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FINAL REPORT
OF
SPRINGFIELD LAKE NO. 1
OUTLET STRUCTURE & CHANNEL STUDY

Task B – Preliminary Plan

Springfield Township, Summit County

Prepared For:

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List of Acronyms

In preparation of this document, the following acronyms have been used:

AMC	Antecedent Moisture Condition
CMP	Corrugated Metal Pipe
CN	Curve Number
CPP	Corrugated Plastic Pipe
HEC-HMS	Hydraulic Engineering Center – Hydraulic Modeling System
HEC-RAS	Hydraulic Engineering Center – River Analysis System
GIS	Geographic Information System
LiDAR	Light Detection and Ranging
NAD	North American Datum
NAVD	North American Vertical Datum
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
OEPA	Ohio Environmental Protection Agency
OGRIP	Ohio Geographically Referenced Information Program
OSIP	Ohio Statewide Imagery Program
PVC	Polyvinyl Chloride
RCN	Runoff Curve Number
RCP	Reinforced Concrete Pipe
SCS	Soil Conservation Services
Tc	Time of Concentration
USACE HEC-SSP	United States Army Corps of Engineers Hydraulic Engineering Center Statistical Software Package
USGS	United States Geological Survey

1.0 Executive Summary

DLZ was contracted by Summit County Office of the Engineer to perform an evaluation of and recommend improvements to the Springfield Lake Outlet Structure and Channel. The Springfield Lake outlet channel often requires dredging to remove debris that builds up over time. DLZ studied approximately 5,400 LF of the channel from the Springfield Lake Outlet Structure North to the City of Akron corporation limits. The improvements discussed in this report intend to mitigate debris build up, reduce long term maintenance, and improve water quality in the channel. This report discusses the following topics: surveying, waters investigation, hydraulic and hydrological analysis, structure evaluations, proposed channel design, geotechnical evaluation, preliminary cost estimate, and recommended maintenance schedules. DLZ recommends no changes to the Outlet Structure and some modifications to the outlet channel geometry at strategic locations along with on-going maintenance. The preliminary Class IV cost estimate for the channel improvements is $900,000.

2.0 Introduction

Summit County (the County) plans to perform improvements at the Springfield Lake (the Lake) outlet structure and channel. Springfield Lake is located in Springfield Township, just South of The City of Akron border, see **Figure 1** below. The existing lake outlet structure and channel flows North to the City of Akron limits, through commercial and residential areas. In the past, Summit County has had to dredge the channel which outlets Springfield Lake to clear debris and allow continuous flow. The County intends to perform these improvements to reduce the need for future maintenance and dredging. The proposed channel improvements will be designed to provide adequate capacity, reduce bank erosion, remove encroachments, and provide maintenance access and easements, as required.

Figure 1: Springfield Lake General Project Area

DLZ has performed Preliminary and Additional Waters Investigations, including desktop analysis and field visits to identify potential wetlands and streams in the project area. Site visits have also been performed to identify obstructions and illicit discharges along the channel. Survey has been performed in the project area including critical points such as drainage structures, culverts, channel profiles and sections within the study limits. The watershed area draining to Springfield Lake has been verified using record plans, LiDAR and GIS. Hydrologic and hydraulic (H&H) analysis has been performed including the creation of a hydrologic model utilizing HEC HMS software. Subsurface geotechnical investigation was performed including four soil borings around the Springfield Lake Outlet Structure and multiple grab samples taken within the channel.

Conceptual Plans were developed during Task A of this study, these reference a general stationing across the entire channel length of this study area, from STA 0+00* in Springfield Lake to STA 54+00* near the intersection of Shadybrook Dr. and Hillstock Ave. The Conceptual Plans are considered an archive set and can be found in **Appendix S**. These plans were improved upon to create Preliminary Plans during Task B of this study. The Preliminary Plans were used to advance design of the proposed channel improvements, and are found in **Appendix A**. The Preliminary Plans stationing varies from the Conceptual Plans to account for more detailed design between the proposed channel cross section geometry. The Preliminary Plan stations correspond to the Conceptual Plan stations between STA 2+20* and STA 19+00*. In this report, areas of the channel within the limits of Preliminary Plans alignment reference the Preliminary Plans stationing while areas outside of the channel reference the Conceptual Plans stationing and are noted with an asterisk.

In total, DLZ studied 5,400 LF of the outlet channel. Hydraulic and Hydrologic modeling determined that improvements can be implemented in the first 1,680 LF of the channel from the outlet structure that will improve flow for the entire channel length. The entire channel length studied will be accessible for maintenance activities.

3.0 Existing Information Review

DLZ reviewed the existing information provided by the County, including record drawings and reports. A site visit to the Springfield Lake outlet channel was performed on August 1, 2023. DLZ personnel walked the entire length of the channel to find and document any illicit discharges, outfalls, bridges, and obstructions. Photos were taken upstream and downstream every 250 feet along the outlet channel and at any location with discharges/outfalls/obstructions. No illicit discharges were identified. **Appendix A** contains Preliminary Plans for the Springfield Lake project area. Existing conditions are shown in these conceptual plans, including possible structure encroachments and proposed maintenance drives. A Field Walk Photo Log from the site visit can be found in **Appendix B**. A list of notable areas identified from this site visit is shown in **Table 1** below.

Photo No. 28 in **Table 1** shows an active flow outfall into the channel. There was no indication that this is a sanitary outfall; however, it is recommended to perform water quality testing to confirm.

The following existing utilities identified along the channel route may need to be relocated: at STA 107+20 there is an approximately 8" unknown utility pipe crossing the channel, and at STA 39+25* there are two existing sanitary manholes within channel limits that could be impacted by maintenance activities. There are also multiple bridges and one fence crossing over the channel between STA 111+80 and STA 115+80 that will need to be protected or potentially removed and replaced during construction.

Table 1: Notable Items from August 1, 2023 Field Walk Photo Log

Photo No.	Conceptual Plans Station	Preliminary Plans Station	Item Observed	Size	Material	Comments
N/A	0+00	N/A	N/A	NA	N/A	Begin study area
8	9+50	107+30	Pipe Crossing	Approx. 8"	Ductile Iron	Closed pipe crossing above channel. Wooden bench resting against pipe.
9	10+50	108+30	Pipe Outfall	18"	CMP	Storm pipe outfall on East side of channel
12	11+00	108+80	Pipe Culvert	96" x 48"	CMP	Storm culvert under Canfield Road
13	11+50	109+30	Pipe Culvert	48"	RCP	Twin storm pipes with overgrown brush under Waterloo Road
14	13+00	110+80	Pipe Culverts	48"	RCP	Three storm culverts under Waterloo Road
16	13+00	110+80	Pipe Culverts	48"	CMP, three present	Three storm culverts
17	14+00	111+80	Bridge	18 ft wide, 34" tall above water level	Concrete and steel	Driveway bridge. 18 ft wide channel with cinder block walls. There is 1 steel beam crossing between bridges at STA 14+00 and 14+75.
19	14+75	112+55	Bridge	10 ft wide	Concrete and steel	Pedestrian Bridge. 10 ft wide concrete channel walls. There is 1 steel beam crossing between

						bridges at STA 14+00 and 14+75.
21	15+50	113+30	Bridge	20 ft wide	Wood	Wooden pedestrian bridge. 20 ft wide channel. No longer concrete channel walls at this point.
23	17+00	114+80	Fence	Approx. 6 ft tall fence	Chainlink	Fence spans entire length of creek. Open fence at bottom.
24	17+50	115+30	Bridge	14 ft wide	Concrete and steel	Bridge driveway crossing. 14 ft wide channel.
N/A	20+50	N/A	Pipe Outlet	6”	PVC	Pipe noted, no photo taken.
28	21+25	N/A	Pipe Outlet	30”	CPP	Active flow, no indication of sanitary flow noted by survey or field crews.
29	22+25	N/A	Pipe Outlet	30”	CPP	Chainlink fence and silt fence over top half of open end pipe.
36	25+50	N/A	Tributary Inlet	N/A	N/A	Stream inlet to the Springfield Lake outlet channel.
37	26+50	N/A	Pipe Outlet	12”	CPP	Pipe outlet embedded into channel wall, red spray paint marker on top of pipe.
38	27+00	N/A	Pipe Outlet	15”	CPP	Pipe outlet into channel.
41	29+50	N/A	Pipe Outlet	12”	PVC	Pipe outlet into channel.
44	30+75	N/A	Pipe Outlet	18”	CPP	Pipe outlet into channel.

49	33+75	N/A	Tributary Inlet	N/A	N/A	Stream inlet into the Springfield Lake outlet channel.
50	34+00	N/A	Pipe Outlet	10”	PVC	Pipe outlet into channel.
59	44+00	N/A	Debris	N/A	N/A	Debris build up in channel, fell tree branches, wooden pallets, misc. items. Spans ¾ width of channel.
65	48+50	N/A	Pipe Outlet	84”	RCP	Pipe outlet into channel.
66	51+00	N/A	Culvert	90”	CPP	Culvert under Shadybrook Drive. Debris blocking entire length of channel at start of culvert. Fell tree branches, wooden pallets, and sport balls in debris. After road crossing here, the channel is 12 ft wide concrete lined.
70	52+00	N/A	Downspout Outlet	4”	PVC	Home downspouts outlet into channel. Many homes in this area downspouts outlet to channel.
72	54+00	N/A	Downspout Outlet	4”	PVC	Home downspouts outlet into channel.
75	56+00	N/A	Headwall and pipe	12”	Metal	Pipe outlet headwall into channel, just past corporation limit. End of Field Walk Photo Log.
N/A	56+00	N/A	N/A	N/A	N/A	End of study area

4.0 Preliminary Waters Investigation

A preliminary investigation was conducted to identify wetlands, streams, and other regulated waters in the Springfield Lake study area. A desktop wetlands analysis was performed, this included reviewing Federal Emergency Management Agency (FEMA) flood risk reports and maps, Natural Resources Conservation Service (NRCS) Summit County soil reports, and National Wetlands Inventory (NWI) maps. These documents can be found in **Appendix C**.

Similar to the site visit mentioned above, DLZ personnel walked the length of the outlet channel on August 7, 2023, to find and document any features regulated as Waters of the United States (WOTUS). Photos from this site visit are also found in **Appendix C**.

Based on the desktop analysis and site visit investigations, DLZ determined the possible wetland boundary as WOTUS, as shown in **Appendix C – Figure 1**. There were also two streams identified in the field, see photos 5 – 7 in **Appendix C - Site Visit Photo Log**.

4.1 WETLAND DELINEATION

A site visit to determine wetland boundaries was conducted on April 16 and 17, 2024. A summary of findings is included in **Appendix D – Waters of the US Determination Report**.

5.0 Additional Waters Investigation

Additional waters investigation was conducted involving coordination with the Fish and Wildlife Service – Ohio Ecological Services Field Office and the Ohio Historic Preservation Office (OHPO). DLZ also reviewed applicable permits for channel improvements.

5.1 THREATENED AND ENDANGERED SPECIES STUDY

A list of threatened and endangered species was obtained from the Fish and Wildlife Service, Ohio Ecological Services Field Office. A total of two (2) threatened, endangered or candidate species were identified in the project area: Indiana Bat and Monarch Butterfly. The Ohio Department of Natural Resources (ODNR) Office of Real estate and Land Management provided a coordination letter which includes comments and results from the Natural Heritage Database, Fish and Wildlife, and Water Resources offices. According to Ohio Division of Wildlife (DOW) the project area is within the range of the Iowa darter (*Etheostoma exile*; S-E), pugnose minnow (*Opsopoeodus emiliae;* S-E), western banded killifish (*Fundulus diaphanous menona*; S-E), lake chubsucker (*Erimyzon sucetta*; S-T), and the paddlefish (*Polyodon spathula*; S-T). DOW recommends no in-water work occur from March 15 to June 30 to reduce impacts to aquatic species. The DOW also identified four bat species that may be present within the project area. The DOW requests that a habitat assessment for potential hibernaculum be conducted. The detailed Threatened and Endangered Species Review Study is attached in **Appendix E**.

5.2 DESKTOP CULTURAL RESOURCE STUDY

A Section 106 Project Summary Form was submitted to the Ohio Historic Preservation Office (OHPO). It was determined by the Ohio State Historic Preservation Office (SHPO) that no archaeological surveys are required and that the proposed project will not affect historic properties and therefore no further coordination is necessary at this time. The Ohio SHPO response letter is attached in **Appendix F**.

5.3 PERMITS IDENTIFIED

DLZ reviewed the project plans and assumed methods of construction to determine permits that may be needed for the proposed work. A short description of potential permits (i.e., permit type, any exceptions/exemptions, special conditions, and agency with regulatory authority) is included below, along with a matrix summarizing this information (see **Table 2**):

- Soil Erosion & Sedimentation Control – The Summit Soil and Water Conservation District (SSWCD) has jurisdiction over erosion and sediment control features that have to be installed during the construction process. SSWCD is also responsible for the review and approval of the Stormwater Pollution Prevention Plan (SWPPP). The Ohio Environmental Protection Agency (OEPA) requires the Owner/Operator of any site where one (1) or more acre will be disturbed, to file a Notice of Intent and obtain an NPDES Permit. Estimated 2 acres of disturbed area, requiring an application fee of $1000.

- Notice of Intent – Coverage under the National Pollution Discharge Elimination System (NPDES), OEPA Construction General Permit #OHC000006. Estimated 2 acres of disturbed area, requiring a fee of $200.

- Section 404 – The U.S. Army Corps of Engineers (USACE) administers Section 404 of the Clean Water Act (CWA) and has authority to regulate the discharge of fill or dredged material into all "waters of the United States." WOTUS include traditional navigable waters (e.g., certain large rivers and lakes) and tributaries to these waters that are relatively permanent, standing or continuously flowing bodies of water, and wetlands adjacent to these waters. WOTUS are regulated by the USACE, and permits are required for work within wetlands or below the OHWM. Depending on final stream and wetland impacts, this project may meet the conditions for a Nationwide Permit (NWP) under Section 404 of the Clean Water Act. Conditions for each type of NWP permit can vary but typically all require wetland impacts to be less than ½- acre.

- 401 Water Quality Certification – The Ohio Environmental Protection Agency (OEPA) is responsible for issuing Water Quality Certification (WQC) under Section 401 of the Clean Water Act. WQC is required in conjunction with the USACE Section 404 permits. Typically, permit conditions for the 401 WQC can be met under the NWP.

- T&E Species – As noted in the previous section, there are a few potential T&E species of concern within the project corridor. If there is a federal action associated with the project (including funding or permitting), coordination should be undertaken with USFWS to obtain concurrence on a no effect determination. Section 7 compliance would be initiated at USFWS website IPaC: Home (fws.gov). Coordination with DOW may be necessary to determine if additional bat hibernaculum surveys are needed.

- Flood Hazard Permit – Proposed channel improvements take place within the 100-year flood plain. A Flood Hazard Area Development Permit should be submitted to the Floodplain Administrator for Summit County.

Table 2: Permitting Matrix

Permit Type	Agency with Jurisdiction	Cost	Comments
Soil Erosion & Sedimentation Control	Summit Soil and Water Conservation District (SSWCD)	$1000 for between 1 - 4.9 Acres Disturbed	Stormwater Pollution Prevention Plan (SWPPP) will need to be approved by SSWCD. Estimated 2.0 acres disturbed.
Construction Stormwater Notice of Intent	OEPA	$200 for between 1 - 5.99 Acres Disturbed	Required to submit to OEPA. Estimated 2.0 acres disturbed.
Summit Co. Riparian Setback Ordinance (Chapter 937)	Summit Soil and Water Conservation District	None	Summit County Engineer maintains right to access streams.
Section 404 of Clean Water Act	USACE	None	Wetland/stream impacts will need a federal permit.
401 Water Quality Certification	OEPA	Varies on Level of Permit required.	A separate permit may become necessary if wetland/stream impacts exceed NWP thresholds or 401 permit conditions can not be met.
T&E Species	USFWS and ODNR	None	No permits are required, but coordination may be needed if a federal action becomes necessary.
Flood Hazard Area Development Permit	County Floodplain Administrator and FEMA	None	Permit required

6.0 Survey

Survey has been performed in the Springfield Lake project area, including critical points such as drainage structures, culverts, channel longitudinal profile, and channel sections. Horizontal and vertical controls were based on the Ohio North State Plane coordinate system NAD 83 and NAVD 88 datums, respectively. Summit County GIS mapping data was used to determine existing property lines. OGRIP LiDAR/GIS data was utilized to create a base surface in Civil 3D.

A total of ten (10) benchmarks were set for future construction use. The 20 foot channel corridor was surveyed including 50 feet on either side; this includes fifteen (15) cross sections along the channel corridor. Pipe inverts and sizes of drainage structures and culverts located have been included in the survey.

6.1 EASEMENTS

An existing easement description along the Springfield Lake outlet channel was provided by Summit County Engineers in the development of this report. See **Appendix G** for the Springfield Lake Outlet Elevations study. As shown at the end of the study in **Appendix G**, there is an existing "Width of Right of Way 16.5 feet each side of center line of ditch." This easement has been added into the Preliminary Plans in **Appendix A** from the Conceptual Plans in **Appendix S**. Proposed easements along the chosen proposed outlet channel alignment are listed below in **Table 3**. Approximate locations of proposed permanent easements is shown in the Conceptual Plans in **Appendix S**.

Table 3: Proposed Easements within Project Area

No.	Parcel ID	Approximate Conceptual Plan Stations	Approximate Preliminary Plan Stations	Approximate Dimensions/Area	Address	Owner
1	5110846	STA 9+00 to STA 10+50	106+80 to 108+30	1,125 SF	CANFIELD RD	OHIO EDISON CO
2	5109154	STA 11+20 to STA 11+70	108+90 to 109+50	290 SF	2755 E. WATERLOO RD	HENRY DANIEL W
3	5109141	STA 13+00 to STA 15+50	110+80 to 113+30	3,845 SF	2755 E. WATERLOO RD	HENRY DANIEL W
4	5107269	STA 15+50 to STA 16+50	113+30 to 114+30	2,007 SF	1293 SHANAFELT AVE	HENRY DANIEL
5	5106416	STA 16+50 to STA 17+00	114+30 to 114+80	1,170 SF	1283 SHANAFELT AVE	LANHAM JAMES E
6	5106417	STA 16+50 to STA 17+00	114+30 to 114+80	333 SF	1283 SHANAFELT AVE	LANHAM JAMES E
7	5110178	STA 17+00 to STA 22+75	114+80 to N/A	10,000 SF	1259- 1273 SHANAFELT AVE	STORAGE ZONE ENTERPRISES LLC

8	5110796	STA 21+00 to STA 23+25	N/A	1,600 SF	1116 CANTON RD	OREILLY AUTO ENTERPRISES LLC
9	5109983	STA 23+25 TO STA 23+50	N/A	65 SF	CANTON RD	HANNAH G STEPHEN & MARY K
10	5108991	STA 23+50 TO STA 25+00	N/A	160 SF	1100 CANTON RD	HANNAH G STEPHEN & MARY K
11	5103735	STA 22+75 TO STA 24+25	N/A	2,260 SF	1253 ABINGTON RD	CUMMINGS WILLIAM TRUSTEE
12	5105429	STA 24+25 TO STA 24+75	N/A	866 SF	1225 ABINGTON RD	PORTER SETH TRUSTEE
13	5107489	STA 24+75 TO STA 25+50	N/A	940 SF	1221 ABINGTON RD	WINCH BRENDON LEE
14	5102890	STA 25+50 TO STA 26+50	N/A	1,720 SF	1213 ABINGTON RD	POWELL BOBBIE J
15	5100521	STA 26+50 to STA 32+25	N/A	0.80 ACRE	ABINGTON RD	BELACIC FRANK J III
16	5100510	STA 32+25 to STA 33+25	N/A	6,250 SF	CANTON RD	BELACIC FRANK J III
17	5100511	STA 33+25 to STA 34+50	N/A	1,550 SF	CANTON RD	BELACIC FRANK J III
18	5100512	STA 34+25 to STA 34+50	N/A	141 SF	SHADYBROOK (REAR) DR	BELACIC MICHAEL
19	5100504	STA 34+50 to STA 38+50	N/A	0.40 ACRE	SHADYBROOK DR	BELACIC FRANK J III
20	5108782	STA 34+00 to STA 34+50	N/A	840 SF	SHADYBROOK DR	SAMPLE MOLLY E
21	5100531	STA 38+25 TO STA 40+00	N/A	945 SF	954 CANTON RD	FRANKS MOBILE HOMES PARK LCC
22	5108201	STA 38+50 to STA 39+50	N/A	1,940 SF	905& 1/2 SHADYBROOK DR	MORRIS KEITH O

23	5108875	STA 39+50 TO STA 41+00	N/A	4,875 SF	905 SHADYBROOK DR	HUFF LENA M
24	5108874	STA 41+00 TO STA 44+25	N/A	0.30 ACRE	895 SHADYBROOK DR	GIBSON JESSE
25	5106512	STA 44+25 TO STA 45+50	N/A	3,392 SF	873 SHADYBROOK DR	GOVIA MARY LOU
26	5111102	STA 45+50 TO STA 47+50	N/A	7,590 SF	849 SHADYBROOK DR	WEINSCHENK DANIEL
27	6763493	STA 47+50 TO STA 49+25	N/A	5,940 SF	SHADYBROOK DR	THEO LEI EBENEZER BAPTIST CHURCH
28	5111101	STA 49+25 TO STA 51+00	N/A	6,250 SF	825 SHADYBROOK DR	THEO LEI EBENEZER BAPTIST CHURCH
29	5103940	STA 51+50 TO STA 52+50	N/A	3,486 SF	2495 HILLSTOCK AVE	MILHOAN DOUG
30	5103941	STA 52+50 TO STA 53+00	N/A	2,460 SF	2495 HILLSTOCK AVE	MILHOAN DOUG
31	5103939	STA 53+00 TO STA 53+50	N/A	2,025 SF	HILLSTOCK AVE	MILHOAN DOUG
32	5102976	STA 53+50 TO STA 54+00	N/A	1,500 SF	2481 HILLSTOCK AVE	TROUT DAVID B

7.0 Hydrologic and Hydraulic (H&H) Modeling

This report describes the H&H modeling performed for the Springfield Lake and its outlet channel. Hydrologic models were developed using HEC-HMS software, version 4.10, to determine the design flows at the lake outlet, and several intermediate locations downstream along the outlet channel for various recurrence intervals. The event of specific interest is the 100-year event since this is the event of interest for FEMA. Hydraulic models were developed for the lake and its outlet channel using a 1-D steady state HEC-RAS to compute the water surface elevation along the outlet channel using HEC-RAS software, version 6.2. HEC-RAS results were used to assess the capacity of the existing bridges and culverts, and to provide adjustments to channel geometry to improve conveyance and minimize sediment deposition. An iterative procedure was used to ensure consistency between the HEC-HMS and HEC-RAS models at the lake outlet structure.

7.1 LAKE OUTLET HYDROLOGY

The watershed at the lake outlet is shown in **Figure 2**, which closely matches the watershed shape provided in the CT study in **Figure 3**. The watershed was divided into 4 subbasins, based on basin development patterns, topography and the State of Ohio OSIP LiDAR information (2007). The total area of these subbasins is 3.58 sq mi. NOAA Atlas 14 database was employed to generate the design storm for return periods ranging from 5 years to 100 years. The design storm duration was adopted as 24 hours.

