ADDENDUM No. 1

ITB No. 4736

GALLUP PARK VEHICLE AND PEDESTRIAN BRIDGE

Bids Due: Friday, August 25, 2023 11:00AM (Local Time)

The information contained herein shall take precedence over the original documents and all previous addenda (if any), and is appended thereto. **This Addendum includes eighty four (84) pages.**

Bidder is to acknowledge receipt of this Addendum No. 1, including all attachments (if any) in its Bid by so indicating on page ITB-1 of the Invitation to Bid Form. Bids submitted without acknowledgment of receipt of this addendum may be considered nonconforming.

The following forms provided within the ITB document must be included in submitted bids:

- **City of Ann Arbor Prevailing Wage Declaration of Compliance**
- **City of Ann Arbor Living Wage Ordinance Declaration of Compliance**
- **Vendor Conflict of Interest Disclosure Form**
- **City of Ann Arbor Non-Discrimination Ordinance Declaration of Compliance**

Bids that fail to provide these forms listed above upon bid opening may be rejected as non-responsive and mayl not be considered for award.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the Bid document which are outlined below are referenced to a page or Section in which they appear conspicuously. The Bidder is to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Section/Page(s)	Change
BF-1	As provided in ITB No. 4736 Bid Document: Bid Form, Section 1 – Schedule of Prices as Page BF-1 As updated herein: Bid Form, Section 1 – To include the following additional pay items: Item No. 2080042; Erosion Control, Turbidity Curtain, Deep XXX Ft Item No. 7040007; Cofferdam, 1 LSUM Item No. 8127051; Maintaining River Traffic Item No. 8240001; Contractor Staking, 1 LSUM

Comment: The intent with this change is to add in the additional pay items to agree with the contract plans.

ARPA CONTRACT ADDENDUM

Signatures were removed from the ARPA Contract Addendum on page "ARPA Addendum-12"

DETAILED SPECIFICATIONS

Added "Special Provision for Maintaining River Traffic"

Added "Special Provision for Temporary Detectable Warning Surface"

Comment: To clarify requirements for maintaining river traffic during construction and to clarify the pay item "Temporary Detectable Warning Surface.

PROJECT PLANS

Sheet 28 of 55: Added the following pay items:

- Cofferdam; 1 LSUM
- Erosion Control, Turbidity Curtain, Deep; 380 Ft
- Contractor Staking; 1 LSUM

Sheet 32 of 55: Added notes that clarify:

- Galvanizing the CIP Piles at center pier
- CIP Pile Points per MDOT BDG 8.21.03
- Contractor utilizing soft digging techniques for utilities.

II. QUESTIONS AND ANSWERS

The following Questions have been received by the City. Responses are being provided in accordance with the terms of the ITB. Bidders are directed to take note in their review of the documents of the following questions and City responses as they affect work or details in other areas not specifically referenced here.

Question 1: Will the geotechnical report be provided to bidders?
Answer 1: Yes, the geotechnical report is included in Addendum #1.

Question 2: What is the area of impact of construction that was submitted with the EGLE permit?
Answer 2: 7,300 square feet. The EGLE Joint Permit application is included in Addendum #1.

Question 3: Will the existing bridge plans be made available to bidders?
Answer 3: Yes, the original plans for the existing timber vehicle bridge are included in Addendum #1.

Question 4: Does the existing timber bridge contain asbestos, lead, or creosote?
Answer 4: No, it does not contain any of the items listed above.

Question 5: Will the chain link fence on the existing timber bridge be salvaged and retained?
Answer 5: No, the City does not desire to keep the existing chain link fence.

Question 6: Are there any known issues related to migratory birds?
Answer 6: None per the preapplication letter or related information.

Question 7: Are there any special safety requirements for the contractor to be aware of?
Answer 7: A site specific safety plan will be submitted to review prior to commencing work. Specifications include provisions for specific safety submittals.

Question 8: What is the intent of pre-boring the piles?
Answer 8: Preboring of piles is required at those locations where proximity of piles to existing utilities is felt to be critical. Preboring below the inverts will be required at those areas.

