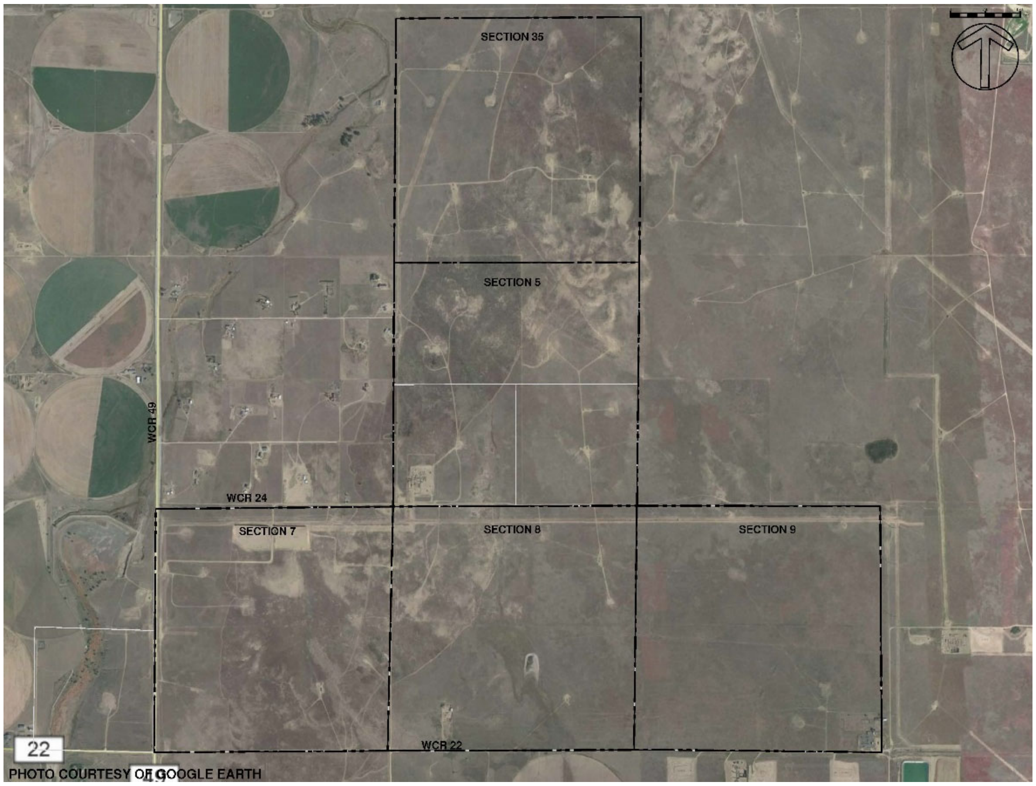
Phase III Drainage Report

for

Pioneer Village

Planning Areas 1-4, 17, and 21

Town of Keenesburg, Weld County, Colorado



SDD Project Number: 1919-001

Drainage Report Prepared for:
Pioneer Community Authority Board
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Initial Submittal: April 9, 2021
Resubmittal:
Resubmittal (If required):
For Signatures:

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Certifications

Engineer Certification

“This report and plan for the Phase III drainage design of Pioneer Village was prepared under my direct supervision in accordance with the provisions of the Town of Keenesburg, the Pioneer Community Authority Board and Weld County. I understand that this jurisdiction does not and will not assume liability for drainage facilities designed by others.”

(AFFIX SEAL)

Signature: ___________________________________

Christopher L Perdue, P.E.
Registered Professional Engineer State of
Colorado No. 50745

Developer/Owner Certification

“_______________ hereby certifies that the drainage facilities for Pioneer Village shall be constructed according to the design presented in this report. I understand that the Town of Keenesburg, the Pioneer Community Authority Board and Weld County does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that each jurisdiction reviews drainage plans pursuant to Colorado Revised Statutes, Title 30, Article 28; but cannot, on behalf of Pioneer Village, guarantee that final drainage design review will absolve __________and/or their successors and/or assigns of future liability for improper design.”

____
Name of Developer/Owner

____
Authorized Representative

Section I – General Location and Description

1.1 Site Location

VICINITY MAP
SCALE: 1" = 5000'

Pioneer Village is a large and complex development located at the northwest corner of County Roads 22 and 49. The project will encompass all of Sections 5, 7, 8, 9 and the southern half of Section 4 within Township 2 North of Range 64 West. Later phases of the Project will also propose development in portions of Section 12 of 2 North, 65 West and Section 32 of 3 North, 64 West. Sections 7, 8 and 9 along with a portion of Section 4 was annexed into the Town of Keenesburg in the fall of 2019. The remaining Sections outlined above will be annexed into the Town in the coming months.

A copy of the Annexation Zoning Map has been provided in the appendices for reference.

As of now, the Project is primarily bounded by residential and agricultural uses. Residential uses are typically large lots in this area with an estimated impervious coverage less than 10% of the overall property.

The primary road network serving the property is Weld County Road 49 to the west and Weld County Road 51 to the southwest. Weld County Road 49 is a major arterial highway and was expanded in recent years to include two north and south lanes and an auxiliary lane. The highway currently aligns with a rural section meaning there is no curb and gutter along this segment. All runoff drains to a roadside ditch where culverts collect the runoff and convey it west towards Box Elder Creek. County Road 51 is a gravel road from the intersection with County Road 18 north to the southeast corner of Pioneer Village. From there a narrower improved surface drive makes up County Road 22 at the moment. The small segment of 22 currently supports local oil and gas activity within the subject property. As part of this Project, over time County Roads 22, 24 and 51 will be improved to their master planned sections within the limits of the Project. The timeline of such improvements hinge upon the overall success of the Project and the transportation needs associated with such success.

The description above is an excerpt from the Phase I Report prepared for the portions of Pioneer Village lying within Sections 7, 8 and 9. This Phase III Report is beig prepared to provide specific detail related to the construction of Planning Areas 1 through 4, 17 and 21. Planning Areas 1 through 4 lie in the northwest corner of Section 7. Planning Areas 17 and 21 lie within the southern portion of Section 8. All of the proposed work will lie within the eastern and middle basins outlined in the Phase I Report.

In addition to the residential planning areas, these plans will also address construction of the Pioneer Village Regional Drainage Way and three large extended detention basins (EDB's).

Due to the overall size of Pioneer Village, our team has drafted this report with a specific focus on Sections 7 through 9. Those sections lie within the first 30-years of master planned permitting and construction. In the case of most master plans of this magnitude, this study will need to be continually revisited to ensure compliance as well as proper long-range planning and revisions as required to address the on-going deviation from the Project's vision as of this draft.

proposed community development project that has been annexed into the Town of Keenesburg. The site is centered around the intersection of Weld County Roads (WCR) 51 and 24, north of WCR 22 and west of WCR 49. This community will lie within Sections 7, 8, 9, and 5 of Township 2 North, Range 64 West and Section 35 of Township 3 North, Range 64 West. The property is located north of the Towns of Hudson and Keenesburg as well as Interstate 76. A Vicinity Map is provided here for reference.

Three primary drainage basins have been identified within the Pioneer Development Area for the first Phase. A natural ridge line runs from the Northwest corner of the NW1/4 of Section 7, East towards the center of Section 7 and North towards WCR 24. The drainage basin located to the west of this ridge line drains West towards Box Elder Creek, a tributary of the South Platte River, while the two basins to the East of this ridge line drain East to a tributary of Box Elder Creek, that runs north to south through Sections 5 and 8 of T3N, R64W. All three basins fall within the larger South Platte River Basin.

1.2 Description of Property

The entire Pioneer Development region spans approximately 3,150 acres zoned for commercial, residential, and industrial development. Currently, this area is comprised of open space and agricultural land with a few well pads and associated gravel access roads. The existing landscape primarily consists of gentle, rolling topography covered in native grasses with surface elevations ranging from approximately 4,800 to 4,950. The only structures currently within the development area are oil and gas infrastructure, some active and some abandoned over the last 10 or so years thereby allowing the current development plan to come to fruition.

VICINITY MAP
NTS

In general, Pioneer slopes gradually from south to north with most of Section 7, 8 and half of 9 bearing in a westerly direction. The east half of Section 9 will flow northeast towards the Section corner. Currently, there is a portion of Section 8 encumbered by the 100-year floodplain. The area dissects Section 8 and is listed as Zone “A” meaning no base flood elevation has been determined at this time. Reference Map Number 08123C1975E with an effective date of January 20th, 2016.

Our research and site investigation have confirmed that no existing irrigation canals or ditches lie within the property.

The geotechnical report available to us during the design process did not allude to any significant geological hazards within the property. A summary of the on-site soils is provided in the table below based on NRCS information made publicly available. Additional soil information is available in the custom soils report in the appendices.

As outlined in the previous section, Planning Area’s 1 through 4 are located in the northwest corner of the project. An existing ridge bisects Planning Areas 1 through 4 with the eastern most planning areas (3&4) draining northeast and the western planning areas (1&2) draining northwest. Due to this natural divide, SSD has proposed two separate stormwater management facilities to address those planning areas.

Planning area’s 17 and 21 naturally drain to the northeast to the existing “un-named” stream listed shown on the above referenced FEMA Firm Panel. The proposed design herein will honor this natural divide with both planning areas sloping gently to the northeast.

In the existing condition, the site is primarily covered in native grasses, with a few, scattered dirt roads providing access to the oil and gas wells on the property (both active and abandoned).

Based on the Custom Soil Resource Report for Pioneer Section 7 included in the Appendices, the portions of Pioneer contained in Section 7 (Planning Areas 1-4 and 17) are primarily composed of the soil types listed below.

Map Unit Symbol	Map Unit Name	% of AOI	Hydrologic Soil Group
44	Olney Loamy Sand, 1 to 3% slopes	0.2	B
49	Osgood Sand, 0 to 3% slopes	14.4	A
70	Valent Sand, 3 to 9% slopes	76.7	A
72	Vona Loamy Sand, 0 to 3% slopes	8.6	A

Based on the Custom Soil Resource Report for Pioneer Section 8 included in the Appendices, the soils in this section are primarily composed of the soil types listed in the table below.

Map Unit Symbol	Map Unit Name	% of AOI	Hydrologic Soil Group
35	Loup-Boel Loamy Sands, 0 to 3% slopes	11.6	A/D
44	Olney Loamy Sand, 1 to 3% slopes	3.4	B
49	Osgood Sand, 0 to 3% slopes	26.0	A
70	Valent Sand, 3 to 9% slopes	53.0	A
72	Vona Loamy Sand, 0 to 3% slopes	5.5	A
85	Water	0.6	---

However, the portion of Section 8 utilized for the construction of Planning Area 21 only contains soil types 44, 49, 70 and 72 as shown on page 9 of the Custom Soil Resource Report for Pioneer Section 8.

The predominant soil type for each of these Sections is Hydrologic Group Type “A”.

There is an existing drainage ditch running South to North on the East side of WCR 49 that contains two culverts. The first culvert allows the ditch to flow under WCR 22, in the Southwest corner of the development area, and a second culver that allows the ditch to flow under WCR 24, in the Northwest corner of the development area.

Our field visits and results of previous a Geotechnical Engineering Study suggest that no major geological features lie within the basin.

The proposed development consists of six residential planning areas, including approximately 1,273 units. The development will include all necessary infrastructure, including wet and dry utilities, parking facilities, connections to existing roadways, storm drainage, and drainage control facilities. Three extended detention basins (EDB) will be located within the development area. One EDB will be located in the northeast corner of Section 7, in the southeast corner of the intersection of WCR 49 and WCR 24. A second will be located north, center of Section 7, just south of WCR 24. The third pond will be located slightly southwest of the center of Section 8, just north of Planning

Area 21 and east of the tributary running through the property. See the exhibit on the following page for delineation of each of these basins, labeled by their associated detention pond.

Section II – Drainage Basins and Sub-Basins

2.1 Major Drainage Basins

There are three major drainage basins identified within the development area for Development Phase 1 of Pioneer.

The first major basin identified is Basin Pond A. This delineation includes 66.46 acres in the NW1/4 and SW1/4 of Section 7 with an impervious land cover condition of 48.87%. This basin will contain all drainage associated with Planning Areas 1 and 2 of this development, a portion of Collector D, a portion of Local road G, and a portion of WCR 24. Pond A's proposed location is in the NW1/4 of the NW1/4 of Section 7, in the southeast corner of the intersection of WCRs 49 and 22.

The second major basin identified is Basin Pond B. The delineation of Pond B includes 51.64 acres in the NE1/4 and SE1/4 of the NW1/4 of Section 7 with an impervious land cover condition of 58%. Basin Pond B will collect drainage from Planning Areas 3 and 4, a portion of Collector A, a portion of Collector D, a portion of WCR 24, and Collector B. Pond B's proposed location is in the NW1/4 of the NE1/4 of Section 7.

The final major basin in Basin Pond C. Basin Pond C contains 144.88 acres that lies within the SE1/4 of Section 7 and the SW ¼ of Section 8. The land cover condition for Basin Pond C is 49% imperviousness. Pond C will collect runoff from Planning Areas 17 and 21, Collector XX, a portion of Collector A, and the portions of WCR 22 included in the initial phase. The proposed location for pond C is in the NE1/4 of the SE1/4 of Section 8

All construction on this site will provide water quality treatment and peak runoff reduction in accordance with Mile High Flood District (MHFD) requirements.

2.2 Minor Drainage Basins

Specifically, this report will focus on the minor drainage basins associated with the proper design of "on-site" and adjacent stormwater management collection, conveyance, and treatment infrastructure. As shown in the attached construction plans, there are four (4) closed conduit systems which will be addressed.

On-Site Conduit Systems:

1. A system consisting of 17 Type "R" Inlets which will collect runoff generated within Planning Areas 1 and 2, as well as all runoff West of the centerline of Local Road G and North of the centerline of Collector A. This conduit system will drain to Pond A, located in the NW1/4 of the NW1/4 corner of Section 7, and will ultimately outfall to an existing Culvert located on the Northeast side of the intersection of WCRs 49 and 24.

2. A system consisting of 18 Type “R’ Inlets and 2 Type “C” drop inlets which will collect runoff from Planning Areas 3 and 4, as well as all runoff East of the centerline of Local Road G and West of Collector B. This conduit system will drain to Pond B, located in the NE 1/4 of Section 7 and will outfall to a ditch draining east toward the tributary of Box Elder Creek.
3. A system consisting of 31 Type “R” Inlets which will collect runoff from all of Planning Area 17, all of the drainage in Planning Area 21 East of Local Road 21-4, and the Northern half of Planning Area 21 that falls West of Local Road 21-4. This system will also collect drainage from Collector XX East of WCR 51, and drainage from the portions of the East side of Collector A that fall South of Collector XX. This system will drain to Pond C, located slightly southwest of the center of Section 8, just north of Planning Area 21 and east of the tributary running through the property.

4. And a system consisting of 16 Type “R” Inlets which will collect runoff from the portions of Planning Area 21 that fall east of Local Road 21-7, the Southern half of Planning Area 21 that falls west of Local Road 21-7, and runoff from WCR 22. This conduit system will also drain to Pond C.

Off-site Systems Tributary to the On-Site Systems

1. While no there are no independent, off-site conduit systems, a portion of the conduit system draining to Pond A is located off-site, to the west of Planning Areas 1 and 2. This portion of the system runs south to north parallel to WCR 49.

A detailed summary of each basin can be found on the following page.

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 1.00	Type “R” Inlet on the Northern half of Collector D, west of Local Road G	1.00	2.77	A	55.0	Typical Single-Family Residential Development	0.40	0.54	2.59	8.10
CI 1.01	Type “R” Inlet on the Northwest side of Local Road 1A	1.01	1.00	A	55.0	Typical Single-Family Residential Development	0.40	0.54	1.16	3.60
CI 1.02	Type “R” Inlet on the Northeast side of Local Road A	1.02	2.90	A	55.0	Typical Single-Family Residential Development	0.40	0.54	3.36	10.50
CI 1.03	Type “R” Inlet on the West side of Local Road 1A at the intersection of Local Roads 1A and 1B	1.03	3.26	A	55.0	Typical Single-Family Residential Development	0.40	0.54	3.12	9.76
CI 1.04	Type “R” Inlet on the South side of Local Road 1B at the intersection of Local Roads 1A and 1B	1.04	4.96	A	55.0	Typical Single-Family Residential Development	0.40	0.54	4.66	14.59
CI 1.05	Type “R” Inlet on the North side of Local Road 1B at the intersection of Local Roads 1A and 1B	1.05	2.29	A	55.00	Typical Single-Family Residential Development	0.40	0.54	2.41	7.53
CI 1.06	Type “R’ Inlet on the South side of Country Road 24 that lies west of Local Road G	1.06	0.83	A	54.00	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.39	0.53	0.99	3.13
CI 1.07	Type “R” Inlet located on Northwest side of Local Road G	1.07	0.31	A	81.4	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.66	0.74	0.79	2.08

Sub Basin	**Basin Description**	**DP**	**Area (acres)**	**HSG**	**IMP %**	**Land Cover**	**C_5**	**C_{100}**	**Q_5**	**Q_{100}**
CI 1.08	Type “R” Inlet located on Northeast side of Local Road G	1.08	0.74	A	80.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.65	0.73	1.60	4.23
Pond A Direct	Direct runoff contributing to Pond A		9.68	A	2.0	Open Space	0.01	0.13	0.10	5.17
CI 2.00	Type “R” Inlet on the Southern half of Collector D, west of Local Road G	2.00	6.40	A	55.0	Typical Single-Family Residential Development	0.40	0.54	4.83	15.12
CI 2.01	Type “R” Inlet on the Northwest corner of Local Road 2A	2.01	3.85	A	55.0	Typical Single-Family Residential Development	0.40	0.54	3.82	11.96
CI 2.02	Type “R” Inlet on the Northeast corner of Local Road 2A	2.02	2.90	A	55.0	Typical Single-Family Residential Development	0.40	0.54	2.98	9.32
CI 2.03	Type “R” Inlet on the Western side of the Northern half of Local Road G	2.03	5.26	A	55.0	Typical Single-Family Residential Development	0.40	0.54	4.36	13.63
CI 2.04	Type “R’ Inlet on the Southwest corner of the Intersection of Local Road G and Local Road 2B	2.04	2.52	A	55.0	Typical Single-Family Residential Development	0.40	0.54	2.91	9.09
CI 2.05	Type “R’ Inlet on the Southwest corner of the Intersection of Local Road G and Local Road 2C	2.05	5.66	A	55.0	Typical Single-Family Residential Development	0.40	0.54	5.37	16.79
CI 2.06	Type “R’ Inlet on the Southeast corner of the Intersection of Local Road G and Local Road 2C	2.06	6.37	A	55.0	Typical Single-Family Residential Development	0.40	0.54	5.50	17.23

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 2.07	Type “R” Inlet on the Northwest corner of Local Road 2B	2.07	1.57	A	55.0	Typical Single-Family Residential Development	0.40	0.54	1.80	5.64
CI 3.00	Type “R” Inlet on the Northern half of Collector D, east of Local Road G		1.29	A	85.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84	3.38	7.96
CI 3.01	Type “R” Inlet on the Southern half of Collector D, east of Local Road G		3.94	A	55.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.51	0.60	5.91	13.94
CI 3.02	Type “R” Inlet on the Eastern half of the most Eastern side of Local 3A, north of Tract A		2.40	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.74	8.78
CI 3.03	Type “R” Inlet on the Western half of the most Eastern side of Local Road 3A, north of the intersection with Local Road 3B		1.71	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.87	6.77
CI 3.04	Type “R” Inlet on the Eastern half of the most Eastern side of Local 3A, south of Tract A		3.45	A	55.0	Typical Single-Family Residential Development	0.51	0.60	5.17	12.00
CI 3.05	Type “R” Inlet on the Northern half of the East side of Local Road 3B		1.38	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.40	5.63

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 3.06	Type “R” Inlet on the Southern half of the East side of Local Road 3B		1.64	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.24	7.47
CI 3.07	Type “R” Inlet on the Western half of the most Eastern side of Local Road 3A, south of the intersection with Local Road 3B		1.71	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.77	6.56
CI 3.08	Type “R” Inlet on the Northwest corner of the intersection of Collector B and Local Road E		0.38	A	85.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84	1.22	2.89
CI 3.08A	Type “R” Inlet on the Northeast corner of the intersection of Collector B and Local Road E		0.28	A	85.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84	0.90	2.13
CI 3.09	Type “R” Inlet on the Northern half of the East side of Local Road E		2.28	A	55.0	Typical Single-Family Residential Development	0.51	0.60	4.24	9.70
CI 4.00	Type “R” Inlet on the Southern half of the East side of Local Road E		4.63	A	55.0	Typical Single-Family Residential Development	0.51	0.60	6.66	15.27
CI 4.01	Type “R” Inlet on the West side of Collector B in the Southwest corner of the intersection of Collector B and Local Road E		2.48	A	55.0	Typical Single-Family Residential Development	0.51	0.60	4.16	9.66

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 4.01A	Type “R” Inlet on the East side of Collector B in the Southeast corner of the intersection of Collector B and Local Road E		1.30	A	85.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84	3.51	8.24
DI 4.02	Type “C” Inlet on the North side of Local Road 4B in the Northeast corner of Planning Area 4		4.35	A	55.0	Typical Single-Family Residential Development	0.51	0.60	10.17	23.47
DI 4.03	Type “C” Inlet on the South side of Local Road 4B in the Northeast corner of Planning Area 4		1.50	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.51	8.09
CI 4.04	Type “R” Inlet on the West side of Local Road 4A in the Southwest corner of the intersection of Local Road 4A and Local Road E		3.17	A	55.0	Typical Single-Family Residential Development	0.51	0.60	7.41	17.10
CI 4.05	Type “R” Inlet on the South side of Local Road 4B, east of the intersection with Local Road 4A and directly North of Tract D		2.06	A	55.0	Typical Single-Family Residential Development	0.51	0.60	4.82	11.11
CI 4.06	Type “R” Inlet on the South side of Local Road 4B, east of the intersection with Local Road 4A and directly North Planning Area 4, Block 5, Lot 1		0.90	A	55.0	Typical Single-Family Residential Development	0.51	0.60	1.51	3.51

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 4.07	Type "R" Inlet on the West side of Local Road 4A, in the Southwest corner of the intersection of Local Road 4A and Local Road 4B		2.36	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.68	8.49
Future Flow WCR 24	Future flow attributed to the continued development of Weld Country Road 24		4.39	A	85.00	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84		
Pond B Direct	Direct runoff contributing to Pond B		0.49	A	17.00	Combination of Open Space and Sidewalk	0.16	0.29		
CI 17A.01	Type "R" Inlet on the North half of Collector XX, on the Northwest corner of the intersection of Collector XX and Country Road 51		2.44	A	85.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84	8.04	18.55
CI 17A.02	Type "R" Inlet on the South half of Collector XX, on the Southwest corner of the intersection of Collector XX and Country Road 51		7.85	A	51.0	Combination of Asphalt Roadway, Sidewalk, some Open Space, and Tree Lawn	0.47	0.56	9.30	21.26
CI 17A.03	Type "R" Inlet on the South half of Collector XX, just East of the intersection of Collector XX and Local Road 17-6		1.27	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.44	5.71

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 17A.04	Type “R” Inlet on the South half of Collector XX, just West of the intersection of Collector XX and Local Road 17-6		4.06	A	85.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.79	0.84	8.92	20.58
CI 17A.05	Type “R” Inlet centered on the South half of Local 17 Loop Road at the intersection of Local 17 Loop Road and Local Road 17-6		4.64	A	55.0	Typical Single-Family Residential Development	0.51	0.60	8.35	19.75
CI 17A.06	Type “R” Inlet on the East side of Local Road 17-1, on the Southeast corner of the intersection of Local Road 17-1 and Collector XX		5.66	A	55.0	Typical Single-Family Residential Development	0.51	0.60	10.52	24.09
CI 17A.07	Type “R” Inlet on the North side of Local 17 Loop Road, directly West of the Intersection of Local 17 Loop Road and Local Road 17-1		6.38	A	35.0	Single-Family Residential and Open Space	0.33	0.44	6.46	15.16
CI 17A.08	Type “R” Inlet on the West side of Local Road 17-1, on the Southwest corner of the intersection of Local Road 17-1 and Local 17 Loop Road		1.33	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.39	5.58
CI 17A.09	Type “R” Inlet on the East side of Local Road 17-1, on the Southeast corner of the intersection of Local Road 17-1 and Local 17 Loop Road		1.58	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.13	7.39
CI 17A.10	Type “R” Inlet on the East side of Local Road 17-3, on the Southeast corner of the intersection of Local Road 17-3 and Local 17 Loop Road		4.33	A	55.0	Typical Single-Family Residential Development	0.51	0.60	7.01	16.35

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 17A.11	Type “R” Inlet on the West side of Local Road 17-3, on the Southwest corner of the intersection of Local Road 17-3 and Local 17 Loop Road		3.38	A	46.0	Single-Family Residential and Open Space	0.43	0.52	5.67	13.12
CI 17A.12	Type “R” Inlet on the West side of Local Road 17-5, on the Southwest corner of the intersection of Local Road 17-5 and Local 17 Loop Road		4.05	A	55.0	Typical Single-Family Residential Development	0.51	0.60	7.28	17.24
CI 17A.13	Type “R” Inlet on the South half of Local 17 Loop Road, to the east of the intersection of Local 17 Loop Road and Local Road 17-5		2.34	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.79	8.98
CI 17A.14	Type “R” Inlet on the East side of Local Road 17-6, on the Southeast corner of the intersection of Local Road 17-6 and Collector XX		6.34	A	39.0	Single-Family Residential and Open Space	0.36	0.47	5.66	13.10
Pond C Direct	Direct runoff contributing to Pond B		3.74	A	7.00	Combination of Open Space with some Asphalt and Sidewalk	0.06	0.21		
CI 21A.01 (NW)	Type “R” Inlet on the North half of Collector XX, on the Northwest corner of the intersection of Collector XX and the Gravel Access Road located West of Pond C		2.07	A	85.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84	4.72	11.19
CI 21A.01 (NE)	Type “R” Inlet on the North half of Collector XX, on the Northeast corner of the intersection of Collector XX and the Gravel Access Road located West of Pond C		1.68	A	85.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.79	0.84	4.12	9.51

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 21A.01 (S)	Type "R" Inlet on the South half of Collector XX, on the southwest corner of the intersection of Collector XX and the Gravel Access Road located West of Pond C		5.65	A	51.0	Combination of Asphalt Roadway, Sidewalk, and Tree Lawn	0.47	0.56	8.29	19.14
CI 21A.02	Type "R" Inlet on the South half of Collector XX, on the southwest corner of the intersection of Collector XX and Local Road 21-4		9.63	A	42.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.39	0.50	9.59	23.02
CI 21A.02A	Type "R" Inlet on the East side of Local Road 21-4, on the southeast corner of the intersection of Collector XX and Local Road 21-4		0.25	A	100.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.93	0.96	0.94	2.17
CI 21A.03	Type "R" Inlet on the North half of Local 21 Loop Road, on the Northwest corner of the intersection of Local 21 Loop Road and Local 21-4		2.79	A	55.0	Typical Single-Family Residential Development	0.51	0.60	4.18	9.53
CI 21A.04	Type "R" Inlet on the South half of Local 21 Loop Road, on the Southwest corner of the intersection of Local 21 Loop Road and Local 21-4		2.55	A	55.0	Typical Single-Family Residential Development	0.51	0.60	4.28	9.78
CI 21A.05	Type "R" Inlet on the South half of Local 21 Loop Road, on the Southeast corner of the intersection of Local 21 Loop Road and Local 21-4		3.49	A	55.0	Typical Single-Family Residential Development	0.51	0.60	6.07	14.02

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 21A.06	Type “R” Inlet on the North half of Local 21 Loop Road, on the Northeast corner of the intersection of Local 21 Loop Road and Local 21-4		1.19	A	55.0	Typical Single-Family Residential Development	0.51	0.60	1.93	4.57
CI 21A.07	Type “R” Inlet on the Northeast side of Local Road 21-3, on the Southeast corner of the intersection of Local Road 21-3 and Local 21 Loop Road		1.97	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.31	7.68
CI 21A.08	Type “R” Inlet on the Northwest side of Local Road 21-3, on the Southwest corner of the intersection of Local Road 21-3 and Local 21 Loop Road		2.33	A	55.0	Typical Single-Family Residential Development	0.51	0.60	4.05	9.36
CI 21A.09	Type “R” Inlet on the Northeast side of Local Road 21-2, on the Southeast corner of the intersection of Local Road 21-2 and Local 21 Loop Road		1.95	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.04	7.25
CI 21A.10	Type “R” Inlet on the Northwest side of Local Road 21-2, on the Southwest corner of the intersection of Local Road 21-2 and Local 21 Loop Road		6.10	A	38.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.36	0.46	6.23	14.45
CI 21A.11	Type “R” Inlet on the Northeast side of Local Road 21-1, on the Southeast corner of the intersection of Local Road 21-1 and Local 21 Loop Road		1.92	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.11	7.37

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 21A.12	Type “R” Inlet on the Northwest side of Local Road 21-1, on the Southwest corner of the intersection of Local Road 21-1 and Local 21 Loop Road		4.27	A	55.0	Typical Single-Family Residential Development	0.51	0.60	6.40	14.59
CI 21A.13	Type “R” Inlet on the Northeast side of Local Road 21-5, on the Southeast corner of the intersection of Local Road 21-5 and Local 21 Loop Road		2.17	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.77	8.72
CI 21A.14	Type “R” Inlet on the Northeast side of Local Road 21-6, on the Southeast corner of the intersection of Local Road 21-6 and Local 21 Loop Road		1.46	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.45	5.78
CI 21B.01	Type “R” Inlet on the North half of Tract N, just east of center		3.12	A	55.0	Typical Single-Family Residential Development	0.51	0.60	5.61	5.61
CI 21B.02	Type “R” Inlet on the South half of Tract N, just east of center		4.75	A	23.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.21	0.34	2.89	2.89
CI 21B.03	Type “R” Inlet on the East side of Local 21 Loop Road, on the Southeast corner of the intersection of Local Road 21-9, and Tract N		2.84	A	42.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.39	0.50	3.52	3.52

Sub Basin	**Basin Description**	**DP**	**Area (acres)**	**HSG**	**IMP %**	**Land Cover**	**C_5**	**C_{100}**	**Q_5**	**Q_{100}**
CI 21B.04	Type “R” Inlet on the West side of Local 21 Loop Road, on the Southwest corner of the intersection of Local 21 Loop Road, Local Road 21-9, and Tract N		2.14	A	55.0	Typical Single-Family Residential Development	0.51	0.60	3.59	12.91
CI 21B.05	Type “R” Inlet on the Southwest side of Local Road 21-8, just North of the intersection of Local 21 Loop Road and Local Road 21-8		0.95	A	55.0	Typical Single-Family Residential Development	0.51	0.60	1.71	6.91
CI 21B.06	Type “R” Inlet on the Southeast side of Local Road 21-8, just North of the intersection of Local 21 Loop Road and Local Road 21-8		0.24	A	55.0	Typical Single-Family Residential Development	0.51	0.60	0.56	8.30
CI 21B.07	Type “R” Inlet on the South side of Local 21 Loop Road, Southwest of the intersection of Local 21 Loop Road and Local Road 21-8		1.03	A	43.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.40	0.50	1.45	8.47
CI 21B.08	Type “R” Inlet on the North side of Local 21 Loop Road, Northwest of the intersection of Local 21 Loop Road and Local Road 21-8		1.63	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.64	6.06
CI 21B.09	Type “R” Inlet on the West side of Local Road 21-7, on the Southwest corner of the intersection of Local Road 2107 and Local 21 Loop Road		5.50	A	34.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.32	0.43	4.27	9.97

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 21B.10	Type “R” Inlet on the West side of Local Road 21-7, on the Northwest corner of the intersection of Local Road 2107 and Local 21 Loop Road		1.61	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.70	6.18
CI 21B.11	Type “R” Inlet on the Southeast side of Local Road 21-6, on the Northeast corner of the intersection of Local Road 21-6 and Local 21 Loop Road		0.98	A	55.0	Typical Single-Family Residential Development	0.51	0.60	1.70	3.94
CI 21B.12	Type “R” Inlet on the Southwest side of Local Road 21-6, on the Northwest corner of the intersection of Local Road 21-6 and Local 21 Loop Road		1.08	A	55.0	Typical Single-Family Residential Development	0.51	0.60	1.88	4.34
CI 21B.13	Type “R” Inlet on the Southeast side of Local Road 21-5, on the Northeast corner of the intersection of Local Road 21-5 and Local 21 Loop Road		0.78	A	55.0	Typical Single-Family Residential Development	0.51	0.60	1.36	3.23
CI 21B.14	Type “R” Inlet on the Southwest side of Local Road 21-5, on the Northwest corner of the intersection of Local Road 21-5 and Local 21 Loop Road		0.98	A	55.0	Typical Single-Family Residential Development	0.51	0.60	1.70	4.05
CI 21B.15	Type “R” Inlet on the Northwest side of Local Road 21-8, on the Southwest corner of the intersection of Local Road 21-8 and Local 21 Loop Road		1.46	A	55.0	Typical Single-Family Residential Development	0.51	0.60	2.63	6.04

Sub Basin	Basin Description	DP	Area (acres)	HSG	IMP %	Land Cover	C_5	C_{100}	Q_5	Q_{100}
CI 21B.16	Type “R” Inlet on the South half of Local 21 Loop Road, Southeast of the intersection of Local Road 21-5 and Local 21 Loop Road		4.93	A	29.0	Combination of Asphalt Roadway, Sidewalk, Single-Family Residential, and Tree Lawn	0.27	0.39	5.40	12.54

Section III – Drainage Design Criteria

3.1 Regulations

All storm drainage infrastructure proposed for construction in connection with this Project have been designed using the following criteria as required by local jurisdictions.

- Weld County Engineering and Construction Guidelines
- Urban Drainage and Flood Control District's Technical Criteria Manual
  - Volumes One, Two and Three
- Urban Drainage Technical Bulletin T-5
- Urban Drainage Technical Bulletin T-12

3.2 Drainage Studies, Outfall Systems Plans, Site Constraints

To our knowledge, no prior drainage studies have been conducted in this area prior to this project. In addition to this Phase III Drainage Report, a Phase I report, including a Master Drainage study has also been completed for this development.

As mentioned in Section 2.1, due to the limited existing infrastructure in the project area, the principal constraint for this system is the existing topography and tributary running North/South across the center of the property. Drainage from Planning Areas One and Two of the development naturally drain Westward, while the remaining Planning Areas naturally drain eastward towards a tributary of Box Elder Creek.

Planning Areas 17 and 21 will drain Northeast to an Extended Detention Basin (EDB) that will slowly release flow into the tributary of Box Elder Creek. Drainage from Planning Areas 1 and 2 will flow to an EDB located in the NW1/4 of Section 7; this EDB shall outfall to an existing culvert located underneath WCR 24, on the eastern side of the intersection of WCRs 49 and 24. Drainage from Planning Areas 3 and 4 will flow to an EDB located in the NE1/4 of Section 7, just south of WCR 22. This EDB shall outfall to a ditch that spans west/east along the southern border of WCR 24 until ultimately out falling into the tributary.

3.3 Hydrology

Hydrology for the Project was determined using two methodologies.

All storm sewer collection and conveyance infrastructure were sized based upon the minor and major storm event. The Weld County Engineering and Construction Guidelines define the "major" storm event as a 100-year storm event. The "minor" storm definition for this report shall be a 5-year storm event. The Rational Method was used for determining peak discharge rates required to size on-site collection system infrastructure. Runoff Coefficients were determined for each on-site basin per values provided in UDFCD's Table 6-3 and 6-4. To calculate peak flows, UDFCD's "UD-Rational Spreadsheet" was used. The rainfall depths utilized are provided below:

	5-year, 1-hour	100-year, 1-hour
Depth (P1) Inches	1.14	2.66

These values were obtained from the National Oceanic and Atmospheric Administrations (NOAA) Rainfall data base.

The stormwater management facility was designed in accordance with volume and release rate criteria outlined by MHFD.

3.4 Hydraulics

All on-site storm sewers are proposed to be constructed using a combination of Corrugated High-Density Polyethylene (HDPE) pipe, Pre-cast Box Culverts, or Class III Reinforced Concrete Pipe (RCP) and are sized to convey runoff generated during the 100-year event. On-site curb inlets have been sized using UDFCD's UD-Inlet Software. A modeling software called Stormwater Studio was utilized to evaluate the capacity and velocity of the conveyance network and determine the hydraulic grade lines during the minor and major event.

Given the overall size of the site and the proposed land cover conditions, the primary design constraint used to size the collection system was pipe capacity. The systems were evaluated to ensure that all proposed pipes and box culverts remained a size that could be prefabricated, and that the Hydraulic Grade Line (HGL) for the major-storm event was not above the ground surface. The primary design goal was to maintain HGL elevations at a minimum of 9-inchs below the top of structure, this was achieved at the vast majority of structures in the proposed network[1]. Note that Chapter 7 of the MHFD Manual does not establish the minimum distance from the top of structure to HGL. Our team utilizes 9-inches since it is a median between the two widely accepted industry standards of one (1) foot and the other being the HGL contained within the structure.

It should also be pointed out that our team made some minor assumptions that attribute to a conservative design which are provided below:

- Due to the size of the basin(s), the intensity reduction based upon the time of concentration was not reduced beyond that of the actual basin. Therefore, basin flows on the perimeter of the development will be higher in our analysis than actual flows if the time of concentration were further reduced as flows from the upstream basin traverse downstream basins to the overall outfall. *Our analysis suggests that no major inefficiencies are created by doing this since the minimum pipe size of 15-inches is oversized as is.*
- In order to design the Storm Drain Network and the Detention Pond, both the rational method and CUHP are required. Mixing the two methodologies often generates unfavorable results so SSD's typical procedure is to size the closed conduits, inlets, culverts, etc. using the rational method and then all pond infrastructure is designed using CUHP working within the UD-Detention Spreadsheet. As our design is presented later this this report, we will highlight the methodologies uses to size each element.

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[1] Our team utilized 9 inches as a reference based on the Type R inlet dimension from the top of structure to invert of throat opening being 9 inches.

3.5 Water Quality Enhancement

Permanent water quality enhancement has been provided in accordance with the UDFCD's Drainage Criteria. Based on the existing topography of the site and the required 100-year detention volume, the post-construction Best Management Practice selected for this site is an EDB. The pond has been sized to provide the required Water Quality Capture Volume (WQCV) and release it over a period of 40-hours per the guidelines in Volume 3 of the Urban Drainage's Manual and Technical Bulletin T-5. A detailed description of the proposed EDB is provided in Section IV on the following pages.

Section IV – Stormwater Management Facility Design

4.1 Stormwater Conveyance Facilities

The design concept used for this site was simple: grade the site to the extent possible to honor the natural drainage divides. As outlined previously, the site has a natural ridgeline (highpoint) that runs north/south through the middle of Section 7. Everything to the west of this ridgeline drains westward towards Weld Country Road 49, while everything located to the east of this ridgeline drains east towards a tributary of Box Elder Creek that runs north/south through the Center of Section 8. To honor these existing drainage paths to the greatest extent possible, this design proposes the construction of three separate EBDs: Pond A, Pond B, and Pond C. Pond A's proposed location is in the northeast corner of Section 7, in the southeast corner of the intersection of WCR 49 and WCR 24. Pond B's proposed location is in the north, center of Section 7, just south of WCR 24. Pond C's Proposed location is slightly southwest of the center of Section 8, just north of Planning Area 21 and east of the tributary running through the property.

Street capacities were also evaluated based upon Weld County's design criteria for major and minor storm events:

1. Major Storm: Drainage system must be able to convey the fully developed flow from a 1-hour, 100-year event without significant damage to the system
2. Minor Storm: Road overtopping not to exceed 6-inches in the 10-year event and 18 inches in the 100 year event

All on-site inlets were proposed and analyzed in accordance with Chapter 7 of the MHFD's manual. The key criteria utilized were spread width and ponding depth.

Results of the street capacity analysis is provided in the UD-Inlet Spreadsheets in the appendices. Our assumptions for allowable spread for each road classification are provided below for the minor and major storms.

Street Classification	Event	Spread	Allowable Depth	Reasoning
Local Residential	Minor Major	17’ 27’	6.4”[2] 6.4”	Flow may pond to the street crown Flow may pond to the right of way
Residential Collector	Minor Major	17’ 33.5’	8.4”[3] 8.4”	One, 12’ drive isle remains Flow may pond to the right of way, with one 12’ drive isle remaining
Minor Arterial	Minor Major	22’ 35.5’	8.88”[4] 8.88”	Two, 12’ drive isles remain Flow may pond to right of way, with two 12’ drive isles remaining

All Type “C” and Type “R” Inlets were analyzed for capture capacity using UDFCD’s UD-Inlet Software and CDOT derived nomographs. Curb inlet calculations and drop inlet computations are provided in the appendices for reference.

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[2] Based on the street section for a local residential, the maximum depth when ponding to the right of way is 0.53’ or 6.4-inches. This is derived using a 4-inch curb height and a tree lawn width of 10-feet at 2.0%. During the minor storm event, the street capacity was analyzed by restricting the depth of flow to the crown elevation(s). During the major event, the crown was allowed to overtop and reach the full 6.4” depth.

[3] Based on the street section for a local collector, the maximum depth when ponding to the right of way is 0.7’ or 8.4-inches. This is derived using a 6-inch curb height and a tree lawn width of 10-feet at 2.0%. During the minor storm event, the street capacity was analyzed by restricting the depth of flow to the crown elevation(s). During the major event, the crown was allowed to overtop and reach the full 8.4” depth.

[4] Based on the street section for a minor arterial, the maximum depth when ponding to the right of way is 0.74’ or 8.88-inches. This is derived using a 6-inch curb height and a tree lawn width of 12-feet at 2.0%. During the minor storm event, the street capacity was analyzed by restricting the depth of flow to the crown elevation(s). During the major event, the crown was allowed to overtop and reach the full 8.88” depth.

Each of these system components proposed were designed to adequately convey a 100-year storm event while containing HGL elevations 9” below surface level. The design proposed for this site is consistent with local requirements having well documented maintenance protocols and therefore no concern is warranted with respect to atypical operation and maintenance procedures.

4.2 Stormwater Storage Facilities

There are three EBD stormwater management facilities proposed for construction as part of this project, identified as Pond A, Pond B, and Pond C. Pond A’s proposed location is in the NW1/4 of Section 7, in the southeast corner of the intersection of WCR 49 and WCR 24. Pond B’s proposed location is in the NE 1/4 Section 7, just south of WCR 24. Pond C’s Proposed location is slightly southwest of the center of Section 8, just north of Planning Area 21 and east of the tributary running through the property. UDFCD’s UD-Detention Spreadsheet was utilized to size the detention facilities, outlet structures, and emergency overflow. The table below depicts the proposed stage for each event and the associated inflow/outflow, based on the final routing for each Pond and associated conduit system(s).

Pond	Condition	Drainage Area (ac)	% IMP	5-Year Peak (cfs)	100-Year Peak (cfs)
A	**Inflow**	66.46	47.9	16.5	81.9
	Outflow			0.6	24.2
B	**Inflow**	51.6	58.0	25.1	96.5
	Outflow			0.7	31.2
C	**Inflow**	144.6	49.0	48.9	203.4
	Outflow			1.7	50.1

	Event	Type	Stage (ft)	Corresponding Elevation
Pond A	**Top of Micropool**	n/a	0.00	4878.23’
	WQCV	Top of Volume	2.82	4881.05’
	EURV	Top of Volume	4.71	4882.94’
	100-Year	Top of Volume	6.36	4884.59’

Pond B	**Top of Micropool**	n/a	0.00	4872.12’
	WQCV	Top of Volume	2.71	4874.83’
	EURV	Top of Volume	4.71	4876.83’
	100-Year	Top of Volume	6.36	4878.48’
Pond C	**Top of Micropool**	n/a	0.00	4862.21’
	WQCV	Top of Volume	3.02	4865.23’
	EURV	Top of Volume	5.49	4867.70’
	100-Year	Top of Volume	7.65	4869.86’

Based on the information above, the proposed facilities are adequately sized to capture, detain and release the required storm events.

The required Initial Surcharge Volume (ISV) has been provided in the outlet structure and trickle channel. Given the Water Quality Capture volume, no additional infrastructure is required to keep the ISV over a hardened surface as recommended by UDFCD.

Pond	WQCV (CF)	ISV (0.3% of WQCV)	Volume Provided (CF)
A	48,395 CF	145.2 CF	213
B	43,037 CF	129.1 CF	219
C	107,026 CF	321.1 CF	344

The UD-Detention Spreadsheet was also utilized to size the emergency spillway for each EDB. Those details can be found in the spreadsheets in the appendices as well as Plan Sheets C7.00 to C7.05 of the Construction Drawings attached hereto.

All outfall pipe sizes were also pulled from the UD-Detention spreadsheet. SSD did confirm the pipe size and slope proposed in the CD’s were adequate to convey the flow; however, most normal capacity calculations do not account for the outlet being surcharged by the pond.

An energy dissipation structure will be installed where each conduit system enters the corresponding pond. The dissipation structures will each have a headwall or “seal” immediately upstream of the trickle channel with a notch sized to release 2% of the peak un-detained 100-year event. The required notches sizes and subsequent release rates are provided in the table below:

Impact Stilling Basin (ISB) #	Pond	100-year UD Flow (CFS)	ISB Release Rate (2% of UD Flow)	Notch Depth (D) x Width (W) Required[3]
1	A	81.9	1.64 CFS	30” (D) x 4-1/4” (W)
2	B	96.5	1.93 CFS	30” (D) x 4-5/8” (W)
3	C	150.5[6]	3.01 CFS	30” (D) x 6-1/8” (W)
4	C	52.9[6]	1.1 CFS	30” (D) x 3-5/16” (W)

Each energy dissipation structure will have the minimum forebay volume integrated into the structure. Per UDFCD Table EDB-4, the minimum forebay volume shall be 3% of the WQCV for drainage areas with greater than 20 impervious acres.

Pond	WQCV (CF)	Required Forebay Volume (CF) (3% of WQCV)	Volume Provided (CF)[4]
A	48,395	1,452	1,595
B	43,037	1,291	1,557
C	107,026	3,211	4,035

A low flow or “trickle” channel is provided from the inflow point to the outlet structure for each of the three ponds. The trickle channels were all designed to have adequate capacity to convey 1% of the 100-year un-detained event.

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[3] Depth was set based upon providing required forebay volume

[6] The Forebays for Pond C were sized based off the acreage draining to each structure. ISB 3 was sized based off 74% of the peak inflow rate contributing to Pond C, while ISB 4 was sized based off 26% of the peak inflow rate contributing to Pond C.

Trickle from ISB #	100-year UD Flow (CFS)	Required Trickle Capacity (2% of UD Flow)	Dimension of Channel	Capacity Provided (CFS)
1	81.9	1.64 CFS	2’ wide x 6” deep	3.88
2	96.5	1.93 CFS	2’ wide x 6” deep	3.01
3	150.5[6]	3.01 CFS	3’ wide x 6” deep	4.88
4	52.9[6]	1.06 CFS	3’ wide x 6” deep	4.88

Please note that like the outlet structure piping and emergency overflow, the notch and the trickle channel were evaluated based on the CUHP Calculations performed within the UD-Detention Spreadsheet. In our opinion, this alternative mitigates mixing methodologies *(i.e. CUHP vs Rationale)* and yields the best results.

Maintenance access has been provided to the invert of each pond via an 20-foot wide drive.

4.3 Water Quality Enhancement Best Management Practices

The proposed EBDs were designed in accordance with MHFD requirements with respect to water quality treatment. A Water Quality Control Plate will be provided within the outlet structure for each pond that will slowly release flow as described below:

Pond	Water Quality Capture Volume (acre-ft)	Time for Release (hrs)
A	1.111	40
B	0.988	40
C	2.457	40

The facilities have also been designed to ensure that the proposed release rates are equal to or less than 90% of the pre-development peak flow rate as determined by UD-Detention.

The previous section outlined the implementation of a sediment forebay at each concentrated pond inflow point which will release 2% of the 100-year un-detained event.

A separate operation and maintenance plan will be prepared for the facility per MHFD standards are part of the facility as-built process. As such, detailed operation and maintenance information will be provided therein. For purposes of this report, the facility's operation and maintenance plan will be consistent with other facilities of this nature. Maintenance information is available from the Mile High Flood Control District should the facility specific operation and maintenance manual be misplaced.

4.4 Floodplain Modification

As mentioned previously, a portion of Section 8 is inundated by the 100-year floodplain which is being amended via construction drawings contained in this package. That design was completed as part of the Pioneer Village Phase I Drainage Study which is attached hereto as a supplement.

4.5 Additional Permitting Requirements

Based on background information available and existing site features, no additional permits aside from the local jurisdiction's required applications typical for this type of project.

4.6 General

At the back of this report, maps and supporting calculations have been provided which support the design concepts and conclusions outlined in this report. A summary of the Appendices is provided on the following page:

Appendix	Title	Included Material
Appendix A	Hydrology	• UDFCD Table 6-3 and 6-4 • Impervious Percentage Calcs • UDFCD's UD Rationale
Appendix B	Hydraulics	• Stormwater Studio Outputs • Inlet Carry Over Calculations • Inlet Spreadsheets
Appendix C	EDB Pond Details	• UDFCD UD-Detention Workbook • Trickle Channel Section • Forebay Notch Sizing
Appendix D	Reference Material	• FIRM Map Index – Weld County Un-incorporated
Appendix E	Drainage Maps	• Post Development Drainage Map
Appendix F	Soils Information	• Web Soil Survey Report

Section V – Conclusions

5.1 Compliance with Standards

As demonstrated throughout this report and concluded in Paragraph 5.3 below, the Stormwater Management Plan proposed for the subject property is considered adequate based upon the analysis completed. Our drainage design was particularly focused on the storm drain collection and conveyance system and compliance with water quality and runoff reduction requirements outlined in the Weld County Standards and Specifications as well as Volumes One through Three of UDFCD's Stormwater Criteria.

5.2 Variances

Based on the current design, no variances to the criteria outlined by Weld County or MHFD have been made.

5.3 Drainage Concept

As shown the in previous sections and the appendices herein, the overall effectiveness of the post construction stormwater management plan outlined herein is considered adequate for the proposed development.

Based on the land cover conditions within the basin, the storm drain collection and conveyance systems are adequate to capture runoff during the minor and major event without generating excessive ponding within the Right of Way. The hydraulic grade line calculations demonstrate that all pipes will operate under normal flow conditions during the minor event. While many pipes will surcharge during a 100-year storm event, the HGLs for each pipe were designed to remain 9" below surface level. The only exception to this is CI 2.00, in which the HGL exceed 9" below surface level but remains below surface level.

As shown in the UD-Inlet Spreadsheet, the proposed roadways and allowable spreading parameters provide adequate street capacity to mitigate hydroplaning issues and provide the necessary travel lanes during the major event.

The stormwater management facility is also adequately sized to provide water quality treatment for both proposed and anticipated future impervious surfaces tributary to the EDBs. The facilities will reduce runoff volumes below pre-developed levels to mitigate any potential impacts of this development on downstream neighbors and existing drainage infrastructure.

Section VI – References

1. Weld County Standards and Specifications, July 2017
2. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Volume 1 revised March 2017, Volume 2 revised September 2017, Volume 3 Revised November 2010
3. Urban Drainage Technical Memo T-5, Extended Detention Basins
4. Urban Drainage Technical Memo T-12, Outlet Structure

Appendix A

Hydrology

Table 6-3. Recommended percentage imperviousness values

Land Use or Surface Characteristics	Percentage Imperviousness (%)
Business:	
Downtown Areas	95
Suburban Areas	75
Residential lots (lot area only)**:**	
Single-family	
2.5 acres or larger	12
0.75 – 2.5 acres	20
0.25 – 0.75 acres	30
0.25 acres or less	45
Apartments	75
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	10
Playgrounds	25
Schools	55
Railroad yard areas	50
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	2
Lawns, clayey soil	2

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group		Storm Return Period					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
A	C_A= $0.84i^{1.302}$	C_A= $0.86i^{1.276}$	C_A= $0.87i^{1.232}$	C_A = $0.88i^{1.124}$	C_A = $0.85i+0.025$	C_A = $0.78i+0.110$	C_A = $0.65i+0.254$
B	C_B= $0.84i^{1.169}$	C_B = $0.86i^{1.088}$	C_B= $0.81i+0.057$	C_B = $0.63i+0.249$	C_B= $0.56i+0.328$	C_B = $0.47i+0.426$	C_B = $0.37i+0.536$
C/D	$C_{C/D}$= $0.83i^{1.122}$	$C_{C/D}$= $0.82i+0.035$	$C_{C/D}$ = $0.74i+0.132$	$C_{C/D}$ = $0.56i+0.319$	$C_{C/D}$ = $0.49i+0.393$	$C_{C/D}$ = $0.41i+0.484$	$C_{C/D}$ = $0.32i+0.588$

Where:

i = % imperviousness (expressed as a decimal)

C_A = Runoff coefficient for Natural Resources Conservation Service (NRCS) HSG A soils

C_B = Runoff coefficient for NRCS HSG B soils

$C_{C/D}$ = Runoff coefficient for NRCS HSG C and D soils.

The values for various catchment imperviousness and storm return periods are presented graphically in Figures 6-1 through 6-3, and are tabulated in Table 6-5. These coefficients were developed for the Denver region to work in conjunction with the time of concentration recommendations in Section 2.4. Use of these coefficients and this procedure outside of the semi-arid climate found in the Denver region may not be valid. The UD-Rational Excel workbook performs all the needed calculations to find the runoff coefficient given the soil type and imperviousness and the reader may want to take advantage of this macro-enabled Excel workbook that is available for download from the UDFCD's website www.udfcd.org.

See Examples 7.1 and 7.2 that illustrate the Rational Method.

Appendix B

Hydraulics

Overall Inputs

Land Use	% Impervious
Open Space/Lawn	0.02
Hardscape/Pavement	1
Roof	0.9
Residential	0.55
Packed Gravel	0.4

Pond A Percent Impervious Calculations

Subbasin	Total Area (ac)	NRCS Hydrologic Soil Group	Open Space/Lawn		Hardscape/Pavement		Roof		Residential		Packed Gravel		% Check	Composite Imperviousness
			Area (ac)	Imp (ac)	Area (ac)	Imp (ac)	Area (ac)	Imp (ac)	Area (ac)	Imp (ac)	Area (ac)	Imp (ac)		
CI2.06	6.37	A	0.00	0.00	0.00	0.00	0.00	0.00	6.37	3.50	0.00	0	100.00%	55%
CI2.05	7.16	A	0.00	0.00	0.00	0.00	0.00	0.00	7.16	3.94	0.00	0	100.00%	55%
CI2.07	1.57	A	0.00	0.00	0.00	0.00	0.00	0.00	1.57	0.86	0.00	0	100.00%	55%
CI2.04	2.52	A	0.00	0.00	0.00	0.00	0.00	0.00	2.52	1.39	0.00	0	100.00%	55%
CI2.03	5.24	A	0.00	0.00	0.00	0.00	0.00	0.00	5.24	2.88	0.00	0	100.00%	55%
CI2.02	2.90	A	0.00	0.00	0.00	0.00	0.00	0.00	2.90	1.60	0.00	0	100.00%	55%
CI2.01	3.85	A	0.00	0.00	0.00	0.00	0.00	0.00	3.85	2.12	0.00	0	100.00%	55%
CI2.00	6.44	A	0.00	0.00	0.00	0.00	0.00	0.00	6.44	3.54	0.00	0	100.00%	55%
CI1.00	3.09	A	0.00	0.00	0.00	0.00	0.00	0.00	3.09	1.70	0.00	0	100.00%	55%
CI1.04	4.97	A	0.00	0.00	0.00	0.00	0.00	0.00	4.97	2.73	0.00	0	100.00%	55%
CI1.03	3.25	A	0.00	0.00	0.00	0.00	0.00	0.00	3.25	1.79	0.00	0	100.00%	55%
CI1.05	2.26	A	0.00	0.00	0.00	0.00	0.00	0.00	2.26	1.24	0.00	0	100.00%	55%
CI1.02	4.21	A	0.00	0.00	0.00	0.00	0.00	0.00	4.21	2.32	0.00	0	100.00%	55%
CI1.01	1.01	A	0.00	0.00	0.00	0.00	0.00	0.00	1.01	0.56	0.00	0	100.00%	55%
CI1.07	0.36	A	0.06	0.00	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0	100.00%	84%
CI1.08	0.84	A	0.15	0.00	0.69	0.69	0.00	0.00	0.00	0.00	0.00	0	100.00%	82%
CI1.06	0.70	A	0.26	0.01	0.44	0.44	0.00	0.00	0.00	0.00	0.00	0	100.00%	64%
Pond (Direct)	9.68	A	9.68	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	100.00%	2%
Total Site	**66.42**	A	**10.15**	**0.20**	**1.43**	**1.43**	**0.00**	**0.00**	**54.84**	**30.16**	**0.00**	**0**	**100.00%**	**48%**
CI10.1	1.00	A	0.26	0.01	0.74	0.74	0.00	0.00	0.00	0.00	0.00	0	100.00%	75%

Calculation of Peak Runoff using Rational Method

Designer: TJH
Company: SSD
Date: 3/24/2021
Project: Pioneer Village
Location: Keenesburg, CO

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$

$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$

Computed $t_c = t_i + t_t$

Regional $t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$

$t_{minimum}$ = 5 (urban)
$t_{minimum}$ = 10 (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1-hour rainfall depth, P1 (in) =	0.86	1.14	1.41	1.85	2.23	2.66	3.83

	a	b	c
Rainfall Intensity Equation Coefficients =	28.50	10.00	0.786

$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$

$Q(cfs) = CIA$

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C							Overland (Initial) Flow Time					Channelized (Travel) Flow Time						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)
CI 1.04	4.96	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	88.50			0.014	10.62	1065.00			0.013	20	2.28	7.78
CI 1.03	3.26	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	97.80			0.033	8.41	1252.70			0.012	20	2.23	9.37
CI 2.05	2.29	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	98.50			0.031	8.62	926.50			0.017	20	2.57	6.01
CI 1.02	2.90	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	60.00			0.080	4.92	905.00			0.012	20	2.19	6.88
CI 1.01	1.00	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	19.80			0.038	3.62	1035.80			0.011	20	2.10	8.23
CI 2.02	2.90	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	94.50			0.021	9.60	1049.50			0.023	20	3.03	5.77
CI 2.01	3.85	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	93.60			0.025	9.02	1300.00			0.021	20	2.90	7.48
CI 2.03	5.26	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	93.80			0.021	9.53	1892.60			0.013	20	2.28	13.83
CI 2.04	2.52	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	30.40			0.019	5.63	1091.62			0.021	20	2.90	6.28
CI 2.05	5.66	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	91.70			0.023	9.17	1353.07			0.016	20	2.53	8.91
CI 2.06	6.37	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	98.60			0.018	10.31	1545.26			0.013	20	2.28	11.29
CI 2.00	6.40	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	112.00			0.026	9.71	2466.80			0.013	20	2.31	17.82
CI 2.07	1.57	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	30.00			0.013	6.33	1003.50			0.022	20	2.95	5.68
CI 1.00	2.77	A	55.0	0.39	0.40	0.42	0.45	0.49	0.54	0.61	98.60			0.018	10.31	1300.98			0.017	20	2.61	8.32
Ci 1.06	0.83	A	54.0	0.38	0.39	0.41	0.44	0.49	0.53	0.60	18.00			0.009	5.61	633.00			0.013	20	2.25	4.68
CI 1.07	0.31	A	81.4	0.64	0.66	0.68	0.70	0.72	0.74	0.78	29.80			0.036	2.83	365.70			0.027	20	3.29	1.85
CI 1.08	0.74	A	80.0	0.63	0.65	0.66	0.69	0.71	0.73	0.77	17.00			0.020	2.68	912.50			0.020	20	2.83	5.38
Pond A Direct	9.68	A	2.0	0.01	0.01	0.01	0.01	0.04	0.13	0.27	491.00			0.025	32.35	327.00			0.030	15	2.60	2.10

Subcatchment Name	Time of Concentration			Rainfall Intensity, I (in/hr)							Peak Flow, Q (cfs)						
	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
CI 1.04	18.40	25.97	18.40	1.77	2.34	2.90	3.80	4.58	5.46	7.87	3.38	4.66	6.00	8.51	11.24	14.59	23.75
CI 1.03	17.78	27.88	17.78	1.80	2.38	2.95	3.87	4.66	5.56	8.00	2.26	3.12	4.01	5.69	7.51	9.76	15.88
CI 2.05	14.63	23.85	14.63	1.98	2.62	3.24	4.25	5.12	6.11	8.80	1.74	2.41	3.10	4.39	5.80	7.53	12.27
CI 1.02	11.80	24.89	11.80	2.17	2.88	3.56	4.68	5.64	6.72	9.68	2.43	3.36	4.32	6.12	8.09	10.50	17.09
CI 1.01	11.85	26.51	11.85	2.17	2.88	3.56	4.67	5.63	6.71	9.67	0.84	1.16	1.49	2.11	2.78	3.61	5.88
CI 2.02	15.36	23.56	15.36	1.93	2.56	3.16	4.15	5.01	5.97	8.60	2.16	2.98	3.84	5.44	7.18	9.32	15.18
CI 2.01	16.49	25.60	16.49	1.87	2.47	3.06	4.01	4.84	5.77	8.31	2.77	3.82	4.92	6.97	9.21	11.96	19.47
CI 2.03	23.36	33.22	23.36	1.56	2.06	2.55	3.35	4.04	4.81	6.93	3.16	4.36	5.61	7.95	10.50	13.63	22.19
CI 2.04	11.90	24.17	11.90	2.17	2.87	3.55	4.66	5.62	6.70	9.65	2.11	2.91	3.74	5.30	7.00	9.09	14.80
CI 2.05	18.09	27.33	18.09	1.78	2.36	2.92	3.83	4.62	5.51	7.93	3.89	5.37	6.91	9.79	12.94	16.79	27.34
CI 2.06	21.61	30.18	21.61	1.62	2.15	2.66	3.49	4.21	5.02	7.23	3.99	5.50	7.09	10.04	13.27	17.23	28.04
CI 2.00	27.53	38.00	27.53	1.42	1.88	2.33	3.05	3.68	4.39	6.32	3.50	4.83	6.22	8.82	11.65	15.12	24.61
CI 2.07	12.01	23.45	12.01	2.16	2.86	3.54	4.64	5.60	6.67	9.61	1.31	1.80	2.32	3.29	4.35	5.64	9.18
CI 1.00	18.63	26.61	18.63	1.76	2.33	2.88	3.78	4.55	5.43	7.82	1.87	2.59	3.33	4.72	6.24	8.10	13.18
Ci 1.06	10.29	22.47	10.29	2.30	3.05	3.77	4.95	5.96	7.11	10.24	0.72	0.99	1.28	1.82	2.41	3.13	5.12
CI 1.07	4.69	13.99	5.00	2.92	3.87	4.78	6.27	7.56	9.02	12.99	0.58	0.79	1.00	1.36	1.69	2.08	3.14
CI 1.08	8.06	17.72	8.06	2.52	3.34	4.13	5.42	6.54	7.80	11.23	1.17	1.60	2.03	2.76	3.43	4.23	6.40
Pond A Direct	34.45	29.05	29.05	1.38	1.82	2.25	2.96	3.57	4.25	6.12	0.07	0.10	0.15	0.31	1.45	5.17	15.82

Pre-Development C Value Calculations
Pioneer Village
Keenesburg, COLORADO

Global Parameters[1]	
Land Use	% Imp.
Open Space/Landscaping	2
Hardscaping	100
Residential Lots	55

Site Soils Type (A, B, or CD) A

Pond B Percent Impervious Calculations

Subbasin	Total Area (acres)	Land Use Area per Sub-Basin							Composite Imperviousness	C Coefficient[2]	
		Hardscaping		Open Space/Landscaping		Residential Lots		% Check		5-year	100-year
		Area (acres)	%	Area (acres)	%	Area (acres)	%				
CI 3.00	1.29	1.10	85.0%	0.19	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
CI 3.01	3.94	0.00	0.0%	0.00	0.0%	3.94	100.0%	100.00%	55%	0.51	0.60
CI 3.02	2.40	0.00	0.0%	0.00	0.0%	2.40	100.0%	100.00%	55%	0.51	0.60
CI 3.03	1.71	0.00	0.0%	0.00	0.0%	1.71	100.0%	100.00%	55%	0.51	0.60
CI 3.04	3.45	0.00	0.0%	0.00	0.0%	3.45	100.0%	100.00%	55%	0.51	0.60
CI 3.05	1.38	0.00	0.0%	0.00	0.0%	1.38	100.0%	100.00%	55%	0.51	0.60
CI 3.06	1.64	0.00	0.0%	0.00	0.0%	1.64	100.0%	100.00%	55%	0.51	0.60
CI 3.07	1.71	0.00	0.0%	0.00	0.0%	1.71	100.0%	100.00%	55%	0.51	0.60
CI 3.08	0.38	0.32	85.0%	0.06	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
CI 3.08A	0.28	0.24	85.0%	0.04	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
CI 3.09	2.28	0.00	0.0%	0.00	0.0%	2.28	100.0%	100.00%	55%	0.51	0.60
CI 4.00	4.63	0.00	0.0%	0.00	0.0%	4.63	100.0%	100.00%	55%	0.51	0.60
CI 4.01	2.48	0.00	0.0%	0.00	0.0%	2.48	100.0%	100.00%	55%	0.51	0.60
CI 4.01A	1.30	1.11	85.0%	0.20	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
CI 4.04	3.17	0.00	0.0%	0.00	0.0%	3.17	100.0%	100.00%	55%	0.51	0.60
CI 4.05	2.06	0.00	0.0%	0.00	0.0%	2.06	100.0%	100.00%	55%	0.51	0.60
CI 4.06	0.90	0.00	0.0%	0.00	0.0%	0.90	100.0%	100.00%	55%	0.51	0.60
CI 4.07	2.36	0.00	0.0%	0.00	0.0%	2.36	100.0%	100.00%	55%	0.51	0.60
DI 4.02	4.35	0.00	0.0%	0.00	0.0%	4.35	100.0%	100.00%	55%	0.51	0.60
DI 4.03	1.50	0.00	0.0%	0.00	0.0%	1.50	100.0%	100.00%	55%	0.51	0.60
Future CR 24	5.16	4.39	85.0%	0.77	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
Pond (Direct)	3.27	0.49	15.0%	2.78	85.0%	0.00	0.0%	100.00%	17%	0.16	0.29
TOTAL SITE	**51.64**	**7.64**	**14.8%**	**4.04**	7.8%	**39.96**	**77.4%**	**100.00%**	58%	0.53	0.62

[1]From Table 6-3 in UDFCD Volume 1

[2]From Table 6-4 in UDFCD Volume 1

STANDARD FORM SF-2

TIME OF CONCENTRATION - POST DEV

Development: Pioneer Village ~ Keenesburg, CO

Calculated By: TH

Date: 3/14/2021

Subbasin Data				**Time of Concentration, T_c**								**Minimum Tc in Urban Areas**			**Final T_c**	**Remarks**
				Initial/Overland Time (t_i)			**Travel Time (t_t)**					**T_c Check**				
Sub-Basin	Area	C5	imperviousness	Length (300' max)	Slope	t_i	Length	Slope	Velocity	t_t	$t_c=t_i+t_t$	Comp T_c	Total Length	T_c (urban) Min		
	acres			ft	%	min.	ft	%	fps	min	min	Tc	min	min	min	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
CI 3.00	1.29	0.79	0.85	17	2.0%	1.8	1200	1.5%	2.4	8.2	10.0	10.0	1217	9.6	9.6	
CI 3.01	3.94	0.51	0.55	20	2.0%	3.8	1750	1.5%	2.4	11.9	15.7	15.7	1770	18.0	15.7	
CI 3.02	2.40	0.51	0.55	110	2.0%	9.0	940	1.8%	2.7	5.8	14.8	14.8	1050	14.7	14.7	
CI 3.03	1.71	0.51	0.55	93	2.6%	7.6	745	1.8%	2.7	4.6	12.2	12.2	838	13.2	12.2	
CI 3.04	3.45	0.51	0.55	22	1.9%	4.1	1365	0.8%	1.7	13.1	17.2	17.2	1387	16.4	16.4	
CI 3.05	1.38	0.51	0.55	95	2.9%	7.4	700	1.9%	2.8	4.2	11.6	11.6	795	12.8	11.6	
CI 3.06	1.64	0.51	0.55	17	2.0%	3.5	850	1.9%	2.8	5.1	8.7	8.7	867	13.8	8.7	
CI 3.07	1.71	0.51	0.55	20	2.0%	3.8	980	0.8%	1.7	9.4	13.3	13.3	1000	14.4	13.3	
CI 3.08	0.38	0.79	0.85	21	2.0%	2.0	313	0.8%	1.7	3.0	5.1	5.1	334	6.4	5.1	
CI 3.08A	0.28	0.79	0.85	21	2.0%	2.0	313	0.8%	1.7	3.0	5.1	5.1	334	6.4	5.1	
CI 3.09	2.28	0.51	0.55	23	2.0%	4.1	1030	2.0%	2.8	6.1	10.2	10.2	1053	14.7	10.2	
CI 4.00	4.63	0.51	0.55	21	2.0%	3.9	2150	1.6%	2.6	14.0	17.9	17.9	2171	19.9	17.9	
CI 4.01	2.48	0.51	0.55	21	2.0%	3.9	1575	2.3%	3.0	8.7	12.6	12.6	1596	17.2	12.6	
CI 4.01A	1.30	0.79	0.85	44	3.4%	2.5	1365	2.3%	3.0	7.5	10.0	10.0	1409	9.1	9.1	
DI 4.02	4.35	0.51	0.55	75	9.0%	4.5	1095	2.3%	3.0	6.1	10.5	10.5	1170	12.3	10.5	
DI 4.03	1.50	0.51	0.55	15	2.0%	3.3	578	2.2%	3.0	3.3	6.6	6.6	593	12.5	6.6	
CI 4.04	3.17	0.51	0.55	79	8.5%	4.7	1252	1.8%	2.7	7.8	12.5	12.5	1331	12.8	12.5	
CI 4.05	2.06	0.51	0.55	27	3.5%	3.7	705	3.2%	3.6	3.3	7.0	7.0	732	12.3	7.0	
CI 4.06	0.90	0.51	0.55	26	1.2%	5.2	547	3.7%	3.8	2.4	7.5	7.5	573	13.2	7.5	
CI 4.07	2.36	0.51	0.55	17	2.0%	3.5	925	2.3%	3.0	5.1	8.6	8.6	942	14.2	8.6	
CI 21B.15	1.46	0.51	0.55	109	2.7%	8.1	248	0.5%	1.4	2.9	11.0	11.0	357	11.2	11.0	
CI 21B.14	0.98	0.51	0.55	118	2.7%	8.4	233	0.5%	1.4	2.7	11.2	11.2	351	11.2	11.2	
CI 21B.13	0.78	0.51	0.55	118	2.7%	8.4	233	0.5%	1.4	2.7	11.2	11.2	351	11.2	11.2	
CI 21B.12	1.08	0.51	0.55	108	1.4%	10.0	297	0.9%	1.9	2.6	12.7	12.7	405	12.0	12.0	
CI 21B.11	0.98	0.51	0.55	108	1.4%	10.0	297	0.9%	1.9	2.6	12.7	12.7	405	12.0	12.0	
CI 21B.10	1.61	0.51	0.55	110	1.5%	10.0	477	0.8%	1.8	4.4	14.4	14.4	587	13.0	13.0	
CI 21B.09	10.43	0.30	0.32	300	0.9%	26.4	1632	0.6%	1.5	18.2	44.6	44.6	1932	30.5	30.5	
CI 21B.08	1.63	0.51	0.55	111	1.4%	10.2	686	0.7%	1.7	6.8	16.9	16.9	797	14.2	14.2	
CI 21B.07	1.03	0.40	0.43	46	1.4%	7.8	459	0.8%	1.7	4.4	12.2	12.2	505	14.7	12.2	
CI 21B.06	0.24	0.51	0.55	15	2.3%	3.2	180	1.3%	2.3	1.3	4.5	4.5	195	10.6	5.0	5 minutes minimum
CI 21B.05	0.95	0.51	0.55	109	2.7%	8.1	310	0.9%	1.9	2.7	10.8	10.8	419	11.4	10.8	
CI 21B.04	2.14	0.51	0.55	110	3.5%	7.5	580	0.5%	1.4	7.1	14.5	14.5	690	12.2	12.2	
CI 21B.03	2.84	0.39	0.42	173	2.3%	12.9	697	0.5%	1.3	8.7	21.5	21.5	870	16.0	16.0	
CI 21B.02	4.75	0.21	0.23	46	1.4%	9.9	1668	0.5%	1.3	20.7	30.6	30.6	1714	28.4	28.4	
CI 21B.01	3.12	0.51	0.55	90	1.0%	10.2	807	0.8	17.7	0.8	11.0	11.0	897	15.7	11.0	

Notes:

1. Flows calculated using the rational method, based on the methods provided in chapter 4 section 4 (rainfall), and Chapter 5 Section 2 (runoff) of the USDCM by UDFCD (2008).
2. $T_i = 0.395(1.1-C_{10})(L)^{0.5}/S^{0.33}$
3. V=KSw^0.5

Pre-Development C Value Calculations
Pioneer Village
Keenesburg, COLORADO

Global Parameters[1]	
Land Use	% Imp.
Open Space/Landscaping	2
Hardscaping	100
Residential Lots	55

Site Soils Type (A, B, or CD) A

Pond C Impervious Calculations

Subbasin	Total Area (acres)	Land Use Area per Sub-Basin						% Check	Composite Imperviousness	C Coefficient[2]	
		Hardscaping		Open Space/Landscaping		Residential Lots				5-year	100-year
		Area (acres)	%	Area (acres)	%	Area (acres)	%				
CI 21B.16	4.93	0.00	0.0%	2.39	48.5%	2.54	51.5%	100.00%	29%	0.27	0.39
CI 21B.15	1.46	0.00	0.0%	0.00	0.0%	1.46	100.0%	100.00%	55%	0.51	0.60
CI 21B.14	0.98	0.00	0.0%	0.00	0.0%	0.98	100.0%	100.00%	55%	0.51	0.60
CI 21B.13	0.78	0.00	0.0%	0.00	0.0%	0.78	100.0%	100.00%	55%	0.51	0.60
CI 21B.12	1.08	0.00	0.0%	0.00	0.0%	1.08	100.0%	100.00%	55%	0.51	0.60
CI 21B.11	0.98	0.00	0.0%	0.00	0.0%	0.98	100.0%	100.00%	55%	0.51	0.60
CI 21B.10	1.61	0.00	0.0%	0.00	0.0%	1.61	100.0%	100.00%	55%	0.51	0.60
CI 21B.09	5.50	0.00	0.0%	2.15	39.1%	3.35	60.9%	100.00%	34%	0.32	0.43
CI 21B.08	1.63	0.00	0.0%	0.00	0.0%	1.63	100.0%	100.00%	55%	0.51	0.60
CI 21B.07	1.03	0.00	0.0%	0.23	22.3%	0.80	77.7%	100.00%	43%	0.40	0.50
CI 21B.06	0.24	0.00	0.0%	0.00	0.0%	0.24	100.0%	100.00%	55%	0.51	0.60
CI 21B.05	0.95	0.00	0.0%	0.00	0.0%	0.95	100.0%	100.00%	55%	0.51	0.60
CI 21B.04	2.14	0.00	0.0%	0.00	0.0%	2.14	100.0%	100.00%	55%	0.51	0.60
CI 21B.03	2.84	0.00	0.0%	0.69	24.3%	2.15	75.7%	100.00%	42%	0.39	0.50
CI 21B.02	4.75	0.00	0.0%	2.89	60.8%	1.86	39.2%	100.00%	23%	0.21	0.34
CI 21B.01	3.12	0.00	0.0%	0.00	0.0%	3.12	100.0%	100.00%	55%	0.51	0.60
CI 21A.14	1.46	0.00	0.0%	0.00	0.0%	1.46	100.0%	100.00%	55%	0.51	0.60
CI 21A.13	2.17	0.00	0.0%	0.00	0.0%	2.17	100.0%	100.00%	55%	0.51	0.60
CI 21A.11	1.92	0.00	0.0%	0.00	0.0%	1.92	100.0%	100.00%	55%	0.51	0.60
CI 21A.12	4.27	0.00	0.0%	0.00	0.0%	4.27	100.0%	100.00%	55%	0.51	0.60
CI 21A.10	6.10	0.00	0.0%	1.92	31.5%	4.18	68.5%	100.00%	38%	0.36	0.46
CI 21A.09	1.95	0.00	0.0%	0.00	0.0%	1.95	100.0%	100.00%	55%	0.51	0.60
CI 21A.08	2.33	0.00	0.0%	0.00	0.0%	2.33	100.0%	100.00%	55%	0.51	0.60
CI 21A.07	1.97	0.00	0.0%	0.00	0.0%	1.97	100.0%	100.00%	55%	0.51	0.60
CI 21A.06	1.19	0.00	0.0%	0.00	0.0%	1.19	100.0%	100.00%	55%	0.51	0.60
CI 21A.05	3.49	0.00	0.0%	0.00	0.0%	3.49	100.0%	100.00%	55%	0.51	0.60
CI 21A.04	2.55	0.00	0.0%	0.00	0.0%	2.55	100.0%	100.00%	55%	0.51	0.60
CI 21A.03	2.79	0.00	0.0%	0.00	0.0%	2.79	100.0%	100.00%	55%	0.51	0.60
CI 21A.02A	0.25	0.25	100.0%	0.00	0.0%	0.00	0.0%	100.00%	100%	0.93	0.96
CI 21A.02	9.63	2.36	24.5%	4.28	44.4%	2.99	31.0%	100.00%	42%	0.39	0.50
CI 21A.01(S)	5.65	1.59	28.1%	1.81	32.0%	2.25	39.8%	100.00%	51%	0.47	0.56
CI 21A.01(NE)	1.68	1.43	85.0%	0.25	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
CI 21A.01(NW)	2.07	1.76	85.0%	0.31	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
CI 17A.14	6.34	0.00	0.0%	1.92	30.3%	4.42	69.7%	100.00%	39%	0.36	0.47
CI 17A.13	2.34	0.00	0.0%	0.00	0.0%	2.34	100.0%	100.00%	55%	0.51	0.60
CI 17A.12	4.05	0.00	0.0%	0.00	0.0%	4.05	100.0%	100.00%	55%	0.51	0.60
CI 17A.11	3.38	0.00	0.0%	0.59	17.5%	2.79	82.5%	100.00%	46%	0.43	0.52
CI 17A.10	4.33	0.00	0.0%	0.00	0.0%	4.33	100.0%	100.00%	55%	0.51	0.60
CI 17A.09	1.58	0.00	0.0%	0.00	0.0%	1.58	100.0%	100.00%	55%	0.51	0.60
CI 17A.08	1.33	0.00	0.0%	0.00	0.0%	1.33	100.0%	100.00%	55%	0.51	0.60
CI 17A.07	6.38	0.00	0.0%	2.37	37.1%	4.01	62.9%	100.00%	35%	0.33	0.44
CI 17A.06	5.66	0.00	0.0%	0.00	0.0%	5.66	100.0%	100.00%	55%	0.51	0.60
CI 17A.05	4.64	0.00	0.0%	0.00	0.0%	4.64	100.0%	100.00%	55%	0.51	0.60
CI 17A.04	4.06	3.45	85.0%	0.61	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
CI 17A.03	1.27	0.00	0.0%	0.00	0.0%	1.27	100.0%	100.00%	55%	0.51	0.60
CI 17A.02	7.85	2.88	36.7%	3.09	39.4%	1.88	23.9%	100.00%	51%	0.47	0.56
CI 17A.01	2.44	2.07	85.0%	0.37	15.0%	0.00	0.0%	100.00%	85%	0.79	0.84
Pond C (Direct)	3.74	0.19	5.0%	3.55	95.0%	0.00	0.0%	100.00%	7%	0.06	0.21
TOTAL SITE	**144.88**	**15.98**	**11.0%**	**29.42**	20.3%	**99.48**	**68.7%**	**100.00%**	49%	0.46	0.55

[1] From Table 6-3 in UDFCD Volume 1

[2] From Table 6-4 in UDFCD Volume 1

STANDARD FORM SF-2

TIME OF CONCENTRATION - POST DEV

Development: Pioneer Village ~ Keenesburg, CO

Calculated By: TH

Date: 3/14/2021

Subbasin Data				Time of Concentration, T_c								Minimum Tc in Urban Areas			Final T_c	Remarks
				Initial/Overland Time (t_i)			Travel Time (t_t)					T_c Check				
Sub-Basin	Area	C5	imperviousness	Length (300' max)	Slope	t_i	Length	Slope	Velocity	t_t	$t_c=t_i+t_t$	Comp T_c	Total Length	T_c (urban) Min		
	acres			ft	%	min.	ft	%	fps	min	min	Tc	min	min	min	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
CI 21B.16	4.93	0.27	0.29	10	2.0%	3.8	935	0.8%	1.7	8.9	12.7	12.7	945	19.5	12.7	
CI 21B.15	1.46	0.51	0.55	109	2.7%	8.1	248	0.5%	1.4	2.9	11.0	11.0	357	11.2	11.0	
CI 21B.14	0.98	0.51	0.55	118	2.7%	8.4	233	0.5%	1.4	2.7	11.2	11.2	351	11.2	11.2	
CI 21B.13	0.78	0.51	0.55	118	2.7%	8.4	233	0.5%	1.4	2.7	11.2	11.2	351	11.2	11.2	
CI 21B.12	1.08	0.51	0.55	108	1.4%	10.0	297	0.9%	1.9	2.6	12.7	12.7	405	12.0	12.0	
CI 21B.11	0.98	0.51	0.55	108	1.4%	10.0	297	0.9%	1.9	2.6	12.7	12.7	405	12.0	12.0	
CI 21B.10	1.61	0.51	0.55	110	1.5%	10.0	477	0.8%	1.8	4.4	14.4	14.4	587	13.0	13.0	
CI 21B.09	5.50	0.32	0.34	300	0.9%	25.7	1632	0.6%	1.5	18.2	43.9	43.9	1932	29.6	29.6	
CI 21B.08	1.63	0.51	0.55	111	1.4%	10.2	686	0.7%	1.7	6.8	16.9	16.9	797	14.2	14.2	
CI 21B.07	1.03	0.40	0.43	46	1.4%	7.8	459	0.8%	1.7	4.4	12.2	12.2	505	14.7	12.2	
CI 21B.06	0.24	0.51	0.55	15	2.3%	3.2	180	1.3%	2.3	1.3	4.5	4.5	195	10.6	5.0	5 minutes minimum
CI 21B.05	0.95	0.51	0.55	109	2.7%	8.1	310	0.9%	1.9	2.7	10.8	10.8	419	11.4	10.8	
CI 21B.04	2.14	0.51	0.55	110	3.5%	7.5	580	0.5%	1.4	7.1	14.5	14.5	690	12.2	12.2	
CI 21B.03	2.84	0.39	0.42	173	2.3%	12.9	697	0.5%	1.3	8.7	21.5	21.5	870	16.0	16.0	
CI 21B.02	4.75	0.21	0.23	46	1.4%	9.9	1668	0.5%	1.3	20.7	30.6	30.6	1714	28.4	28.4	
CI 21B.01	3.12	0.51	0.55	90	1.0%	10.2	807	0.8	17.7	0.8	11.0	11.0	897	15.7	11.0	
CI 21A.14	1.46	0.51	0.55	105	1.0%	11.1	284	0.8%	1.8	2.7	13.7	13.7	389	12.3	12.3	
CI 21A.13	2.17	0.51	0.55	105	1.0%	11.1	347	1.3%	2.3	2.5	13.6	13.6	348	12.0	12.0	
CI 21A.12	4.27	0.51	0.55	60	1.6%	7.2	1256	1.1%	2.1	10.0	17.2	17.2	1316	16.7	16.7	
CI 21A.11	1.92	0.51	0.55	24	2.0%	4.2	1096	1.0%	2.0	9.1	13.3	13.3	1097	14.9	13.3	
CI 21A.10	6.10	0.36	0.38	300	1.8%	19.6	1188	0.8%	1.7	11.4	31.0	31.0	1488	21.1	21.1	
CI 21A.09	1.95	0.51	0.55	24	2.3%	4.0	1171	0.9%	1.9	10.4	14.4	14.4	1171	14.9	14.4	
CI 21A.08	2.33	0.51	0.55	24	2.3%	4.0	880	0.9%	1.8	8.0	12.0	12.0	904	13.7	12.0	
CI 21A.07	1.97	0.51	0.55	83	1.8%	8.1	610	0.8%	1.7	5.9	14.0	14.0	610	12.8	12.8	
CI 21A.06	1.19	0.51	0.55	60	2.2%	6.4	740	0.8%	1.7	7.1	13.5	13.5	800	13.3	13.3	
CI 21A.05	3.49	0.51	0.55	25	1.5%	4.7	705	0.7%	1.7	7.0	11.7	11.7	730	13.7	11.7	
CI 21A.04	2.55	0.51	0.55	24	2.0%	4.2	926	0.8%	1.7	8.9	13.1	13.1	926	14.1	13.1	
CI 21A.03	2.79	0.51	0.55	60	1.6%	7.2	1256	1.1%	2.1	10.0	17.2	17.2	1316	16.7	16.7	
CI 21A.02A	0.25	0.93	1.00	23	2.0%	1.2	15	2.0%	2.8	0.1	1.3	1.3	38	3.1	5.0	5 minutes minimum
CI 21A.02	9.63	0.39	0.42	144	2.2%	11.9	2380	0.9%	1.9	20.6	32.5	32.5	2381	23.7	23.7	
CI 21A.01(S)	5.65	0.47	0.51	20	1.6%	4.4	890	0.4%	1.2	12.4	16.8	16.8	910	15.4	15.4	

CI 21A.01(NE)	1.68	0.79	0.85	27	2.0%	2.3	1870	0.4%	1.2	26.0	28.3	28.3	1871	12.0	12.0	
CI 21A.01(NW)	2.07	0.79	0.85	106	2.1%	4.6	2175	0.4%	1.2	30.2	34.8	34.8	2281	13.4	13.4	
CI 17A.14	6.34	0.36	0.39	47	1.0%	9.3	2153	1.0%	2.0	17.8	27.0	27.0	2200	29.3	27.0	
CI 17A.13	2.34	0.51	0.55	24	2.0%	4.2	1096	1.0%	2.0	9.1	13.3	13.3	1096	14.9	13.3	
CI 17A.12	4.05	0.51	0.55	24	2.0%	4.2	925	1.5%	2.4	6.3	10.5	10.5	949	14.2	10.5	
CI 17A.11	3.38	0.43	0.46	13	2.0%	3.5	953	1.9%	2.7	5.8	9.4	9.4	966	16.1	9.4	
CI 17A.10	4.33	0.51	0.55	251	2.6%	12.4	734	1.7%	2.6	4.7	17.1	17.1	985	13.8	13.8	
CI 17A.09	1.58	0.51	0.55	19	2.2%	3.6	797	2.1%	2.9	4.6	8.2	8.2	816	13.4	8.2	
CI 17A.08	1.33	0.51	0.55	98	2.4%	8.0	525	2.4%	3.1	2.8	10.8	10.8	623	12.4	10.8	
CI 17A.07	6.38	0.33	0.35	165	3.0%	12.6	1177	1.3%	2.3	8.7	21.3	21.3	1342	19.0	19.0	
CI 17A.06	5.66	0.51	0.55	19	2.2%	3.6	1062	1.8%	2.7	6.6	10.2	10.2	1081	14.6	10.2	
CI 17A.05	4.64	0.51	0.55	24	3.6%	3.4	1052	1.6%	2.5	6.9	10.3	10.3	1076	13.5	10.3	
CI 17A.04	4.06	0.79	0.85	26	1.9%	2.3	2670	1.1%	2.0	21.7	24.0	24.0	2696	15.2	15.2	
CI 17A.03	1.27	0.51	0.55	15	2.0%	3.3	805	1.5%	2.4	5.6	8.9	8.9	820	13.6	8.9	
CI 17A.02	7.85	0.47	0.51	25	2.0%	4.6	2611	1.2%	2.1	20.3	24.9	24.9	2636	23.3	23.3	
CI 17A.01	2.44	0.79	0.85	24	2.6%	2.0	2680	1.1	21.0	2.1	4.1	4.1	2704	13.9	5.0	
0.00	#N/A	#N/A	#N/A	-	-	-	1668		-	-	-	-	-	-	5.0	5 minutes minimum
PR20	#N/A	#N/A	#N/A	150	3.2%	#N/A	1668	0.5%	1.4	19.7	#N/A	#N/A	1818	#N/A	#N/A	
PR21	#N/A	#N/A	#N/A	54	5.6%	#N/A	1668	5.0%	4.5	6.2	#N/A	#N/A	1722	#N/A	#N/A	
PR22	#N/A	#N/A	#N/A	97	6.5%	#N/A	1668	3.6%	3.8	7.3	#N/A	#N/A	1765	#N/A	#N/A	

Notes:

1. Flows calculated using the rational method, based on the methods provided in chapter 4 section 4 (rainfall), and Chapter 5 Section 2 (runoff) of the USDCM by UDFCD (2008).
2. $T_i = 0.395(1.1\text{-}C_{10})(L)^{0.5}/S^{0.33}$
3. V=KSw^0.5

Pioneer Village Phase 1
Town of Keenesburg

Offsite Impervious Calculations for Culverts and Inlets Along WCR 49

Structure	Design Points	Total Area (ac)	NRCS Hydrologic	Open Space/Lawn		Hardscape/Pavement		Roof		Residential		Packed Gravel		% Check	Percent Impervious
				Area (ac)	Imp (ac)	Area (ac)	Imp (ac)	Area (ac)	Imp (ac)	Area (ac)	Imp (ac)	Area (ac)	Imp (ac)		
EX CULV 1	EX CULV 1	5.46	A	4.5692	0.091384	0.8908	0.8908							100.00%	17.99%
P CULV 1	P CULV 1	7.73	A	6.145	0.1229	1.585	1.585							100.00%	22.09%
CI A.00	P CULV 2	0.93	A	0.648	0.01296	0.282	0.282							100.00%	31.72%
Ci A.01	P CULV 3	0.64	A	0.373	0.00746	0.267	0.267							100.00%	42.88%

Designer: TJH
Company: SSD
Date: 4/8/2021
Project: Pioneer Village
Location: Keenesburg, CO

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

$$\text{Computed } t_c = t_i + t_t$$

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$t_{minimum}$ = 5 (urban)
$t_{minimum}$ = 10 (non-urban)

$$\text{Selected } t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1-hour rainfall depth, P1 (in) =	0.86	1.14	1.41	1.85	2.23	2.66	3.83

	a	b	c
Rainfall Intensity Equation Coefficients =	28.50	10.00	0.786

$$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C						
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
EX CULV 1	5.46	A	18.0	0.09	0.10	0.11	0.13	0.18	0.25	0.37
P CULV 1	7.73	A	22.1	0.12	0.13	0.14	0.16	0.21	0.28	0.40
CI A.00	0.93	A	31.7	0.19	0.20	0.21	0.24	0.30	0.36	0.46
CI A.01	0.64	A	42.9	0.28	0.29	0.31	0.34	0.39	0.44	0.53

Subcatchment Name	Overland (Initial) Flow Time					Channelized (Travel) Flow Time						
	Overland Flow Length L_i (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	U/S Elevation (ft) (Optional)	D/S Elevation (ft) (Optional)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)
EX CULV 1	300.00			0.017	26.55	708.95			0.014	15	1.74	6.78
P CULV 1	300.00			0.038	19.62	1022.00			0.017	15	1.93	8.81
CI A.00	17.30			0.023	5.14	318.50			0.039	20	3.94	1.35
CI A.01	49.30			0.019	8.26	274.50			0.039	20	3.94	1.16

Subcatchment Name	Time of Concentration			Rainfall Intensity, I (in/hr)						
	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
EX CULV 1	33.33	31.77	31.77	1.30	1.73	2.14	2.81	3.38	4.03	5.81
P CULV 1	28.43	33.18	28.43	1.39	1.85	2.28	3.00	3.61	4.31	6.20
CI A.00	6.49	22.61	6.49	2.71	3.59	4.44	5.83	7.02	8.38	12.06
CI A.01	9.42	20.26	9.42	2.38	3.16	3.90	5.12	6.17	7.37	10.61

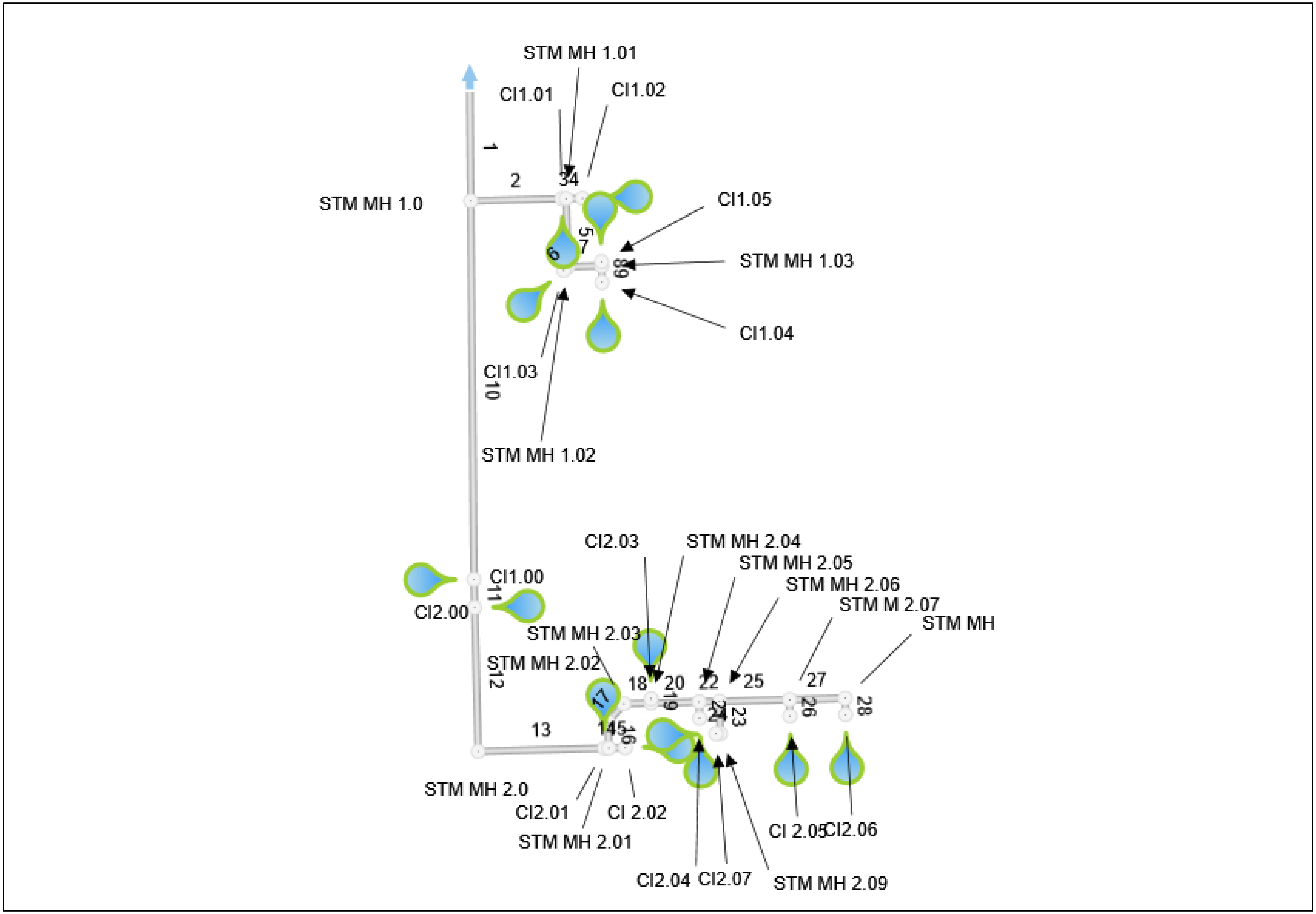
Subcatchment Name	Peak Flow, Q (cfs)						
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
EX CULV 1	0.64	0.91	1.23	1.97	3.30	5.51	11.73
P CULV 1	1.27	1.79	2.40	3.75	5.96	9.39	19.01
CI A.00	0.47	0.66	0.88	1.32	1.93	2.78	5.14
CI A.01	0.43	0.59	0.77	1.12	1.55	2.09	3.60