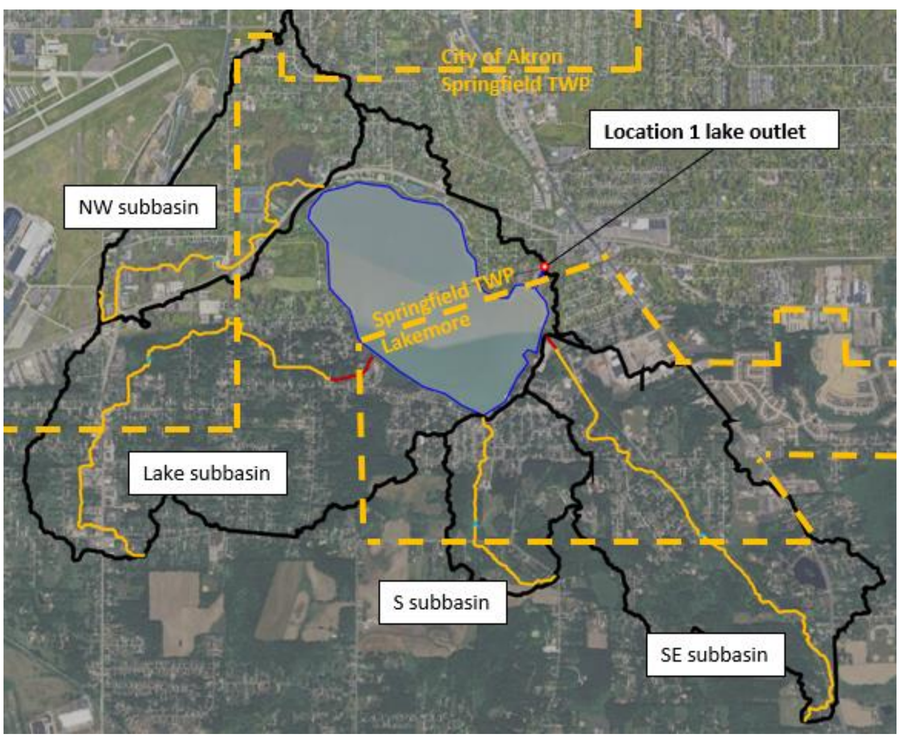


Figure 2: Delineation of Springfield Lake Watershed at the Lake Outlet

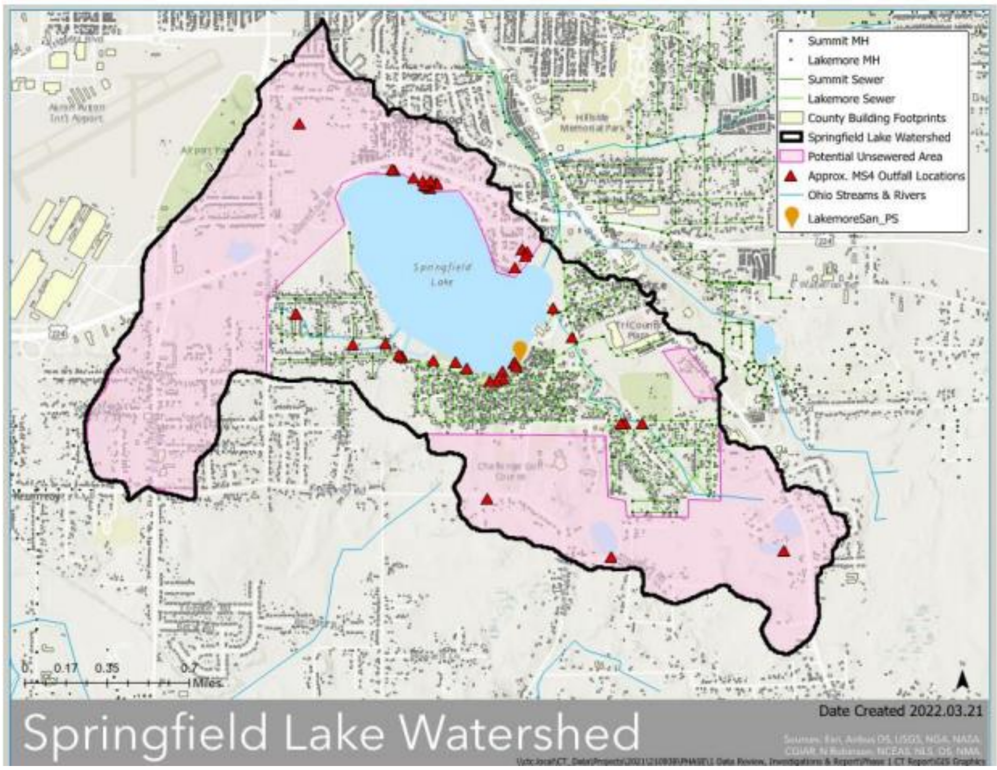


Figure 3: Springfield Lake Watershed Delineation by CT Consultants

***Springfield Lake Phase 1 Data Review*, CT Consultants, 2022.**

The SCS Runoff Curve Number method was used to compute the runoff losses based on soil type and land use type within each subbasin. The soil type distribution and land use distribution of the study area are shown in **Figure 4** and **Figure 5**, respectively. The runoff curve number data (AMC II conditions) for the applicable land use and soil types is shown in **Table 4**. By intersecting the runoff curve number values for the various land use and soil types within the drainage area, the composite runoff curve number for each subbasin to the lake outlet was computed in **Table 5**.

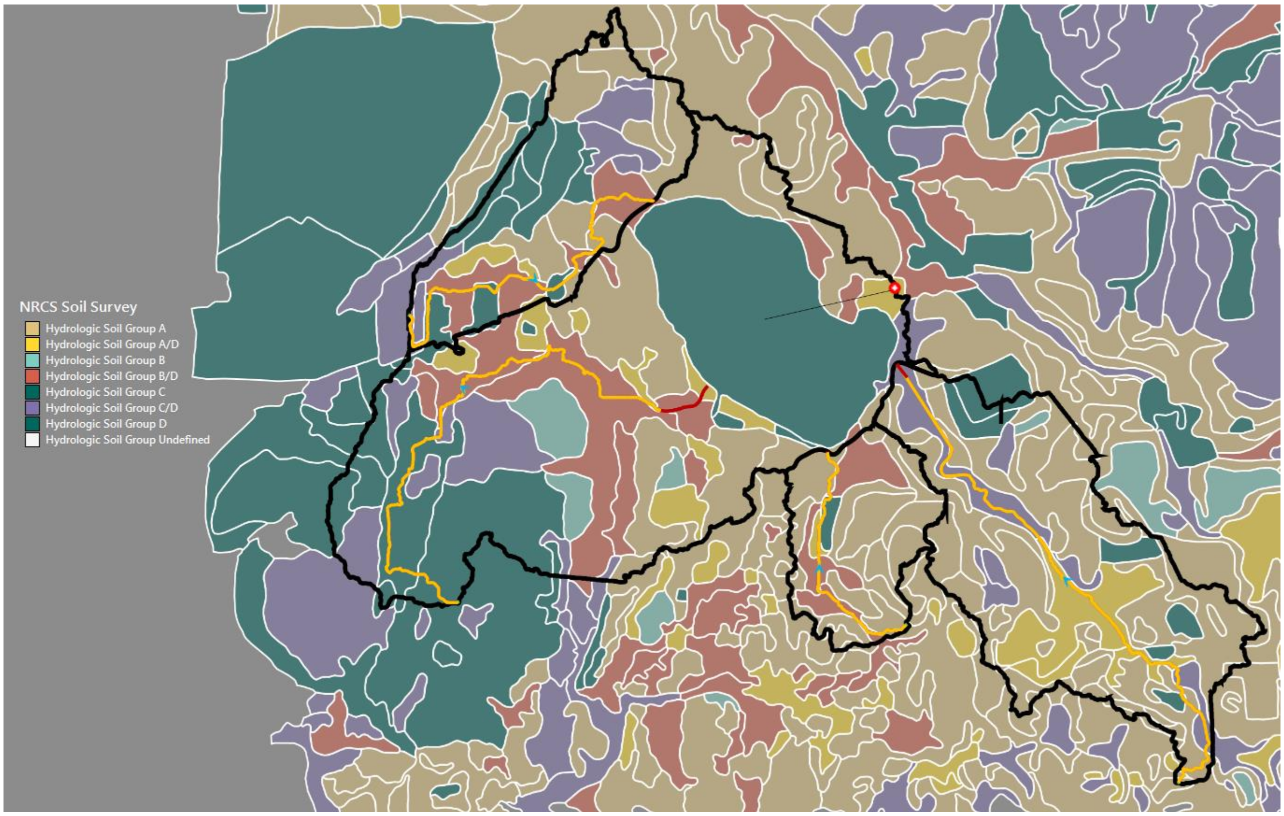


Figure 4: Soil Group Distribution

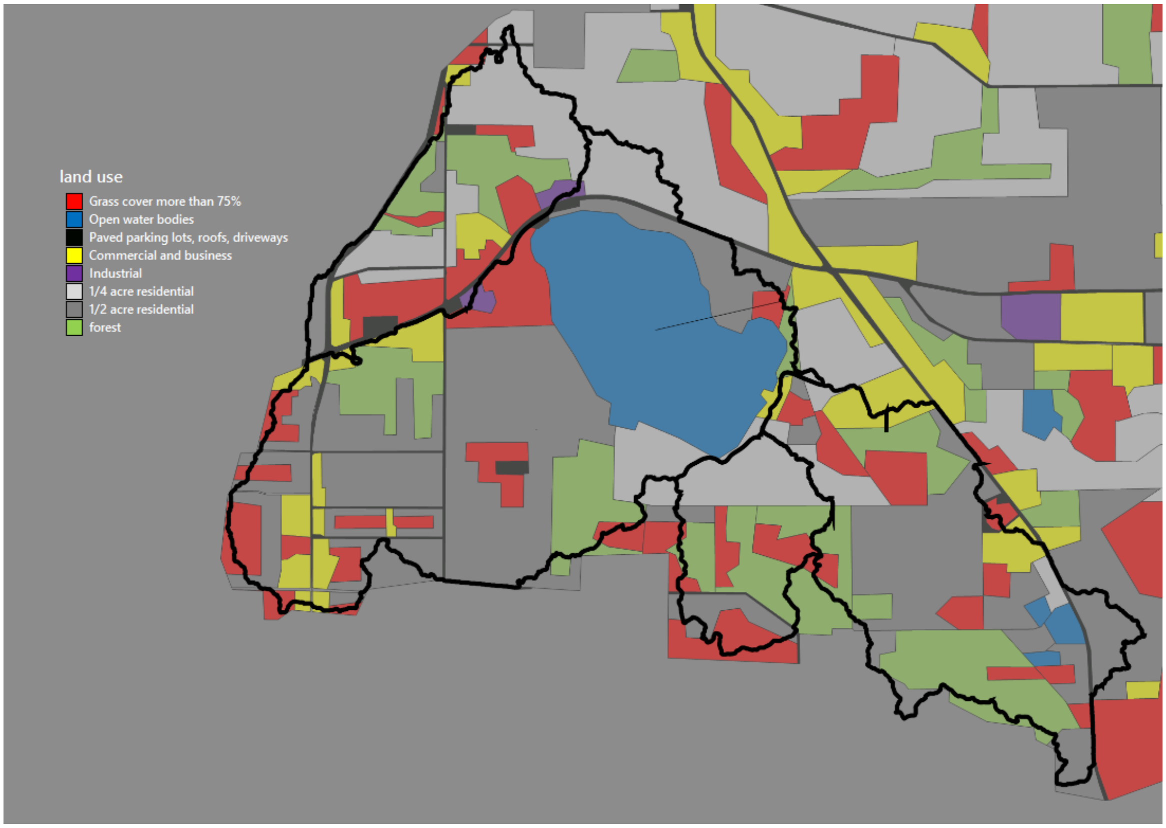


Figure 5: Land Use Distribution

Table 4: Runoff Curve Number for Hydrologic Soil-Cover Complexes

Land use	Soil Group A	Soil Group B	Soil Group C	Soil Group D
Grass cover more than 75%	39	61	74	80
Open water bodies	100	100	100	100
Paved parking lots, roofs, driveways	98	98	98	98
Commercial and business	89	92	94	95
Industrial	81	88	91	93
1/4 acre residential	61	75	83	87
1/2 acre residential	54	70	80	85
forest	45	60	73	79

The SCS lag method was employed to transform the effective rainfall into surface runoff. The time of concentration, Tc, is determined based on the flow travel time from the farthest point within the subbasin to the outlet point. The travel flow path includes various flow segments such as overland flow (100 ft at maximum), shallow concentrated flow, open channel flow, and flow through ponded water (zero flow travel time). In **Figure 2**, overland flow segment, shallow concentrated flow segment, and open channel flow segment are represented by orange, yellow, and red, respectively. Lag time was defined as 0.6Tc. A summary of subbasin parameters is presented in **Table 5**. A breakdown of the longest flow path is available in **Appendix H.**

Table 5: Subbasin Parameters

Subbasin #	Area (sq mi)	RCN	Tc (min)	Lag time (min)	Impervious area ratio (%)
Lake subbasin	1.87	76.33	252.32	151.39	60
NW subbasin	0.52	71.78	126.16	75.70	65
S subbasin	0.30	54.82	69.30	41.58	30
SE subbasin	0.88	59.30	135.14	81.08	50
Sum	3.6	69.66	252.32	151.39	55

As depicted in **Figure 5**, Springfield Lake is situated within an urbanized area with stormwater drainage systems connected to the lake, significantly affecting the natural hydrological processes of the area. To account for these effects, the HEC-HMS model was modified by adjusting the impervious area ratio for the more urbanized subbasins.

In the HEC-HMS analysis, the modified Puls method was employed to simulate the outflow routing through the lake. As per DLZ's field inspection, the flow control structure at lake outlet features a rectangular sharp crested weir with a width of approximately 15 ft. The crest of the weir is at 1074.75 ft, which was used as the normal pool elevation in the analysis. The elevation of high ground surrounding the outlet level is 1078 ft or higher according to the State of Ohio OSIP LiDAR data.

It should be noted that the weir elevation determined by DLZ field survey is quite close to the weir information documented in the 2015 survey report (See **Appendix G** – Springfield Lake Outlet Elevations Report of Survey by Summit County Engineer's Office, 2015). The 2015 survey report indicates the crest of the weir is at approximately 1074.9 ft using the NAVD 88 referenced datum. See **Appendix I** for Vertical Datum Conversion Methodology.

The weir discharge coefficient, Cd, for the outlet weir, is an important parameter for accurately predicting water levels and flows in the lake and at the entrance to the outlet channel. During high flow events, the outlet weir is subject to submergence effects, as the water depth on the downstream side of the weir is comparable to or even higher than the maximum pool level predicted by HEC-HMS for certain flow events.

In this case, for the 100-year event, an iterative adjustment of the Cd value was performed, which resulted in a Cd value of 1.5 for the 100-year event. The adjustment process involves conducting multiple HEC-HMS and HEC-RAS runs in a trial-and-error approach. During each iteration, different Cd values were applied, and the resulting water levels and outflows predicted by HEC-HMS were compared against the corresponding HEC-RAS model results. The Cd value was adjusted iteratively until a satisfactory match for outlet flows and lake elevations was achieved between the HEC-HMS and HEC-RAS models.

Table 6 provides the elevation-area relationship for the lake which was obtained from the State of Ohio OSIP LiDAR data.

Table 6: Storage-to-Elevation Relationship

Elevation (ft)	Area (acre)	Incremental storage volume (ac-ft)	Total storage volume (ac-ft)
1074.7	290	0	0
1074.75 (outlet)	-	-	-
1075.0	291	87	87
1076.0	294	292	380
1077.0	297	295	675
1078.0	301	299	974
1079.0	305	303	1277

The resulting inflow hydrograph to the lake and outflow hydrograph exiting the lake during the 100-year flood condition from the HEC-HMS model results are shown in **Figure 6**. In the 100-year storm, HEC-HMS predicted a peak inflow discharge of 1797 cfs and a peak outflow discharge of 84 cfs. The maximum pool level was 1077.2 ft, at which the volume of runoff stored by the lake was 1019 ac-ft.

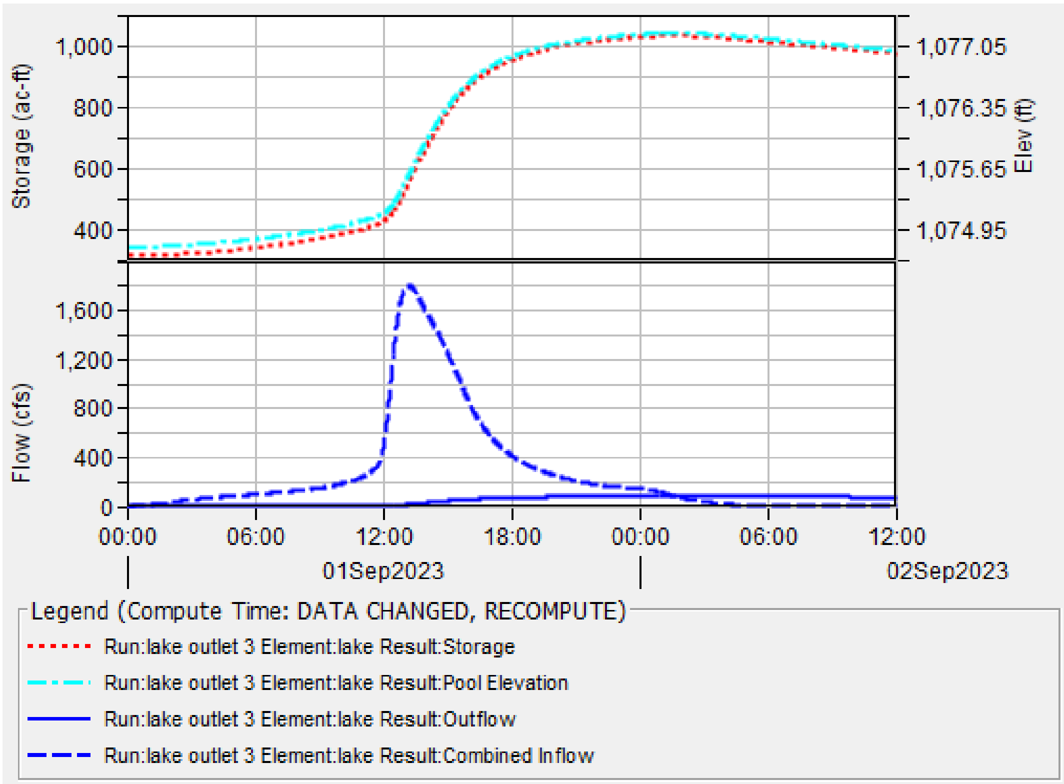


Figure 6: Inflow Hydrograph to the Lake and Routed Outflow Hydrograph in the 100-year Condition

There are significant challenges in determining tributary inflows discharging to the outlet channel downstream of the lake outlet. Streamflow data from the downstream USGS gage (Gage No. 04205000) and the flow frequency values in the FIS report (effective for Summit County dated 04/19/2016, see **Appendix J**) were analyzed for this purpose. As shown in **Figure 7**, the gage site (Location 6) is situated 3 miles downstream of the Springfield Lake outlet (Location 1) and FIS flow frequency values are available at the downstream limit of this study (Location 5). Flood frequency analysis was conducted using the HEC-SSP software on the flow data at the gage site to determine the simulated peak flows for return periods ranging from 5-year to 100-year. See **Appendix K – Flood Frequency Analysis on the Gage Data Flow**. The drainage area at Locations 1, 5, 6 and the computed/available flow frequency values from various sources are presented in **Table 7**. Note that flow enters the lake outlet channel at three locations (2,3, and 4) downstream of the lake outlet.

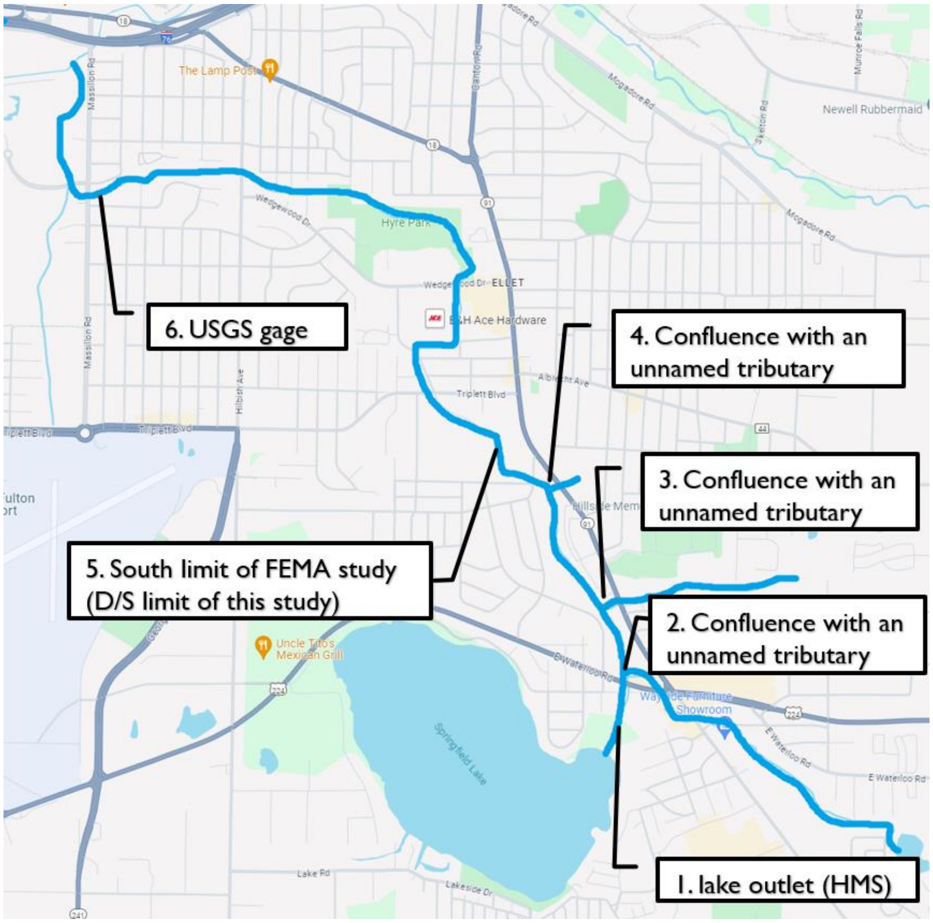


Figure 7: Aerial Map Showing the Locations of Interest

Table 7: Peak Flow Discharges at Lake Outlet and Downstream Locations with Data

Location	Source	DA (sq mi)	Q5 (cfs)	Q10 (cfs)	Q50 (cfs)	Q100 (cfs)
1	HEC-HMS/HEC-RAS	3.6	29	38	67	84
2	StreamStats ratio	-	61	90	148	175
3	StreamStats ratio	-	88	137	224	263
4	StreamStats ratio	-	100	159	260	306
5	FIS report	8.2	-	186	297	348
6	HEC-SSP (gage)	9.7	184	226	324	370

7.2 OUTLET CHANNEL HYDROLOGY

Figure 7 illustrates several locations of interest within the project limit. These include Locations 2, 3, and 4, where tributary flows join the outlet channel, resulting in an increase of peak flow. DLZ field verified the existence of pipes and culverts that deliver the tributary flow into the outlet channel at these locations.

Due to the budget and time constraints, comprehensive watershed analyses were not carried out at these intermediate locations to obtain the flow hydrograph. Instead, this study estimated the stream peak flow by adding the peak inflow from each contributing watershed. These intermediate flow estimates are approximate, because the adding of peak flows does not account for time impacts (at each of the locations along the outlet channel, factors such as the storage, travel time, and constriction due to culvert along contributing creeks are not considered).