Question 9: No item on the bid form for cofferdams exists. How are we expected to price this? Will this be added to the bid form as an addendum?
Answer 9: The pay item, "Cofferdam" has been added to the bid form as part of Addendum #1. This pay item has also been added to the Misc. Quantities box on Sheet 28 of 55.

Question 10: No item on the bid form for a turbidity curtain exists. How are we expected to price this? Will this be added to the bid form as an addendum?
Answer 10: The pay item, "Turbidity Curtain, Deep" has been added to the bid form as part of Addendum #1. This pay item has also been added to the Misc. Quantities box on Sheet 28 of 55.

Question 11: There is a bid item "Pile, Galv" which is a lump sum item, but the piles to receive this treatment and the limits on each pile are not defined. Can the locations and limits of the galvanizing of the piles be clarified?
Answer 11: The galvanized piles are to be the 16-inch diameter piles at the pier only. The limits of galvanizing are to be from pile cut-off elevation to bottom of river (+/- El 739.0)

Question 12: What item are we to include the costs for the ice breaker shown on plan sheet 32?
Answer 12: The cost for the angle called for in the detail as well as its installation is to be included in the cost of "Piles, CIP Conc, Furn and Driven, 16 inch.

Question 13: Can an excel version of the Schedule of Prices (Bid Form, Section 1) be provided, this will be helpful when we are writing in our bid prices.
Answer 13: Yes, an excel file of the Schedule of Prices can be requested by emailing Hillary Hanzel at hhanzel@a2gov.org. However, the City takes no responsibility for the accuracy of this file and it shall be used at the bidders' discretion. Bidders are responsible for the accuracy of the bid form that they submit.

Question 14: There was no special provision provided in the documents for following items, can a special provision be provided for these? Temporary Detectable Warning Surface and Timber Walkway.
Answer 14: A special provision has been added to Addendum #1 for the pay item 8127010 - _ Temporary Detectable Warning Surface. For the timber walkway, Sheet 51 of 55 provides information necessary for this pay item. Since MDOT pay item numbers are used, and there is no standard pay item number for Timber Walkway, a "7000" number was used.

Question 15: Will a copy of the EGLE permit be available via addendum or issued prior to the deadline?

Answer 15: The EGLE permit is in the review process and will be available prior to award by the City. The City has already performed a mussel survey and relocation and anticipates receiving the permit prior to award.

Question 16: Does the EGLE permit any work within the water way to stage construction equipment to reach the pier?

Answer 16: The EGLE permit is in the review process and will be available prior to award by the city.

Question 17: There is typically disturbance to river bottom when driving pile bents. Will there be any allowance for a cofferdam to install the new piles? Will there be any allowance for the removal of the existing pile bents?

Answer 17: Cofferdams have been shown at the abutments with turbidity curtains at all three substructure units. The removal of existing timber pile bents are included in the pay item “Structure, Rem”.

Question 18: There was no detail for a pile point for the CIP piles, is there a particular pile point desired for these piles?

Answer 18: Pile point for CIP piles are to be per MDOT BDG 8.21.03

Question 19: There appears to be 2-12” sewer lines and 1 underground electric line in the location of the cofferdams. Is there any information available related to the depth of these lines so we can consider this in our bid?

Answer 19: Information (via the subsurface utility engineering “SUE” investigation) will be provided as part of Addendum #1.

Question 20: Is the contractor responsible for quality control and surveying, or will this be provided by the owner?

Answer 20: Contractor is responsible for quality control per the specifications. City will provide third-party testing services. A pay item has been added to the bid form for contractor staking (MDOT Pay Item No. 8240001).

Question 21: The unit of measurement for pay item “2010045 Masonry & Conc Structure, Rem” for the removal of the existing cobblestone & timber fence/wall differs where the plans which call for 44 FT of removal and the bid form which calls for 44 CYD of removal. Which is correct?

Answer 21: The bid form showing 44 CYD of removal is correct.

Question 22: Will the sign-in sheet and agenda from the pre-bid meeting be made available?

Answer 22: The pre-bid meeting sign-in sheet and agenda are included in Addendum #1.

Bidders are responsible for any conclusions that they may draw from the information contained in the Addendum.

