38 x 60 e	0.48	834.16	834.94	844.31	844.80	841.16	844.61	61
6	5	109.400	0.00	31.02	0.00	0.00	17.39	0.0	47.8	2.3	82.06	204.0	6.53	48	1.72	834.94	836.82	845.77	846.08	844.61	846.82	64
7	6	60.000	0.00	31.02	0.00	0.00	17.39	0.0	47.6	2.3	82.15	169.3	6.54	48	1.18	836.82	837.53	846.18	846.35	846.82	848.53	67
8	7	180.000	0.00	28.02	0.00	0.00	15.80	0.0	47.1	2.3	78.70	172.8	6.26	48	1.23	837.70	839.92	847.01	847.47	848.53	854.75	68
9	8	218.696	0.00	23.77	0.00	0.00	13.04	0.0	46.8	2.4	72.37	99.65	10.24	36	1.90	839.75	843.91	848.08	850.28	854.75	853.19	70
10	9	60.115	0.00	21.10	0.00	0.00	11.56	0.0	46.7	2.4	68.94	92.72	9.75	36	1.65	843.91	844.90	851.91	852.45	853.19	853.90	72
11	10	183.640	0.00	17.62	0.00	0.00	9.56	0.0	23.2	3.7	61.82	108.0	8.75	36	2.23	844.90	849.00	853.93	855.28	853.90	864.00	76
12	11	203.820	0.00	14.53	0.00	0.00	7.58	0.0	22.4	3.8	55.09	50.61	7.79	36	0.49	851.00	852.00	856.47	857.65	864.00	861.00	50
13	12	97.870	0.00	14.01	0.00	0.00	7.35	0.0	22.3	3.8	54.31	75.15	12.43	30	2.86	856.50	859.30	858.41	861.65	861.00	869.80	32A
14	13	145.280	0.00	8.65	0.00	0.00	4.43	0.0	20.6	3.9	44.06	35.55	8.98	30	0.64	858.80	859.73	861.65	863.08	869.80	864.73	34
15	14	157.046	0.00	6.47	0.00	0.00	3.37	0.0	20.3	4.0	39.96	41.19	8.14	30	0.86	859.73	861.08	864.33	865.60	864.73	870.36	37
16	15	365.020	0.00	1.85	0.00	0.00	1.13	0.0	17.1	4.4	4.91	15.07	4.61	15	4.64	863.86	880.80	866.63	881.70	870.36	887.30	43
17	16	6.720	0.28	1.12	0.47	0.13	0.54	8.6	17.1	4.4	2.37	11.45	3.23	15	2.68	880.80	880.98	881.70	881.60	887.30	886.98	44
18	17	144.308	0.14	0.84	0.59	0.08	0.41	9.5	15.6	4.6	1.88	15.01	3.39	15	4.60	880.98	887.62	881.60	888.17	886.98	893.62	45
19	18	86.066	0.20	0.70	0.47	0.09	0.33	7.7	14.5	4.7	1.56	14.49	3.24	15	4.29	887.62	891.31	888.17	891.80	893.62	897.31	46
20	19	104.361	0.50	0.50	0.47	0.24	0.24	12.7	12.7	5.1	1.19	14.41	2.91	15	4.24	891.31	895.74	891.80	896.17	897.31	901.74	47
21	16	14.663	0.73	0.73	0.80	0.58	0.58	6.0	6.0	6.8	3.95	7.75	4.46	15	1.23	880.80	880.98	881.70	881.78	887.30	886.98	42
22	13	49.662	0.00	5.36	0.00	0.00	2.92	0.0	22.2	3.8	11.02	12.20	10.17	15	3.04	863.80	865.31	864.73	866.51	869.80	872.31	31

Project File: 22039805_PR-model_calculations.stm

Number of lines: 66

Run Date: 7/5/2023

NOTES:Intensity = 65.69 / (Inlet time + 9.80) ^ 0.82; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

PR 10-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	260.828	0.00	1.98	0.00	0.00	1.13	0.0	21.0	3.9	4.40	11.19	4.30	15	2.56	865.31	871.98	866.51	872.83	872.31	878.98	28
24	23	6.943	0.10	0.10	0.95	0.10	0.10	6.0	6.0	6.8	0.64	11.26	3.82	15	2.59	875.48	875.66	875.68	875.97	878.98	878.66	Pipe - (1122)
25	23	14.495	1.88	1.88	0.55	1.03	1.03	20.9	20.9	3.9	4.04	7.80	4.67	15	1.24	871.98	872.16	872.83	872.97	878.98	878.66	27
26	11	160.753	0.00	2.63	0.00	0.00	1.66	0.0	22.5	3.8	6.22	28.84	9.10	18	6.43	856.75	867.08	857.22	868.04	864.00	874.58	Pipe - (1171)
27	26	7.219	1.24	1.24	0.63	0.78	0.78	22.4	22.4	3.8	2.94	10.73	5.85	15	2.35	871.08	871.25	871.53	871.94	874.58	874.25	78
28	22	38.536	0.70	3.31	0.52	0.36	1.72	6.0	16.9	4.4	7.55	19.45	6.44	15	7.73	865.31	868.29	866.51	869.38	872.31	872.04	30A
29	28	23.056	2.61	2.61	0.52	1.36	1.36	16.8	16.8	4.4	5.97	7.28	5.50	15	1.08	868.29	868.54	869.38	869.53	872.04	872.04	30
30	22	12.797	0.07	0.07	0.95	0.07	0.07	6.0	6.0	6.8	0.45	14.10	3.83	15	4.06	867.81	868.33	867.96	868.59	872.31	872.33	32
31	26	14.219	1.39	1.39	0.63	0.88	0.88	11.8	11.8	5.2	4.57	7.65	4.77	15	1.20	867.08	867.25	868.04	868.12	874.58	874.25	80
32	15	6.719	4.43	4.43	0.47	2.08	2.08	20.3	20.3	4.0	8.27	22.25	11.95	15	10.12	866.36	867.04	866.89	868.17	870.36	870.04	38
33	15	14.745	0.19	0.19	0.82	0.16	0.16	6.0	6.0	6.8	27.65	5.15	22.54	15	0.54	861.08	861.16	866.63	868.94	870.36	870.12	36
34	33	137.628	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	26.60	17.35	8.47	24	0.50	861.16	861.85	872.89	874.51	870.12	864.01	81
35	14	6.719	0.40	0.40	0.58	0.23	0.23	10.6	10.6	5.5	1.27	11.45	1.04	15	2.68	860.73	860.91	864.33	864.33	864.73	864.41	35
36	14	14.709	1.78	1.78	0.47	0.84	0.84	15.9	15.9	4.5	3.79	7.74	3.09	15	1.22	860.73	860.91	864.33	864.37	864.73	864.41	33
37	11	8.255	0.26	0.26	0.69	0.18	0.18	8.2	8.2	6.1	1.09	25.42	6.70	15	13.20	859.00	860.09	859.18	860.50	864.00	863.59	75
38	11	14.024	0.20	0.20	0.72	0.14	0.14	6.0	6.0	6.8	0.97	7.36	4.83	12	3.64	858.00	858.51	858.25	858.92	864.00	864.01	77
39	10	13.219	1.31	3.48	0.45	0.59	2.00	14.6	46.6	2.4	19.71	25.21	6.28	24	1.06	846.40	846.54	853.93	854.02	853.90	853.54	73
40	9	8.218	2.20	2.20	0.53	1.17	1.17	16.1	16.1	4.5	5.24	10.06	4.27	15	2.07	849.66	849.83	851.91	851.95	853.19	852.83	69
41	9	13.219	0.47	0.47	0.65	0.31	0.31	14.2	14.2	4.8	1.46	7.93	1.19	15	1.29	845.66	845.83	851.91	851.91	853.19	852.83	71
42	7	29.277	0.00	3.00	0.53	0.00	1.59	0.0	17.0	4.4	6.96	11.12	3.94	18	0.96	840.14	840.42	847.01	847.12	848.53	846.92	66
43	5	16.227	0.96	1.31	0.49	0.47	0.73	13.4	16.1	4.5	3.28	43.75	1.86	18	14.79	835.96	838.36	845.77	845.79	844.61	844.69	62
44	43	24.561	0.35	0.35	0.74	0.26	0.26	15.7	15.7	4.6	1.18	14.04	0.96	15	4.03	838.96	839.95	845.81	845.82	844.69	844.90	63

Project File: 22039805_PR-model_calculations.stm | Number of lines: 66 | Run Date: 7/5/2023

NOTES:Intensity = 65.69 / (Inlet time + 9.80) ^ 0.82; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