Plan View

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



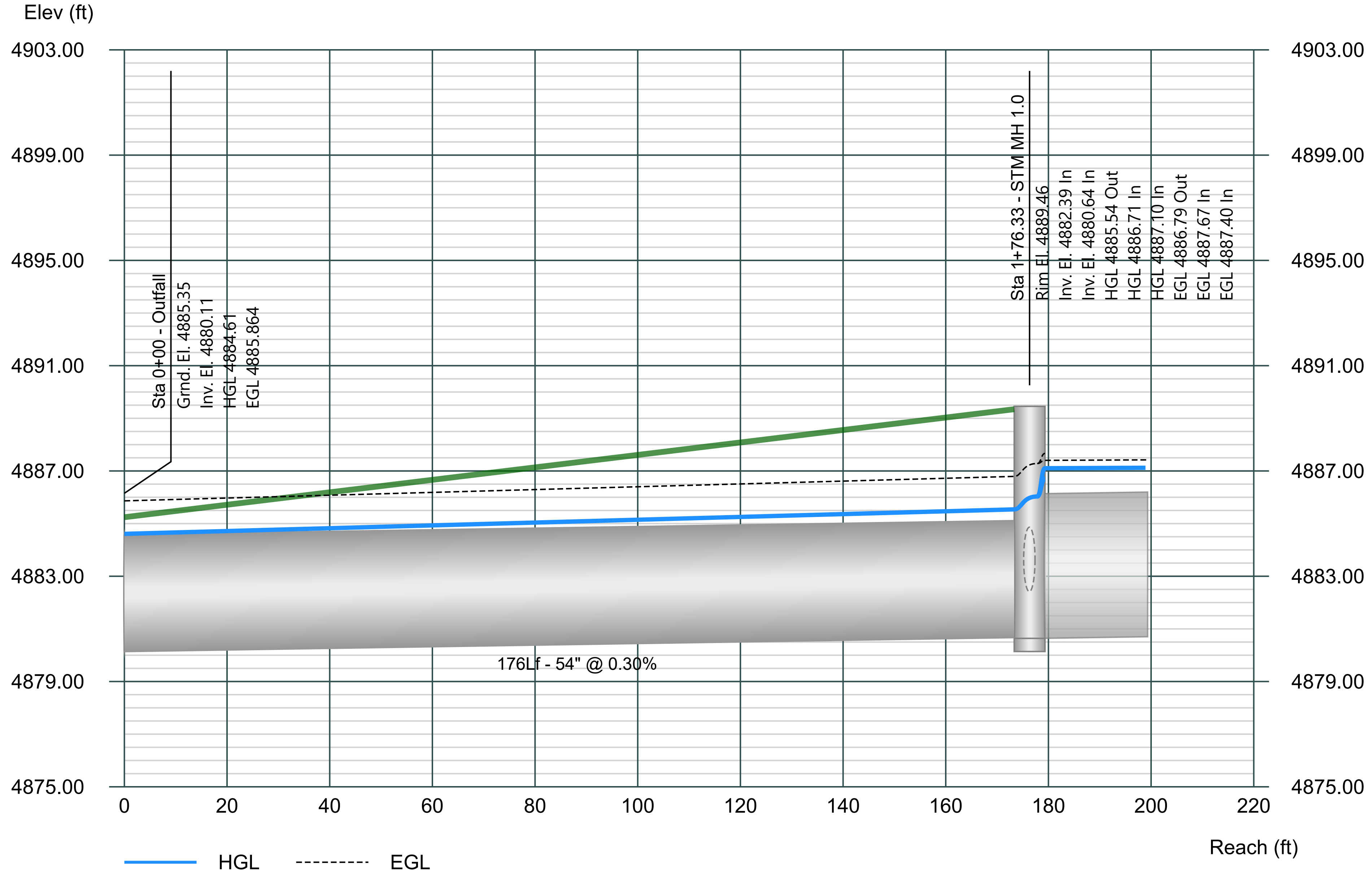
Project File: PA 1 and 2 NEW.sws

Line 1 - Pipe - (110) (1) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



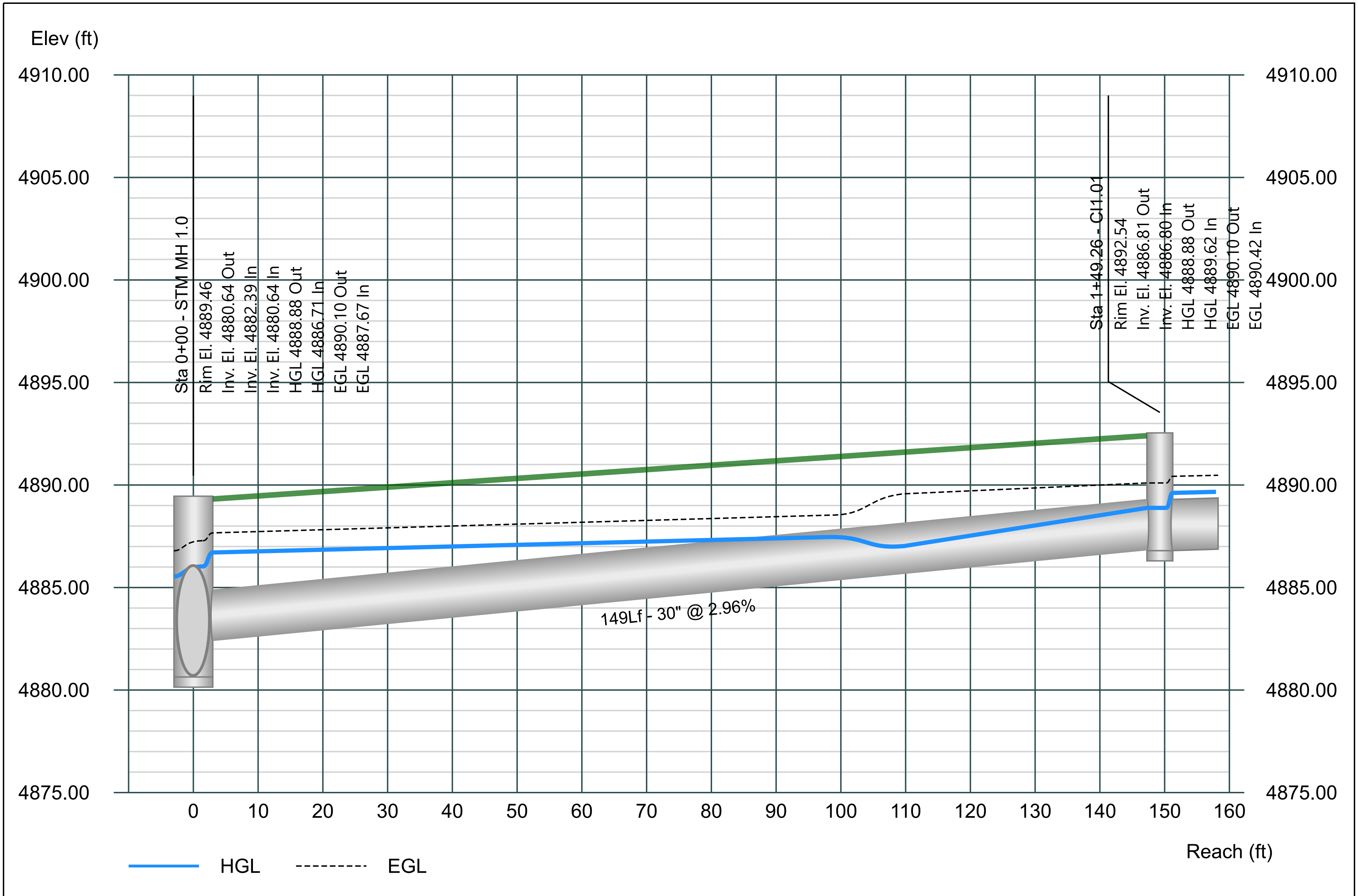
Project File: PA 1 and 2 NEW.sws

Line 2 - Pipe - (362) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



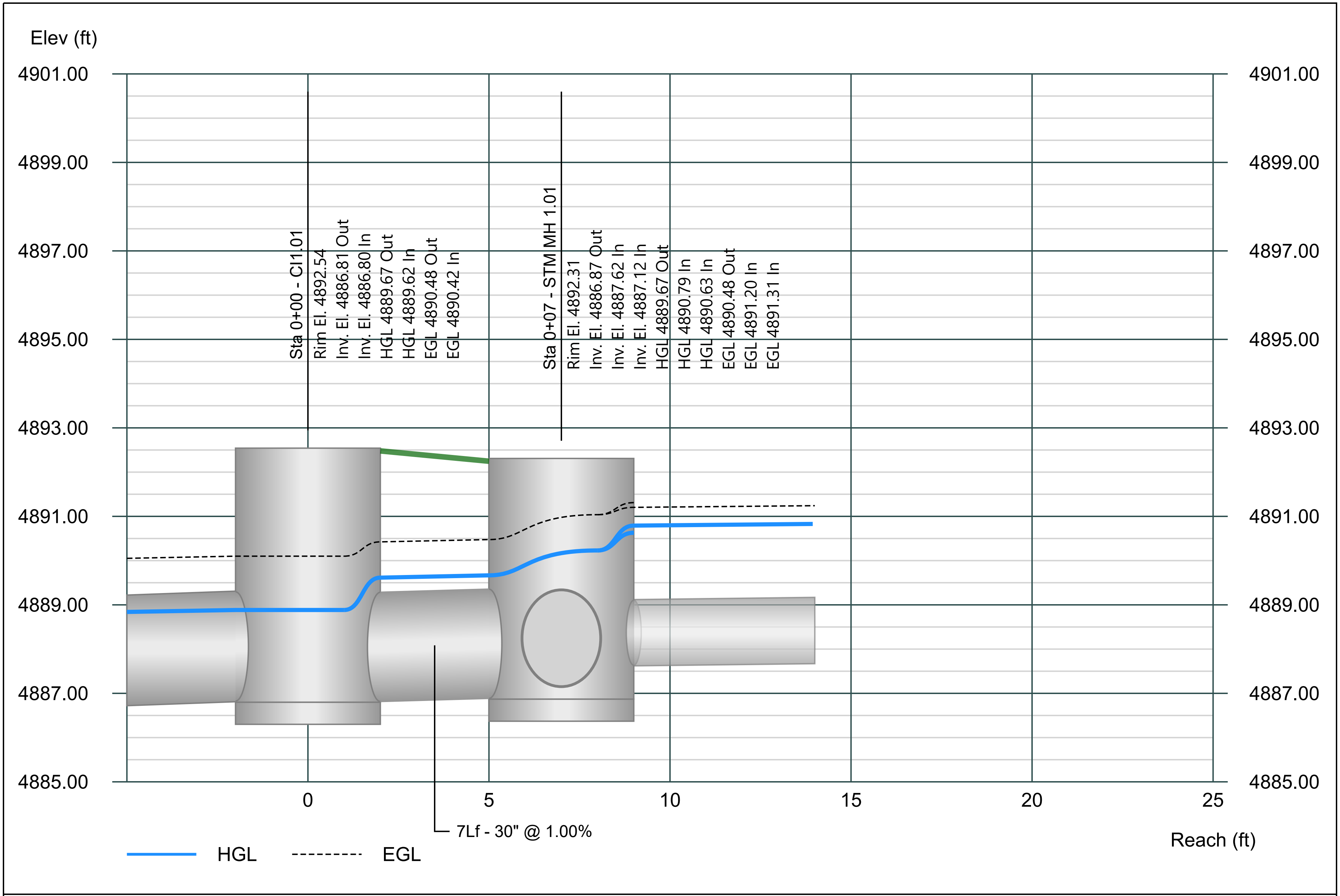
Project File: PA 1 and 2 NEW.sws

Line 3 - Pipe - (361) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



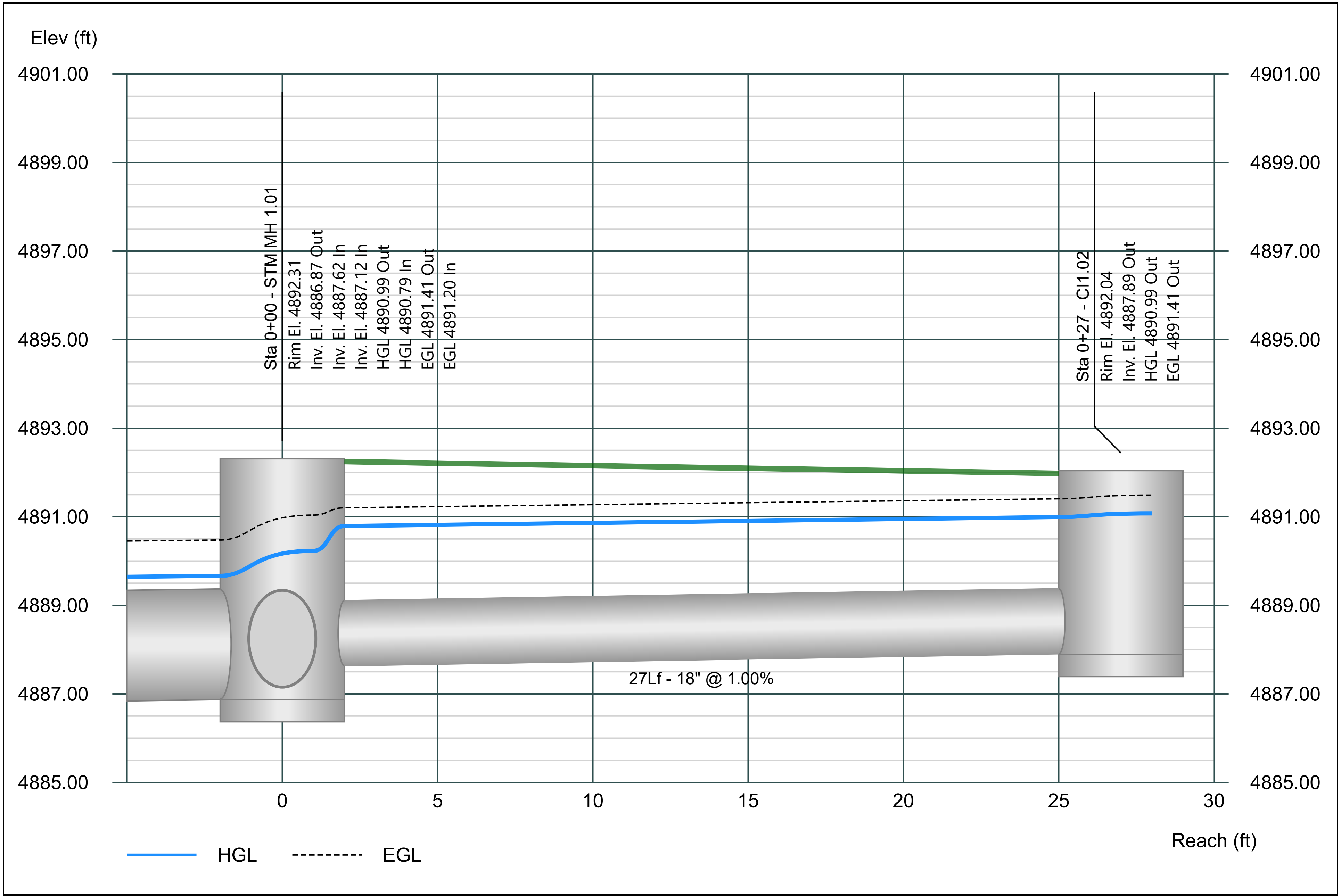
Project File: PA 1 and 2 NEW.sws

Line 4 - Pipe - (364) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



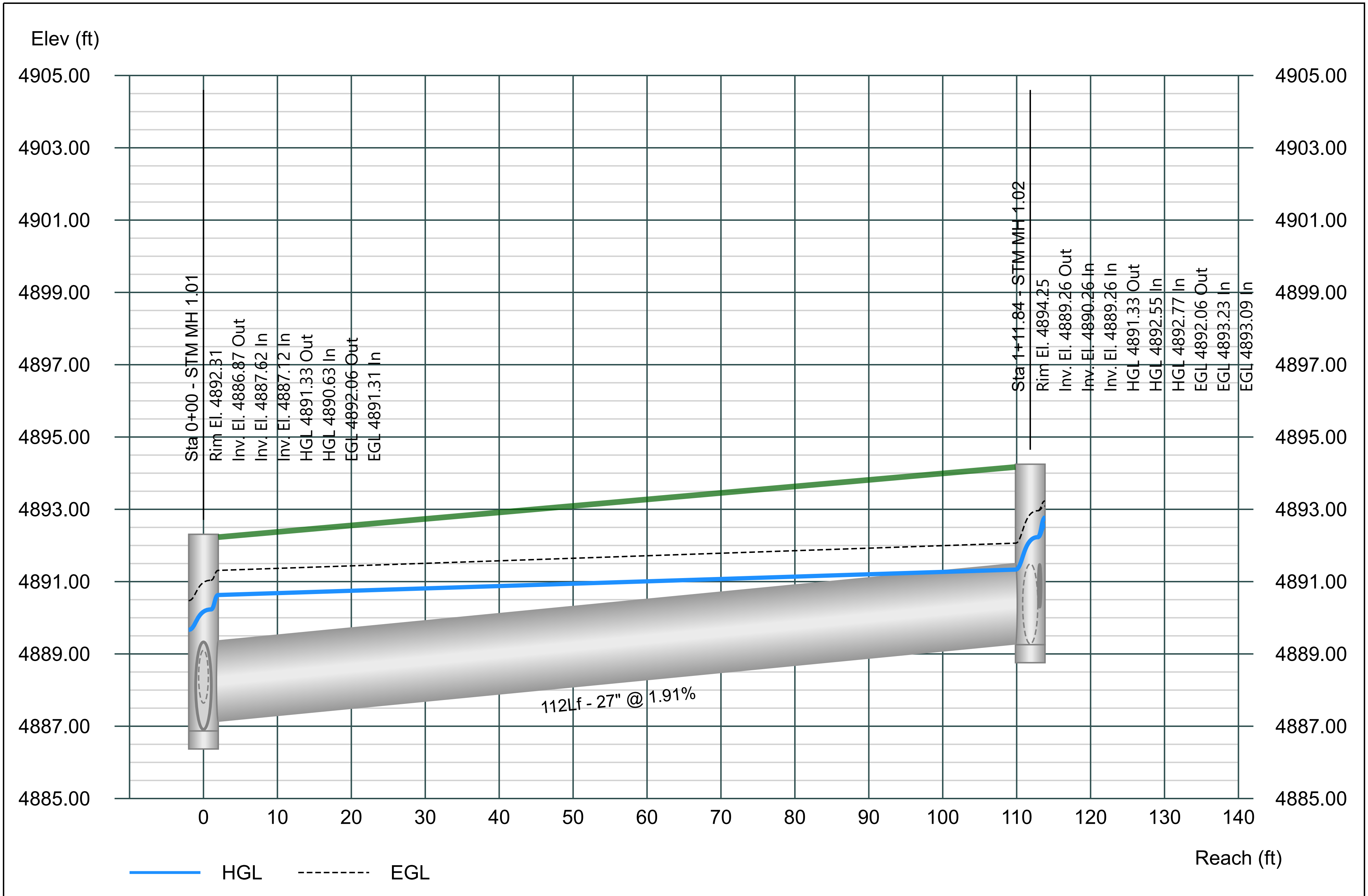
Project File: PA 1 and 2 NEW.sws

Line 5 - Pipe - (360) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



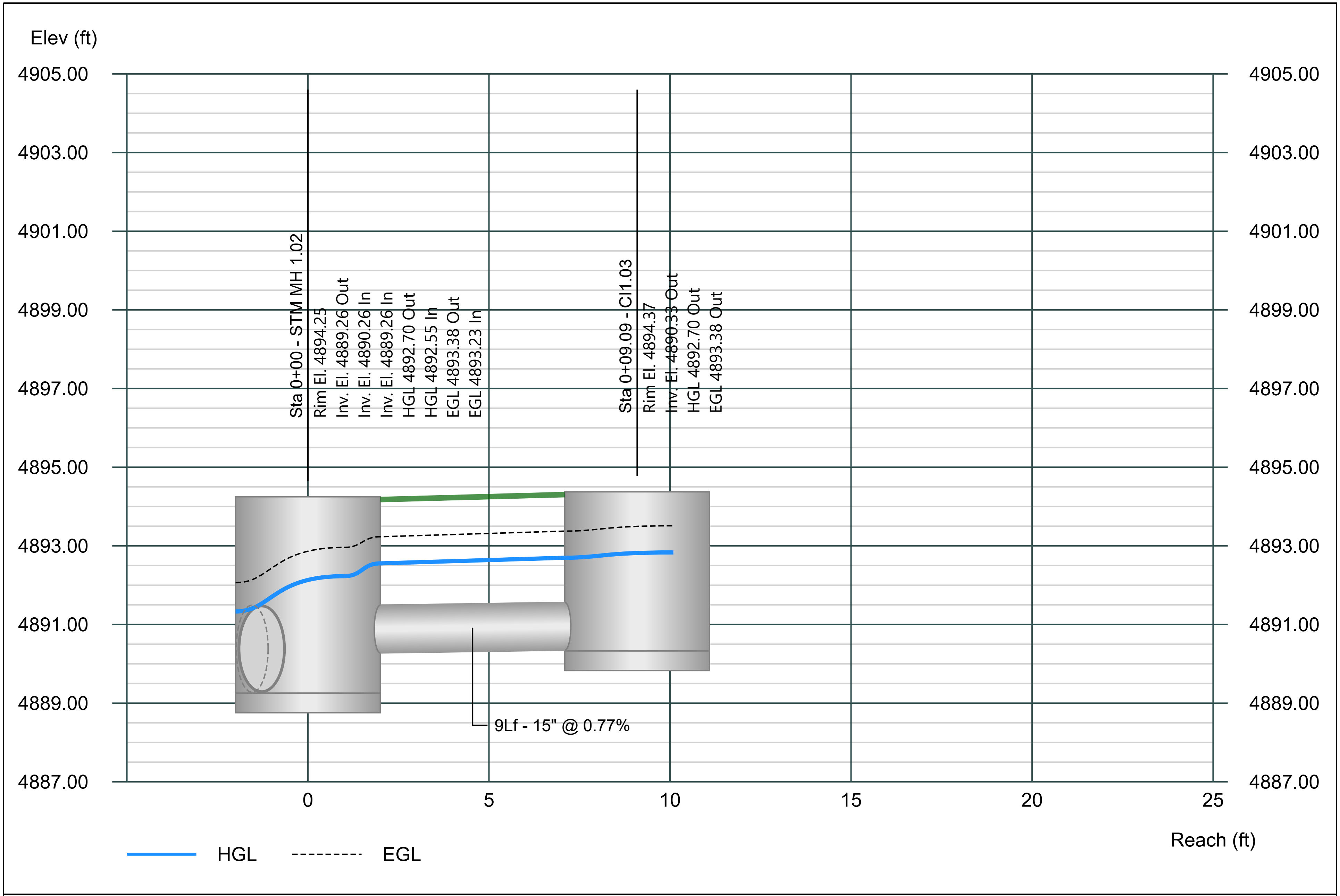
Project File: PA 1 and 2 NEW.sws

Line 6 - Pipe - (363) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



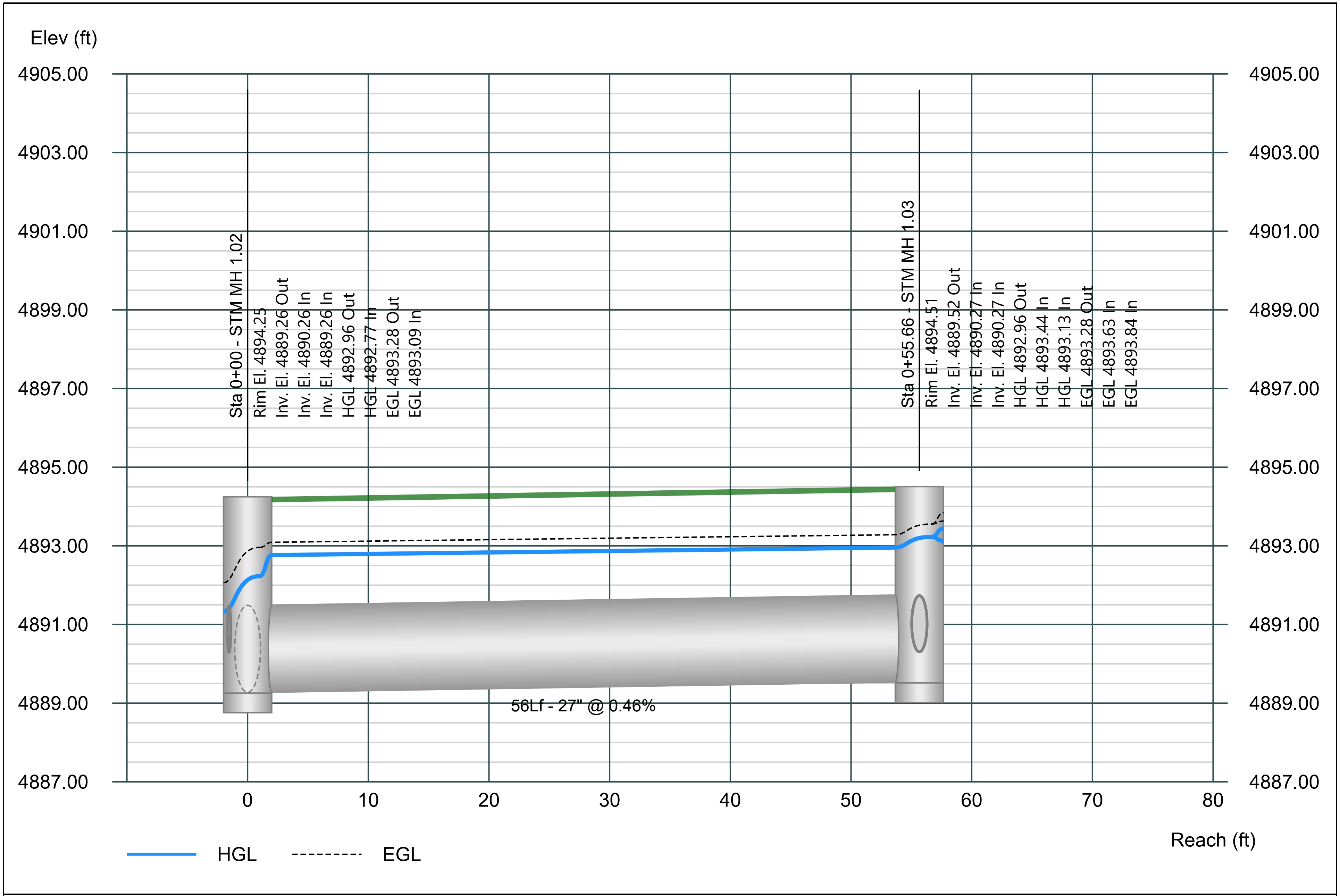
Project File: PA 1 and 2 NEW.sws

Line 7 - Pipe - (359) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021

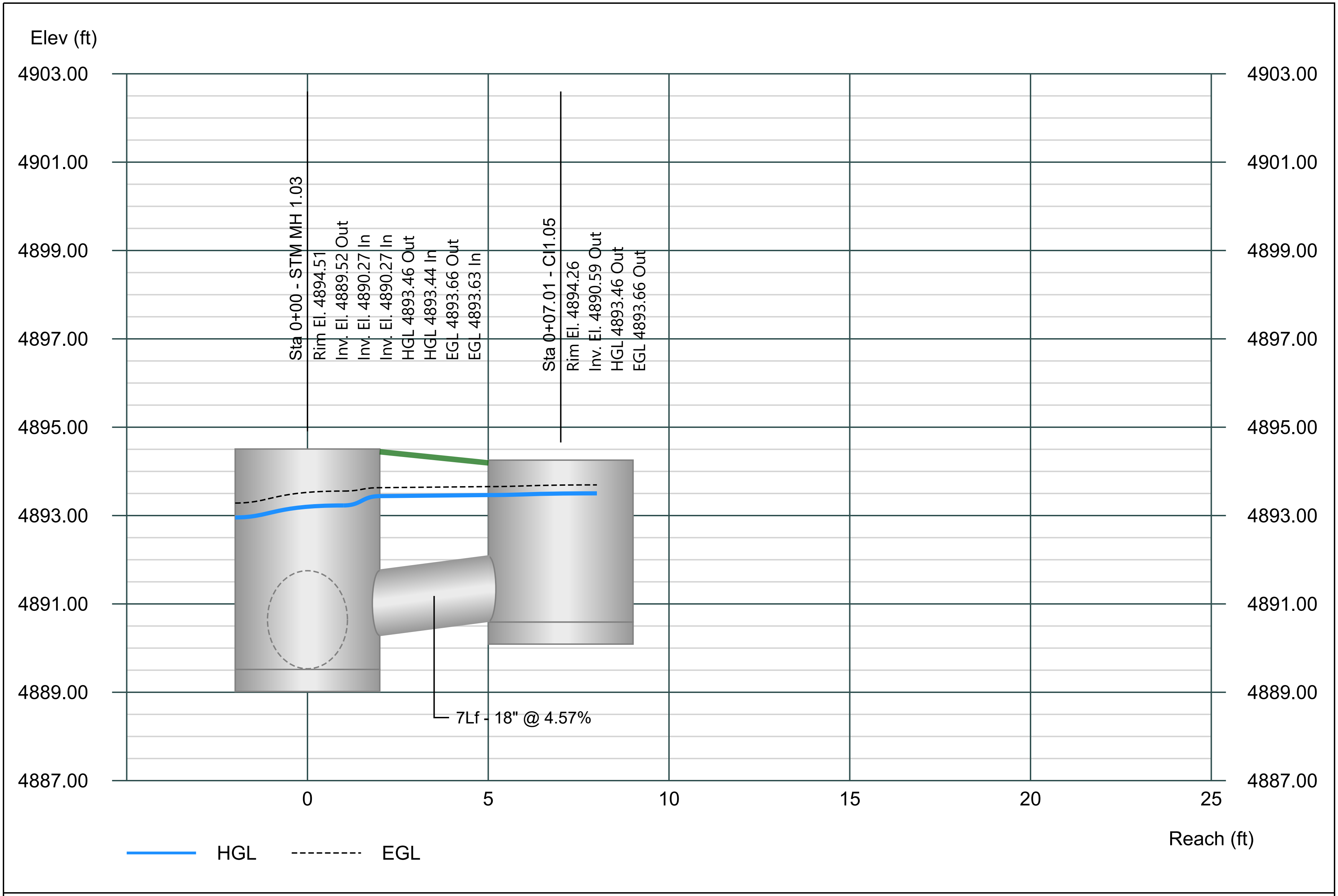


Line 8 - Pipe - (578) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



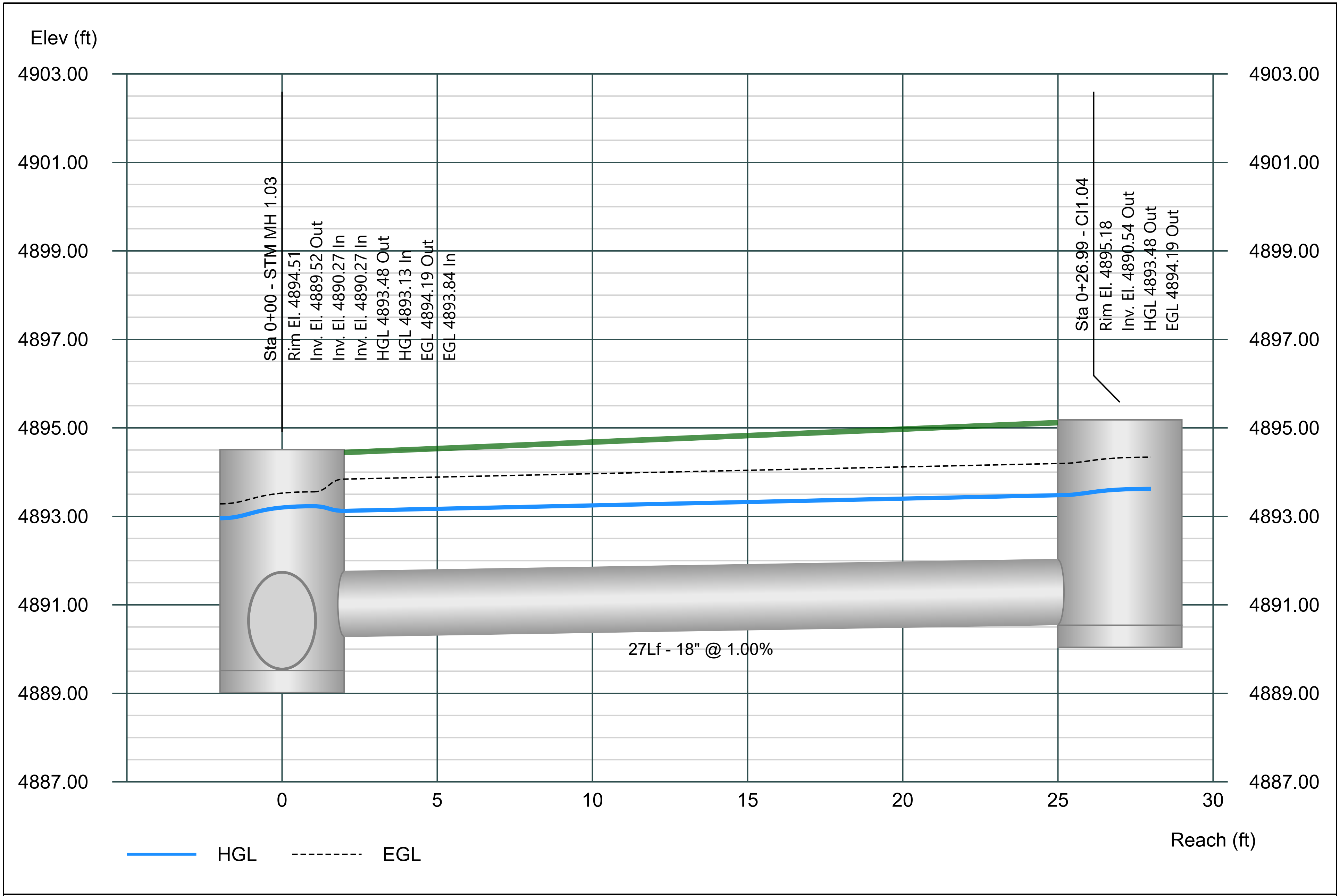
Project File: PA 1 and 2 NEW.sws

Line 9 - Pipe - (358) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



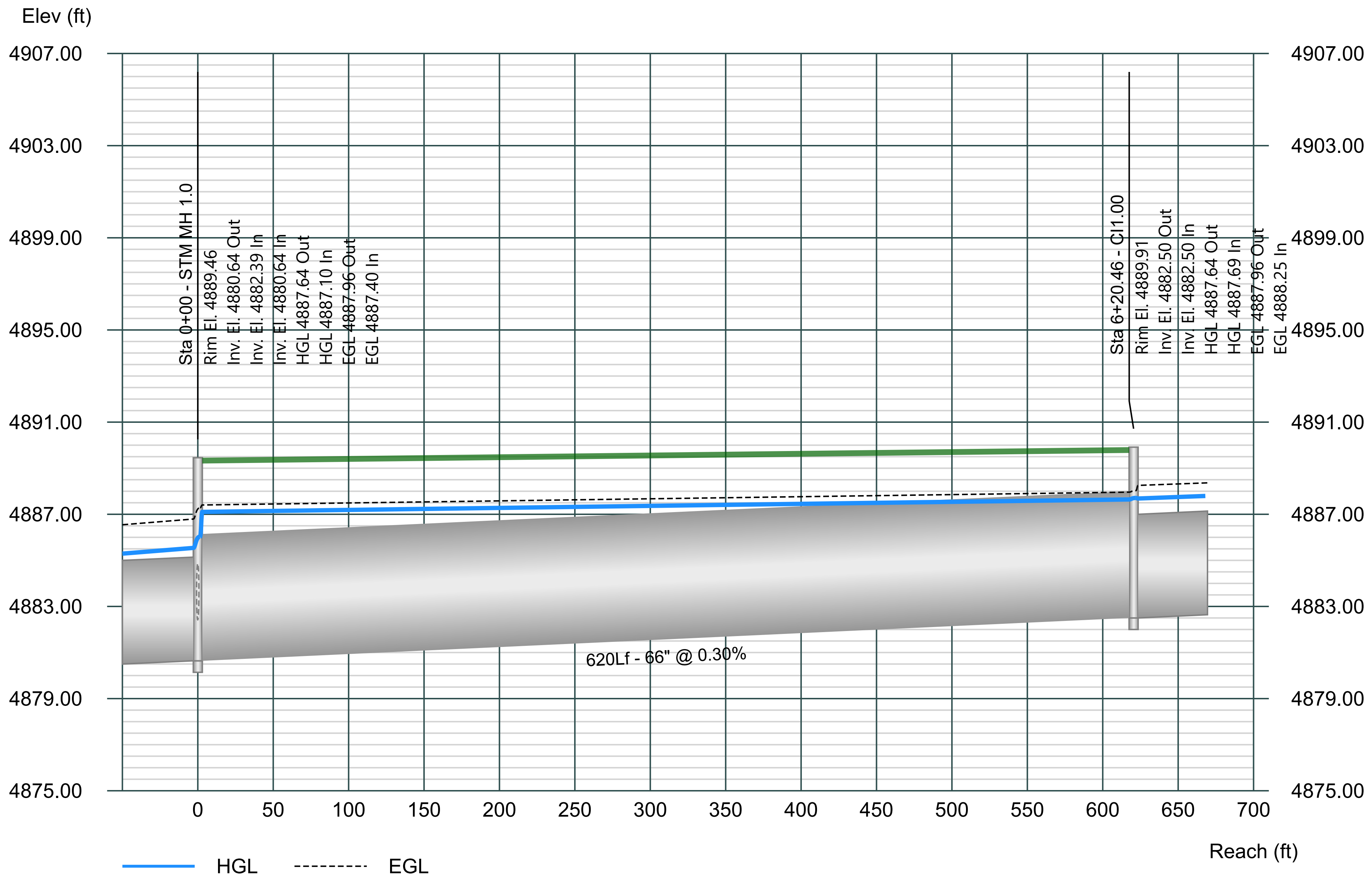
Project File: PA 1 and 2 NEW.sws

Line 10 - Pipe - (110) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



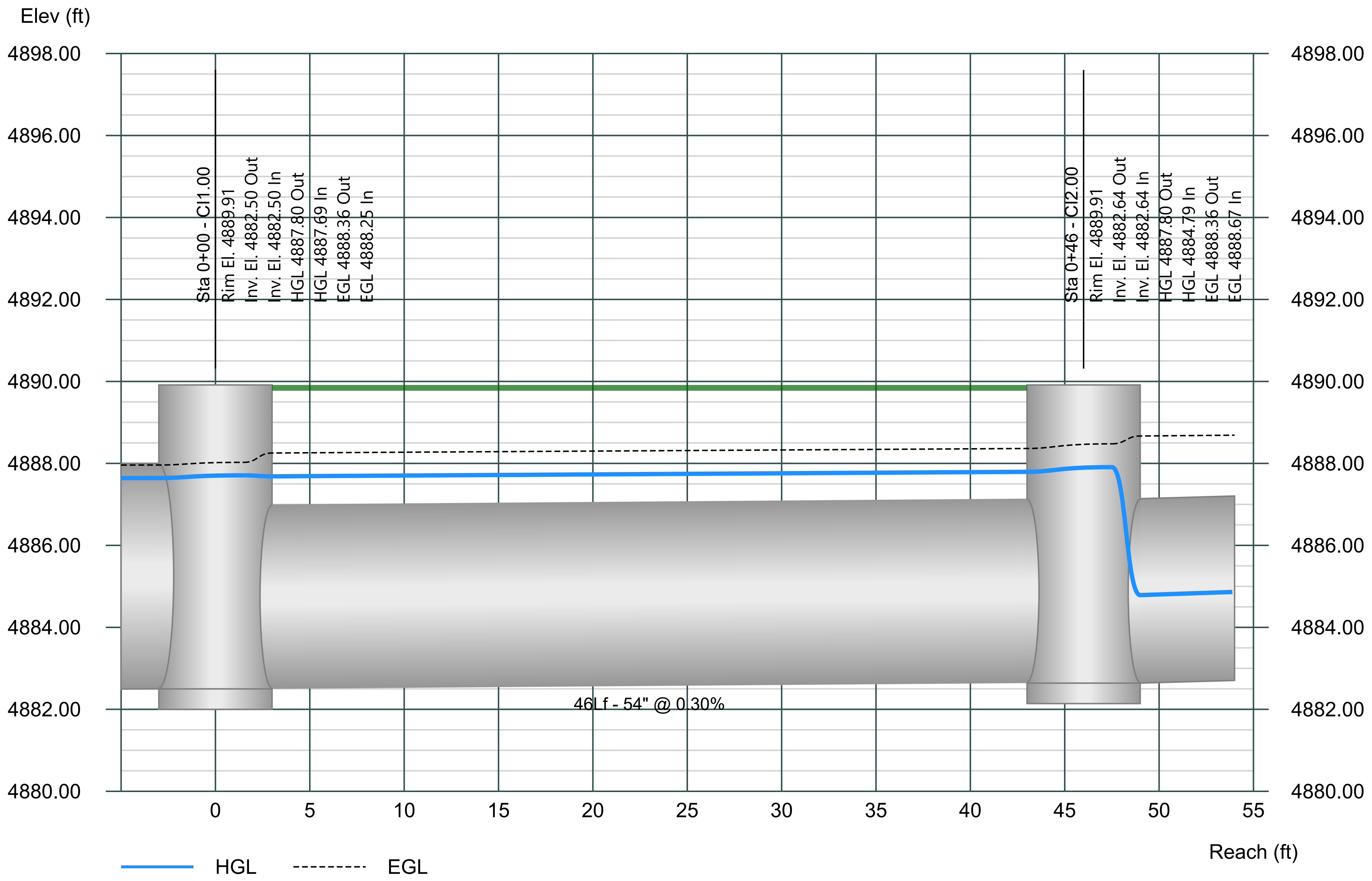
Project File: PA 1 and 2 NEW.sws

Line 11 - Pipe - (109) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



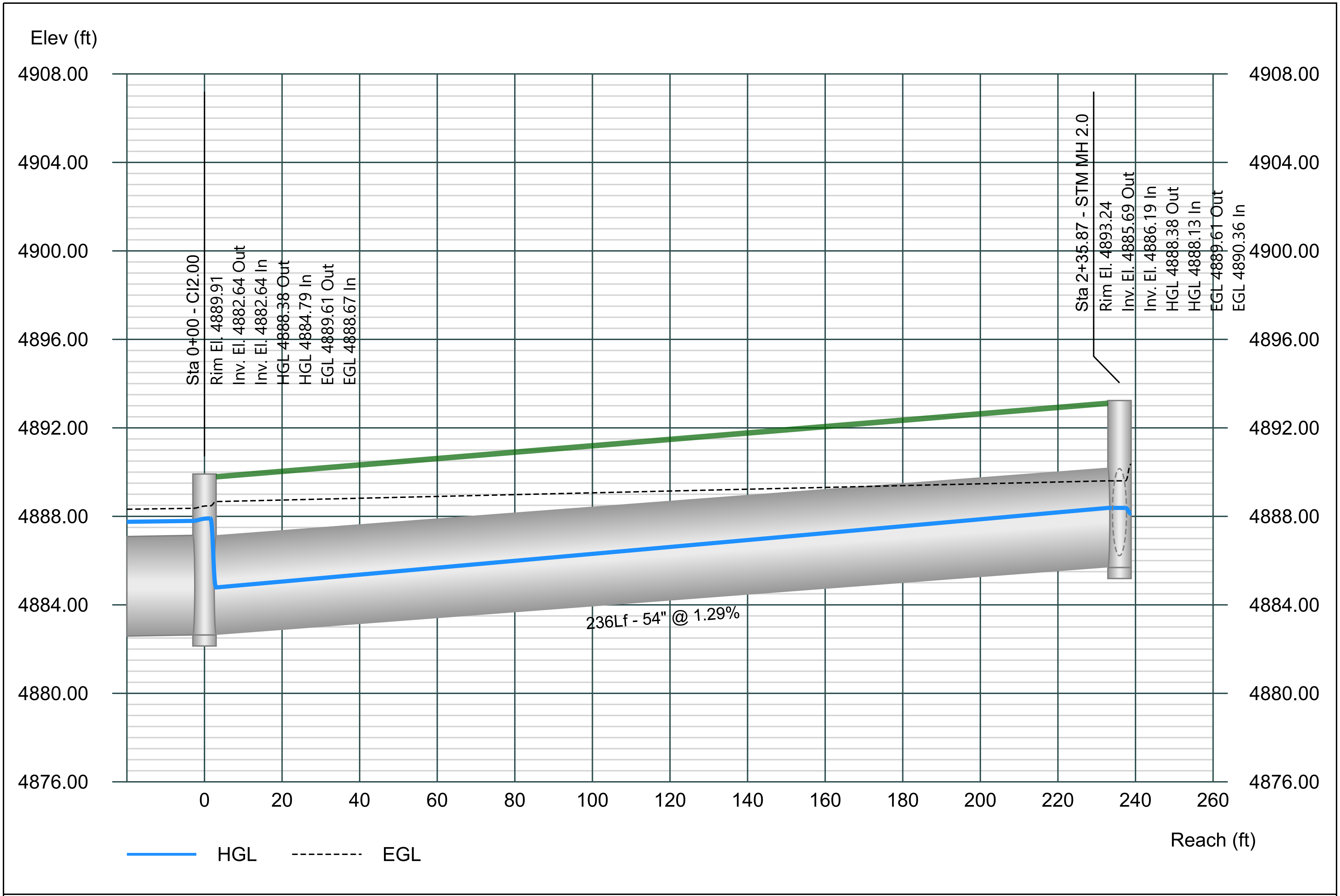
Project File: PA 1 and 2 NEW.sws

Line 12 - Pipe - (108) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



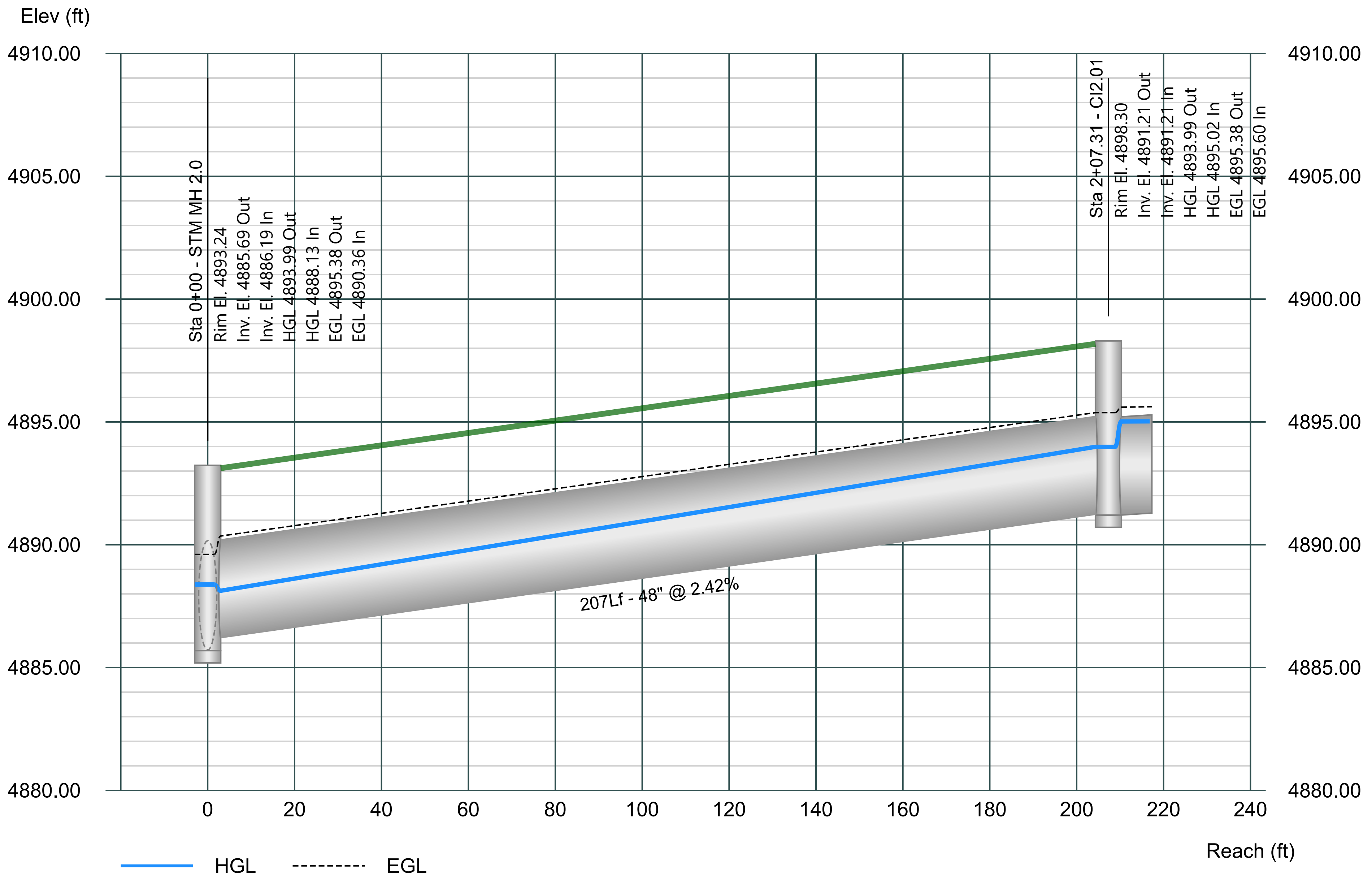
Project File: PA 1 and 2 NEW.sws

Line 13 - Pipe - (107) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



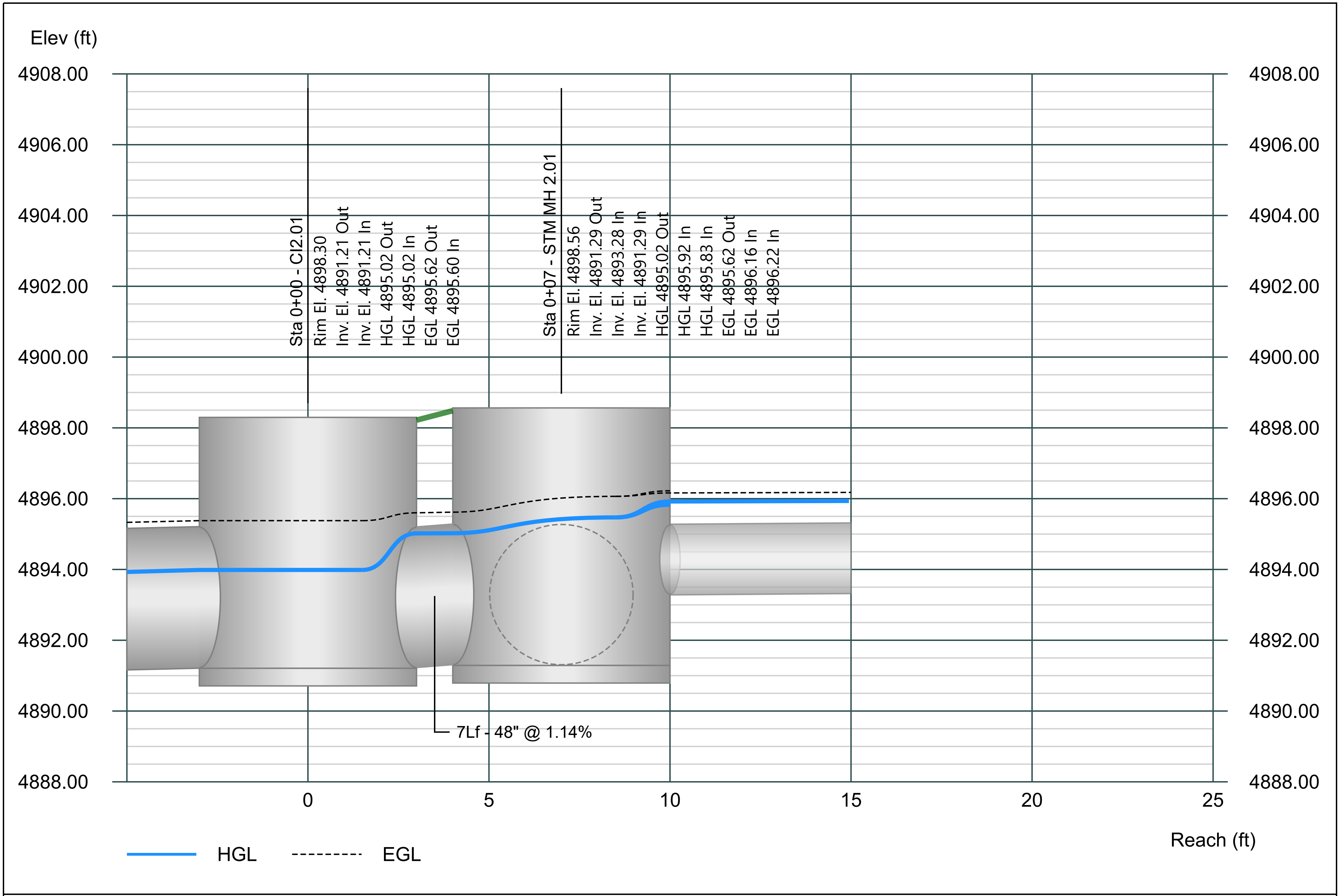
Project File: PA 1 and 2 NEW.sws

Line 14 - Pipe - (106) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



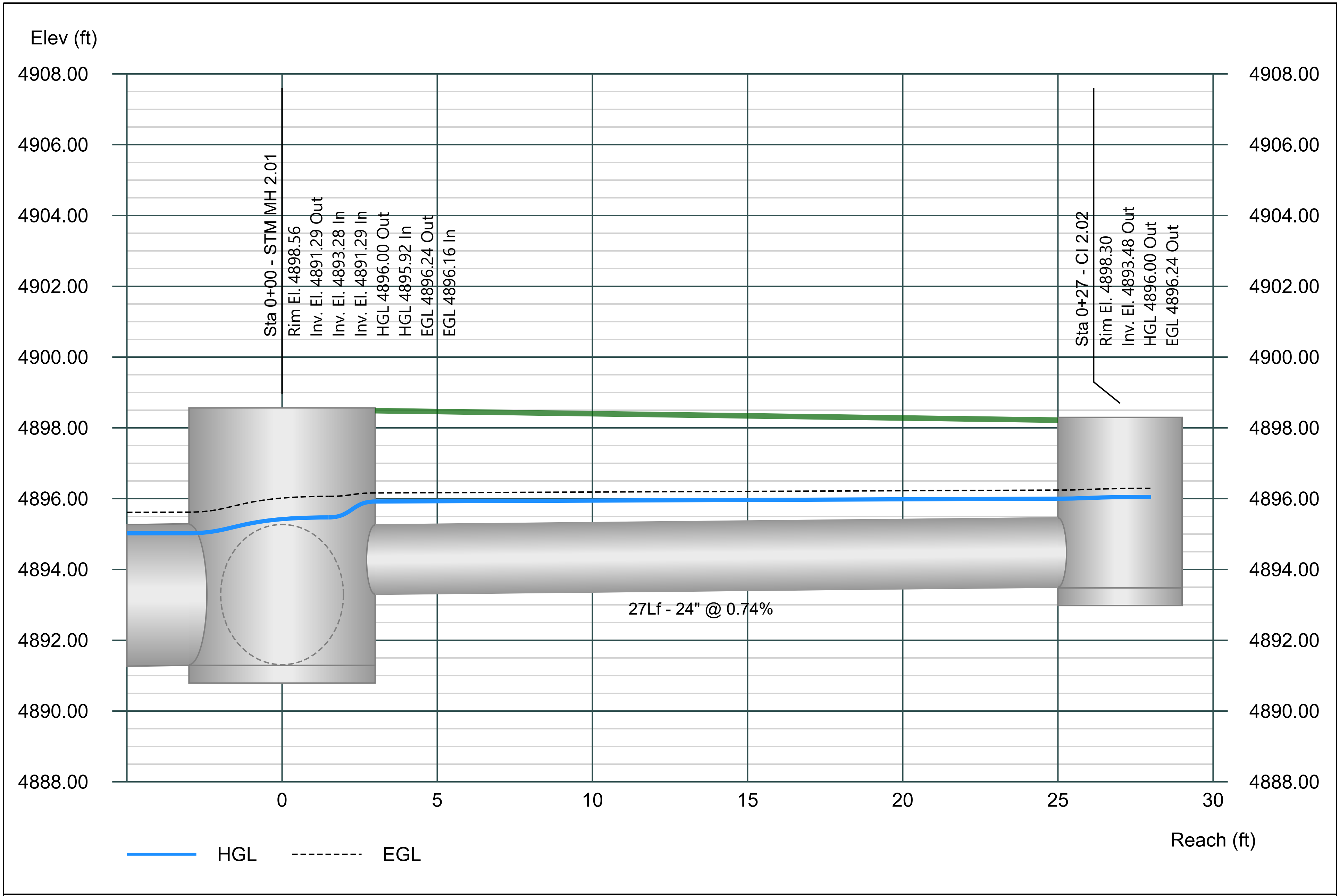
Project File: PA 1 and 2 NEW.sws

Line 15 - Pipe - (354) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



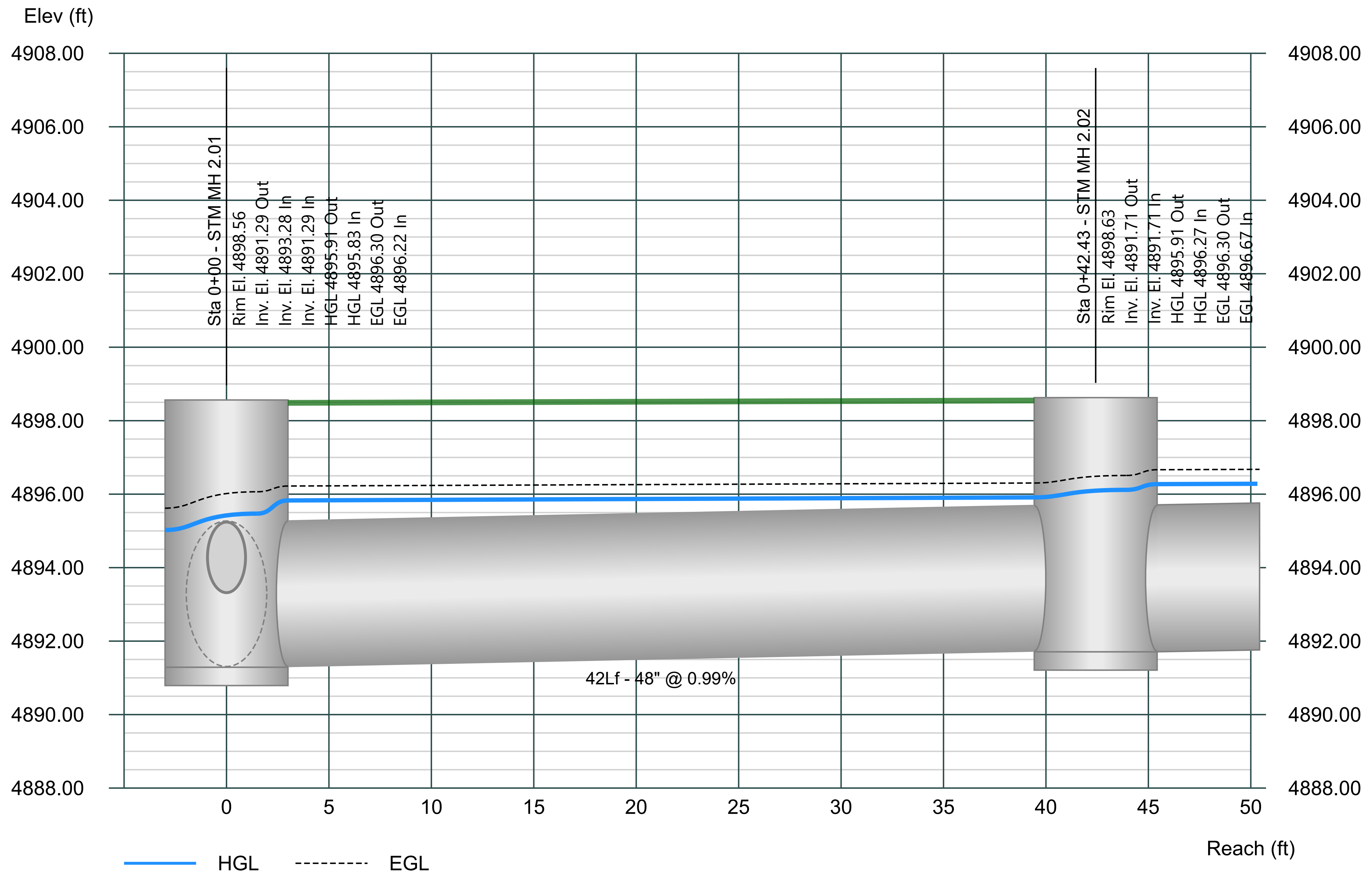
Project File: PA 1 and 2 NEW.sws

Line 16 - Pipe - (105) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



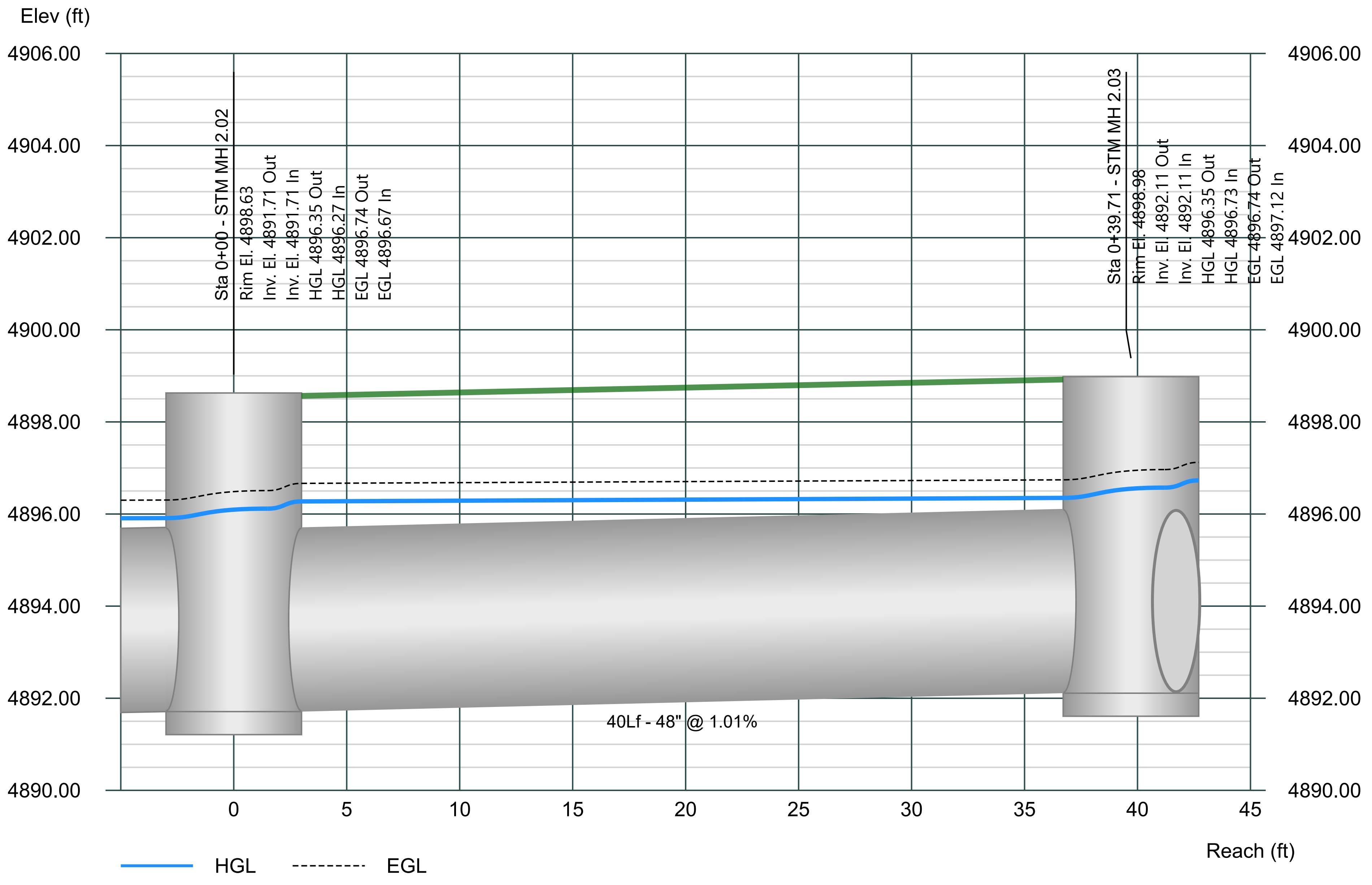
Project File: PA 1 and 2 NEW.sws

Line 17 - Pipe - (104) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



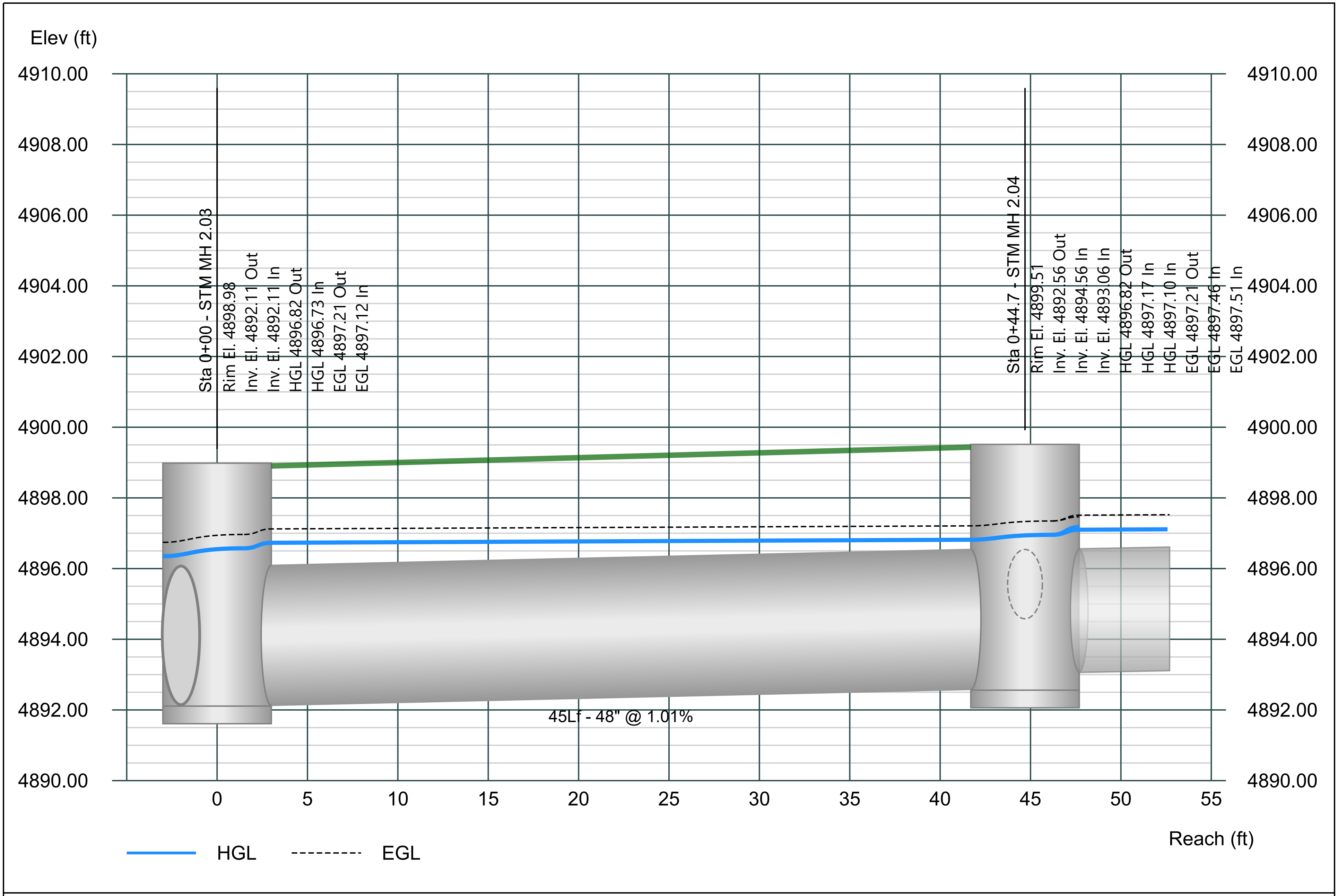
Project File: PA 1 and 2 NEW.sws

Line 18 - Pipe - (103) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021

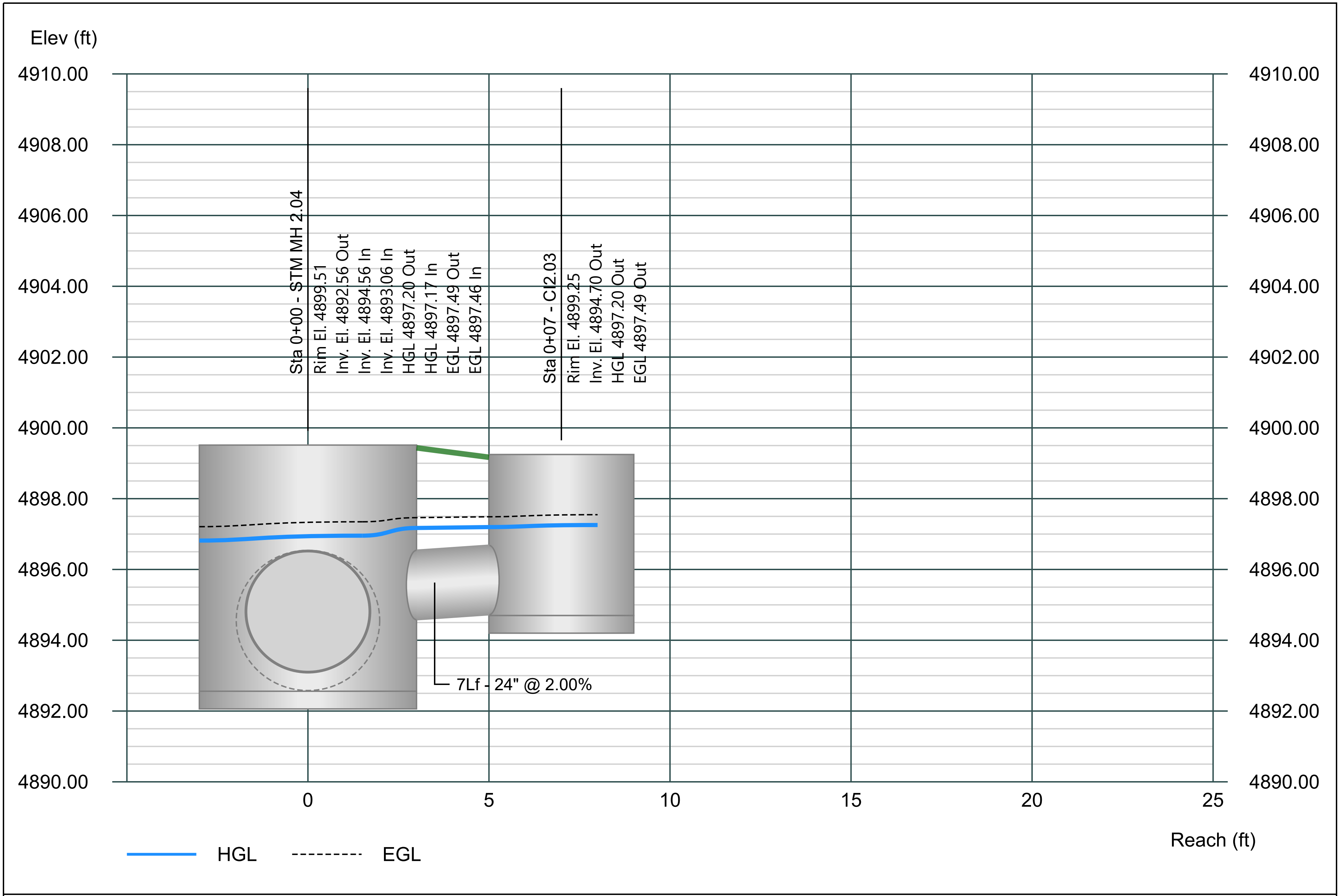


Line 19 - Pipe - (366) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



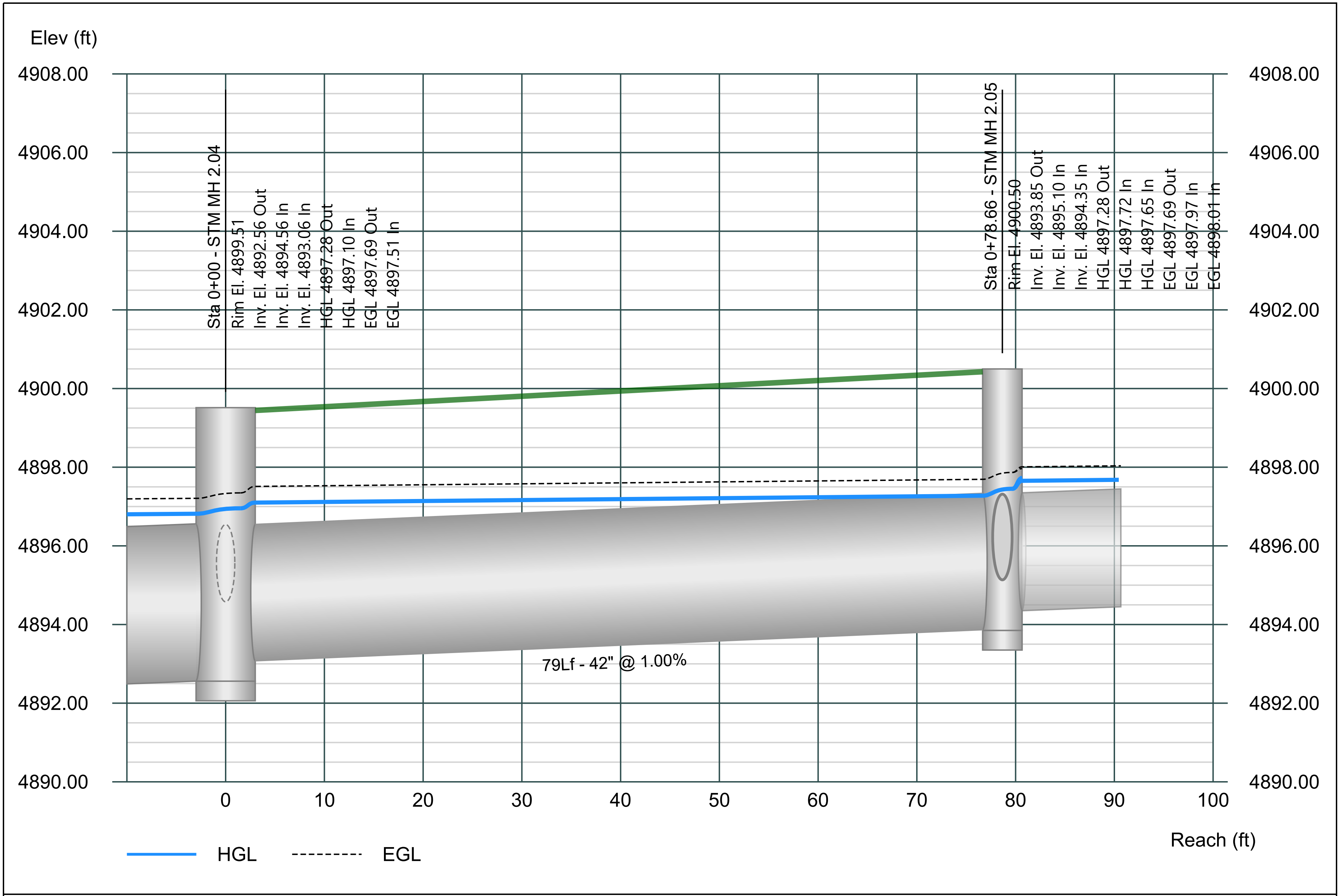
Project File: PA 1 and 2 NEW.sws

Line 20 - Pipe - (102) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021

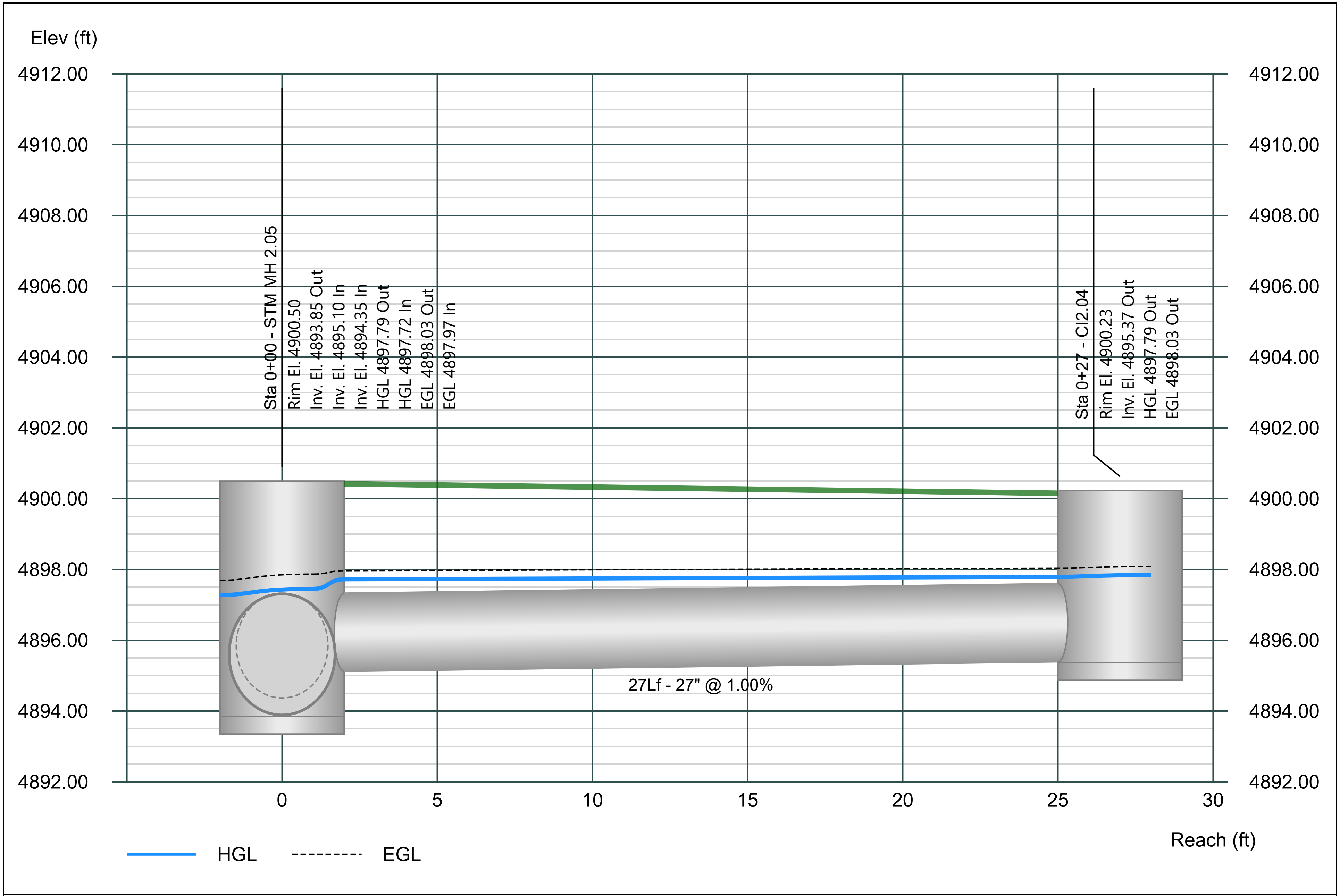


Line 21 - Pipe - (101) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



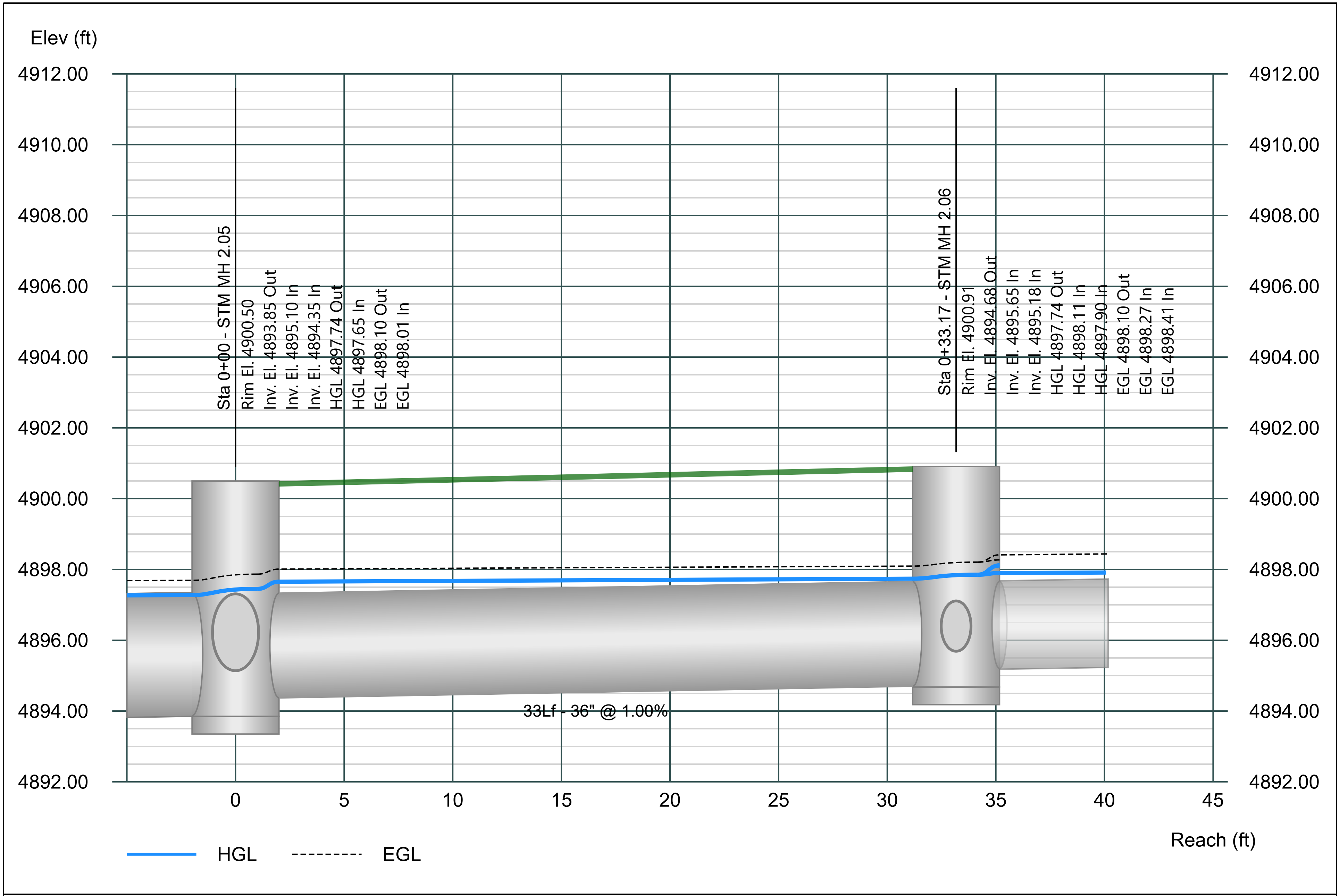
Project File: PA 1 and 2 NEW.sws

Line 22 - Pipe - (576) (1) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



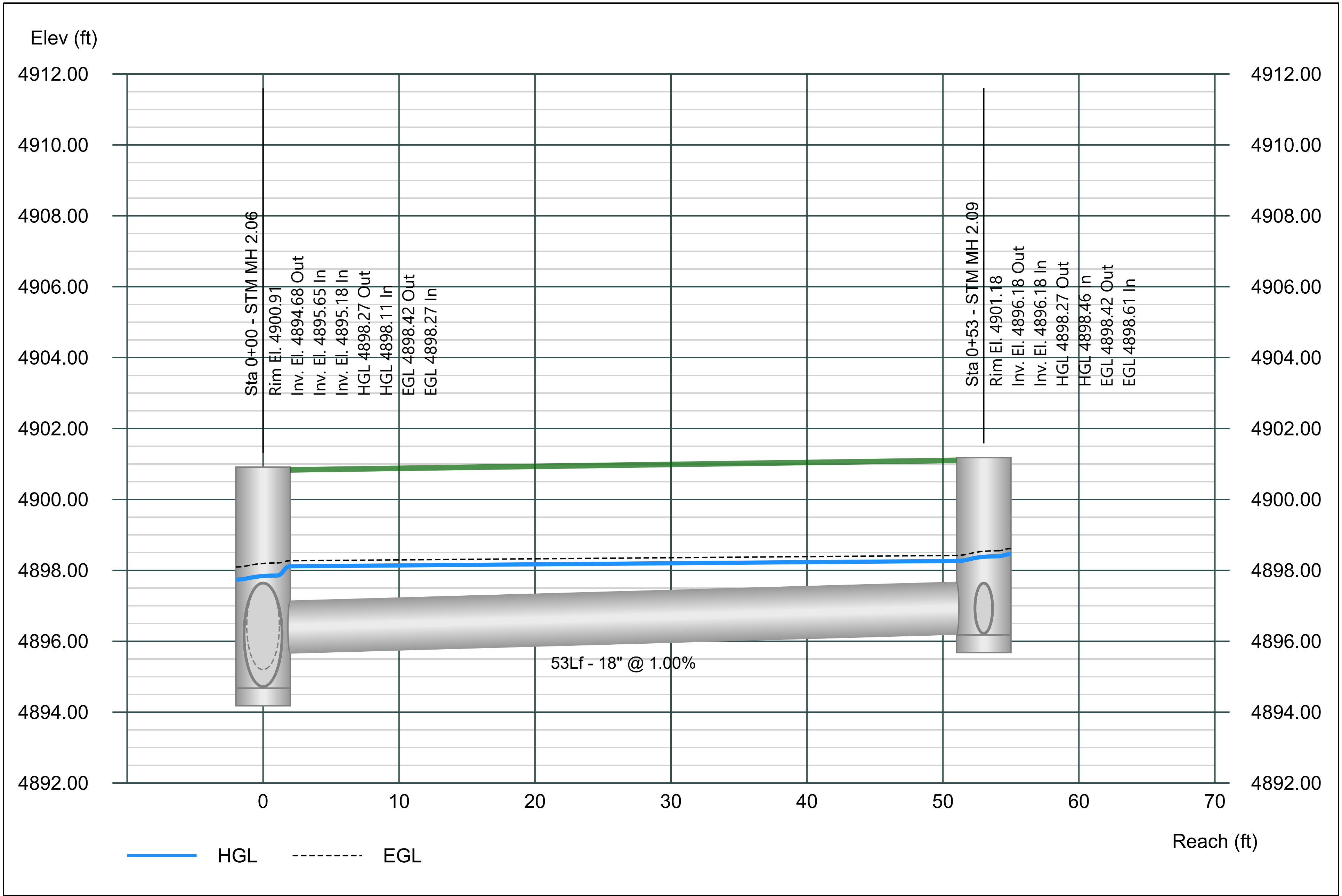
Project File: PA 1 and 2 NEW.sws

Line 23 - Pipe - (580) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



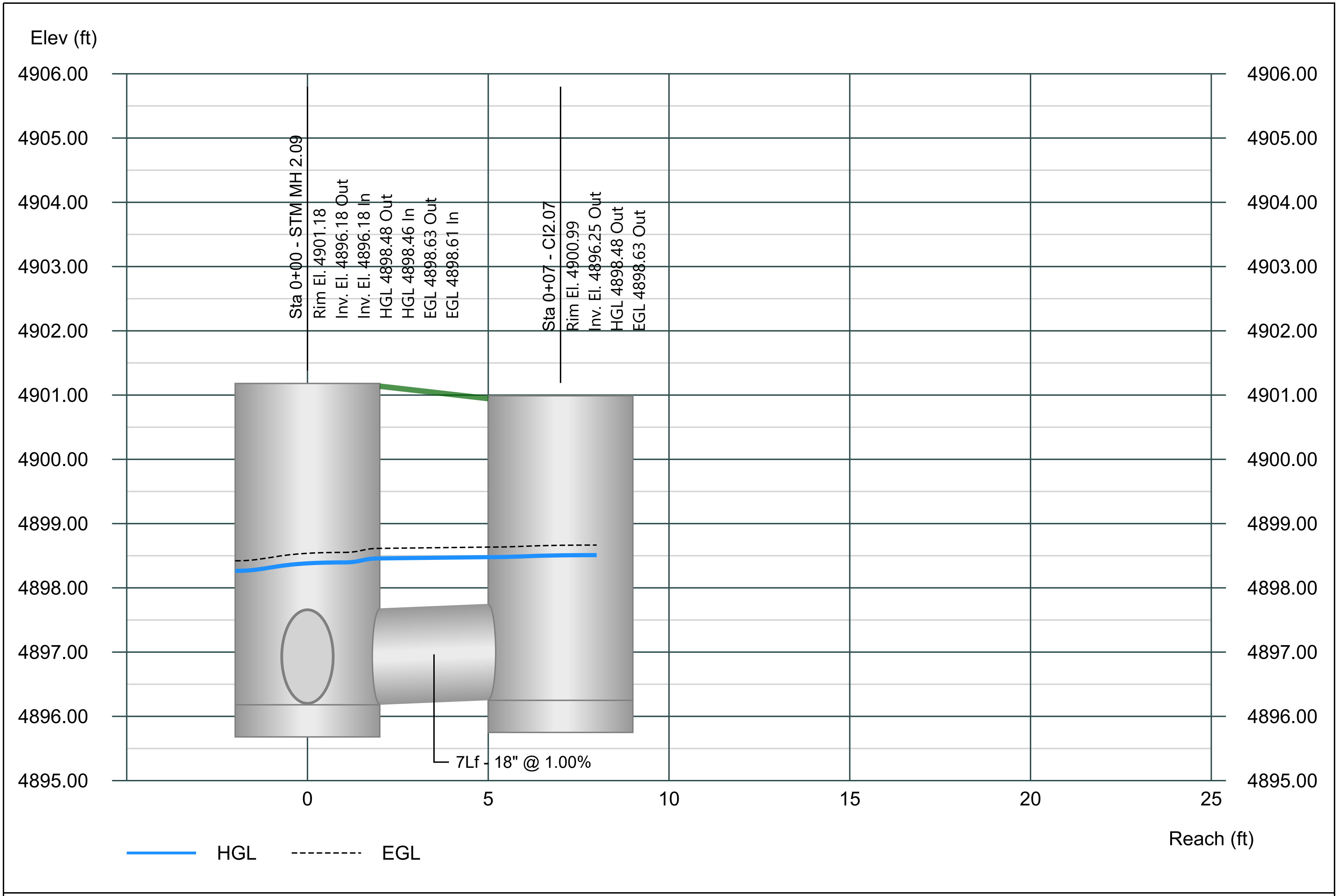
Project File: PA 1 and 2 NEW.sws

Line 24 - Pipe - (579) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



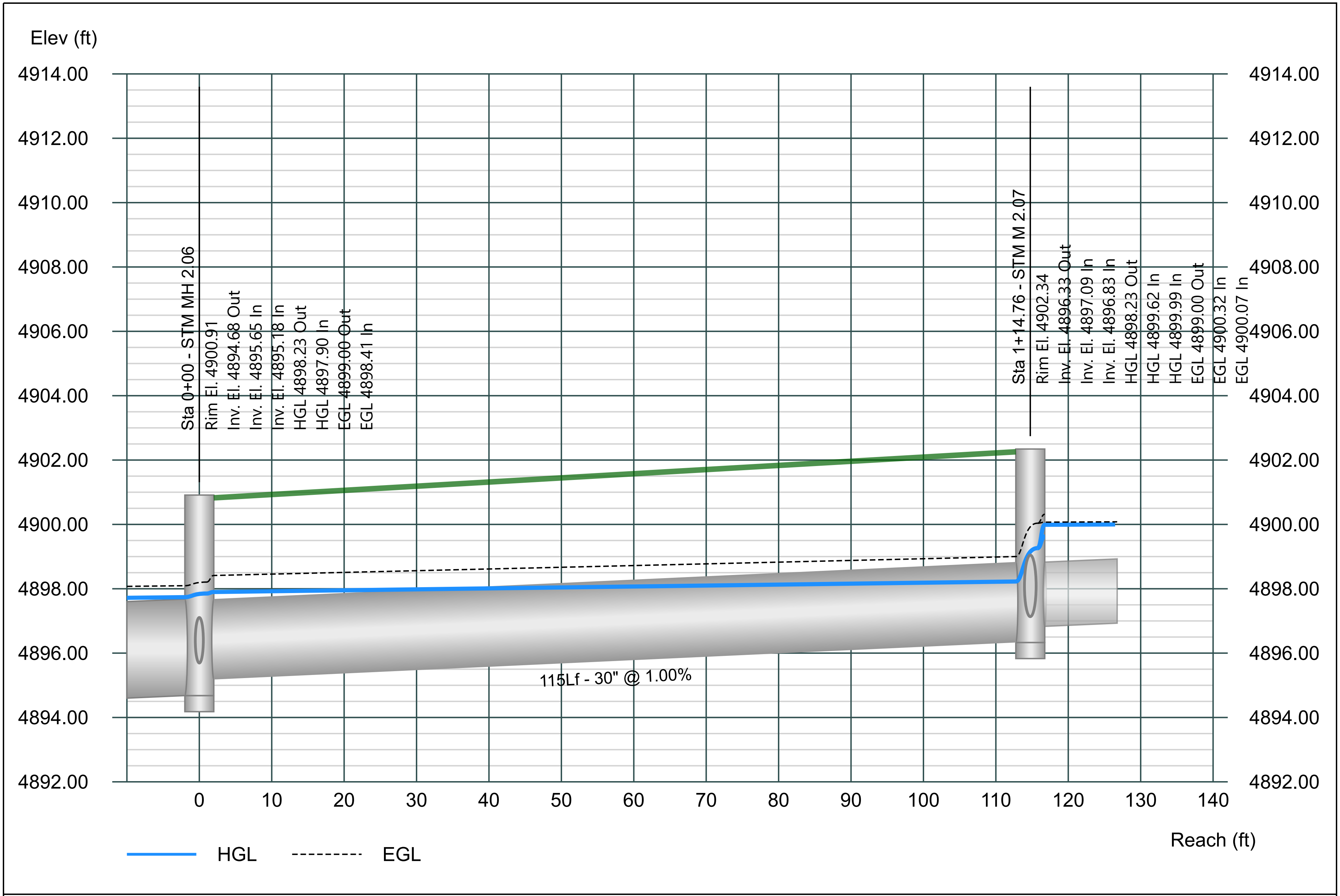
Project File: PA 1 and 2 NEW.sws

Line 25 - Pipe - (576) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



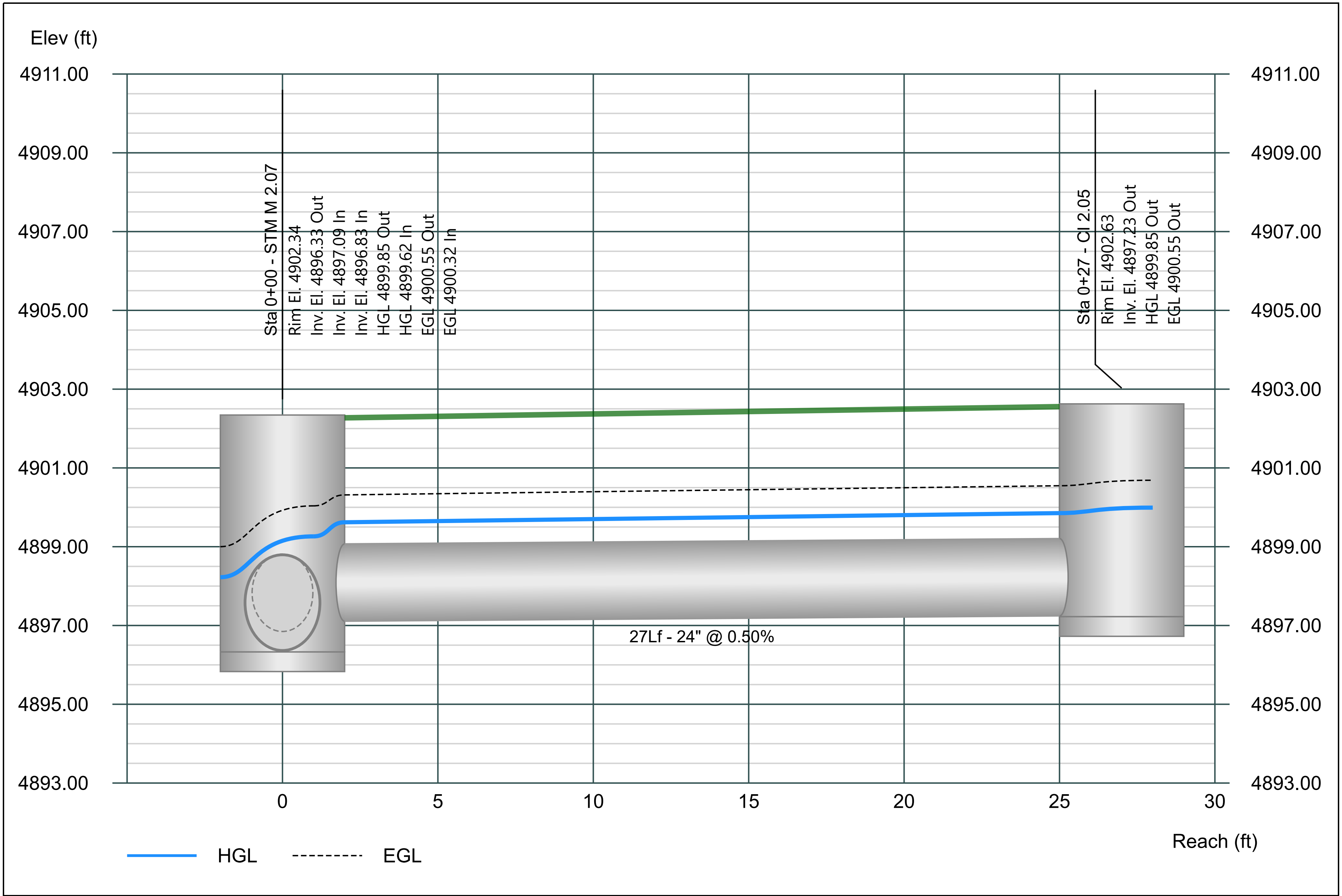
Project File: PA 1 and 2 NEW.sws

Line 26 - Pipe - (577) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



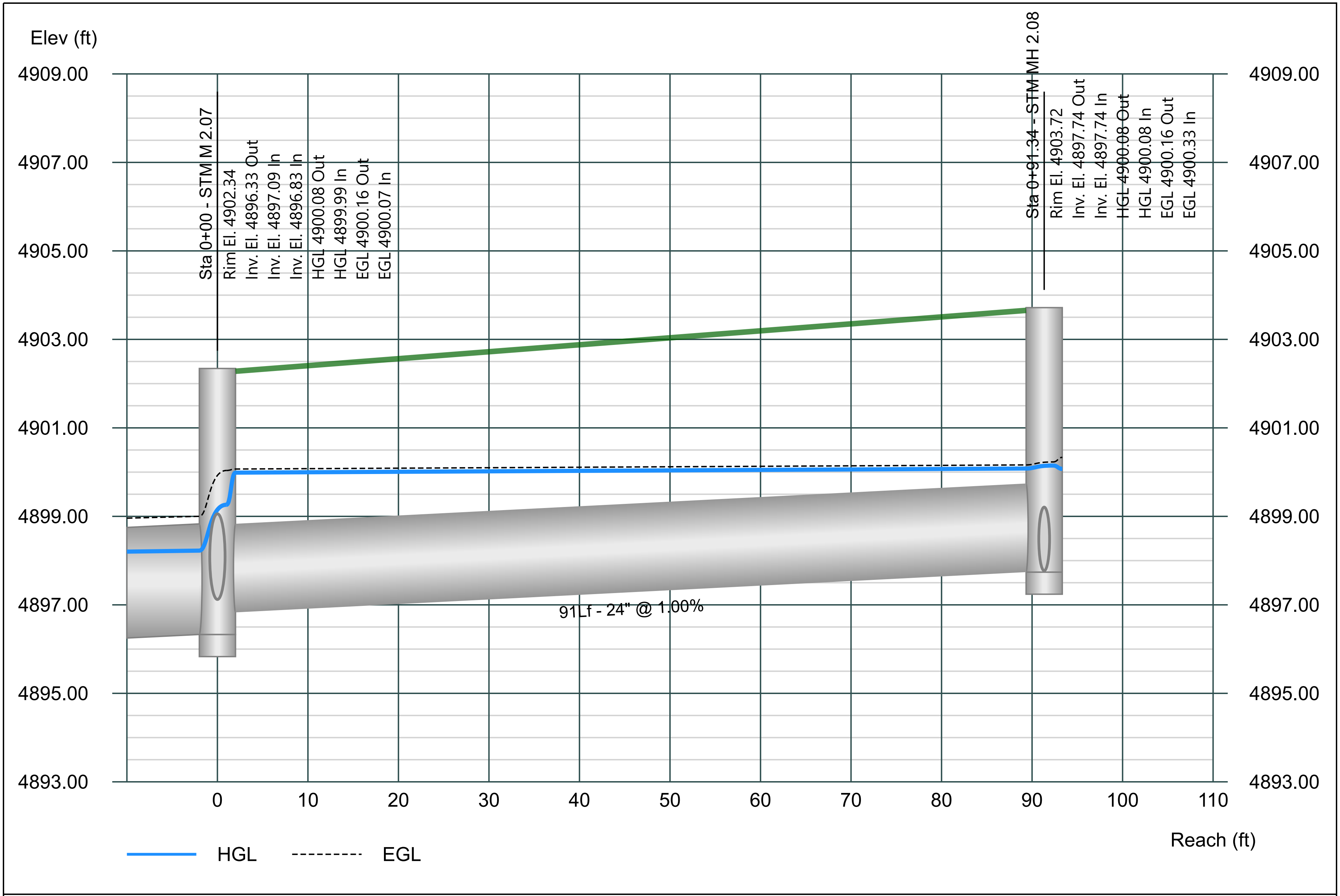
Project File: PA 1 and 2 NEW.sws

Line 27 - Pipe - (575) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



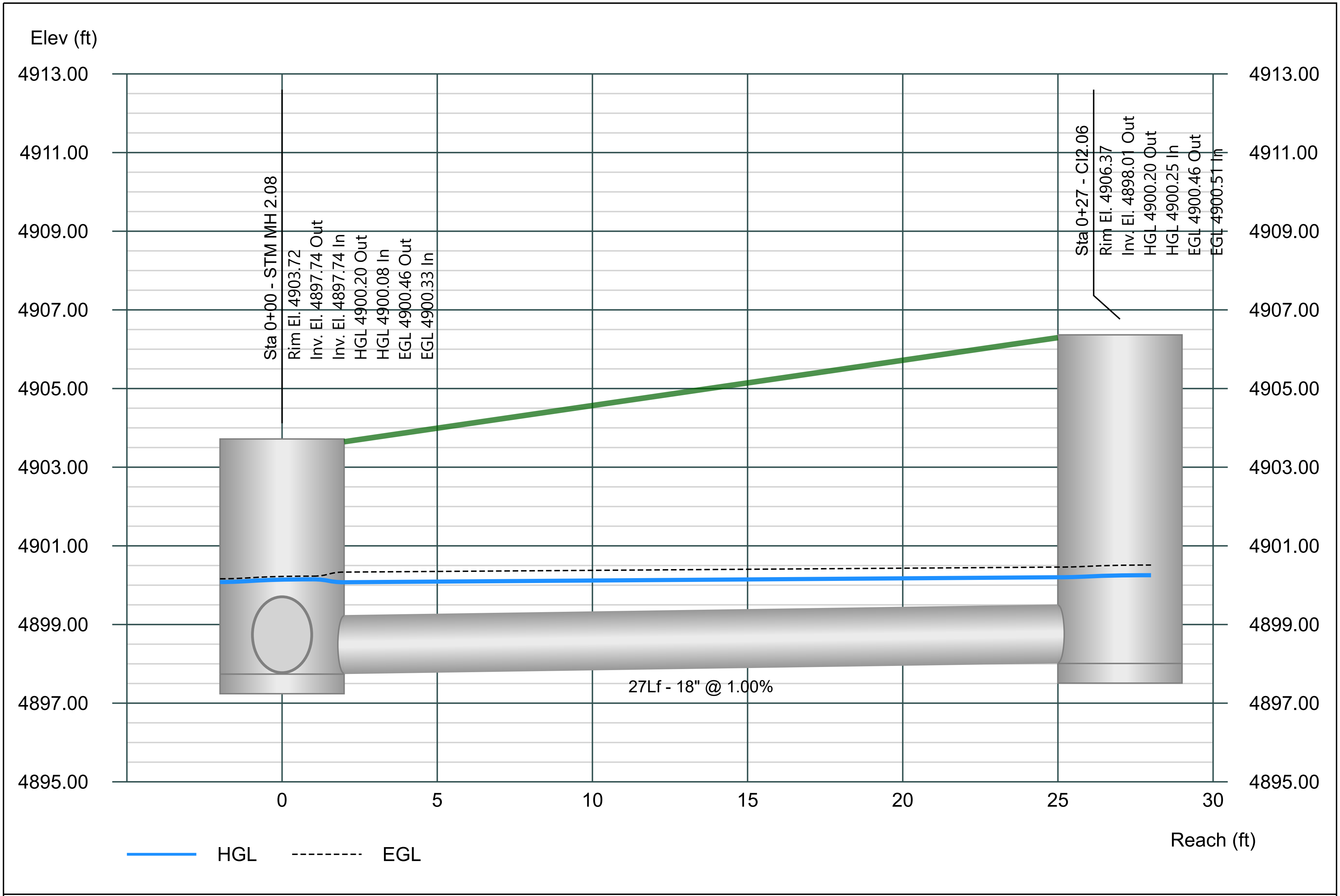
Project File: PA 1 and 2 NEW.sws

Line 28 - Pipe - (574) (Storm Sewer PAs 1 and 2)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village- PA 1 and 2

03-24-2021



Project File: PA 1 and 2 NEW.sws

Energy Grade Line Calculations

Stormwater Studio 2021 v 3.0.0.24

Project Name: Enter Project Name...

03-24-2021

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
	(in)	(cfs)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	(ft)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	n Value	Enrgy Loss (ft)	HGLa Elev (ft)	EGLa Elev (ft)	Enrgy Loss (ft)
1	54	142.80	4880.11	4.50[3]	15.90	4884.61	8.98	1.25	4885.86	176.33	4880.64	4.50	15.90	4885.54	8.98	1.25	4886.79	0.013	0.930	4886.03	4887.28	0.49
2	30	38.50	4882.39	2.50	4.91	4886.71	7.84	0.96	4887.67	149.26	4886.81	2.07[2]	4.35	4888.88	8.84	1.22	4890.10	0.013	2.435	4888.88	4890.10	0.00
3	30	35.40	4886.80	2.50	4.91	4889.62	7.21	0.81	4890.42	7.00	4886.87	2.50	4.91	4889.67	7.21	0.81	4890.48	0.013	0.052	4890.23	4891.04	0.56
4	18	9.10	4887.62	1.50	1.77	4890.79	5.15	0.41	4891.20	27.00	4887.89	1.50	1.77	4890.99	5.15	0.41	4891.41	0.013	0.203	4891.08	4891.49	0.08
5	27	26.30	4887.12	2.25	3.98	4890.63	6.62	0.68	4891.31	111.84	4889.26	2.08	3.83	4891.33	6.86	0.73	4892.06	0.013	0.753	4892.23	4892.96	0.90
6	15	8.10	4890.26	1.25[3]	1.23	4892.55	6.60	0.68	4893.23	9.09	4890.33	1.25	1.23	4892.70	6.60	0.68	4893.38	0.013	0.143	4892.83	4893.51	0.14
7	27	18.20	4889.26	2.25	3.98	4892.77	4.58	0.33	4893.09	55.66	4889.52	2.25	3.98	4892.96	4.58	0.33	4893.28	0.013	0.192	4893.23	4893.56	0.27
8	18	6.20	4890.27	1.50	1.77	4893.44	3.51	0.19	4893.63	7.01	4890.59	1.50	1.77	4893.46	3.51	0.19	4893.66	0.013	0.024	4893.50	4893.69	0.04
9	18	12.00	4890.27	1.50[3]	1.77	4893.13	6.79	0.72	4893.84	26.99	4890.54	1.50	1.77	4893.48	6.79	0.72	4894.19	0.013	0.353	4893.62	4894.34	0.14
10	66	104.30	4880.64	5.50	23.75	4887.10	4.39	0.30	4887.40	620.46	4882.50	5.14	23.11	4887.64	4.51	0.32	4887.96	0.013	0.557	4887.71	4888.03	0.07
11	54	96.20	4882.50	4.50	15.90	4887.69	6.05	0.57	4888.25	46.00	4882.64	4.50	15.90	4887.80	6.05	0.57	4888.36	0.013	0.110	4887.91	4888.48	0.11
12	54	88.10	4882.64	2.15‡	7.49	4884.79	11.76	2.15	4888.67	235.87	4885.69	2.69[2]	9.93	4888.38	8.87	1.22	4889.61	0.013	0.938	4888.38	4889.61	0.00
13	48	88.10	4886.19	1.94‡	6.04	4888.13	14.59	3.31	4890.36	207.31	4891.21	2.78[2]	9.31	4893.99	9.46	1.39	4895.38	0.013	5.023	4893.99	4895.38	0.00
14	48	75.50	4891.21	3.81	12.35	4895.02	6.11	0.58	4895.60	7.00	4891.29	3.73	12.21	4895.02	6.18	0.59	4895.62	0.013	0.018	4895.47	4896.07	0.45
15	24	12.40	4893.28	2.00	3.14	4895.92	3.95	0.24	4896.16	27.00	4893.48	2.00	3.14	4896.00	3.95	0.24	4896.24	0.013	0.081	4896.05	4896.29	0.05
16	48	63.10	4891.29	4.00	12.56	4895.83	5.02	0.39	4896.22	42.43	4891.71	4.00	12.57	4895.91	5.02	0.39	4896.30	0.013	0.082	4896.12	4896.51	0.21
17	48	63.10	4891.71	4.00	12.56	4896.27	5.02	0.39	4896.67	39.71	4892.11	4.00	12.57	4896.35	5.02	0.39	4896.74	0.013	0.077	4896.57	4896.97	0.22
18	48	63.10	4892.11	4.00	12.56	4896.73	5.02	0.39	4897.12	44.70	4892.56	4.00	12.57	4896.82	5.02	0.39	4897.21	0.013	0.086	4896.96	4897.35	0.14
19	24	13.60	4894.56	2.00	3.14	4897.17	4.33	0.29	4897.46	7.00	4894.70	2.00	3.14	4897.20	4.33	0.29	4897.49	0.013	0.025	4897.26	4897.55	0.06
20	42	49.50	4893.06	3.50	9.62	4897.10	5.15	0.41	4897.51	78.66	4893.85	3.43	9.57	4897.28	5.17	0.42	4897.69	0.013	0.181	4897.45	4897.87	0.18
21	27	15.70	4895.10	2.25	3.98	4897.72	3.95	0.24	4897.97	27.00	4895.37	2.25	3.98	4897.79	3.95	0.24	4898.03	0.013	0.069	4897.84	4898.08	0.05
22	36	33.80	4894.35	3.00	7.07	4897.65	4.78	0.36	4898.01	33.17	4894.68	3.00	7.07	4897.74	4.78	0.36	4898.10	0.013	0.085	4897.85	4898.21	0.11

Notes: [2] Critical depth. [3] Normal depth. ‡ Supercritical.

Project File: PA 1 and 2 NEW.sws

Energy Grade Line Calculations

Stormwater Studio 2021 v 3.0.0.24

Project Name: Enter Project Name...

03-24-2021

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
	(in)	(cfs)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	(ft)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	n Value	Enrgy Loss (ft)	HGLa Elev (ft)	EGLa Elev (ft)	Enrgy Loss (ft)
23	18	5.60	4895.65	1.50	1.77	4898.11	3.17	0.16	4898.27	53.00	4896.18	1.50	1.77	4898.27	3.17	0.16	4898.42	0.013	0.151	4898.40	4898.55	0.13
24	18	5.60	4896.18	1.50	1.77	4898.46	3.17	0.16	4898.61	7.00	4896.25	1.50	1.77	4898.48	3.17	0.16	4898.63	0.013	0.020	4898.51	4898.67	0.03
25	30	28.20	4895.18	2.50	4.91	4897.90	5.75	0.51	4898.41	114.76	4896.33	1.90	3.99	4898.23	7.06	0.77	4899.00	0.013	0.588	4899.26	4900.04	1.04
26	24	21.00	4897.09	2.00[3]	3.14	4899.62	6.69	0.69	4900.32	27.00	4897.23	2.00	3.14	4899.85	6.68	0.69	4900.55	0.013	0.233	4899.99	4900.69	0.14
27	24	7.20	4896.83	2.00	3.14	4899.99	2.29	0.08	4900.07	91.34	4897.74	2.00	3.14	4900.08	2.29	0.08	4900.16	0.013	0.093	4900.15	4900.23	0.07
28	18	7.20	4897.74	1.50	1.77	4900.08	4.08	0.26	4900.33	27.00	4898.01	1.50	1.77	4900.20	4.07	0.26	4900.46	0.013	0.127	4900.25	4900.51	0.05

Notes: [3] Normal depth.

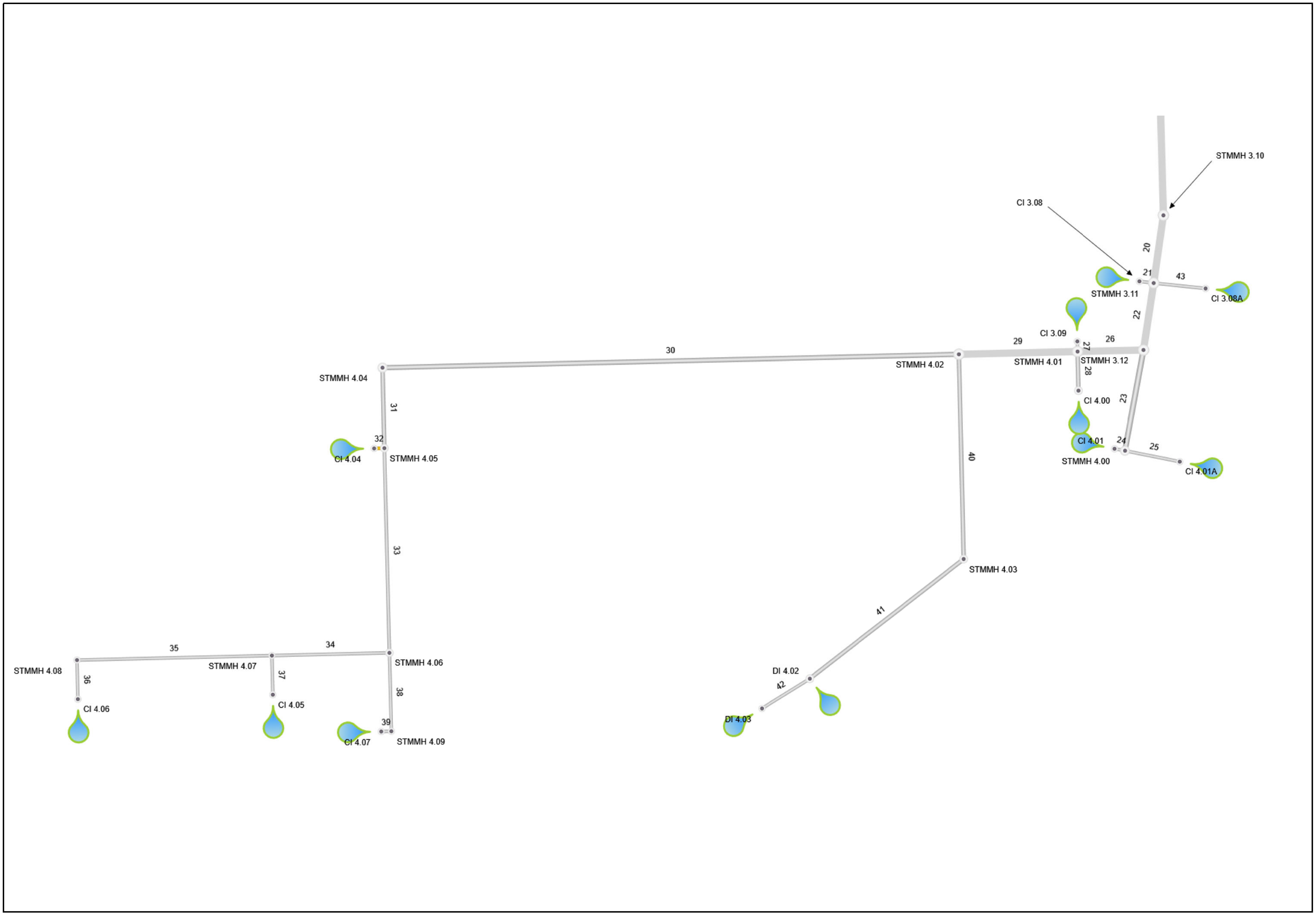
Project File: PA 1 and 2 NEW.sws

Plan View

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



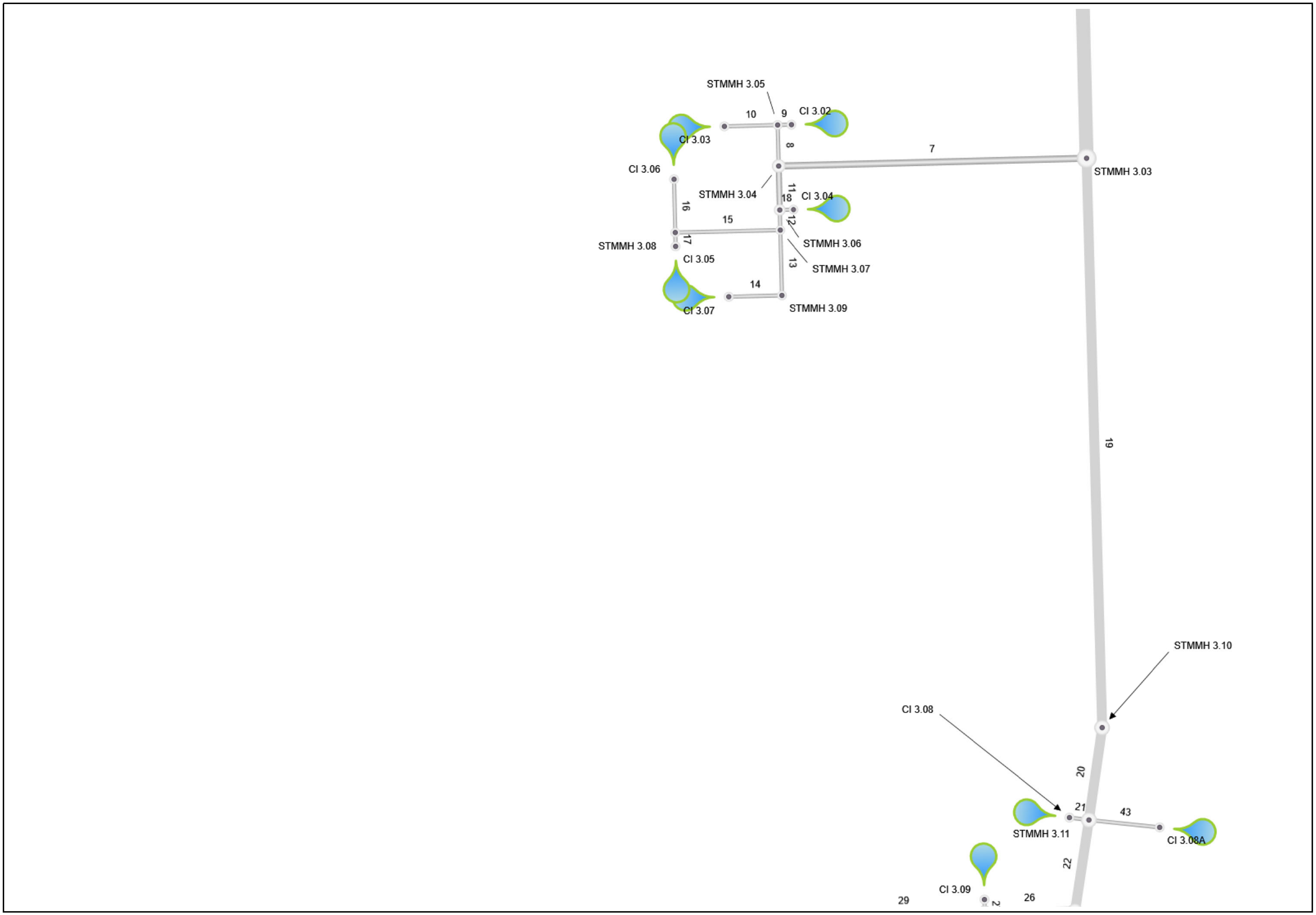
Project File: PA 3 and 4 Storm Sewer System.sws

Plan View

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021

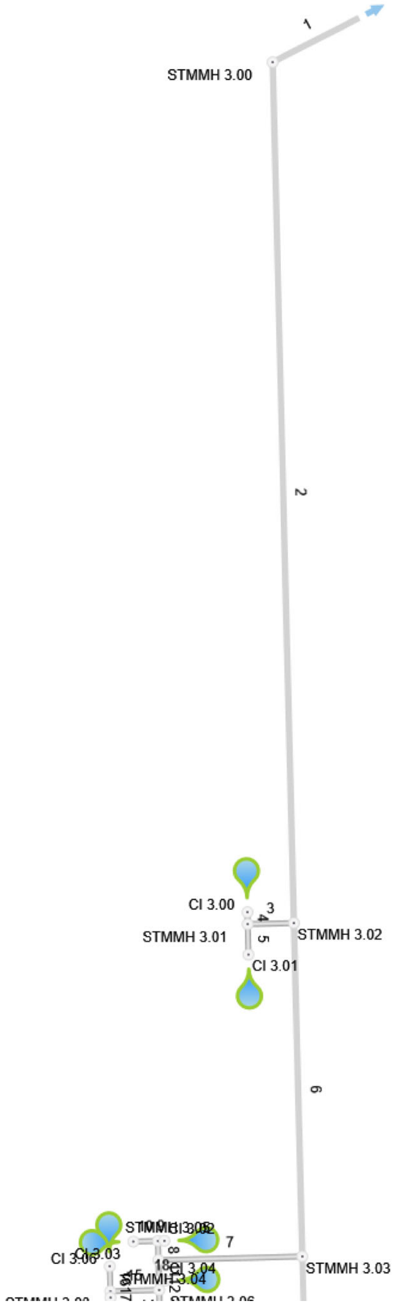


Plan View

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



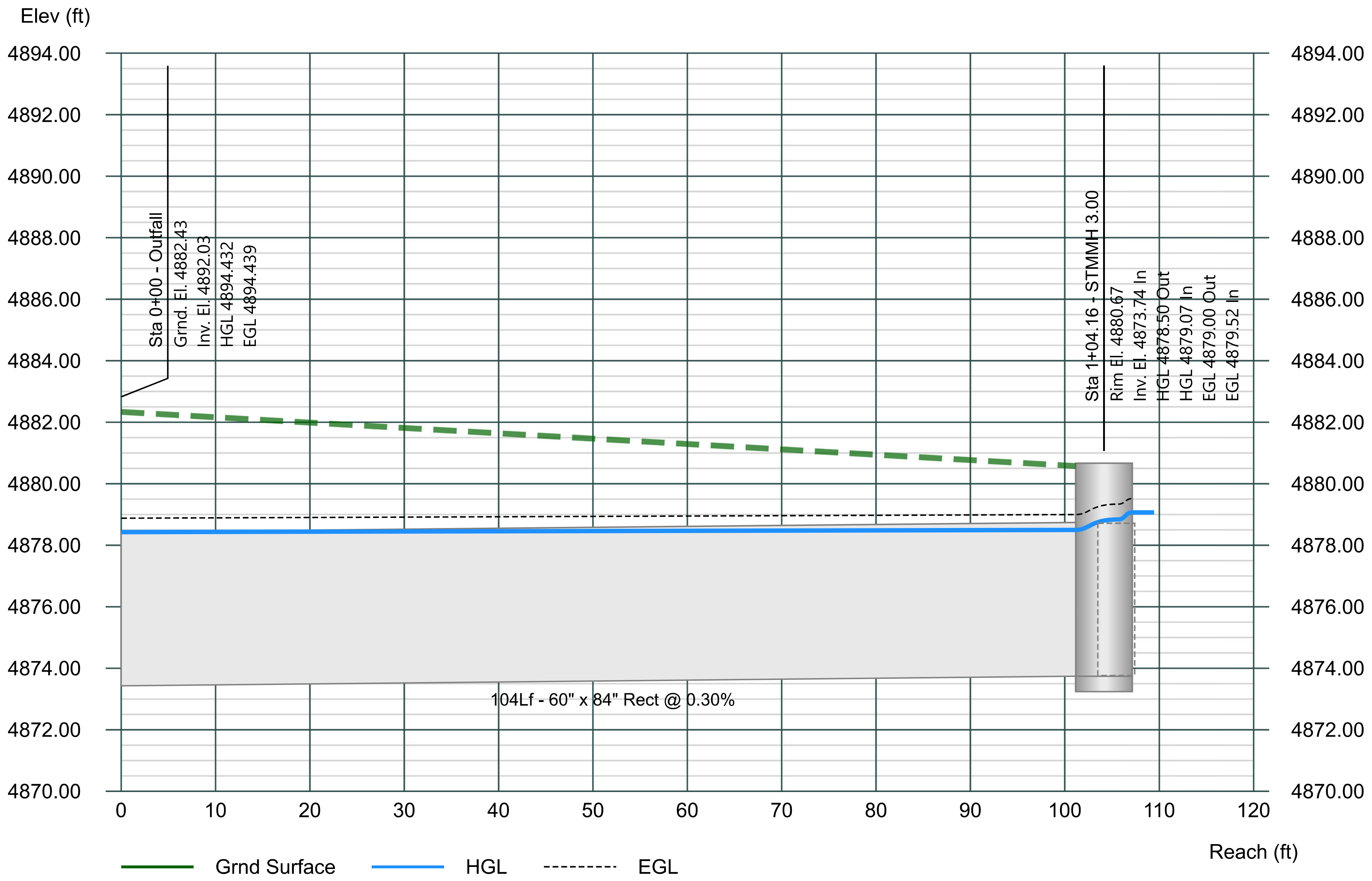
Project File: PA 3 and 4 Storm Sewer System.sws

Line 1 - Pipe - (121) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



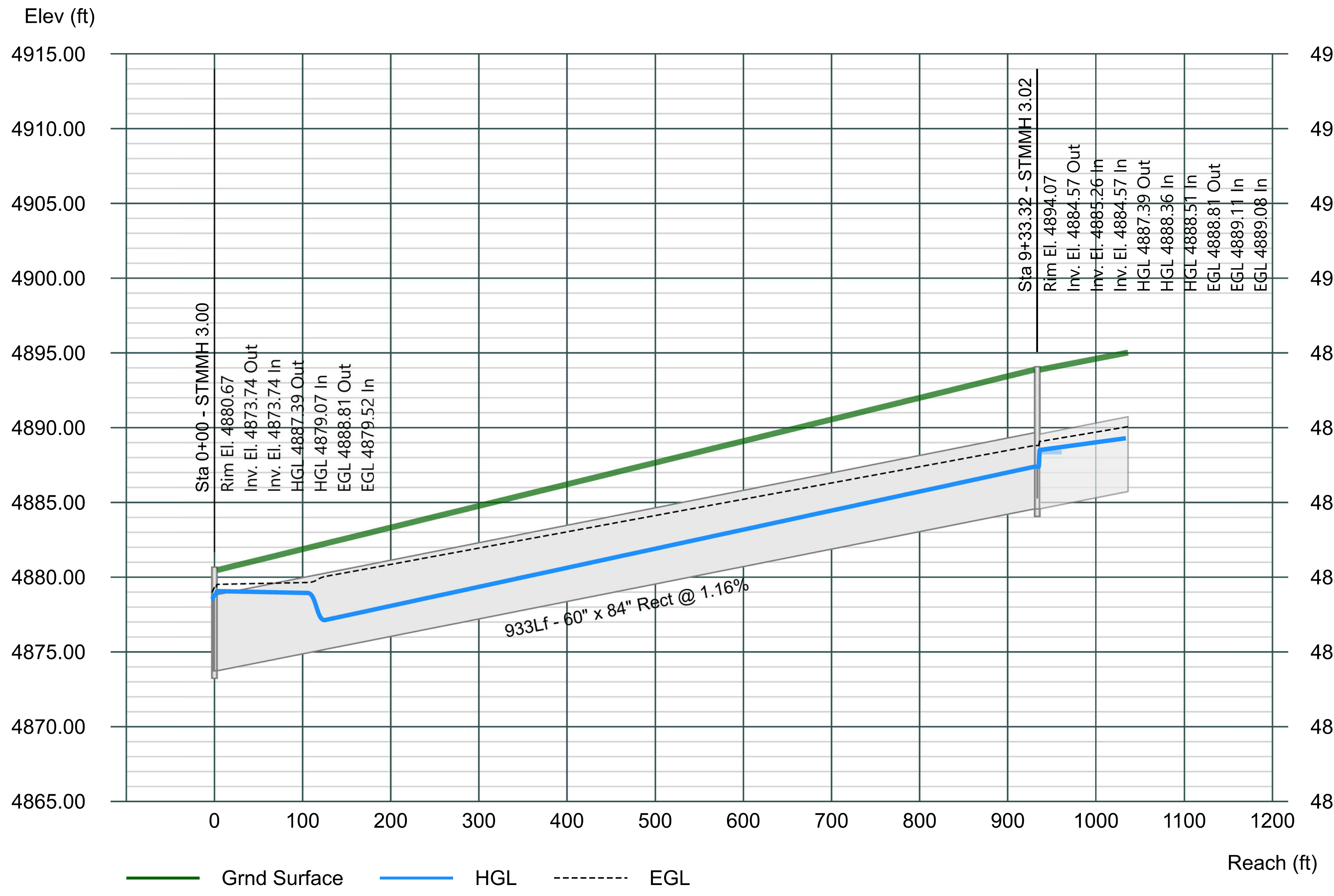
Project File: PA 3 and 4 Storm Sewer System.sws

Line 2 - Pipe - (588) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



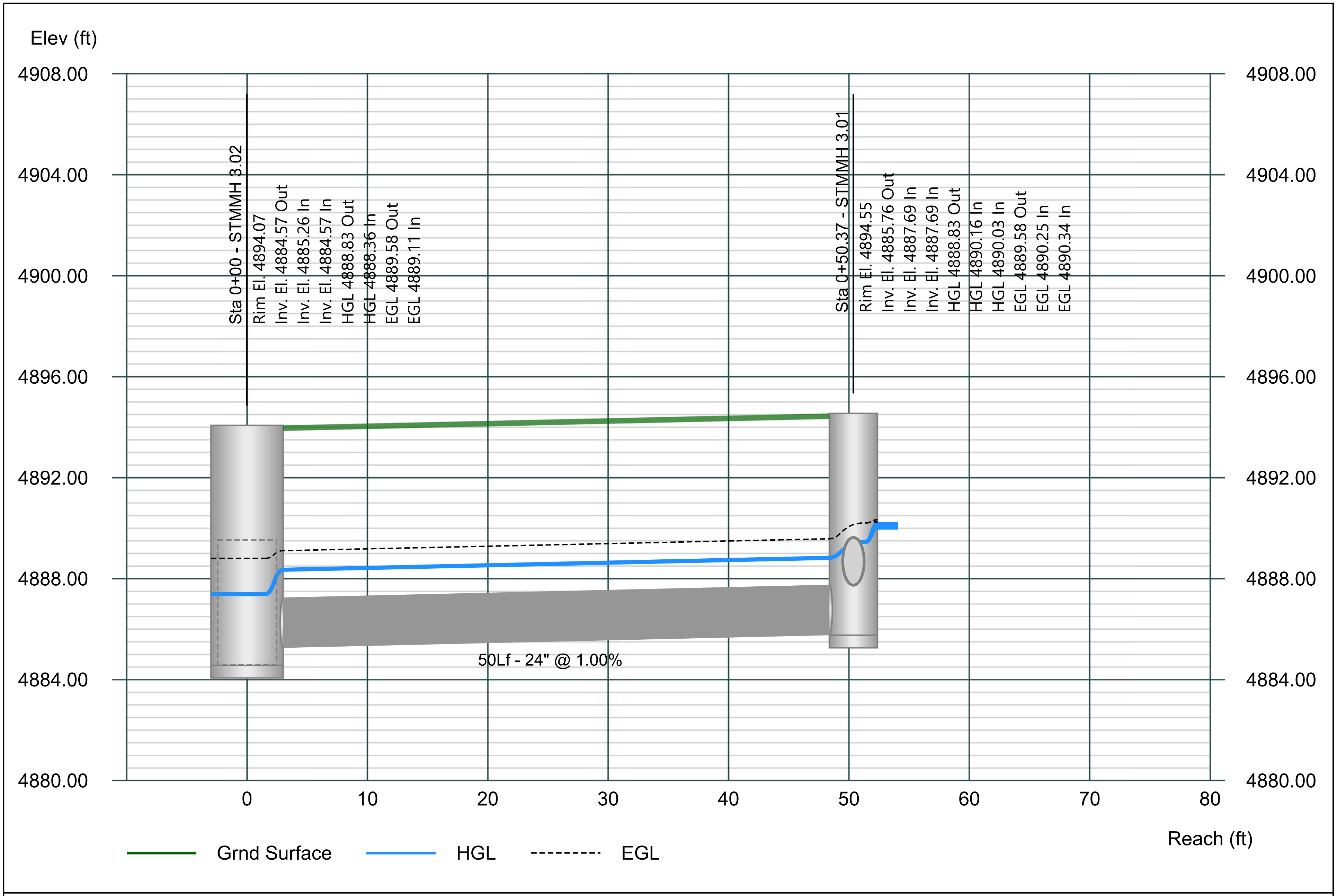
Project File: PA 3 and 4 Storm Sewer System.sws

Line 3 - Pipe - (581) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



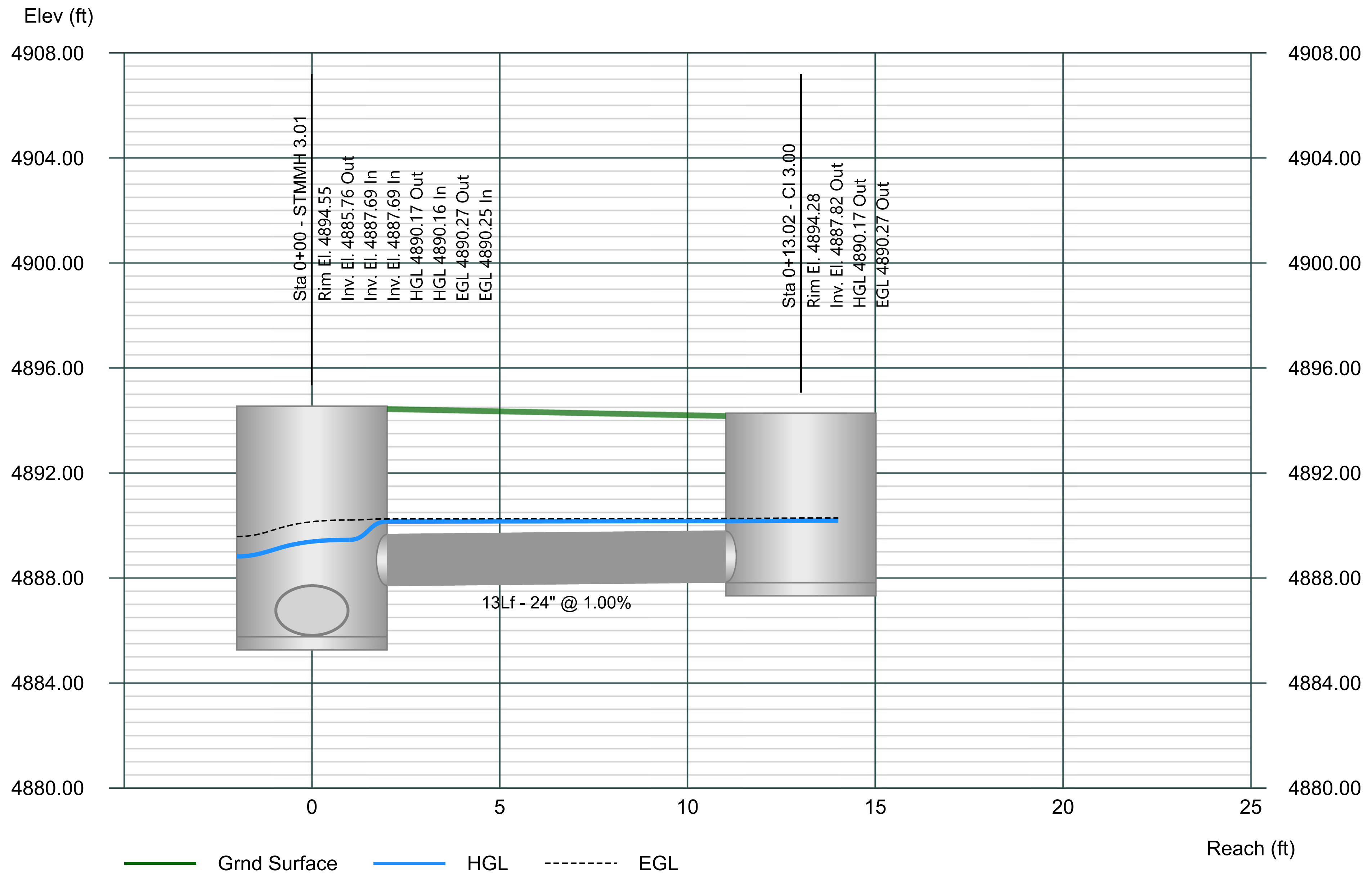
Project File: PA 3 and 4 Storm Sewer System.sws

Line 4 - Pipe - (567) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



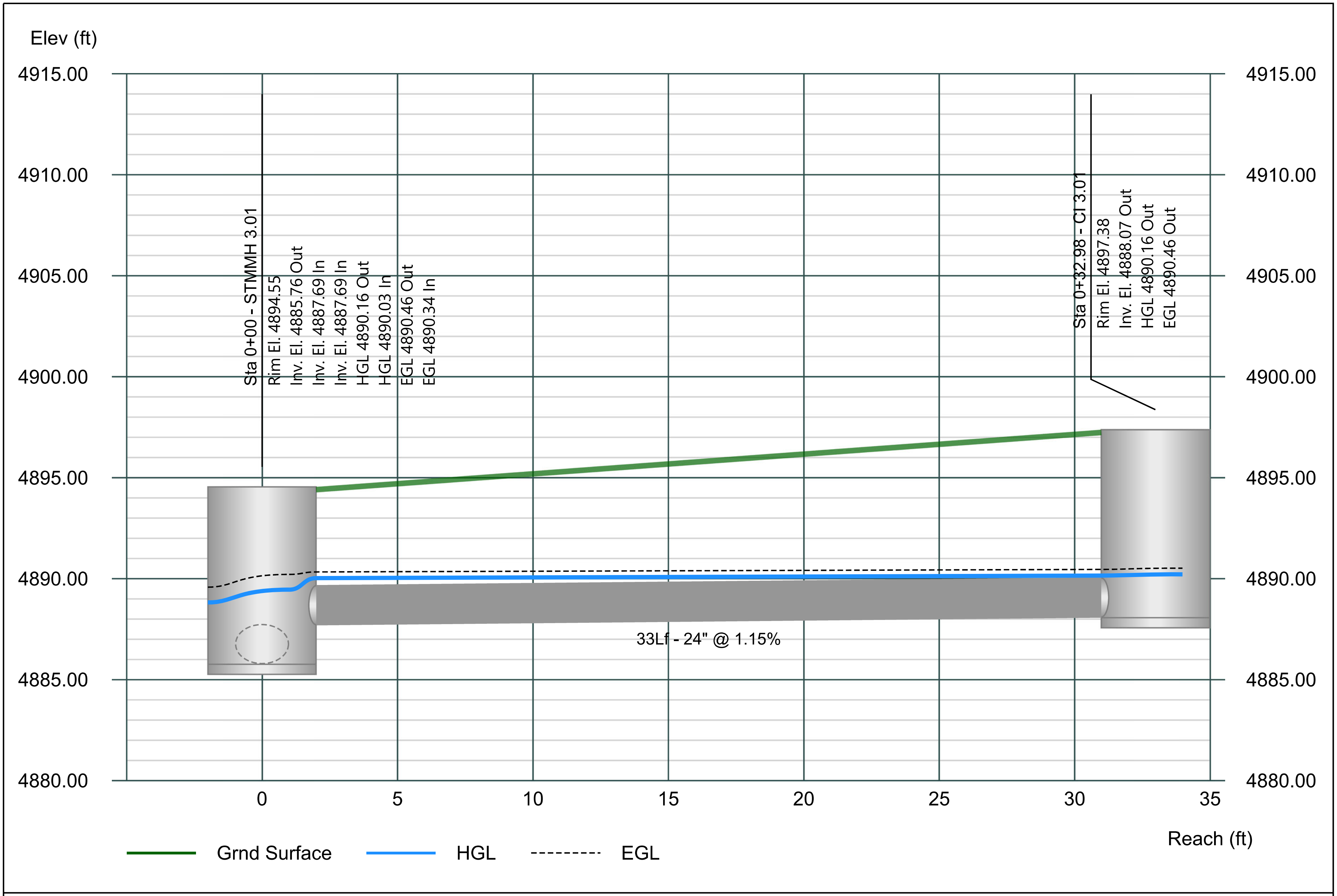
Project File: PA 3 and 4 Storm Sewer System.sws

Line 5 - Pipe - (589) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



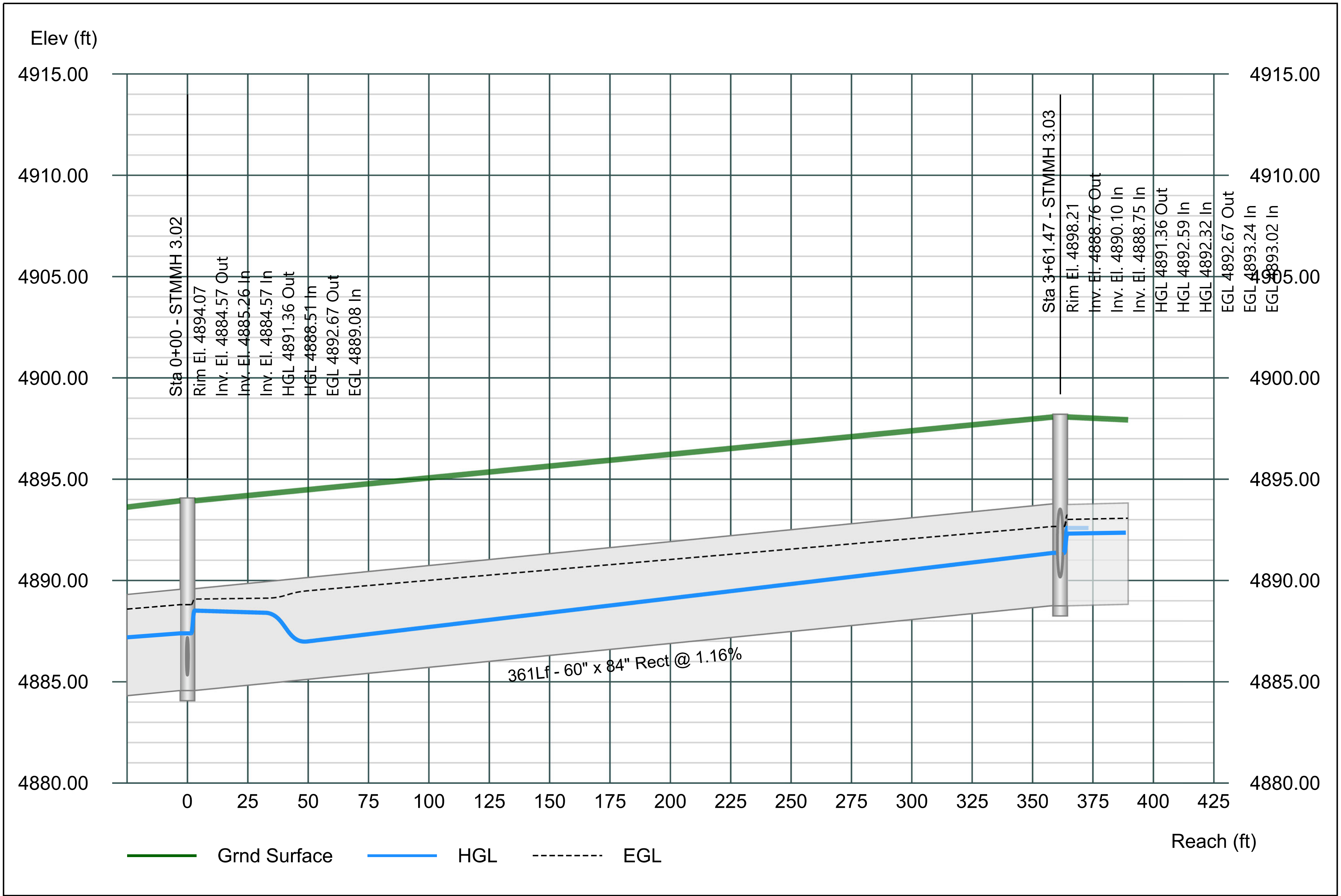
Project File: PA 3 and 4 Storm Sewer System.sws

Line 6 - Pipe - (590) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



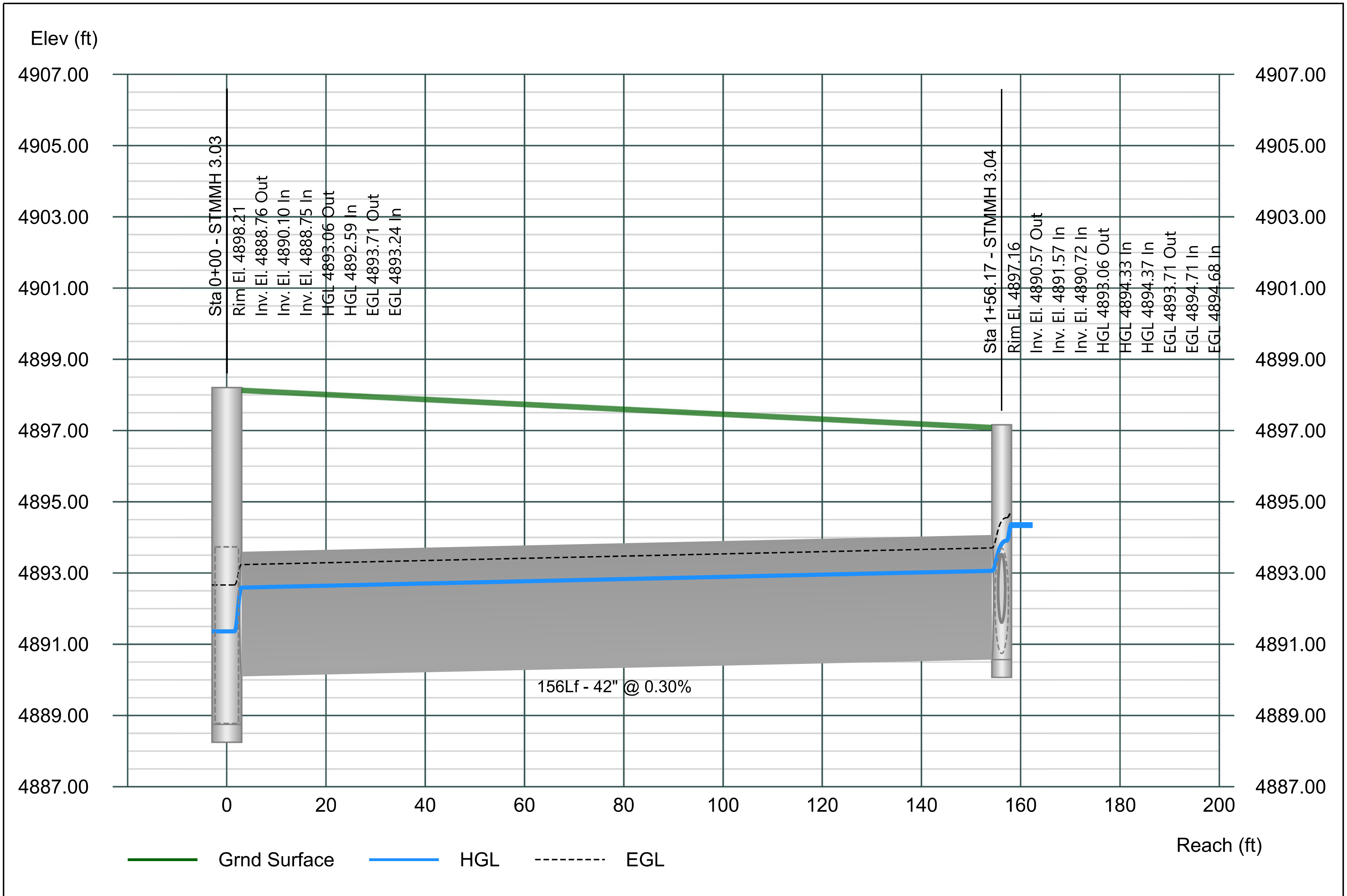
Project File: PA 3 and 4 Storm Sewer System.sws

Line 7 - Pipe - (372) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



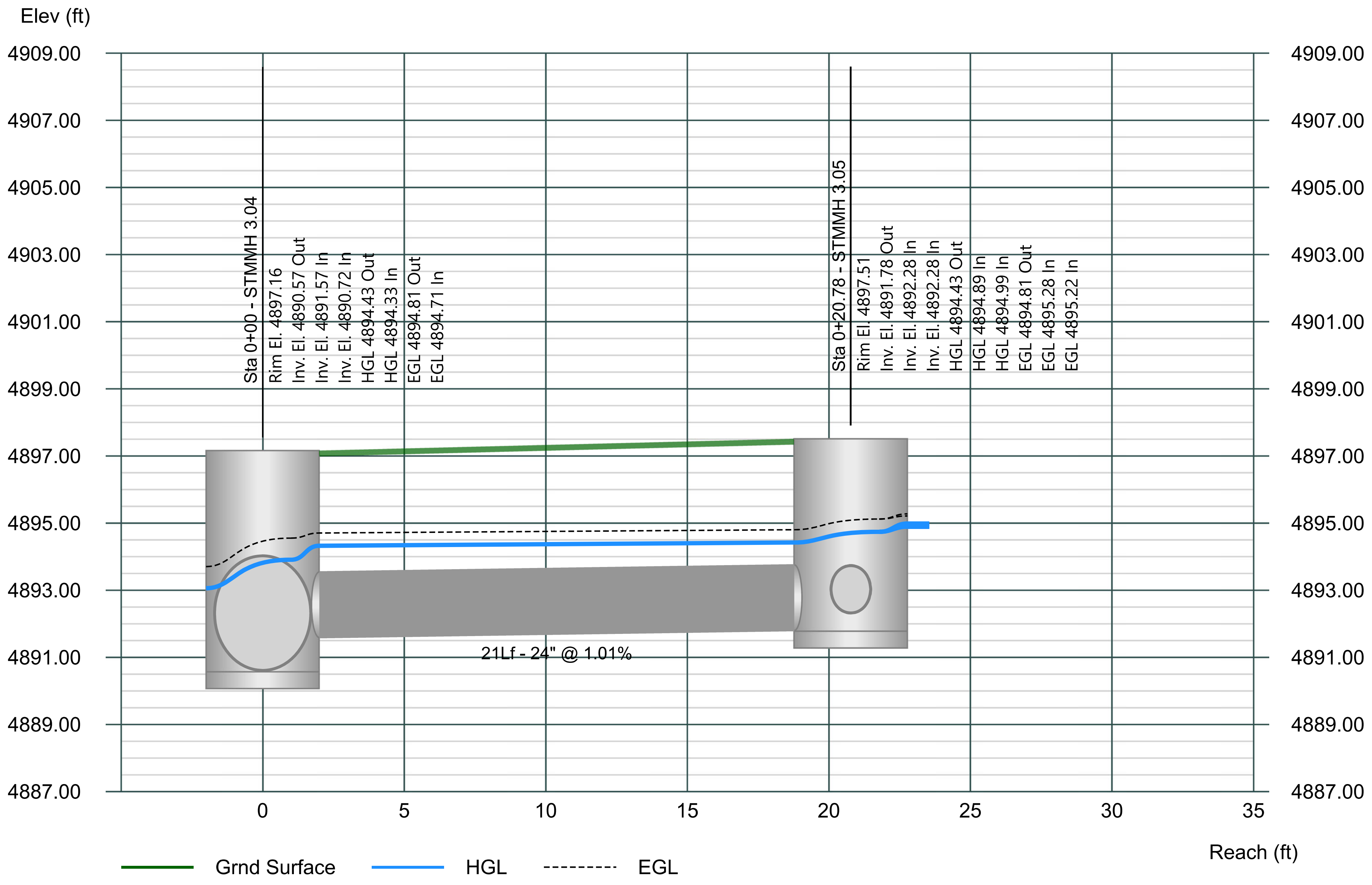
Project File: PA 3 and 4 Storm Sewer System.sws

Line 8 - Pipe - (378) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



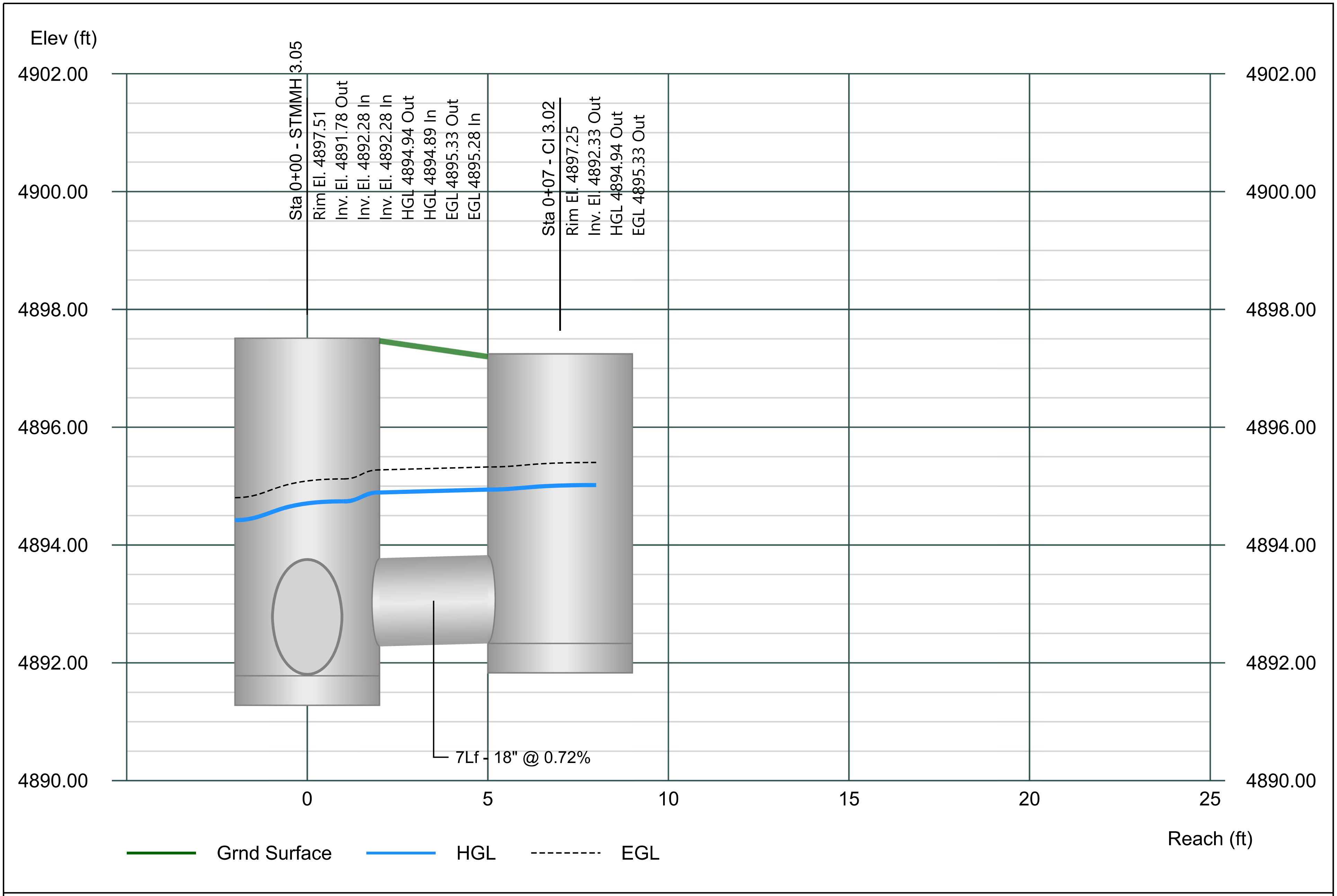
Project File: PA 3 and 4 Storm Sewer System.sws

Line 9 - Pipe - (379) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



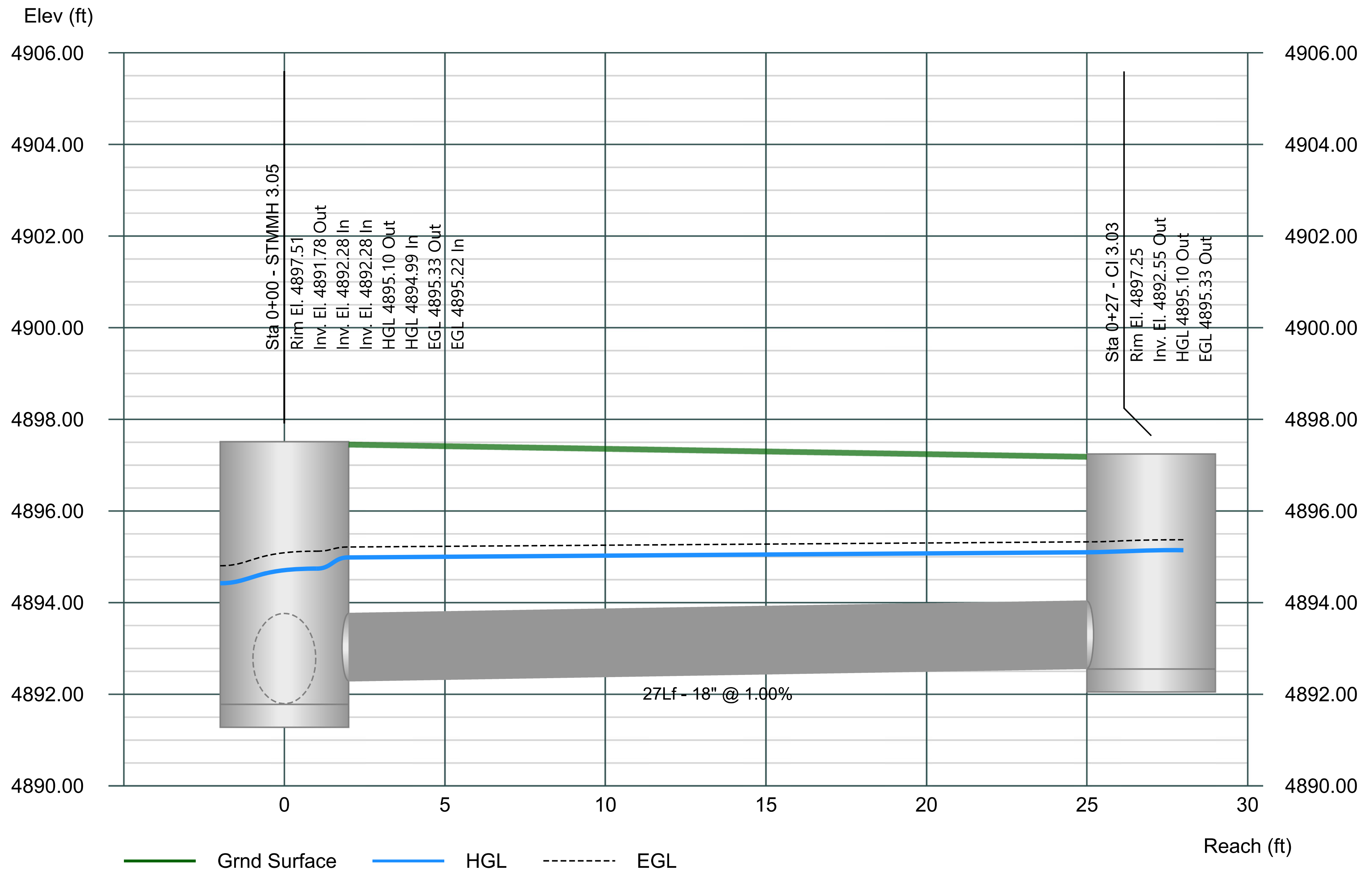
Project File: PA 3 and 4 Storm Sewer System.sws

Line 10 - Pipe - (377) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021

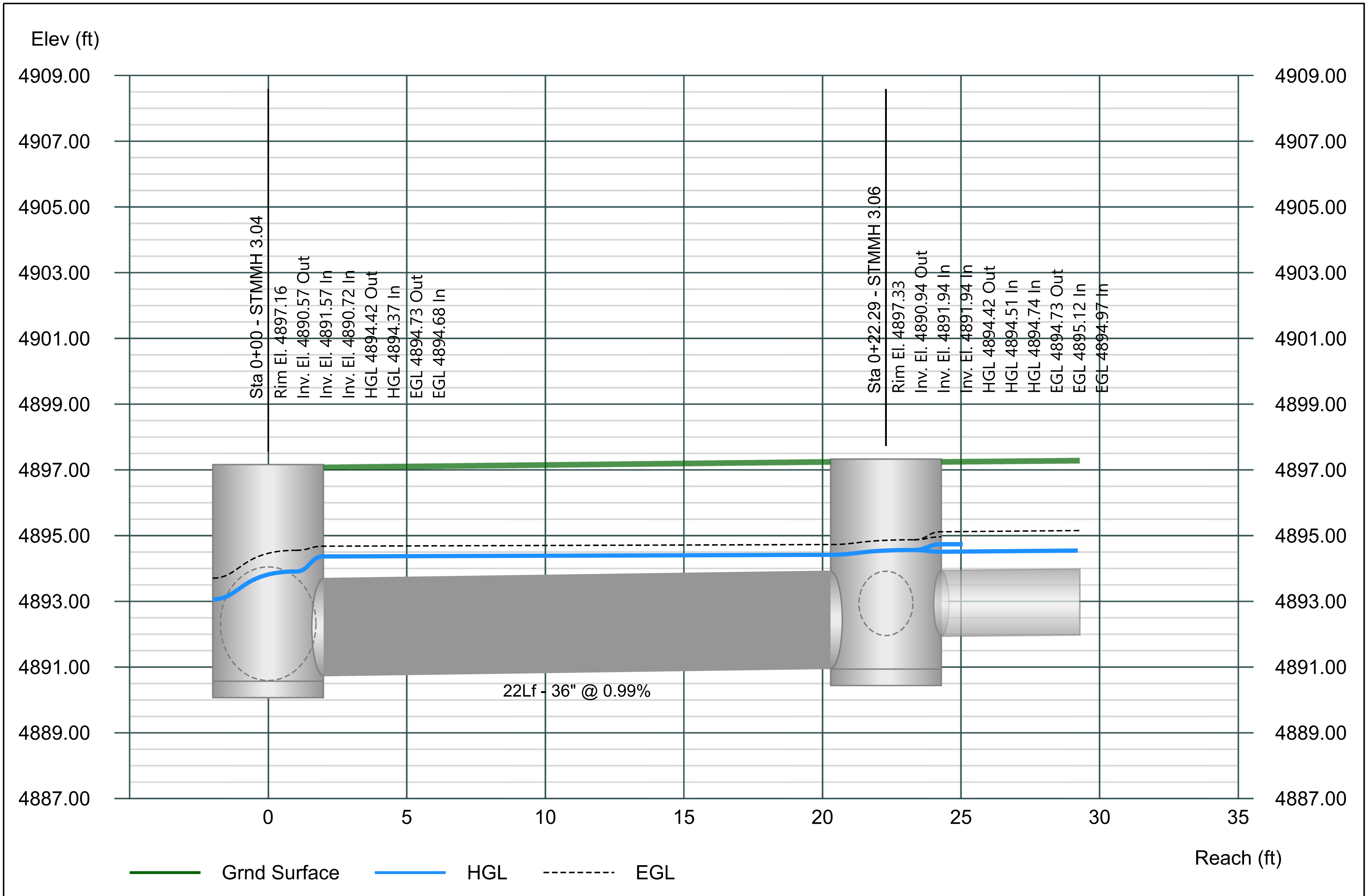


Line 11 - Pipe - (371) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



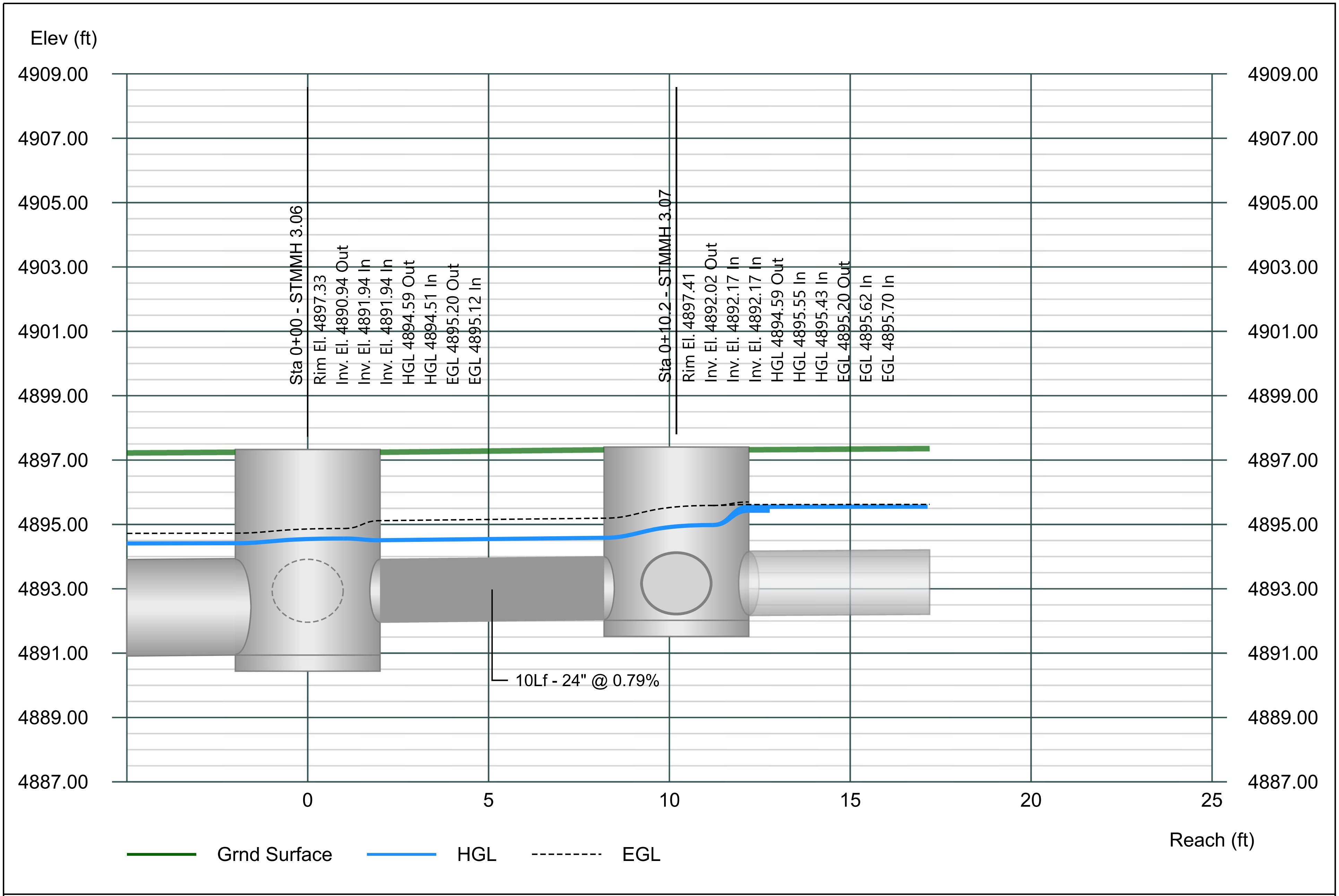
Project File: PA 3 and 4 Storm Sewer System.sws

