Stormwater Management Narrative

For

Block 13, Lots 13-18, 20 & 21
Block 14, Lots 12 & 14
Block 15, Lots 5-12
Borough of Sea Bright
Monmouth County, NJ

January 17, 2022
Revised July 22, 2022

Prepared by:

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APPENDIX

A. INTRODUCTION

The site is known as Lots 13-18, 20 & 21 in Block 13, Lots 12 & 14 in Block 14, and Lots 5-12 in Block 15, in the Borough of Sea Bright, Monmouth County, New Jersey, and consists of approximately 2.66 acres. The entire tract is located within an urban redevelopment area within the Environmentally Sensitive Barrier Island PA-52 as shown on the State Planning Area Map. Portions of the site is located at the eastern end of Surf Street and New Street, and Church Street, portions are located on the south and north sides of South Street and south of River Street, bordered by the South Shrewsbury River along the eastern property line. The tract has frontage to Front Street, Church Street, South Street, River Street, and an unnamed street traversing from South to River Streets. Currently the site consists of residential dwellings with access driveways and building appurtenances, marine buildings and paved and gravel parking areas, and abandoned commercial buildings with associated parking areas.

The proposed development of the property consists of the construction of 4 (four) single-family homes, 25 (twenty-five) townhouse units distributed in 5 (five) buildings, and residential condominium building with 15 (fifteen) residential units. Associated with the construction of the residential development is the construction of access driveways, pedestrian circulation, improvements to the municipal roadways, lighting and landscaping, and a stormwater management system. In addition, approximately one acre of the tract area is proposed to be open space. The construction of the project as proposed reduces the impervious coverage by approximately 0.85 acres.

The intent of this report is to analyze the stormwater impact of the proposed development.

B. PRE-DEVELOPED DRAINAGE CONDITIONS

The site currently consists of residential dwellings with access driveways and building appurtenances, marine buildings and paved and gravel parking areas, and abandoned commercial buildings with associated parking areas. Currently, approximately 2.28 acres of the tract area is covered with impervious surfaces. The stormwater runoff generated by northern portion of the site currently flows towards the existing drainage pipe system located in River Street, South Street, and Church Street. Currently, these drainage systems discharge directly into South Shrewsbury River through the existing bulkhead culverts. The stormwater generated by the southern portion of the site is collected and conveyed through the existing drainage pipe system in Front Street and Beach Street, discharging into an existing pump station at the terminus of Beach Street. The pump station ultimately discharges stormwater runoff into South Shrewsbury River. The South Shrewsbury River bordering the site is classified as tidal waters.

C. POST-DEVELOPED DRAINAGE CONDITIONS

It is proposed to construct 4 (four) single-family homes, 25 (twenty-five) townhouse units distributed in 5 (five) buildings, and a residential condominium building with 15 (fifteen) units. Associated with the residential development, it is proposed to construct access driveways, pedestrian circulation, improvements to the municipal streets, lighting and landscaping, and stormwater management pipe system. In addition, not part of this project, but in connection to, construction of a pump station at the terminus of South Street is proposed. The existing drainage pipe systems in South Street, Church Street, and River Street is proposed to be intercepted and connected to the proposed drainage system. The northern drainage system will discharge into the proposed pump station at the terminus of River Street. The proposed pump station will ultimately discharge into Shrewsbury River. The existing discharge culverts along the bulkhead from Church Street to River

Street will be abandoned. The proposed pump station at the terminus of River Street is not part of this project.

The proposed post-development drainage patterns will remain the same as under existing pre-development conditions. The stormwater generated by the southern portion of the site will continue to be directed into the existing pump station in Beach Street prior discharging into South Shrewsbury River. The stormwater generated by northern portion of the site will continue to drain northwards towards to the proposed pump station at the terminus of River Street (to be designed and constructed by others) prior to discharging into South Shrewsbury River.

The development disturbs approximately 3.63 acres and reduces the impervious areas by approximately 0.85 acres. In addition, the project proposes approximately one acre of open space along the Shrewsbury River. As such, due to the reduction of impervious areas, including reduction to motor vehicle areas, the South Shrewsbury River discharge waters being tidal, and the project being located within an Urban Redevelopment Area as defined in the Stormwater Management rules, the project is exempted to meet the NJAC 7:8 requirements for stormwater runoff quality, quantity, and groundwater recharge.

D. STORM SEWER DESIGN

The storm sewer has been designed in accordance with the Borough and NJDEP requirements. Hydraflow Storm Sewers Extension v2021 Software by Autodesk was utilized in the design. The proposed storm sewer was designed using the Rational Method with a minimum time of concentration of 10 minutes and the New Jersey Intensity-Duration-Frequency Table. A composite of "C" Runoff Coefficient of 0.9 for impervious areas, 0.20 for grassed and landscaped areas was utilized for the drainage areas to the stormwater conveyance system. Manning's Formula with a Coefficient of 0.013 for reinforced concrete pipe was utilized. The storm sewer was designed to convey the 25-year storm frequency.

The drainage pipe system proposed as part of the development includes the off-site areas draining into the existing pipes being intercepted. Conservatively, the stormwater runoff generated by the offsite areas were calculated assuming 95% of impervious areas. The southern portion of the on-site pipe system is proposed connect to the existing pipe system in Front Street, which is connected to the existing pump station in Beach Street prior discharging to Shrewsbury River. The northern portion of the pipe system is proposed to connect to the proposed pump station in River Street (to be designed by others), prior to discharge into South Shrewsbury River.

No attempt has been made to verify or calculate the capacity of the existing or propose pump stations. Noting that the proposed pump station and culvert discharge piping at the terminus of River Street is not part of this project and will be designed and constructed by others.

The storm sewer design calculations can be found in the Appendix.

E. CONCLUSION

As the project reduces impervious areas by approximately 0.85 acre, including reduction in motor vehicle surfaces, enhance the drainage pipe system, no adverse impact to surrounding properties is expected due to the construction of the project as proposed.