PR 10-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	3	15.000	0.85	13.69	0.58	0.49	8.84	12.9	25.3	3.5	30.94	37.43	9.85	24	2.33	833.53	833.88	841.89	842.13	840.00	840.13	58
46	45	21.000	5.16	12.84	0.65	3.35	8.35	16.7	25.3	3.5	29.23	24.20	16.54	18	4.52	836.74	837.69	842.89	844.28	840.13	840.13	59
47	12	9.630	0.52	0.52	0.45	0.23	0.23	13.9	13.9	4.8	1.13	22.30	0.67	18	3.84	856.75	857.12	858.41	858.41	861.00	860.08	49
48	39	85.400	0.00	2.17	0.00	0.00	1.41	46.5	46.5	2.4	18.32	17.63	10.37	18	2.40	852.97	855.02	854.63	856.85	853.54	858.67	1281
49	46	354.308	0.00	7.68	0.00	0.00	4.99	0.0	24.2	3.6	17.94	38.06	5.73	24	2.41	837.69	846.24	846.40	848.20	840.13	851.87	48A(2)
50	49	110.000	0.00	7.68	0.00	0.00	4.99	0.0	23.9	3.6	18.09	33.04	8.88	24	1.82	847.50	849.50	848.56	851.03	851.87	853.77	48A(2)
51	50	223.000	5.26	7.68	0.65	3.42	4.99	21.1	23.5	3.7	18.25	28.72	13.82	18	6.37	850.60	864.81	851.47	866.26	853.77	870.38	48A(2)(2)
52	8	40.000	2.27	4.25	0.65	1.48	2.76	15.4	23.2	3.7	10.18	1.57	8.30	15	0.05	845.94	845.96	848.08	848.93	854.75	854.15	52A
53	52	52.600	0.00	1.98	0.00	0.00	1.29	0.0	22.9	3.7	4.78	9.10	3.89	15	1.69	845.96	846.85	850.00	850.25	854.15	853.34	52A(2)
54	53	86.200	0.00	1.98	0.00	0.00	1.29	0.0	22.4	3.8	4.84	9.14	3.94	15	1.71	846.85	848.32	850.29	850.71	853.34	852.14	52A(2)
55	54	72.700	0.00	1.98	0.00	0.00	1.29	0.0	22.0	3.8	4.89	2.46	3.98	15	0.12	848.42	848.51	850.95	851.30	852.14	851.26	52A(2)(2)
56	55	88.400	0.00	1.98	0.00	0.00	1.29	0.0	21.5	3.8	4.95	23.07	4.63	15	10.87	848.42	858.03	851.34	858.93	851.26	0.00	
57	56	206.000	1.98	1.98	0.65	1.29	1.29	20.7	20.7	3.9	5.06	17.61	5.60	15	6.33	858.11	871.16	858.93	872.07	0.00	0.00	
58	42	35.000	1.38	1.38	0.53	0.73	0.73	14.5	14.5	4.7	3.47	4.58	9.93	8	12.23	841.52	845.80	847.36	849.82	846.92	846.90	
59	42	89.000	0.00	1.62	0.00	0.00	0.86	0.0	16.3	4.5	3.84	22.04	2.17	18	3.75	842.29	845.63	847.36	847.46	846.92	848.28	
60	59	6.630	1.62	1.62	0.53	0.86	0.86	16.2	16.2	4.5	3.84	9.41	3.13	15	1.81	845.88	846.00	847.54	847.56	848.28	847.89	
61	48	198.697	0.00	2.17	0.00	0.00	1.41	0.0	24.3	3.6	5.05	16.10	4.70	15	5.30	855.02	865.55	858.90	866.46	858.67	869.35	
62	61	15.300	0.00	2.17	0.00	0.00	1.41	0.0	24.3	3.6	5.06	6.93	5.28	15	0.98	865.55	865.70	866.46	866.61	869.35	0.00	
63	62	83.000	2.17	2.17	0.65	1.41	1.41	24.0	24.0	3.6	5.10	7.00	5.31	15	1.00	865.70	866.53	866.61	867.44	0.00	0.00	
64	51	81.000	0.00	2.42	0.00	0.00	1.57	0.0	23.2	3.7	5.79	12.87	7.93	15	3.38	865.88	868.62	866.47	869.59	870.38	873.12	
65	64	313.000	0.73	2.42	0.65	0.47	1.57	12.0	22.1	3.8	5.95	4.95	4.85	15	0.50	868.62	870.19	869.87	872.14	873.12	878.00	(2)
66	65	163.000	1.69	1.69	0.65	1.10	1.10	21.3	21.3	3.9	4.24	4.96	3.46	15	0.50	870.19	871.01	872.32	872.92	878.00	0.00	

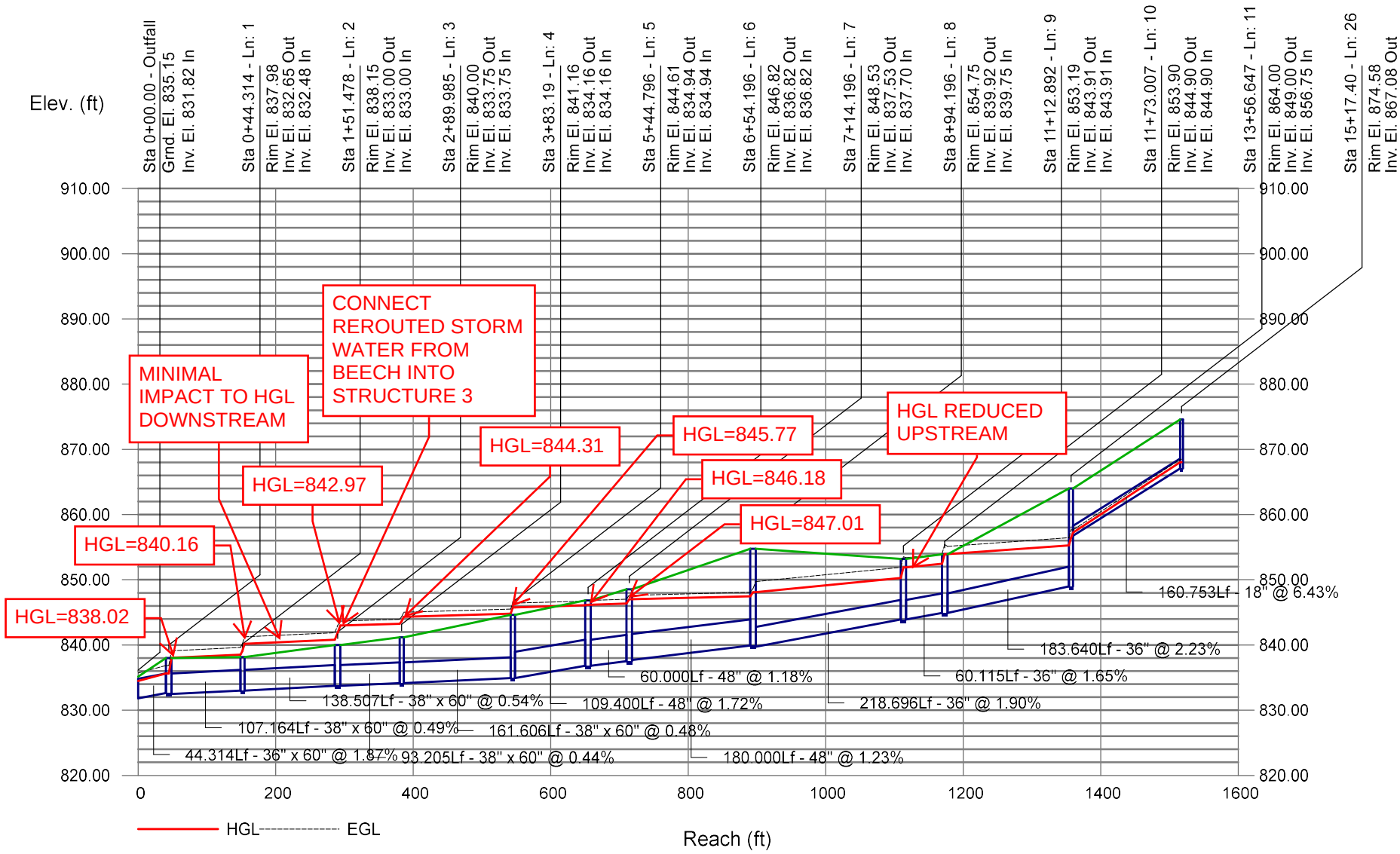
Project File: 22039805_PR-model_calculations.stm