Line 12 - Pipe - (370) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



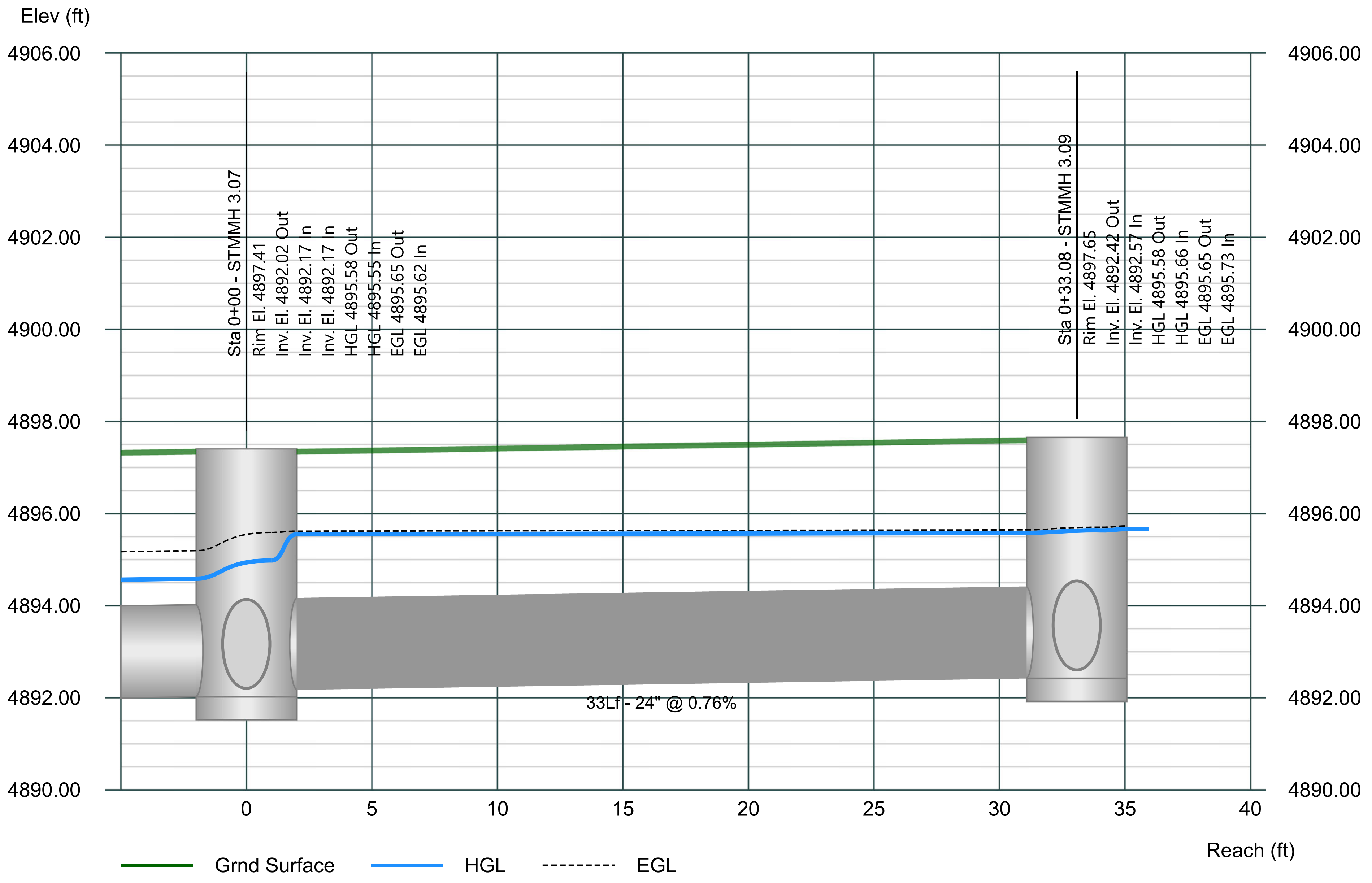
Project File: PA 3 and 4 Storm Sewer System.sws

Line 13 - Pipe - (369) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



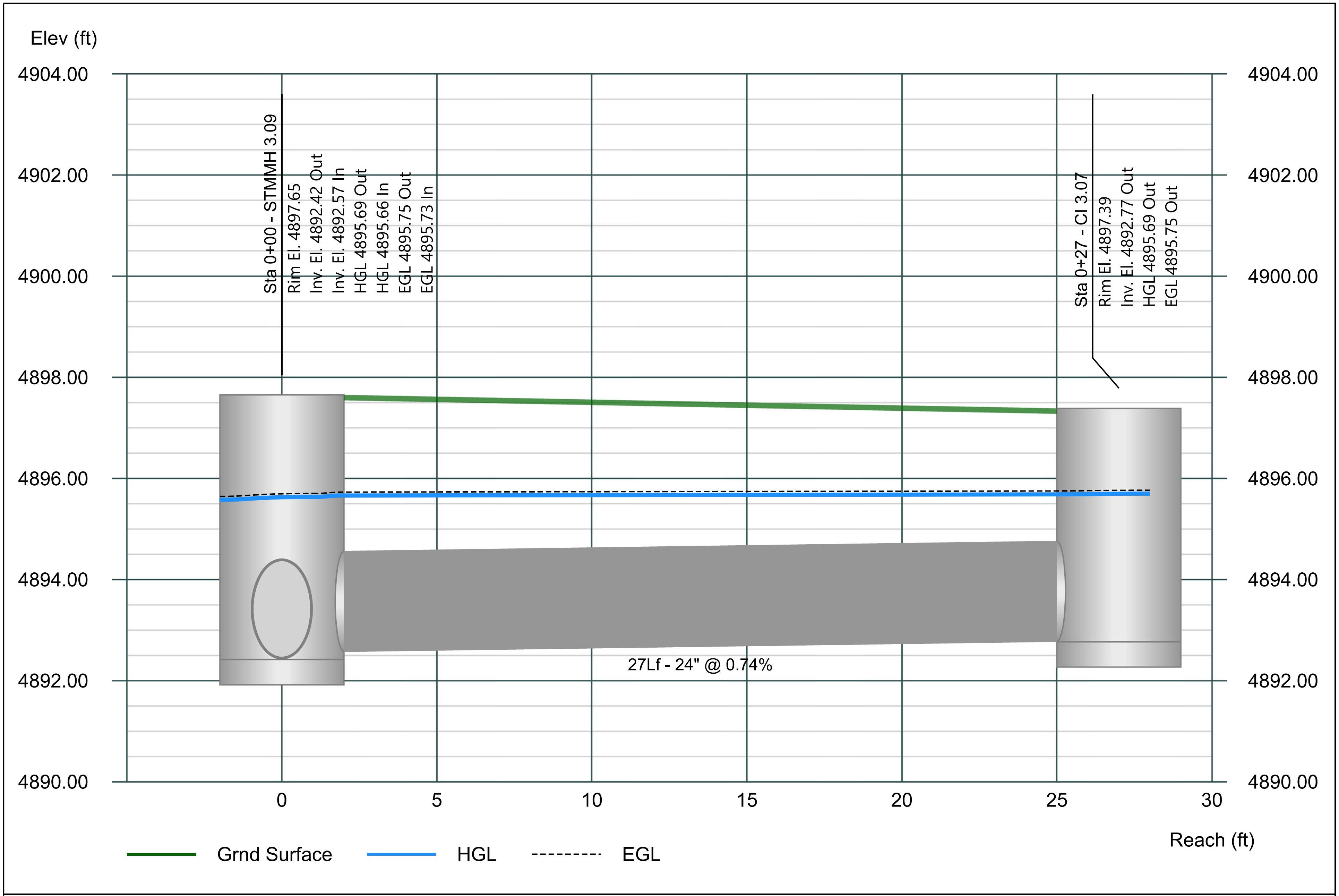
Project File: PA 3 and 4 Storm Sewer System.sws

Line 14 - Pipe - (373) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



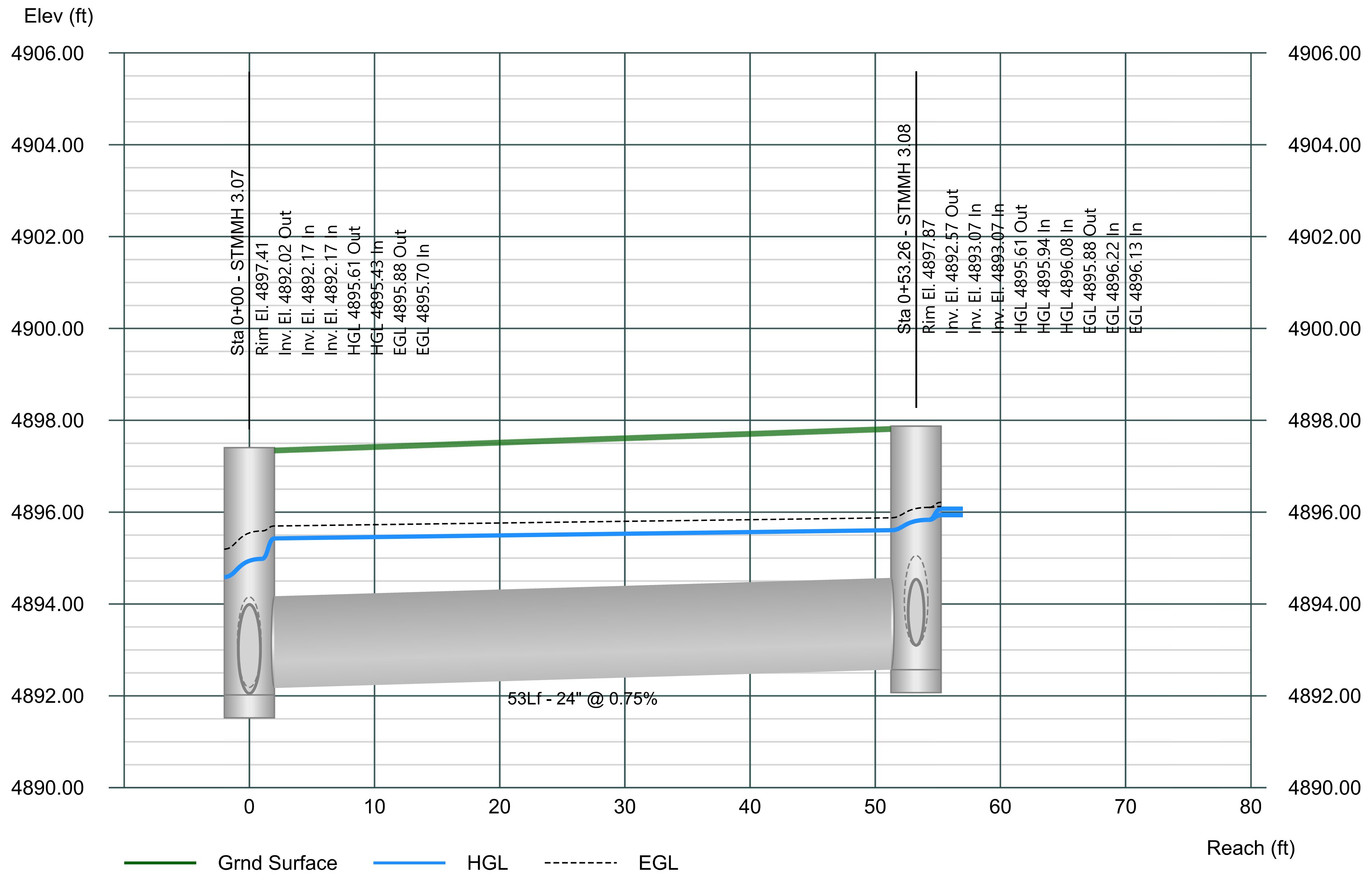
Project File: PA 3 and 4 Storm Sewer System.sws

Line 15 - Pipe - (375) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



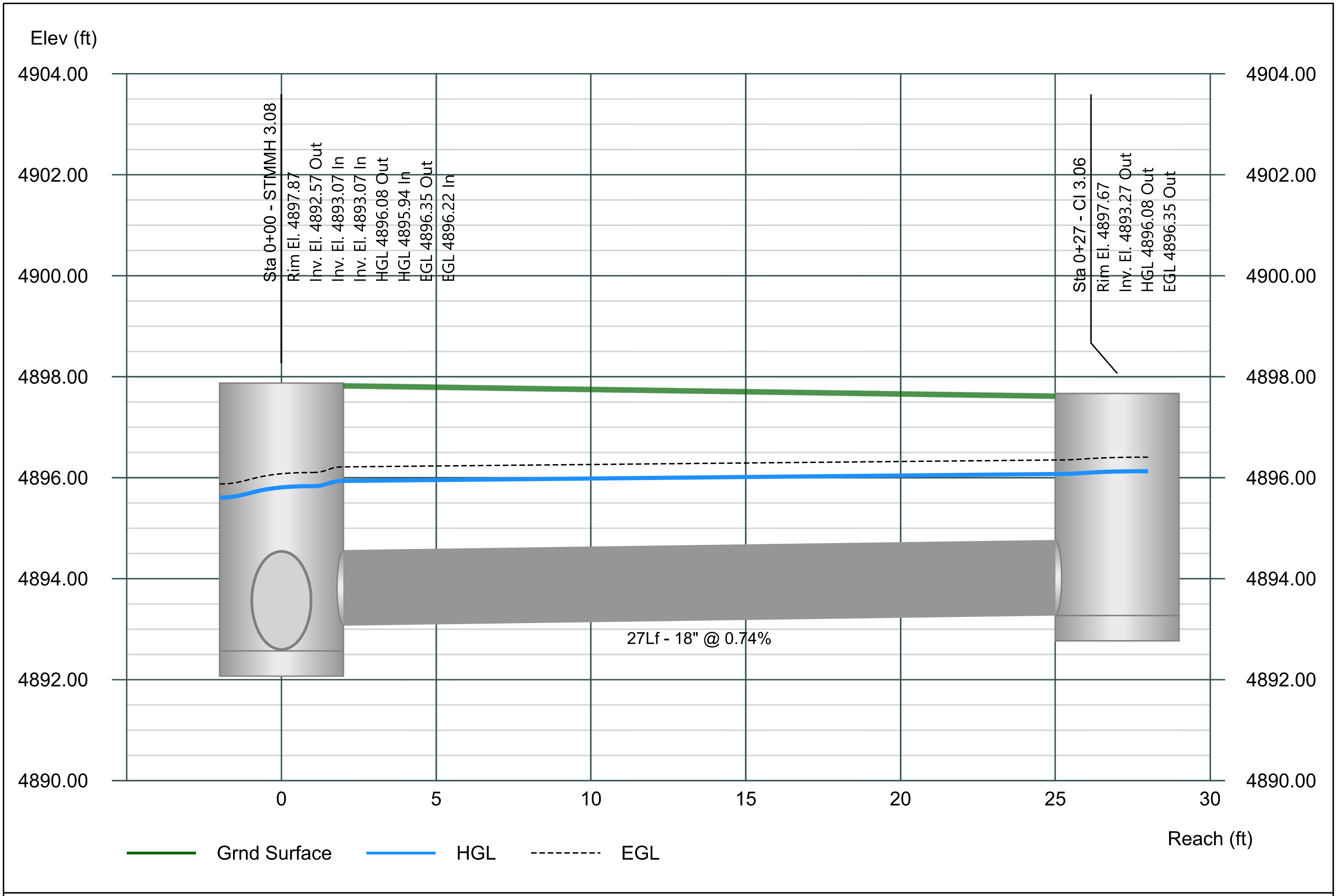
Project File: PA 3 and 4 Storm Sewer System.sws

Line 16 - Pipe - (374) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



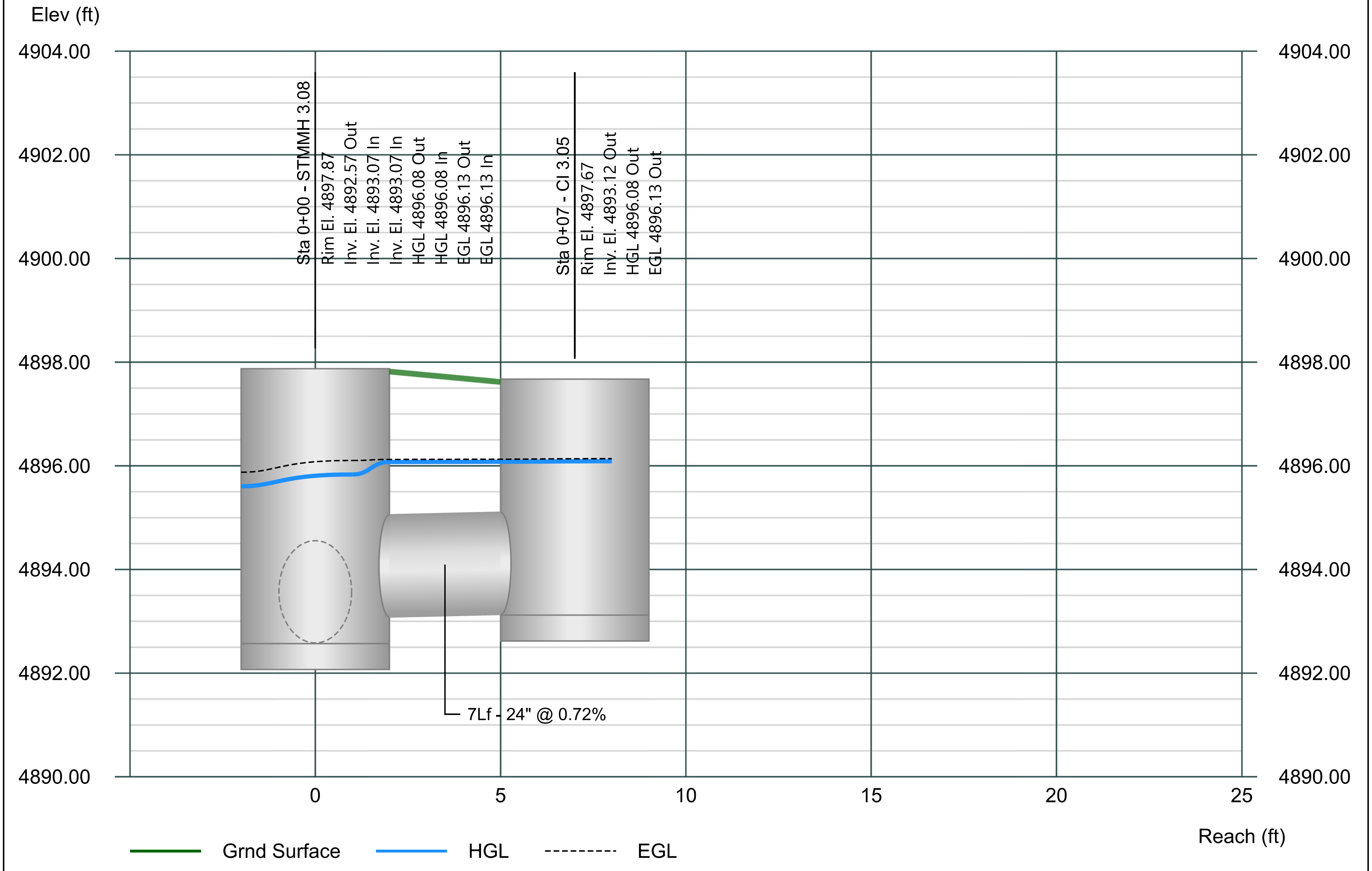
Project File: PA 3 and 4 Storm Sewer System.sws

Line 17 - Pipe - (376) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



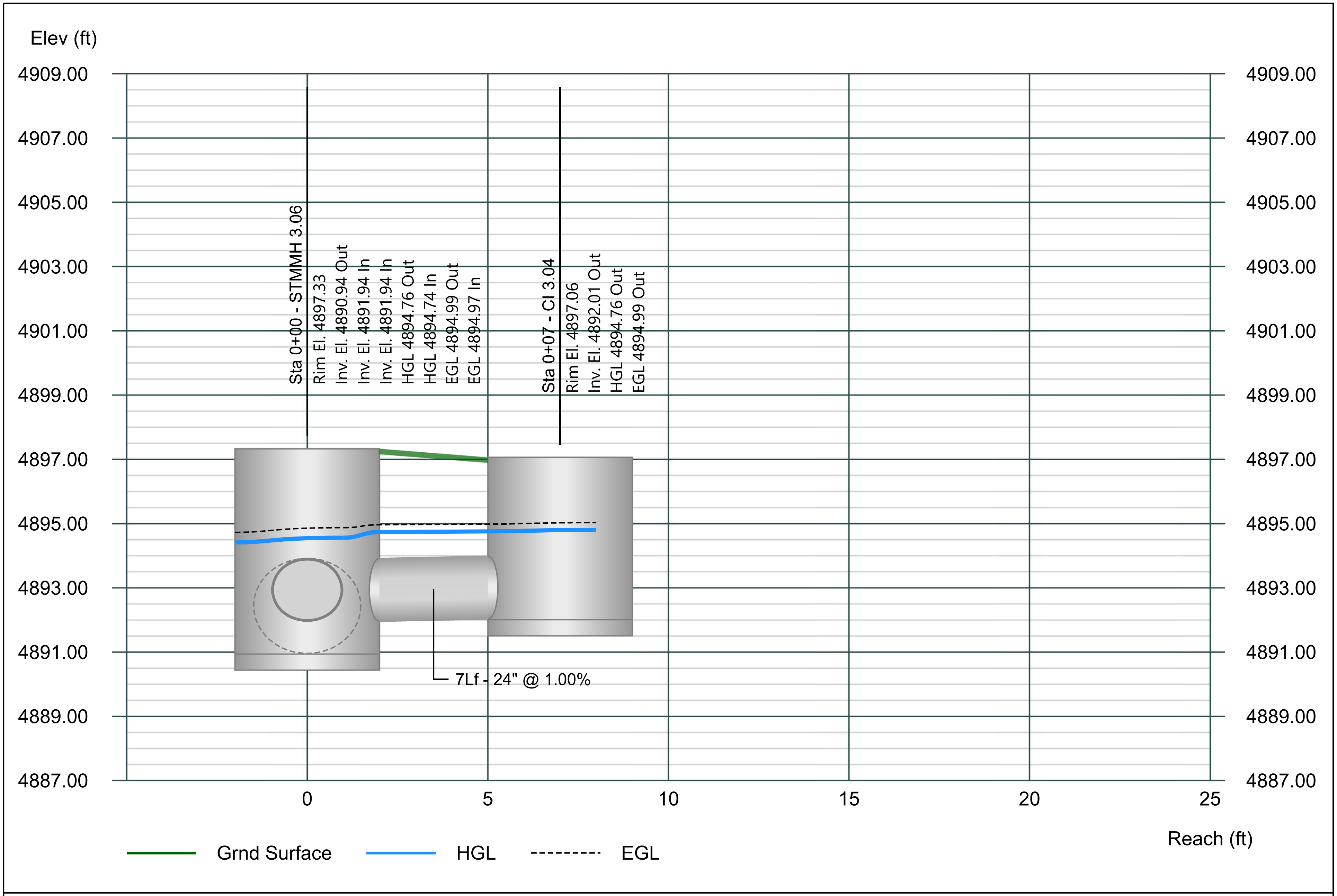
Project File: PA 3 and 4 Storm Sewer System.sws

Line 18 - Pipe - (380) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



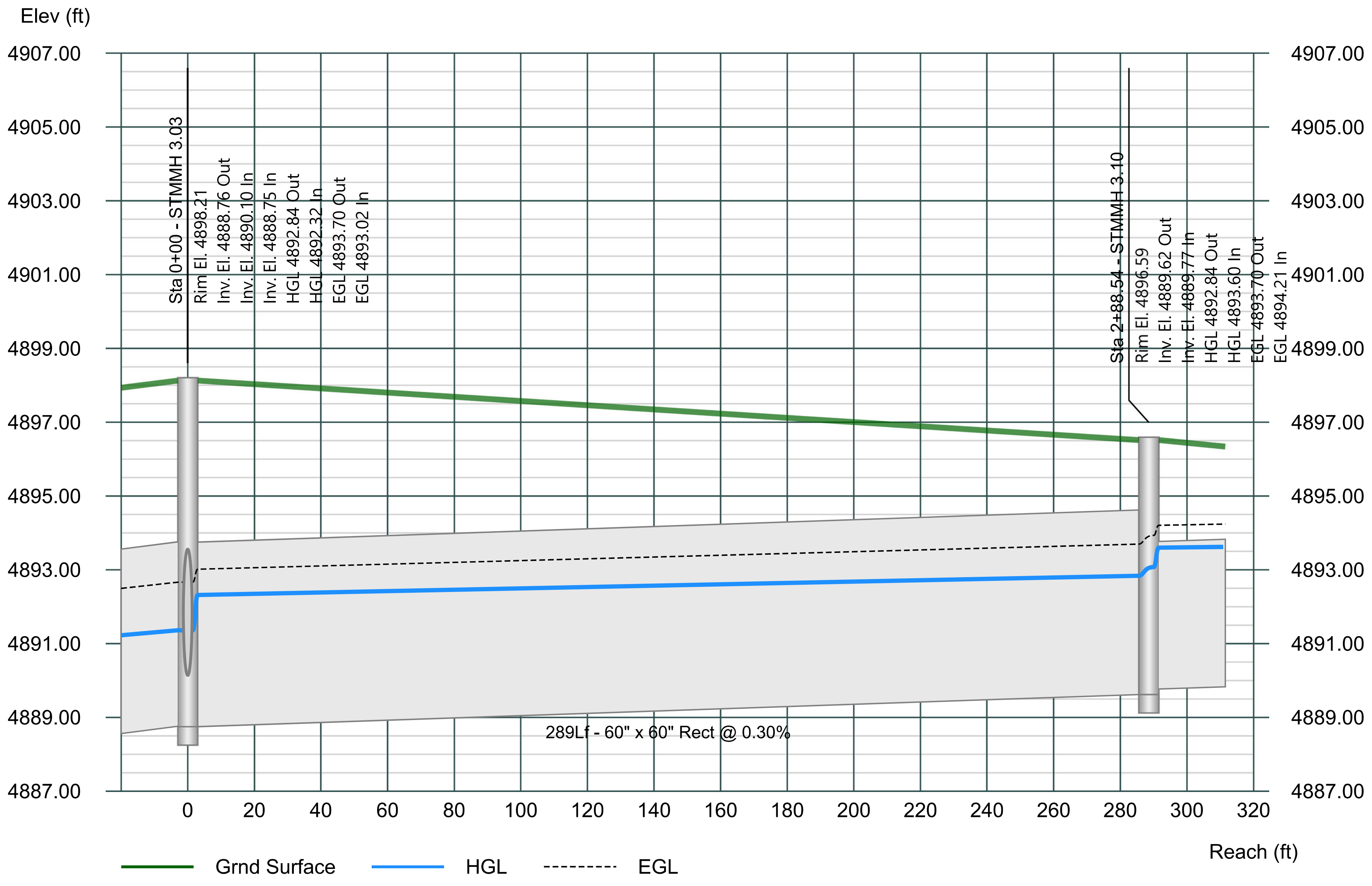
Project File: PA 3 and 4 Storm Sewer System.sws

Line 19 - Pipe - (117) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



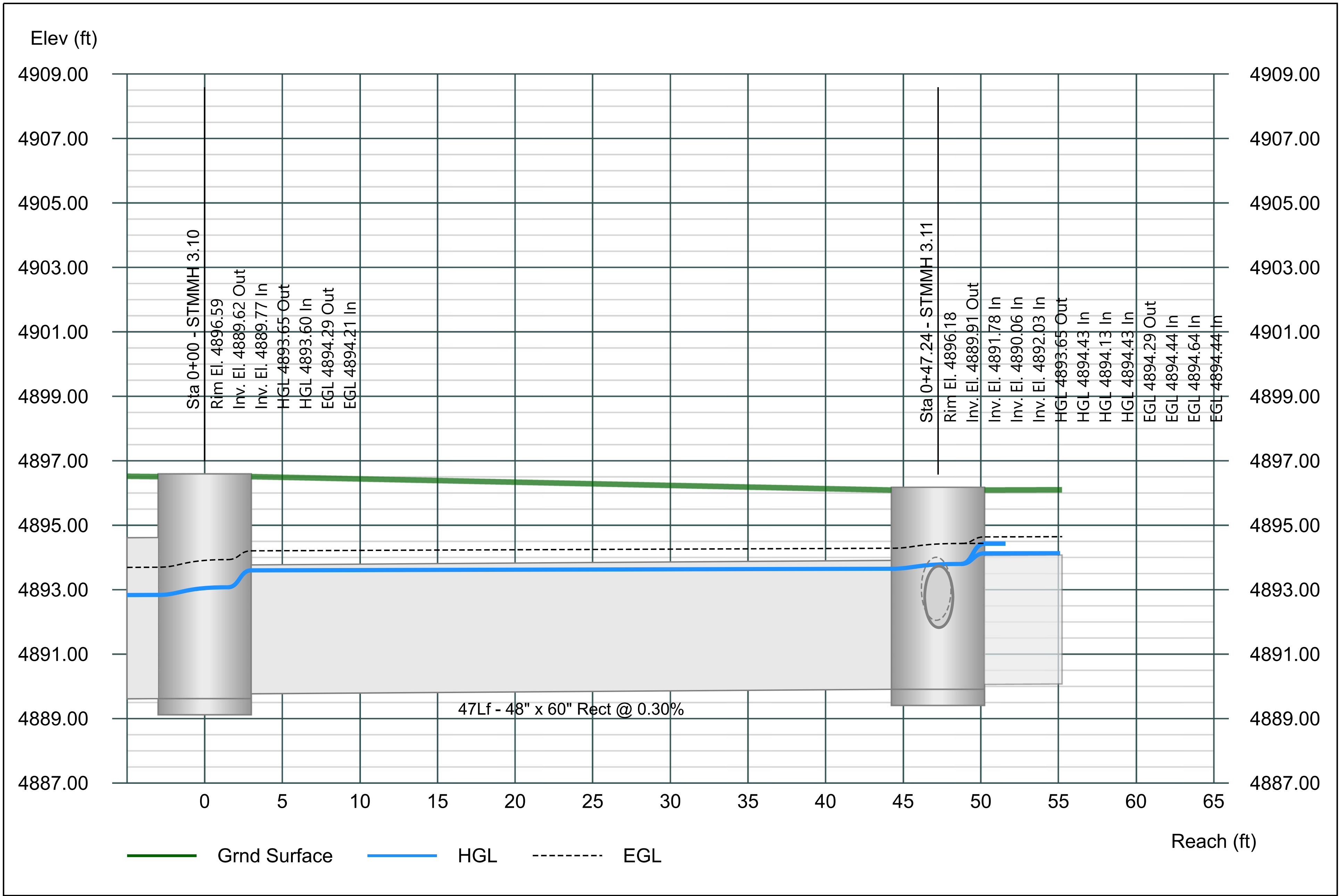
Project File: PA 3 and 4 Storm Sewer System.sws

Line 20 - Pipe - (116) (1) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



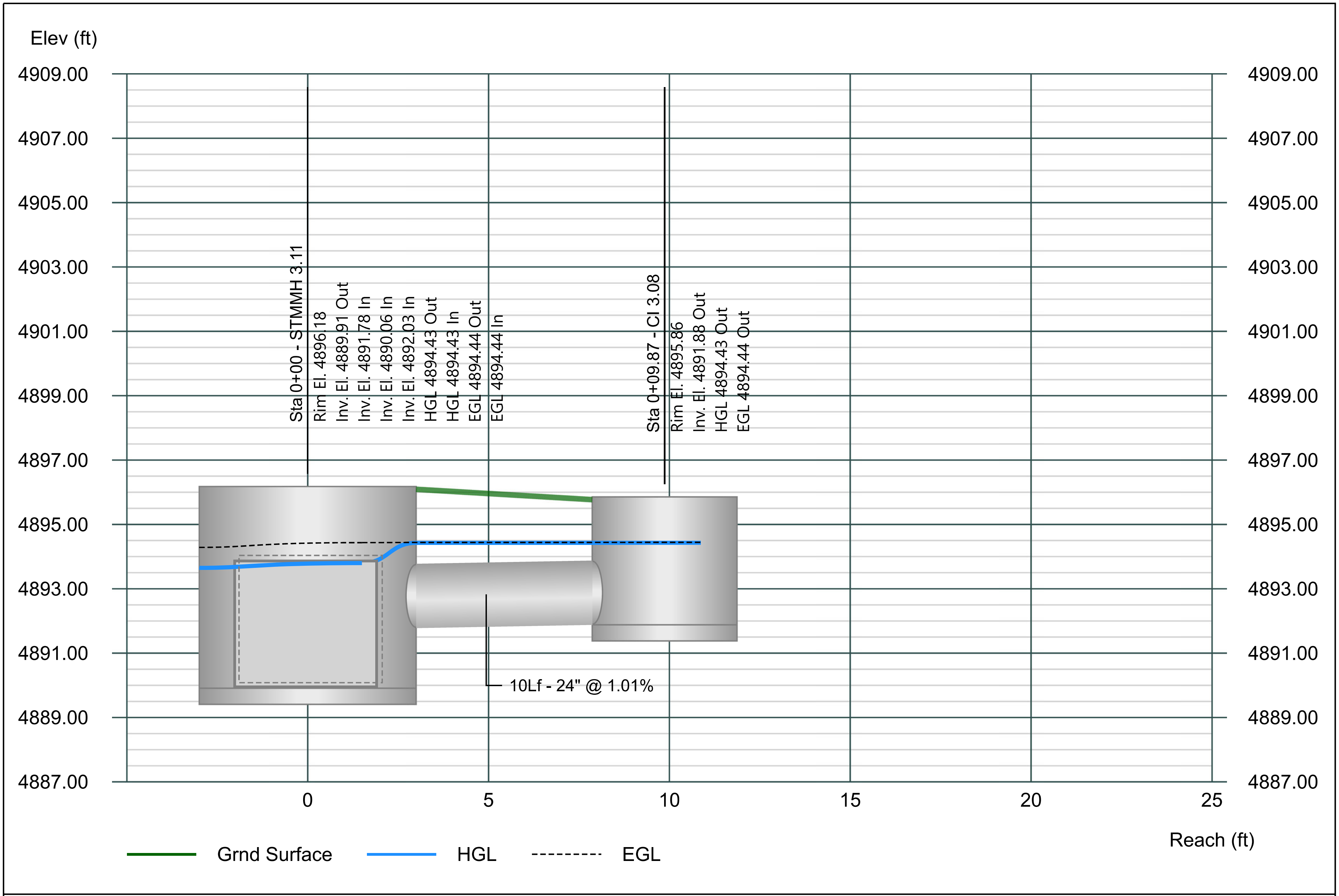
Project File: PA 3 and 4 Storm Sewer System.sws

Line 21 - Pipe - (410) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



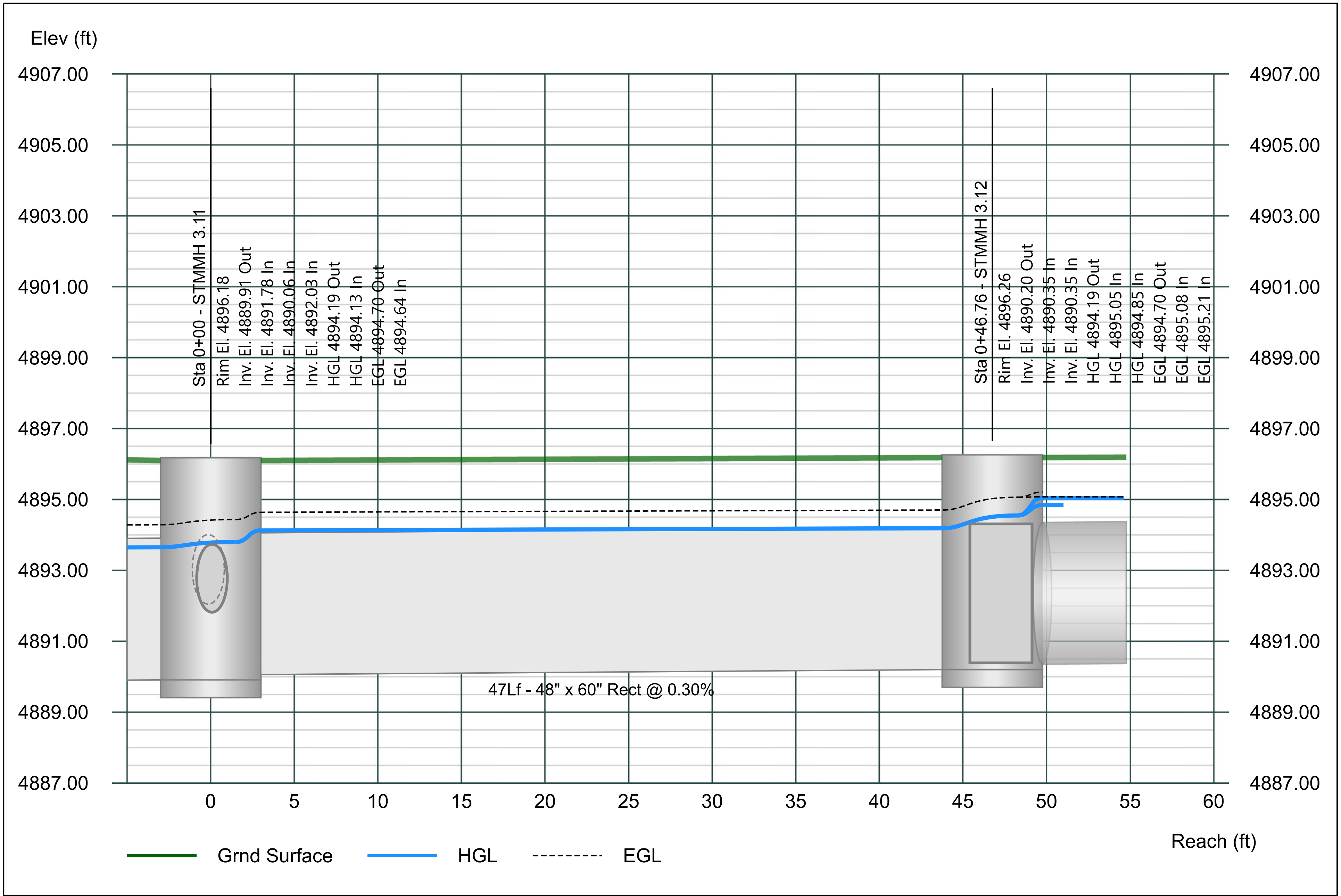
Project File: PA 3 and 4 Storm Sewer System.sws

Line 22 - Pipe - (116) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



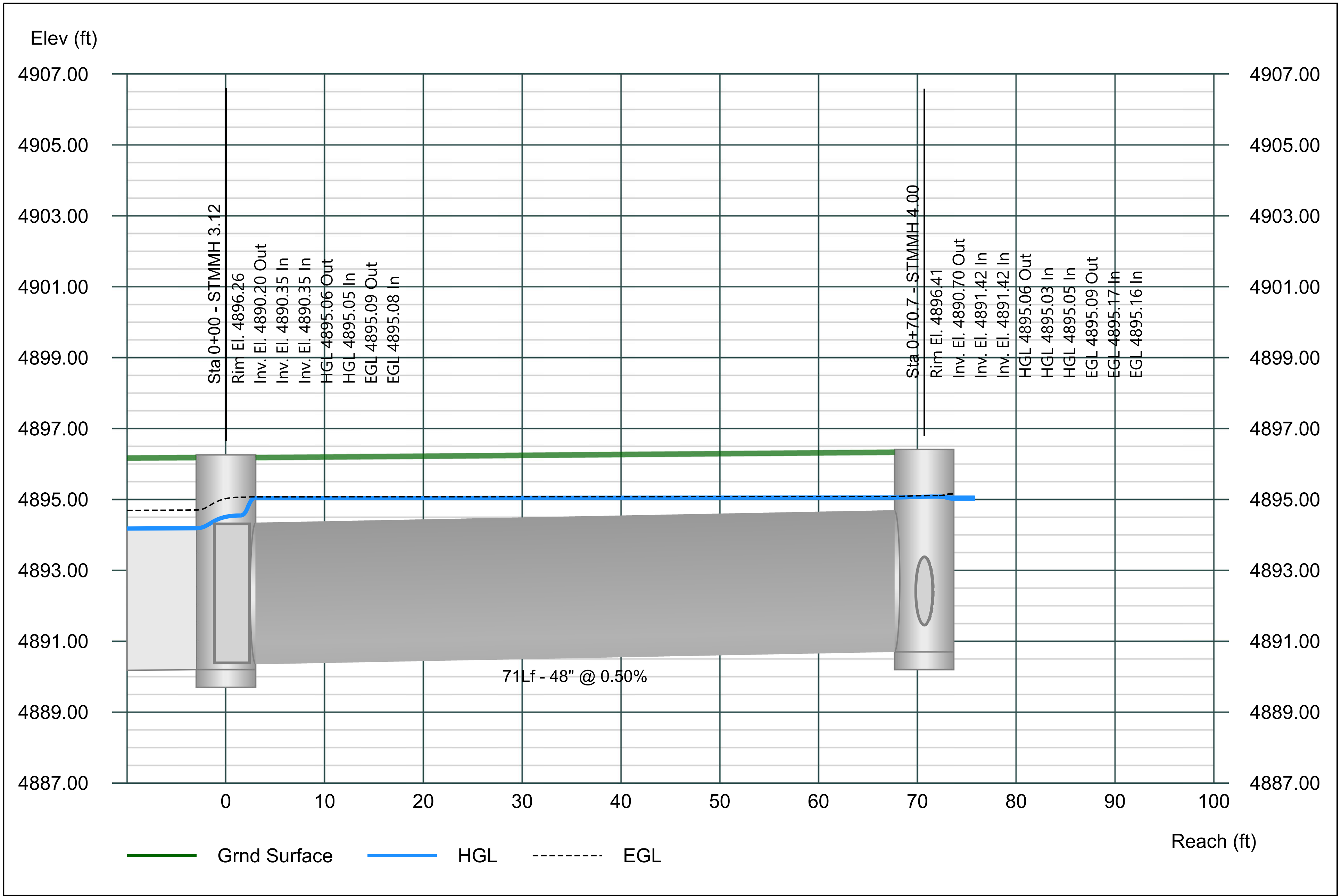
Project File: PA 3 and 4 Storm Sewer System.sws

Line 23 - Pipe - (413) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



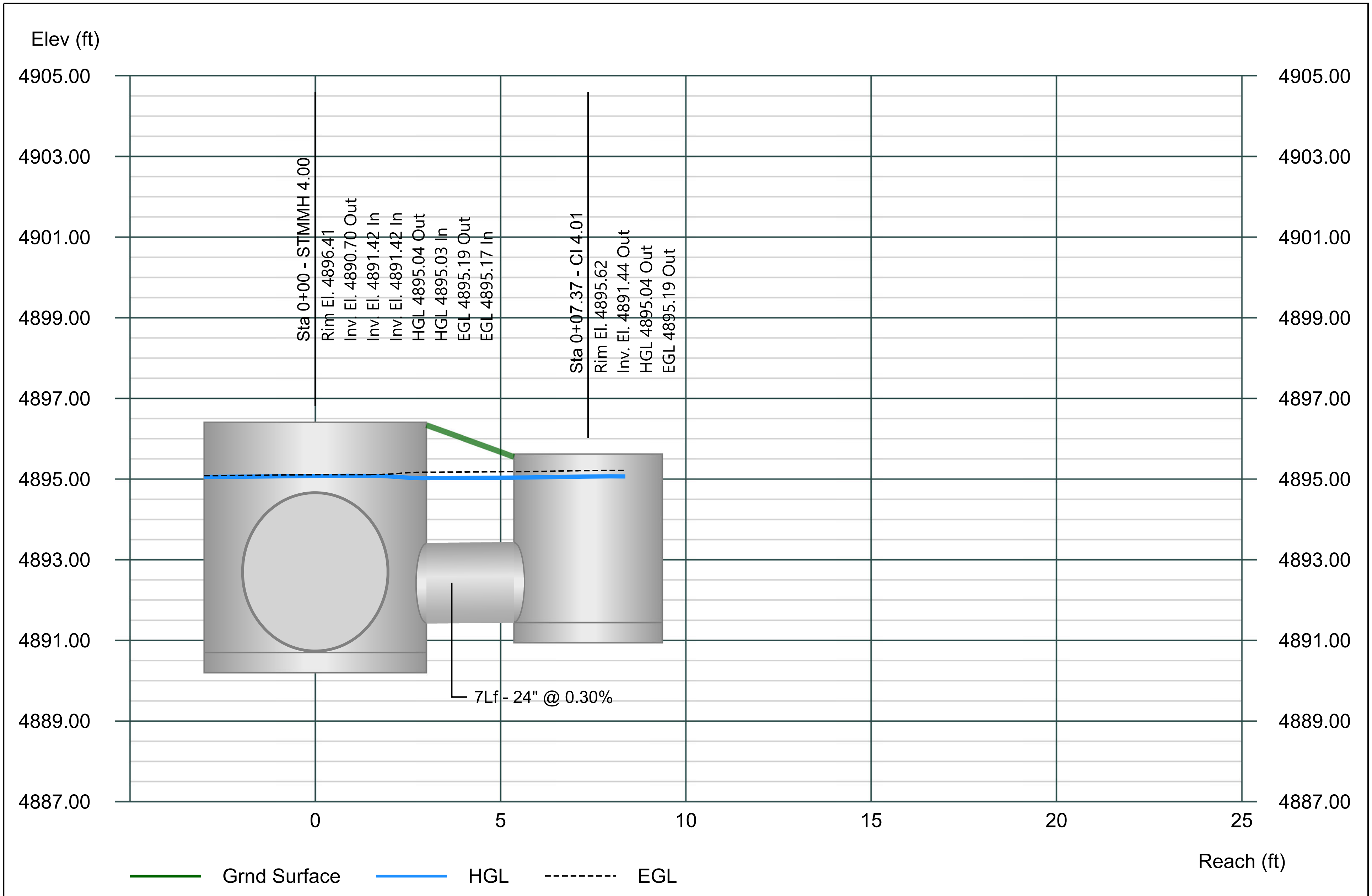
Project File: PA 3 and 4 Storm Sewer System.sws

Line 24 - Pipe - (412) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



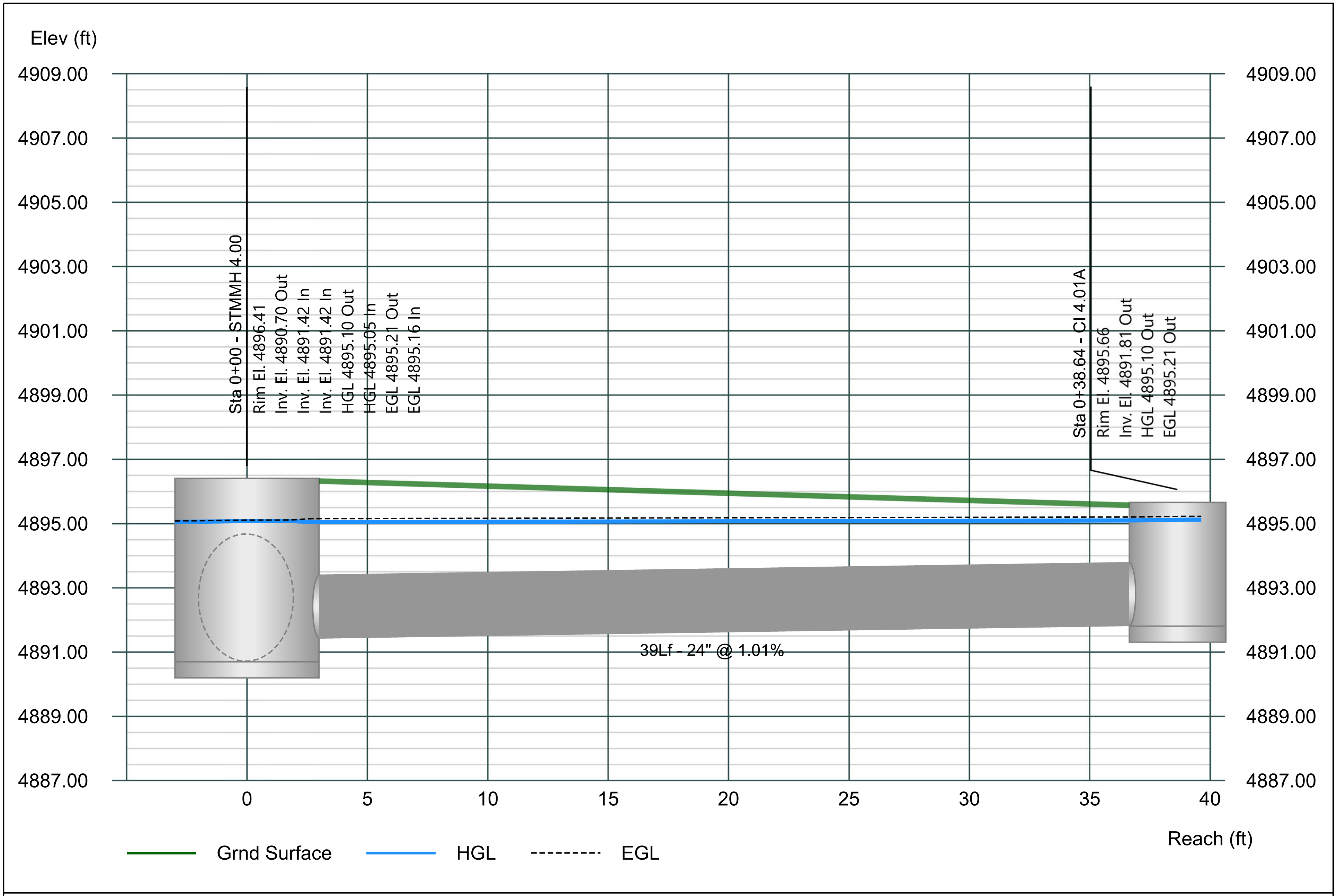
Project File: PA 3 and 4 Storm Sewer System.sws

Line 25 - Pipe - (598) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



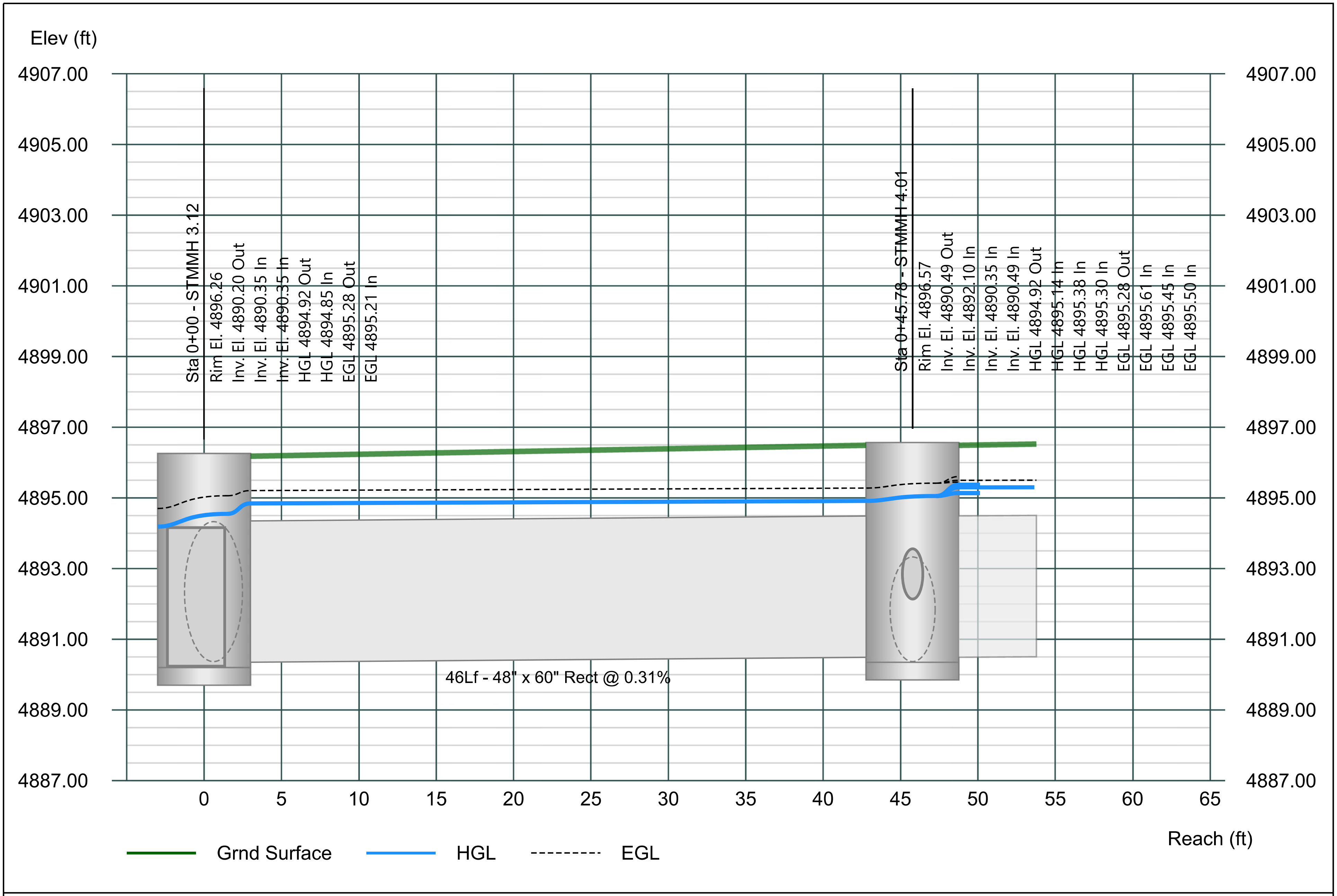
Project File: PA 3 and 4 Storm Sewer System.sws

Line 26 - Pipe - (115) (1) (1) (1) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



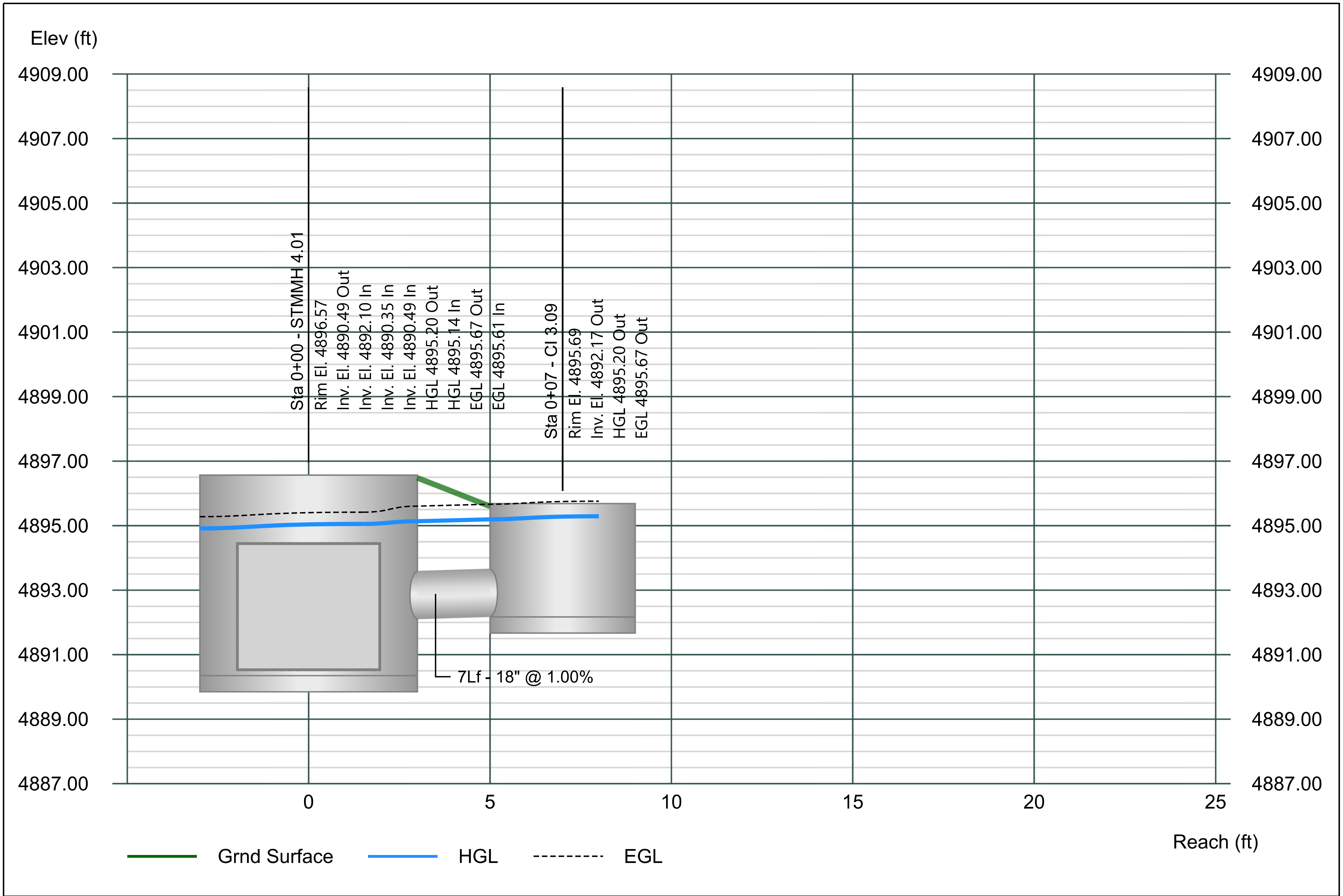
Project File: PA 3 and 4 Storm Sewer System.sws

Line 27 - Pipe - (394) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



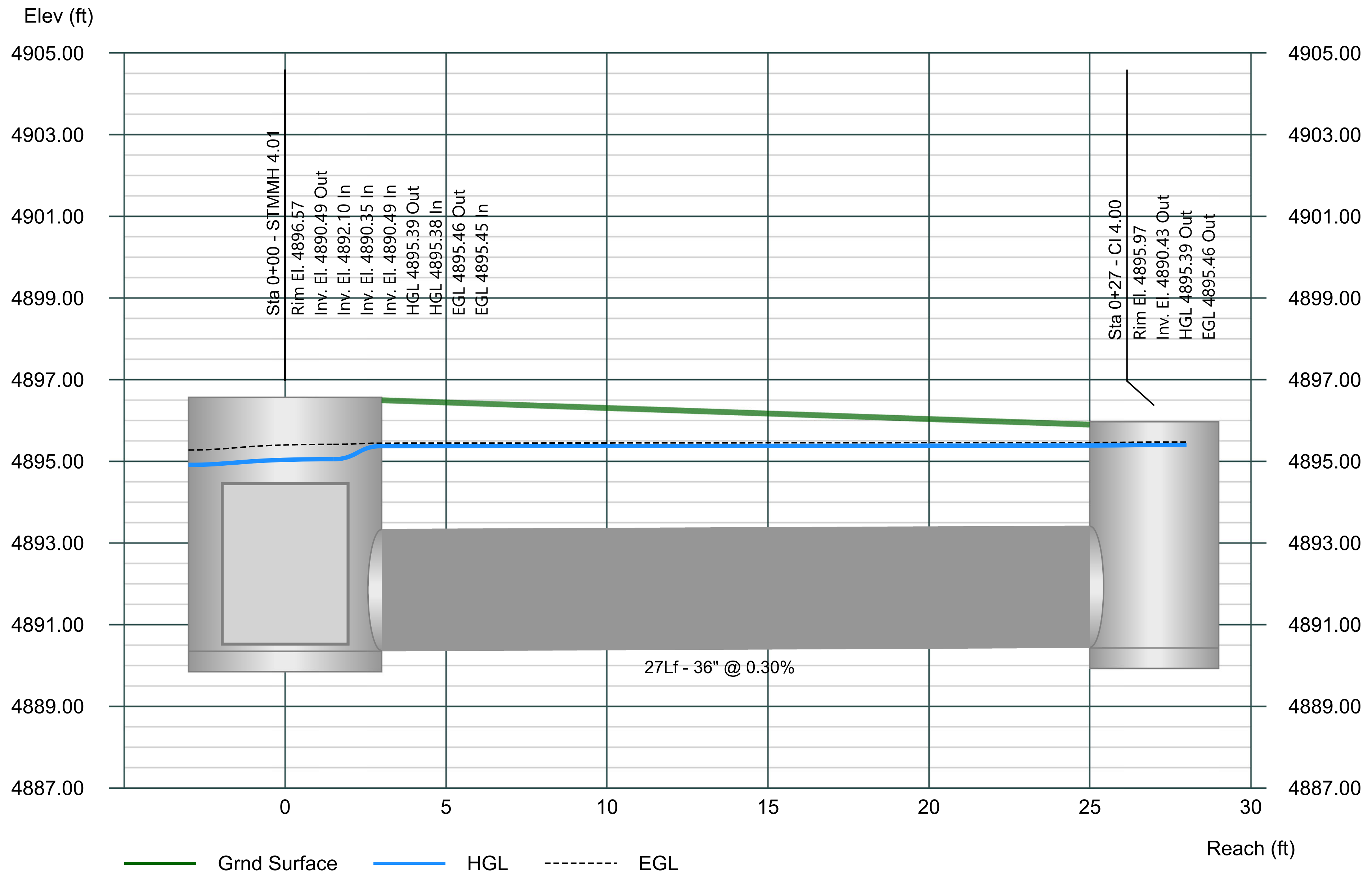
Project File: PA 3 and 4 Storm Sewer System.sws

Line 28 - Pipe - (115) (1) (1) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



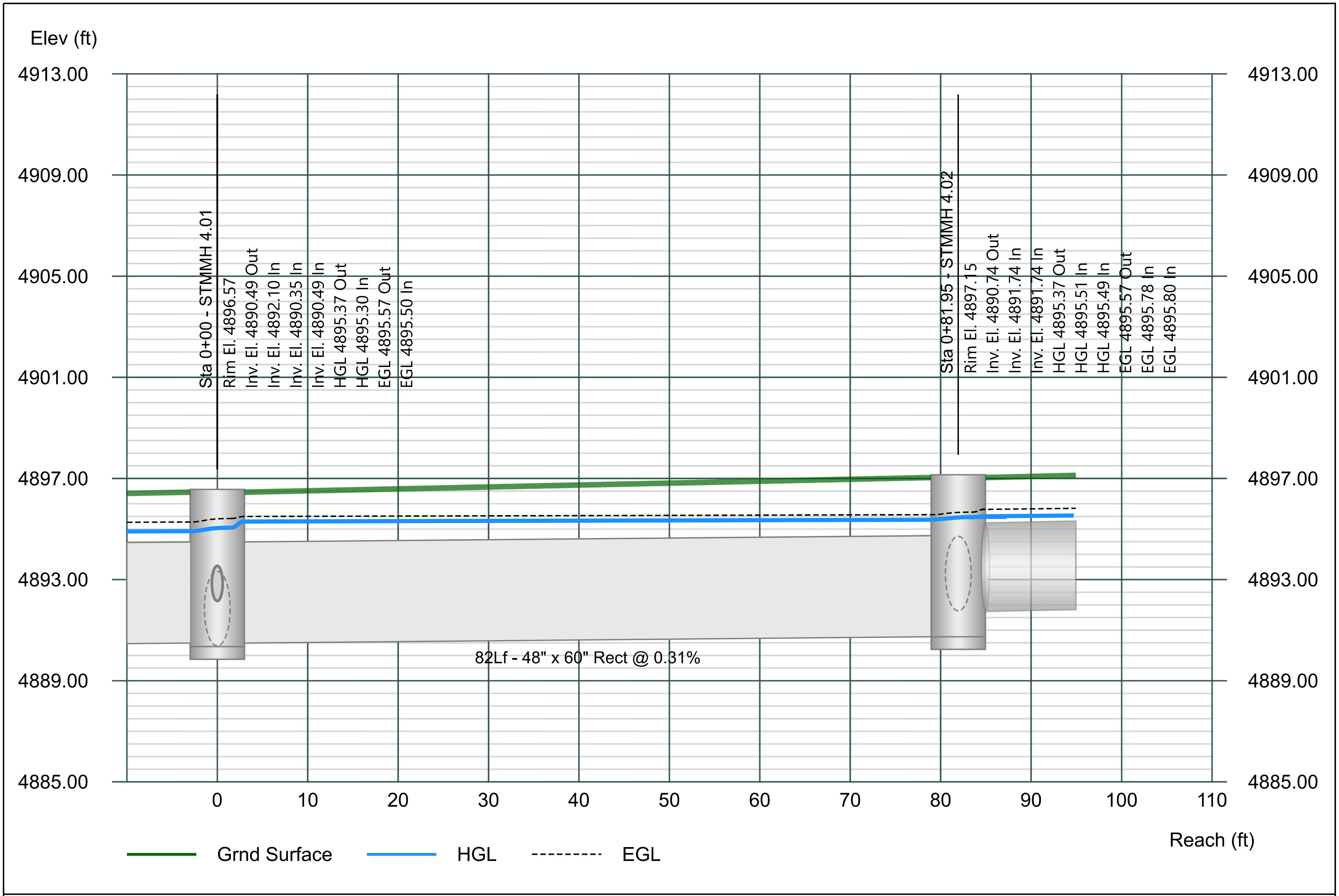
Project File: PA 3 and 4 Storm Sewer System.sws

Line 29 - Pipe - (584) (1) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



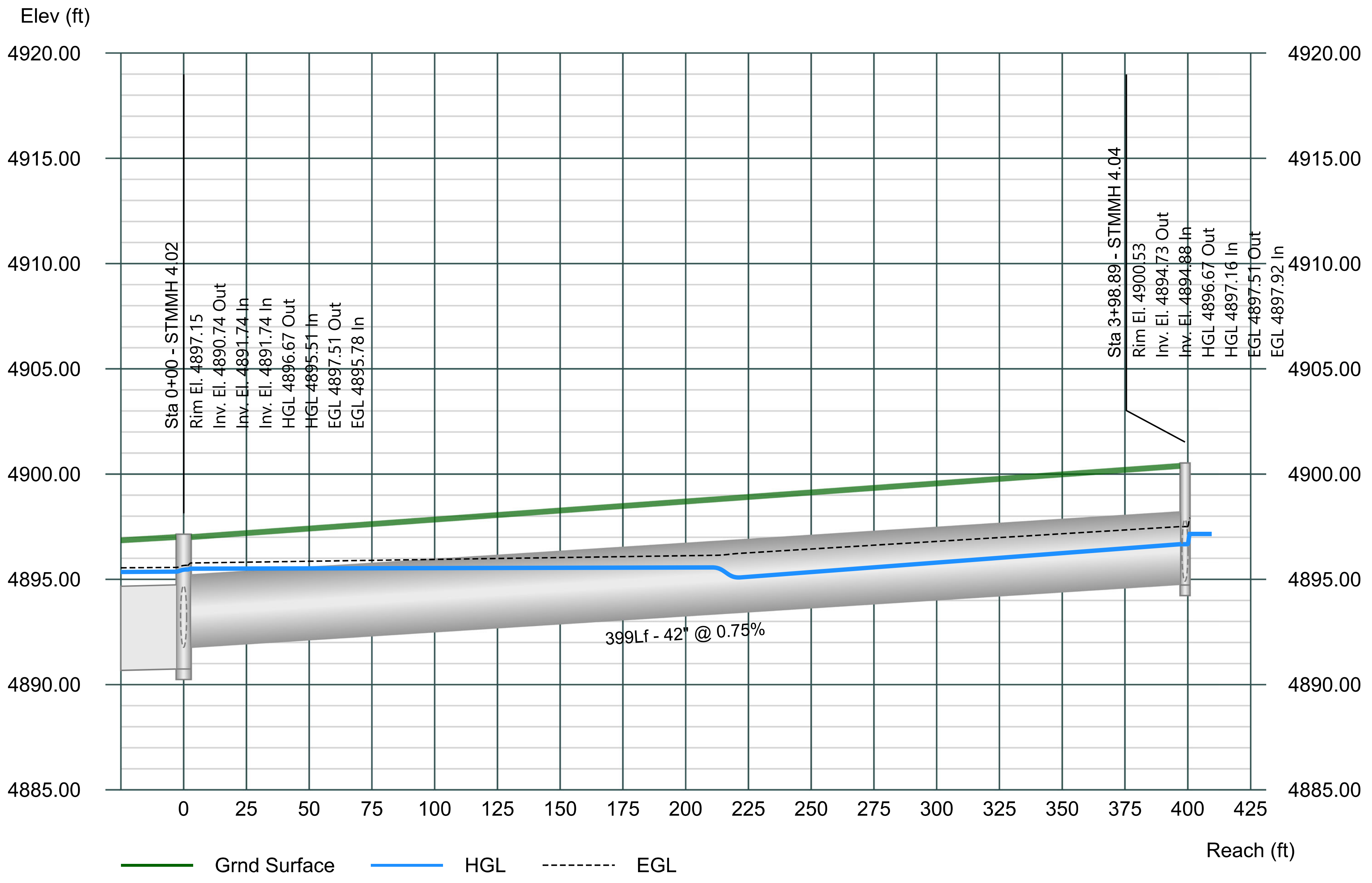
Project File: PA 3 and 4 Storm Sewer System.sws

Line 30 - Pipe - (584) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



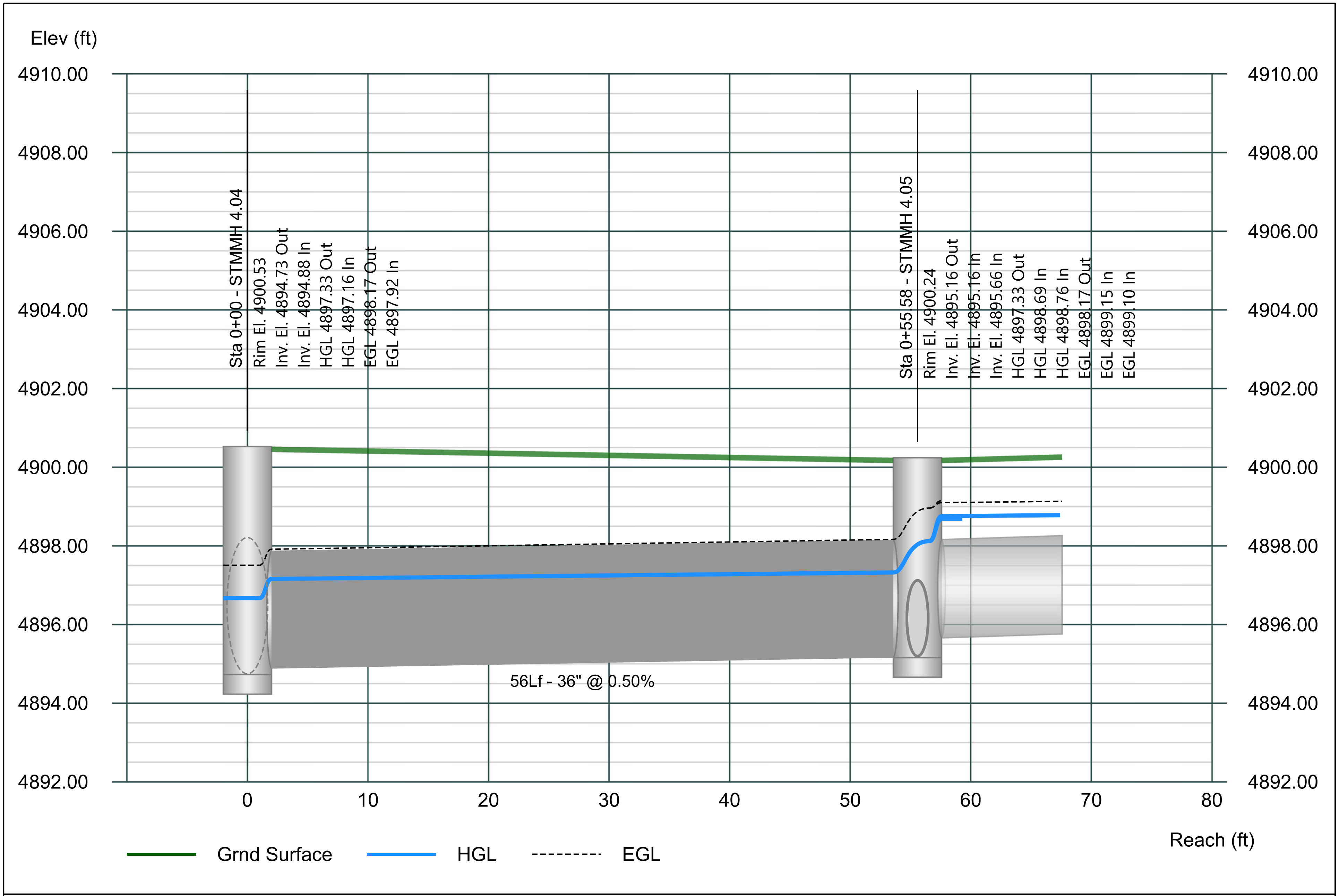
Project File: PA 3 and 4 Storm Sewer System.sws

Line 31 - Pipe - (583) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



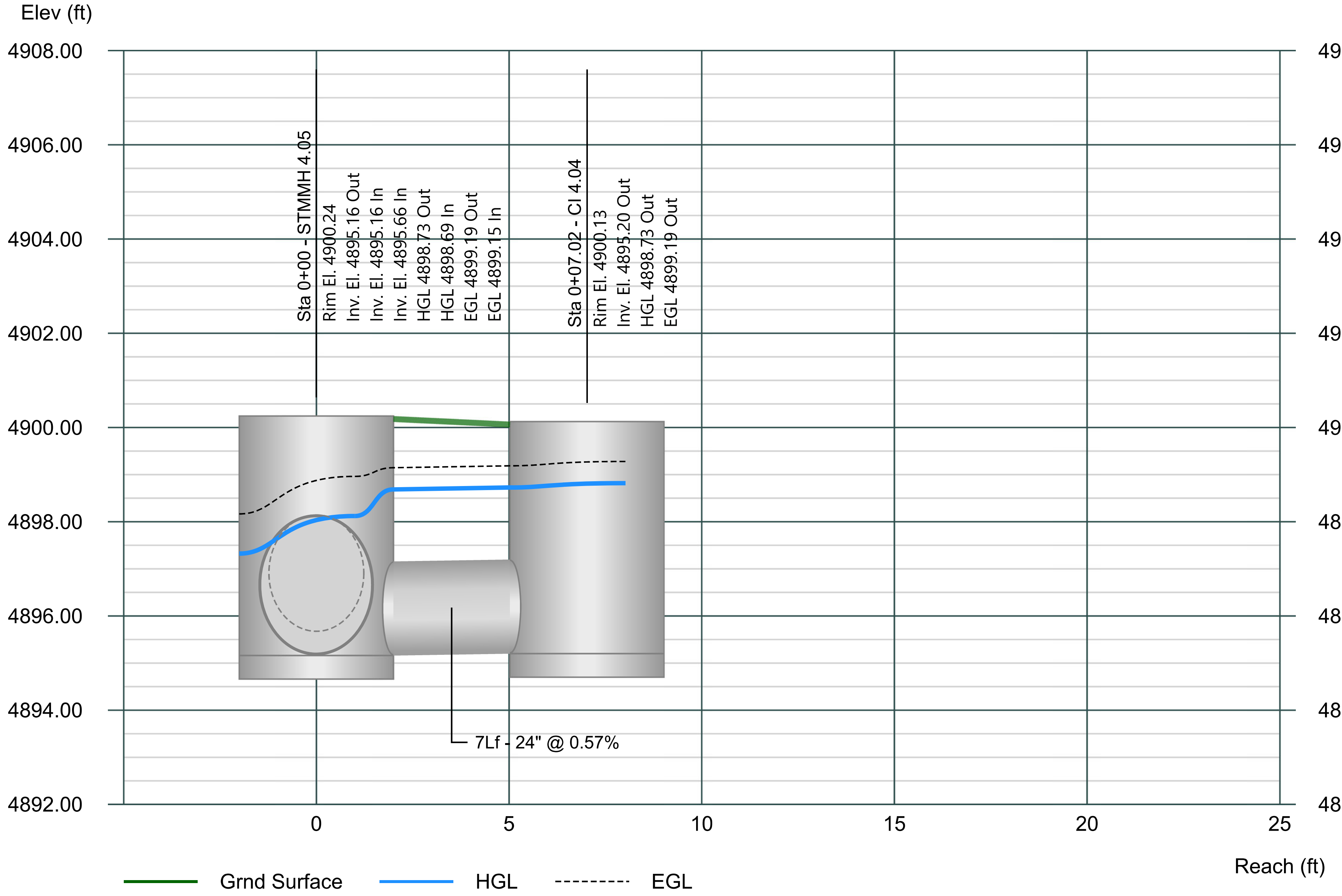
Project File: PA 3 and 4 Storm Sewer System.sws

Line 32 - Pipe - (582) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



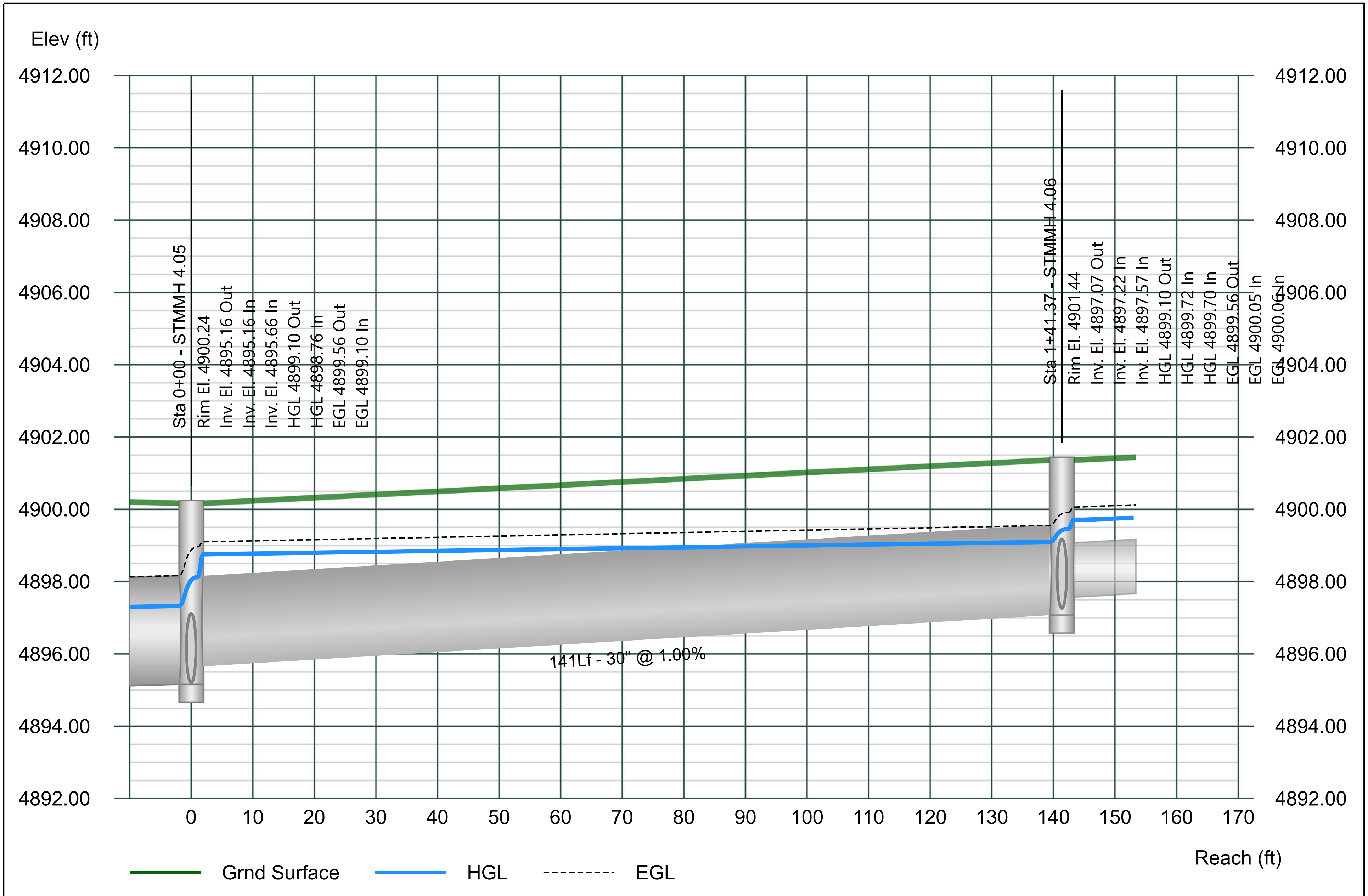
Project File: PA 3 and 4 Storm Sewer System.sws

Line 33 - Pipe - (594) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



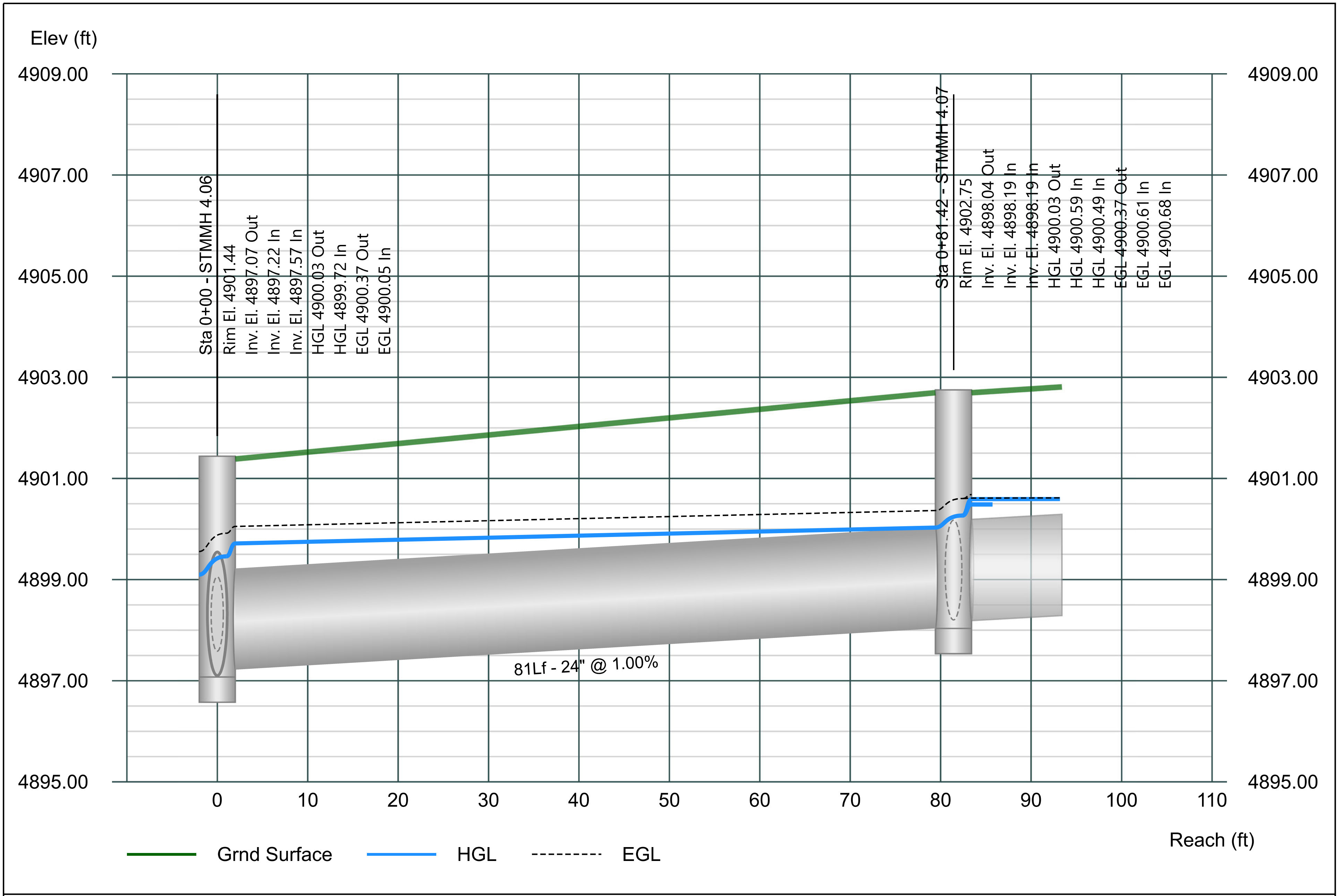
Project File: PA 3 and 4 Storm Sewer System.sws

Line 34 - Pipe - (593) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



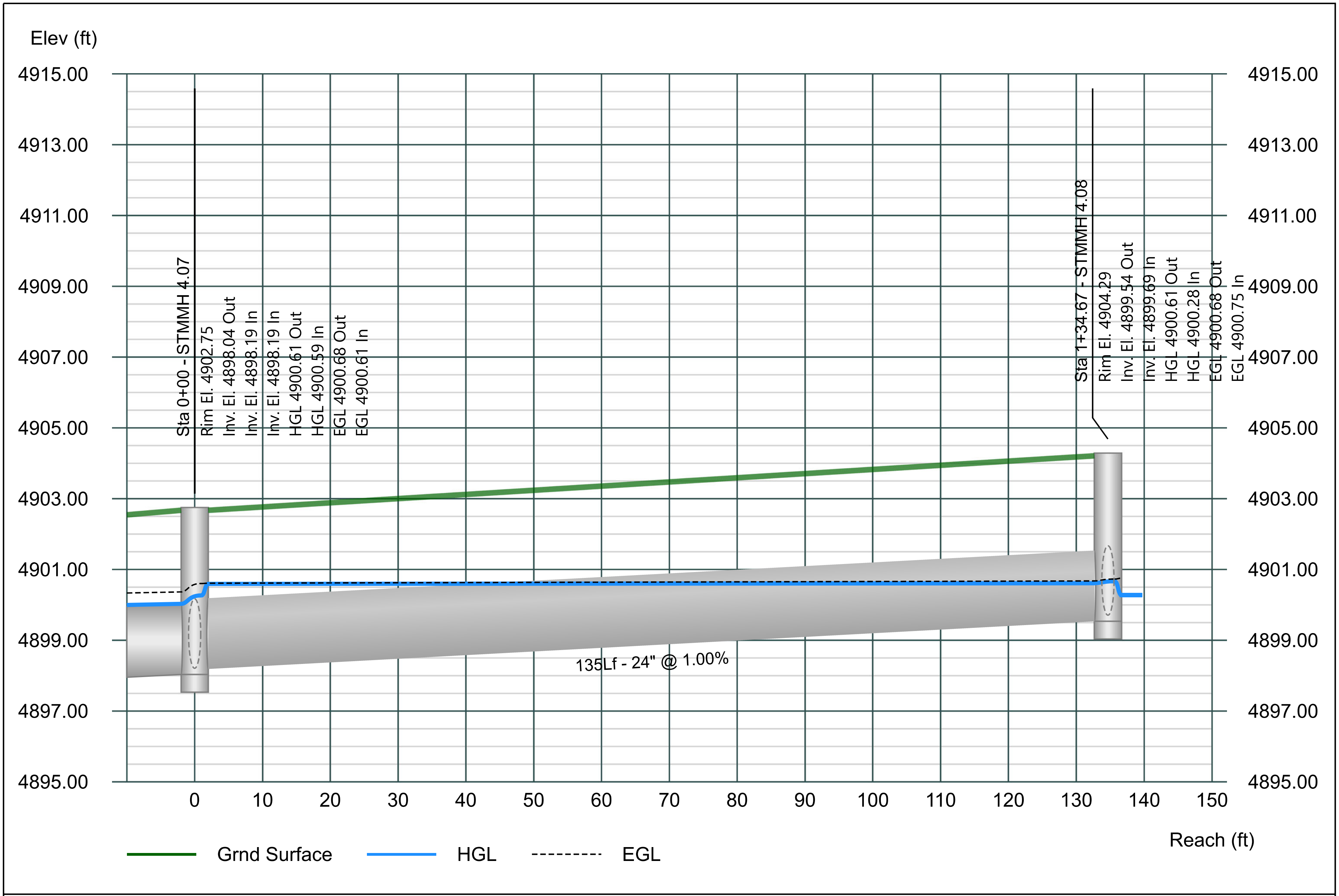
Project File: PA 3 and 4 Storm Sewer System.sws

Line 35 - Pipe - (592) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



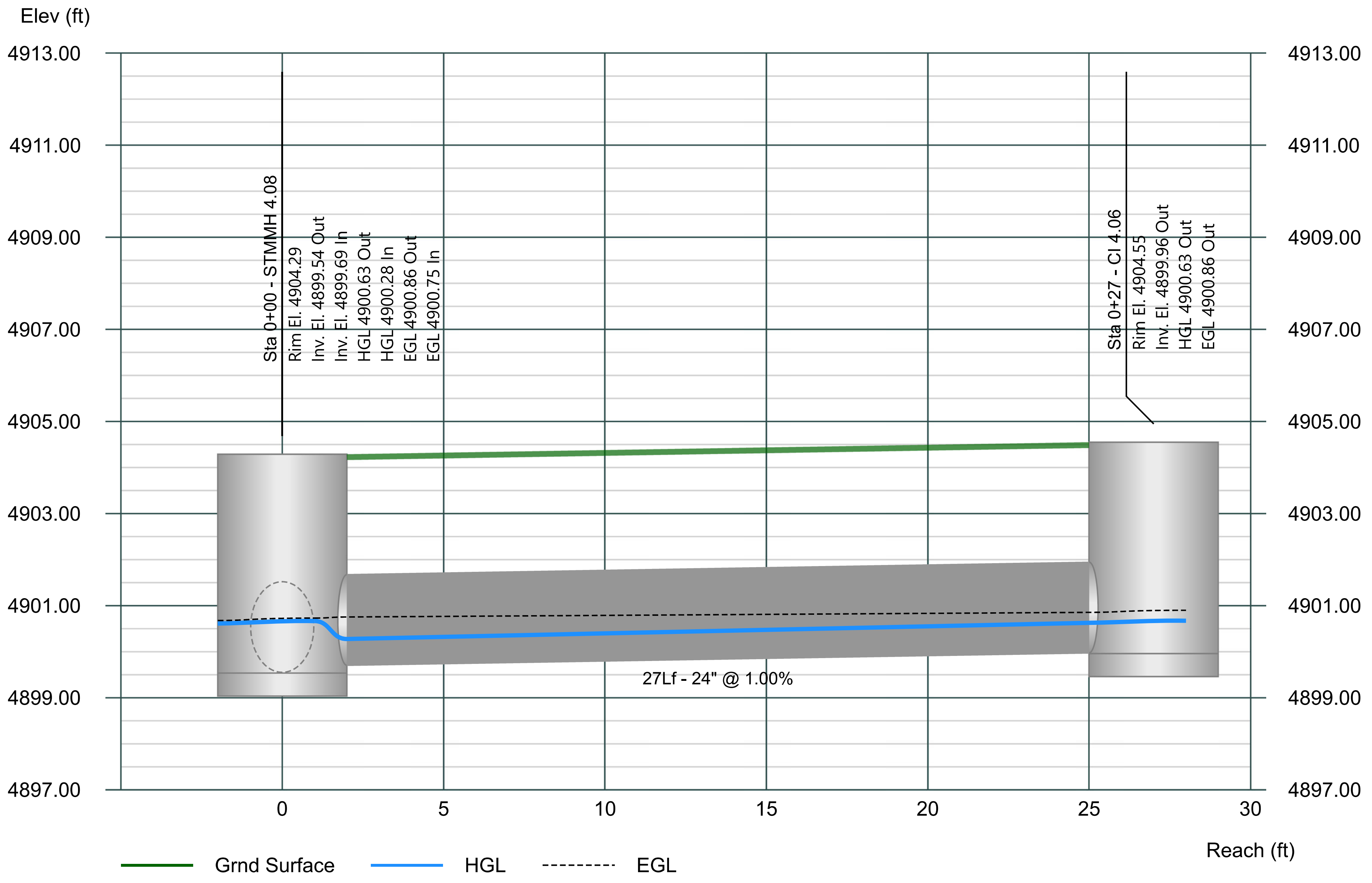
Project File: PA 3 and 4 Storm Sewer System.sws

Line 36 - Pipe - (591) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



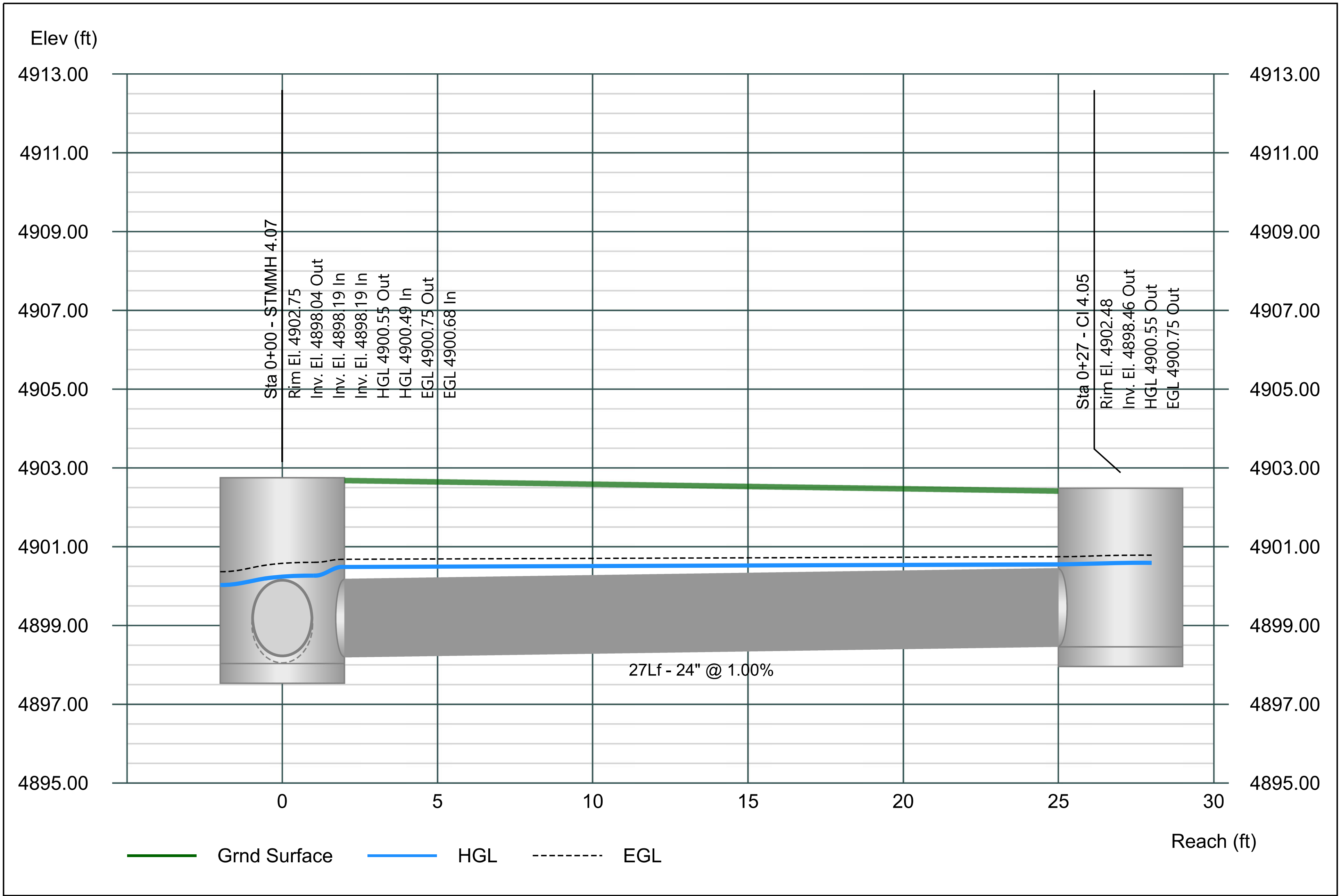
Project File: PA 3 and 4 Storm Sewer System.sws

Line 37 - Pipe - (595) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



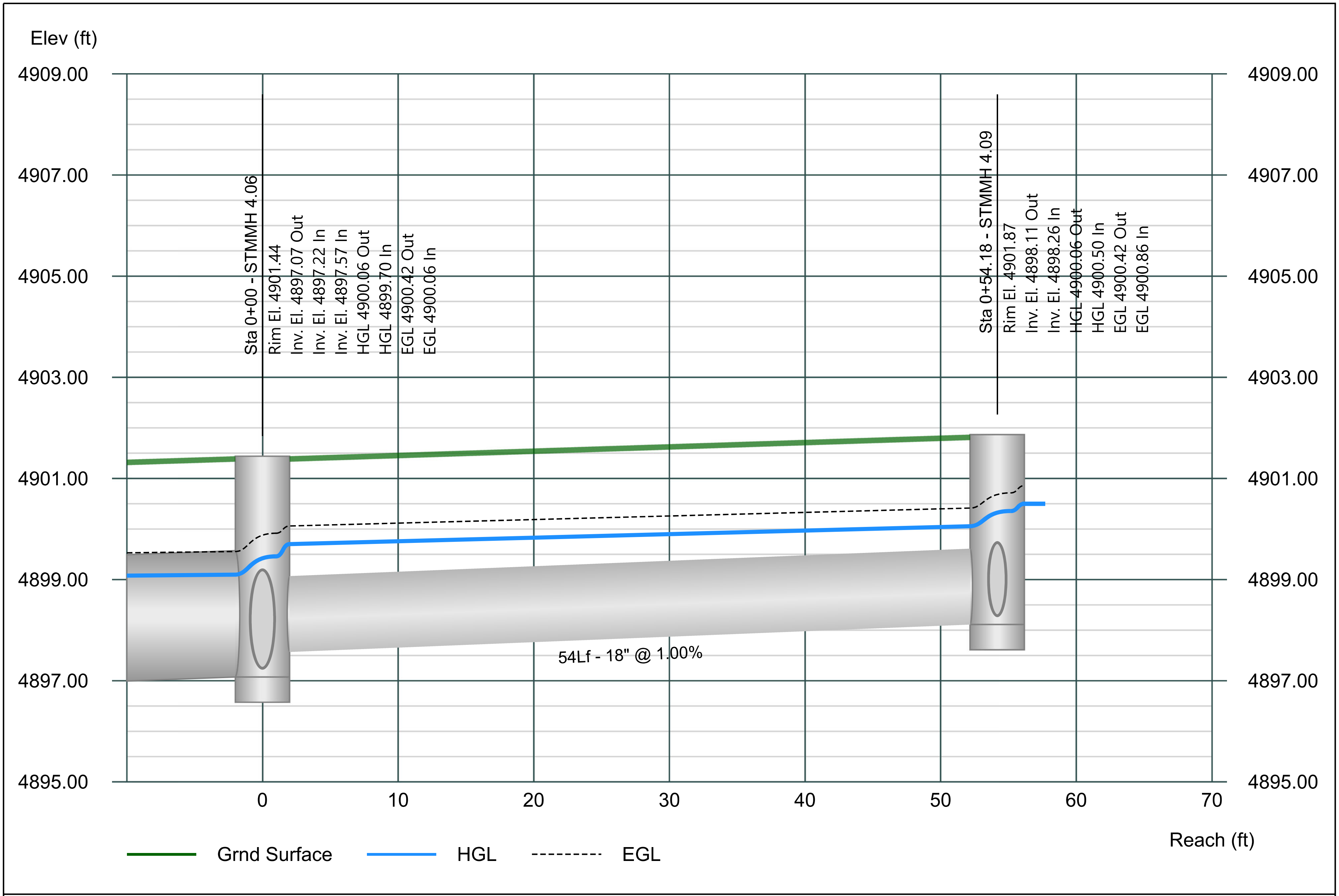
Project File: PA 3 and 4 Storm Sewer System.sws

Line 38 - Pipe - (597) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



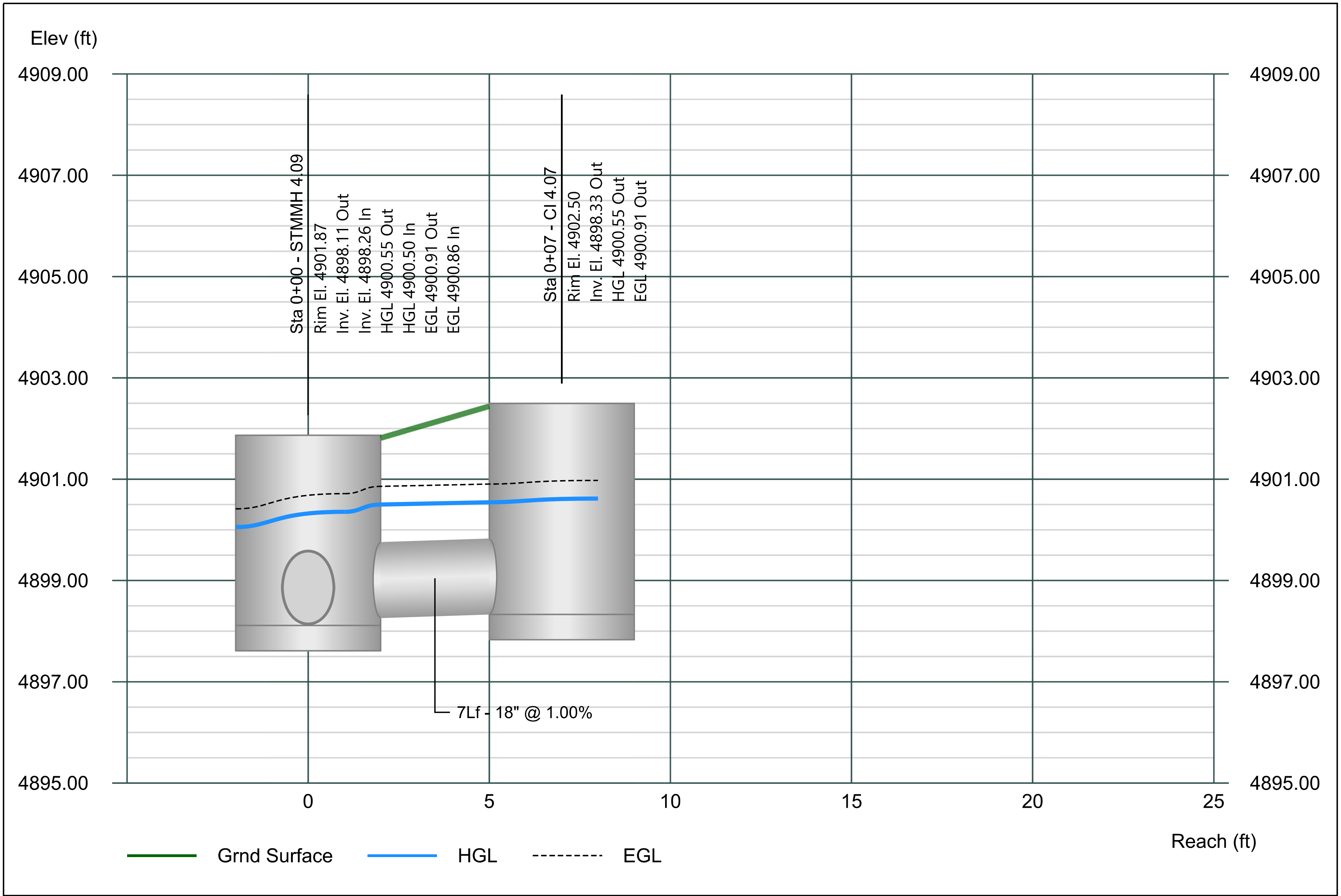
Project File: PA 3 and 4 Storm Sewer System.sws

Line 39 - Pipe - (596) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



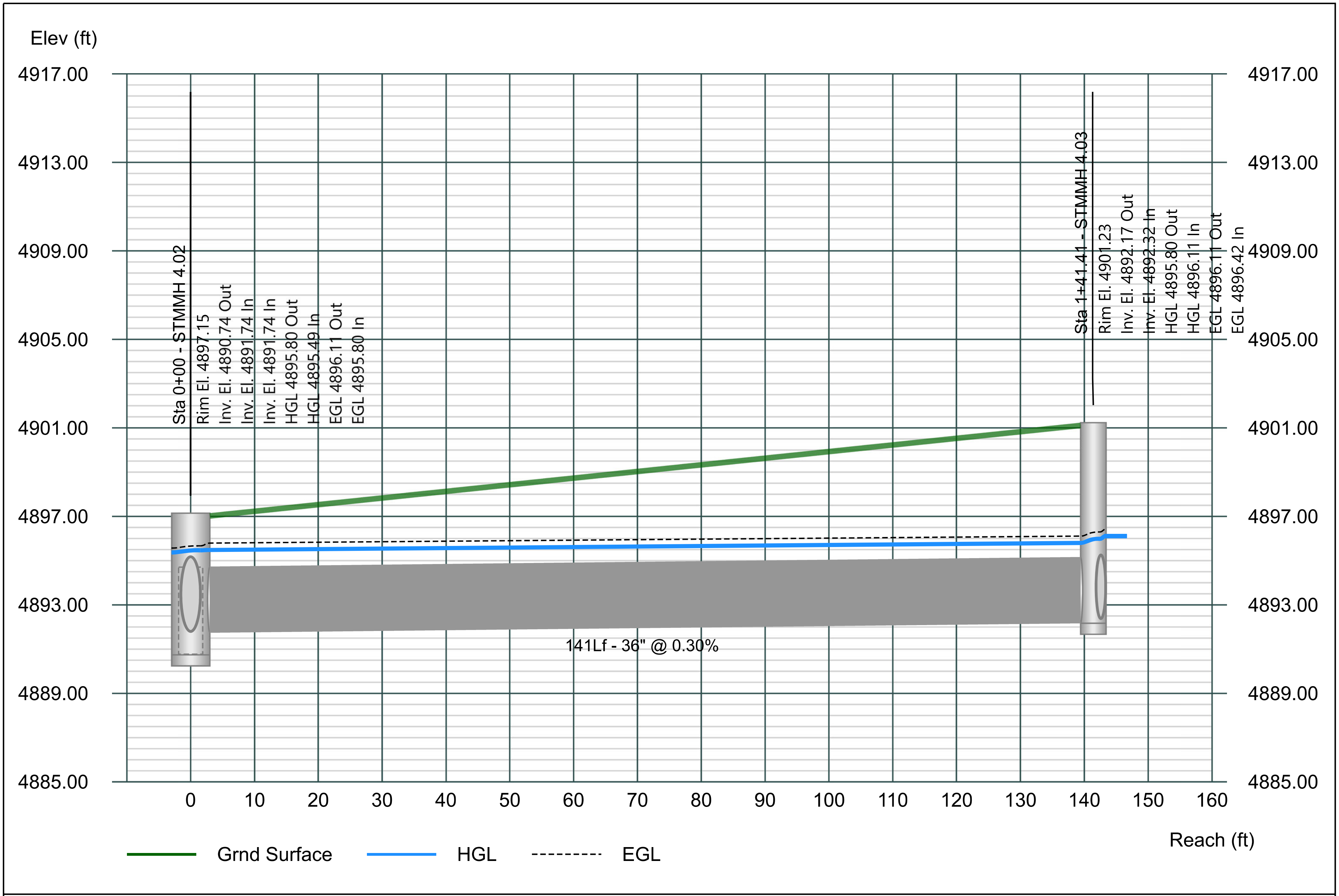
Project File: PA 3 and 4 Storm Sewer System.sws

Line 40 - Pipe - (585) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



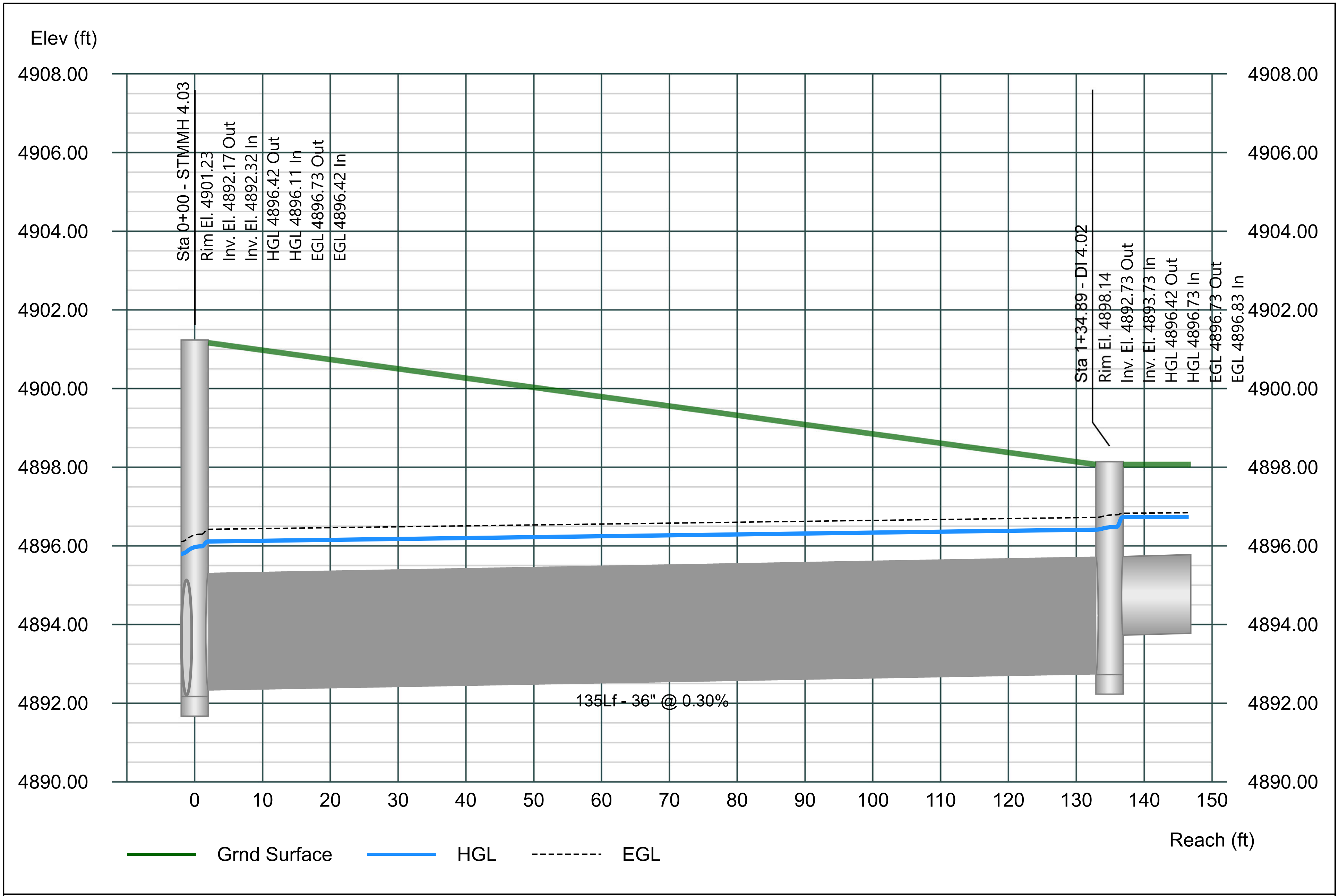
Project File: PA 3 and 4 Storm Sewer System.sws

Line 41 - Pipe - (114) (1) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



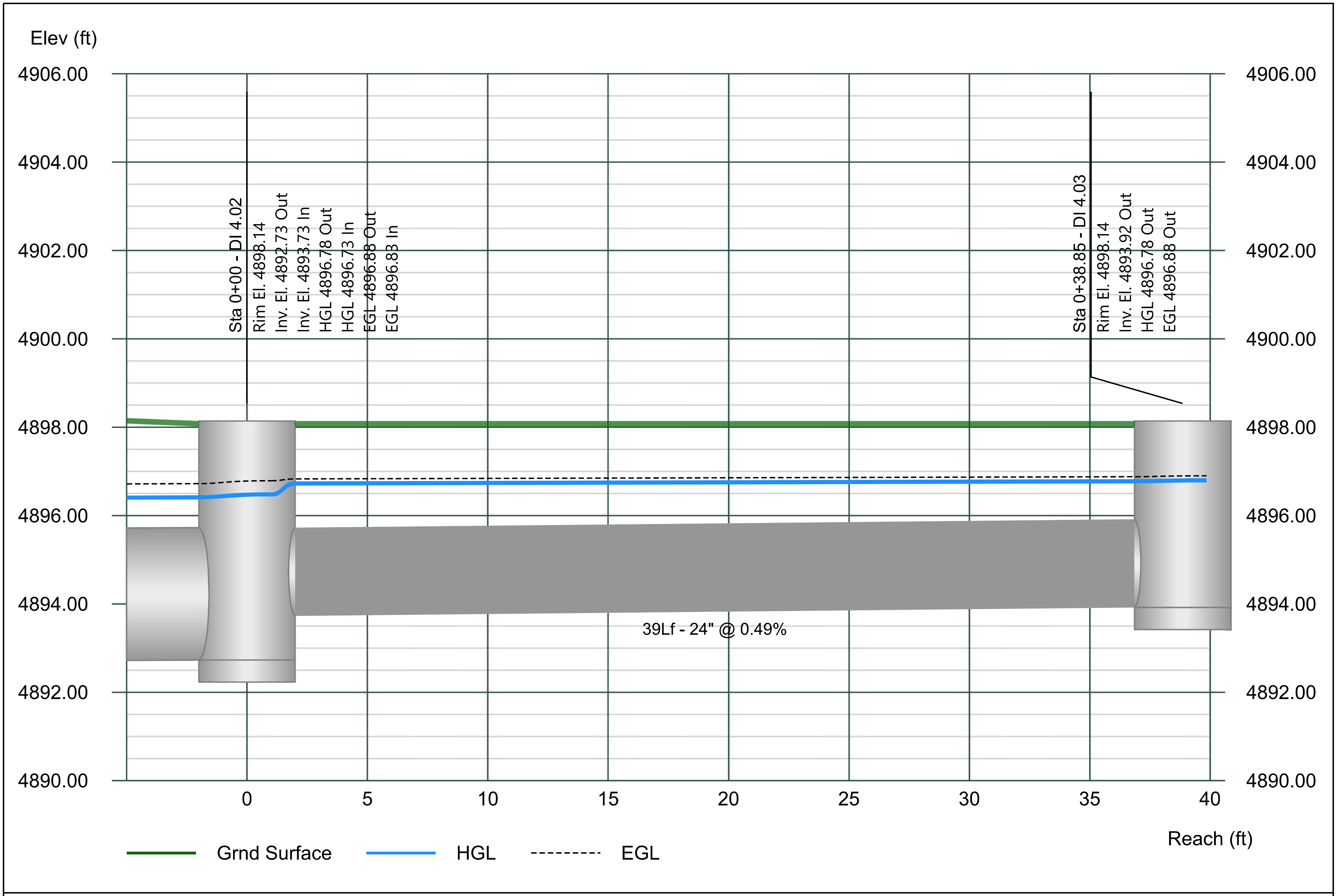
Project File: PA 3 and 4 Storm Sewer System.sws

Line 42 - Pipe - (114) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



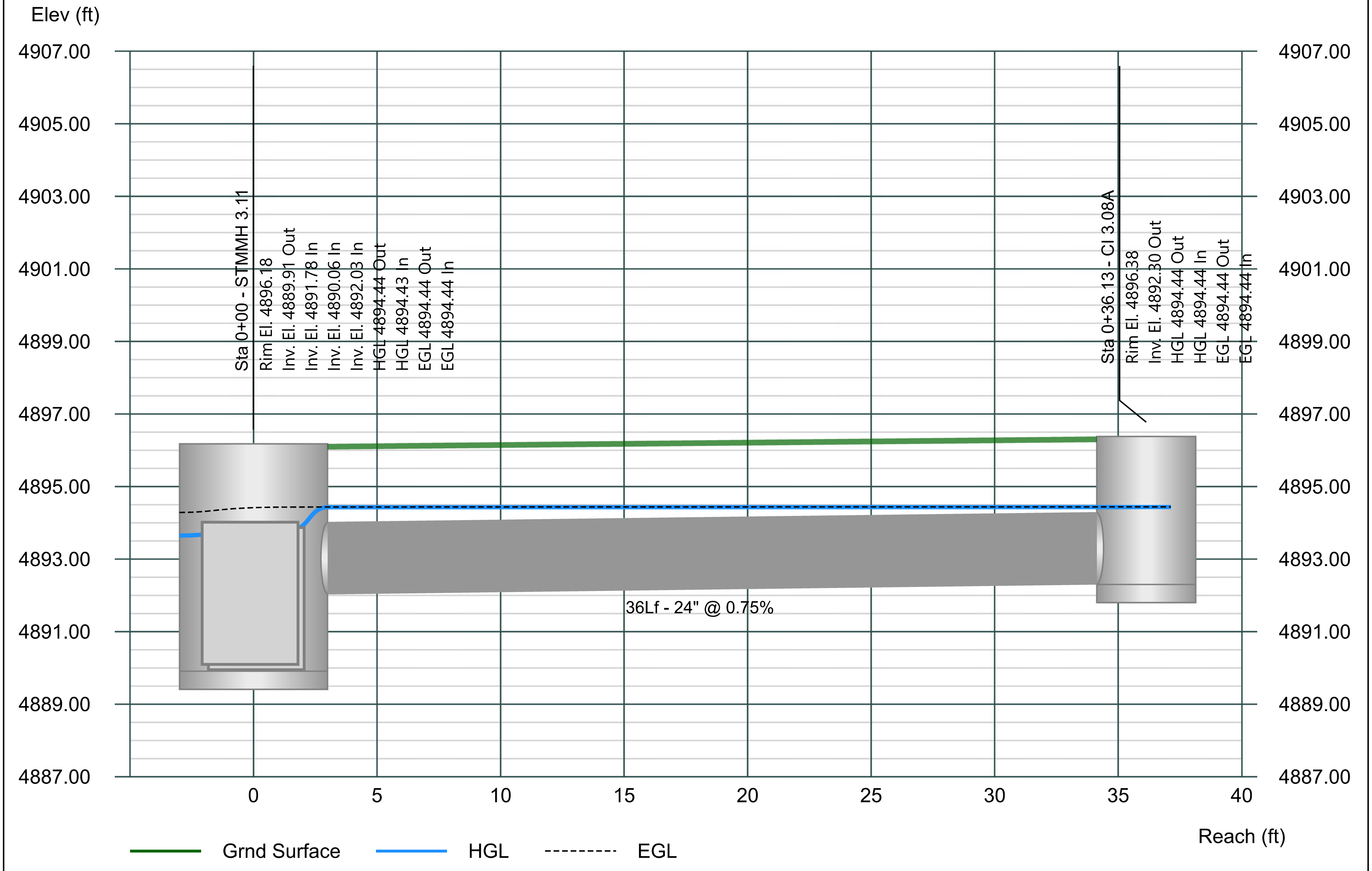
Project File: PA 3 and 4 Storm Sewer System.sws

Line 43 - Pipe - (600) (PA 3 and 4 Storm Sewer Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021



Project File: PA 3 and 4 Storm Sewer System.sws

Energy Grade Line Calculations

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021

Line No	Line Size (in)	Q (cfs)	Downstream							Length (ft)	Upstream							Pipe		Junction		
			Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)		Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	n Value	Enrgy Loss (ft)	HGLa Elev (ft)	EGLa Elev (ft)	Enrgy Loss (ft)
1	60x84r	188.77	4873.43	5.00	35.00	4878.43	5.39	0.45	4878.88	104.16	4873.74	4.76	33.31	4878.50	5.67	0.50	4879.00	0.013	0.118	4878.84	4879.34	0.34
2	60x84r	188.77	4873.74	5.00	35.00	4879.07	5.39	0.45	4879.52	933.32	4884.57	2.82[2]	19.77	4887.39	9.55	1.42	4888.81	0.013	9.288	4887.39	4888.81	0.00
3	24	21.90	4885.26	2.00	3.14	4888.36	6.97	0.76	4889.11	50.37	4885.76	2.00	3.14	4888.83	6.97	0.76	4889.58	0.013	0.472	4889.46	4890.21	0.63
4	24	7.96	4887.69	2.00	3.14	4890.16	2.53	0.10	4890.25	13.02	4887.82	2.00	3.14	4890.17	2.53	0.10	4890.27	0.013	0.016	4890.19	4890.29	0.02
5	24	13.94	4887.69	2.00	3.14	4890.03	4.44	0.31	4890.34	32.98	4888.07	2.00	3.14	4890.16	4.44	0.31	4890.46	0.013	0.125	4890.22	4890.52	0.06
6	60x84r	166.87	4884.57	3.94	27.61	4888.51	6.04	0.57	4889.08	361.47	4888.76	2.60[2]	18.21	4891.36	9.16	1.30	4892.67	0.013	3.585	4891.36	4892.67	0.00
7	42	47.21	4890.10	2.49[3]	7.33	4892.59	6.44	0.65	4893.24	156.17	4890.57	2.49	7.33	4893.06	6.44	0.64	4893.71	0.013	0.470	4893.91	4894.56	0.85
8	24	15.55	4891.57	2.00	3.14	4894.33	4.95	0.38	4894.71	20.78	4891.78	2.00	3.14	4894.43	4.95	0.38	4894.81	0.013	0.098	4894.74	4895.12	0.32
9	18	8.78	4892.28	1.50	1.77	4894.89	4.97	0.38	4895.28	7.00	4892.33	1.50	1.77	4894.94	4.97	0.38	4895.33	0.013	0.049	4895.02	4895.40	0.08
10	18	6.77	4892.28	1.50	1.77	4894.99	3.83	0.23	4895.22	27.00	4892.55	1.50	1.77	4895.10	3.83	0.23	4895.33	0.013	0.112	4895.15	4895.37	0.05
11	36	31.66	4890.72	3.00	7.07	4894.37	4.48	0.31	4894.68	22.29	4890.94	3.00	7.07	4894.42	4.48	0.31	4894.73	0.013	0.050	4894.56	4894.88	0.15
12	24	19.66	4891.94	2.00	3.14	4894.51	6.26	0.61	4895.12	10.20	4892.02	2.00	3.14	4894.59	6.26	0.61	4895.20	0.013	0.077	4894.98	4895.59	0.40
13	24	6.56	4892.17	2.00	3.14	4895.55	2.09	0.07	4895.62	33.08	4892.42	2.00	3.14	4895.58	2.09	0.07	4895.65	0.013	0.028	4895.64	4895.70	0.06
14	24	6.56	4892.57	2.00	3.14	4895.66	2.09	0.07	4895.73	27.00	4892.77	2.00	3.14	4895.69	2.09	0.07	4895.75	0.013	0.023	4895.70	4895.77	0.01
15	24	13.10	4892.17	2.00	3.14	4895.43	4.17	0.27	4895.70	53.26	4892.57	2.00	3.14	4895.61	4.17	0.27	4895.88	0.013	0.179	4895.83	4896.11	0.23
16	18	7.47	4893.07	1.50	1.77	4895.94	4.23	0.28	4896.22	27.00	4893.27	1.50	1.77	4896.08	4.23	0.28	4896.35	0.013	0.137	4896.13	4896.41	0.06
17	24	5.63	4893.07	2.00	3.14	4896.08	1.79	0.05	4896.13	7.00	4893.12	2.00	3.14	4896.08	1.79	0.05	4896.13	0.013	0.004	4896.09	4896.14	0.01
18	24	12.00	4891.94	2.00	3.14	4894.74	3.82	0.23	4894.97	7.00	4892.01	2.00	3.14	4894.76	3.82	0.23	4894.99	0.013	0.020	4894.81	4895.03	0.05
19	60x60r	119.66	4888.75	3.57	17.84	4892.32	6.71	0.70	4893.02	288.54	4889.62	3.22	16.10	4892.84	7.43	0.86	4893.70	0.013	0.681	4893.08	4893.94	0.24
20	48x60r	119.66	4889.77	3.83	19.16	4893.60	6.25	0.61	4894.21	47.24	4889.91	3.74	18.71	4893.65	6.40	0.64	4894.29	0.013	0.080	4893.80	4894.44	0.15
21	24	2.89	4891.78	2.00	3.14	4894.43	0.92	0.01	4894.44	9.87	4891.88	2.00	3.14	4894.43	0.92	0.01	4894.44	0.013	0.001	4894.43	4894.45	0.00
22	48x60r	114.64	4890.06	4.00	20.00	4894.13	5.73	0.51	4894.64	46.76	4890.20	3.99	19.95	4894.19	5.75	0.51	4894.70	0.013	0.063	4894.55	4895.06	0.36

Notes: Return Period = 100-yrs. [2] Critical depth. [3] Normal depth. r = rectangular e = elliptical a = arch

Project File: PA 3 and 4 Storm Sewer System.sws

Energy Grade Line Calculations

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ PA 3 and 4

03-18-2021

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
	(in)	(cfs)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	(ft)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	n Value	Enrgy Loss (ft)	HGLa Elev (ft)	EGLa Elev (ft)	Enrgy Loss (ft)
23	48	17.90	4890.35	4.00	12.56	4895.05	1.42	0.03	4895.08	70.70	4890.70	4.00	12.57	4895.06	1.42	0.03	4895.09	0.013	0.011	4895.08	4895.11	0.03
24	24	9.66	4891.42	2.00	3.14	4895.03	3.08	0.15	4895.17	7.37	4891.44	2.00	3.14	4895.04	3.07	0.15	4895.19	0.013	0.014	4895.07	4895.22	0.03
25	24	8.24	4891.42	2.00	3.14	4895.05	2.62	0.11	4895.16	38.64	4891.81	2.00	3.14	4895.10	2.62	0.11	4895.21	0.013	0.051	4895.12	4895.23	0.02
26	48x60r	96.74	4890.35	4.00	20.00	4894.85	4.84	0.36	4895.21	45.78	4890.49	4.00	20.00	4894.92	4.84	0.36	4895.28	0.013	0.071	4895.06	4895.42	0.14
27	18	9.70	4892.10	1.50	1.77	4895.14	5.49	0.47	4895.61	7.00	4892.17	1.50	1.77	4895.20	5.49	0.47	4895.67	0.013	0.060	4895.29	4895.76	0.09
28	36	15.27	4890.35	3.00	7.07	4895.38	2.16	0.07	4895.45	27.00	4890.43	3.00	7.07	4895.39	2.16	0.07	4895.46	0.013	0.014	4895.40	4895.48	0.01
29	48x60r	71.77	4890.49	4.00	20.00	4895.30	3.59	0.20	4895.50	81.95	4890.74	4.00	20.00	4895.37	3.59	0.20	4895.57	0.013	0.070	4895.47	4895.67	0.10
30	42	40.21	4891.74	3.50	9.62	4895.51	4.18	0.27	4895.78	398.89	4894.73	1.94^2	5.48	4896.67	7.34	0.84	4897.51	0.013	1.729	4896.67	4897.51	0.00
31	36	40.21	4894.88	2.28	5.76	4897.16	6.98	0.76	4897.92	55.58	4895.16	2.17	5.46	4897.33	7.36	0.84	4898.17	0.013	0.251	4898.12	4898.96	0.80
32	24	17.10	4895.16	2.00	3.14	4898.69	5.44	0.46	4899.15	7.02	4895.20	2.00	3.14	4898.73	5.44	0.46	4899.19	0.013	0.040	4898.82	4899.28	0.09
33	30	23.11	4895.66	2.50	4.91	4898.76	4.71	0.34	4899.10	141.37	4897.07	2.03	4.26	4899.10	5.42	0.46	4899.56	0.013	0.455	4899.46	4899.92	0.36
34	24	14.62	4897.22	2.00	3.14	4899.72	4.65	0.34	4900.05	81.42	4898.04	2.00	3.14	4900.03	4.65	0.34	4900.37	0.013	0.314	4900.27	4900.61	0.24
35	24	3.51	4898.19	2.00	3.14	4900.59	1.12	0.02	4900.61	134.67	4899.54	1.08	1.72	4900.61	2.04	0.06	4900.68	0.013	0.065	4900.67	4900.73	0.05
36	24	3.51	4899.69	0.59‡	0.77	4900.28	4.57	0.32	4900.75	27.00	4899.96	0.67	0.92	4900.63	3.82	0.23	4900.86	0.013	0.101	4900.67	4900.90	0.05
37	24	11.11	4898.19	2.00	3.14	4900.49	3.54	0.19	4900.68	27.00	4898.46	2.00	3.14	4900.55	3.54	0.19	4900.75	0.013	0.065	4900.59	4900.79	0.04
38	18	8.49	4897.57	1.50	1.77	4899.70	4.81	0.36	4900.06	54.18	4898.11	1.50	1.77	4900.06	4.80	0.36	4900.42	0.013	0.354	4900.36	4900.72	0.30
39	18	8.49	4898.26	1.50	1.77	4900.50	4.81	0.36	4900.86	7.00	4898.33	1.50	1.77	4900.55	4.80	0.36	4900.91	0.013	0.046	4900.62	4900.98	0.07
40	36	31.56	4891.74	3.00	7.07	4895.49	4.47	0.31	4895.80	141.41	4892.17	3.00	7.07	4895.80	4.46	0.31	4896.11	0.013	0.317	4895.99	4896.30	0.19
41	36	31.56	4892.32	3.00	7.07	4896.11	4.47	0.31	4896.42	134.89	4892.73	3.00	7.07	4896.42	4.46	0.31	4896.73	0.013	0.302	4896.48	4896.79	0.07
42	24	8.09	4893.73	2.00	3.14	4896.73	2.58	0.10	4896.83	38.85	4893.92	2.00	3.14	4896.78	2.58	0.10	4896.88	0.013	0.050	4896.80	4896.90	0.02
43	24	2.13	4892.03	2.00	3.14	4894.43	0.68	0.01	4894.44	36.13	4892.30	2.00	3.14	4894.44	0.68	0.01	4894.44	0.013	0.003	4894.44	4894.44	0.00