CITY OF ANN ARBOR PARKS AND RECREATION SERVICES
ITB #4736 GALLUP PARK VEHICLE AND PEDESTRIAN BRIDGE
PRE-BID MEETING
AUGUST 10, 2023 @ 1:00 OM

AGENDA

I. Introductions
   a. Hillary Hanzel, City of Ann Arbor Parks & Recreation Project Manager
   b. Bob Breen, Wade Trim, Design Engineers and Construction Oversight
   c. Deb Axelrood, SmithGroup, Site Design
   d. Joe Anderson, Gallup Park Canoe Livery Manager
   e. Jason Nealis, City of Ann Arbor Park Operations Supervisors
   f. Doug Forsyth, City of Ann Arbor Safety Manager
   g. Sign-In Sheet

II. Administrative
   a. **Bid submittal** – Include all required bonds and forms, including responses to Responsible Contractor Policy questions.
   b. Will award to lowest responsible bidder.
   c. There is a bid alternate for rip rap.
   d. **Project has federal funds from the American Rescue Plan Act (ARPA).** It does not require Davis Bacon but contractors must follow the City's Prevailing Wage Policy.
   e. **Prevailing Wage –** Contractors will be required to submit weekly certified payrolls and wage rate interviews will be conducted at least twice throughout the project. Wage determination that will be used on the project is included in the ITB.

III. Schedule
   a. Email questions are due on or before **Friday, August 11, 2023 3:00pm**
      i. Scope of Work/ITB Content questions shall be e-mailed to Bob Breen and Hillary Hanzel
      ii. Bid Process and Compliance questions shall be e-mailed to Colin Spencer, Purchasing Manager
   a. Addendum, **week of August 14th**
   b. Bids due, **Friday, August 25, 2023 11:00AM** (Local Time)
   c. Selected Contractor notification by **September 6, 2023**
   d. City Council Award, anticipated **October 2, 2023**
   e. Construction Notice to Proceed anticipated **mid-October, 2023**
   f. Substantial Completion by **May 15, 2024** (bridge and relocated road approaches open to traffic)
   g. Final Completion by **June 28, 2024** (including existing bridge removal)

CITY OF ANN ARBOR PARKS AND RECREATION SERVICES
ITB #4736 GALLUP PARK VEHICLE AND PEDESTRIAN BRIDGE
PRE-BID MEETING
AUGUST 10, 2023 @ 1:00 OM

IV. Project Description

a. Construction of a new pre-stressed concrete bridge adjacent to existing bridge.
b. Removal of existing wooden vehicle bridge once new bridge is constructed.
c. Maintenance of Traffic – MOT Plans are included and show that both vehicle and pedestrian traffic is to be maintained on the existing bridge until the new bridge is constructed. River traffic is also expected to be maintained during construction, with a possible exception for short closures.
d. Site Access – Staging areas are shown on MOT plans.
    i. All equipment in through the main park entrance off Fuller Rd.
e. Temporary trail detour route
f. Memorial grove – minimize tree impacts
g. Permits
    i. MDEQ Joint Permit – City has applied and anticipates receiving it in the next 30 days.
    ii. City SESC Permit – No Fee
h. Hours of work: 7:00 a.m. to 8:00 p.m. Monday thru Friday. Saturday work requires written approval in advance.
i. Geotech report and SUE report will be made available to the awarded contractor.
j. Liquidated Damages - $500/calendar day.

V. Questions

VI. Site Visit

Contact Information:
Hillary Hanzel, Park Planner & Landscape Architect
The City of Ann Arbor Parks and Recreation Services
Phone: (734) 794-6230 ext. 42548
E-mail: hhanzel@a2gov.org