Peak flow estimates contributed by the intermediate watersheds along the outlet channel were obtained with the help of USGS StreamStats. The HEC-HMS/HEC-RAS peak flow data at lake outlet (Location 1) and FEMA values (Location 5) were utilized to determine the total flow increase between these two locations. Linear interpolation based on ratios of peak flows predicted by StreamStats was employed to assign the flow from each tributary watershed such that it equals the total flow increase required between Location 1 and 5. The results are summarized in **Table 7**. Details are provided in the **Appendix L – StreamStats Peak Flow Estimate**.

Note that the iterative process for determining the Cd at the lake outlet requires re-computation of the tributary inflow every time the flow at Location 1 is changed.

7.3 EXISTING OUTLET CHANNEL AND CULVERT CAPACITY EVALUATION

An approximate hydraulic analysis based on the Manning equation was conducted to evaluate the capacity of the existing channel sections just upstream of each hydraulic structure along the lake outlet channel. Though the Manning equation analysis shows that the water surface elevation at each cross section does not surcharge the adjacent structure for the 100-year event, such analysis may not represent the true conditions when all stream cross sections are considered as a unit.

Consequently, for a more detailed analysis, a 1-D steady state HEC-RAS model was created that covered the entire stream and all the roadway crossings starting upstream at the lake outlet to the downstream end of the project limit (**Figure 8**). The channel geometries were developed using DLZ field surveyed stream cross section data, merged with the overbank data obtained from the OGRIP topographic map. Manning "n" values used in the model were based on the field observations of the existing channel and floodplain conditions. The known maximum pool level from HEC-HMS analysis and the water surface elevation in the FIS report were used to determine the upstream and downstream boundary conditions, respectively. Expansion and contraction losses of 0.3 and 0.1, respectively, were used for the cross sections, except at the two sections upstream and downstream of each roadway where the expansion and contraction coefficients were increased to 0.5 and 0.3, respectively to reflect impacts of manmade obstructions. Ineffective flow areas were established to identify the areas of the cross sections that do not have conveyance due to the embankment blockage of the roadway.

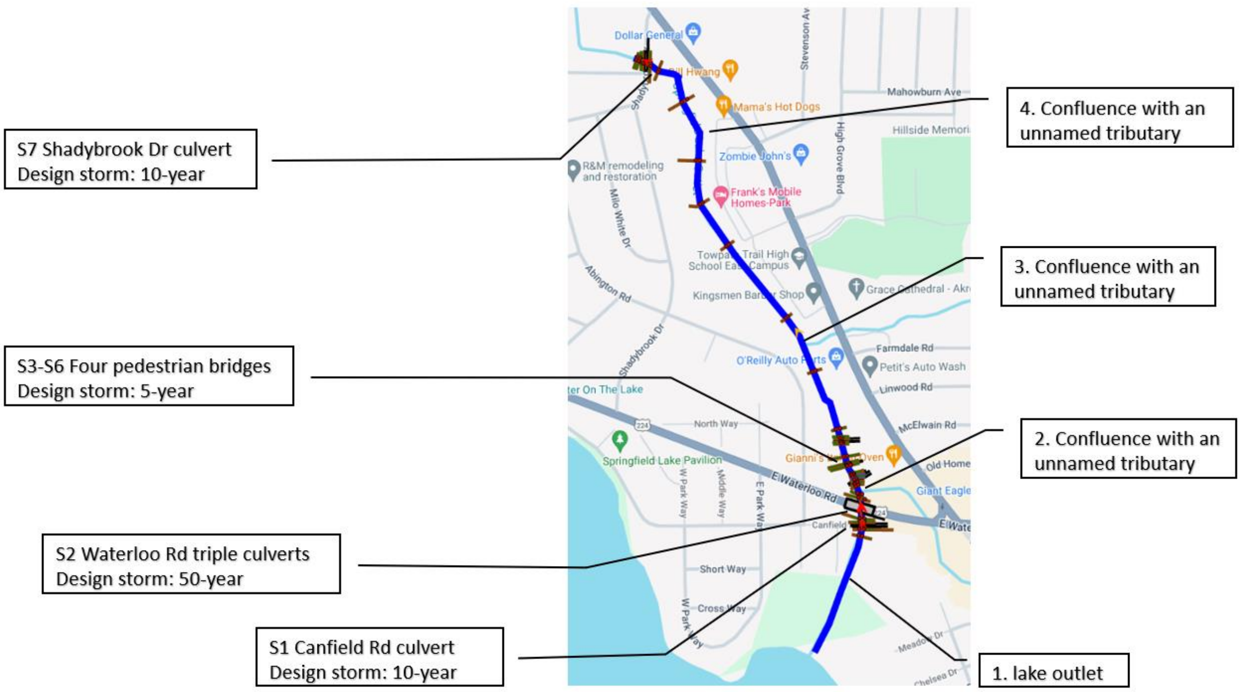


Figure 8: Sketch of HEC-RAS Model Showing the Location of Existing Structures

Figure 8 depicts a total of 7 roadway crossings. The design storm and check storm were determined in accordance with ODOT L&D vol. 2, based on roadway designation and the ADT. A summary of the 7 structures is included in **Table 8**.

Table 8: Summary of Roadway Crossings

Structure	Station	Description	Design storm	Check storm
S1	STA 108+44	Culvert under Canfield Rd	10-year	100-year
S2	STA 109+85	Three culverts under Waterloo Rd	50-year	100-year
S3	STA 111+95	Pedestrian bridge	5-year	100-year
S4	STA 112+50	Pedestrian bridge	5-year	100-year
S5	STA 113+42	Pedestrian bridge	5-year	100-year
S6	STA 115+27	Pedestrian bridge	5-year	100-year
S7	STA 148+40	Culvert under Shadybrook Rd	10-year	100-year

The peak flow values at Locations 1 to 4 (**Table 7**) were applied to the cross sections at the corresponding locations. The resulting discharge profile is shown in **Figure 9**.

Figure 10 illustrates the water surface elevation profile. All the existing bridges and culverts meet ODOT requirements. During the design storm, the flow can pass the roadway crossing without rising above the low chord. During the check storm, the flow does not overtop the roadway (see **Table 9**).

Figure 11 illustrates the existing condition velocity profile in the main channel. The HEC-RAS analysis indicates low velocities (less than 1.5 fps) at the cross sections from STA 107+80 to STA 111+60 (near Canfield Road and Waterloo Road) and from STA 140+00 to 147+00 (STA 43+00* to STA 50+00* near Shadybrook Drive), as shown in **Figure 7.** These low velocities could result in siltation. These findings are consistent with photographs at these locations/structures taken during field inspection that show siltation/ debris accumulation in the channel. Detailed HEC-RAS results can be found in **Appendix M**.

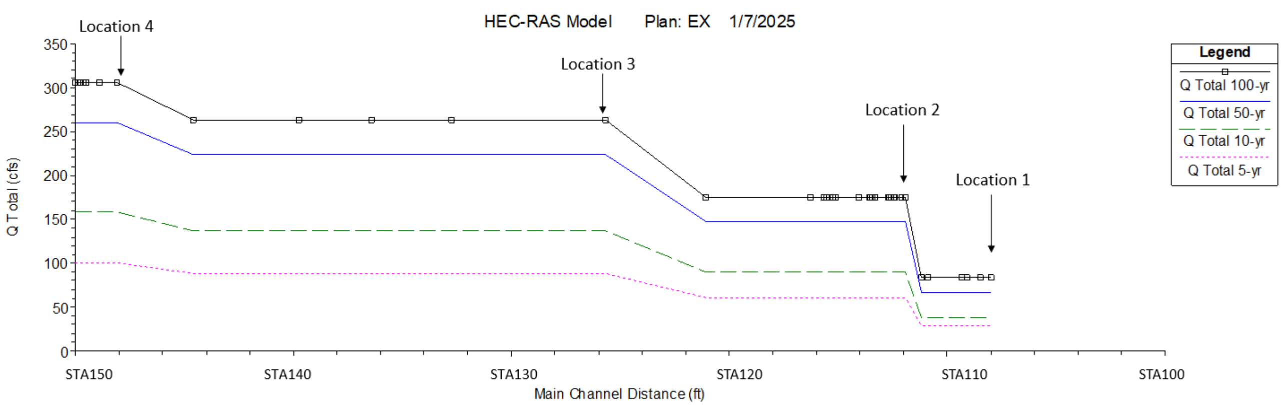


Figure 9: Total Discharge Profile

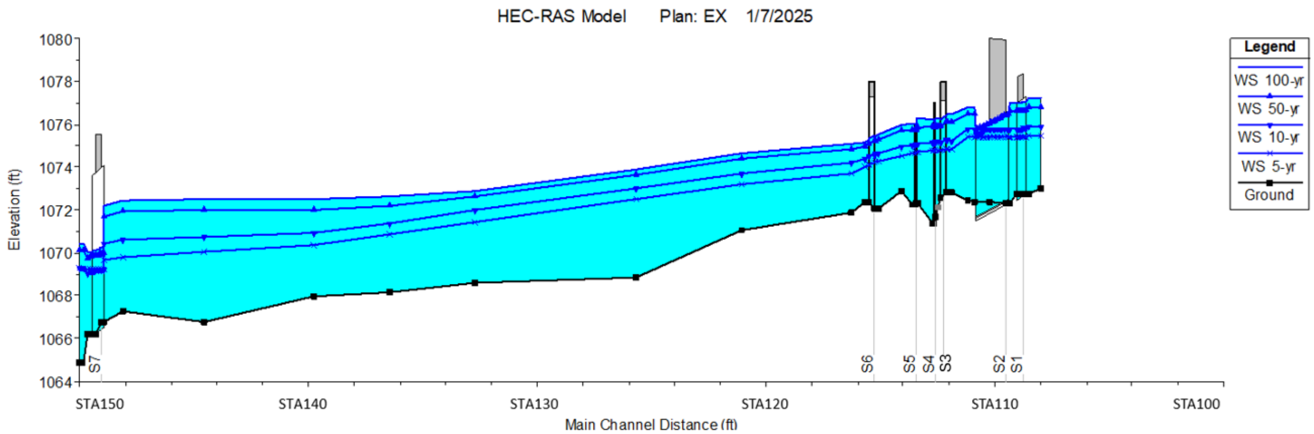


Figure 10: Water Surface Elevation Profile in the Existing Condition

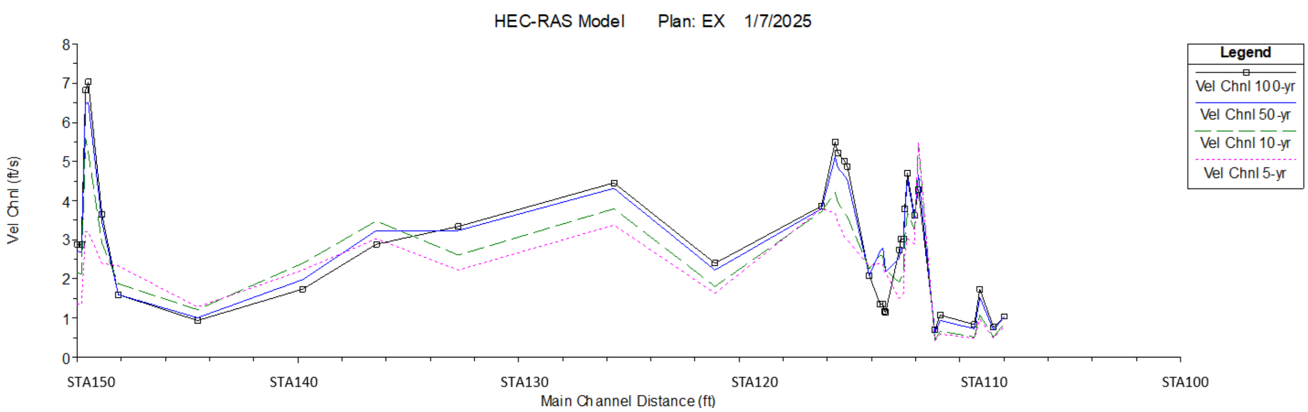


Figure 11: Channel Velocity Profile in the Existing Condition

Table 9: Hydraulic Parameters Adjacent to Structures in the Existing Condition Model

Structure		Design flood		Check flood	
Location	**Low chord (ft)**	**Storm**	**HW (ft)**	**Storm**	**HW (ft)**
S1 Canfield Rd STA 108+44	1077.40	10-year	1075.88	100-year	1077.25
S2 Waterloo Rd STA 109+85	1076.73	50-year	1076.59	100-year	1076.97
S3 Pedestrian bridge STA 111+95	1077.10	5-year	1074.86	100-year	1076.49
S4 Pedestrian bridge STA 112+50	1076.20	5-year	1074.81	100-year	1076.30
S5 Pedestrian bridge STA 113+42	1075.50	5-year	1074.69	100-year	1076.27
S6 Pedestrian bridge STA 115+27	1077.31	5-year	1074.27	100-year	1075.46
S7 Shadybrook Rd STA 148+40	1074.05	10-year	1070.45	100-year	1072.16

7.4 PROPOSED CONDITION OUTLET CHANNEL AND CULVERT CAPACITY EVALUATION

The HEC-RAS analysis has identified two critical locations within the existing outlet channel that require comprehensive stream regrading.

First, the upstream portion of the outlet channel, from STA 107+80 to STA 116+20 (from Canfield Road to the downstream pedestrian bridges), exhibits a negative longitudinal slope, amplifying the risk of siltation. To mitigate this issue, the streambed should be adjusted to establish a mild longitudinal slope ranging from 0.05% to 0.5%. Refinement of section geometries are implemented to align with the surrounding high ground. The existing side slope is maintained, or a 2H:1V side slope configuration is implemented to ensure lateral stability of the channel bank.

Second, the channel velocity is low within the areas between STA 107+67 and STA 111+57 (Canfield Road to Waterloo Road) and between STA 140+00 and STA 147+00 (STA 43+00* and STA 50+00*, upstream of Shadybrook Drive), raising a red flag regarding excessive sediment deposition. To address this, a series of measures are proposed. For the segment from STA 107+67 to STA 111+57, a two-stage channel design is proposed to modify the existing channel geometry. This approach narrows the cross-sectional width to augment channel velocity. The first stage inset channel is designed to accommodate the low flow events, while the second stage benches are intended to manage high flow events. The design intent is to concentrate sediment deposition to the low velocity section of the channel between STA 140+00 and 147+00. It is crucial to schedule periodic sediment removal, especially within the low velocity zone between STA 140+00 and 147+00, to prevent blockages and ensure optimal channel performance.

HEC-RAS was employed to validate the hydraulic performance of proposed channel modifications. Updated cross section geometries were integrated into the existing condition HEC-RAS model to execute the proposed condition model. **Figure 12** illustrates that the proposed condition water surface level meets ODOT's design requirements, ensuring no water level increase in the check storm, and providing sufficient freeboard in the design storm (**Table 11**). In contrast to the existing condition, water levels decrease on average by 0.3 ft, with a maximum decrease of 0.73 ft just downstream of Waterloo Road culvert (STA 110+92) where the two-stage channel is proposed. The 100-year flood map is presented in **Appendix N**.

Between structures S2 and S3, a sudden increase in water level occurs in the 50-year and 100-year events. During these high-flow events, the inlet of S2 approaches its maximum capacity, and the flow control shifts toward the culvert outlet. Consequently, tailwater conditions start to impact the hydraulics of S2. While upsizing S2 could effectively improve this situation, a replacement is not proposed, as the existing structure meets the required criteria for both the design storm and check storm events. Furthermore, since S2 is located beneath Waterloo Rd, replacing it would be prohibitively expensive.

Figure 13 illustrates the channel velocity profile in the proposed condition. Within the segment from STA 107+67 to STA 111+57, the channel velocity is increased to 1.5 fps during the 50-year and 100-year flow scenarios. However, this velocity does not reach the desired threshold of 2 fps at which sediment deposition will be minimal. The culvert outlet velocity at Canfield Road and Waterloo Road will experience a slight increase. During the 50-year event, the outlet velocity at Canfield Road and Waterloo Road culverts rise above 1.73 fps and 2.65 fps, respectively. In the 100-year event, the outlet velocity at these culverts are increased above 2.22 fps and 3.1 fps, respectively. Detailed HEC-RAS results can be found in **Appendix M**. It is recommended that a sediment removal plan be implemented to address potential sediment buildup. A maintenance schedule can be found in **Section 10**.

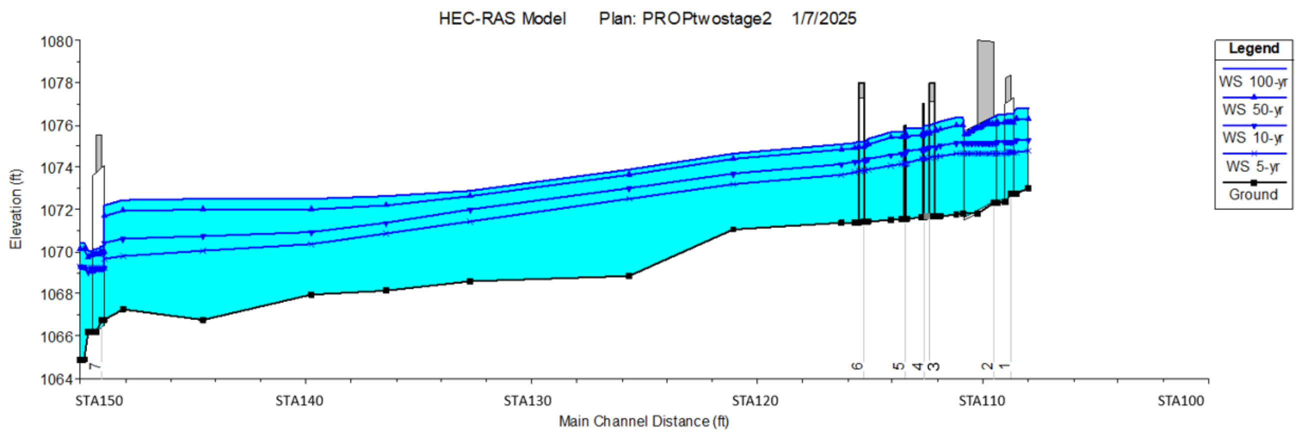


Figure 12: Water Surface Profile in the Proposed Condition

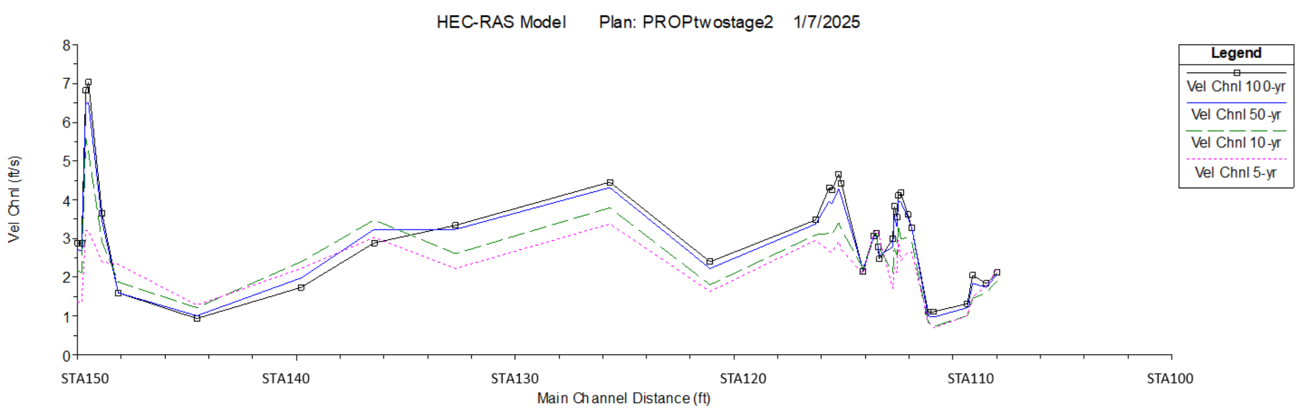


Figure 13: Channel Velocity Profile in the Proposed Condition

Table 10: Hydraulic Parameter Adjacent to Structures in the Proposed Condition Model

Structure		Design flood		Check flood	
Location	**Low chord (ft)**	**Storm**	**HW (ft)**	**Storm**	**HW (ft)**
S1 Canfield Rd STA 108+44	1077.40	10-year	1075.29	100-year	1076.76
S2 Waterloo Rd STA 109+85	1076.73	50-year	1076.07	100-year	1076.50
S3 Pedestrian bridge STA 111+95	1077.10	5-year	1074.49	100-year	1076.11
S4 Pedestrian bridge STA 112+50	1076.20	5-year	1074.41	100-year	1075.96
S5 Pedestrian bridge STA 113+42	1075.50	5-year	1074.18	100-year	1075.80
S6 Pedestrian bridge STA 115+27	1077.31	5-year	1073.85	100-year	1075.24
S7 Shadybrook Rd STA 148+40	1074.05	10-year	1070.45	100-year	1072.16

7.5 IMPACT OF TRIBUTARY DETENTION

A preliminary analysis was conducted to determine the impact of flow detention along the tributary streams that flow into the outlet channel. This involves the construction of detention ponds to regulate the tributary flow entering the outlet channel, which will reduce water levels along the outlet channel.

The proposed condition HEC-RAS model was rerun with lower inflows to the outlet channel. A reduction factor of 0.7 was applied to the peak flow from each of the tributary watersheds at Locations 2, 3, and 4. The Location of these tributary watersheds are shown in **Figure 7**. As shown in **Figure 14**, the flow discharge profile exhibits the expected decrease in flow rates. The corresponding water level profile indicates a reduction of 0.3 ft compared to the proposed condition baseline case (**Figure 15**). Despite these changes, the velocity of the outlet channel does not decrease significantly (**Figure 16**). The flood map can be found in **Appendix N**. While these findings are very promising, further discussion with the county is necessary to see if this is a desired option to pursue in the future.