APPENDIX A

DRAINAGE PIPE CALCULATIONS

WJH

Line No.	Inlet ID	DnStm Ln No	Drng Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Incr Q (cfs)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Type	n-val Pipe	Line Length (ft)	Line Slope (%)	Invert Dn (ft)	Invert Up (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)
1	DMH-S20	Outfall	0.00	0.00	0.00	12.59	10.0	0.00	0.00	26.80	73.60	2.79	42	Cir	0.013	9.34	0.54	-6.50	-6.45	2.14	2.78
2	DMH-S19	1	0.00	0.90	0.00	5.35	10.0	0.00	0.00	11.48	67.54	1.19	42	Cir	0.013	73.23	0.45	-6.45	-6.12	2.78	4.18
3	E2	2	0.12	0.90	0.11	0.24	10.0	0.62	0.00	1.34	5.40	2.92	15	Cir	0.013	77.31	0.70	0.60	1.14	4.18	4.30
4	E1	3	0.15	0.90	0.14	0.14	10.0	0.77	0.00	0.77	4.57	2.36	15	Cir	0.013	127.90	0.50	1.14	1.78	4.30	4.89
5	S18	2	0.00	0.00	0.00	5.11	10.0	0.00	0.00	11.01	44.50	1.56	36	Cir	0.013	65.15	0.45	-5.62	-5.33	4.18	3.60
6	DMH-16	5	0.00	0.00	0.00	5.11	10.0	0.00	0.00	11.03	43.74	1.56	36	Cir	0.013	23.25	0.43	-5.33	-5.23	3.60	3.75
7	S17	6	0.11	0.83	0.09	3.56	10.0	0.52	0.00	7.70	44.27	1.09	36	Cir	0.013	11.35	0.44	-5.23	-5.18	3.75	3.80
8	S15	7	0.24	0.66	0.16	3.47	10.0	0.91	0.00	7.64	42.18	1.08	36	Cir	0.013	160.01	0.40	-5.18	-4.54	3.80	4.00
9	DMH-S14	8	0.00	0.68	0.00	3.31	10.0	0.00	0.00	7.32	42.47	1.04	36	Cir	0.013	32.06	0.41	-4.54	-4.41	4.00	3.85
10	EX-DMH 2	9	0.00	0.00	0.00	3.31	10.0	0.00	0.00	7.33	27.97	1.49	30	Cir	0.013	12.90	0.47	-3.90	-3.84	3.85	3.90
11	EX. MH 1	10	0.00	0.00	0.00	3.22	10.0	0.00	0.00	7.13	8.49	4.03	18	Cir	0.013	42.88	0.65	-2.73	-2.45	3.90	4.00
12	DMH-C3	11	3.46	0.87	3.01	3.17	10.0	17.20	0.00	7.04	10.50	3.98	18	Cir	0.013	40.98	1.00	-1.06	-0.65	4.00	3.58
13	C1	12	0.03	0.90	0.03	0.06	10.0	0.15	0.00	0.13	6.13	0.11	15	Cir	0.013	15.55	0.90	-0.40	-0.26	3.58	3.85
14	Y-4	13	0.05	0.57	0.03	0.03	10.0	0.16	0.00	0.08	3.50	0.10	12	Cir	0.013	63.17	0.97	-0.01	0.60	3.85	3.25
15	Y-3	14	0.01	0.20	0.00	0.00	10.0	0.01	0.00	0.01	3.57	0.01	12	Cir	0.013	39.81	1.00	0.60	1.00	3.25	3.00
16	EX. INLET A	11	0.03	0.90	0.03	0.03	10.0	0.15	0.00	0.15	2.65	0.20	12	Cir	0.012	17.00	0.47	0.54	0.62	4.00	3.70
17	EX. INLET B	11	0.02	0.90	0.02	0.02	10.0	0.10	0.00	0.10	2.51	0.13	12	Cir	0.012	18.87	0.42	0.39	0.47	4.00	4.20
18	EX-INLET	6	0.07	0.90	0.06	1.55	10.0	0.36	0.00	6.47	31.34	1.32	30	Cir	0.013	77.06	0.58	-3.70	-3.25	3.75	2.65
19	B3A	18	0.63	0.87	0.55	1.49	10.0	3.13	0.00	6.25	21.28	1.99	24	Cir	0.013	39.52	0.89	-2.75	-2.40	2.65	2.75
20	B3	19	1.08	0.86	0.93	0.94	10.0	5.31	0.00	3.96	7.41	2.24	18	Cir	0.013	18.09	0.50	-1.90	-1.81	2.75	2.75
21	Y-2	20	0.02	0.46	0.01	0.01	10.0	0.05	0.00	0.05	3.22	0.07	12	Cir	0.013	42.88	0.82	0.15	0.50	2.75	3.00
22	C2	12	0.13	0.79	0.10	0.10	10.0	0.59	0.00	0.59	5.67	0.48	15	Cir	0.013	16.86	0.77	-0.03	0.10	3.58	3.50
23	DMH-S22	1	3.01	0.86	2.59	7.24	10.0	14.79	0.00	41.20	79.70	4.28	42	Cir	0.013	11.16	0.63	-4.00	-3.93	2.78	2.70

Project File: Rev. Storm Conveyance.stm | Number of lines: 30 | Date: 7/25/2022

NOTES: ** Critical depth

WJH

Line No.	Inlet ID	DnStm Ln No	Drng Area (ac)	Runoff Coeff (C)	Incr CxA	Total CxA	Inlet Time (min)	Incr Q (cfs)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Type	n-val Pipe	Line Length (ft)	Line Slope (%)	Invert Dn (ft)	Invert Up (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)
24	S21	23	5.41	0.86	4.65	4.65	10.0	26.59	0.00	26.59	46.23	3.76	36	Cir	0.013	27.06	0.48	-3.43	-3.30	2.70	2.25
25	S30	10	0.13	0.74	0.10	0.10	10.0	0.55	0.00	0.55	4.70	0.45	15	Cir	0.013	16.96	0.53	-2.84	-2.75	3.90	3.70
26	S4B	Outfall	2.31	0.86	1.99	2.65	10.0	11.35	0.00	12.86	18.74	4.09	24	Cir	0.013	7.28	0.69	-2.00	-1.95	1.66	1.73
27	S8	26	0.13	0.85	0.11	0.66	10.0	0.63	0.00	3.27	7.71	2.66	15	Cir	0.013	105.34	1.42	-1.20	0.30	1.73	4.10
28	S7	27	0.16	0.82	0.13	0.13	10.0	0.75	0.00	0.75	4.59	0.82	15	Cir	0.013	75.33	0.50	0.82	1.20	4.10	4.40
29	S9	27	0.38	0.87	0.33	0.42	10.0	1.89	0.00	2.12	4.66	1.73	15	Cir	0.013	84.34	0.52	0.30	0.74	4.10	3.80
30	S12	29	0.16	0.54	0.09	0.09	10.0	0.49	0.00	0.49	4.55	0.54	15	Cir	0.013	112.76	0.50	0.74	1.30	3.80	4.10