Notes: Return Period = 100-yrs. ^{2} Critical depth. ‡ Supercritical. r = rectangular e = elliptical a = arch

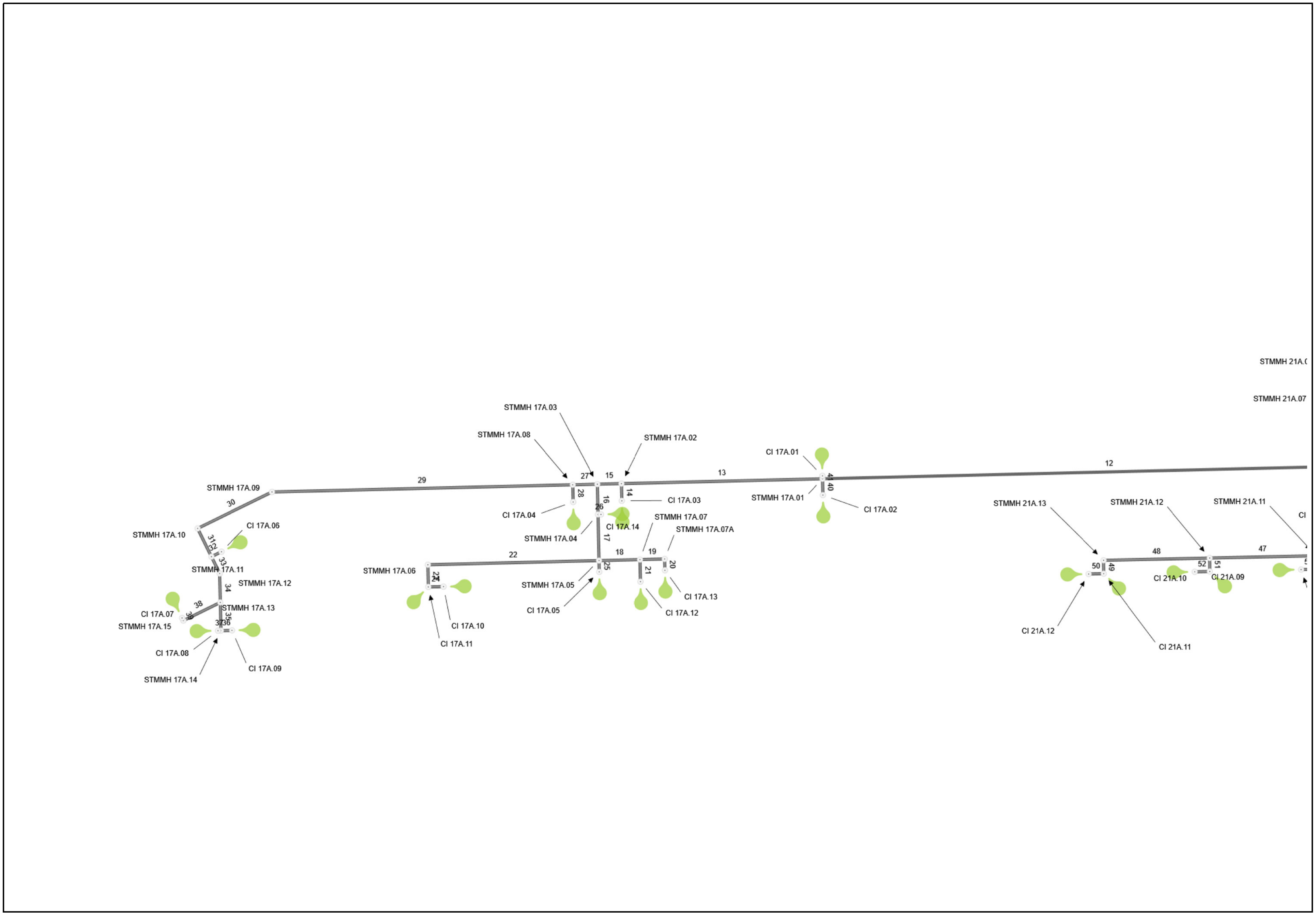
Project File: PA 3 and 4 Storm Sewer System.sws

Plan View

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

04-09-2021



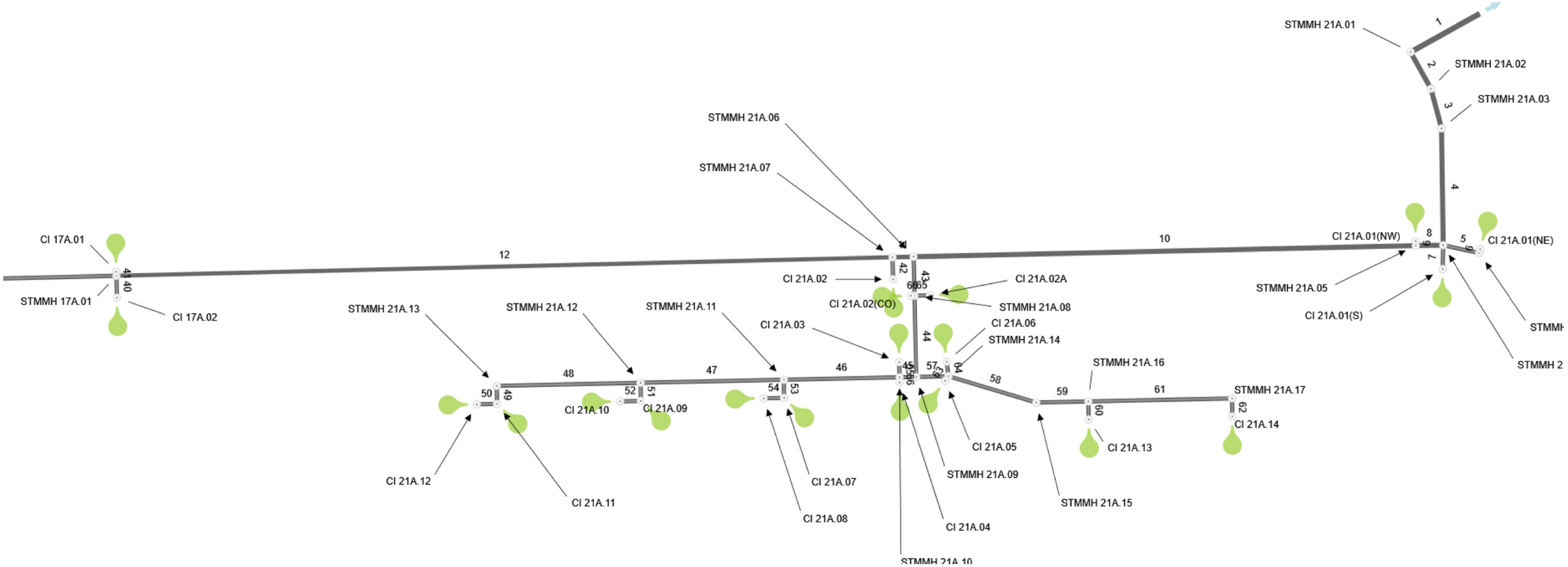
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Plan View

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

04-09-2021



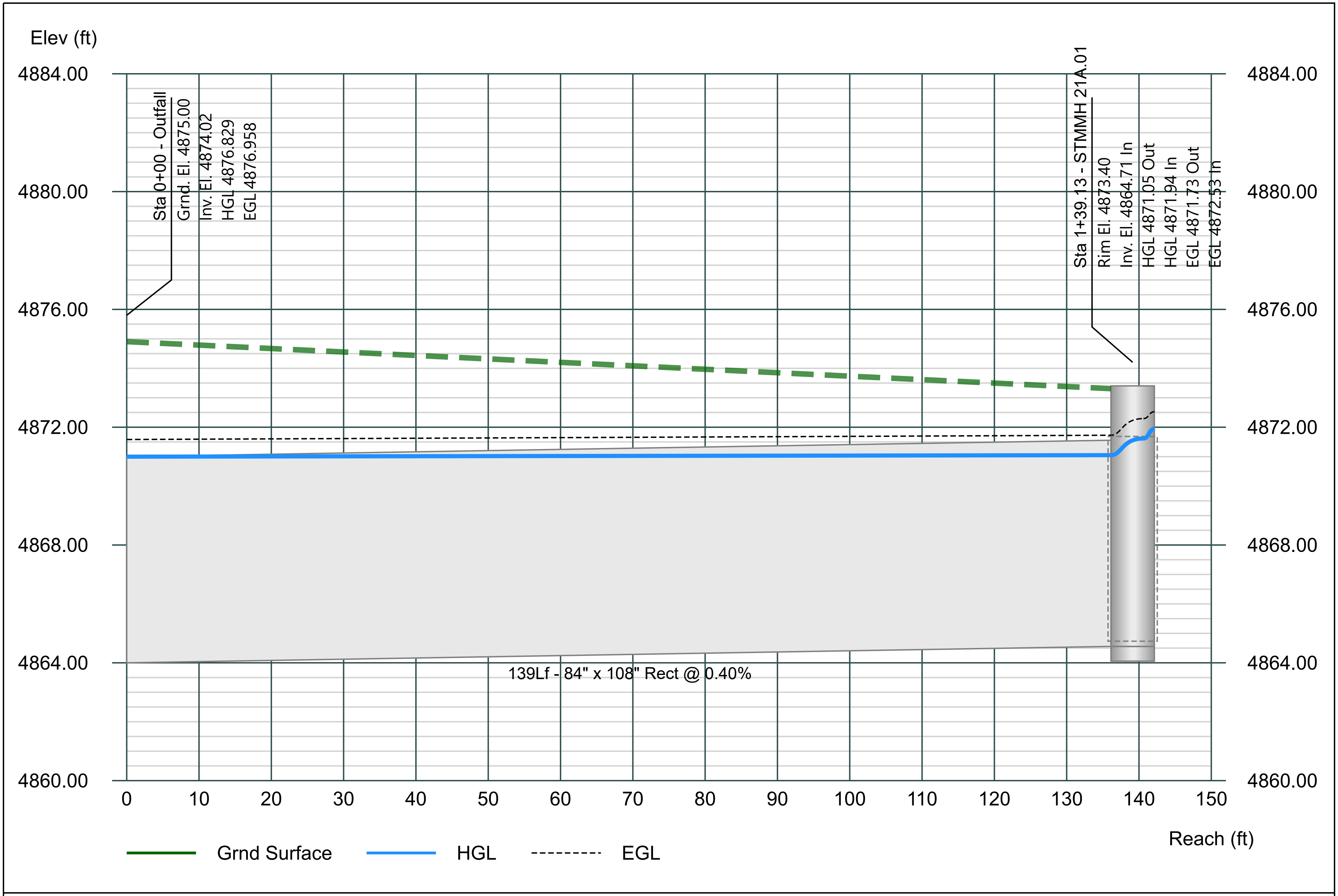
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 1 - Pipe - (136) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



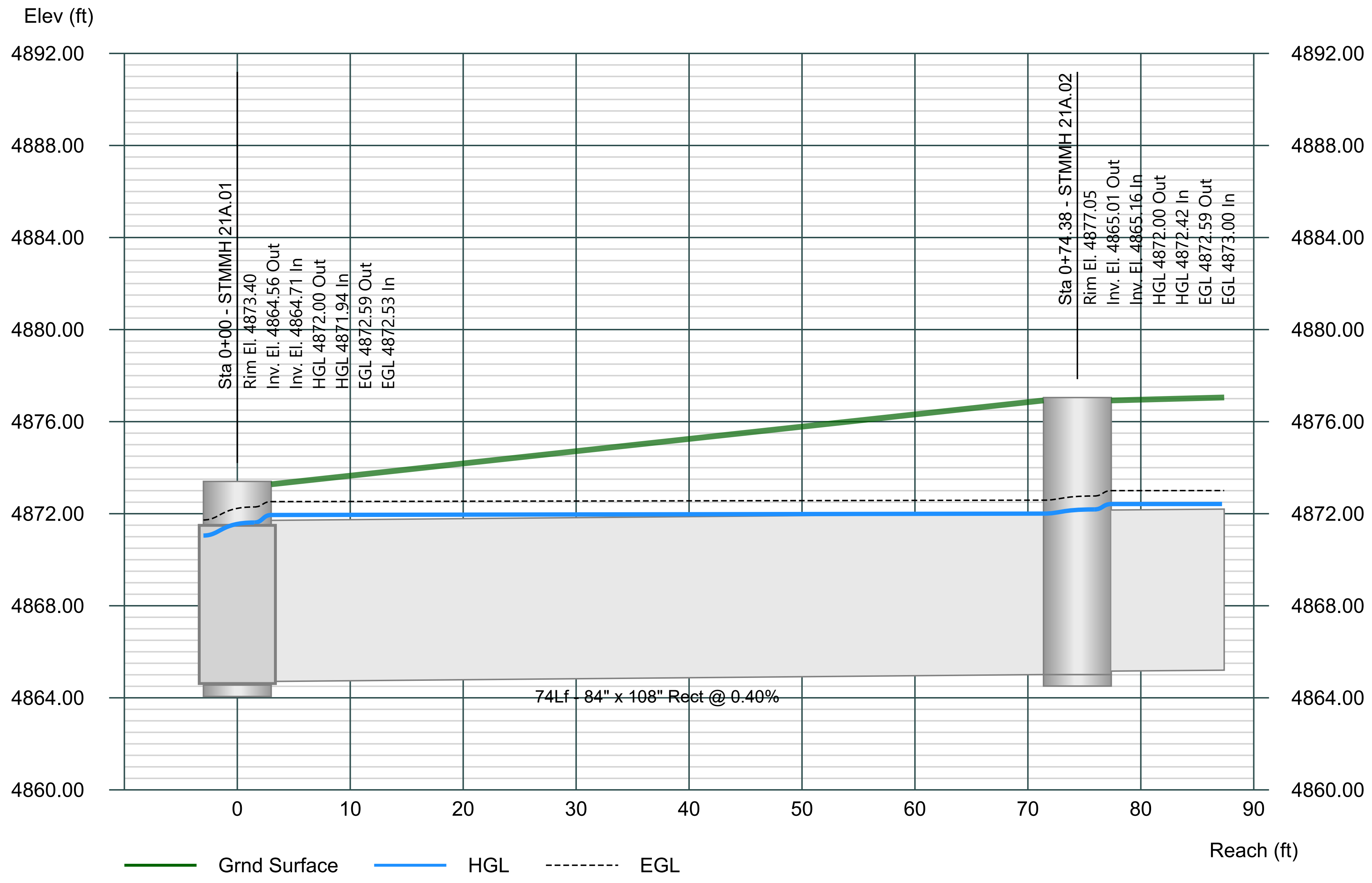
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 2 - Pipe - (135) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



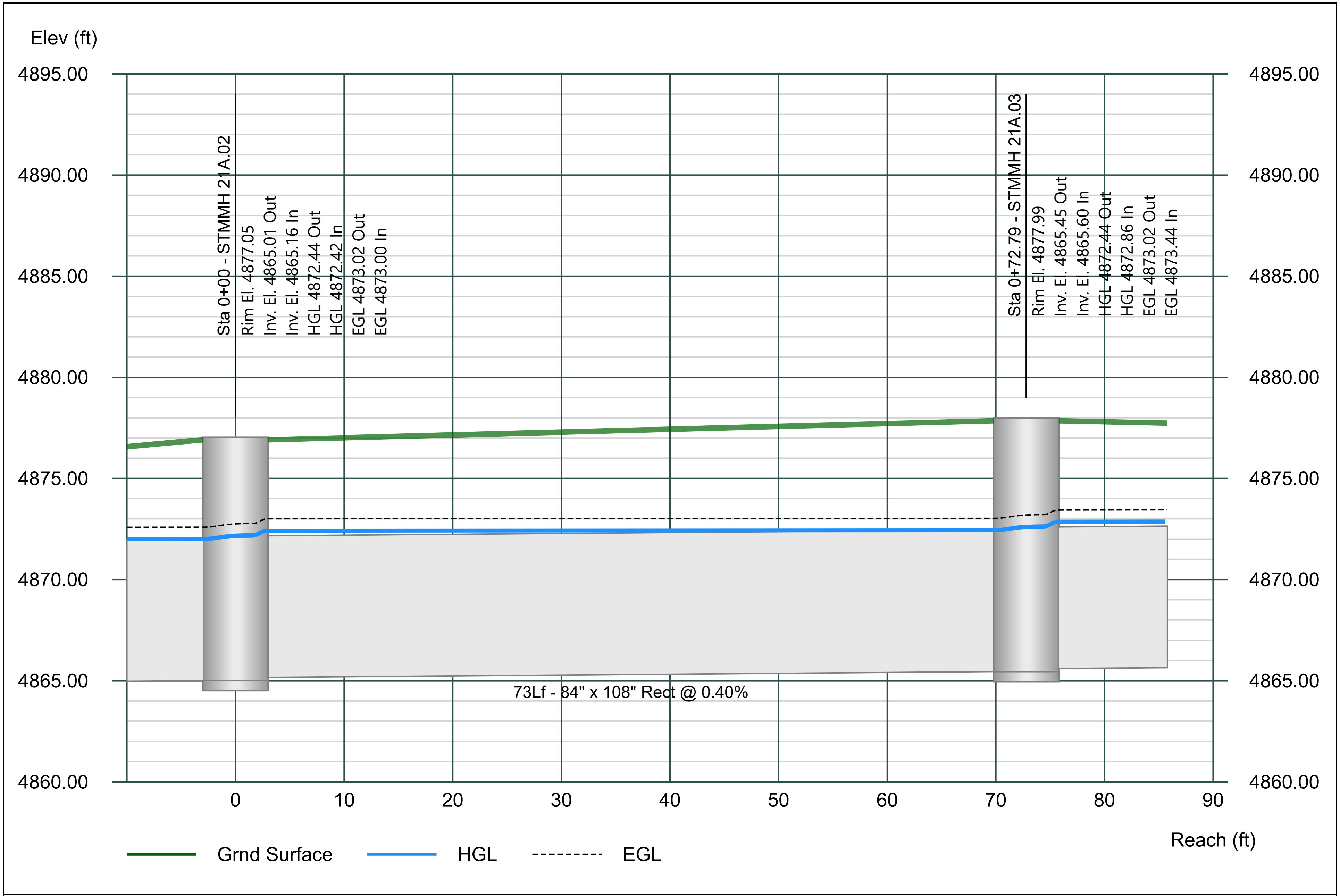
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 3 - Pipe - (134) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



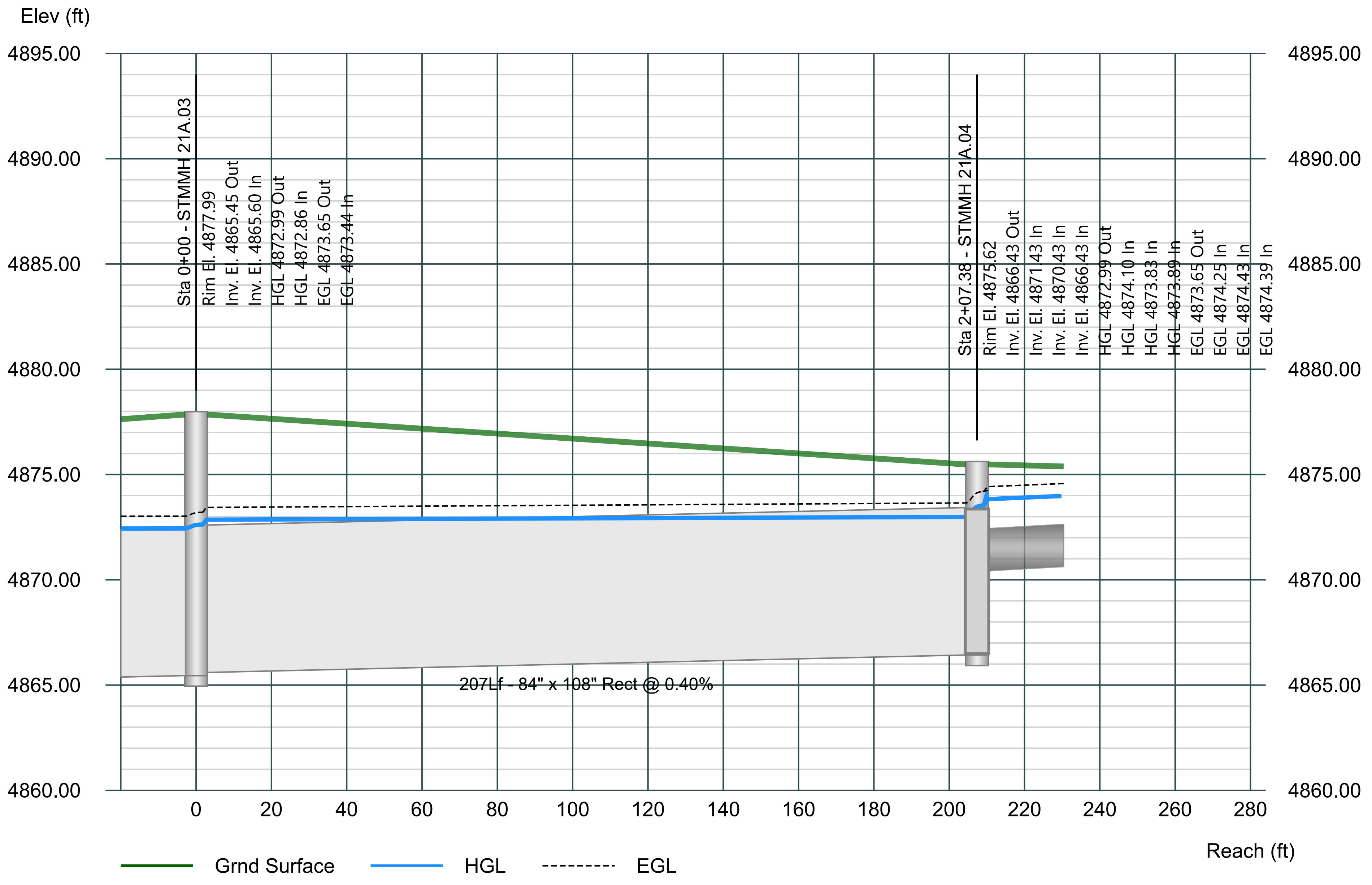
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 4 - Pipe - (133) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



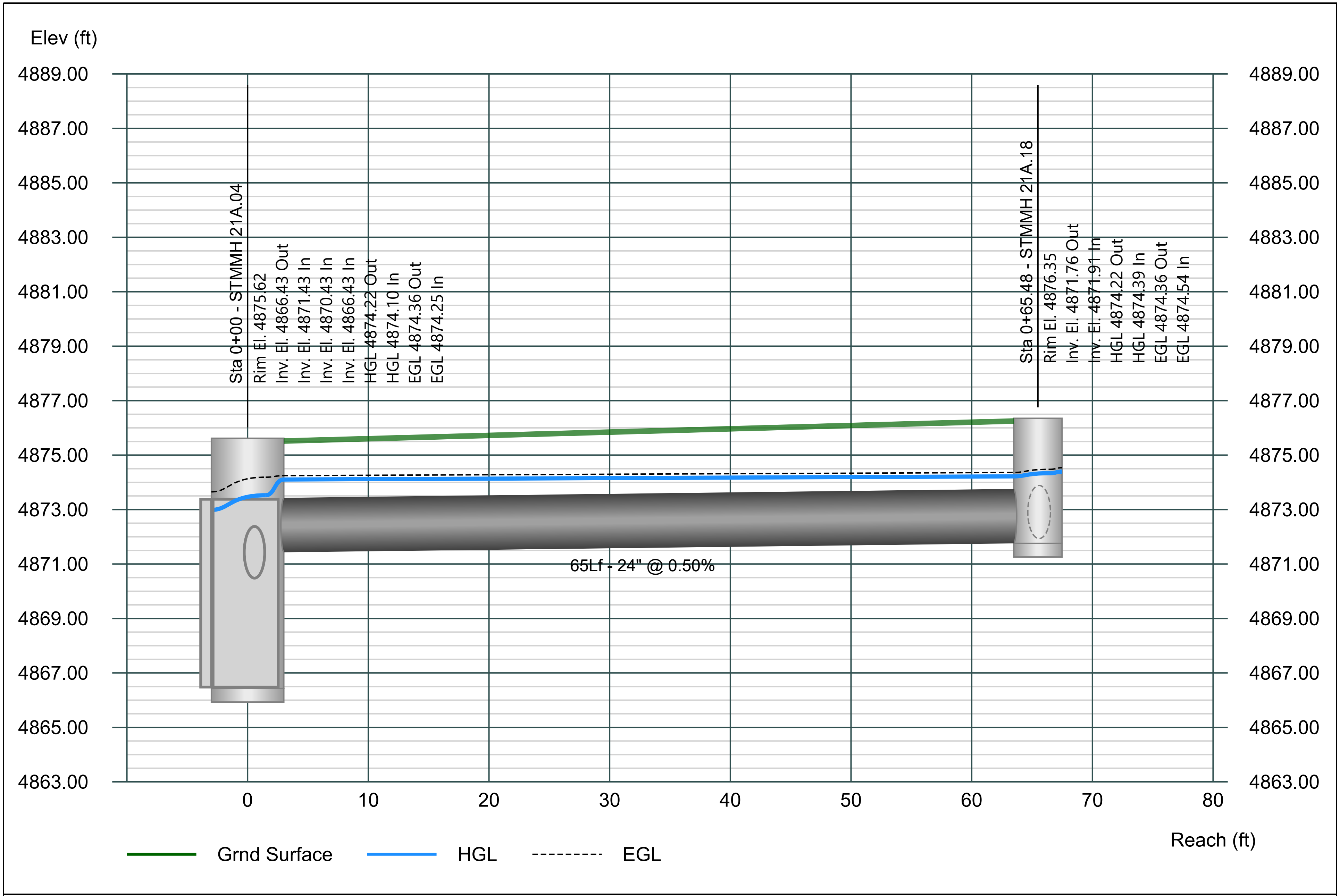
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 5 - Pipe - (389) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



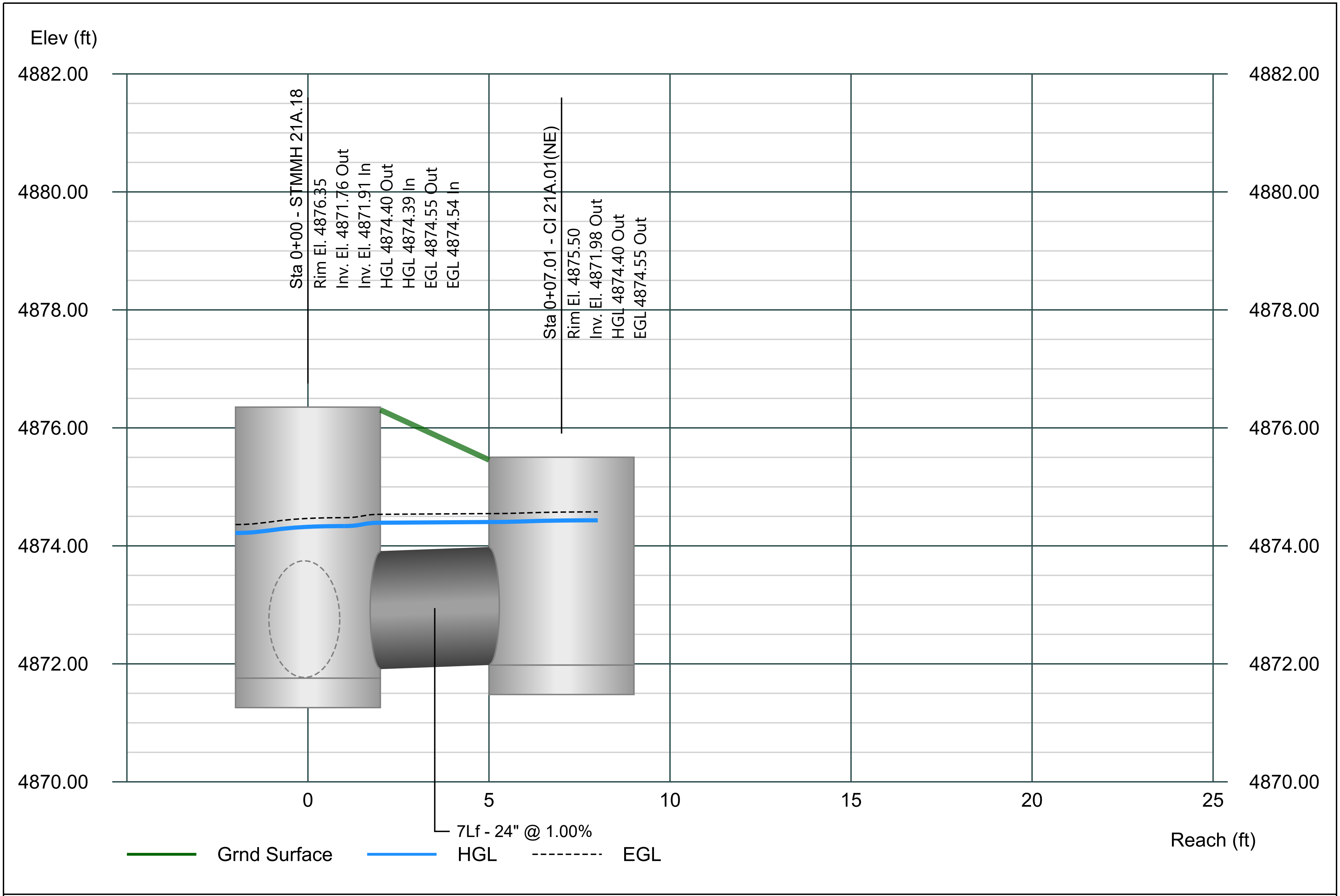
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 6 - Pipe - (390) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



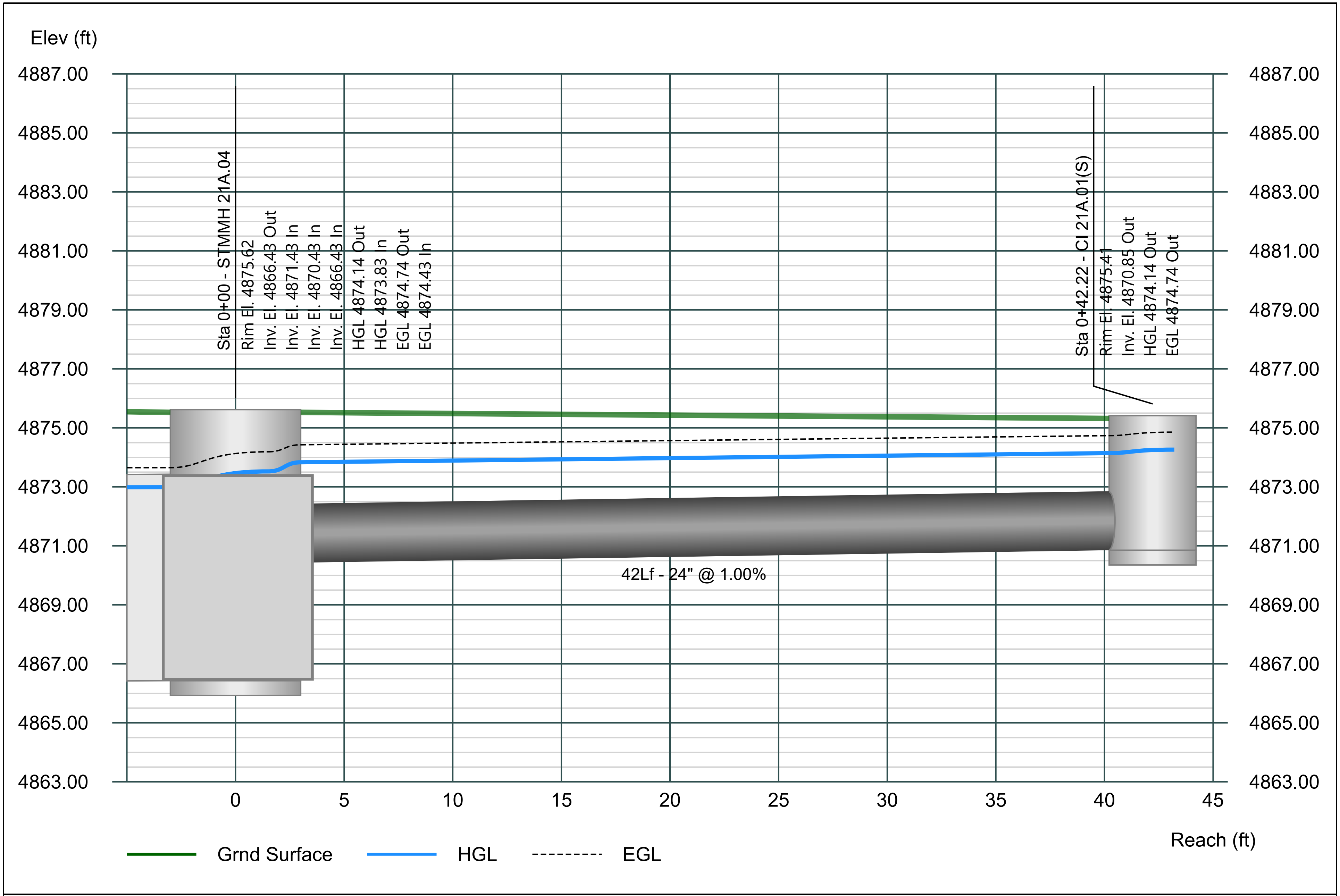
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 7 - Pipe - (388) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



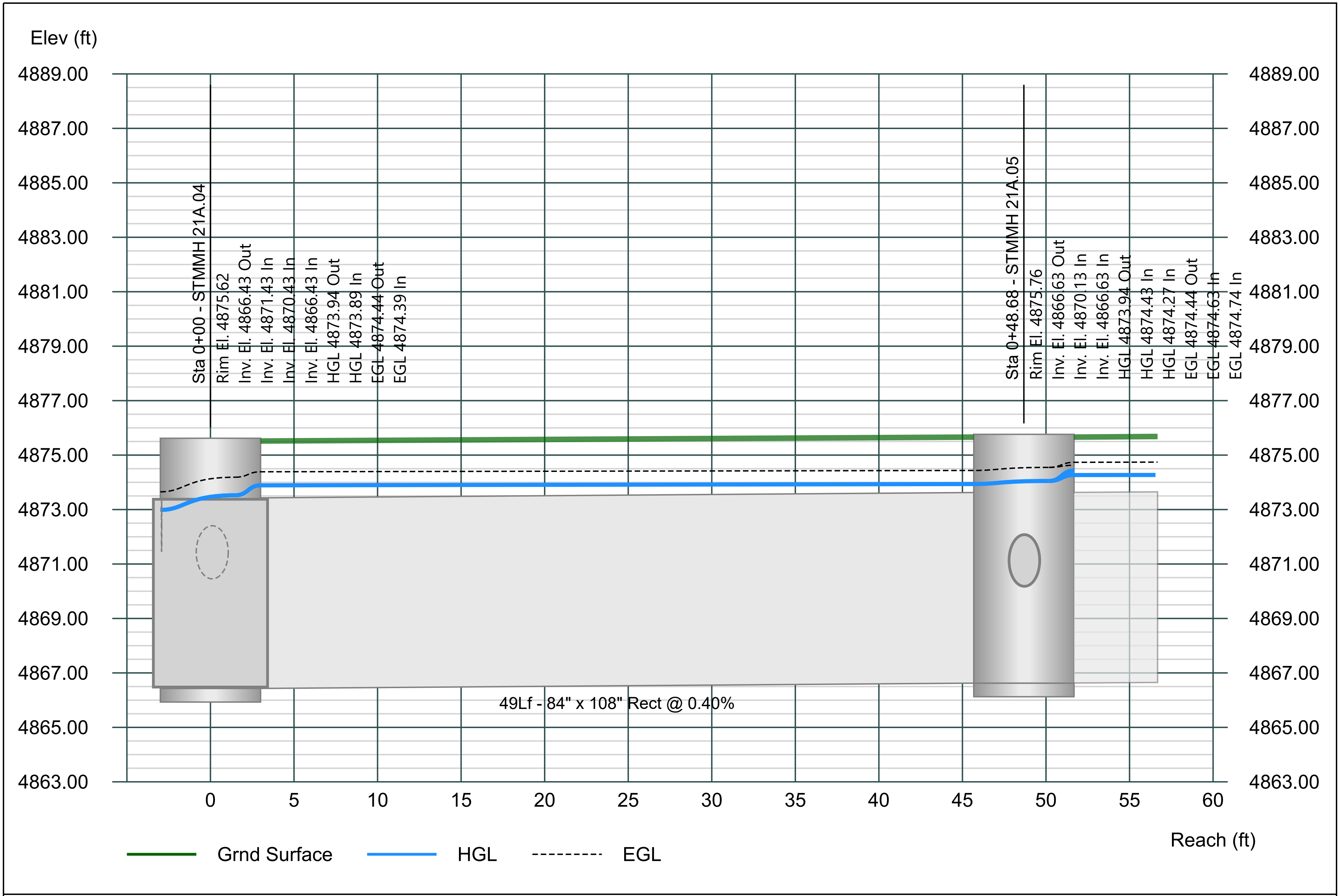
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 8 - Pipe - (132) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



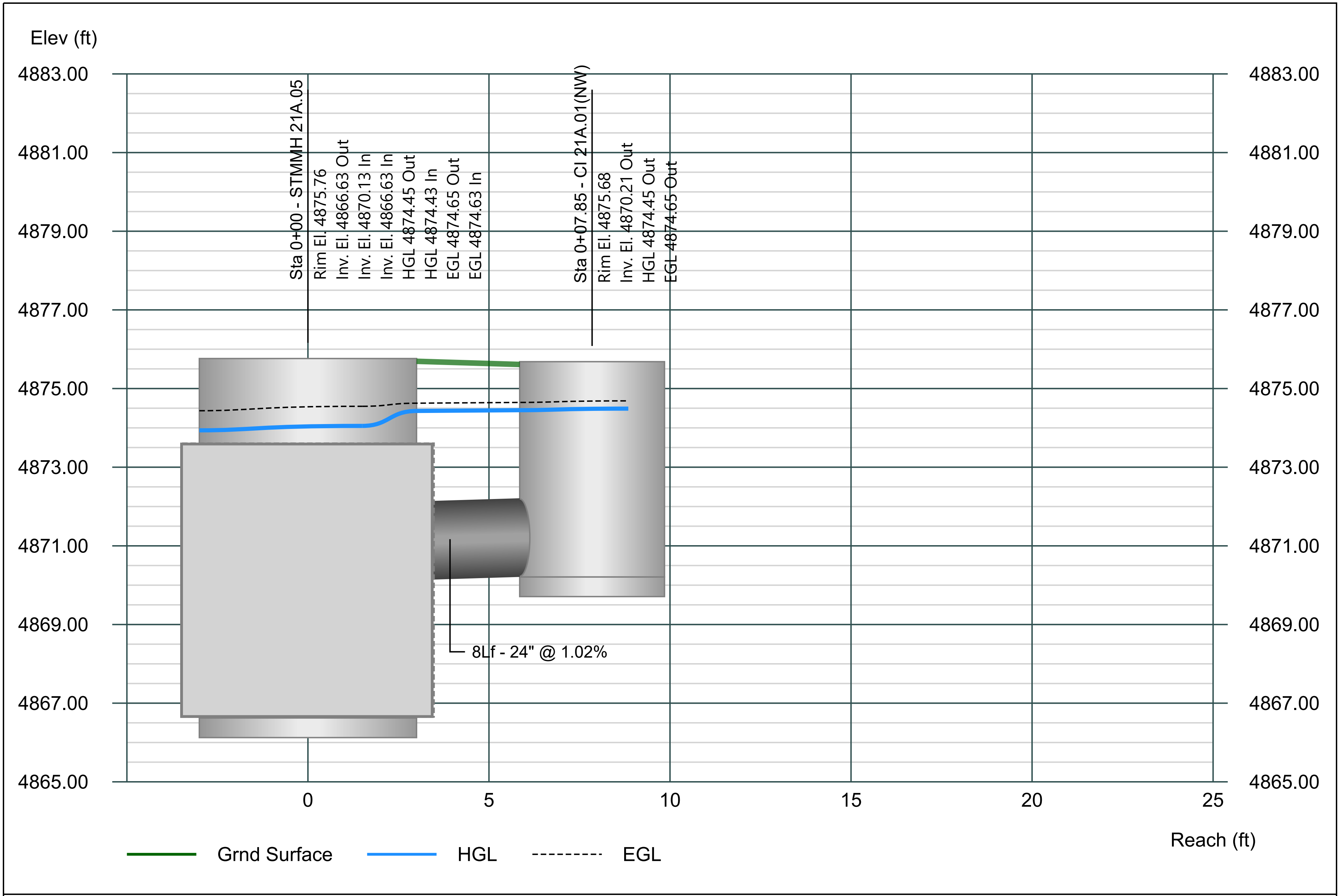
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 9 - Pipe - (400) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



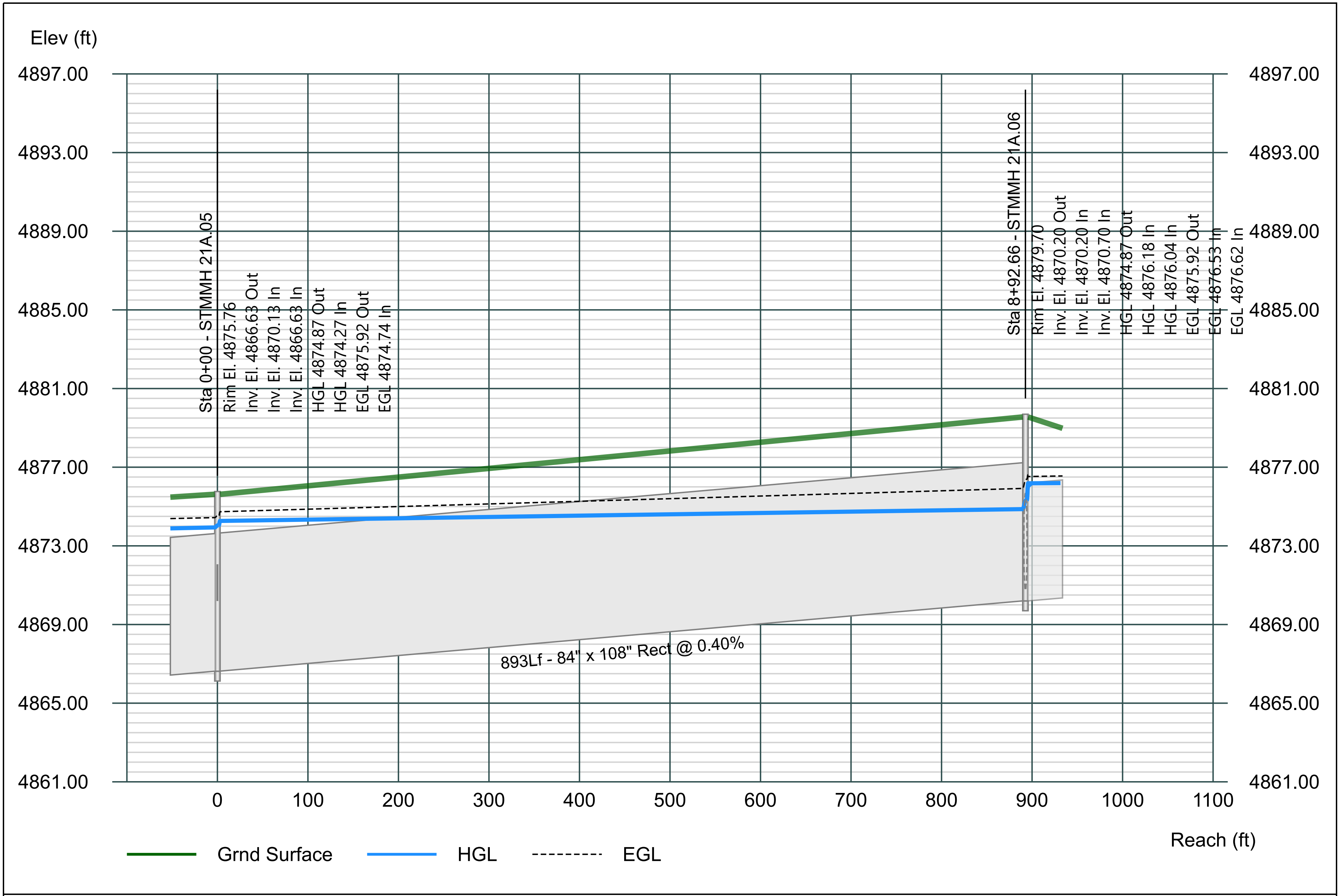
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 10 - Pipe - (130) (1)(0) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



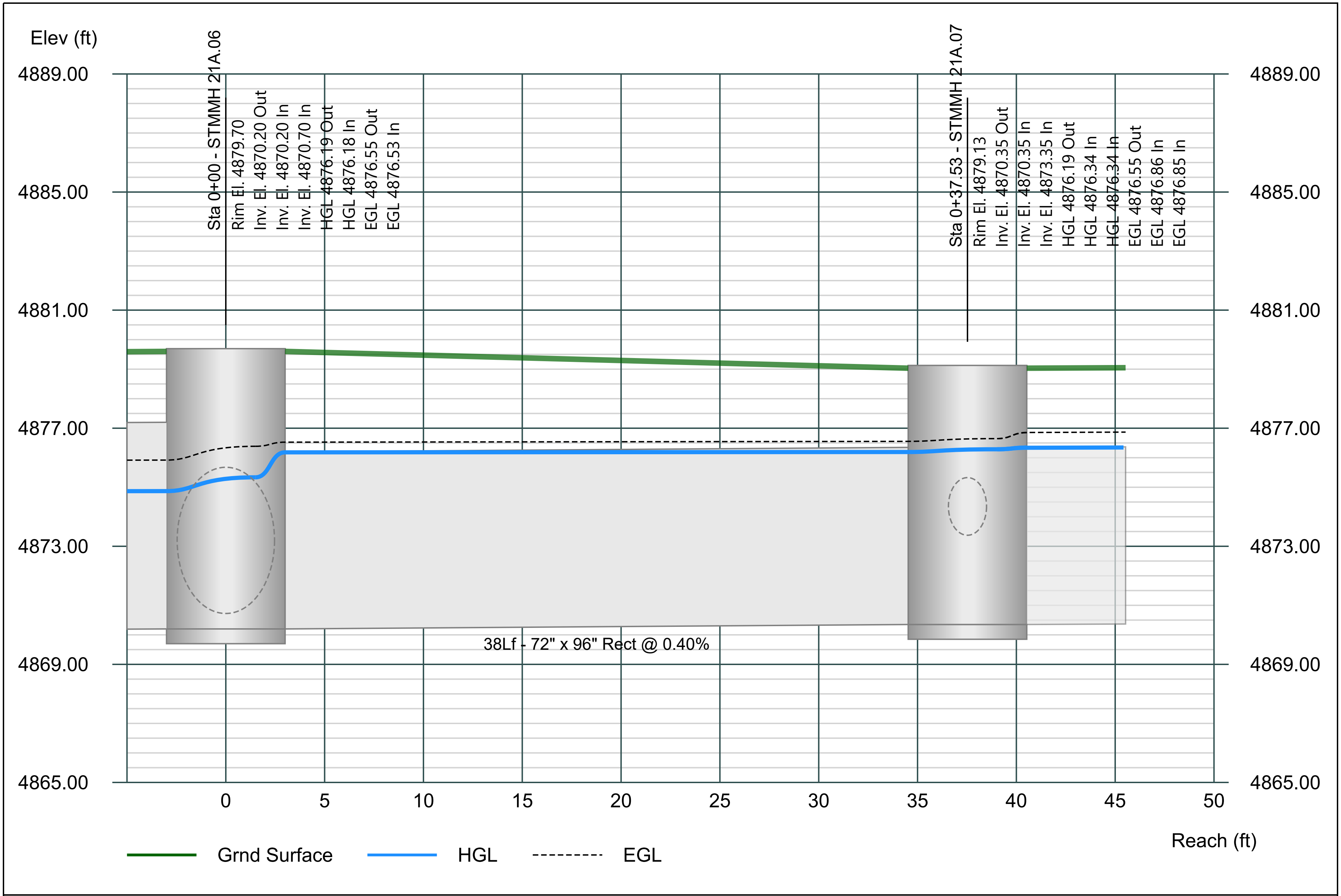
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 11 - Pipe - (129) (1) (1) (1) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



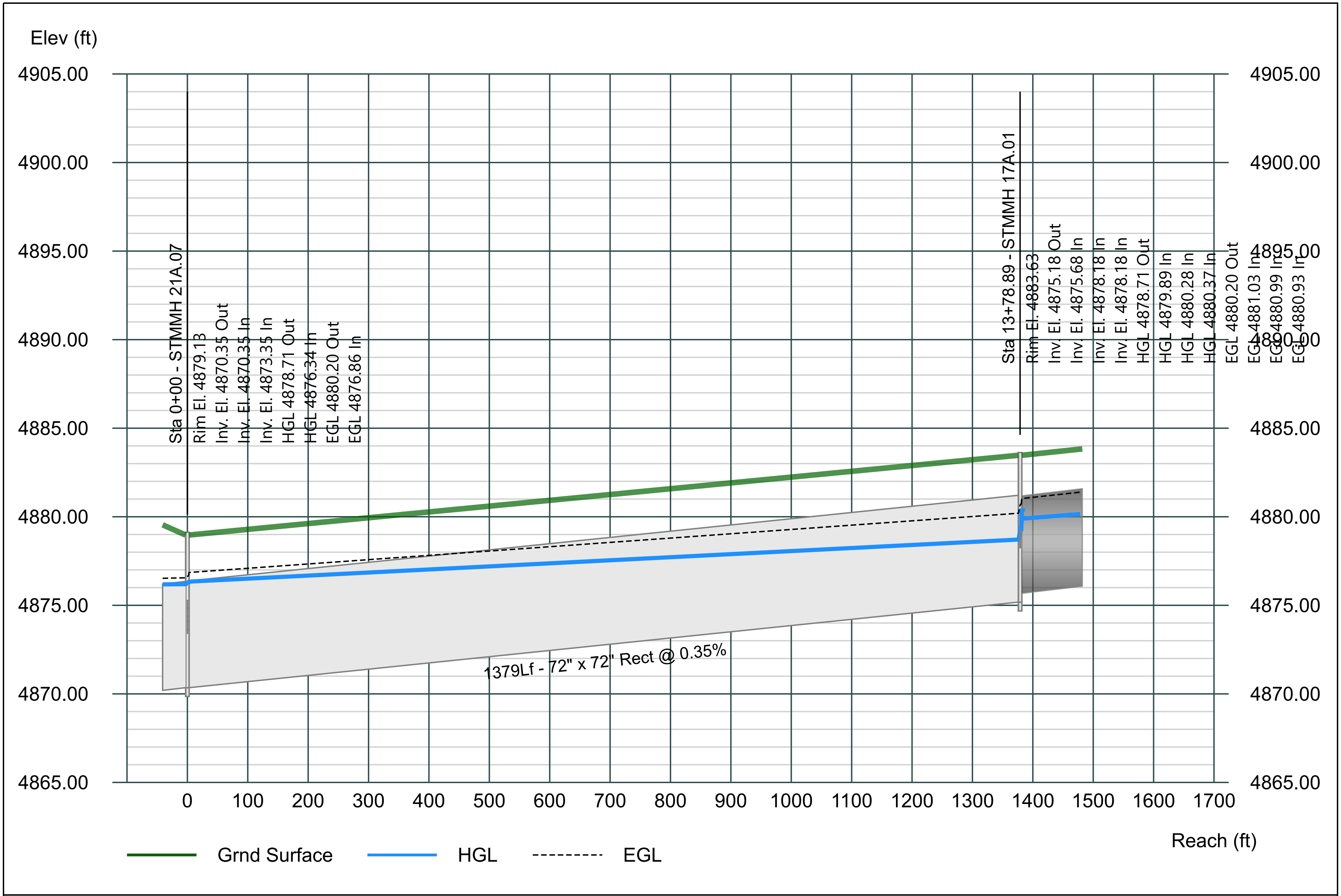
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 12 - Pipe - (129) (1) (1) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



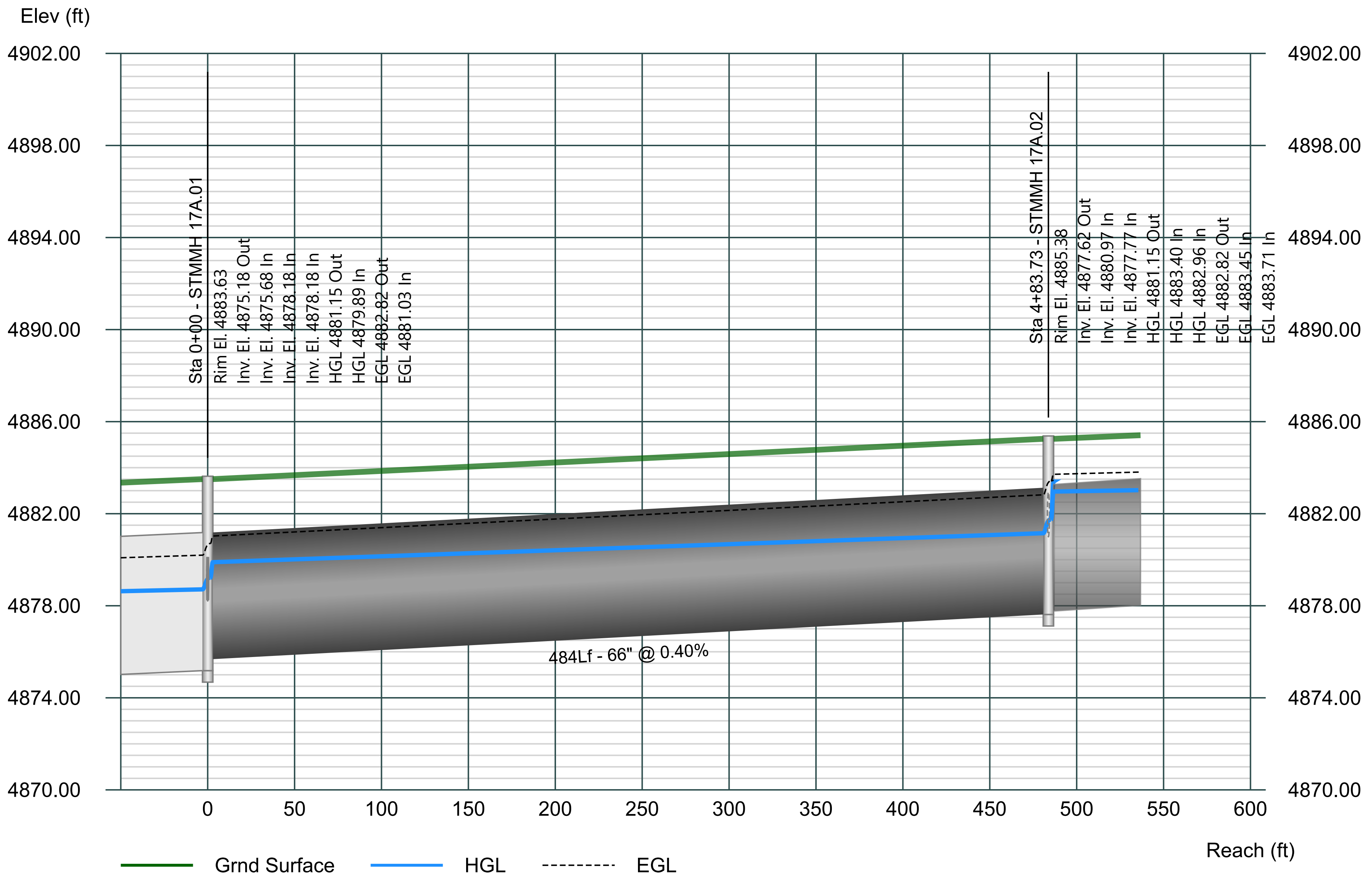
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 13 - Pipe - (129) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



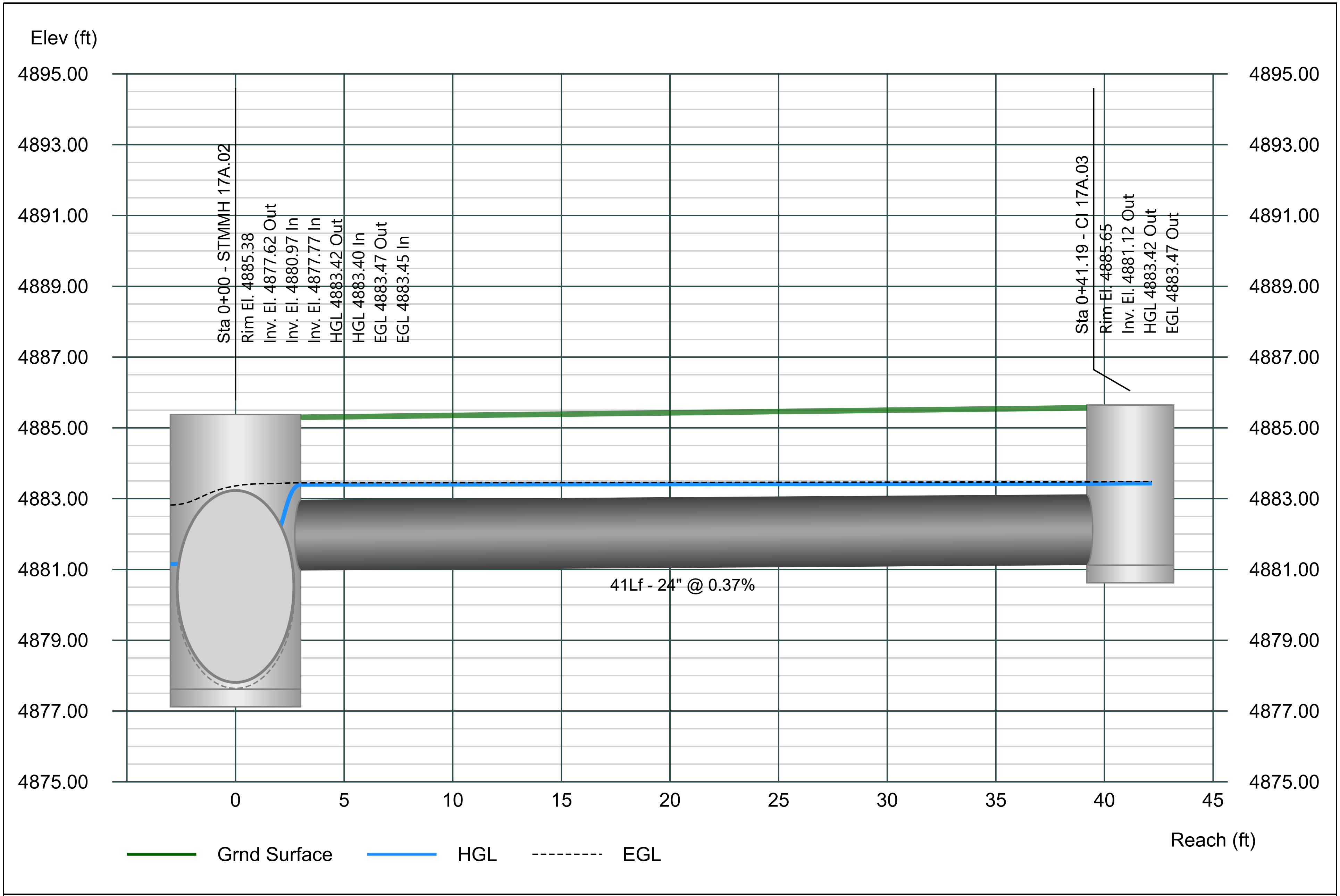
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 14 - Pipe - (399) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



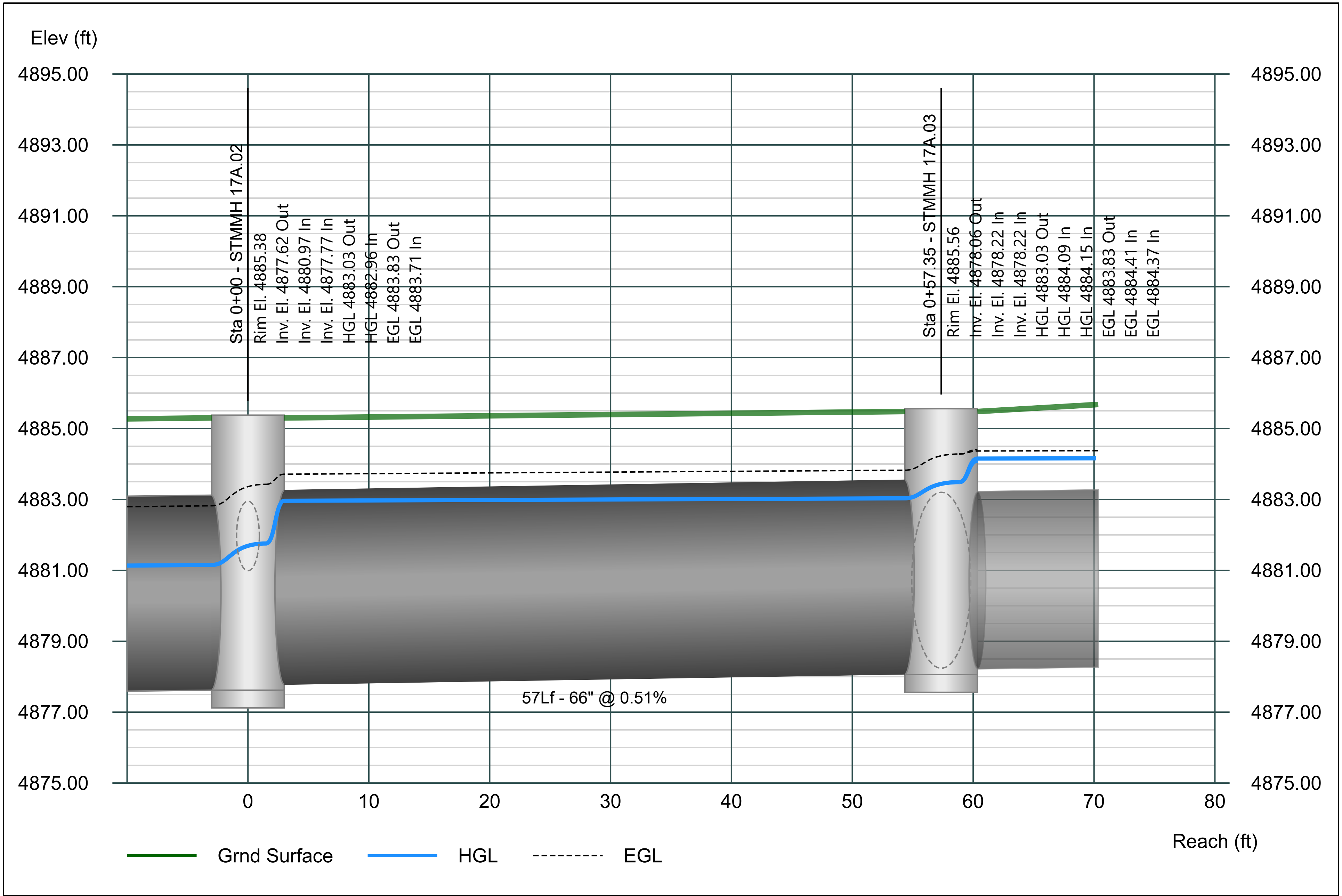
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 15 - Pipe - (128) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



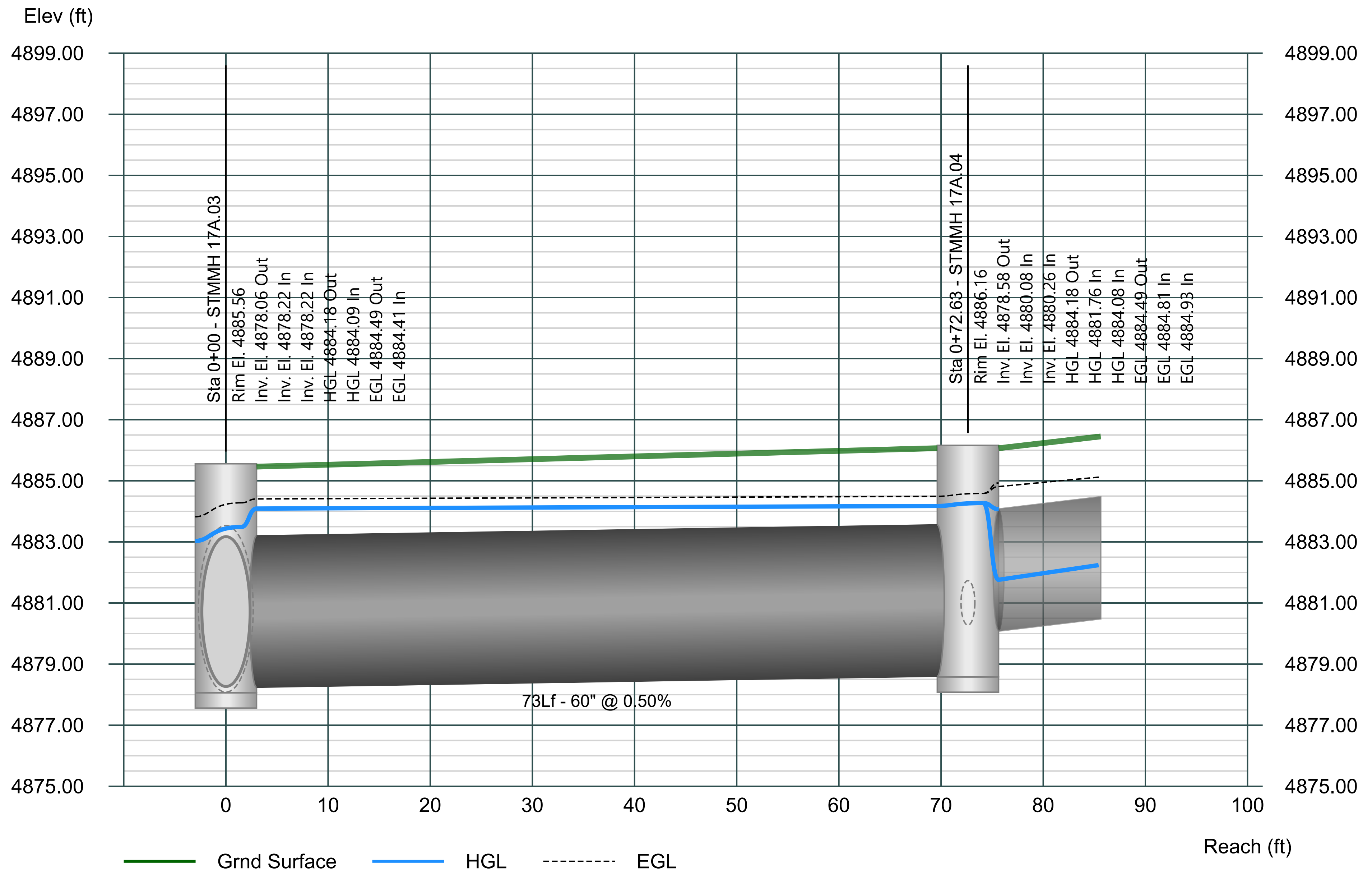
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 16 - Pipe - (127) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



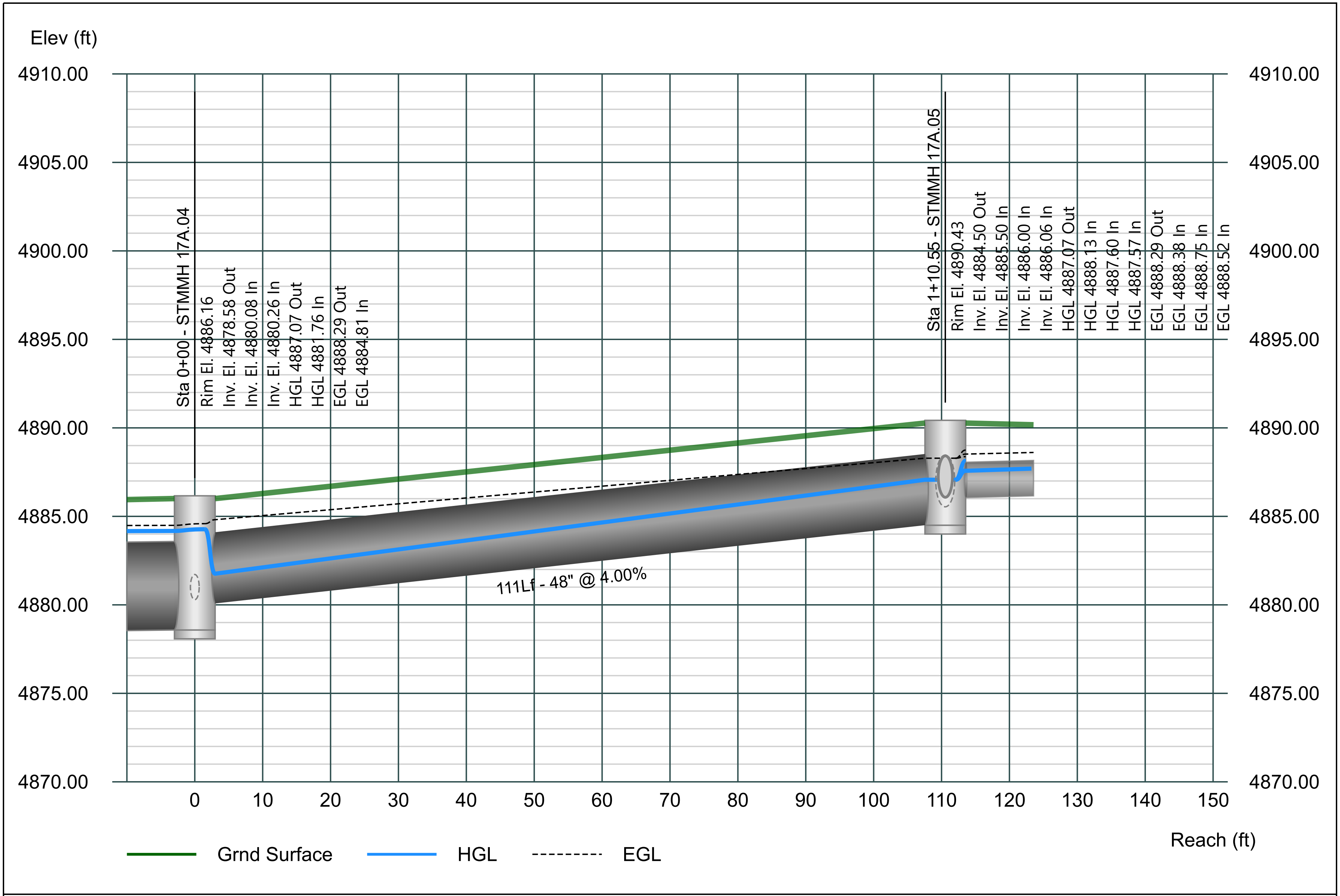
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 17 - Pipe - (126)(0) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



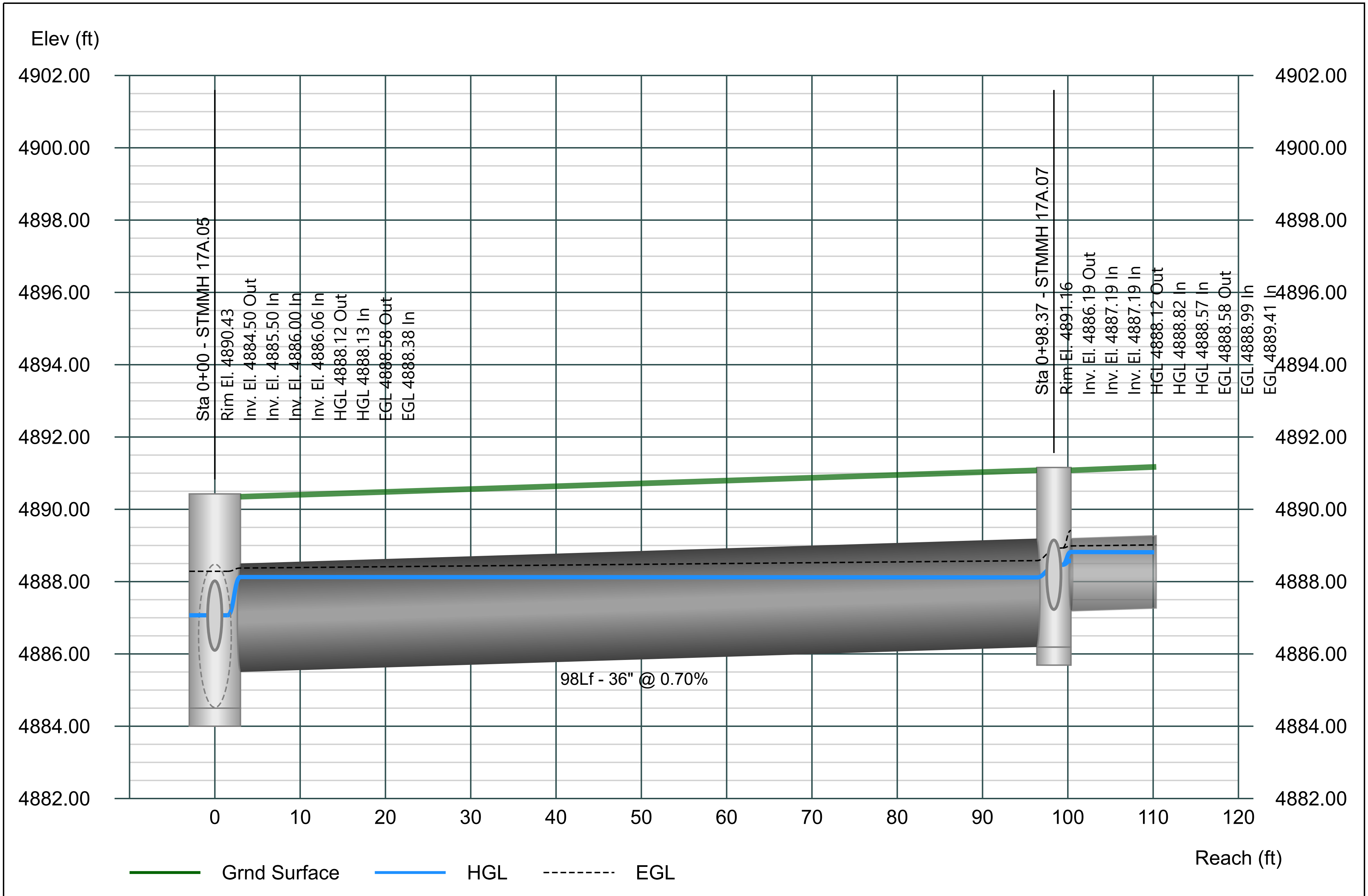
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 18 - Pipe - (591) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



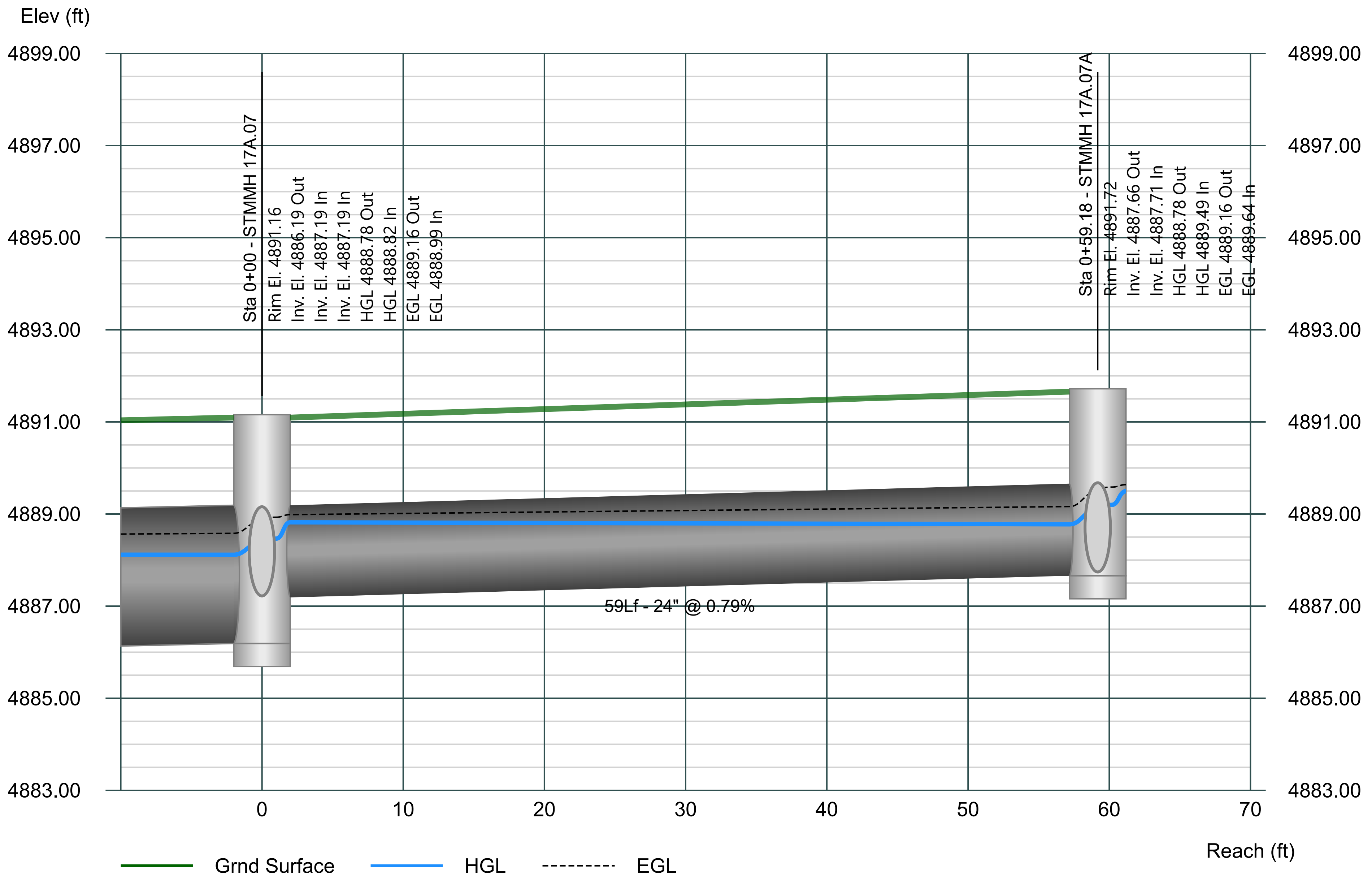
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 19 - Pipe - (604) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



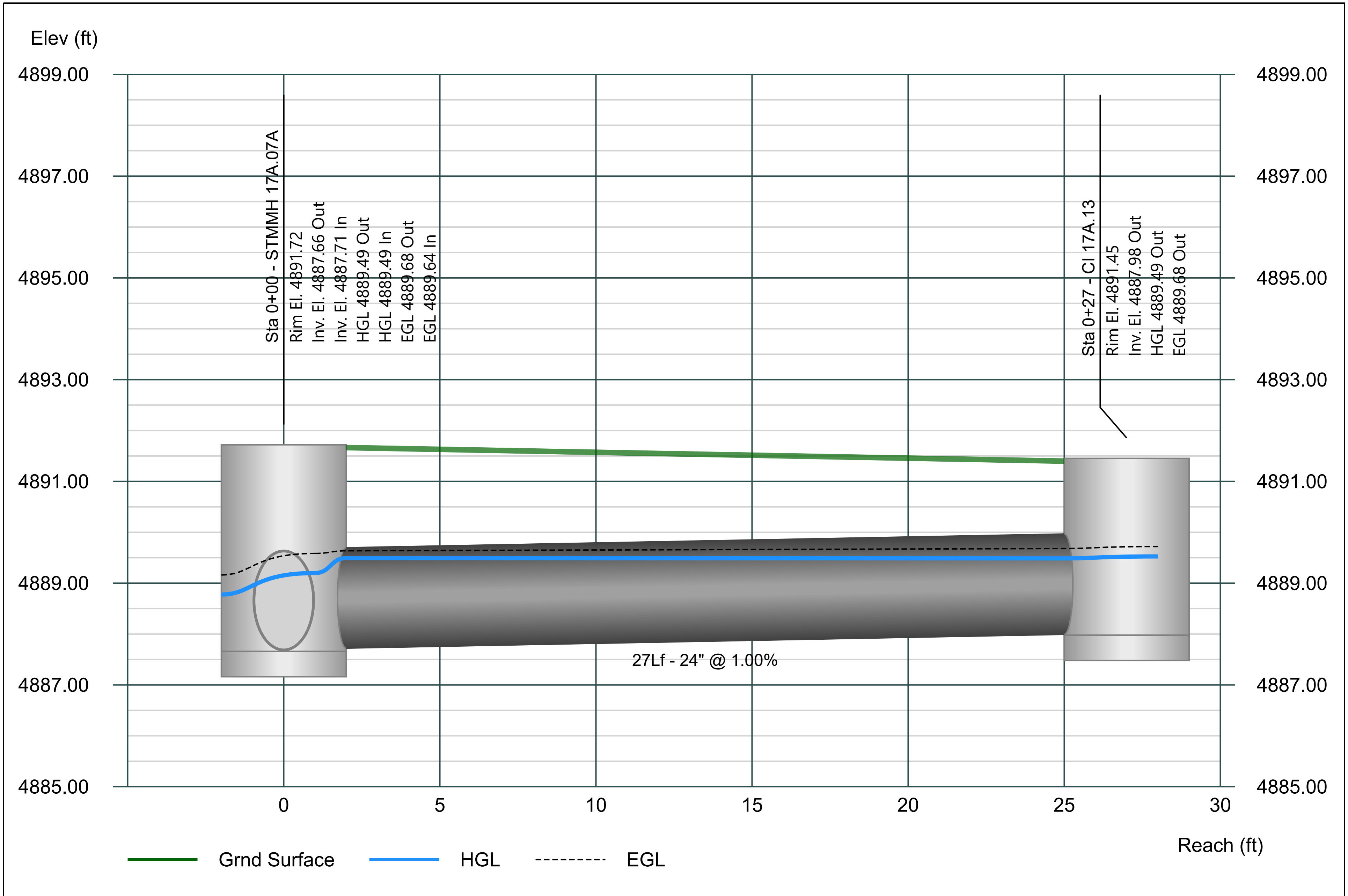
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 20 - Pipe - (589) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



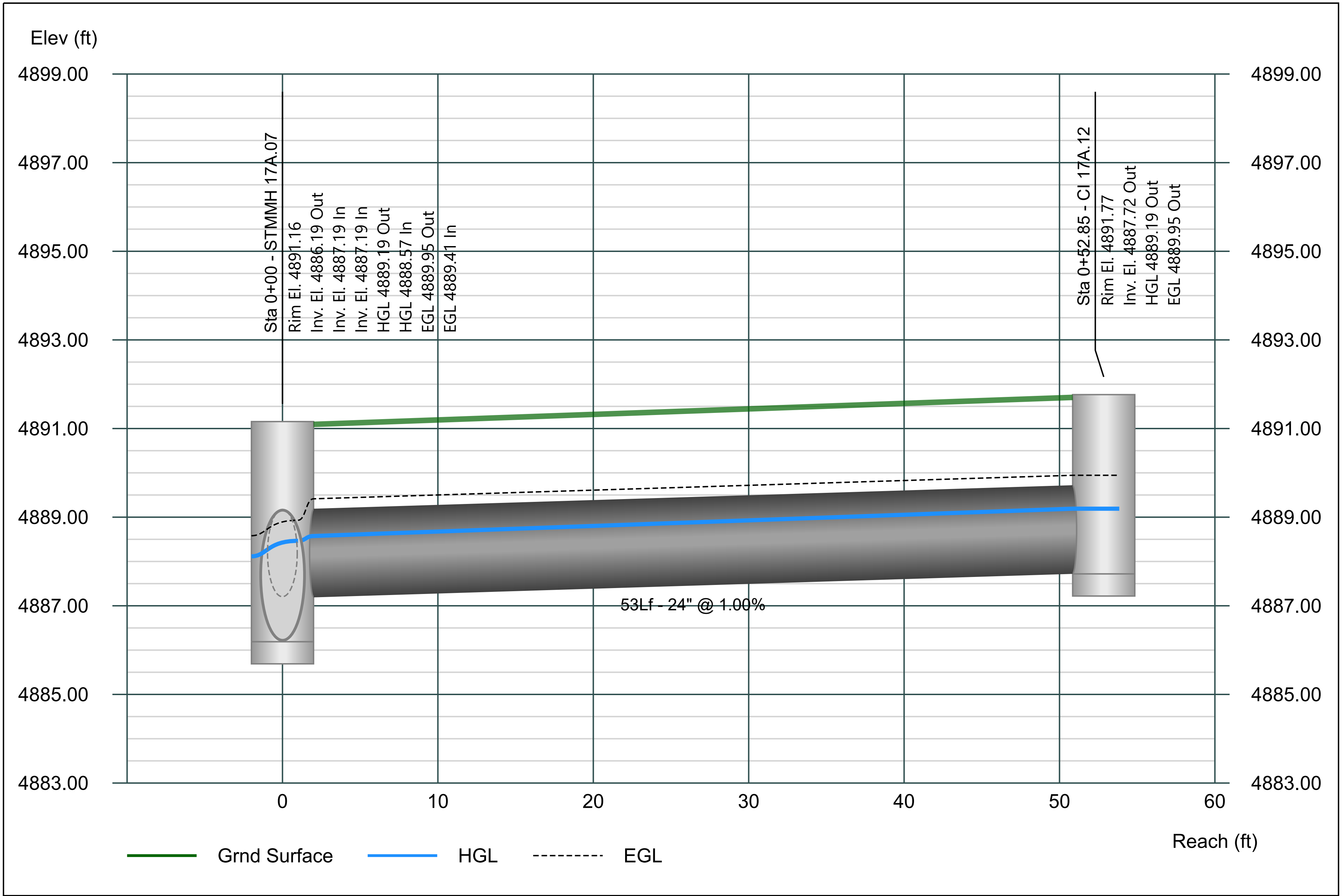
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 21 - Pipe - (590) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



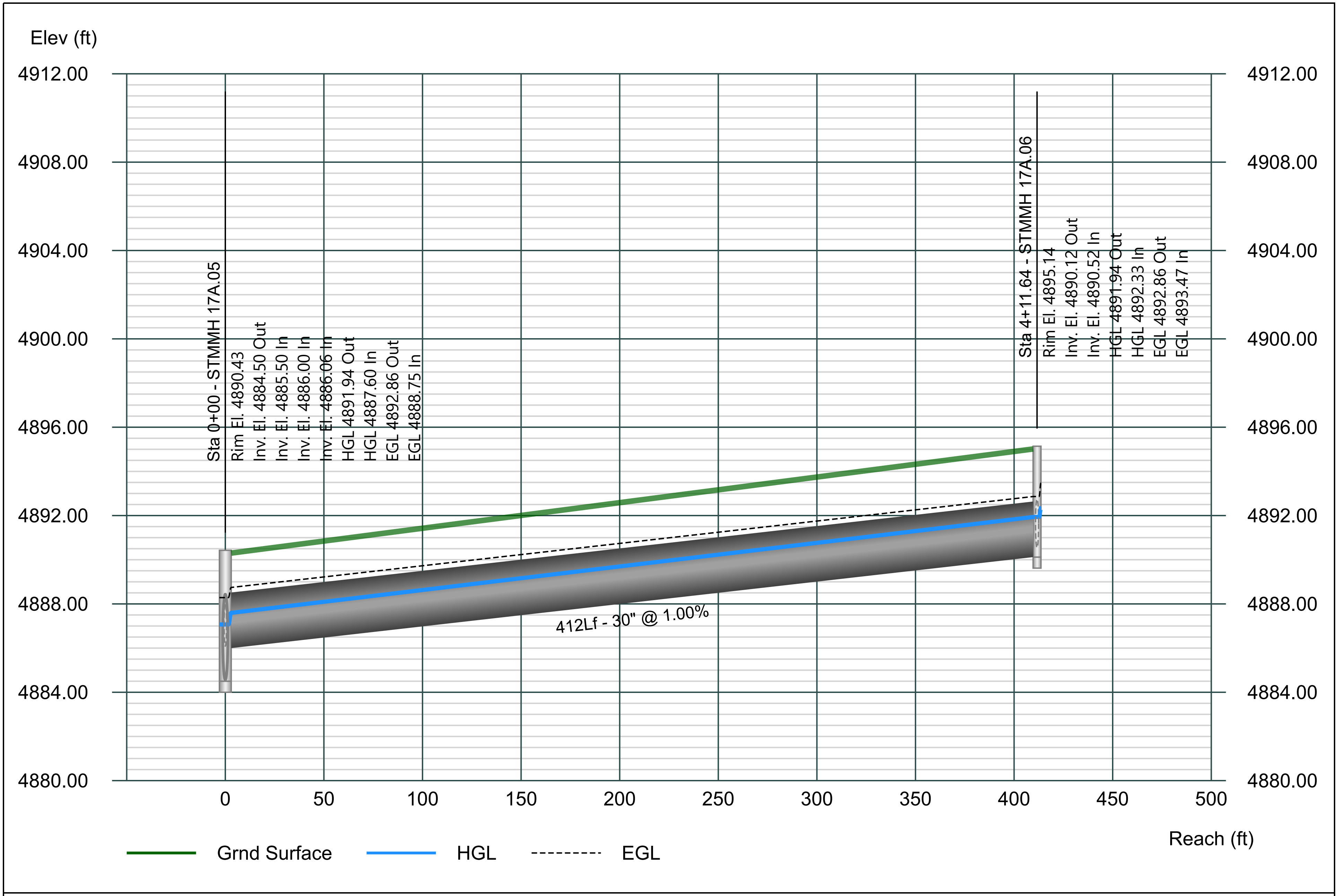
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 22 - Pipe - (594) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



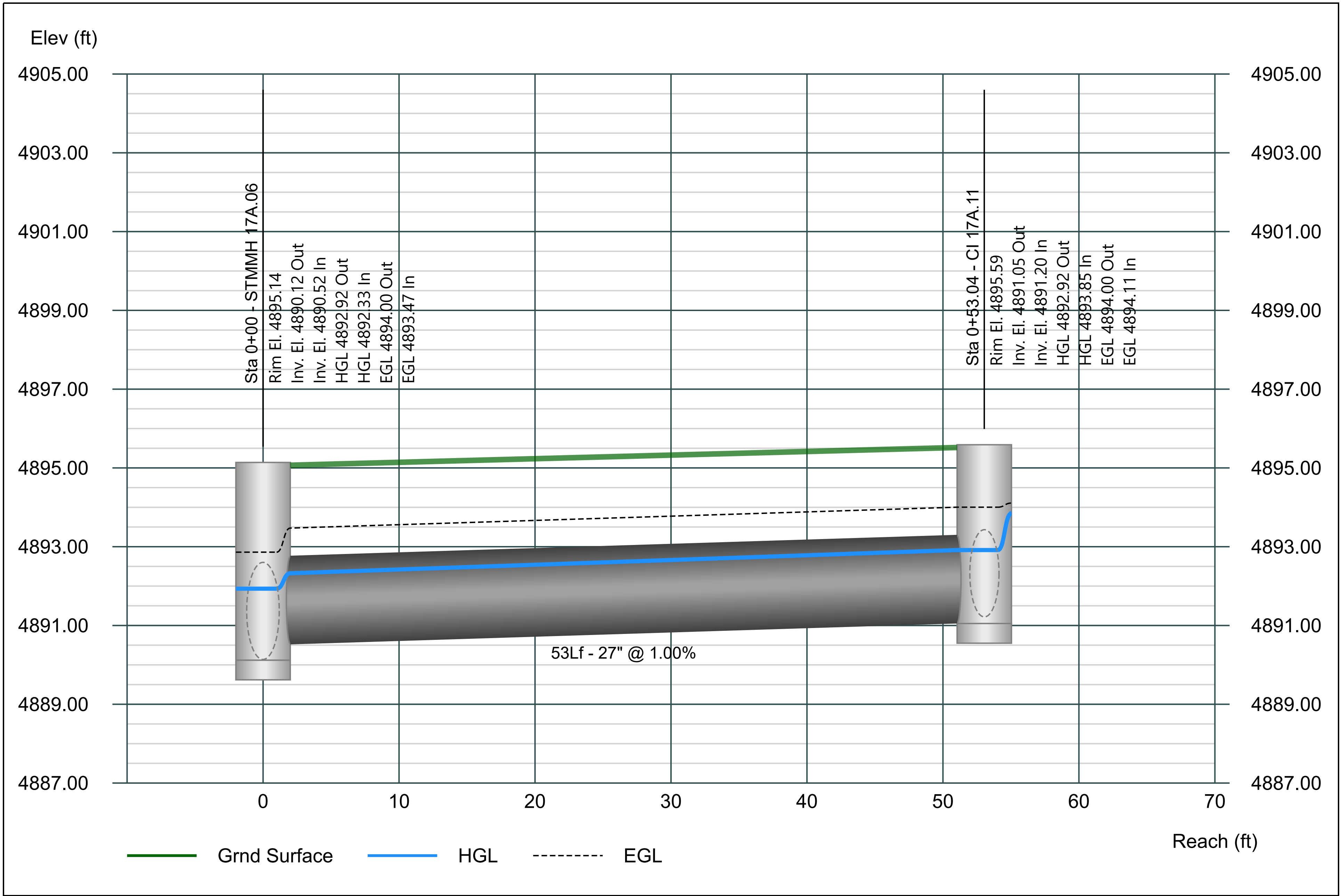
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 23 - Pipe - (593) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



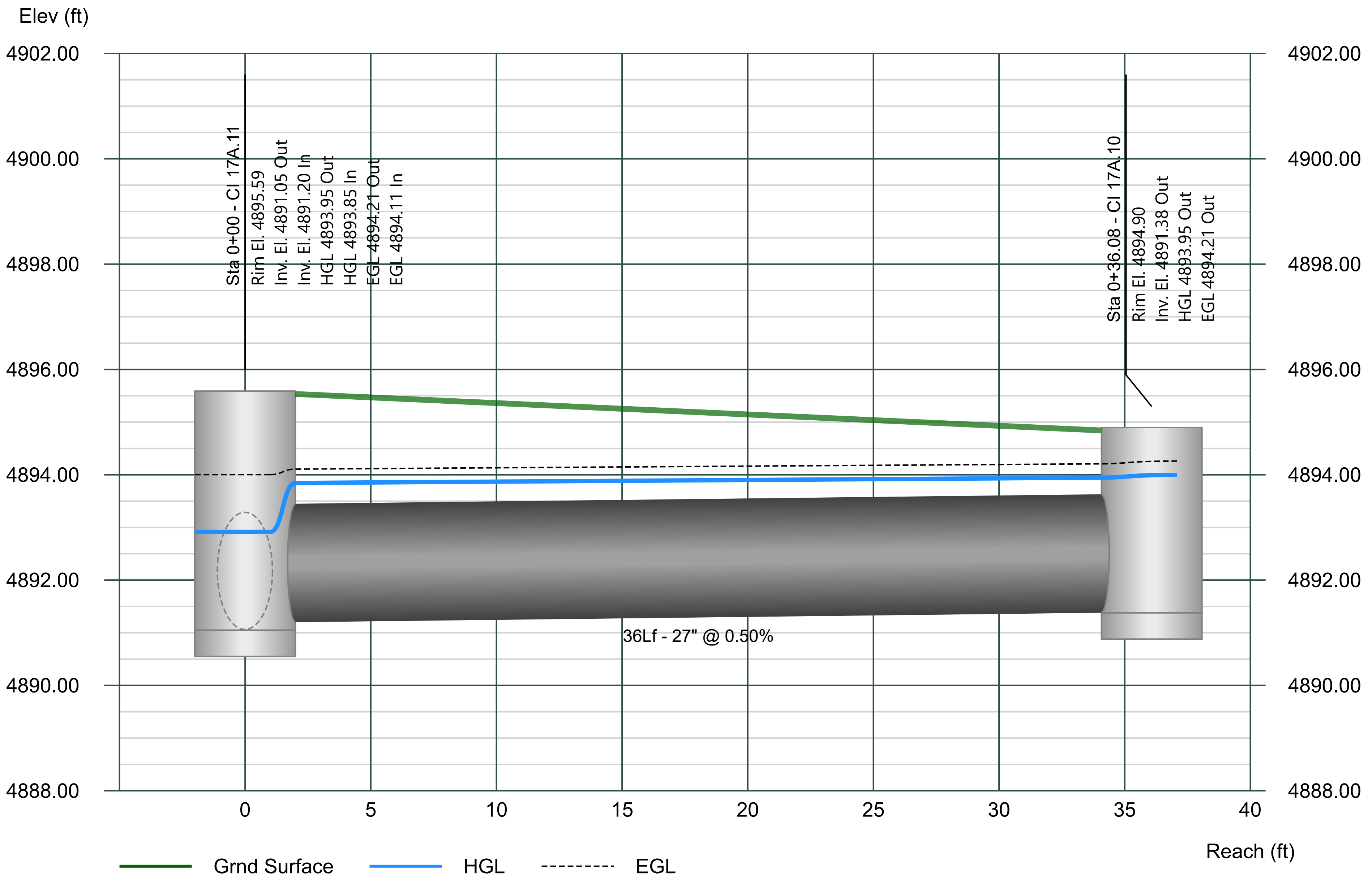
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 24 - Pipe - (592) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



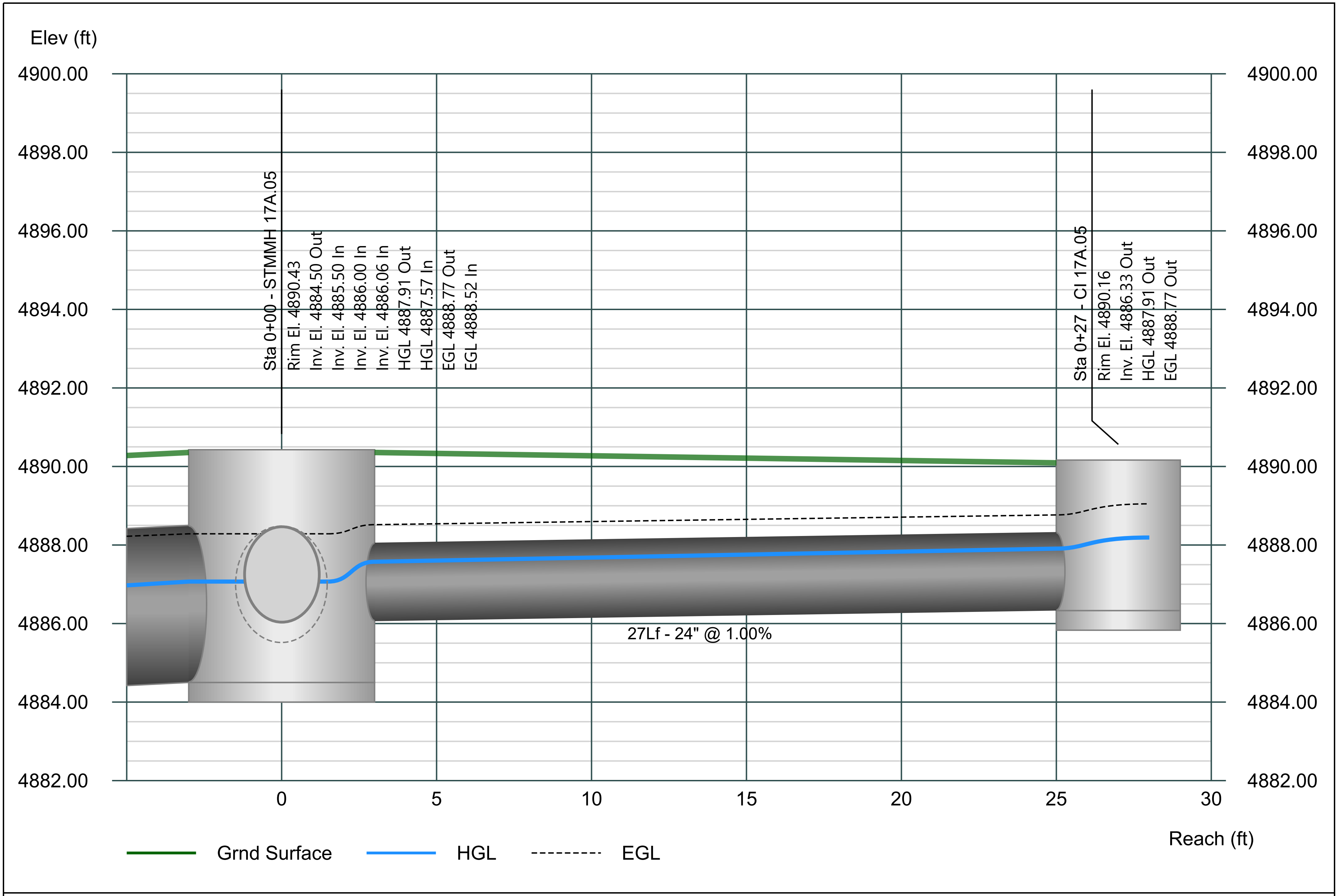
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 25 - Pipe - (607) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



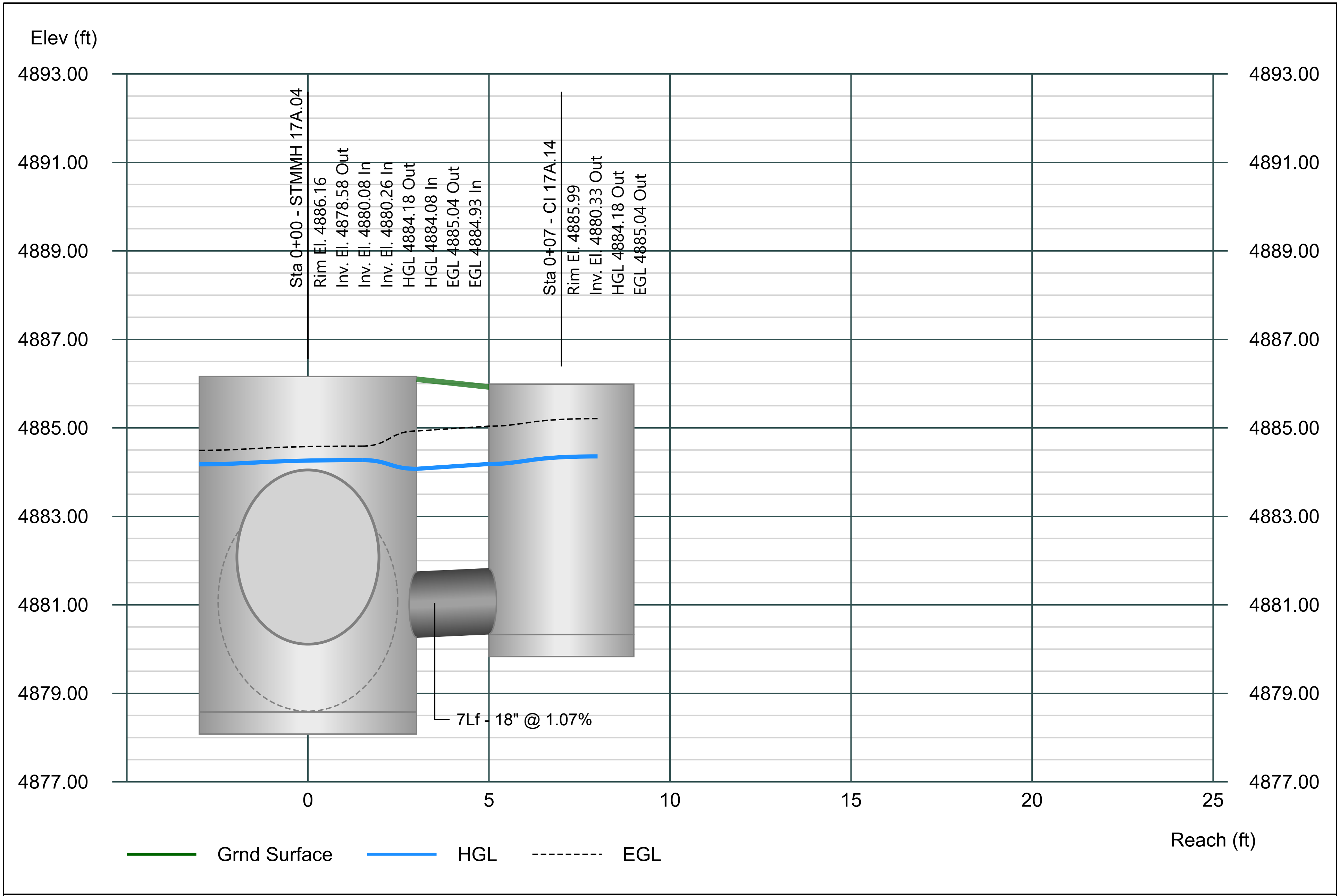
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 26 - Pipe - (605) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



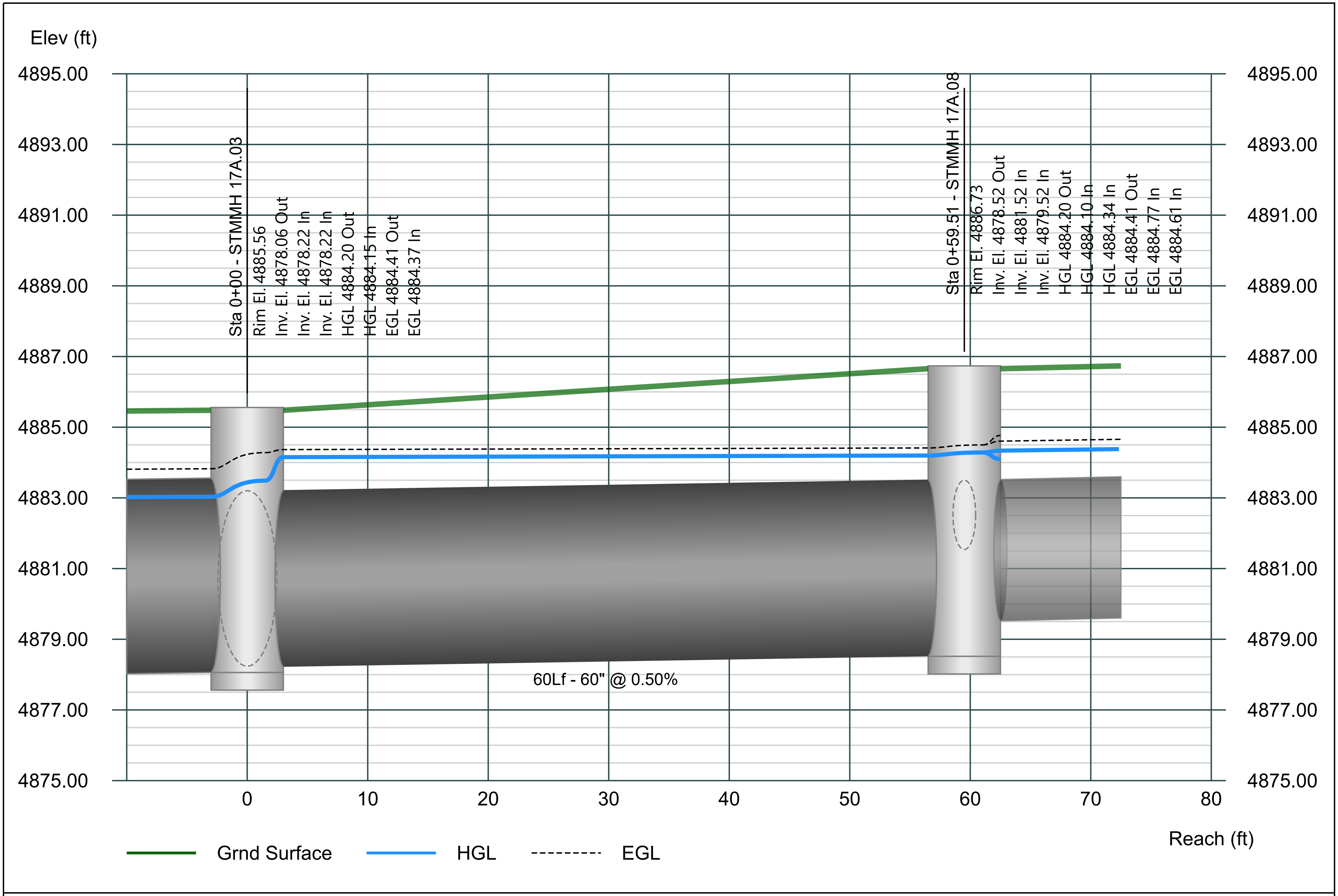
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 27 - Pipe - (397) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



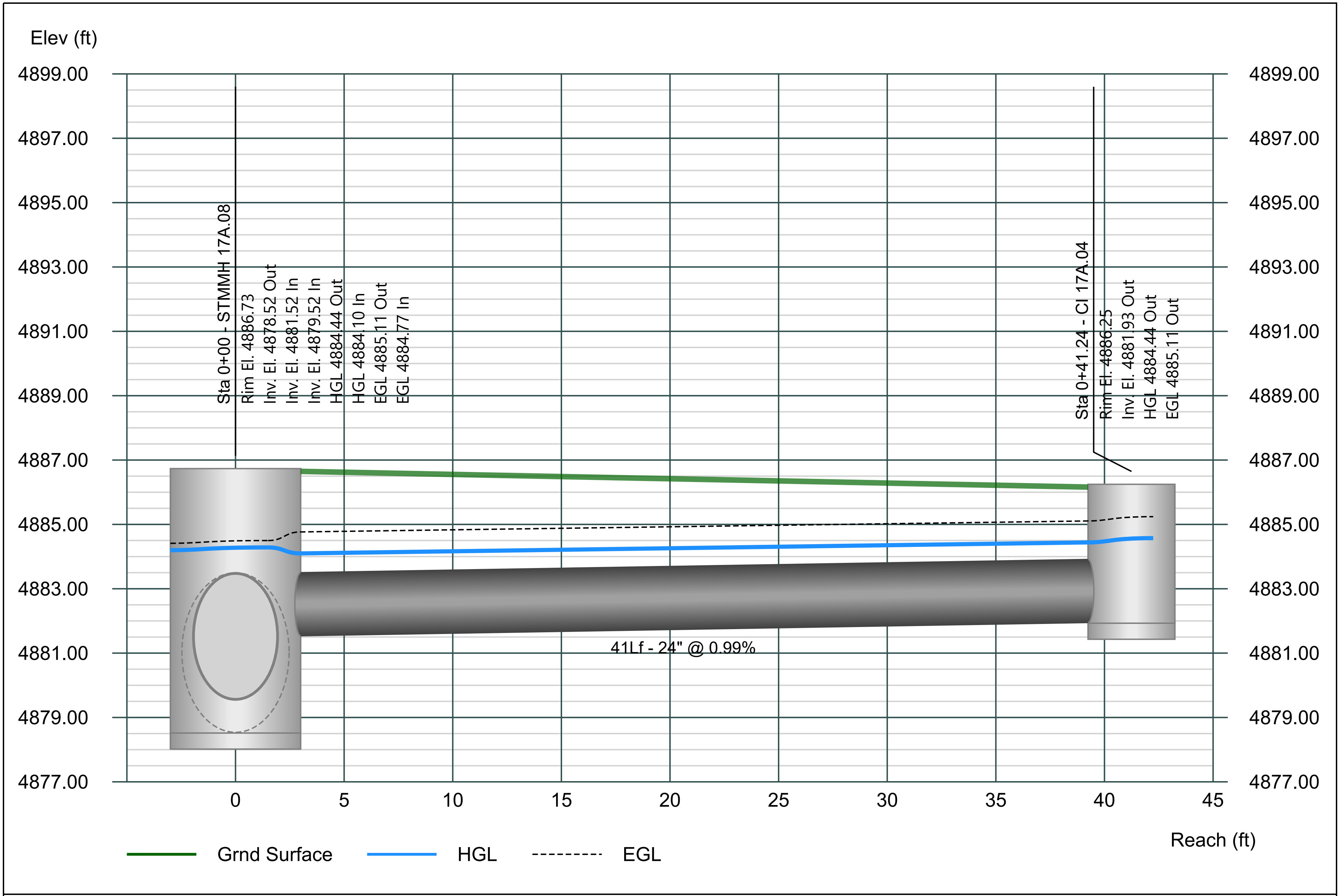
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 28 - Pipe - (396) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



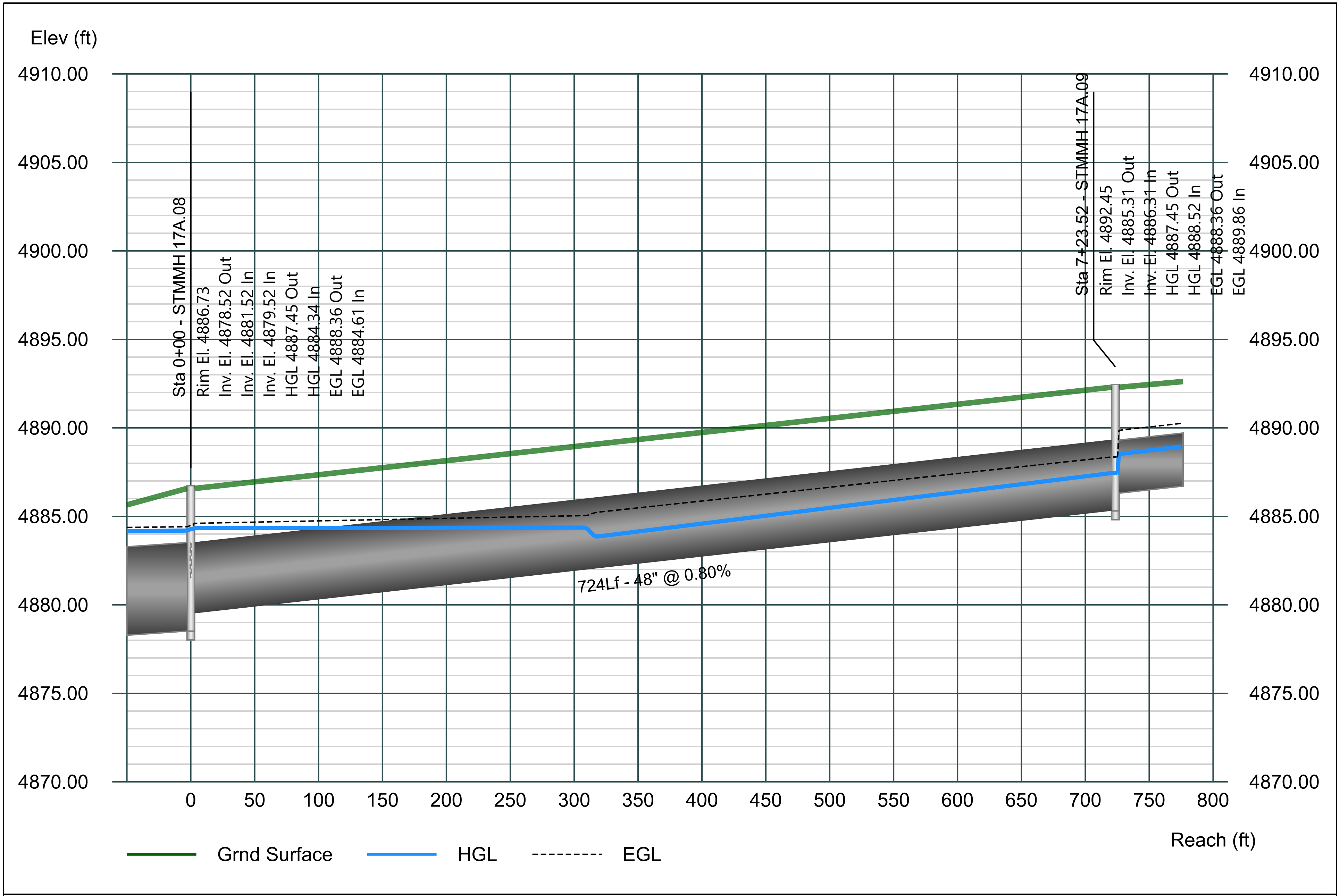
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 29 - Pipe - (598) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



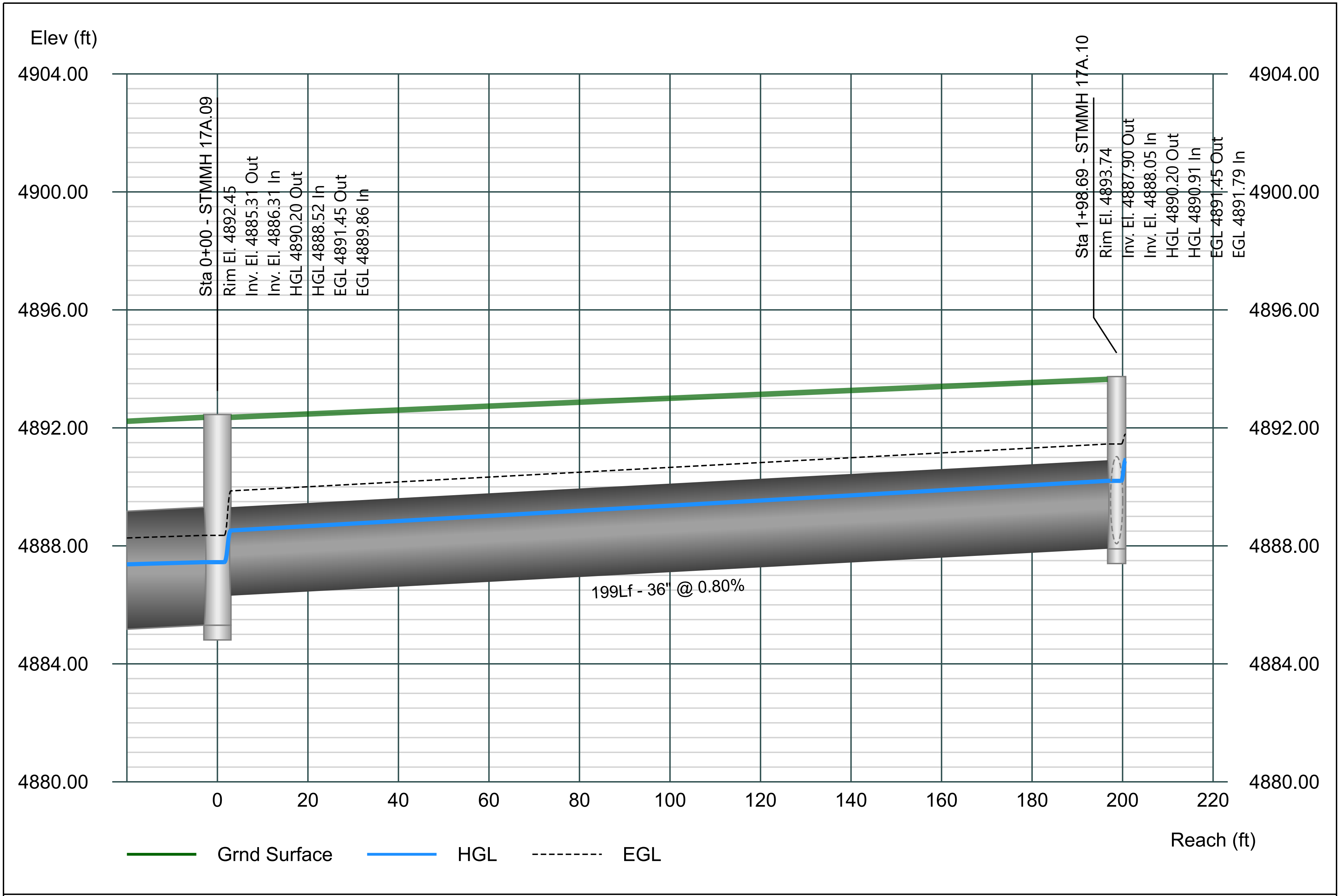
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 30 - Pipe - (597) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



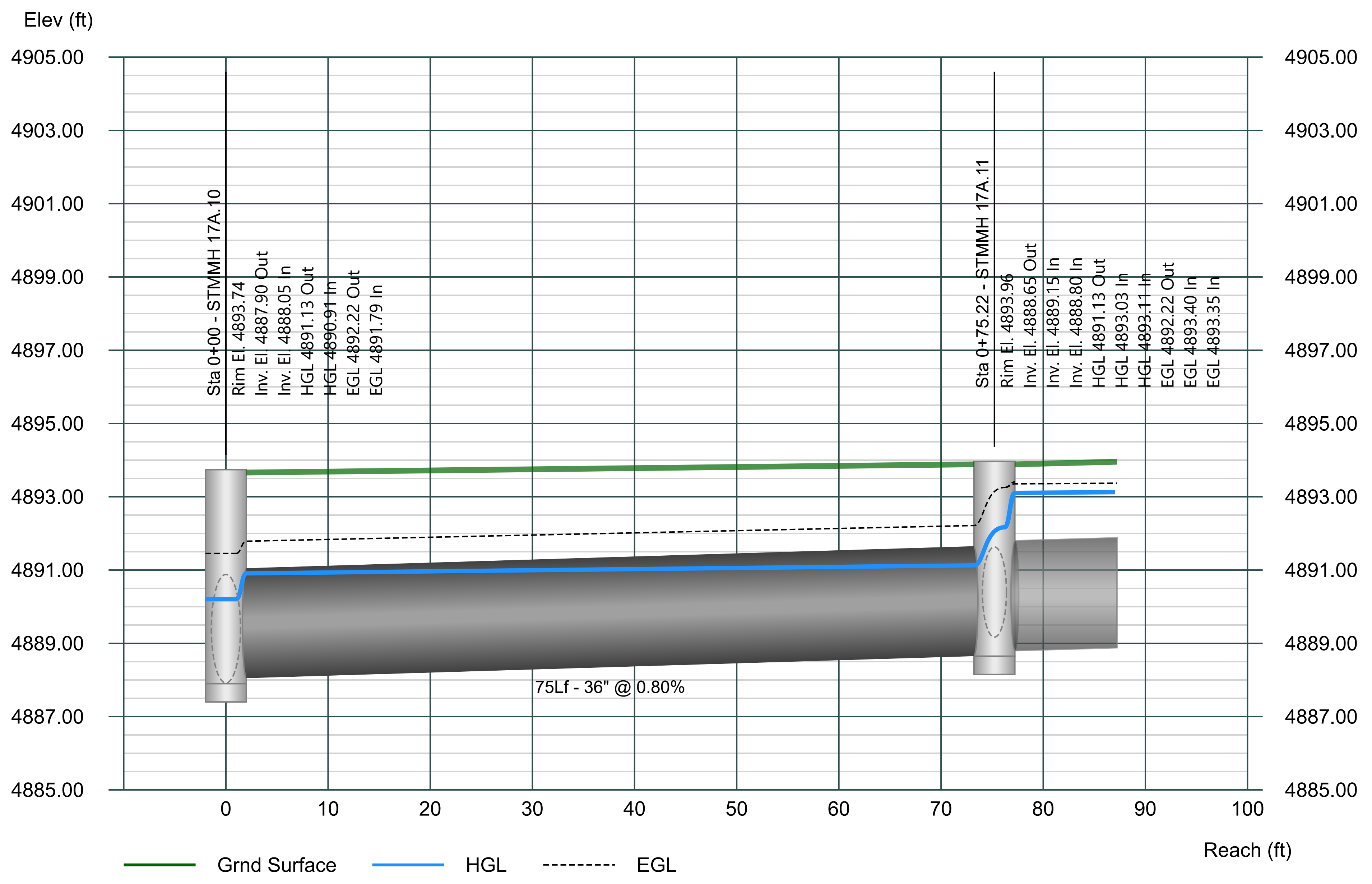
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 31 - Pipe - (596) (1) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



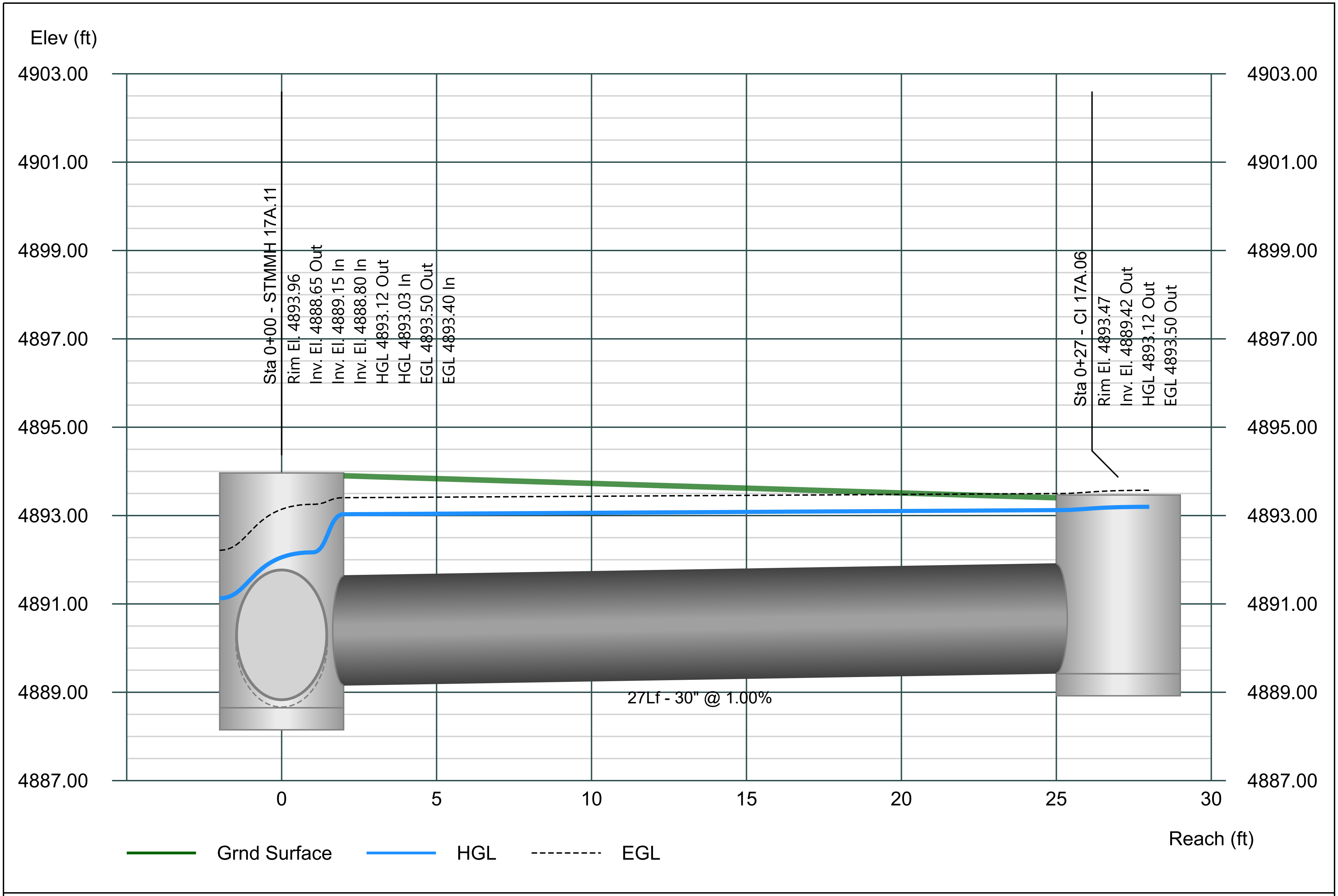
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 32 - Pipe - (603) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



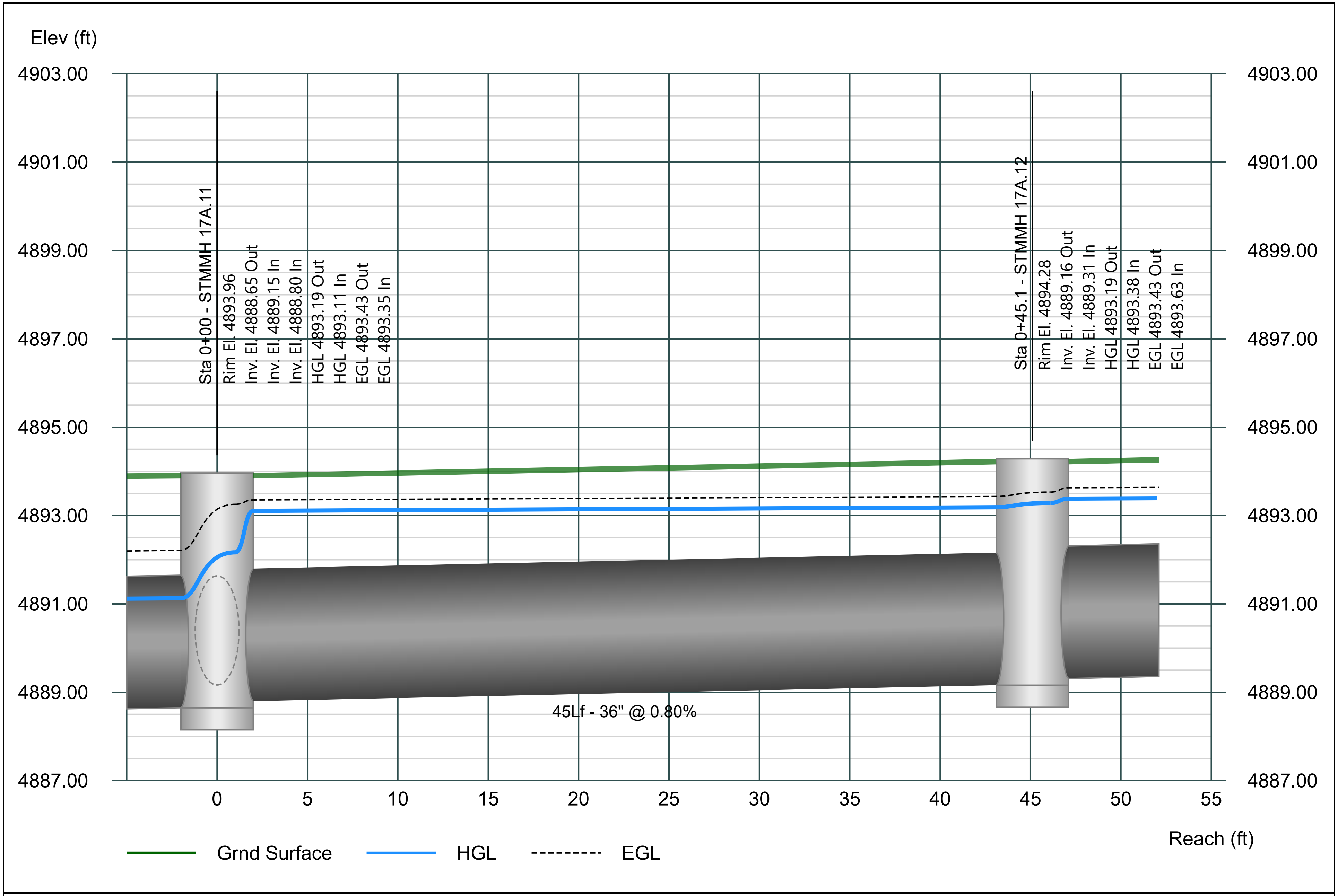
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 33 - Pipe - (596) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