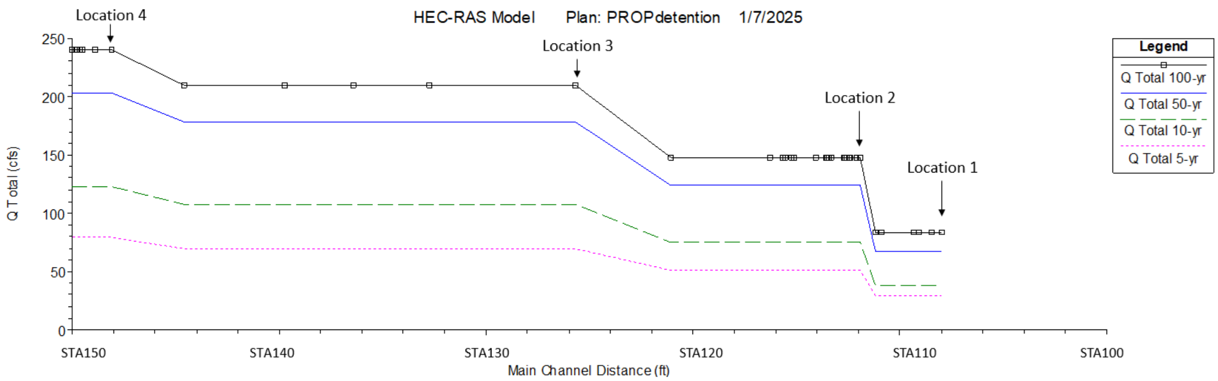


Figure 14: Total Discharge Profile in the Proposed Condition with Reduced Tributary Flows due to the Detention Pond

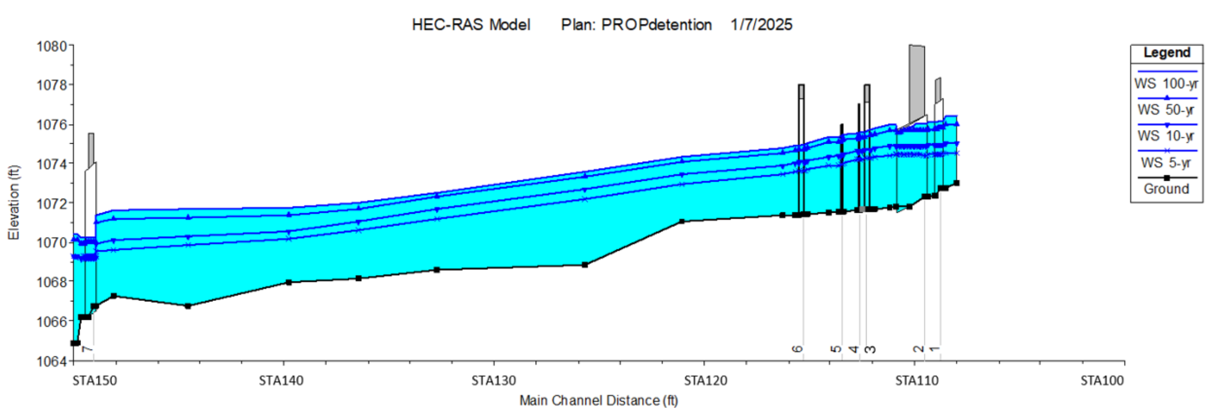


Figure 15: Water Surface Elevation Profile in the Proposed Condition with Reduced Tributary Flows due to the Detention Pond

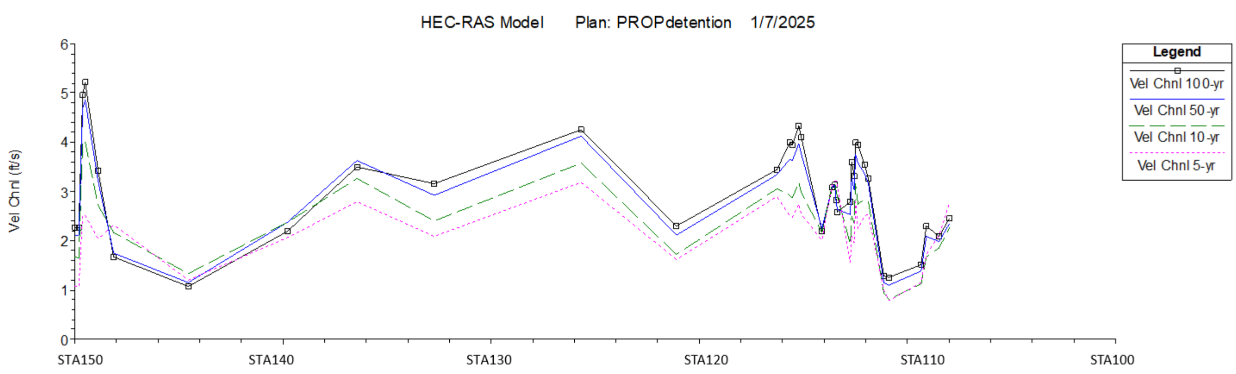


Figure 16: Water Surface Elevation Profile in the Proposed Condition with Reduced Tributary Flows due to the Detention Pond

As part of this preliminary analysis, the required storage capacity of the detention pond was assessed. **Table 11** presents the storage needed to achieve the flow reduction for each tributary. The detention pond was sized to accommodate the 100-year flood event, based on the methodology outlined in **Appendix O**.

Table 11: Tributary Peak Flow and Required Storage Capacity

Tributary location	Q100 (cfs)	Q100 with a Reduction Factor of 0.7 (cfs)	Required Storage Capacity (ac-ft)
2	89	62	4.0
3	88	62	3.9
4	43	30	1.9

7.6 H&H MODELING CONCLUSIONS

This report outlines the hydrological and hydraulic analyses conducted for the Springfield Lake watershed, outlet structure, and lake outlet channel. A HEC-HMS model was utilized to determine the lake outlet flow discharges, while flow estimates using ratios of USGS StreamStats was employed to estimate the flow discharges contributions at intermediate locations along the stream where tributary channels discharge to the outlet channel. It should be noted that the intermediate flow estimations are approximate.

Based on the current analysis, the outlet weir appears to be hydraulically adequate. The HEC-RAS analysis demonstrates that existing roadway crossings are capable of passing the required flow, with the design flood not surcharging the structures and the check flood not overtopping the structures.

Two significant hydraulic issues were identified, particularly in proximity to the existing hydraulic structures. There is a potential of sediment accumulation in the outlet channel due to low channel velocity. The longitudinal slope is not consistently positive. To mitigate these issues, adjustments should be made to the cross-section geometries. A two-stage channel geometry is proposed for the segment near the Canfield Road and Waterloo Road, while modifications to the channel streambed elevation ensure a positive slope over the entire outlet channel length. Though these improvements do increase the velocities at these sections, several sections (STA 107+67 to STA 111+57, and STA 43+00* and STA 50+00*) will still have velocities below the threshold velocity of 2 fps. Consequently, regular maintenance comprised of periodic sediment/debris removal is recommended at these locations.

8.0 Structural Inspection

A structural visual inspection of the Springfield Lake Overflow Outlet Structure was performed on April 10, 2024. A summary of findings is available in **Appendix P**.

9.0 Geotechnical Evaluation

A geotechnical subsurface exploration was conducted as part of this study, the Final Report of Subsurface Exploration is available in **Appendix Q**.

10.0 Preliminary Cost Estimate

A Class 4 AACE Estimate of Probable Construction Cost was created as part of Task B and is included in **Appendix R.**

11.0 Recommended Maintenance Schedule

The proposed channel improvements are intended to limit debris and sediment buildup to the area between Station 43+00 and 50+00. It has been determined that in some areas of the overflow channel, routine maintenance should be implemented to ensure proper performance. During surveying and field work investigations, DLZ identified areas of the outlet channel and culverts with debris and sediment buildup. It is recommended that the contract documents associated with this project include one (1) foot of sediment cleaning from the culverts under Waterloo Road and miscellaneous allowances for additional channel sediment cleaning. In some areas where there may not be access drives, temporary timber matting or similar methods may be placed over wetlands for maintenance access.

Construction will be in accordance with Ohio Revised Code 6131,Single County Drainage Improvements. Fees for future maintenance cost to be determined.

DLZ recommends the following maintenance schedule shown in **Table 12**.

Table 12: Future Maintenance Schedule

Item	Description	Frequency
Inspect Overflow Channel from STA 10+00 to 13+80 and STA 43+00 to STA 50+00	Inspect this approximate area for sediment and debris build up. Remove debris if necessary.	Monitor annually to record debris levels; Recommend observing sediment level within culverts to determine debris increases; Remove debris when greater than three (3) inches of debris is recorded.
Inspect Outlet Structure	Visually inspect the lake outlet structure during low flow periods.	Perform structural inspection every five (5) years.
Inspect Overflow Channel from STA 13+80 to 43+00	Visually inspect the channel during low flow periods.	Monitor once every two (2) years to record debris levels.
Canfield Road, Waterloo Road, and Shadybrook Drive Culverts	Areas noted during inspection that contain sediment or debris build up in roadway culverts should be removed by an industrial pipe cleaning company.	Monitor annually to record debris levels; Remove debris when greater than three (3) inches of debris is recorded within culverts.

12.0 Updates

This report was updated from the original "Task A – Conceptual Plan" to incorporate services performed under Task B and Task C.8, including the following changes:

- Preliminary Plans were developed under Task B, as shown in **Appendix A**.
- **Section 5.0 Additional Waters Investigation** was added to incorporate Task B investigations including threatened and endangered species study, desktop cultural resource study, and permit identification.
- **Section 7.0 Hydrologic and Hydraulic (H&H) Modeling** was updated to incorporate the Task B hydraulic modeling results.
- **Section 9.0 Geotechnical Evaluation** was added from Task C.8 including the Geotechnical Investigation Report in **Appendix Q**.
- **Section 10.0 Preliminary Cost Estimate** was added from Task C.8. A Class 4 AACE Estimate of Probable Construction Cost is included in **Appendix R**.

13.0 Conclusions

DLZ studied the Springfield Lake Outlet Structure & Channel and recommends improvements as shown in the Preliminary Plans to reduce debris build up, provide access for long term maintenance, and improve water quality in the channel. Tasks performed with this study to determine recommended improvements include surveying, waters investigation, hydraulic and hydrological analysis, constructability analysis, structure evaluations, channel design evaluations, geotechnical evaluation, cost evaluation, and maintenance evaluations. Based on our structural evaluation, no changes to the Outlet Structure are currently recommended. However, modifications to the outlet channel geometry at strategic locations to improve velocity, along with access routes for improved maintenance, are recommended. The preliminary Class IV cost estimate for the channel improvements is $900,000.

The following factors were considered prior to submitting the final recommendations:

Favorable aspects of the recommended improvements include:

- Access to the channel is significantly improved with the proposed access routes.
- Frequency of maintenance operations will be reduced due to recommended channel improvements.
- Channel design concentrates debris buildup to specific areas along proposed access routes.
- Reduced debris buildup along the channel enhances aesthetic attributes for abutting property owners.
- The outlet structure itself is in good condition and does not need replaced.

Unfavorable aspects of the recommended improvements include:

- Disruption to nearby properties during construction.
- Proposed easements in some areas encroach on nearby properties.

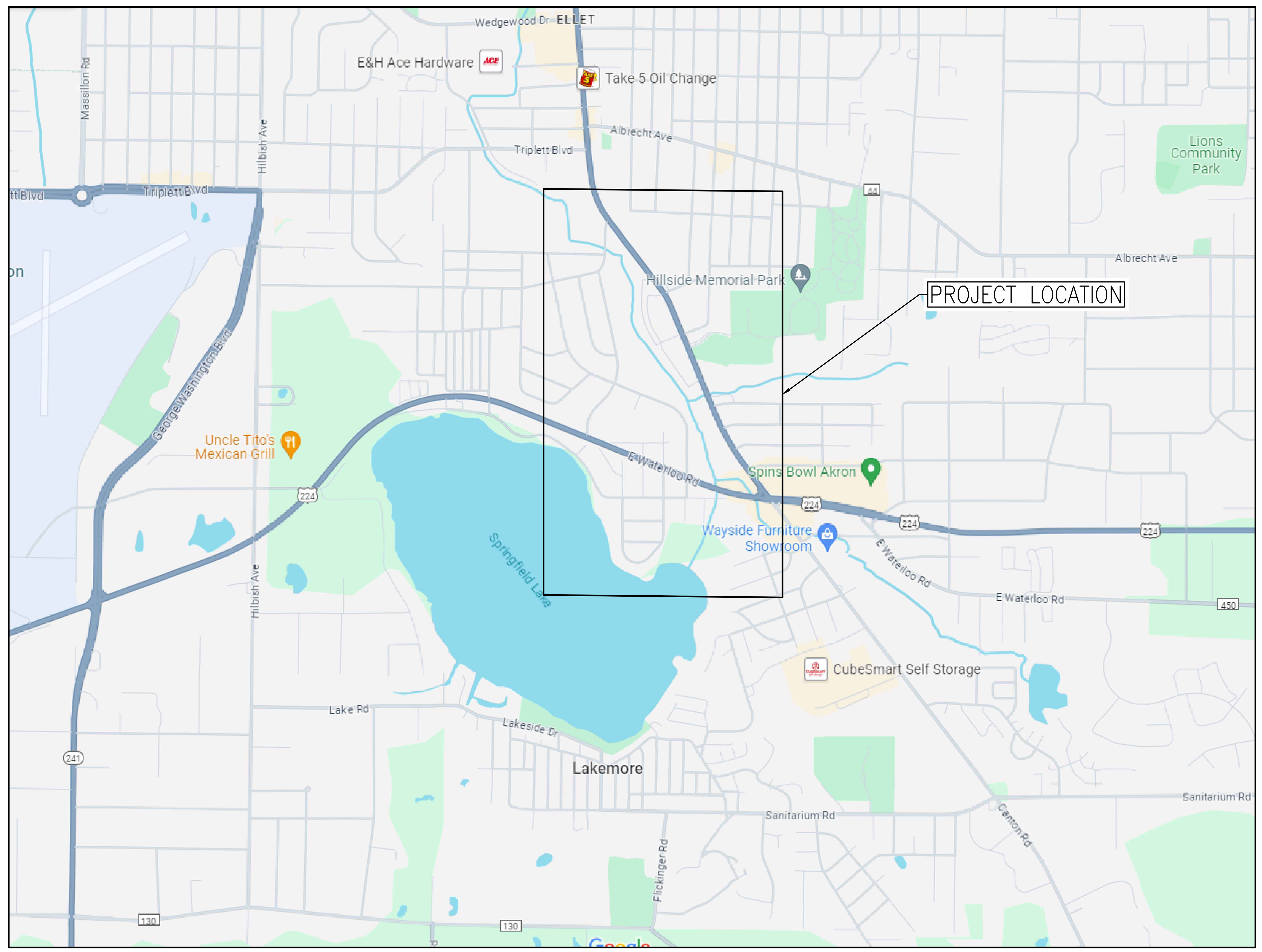
DLZ determined that the recommended improvements are cost effective and constructable with limited impacts to stakeholders, residents, and businesses. Access for constructability and maintenance will be significantly improved with the proposed access routes. Easement acquisition will be minimized as a majority of the channel is within an existing Summit County easement. Channel improvements will reduce maintenance frequency and cost by improving channel flow velocity for stagnant areas, concentrating debris build up to more accessible areas, and improving the stability, water quality, and ecological benefits of the channel with natural stream features. Therefore, it is DLZ’s opinion that the project is feasible and will provide benefits that exceed the estimated construction cost.

APPENDIX A – Preliminary Plans

SUMMIT COUNTY ENGINEER'S OFFICE

SUMMIT COUNTY, OHIO
SURFACE WATER MANAGEMENT
DISTRICT HUC 12-041100020303
SPRINGFIELD LAKE CHANNEL RESTORATION
PRELIMINARY PLANS
JANUARY 10, 2025

Sheet List Table	
Sheet Number	Sheet Title
C-0.0	TITLE SHEET
C-2.0	SURVEY CONTROL
C-3.0	TYPICAL SECTIONS I
C-3.1	TYPICAL SECTIONS II
C-3.2	CHANNEL STABILIZATION DETAILS
C-4.0	PLAN & PROFILE STA 100+00 TO STA 103+00
C-4.1	PLAN & PROFILE STA 103+00 TO STA 108+00
C-4.2	PLAN & PROFILE STA 108+00 TO STA 113+00
C-4.3	PLAN & PROFILE STA 113+00 TO STA 116+83
C-5.0	CHANNEL CROSS SECTIONS
C-6.0	ACCESS DRIVE 1 PLAN & PROFILE
C-6.1	ACCESS DRIVE 2-1 PLAN & PROFILE
C-6.2	ACCESS DRIVE 2-2 PLAN & PROFILE
C-6.3	ACCESS DRIVE 3-1 PLAN & PROFILE
C-6.4	ACCESS DRIVE 3-2 PLAN & PROFILE
C-6.5	PAVEMENT DETAILS



ALAN BRUBAKER, P.E., P.S.
SUMMIT COUNTY ENGINEER

CHARLES HAUBER, P.E., P.S.
ENGINEERING PROJECT MANAGER

PROJECT CONTROL

POSITIONING METHOD: ____GPS______________

MONUMENT TYPE: ______ODOT-VRS___________

VERTICAL POSITIONING

ORTHOMETRIC HEIGHT DATUM: __NAVD88_______________

GEOID: ______GEOID18A___________

HORIZONTAL POSITIONING

REFERENCE FRAME: ________NAD83(2011)_________

ELLIPSOID: _______GRS1980__________

MAP PROJECTION: _Lambert Conformal Conic Projection___________

COORDINATE SYSTEM: __Ohio State Plane, North Zone_______________

COMBINED SCALE FACTOR: 1.000000

ORIGIN OF COORDINATE

SYSTEM: __Northing: 0 USft
Easting: 0 US ft
Lat. :N 39° 27' 01.76097"
Lon.:W 89° 28' 32.98476"

SUBMITTED BY ______________ DATE 3-7-2025
DLZ OHIO, INC.

MATCHLINE SEE THIS SHEET

SURVEY CONTROL POINTS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
SP–1	500,441.53	2,262,611.88	1075.66	IPINS
SP–2	500,624.24	2,262,917.22	1075.84	IPINS
SP–3	498,277.98	2,263,373.89	1075.68	IPINS
SP–4	498,711.40	2,263,542.24	1075.26	IPINS
SP–5	499,046.37	2,263,640.77	1078.67	IPINS
SP–6	499,243.88	2,263,638.23	1082.77	MAGS
SP–7	499,601.68	2,263,421.84	1077.29	MAGS
SP–8	499,926.27	2,263,336.54	1075.52	MAGS
SP–9	500,469.71	2,263,128.89	1075.85	IPINS
SP–10	500,677.52	2,263,304.09	1079.74	MAGS
SP–11	501,310.18	2,262,931.61	1077.79	IPINS
SP–12	501,075.72	2,262,673.11	1078.43	IPINS
SP–13	502,815.92	2,261,944.18	1089.93	IPINS
SP–14	502,367.68	2,261,977.46	1073.45	IPINS
SP–15	502,374.82	2,261,945.22	1073.24	BM J
SP–16	502,384.78	2,262,139.61	1072.12	BM I
SP–17	501,280.53	2,262,501.11	1072.50	BM H
SP–18	501,006.05	2,262,722.89	1076.04	BM G
SP–19	500,733.75	2,262,943.66	1075.44	BM F
SP–20	500,477.74	2,263,150.26	1076.47	BM E

SURVEY CONTROL POINTS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
SP–21	499,243.83	2,263,638.21	1082.77	BM C
SP–22	499,931.88	2,263,304.01	1076.58	BM D
SP–23	498,786.38	2,263,643.28	1078.34	BM B
SP–24	498,252.43	2,263,357.21	1076.06	BM A
SP–25	498,932.22	2,263,621.59	1077.32	IPINS DLZ CAP
SP–26	498,794.73	2,263,640.87	1077.29	IPINS DLZ CAP
SP–27	499,373.35	2,263,512.74	1077.88	MAGS
SP–28	499,447.63	2,263,466.39	1074.78	IPINS DLZ CAP
SP–29	500,060.60	2,263,374.90	1077.31	MAGS
SP–30	500,263.85	2,263,238.42	1077.25	IPINS DLZ CAP
SP–31	500,628.27	2,262,995.48	1072.49	IPINS DLZ CAP
SP–32	500,847.48	2,262,826.17	1072.45	IPINS DLZ CAP
SP–33	501,455.20	2,262,398.63	1071.50	IPINS DLZ CAP
SP–34	501,761.21	2,262,295.96	1071.42	IPINS DLZ CAP
SP–35	502,025.30	2,262,266.59	1071.05	IPINS DLZ CAP
SP–36	502,233.86	2,262,175.78	1071.49	IPINS DLZ CAP
SP–37	502,368.74	2,262,153.83	1071.96	IPINS DLZ CAP

MATCHLINE SEE THIS SHEET

SURVEY NOTES:

1. HORIZONTAL DATUM IS OHIO STATE PLANE, NORTH ZONE NAD83(2011) U.S. FEET. VERTICAL DATUM IS NAVD 1988 U.S. FEET.
2. PROPERTY LINES ARE FROM A TAX MAP OVERLAY. NO BOUNDARY SURVEYS HAVE BEEN PERFORMED.
3. THIS PLAN SET AND THE SURVEY ON WHICH IT IS BASED HAVE BEEN PREPARED WITHOUT THE BENEFIT OF TITLE REPORT AND ARE NOT INTENDED TO REFLECT ALL EASEMENTS, ENCUMBRANCES, OR OTHER CIRCUMSTANCES AFFECTING THE TITLE TO THE PROPERTIES SHOWN HEREON.

0 200' 400'
HORIZONTAL SCALE IN FEET

DLZ

ALAN BRUBAKER, P.E., P.S.
SUMMIT COUNTY ENGINEER
538 E. SOUTH STREET
AKRON, OH 44311

REV NO	DATE	ISSUED BY	REMARKS

DESIGNED BY: PAN
DRAWN BY: PAN
SHEET CHK'D BY: MSE
CROSS CHK'D BY: KDR
APPROVED BY: MSE
ISSUED DATE: 3/7/25

SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION PRELIMINARY PLANS

SURVEY CONTROL

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: C-2.0

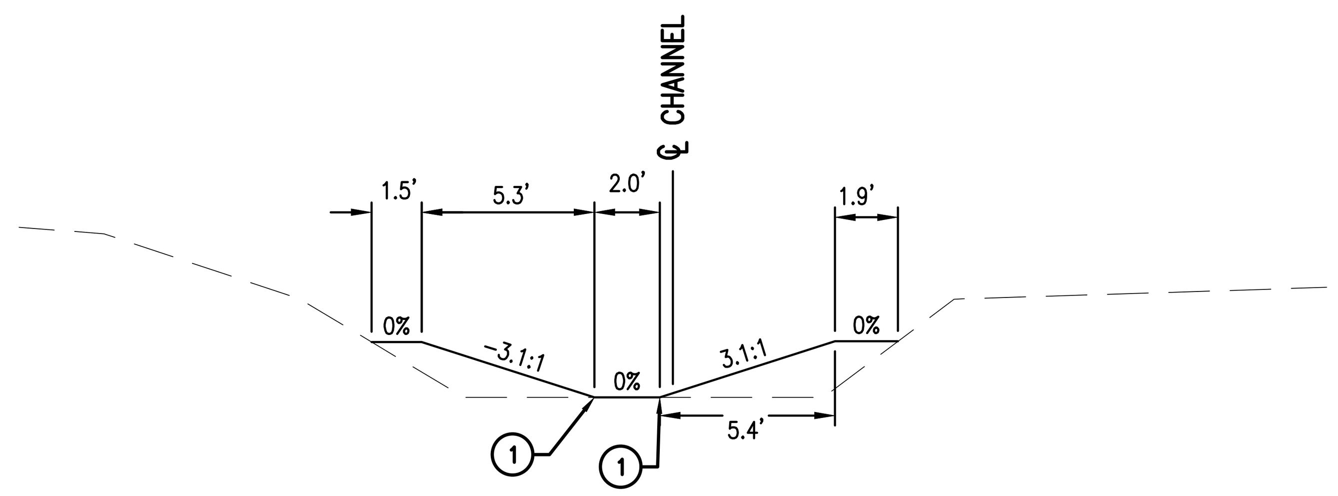
KEY LEGEND:

(1) ROCK TOE PROTECTION, SEE DETAIL

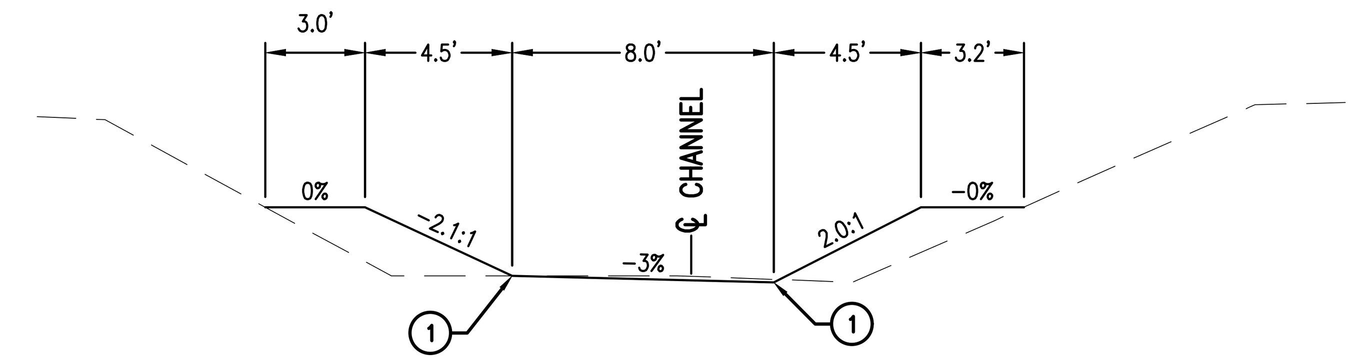
(2) ROCK BANK STABILIZATION, SEE DETAIL

NOTES:

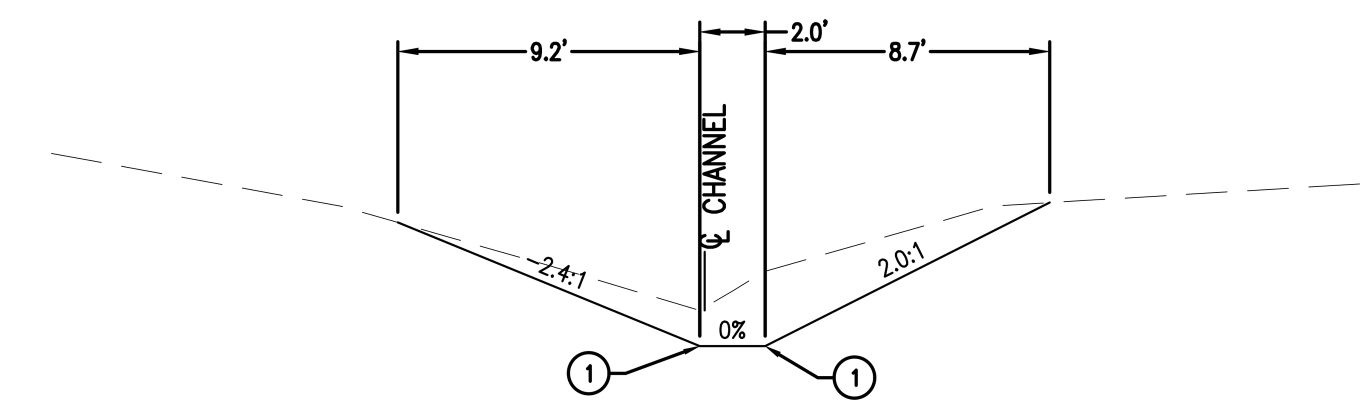
1. TRANSITION CHANNEL FOR 10 FT BETWEEN TYPICAL SECTIONS.