Number of lines: 66

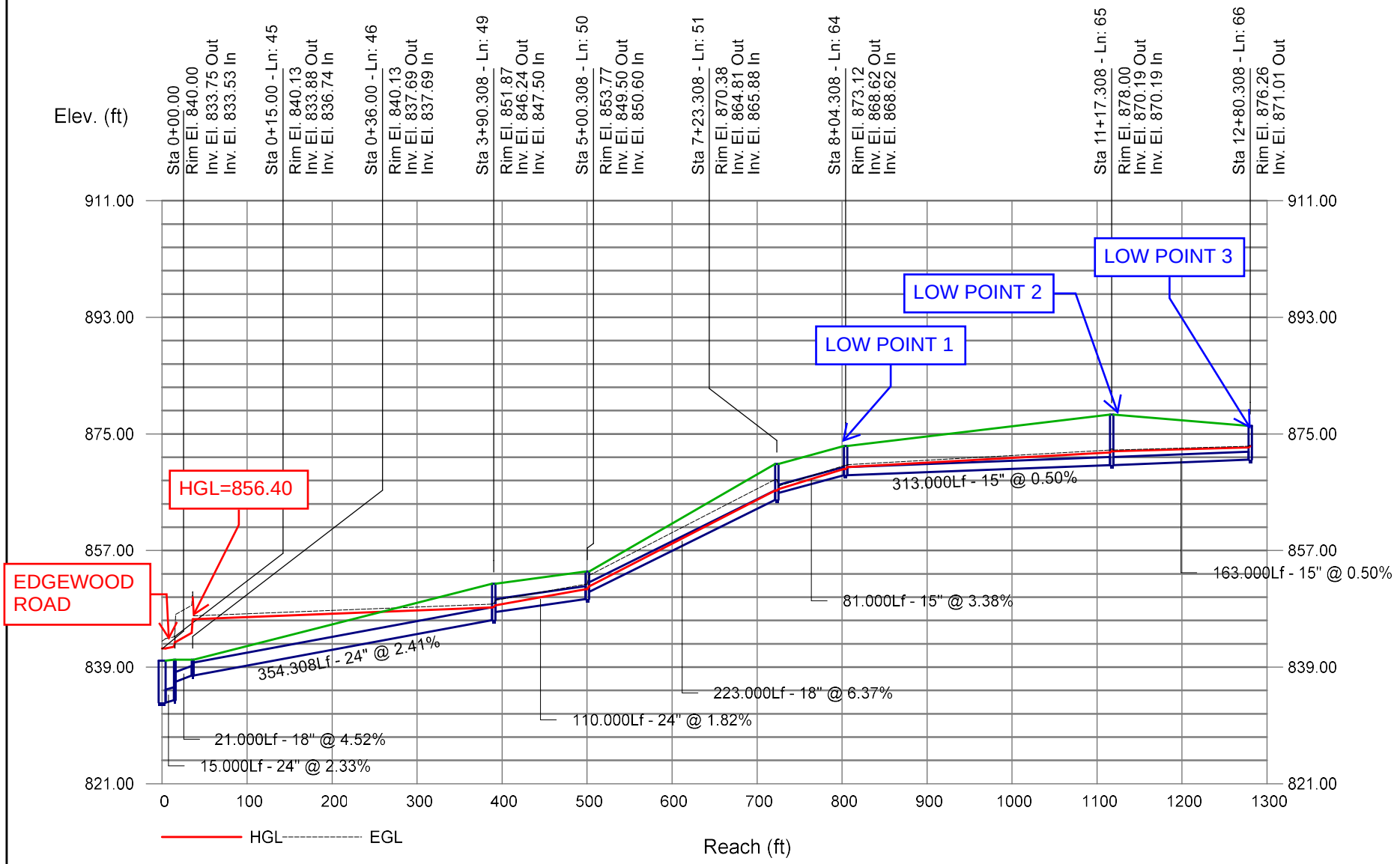
Run Date: 7/5/2023

NOTES:Intensity = 65.69 / (Inlet time + 9.80) ^ 0.82; Return period =Yrs. 10 ; c = cir e = ellip b = box