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NOTES: ** Critical depth

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	42	26.80	-6.50	1.03	3.50	9.62	2.79	0.12	1.15	0.071	9.34	-6.45	1.04	3.50	9.62	2.79	0.12	1.16	0.071	0.071	0.007	0.80	0.10
2	42	11.48	-6.45	1.13	3.50	9.62	1.19	0.02	1.16	0.013	73.23	-6.12	1.14	3.50	9.62	1.19	0.02	1.16	0.013	0.013	0.010	0.70	0.02
3	15	1.34	0.60	1.16	0.56	0.41	2.54	0.17	1.33	0.000	77.31	1.14	1.60 j	0.46**	0.41	3.30	0.17	1.77	0.000	0.000	n/a	0.50	n/a
4	15	0.77	1.14	1.60	0.46	0.27	1.89	0.06	1.65	0.174	127.90	1.78	2.12	0.34**	0.27	2.82	0.12	2.25	0.524	0.349	n/a	0.50	0.06
5	36	11.01	-5.62	1.16	3.00	7.07	1.56	0.04	1.20	0.027	65.15	-5.33	1.18	3.00	7.07	1.56	0.04	1.21	0.027	0.027	0.018	1.00	0.04
6	36	11.03	-5.33	1.21	3.00	7.07	1.56	0.04	1.25	0.027	23.25	-5.23	1.22	3.00	7.07	1.56	0.04	1.26	0.027	0.027	0.006	0.00	0.00
7	36	7.70	-5.23	1.22	3.00	7.07	1.09	0.02	1.24	0.013	11.35	-5.18	1.22	3.00	7.07	1.09	0.02	1.24	0.013	0.013	0.002	0.50	0.01
8	36	7.64	-5.18	1.23	3.00	7.07	1.08	0.02	1.25	0.013	160.01	-4.54	1.25	3.00	7.07	1.08	0.02	1.27	0.013	0.013	0.021	0.60	0.01
9	36	7.32	-4.54	1.26	3.00	7.07	1.04	0.02	1.28	0.012	32.06	-4.41	1.27	3.00	7.07	1.04	0.02	1.28	0.012	0.012	0.004	0.80	0.01
10	30	7.33	-3.90	1.28	2.50	4.91	1.49	0.03	1.31	0.032	12.90	-3.84	1.28	2.50	4.91	1.49	0.03	1.32	0.032	0.032	0.004	0.70	0.02
11	18	7.13	-2.73	1.31	1.50	1.77	4.03	0.25	1.56	0.461	42.88	-2.45	1.51	1.50	1.77	4.03	0.25	1.76	0.461	0.461	0.198	1.00	0.25
12	18	7.04	-1.06	1.76	1.50	1.77	3.98	0.25	2.01	0.449	40.98	-0.65	1.94	1.50	1.77	3.98	0.25	2.19	0.449	0.449	0.184	0.70	0.17
13	15	0.13	-0.40	2.12	1.25	1.23	0.11	0.00	2.12	0.000	15.55	-0.26	2.12	1.25	1.23	0.11	0.00	2.12	0.000	0.000	0.000	0.60	0.00
14	12	0.08	-0.01	2.12	1.00	0.79	0.10	0.00	2.12	0.000	63.17	0.60	2.12	1.00	0.79	0.10	0.00	2.12	0.000	0.000	0.000	0.65	0.00
15	12	0.01	0.60	2.12	1.00	0.79	0.01	0.00	2.12	0.000	39.81	1.00	2.12	1.00	0.79	0.01	0.00	2.12	0.000	0.000	0.000	0.50	0.00
16	12	0.15	0.54	1.76	1.00	0.79	0.20	0.00	1.76	0.002	17.00	0.62	1.76	1.00	0.79	0.20	0.00	1.76	0.002	0.002	0.000	0.50	0.00
17	12	0.10	0.39	1.76	1.00	0.79	0.13	0.00	1.76	0.001	18.87	0.47	1.76	1.00	0.79	0.13	0.00	1.76	0.001	0.001	0.000	0.50	0.00
18	30	6.47	-3.70	1.22	2.50	4.91	1.32	0.03	1.25	0.025	77.06	-3.25	1.24	2.50	4.91	1.32	0.03	1.27	0.025	0.025	0.019	0.50	0.01
19	24	6.25	-2.75	1.25	2.00	3.14	1.99	0.06	1.31	0.076	39.52	-2.40	1.28	2.00	3.14	1.99	0.06	1.34	0.076	0.076	0.030	0.80	0.05
20	18	3.96	-1.90	1.33	1.50	1.77	2.24	0.08	1.41	0.142	18.09	-1.81	1.36	1.50	1.77	2.24	0.08	1.44	0.142	0.142	0.026	0.60	0.05
21	12	0.05	0.15	1.40	1.00	0.79	0.07	0.00	1.40	0.000	42.88	0.50	1.41	0.91	0.75	0.07	0.00	1.41	0.000	0.000	0.000	0.50	0.00
22	15	0.59	-0.03	2.12	1.25	1.23	0.48	0.00	2.12	0.008	16.86	0.10	2.12	1.25	1.23	0.48	0.00	2.12	0.008	0.008	0.001	0.50	0.00

Project File: Rev. Storm Conveyance.stm | Number of lines: 30 | Run Date: 7/25/2022