SIGN-IN SHEET

ITB #4736

Project: Gallup Park Vehicle & Pedestrian Bridge Job No.: ANN2040-02T

Note: Please Print Purpose: Pre-Bid Meeting Date/Time: 08/10/2023 - 1:00 PM

Initial	Name/Title	Company	Address	E-Mail	Telephone
	Bob Breen, PM	WADE TRIM	25251 NORTHLINE, 48180	rbreen@wadetrim.com	734 947-2675
	Hillary Hanzel	City of A2		hhanzel@A2GOV.ORG	
	Tyler Bassinger	FH Paschen		tbassinger@fhpaschen.com	313-460-2402
	Aziz Atiyeh	FH Paschen		aatiyeh@fhpaschen.com	248 2553206
	Anthony Hudson	FH Paschen		ahudson@fhpaschen.com	313-909-0873
	Zach Deur PM	Anlaan		zachdeur@anlaan.com	616-498-8066
	Jim Werner Asst. PM	Davis Cons.		Jim@davisconstruction.us	517-899-8170
	Jason Nealis	City of A2		jnealis@a2gov.org	
	Doug Forsyth	City of A2		dforsyth@a2gov.org	
	Ben Edwards	C.A. Hull		bedwards@cahull.com	810-358-0225
	DEB ANKEROOT	SMITHGROUP		DEB.ANKEROOT@SMITHGROUP.COM	734-669-7116
	KEVIN ANDERSON	Z CONTRACTORS		Kanderson@Z-Contractors.com	586-625-6895

WADE TRIM

BID FORM

Section 1 - Schedule of Prices

Company:_____

Project: ITB #4736 Gallup Park Vehicle and Pedestrian Bridge								
UNIT PRICE BID -								
Item No.	**Primary Description**	**Supplemental Description**		**Estimated Quantity**		**Unit Price**		**Total Price**
1100001	Mobilization, Max		LSUM	1	$		$	-
2010001	Clearing		Acre	0.1	$		$	-
2020004	Tree, Rem, 6 inch to 18 inch		Ea	10	$		$	-
2020008	Stump, Rem, 6 inch to 18 inch		Ea	10	$		$	-
2040020	Curb and Gutter, Rem		Ft	190	$		$	-
2040025	Fence, Rem		Ft	73	$		$	-
2040045	Masonry and Conc Structure, Rem		Cyd	44	$		$	-
2040050	Pavt, Rem		Syd	1330	$		$	-
2040055	Sidewalk, Rem		Syd	1080	$		$	-
2080016	Erosion Control, Gravel Access Approach		Ea	2	$		$	-
2080020	Erosion Control, Inlet Protection, Fabric Drop		Ea	2	$		$	-
2080036	Erosion Control, Silt Fence		Ft	1330	$		$	-
3020016	Aggregate Base, 6 inch		Syd	975	$		$	-
3020020	Aggregate Base, 8 inch		Syd	48	$		$	-
3020026	Aggregate Base, 10 inch		Syd	762	$		$	-
3060010	Aggregate Surface Cse, 6 inch		Syd	232	$		$	-
4010012	Culv End Sect, 12 inch		Ea	1	$		$	-
4020987	Sewer, Cl IV, 12 inch, Tr Det B		Ft	125	$		$	-
4030040	Dr Structure Cover, Type G		Ea	2	$		$	-
4030210	Dr Structure, 48 inch dia		Ea	2	$		$	-
5012013	HMA, 3EML		Ton	123	$		$	-
5012025	HMA, 4EML		Ton	63	$		$	-
5012037	HMA, 5EML		Ton	93	$		$	-
6020100	Conc Pavt, Nonreinf, 6 inch		Syd	48	$		$	-
6027001	_	Straight Curb, Conc, 18 inch wide	Ft	128	$		$	-
8020038	Curb and Gutter, Conc, Det F4		Ft	107	$		$	-
8030010	Detectable Warning Surface		Ft	32	$		$	-
8030046	Sidewalk, Conc, 6 inch		Sft	6447	$			-
8087050	_	Tree Protection Fence, 4 foot Ht.	Ft	23	$		$	-
8100405	Sign, Type IIIB		Sft	8	$		$	-
8107050	_	Bollard, Wood	Ea	49	$		$	-
8107050	_	Regulatory Sign, Relocate	Ea	5	$		$	-
8107050	_	Memorial Sign, Relocate	Ea	1	$		$	-
8107050	_	Bike Repair Station, Relocate	Ea	1	$		$	-
8107050	_	Border to Border Trail Marker, Relocate	Ea	1	$		$	-
8107050	_	Concrete Wheel Stop, Relocate	Ea	10	$		$	-
8107050	_	Light Pole, Relocate	Ea	2	$		$	-
8107050		Sign, Type R1-6 (Vertical Delineator)	Ea	4	$		$	-