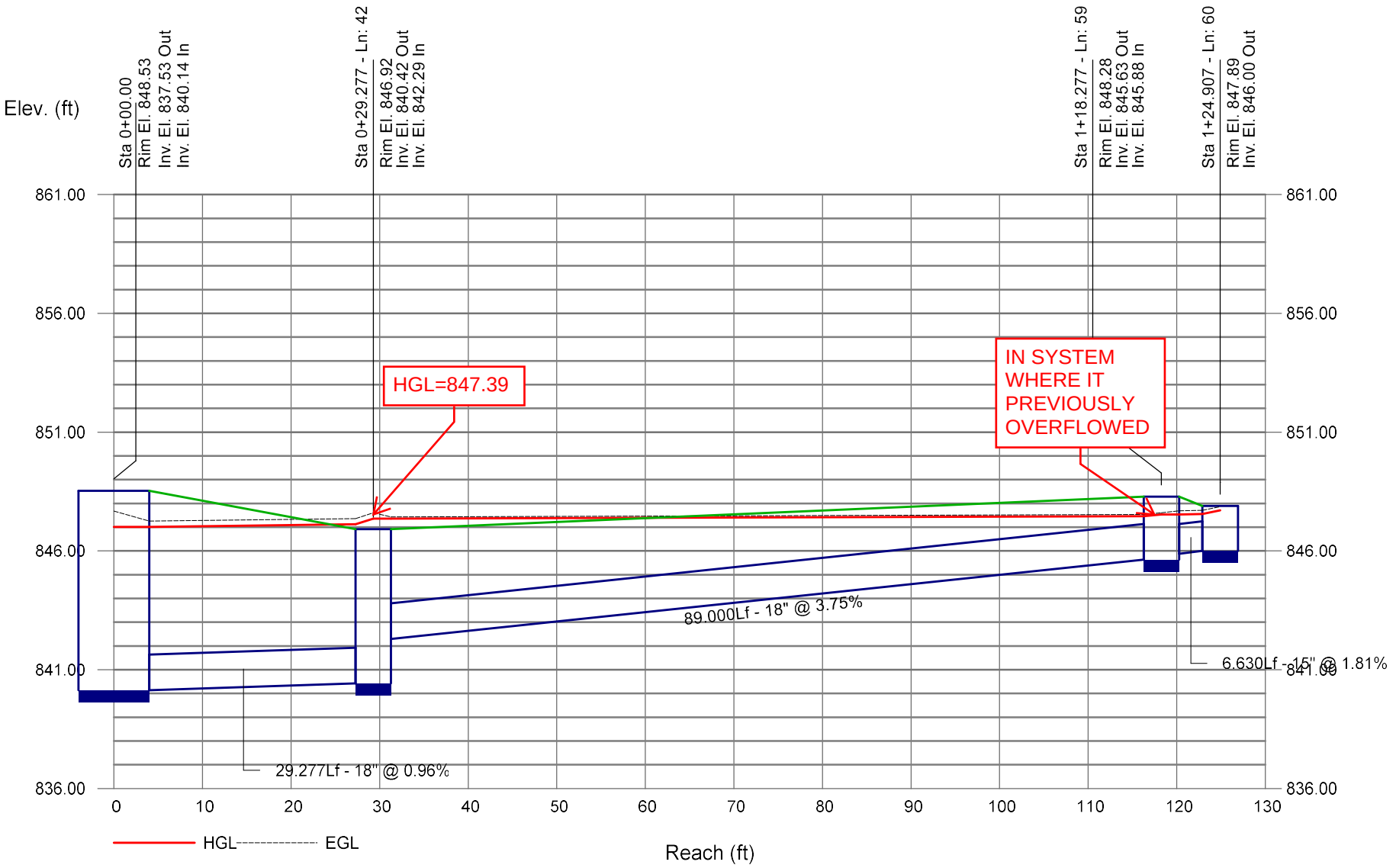
SYSTEM ALONG EDGEWOOD ROAD



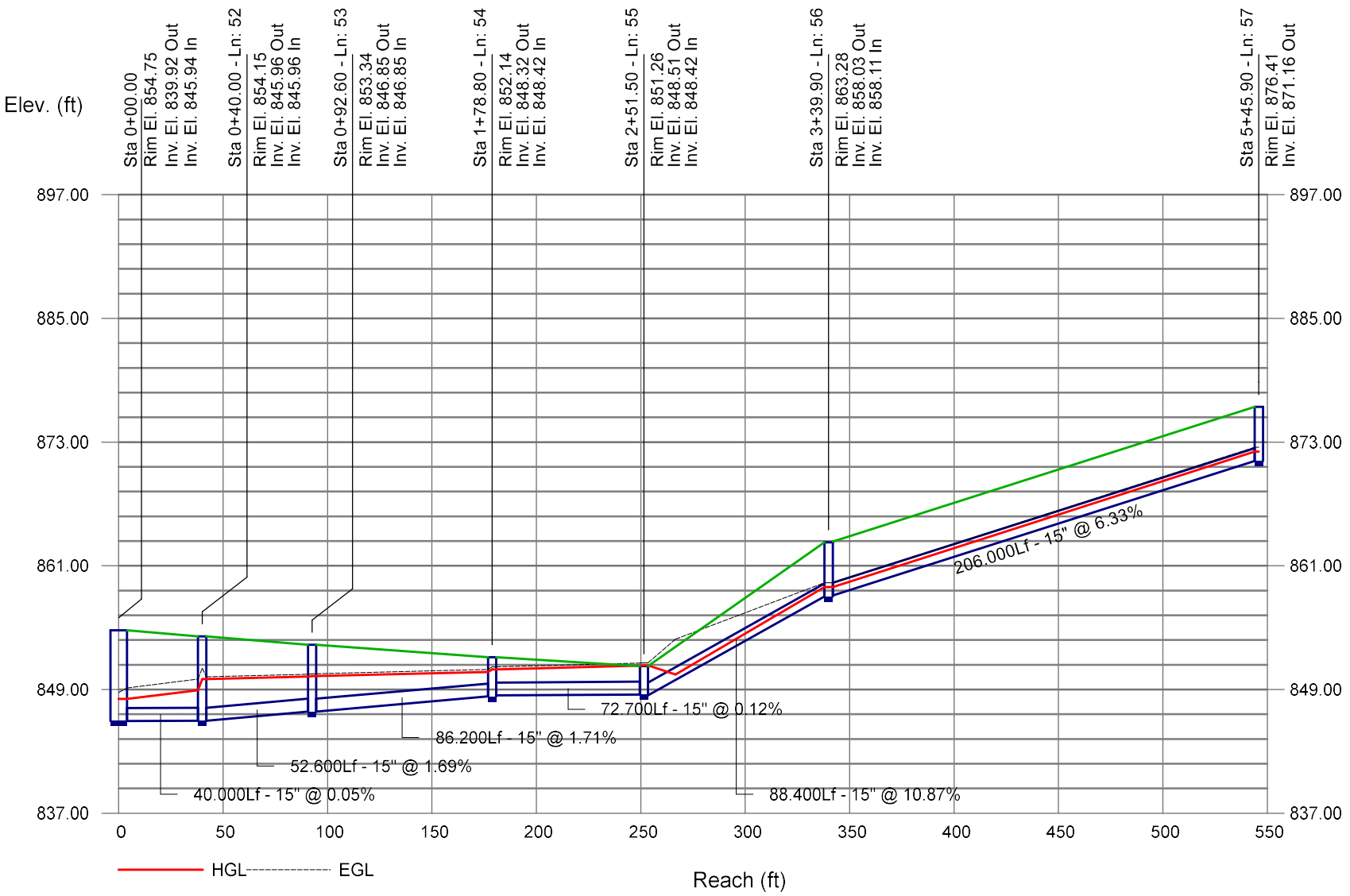
DRAINAGE FROM LOW POINT 1



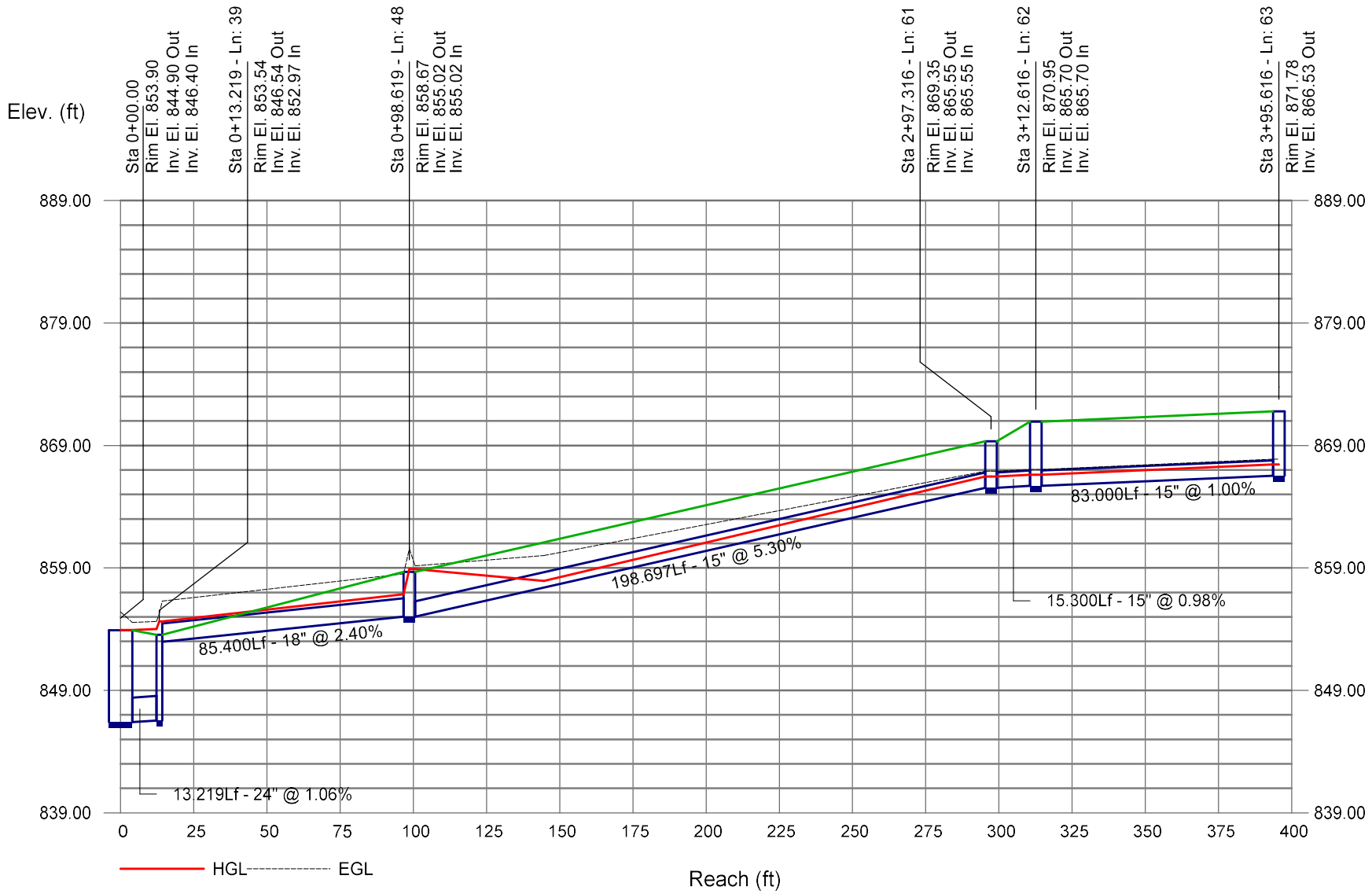
DRAINAGE IN FRONT YARD OF 70/74 EDGEWOOD



DRAINAGE AT LOW POINT 4



DRAINAGE @ LOW POINT 5 (BUCKNER)