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
23	42	41.20	-4.00	1.13	3.50	9.62	4.28	0.29	1.42	0.168	11.16	-3.93	1.15	3.50	9.62	4.28	0.29	1.44	0.168	0.168	0.019	0.80	0.23
24	36	26.59	-3.43	1.38	3.00	7.07	3.76	0.22	1.60	0.159	27.06	-3.30	1.42	3.00	7.07	3.76	0.22	1.64	0.159	0.159	0.043	0.50	0.11
25	15	0.55	-2.84	1.31	1.25	1.23	0.45	0.00	1.31	0.007	16.96	-2.75	1.31	1.25	1.23	0.45	0.00	1.31	0.007	0.007	0.001	0.50	0.00
26	24	12.86	-2.00	1.44	2.00	3.14	4.10	0.26	1.70	0.324	7.28	-1.95	1.46	2.00	3.14	4.09	0.26	1.72	0.323	0.324	0.024	0.50	0.13
27	15	3.27	-1.20	1.59	1.25	1.23	2.66	0.11	1.70	0.256	105.34	0.30	1.86	1.25	1.23	2.66	0.11	1.97	0.256	0.256	0.270	0.60	0.07
28	15	0.75	0.82	1.93	1.11	1.15	0.65	0.01	1.94	0.012	75.33	1.20	1.94	0.74	0.75	1.00	0.02	1.95	0.032	0.022	0.016	0.50	0.01
29	15	2.12	0.30	1.93	1.25	1.23	1.73	0.05	1.98	0.108	84.34	0.74	1.99	1.25	1.23	1.73	0.05	2.04	0.106	0.107	0.090	0.50	0.02
30	15	0.49	0.74	2.01	1.25	1.23	0.40	0.00	2.02	0.006	112.76	1.30	2.02	0.72	0.73	0.67	0.01	2.03	0.015	0.010	0.012	0.50	0.00

Project File: Rev. Storm Conveyance.stm | Number of lines: 30 | Run Date: 7/25/2022

Notes: ; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

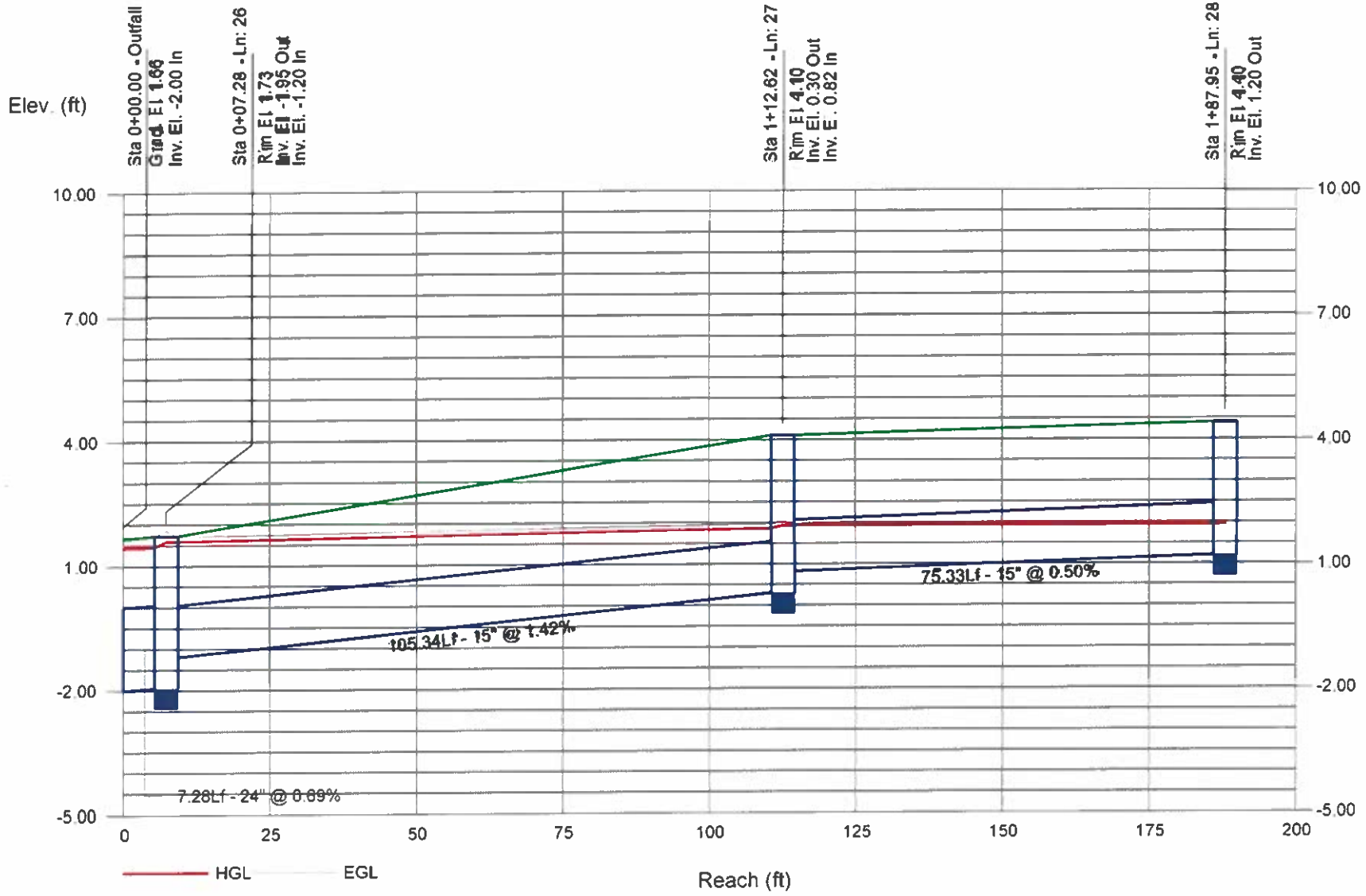
APPENDIX B

DRAINAGE PIPE PROFILES

Storm Sewer Profile

INLET S7 TO DMH S4A (IN FRONT STREET)