Item No.	Primary Description	Supplemental Description		Estimated Quantity		Unit Price			Total Price
8110110	Pavt Mrkg, Polyurea, 12 inch, Crosswalk		Ft	50	$			$	-
8120012	Barricade, Type III,High Intensity, Double Sided, Lighted, Furn		Ea	10	$			$	-
8120026	Pedestrian Type II Barricade, Temp		Ea	6	$			$	-
8120027	Pedestrian Type II channelizer, Temp		Ft	1320	$			$	-
8120170	Minor Traf Devices		LSUM	1	$			$	-
8120252	Plastic Drum, Flourescent, Furn		Ea	30	$			$	-
8120310	Sign Cover		Ea	4	$			$	-
8120350	Sign, Type B,Temp, Prismatic, Furn		Sft	240	$			$	-
8120351	Sign, Type B, Temp, Prismatic, Oper		SFt	240	$			$	-
8120370	Traf Regulor Control		LSUM	1	$			$	-
8122250	Pedestrian Path, Temp		Ft	660	$			$	-
8122251	Pedestrian Ramp, Temp		Ea	2	$			$	-
8127010	_	Temporary Detectable Warning Surface	Sft	4	$			$	-
8127051	_	Maintaining River Traffic	LSUM	1	$			$	-
8157011	_	Seeded Lawn	Syd	3059	$			$	-
8157021	_	Planting Mixture, 12 inch	Cyd	59	$			$	-
8157050	_	Workout Equipment, Relocate	Ea	1	$			$	-
8157050	_	Bench, Relocate	Ea	1	$			$	-
8157050	_	Water Fountain, Relocate	Ea	1	$			$	-
8157050	_	Amelanchier x grandiflora 'Autumn Brilliance, 2 1/2 cal, B&B	Ea	1	$			$	-
8157050	_	Betula populifolia 'Whitespire', 8' ht, B&B	Ea	4	$			$	-
8157050	_	Acer rubrum 'Franksred', 3 cal. B&B	Ea	3	$			$	-
8157050	_	Nyssa sylvatica, 3 cal. B&B	Ea	3	$			$	-
8157050	_	Plantanus x acerifolia 'bloodgood', 3 cal. B&B	Ea	3	$			$	-
8157050	_	Quercus bicolor, 3 cal. B&B	Ea	1	$			$	-
8157050	_	Aronia melanocarpa 'UCONNAM165', 18 spd. Cont	Ea	46	$			$	-
8157050	_	Cornus Sericea 'Baileyi', 24 spd. Cont.	Ea	27	$			$	-
8157050	_	Carex vulpinoidea, No 1 Cont	Ea	65	$			$	-
8157050	_	Iris virginica, No. 1 Cont	Ea	68	$			$	-
8157050	_	Liatris spicata 'Kobold', No. 1 Cont	Ea	40	$			$	-
8157050	_	Penstemon digitalis, No. 1 Cont	Ea	86	$			$	-
8157050	_	Rudbeckia fulgida sullivantii 'Goldstrum', No. 1 Cont	Ea	87	$			$	-
8157050	_	Symphyotrichum novae-angliae 'Purple Dome', No. 1 Cont	Ea	26	$			$	-
8167021	_	Shredded Bark Mulch, 2 inch	Cyd	10	$			$	-
8167021	_	Topsoil	Cyd	340	$			$	-
8240001	Contractor Staking		LSUM	1	$			$	-