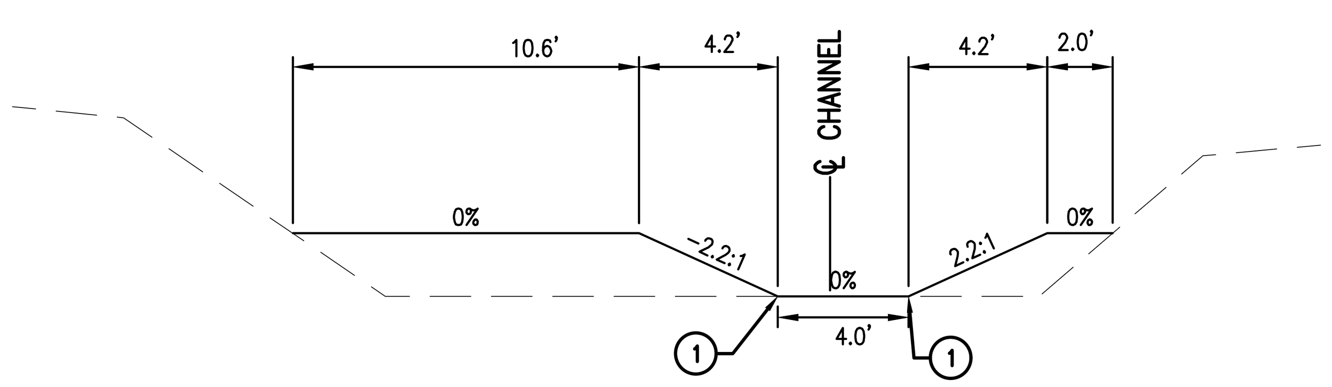
TYPICAL SECTION 1
STA. 100+70 TO 108+13



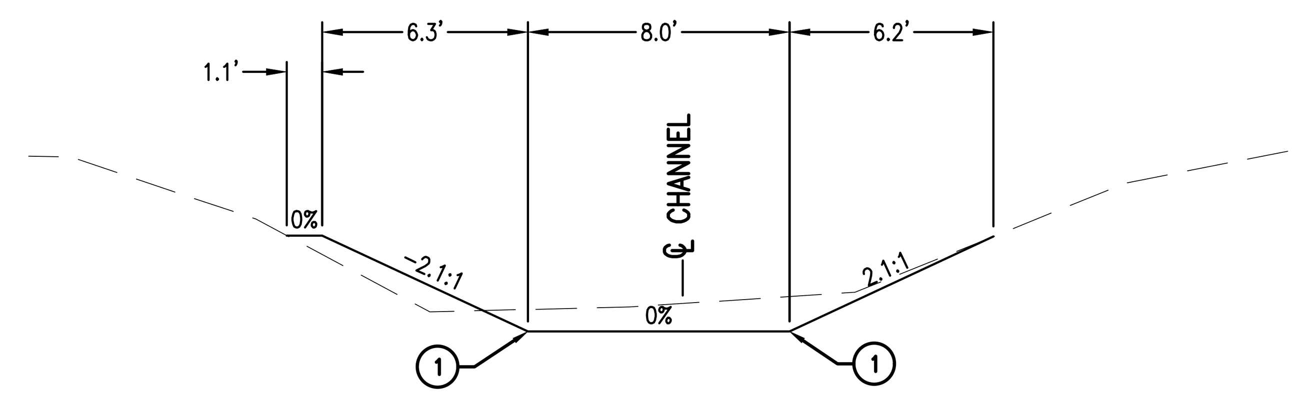
TYPICAL SECTION 4A
STA. 109+09 TO 109+11



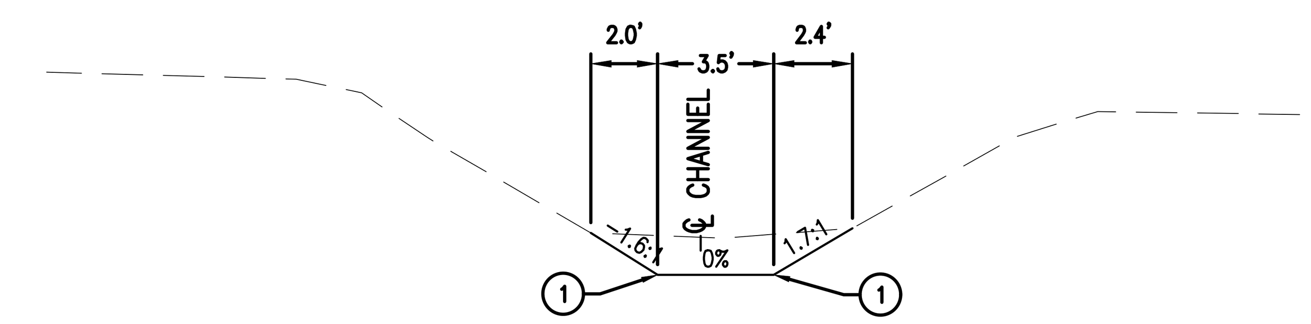
TYPICAL SECTION 6
STA. 111+57 TO 111+80



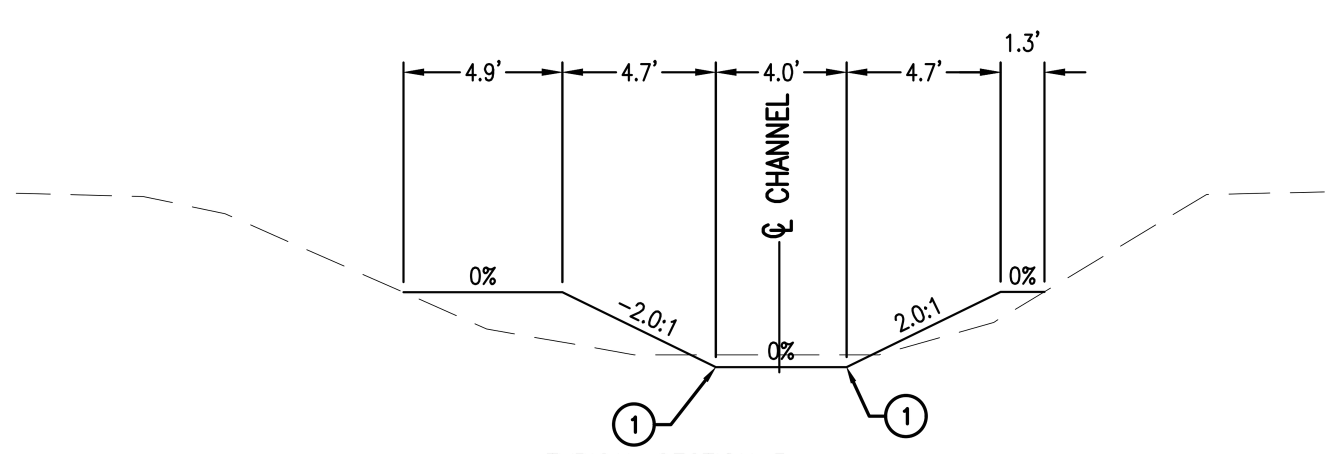
TYPICAL SECTION 2
STA. 108+13 TO 108+36



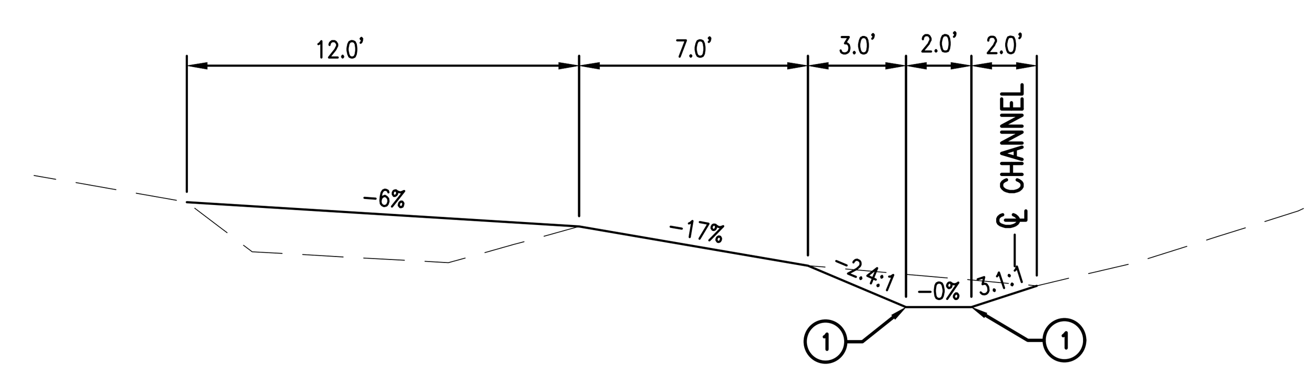
TYPICAL SECTION 4B
STA. 110+55 TO 110+92



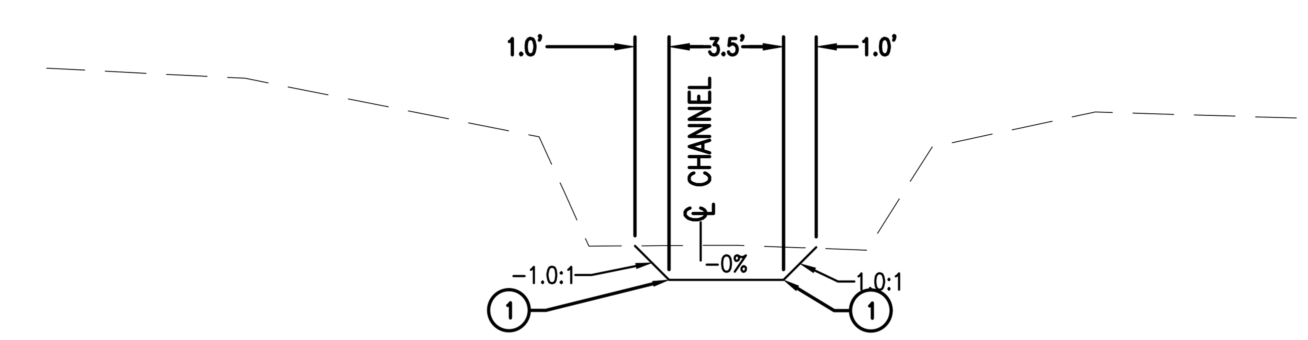
TYPICAL SECTION 7
STA. 111+80 TO 111+81



TYPICAL SECTION 3
STA. 108+76 TO 109+09



TYPICAL SECTION 5
STA. 110+92 TO 111+57



TYPICAL SECTION 8
STA. 112+05 TO 112+25

0 5' 10'
HORIZONTAL SCALE IN FEET

0 5' 10'
VERTICAL SCALE IN FEET

DLZ

ALAN BRUBAKER, P.E., P.S.
SUMMIT COUNTY ENGINEER
538 E. SOUTH STREET
AKRON, OH 44311

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ISSUED DATE: 3/7/25

SURFACE WATER MANAGEMENT
DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

TYPICAL SECTIONS I

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.:
C-3.0

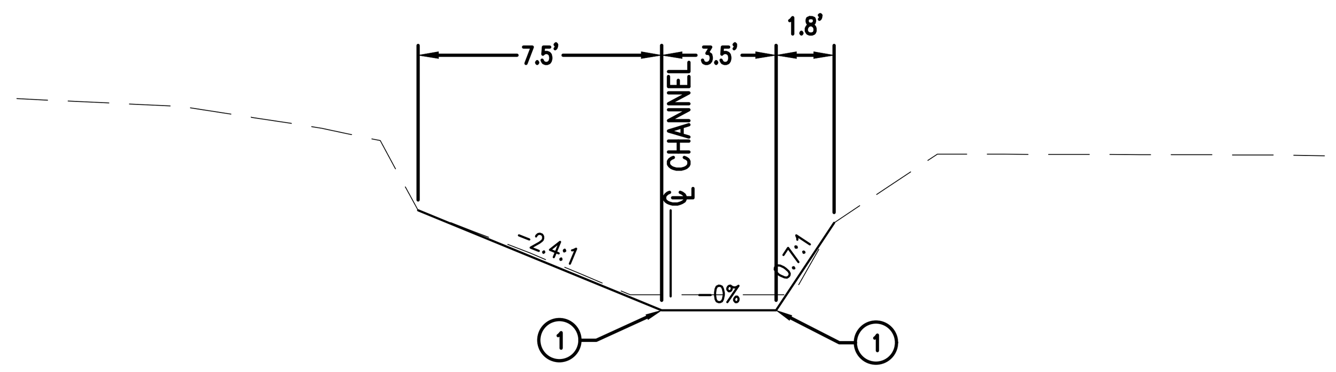
KEY LEGEND:

(1) ROCK TOE PROTECTION, SEE DETAIL

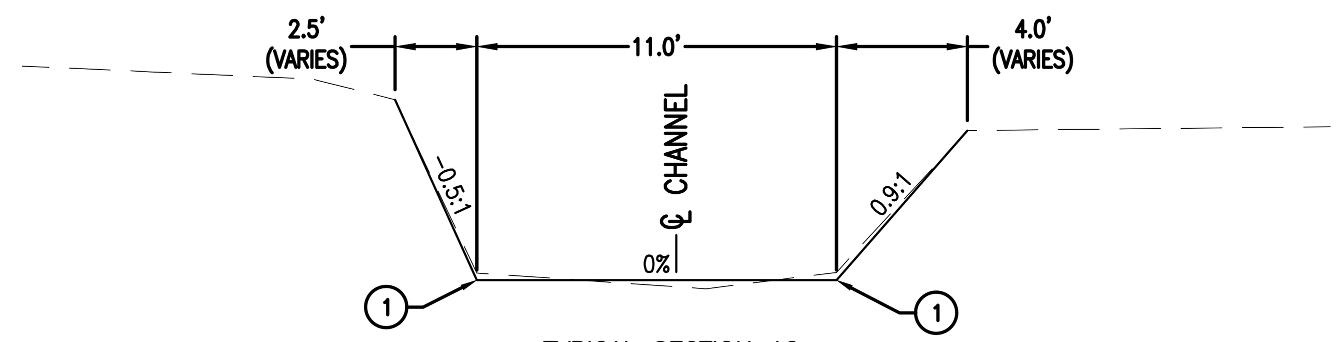
(2) ROCK BANK STABILIZATION, SEE DETAIL

NOTES:

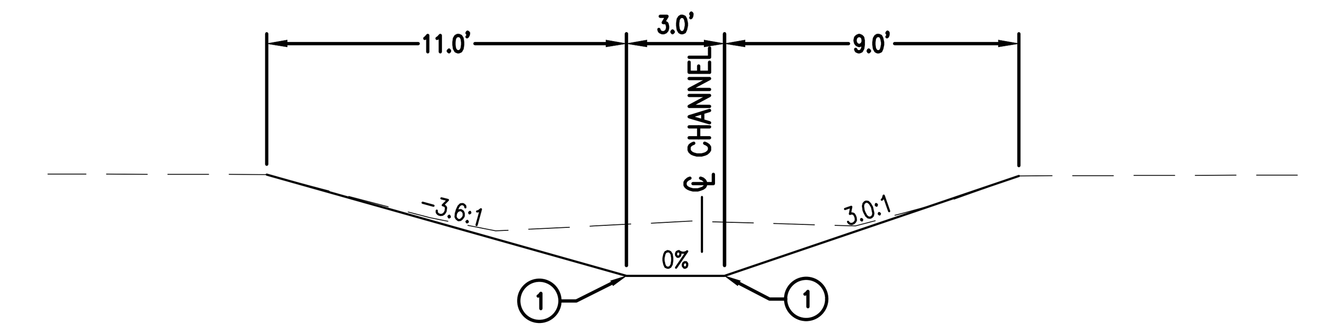
1. TRANSITION CHANNEL FOR 10 FT BETWEEN TYPICAL SECTIONS.



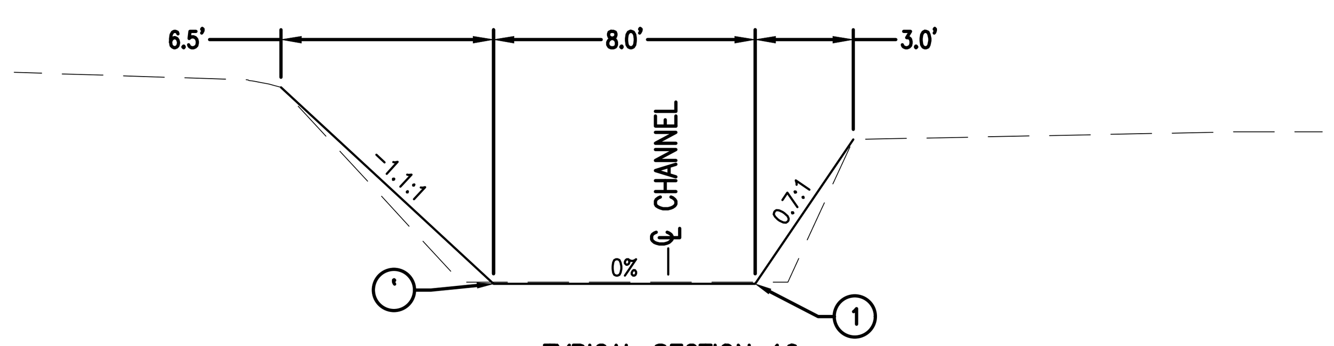
TYPICAL SECTION 9
STA. 112+25 TO 112+47



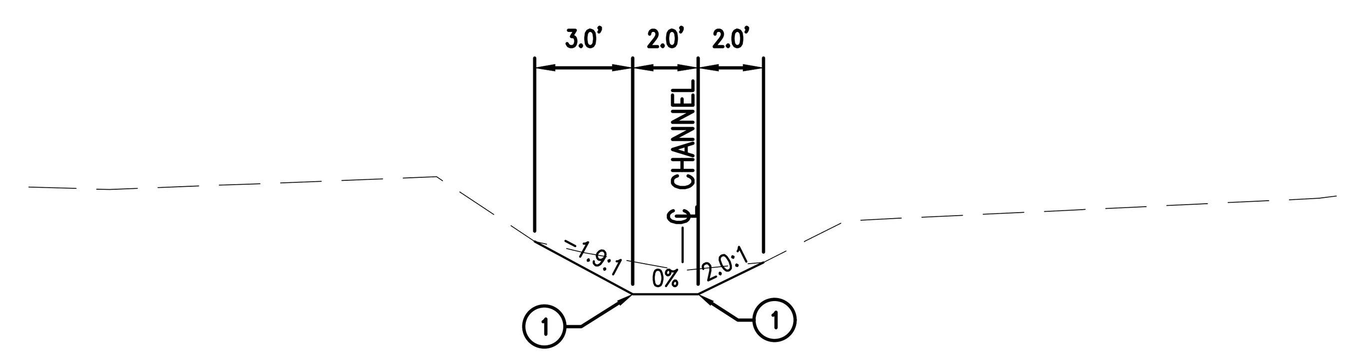
TYPICAL SECTION 12
STA. 112+67 TO 113+31



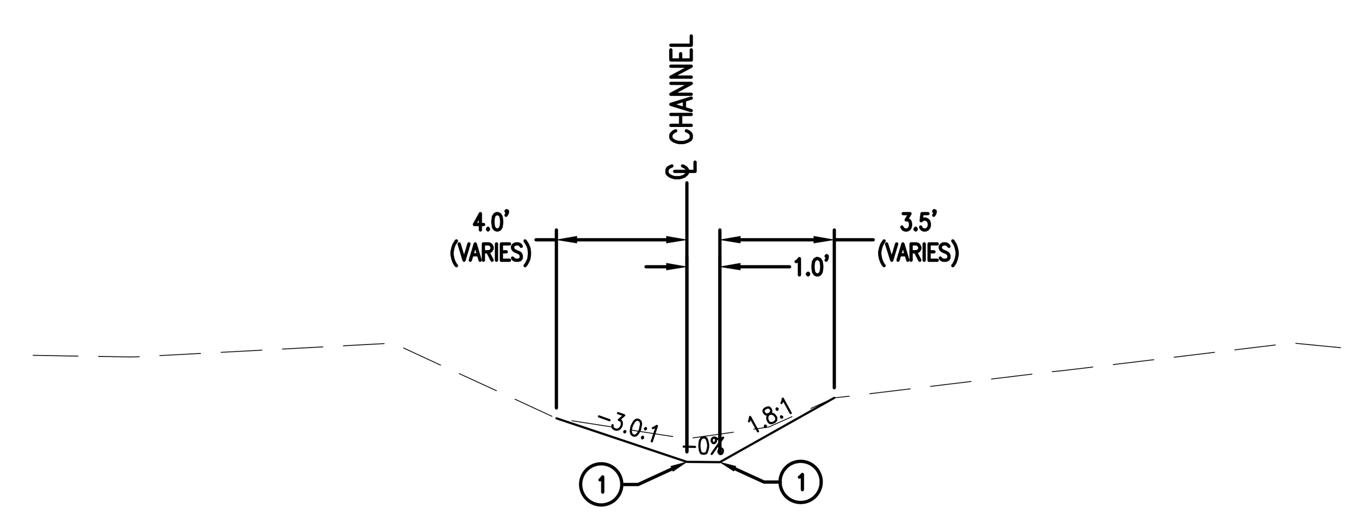
TYPICAL SECTION 15
STA. 113+96 TO 115+15