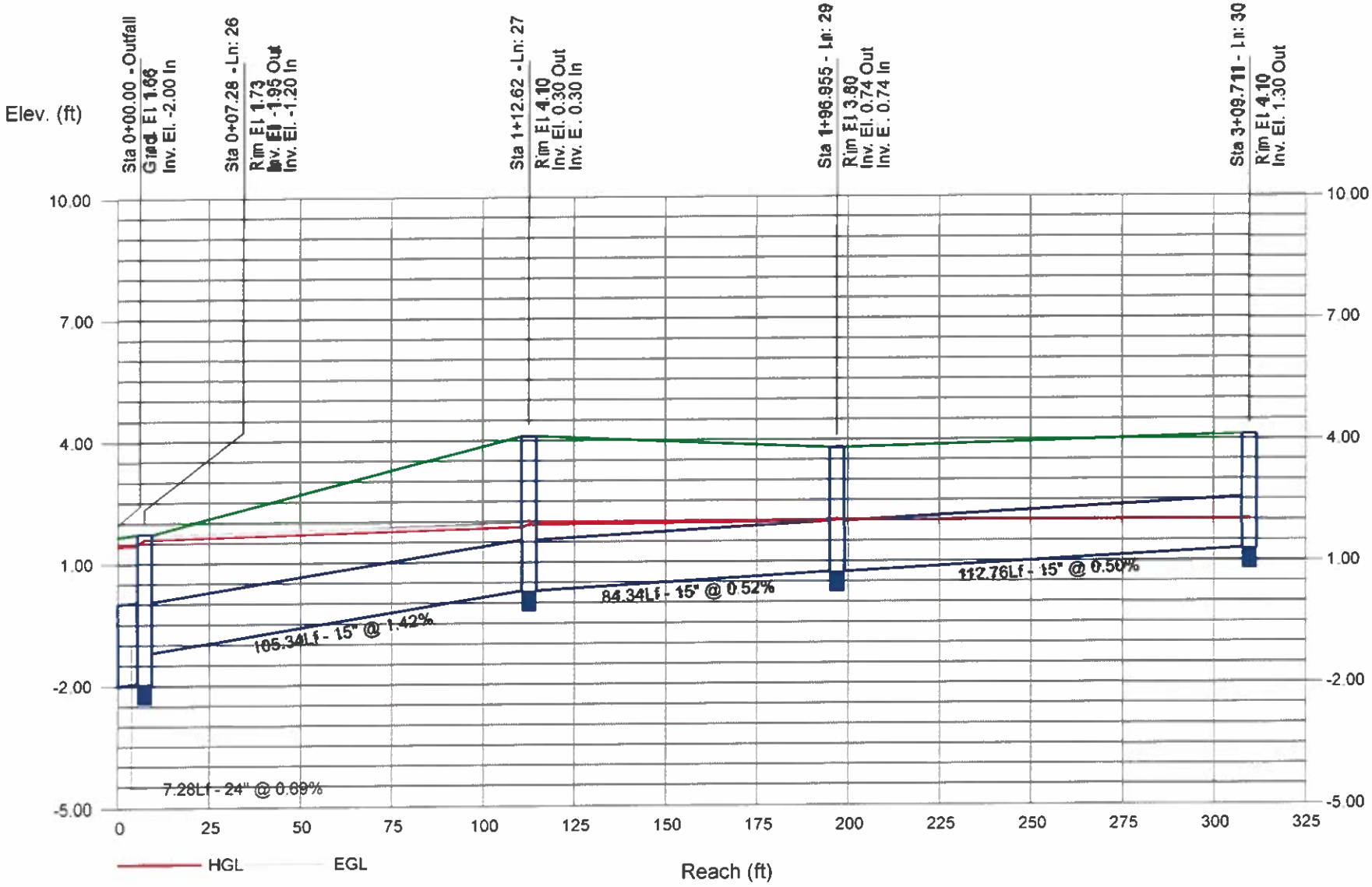
Proj. file: Rev. Storm Conveyance1.stm



Storm Sewer Profile

INLET S12 TO DMH S4A (IN FRONT STREET)