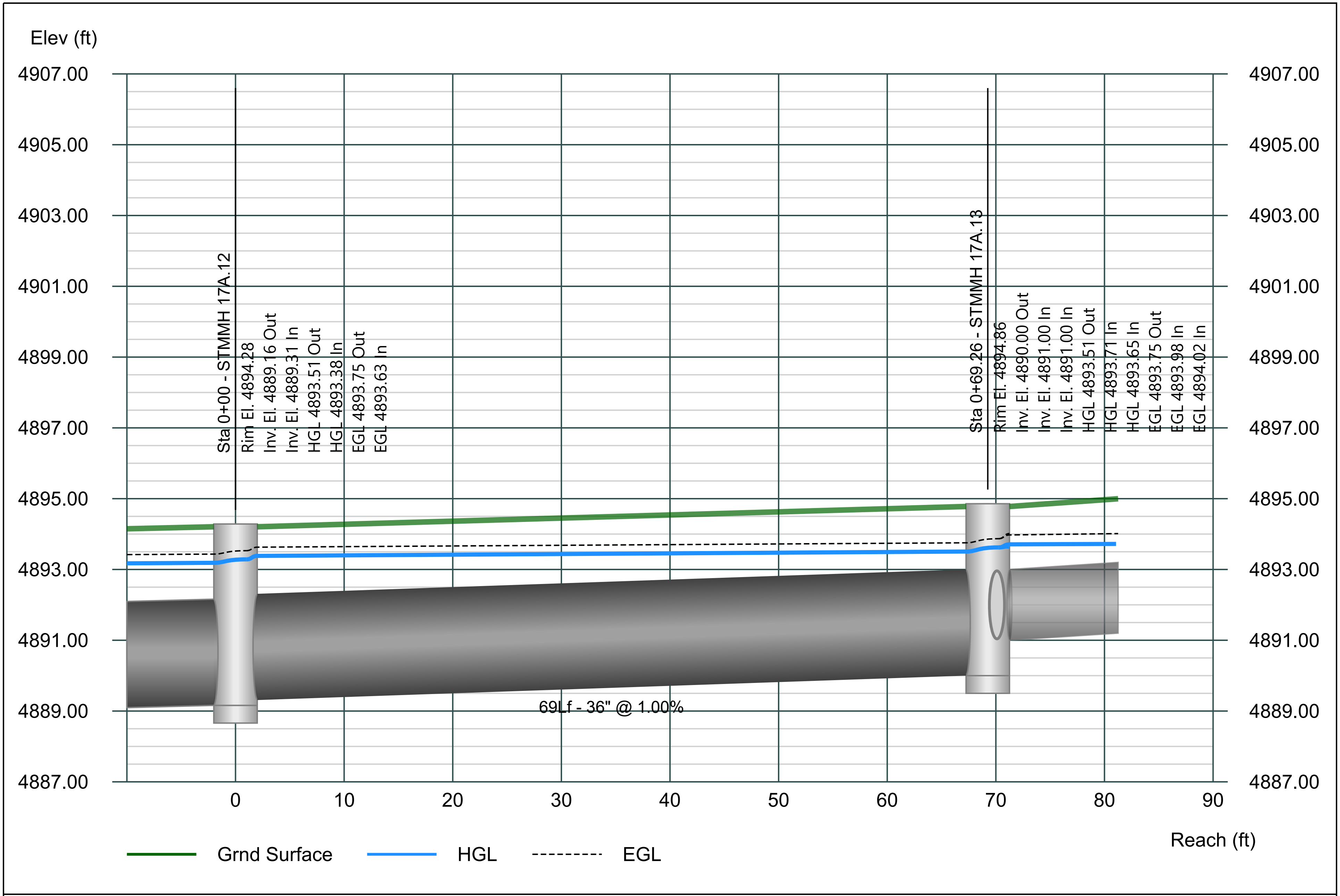
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 34 - Pipe - (595) (1) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



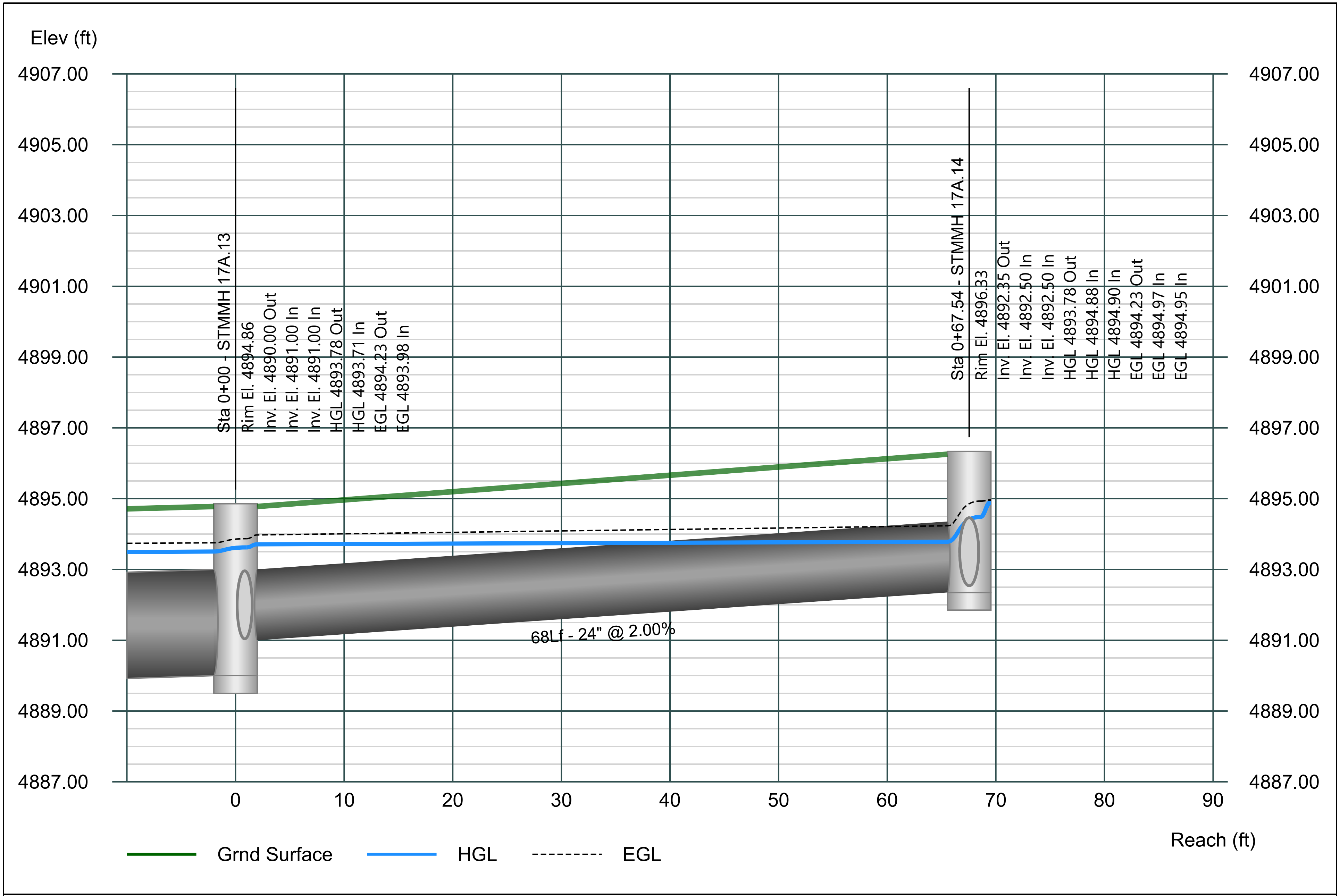
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 35 - Pipe - (595) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



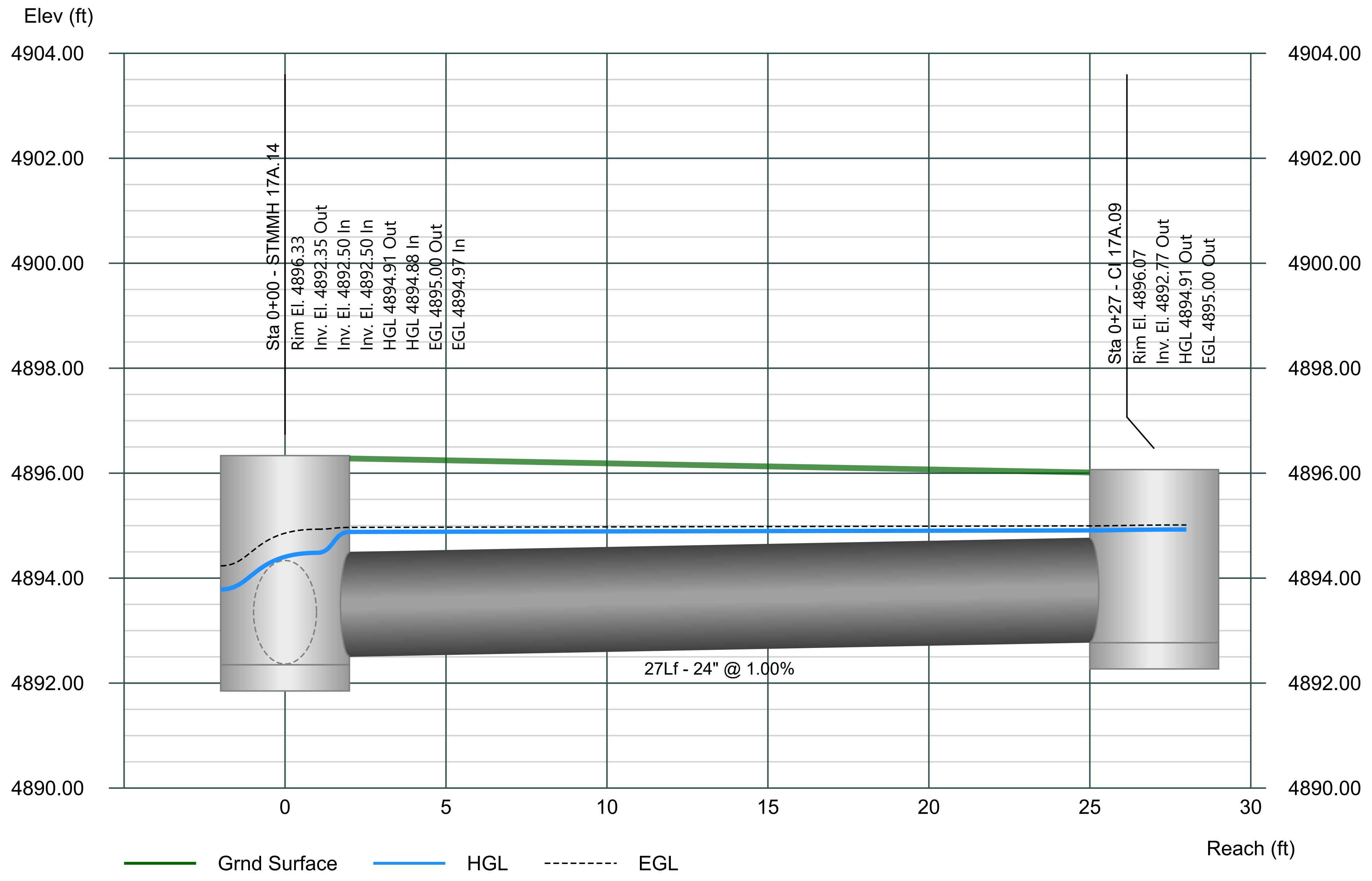
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 36 - Pipe - (602) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



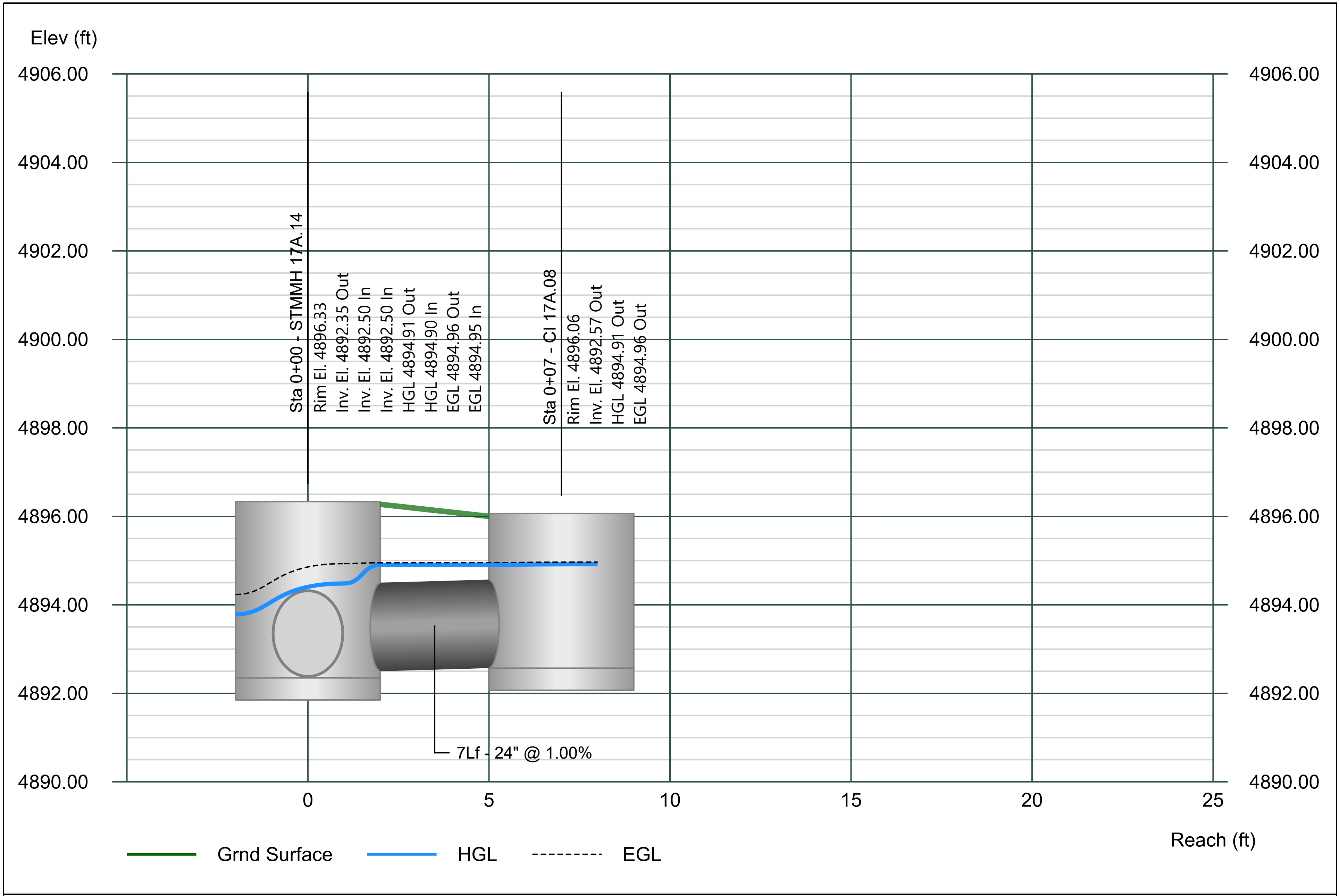
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 37 - Pipe - (601) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



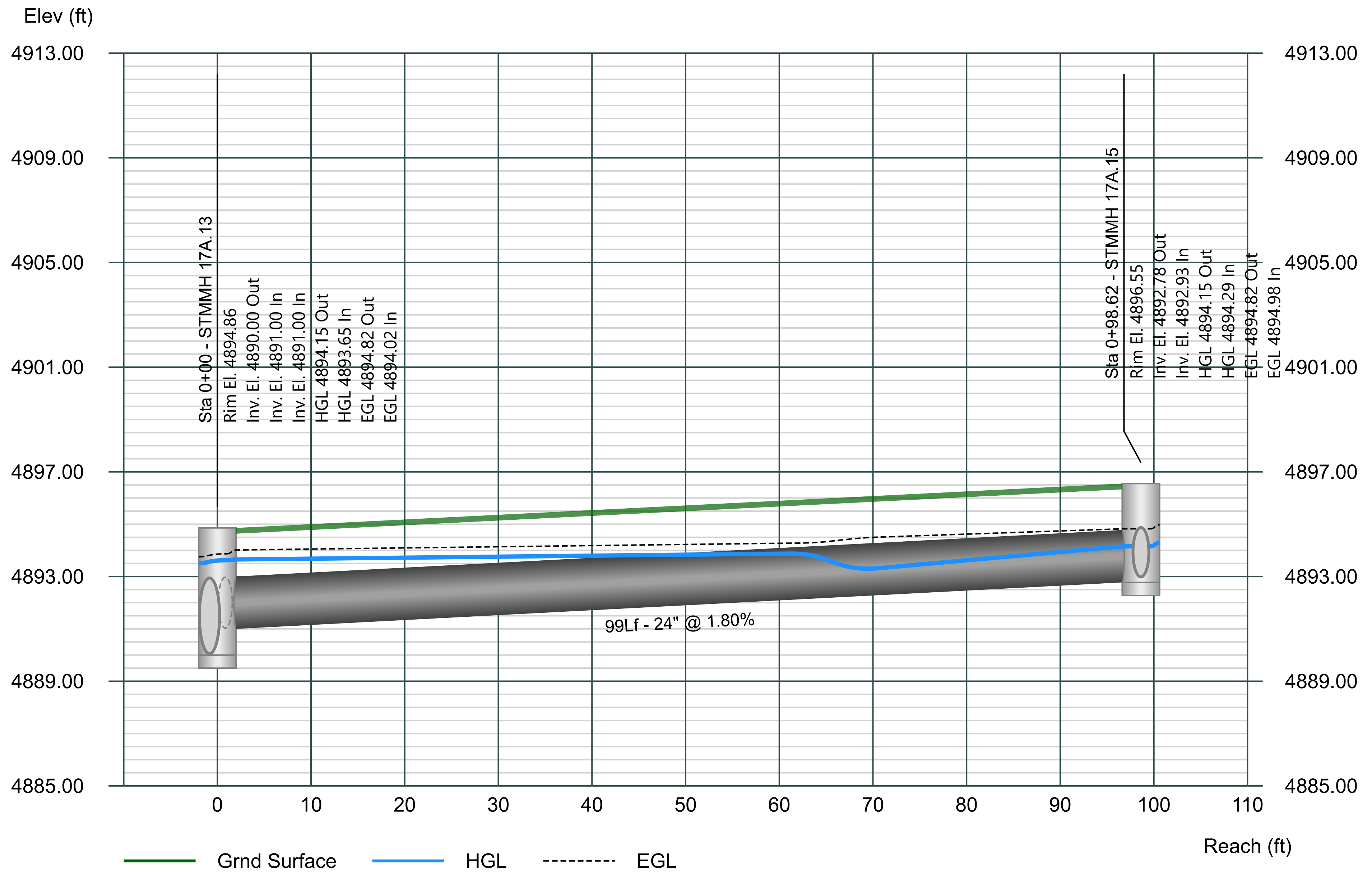
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 38 - Pipe - (599) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



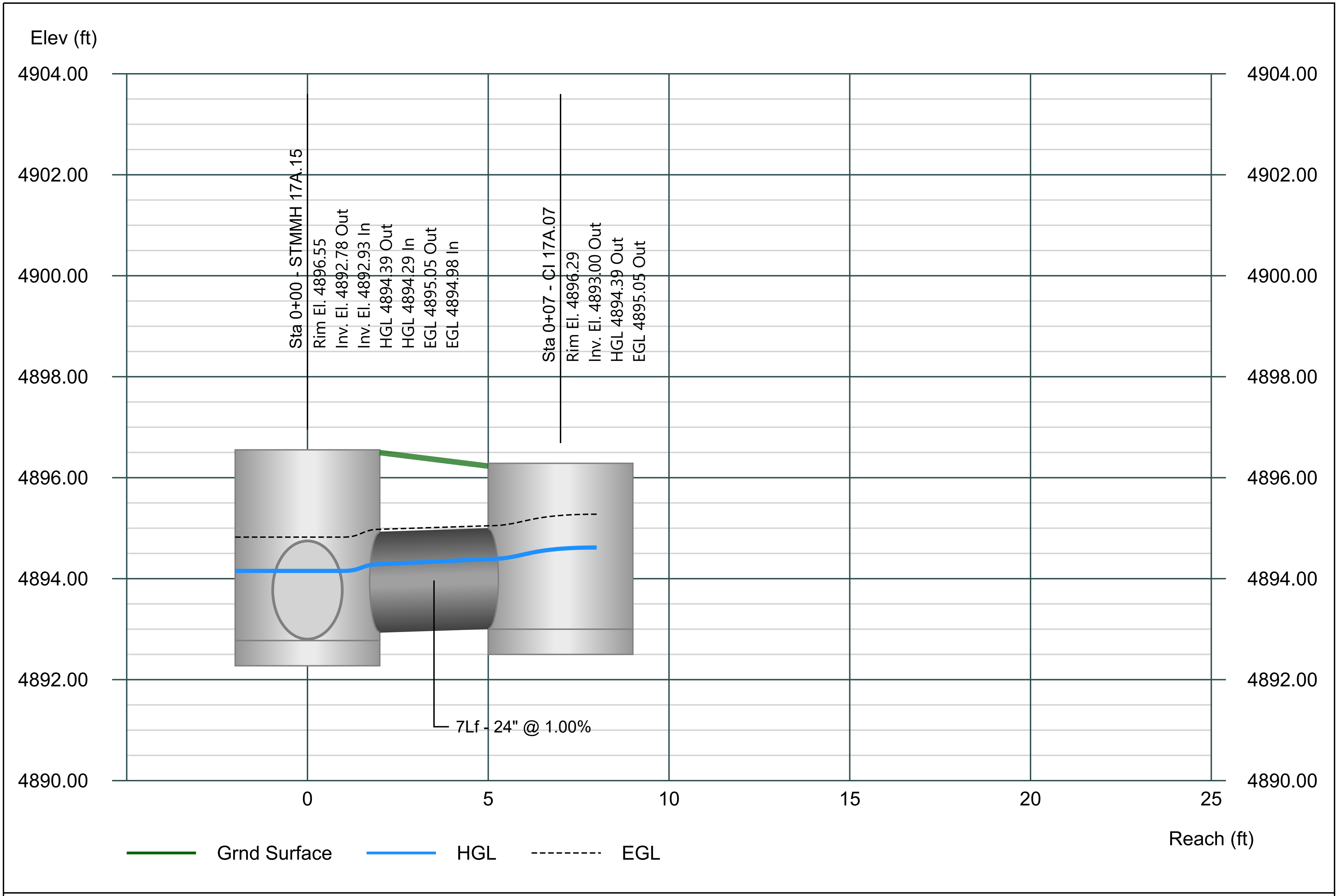
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 39 - Pipe - (600) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



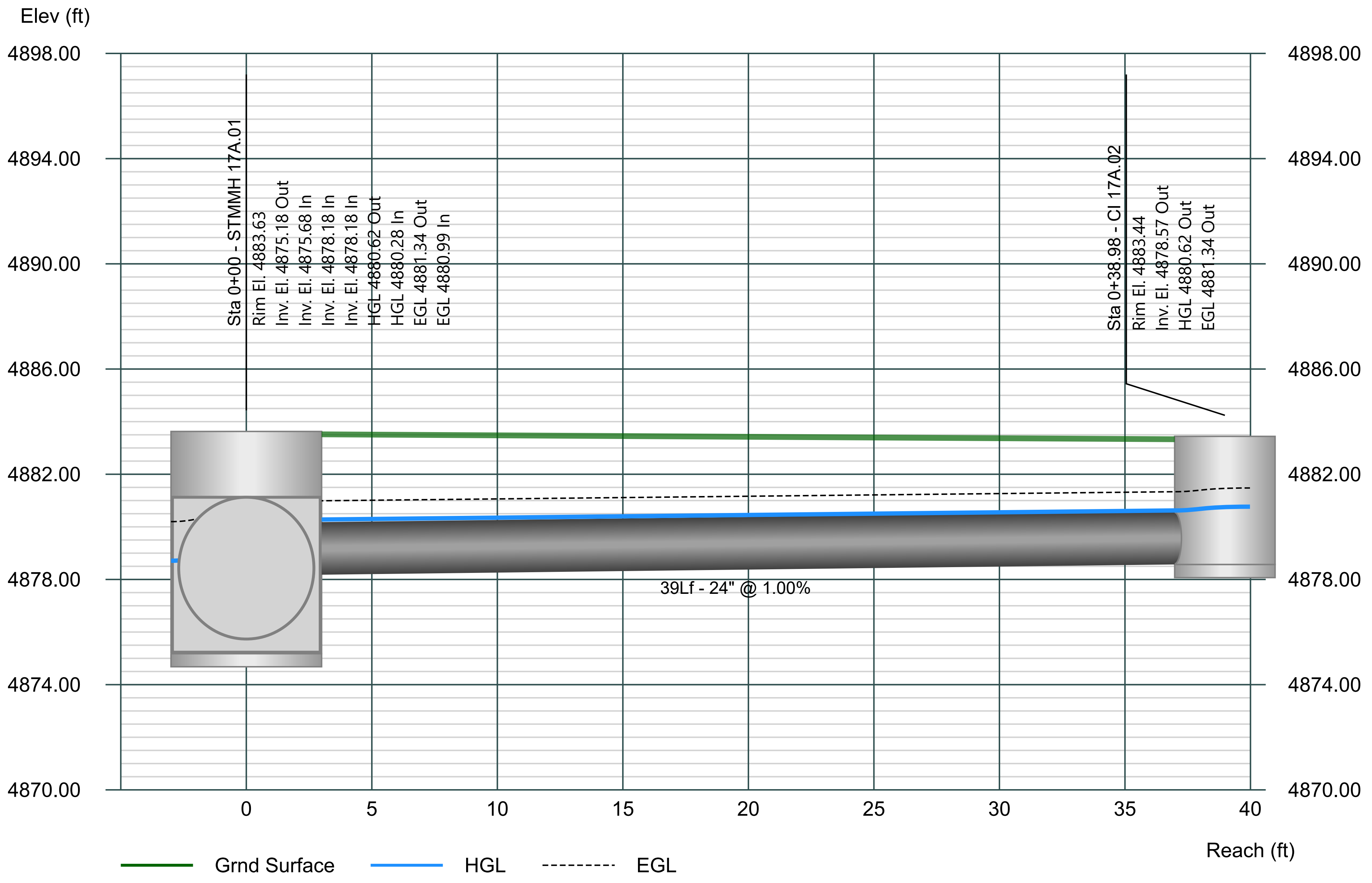
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 40 - Pipe - (566) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



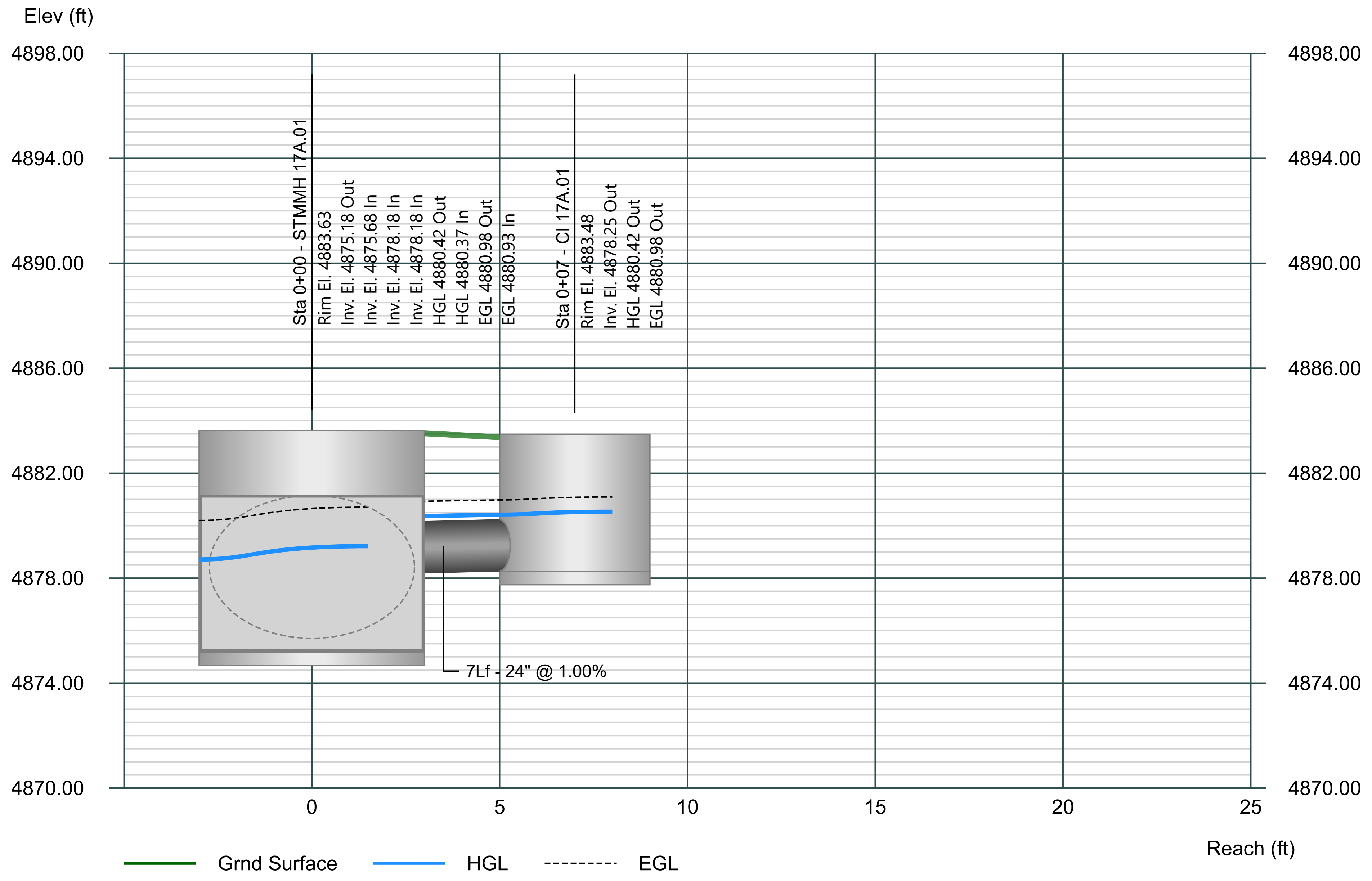
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 41 - Pipe - (581) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



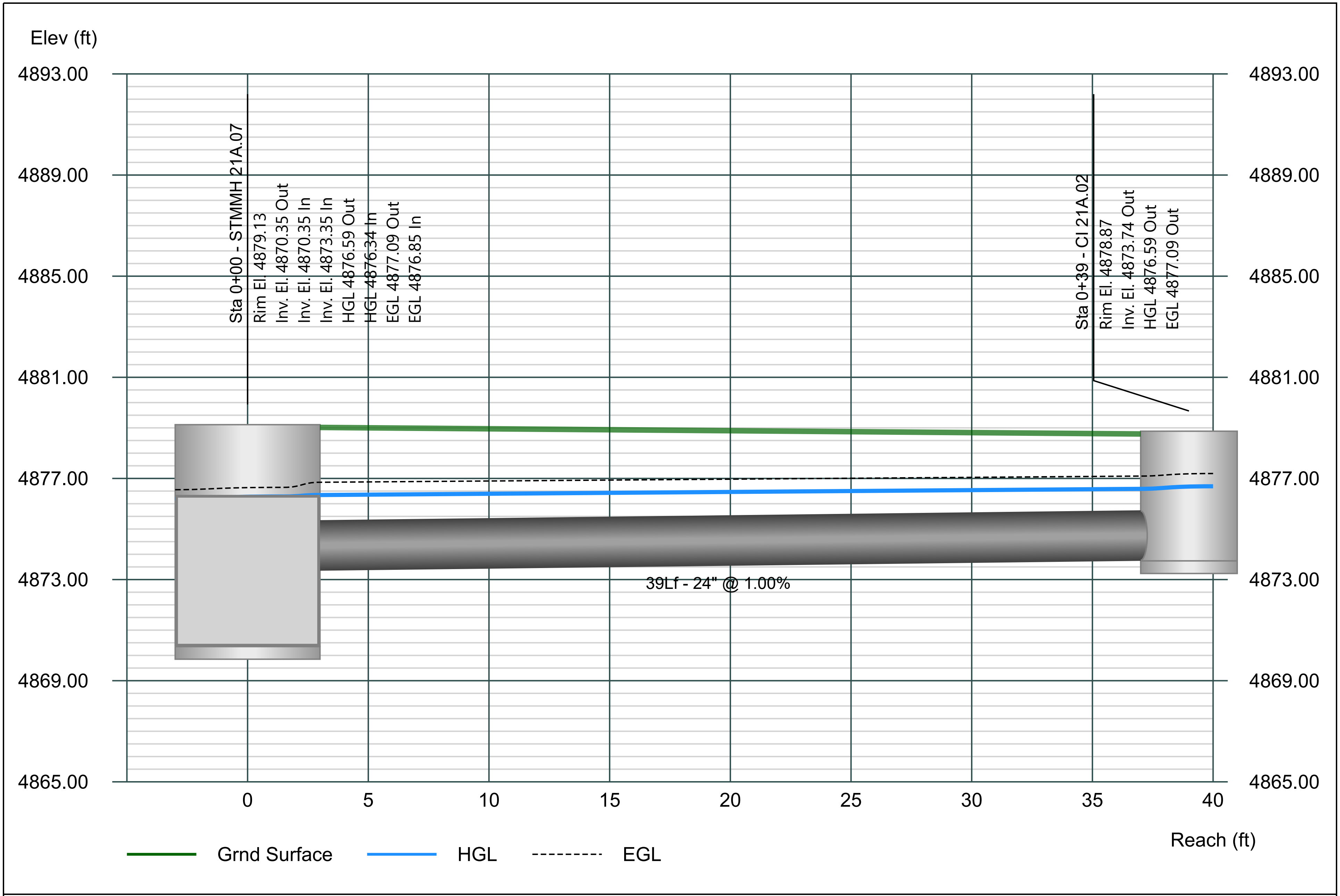
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 42 - Pipe - (606) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



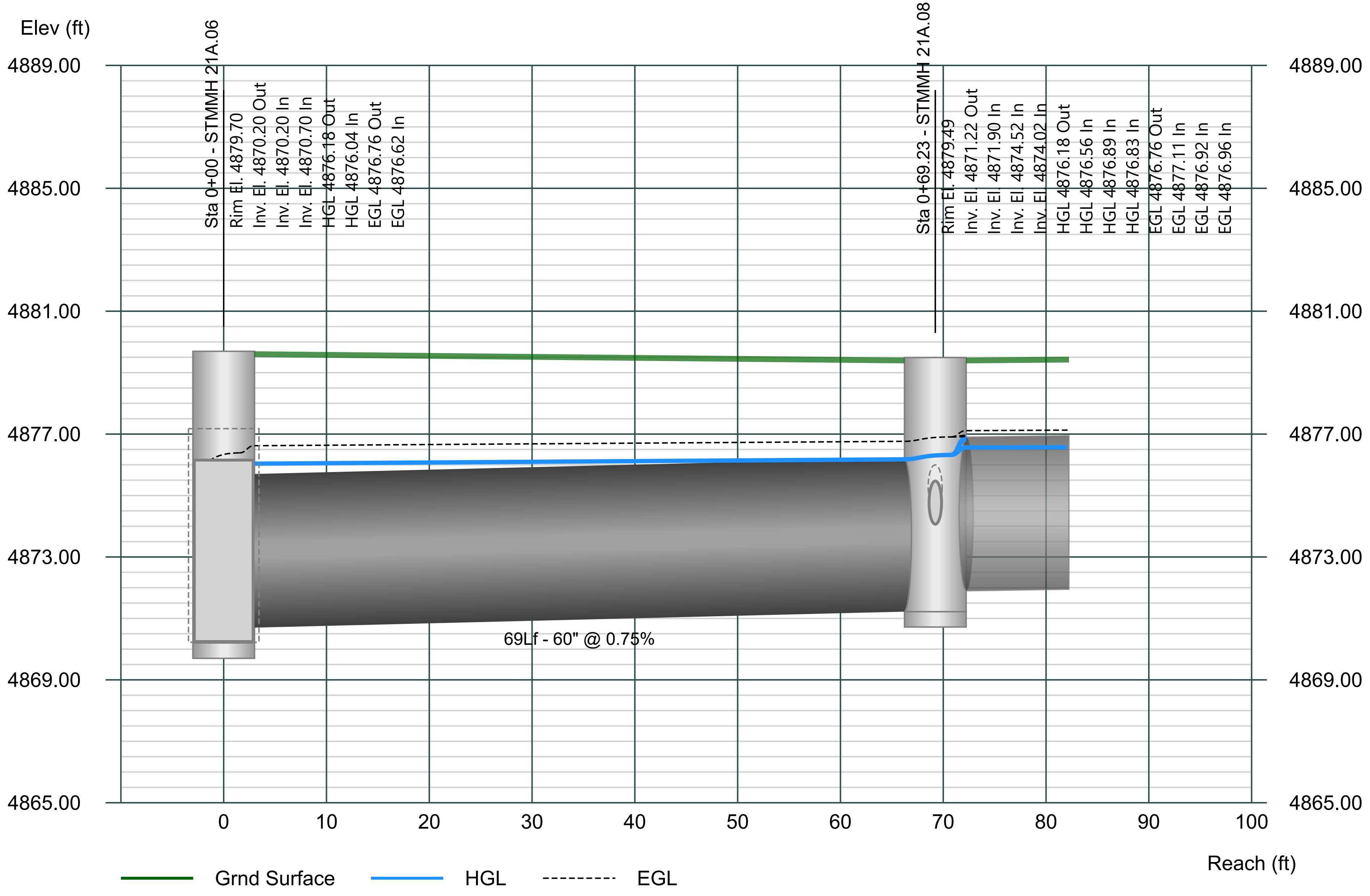
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 43 - Pipe - (526) (1) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



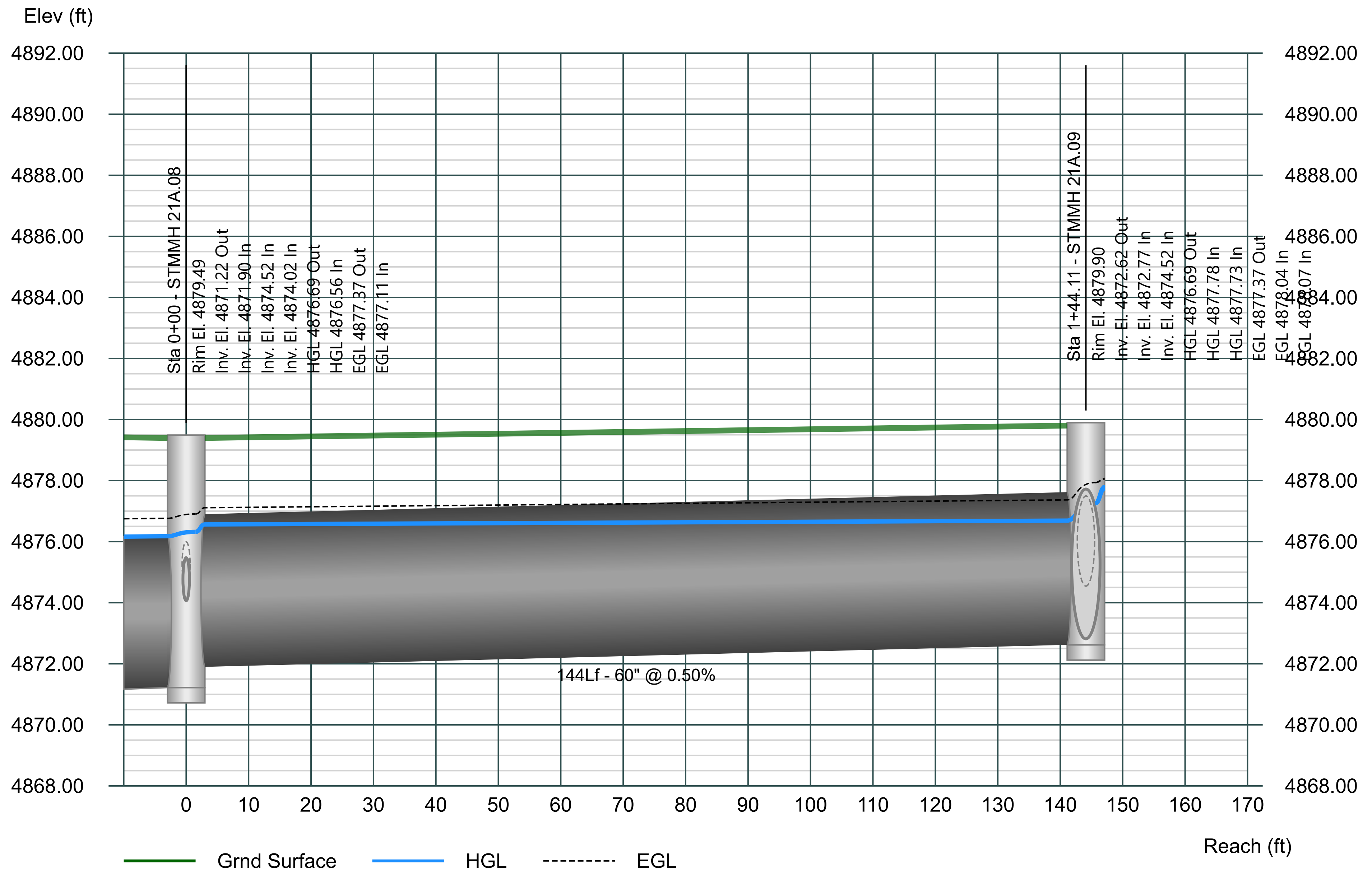
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 44 - Pipe - (526) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



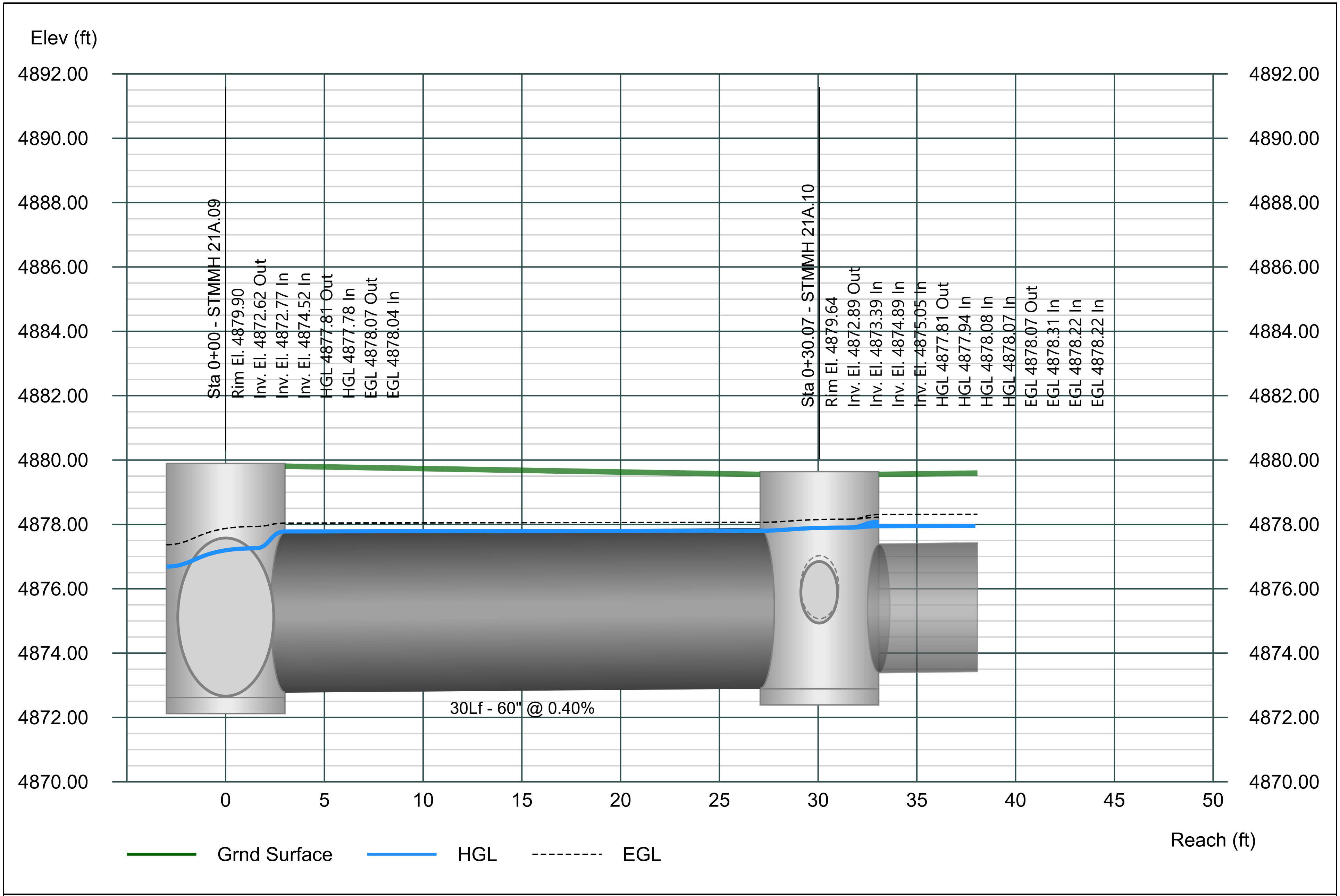
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 45 - Pipe - (534) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



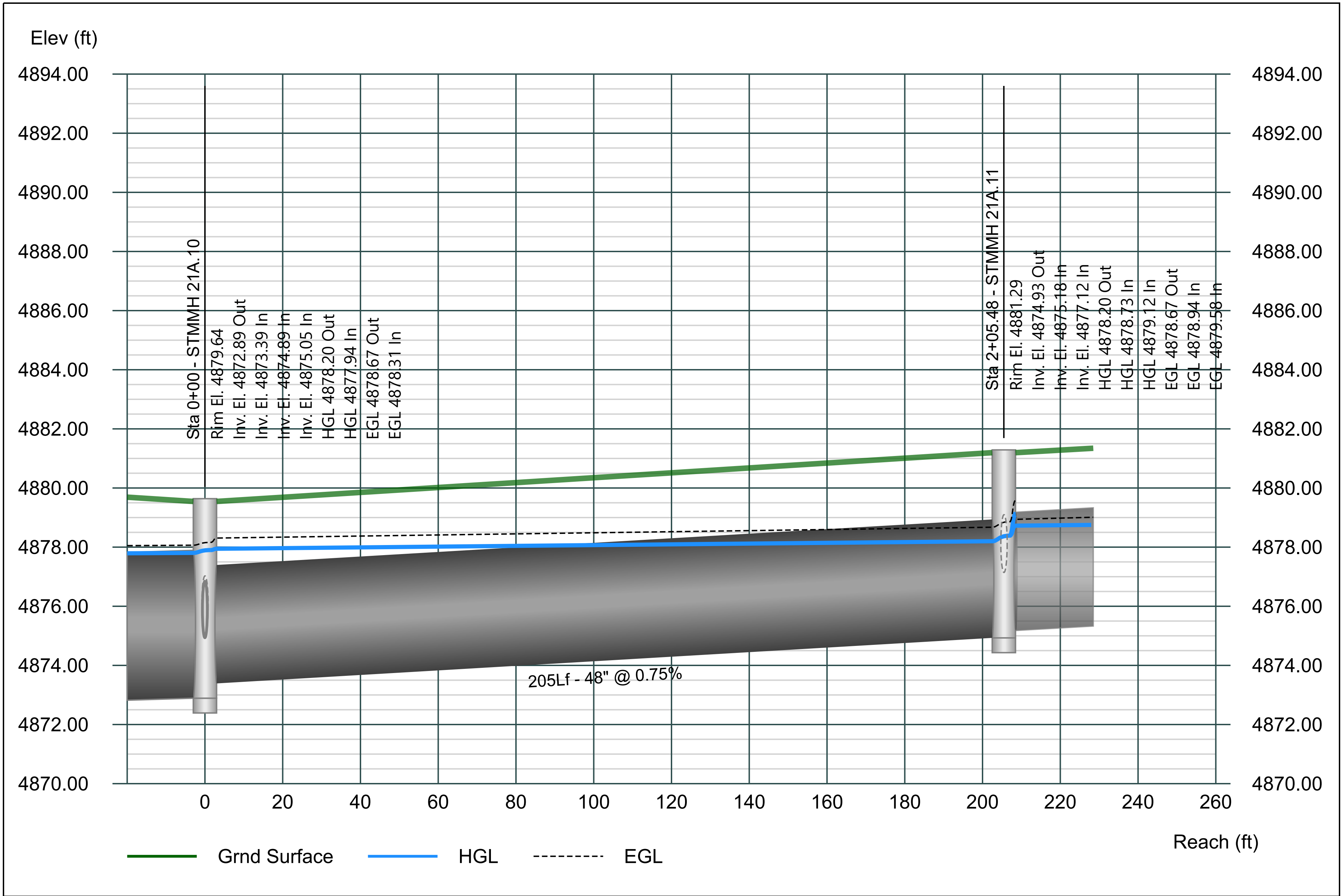
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 46 - Pipe - (533) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



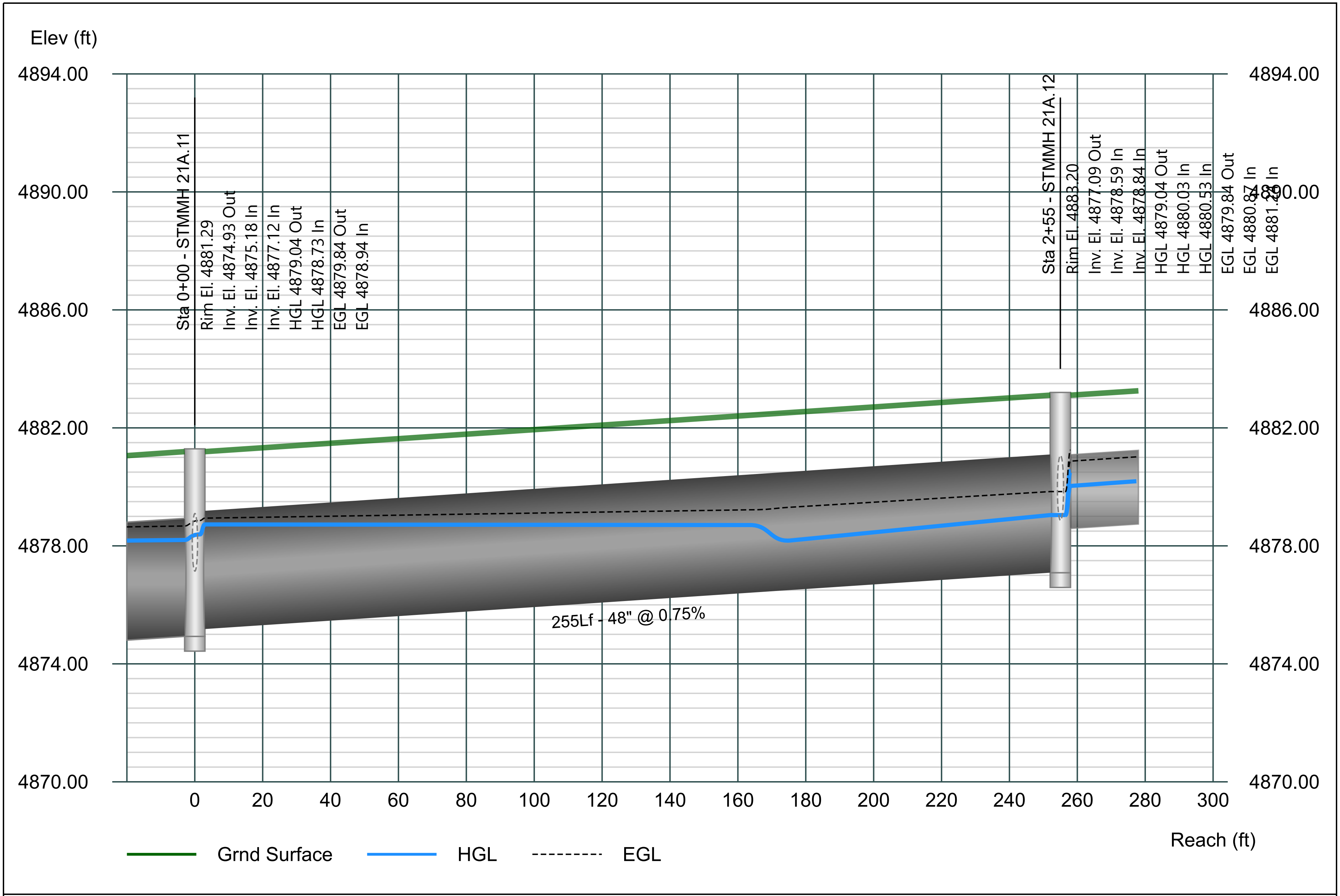
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 47 - Pipe - (548) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



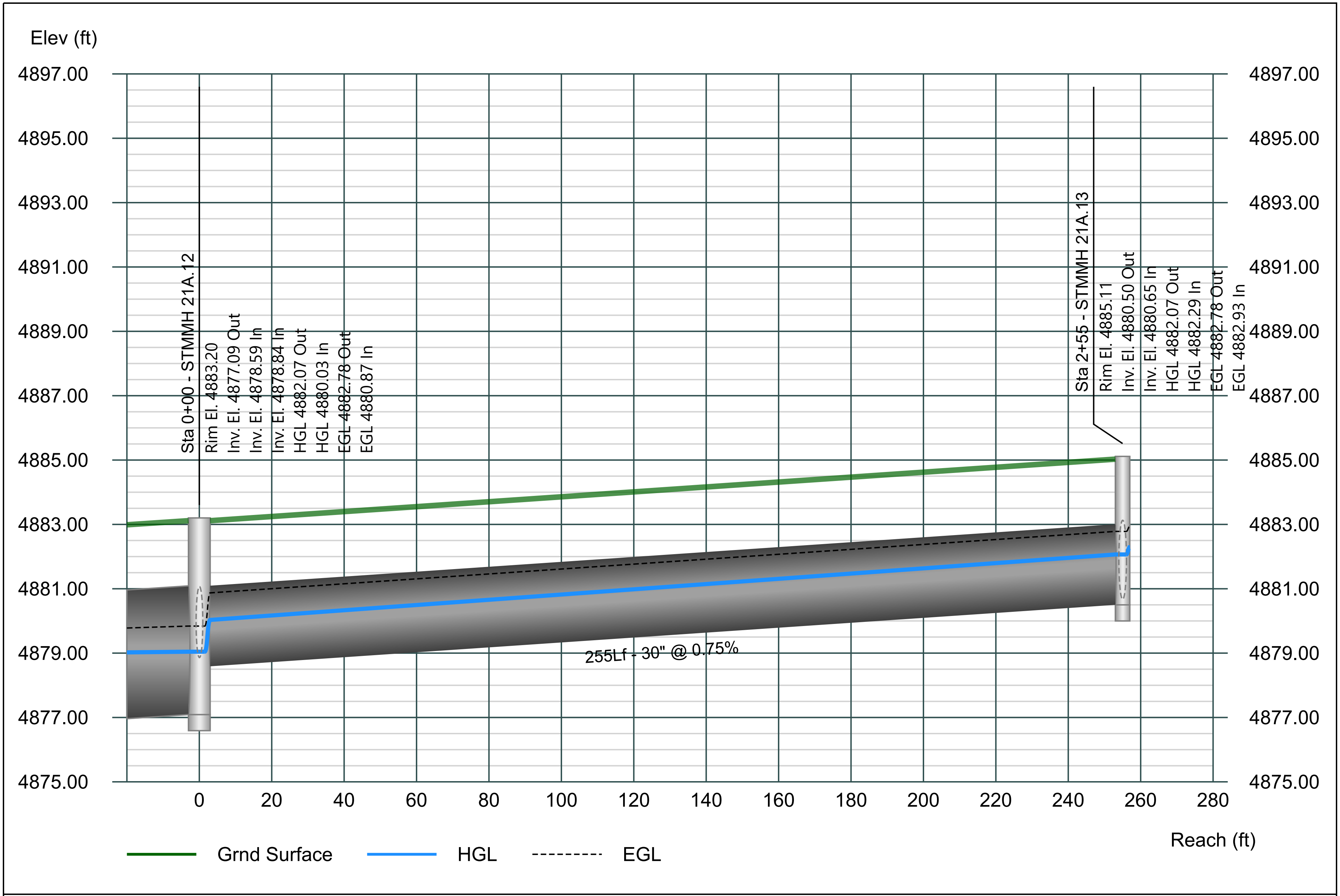
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 48 - Pipe - (546) (2) (1) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



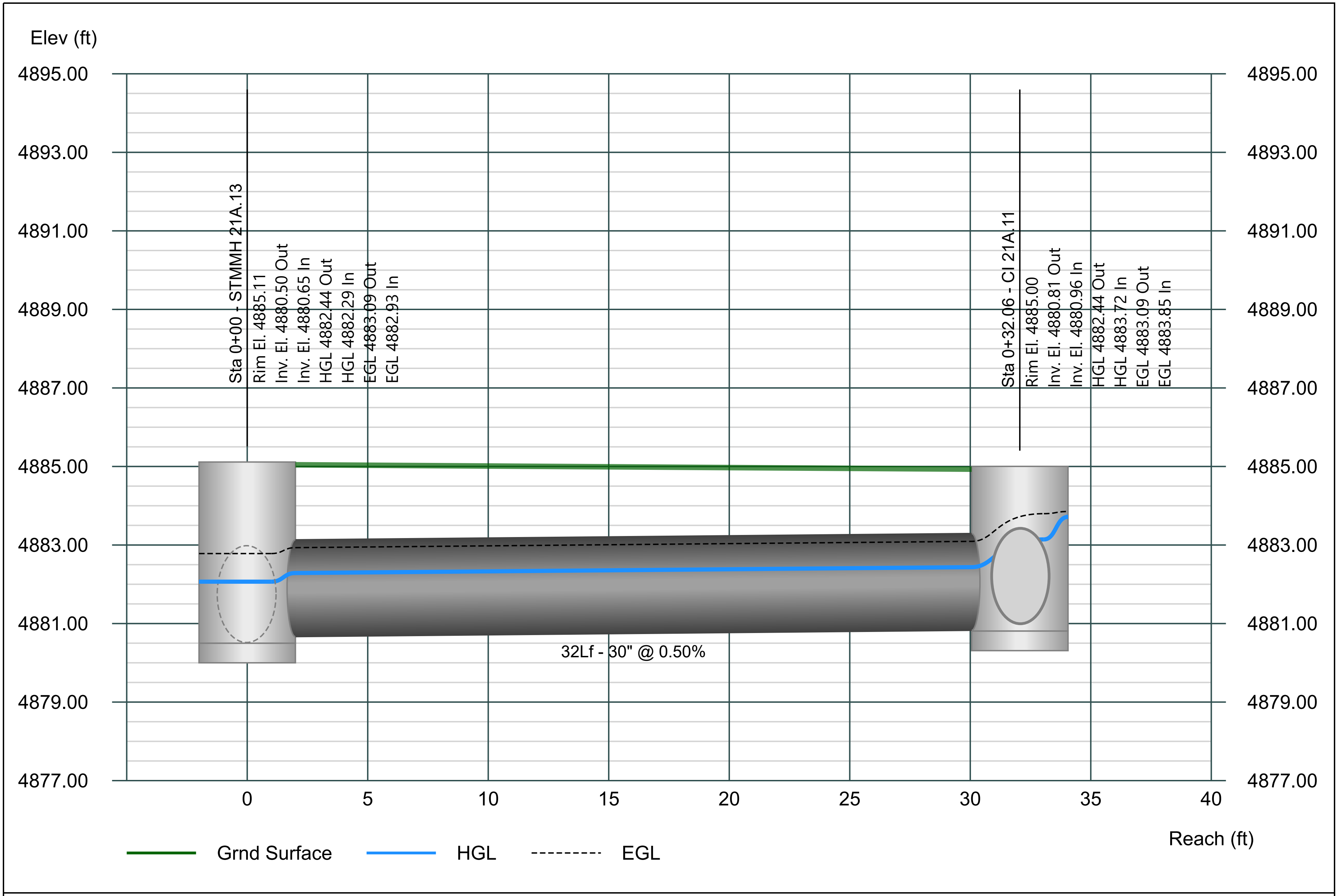
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 49 - Pipe - (545) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



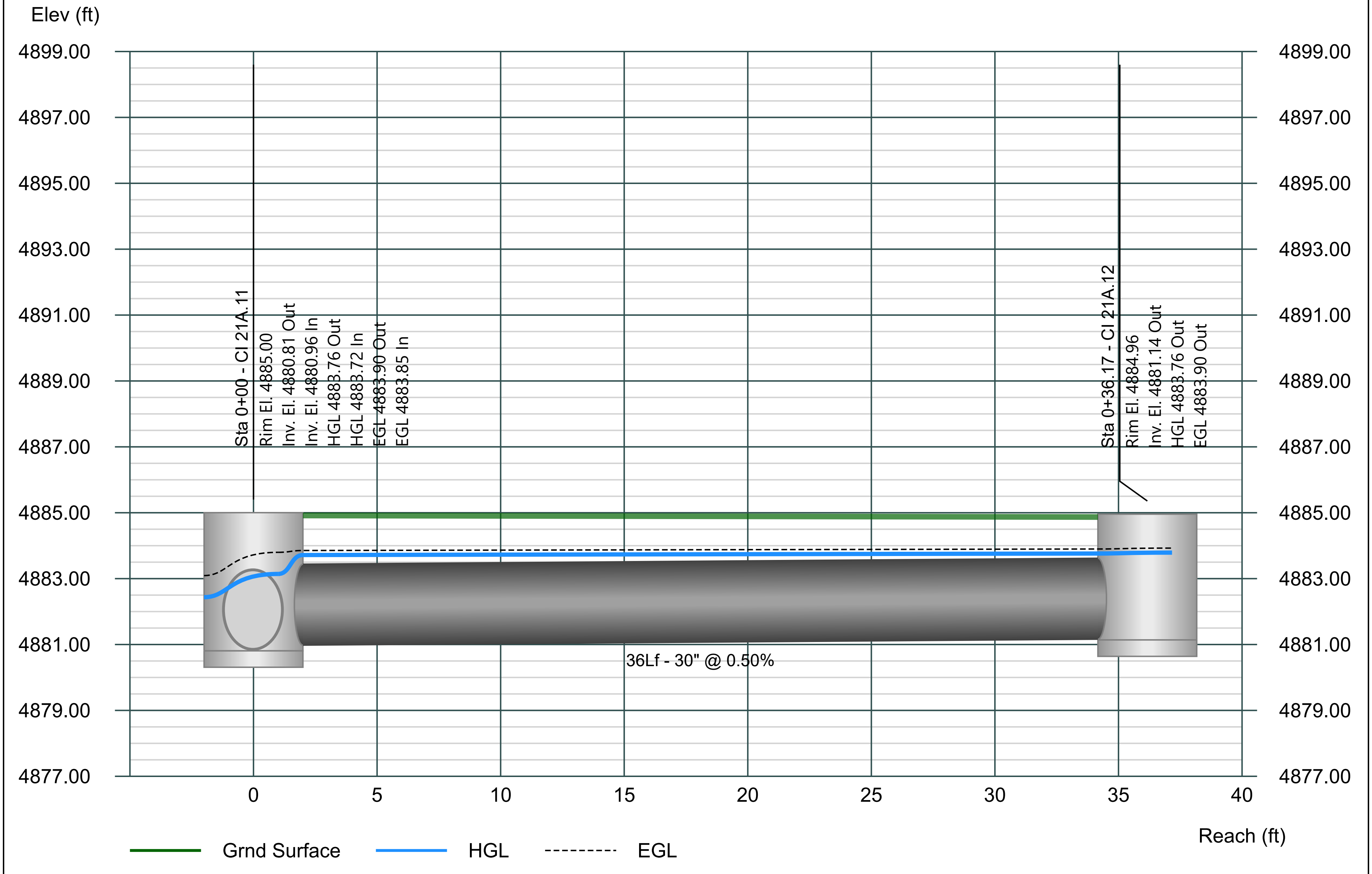
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 50 - Pipe - (527) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



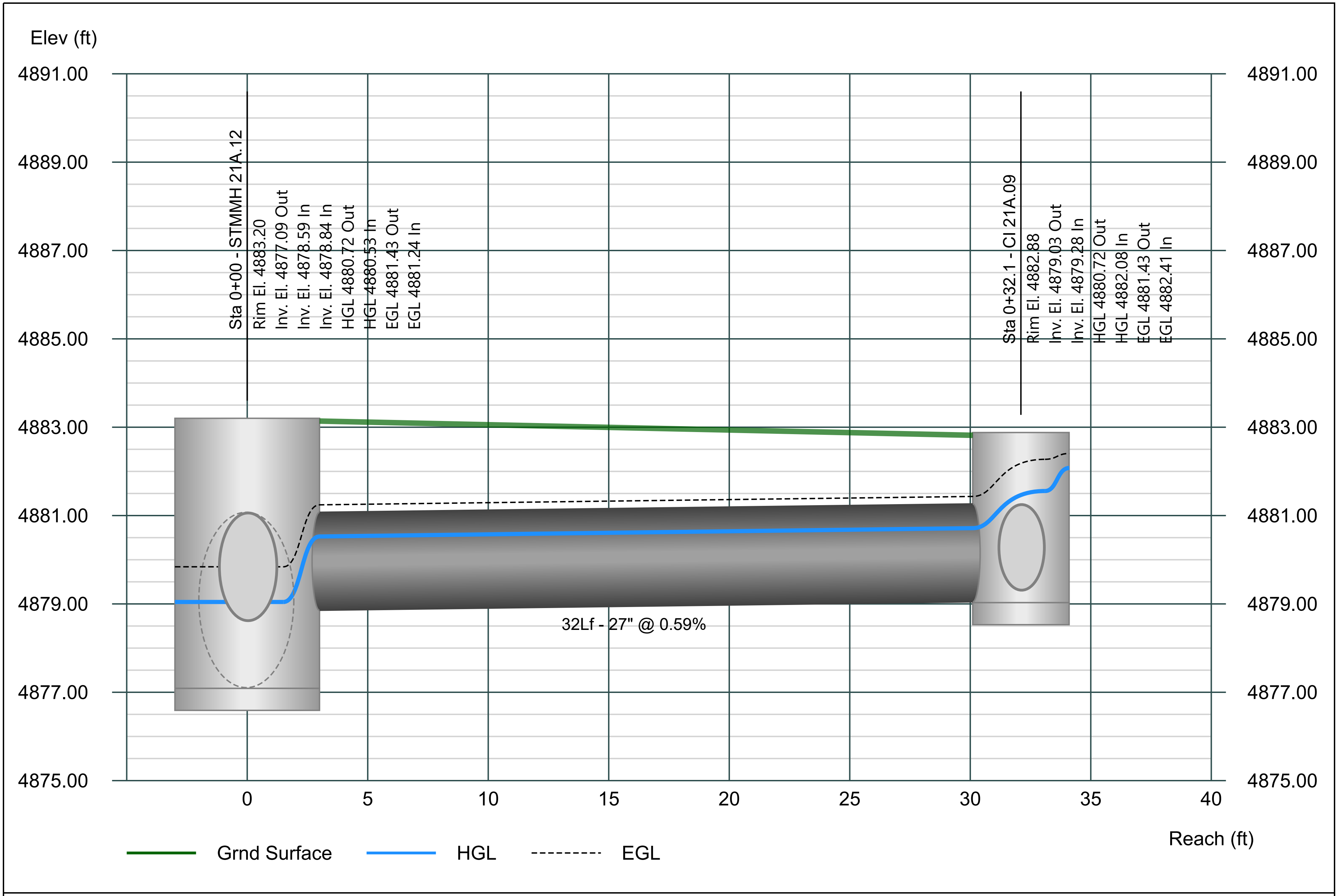
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 51 - Pipe - (549) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



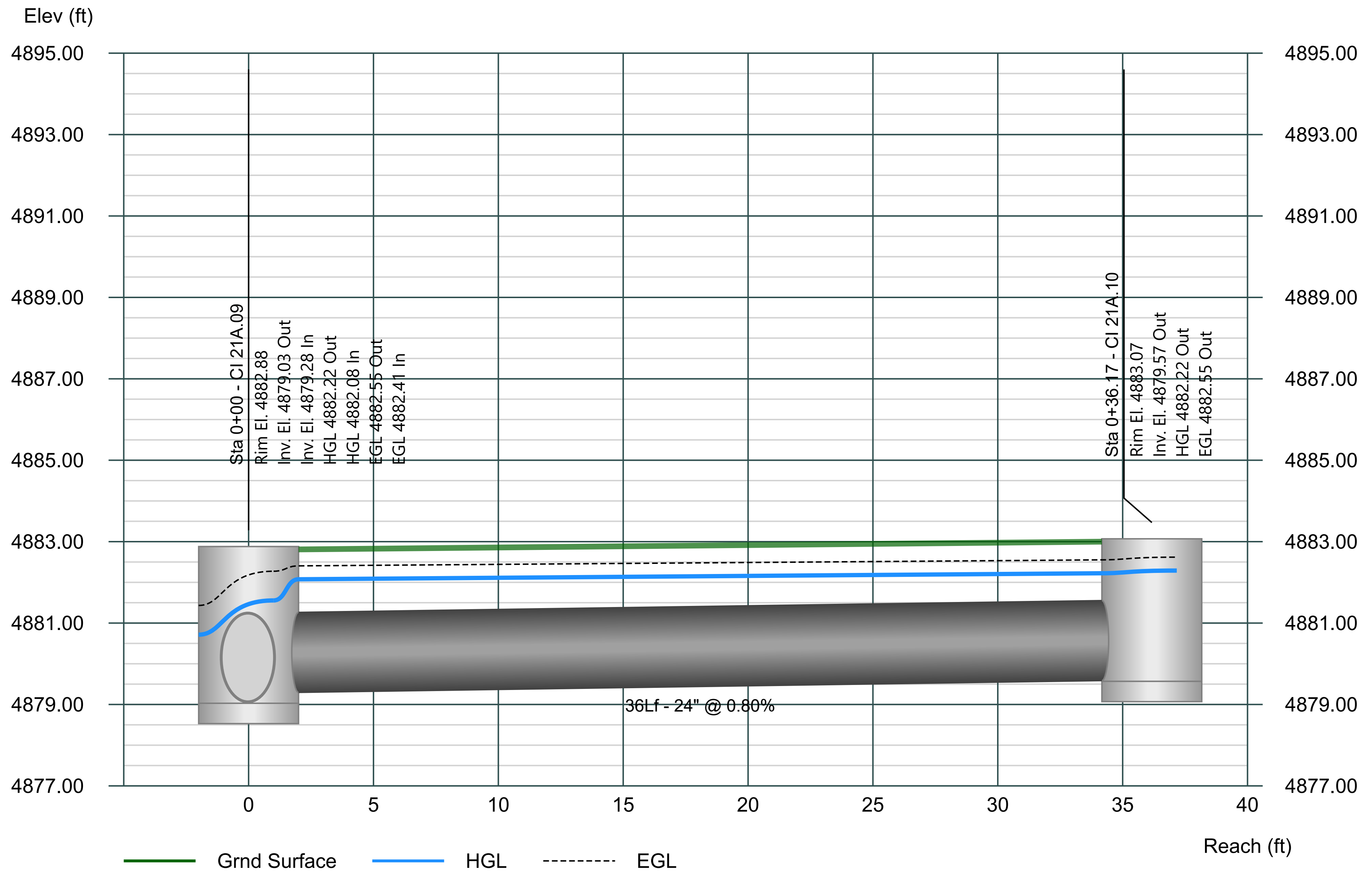
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 52 - Pipe - (529) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021

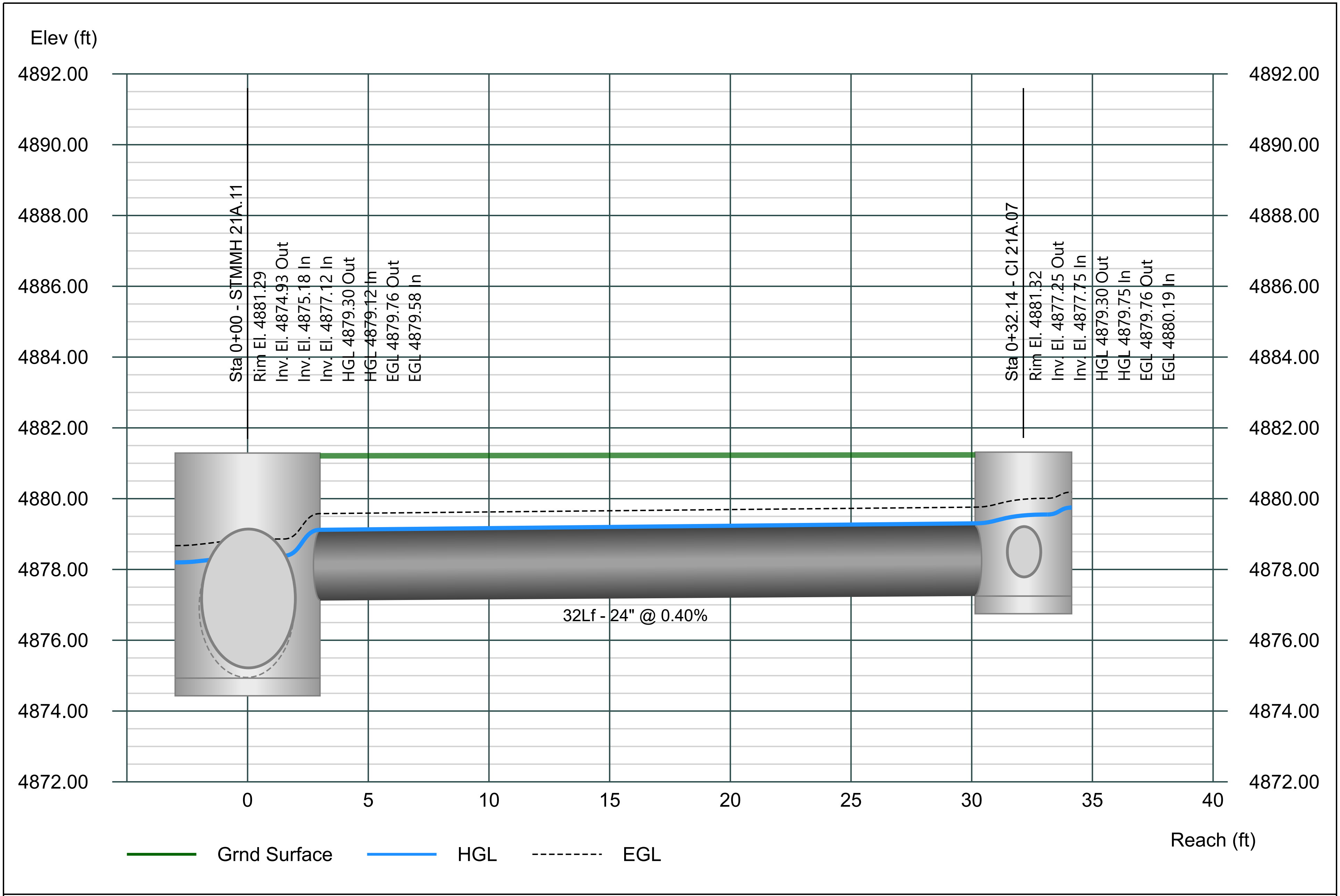


Line 53 - Pipe - (532)(0) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



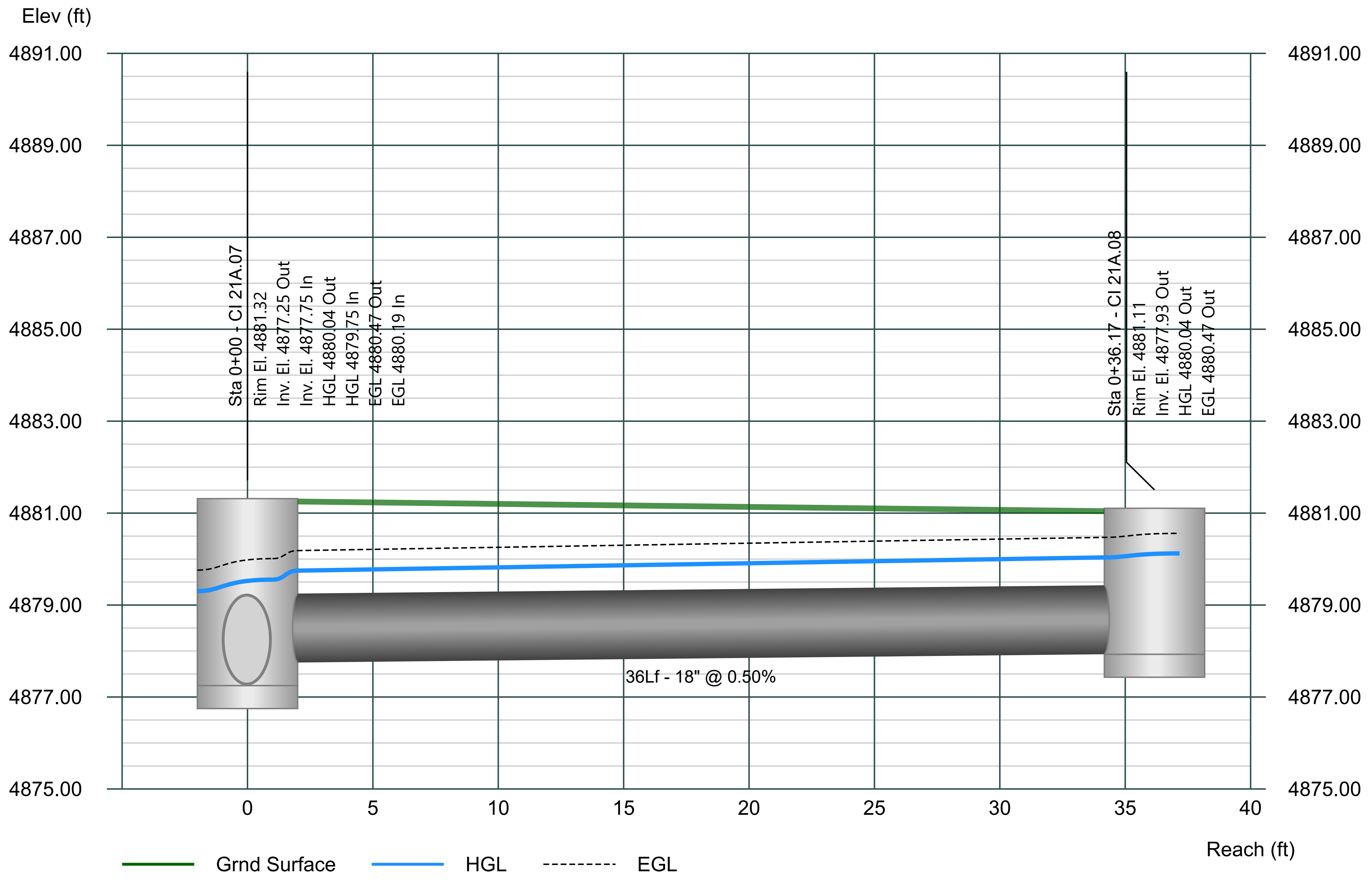
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 54 - Pipe - (531) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



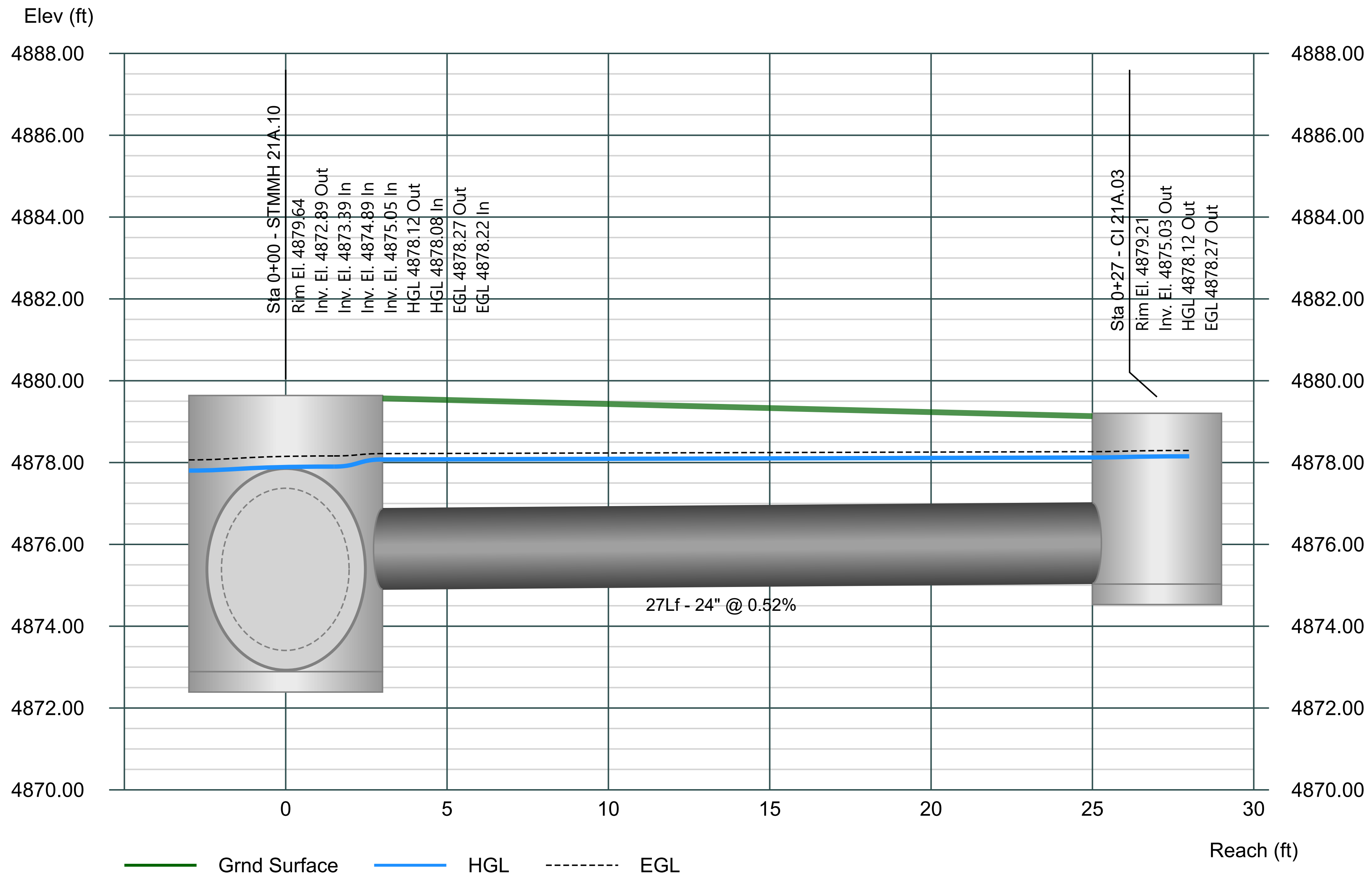
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 55 - Pipe - (536) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



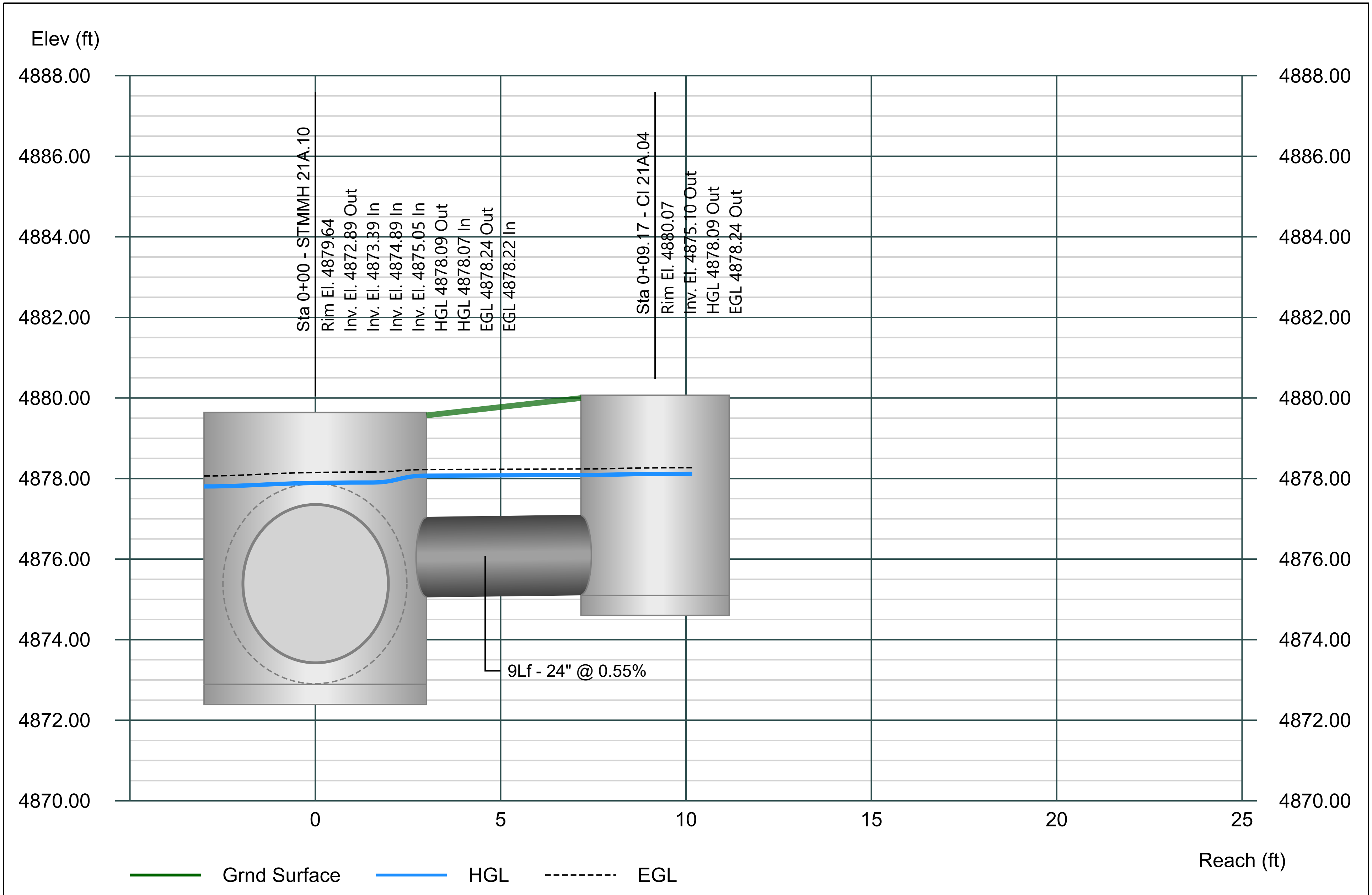
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 56 - Pipe - (535) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



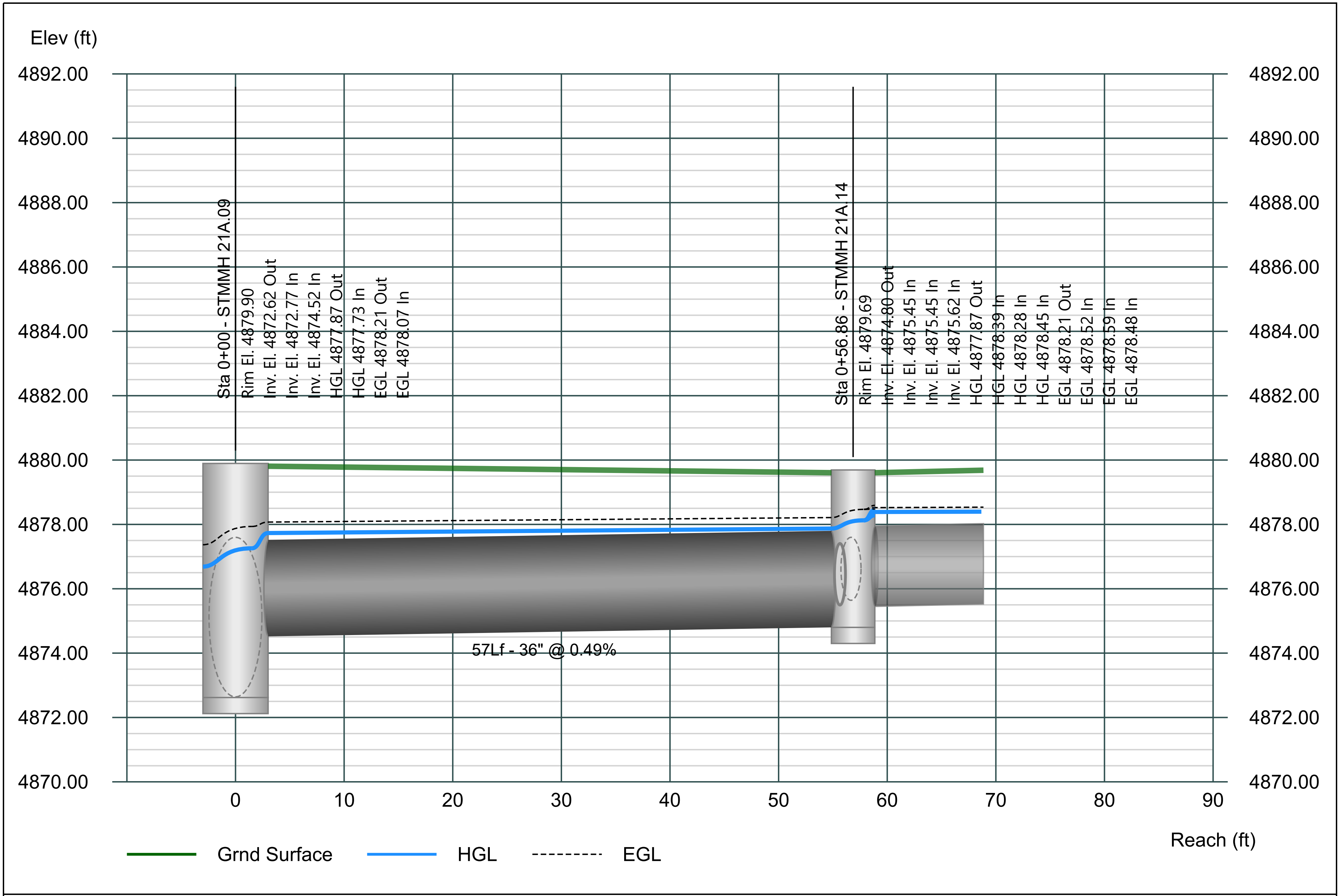
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 57 - Pipe - (525) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



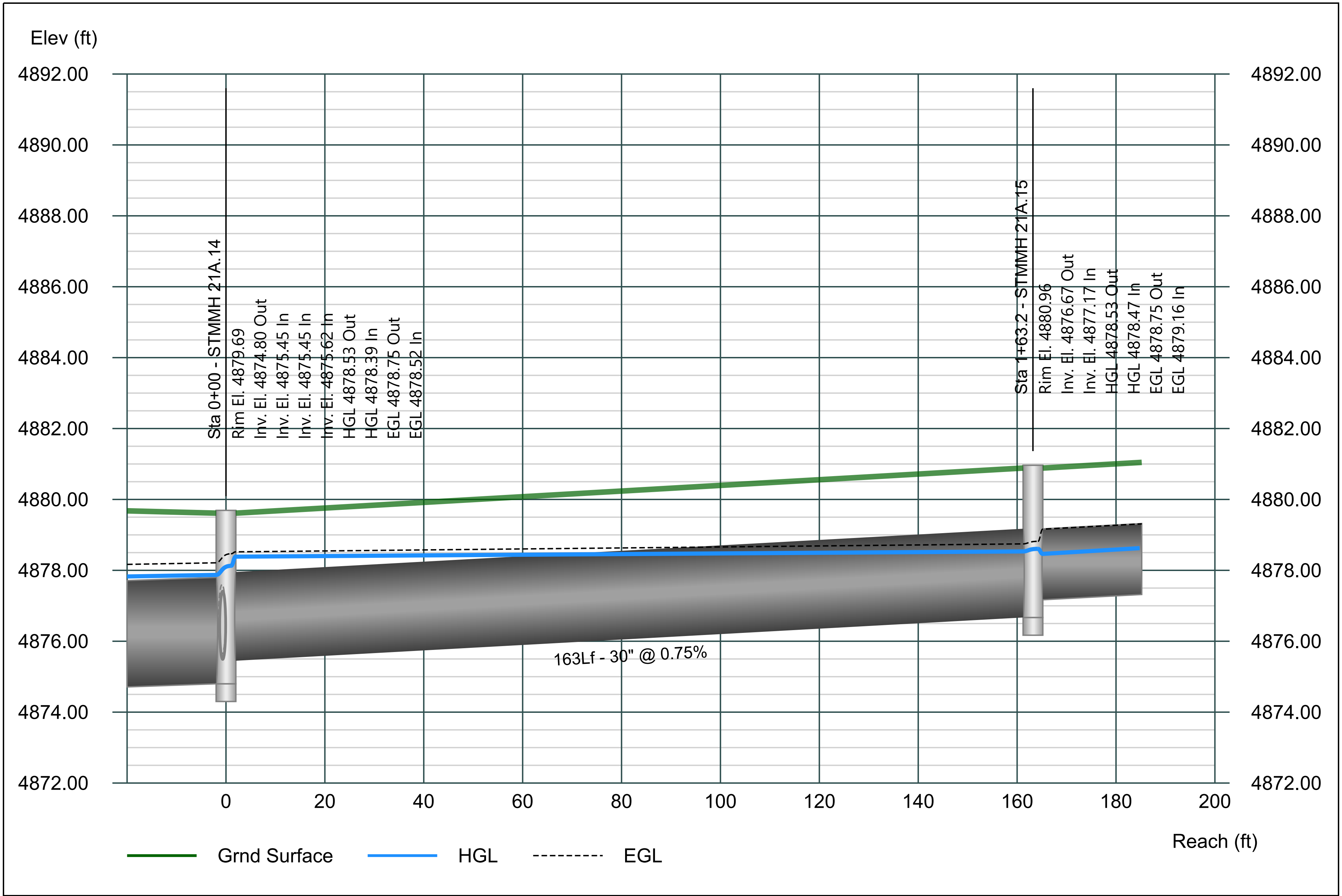
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 58 - Pipe - (559) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



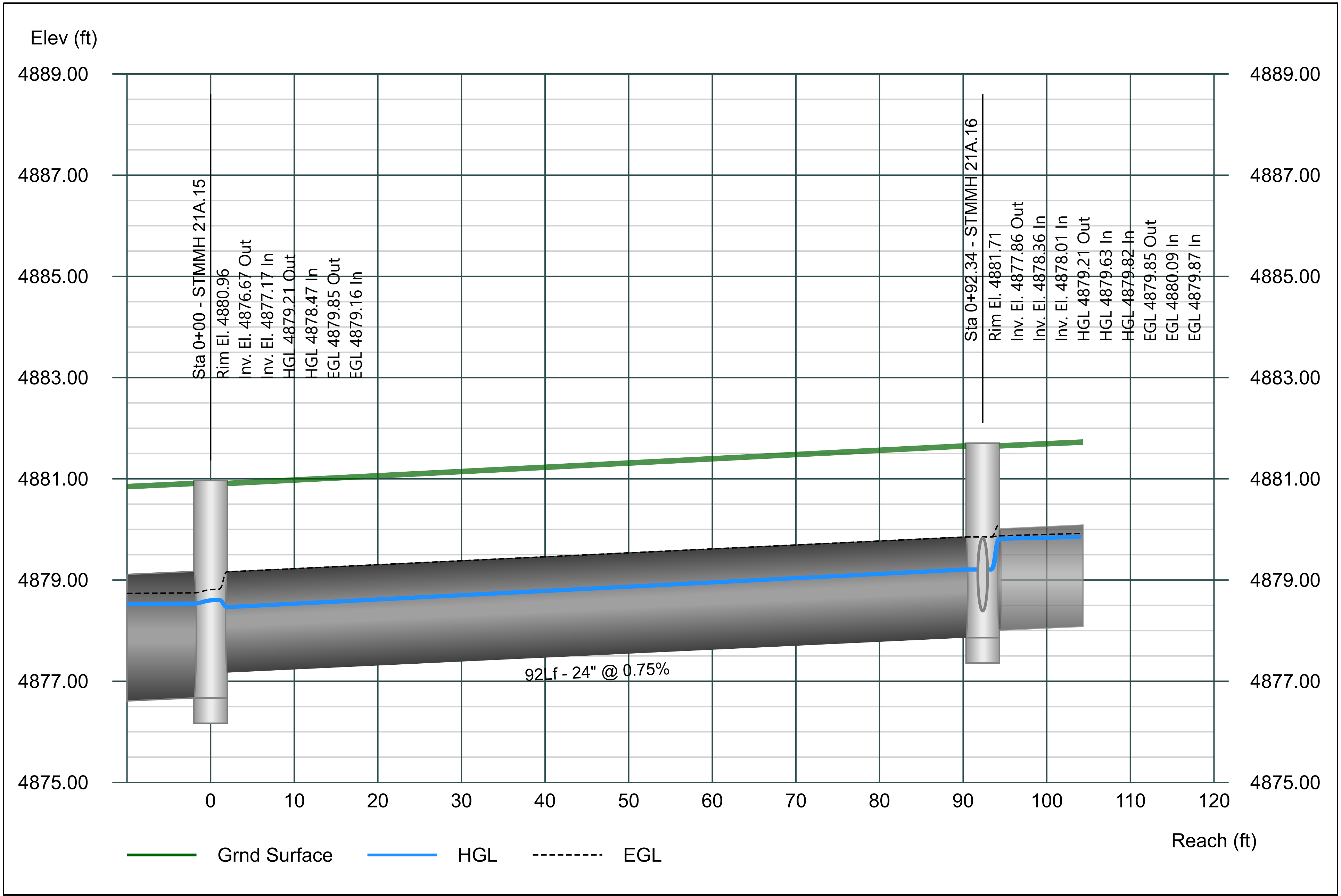
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 59 - Pipe - (556) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



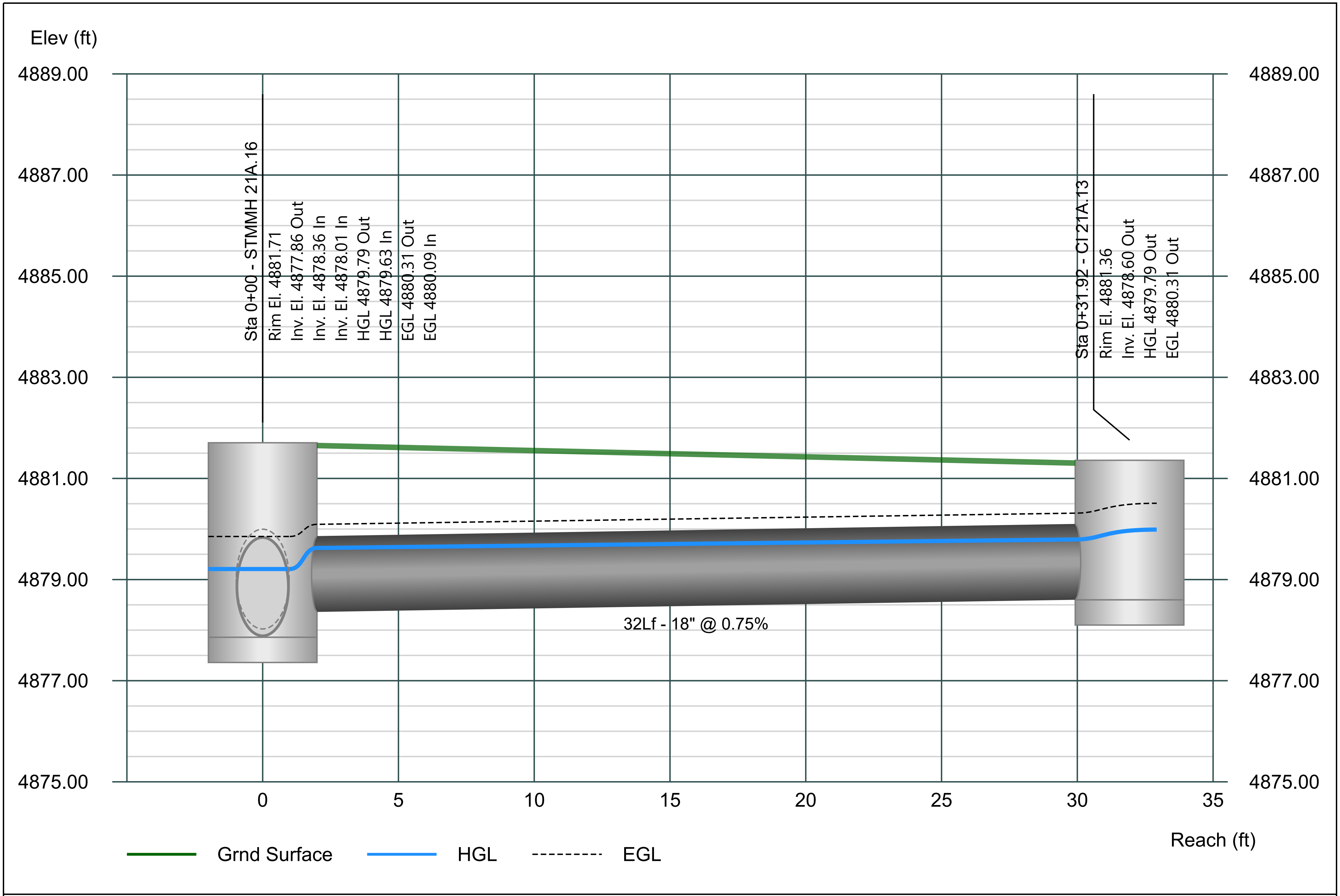
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 60 - Pipe - (560) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



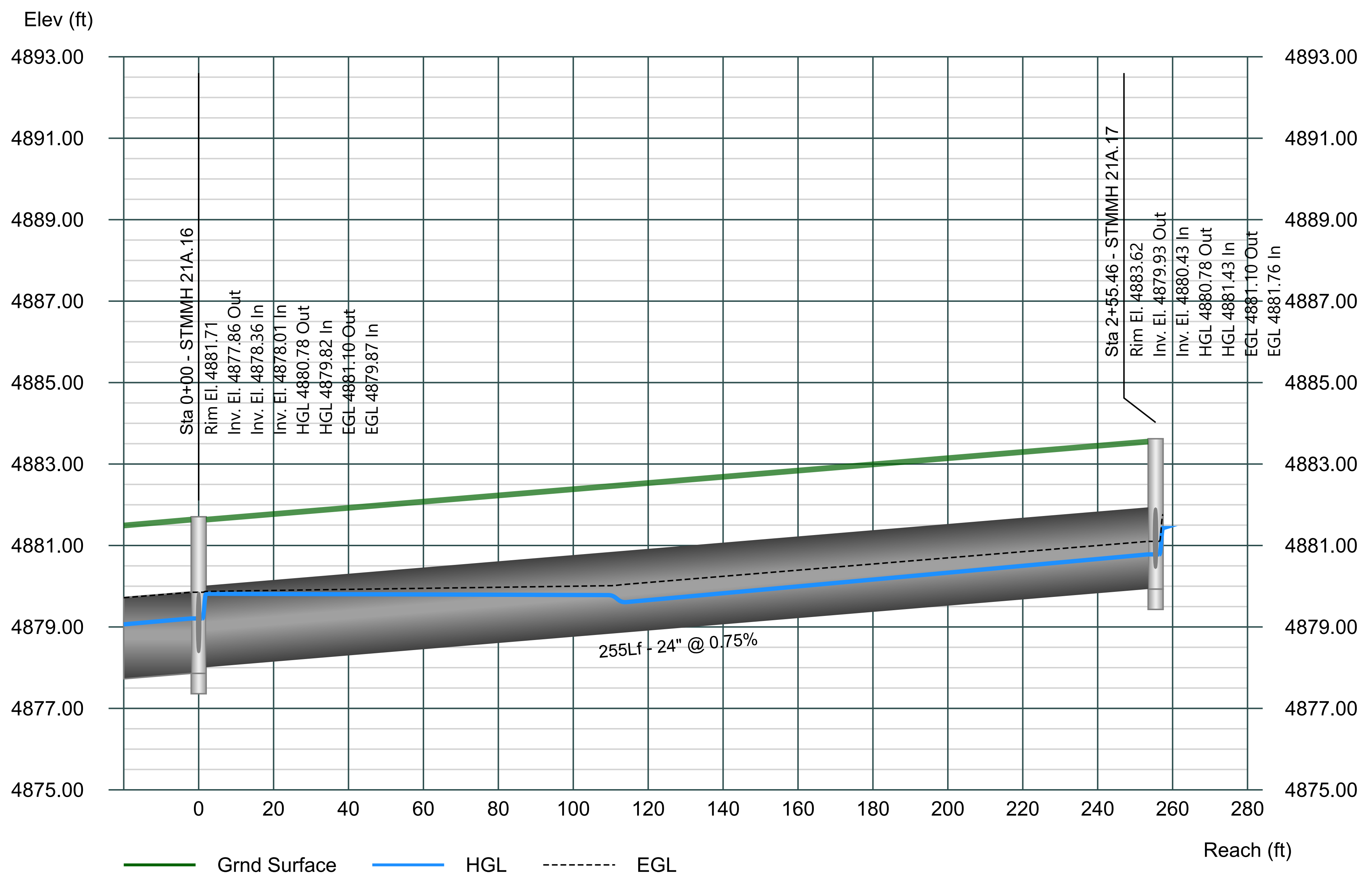
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 61 - Pipe - (555) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



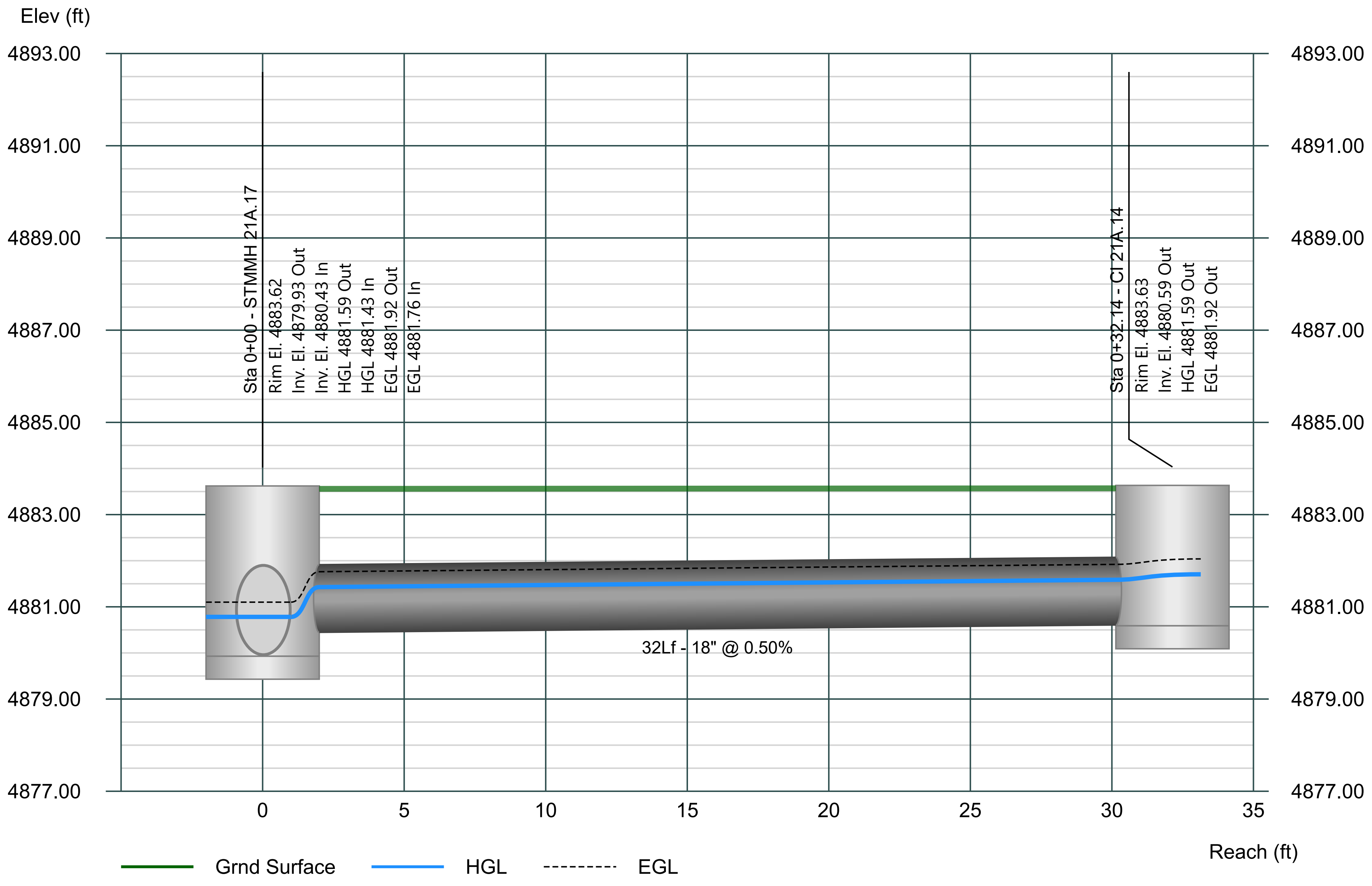
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 62 - Pipe - (554) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



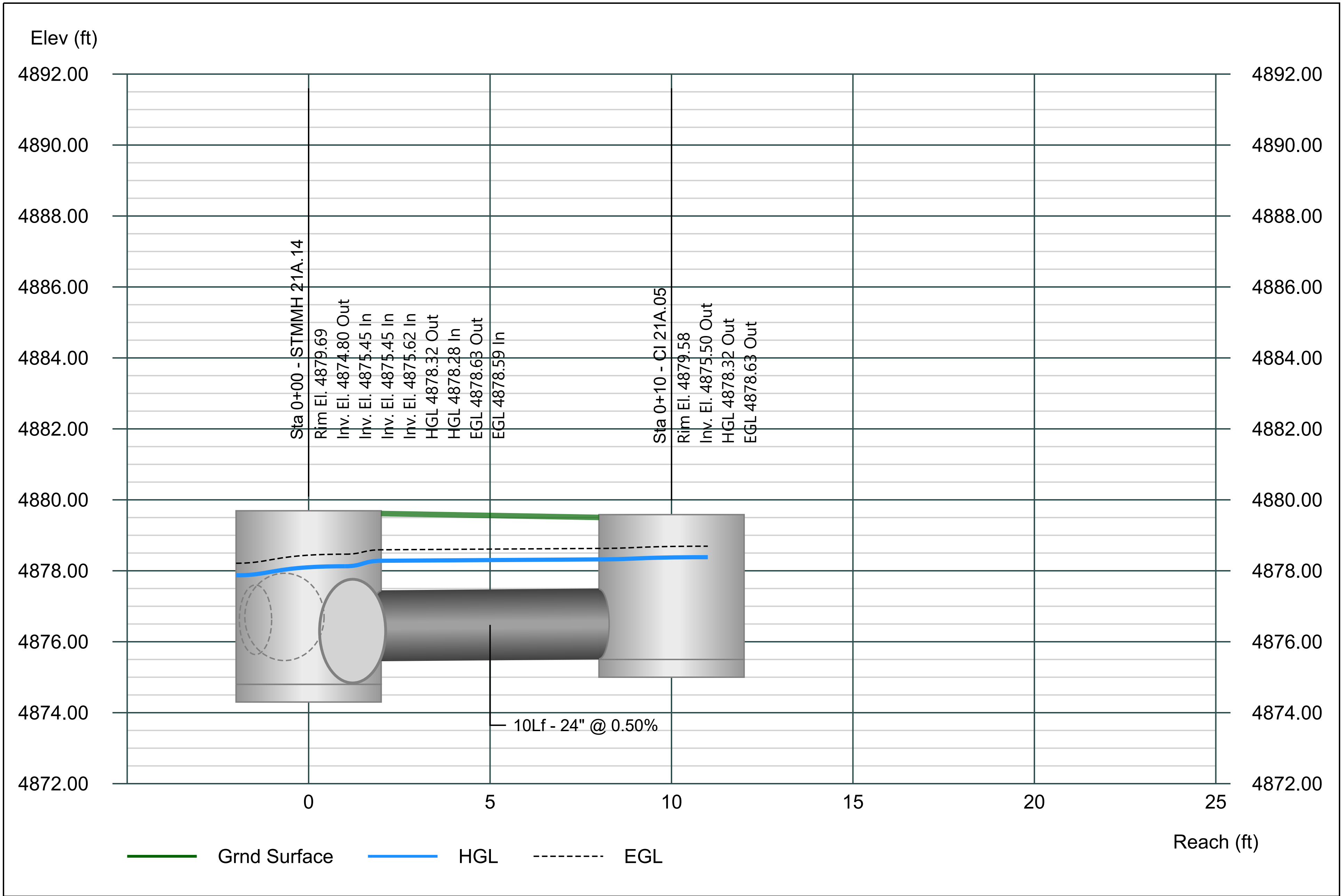
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 63 - Pipe - (524) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



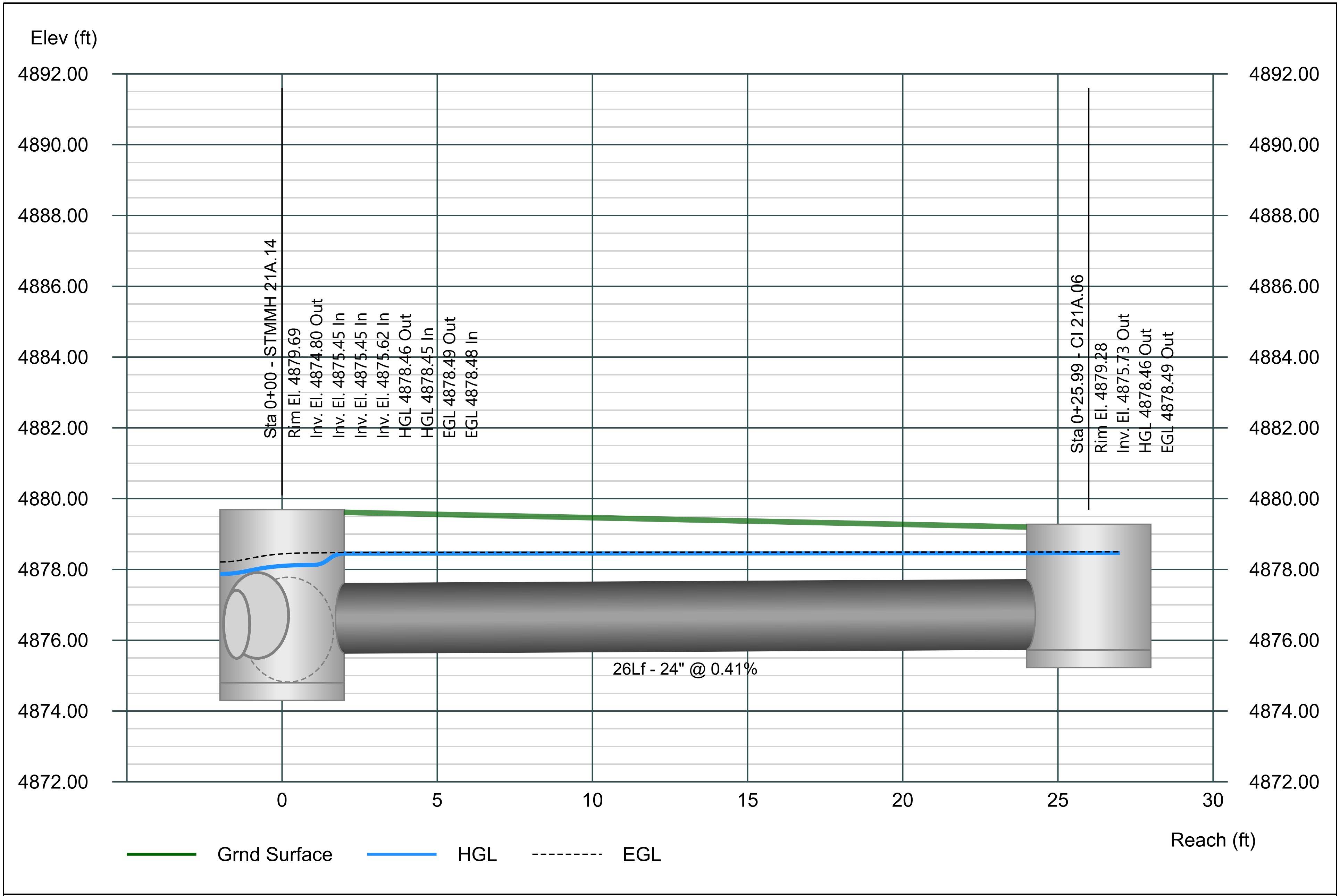
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 64 - Pipe - (537) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



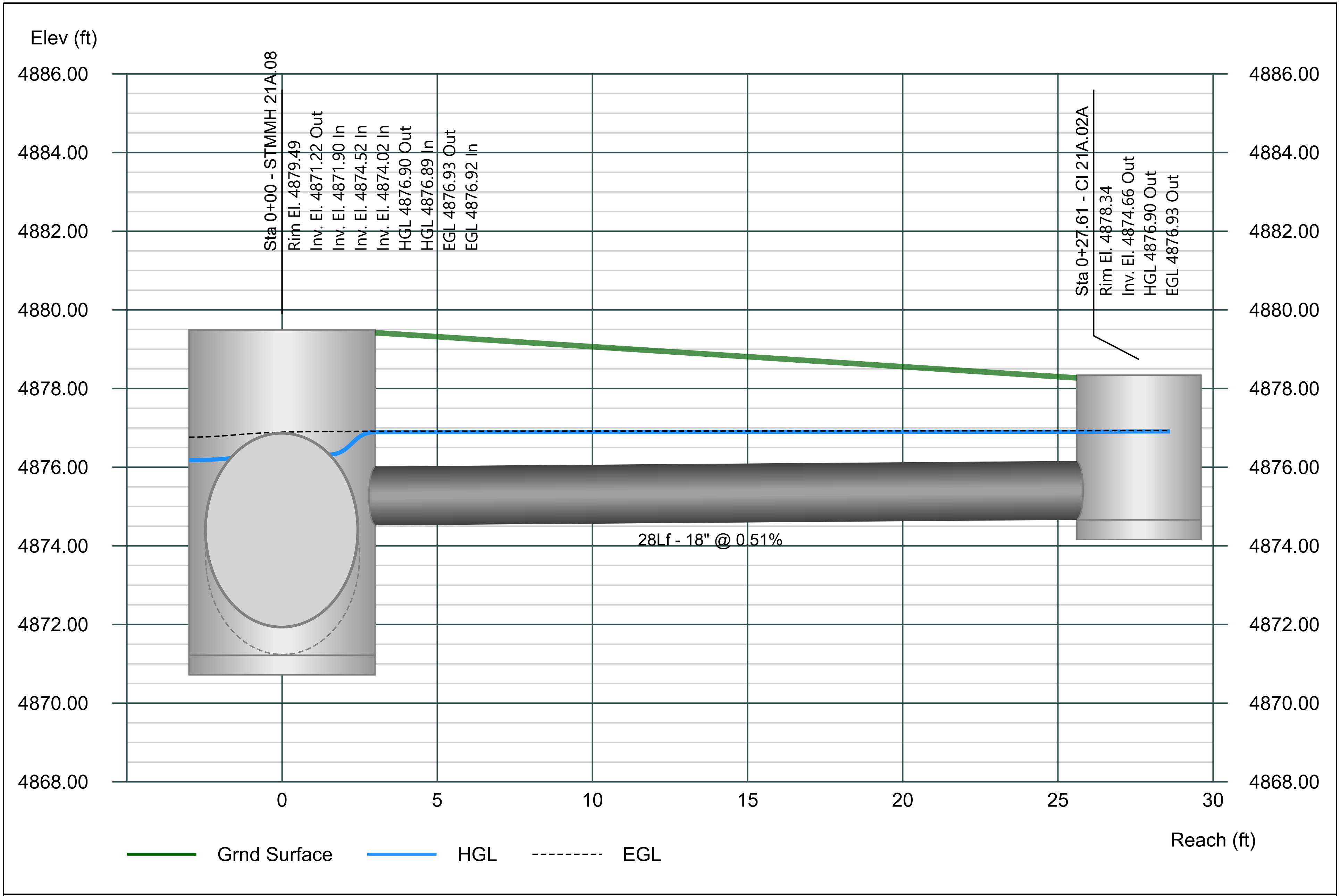
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 65 - Pipe - (542) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



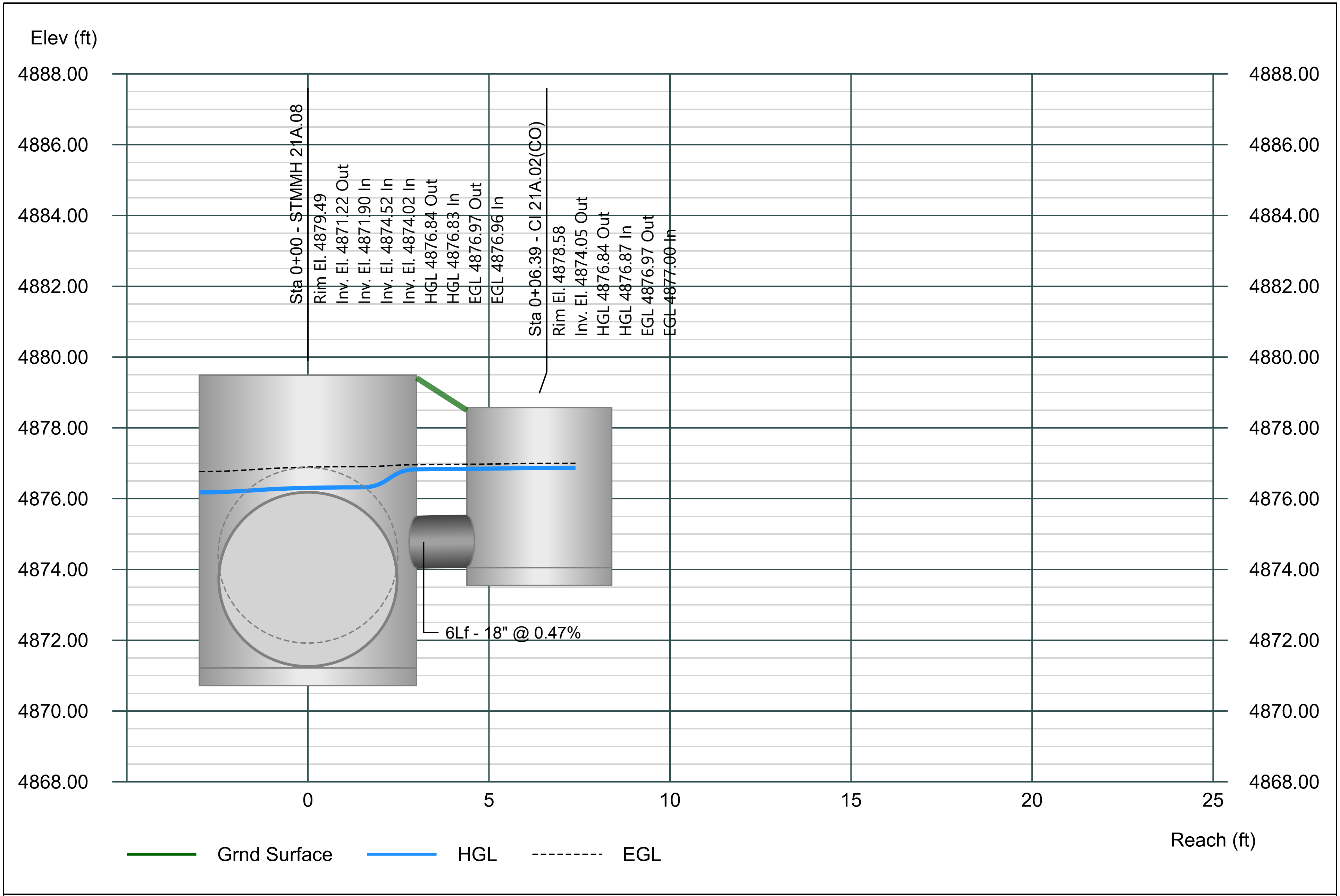
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Line 66 - Pipe - (541) (PA 21A NETWORK)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021



Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Storm Sewer Tabulation

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
Pipe - (136) (PA 21A NETWORK)	139.13	0.000	0.000	0.00	0.00	0.00	0.0	11.08	8.65	385.60	715.69	6.36	84x108r	0.40	4864.56	4864.00	4871.05	4871.00	4873.40	0.00	1
Pipe - (135) (PA 21A NETWORK)	74.38	0.000	0.000	0.00	0.00	0.00	0.0	10.88	8.70	385.60	718.33	6.12	84x108r	0.40	4865.01	4864.71	4872.00	4871.94	4877.05	4873.40	2
Pipe - (134) (PA 21A NETWORK)	72.79	0.000	0.000	0.00	0.00	0.00	0.0	10.68	8.76	385.60	714.20	6.12	84x108r	0.40	4865.45	4865.16	4872.44	4872.42	4877.99	4877.05	3
Pipe - (133) (PA 21A NETWORK)	207.38	0.000	0.000	0.00	0.00	0.00	0.0	10.14	8.92	385.60	715.64	6.33	84x108r	0.40	4866.43	4865.60	4872.99	4872.86	4875.62	4877.99	4
Pipe - (389) (PA 21A NETWORK)	65.48	0.000	0.000	0.00	0.00	0.00	0.0	0.04	10.85	9.51	16.00	3.03	24	0.50	4871.76	4871.43	4874.22	4874.10	4876.35	4875.62	5
Pipe - (390) (PA 21A NETWORK)	7.01	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	9.51	22.58	3.03	24	1.00	4871.98	4871.91	4874.40	4874.39	4875.50	4876.35	6
Pipe - (388) (PA 21A NETWORK)	42.22	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	19.40	22.62	6.18	24	1.00	4870.85	4870.43	4874.14	4873.83	4875.41	4875.62	7
Pipe - (132) (PA 21A NETWORK)	48.68	0.000	0.000	0.00	0.00	0.00	0.0	9.99	8.96	356.69	715.81	5.66	84x108r	0.40	4866.63	4866.43	4873.94	4873.89	4875.76	4875.62	8
Pipe - (400) (PA 21A NETWORK)	7.85	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	11.19	22.85	3.56	24	1.02	4870.21	4870.13	4874.45	4874.43	4875.68	4875.76	9
Pipe - (130) (1)(0) (PA 21A NETWORK)	892.66	0.000	0.000	0.00	0.00	0.00	0.0	7.82	9.68	345.50	715.62	6.85	84x108r	0.40	4870.20	4866.63	4874.87	4874.27	4879.70	4875.76	10
Pipe - (129) (1) (1) (1) (PA 21A NETWORK)	37.53	0.000	0.000	0.00	0.00	0.00	0.0	7.69	9.72	225.13	496.80	4.76	72x96r	0.40	4870.35	4870.20	4876.19	4876.18	4879.13	4879.70	11
Pipe - (129) (1) (1) (PA 21A NETWORK)	1378.89	0.000	0.000	0.00	0.00	0.00	0.0	4.73	10.85	207.23	319.19	7.77	72x72r	0.35	4875.18	4870.35	4878.71	4876.34	4883.63	4879.13	12
Pipe - (129) (PA 21A NETWORK)	483.73	0.000	0.000	0.00	0.00	0.00	0.0	3.88	10.85	167.05	212.69	9.46	66	0.40	4877.62	4875.68	4881.15	4879.89	4885.38	4883.63	13
Pipe - (399) (PA 21A NETWORK)	41.19	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	5.71	13.73	1.82	24	0.37	4881.12	4880.97	4883.42	4883.40	4885.65	4885.38	14
Pipe - (128) (PA 21A NETWORK)	57.35	0.000	0.000	0.00	0.00	0.00	0.0	3.75	10.85	161.34	238.84	7.04	66	0.51	4878.06	4877.77	4883.03	4882.96	4885.56	4885.38	15
Pipe - (127) (PA 21A NETWORK)	72.63	0.000	0.000	0.00	0.00	0.00	0.0	1.41	10.85	88.54	183.34	4.51	60	0.50	4878.58	4878.22	4884.18	4884.09	4886.16	4885.56	16
Pipe - (126)(0) (PA 21A NETWORK)	110.55	0.000	0.000	0.00	0.00	0.00	0.0	1.17	10.85	75.44	287.22	11.96	48	4.00	4884.50	4880.08	4887.07	4881.76	4890.43	4886.16	17
Pipe - (591) (PA 21A NETWORK)	98.37	0.000	0.000	0.00	0.00	0.00	0.0	0.38	10.85	26.22	55.86	4.73	36	0.70	4886.19	4885.50	4888.12	4888.13	4891.16	4890.43	18
Pipe - (604) (PA 21A NETWORK)	59.18	0.000	0.000	0.00	0.00	0.00	0.0	0.14	10.85	8.98	20.16	4.13	24	0.79	4887.66	4887.19	4888.78	4888.82	4891.72	4891.16	19
Pipe - (589) (PA 21A NETWORK)	27.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	8.98	22.62	3.29	24	1.00	4887.98	4887.71	4889.49	4889.49	4891.45	4891.72	20
Pipe - (590) (PA 21A NETWORK)	52.85	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	17.24	22.66	7.20	24	1.00	4887.72	4887.19	4889.19	4888.57	4891.77	4891.16	21
Pipe - (594) (PA 21A NETWORK)	411.64	0.000	0.000	0.00	0.00	0.00	0.0	0.25	10.85	29.47	41.03	8.32	30	1.00	4890.12	4886.00	4891.94	4887.60	4895.14	4890.43	22

Notes: IDF File = SampleIDF.idf, Return Period = 100-yrs. r = rectangular e = elliptical a = arch

Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Storm Sewer Tabulation

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
Pipe - (593) (PA 21A NETWORK)	53.04	0.000	0.000	0.00	0.00	0.00	0.0	0.15	10.85	29.47	30.96	8.49	27	1.00	4891.05	4890.52	4892.92	4892.33	4895.59	4895.14	23
Pipe - (592) (PA 21A NETWORK)	36.08	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	16.35	21.85	4.11	27	0.50	4891.38	4891.20	4893.95	4893.85	4894.90	4895.59	24
Pipe - (607) (PA 21A NETWORK)	27.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	19.75	22.62	7.59	24	1.00	4886.33	4886.06	4887.91	4887.57	4890.16	4890.43	25
Pipe - (605) (PA 21A NETWORK)	7.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	13.10	10.88	7.41	18	1.07	4880.33	4880.26	4884.18	4884.08	4885.99	4886.16	26
Pipe - (397) (PA 21A NETWORK)	59.51	0.000	0.000	0.00	0.00	0.00	0.0	3.48	10.85	72.80	184.13	3.71	60	0.50	4878.52	4878.22	4884.20	4884.15	4886.73	4885.56	27
Pipe - (396) (PA 21A NETWORK)	41.24	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	20.58	22.56	6.55	24	0.99	4881.93	4881.52	4884.44	4884.10	4886.25	4886.73	28
Pipe - (598) (PA 21A NETWORK)	723.52	0.000	0.000	0.00	0.00	0.00	0.0	1.43	10.85	52.22	128.50	5.90	48	0.80	4885.31	4879.52	4887.45	4884.34	4892.45	4886.73	29
Pipe - (597) (PA 21A NETWORK)	198.69	0.000	0.000	0.00	0.00	0.00	0.0	1.06	10.85	52.22	59.66	9.16	36	0.80	4887.90	4886.31	4890.20	4888.52	4893.74	4892.45	30
Pipe - (596) (1) (PA 21A NETWORK)	75.22	0.000	0.000	0.00	0.00	0.00	0.0	0.91	10.85	52.22	59.57	7.94	36	0.80	4888.65	4888.05	4891.13	4890.91	4893.96	4893.74	31
Pipe - (603) (PA 21A NETWORK)	27.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	24.09	41.01	4.91	30	1.00	4889.42	4889.15	4893.12	4893.03	4893.47	4893.96	32
Pipe - (596) (PA 21A NETWORK)	45.10	0.000	0.000	0.00	0.00	0.00	0.0	0.72	10.85	28.13	59.61	3.98	36	0.80	4889.16	4888.80	4893.19	4893.11	4894.28	4893.96	33
Pipe - (595) (1) (PA 21A NETWORK)	69.26	0.000	0.000	0.00	0.00	0.00	0.0	0.43	10.85	28.13	66.57	3.98	36	1.00	4890.00	4889.31	4893.51	4893.38	4894.86	4894.28	34
Pipe - (595) (PA 21A NETWORK)	67.54	0.000	0.000	0.00	0.00	0.00	0.0	0.19	10.85	12.97	31.98	4.75	24	2.00	4892.35	4891.00	4893.78	4893.71	4896.33	4894.86	35
Pipe - (602) (PA 21A NETWORK)	27.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	7.39	22.62	2.35	24	1.00	4892.77	4892.50	4894.91	4894.88	4896.07	4896.33	36
Pipe - (601) (PA 21A NETWORK)	7.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	5.58	22.59	1.78	24	1.00	4892.57	4892.50	4894.91	4894.90	4896.06	4896.33	37
Pipe - (599) (PA 21A NETWORK)	98.62	0.000	0.000	0.00	0.00	0.00	0.0	0.02	10.85	15.16	30.34	5.69	24	1.80	4892.78	4891.00	4894.15	4893.65	4896.55	4894.86	38
Pipe - (600) (PA 21A NETWORK)	7.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	15.16	22.59	6.60	24	1.00	4893.00	4892.93	4894.39	4894.29	4896.29	4896.55	39
Pipe - (566) (PA 21A NETWORK)	38.98	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	21.26	22.61	6.77	24	1.00	4878.57	4878.18	4880.62	4880.28	4883.44	4883.63	40
Pipe - (581) (PA 21A NETWORK)	7.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	18.92	22.59	6.02	24	1.00	4878.25	4878.18	4880.42	4880.37	4883.48	4883.63	41
Pipe - (606) (PA 21A NETWORK)	39.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	17.90	22.62	5.70	24	1.00	4873.74	4873.35	4876.59	4876.34	4878.87	4879.13	42
Pipe - (526) (1) (PA 21A NETWORK)	69.23	0.000	0.000	0.00	0.00	0.00	0.0	3.08	10.85	120.37	225.75	6.14	60	0.75	4871.22	4870.70	4876.18	4876.04	4879.49	4879.70	43
Pipe - (526) (PA 21A NETWORK)	144.11	0.000	0.000	0.00	0.00	0.00	0.0	2.70	10.85	113.10	184.14	6.27	60	0.50	4872.62	4871.90	4876.69	4876.56	4879.90	4879.49	44

Notes: IDF File = SampleIDF.idf, Return Period = 100-yrs.

Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Storm Sewer Tabulation

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village ~ 17 & 21 A Network

03-17-2021

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
Pipe - (534) (PA 21A NETWORK)	30.07	0.000	0.000	0.00	0.00	0.00	0.0	2.36	10.85	80.01	164.63	4.08	60	0.40	4872.89	4872.77	4877.81	4877.78	4879.64	4879.90	45
Pipe - (533) (PA 21A NETWORK)	205.48	0.000	0.000	0.00	0.00	0.00	0.0	1.69	10.85	60.70	124.36	5.18	48	0.75	4874.93	4873.39	4878.20	4877.94	4881.29	4879.64	46
Pipe - (548) (PA 21A NETWORK)	255.00	0.000	0.000	0.00	0.00	0.00	0.0	0.91	10.85	43.66	124.31	5.43	48	0.75	4877.09	4875.18	4879.04	4878.73	4883.20	4881.29	47
Pipe - (546) (2) (1) (PA 21A NETWORK)	255.00	0.000	0.000	0.00	0.00	0.00	0.0	0.29	10.85	21.96	35.50	7.14	30	0.75	4880.50	4878.59	4882.07	4880.03	4885.11	4883.20	48
Pipe - (545) (PA 21A NETWORK)	32.06	0.000	0.000	0.00	0.00	0.00	0.0	0.20	10.85	21.96	28.99	6.47	30	0.50	4880.81	4880.65	4882.44	4882.29	4885.00	4885.11	49
Pipe - (527) (PA 21A NETWORK)	36.17	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	14.59	28.95	2.97	30	0.50	4881.14	4880.96	4883.76	4883.72	4884.96	4885.00	50
Pipe - (549) (PA 21A NETWORK)	32.10	0.000	0.000	0.00	0.00	0.00	0.0	0.13	10.85	21.70	23.82	6.79	27	0.59	4879.03	4878.84	4880.72	4880.53	4882.88	4883.20	51
Pipe - (529) (PA 21A NETWORK)	36.17	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	14.45	20.24	4.60	24	0.80	4879.57	4879.28	4882.22	4882.08	4883.07	4882.88	52
Pipe - (532)(0) (PA 21A NETWORK)	32.14	0.000	0.000	0.00	0.00	0.00	0.0	0.11	10.85	17.04	14.32	5.42	24	0.40	4877.25	4877.12	4879.30	4879.12	4881.32	4881.29	53
Pipe - (531) (PA 21A NETWORK)	36.17	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	9.36	7.41	5.30	18	0.50	4877.93	4877.75	4880.04	4879.75	4881.11	4881.32	54
Pipe - (536) (PA 21A NETWORK)	27.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	9.53	16.27	3.03	24	0.52	4875.03	4874.89	4878.12	4878.08	4879.21	4879.64	55
Pipe - (535) (PA 21A NETWORK)	9.17	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	9.78	16.75	3.11	24	0.55	4875.10	4875.05	4878.09	4878.07	4880.07	4879.64	56
Pipe - (525) (PA 21A NETWORK)	56.86	0.000	0.000	0.00	0.00	0.00	0.0	2.49	10.85	33.09	46.78	4.68	36	0.49	4874.80	4874.52	4877.87	4877.73	4879.69	4879.90	57
Pipe - (559) (PA 21A NETWORK)	163.20	0.000	0.000	0.00	0.00	0.00	0.0	1.68	10.85	14.50	35.46	3.32	30	0.75	4876.67	4875.45	4878.53	4878.39	4880.96	4879.69	58
Pipe - (556) (PA 21A NETWORK)	92.34	0.000	0.000	0.00	0.00	0.00	0.0	1.43	10.85	14.50	19.55	6.59	24	0.75	4877.86	4877.17	4879.21	4878.47	4881.71	4880.96	59
Pipe - (560) (PA 21A NETWORK)	31.92	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	8.72	9.11	5.63	18	0.75	4878.60	4878.36	4879.79	4879.63	4881.36	4881.71	60
Pipe - (555) (PA 21A NETWORK)	255.46	0.000	0.000	0.00	0.00	0.00	0.0	0.12	10.85	5.78	19.61	3.24	24	0.75	4879.93	4878.01	4880.78	4879.82	4883.62	4881.71	61
Pipe - (554) (PA 21A NETWORK)	32.14	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	5.78	7.40	4.63	18	0.50	4880.59	4880.43	4881.59	4881.43	4883.63	4883.62	62
Pipe - (524) (PA 21A NETWORK)	10.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	14.02	15.96	4.46	24	0.50	4875.50	4875.45	4878.32	4878.28	4879.58	4879.69	63
Pipe - (537) (PA 21A NETWORK)	25.99	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	4.57	14.44	1.45	24	0.41	4875.73	4875.62	4878.46	4878.45	4879.28	4879.69	64
Pipe - (542) (PA 21A NETWORK)	27.61	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	2.17	7.48	1.23	18	0.51	4874.66	4874.52	4876.90	4876.89	4878.34	4879.49	65
Pipe - (541) (PA 21A NETWORK)	6.39	0.000	0.000	0.00	0.00	0.00	0.0	0.00	10.85	5.10	7.17	2.89	18	0.47	4874.05	4874.02	4876.84	4876.83	4878.58	4879.49	66

Notes: IDF File = SampleIDF.idf, Return Period = 100-yrs.

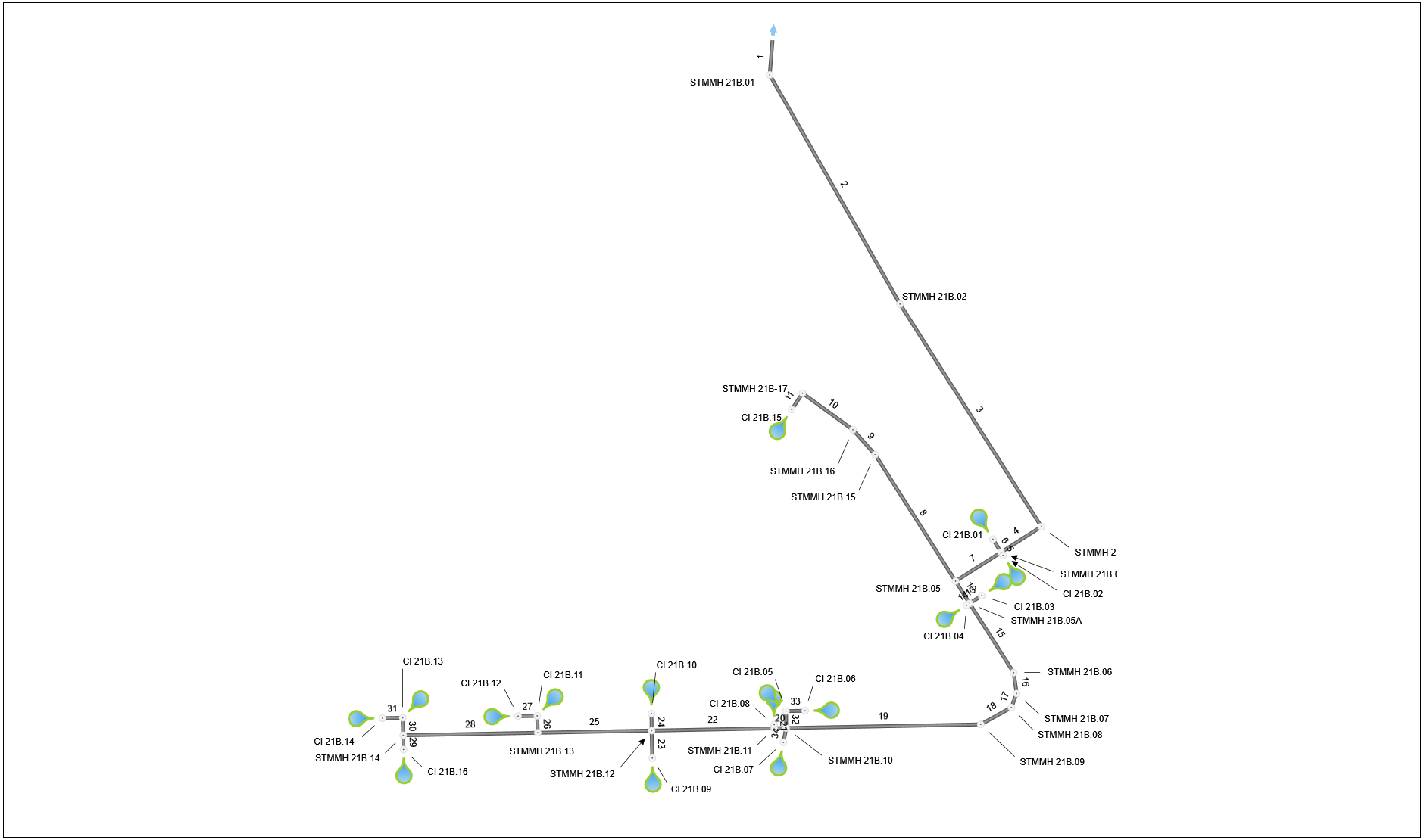
Project File: Pioneer Village ~ 17 and 21 Pipe Network A (2021-03-16).sws

Plan View

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021

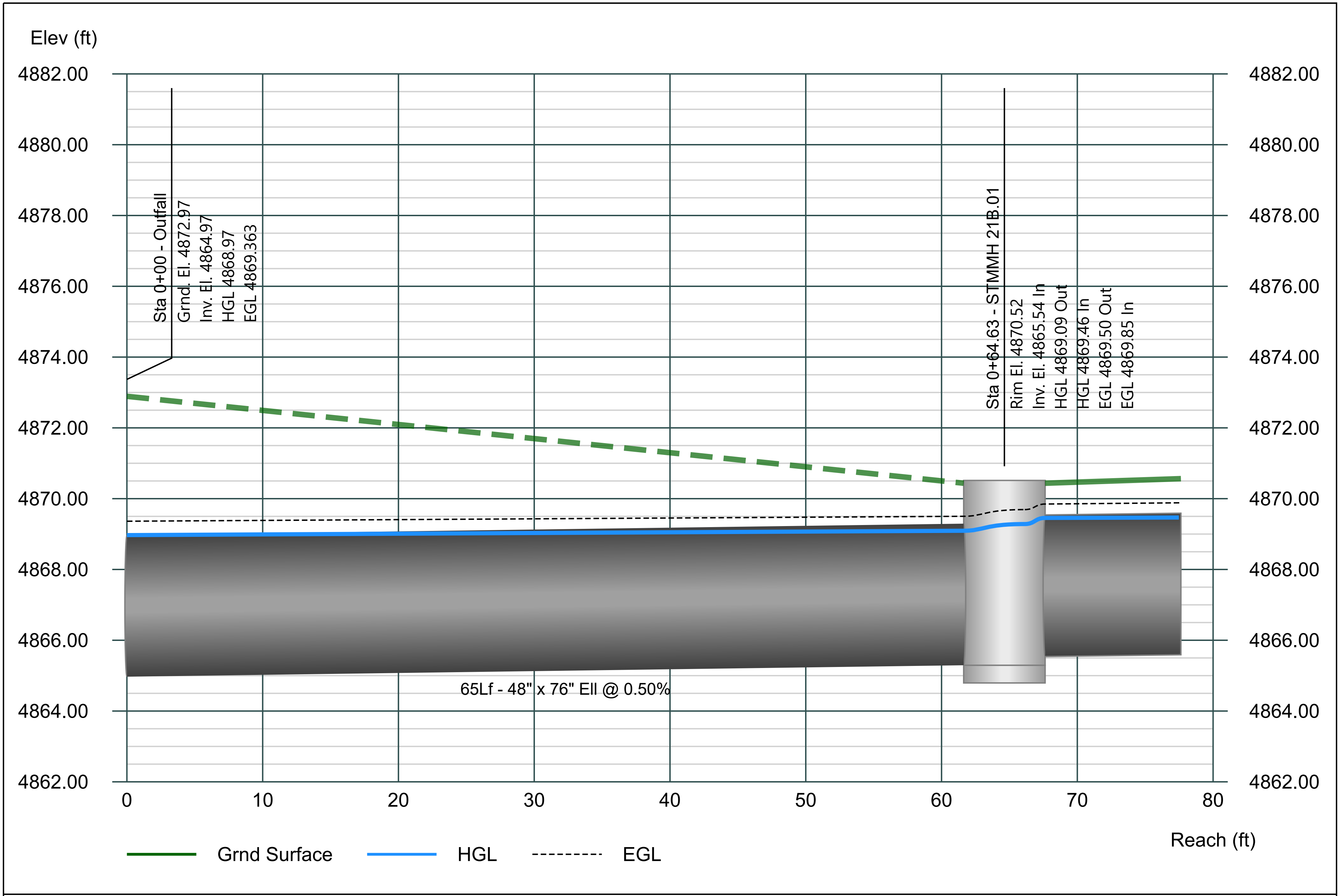


Line 1 - Pipe - (500)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



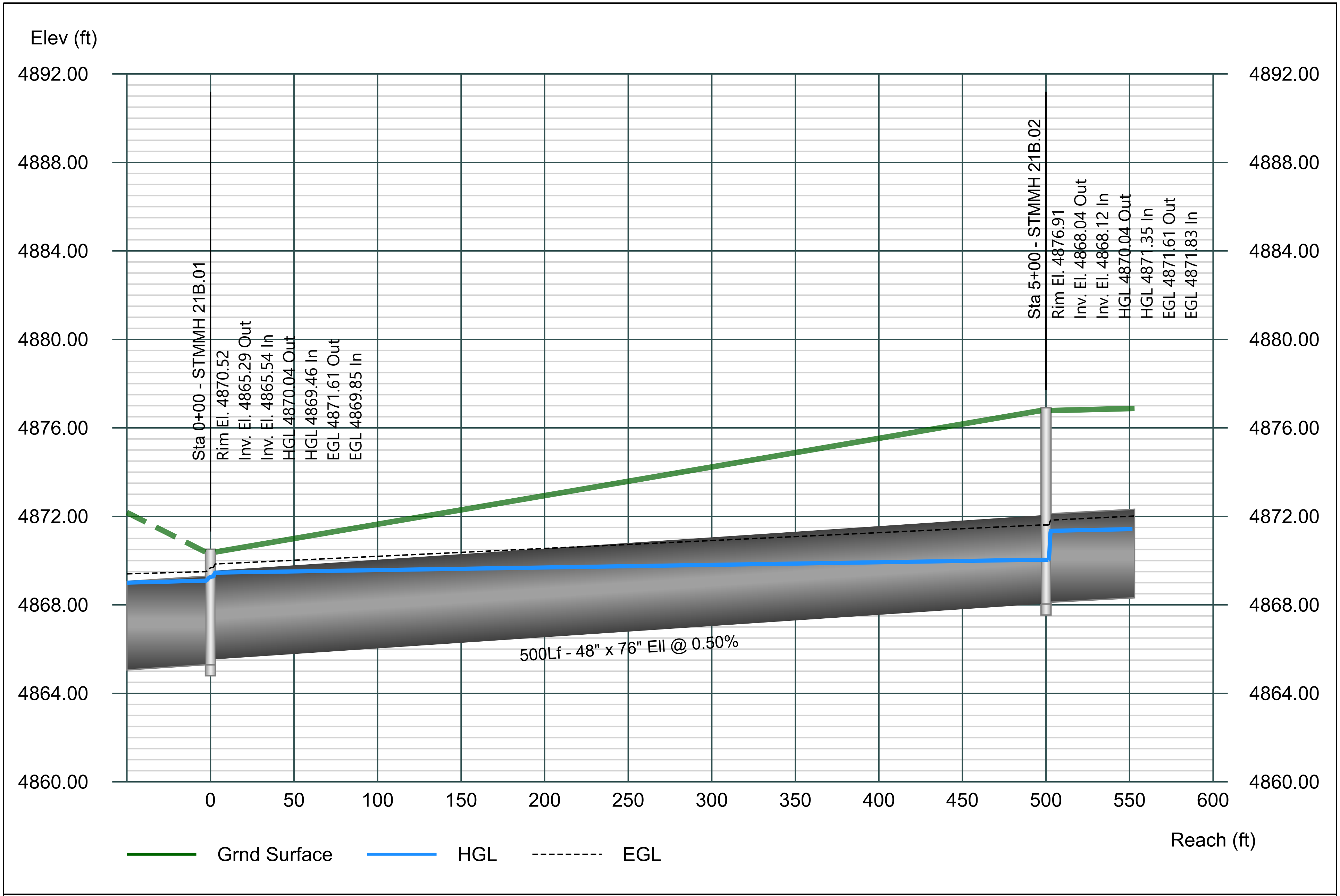
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 2 - Pipe - (499) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



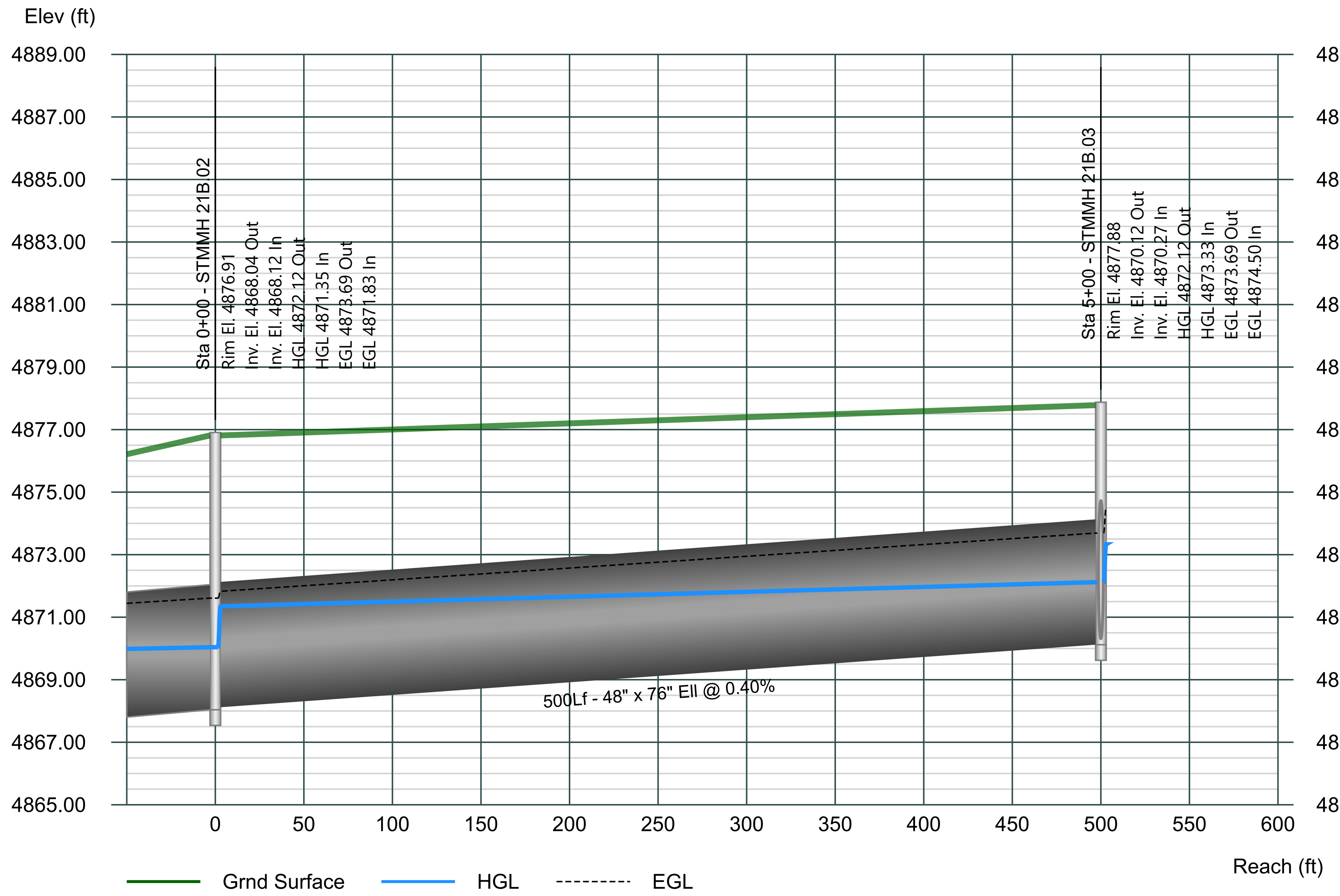
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 3 - Pipe - (498) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



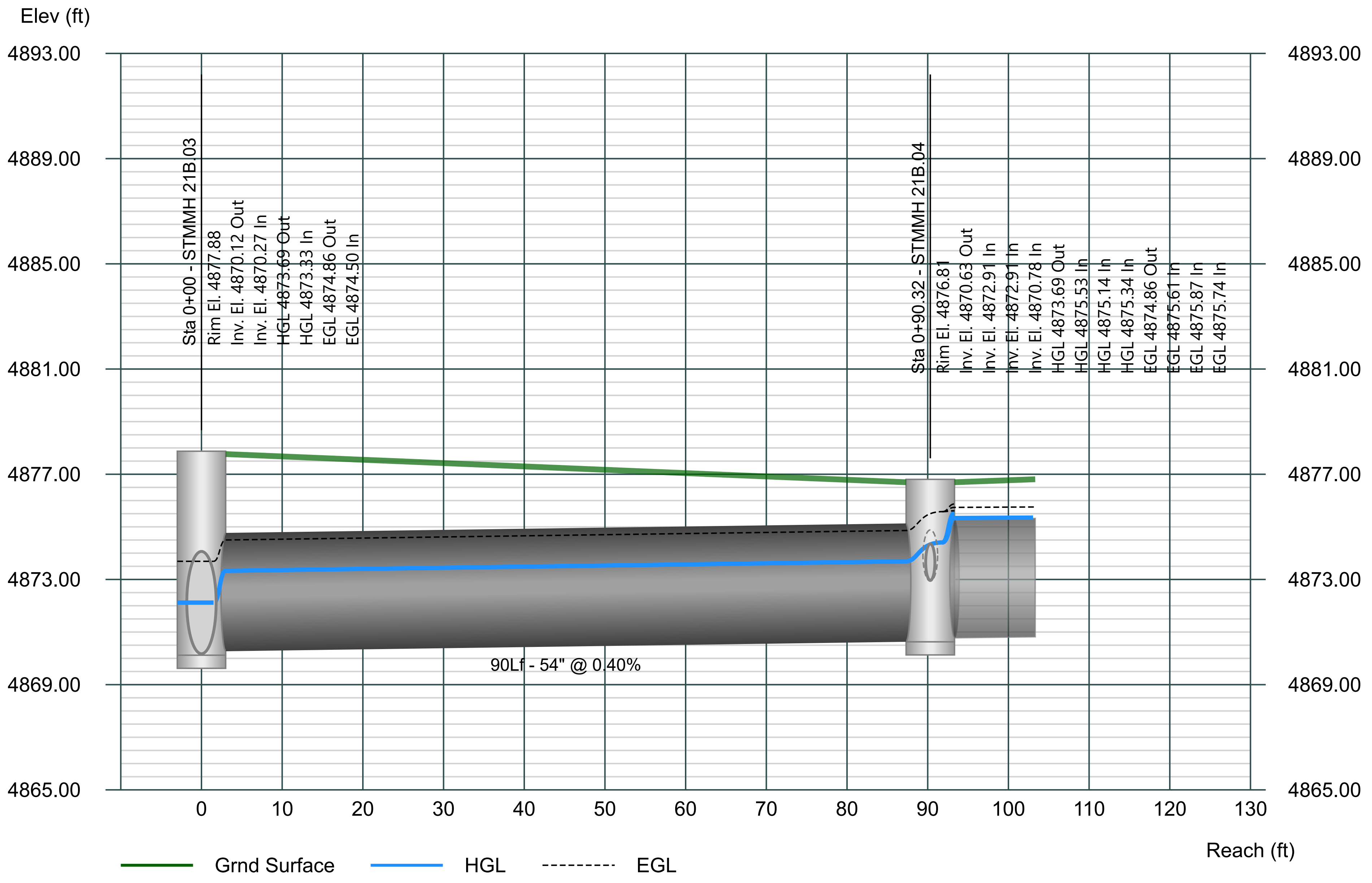
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 4 - Pipe - (497) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



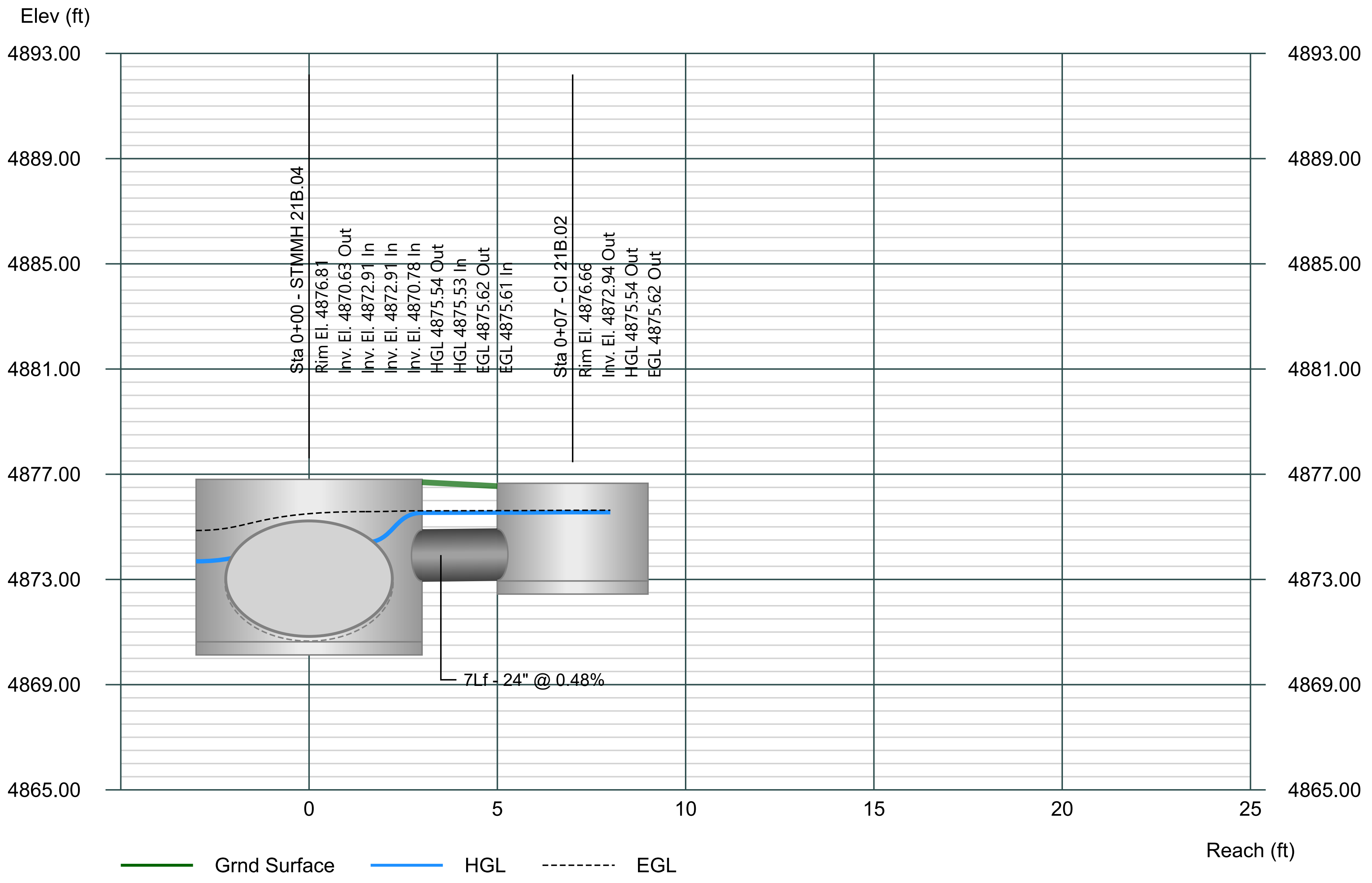
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 5 - Pipe - (515) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



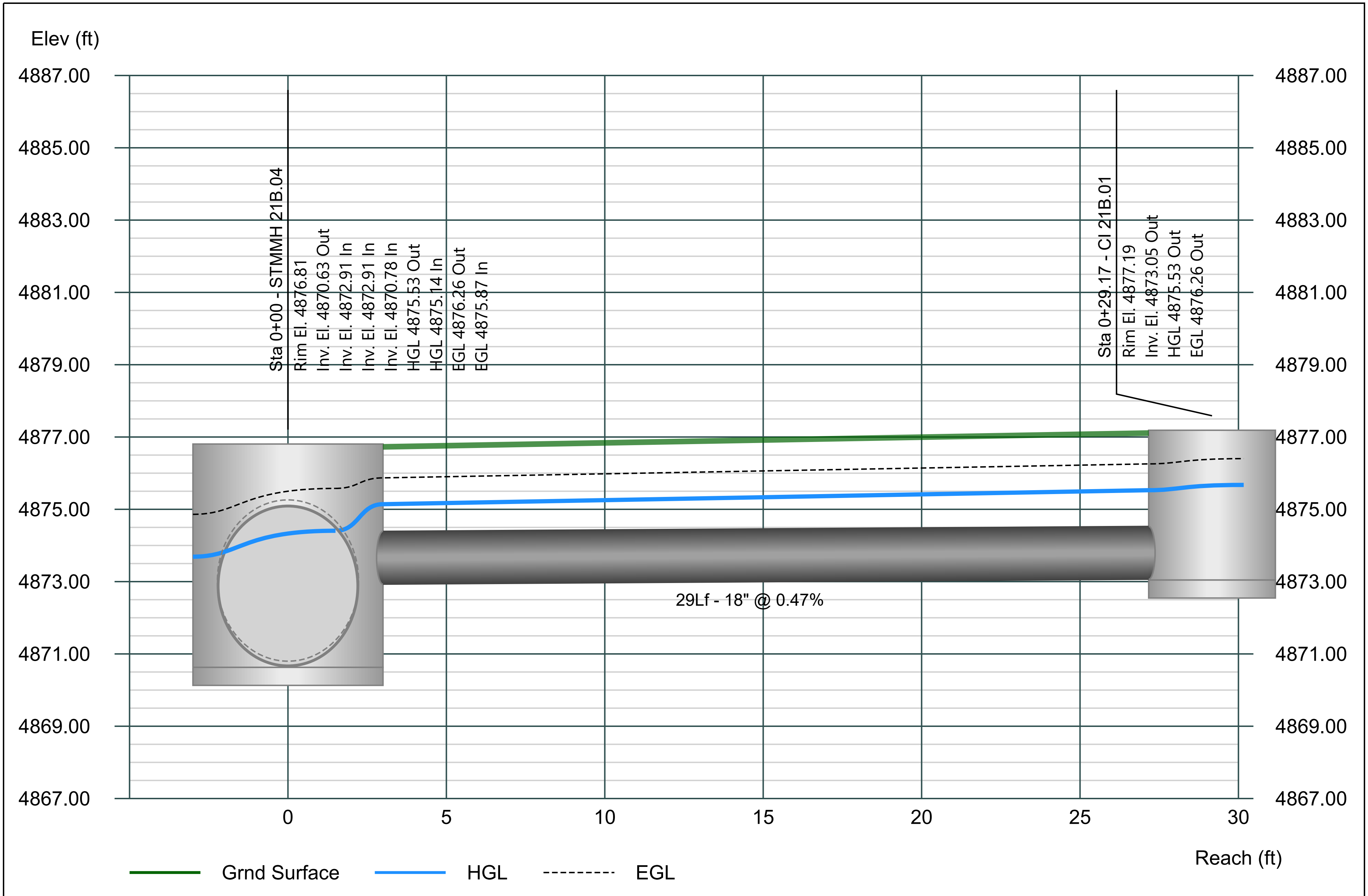
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 6 - Pipe - (513) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



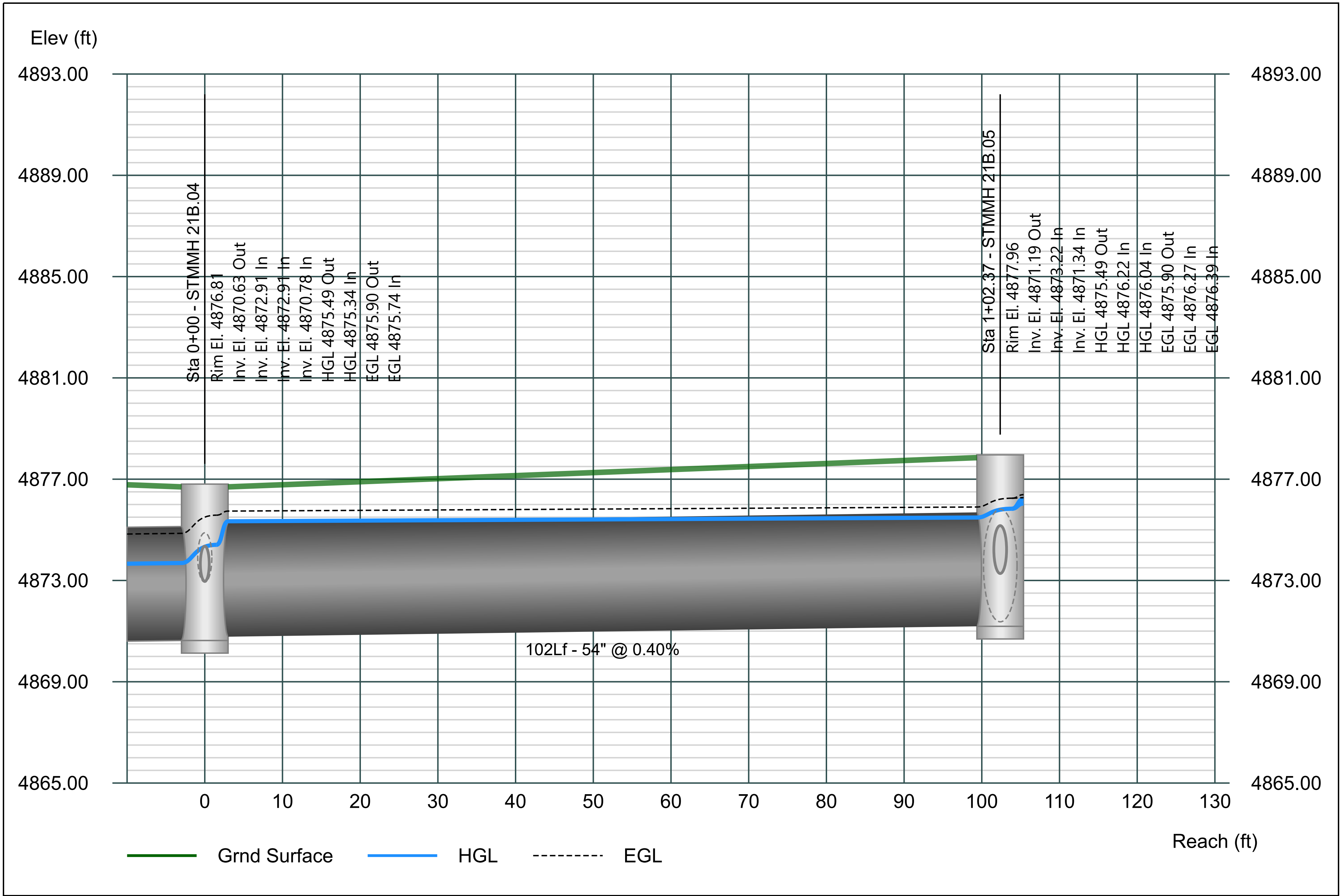
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 7 - Pipe - (496) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



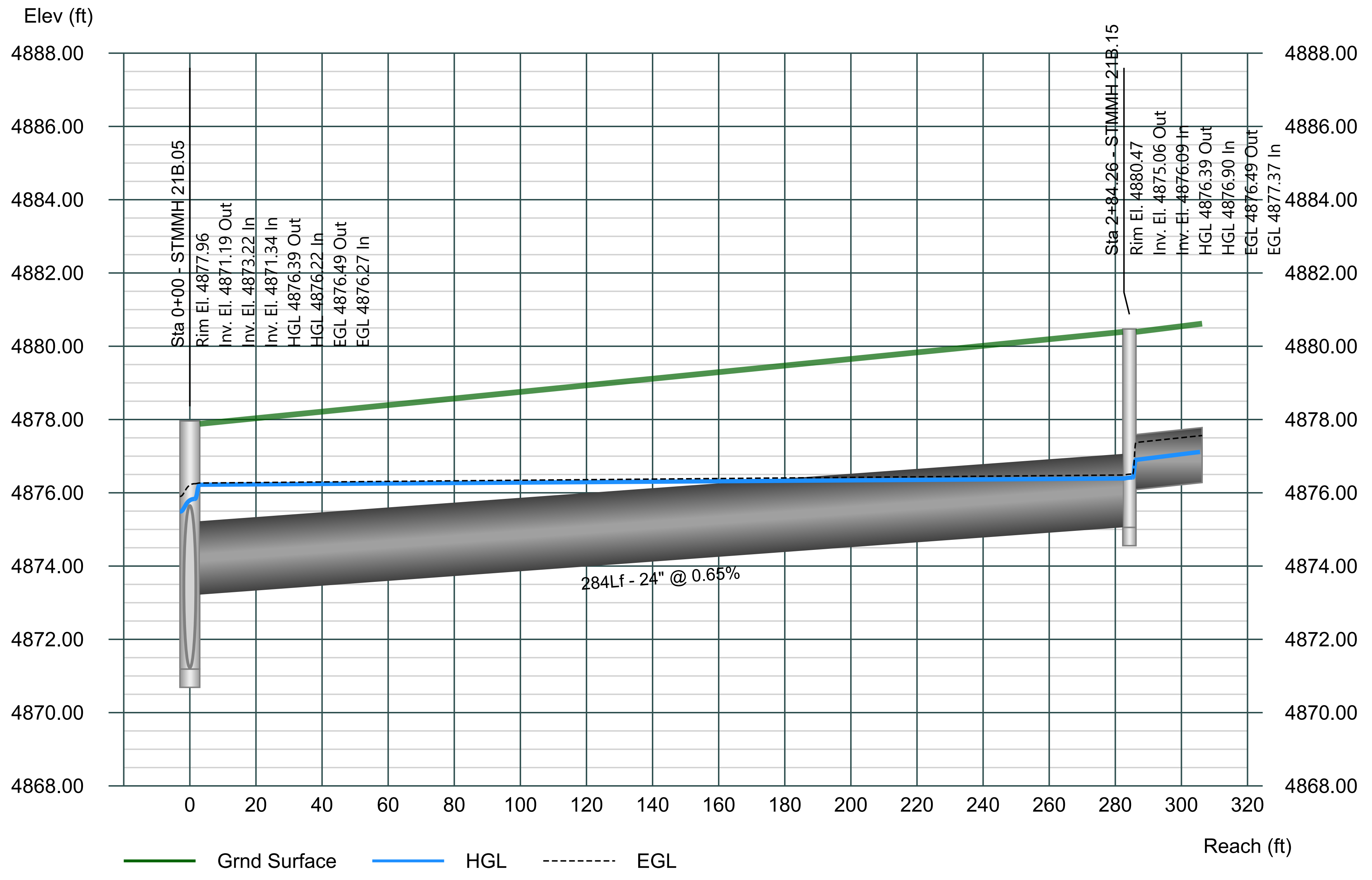
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 8 - Pipe - (507) (1) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



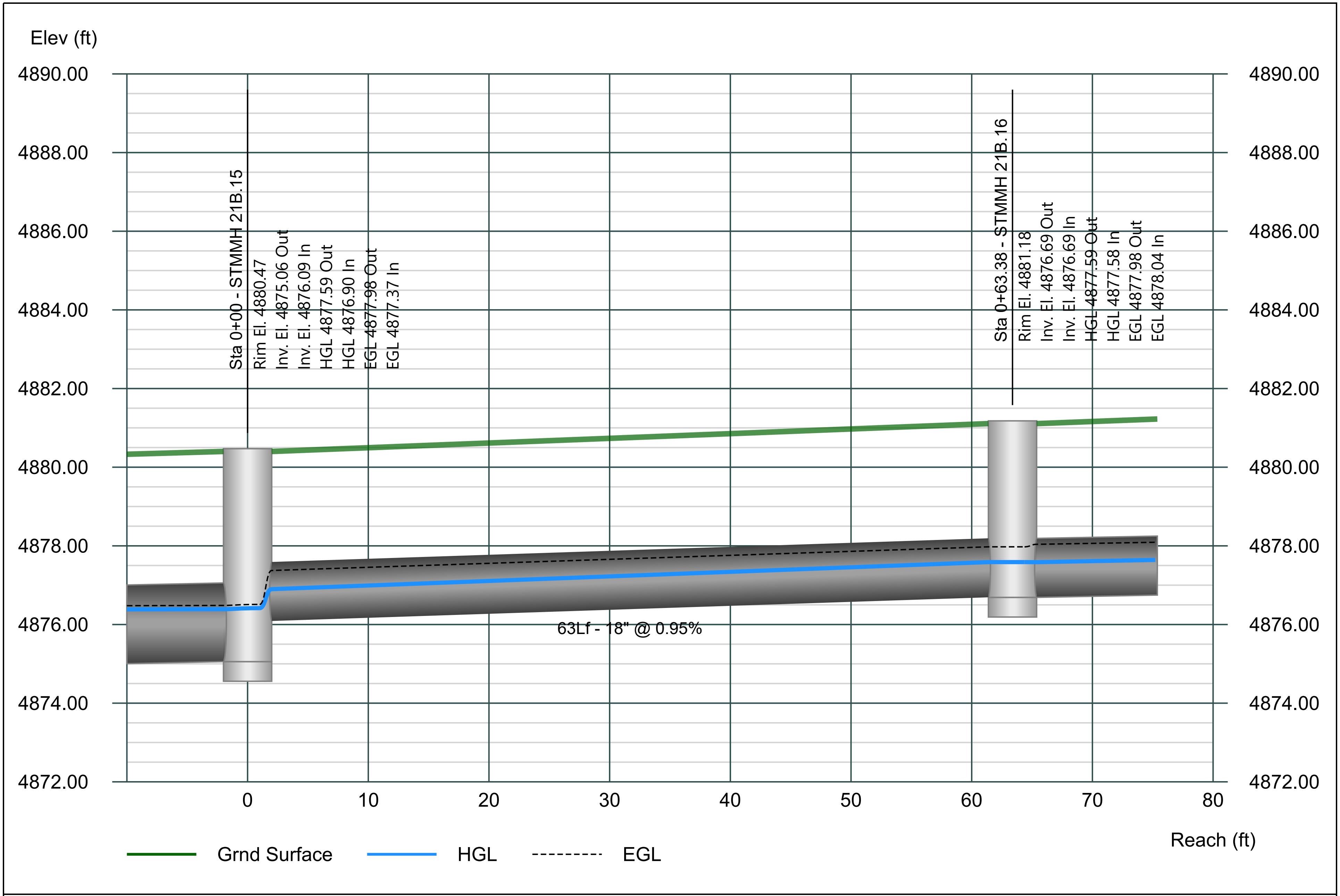
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 9 - Pipe - (506) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



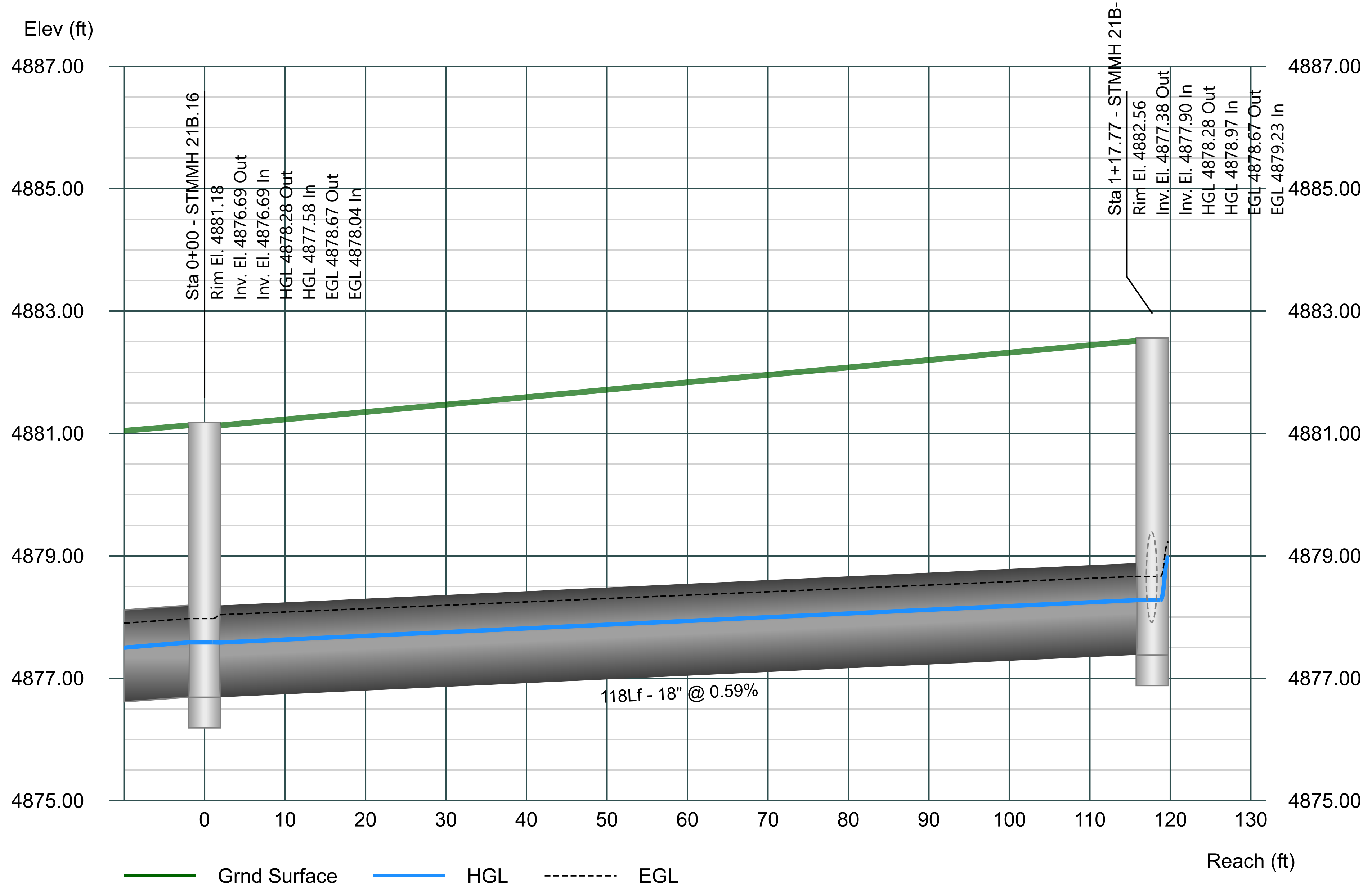
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 10 - Pipe - (505) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



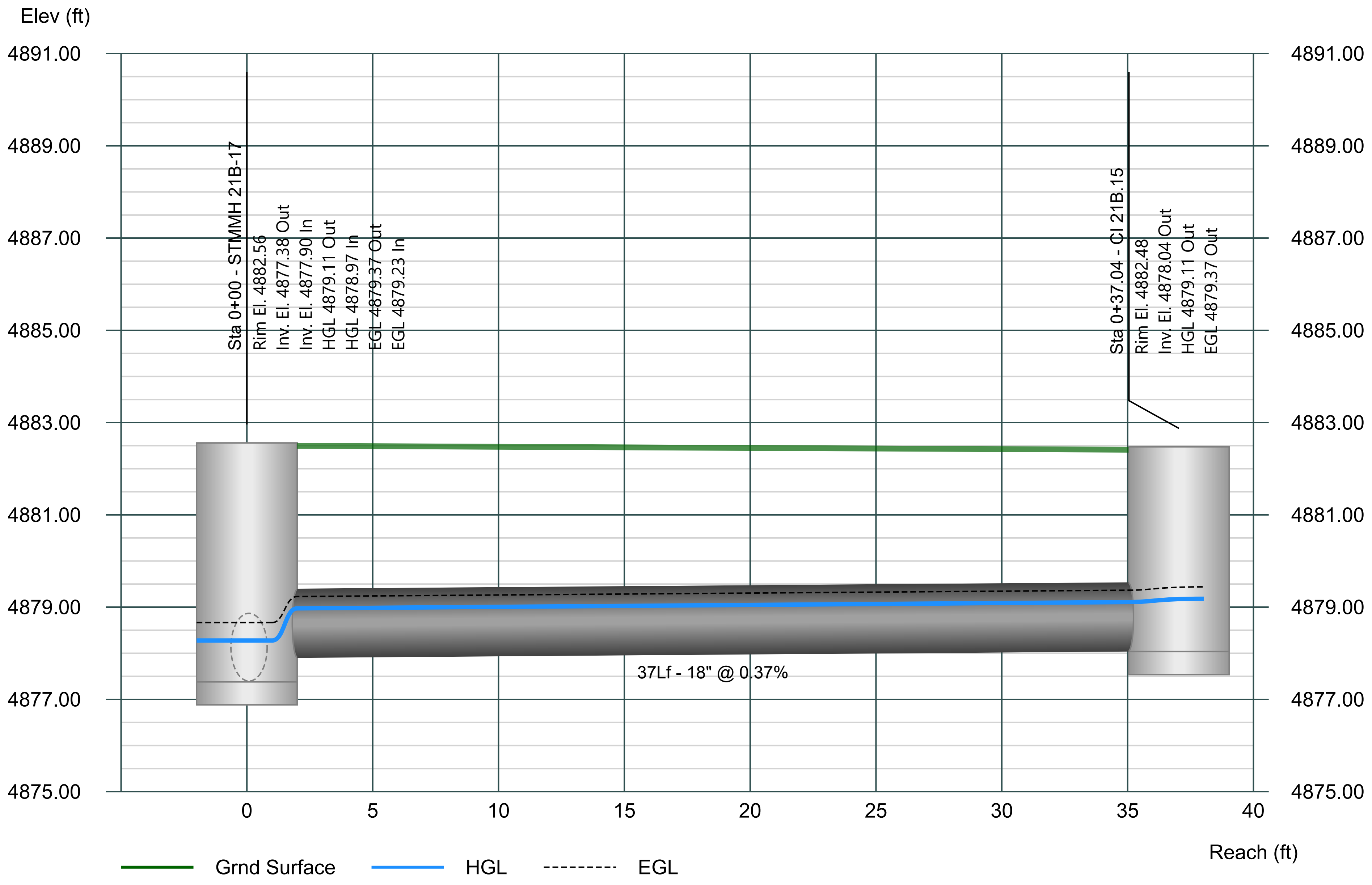
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 11 - Pipe - (503) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



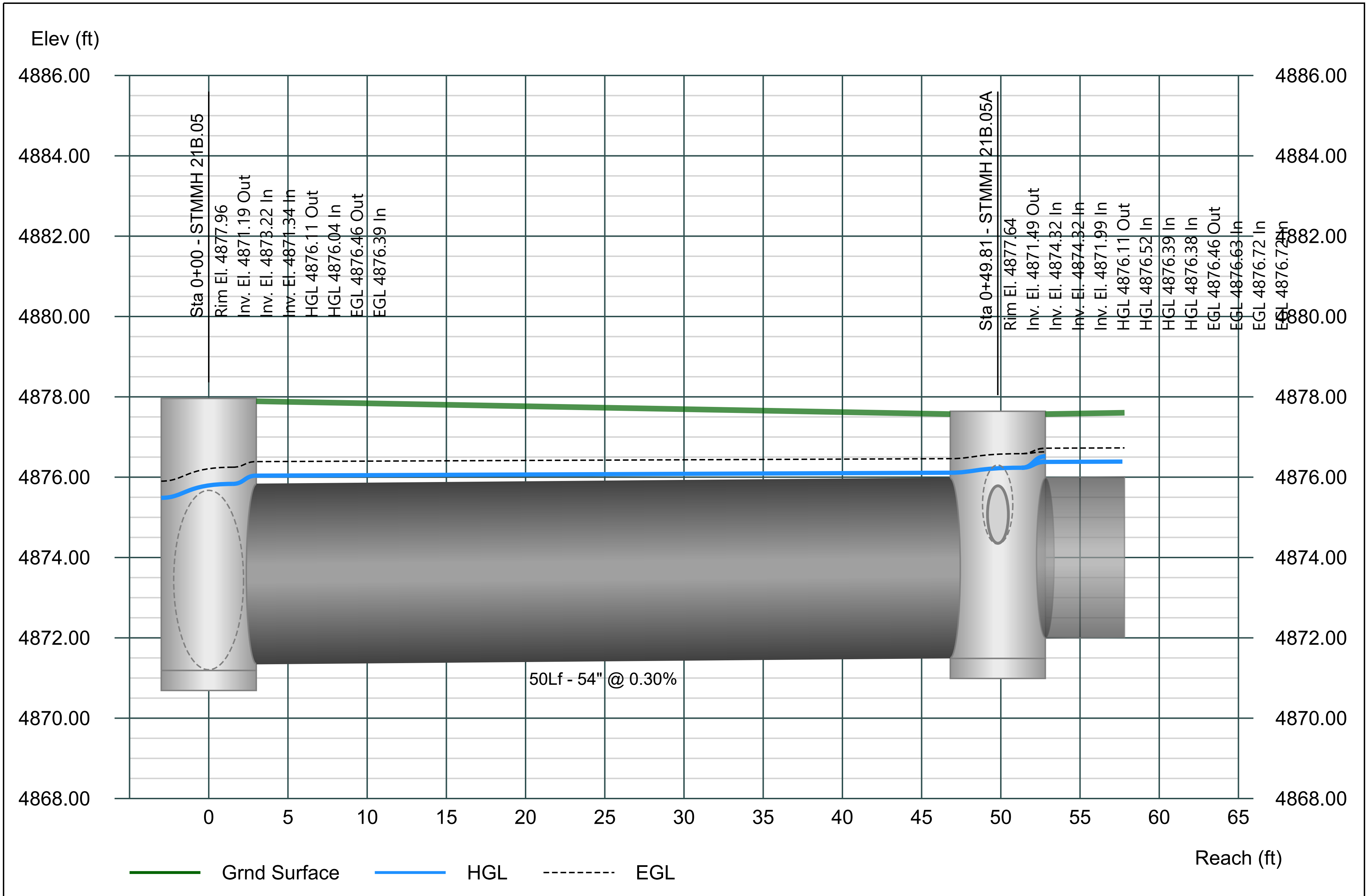
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 12 - Pipe - (510) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



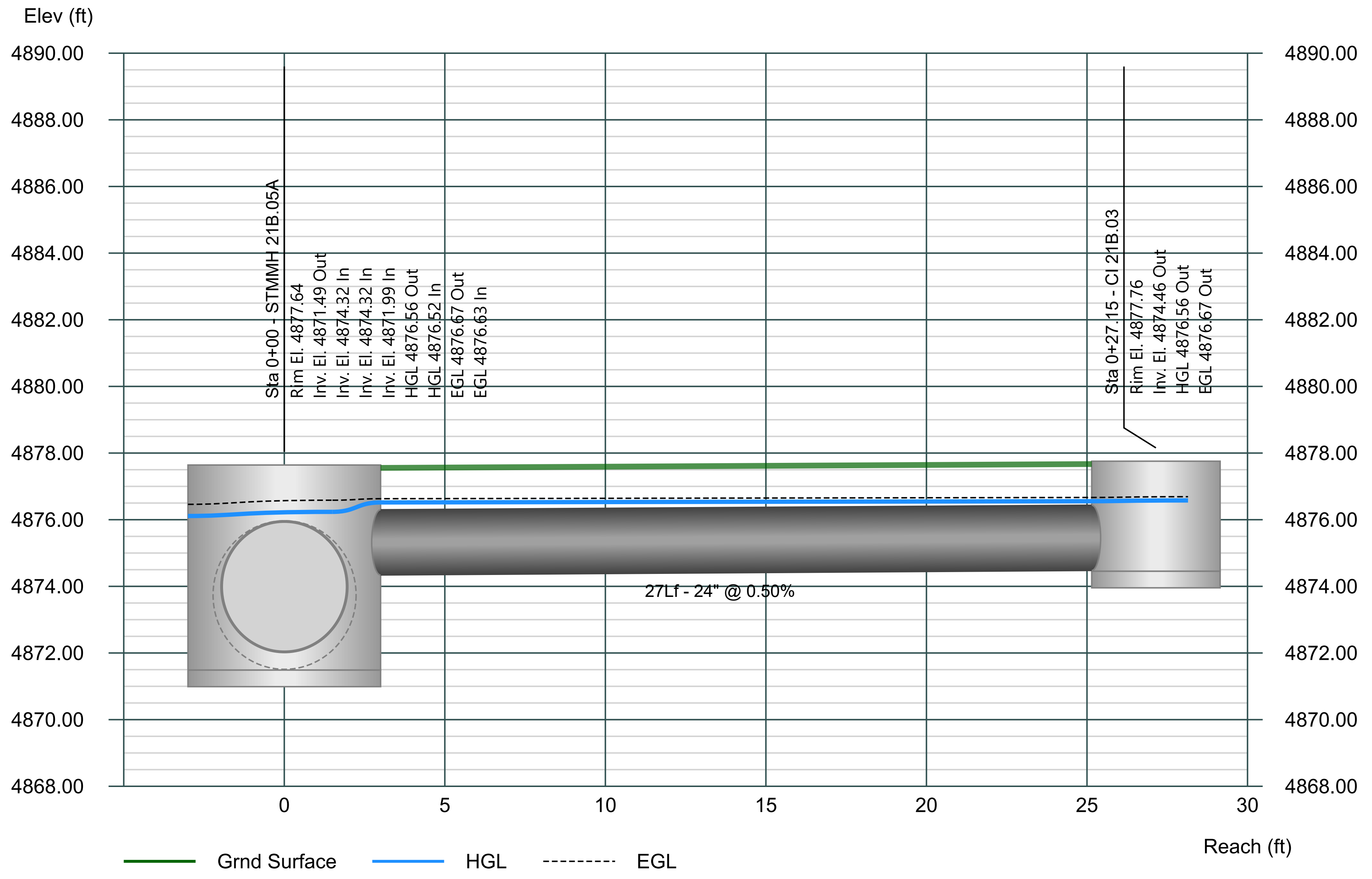
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 13 - Pipe - (565) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021

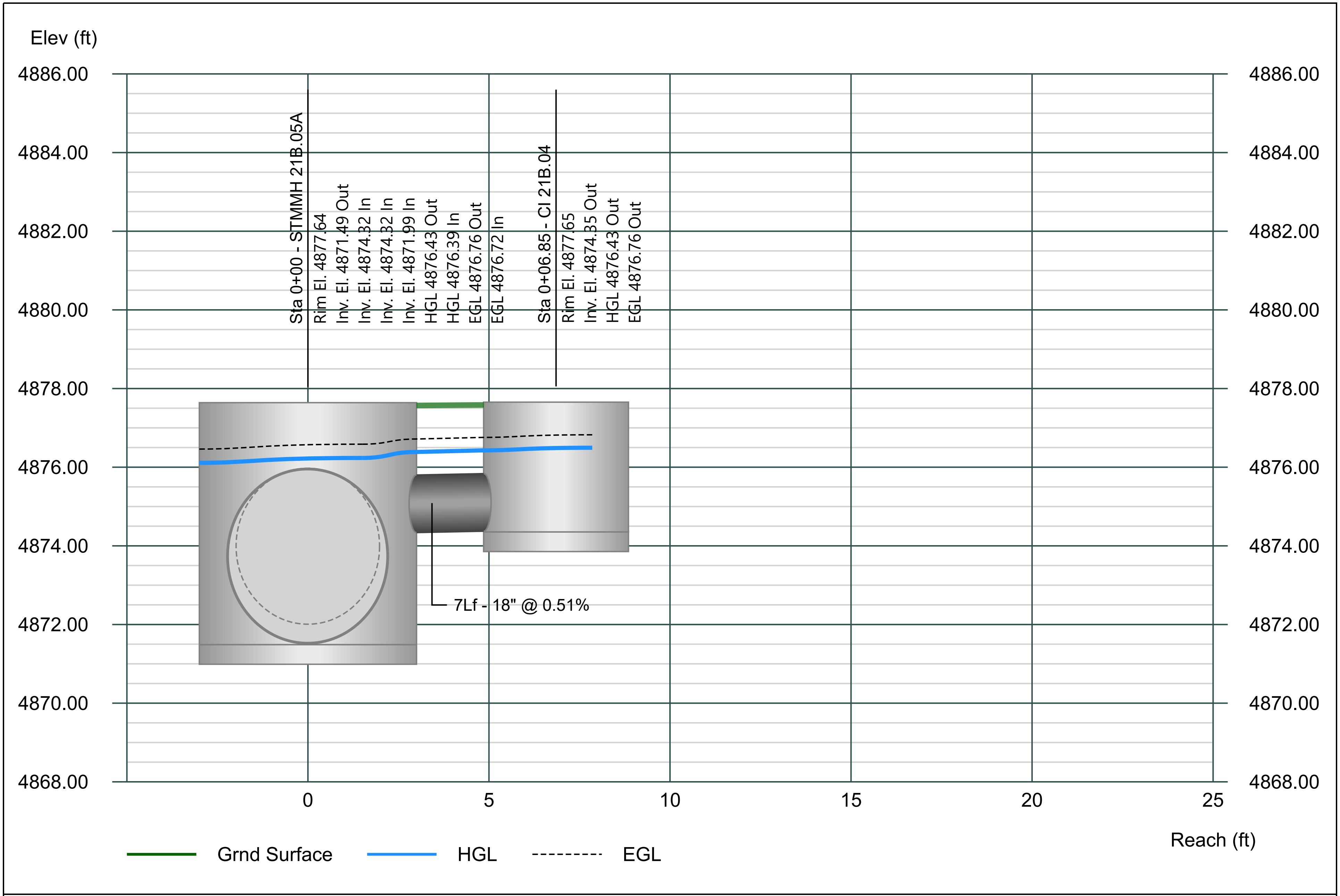


Line 14 - Pipe - (511) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



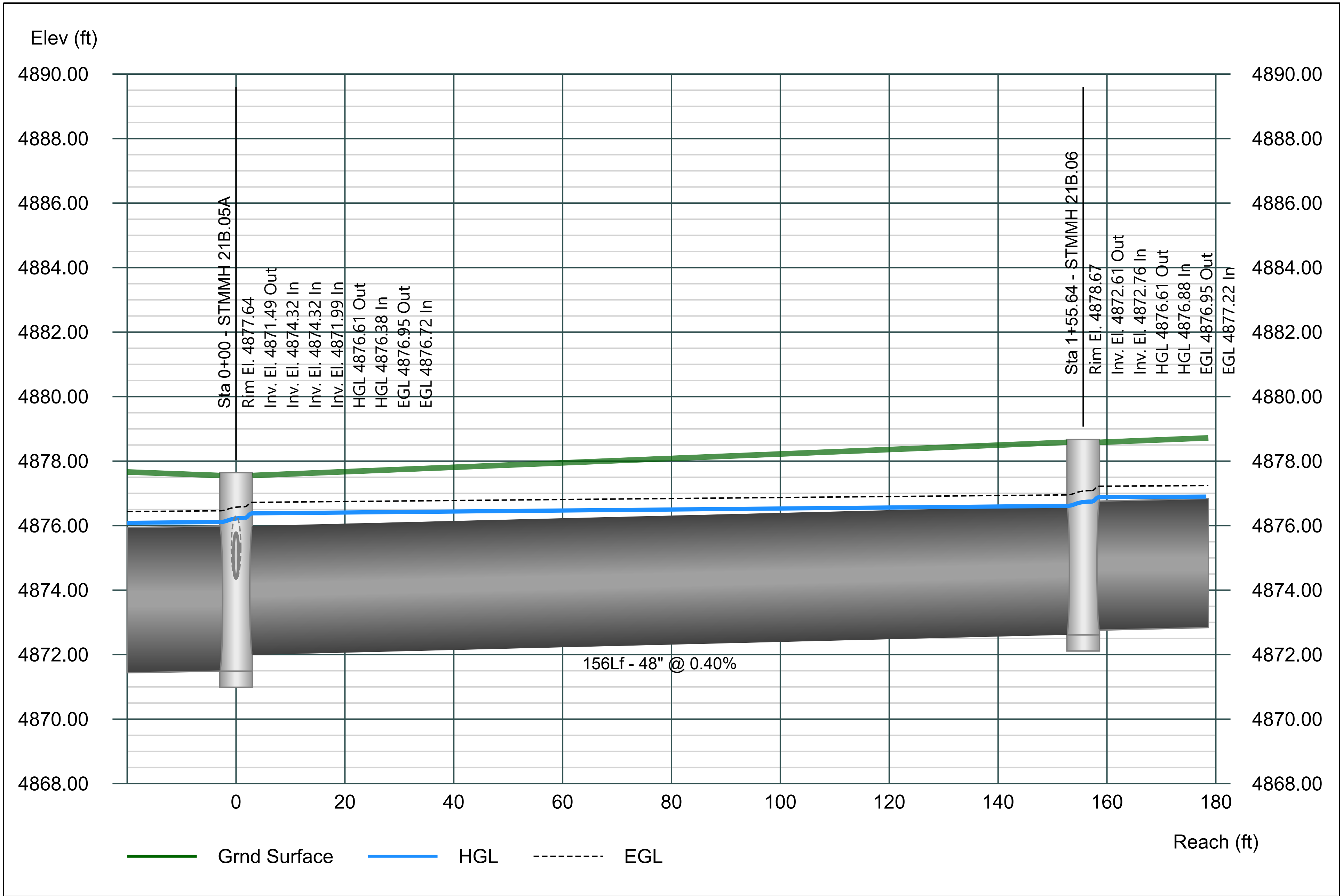
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 15 - Pipe - (564) (1) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



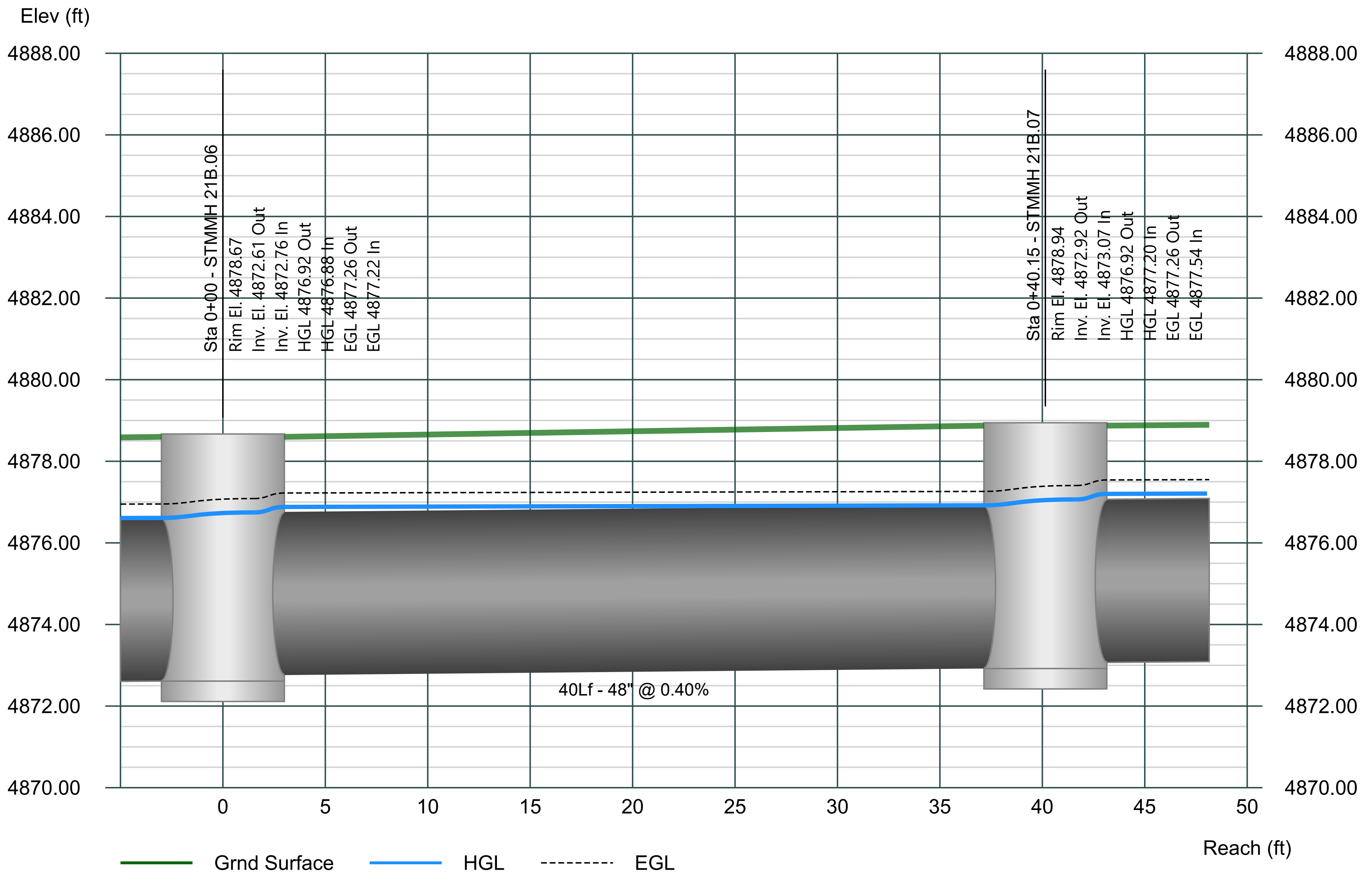
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 16 - Pipe - (564) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



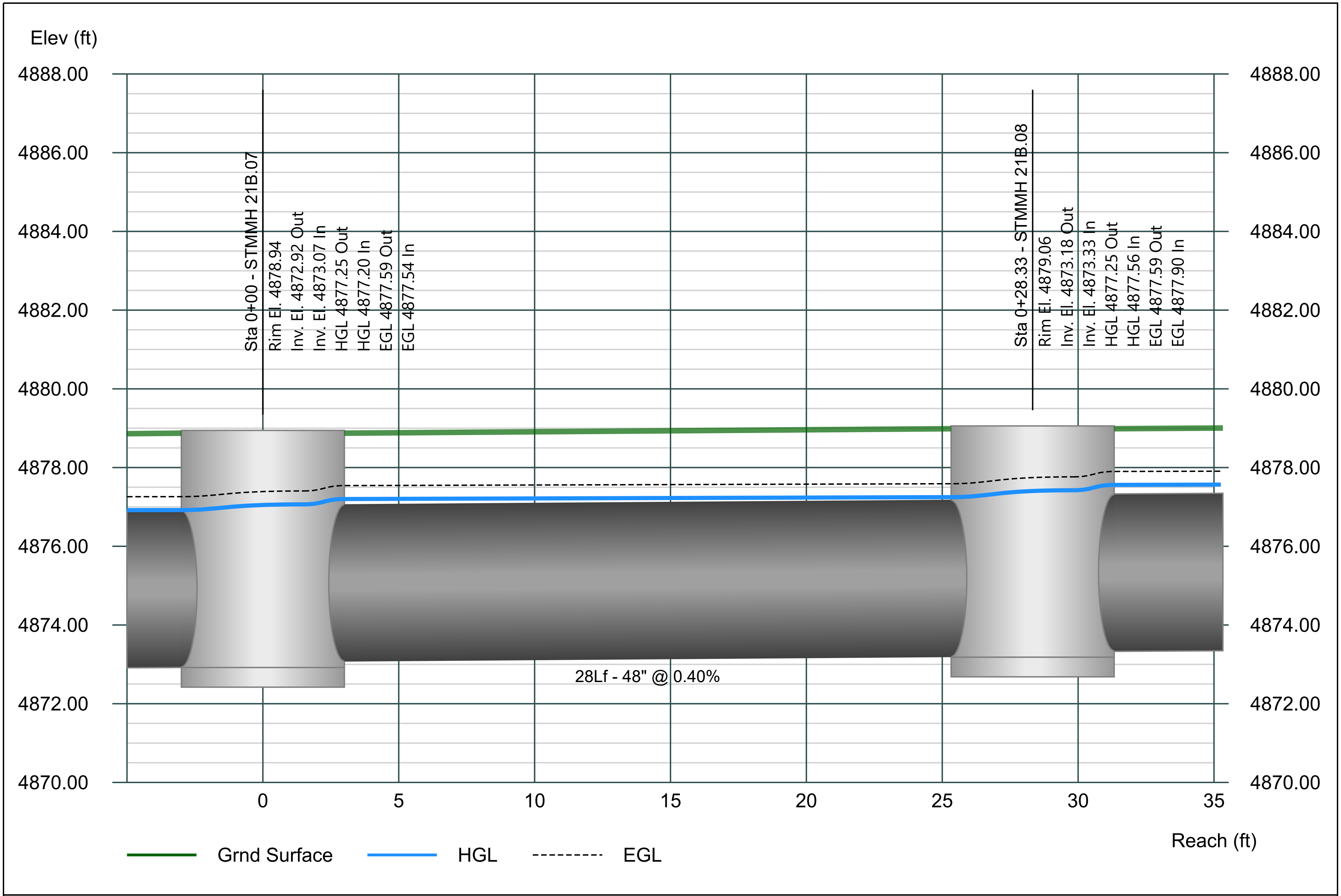
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 17 - Pipe - (493) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



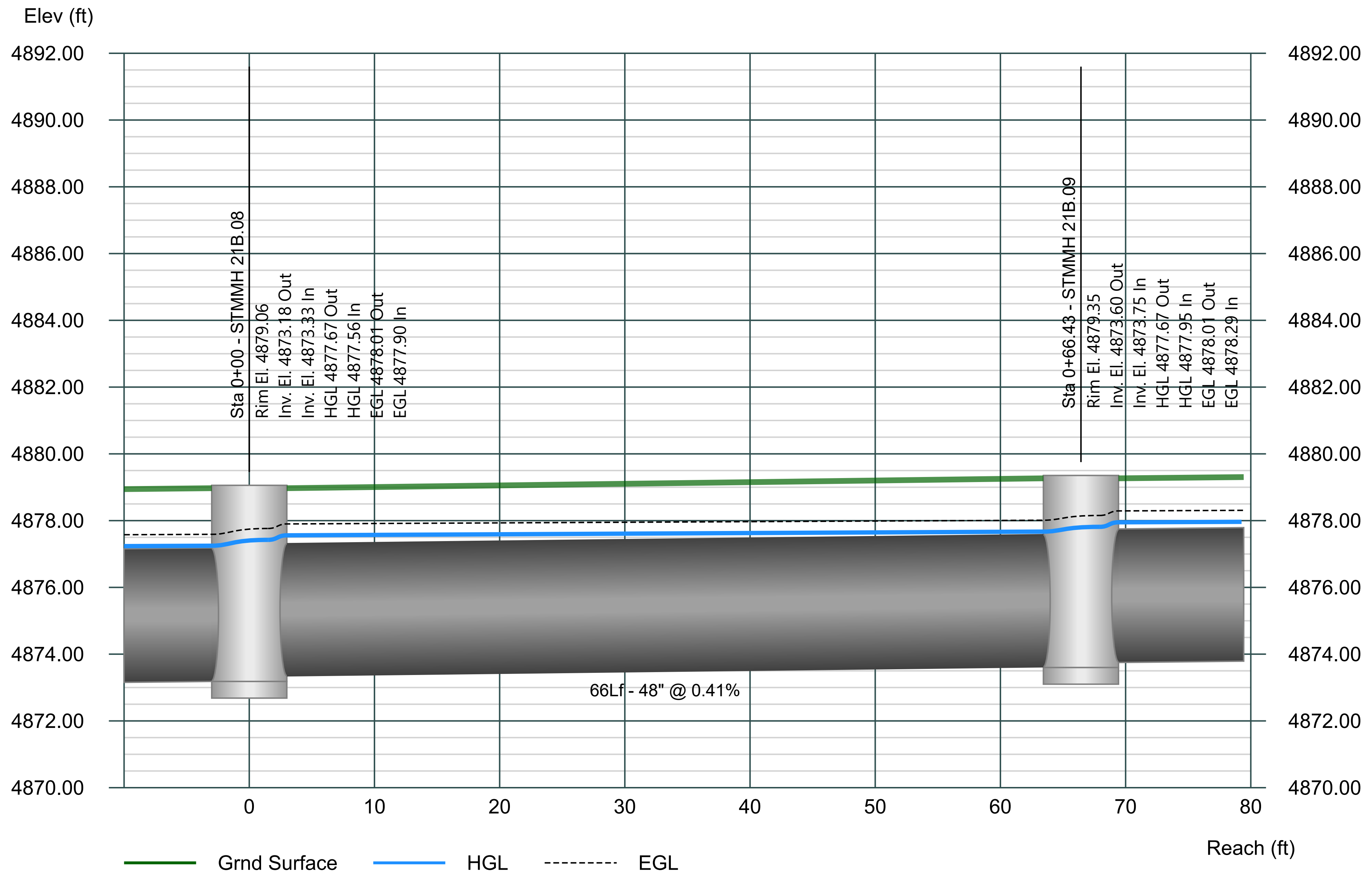
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 18 - Pipe - (492) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



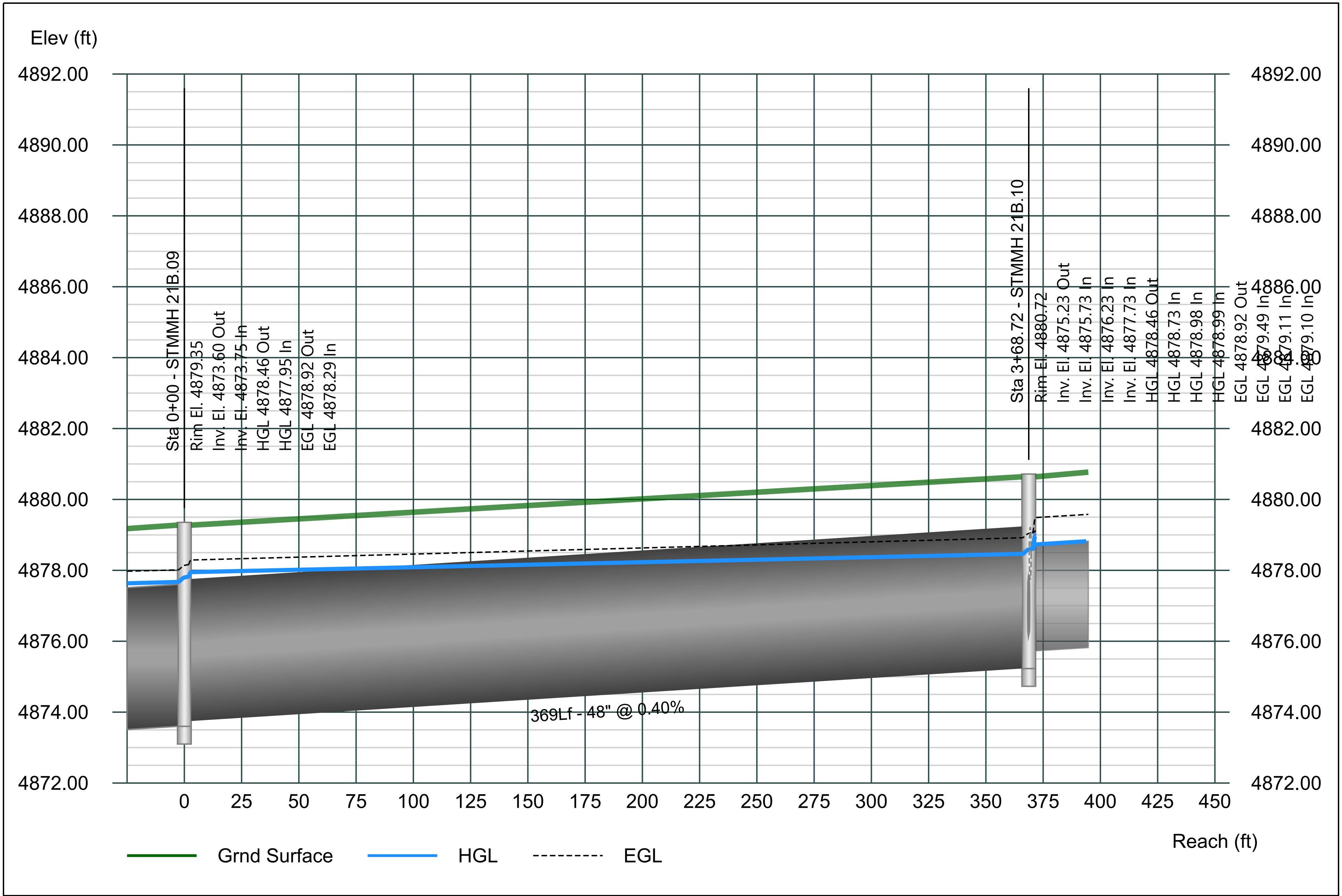
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 19 - Pipe - (571) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



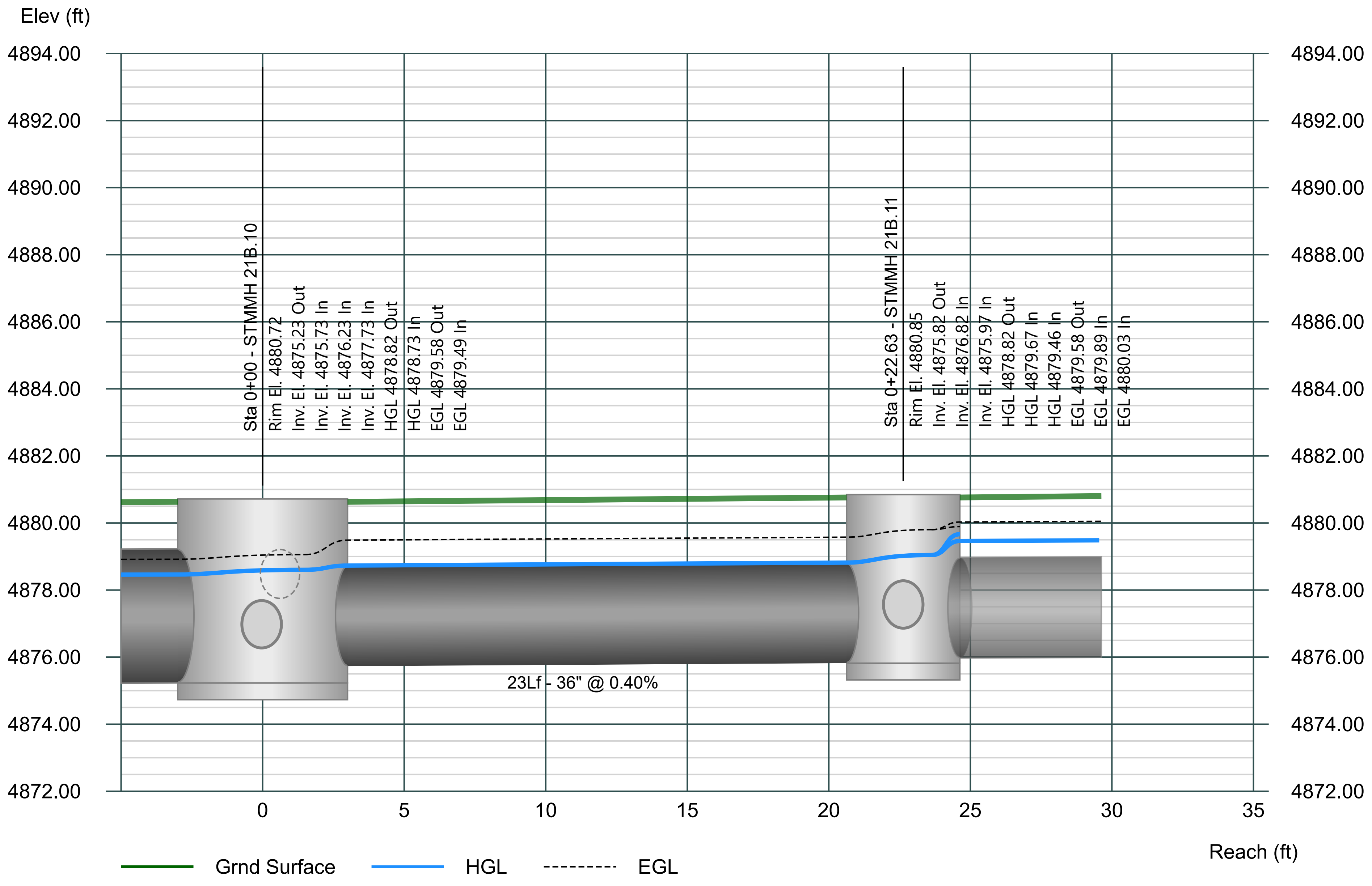
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 20 - Pipe - (570) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



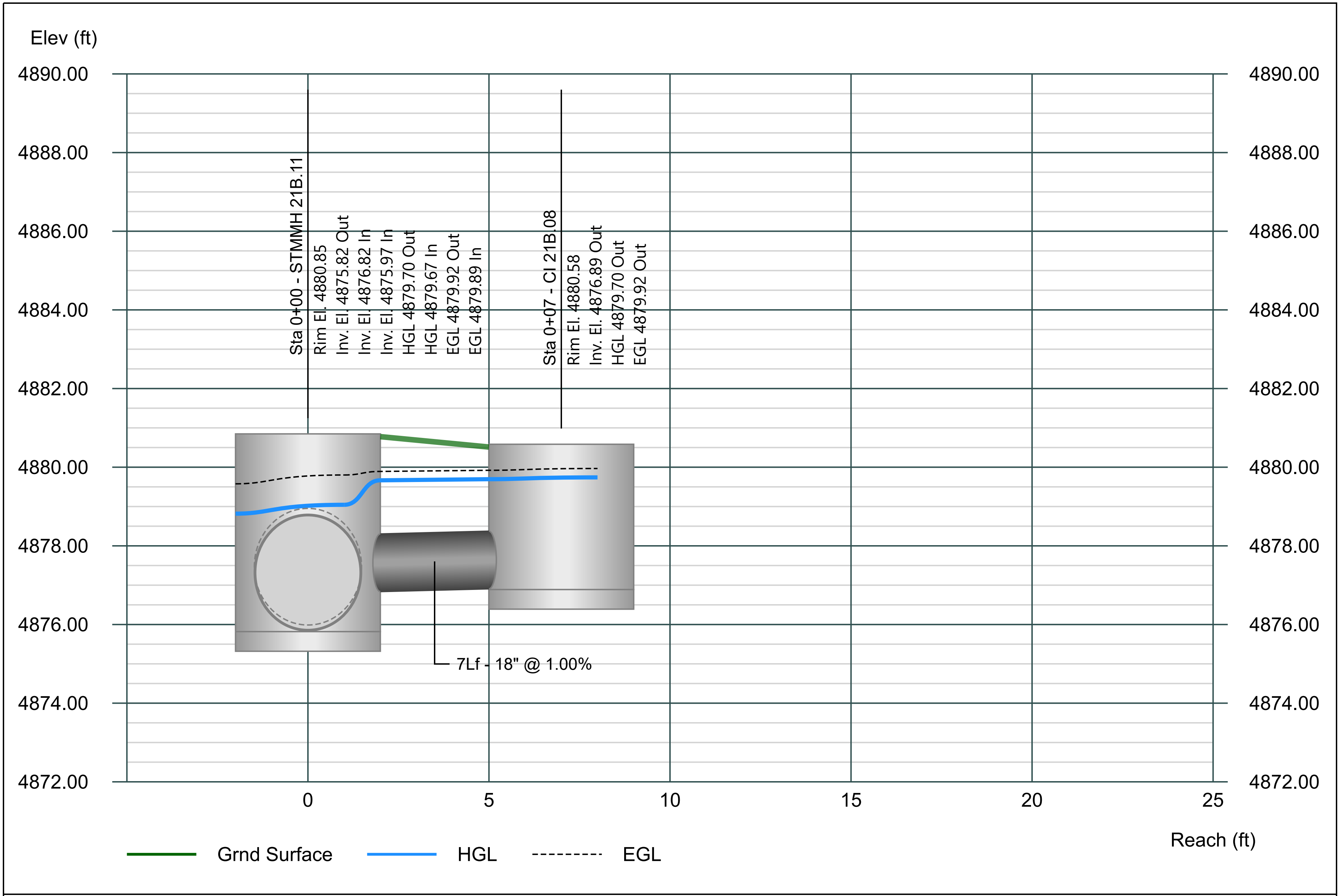
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 21 - Pipe - (518) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



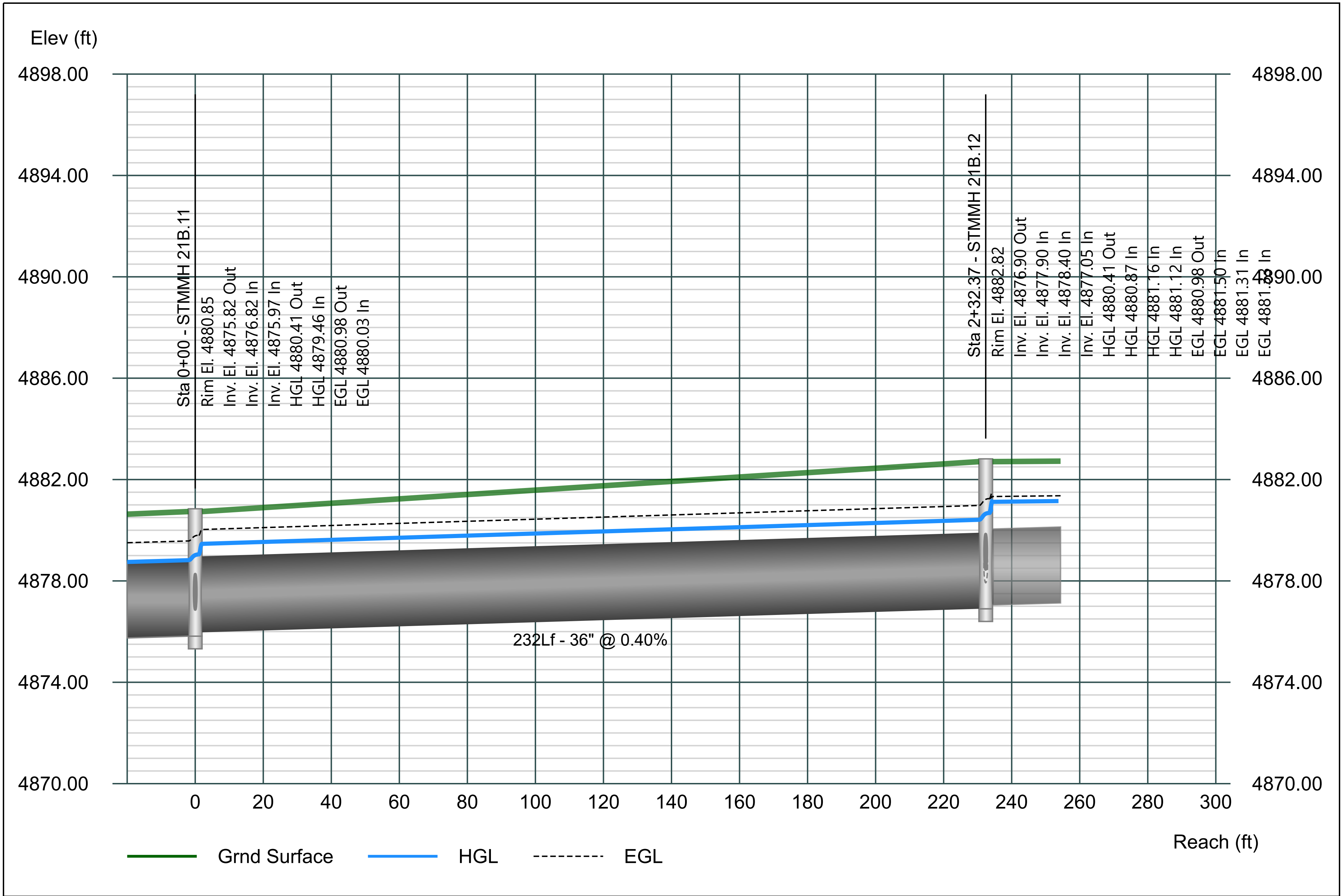
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 22 - Pipe - (488) (1) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



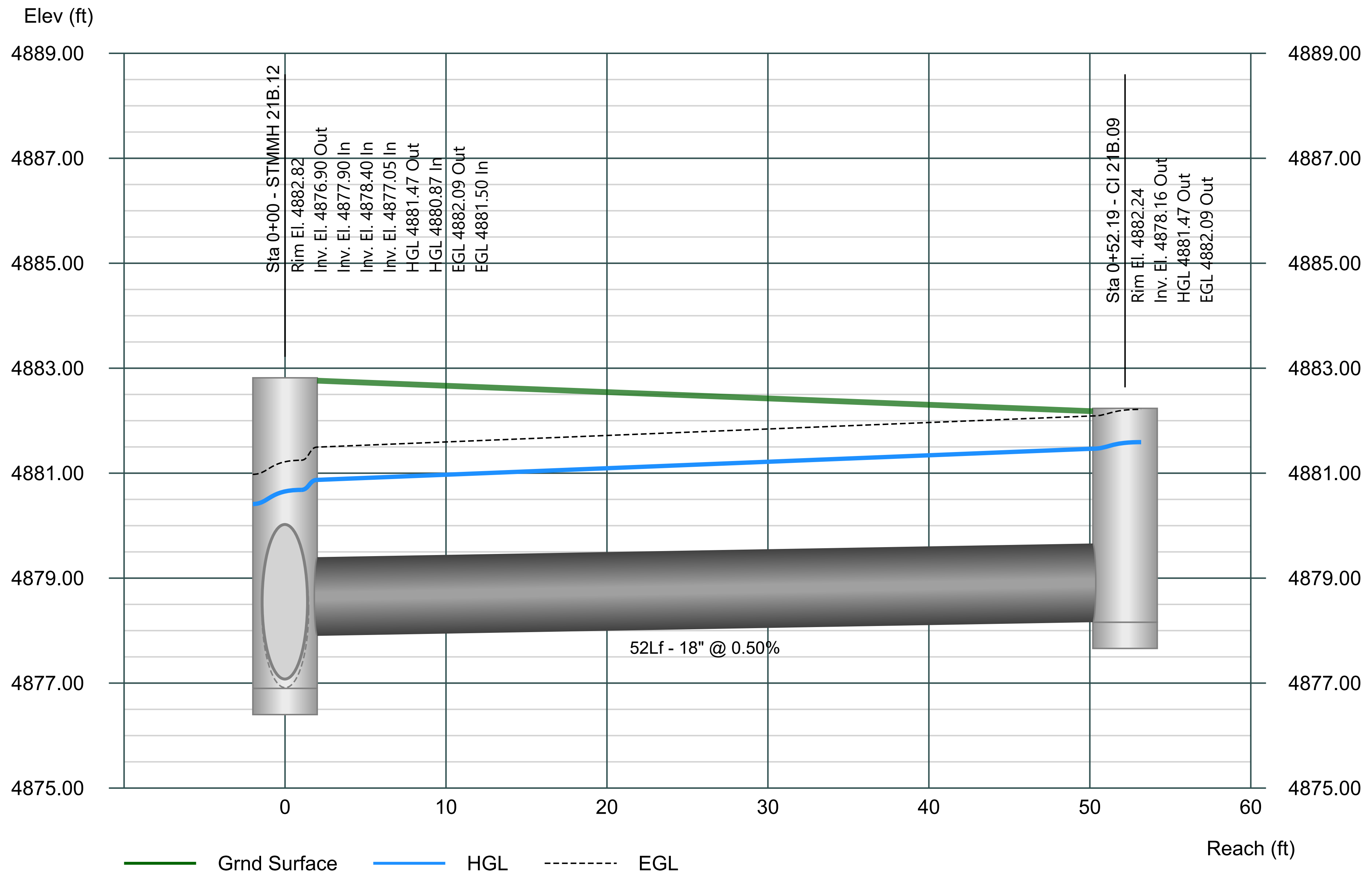
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 23 - Pipe - (585) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



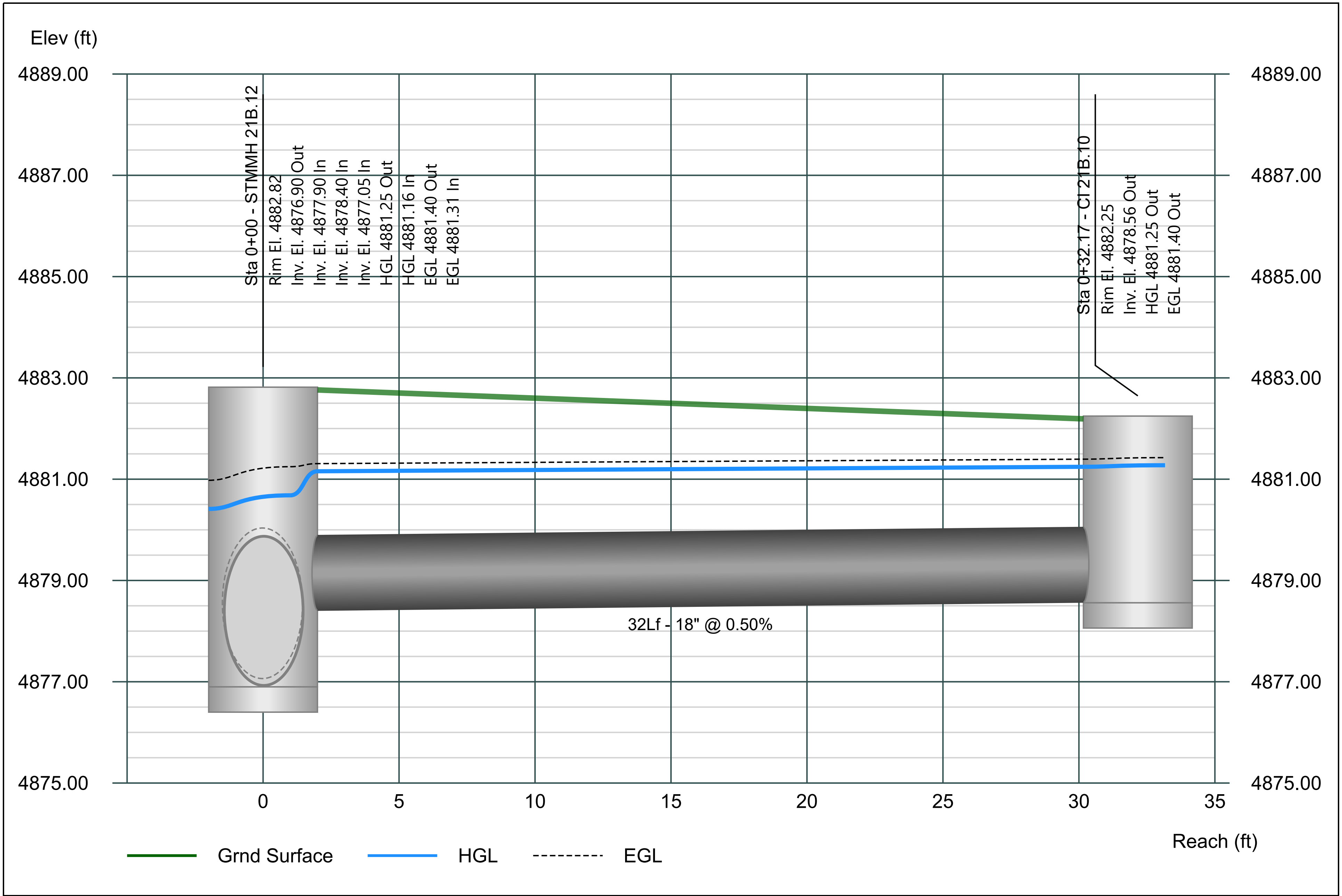
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 24 - Pipe - (519) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



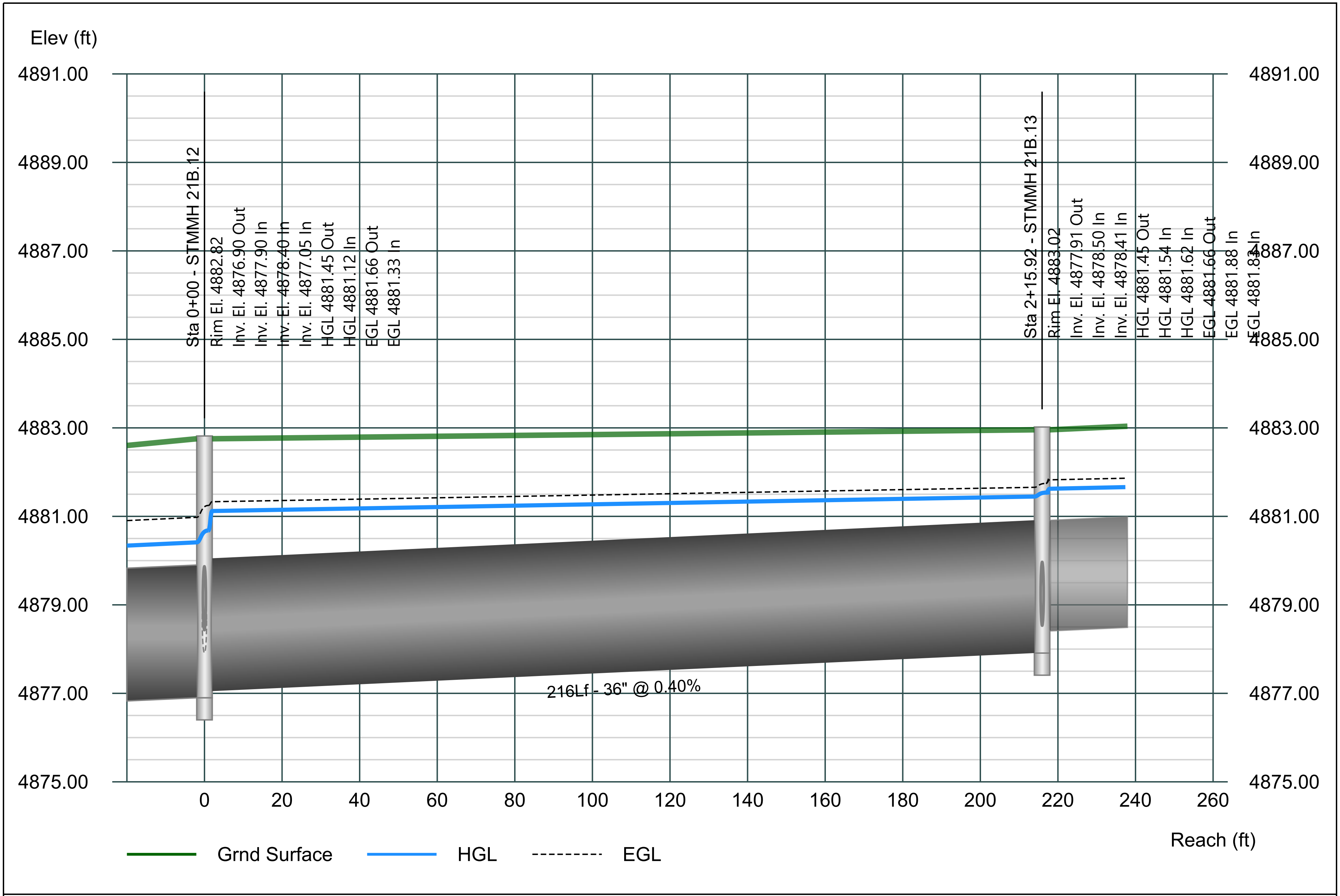
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 25 - Pipe - (487) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



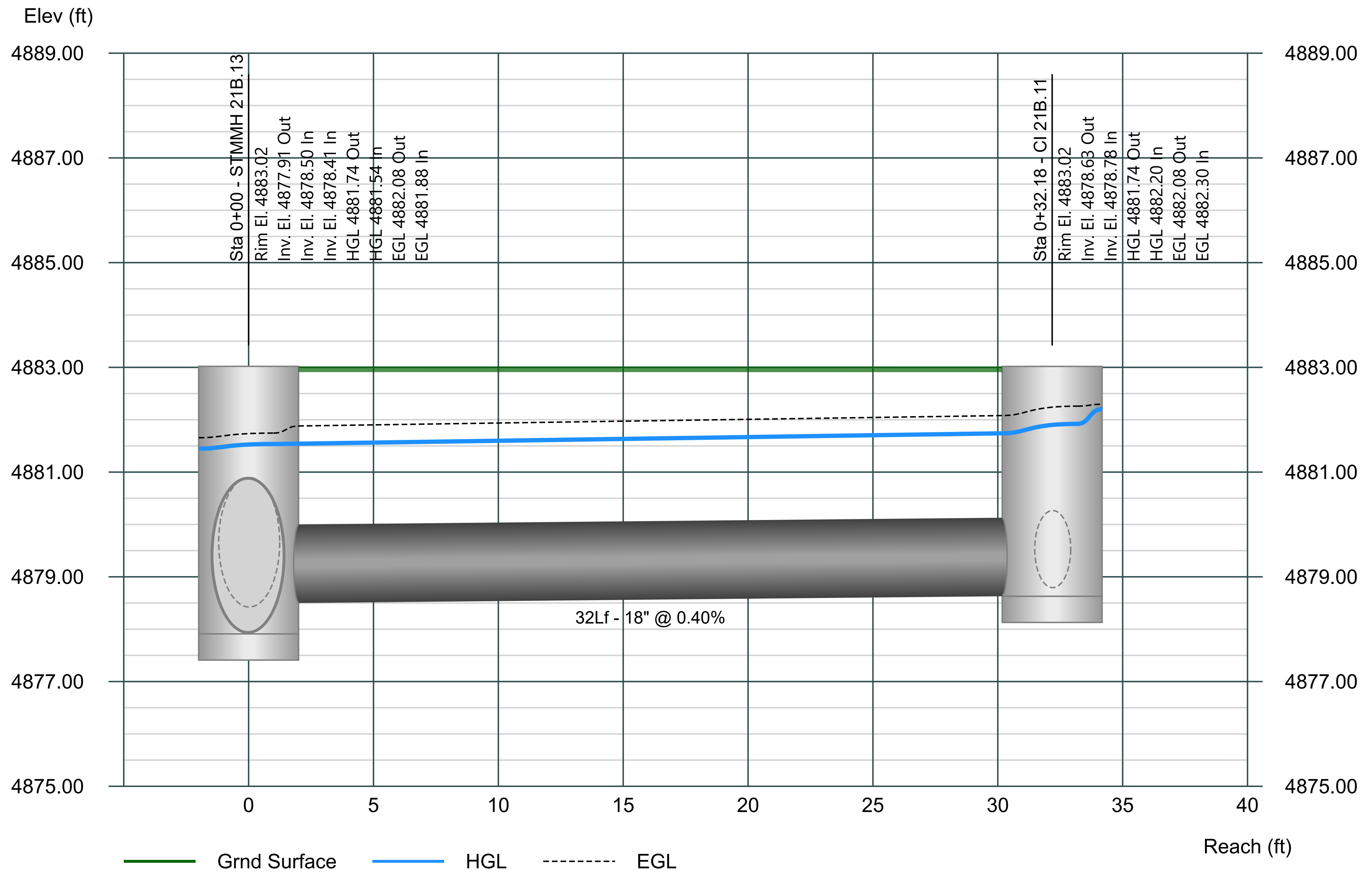
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 26 - Pipe - (486) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



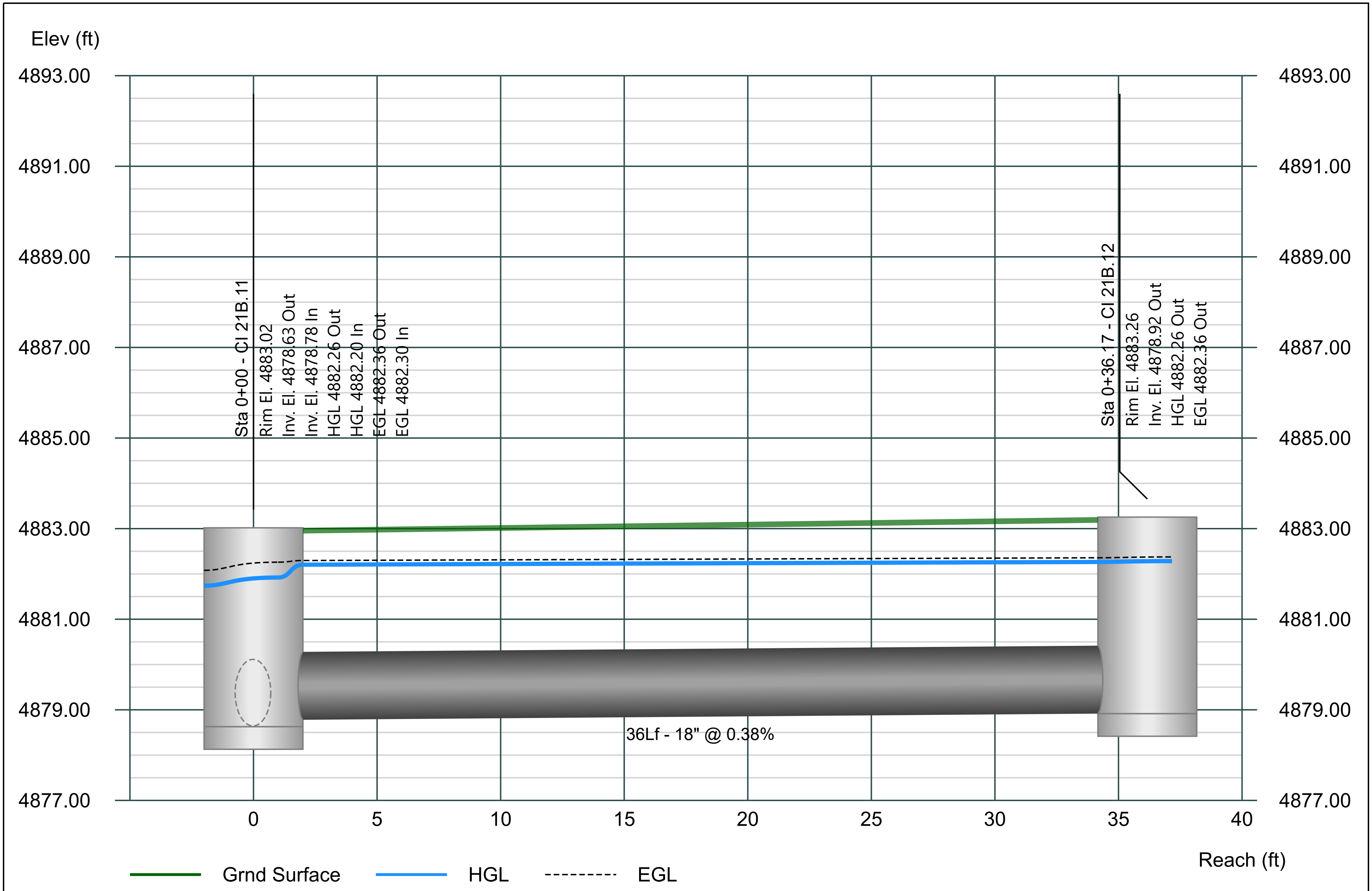
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 27 - Pipe - (485) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



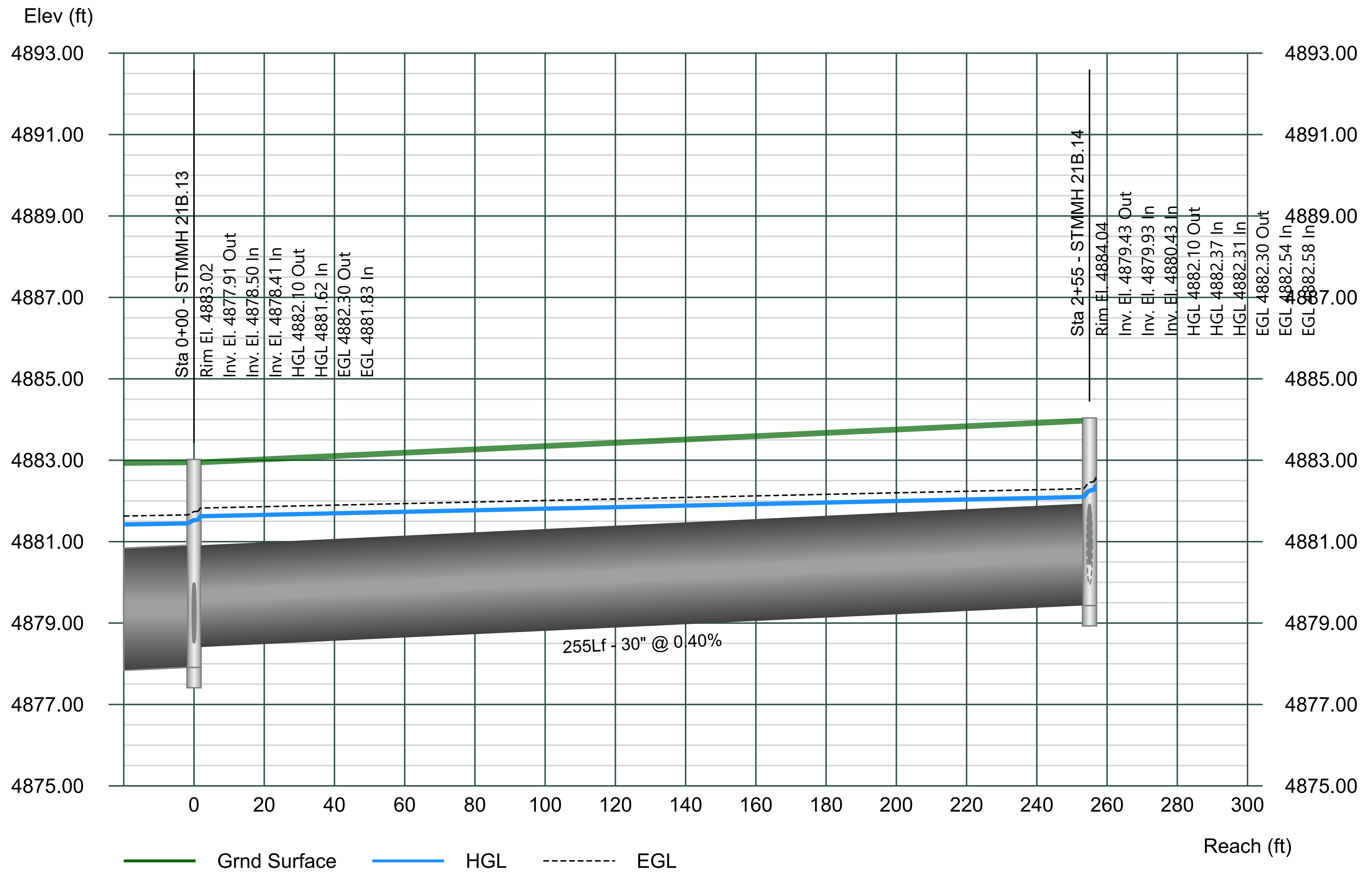
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 28 - Pipe - (580) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



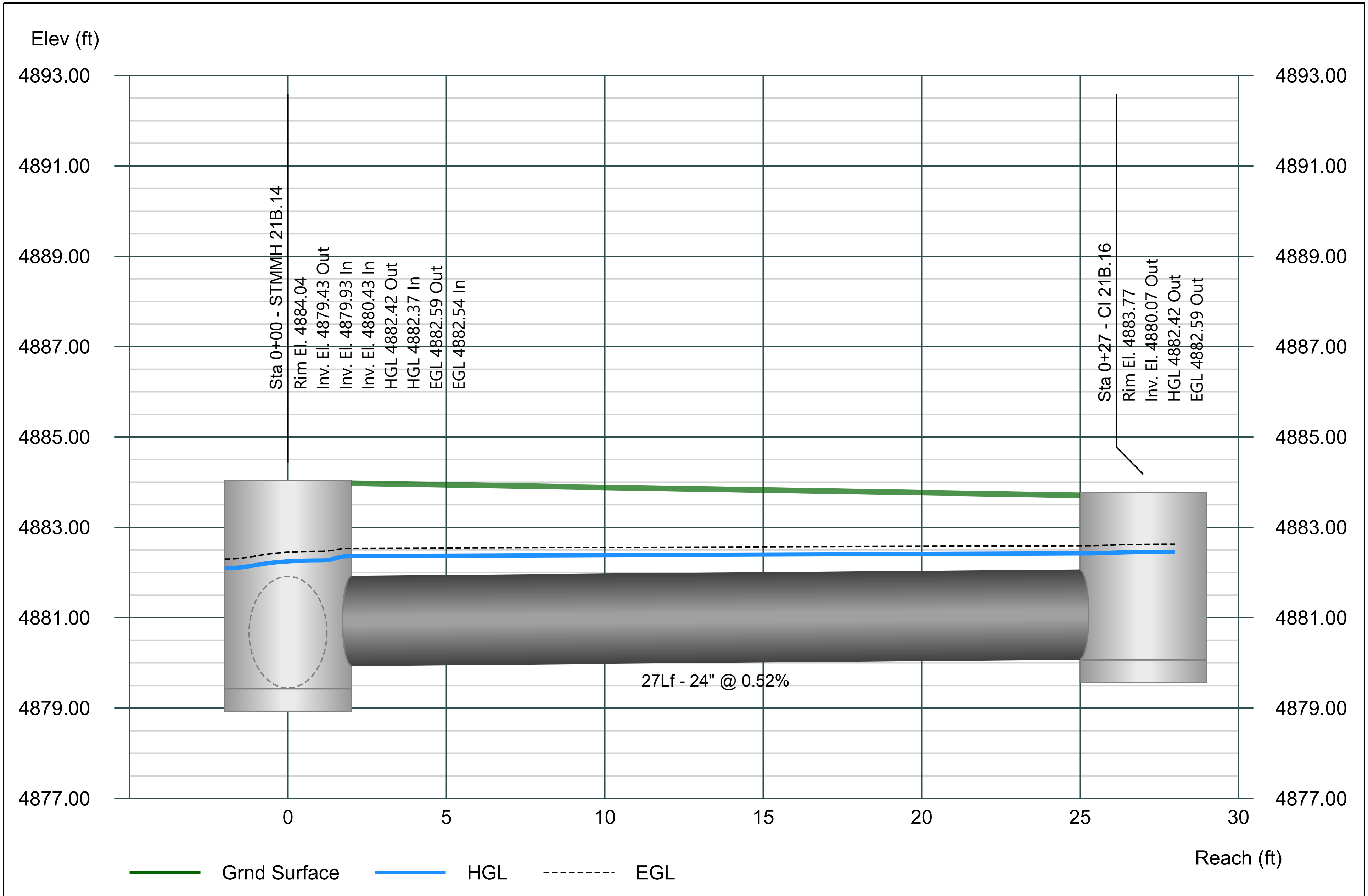
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 29 - Pipe - (587) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



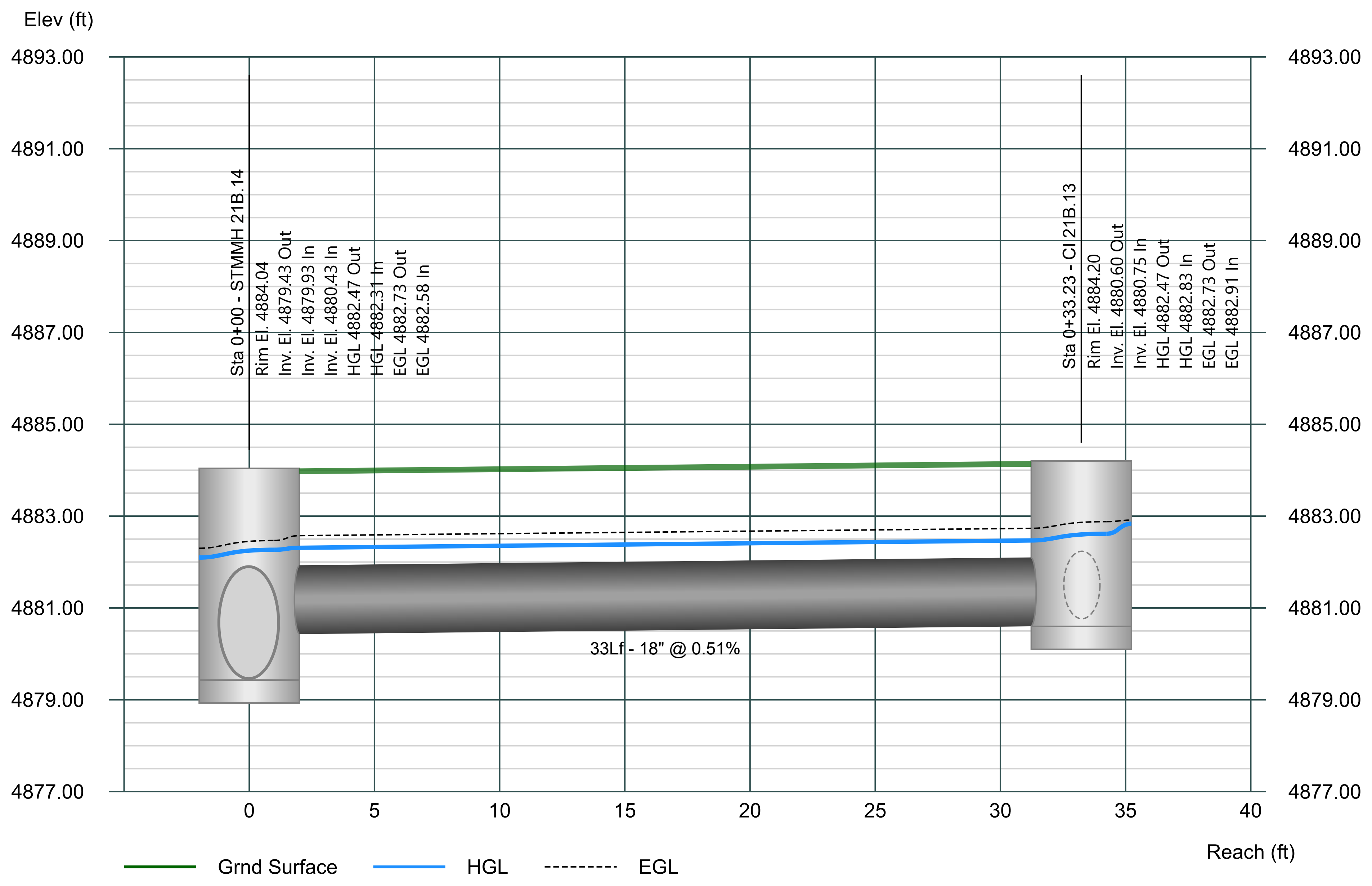
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 30 - Pipe - (579) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



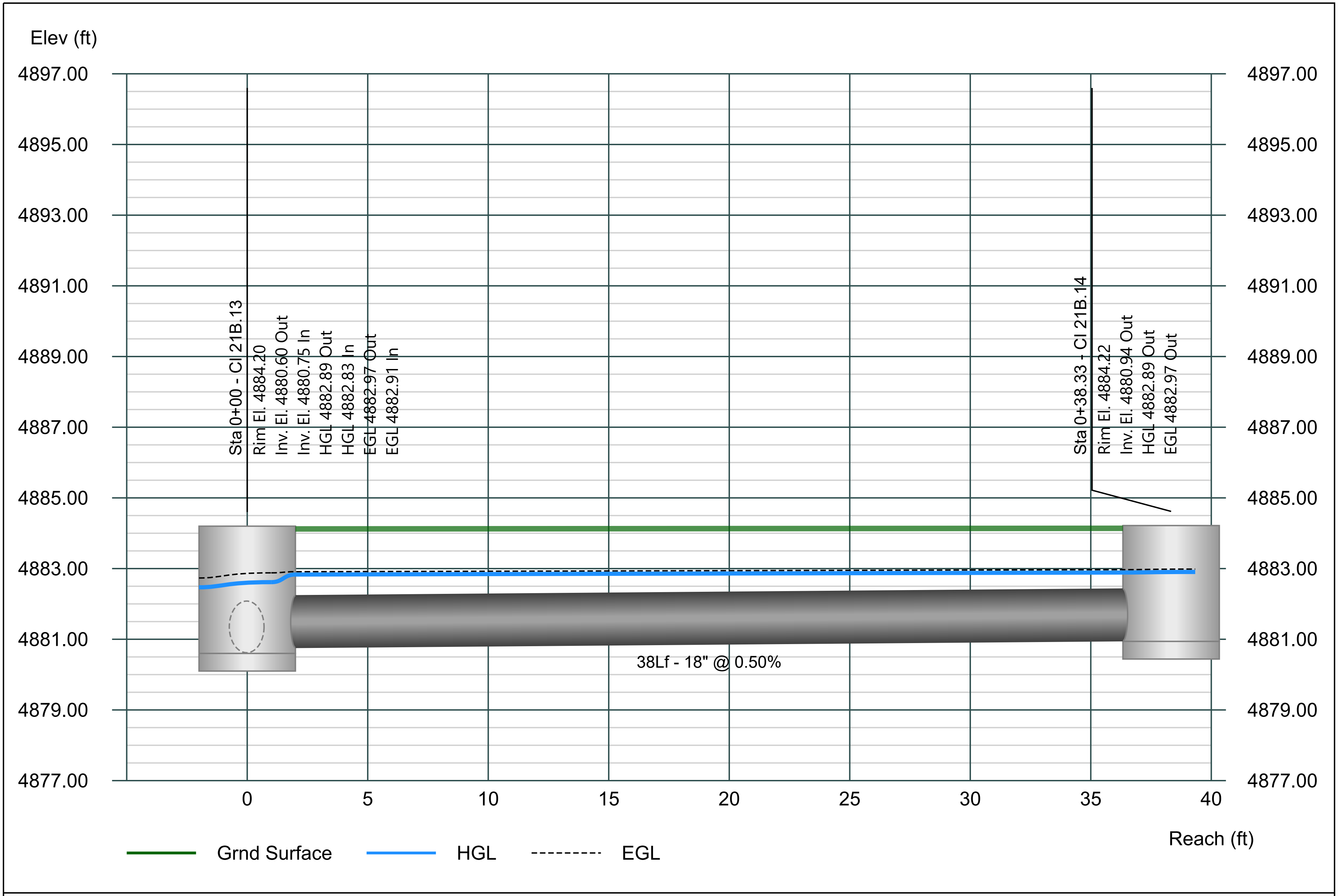
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 31 - Pipe - (578) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