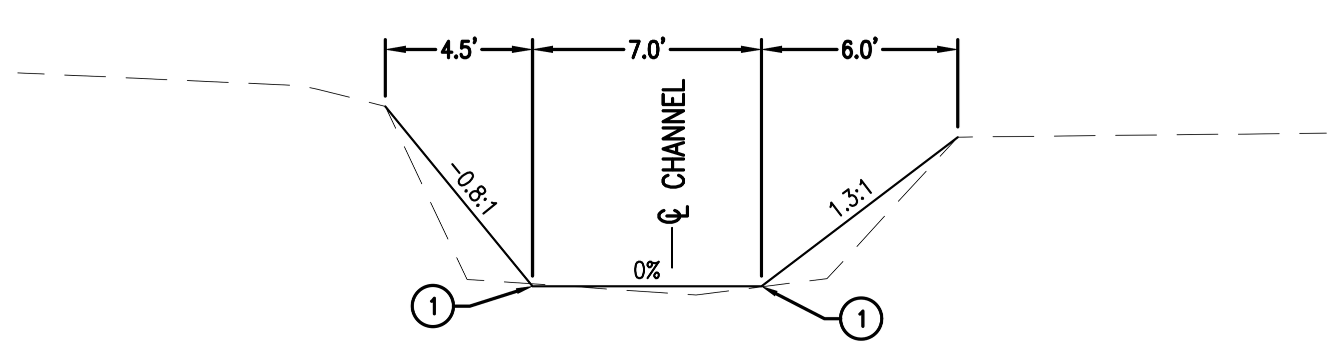
TYPICAL SECTION 10
STA. 112+47 TO 112+53



TYPICAL SECTION 13
STA. 113+31 TO 113+38



TYPICAL SECTION 14
STA. 113+38 TO 113+96



TYPICAL SECTION 11
STA. 112+53 TO 112+67

0 5' 10'
HORIZONTAL SCALE IN FEET

0 5' 10'
VERTICAL SCALE IN FEET

DLZ

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538 E. SOUTH STREET
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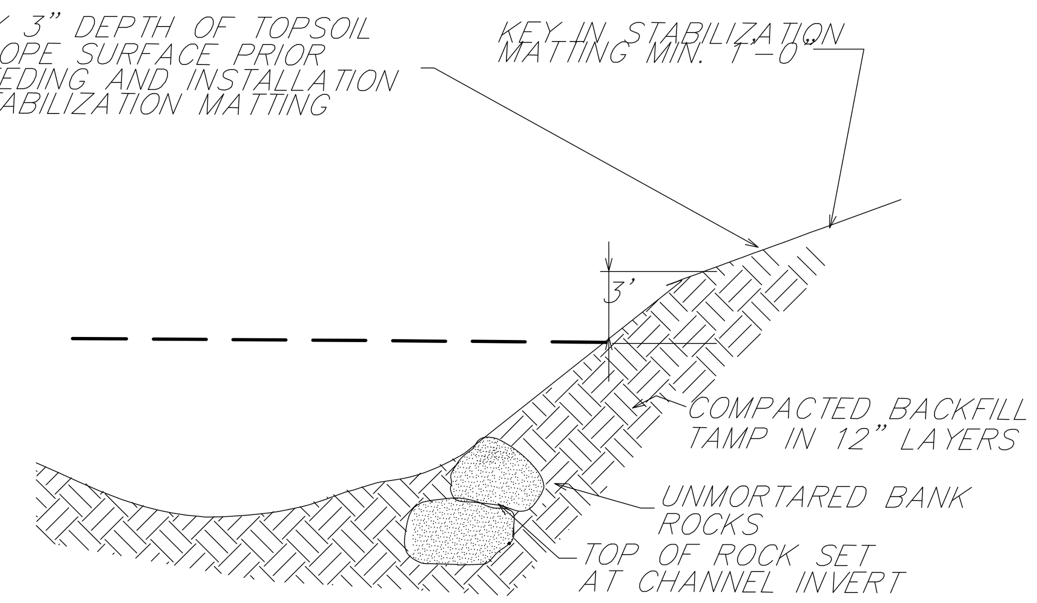
SURFACE WATER MANAGEMENT
DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL
RESTORATION
PRELIMINARY PLANS

TYPICAL SECTIONS II

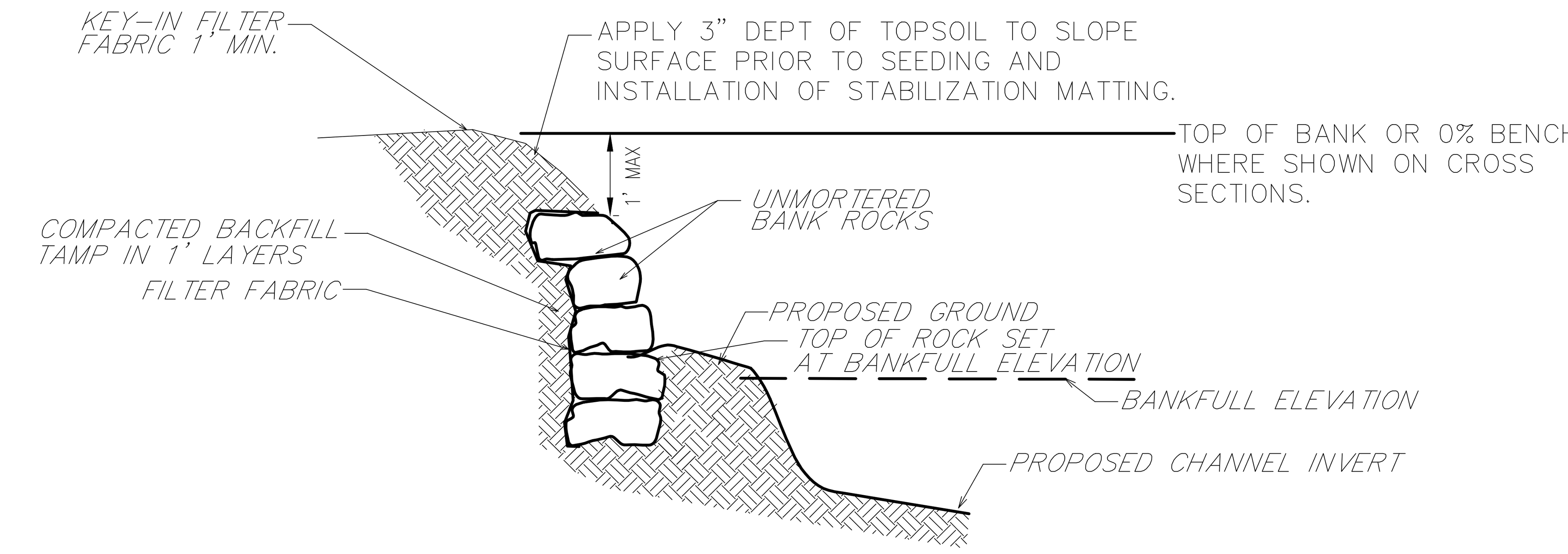
WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: C-3.1



ROCK TOE PROTECTION
CROSS SECTION - TYPICAL

NOT TO SCALE



ROCK BANK STABILIZATION
SECTION- TYPICAL

NOT TO SCALE

DLZ

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SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

CHANNEL STABILIZATION DETAILS

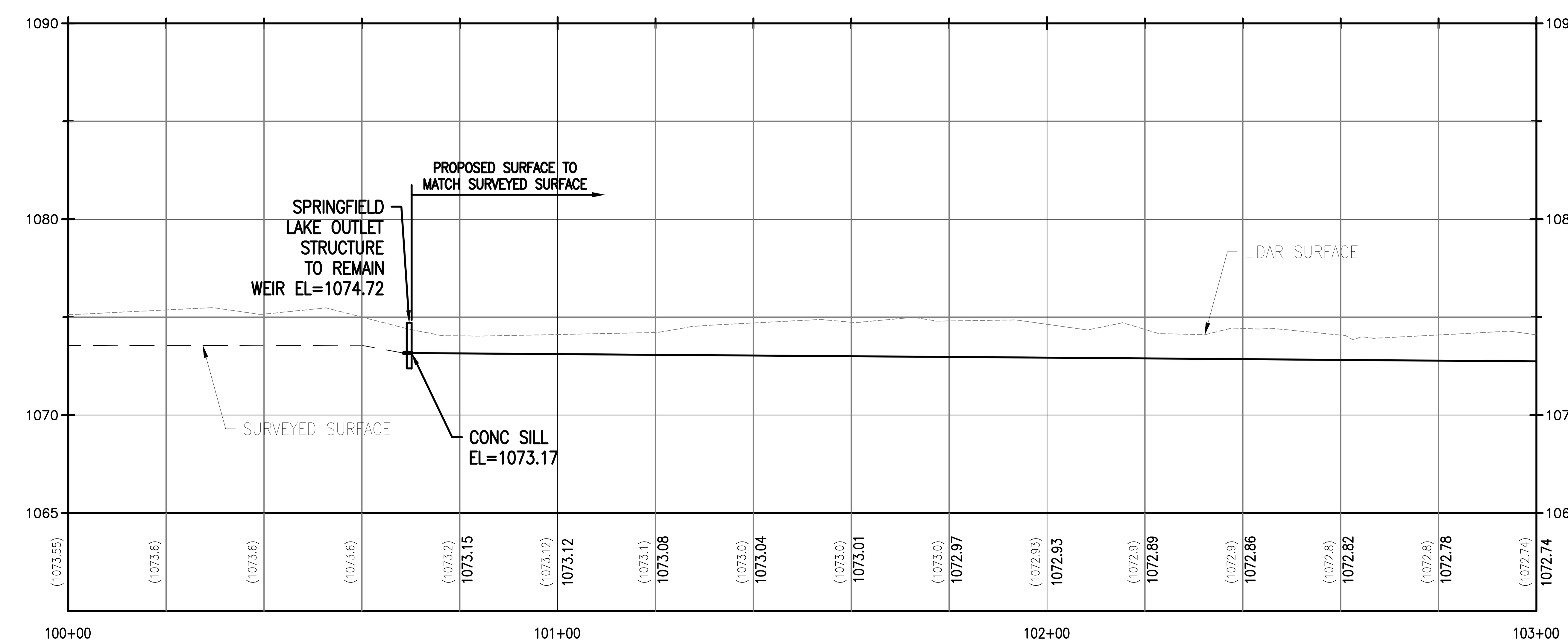
WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: **C-3.2**

LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
- CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)
- CONSTRUCTION/MAINTENANCE DRIVE
- PRIVATELY OWNED BRIDGE
- ROCK BANK STABILIZATION (SEE DETAIL)
- ROCK TOE PROTECTION (SEE DETAIL)
- PERMANENT EASEMENT
- EXISTING DITCH EASEMENT
- SANITARY PIPE
- STORM PIPE
- EXISTING DITCH EASEMENT ENCROACHMENT
- PERMANENT EASEMENT ENCROACHMENT
- FENCE

NOTE:
1. LIDAR AND SURVEYED SURFACES ON PROFILE ARE ALONG THE CENTER OF THE CHANNEL. THE ACCURACY OF THE LIDAR SURFACE VARIES. EXISTING ELEVATIONS SHOWN ALONG BOTTOM OF PROFILE ARE INTERPELATED BETWEEN SURVEYED SECTIONS.



SPRINGFIELD LAKE DRAINAGE CHANNEL PROFILE (100+00.00 TO 103+00.00)

0 20' 40' HORIZONTAL SCALE IN FEET

0 5' 10' VERTICAL SCALE IN FEET

DLZ

ALAN BRUBAKER, P.E., P.S.
SUMMIT COUNTY ENGINEER
538 E. SOUTH STREET
AKRON, OH 44311

REV NO	DATE	ISSUED BY	REMARKS

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CROSS CHK'D BY: KDR
APPROVED BY: MSE
ISSUED DATE: 3/7/25

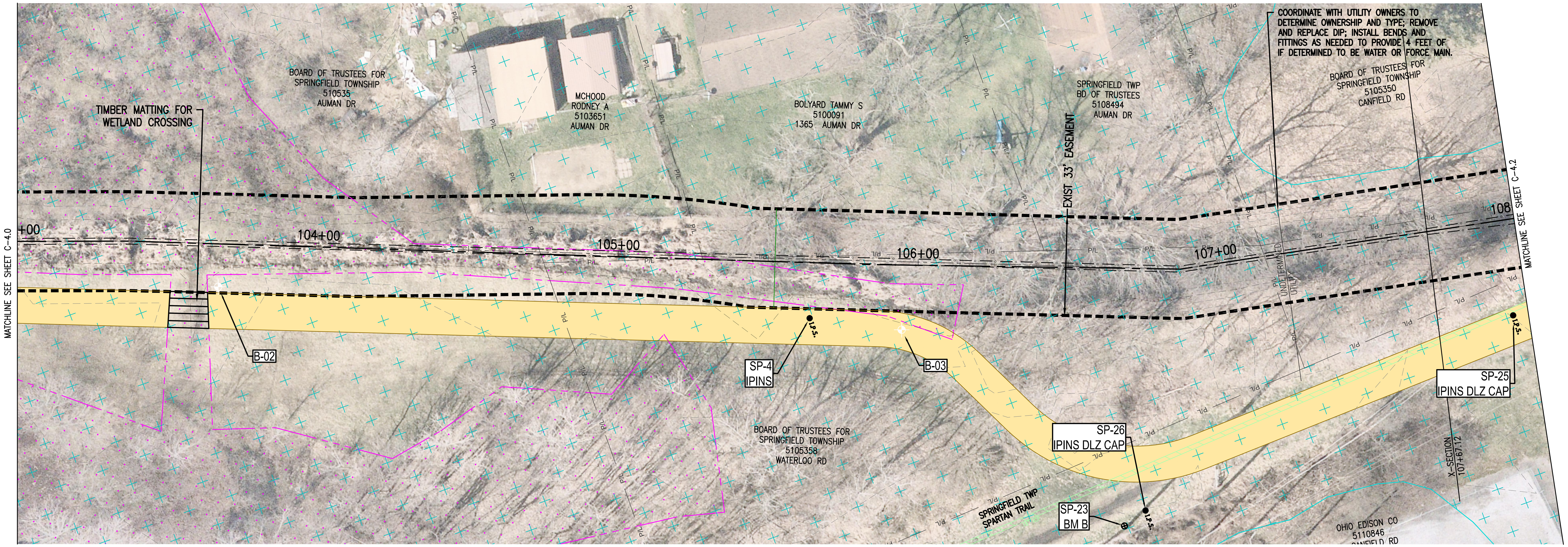
SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION PRELIMINARY PLANS

PLAN & PROFILE STA 100+00 TO STA 103+00

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

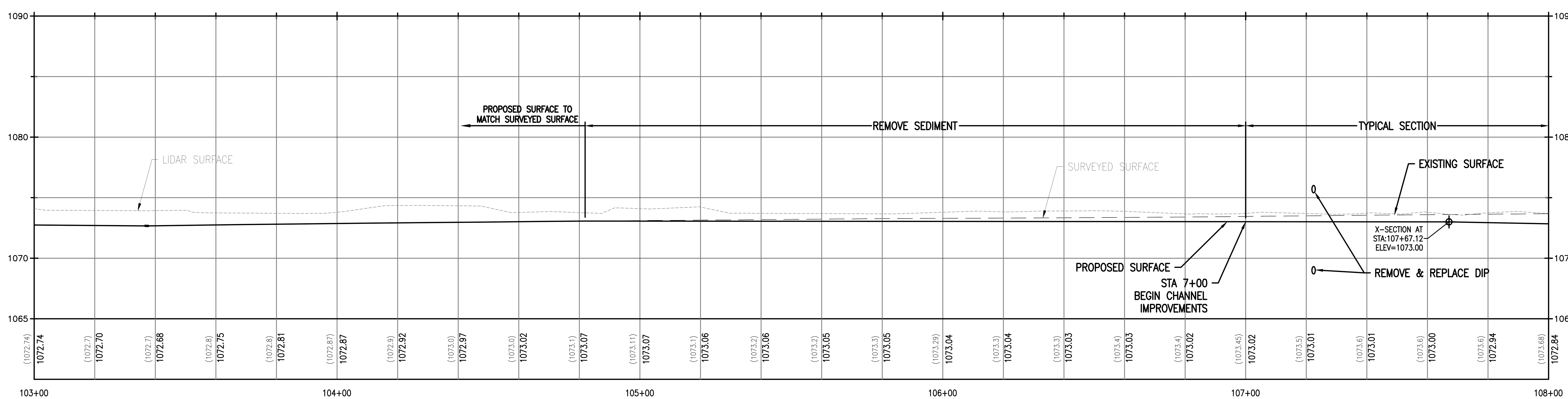
SHEET NO.: C-4.0



LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
- CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)
- CONSTRUCTION/MAINTENANCE DRIVE
- PRIVATELY OWNED BRIDGE
- ROCK BANK STABILIZATION (SEE DETAIL)
- ROCK TOE PROTECTION (SEE DETAIL)
- PERMANENT EASEMENT
- EXISTING DITCH EASEMENT
- SANITARY PIPE
- STORM PIPE
- EXISTING DITCH EASEMENT ENCROACHMENT
- PERMANENT EASEMENT ENCROACHMENT
- FENCE

NOTE:
1. LIDAR AND SURVEYED SURFACES ON PROFILE ARE ALONG THE CENTER OF THE CHANNEL. THE ACCURACY OF THE LIDAR SURFACE VARIES. EXISTING ELEVATIONS SHOWN ALONG BOTTOM OF PROFILE ARE INTERPELATED BETWEEN SURVEYED SECTIONS.



SPRINGFIELD LAKE DRAINAGE CHANNEL PROFILE (103+00.00 TO 108+00.00)

HORIZONTAL SCALE IN FEET: 0, 20', 40'

VERTICAL SCALE IN FEET: 0, 5', 10'

DLZ

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SUMMIT COUNTY ENGINEER
538 E. SOUTH STREET
AKRON, OH 44311

REV NO	DATE	ISSUED BY	REMARKS

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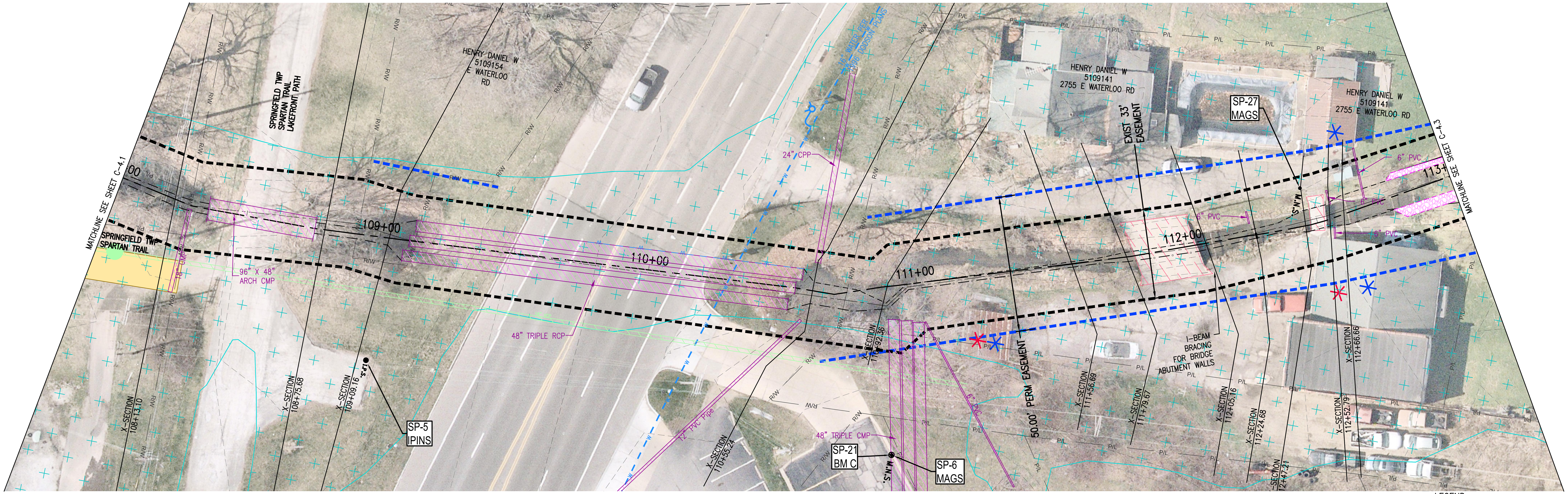
SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

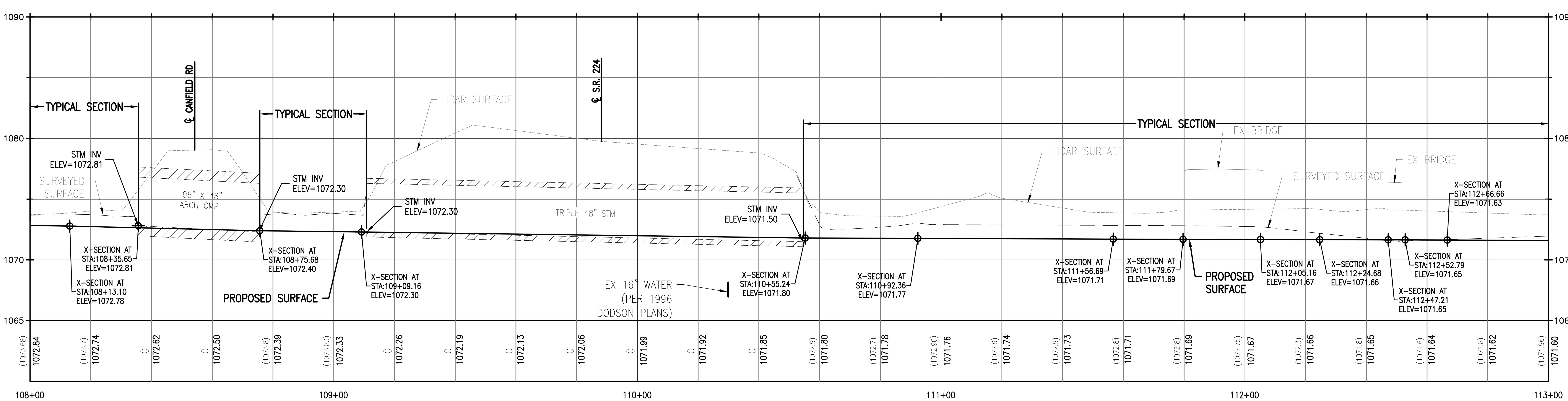
SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

PLAN & PROFILE STA 103+00 TO STA 108+00

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: C-4.1





SPRINGFIELD LAKE DRAINAGE CHANNEL PROFILE (108+00.00 TO 113+00.00)

HORIZONTAL SCALE IN FEET (0, 20', 40')

VERTICAL SCALE IN FEET (0, 5', 10')

LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
- CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)
- CONSTRUCTION/MAINTENANCE DRIVE
- PRIVATELY OWNED BRIDGE
- ROCK BANK STABILIZATION (SEE DETAIL)
- ROCK TOE PROTECTION (SEE DETAIL)
- PERMANENT EASEMENT
- EXISTING DITCH EASEMENT
- SANITARY PIPE
- STORM PIPE
- EXISTING DITCH EASEMENT ENCROACHMENT
- PERMANENT EASEMENT ENCROACHMENT
- FENCE

NOTE:
1. LIDAR AND SURVEYED SURFACES ON PROFILE ARE ALONG THE CENTER OF THE CHANNEL. THE ACCURACY OF THE LIDAR SURFACE VARIES. EXISTING ELEVATIONS SHOWN ALONG BOTTOM OF PROFILE ARE INTERPELATED BETWEEN SURVEYED SECTIONS.