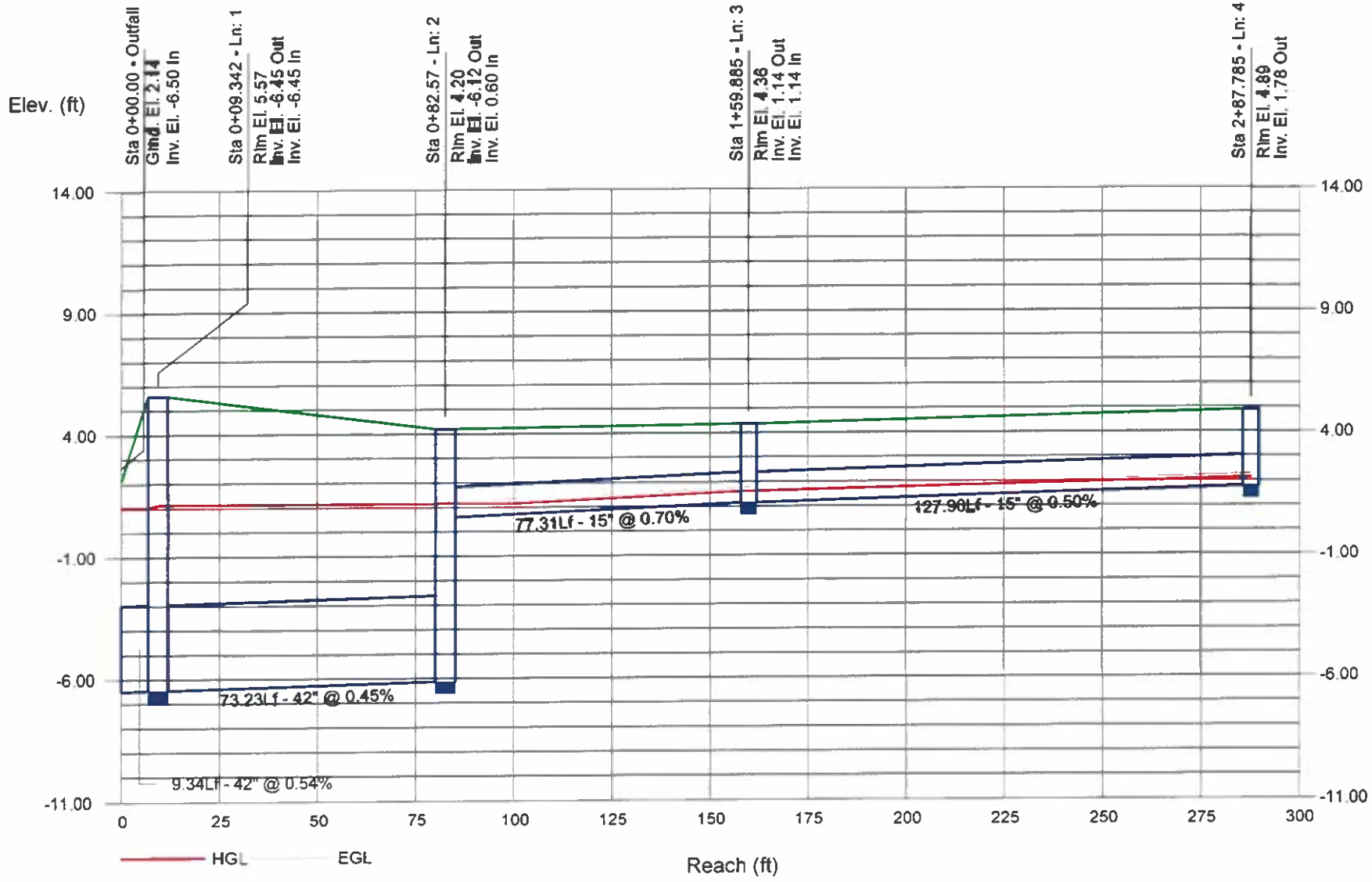
Proj. file: Rev. Storm Conveyance1.stm



Storm Sewer Profile

INLET E1 TO PROPOSED PUMP STATION

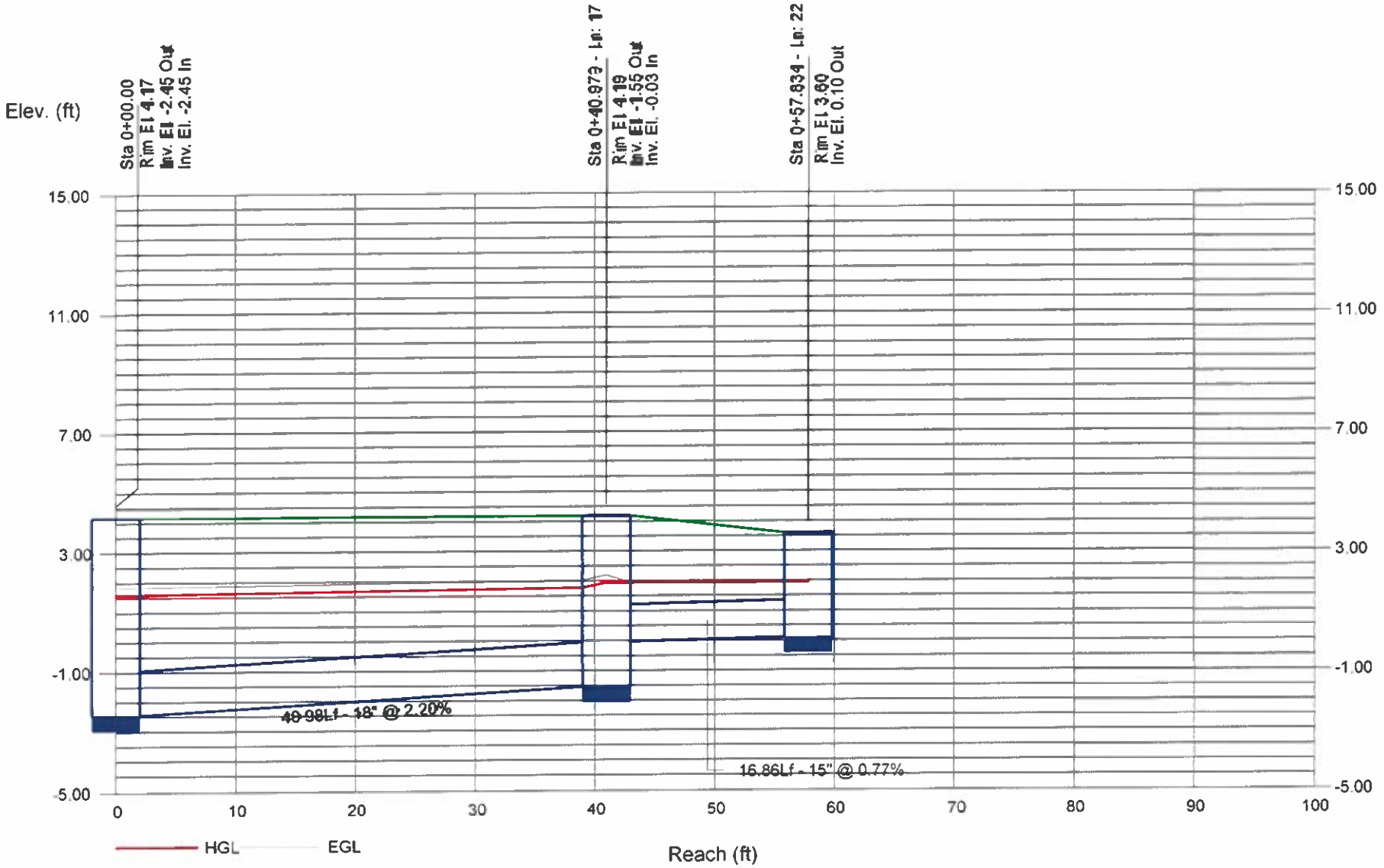
Proj. file: Rev. Storm Conveyance1.stm



Storm Sewer Profile

INLET C2 TO EX. DMH 1