Storm Sewer Tabulation

PR 25-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	44.314	0.13	47.03	0.95	0.12	27.44	6.0	49.0	2.6	113.7	190.9	13.07	36 x 60 e	1.87	831.82	832.65	834.50	835.65	835.15	837.98	55
2	1	107.164	0.83	46.90	0.40	0.33	27.32	20.1	48.8	2.6	113.5	105.1	9.13	38 x 60 e	0.49	832.48	833.00	838.47	839.08	837.98	838.15	56
3	2	138.507	0.00	46.07	0.00	0.00	26.99	0.0	48.6	2.6	112.9	111.0	9.08	38 x 60 e	0.54	833.00	833.75	841.02	841.79	838.15	840.00	57
4	3	93.205	0.05	32.38	0.58	0.03	18.15	6.4	48.4	2.6	89.66	100.0	7.21	38 x 60 e	0.44	833.75	834.16	844.36	844.69	840.00	841.16	60
5	4	161.606	0.00	32.33	0.00	0.00	18.12	0.0	48.0	2.7	89.82	104.8	7.22	38 x 60 e	0.48	834.16	834.94	845.90	846.47	841.16	844.61	61
6	5	109.400	0.00	31.02	0.00	0.00	17.39	0.0	47.7	2.7	88.04	204.0	7.01	48	1.72	834.94	836.82	847.59	847.94	844.61	846.82	64
7	6	60.000	0.00	31.02	0.00	0.00	17.39	0.0	47.6	2.7	88.12	169.3	7.01	48	1.18	836.82	837.53	848.06	848.25	846.82	848.53	67
8	7	180.000	0.00	28.02	0.00	0.00	15.80	0.0	47.1	2.7	84.12	172.8	6.69	48	1.23	837.70	839.92	849.01	849.54	848.53	854.75	68
9	8	218.696	0.00	23.77	0.00	0.00	13.04	0.0	46.8	2.7	76.84	99.65	10.87	36	1.90	839.75	843.91	850.24	852.71	854.75	853.19	70
10	9	60.115	0.00	21.10	0.00	0.00	11.56	0.0	46.7	2.7	72.90	92.72	10.31	36	1.65	843.91	844.90	854.55	855.16	853.19	853.90	72
11	10	183.640	0.00	17.62	0.00	0.00	9.56	0.0	23.1	4.1	65.72	108.0	9.30	36	2.23	844.90	849.00	856.81	858.33	853.90	864.00	76
12	11	203.820	0.00	14.53	0.00	0.00	7.58	0.0	22.3	4.2	58.26	50.61	8.24	36	0.49	851.00	852.00	859.68	861.00	864.00	861.00	50
13	12	97.870	0.00	14.01	0.00	0.00	7.35	0.0	22.1	4.2	57.39	75.15	11.69	30	2.86	856.50	859.30	861.85	863.48	861.00	869.80	32A
14	13	145.280	0.00	8.65	0.00	0.00	4.43	0.0	20.6	4.4	45.90	35.55	9.35	30	0.64	858.80	859.73	865.61	867.16	869.80	864.73	34
15	14	157.046	0.00	6.47	0.00	0.00	3.37	0.0	20.3	4.4	41.37	41.19	8.43	30	0.86	859.73	861.08	868.52	869.88	864.73	870.36	37
16	15	365.020	0.00	1.85	0.00	0.00	1.13	0.0	16.7	4.9	5.48	15.07	4.98	15	4.64	863.86	880.80	870.99	881.75	870.36	887.30	43
17	16	6.720	0.28	1.12	0.47	0.13	0.54	8.6	16.7	4.9	2.64	11.45	3.37	15	2.68	880.80	880.98	881.75	881.63	887.30	886.98	44
18	17	144.308	0.14	0.84	0.59	0.08	0.41	9.5	15.3	5.1	2.09	15.01	3.51	15	4.60	880.98	887.62	881.63	888.20	886.98	893.62	45
19	18	86.066	0.20	0.70	0.47	0.09	0.33	7.7	14.3	5.2	1.73	14.49	3.34	15	4.29	887.62	891.31	888.20	891.83	893.62	897.31	46
20	19	104.361	0.50	0.50	0.47	0.24	0.24	12.7	12.7	5.6	1.31	14.41	2.99	15	4.24	891.31	895.74	891.83	896.19	897.31	901.74	47
21	16	14.663	0.73	0.73	0.80	0.58	0.58	6.0	6.0	7.5	4.40	7.75	4.68	15	1.23	880.80	880.98	881.75	881.83	887.30	886.98	42
22	13	49.662	0.00	5.36	0.00	0.00	2.92	0.0	22.1	4.2	12.24	12.20	9.98	15	3.04	863.80	865.31	865.61	867.13	869.80	872.31	31

Project File: 22039805_PR-model_calculations.stm

Number of lines: 66

Run Date: 7/5/2023

NOTES:Intensity = 43.97 / (Inlet time + 6.33) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

PR 25-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	260.828	0.00	1.98	0.00	0.00	1.13	0.0	21.0	4.3	4.87	11.19	4.58	15	2.56	865.31	871.98	868.68	872.87	872.31	878.98	28
24	23	6.943	0.10	0.10	0.95	0.10	0.10	6.0	6.0	7.5	0.72	11.26	3.95	15	2.59	875.48	875.66	875.69	875.99	878.98	878.66	Pipe - (1122)
25	23	14.495	1.88	1.88	0.55	1.03	1.03	20.9	20.9	4.3	4.47	7.80	4.87	15	1.24	871.98	872.16	872.87	873.02	878.98	878.66	27
26	11	160.753	0.00	2.63	0.00	0.00	1.66	0.0	22.4	4.2	6.89	28.84	4.66	18	6.43	856.75	867.08	859.68	868.10	864.00	874.58	Pipe - (1171)
27	26	7.219	1.24	1.24	0.63	0.78	0.78	22.4	22.4	4.2	3.25	10.73	6.03	15	2.35	871.08	871.25	871.55	871.98	874.58	874.25	78
28	22	38.536	0.70	3.31	0.52	0.36	1.72	6.0	16.9	4.8	8.32	19.45	6.96	15	7.73	865.31	868.29	868.68	869.42	872.31	872.04	30A
29	28	23.056	2.61	2.61	0.52	1.36	1.36	16.8	16.8	4.8	6.58	7.28	5.86	15	1.08	868.29	868.54	869.42	869.57	872.04	872.04	30
30	22	12.797	0.07	0.07	0.95	0.07	0.07	6.0	6.0	7.5	0.50	14.10	1.53	15	4.06	867.81	868.33	868.68	868.61	872.31	872.33	32
31	26	14.219	1.39	1.39	0.63	0.88	0.88	11.8	11.8	5.8	5.04	7.65	4.99	15	1.20	867.08	867.25	868.10	868.16	874.58	874.25	80
32	15	6.719	4.43	4.43	0.47	2.08	2.08	20.3	20.3	4.4	9.14	22.25	7.45	15	10.12	866.36	867.04	870.99	871.10	870.36	870.04	38
33	15	14.745	0.19	0.19	0.82	0.16	0.16	6.0	6.0	7.5	27.77	5.15	22.63	15	0.54	861.08	861.16	870.99	873.31	870.36	870.12	36
34	33	137.628	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	26.60	17.35	8.47	24	0.50	861.16	861.85	877.30	878.92	870.12	864.01	81
35	14	6.719	0.40	0.40	0.58	0.23	0.23	10.6	10.6	6.0	1.40	11.45	1.14	15	2.68	860.73	860.91	868.52	868.52	864.73	864.41	35
36	14	14.709	1.78	1.78	0.47	0.84	0.84	15.9	15.9	5.0	4.17	7.74	3.40	15	1.22	860.73	860.91	868.52	868.57	864.73	864.41	33
37	11	8.255	0.26	0.26	0.69	0.18	0.18	8.2	8.2	6.7	1.21	25.42	2.49	15	13.20	859.00	860.09	859.68	860.52	864.00	863.59	75
38	11	14.024	0.20	0.20	0.72	0.14	0.14	6.0	6.0	7.5	1.09	7.36	1.38	12	3.64	858.00	858.51	859.68	859.69	864.00	864.01	77
39	10	13.219	1.31	3.48	0.45	0.59	2.00	14.6	46.6	2.7	20.40	25.21	6.49	24	1.06	846.40	846.54	856.81	856.91	853.90	853.54	73
40	9	8.218	2.20	2.20	0.53	1.17	1.17	16.1	16.1	5.0	5.78	10.06	4.71	15	2.07	849.66	849.83	854.55	854.60	853.19	852.83	69
41	9	13.219	0.47	0.47	0.65	0.31	0.31	14.2	14.2	5.3	1.61	7.93	1.31	15	1.29	845.66	845.83	854.55	854.55	853.19	852.83	71
42	7	29.277	0.00	3.00	0.53	0.00	1.59	0.0	16.9	4.8	7.69	11.12	4.35	18	0.96	840.14	840.42	849.01	849.15	848.53	846.92	66
43	5	16.227	0.96	1.31	0.49	0.47	0.73	13.4	16.1	5.0	3.62	43.75	2.05	18	14.79	835.96	838.36	847.59	847.61	844.61	844.69	62
44	43	24.561	0.35	0.35	0.74	0.26	0.26	15.7	15.7	5.0	1.30	14.04	1.06	15	4.03	838.96	839.95	847.64	847.65	844.69	844.90	63

Project File: 22039805_PR-model_calculations.stm | Number of lines: 66 | Run Date: 7/5/2023

NOTES:Intensity = 43.97 / (Inlet time + 6.33) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