DLZ

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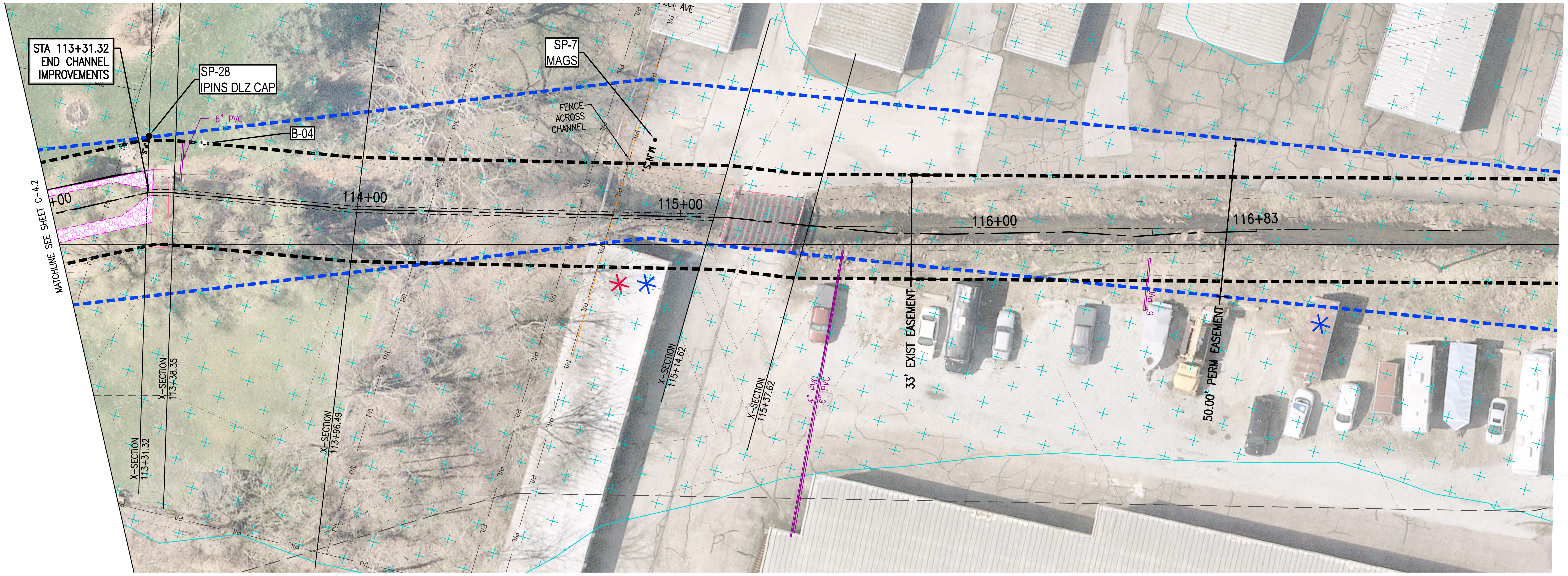
SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

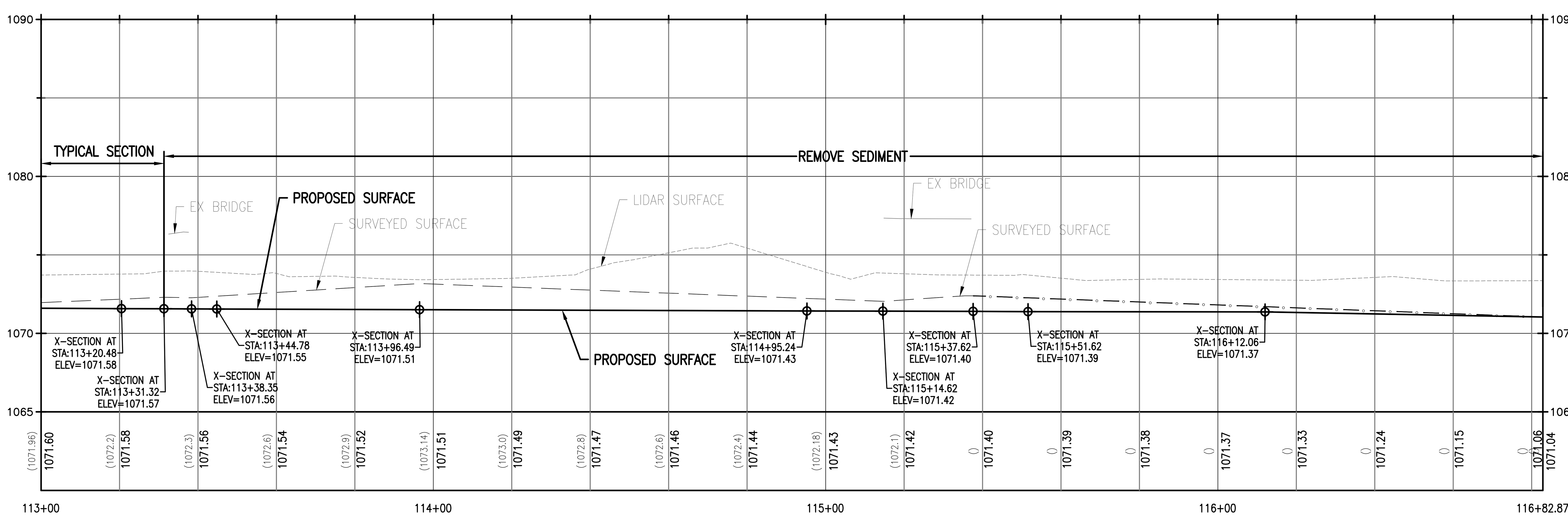
SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION PRELIMINARY PLANS

PLAN & PROFILE STA 108+00 TO STA 113+00

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: C-4.2





SPRINGFIELD LAKE DRAINAGE CHANNEL PROFILE (113+00.00 TO 116+82.87)

LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
- CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)
- CONSTRUCTION/MAINTENANCE DRIVE
- PRIVATELY OWNED BRIDGE
- ROCK BANK STABILIZATION (SEE DETAIL)
- ROCK TOE PROTECTION (SEE DETAIL)
- PERMANENT EASEMENT
- EXISTING DITCH EASEMENT
- SANITARY PIPE
- STORM PIPE
- EXISTING DITCH EASEMENT ENCROACHMENT
- PERMANENT EASEMENT ENCROACHMENT
- FENCE

NOTE:
1. LIDAR AND SURVEYED SURFACES ON PROFILE ARE ALONG THE CENTER OF THE CHANNEL. THE ACCURACY OF THE LIDAR SURFACE VARIES. EXISTING ELEVATIONS SHOWN ALONG BOTTOM OF PROFILE ARE INTERPELATED BETWEEN SURVEYED SECTIONS.

0 20' 40'
HORIZONTAL SCALE IN FEET

0 5' 10'
VERTICAL SCALE IN FEET

DLZ

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SUMMIT COUNTY ENGINEER
538 E. SOUTH STREET
AKRON, OH 44311

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APPROVED BY: MSE
ISSUED DATE: 3/7/25

SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

PLAN & PROFILE STA 113+00 TO STA 116+83

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: C-4.3

DLZ

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538 E. SOUTH STREET
AKRON, OH 44311

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ISSUED DATE: 3/7/25

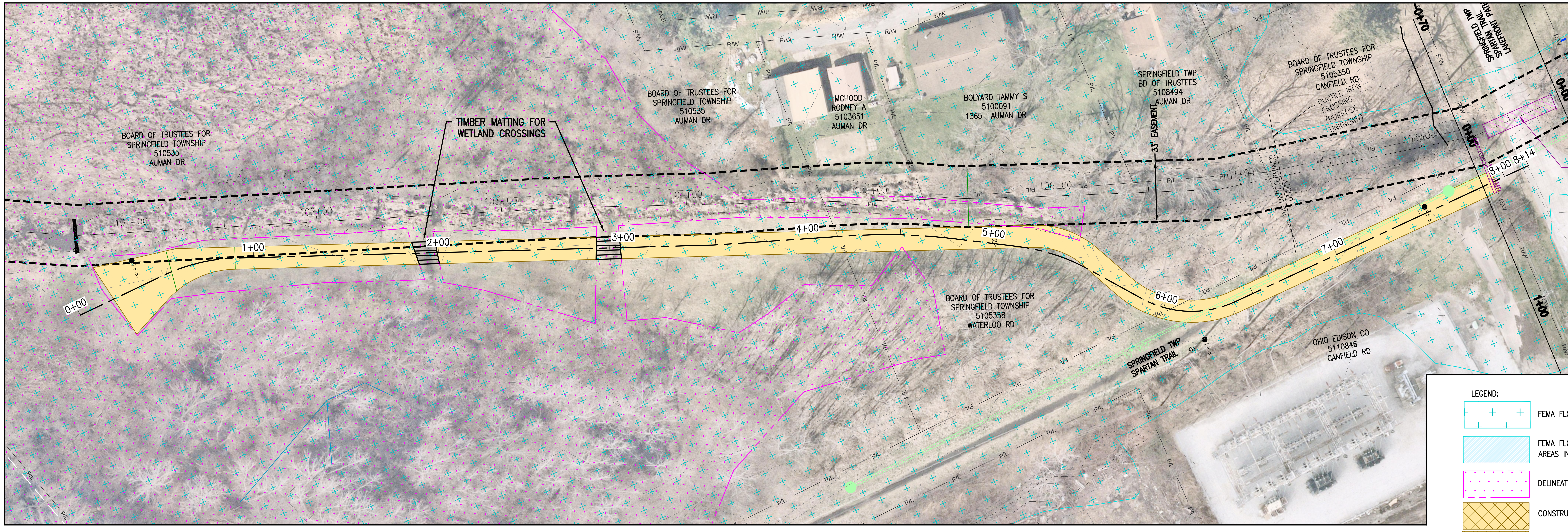
SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

CHANNEL CROSS SECTIONS

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

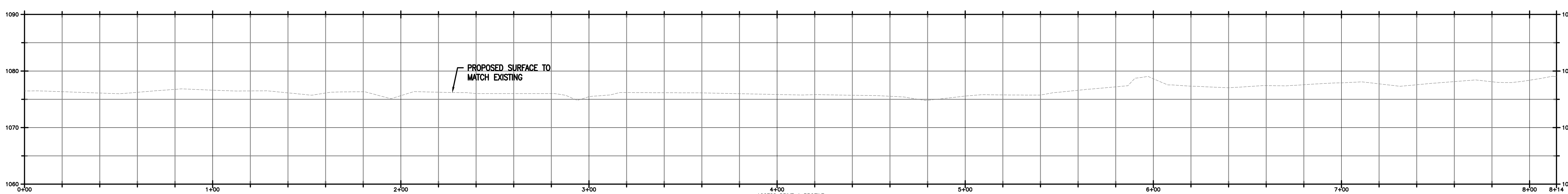
SHEET NO.: C-5.0



LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- FEMA FLOOD PLANE FLOODWAY AREAS IN ZONE "AE"
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
- CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)
- CONSTRUCTION/MAINTENANCE DRIVE
- PRIVATELY OWNED BRIDGE
- PERMANENT EASEMENT
- EXISTING DITCH EASEMENT
- SANITARY PIPE
- STORM PIPE
- FENCE

SEE SPECIFICATIONS FOR ALTERNATE BID ITEM FOR ACCESS DRIVES



0 30' 60'
HORIZONTAL SCALE IN FEET

0 10' 20'
VERTICAL SCALE IN FEET

DLZ

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SUMMIT COUNTY ENGINEER
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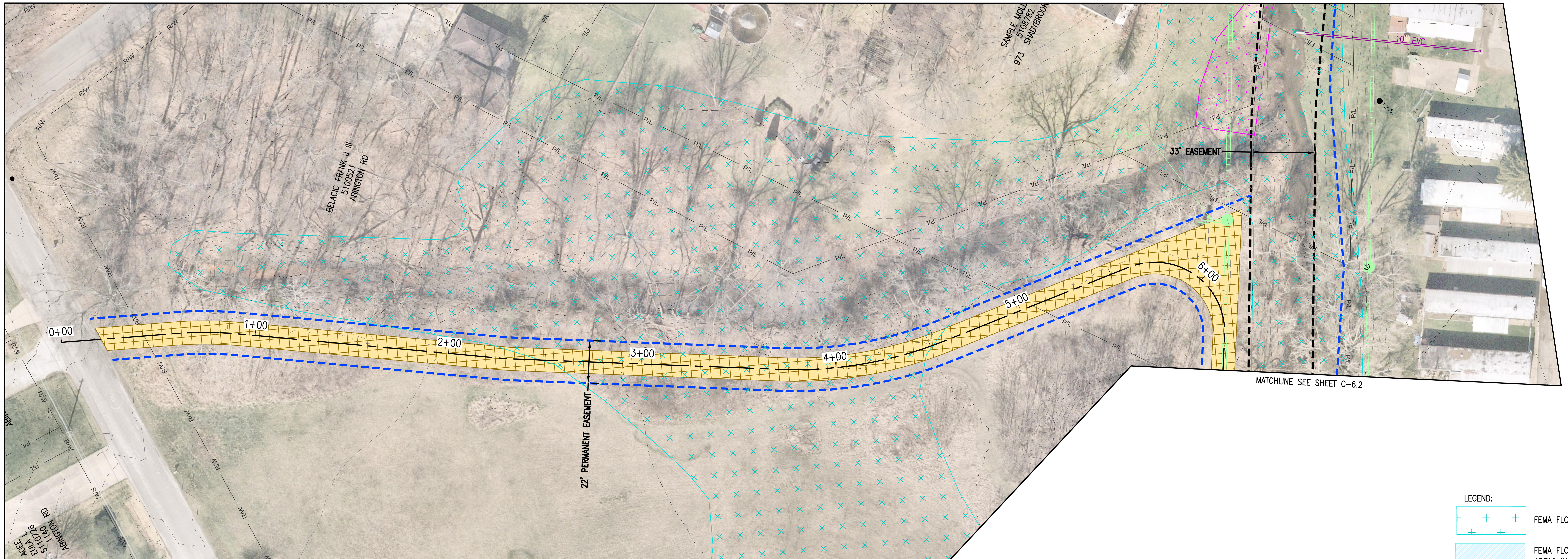
SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

ACCESS DRIVE 1
PLAN & PROFILE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: C-6.0



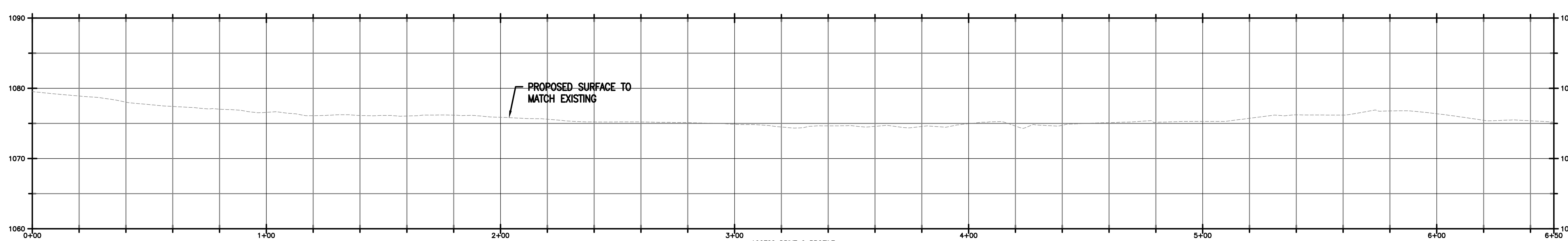
HORIZONTAL SCALE IN FEET (0, 30', 60')

VERTICAL SCALE IN FEET (0, 10', 20')

LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- FEMA FLOOD PLANE FLOODWAY AREAS IN ZONE "AE"
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
- CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)
- CONSTRUCTION/MAINTENANCE DRIVE
- PRIVATELY OWNED BRIDGE
- PERMANENT EASEMENT
- EXISTING DITCH EASEMENT
- SANITARY PIPE
- STORM PIPE
- FENCE

SEE SPECIFICATIONS FOR ALTERNATE BID ITEM FOR ACCESS DRIVES



REV NO	DATE	ISSUED BY	REMARKS

ALAN BRUBAKER, P.E., P.S.
SUMMIT COUNTY ENGINEER
538 E. SOUTH STREET
AKRON, OH 44311

DESIGNED BY: PAN
DRAWN BY: PAN
SHEET CHK'D BY: MSE
CROSS CHK'D BY: KDR
APPROVED BY: MSE
ISSUED DATE: 3/7/25

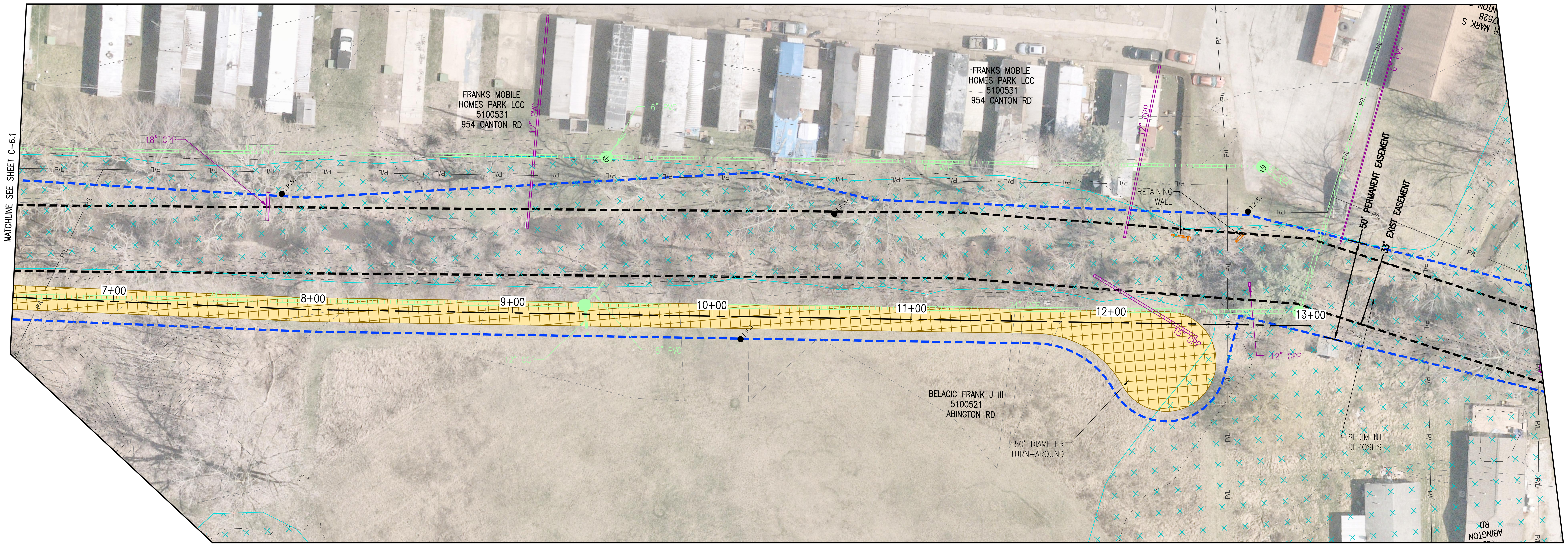
SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

ACCESS DRIVE 2-1
PLAN & PROFILE

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

SHEET NO.: C-6.1



LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- FEMA FLOOD PLANE FLOODWAY AREAS IN ZONE "AE"
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
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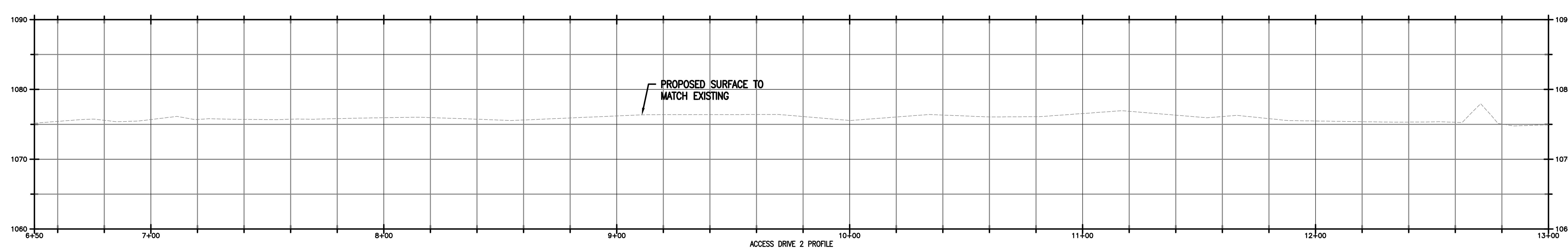
- STORM PIPE
- FENCE

SEE SPECIFICATIONS FOR ALTERNATE BID ITEM FOR ACCESS DRIVES

0 30' 60'
HORIZONTAL SCALE IN FEET

0 10' 20'
VERTICAL SCALE IN FEET



DLZ

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SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

ACCESS DRIVE 2-2
PLAN & PROFILE

WARNING
0 1/2 1
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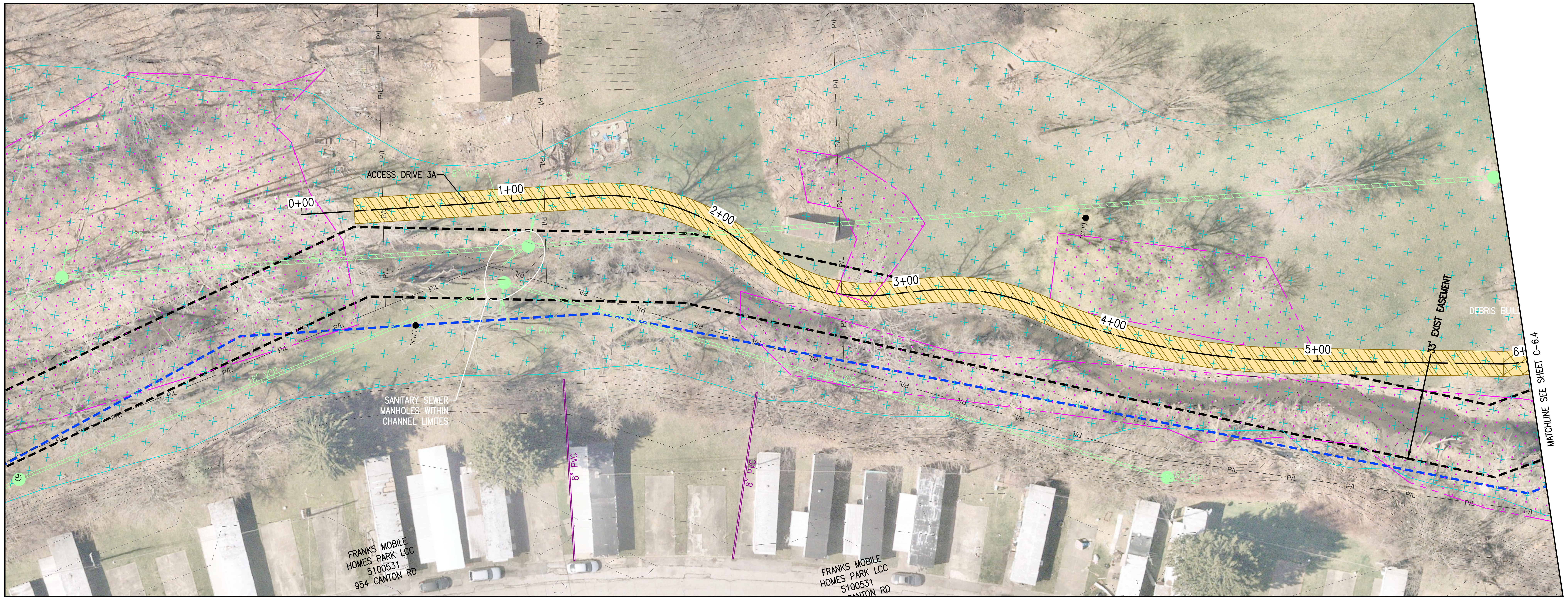
SHEET NO.: C-6.2