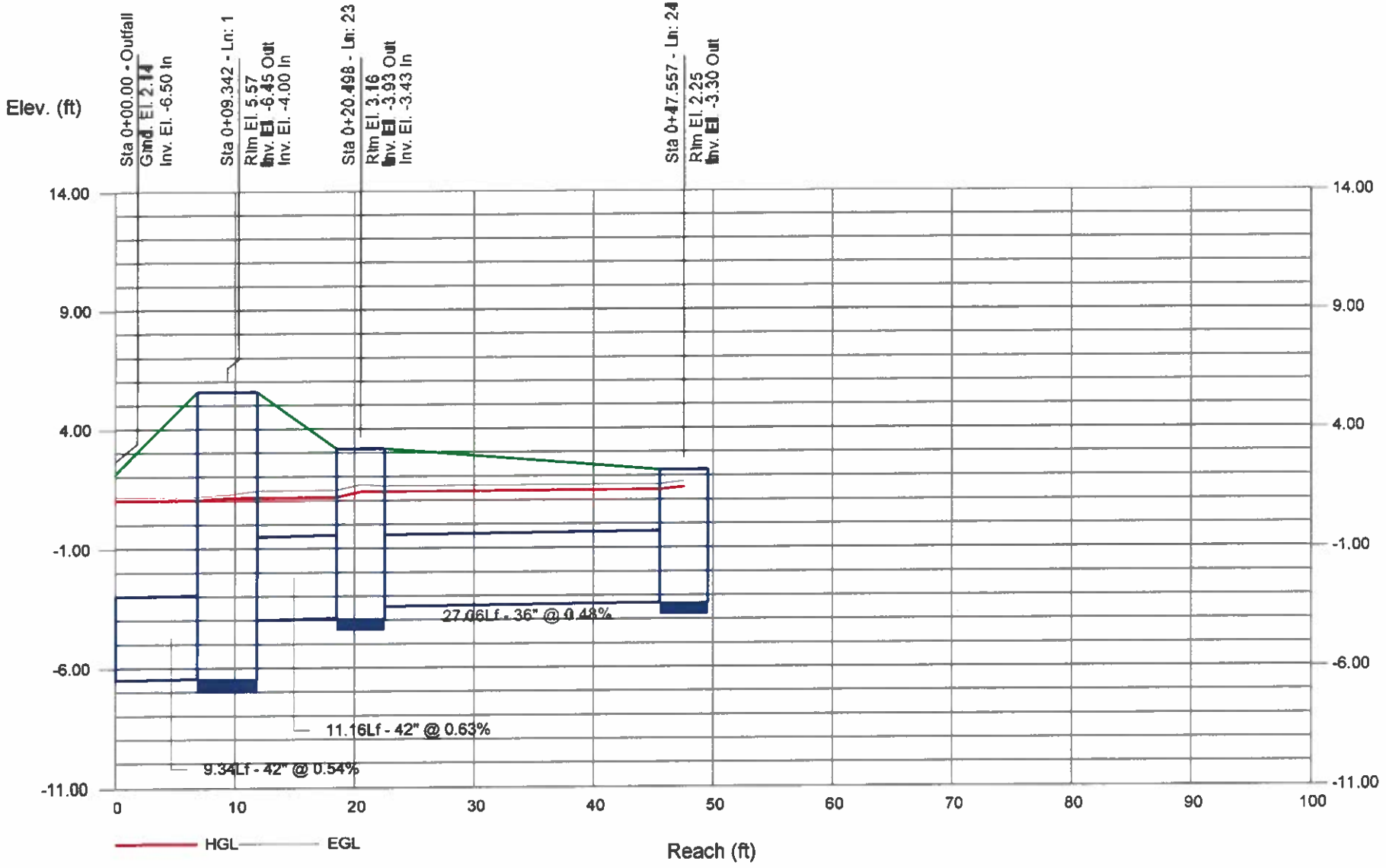
Proj. file: Rev. Storm Conveyance.stm



Storm Sewer Profile

INLET S21 TO PROPOSED PUMP STATION

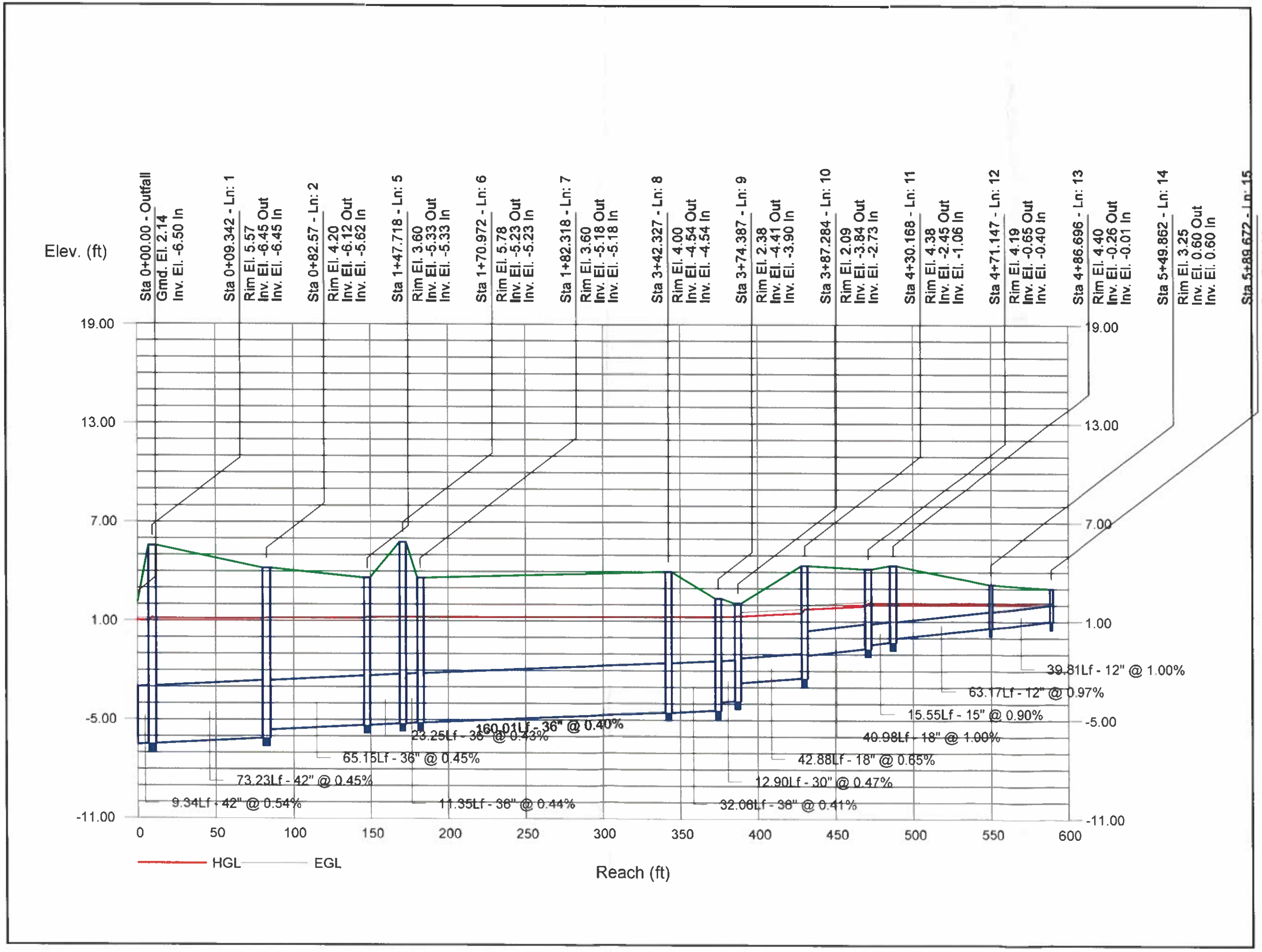
Proj. file: Rev. Storm Conveyance1.stm



Storm Sewer Profile

YARD INLET Y-3 TO PROPOSED PUMP STATION