PR 25-YEAR

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	3	15.000	0.85	13.69	0.58	0.49	8.84	12.9	24.9	3.9	34.69	37.43	11.04	24	2.33	833.53	833.88	843.08	843.38	840.00	840.13	58
46	45	21.000	5.16	12.84	0.65	3.35	8.35	16.7	24.9	3.9	32.77	24.20	18.55	18	4.52	836.74	837.69	844.32	846.07	840.13	840.13	59
47	12	9.630	0.52	0.52	0.45	0.23	0.23	13.9	13.9	5.3	1.25	22.30	0.71	18	3.84	856.75	857.12	861.85	861.85	861.00	860.08	49
48	39	85.400	0.00	2.17	0.00	0.00	1.41	46.5	46.5	2.7	18.81	17.63	10.64	18	2.40	852.97	855.02	857.56	859.90	853.54	858.67	1281
49	46	354.308	0.00	7.68	0.00	0.00	4.99	0.0	23.9	4.0	20.04	38.06	6.38	24	2.41	837.69	846.24	848.74	851.11	840.13	851.87	48A(2)
50	49	110.000	0.00	7.68	0.00	0.00	4.99	0.0	23.6	4.0	20.18	33.04	6.43	24	1.82	847.50	849.50	851.21	851.96	851.87	853.77	48A(2)
51	50	223.000	5.26	7.68	0.65	3.42	4.99	21.1	23.3	4.1	20.34	28.72	11.54	18	6.37	850.60	864.81	852.09	866.28	853.77	870.38	48A(2)(2)
52	8	40.000	2.27	4.25	0.65	1.48	2.76	15.4	23.1	4.1	11.31	1.57	9.22	15	0.05	845.94	845.96	850.24	851.28	854.75	854.15	52A
53	52	52.600	0.00	1.98	0.00	0.00	1.29	0.0	22.8	4.1	5.31	9.10	4.32	15	1.69	845.96	846.85	852.60	852.91	854.15	853.34	52A(2)
54	53	86.200	0.00	1.98	0.00	0.00	1.29	0.0	22.3	4.2	5.37	9.14	4.37	15	1.71	846.85	848.32	852.97	853.47	853.34	852.14	52A(2)
55	54	72.700	0.00	1.98	0.00	0.00	1.29	0.0	21.9	4.2	5.42	2.46	4.42	15	0.12	848.42	848.51	853.77	854.21	852.14	851.26	52A(2)(2)
56	55	88.400	0.00	1.98	0.00	0.00	1.29	0.0	21.4	4.3	5.49	23.07	4.98	15	10.87	848.42	858.03	854.25	858.98	851.26	0.00	
57	56	206.000	1.98	1.98	0.65	1.29	1.29	20.7	20.7	4.3	5.60	17.61	5.85	15	6.33	858.11	871.16	858.98	872.12	0.00	0.00	
58	42	35.000	1.38	1.38	0.53	0.73	0.73	14.5	14.5	5.2	3.81	4.58	10.93	8	12.23	841.52	845.80	849.44	852.42	846.92	846.90	
59	42	89.000	0.00	1.62	0.00	0.00	0.86	0.0	16.3	4.9	4.23	22.04	2.39	18	3.75	842.29	845.63	849.44	849.56	846.92	848.28	
60	59	6.630	1.62	1.62	0.53	0.86	0.86	16.2	16.2	4.9	4.23	9.41	3.45	15	1.81	845.88	846.00	849.65	849.68	848.28	847.89	
61	48	198.697	0.00	2.17	0.00	0.00	1.41	0.0	24.3	4.0	5.61	16.10	5.07	15	5.30	855.02	865.55	862.06	866.51	858.67	869.35	
62	61	15.300	0.00	2.17	0.00	0.00	1.41	0.0	24.2	4.0	5.62	6.93	5.56	15	0.98	865.55	865.70	866.51	866.66	869.35	0.00	
63	62	83.000	2.17	2.17	0.65	1.41	1.41	24.0	24.0	4.0	5.66	7.00	5.59	15	1.00	865.70	866.53	866.66	867.49	0.00	0.00	
64	51	81.000	0.00	2.42	0.00	0.00	1.57	0.0	23.0	4.1	6.45	12.87	8.25	15	3.38	865.88	868.62	866.51	869.64	870.38	873.12	
65	64	313.000	0.73	2.42	0.65	0.47	1.57	12.0	22.1	4.2	6.60	4.95	5.38	15	0.50	868.62	870.19	869.87	872.66	873.12	878.00	(2)
66	65	163.000	1.69	1.69	0.65	1.10	1.10	21.3	21.3	4.3	4.70	4.96	3.83	15	0.50	870.19	871.01	872.89	873.62	878.00	0.00	

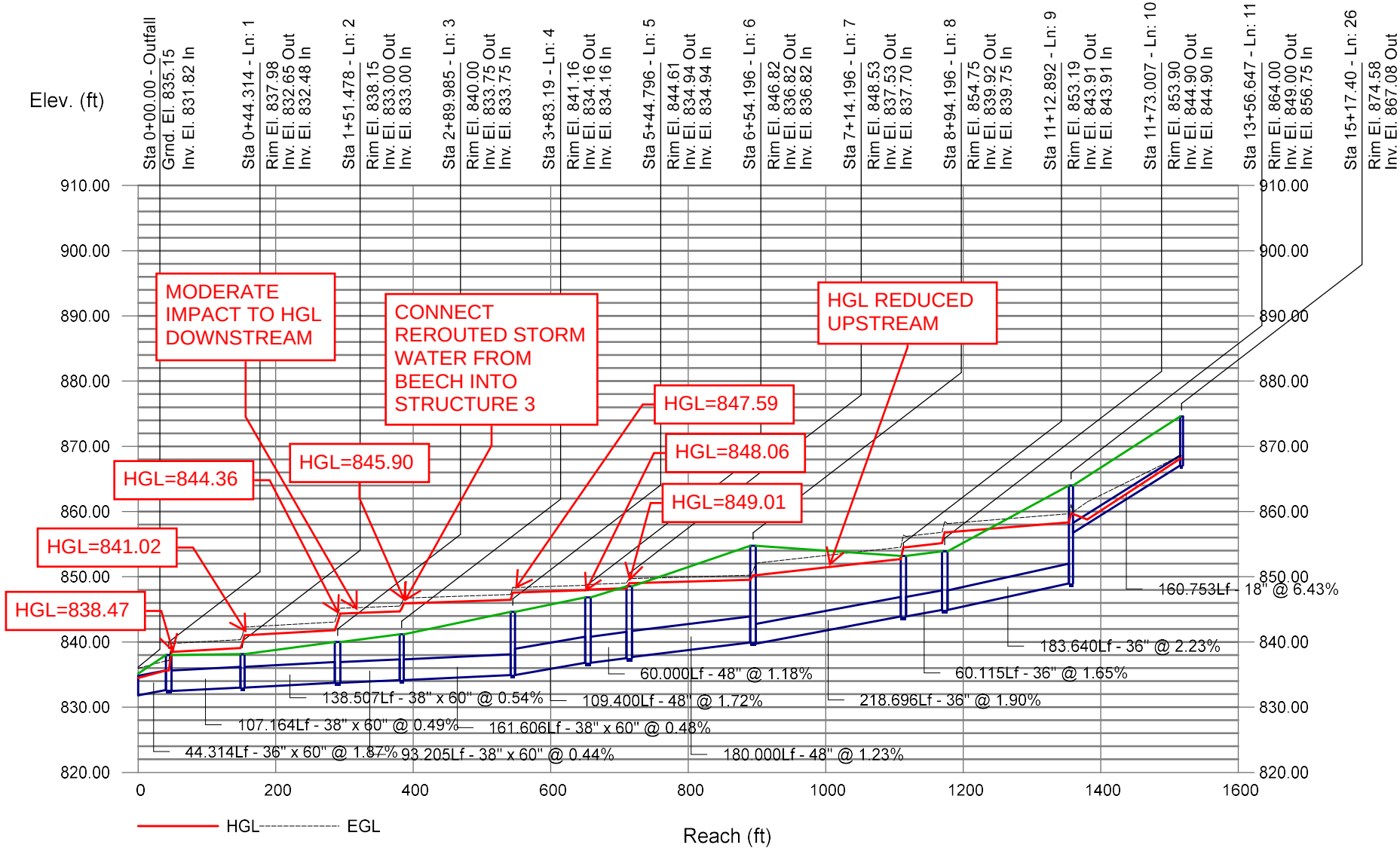
Project File: 22039805_PR-model_calculations.stm