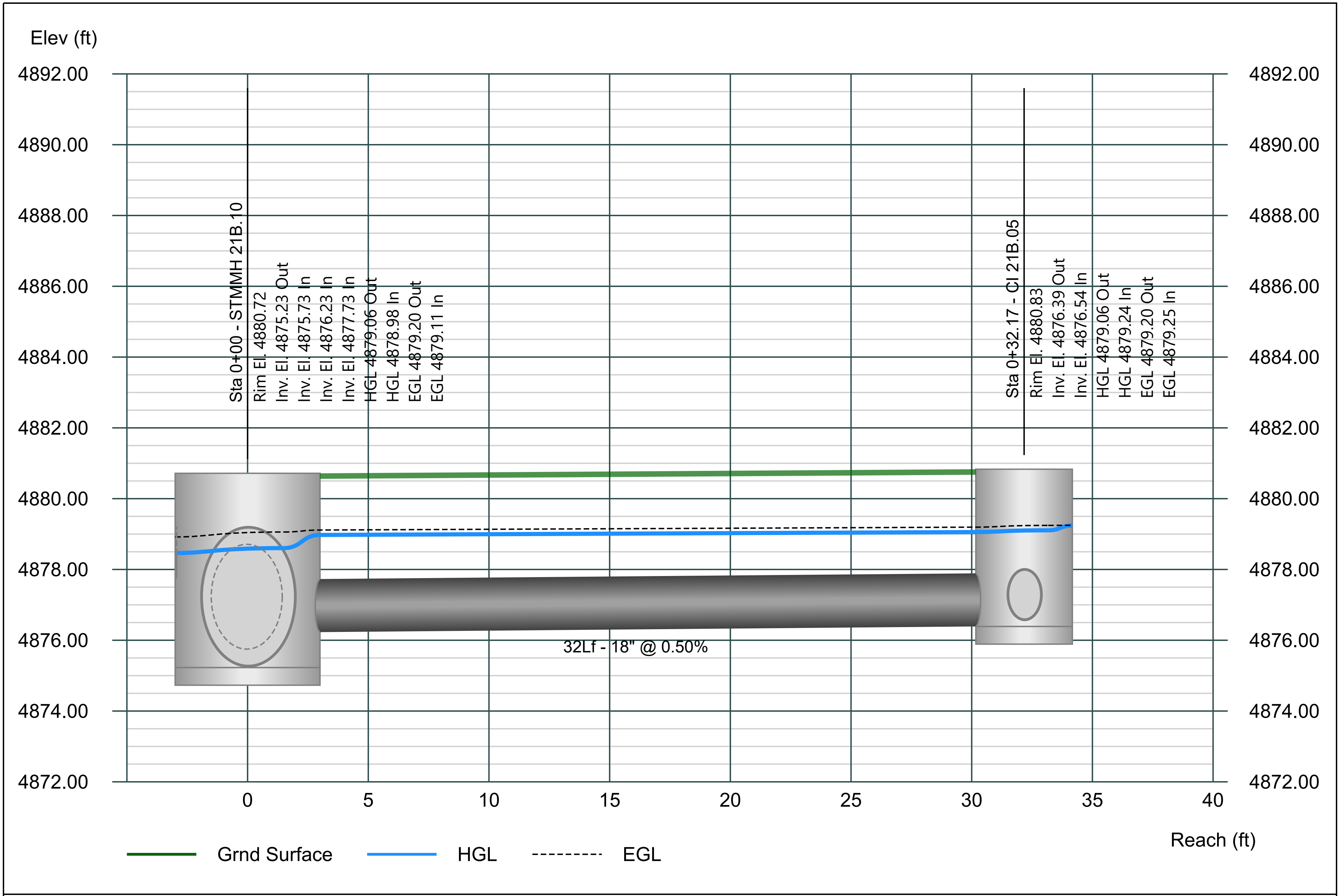
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 32 - Pipe - (586)(0) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021

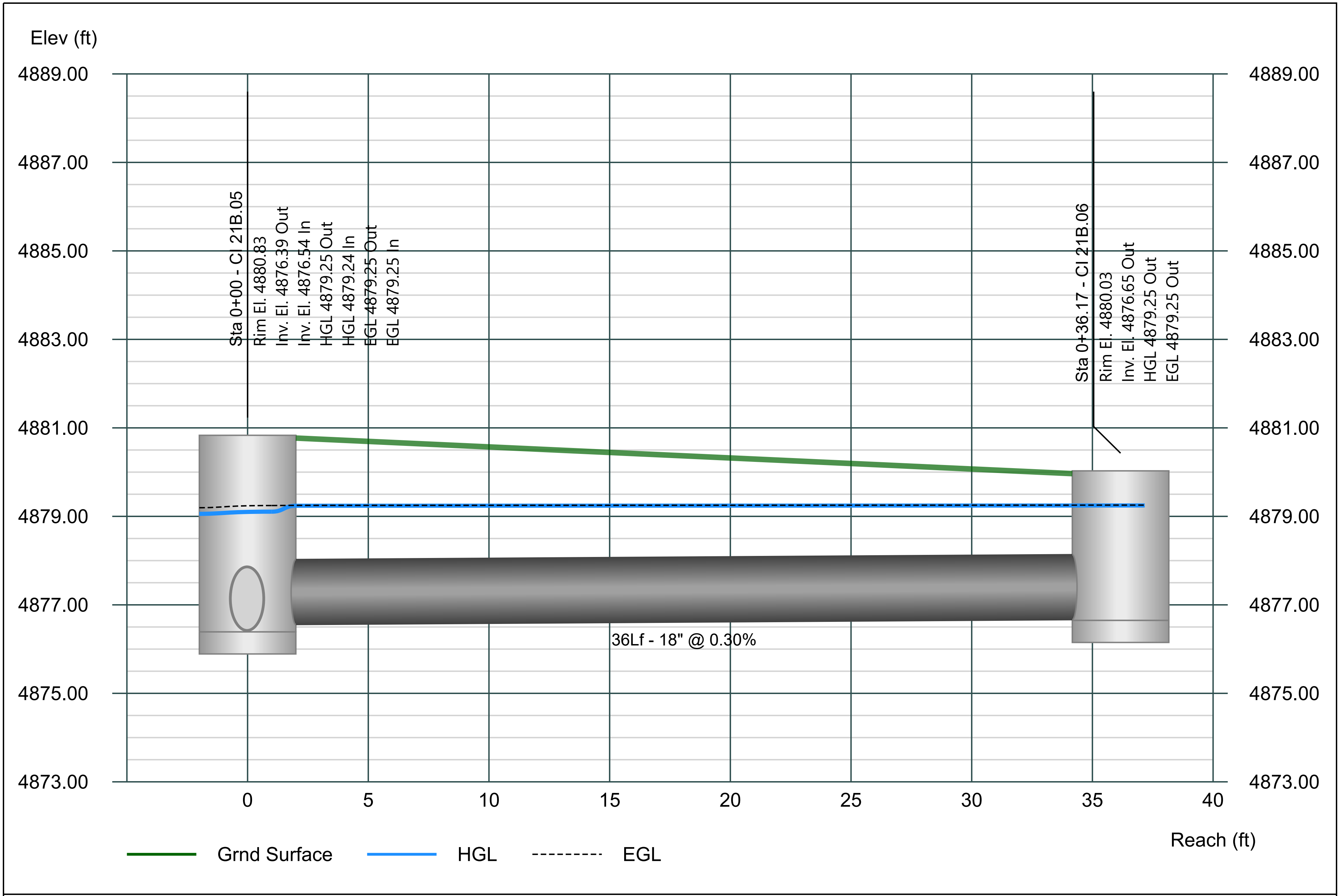


Line 33 - Pipe - (584)(0) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



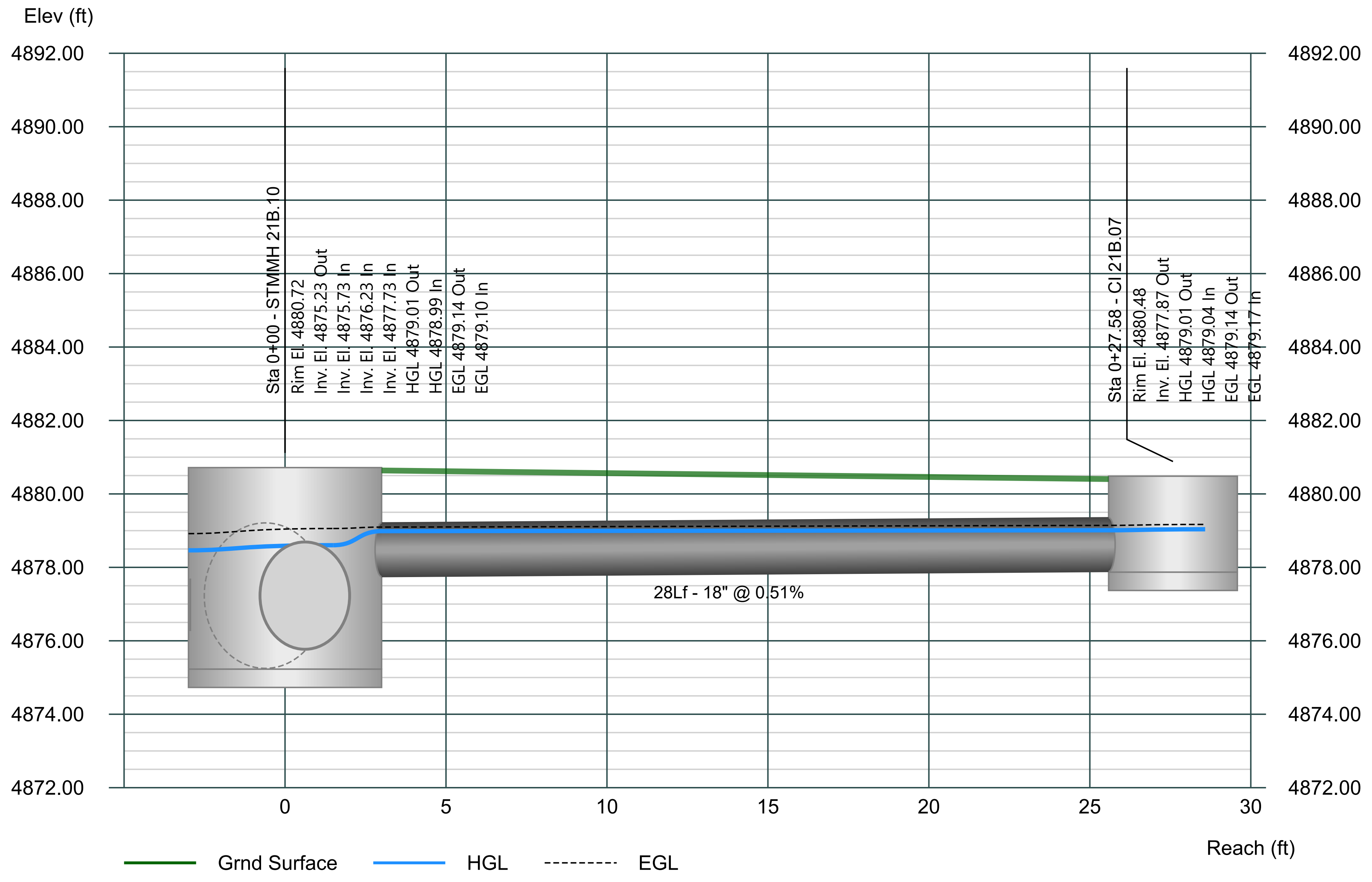
Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Line 34 - Pipe - (517) (Storm Sewer - 21 B Network)

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021



Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Energy Grade Line Calculations

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
	(in)	(cfs)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	(ft)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	n Value	Enrgy Loss (ft)	HGLa Elev (ft)	EGLa Elev (ft)	Enrgy Loss (ft)
1	48x76e	99.96	4864.97	4.00	19.90	4868.97	5.02	0.39	4869.36	64.63	4865.29	3.80	19.50	4869.09	5.13	0.41	4869.50	0.013	0.139	4869.28	4869.69	0.19
2	48x76e	99.96	4865.54	3.92	19.90	4869.46	5.02	0.39	4869.85	500.00	4868.04	2.00	9.95	4870.04	10.05	1.57	4871.61	0.013	1.762	4870.04	4871.61	0.00
3	48x76e	99.96	4868.12	3.23	17.95	4871.35	5.57	0.48	4871.83	500.00	4870.12	2.00	9.95	4872.12	10.05	1.57	4873.69	0.013	1.861	4872.12	4873.69	0.00
4	54	99.96	4870.27	3.06[3]	11.52	4873.33	8.68	1.17	4874.50	90.32	4870.63	3.06	11.52	4873.69	8.68	1.17	4874.86	0.013	0.360	4874.41	4875.58	0.72
5	24	6.96	4872.91	2.00	3.14	4875.53	2.22	0.08	4875.61	7.00	4872.94	2.00	3.14	4875.54	2.22	0.08	4875.62	0.013	0.007	4875.56	4875.63	0.02
6	18	12.09	4872.91	1.50[3]	1.77	4875.14	6.84	0.73	4875.87	29.17	4873.05	1.50	1.77	4875.53	6.84	0.73	4876.26	0.013	0.387	4875.67	4876.40	0.15
7	54	80.91	4870.78	4.50	15.90	4875.34	5.09	0.40	4875.74	102.37	4871.19	4.30	15.65	4875.49	5.17	0.42	4875.90	0.013	0.162	4875.83	4876.25	0.35
8	24	5.50	4873.22	2.00	3.14	4876.22	1.75	0.05	4876.27	284.26	4875.06	1.33	2.22	4876.39	2.47	0.10	4876.49	0.013	0.218	4876.42	4876.51	0.03
9	18	5.50	4876.09	0.81‡	0.97	4876.90	5.66	0.50	4877.37	63.38	4876.69	0.90[2]	1.10	4877.59	5.00	0.39	4877.98	0.013	0.602	4877.59	4877.98	0.00
10	18	5.50	4876.69	0.89‡	1.10	4877.58	5.00	0.39	4878.04	117.77	4877.38	0.90[2]	1.10	4878.28	5.00	0.39	4878.67	0.013	0.626	4878.28	4878.67	0.00
11	18	5.50	4877.90	1.07[3]	1.35	4878.97	4.07	0.26	4879.23	37.04	4878.04	1.07	1.35	4879.11	4.07	0.26	4879.37	0.013	0.137	4879.18	4879.44	0.07
12	54	75.41	4871.34	4.50	15.90	4876.04	4.74	0.35	4876.39	49.81	4871.49	4.50	15.90	4876.11	4.74	0.35	4876.46	0.013	0.073	4876.24	4876.59	0.12
13	24	8.43	4874.32	2.00	3.14	4876.52	2.68	0.11	4876.63	27.15	4874.46	2.00	3.14	4876.56	2.68	0.11	4876.67	0.013	0.038	4876.58	4876.69	0.02
14	18	8.13	4874.32	1.50[3]	1.77	4876.39	4.60	0.33	4876.72	6.85	4874.35	1.50	1.77	4876.43	4.60	0.33	4876.76	0.013	0.041	4876.50	4876.82	0.07
15	48	58.85	4871.99	4.00	12.56	4876.38	4.68	0.34	4876.72	155.64	4872.61	4.00	12.57	4876.61	4.68	0.34	4876.95	0.013	0.231	4876.75	4877.09	0.13
16	48	58.85	4872.76	4.00	12.56	4876.88	4.68	0.34	4877.22	40.15	4872.92	4.00	12.57	4876.92	4.68	0.34	4877.26	0.013	0.039	4877.07	4877.41	0.14
17	48	58.85	4873.07	4.00	12.56	4877.20	4.68	0.34	4877.54	28.33	4873.18	4.00	12.57	4877.25	4.68	0.34	4877.59	0.013	0.047	4877.42	4877.76	0.17
18	48	58.85	4873.33	4.00	12.56	4877.56	4.68	0.34	4877.90	66.43	4873.60	4.00	12.57	4877.67	4.68	0.34	4878.01	0.013	0.111	4877.81	4878.15	0.14
19	48	58.85	4873.75	4.00	12.56	4877.95	4.68	0.34	4878.29	368.72	4875.23	3.23	10.89	4878.46	5.41	0.45	4878.92	0.013	0.627	4878.60	4879.06	0.14
20	36	49.37	4875.73	3.00[3]	7.07	4878.73	6.99	0.76	4879.49	22.63	4875.82	3.00	7.07	4878.82	6.98	0.76	4879.58	0.013	0.088	4879.04	4879.80	0.23
21	18	6.74	4876.82	1.50	1.77	4879.67	3.81	0.23	4879.89	7.00	4876.89	1.50	1.77	4879.70	3.81	0.23	4879.92	0.013	0.029	4879.74	4879.97	0.05
22	36	42.63	4875.97	3.00	7.07	4879.46	6.03	0.57	4880.03	232.37	4876.90	3.00	7.07	4880.41	6.03	0.57	4880.98	0.013	0.949	4880.68	4881.25	0.27

Notes: Return Period = 100-yrs. [2] Critical depth. [3] Normal depth. ‡ Supercritical. r = rectangular e = elliptical a = arch

Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Energy Grade Line Calculations

Stormwater Studio 2021 v 3.0.0.24

Project Name: Pioneer Village Storm Network 21B

03-15-2021

Line No	Line Size	Q	Downstream							Length	Upstream							Pipe		Junction		
	(in)	(cfs)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	(ft)	Invert Elev (ft)	Depth (ft)	Area (sqft)	HGL Elev (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)	n Value	Enrgy Loss (ft)	HGLa Elev (ft)	EGLa Elev (ft)	Enrgy Loss (ft)
23	18	11.20	4877.90	1.50[3]	1.77	4880.87	6.34	0.62	4881.50	52.19	4878.16	1.50	1.77	4881.47	6.34	0.62	4882.09	0.013	0.594	4881.59	4882.22	0.13
24	18	5.50	4878.40	1.50	1.77	4881.16	3.11	0.15	4881.31	32.17	4878.56	1.50	1.77	4881.25	3.11	0.15	4881.40	0.013	0.088	4881.28	4881.43	0.03
25	36	25.93	4877.05	3.00	7.07	4881.12	3.67	0.21	4881.33	215.92	4877.91	3.00	7.07	4881.45	3.67	0.21	4881.66	0.013	0.326	4881.54	4881.75	0.09
26	18	8.25	4878.50	1.50[3]	1.77	4881.54	4.67	0.34	4881.88	32.18	4878.63	1.50	1.77	4881.74	4.67	0.34	4882.08	0.013	0.199	4881.92	4882.26	0.18
27	18	4.30	4878.78	1.50	1.77	4882.20	2.43	0.09	4882.30	36.17	4878.92	1.50	1.77	4882.26	2.43	0.09	4882.36	0.013	0.061	4882.28	4882.38	0.02
28	30	17.68	4878.41	2.50	4.91	4881.62	3.60	0.20	4881.83	255.00	4879.43	2.50	4.91	4882.10	3.60	0.20	4882.30	0.013	0.474	4882.27	4882.47	0.17
29	24	10.40	4879.93	2.00	3.14	4882.37	3.31	0.17	4882.54	27.00	4880.07	2.00	3.14	4882.42	3.31	0.17	4882.59	0.013	0.057	4882.46	4882.63	0.03
30	18	7.28	4880.43	1.50	1.77	4882.31	4.12	0.26	4882.58	33.23	4880.60	1.50	1.77	4882.47	4.12	0.26	4882.73	0.013	0.159	4882.62	4882.88	0.15
31	18	4.05	4880.75	1.50	1.77	4882.83	2.29	0.08	4882.91	38.33	4880.94	1.50	1.77	4882.89	2.29	0.08	4882.97	0.013	0.057	4882.90	4882.99	0.02
32	18	5.28	4876.23	1.50	1.77	4878.98	2.99	0.14	4879.11	32.17	4876.39	1.50	1.77	4879.06	2.99	0.14	4879.20	0.013	0.082	4879.11	4879.25	0.05
33	18	1.29	4876.54	1.50	1.77	4879.24	0.73	0.01	4879.25	36.17	4876.65	1.50	1.77	4879.25	0.73	0.01	4879.25	0.013	0.005	4879.25	4879.26	0.00
34	18	4.20	4877.73	1.26	1.58	4878.99	2.66	0.11	4879.10	27.58	4877.87	1.14	1.44	4879.01	2.91	0.13	4879.14	0.013	0.046	4879.04	4879.17	0.03

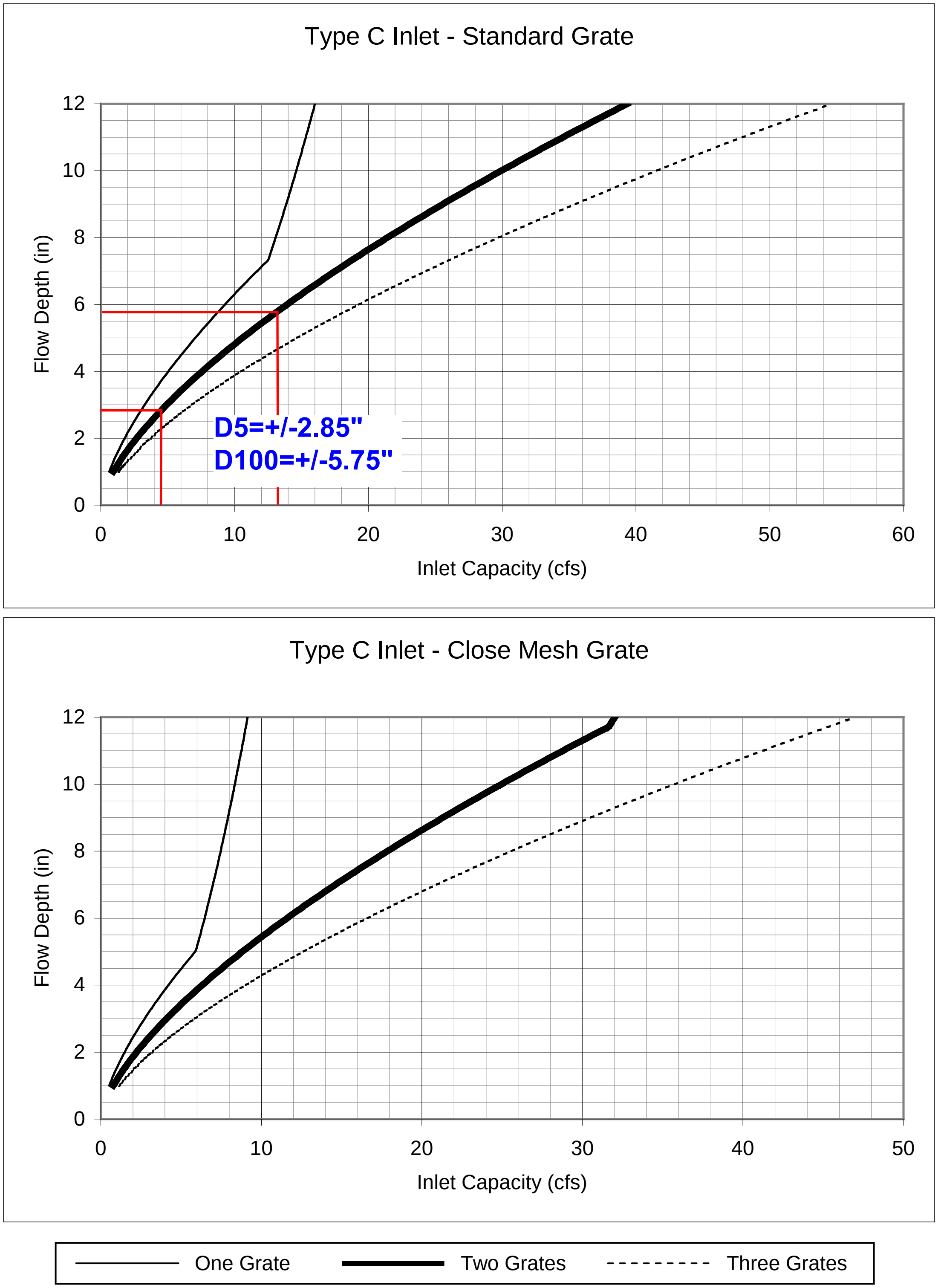
Notes: Return Period = 100-yrs. [3] Normal depth.

Project File: Pioneer Village - Network 21B Storm Analysis (2021-03-14).sws

Type C Inlet #4.02 - Capacity Analysis

FIGURE 8-9, INLET CAPACITY CHART SUMP CONDITIONS

AREA (TYPE C) INLET



Notes:

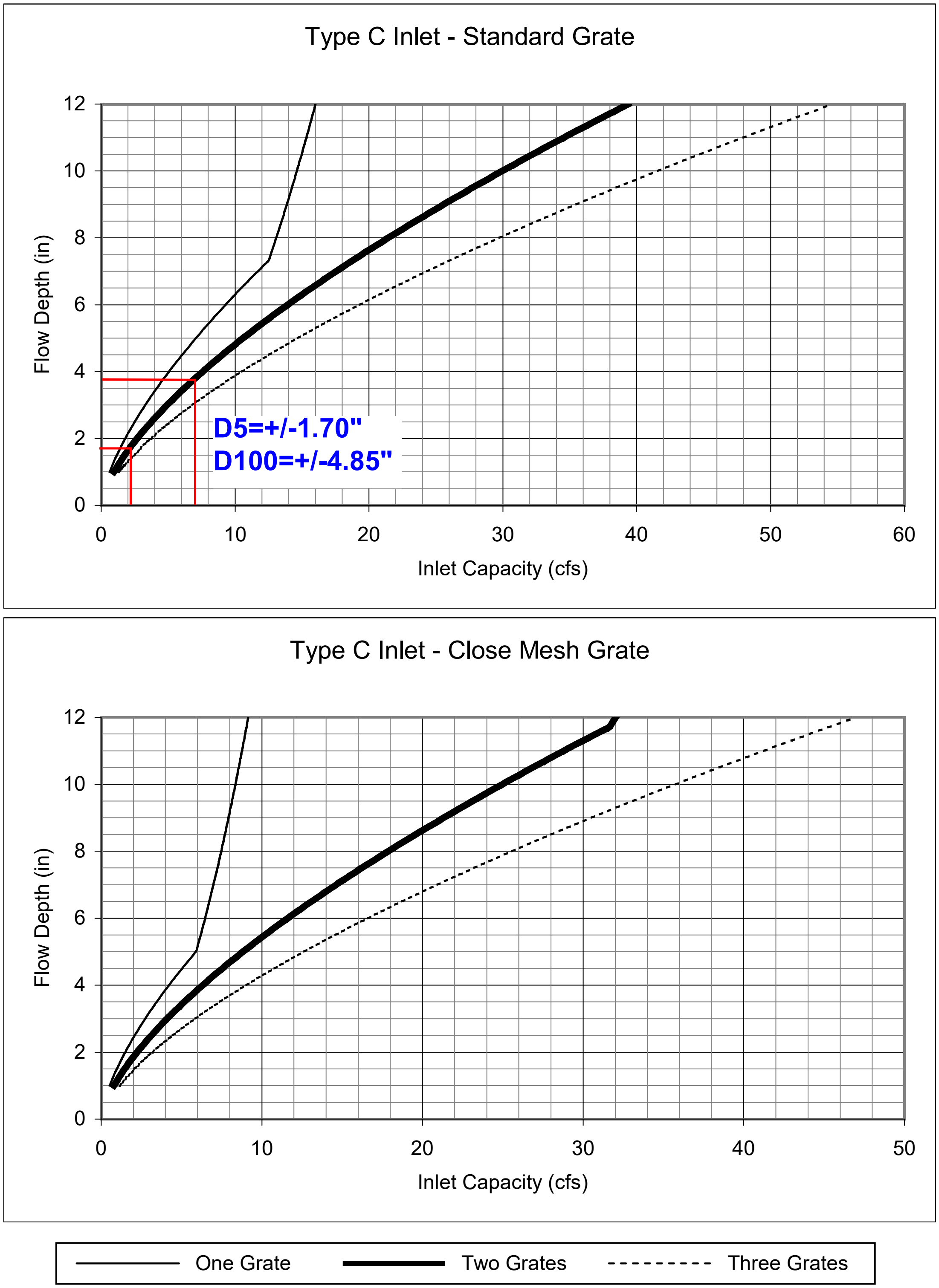
1. SEMSWA standard inlet parameters must apply to use these charts.

Inlet #10 will collect runoff from Basins 07 and 07a. Combining the flow rates of each inlet nets a Q_5 of 1.44 and Q_{100} of 2.81 CFS. The ponding depths are provided above.

Type C Inlet #4.03 - Capacity Analysis

FIGURE 8-9, INLET CAPACITY CHART SUMP CONDITIONS

AREA (TYPE C) INLET



Notes:

1. SEMSWA standard inlet parameters must apply to use these charts.

Inlet #10 will collect runoff from Basins 07 and 07a. Combining the flow rates of each inlet nets a Q_5 of 1.44 and Q_{100} of 2.81 CFS. The ponding depths are provided above.

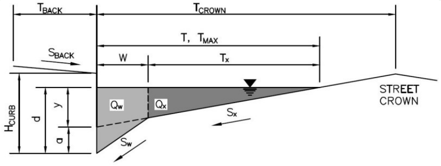
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 1.00**



Gutter Geometry (Enter data in the blue cells)

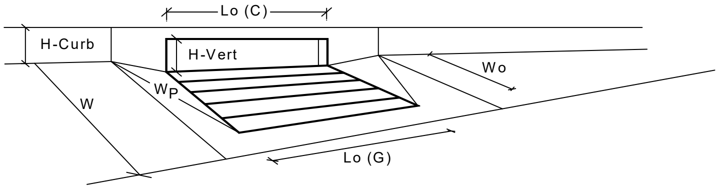
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.4	8.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	5.6	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.53	0.53	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.76	0.76	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		Q_a =	**10.3**	**10.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	2.6	8.1	cfs

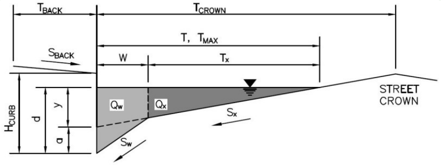
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 1.01**



Gutter Geometry (Enter data in the blue cells)

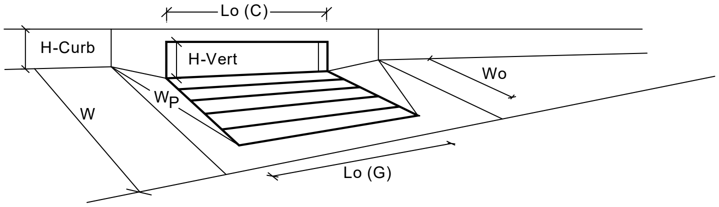
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
	Gutter Width	W =	2.00	ft
	Street Transverse Slope	S_X =	0.020	ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



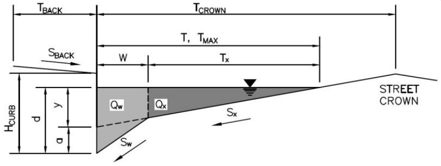
Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	5.6	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.76	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**10.3**	**10.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.9	3.1	cfs

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**
Inlet ID: **CI 1.02**



Gutter Geometry (Enter data in the blue cells)

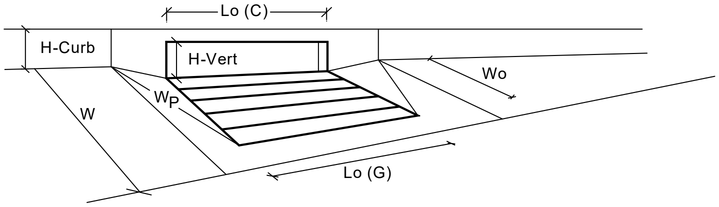
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



CDOT Type R Curb Opening

		MINOR	MAJOR	
	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	5.6	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.76	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**10.3**	**10.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.5	9.1	cfs

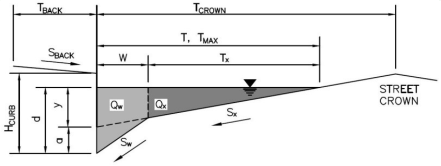
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 1.03**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

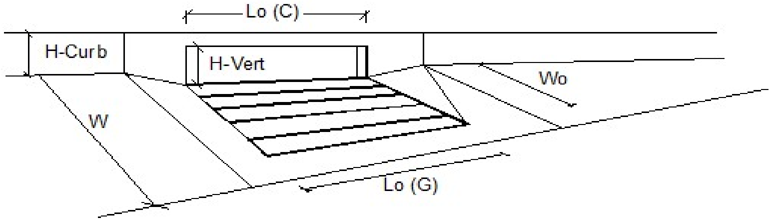
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**17.2**	**27.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)

CDOT Type R Curb Opening

		MINOR	MAJOR	
	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.3**	**8.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**99**	**%**

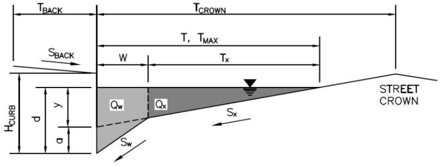
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 1.04**



Gutter Geometry (Enter data in the blue cells)

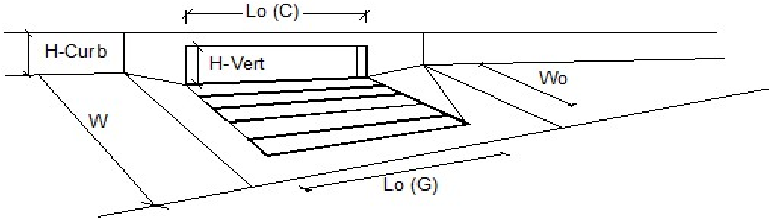
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.014		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**16.6**	**27.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

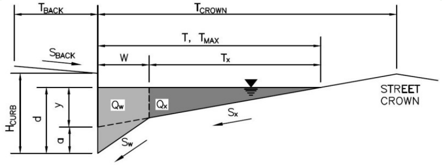
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.5**	**11.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**97**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**
Inlet ID: **CI 1.05**



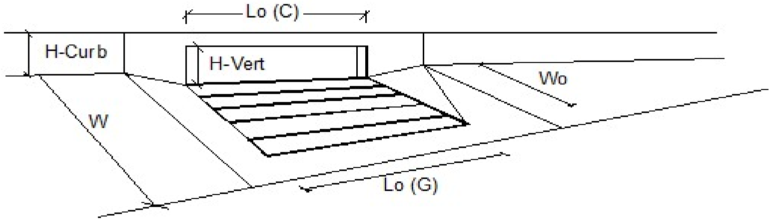
Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.014		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**16.6**	**27.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



De		MINOR	MAJOR	
Typ CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.3**	**6.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

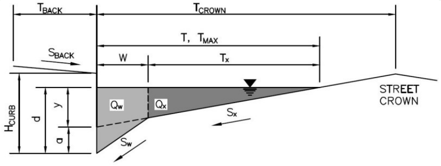
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 1.06**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	22.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.9	8.9	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

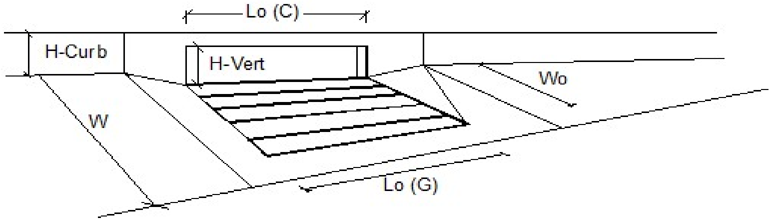
MINOR STORM Allowable Capacity is based on Spread Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**6.6**	**54.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**1.0**	**3.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

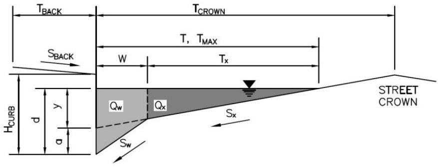
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 1.07**



Gutter Geometry (Enter data in the blue cells)

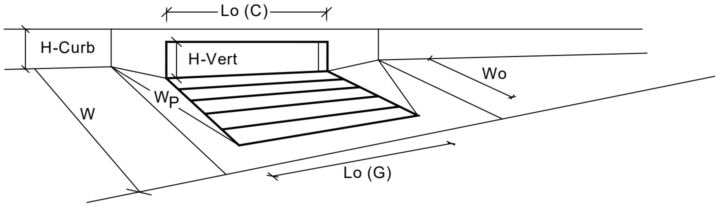
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▼	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	6.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.37	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.60	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.81	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

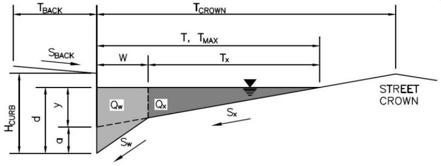
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**8.0**	**11.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.8	2.1	cfs

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**
Inlet ID: **CI 1.08**



Gutter Geometry (Enter data in the blue cells)

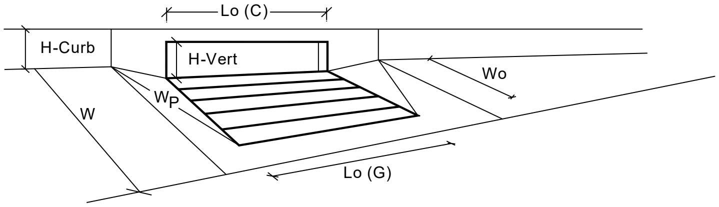
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▾

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	6.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.37	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.60	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.81	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.0**	**11.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.6	4.2	cfs

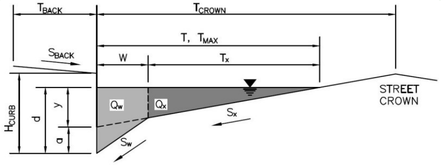
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 2.00**



Gutter Geometry (Enter data in the blue cells)

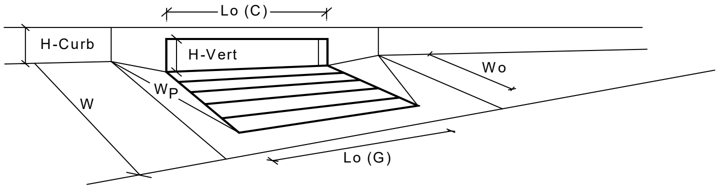
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.4	8.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	8.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.79	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.91	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

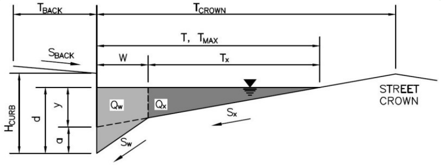
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**10.3**	**29.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	4.8	15.1	cfs

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**
Inlet ID: **CI 2.01**



Gutter Geometry (Enter data in the blue cells)

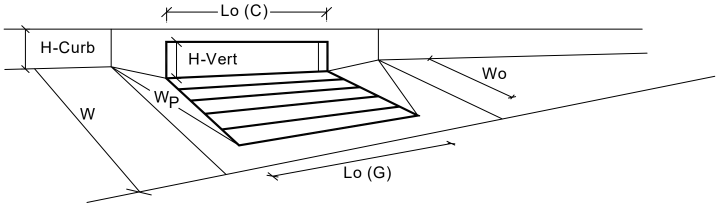
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	6.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.37	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.60	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.81	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**10.3**	**14.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{\text{PEAK REQUIRED}}$ =	3.8	12.5	cfs

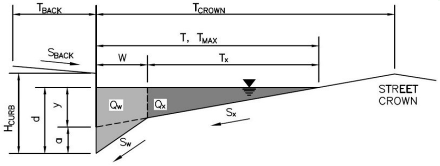
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 2.02**



Gutter Geometry (Enter data in the blue cells)

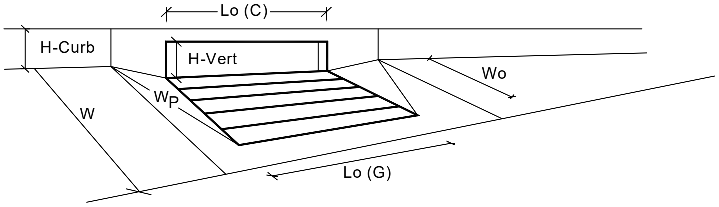
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion **MAJOR STORM Allowable Capacity is based on Depth Criterion**	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



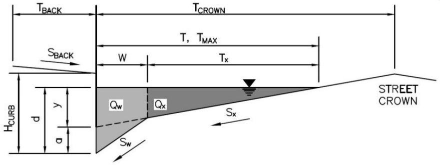
		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	6.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.37	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.60	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.81	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**10.3**	**14.8**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.0	12.4	cfs

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Pioneer Village, Keenesburg CO
Inlet ID: CI 2.03



Gutter Geometry (Enter data in the blue cells)

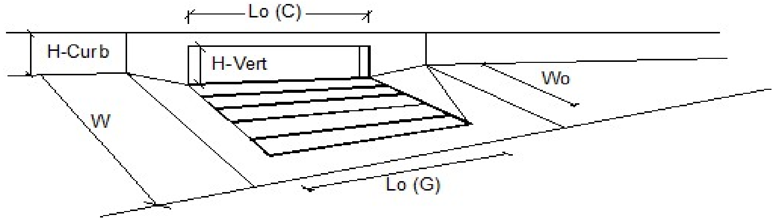
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**17.2**	**27.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.4**	**13.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

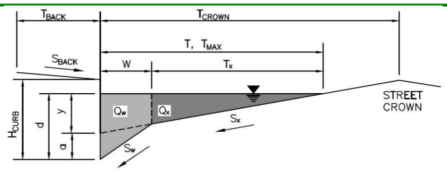
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Pioneer Village, Keenesburg CO

Inlet ID: CI 2.04



Gutter Geometry (Enter data in the blue cells)

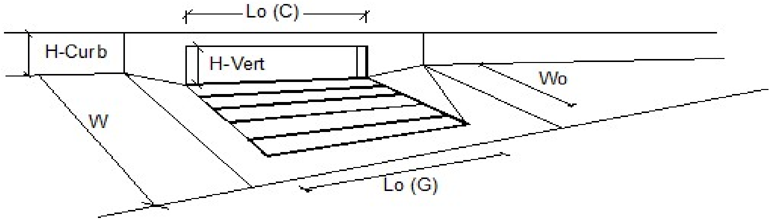
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.021		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**20.3**	**20.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.9**	**12.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**3.1**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**80**	**%**

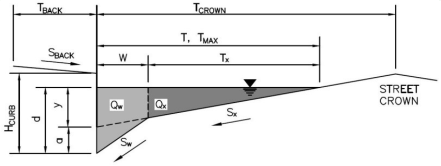
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 2.05**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

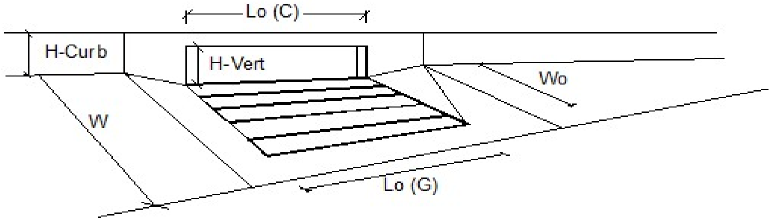
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**17.7**	**28.8**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.4**	**14.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**6.6**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**69**	**%**

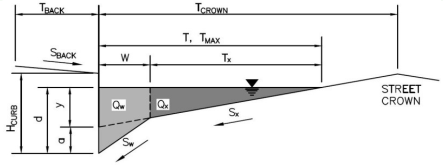
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 2.06**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

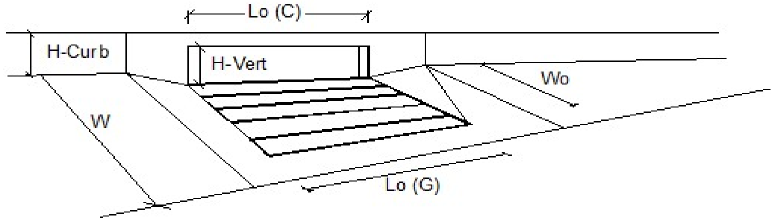
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**16.0**	**26.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▼		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.5**	**13.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**4.2**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**75**	**%**

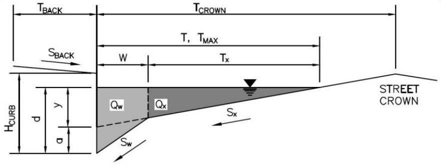
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI 2.07**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.021		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

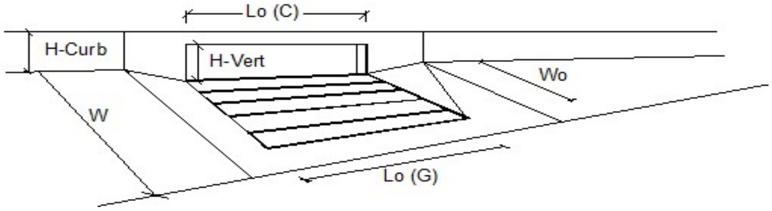
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**20.3**	**32.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.8**	**5.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

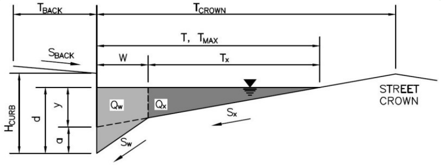
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Enter Your Project Name Here

Inlet ID: CI 3.00



Gutter Geometry (Enter data in the blue cells)

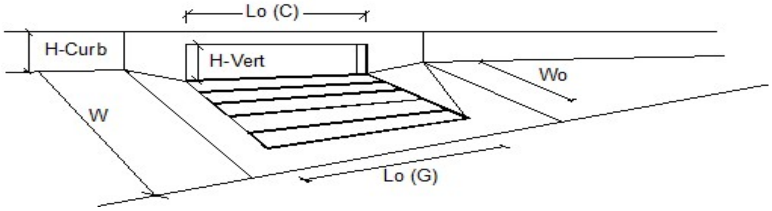
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**17.2**	**27.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▼

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.4**	**8.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**98**	**%**

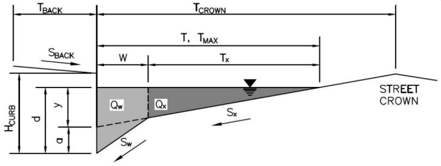
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 3.01**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

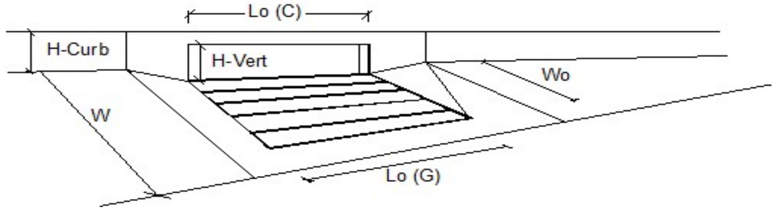
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**17.2**	**27.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▼

		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.9**	**13.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**95**	**%**

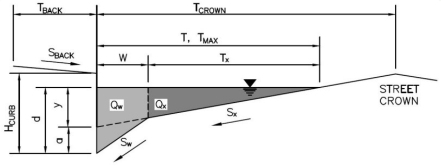
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 3.02**



Gutter Geometry (Enter data in the blue cells)

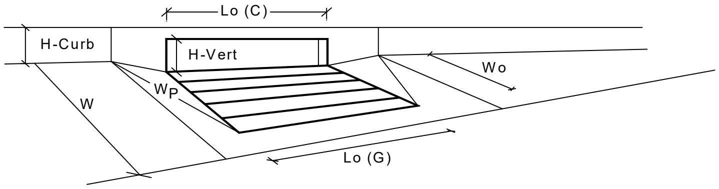
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	17.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▼	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	6.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.37	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.60	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.81	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**8.0**	**11.6**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	3.8	10.4	cfs

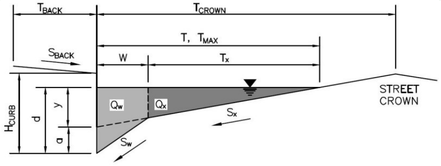
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 3.03**



Gutter Geometry (Enter data in the blue cells)

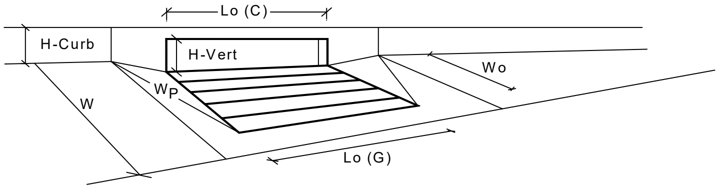
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening	CDOT Type R Curb Opening	
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.57	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.79	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

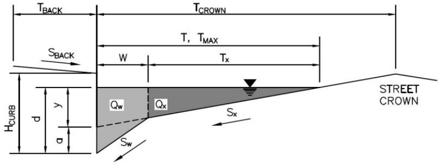
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**8.0**	**9.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.9	6.8	cfs

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Enter Your Project Name Here
Inlet ID: CI 3.04



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

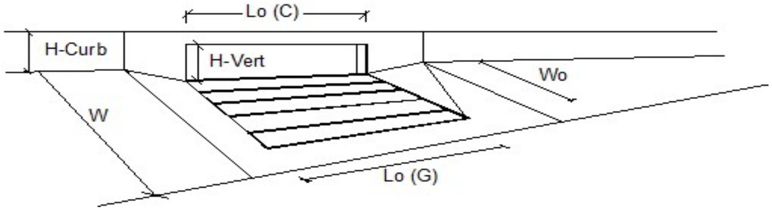
Warning 02

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.2**	**10.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**87**	**%**

Selected: CDOT Type R Curb Opening

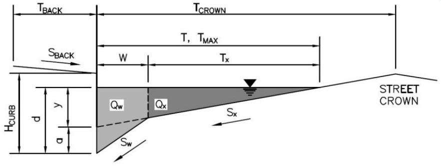
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 3.05**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.019	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

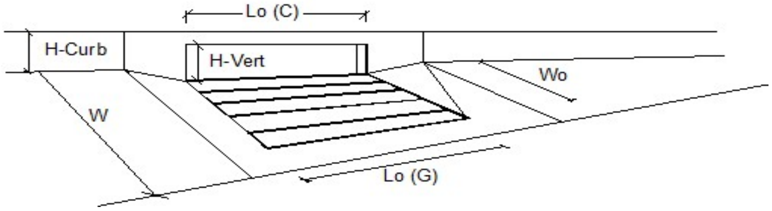
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**19.3**	**31.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.4**	**5.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

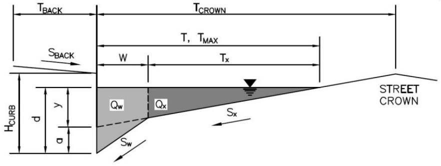
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Enter Your Project Name Here

Inlet ID: CI 3.06



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.019	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

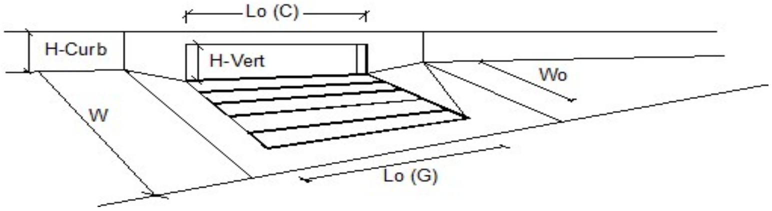
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**19.3**	**31.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



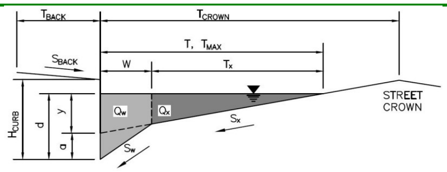
		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.2**	**7.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Enter Your Project Name Here
Inlet ID: CI 3.07



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

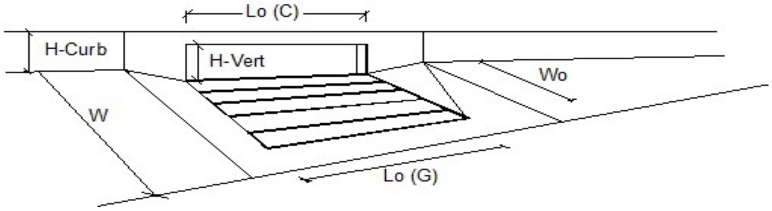
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



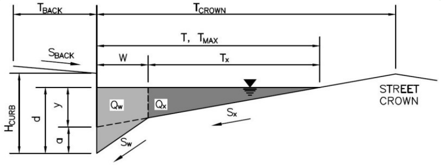
Design Information (Input)	CDOT Type R Curb Opening ▾		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.8**	**6.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**99**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**
Inlet ID: **CI 3.08**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

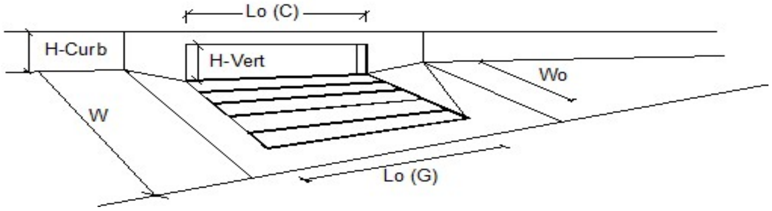
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	11.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.6	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**4.1**	**11.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.2**	**2.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

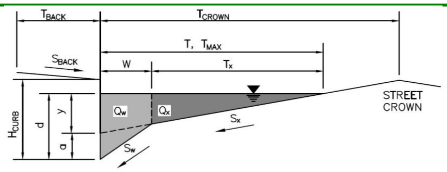
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 3.08A**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	11.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.6	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

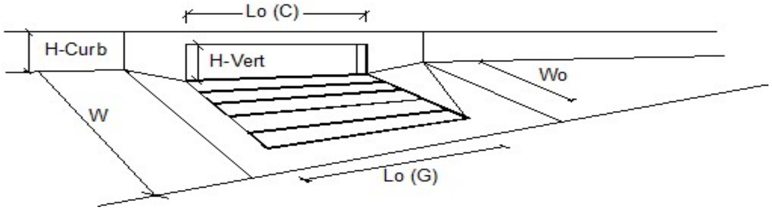
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**4.1**	**11.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▾		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.9**	**2.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

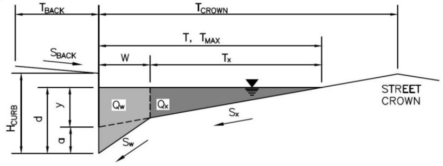
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 3.09**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

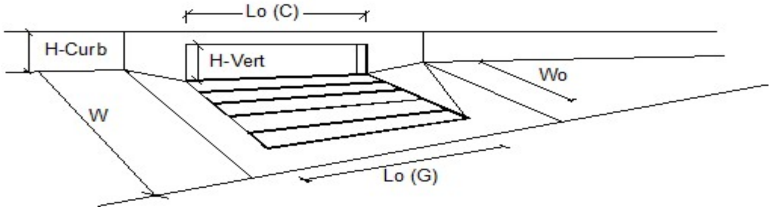
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**19.8**	**32.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.2**	**9.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

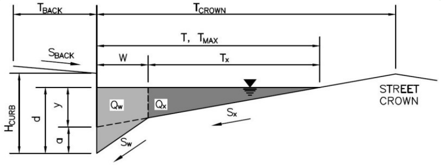
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 4.00**



Gutter Geometry (Enter data in the blue cells)

	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
	Gutter Width	W =	2.00	ft
	Street Transverse Slope	S_X =	0.020	ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.009	ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

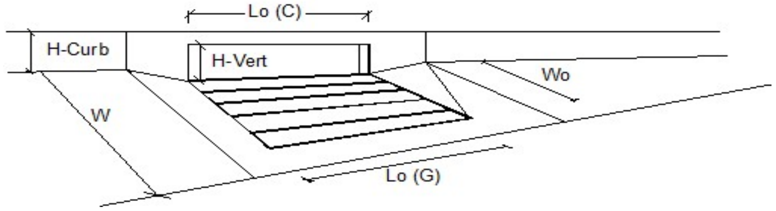
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.3**	**21.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▾

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.7**	**15.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**2.4**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**99**	**87**	**%**

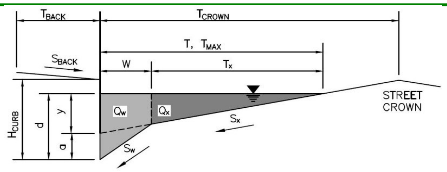
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI4.01**



Gutter Geometry (Enter data in the blue cells)

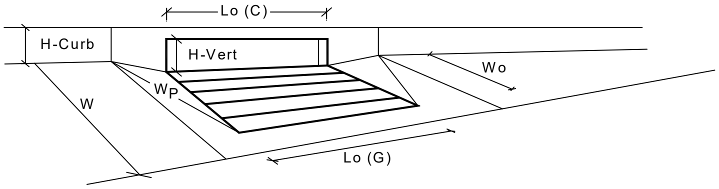
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.4	8.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	8.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.79	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.91	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**10.3**	**29.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.3	10.8	cfs

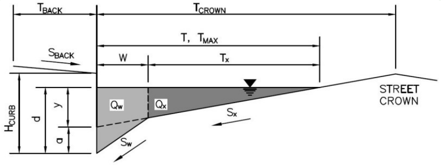
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 4.04**



Gutter Geometry (Enter data in the blue cells)

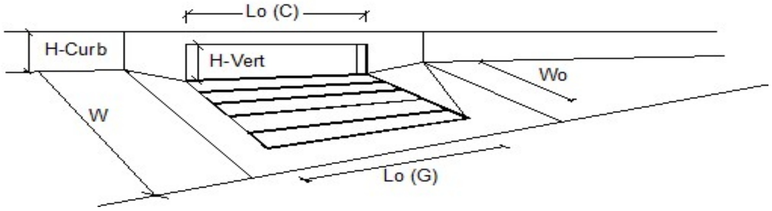
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.3**	**15.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**2.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**98**	**86**	**%**

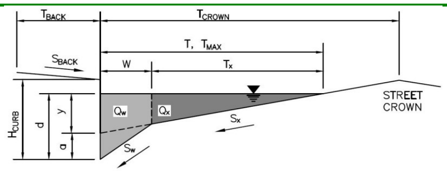
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 4.01A**



Gutter Geometry (Enter data in the blue cells)

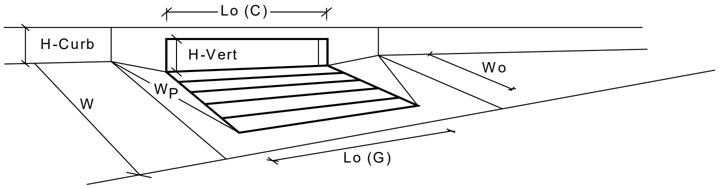
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	11.0	23.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.6	6.0	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion **MAJOR STORM Allowable Capacity is based on Depth Criterion**	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.2	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.18	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.39	0.57	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.65	0.79	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**3.2**	**9.7**	**cfs**
WARNING: Inlet Capacity less than Q Peak for Minor Storm	$Q_{PEAK REQUIRED}$ =	3.5	8.2	cfs

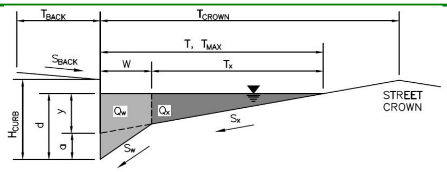
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Enter Your Project Name Here

Inlet ID: CI 4.05



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

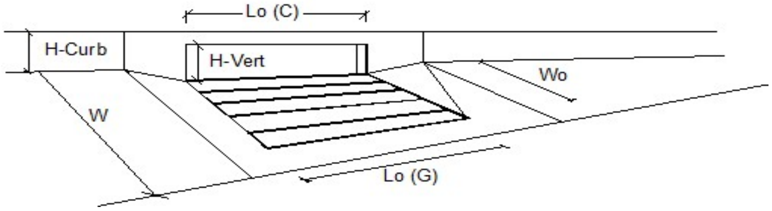
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**14.0**	**22.8**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

CDOT Type R Curb Opening

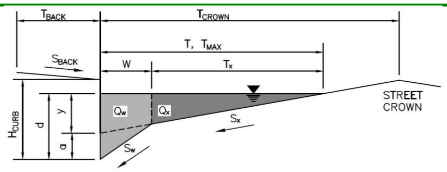
		MINOR	MAJOR	
Street Hydraulics: OK - Q < Allowable Street Capacity'				
Total Inlet Interception Capacity	**Q =**	**4.8**	**10.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**90**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Enter Your Project Name Here
Inlet ID: CI 4.06



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.014	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

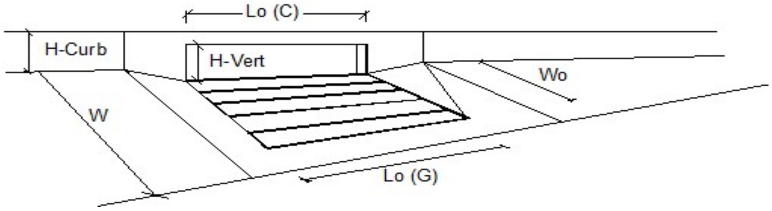
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**17.9**	**29.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

CDOT Type R Curb Opening ▼

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.5**	**3.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

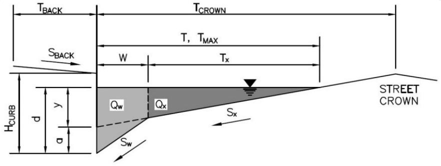
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Enter Your Project Name Here**

Inlet ID: **CI 4.07**



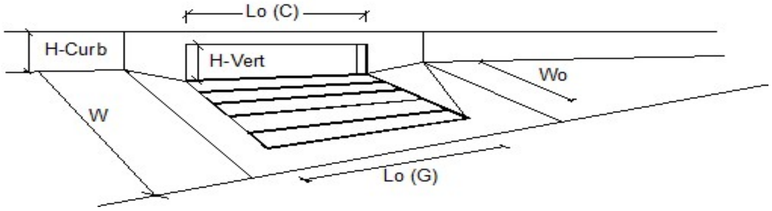
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**23.4**	**30.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

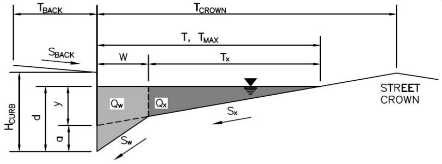
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.7**	**8.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**
Inlet ID: **CI 10.1**



Gutter Geometry (Enter data in the blue cells)

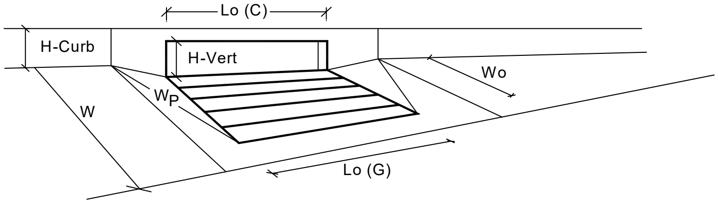
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.4	8.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion **MAJOR STORM Allowable Capacity is based on Depth Criterion**	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



		MINOR	MAJOR	
Design Information (Input)				
CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	5.6	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	0.76	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**8.0**	**8.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.6	4.2	cfs

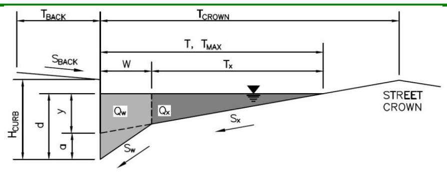
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Pioneer Village - Keenesburg, Colorado

Inlet ID: CI 17A.01



Gutter Geometry (Enter data in the blue cells)

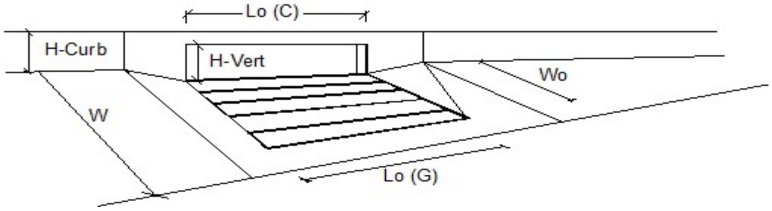
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.011		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.8	9.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**14.0**	**88.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**8.2**	**15.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**3.2**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**83**	**%**

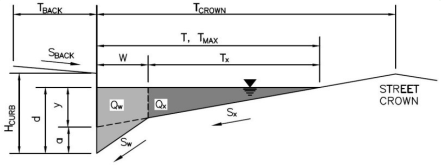
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.02**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.012	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.8	9.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

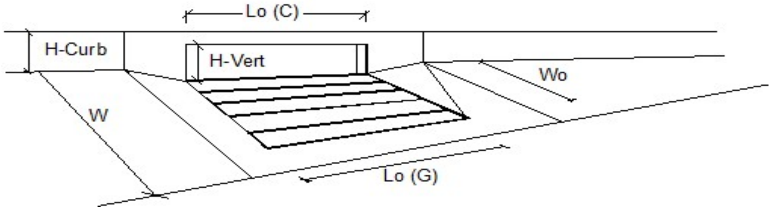
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**14.6**	**92.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



		MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening ▾			
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.3**	**17.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**5.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**77**	**%**

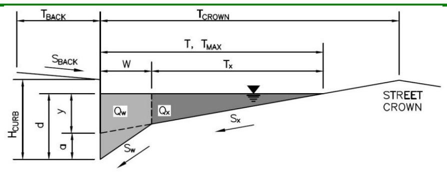
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.03**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.8	9.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

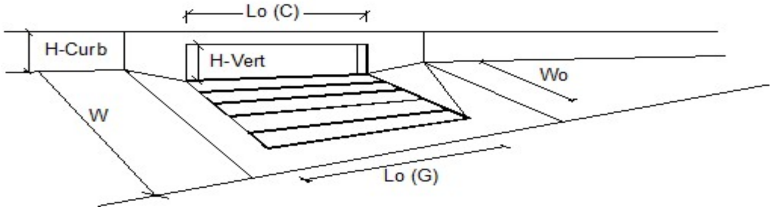
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**16.4**	**103.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.4**	**13.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**91**	**%**

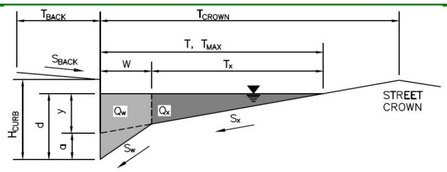
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Pioneer Village - Keenesburg, Colorado

Inlet ID: CI 17A.04



Gutter Geometry (Enter data in the blue cells)

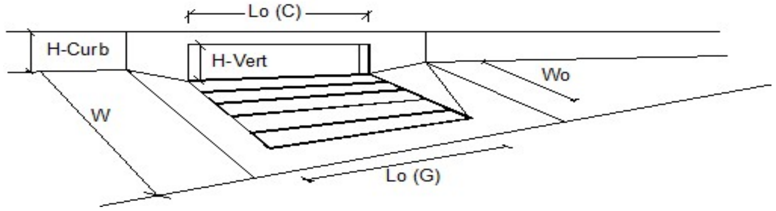
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.011		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.8	9.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.7**	**86.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.0**	**19.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**8.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**70**	**%**

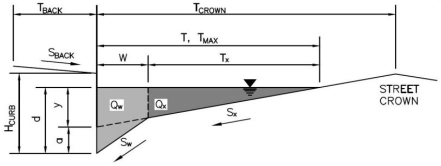
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.05**



Gutter Geometry (Enter data in the blue cells)

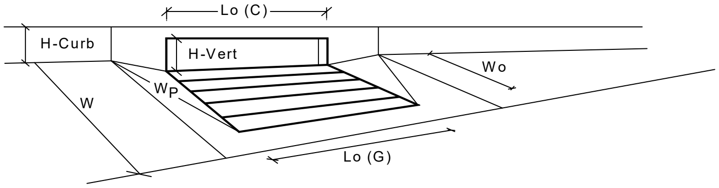
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



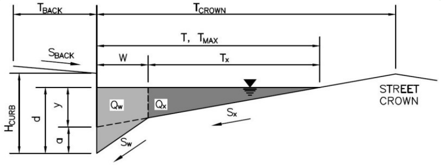
Design Information (Input)	CDOT Type R Curb Opening ▾	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	9.0	9.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.58	0.58	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.85	0.85	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	0.93	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**34.3**	**34.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	8.4	23.8	cfs

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**
Inlet ID: **CI 17A.06**

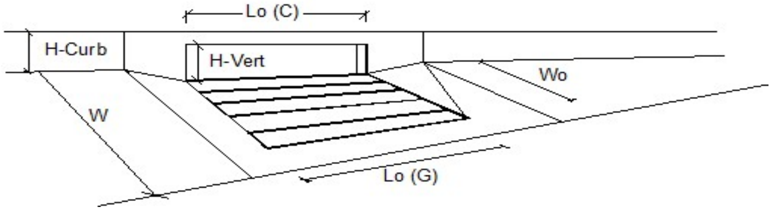


Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.018		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**18.8**	**30.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**10.4**	**20.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**6.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**99**	**75**	**%**

CDOT Type R Curb Opening ▾

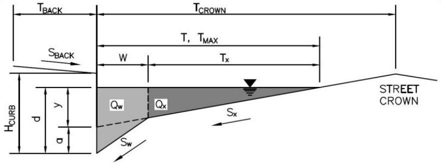
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.07**



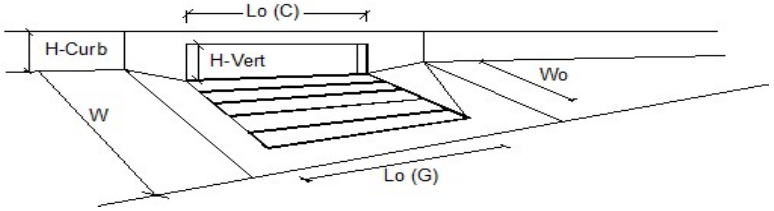
	Gutter Geometry (Enter data in the blue cells)				
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.014		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
			Minor Storm	Major Storm	
	MINOR STORM Allowable Capacity is based on Spread Criterion				
	MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**16.6**	**27.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.4**	**12.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**80**	**%**

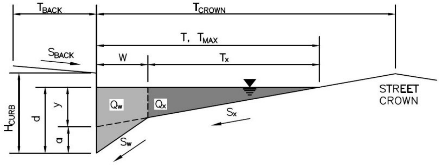
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.08**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.024		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

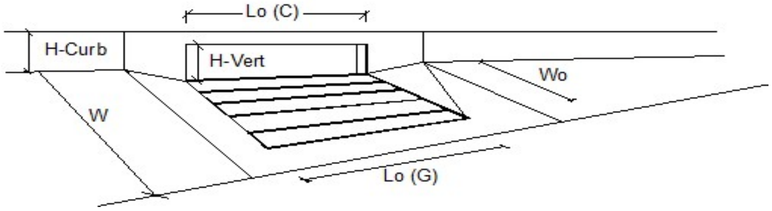
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**21.7**	**31.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



			MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening				
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.4**	**5.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

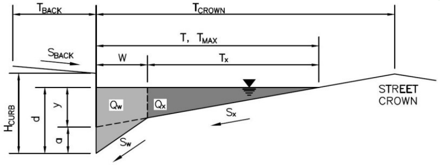
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.09**



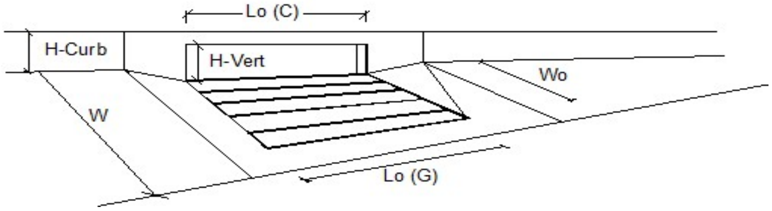
	Gutter Geometry (Enter data in the blue cells)				
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.021		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
			Minor Storm	Major Storm	
	MINOR STORM Allowable Capacity is based on Spread Criterion				
	MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**20.3**	**32.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▼		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.1**	**7.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

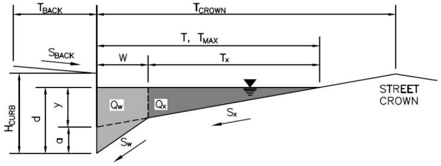
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.10**



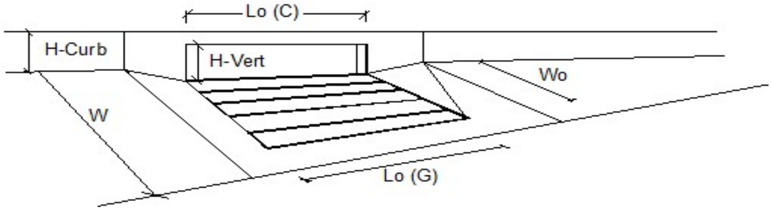
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.017		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**18.3**	**29.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.0**	**16.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**88**	**%**

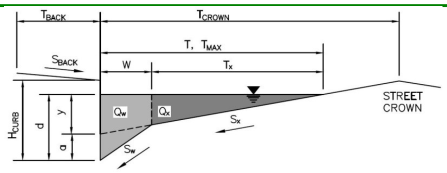
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.11**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.019	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

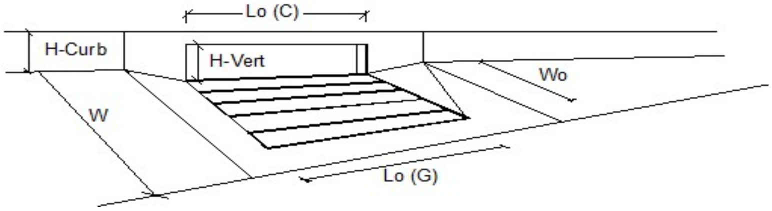
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**19.3**	**31.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▾

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.7**	**11.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**86**	**%**

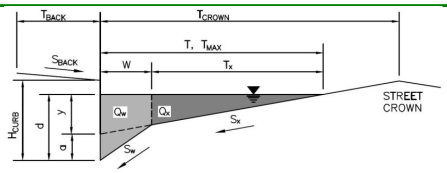
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17B.12**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	

Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.015	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

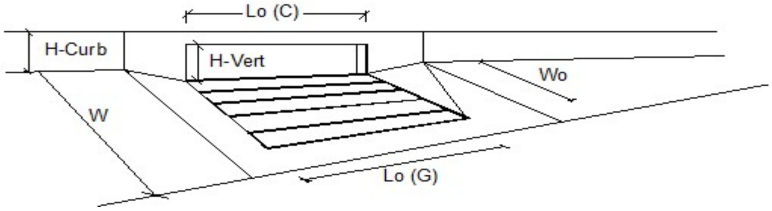
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**17.2**	**27.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



			MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening				
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**7.3**	**15.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**2.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**89**	**%**

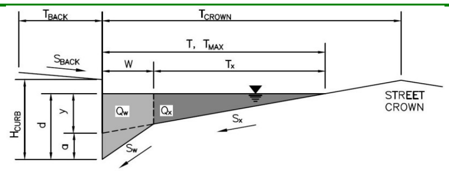
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 17A.13**



Gutter Geometry (Enter data in the blue cells)

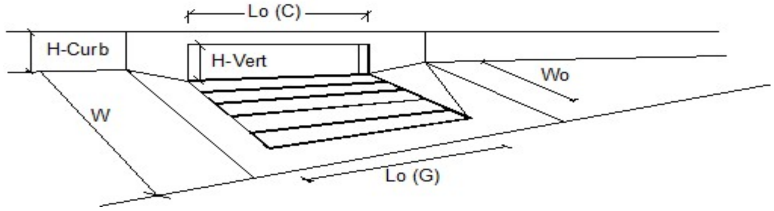
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.0**	**22.8**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**3.8**	**8.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.4**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**96**	**%**

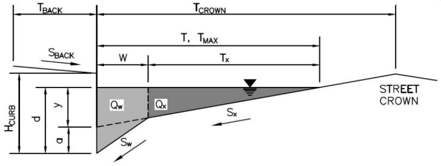
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Pioneer Village - Keenesburg, Colorado

Inlet ID: CI 17A.14



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.011	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

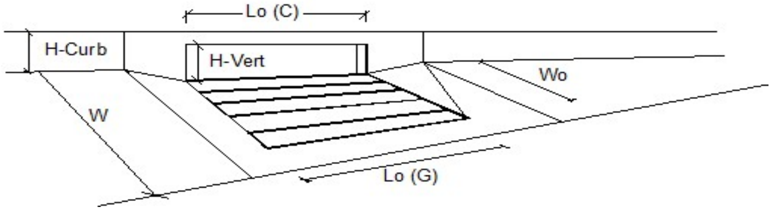
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**15.9**	**25.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.7**	**12.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.7**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**95**	**%**

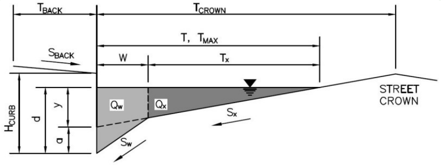
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.13**



Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	7.5	7.5	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	4.1	4.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.6	0.6	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**12.1**	**12.1**	**cfs**
Flow Velocity within the Gutter Section	V =	5.3	5.3	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.5	2.5	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	20.4	20.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	18.4	18.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.291	0.291	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	12.9	12.9	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	12.8	12.8	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	5.3	5.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	1.7	1.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	19.7	19.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	5.9	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.1	3.1	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq$ 6") Storm	R =	1.00	1.00	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**19.7**	**19.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	6.40	6.40	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.81	0.81	inches

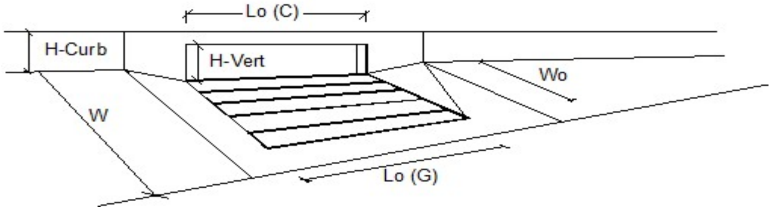
MINOR STORM Allowable Capacity is based on Spread Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**1.4**	**3.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

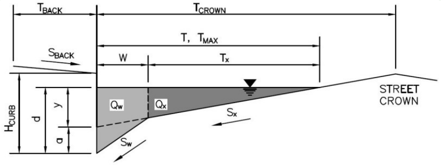
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.01(NE)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.004		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.8	9.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

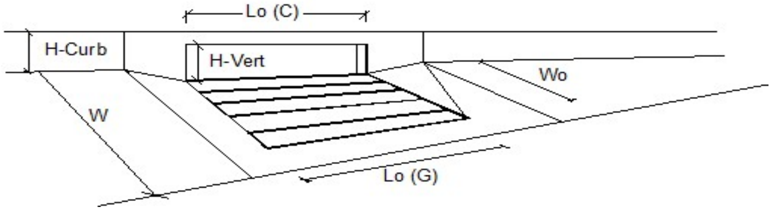
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.0**	**50.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▼	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**4.1**	**9.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

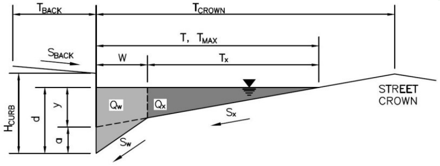
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.01(NW)**



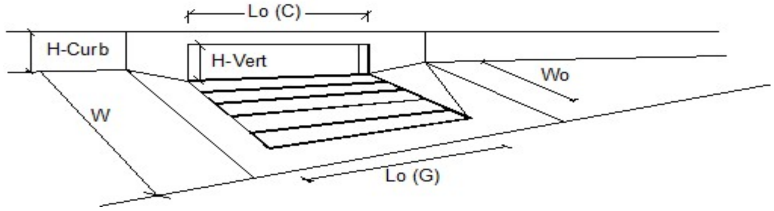
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.004		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.8	9.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.0**	**50.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.7**	**10.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**97**	**%**

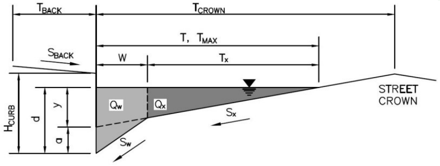
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.01(S)**



Gutter Geometry (Enter data in the blue cells)

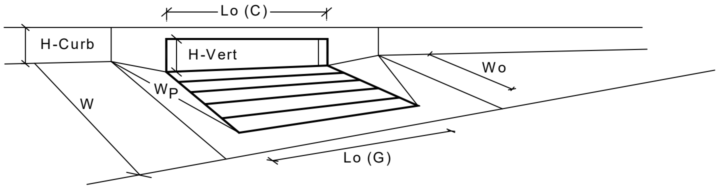
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.6	7.1	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▼	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	7.1	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	20.00	20.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.30	0.43	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.53	0.67	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.76	0.85	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		Q_a =	**10.3**	**19.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	8.3	19.1	cfs

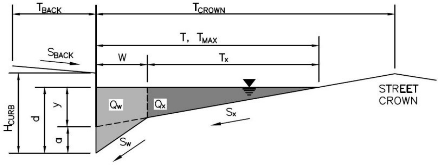
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Pioneer Village - Keenesburg, Colorado

Inlet ID: CI 21A.02 (Carryover)



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.009	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

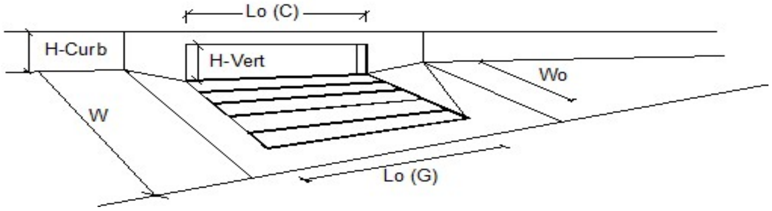
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.3**	**21.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input) CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.0**	**5.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**0**	**100**	**%**

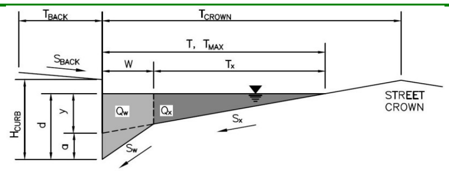
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.02**



Gutter Geometry (Enter data in the blue cells)

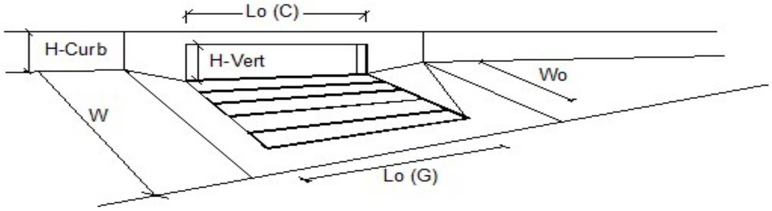
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	16.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.090		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	23.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	5.8	9.8	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**15.7**	**63.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**9.6**	**17.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**5.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**78**	**%**

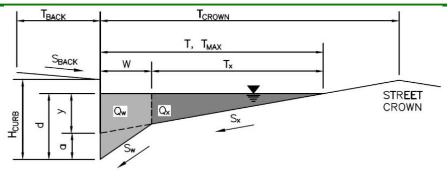
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.02A**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

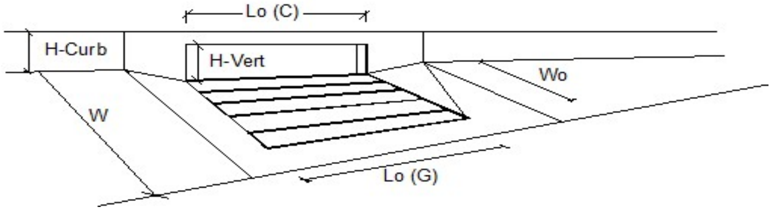
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**19.8**	**32.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**1.0**	**3.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

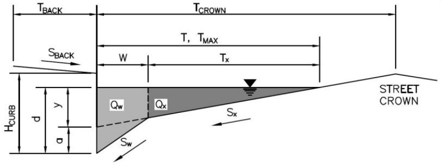
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.03**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.011		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

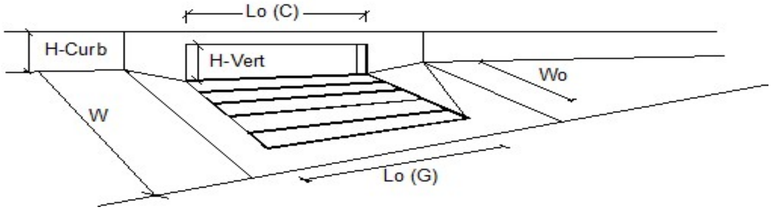
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.7**	**23.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.2**	**9.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**92**	**%**

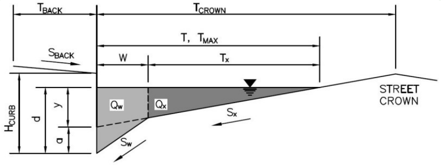
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.04**



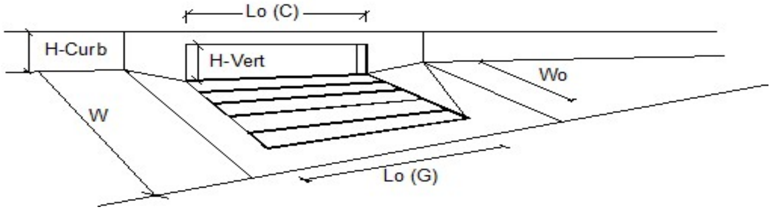
	Gutter Geometry (Enter data in the blue cells)				
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
			Minor Storm	Major Storm	
	MINOR STORM Allowable Capacity is based on Spread Criterion				
	MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**13.1**	**21.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.3**	**9.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**92**	**%**

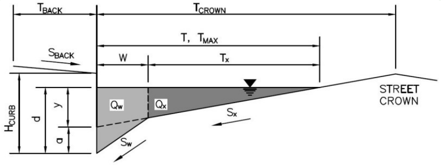
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.05**



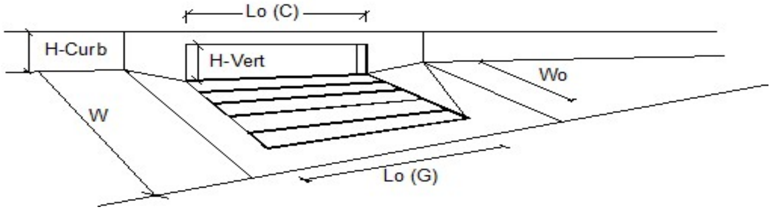
	Gutter Geometry (Enter data in the blue cells)				
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
			Minor Storm	Major Storm	
	MINOR STORM Allowable Capacity is based on Spread Criterion				
	MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**13.1**	**21.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.0**	**11.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**81**	**%**

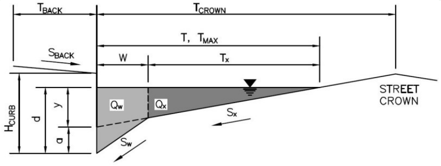
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.06**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

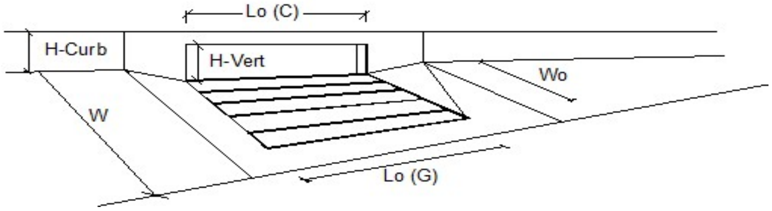
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.0**	**6.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**1.2**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**84**	**%**

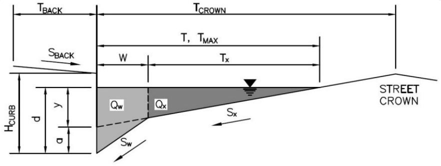
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.07**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

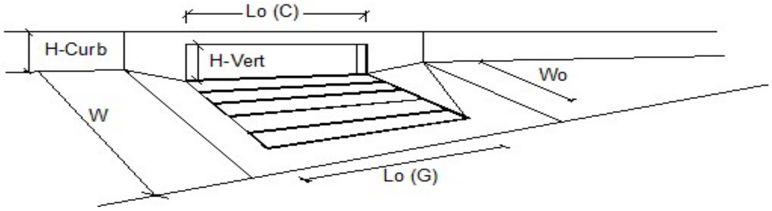
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▾

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.3**	**8.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**96**	**%**

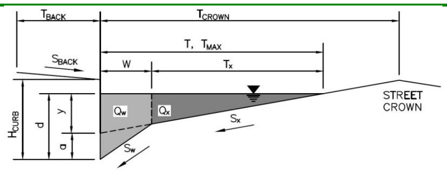
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.08**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

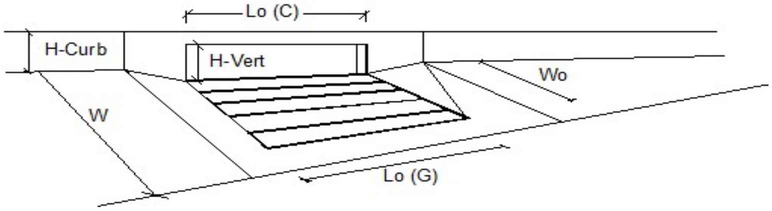
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▼

		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.0**	**9.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**91**	**%**

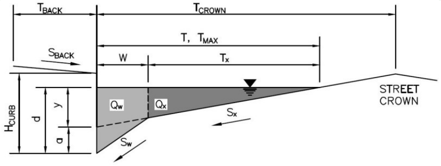
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.10**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

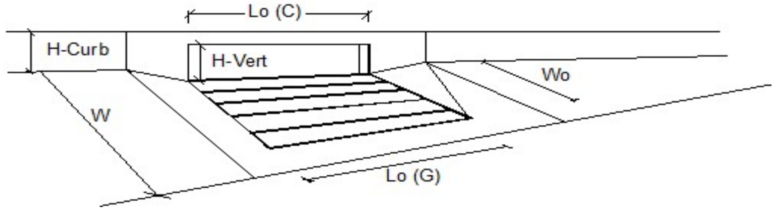
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.5**	**20.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▾		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.2**	**11.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**3.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**99**	**79**	**%**

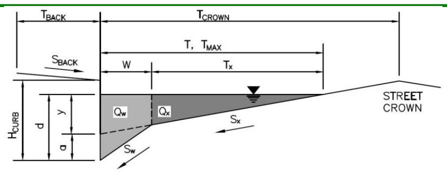
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.11**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.011	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

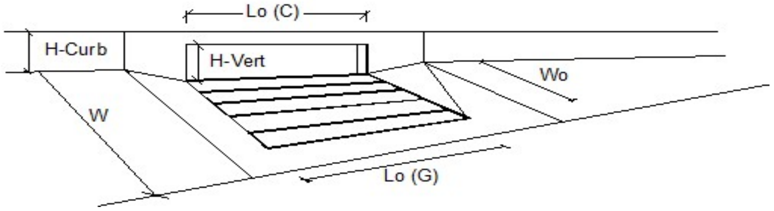
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.7**	**23.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**3.1**	**9.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.7**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**93**	**%**

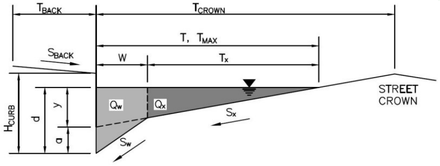
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.12**



Gutter Geometry (Enter data in the blue cells)

	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.011		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

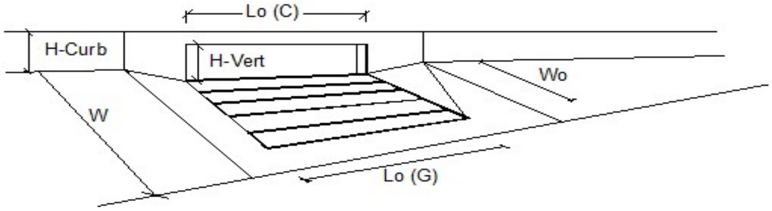
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**14.7**	**23.9**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**6.4**	**11.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**81**	**%**

CDOT Type R Curb Opening

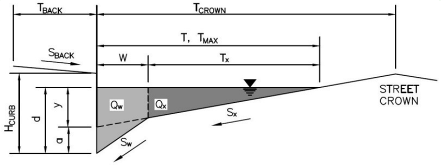
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21A.13**



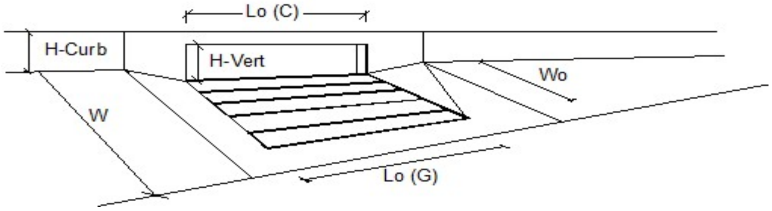
	Gutter Geometry (Enter data in the blue cells)				
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
	MINOR STORM Allowable Capacity is based on Spread Criterion		Minor Storm	Major Storm	
	MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**16.0**	**26.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



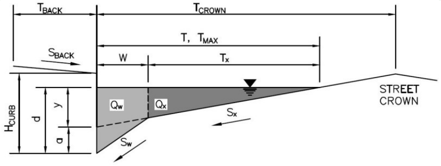
		MINOR	MAJOR	
Design Information (Input) CDOT Type R Curb Opening				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.8**	**8.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**97**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**
Inlet ID: **CI 21A.14**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

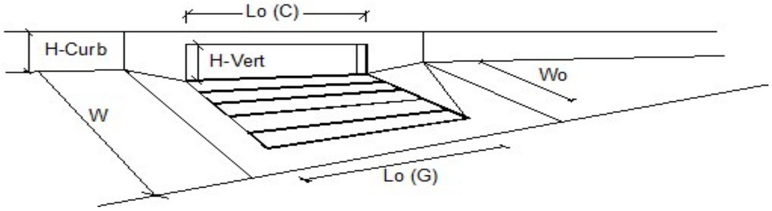
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.5**	**20.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.4**	**5.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**99**	**%**

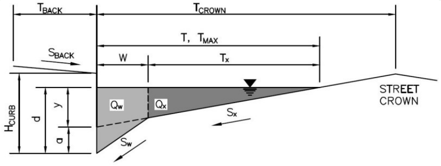
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.01**



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.003	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	7.0	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

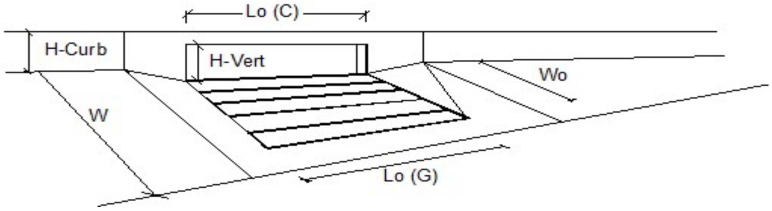
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.7**	**17.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**5.5**	**11.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.1**	**1.2**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**97**	**91**	**%**

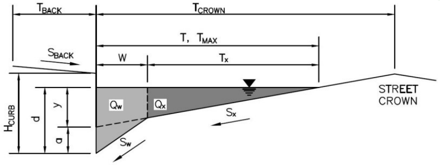
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.02**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.003	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

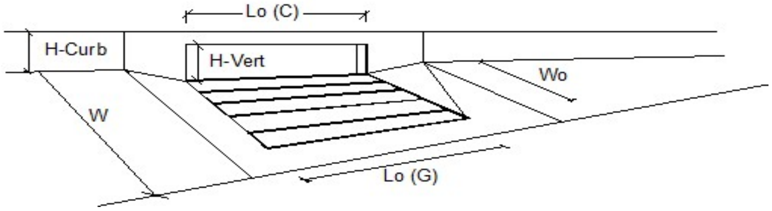
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**7.7**	**12.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening ▾		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**2.9**	**6.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.3**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**96**	**%**

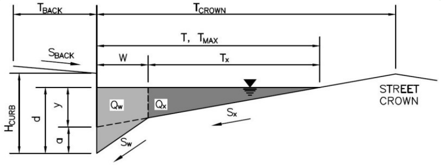
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.03**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.065		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

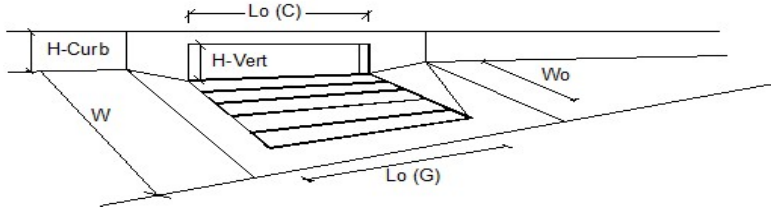
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**23.3**	**23.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▼

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.5**	**8.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

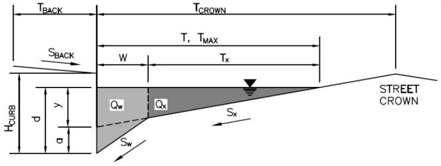
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.04**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

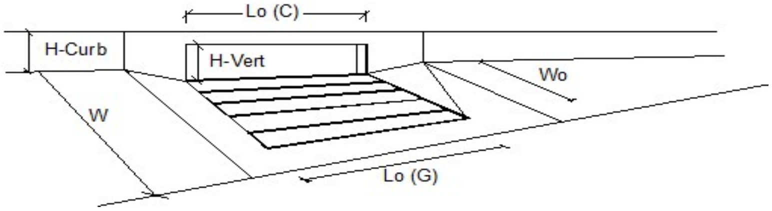
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**11.3**	**18.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



			MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening				
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**3.6**	**8.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.3**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**96**	**%**

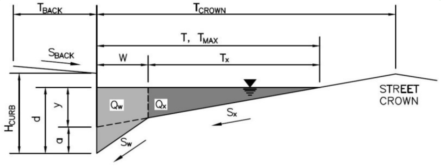
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.05**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.012		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

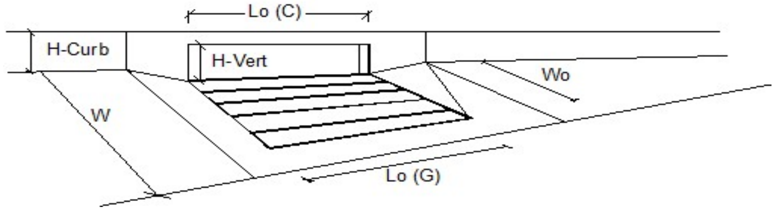
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**15.0**	**24.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.7**	**4.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

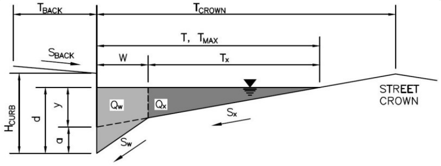
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.06**



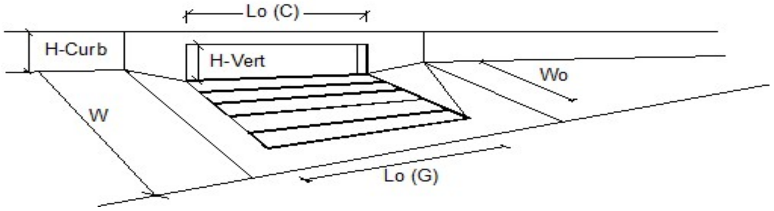
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▼	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**0.6**	**1.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

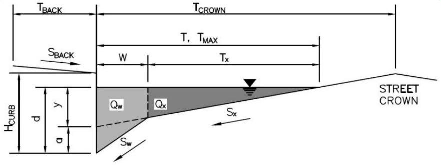
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.07**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.004	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

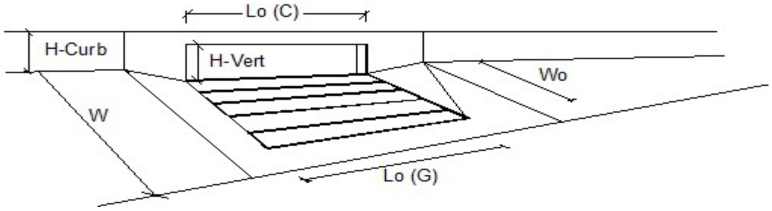
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**8.9**	**14.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.5**	**4.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**98**	**%**

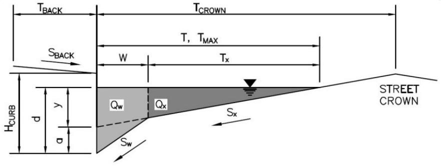
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.08**



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.750	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	75.2	75.2	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	40.5	40.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	5.6	5.6	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**121.3**	**121.3**	**cfs**
Flow Velocity within the Gutter Section	V =	52.9	52.9	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	24.7	24.7	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	20.4	20.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	18.4	18.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.291	0.291	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	129.1	129.1	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	127.7	127.7	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	53.0	53.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	16.6	16.6	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	197.3	197.3	cfs
Average Flow Velocity Within the Gutter Section	V =	58.8	58.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	31.4	31.4	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq$ 6") Storm	R =	0.06	0.06	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**11.2**	**11.2**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	2.87	2.87	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.00	inches

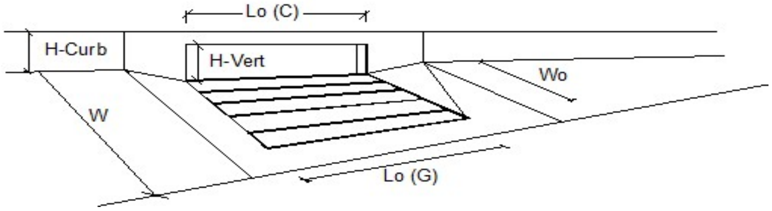
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**11.2**	**11.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▼ Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.6**	**6.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

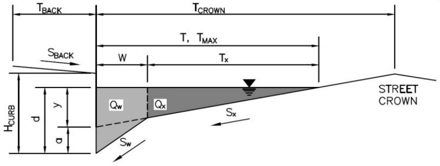
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.09**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.004	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

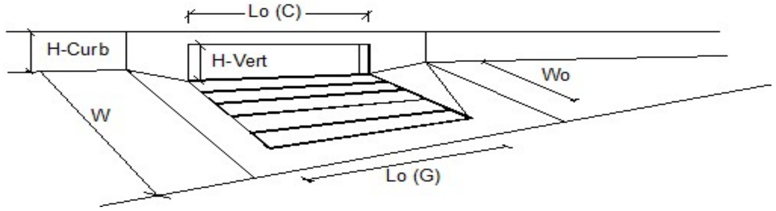
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.9**	**14.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet — CDOT Type R Curb Opening	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	20.00	20.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

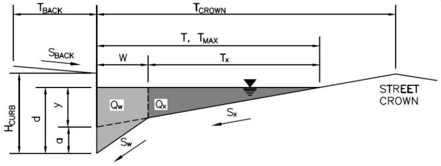
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.3**	**11.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**99**	**93**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**
Inlet ID: **CI 21B.10**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

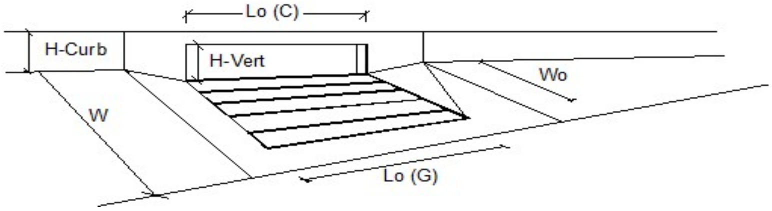
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.7**	**5.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**90**	**%**

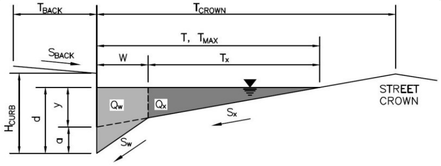
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.11**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

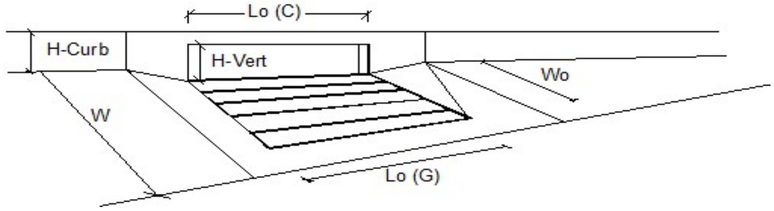
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)

CDOT Type R Curb Opening

		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.7**	**4.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

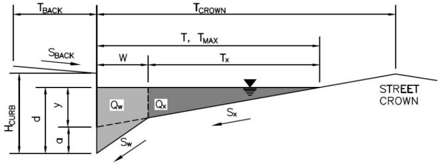
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.12**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.020	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	4.9	4.9	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	2.6	2.6	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.6	0.6	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**8.1**	**8.1**	**cfs**
Flow Velocity within the Gutter Section	V =	3.4	3.4	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	1.6	1.6	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	20.4	20.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	18.4	18.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.291	0.291	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	8.4	8.4	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	8.3	8.3	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.4	3.4	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	1.7	1.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	13.4	13.4	cfs
Average Flow Velocity Within the Gutter Section	V =	3.8	3.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.0	2.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq$ 6") Storm	R =	1.00	1.00	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**13.4**	**13.4**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	6.40	6.40	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.81	0.81	inches

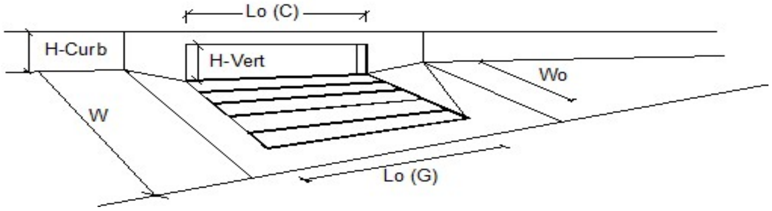
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.1**	**13.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.9**	**4.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**98**	**%**

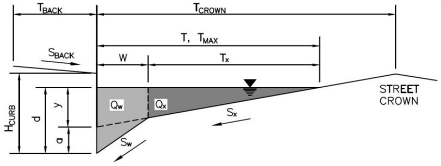
CDOT Type R Curb Opening ▼

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**
Inlet ID: **CI 21B.14**



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.750	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	75.2	75.2	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	40.5	40.5	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	5.6	5.6	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**121.3**	**121.3**	**cfs**
Flow Velocity within the Gutter Section	V =	52.9	52.9	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	24.7	24.7	

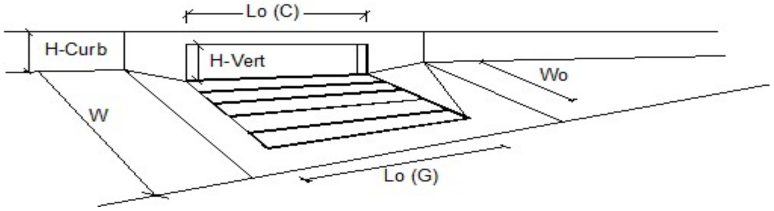
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	20.4	20.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	18.4	18.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.291	0.291	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	129.1	129.1	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	127.7	127.7	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	53.0	53.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	16.6	16.6	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	197.3	197.3	cfs
Average Flow Velocity Within the Gutter Section	V =	58.8	58.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	31.4	31.4	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d $\geq$ 6") Storm	R =	0.06	0.06	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**11.2**	**11.2**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	2.87	2.87	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	0.00	inches

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**11.2**	**11.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



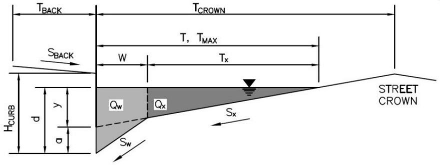
			MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening ▼				
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**1.7**	**4.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**
Inlet ID: **CI 21B.15**



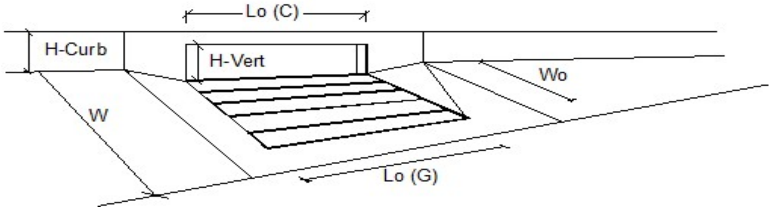
	Gutter Geometry (Enter data in the blue cells)				
	Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
	Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
	Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
	Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
	Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
	Gutter Width	W =	2.00		ft
	Street Transverse Slope	S_X =	0.020		ft/ft
	Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
	Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
	Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	7.5	7.5	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	4.1	4.1	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.6	0.6	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**12.1**	**12.1**	**cfs**
Flow Velocity within the Gutter Section	V =	5.3	5.3	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	2.5	2.5	
Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	20.4	20.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	18.4	18.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.291	0.291	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	12.9	12.9	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	12.8	12.8	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	5.3	5.3	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	1.7	1.7	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	19.7	19.7	cfs
Average Flow Velocity Within the Gutter Section	V =	5.9	5.9	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	3.1	3.1	
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \geq 6"$) Storm	R =	1.00	1.00	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**19.7**	**19.7**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	6.40	6.40	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.81	0.81	inches
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening ▼

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.6**	**5.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**91**	**%**

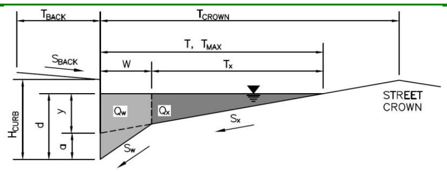
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**

Inlet ID: **CI 21B.16**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.004	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
	Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes

Maximum Capacity for 1/2 Street based On Allowable Spread		Minor Storm	Major Storm	
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.08	4.08	inches
Vertical Depth between Gutter Lip and Gutter Flowline (usually 2")	d_C =	2.0	2.0	inches
Gutter Depression (d_C - (W * S_x * 12))	a =	1.51	1.51	inches
Water Depth at Gutter Flowline	d =	5.59	5.59	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	15.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.350	0.350	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	5.5	5.5	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	3.0	3.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.4	0.4	cfs
Maximum Flow Based On Allowable Spread	**Q_T =**	**8.9**	**8.9**	**cfs**
Flow Velocity within the Gutter Section	V =	3.9	3.9	fps
V*d Product: Flow Velocity times Gutter Flowline Depth	V*d =	1.8	1.8	

Maximum Capacity for 1/2 Street based on Allowable Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	20.4	20.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\ TH}$ =	18.4	18.4	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.291	0.291	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\ TH}$	$Q_{X\ TH}$ =	9.4	9.4	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	9.3	9.3	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	3.9	3.9	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	1.2	1.2	cfs
Total Discharge for Major & Minor Storm (Pre-Safety Factor)	Q =	14.4	14.4	cfs
Average Flow Velocity Within the Gutter Section	V =	4.3	4.3	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	2.3	2.3	
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \geq$ 6") Storm	R =	1.00	1.00	
Max Flow Based on Allowable Depth (Safety Factor Applied)	**Q_d =**	**14.4**	**14.4**	**cfs**
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	6.40	6.40	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.81	0.81	inches

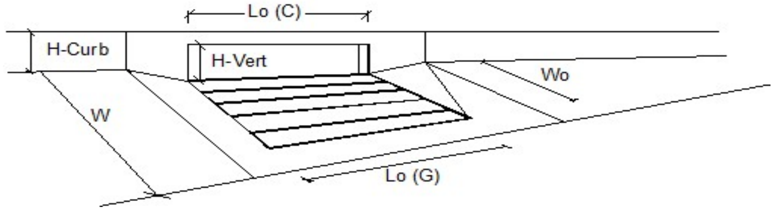
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.9**	**14.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

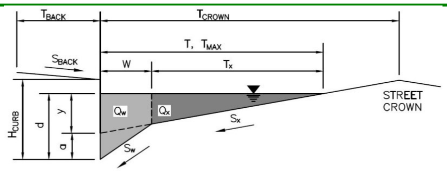
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.3**	**10.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.1**	**2.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**98**	**83**	**%**

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**
Inlet ID: **CI A.00**



Gutter Geometry (Enter data in the blue cells)

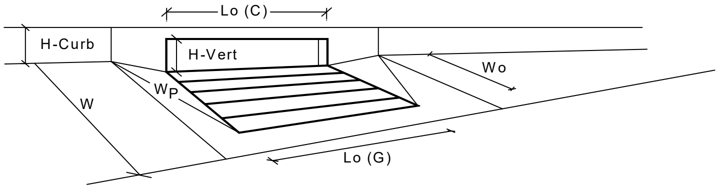
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.4	8.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)	CDOT Type R Curb Opening	MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	8.4	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.53	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.79	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.91	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**6.9**	**17.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.7	2.8	cfs

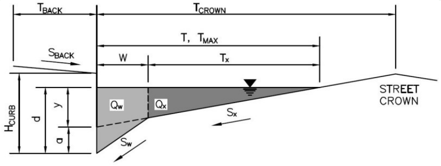
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village, Keenesburg CO**

Inlet ID: **CI A.01**



Gutter Geometry (Enter data in the blue cells)

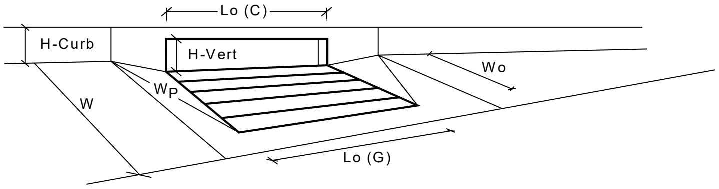
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	23.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

			Minor Storm	Major Storm	
	Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02	Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	8.4	8.4	inches
	Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



			MINOR	MAJOR	
Design Information (Input)	CDOT Type R Curb Opening ▾				
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	5.6	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

		MINOR	MAJOR	
Low Head Performance Reduction (Calculated)				
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.30	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	0.53	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.91	0.91	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

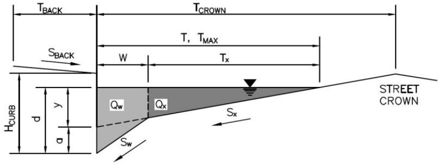
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**6.9**	**6.9**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.6	2.1	cfs

Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Pioneer Village - Keenesburg, Colorado**
Inlet ID: **CI 21A.09**

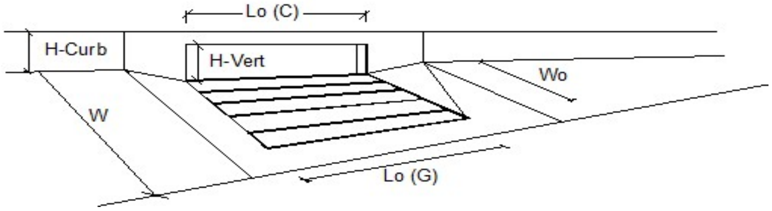


Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020		
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Warning 02 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.4	6.4	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☑	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.1**	**19.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.1**	**9.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**91**	**%**

Appendix C

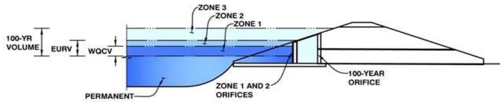
EDB Pond Details

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: **Pioneer Village**

Basin ID: **Pond 1 and 2**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	66.46	acres
Watershed Length =	3,508	ft
Watershed Length to Centroid =	1,872	ft
Watershed Slope =	0.011	ft/ft
Watershed Imperviousness =	47.87%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.111	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	3.624	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.86 in.) =	1.448	acre-feet	0.86	inches
5-yr Runoff Volume (P1 = 1.14 in.) =	1.973	acre-feet	1.14	inches
10-yr Runoff Volume (P1 = 1.41 in.) =	2.612	acre-feet	1.41	inches
25-yr Runoff Volume (P1 = 1.85 in.) =	3.910	acre-feet	1.85	inches
50-yr Runoff Volume (P1 = 2.23 in.) =	5.523	acre-feet	2.23	inches
100-yr Runoff Volume (P1 = 2.66 in.) =	7.670	acre-feet	2.66	inches
500-yr Runoff Volume (P1 = 3.83 in.) =	13.699	acre-feet	3.83	inches
Approximate 2-yr Detention Volume =	1.681	acre-feet		
Approximate 5-yr Detention Volume =	2.330	acre-feet		
Approximate 10-yr Detention Volume =	3.020	acre-feet		
Approximate 25-yr Detention Volume =	4.253	acre-feet		
Approximate 50-yr Detention Volume =	5.099	acre-feet		
Approximate 100-yr Detention Volume =	6.152	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.111	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.513	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.528	acre-feet
Total Detention Basin Volume =	6.152	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = 0.10 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
4879	--	0.77	--	--	--	888	0.020	342	0.008
4880	--	1.77	--	--	--	18,406	0.423	9,989	0.229
4881	--	2.77	--	--	--	53,622	1.231	46,002	1.056
4882	--	3.77	--	--	--	57,524	1.321	101,575	2.332
4883	--	4.77	--	--	--	62,952	1.445	161,813	3.715
4884	--	5.77	--	--	--	68,243	1.567	227,411	5.221
4885	--	6.77	--	--	--	74,017	1.699	298,541	6.854
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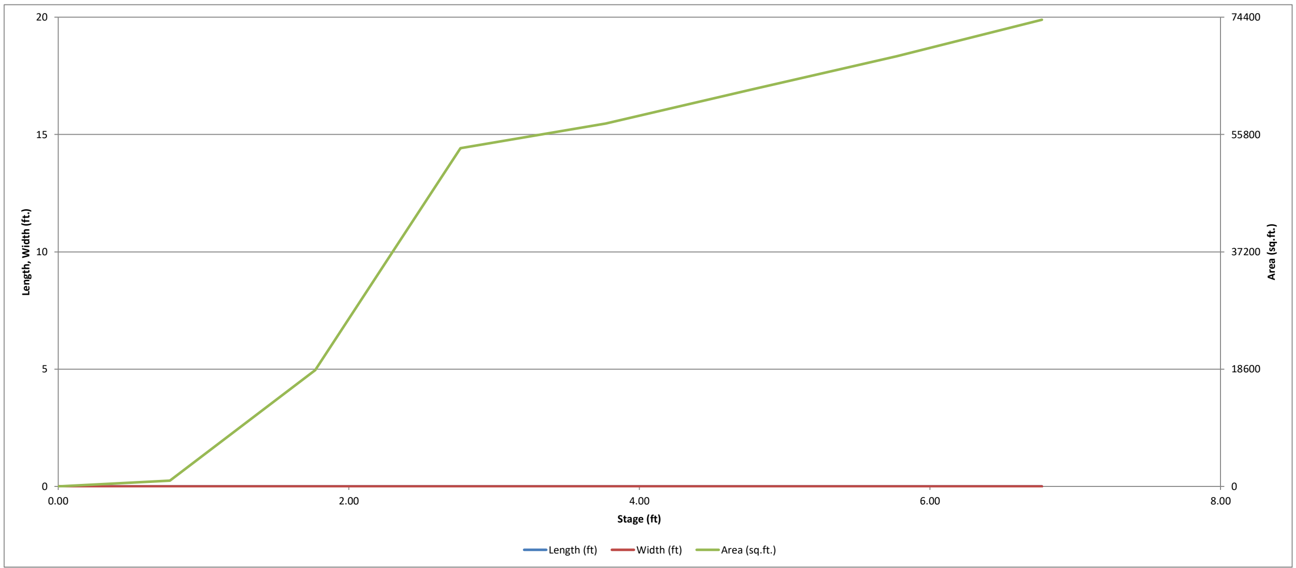
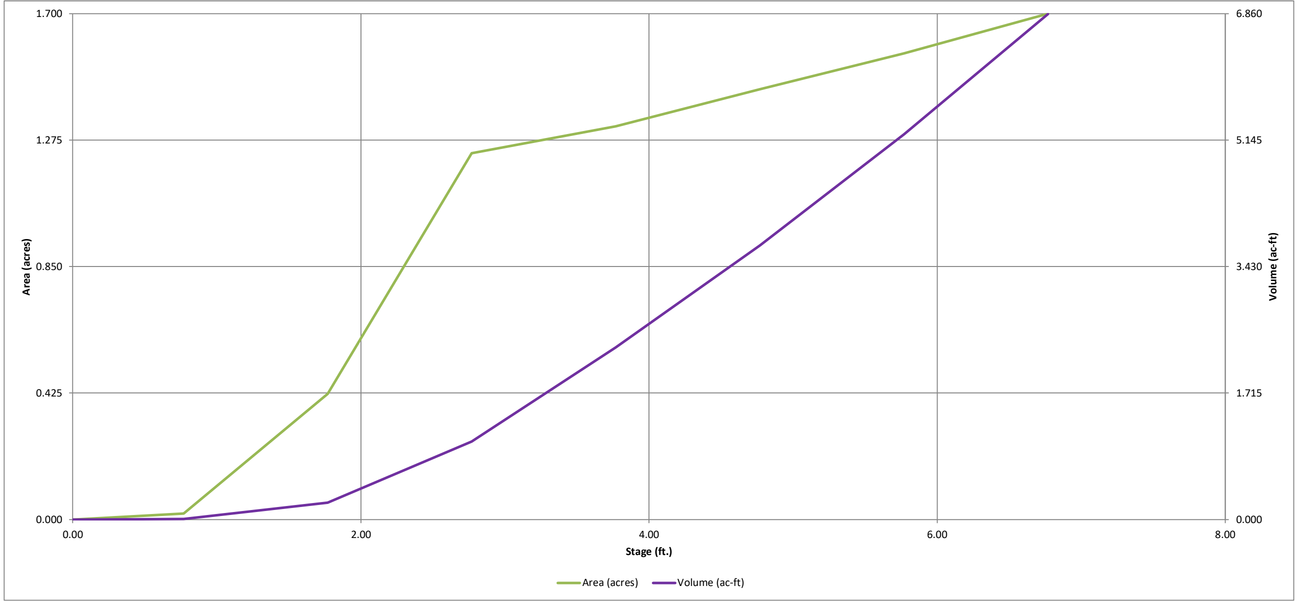
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

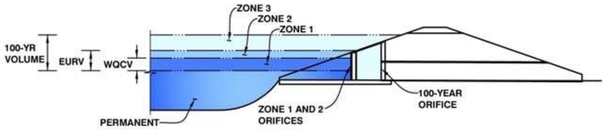




DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: **Pioneer Village**
Basin ID: **Pond 1 and 2**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.82	1.111	Orifice Plate
Zone 2 (EURV)	4.71	2.513	Orifice Plate
Zone 3 (100-year)	6.36	2.528	Weir&Pipe (Restrict)
	Total (all zones)	6.152	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	4.71	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	18.84	inches
Orifice Plate: Orifice Area per Row =	5.00	sq. inches (use rectangular openings)

Calculated Parameters for Plate

WQ Orifice Area per Row =	3.472E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.60	3.20					
Orifice Area (sq. inches)	5.00	5.00	5.00					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.71	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	8.00	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V
Horiz. Length of Weir Sides =	4.67	N/A	feet
Overflow Grate Open Area % =	75%	N/A	%, grate open area/total area
Debris Clogging % =	0%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	5.88	N/A	feet
Overflow Weir Slope Length =	4.81	N/A	feet
Grate Open Area / 100-yr Orifice Area =	15.87	N/A	
Overflow Grate Open Area w/o Debris =	28.88	N/A	ft^2
Overflow Grate Open Area w/ Debris =	28.88	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	13.50		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.82	N/A	ft^2
Outlet Orifice Centroid =	0.64	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.70	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.36	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	100.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.41	feet
Stage at Top of Freeboard =	7.77	feet
Basin Area at Top of Freeboard =	1.70	acres
Basin Volume at Top of Freeboard =	6.85	acre-ft

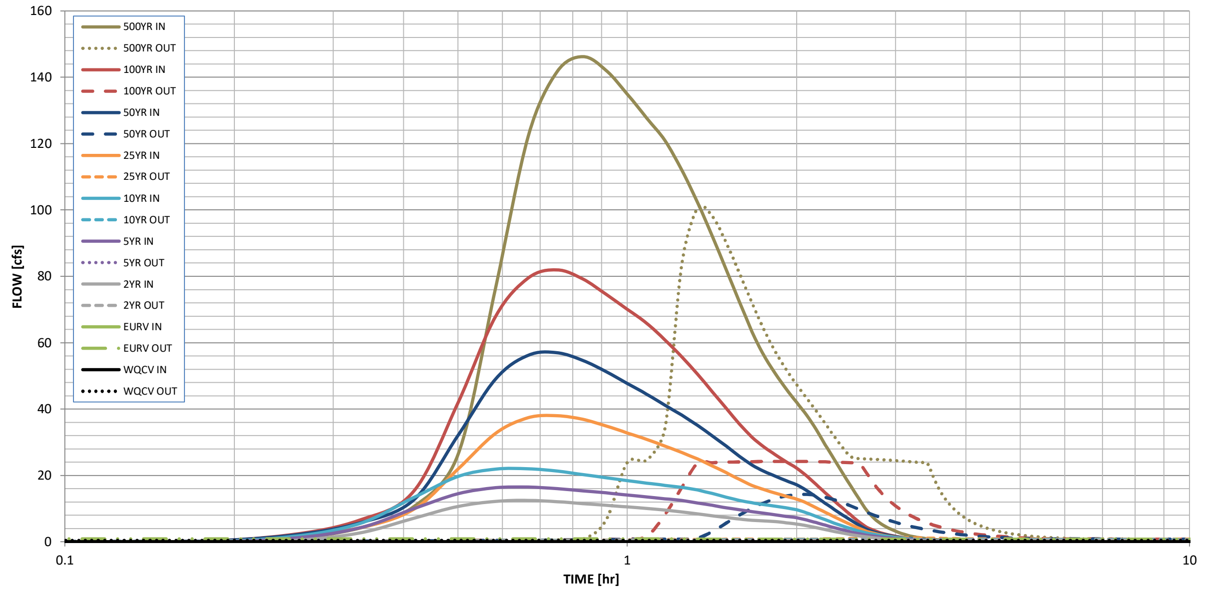
Routed Hydrograph Results

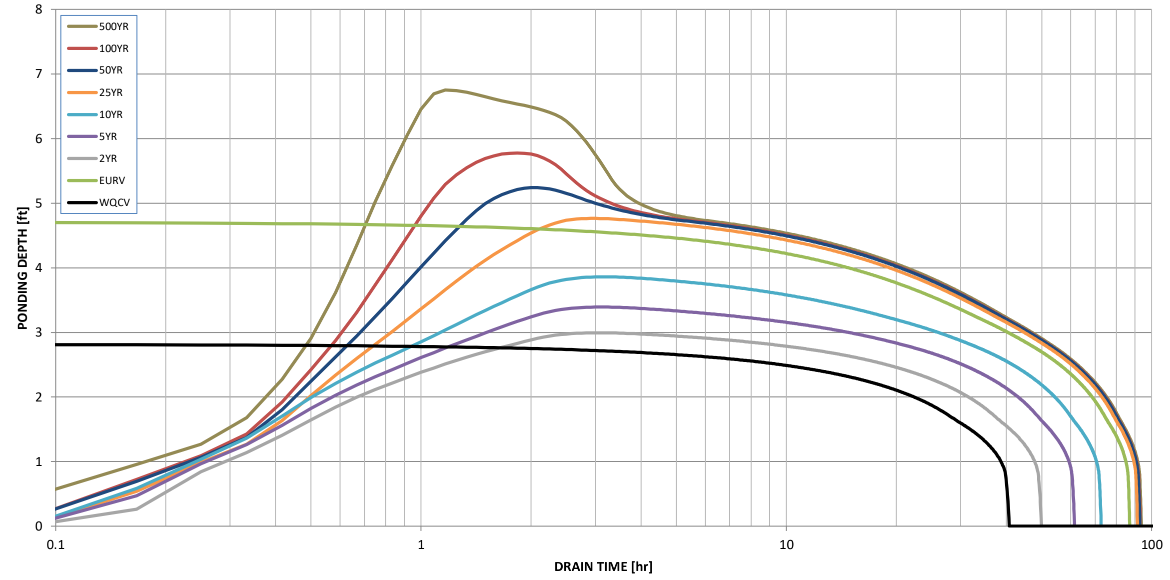
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

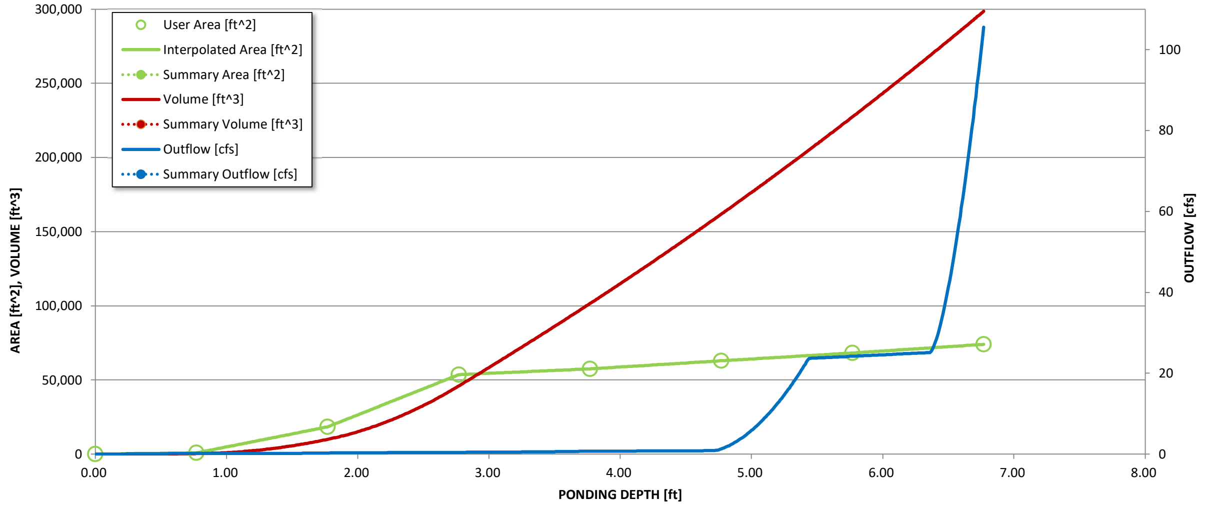
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.41	1.85	2.23	2.66	3.83
CUHP Runoff Volume (acre-ft) =	1.111	3.624	1.448	1.973	2.612	3.910	5.523	7.670	13.699
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.448	1.973	2.612	3.910	5.523	7.670	13.699
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.2	0.4	3.1	14.0	29.1	71.4
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.00	0.01	0.05	0.21	0.44	1.07
Peak Inflow Q (cfs) =	N/A	N/A	12.5	16.5	22.0	38.0	57.0	81.9	146.2
Peak Outflow Q (cfs) =	0.5	0.9	0.5	0.6	0.7	1.2	14.3	24.2	100.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	3.0	1.6	0.4	1.0	0.8	1.4
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.0	0.5	0.8	0.9
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	80	47	57	67	83	82	79	73
Time to Drain 99% of Inflow Volume (hours) =	**40**	84	49	60	71	88	89	87	84
Maximum Ponding Depth (ft) =	2.82	4.71	2.99	3.39	3.86	4.76	5.24	5.78	6.75
Area at Maximum Ponding Depth (acres) =	1.24	1.44	1.25	1.29	1.33	1.44	1.50	1.57	1.70
Maximum Volume Stored (acre-ft) =	1.118	3.628	1.329	1.837	2.451	3.700	4.407	5.221	6.820

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval
5.00 min

SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.10	0.84
0:15:00	0.00	0.00	0.36	0.96	1.44	1.24	1.90	2.07	4.12
0:20:00	0.00	0.00	2.63	4.15	5.46	4.23	5.66	6.50	10.56
0:25:00	0.00	0.00	7.07	9.94	13.30	9.75	12.59	15.12	26.25
0:30:00	0.00	0.00	10.68	14.52	19.67	21.92	32.00	41.86	76.61
0:35:00	0.00	0.00	12.19	16.27	21.91	32.67	49.08	67.96	122.26
0:40:00	0.00	0.00	12.51	16.49	22.02	37.39	56.24	79.48	141.63
0:45:00	0.00	0.00	12.13	16.01	21.28	38.02	56.97	81.93	146.22
0:50:00	0.00	0.00	11.54	15.39	20.27	36.89	54.68	79.19	142.07
0:55:00	0.00	0.00	11.00	14.75	19.34	34.95	51.29	74.56	134.91
1:00:00	0.00	0.00	10.50	14.09	18.47	32.84	47.75	70.05	127.65
1:05:00	0.00	0.00	10.06	13.49	17.68	30.87	44.48	65.85	120.91
1:10:00	0.00	0.00	9.56	12.99	17.03	28.82	41.18	60.85	112.00
1:15:00	0.00	0.00	9.01	12.42	16.41	26.91	38.15	55.72	102.26
1:20:00	0.00	0.00	8.45	11.73	15.61	24.94	35.08	50.49	92.14
1:25:00	0.00	0.00	7.88	10.99	14.55	22.90	31.95	45.21	81.94
1:30:00	0.00	0.00	7.32	10.27	13.44	20.81	28.80	40.19	72.31
1:35:00	0.00	0.00	6.86	9.65	12.46	18.78	25.75	35.49	63.36
1:40:00	0.00	0.00	6.53	9.12	11.75	17.00	23.14	31.52	56.13
1:45:00	0.00	0.00	6.29	8.61	11.22	15.70	21.26	28.60	50.68
1:50:00	0.00	0.00	6.08	8.14	10.73	14.67	19.76	26.25	46.11
1:55:00	0.00	0.00	5.75	7.69	10.23	13.75	18.42	24.15	42.00
2:00:00	0.00	0.00	5.35	7.24	9.64	12.90	17.16	22.21	38.20
2:05:00	0.00	0.00	4.83	6.57	8.73	11.69	15.47	19.85	33.86
2:10:00	0.00	0.00	4.24	5.78	7.67	10.28	13.54	17.27	29.27
2:15:00	0.00	0.00	3.67	5.01	6.64	8.89	11.63	14.78	24.89
2:20:00	0.00	0.00	3.15	4.28	5.67	7.56	9.80	12.40	20.69
2:25:00	0.00	0.00	2.65	3.60	4.76	6.31	8.08	10.13	16.71
2:30:00	0.00	0.00	2.18	2.97	3.94	5.15	6.48	7.99	12.93
2:35:00	0.00	0.00	1.77	2.42	3.21	4.08	5.01	6.02	9.50
2:40:00	0.00	0.00	1.45	1.99	2.64	3.16	3.77	4.41	7.01
2:45:00	0.00	0.00	1.20	1.66	2.21	2.50	2.97	3.37	5.35
2:50:00	0.00	0.00	1.00	1.40	1.86	2.03	2.39	2.64	4.13
2:55:00	0.00	0.00	0.84	1.17	1.56	1.66	1.95	2.08	3.18
3:00:00	0.00	0.00	0.70	0.97	1.30	1.35	1.58	1.65	2.45
3:05:00	0.00	0.00	0.59	0.81	1.08	1.10	1.29	1.30	1.87
3:10:00	0.00	0.00	0.49	0.67	0.89	0.90	1.05	1.03	1.45
3:15:00	0.00	0.00	0.41	0.55	0.74	0.74	0.86	0.83	1.16
3:20:00	0.00	0.00	0.33	0.45	0.60	0.60	0.70	0.68	0.94
3:25:00	0.00	0.00	0.27	0.36	0.48	0.49	0.56	0.55	0.75
3:30:00	0.00	0.00	0.22	0.28	0.38	0.39	0.44	0.44	0.59
3:35:00	0.00	0.00	0.17	0.22	0.30	0.30	0.34	0.34	0.45
3:40:00	0.00	0.00	0.12	0.16	0.23	0.22	0.25	0.25	0.33
3:45:00	0.00	0.00	0.09	0.12	0.16	0.16	0.18	0.17	0.23
3:50:00	0.00	0.00	0.06	0.08	0.11	0.11	0.12	0.11	0.14
3:55:00	0.00	0.00	0.03	0.05	0.07	0.07	0.07	0.07	0.08
4:00:00	0.00	0.00	0.02	0.03	0.04	0.03	0.03	0.03	0.03
4:05:00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01
4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	**Stage** [ft]	**Area** [ft^2]	**Area** [acres]	**Volume** [ft^3]	**Volume** [ac-ft]	**Total Outflow** [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