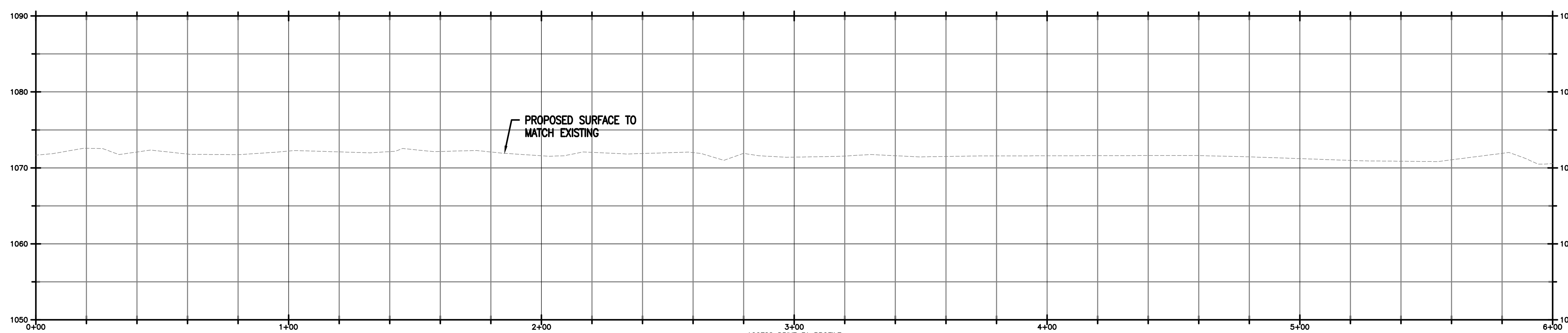
LEGEND:

- FEMA FLOOD PLANE ZONE 'A'
- FEMA FLOOD PLANE FLOODWAY AREAS IN ZONE "AE"
- DELINEATED WETLANDS
- CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)
- CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)
- CONSTRUCTION/MAINTENANCE DRIVE
- PRIVATELY OWNED BRIDGE
- PERMANENT EASEMENT
- EXISTING DITCH EASEMENT
- SANITARY PIPE
- STORM PIPE
- FENCE

SEE SPECIFICATIONS FOR ALTERNATE BID ITEM FOR ACCESS DRIVES

0 30' 60'
HORIZONTAL SCALE IN FEET

0 10' 20'
VERTICAL SCALE IN FEET



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SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

ACCESS DRIVE 3-1
PLAN & PROFILE

WARNING
0 1/2 1
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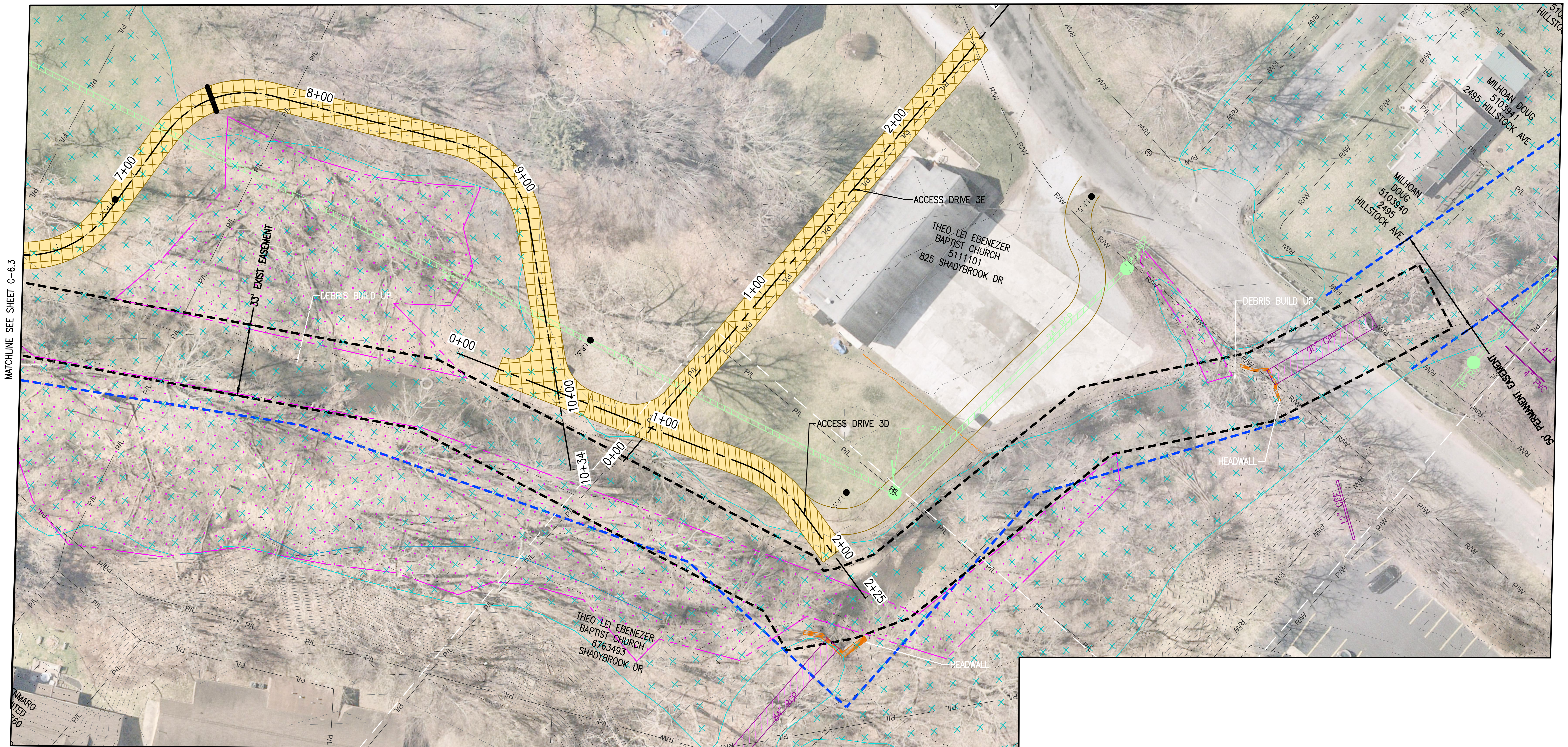
SHEET NO.: C-6.3



LEGEND:

FEMA FLOOD PLANE ZONE 'A'

FEMA FLOOD PLANE FLOODWAY AREAS IN ZONE "AE"

DELINEATED WETLANDS

CONSTRUCTION/MAINTENANCE DRIVE (GRAVEL)

CONSTRUCTION/MAINTENANCE DRIVE (GRASS PAVERS)

CONSTRUCTION/MAINTENANCE DRIVE

PRIVATELY OWNED BRIDGE

PERMANENT EASEMENT

EXISTING DITCH EASEMENT

SANITARY PIPE

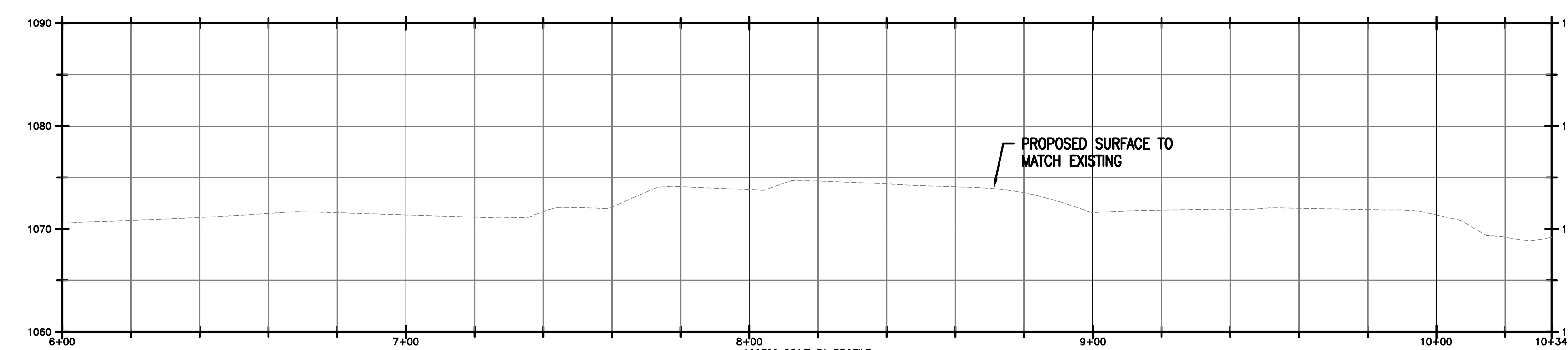
STORM PIPE

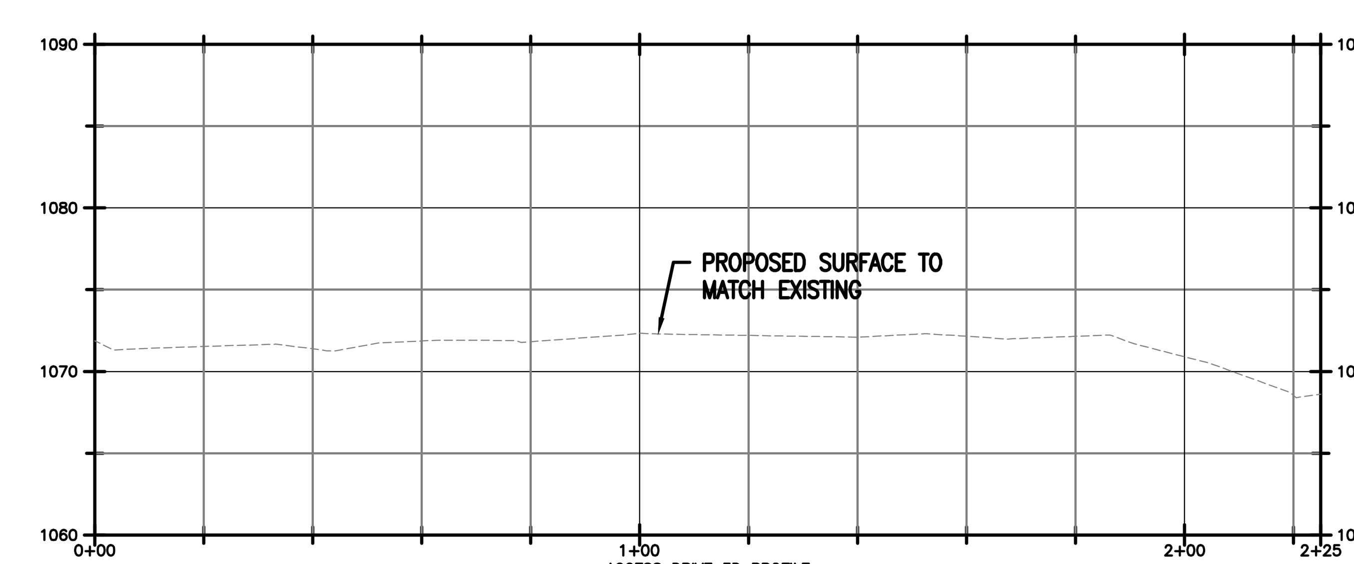
FENCE

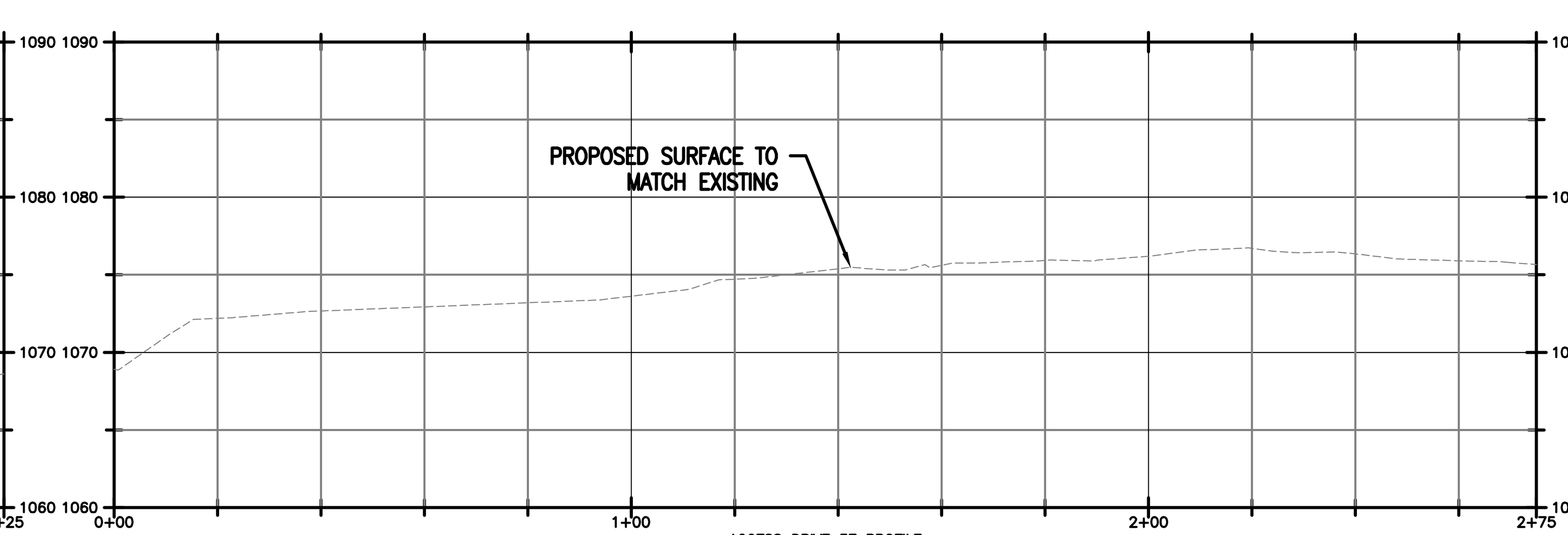
SEE SPECIFICATIONS FOR ALTERNATE BID ITEM FOR ACCESS DRIVES

0 30' 60'
HORIZONTAL SCALE IN FEET

0 10' 20'
VERTICAL SCALE IN FEET







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SURFACE WATER MANAGEMENT DISTRICT HUC 12-041100020303

SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

ACCESS DRIVE 3-2
PLAN & PROFILE

WARNING
0 1/2 1
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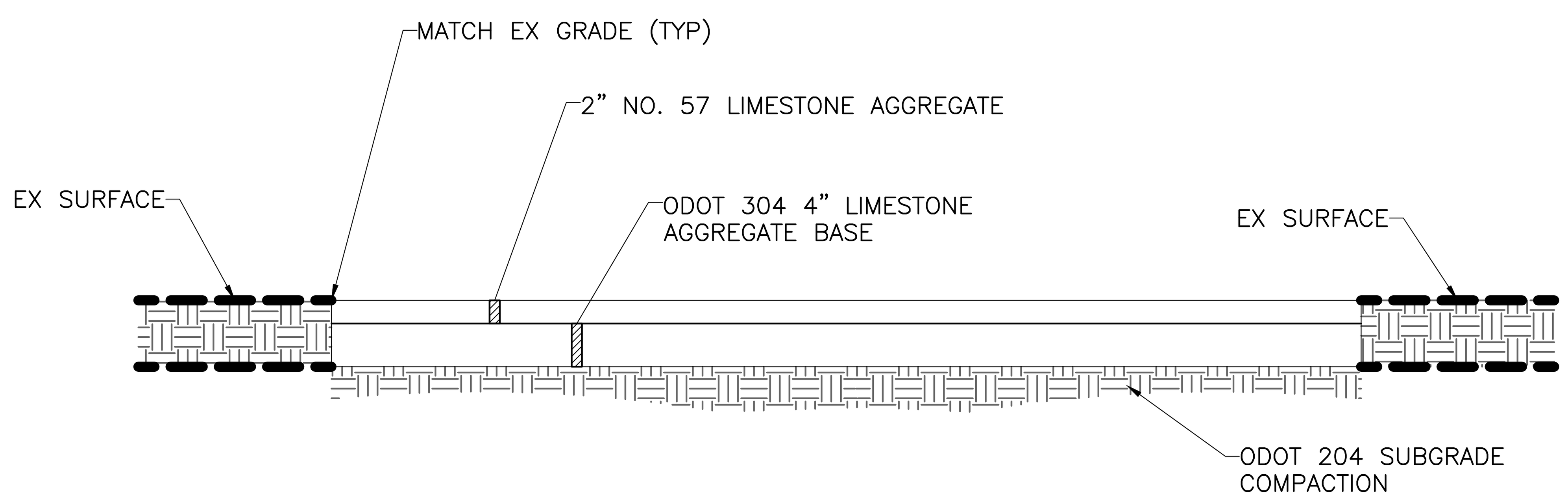
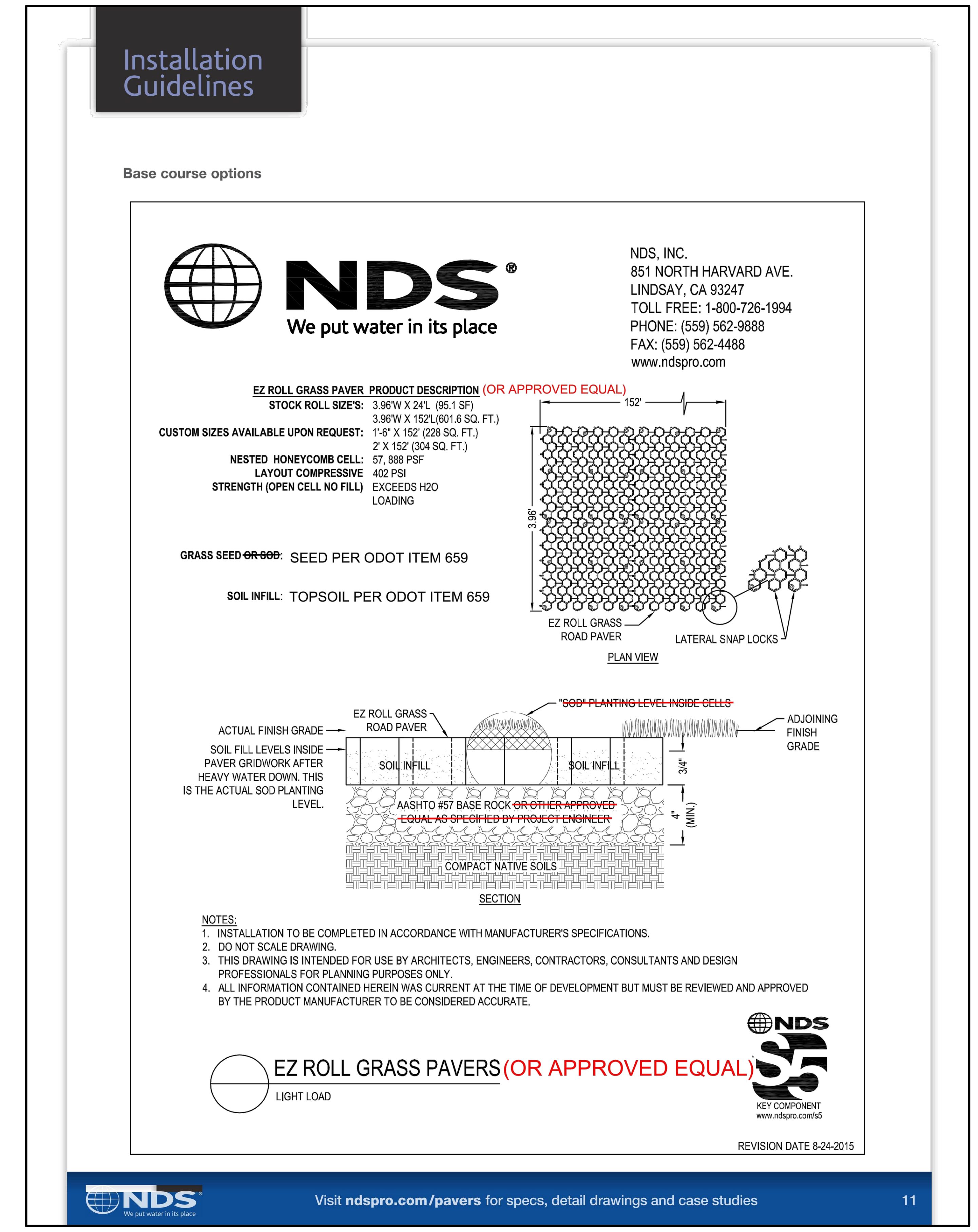
SHEET NO.:
C-6.4



CONSTRUCTION MAINTENANCE/ACCESS DRIVE
NOT TO SCALE



Installation Guidelines

Base course options

NDS®
We put water in its place

NDS, INC.
851 NORTH HARVARD AVE.
LINDSAY, CA 93247
TOLL FREE: 1-800-726-1994
PHONE: (559) 562-9888
FAX: (559) 562-4488
www.ndspro.com

EZ ROLL GRASS PAVER PRODUCT DESCRIPTION (OR APPROVED EQUAL)

STOCK ROLL SIZE'S:	3.96'W X 24'L (95.1 SF)
	3.96'W X 152'L(601.6 SQ. FT.)
CUSTOM SIZES AVAILABLE UPON REQUEST:	1'-6" X 152' (228 SQ. FT.)
	2' X 152' (304 SQ. FT.)
NESTED HONEYCOMB CELL:	57, 888 PSF
LAYOUT COMPRESSIVE	402 PSI
STRENGTH (OPEN CELL NO FILL)	EXCEEDS H2O LOADING

GRASS SEED ~~OR SOD~~: SEED PER ODOT ITEM 659

SOIL INFILL: TOPSOIL PER ODOT ITEM 659

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWING.
3. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY.
4. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.

EZ ROLL GRASS PAVERS (OR APPROVED EQUAL)
LIGHT LOAD

NDS S5 KEY COMPONENT www.ndspro.com/s5

REVISION DATE 8-24-2015

Visit **ndspro.com/pavers** for specs, detail drawings and case studies 11

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SPRINGFIELD LAKE CHANNEL CHANNEL RESTORATION
PRELIMINARY PLANS

PAVEMENT DETAILS

WARNING
0 1/2 1
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SHEET NO.: C-6.5