Number of lines: 66

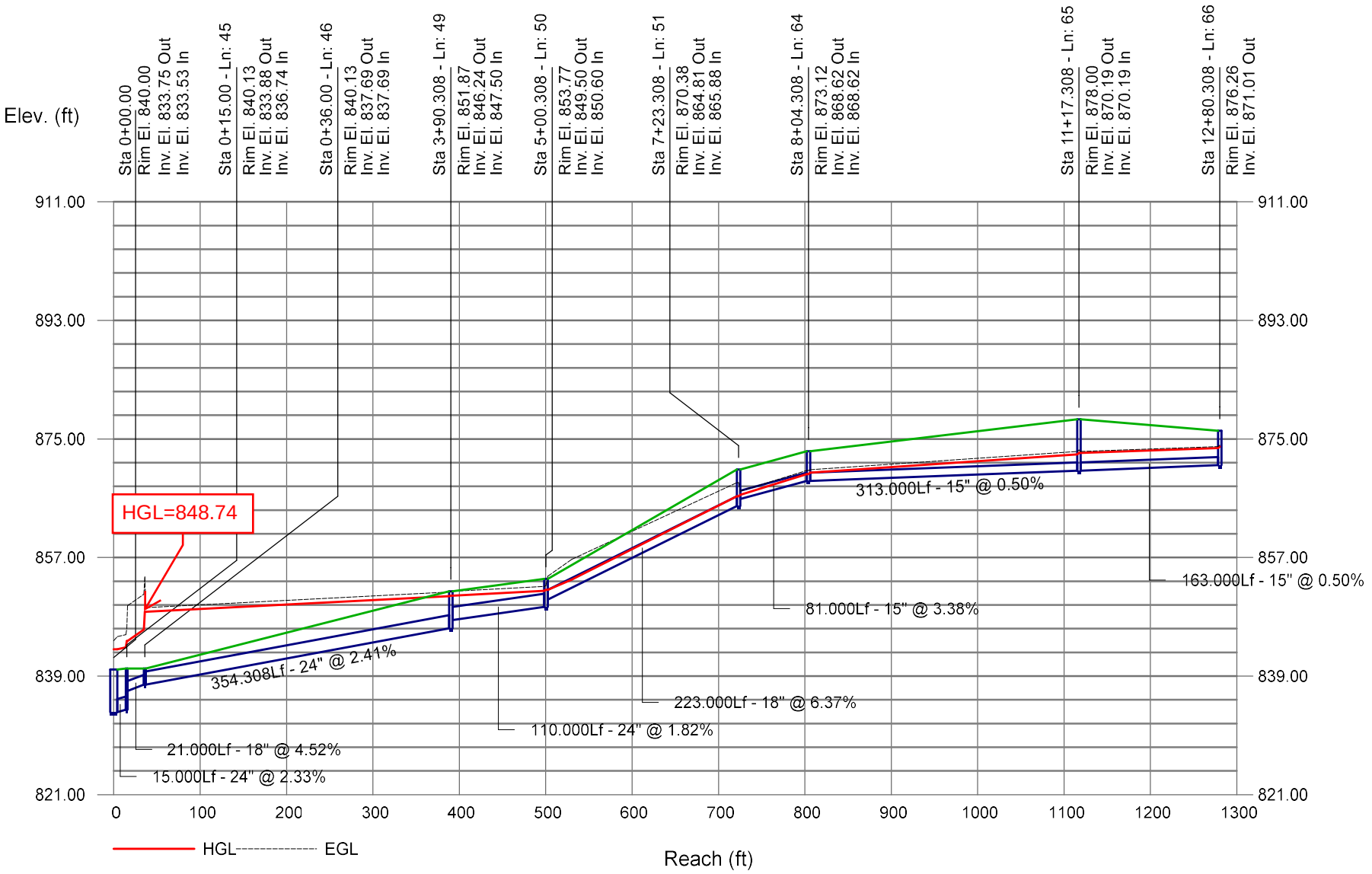
Run Date: 7/5/2023

NOTES:Intensity = 43.97 / (Inlet time + 6.33) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