Channel Report

Pond A Forebay Notch

Channel 1

RECTANGULAR

Bottom Width = 0.35 ft

Total Depth = 2.50 ft

Invert Elevation = 10.00 ft

Channel Slope = 0.300 %

Manning's n = 0.013

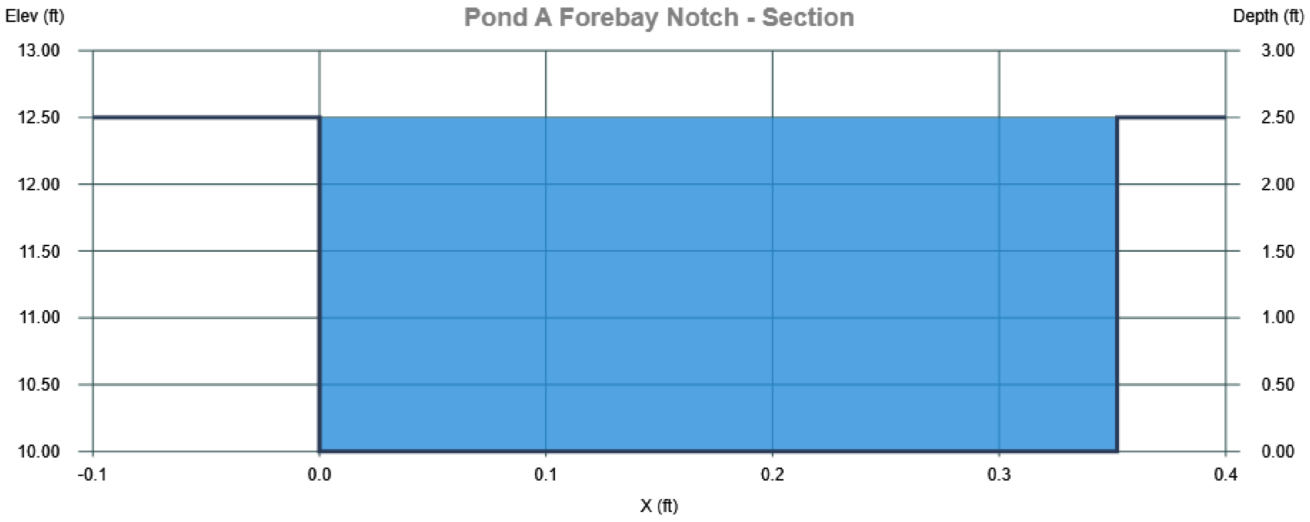
DISCHARGE

Method = Known Q

Known Q = 1.64 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
1.64	2.49	0.88	1.87	5.33	0.013	0.88	12.49	12.54	0.47	0.35



Pond A Trickle Channel

Channel 1

RECTANGULAR

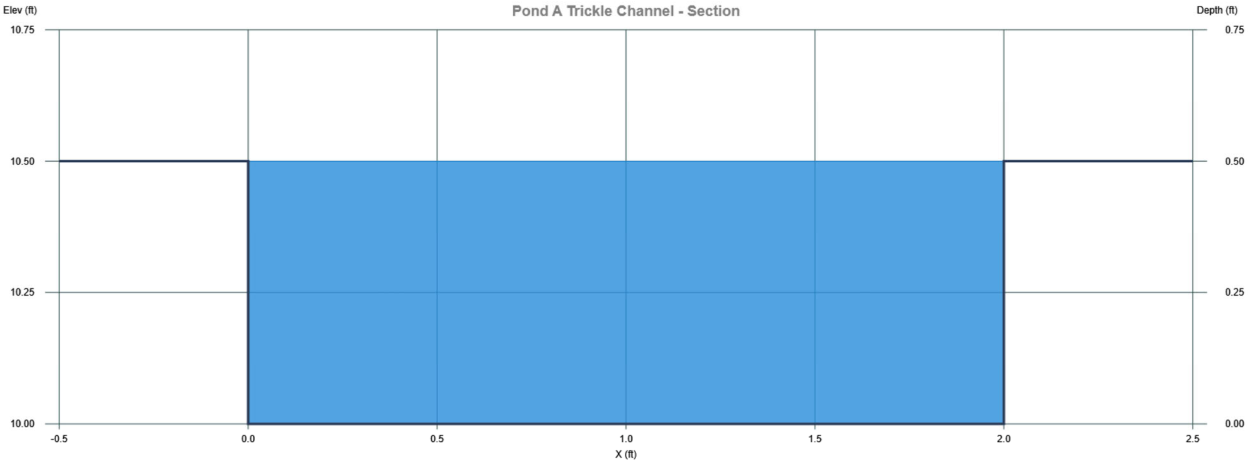
Bottom Width = 2.00 ft
Total Depth = 0.50 ft
Invert Elevation = 10.00 ft
Channel Slope = 0.500 %
Manning's n = 0.013

DISCHARGE

Method = Q vs Depth
Q Min = 0.11 cfs
Q Max = 3.88 cfs
Increments = 10

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
3.88	0.50	1.00	3.88	3.00	0.013	0.49	10.50	10.73	0.16	2.00

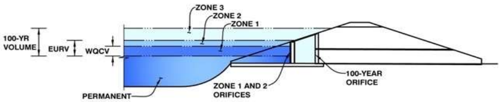


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Pioneer Village ~ PA's 3 and 4

Basin ID: Pond B



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type = **EDB**
Watershed Area = 51.64 acres
Watershed Length = 4,072 ft
Watershed Length to Centroid = 1,942 ft
Watershed Slope = 0.014 ft/ft
Watershed Imperviousness = 58.00% percent
Percentage Hydrologic Soil Group A = 50.0% percent
Percentage Hydrologic Soil Group B = 50.0% percent
Percentage Hydrologic Soil Groups C/D = 0.0% percent
Target WQCV Drain Time = 40.0 hours
Location for 1-hr Rainfall Depths = User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.988	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	3.420	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.86 in.) =	1.890	acre-feet	0.86	inches
5-yr Runoff Volume (P1 = 1.14 in.) =	2.671	acre-feet	1.14	inches
10-yr Runoff Volume (P1 = 1.41 in.) =	3.438	acre-feet	1.41	inches
25-yr Runoff Volume (P1 = 1.85 in.) =	5.370	acre-feet	1.85	inches
50-yr Runoff Volume (P1 = 2.23 in.) =	6.941	acre-feet	2.23	inches
100-yr Runoff Volume (P1 = 2.66 in.) =	9.020	acre-feet	2.66	inches
500-yr Runoff Volume (P1 = 3.83 in.) =	14.217	acre-feet	3.83	inches
Approximate 2-yr Detention Volume =	1.739	acre-feet		
Approximate 5-yr Detention Volume =	2.438	acre-feet		
Approximate 10-yr Detention Volume =	3.245	acre-feet		
Approximate 25-yr Detention Volume =	4.257	acre-feet		
Approximate 50-yr Detention Volume =	4.901	acre-feet		
Approximate 100-yr Detention Volume =	5.754	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) = 0.988 acre-feet
Zone 2 Volume (EURV - Zone 1) = 2.432 acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) = 2.334 acre-feet
Total Detention Basin Volume = 5.754 acre-feet
Initial Surcharge Volume (ISV) = user ft^3
Initial Surcharge Depth (ISD) = user ft
Total Available Detention Depth (H_{total}) = user ft
Depth of Trickle Channel (H_{TC}) = user ft
Slope of Trickle Channel (S_{TC}) = user ft/ft
Slopes of Main Basin Sides (S_{main}) = user H:V
Basin Length-to-Width Ratio ($R_{L/W}$) = user

Initial Surcharge Area (A_{ISV}) = user ft^2
Surcharge Volume Length (L_{ISV}) = user ft
Surcharge Volume Width (W_{ISV}) = user ft
Depth of Basin Floor (H_{FLOOR}) = user ft
Length of Basin Floor (L_{FLOOR}) = user ft
Width of Basin Floor (W_{FLOOR}) = user ft
Area of Basin Floor (A_{FLOOR}) = user ft^2
Volume of Basin Floor (V_{FLOOR}) = user ft^3
Depth of Main Basin (H_{MAIN}) = user ft
Length of Main Basin (L_{MAIN}) = user ft
Width of Main Basin (W_{MAIN}) = user ft
Area of Main Basin (A_{MAIN}) = user ft^2
Volume of Main Basin (V_{MAIN}) = user ft^3
Calculated Total Basin Volume (V_{total}) = **user** acre-feet

Depth Increement = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
4873	--	0.88	--	--	--	3,785	0.087	1,665	0.038
4874	--	1.88	--	--	--	22,821	0.524	14,968	0.344
4875	--	2.88	--	--	--	49,735	1.142	51,246	1.176
4876	--	3.88	--	--	--	54,046	1.241	103,137	2.368
4877	--	4.88	--	--	--	58,452	1.342	159,386	3.659
4878	--	5.88	--	--	--	62,956	1.445	220,090	5.053
4879	--	6.88	--	--	--	67,561	1.551	285,348	6.551
4880	--	7.88	--	--	--	72,280	1.659	355,269	8.156
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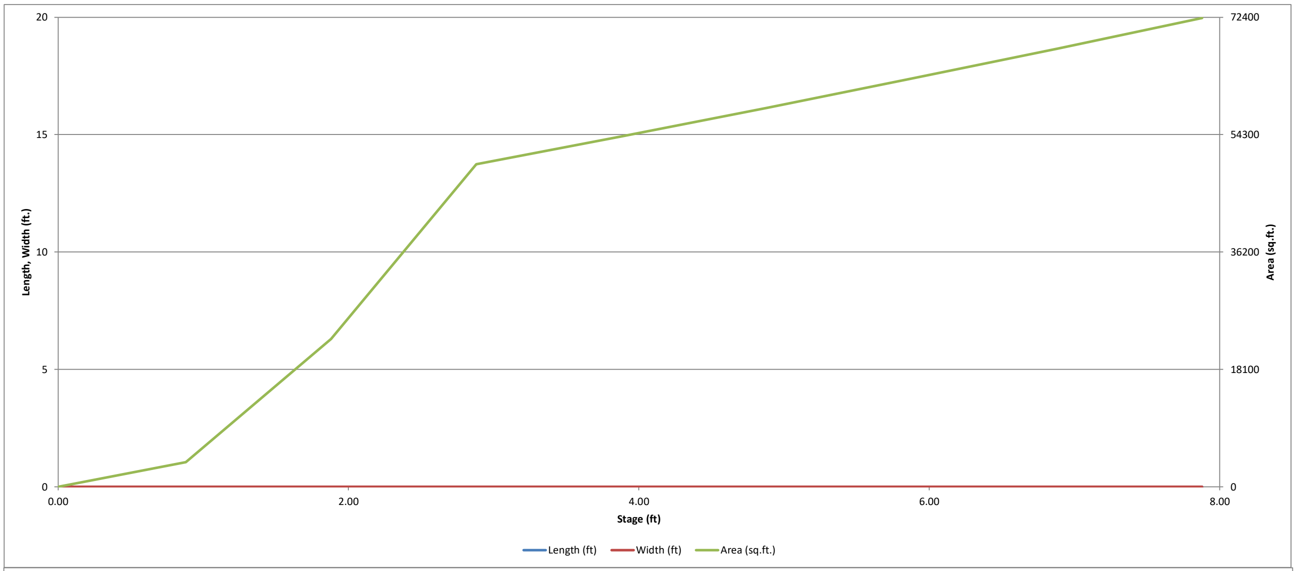
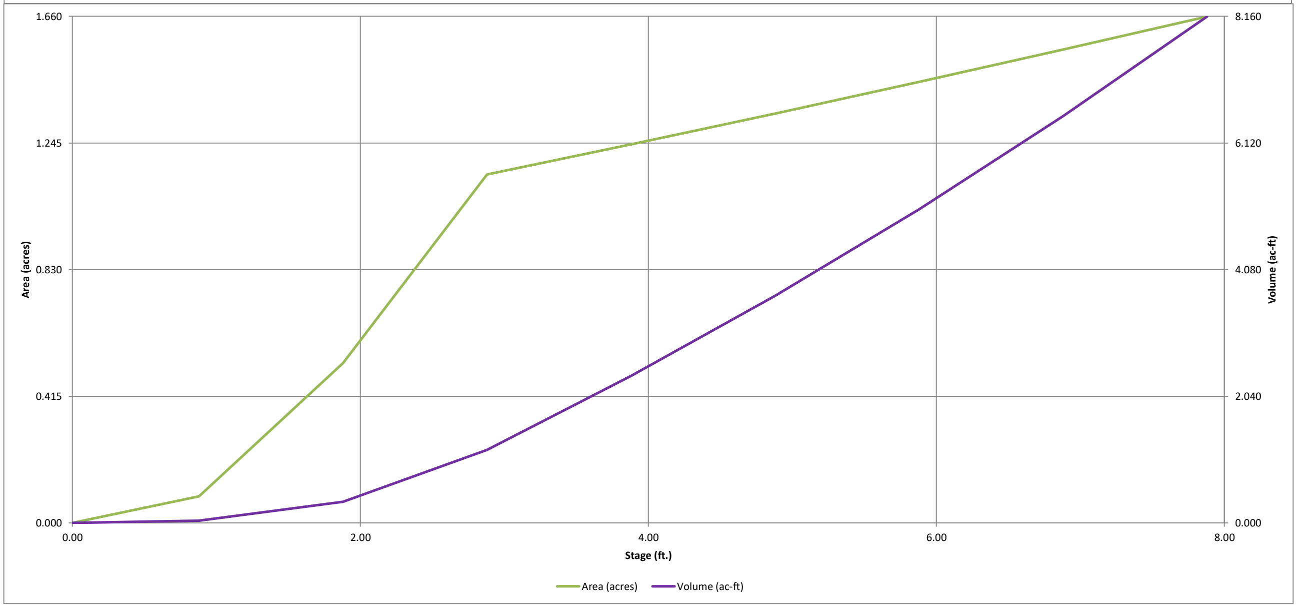
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

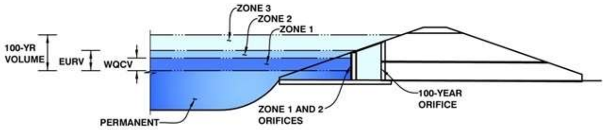




DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: **Pioneer Village ~ PA's 3 and 4**
Basin ID: **Pond B**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.71	0.988	Orifice Plate
Zone 2 (EURV)	4.71	2.432	Orifice Plate
Zone 3 (100-year)	6.36	2.334	Weir&Pipe (Restrict)
Total (all zones)		5.754	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)
Underdrain Orifice Diameter =		inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =		ft^2
Underdrain Orifice Centroid =		feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	4.71	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	18.80	inches
Orifice Plate: Orifice Area per Row =	4.85	sq. inches (use rectangular openings)

Calculated Parameters for Plate

WQ Orifice Area per Row =	3.368E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.57	3.14					
Orifice Area (sq. inches)	4.85	4.85	4.85					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.71	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	8.00	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V
Horiz. Length of Weir Sides =	4.67	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	0%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	5.88	N/A	feet
Overflow Weir Slope Length =	4.81	N/A	feet
Grate Open Area / 100-yr Orifice Area =	10.00	N/A	
Overflow Grate Open Area w/o Debris =	26.80	N/A	ft^2
Overflow Grate Open Area w/ Debris =	26.80	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.26	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	19.10		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	2.68	N/A	ft^2
Outlet Orifice Centroid =	0.87	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.20	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.44	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	32.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.94	feet
Stage at Top of Freeboard =	8.38	feet
Basin Area at Top of Freeboard =	1.66	acres
Basin Volume at Top of Freeboard =	8.16	acre-ft

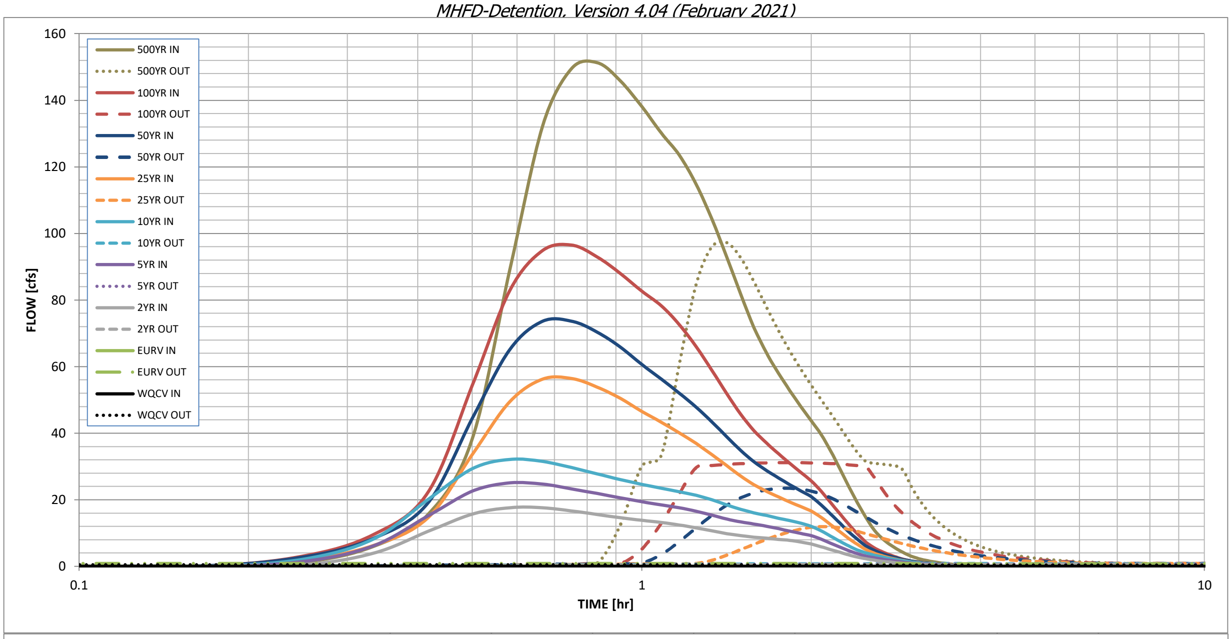
Routed Hydrograph Results

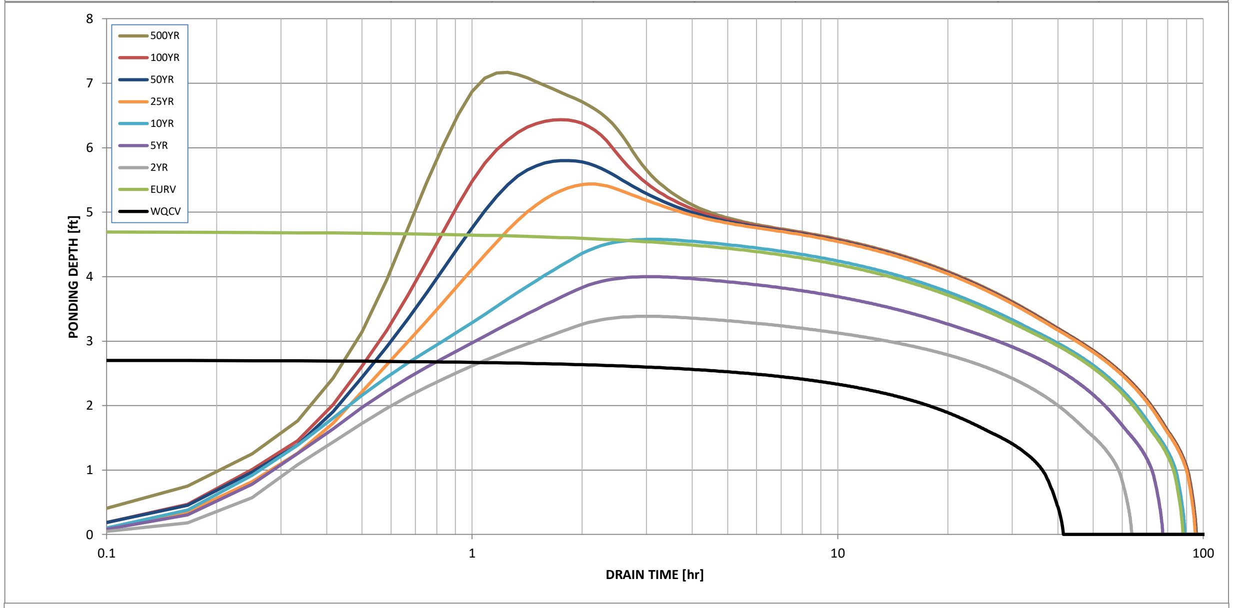
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

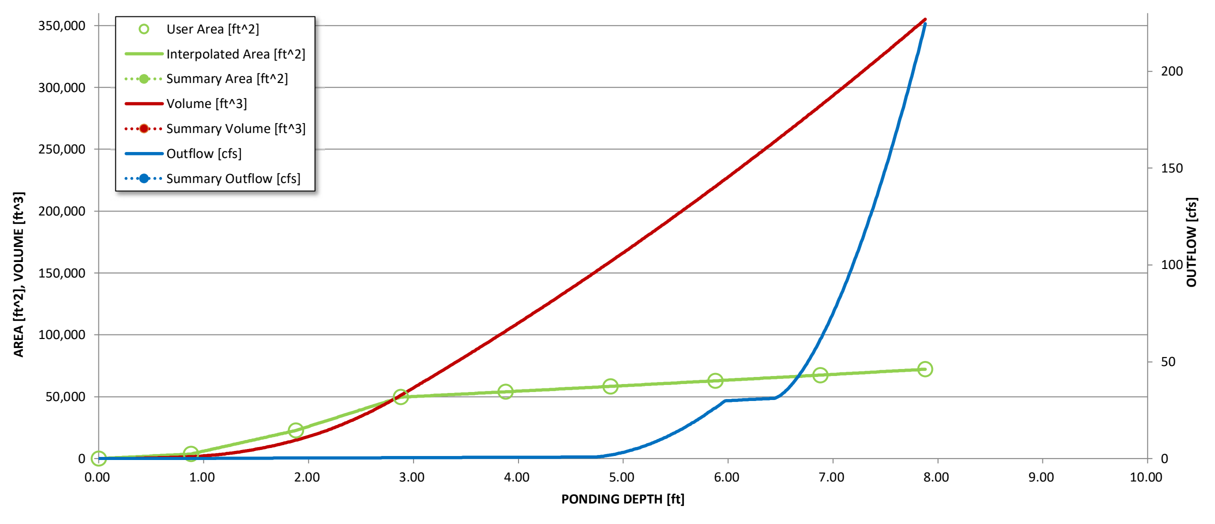
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.41	1.85	2.23	2.66	3.83
CUHP Runoff Volume (acre-ft) =	0.988	3.420	1.890	2.671	3.438	5.370	6.941	9.020	14.217
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.890	2.671	3.438	5.370	6.941	9.020	14.217
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.3	0.5	12.2	21.2	34.2	64.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.01	0.01	0.24	0.41	0.66	1.25
Peak Inflow Q (cfs) =	N/A	N/A	17.6	25.1	32.1	56.4	73.7	96.5	151.3
Peak Outflow Q (cfs) =	0.4	0.8	0.6	0.7	0.8	11.9	23.4	31.2	97.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	2.3	1.6	1.0	1.1	0.9	1.5
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.4	0.8	1.1	1.2
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	79	58	70	80	83	80	77	72
Time to Drain 99% of Inflow Volume (hours) =	**40**	84	61	74	85	90	89	88	85
Maximum Ponding Depth (ft) =	2.71	4.71	3.38	4.00	4.58	5.44	5.80	6.44	7.17
Area at Maximum Ponding Depth (acres) =	1.04	1.32	1.19	1.25	1.31	1.40	1.44	1.50	1.58
Maximum Volume Stored (acre-ft) =	0.991	3.432	1.760	2.505	3.248	4.413	4.937	5.863	6.989

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.15	1.23
	0:15:00	0.00	0.00	0.53	1.43	2.16	1.85	2.80	3.03	5.99
	0:20:00	0.00	0.00	3.91	6.17	8.19	6.28	8.33	9.51	15.53
	0:25:00	0.00	0.00	10.46	15.13	20.01	14.56	18.97	22.06	38.26
	0:30:00	0.00	0.00	15.70	22.56	29.30	33.58	44.44	54.28	89.28
	0:35:00	0.00	0.00	17.63	25.06	32.14	49.50	65.18	82.94	132.23
	0:40:00	0.00	0.00	17.61	24.67	31.51	56.25	73.59	94.87	149.50
	0:45:00	0.00	0.00	16.67	23.26	29.66	56.42	73.67	96.49	151.32
	0:50:00	0.00	0.00	15.58	21.89	27.78	53.87	70.36	92.96	145.83
	0:55:00	0.00	0.00	14.61	20.59	26.05	50.43	65.84	87.95	138.14
	1:00:00	0.00	0.00	13.82	19.42	24.62	46.56	60.65	82.66	130.13
	1:05:00	0.00	0.00	13.21	18.47	23.48	43.28	56.27	78.27	123.54
	1:10:00	0.00	0.00	12.45	17.58	22.41	40.07	52.02	72.60	114.71
	1:15:00	0.00	0.00	11.56	16.55	21.30	36.88	47.82	65.94	104.26
	1:20:00	0.00	0.00	10.66	15.36	19.97	33.55	43.38	58.87	92.96
	1:25:00	0.00	0.00	9.84	14.22	18.43	30.24	38.96	51.90	81.70
	1:30:00	0.00	0.00	9.22	13.34	17.11	27.09	34.77	45.66	71.75
	1:35:00	0.00	0.00	8.78	12.73	16.10	24.52	31.40	40.78	64.04
	1:40:00	0.00	0.00	8.43	12.05	15.24	22.53	28.78	37.02	58.01
	1:45:00	0.00	0.00	8.12	11.30	14.47	20.85	26.55	33.81	52.81
	1:50:00	0.00	0.00	7.81	10.58	13.74	19.35	24.55	30.91	48.11
	1:55:00	0.00	0.00	7.31	9.89	12.97	17.95	22.70	28.24	43.76
	2:00:00	0.00	0.00	6.70	9.20	12.06	16.62	20.93	25.70	39.64
	2:05:00	0.00	0.00	5.91	8.16	10.66	14.73	18.49	22.56	34.65
	2:10:00	0.00	0.00	5.04	6.96	9.05	12.54	15.69	19.13	29.27
	2:15:00	0.00	0.00	4.21	5.79	7.50	10.39	12.94	15.78	24.05
	2:20:00	0.00	0.00	3.44	4.72	6.11	8.39	10.41	12.65	19.18
	2:25:00	0.00	0.00	2.78	3.81	4.95	6.61	8.14	9.81	14.78
	2:30:00	0.00	0.00	2.27	3.11	4.07	5.07	6.19	7.35	11.13
	2:35:00	0.00	0.00	1.88	2.58	3.41	4.01	4.89	5.69	8.63
	2:40:00	0.00	0.00	1.57	2.17	2.86	3.23	3.93	4.48	6.78
	2:45:00	0.00	0.00	1.31	1.81	2.39	2.62	3.18	3.52	5.30
	2:50:00	0.00	0.00	1.09	1.50	1.98	2.11	2.55	2.75	4.12
	2:55:00	0.00	0.00	0.90	1.24	1.63	1.71	2.06	2.15	3.19
	3:00:00	0.00	0.00	0.75	1.01	1.33	1.38	1.66	1.67	2.46
	3:05:00	0.00	0.00	0.62	0.83	1.09	1.13	1.35	1.33	1.95
	3:10:00	0.00	0.00	0.51	0.68	0.89	0.92	1.10	1.08	1.58
	3:15:00	0.00	0.00	0.41	0.54	0.71	0.74	0.88	0.87	1.27
	3:20:00	0.00	0.00	0.33	0.43	0.56	0.58	0.69	0.70	1.01
	3:25:00	0.00	0.00	0.25	0.33	0.43	0.45	0.54	0.54	0.78
	3:30:00	0.00	0.00	0.19	0.24	0.32	0.34	0.40	0.41	0.58
	3:35:00	0.00	0.00	0.13	0.17	0.23	0.24	0.29	0.29	0.41
	3:40:00	0.00	0.00	0.08	0.12	0.15	0.16	0.19	0.19	0.27
	3:45:00	0.00	0.00	0.05	0.07	0.09	0.10	0.11	0.11	0.16
	3:50:00	0.00	0.00	0.02	0.04	0.05	0.05	0.06	0.06	0.08
	3:55:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	**Stage [ft]**	**Area [ft^2]**	**Area [acres]**	**Volume [ft^3]**	**Volume [ac-ft]**	**Total Outflow [cfs]**

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

Channel Report

Project Name: New Project

Studio Express by Hydrology Studio v 1.0.0.9

04-01-2021

Pond B Forebay Notch

Channel 1

RECTANGULAR

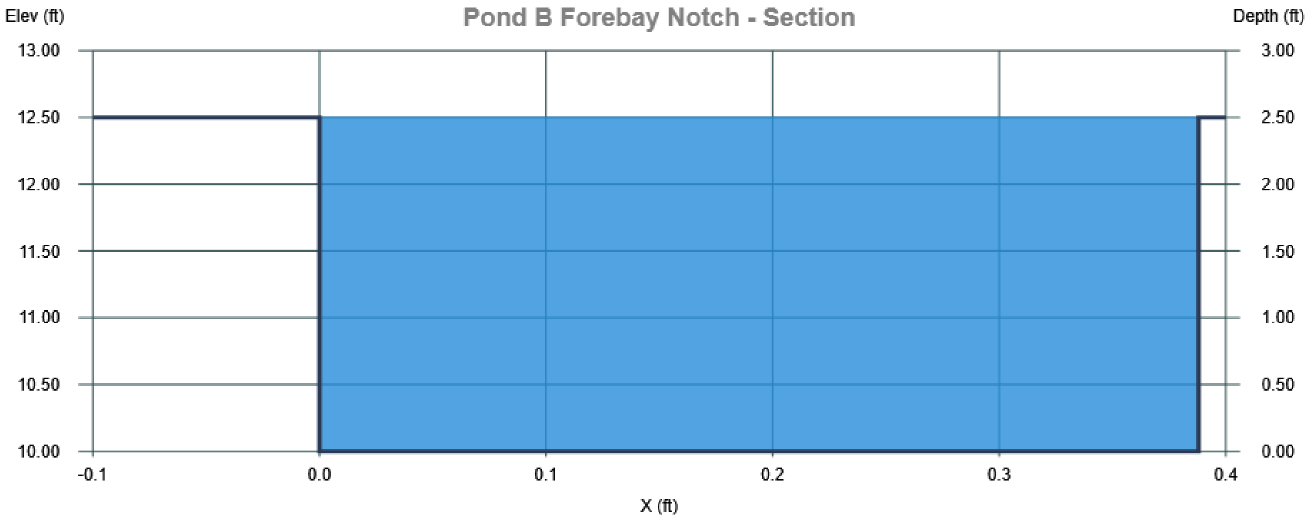
Bottom Width = 0.39 ft
Total Depth = 2.50 ft
Invert Elevation = 10.00 ft
Channel Slope = 0.300 %
Manning's n = 0.013

DISCHARGE

Method = Known Q
Known Q = 1.93 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
1.93	2.50	0.97	1.99	5.39	0.013	0.92	12.50	12.56	0.47	0.39



Pond B Trickle Channel

Channel 2

RECTANGULAR

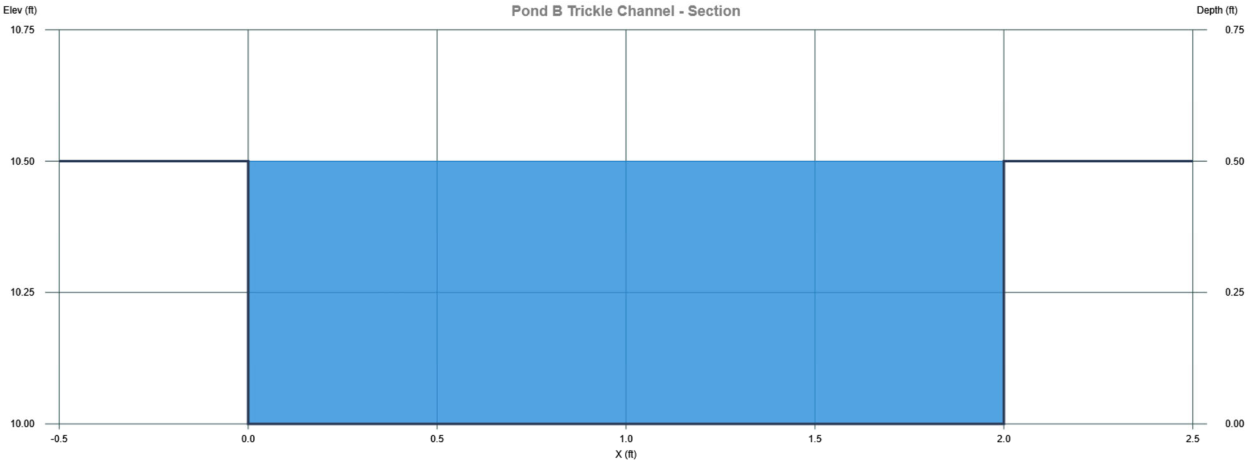
Bottom Width = 2.00 ft
Total Depth = 0.50 ft
Invert Elevation = 10.00 ft
Channel Slope = 0.300 %
Manning's n = 0.013

DISCHARGE

Method = Q vs Depth
Q Min = 0.08 cfs
Q Max = 3.01 cfs
Increments = 10

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
3.01	0.50	1.00	3.01	3.00	0.013	0.42	10.50	10.64	0.09	2.00

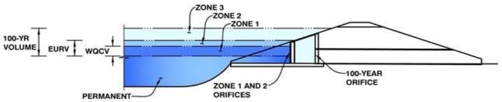


DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Pioneer Village**

Basin ID: **Pond C (PA's 17 and 21)**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type = **EDB**
Watershed Area = 144.88 acres
Watershed Length = 5,740 ft
Watershed Length to Centroid = 2,455 ft
Watershed Slope = 0.008 ft/ft
Watershed Imperviousness = 49.00% percent
Percentage Hydrologic Soil Group A = 100.0% percent
Percentage Hydrologic Soil Group B = 0.0% percent
Percentage Hydrologic Soil Groups C/D = 0.0% percent
Target WQCV Drain Time = 40.0 hours
Location for 1-hr Rainfall Depths = User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	2.457	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	8.139	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.86 in.) =	4.248	acre-feet	0.86	inches
5-yr Runoff Volume (P1 = 1.14 in.) =	5.786	acre-feet	1.14	inches
10-yr Runoff Volume (P1 = 1.41 in.) =	7.539	acre-feet	1.41	inches
25-yr Runoff Volume (P1 = 1.85 in.) =	10.932	acre-feet	1.85	inches
50-yr Runoff Volume (P1 = 2.23 in.) =	14.760	acre-feet	2.23	inches
100-yr Runoff Volume (P1 = 2.66 in.) =	19.737	acre-feet	2.66	inches
500-yr Runoff Volume (P1 = 3.83 in.) =	33.551	acre-feet	3.83	inches
Approximate 2-yr Detention Volume =	3.779	acre-feet		
Approximate 5-yr Detention Volume =	5.235	acre-feet		
Approximate 10-yr Detention Volume =	6.779	acre-feet		
Approximate 25-yr Detention Volume =	9.533	acre-feet		
Approximate 50-yr Detention Volume =	11.412	acre-feet		
Approximate 100-yr Detention Volume =	13.730	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) = 2.457 acre-feet
Zone 2 Volume (EURV - Zone 1) = 5.682 acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) = 5.591 acre-feet
Total Detention Basin Volume = 13.730 acre-feet
Initial Surcharge Volume (ISV) = user ft^3
Initial Surcharge Depth (ISD) = user ft
Total Available Detention Depth (H_{total}) = user ft
Depth of Trickle Channel (H_{TC}) = user ft
Slope of Trickle Channel (S_{TC}) = user ft/ft
Slopes of Main Basin Sides (S_{main}) = user H:V
Basin Length-to-Width Ratio ($R_{L/W}$) = user

Initial Surcharge Area (A_{ISV}) = user ft^2
Surcharge Volume Length (L_{ISV}) = user ft
Surcharge Volume Width (W_{ISV}) = user ft
Depth of Basin Floor (H_{FLOOR}) = user ft
Length of Basin Floor (L_{FLOOR}) = user ft
Width of Basin Floor (W_{FLOOR}) = user ft
Area of Basin Floor (A_{FLOOR}) = user ft^2
Volume of Basin Floor (V_{FLOOR}) = user ft^3
Depth of Main Basin (H_{MAIN}) = user ft
Length of Main Basin (L_{MAIN}) = user ft
Width of Main Basin (W_{MAIN}) = user ft
Area of Main Basin (A_{MAIN}) = user ft^2
Volume of Main Basin (V_{MAIN}) = user ft^3
Calculated Total Basin Volume (V_{total}) = **user** acre-feet

Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
4863	--	0.79	--	--	--	2,680	0.062	1,058	0.024
4864	--	1.79	--	--	--	37,698	0.865	21,247	0.488
4865	--	2.79	--	--	--	91,521	2.101	85,856	1.971
4866	--	3.79	--	--	--	98,660	2.265	180,947	4.154
4867	--	4.79	--	--	--	102,931	2.363	281,742	6.468
4868	--	5.79	--	--	--	107,997	2.479	387,206	8.889
4869	--	6.79	--	--	--	113,712	2.610	498,061	11.434
4869.71	--	7.50	--	--	--	118,652	2.724	580,550	13.328
4870	--	7.79	--	--	--	121,268	2.784	615,339	14.126
4871	--	8.79	--	--	--	124,198	2.851	738,072	16.944
4871.2	--	8.99	--	--	--	125,693	2.886	763,061	17.517
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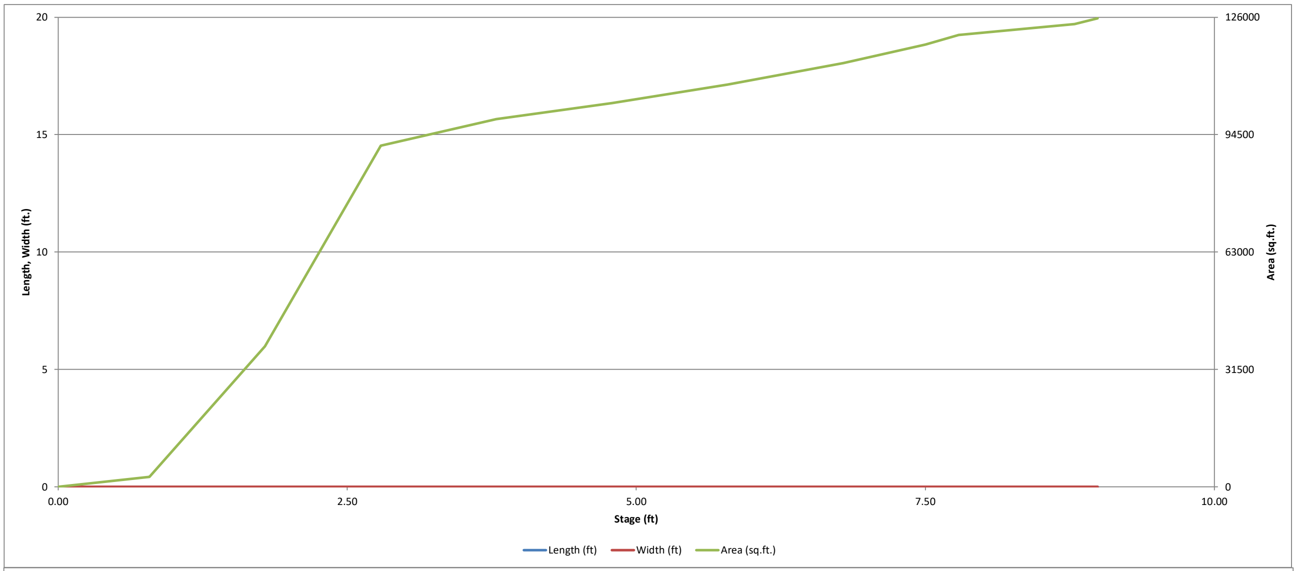
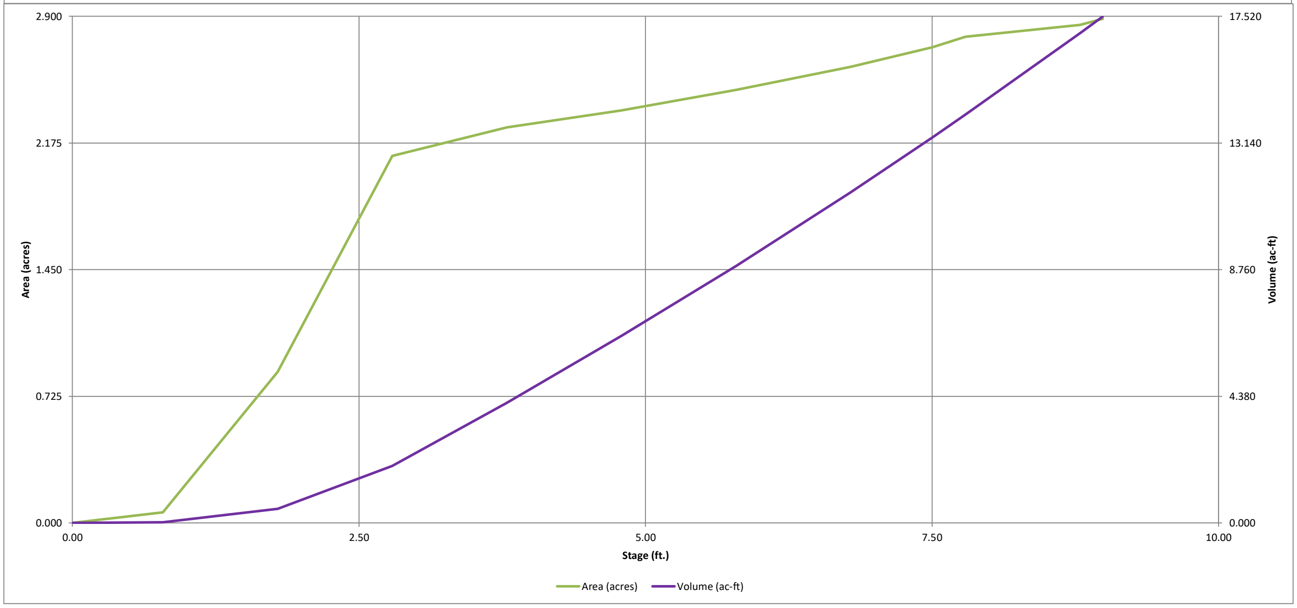
DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

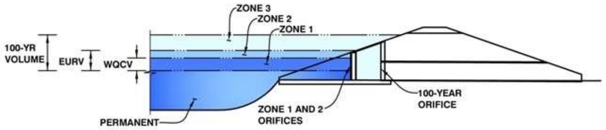




DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: **Pioneer Village**
Basin ID: **Pond C (PA's 17 and 21)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.02	2.457	Orifice Plate
Zone 2 (EURV)	5.49	5.682	Orifice Plate
Zone 3 (100-year)	7.65	5.591	Weir&Pipe (Restrict)
Total (all zones)		13.730	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP) — Calculated Parameters for Underdrain

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP) — Calculated Parameters for Plate

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	7.882E-02	ft^2
Depth at top of Zone using Orifice Plate =	5.49	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	22.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	11.35	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.83	3.66					
Orifice Area (sq. inches)	11.35	11.35	11.35					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular) — Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe) — Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.49	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.66	N/A	feet
Overflow Weir Front Edge Length =	8.00	N/A	feet	Overflow Weir Slope Length =	4.81	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	6.82	N/A	
Horiz. Length of Weir Sides =	4.67	N/A	feet	Overflow Grate Open Area w/o Debris =	26.80	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	26.80	N/A	ft^2
Debris Clogging % =	0%	N/A	%				

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice) — Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	3.93	N/A	ft^2
Outlet Pipe Diameter =	30.00	N/A	inches	Outlet Orifice Centroid =	1.03	N/A	feet
Restrictor Plate Height Above Pipe Invert =	22.40		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.09	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal) — Calculated Parameters for Spillway

Spillway Invert Stage=	7.77	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.37	feet
Spillway Crest Length =	300.00	feet	Stage at Top of Freeboard =	9.14	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	2.89	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	17.52	acre-ft

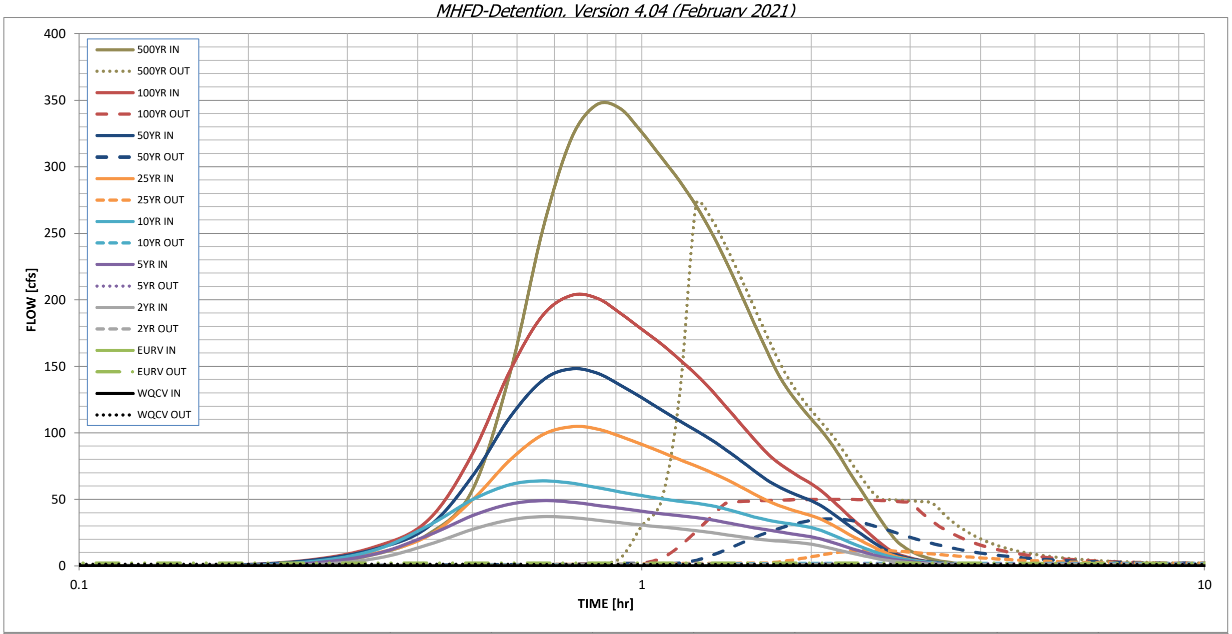
Routed Hydrograph Results

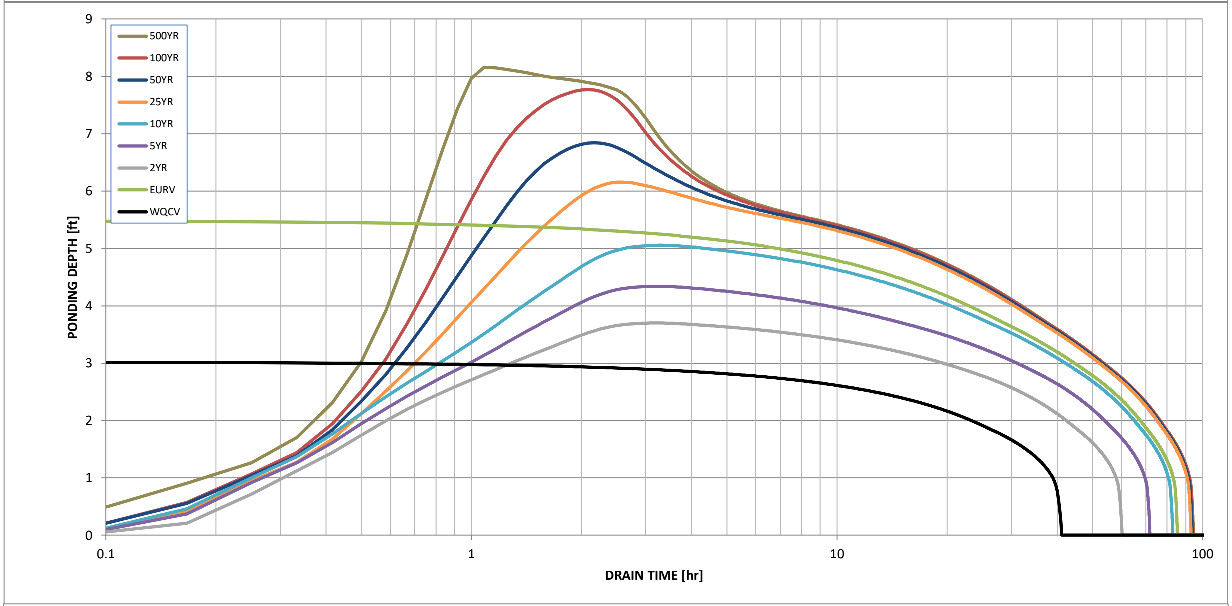
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

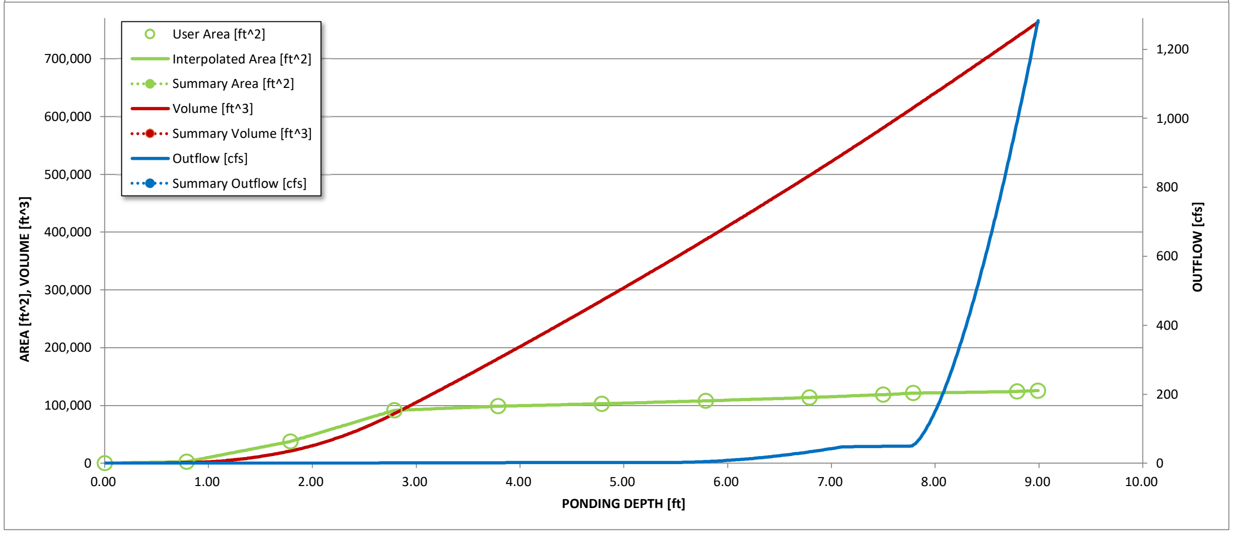
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.41	1.85	2.23	2.66	3.83
CUHP Runoff Volume (acre-ft) =	2.457	8.139	4.248	5.786	7.539	10.932	14.760	19.737	33.551
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	4.248	5.786	7.539	10.932	14.760	19.737	33.551
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.0	0.4	0.8	5.8	26.5	55.0	138.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.00	0.00	0.01	0.04	0.18	0.38	0.95
Peak Inflow Q (cfs) =	N/A	N/A	37.0	48.9	63.8	104.6	148.1	203.4	346.7
Peak Outflow Q (cfs) =	1.1	2.1	1.3	1.7	2.0	11.8	35.4	50.1	272.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	4.5	2.4	2.0	1.3	0.9	2.0
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.4	1.2	1.8	1.8
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	78	56	66	76	83	81	78	72
Time to Drain 99% of Inflow Volume (hours) =	**40**	82	59	70	80	89	89	88	85
Maximum Ponding Depth (ft) =	3.02	5.49	3.70	4.34	5.06	6.16	6.85	7.77	8.16
Area at Maximum Ponding Depth (acres) =	2.14	2.44	2.25	2.32	2.39	2.53	2.62	2.78	2.81
Maximum Volume Stored (acre-ft) =	2.459	8.150	3.928	5.391	7.086	9.790	11.565	14.071	15.161

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.18	1.53
	0:15:00	0.00	0.00	0.65	1.76	2.63	2.26	3.56	3.86	8.35
	0:20:00	0.00	0.00	5.20	8.62	11.53	9.03	12.31	14.00	23.58
	0:25:00	0.00	0.00	15.79	22.74	29.92	22.44	28.95	34.05	56.65
	0:30:00	0.00	0.00	27.44	37.70	49.67	49.39	67.25	83.96	144.60
	0:35:00	0.00	0.00	34.59	46.44	60.98	79.57	111.75	146.69	252.30
	0:40:00	0.00	0.00	37.02	48.92	63.83	98.51	139.45	188.12	321.34
	0:45:00	0.00	0.00	36.35	47.86	62.20	104.64	148.09	203.39	346.75
	0:50:00	0.00	0.00	34.36	45.51	58.77	102.95	144.86	201.18	343.61
	0:55:00	0.00	0.00	32.40	43.26	55.59	97.36	135.82	189.81	325.86
	1:00:00	0.00	0.00	30.64	41.09	52.77	91.31	126.40	177.88	307.14
	1:05:00	0.00	0.00	29.19	39.19	50.37	85.45	117.33	166.82	289.51
	1:10:00	0.00	0.00	27.91	37.73	48.61	79.94	109.00	155.34	270.53
	1:15:00	0.00	0.00	26.47	36.27	47.04	74.97	101.61	143.73	250.00
	1:20:00	0.00	0.00	24.92	34.51	45.14	70.04	94.38	131.59	227.85
	1:25:00	0.00	0.00	23.33	32.51	42.57	64.83	86.85	118.97	204.84
	1:30:00	0.00	0.00	21.76	30.47	39.61	59.43	79.17	106.73	182.64
	1:35:00	0.00	0.00	20.38	28.65	36.79	54.12	71.64	95.34	162.03
	1:40:00	0.00	0.00	19.35	27.09	34.57	49.23	64.68	84.99	143.60
	1:45:00	0.00	0.00	18.63	25.67	32.96	45.45	59.52	77.38	130.40
	1:50:00	0.00	0.00	18.04	24.32	31.61	42.53	55.52	71.51	119.83
	1:55:00	0.00	0.00	17.27	23.05	30.28	40.07	52.13	66.40	110.47
	2:00:00	0.00	0.00	16.23	21.80	28.79	37.81	48.99	61.74	101.92
	2:05:00	0.00	0.00	14.86	20.15	26.61	34.99	45.17	56.44	92.59
	2:10:00	0.00	0.00	13.24	18.05	23.81	31.40	40.42	50.27	82.08
	2:15:00	0.00	0.00	11.59	15.83	20.85	27.57	35.39	43.92	71.45
	2:20:00	0.00	0.00	10.05	13.69	18.01	23.86	30.50	37.84	61.33
	2:25:00	0.00	0.00	8.61	11.71	15.40	20.38	25.89	32.04	51.64
	2:30:00	0.00	0.00	7.27	9.89	13.01	17.15	21.59	26.57	42.51
	2:35:00	0.00	0.00	6.03	8.19	10.80	14.11	17.57	21.38	33.82
	2:40:00	0.00	0.00	4.89	6.68	8.85	11.34	13.89	16.57	25.79
	2:45:00	0.00	0.00	3.98	5.48	7.26	8.92	10.67	12.33	19.03
	2:50:00	0.00	0.00	3.30	4.58	6.09	7.04	8.37	9.43	14.59
	2:55:00	0.00	0.00	2.77	3.87	5.14	5.69	6.74	7.44	11.39
	3:00:00	0.00	0.00	2.33	3.25	4.32	4.66	5.51	5.91	8.91
	3:05:00	0.00	0.00	1.97	2.72	3.63	3.82	4.50	4.71	6.97
	3:10:00	0.00	0.00	1.66	2.28	3.04	3.15	3.70	3.77	5.47
	3:15:00	0.00	0.00	1.39	1.90	2.55	2.61	3.07	3.04	4.33
	3:20:00	0.00	0.00	1.16	1.58	2.12	2.15	2.52	2.45	3.44
	3:25:00	0.00	0.00	0.96	1.29	1.73	1.76	2.06	2.00	2.80
	3:30:00	0.00	0.00	0.78	1.04	1.40	1.42	1.66	1.62	2.26
	3:35:00	0.00	0.00	0.63	0.82	1.11	1.13	1.32	1.30	1.80
	3:40:00	0.00	0.00	0.48	0.64	0.87	0.89	1.02	1.01	1.39
	3:45:00	0.00	0.00	0.36	0.48	0.66	0.67	0.77	0.76	1.04
	3:50:00	0.00	0.00	0.26	0.34	0.48	0.49	0.56	0.55	0.74
	3:55:00	0.00	0.00	0.17	0.24	0.33	0.34	0.38	0.37	0.48
	4:00:00	0.00	0.00	0.10	0.15	0.21	0.22	0.24	0.22	0.29
	4:05:00	0.00	0.00	0.05	0.09	0.12	0.12	0.13	0.11	0.14
	4:10:00	0.00	0.00	0.02	0.04	0.05	0.05	0.05	0.04	0.04
	4:15:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	**Stage** [ft]	**Area** [ft ^{2}]	**Area** [acres]	**Volume** [ft ^{3}]	**Volume** [ac-ft]	**Total Outflow** [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

Channel Report

Project Name: New Project

Studio Express by Hydrology Studio v 1.0.0.9

04-01-2021

Pond C Forebay 1 Notch

Channel 1

RECTANGULAR

Bottom Width = 0.51 ft

Total Depth = 2.50 ft

Invert Elevation = 10.00 ft

Channel Slope = 0.300 %

Manning's n = 0.013

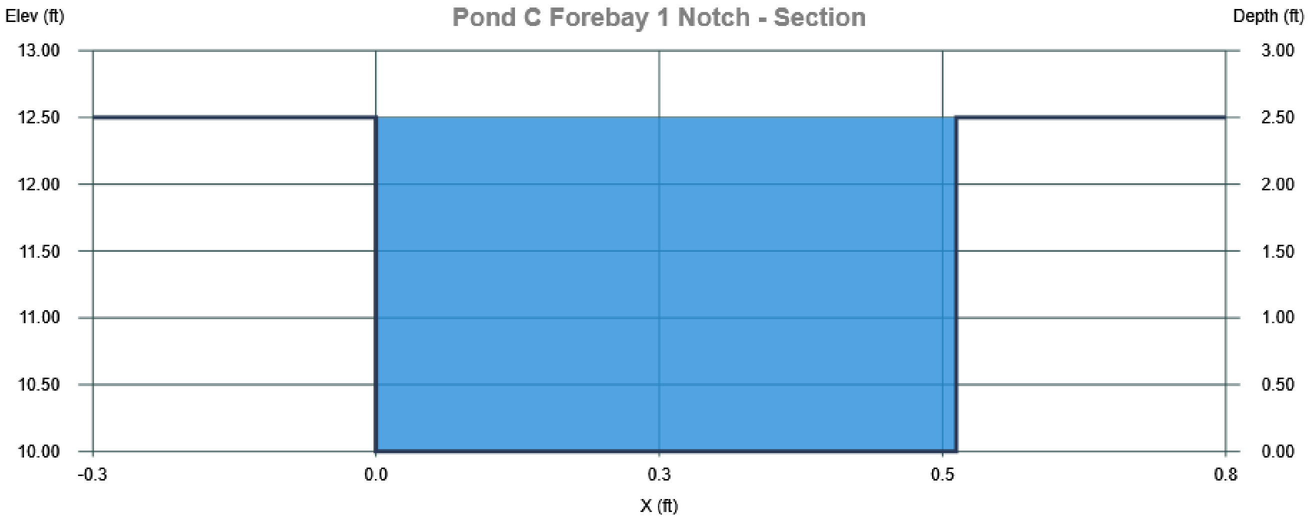
DISCHARGE

Method = Known Q

Known Q = 3.01 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
3.01	2.49	1.27	2.36	5.49	0.013	1.03	12.49	12.58	0.47	0.51



Channel Report

Project Name: New Project

Studio Express by Hydrology Studio v 1.0.0.9

04-01-2021

Pond C Forebay 2 Notch

Channel 1

RECTANGULAR

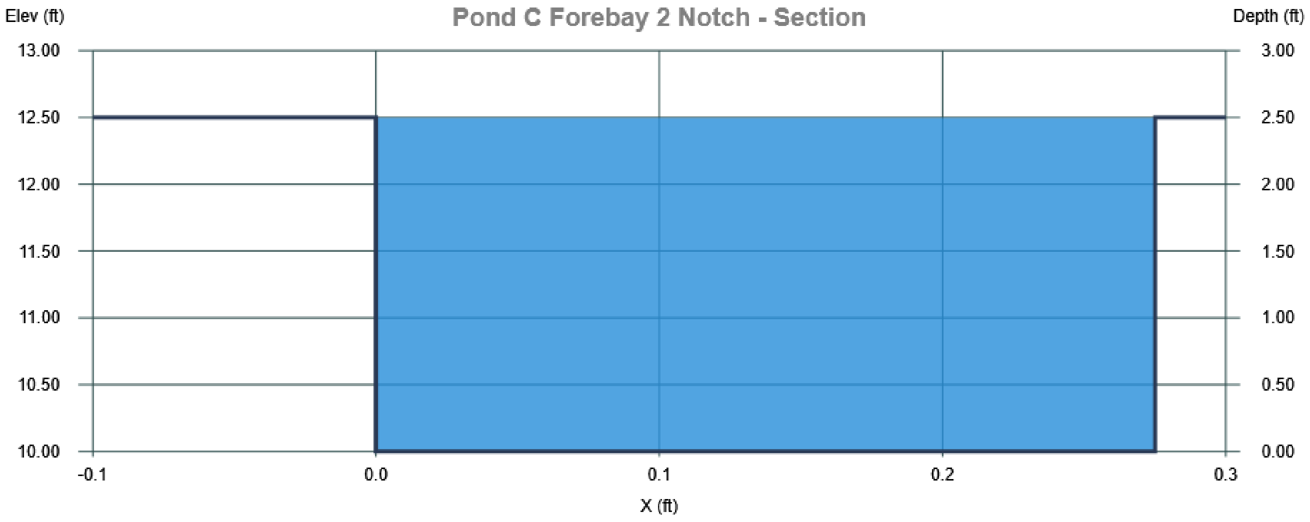
Bottom Width = 0.28 ft
Total Depth = 2.50 ft
Invert Elevation = 10.00 ft
Channel Slope = 0.300 %
Manning's n = 0.013

DISCHARGE

Method = Known Q
Known Q = 1.10 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
1.10	2.49	0.68	1.61	5.25	0.013	0.80	12.49	12.53	0.47	0.28



Channel Report

Pond C Trickle Channel

Channel 3

RECTANGULAR

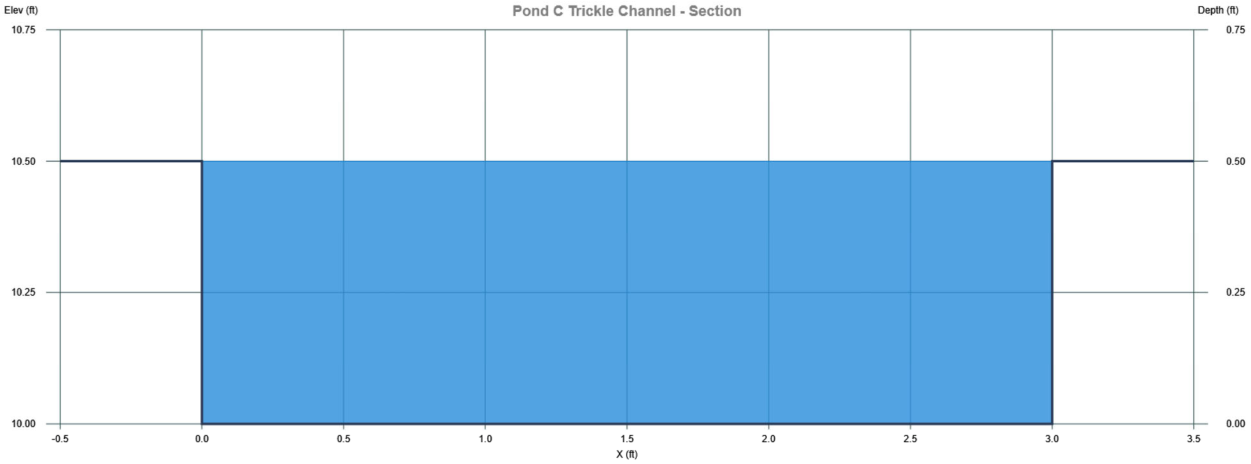
Bottom Width = 3.00 ft
Total Depth = 0.50 ft
Invert Elevation = 10.00 ft
Channel Slope = 0.300 %
Manning's n = 0.013

DISCHARGE

Method = Q vs Depth
Q Min = 0.12 cfs
Q Max = 4.88 cfs
Increments = 10

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
4.88	0.50	1.50	3.25	4.00	0.013	0.44	10.50	10.66	0.09	3.00



Appendix D

Reference Material

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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

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

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

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

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

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

Base map information shown on this FIRM was derived from NAIP Orthophotography produced with a one meter ground resolution from photography dated 2013.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

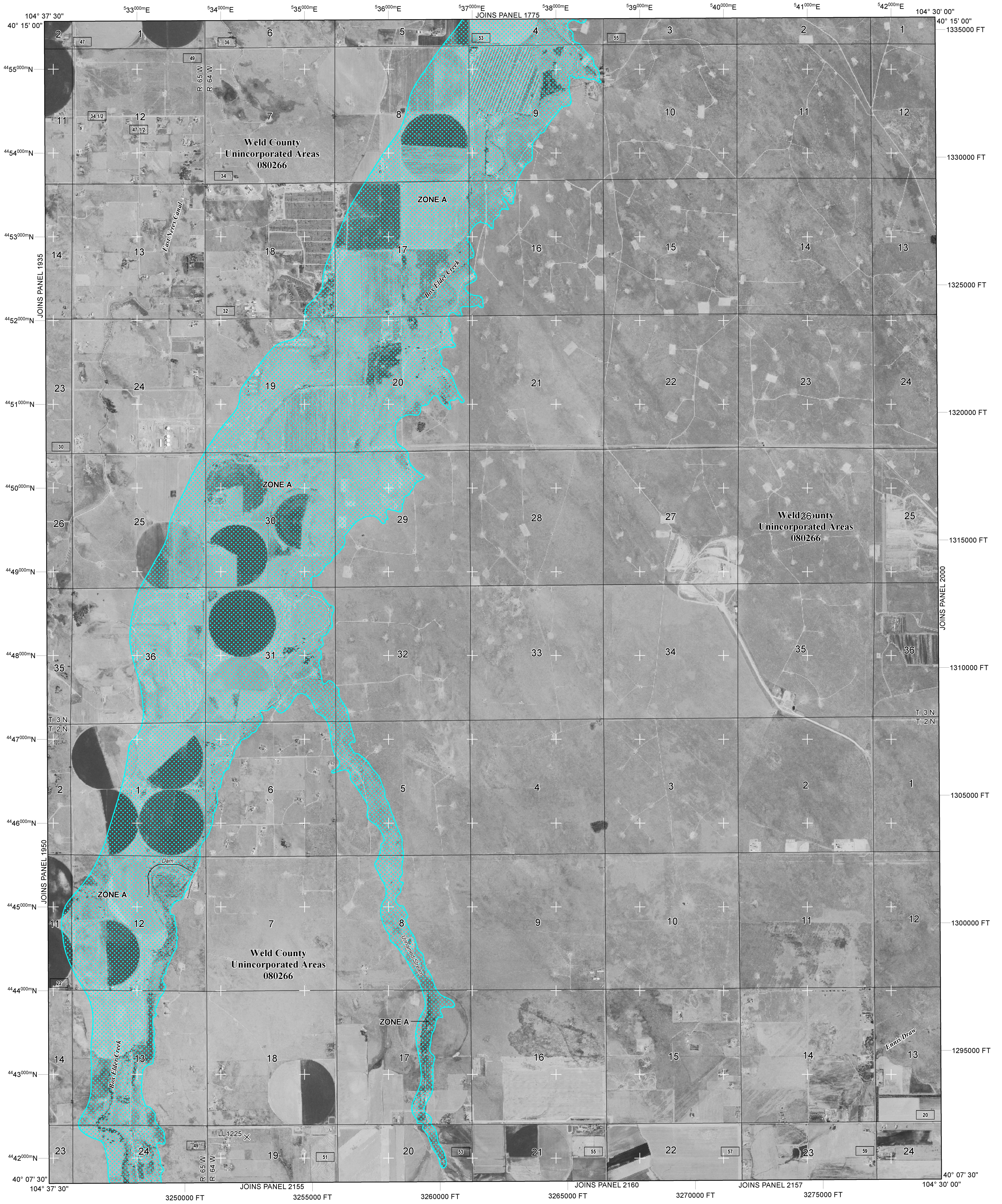
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result,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

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

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

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

▨ SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

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

▨ OTHER FLOOD AREAS

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

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▨ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

———	1% Annual Chance Floodplain Boundary
———	0.2% Annual Chance Floodplain Boundary
— —	Floodway boundary
— — —	Zone D boundary
• • • • • • • •	CBRS and OPA boundary
▨ ←	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)———(A)	Cross section line
(23) - - - - - (23)	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: Colorado State Plane Central Zone (FIPS Zone 0502), Lambert Conformal Conic projection
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 13
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 20, 2016

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

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

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

N

MAP SCALE 1" = 2000'

1000	0	2000	4000	FEET
600	0	600	1200	METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1975E

FIRM
FLOOD INSURANCE RATE MAP
WELD COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 1975 OF 2250
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WELD COUNTY	080266	1975	E

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

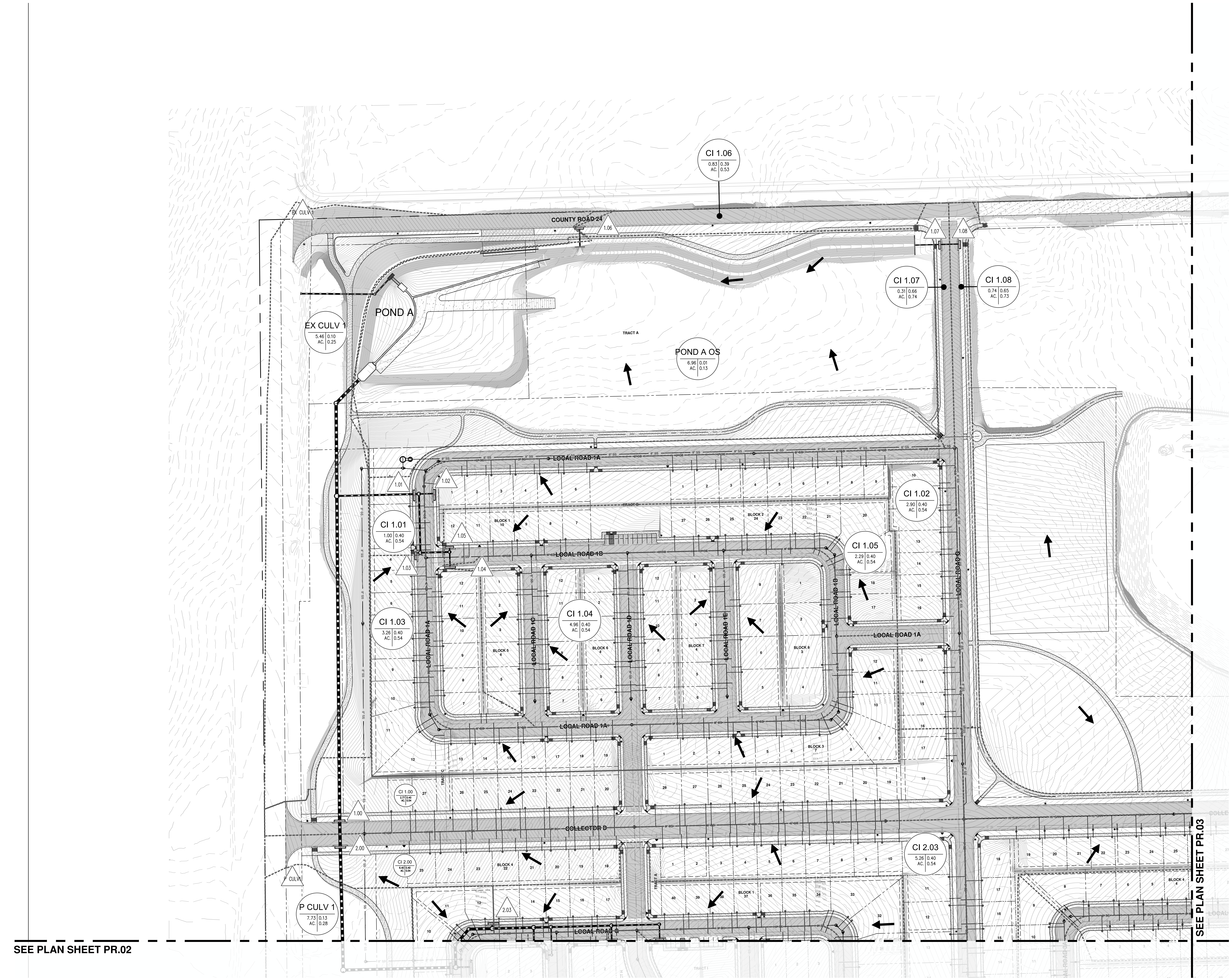
MAP NUMBER
08123C1975E

EFFECTIVE DATE
JANUARY 20, 2016

Federal Emergency Management Agency

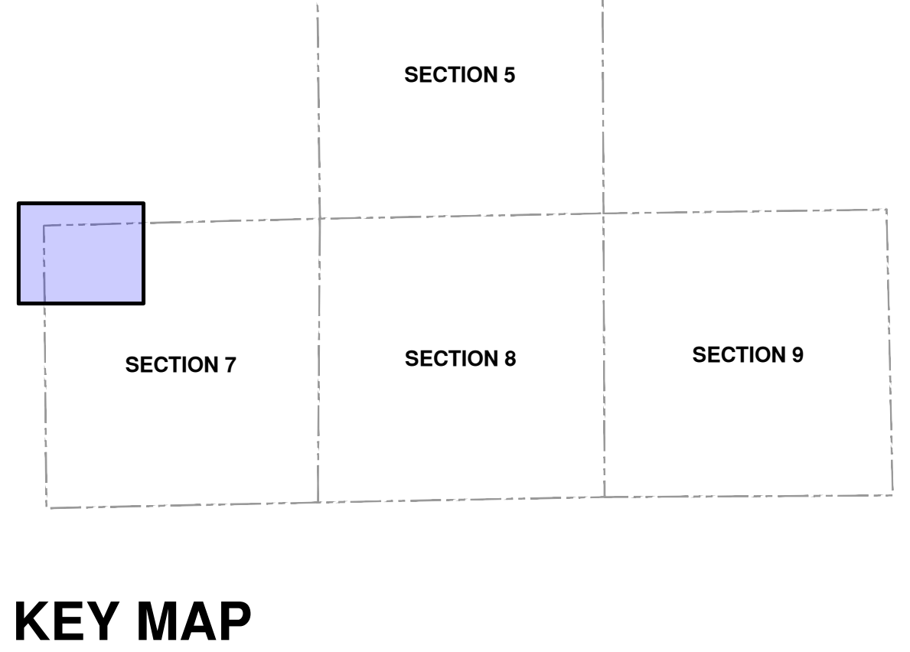
Appendix E

Drainage Maps



PHASE III DRAINAGE MAP

SCALE: 1"=70'

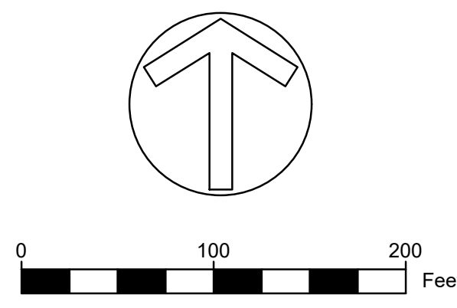


KEY MAP

SCALE: NTS

BMP LEGEND

Basin Area AC. | C5 C100	DRAINAGE BASIN IDENTIFIER
△ DP	DESIGN POINT IDENTIFIER
←	DRAINAGE ARROW
┄	DRAINAGE DIVIDE



ENGINEER IN CHARGE:

PRELIMINARY NOT FOR CONSTRUCTION

CONTACT INFORMATION
88 INVERNESS CIRCLE EAST, SUITE E-101
ENGLEWOOD, CO 80112
(720) 206-6931
CPERDUE@STRATEGICSITEDESIGNS.COM
ATTENTION: CHRISTOPHER PERDUE, P.E., M.B.A.

STRATEGIC SITE DESIGNS

BASIS OF BEARINGS:

BEARINGS SHOWN HEREON ARE GRID BEARINGS DERIVED FROM GPS OBSERVATION BASED UPON THE COLORADO COORDINATE SYSTEM OF 1983 NORTH ZONE (NAD 83, 2011) REFERENCED TO THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 7, TOWNSHIP 2 NORTH, RANGE 64 WEST, SIXTH PRINCIPAL MERIDIAN, TAKEN TO BEAR SOUTH 00°30'28" EAST, A DISTANCE OF 2,612.70 FEET.

BENCHMARK

NGS ROGGEN RM 1: RECOVERED A 3 1/2" BRASS CAP LOCATED 200' SOUTH OF FRONTAGE RD I-76 AND 2500 WEST OF COUNTY RD 73.

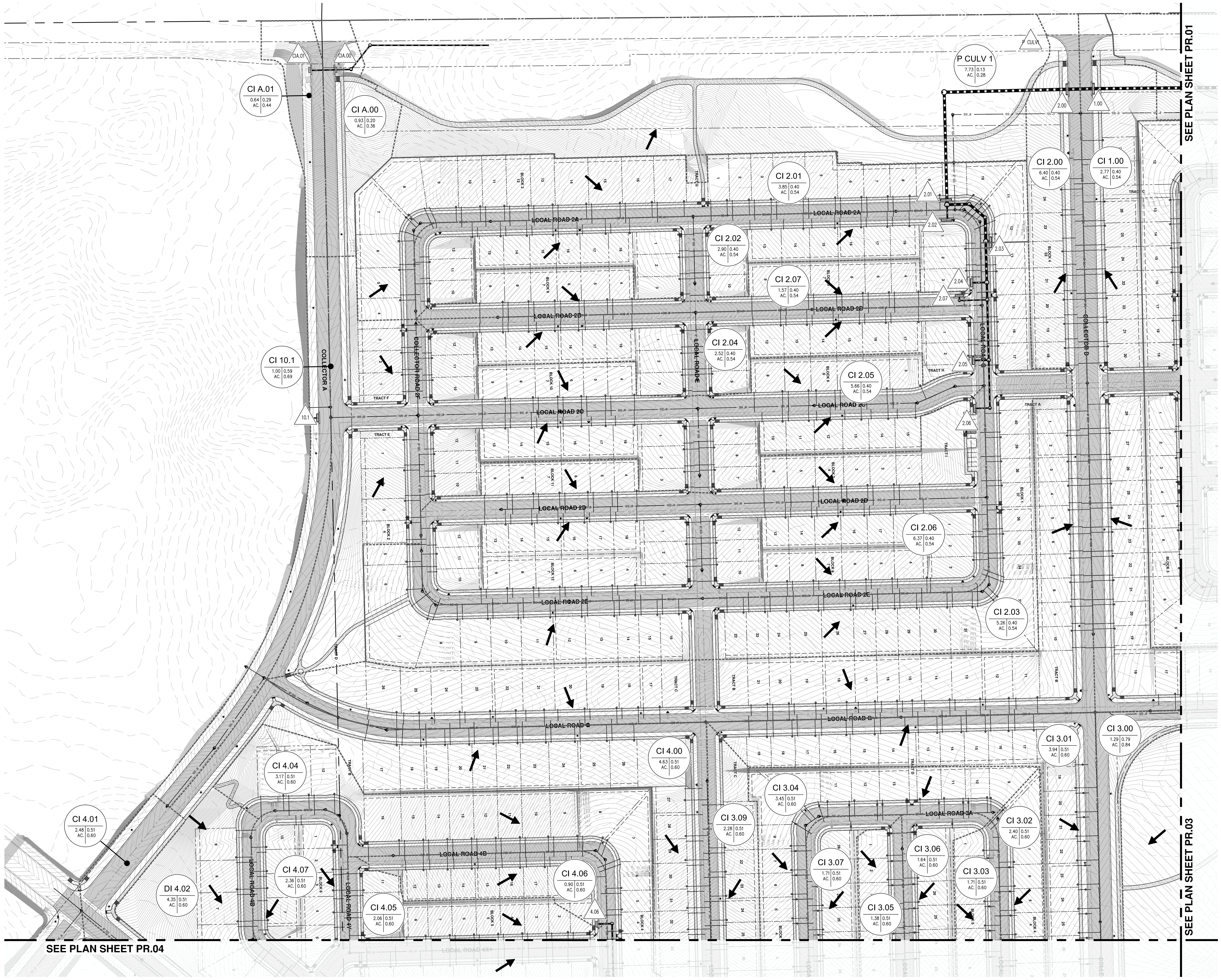
ELEVATION = 4721.56 (NAVD 88)

PIONEER VILLAGE
PA'S 1-4, 17 AND 21
TOWN OF KEENESBURG
WELD COUNTY, COLORADO

PHASE III
DRAINAGE MAP

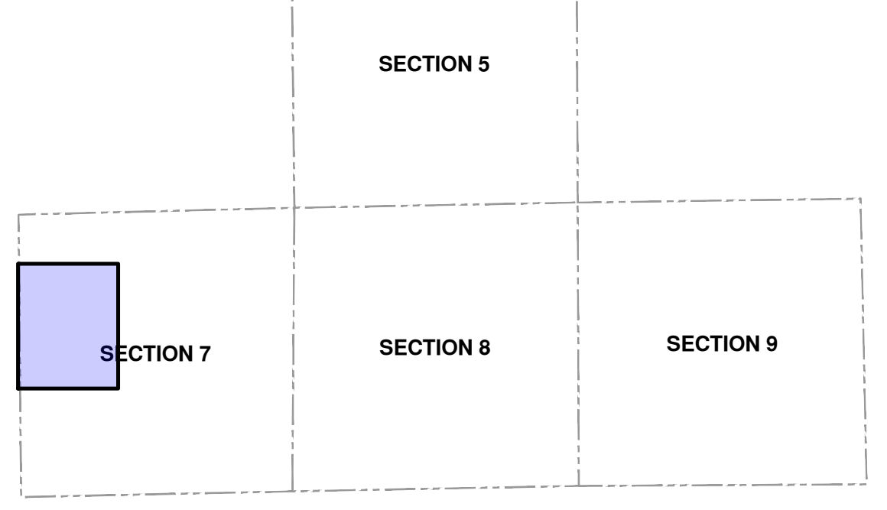
REV	DESCRIPTION	BY	DATE

JOB NO: 1903-001
ORIGINAL ISSUE: 03/15/2021
DESIGN BY: CLP
CHECKED BY: CLP
SCALE: 1" = 70'
SHEET NUMBER
PR.01



PHASE III DRAINAGE MAP

SCALE: 1"=70'



KEY MAP

SCALE: NTS

BMP LEGEND

Basin Area AC. | C5 C100	DRAINAGE BASIN IDENTIFIER
△ DP	DESIGN POINT IDENTIFIER
←	DRAINAGE ARROW
┅┅┅	DRAINAGE DIVIDE

0 100 200 Feet

ENGINEER IN CHARGE:

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PA'S 1-4, 17 AND 21
TOWN OF KEENESBURG
WELD COUNTY, COLORADO

PHASE III
DRAINAGE MAP

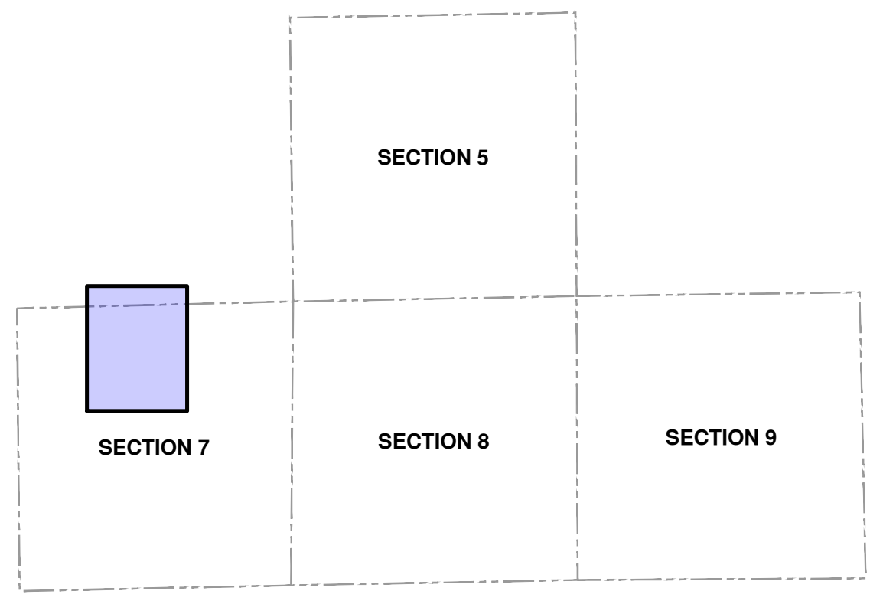
REV	DESCRIPTION	BY	DATE

JOB NO:	1903-001
ORIGINAL ISSUE:	03/15/2021
DESIGN BY:	CLP
CHECKED BY:	CLP
SCALE:	1" = 70'

SHEET NUMBER

PR.02

C3.05
PHASE III DRAINAGE MAP
SCALE: 1"=70'

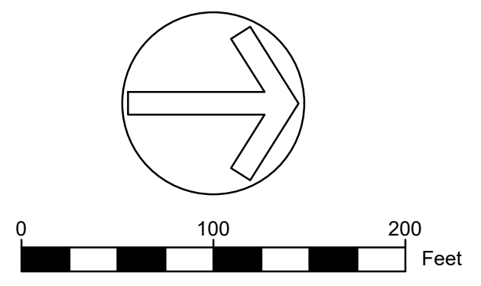


KEY MAP

SCALE: NTS

BMP LEGEND

Basin Area AC. C5 C100	DRAINAGE BASIN IDENTIFIER
△ DP	DESIGN POINT IDENTIFIER
←	DRAINAGE ARROW
┅┅┅	DRAINAGE DIVIDE



ENGINEER IN CHARGE:

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PIONEER VILLAGE
PA'S 1-4, 17 AND 21
TOWN OF KEENESBURG
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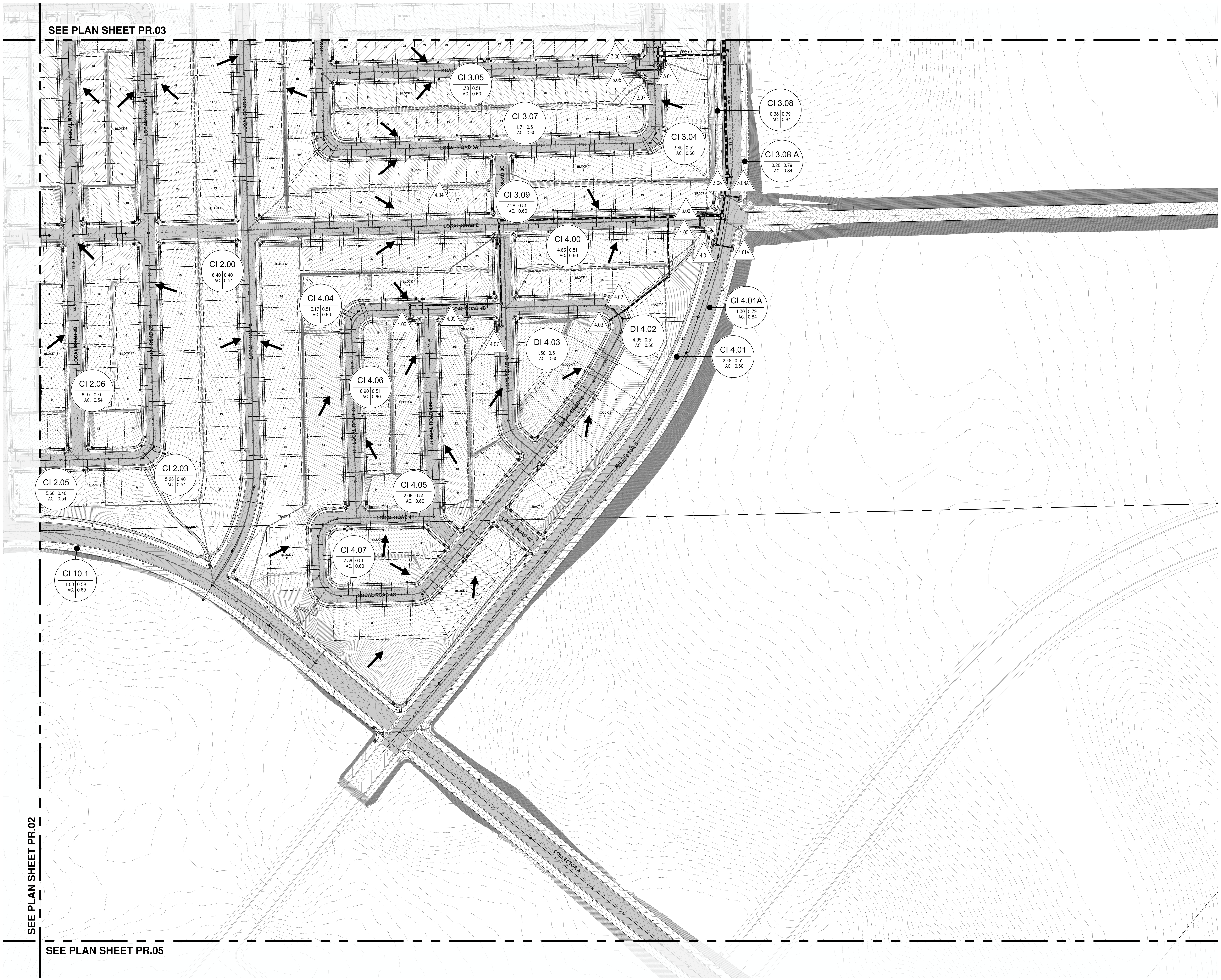
PHASE III
DRAINAGE MAP

REV	DESCRIPTION	BY	DATE

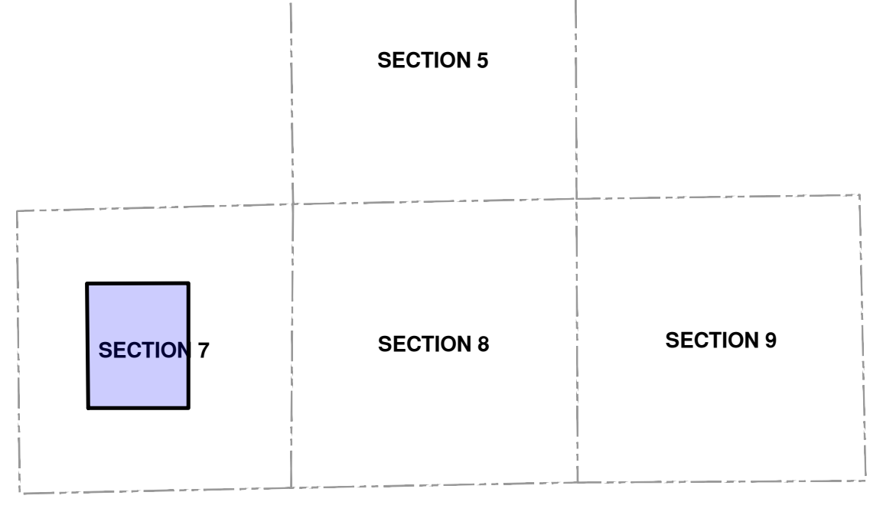
JOB NO:	1903-001
ORIGINAL ISSUE:	03/15/2021
DESIGN BY:	CLP
CHECKED BY:	CLP
SCALE:	1" = 70'

SHEET NUMBER
PR.03



PHASE III DRAINAGE MAP

SCALE: 1"=70'

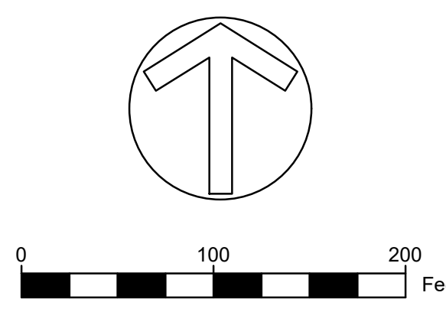


KEY MAP

SCALE: NTS

BMP LEGEND

Basin Area AC. C5 C100	DRAINAGE BASIN IDENTIFIER
DP	DESIGN POINT IDENTIFIER
←	DRAINAGE ARROW
┈	DRAINAGE DIVIDE



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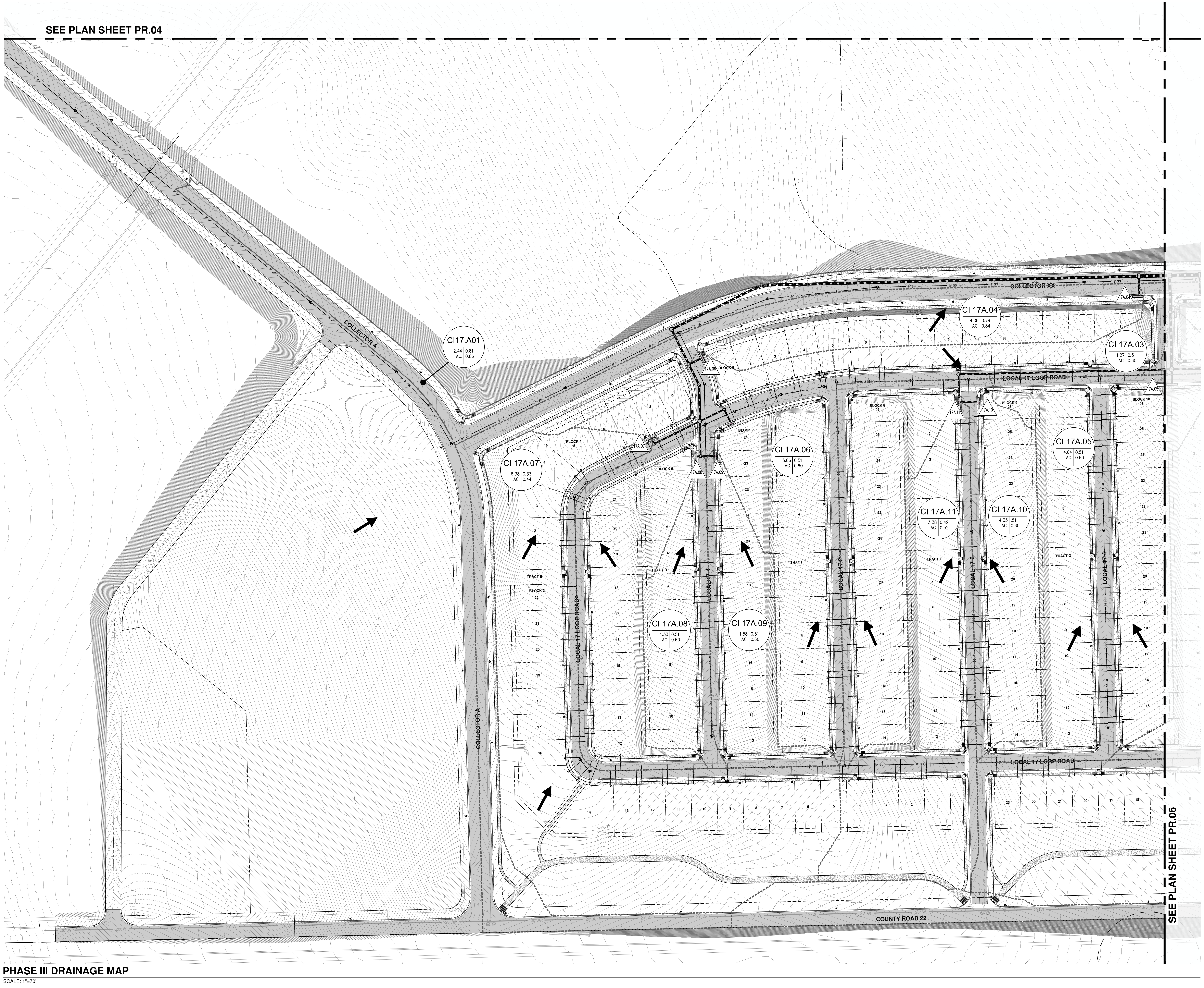
WELD COUNTY, COLORADO

PHASE III
DRAINAGE MAP

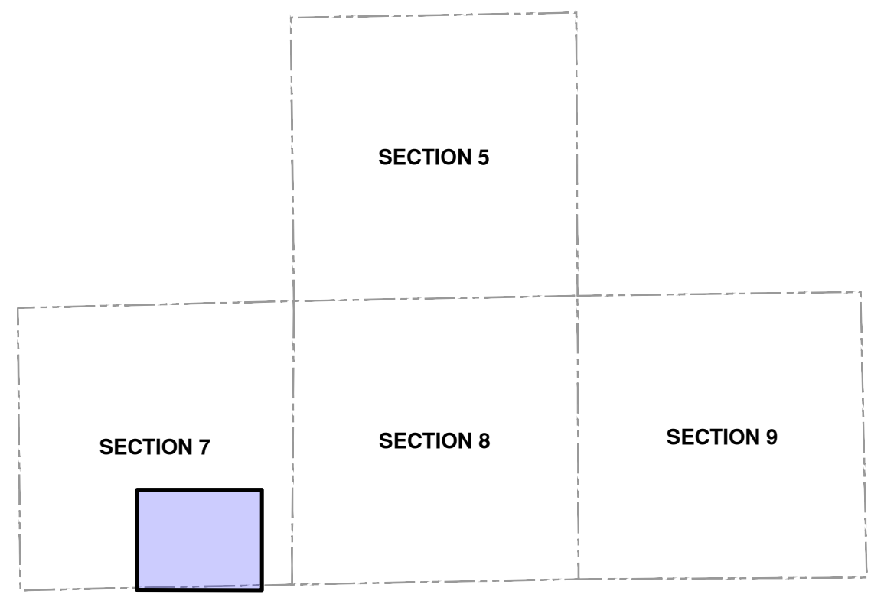
REV	DESCRIPTION	BY	DATE

JOB NO:	1903-001
ORIGINAL ISSUE:	03/15/2021
DESIGN BY:	CLP
CHECKED BY:	CLP
SCALE:	1" = 70'
SHEET NUMBER	**PR.04**



PHASE III DRAINAGE MAP

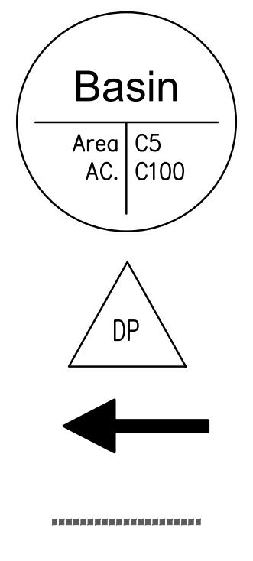
SCALE: 1"=70'



KEY MAP

SCALE: NTS

BMP LEGEND

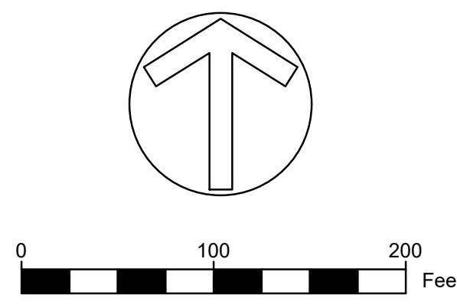


DRAINAGE BASIN IDENTIFIER

DESIGN POINT IDENTIFIER

DRAINAGE ARROW

DRAINAGE DIVIDE



ENGINEER IN CHARGE:

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STRATEGIC SITE DESIGNS

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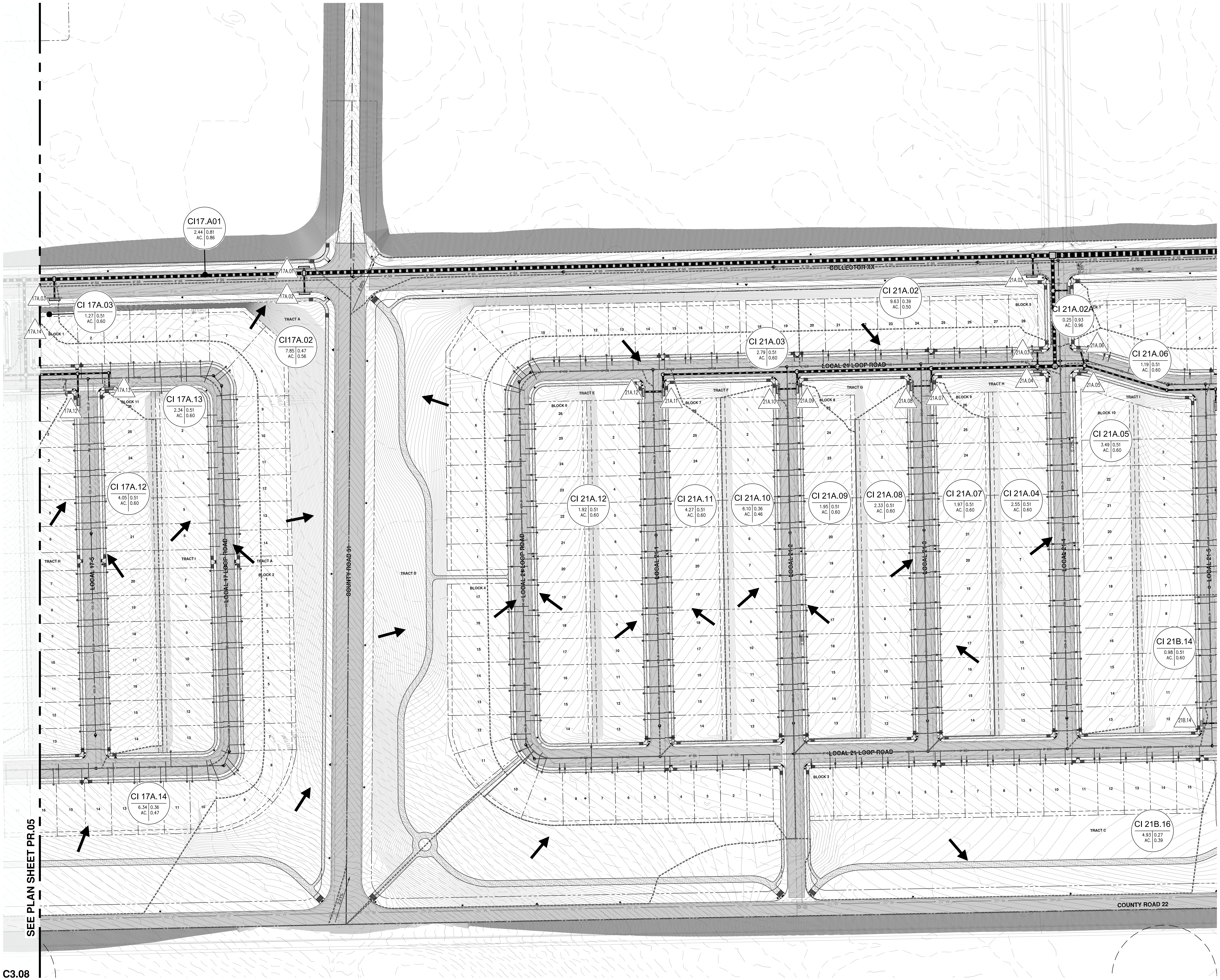
PIONEER VILLAGE
PA'S 1-4, 17 AND 21
TOWN OF KEENESBURG
WELD COUNTY, COLORADO

PHASE III
DRAINAGE MAP

REV	DESCRIPTION	BY	DATE

JOB NO:	1903-001
ORIGINAL ISSUE:	03/15/2021
DESIGN BY:	CLP
CHECKED BY:	CLP
SCALE:	1" = 70'

SHEET NUMBER
PR.05



C3.08
PHASE III DRAINAGE MAP

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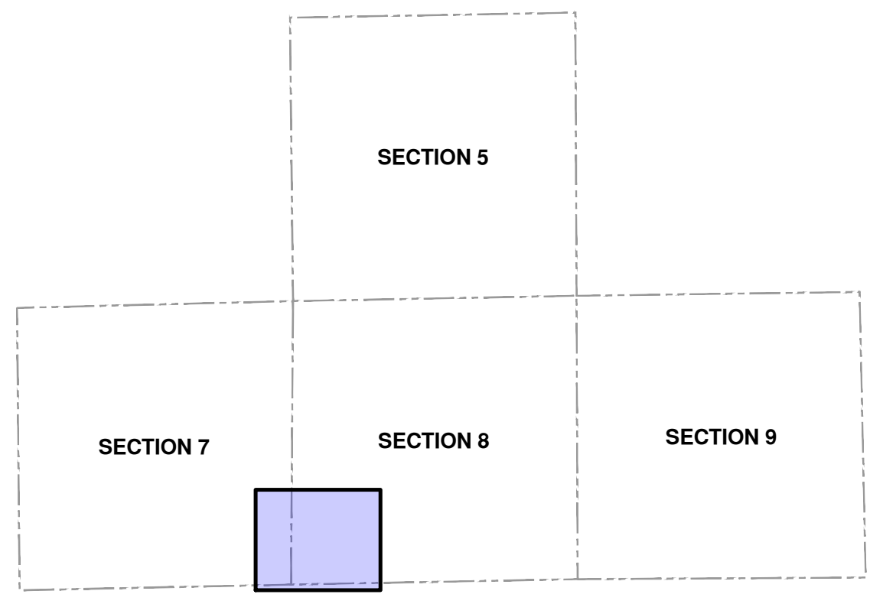
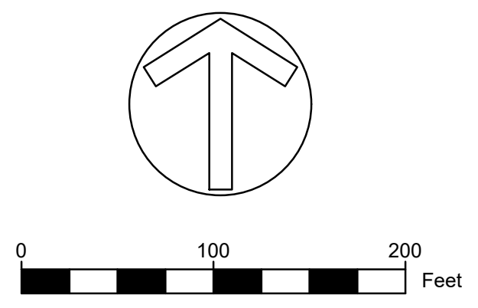


KEY MAP

SCALE: NTS

BMP LEGEND

Basin Area AC. | C5 C100	DRAINAGE BASIN IDENTIFIER
△ DP	DESIGN POINT IDENTIFIER
←	DRAINAGE ARROW
┈┈┈	DRAINAGE DIVIDE



ENGINEER IN CHARGE:

PRELIMINARY
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STRATEGIC
SITE DESIGNS

CONTACT INFORMATION
88 INVERNESS CIRCLE EAST, SUITE E-101
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PIONEER VILLAGE
PA'S 1-4, 17 AND 21
TOWN OF KEENESBURG
WELD COUNTY, COLORADO

PHASE III
DRAINAGE MAP

REV	DESCRIPTION	BY	DATE

JOB NO:	1903-001
ORIGINAL ISSUE:	03/15/2021
DESIGN BY:	CLP
CHECKED BY:	CLP
SCALE:	1" = 70'

SHEET NUMBER

PR.06

PHASE III DRAINAGE MAP

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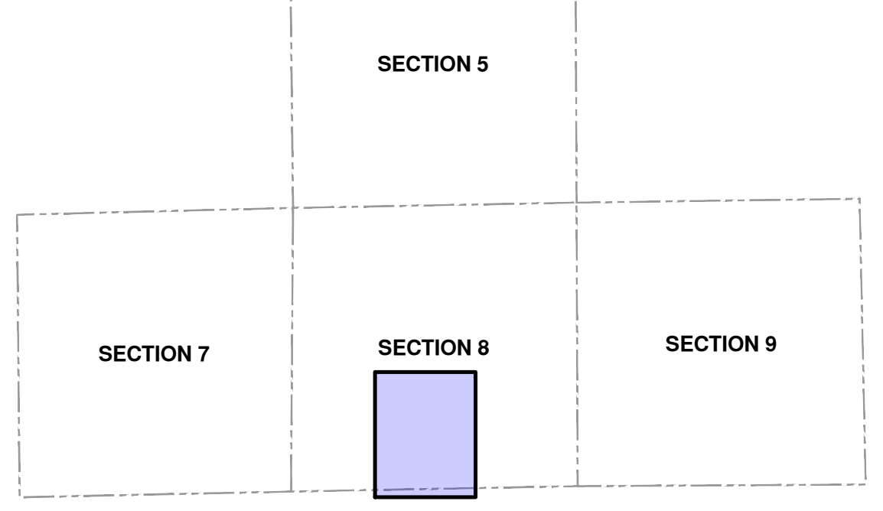
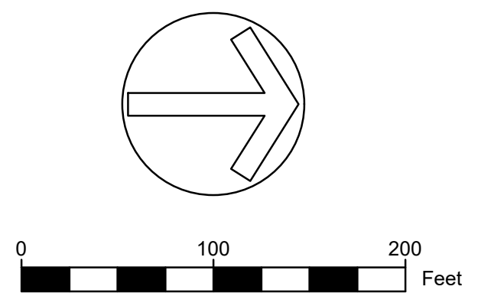


KEY MAP

SCALE: NTS

BMP LEGEND

Basin / Area AC. / C5 C100	DRAINAGE BASIN IDENTIFIER
DP	DESIGN POINT IDENTIFIER
←	DRAINAGE ARROW
┅	DRAINAGE DIVIDE



ENGINEER IN CHARGE:

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PHASE III
DRAINAGE MAP

REV	DESCRIPTION	BY	DATE

JOB NO: 1903-001
ORIGINAL ISSUE: 03/15/2021
DESIGN BY: CLP
CHECKED BY: CLP
SCALE: 1" = 70'
SHEET NUMBER
PR.07

Appendix F

Web Soil Survey

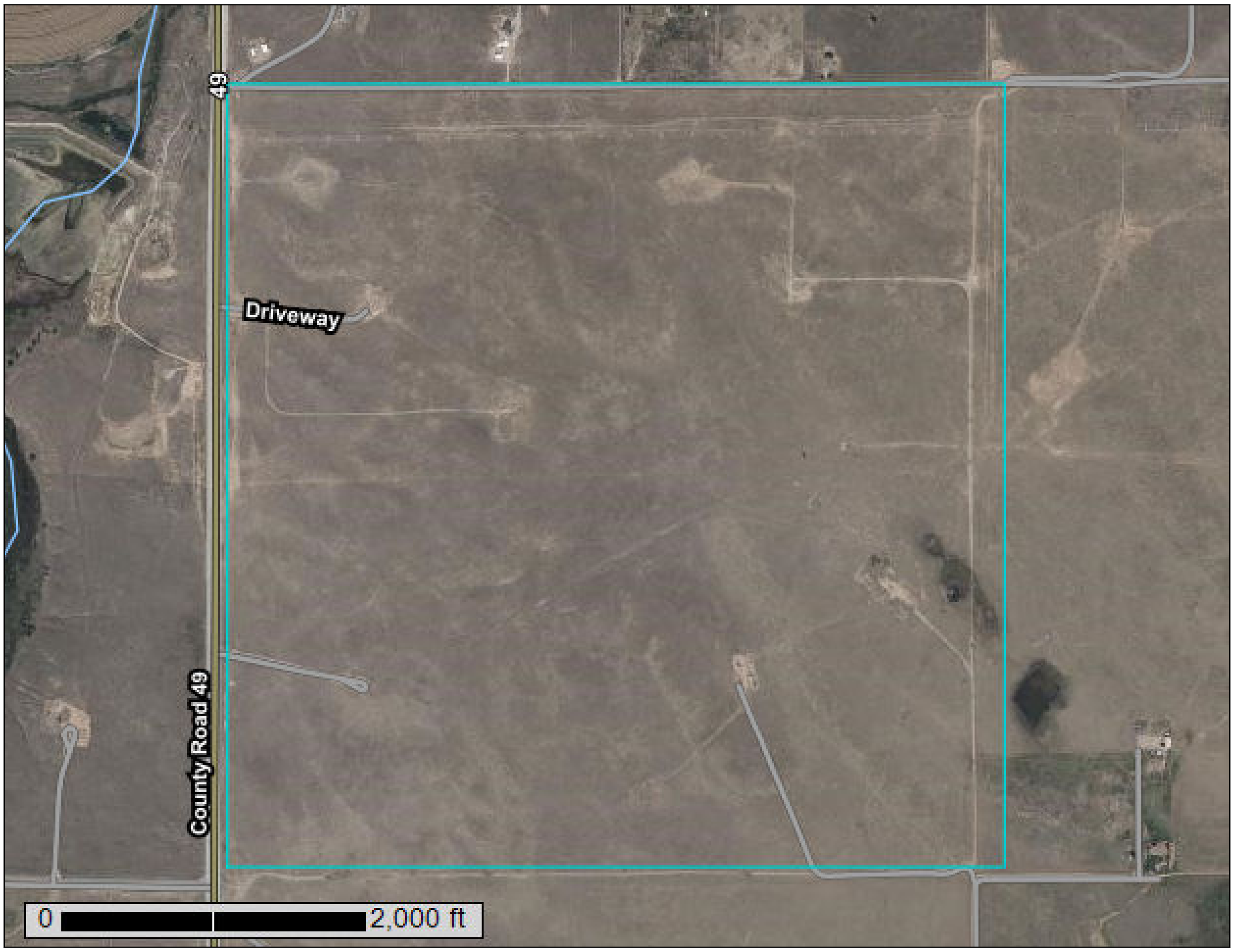
United States
Department of
Agriculture

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Weld County, Colorado, Southern Part

Pioneer Village Section 7



December 9, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

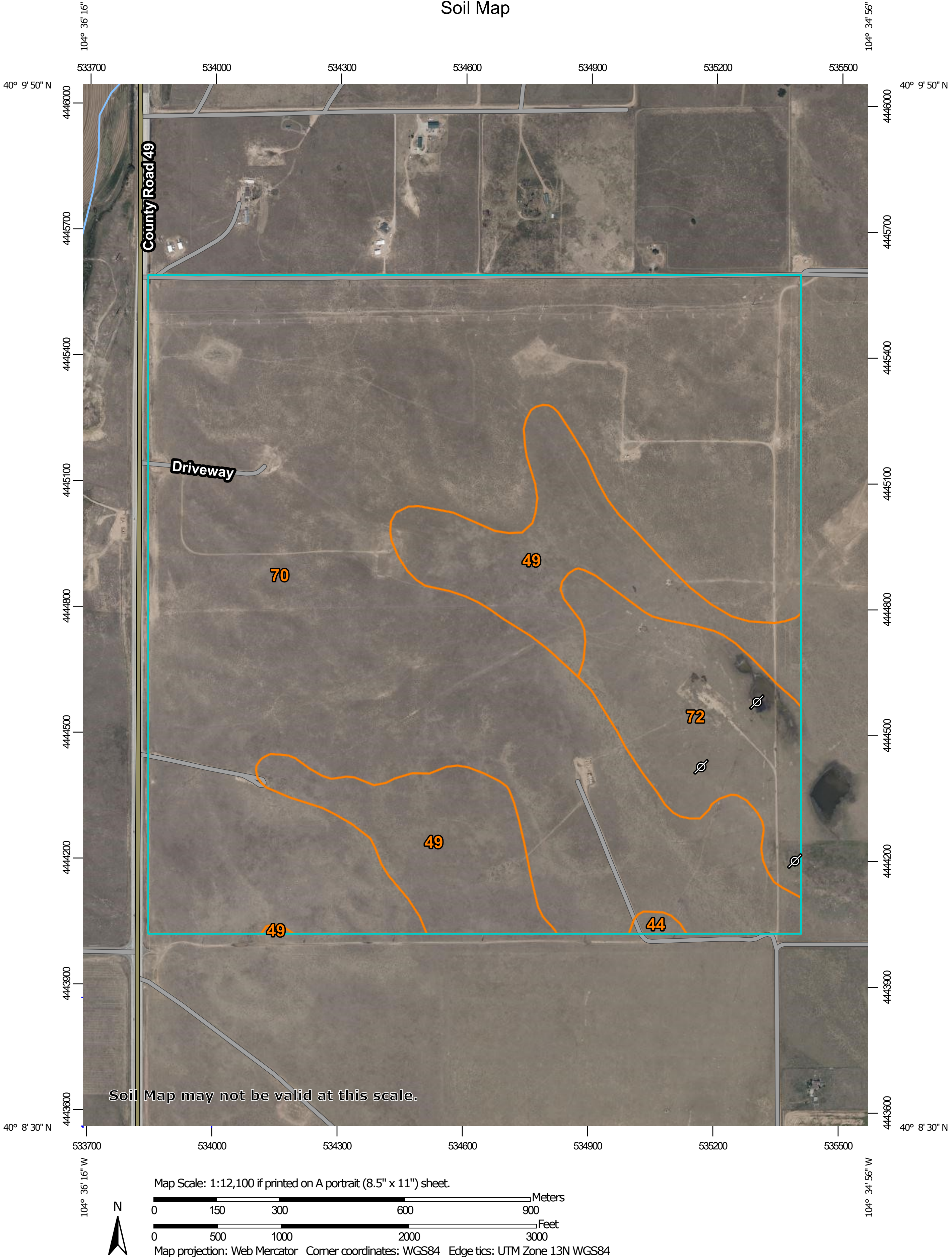
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Soil Map may not be valid at this scale.

Map Scale: 1:12,100 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- ☐ Area of Interest (AOI)

Soils

- ☐ Soil Map Unit Polygons
- Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features

- Blowout
- ☒ Borrow Pit
- Clay Spot
- ◇ Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- ◎ Miscellaneous Water
- ○ Perennial Water
- Rock Outcrop
- + Saline Spot
- Sandy Spot
- Severely Eroded Spot
- ◇ Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- △ Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Weld County, Colorado, Southern Part
Survey Area Data: Version 19, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 19, 2018—Aug 10, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
44	Olney loamy sand, 1 to 3 percent slopes	1.4	0.2%
49	Osgood sand, 0 to 3 percent slopes	88.0	14.4%
70	Valent sand, 3 to 9 percent slopes	467.2	76.7%
72	Vona loamy sand, 0 to 3 percent slopes	52.6	8.6%
Totals for Area of Interest		**609.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Weld County, Colorado, Southern Part

44—Olney loamy sand, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 362r
Elevation: 4,600 to 5,200 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 125 to 175 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Olney and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Olney

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed deposit outwash

Typical profile

H1 - 0 to 10 inches: loamy sand
H2 - 10 to 20 inches: sandy clay loam
H3 - 20 to 25 inches: sandy clay loam
H4 - 25 to 60 inches: fine sandy loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Vona

Percent of map unit: 8 percent

Hydric soil rating: No

Zigweid

Percent of map unit: 7 percent
Hydric soil rating: No

49—Osgood sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 362x
Elevation: 4,680 to 4,900 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 140 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Osgood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Osgood

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile

H1 - 0 to 22 inches: sand
H2 - 22 to 34 inches: sandy loam
H3 - 34 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A

Ecological site: R067BY015CO - Deep Sand
Hydric soil rating: No

Minor Components

Valent
Percent of map unit: 10 percent
Hydric soil rating: No

Dailey
Percent of map unit: 5 percent
Hydric soil rating: No

70—Valent sand, 3 to 9 percent slopes

Map Unit Setting
National map unit symbol: 2tczf
Elevation: 3,050 to 5,150 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition
Valent and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valent

Setting
Landform: Hills, dunes
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, head slope, nose slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Noncalcareous eolian sands

Typical profile
A - 0 to 5 inches: sand
AC - 5 to 12 inches: sand
C1 - 12 to 30 inches: sand
C2 - 30 to 80 inches: sand

Properties and qualities
Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 39.96 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R067BY015CO - Deep Sand, R072XY109KS - Rolling Sands
Hydric soil rating: No

Minor Components

Dailey

Percent of map unit: 10 percent
Landform: Interdunes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R067BY015CO - Deep Sand, R072XA021KS - Sands (North) (PE 16-20)
Hydric soil rating: No

Vona

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope, backslope, shoulder
Landform position (three-dimensional): Side slope, head slope, nose slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains, R072XA022KS - Sandy (North) Draft (April 2010) (PE 16-20)
Hydric soil rating: No

Haxtun

Percent of map unit: 5 percent
Landform: Interdunes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R067BY024CO - Sandy Plains, R072XY111KS - Sandy Plains
Hydric soil rating: No

72—Vona loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 363r
Elevation: 4,600 to 5,200 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Farmland of local importance

Map Unit Composition

Vona and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vona

Setting

Landform: Plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium and/or eolian deposits

Typical profile

H1 - 0 to 6 inches: loamy sand
H2 - 6 to 28 inches: fine sandy loam
H3 - 28 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Remmit

Percent of map unit: 10 percent
Hydric soil rating: No

Valent

Percent of map unit: 5 percent
Hydric soil rating: No

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United States
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Agriculture

Natural
Resources
Conservation
Service

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States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for
Weld County, Colorado, Southern Part

Pioneer Village Section 8

January 20, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

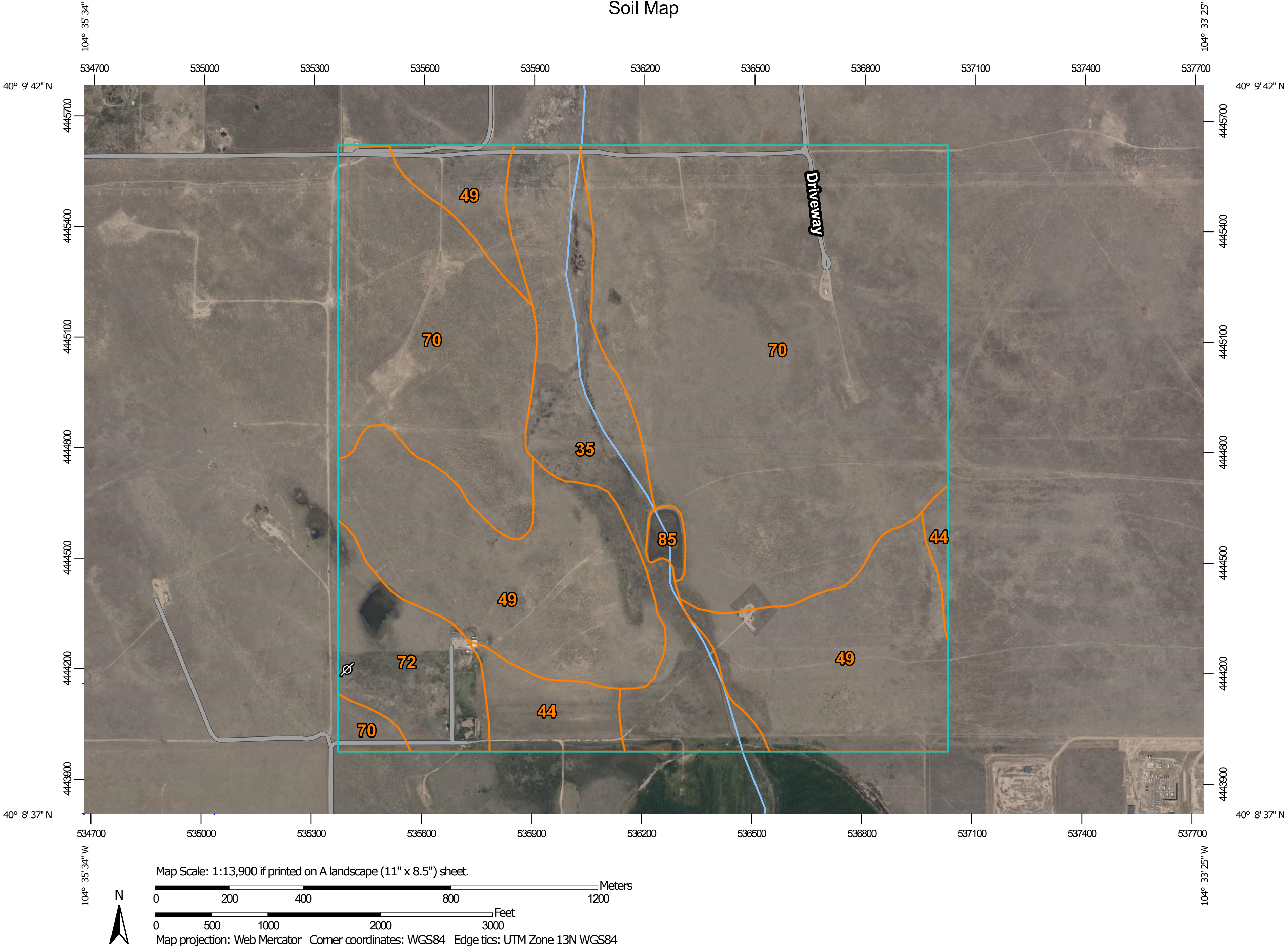
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:13,900 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Weld County, Colorado, Southern Part
Survey Area Data: Version 19, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 19, 2018—Aug 10, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
35	Loup-Boel loamy sands, 0 to 3 percent slopes	78.9	11.6%
44	Olney loamy sand, 1 to 3 percent slopes	22.8	3.4%
49	Osgood sand, 0 to 3 percent slopes	176.6	26.0%
70	Valent sand, 3 to 9 percent slopes	359.5	53.0%
72	Vona loamy sand, 0 to 3 percent slopes	37.0	5.5%
85	Water	3.9	0.6%
Totals for Area of Interest		**678.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Weld County, Colorado, Southern Part

35—Loup-Boel loamy sands, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 362f
Elevation: 4,550 to 4,750 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Loup and similar soils: 55 percent
Boel and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Loup

Setting

Landform: Swales, drainageways, streams
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile

H1 - 0 to 16 inches: loamy sand
H2 - 16 to 40 inches: loamy sand
H3 - 40 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A/D
Ecological site: R067BY029CO - Sandy Meadow
Hydric soil rating: Yes

Description of Boel

Setting

Landform: Swales, drainageways, streams
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Stratified sandy alluvium

Typical profile

H1 - 0 to 14 inches: loamy sand
H2 - 14 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A
Ecological site: R067BY029CO - Sandy Meadow
Hydric soil rating: No

Minor Components

Osgood

Percent of map unit: 5 percent
Hydric soil rating: No

Valent

Percent of map unit: 5 percent
Hydric soil rating: No

44—Olney loamy sand, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 362r
Elevation: 4,600 to 5,200 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 125 to 175 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Olney and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Olney

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed deposit outwash

Typical profile

H1 - 0 to 10 inches: loamy sand
H2 - 10 to 20 inches: sandy clay loam
H3 - 20 to 25 inches: sandy clay loam
H4 - 25 to 60 inches: fine sandy loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Vona

Percent of map unit: 8 percent
Hydric soil rating: No

Zigweid

Percent of map unit: 7 percent
Hydric soil rating: No

49—Osgood sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 362x
Elevation: 4,680 to 4,900 feet

Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 140 to 150 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Osgood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Osgood

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile

H1 - 0 to 22 inches: sand
H2 - 22 to 34 inches: sandy loam
H3 - 34 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R067BY015CO - Deep Sand
Hydric soil rating: No

Minor Components

Valent

Percent of map unit: 10 percent
Hydric soil rating: No

Dailey

Percent of map unit: 5 percent
Hydric soil rating: No

70—Valent sand, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2tczf
Elevation: 3,050 to 5,150 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 130 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Valent and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valent

Setting

Landform: Hills, dunes
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, head slope, nose slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Noncalcareous eolian sands

Typical profile

A - 0 to 5 inches: sand
AC - 5 to 12 inches: sand
C1 - 12 to 30 inches: sand
C2 - 30 to 80 inches: sand

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 39.96 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R067BY015CO - Deep Sand, R072XY109KS - Rolling Sands

Hydric soil rating: No

Minor Components

Dailey

Percent of map unit: 10 percent
Landform: Interdunes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R067BY015CO - Deep Sand, R072XA021KS - Sands (North) (PE 16-20)
Hydric soil rating: No

Vona

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope, backslope, shoulder
Landform position (three-dimensional): Side slope, head slope, nose slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R067BY024CO - Sandy Plains, R072XA022KS - Sandy (North) Draft (April 2010) (PE 16-20)
Hydric soil rating: No

Haxtun

Percent of map unit: 5 percent
Landform: Interdunes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R067BY024CO - Sandy Plains, R072XY111KS - Sandy Plains
Hydric soil rating: No

72—Vona loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 363r
Elevation: 4,600 to 5,200 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Farmland of local importance

Map Unit Composition

Vona and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vona

Setting

Landform: Plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium and/or eolian deposits

Typical profile

H1 - 0 to 6 inches: loamy sand
H2 - 6 to 28 inches: fine sandy loam
H3 - 28 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Remmit

Percent of map unit: 10 percent
Hydric soil rating: No

Valent

Percent of map unit: 5 percent
Hydric soil rating: No

85—Water

Map Unit Composition

Water: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Aquolls

Percent of map unit: 5 percent
Landform: Marshes
Hydric soil rating: Yes

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