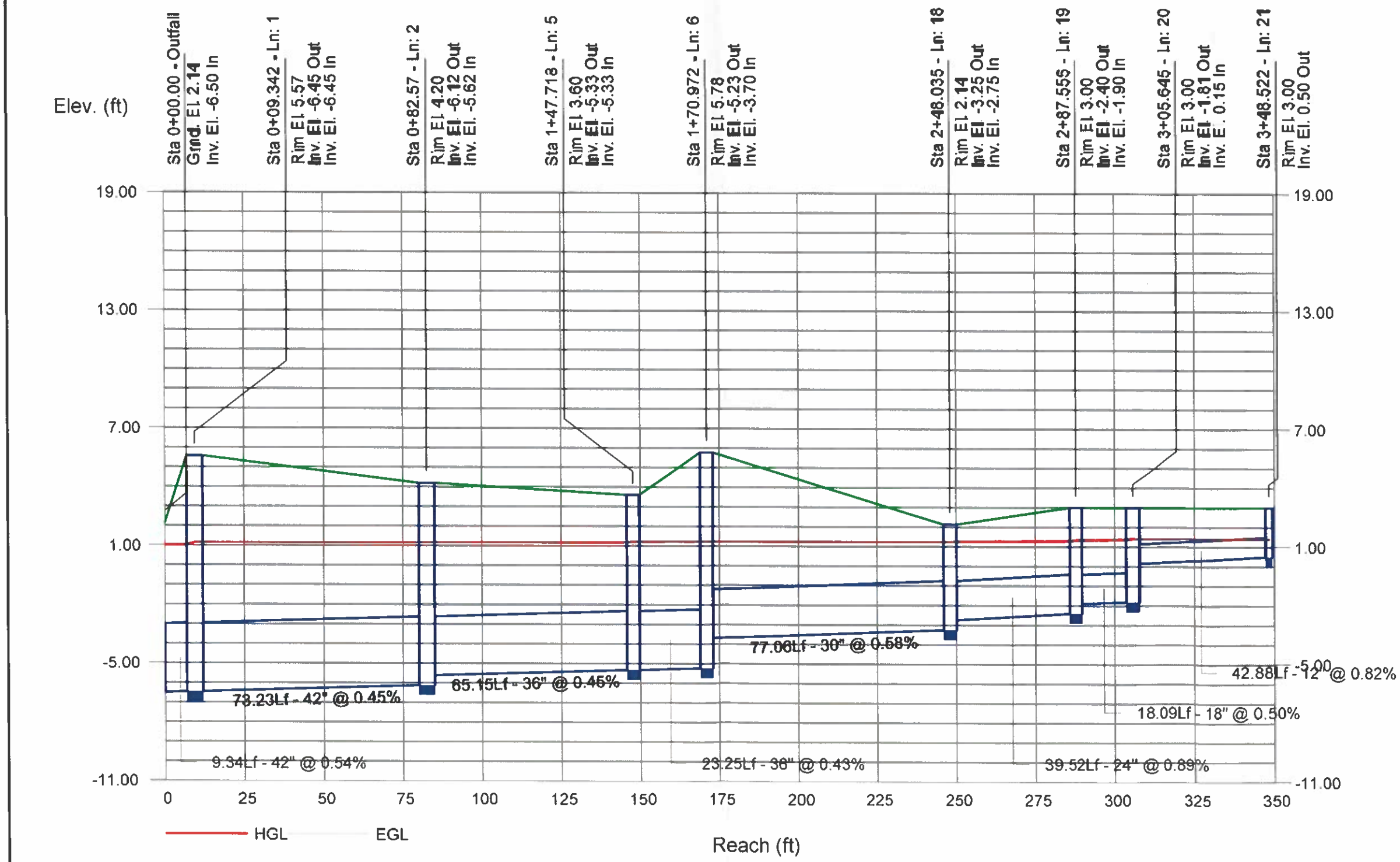
Proj. file: Rev. Storm Conveyance1.stm



Storm Sewer Profile

YARD INLET Y-2 TO PROPOSED PUMP STATION

Proj. file: Rev. Storm Conveyance1.stm



APPENDIX C

OVERALL DRAINAGE INLET MAP

APPENDIX D

DRAINAGE INLET MAP