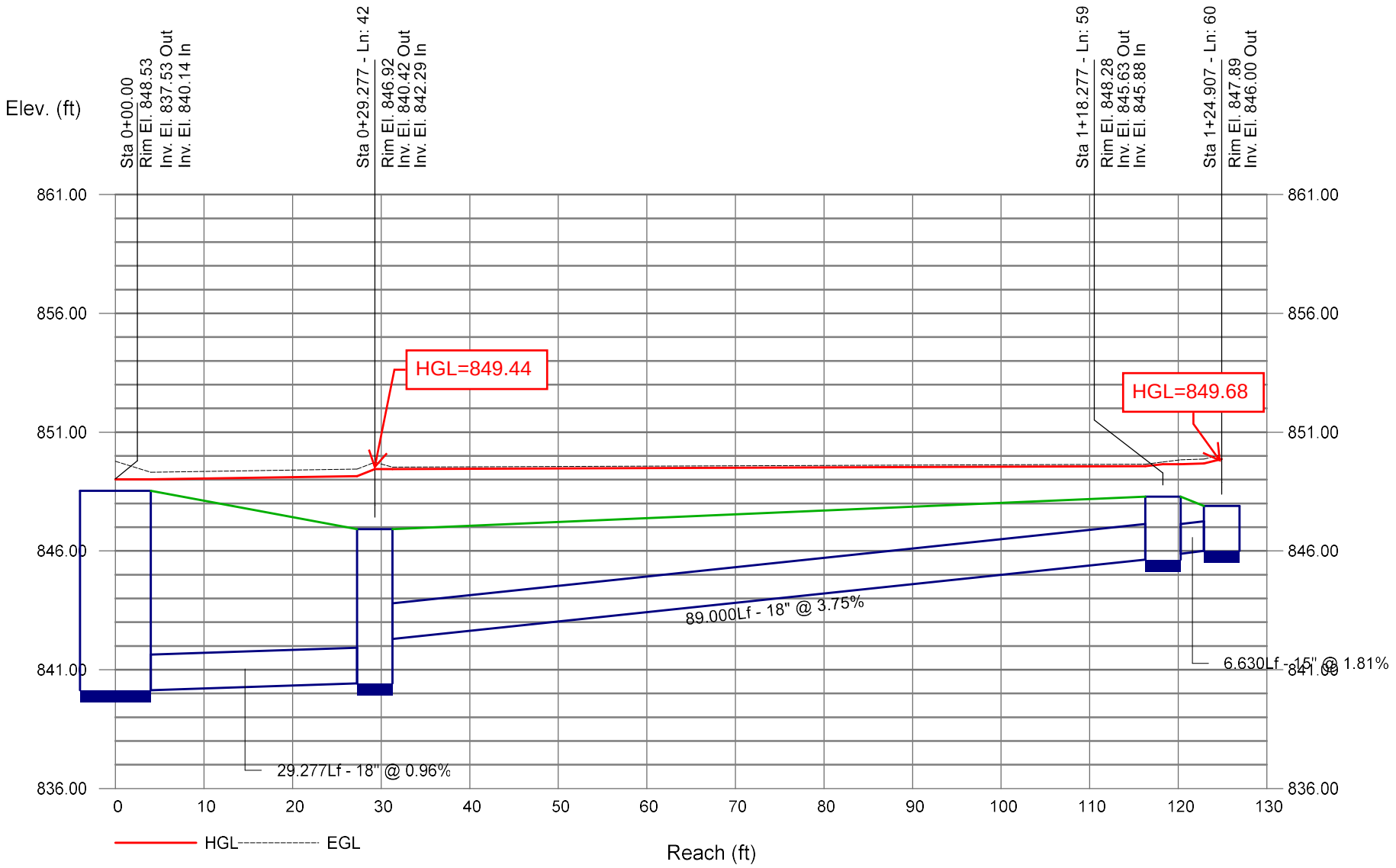
SYSTEM ALONG EDGEWOOD ROAD



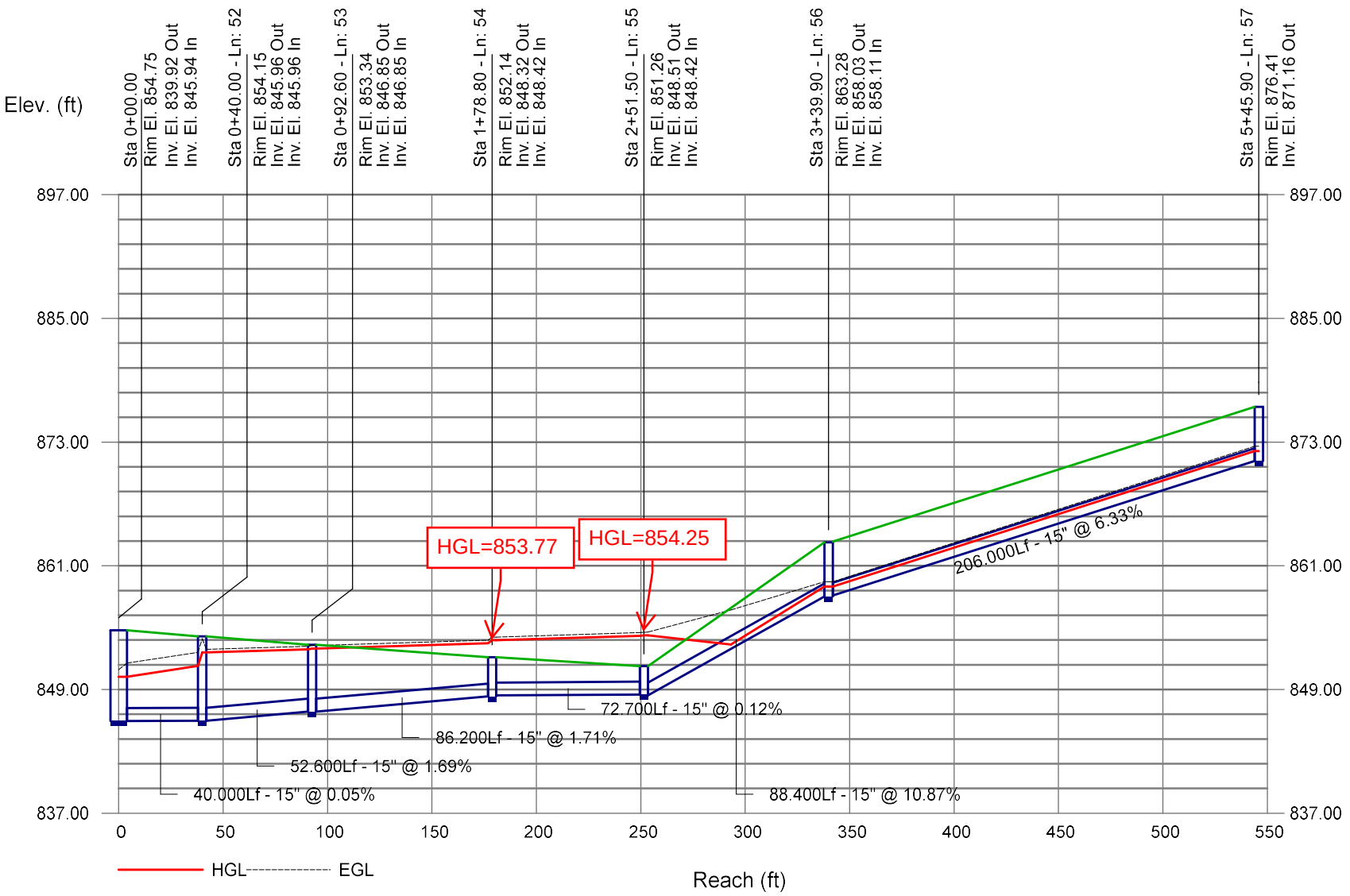
DRAINAGE FROM LOW POINT 1



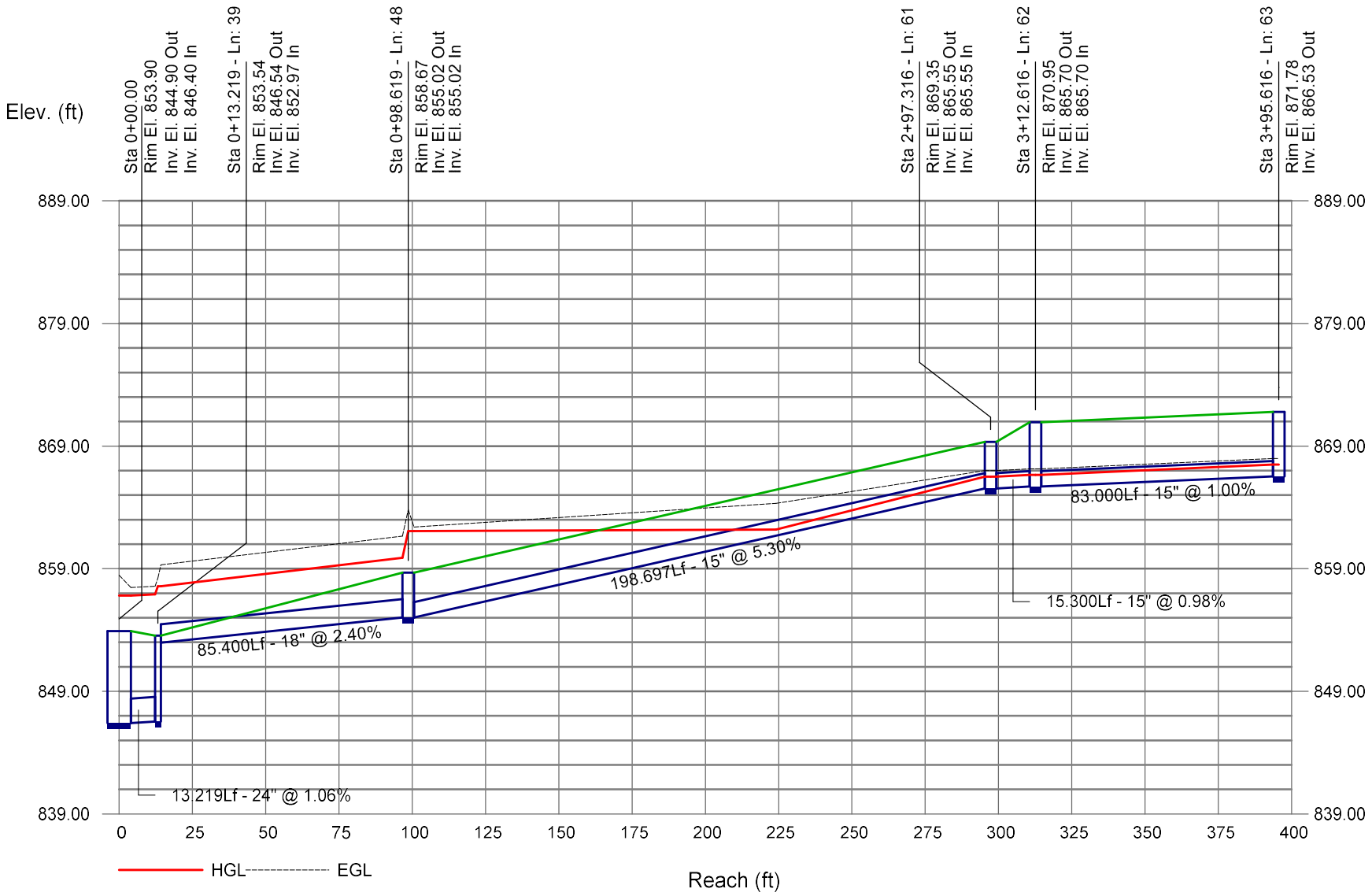
DRAINAGE IN FRONT YARD OF 70/74 EDGEWOOD



DRAINAGE @ LOW POINT 4



DRAINAGE @ LOW POINT 5 (BUCKNER)



CT Consultants, Inc.

Project: **BEECH DRIVE DRAINAGE STUDY**
EDGEWOOD, KENTUCKY
PRELIMINARY OPINION OF CONSTRUCTION COST

Date: 06/29/2023
Project No.: 220398-05

ITEM NO.	SPEC. NO.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Total Amount Bid
		UPSIZE AND EXTEND STORM SEWER SYSTEM				
1	110	MOBILIZATION	1	LS	$5,000.00	$5,000.00
2	112	MAINTENANCE OF TRAFFIC	1	LS	$5,000.00	$5,000.00
3	202	CLEARING AND GRUBBING	1	LS	$10,000.00	$10,000.00
4	203	REMOVE EXISTING STORM STRUCTURE	6	EA	$1,000.00	$6,000.00
5	203	REMOVE EXISTING STORM SEWER PIPE	600	LF	$25.00	$15,000.00
5	212/213	EROSION CONTROL	1	LS	$5,000.00	$5,000.00
6	SPL	FULL DEPTH REPAIR FOR TRENCH	335	SY	$60.00	$20,100.00
7	402/403	1.5" ASPHALT PAVEMENT SURFACE WITH ARAMID FIBER REINFORCEMENT (FORTA-FI, ACE FIBER, OR APPROVED EQUAL)	1,500	SY	$12.00	$18,000.00
8	408	1.5" PAVEMENT MILLING AND TEXTURING	1,500	SY	$4.00	$6,000.00
9	SPL	4" CONCRETE ROLL CURB AND GUTTER	1,800	LF	$40.00	$72,000.00
10	501	6" CONCRETE APRON/DRIVEWAY REPLACEMENT	3,000	SF	$13.00	$39,000.00
11	701	24" STORM SEWER	365	LF	$200.00	$73,000.00
12	701	18" STORM SEWER	220	LF	$190.00	$41,800.00

* CONTINGENCY ITEM - TO BE USED AT THE ENGINEER'S DIRECTION

CT Consultants, Inc.

Project: **BEECH DRIVE DRAINAGE STUDY**
EDGEWOOD, KENTUCKY
PRELIMINARY OPINION OF CONSTRUCTION COST

Date: 06/29/2023
Project No.: 220398-05

ITEM NO.	SPEC. NO.	ITEM	Estimated Quantity	Unit of Measure	Unit Cost Total	Total Amount Bid
13	701	15" STORM SEWER	680	LF	$170.00	$115,600.00
14	SPL	STANDARD DOUBLE GRATE CURB INLET	16	EA	$5,000.00	$80,000.00
15	SPL	STANDARD STORM MANHOLE	3	EA	$6,000.00	$18,000.00
16	SPL	YARD RESTORATION	1	LS	$10,000.00	$10,000.00
		CONTINGENCY (20%)				$108,000.00
		TOTAL CONSTRUCTION				**$647,500.00**
		ENGINEERING				$52,000.00
		GEOTECH				$10,000.00
		CONSTRUCTION ADMINISTRATION				$13,000.00
		STAKE OUT				$2,500.00
		EASEMENTS	4	EA	$2,000.00	$8,000.00
		RECORD DRAWINGS				$3,500.00
		TOTAL				**$736,500.00**

* CONTINGENCY ITEM - TO BE USED AT THE ENGINEER'S DIRECTION