Item No.	Primary Description	Supplemental Description		Estimated Quantity		Unit Price			Total Price
2040060	Structures, Rem		LSUM	1	$			$	-
2060002	Backfill, Structure, CIP		Cyd	389	$			$	-
2060010	Excavation, Fdn		Cyd	366	$			$	-
2080042	Erosion Control, Turbidity Curtain, Deep		Ft	380	$			$	-
4040031	Underdrain, Fdn, 4 inch		Ft	292	$			$	-
4040091	Underdrain Outlet, 4 inch		Ft	102	$			$	-
6020208	Joint, Expansion, E3		Ft	73	$			$	-
7040007	Cofferdam		LSUM	1					-
7050001	Prebore, Fdn Piling		Ft	653	$			$	-
7050002	Pile Driving Equipment, Furn		LSUM	1	$			$	-
7050025	Pile Point, CIP Conc		Ea	7	$			$	-
7050026	Pile, CIP Conc, Furn and Driven, 16 inch		Ft	535	$			$	-
7050027	Test Pile, CIP Conc, 16 inch		Ea	1	$			$	-
7050034	Pile, Steel, Furn and Driven, 14 inch		Ft	1560	$			$	-
7050035	Test Pile, Steel, 14 inch		Ea	2	$			$	-
7050038	Pile, Galv		LSUM	1	$			$	-
7050039	Pile Point, Steel		Ea	22	$			$	-
7050050	Pile, Steel, Splice		Ea	29	$			$	-
7060001	Bridge Ltg, Furn and Rem		LSUM	1	$			$	-
7060002	Bridge Ltg, Oper and Maintain		Cyd	228	$			$	-
7060020	Conc, Low Temp Protection		Cyd	536					-
7060040	Elec Grounding System		Ea	1	$			$	-
7060050	Expansion Joint Device		Ft	73	$			$	-
7060051	Expansion Joint Device, Cover Plate		Ft	40	$			$	-
7060060	False Decking		Sft	9925	$			$	-
7060092	Reinforcement, Steel, Epoxy Coated		Lb	88405	$			$	-
7060100	Substructure Conc		Cyd	228	$			$	-
7060110	Superstructure Conc		Cyd	80	$			$	-
7060111	Superstructure Conc, Form, Finish, and Cure		LSUM	1	$			$	-
7060112	Superstructure Conc, Form, Finish, and Cure, Night Casting		LSUM	1	$			$	-
7060113	Superstructure Conc, Night Casting		Cyd	228	$			$	-
7067010	_	Cobblestone Veneer	Sft	1600					-
7067010	_	Stone Cap	Sft	205					-
7070016	Bearing, Elastomeric, 2 inch		Sin	7400	$			$	-
7070053	Steel Diaphragm, Prest Conc Beam, Furn and Fab		Lb	1546	$			$	-

Item No.	Primary Description	Supplemental Description		Estimated Quantity		Unit Price		Total Price
7070054	Steel Diaphragm, Prest Conc Beam, Erect		Lb	1546	$		$	-
7080110	Prest Conc Bulb-Tee Beam, Furn, 36 inch by 49 inch		Ft	707	$		$	-
7080111	Prest Conc Bulb-Tee Beam, Erect, 36 inch by 49 inch		Ft	707	$		$	-
7097010	_	Timber Walkway	Sft	5200	$		$	-
7100003	Joint Waterproofing, Expansion		Sft	105	$		$	-
7100011	Conc Surface Coating		Syd	462	$		$	-
7117001	_	Timber Railing, Pedestrian	Ft	360	$		$	-
7117001	_	Timber Railing, Vehicular	Ft	348	$		$	-
8007051	_	Vibration Monitoring	LSUM	1	$		$	-
						BASE BID SUB-TOTAL	**$**	**-**
OPTION 'A' - RIPRAP CHANNEL PROTECTION								
8137011		Riprap, Spec, Class III	Syd	455	$		$	-
8137021	_	Ledge Stone Bank Reinforcement, 12 inch	Cyd	23	$		$	-
8137021	_	Ledge Stone Bank Reinforcement, 24 inch	Cyd	170	$		$	-
3020002	Aggregate Base, LM		Cyd	231	$		$	-
						Option 'A' Sub-total	$	**-**
OPTION 'B' - RIPRAP CHANNEL PROTECTION								
8137011		Riprap, Spec, Class III	Syd	455	$		$	-
8137021	_	Ledge Stone Bank Reinforcement, 12 inch	Cyd	5	$		$	-
8137021	_	Ledge Stone Bank Reinforcement, 24 inch	Cyd	55	$		$	-
8137031	_	Riprap, Fieldstone, Spec	Ton	300	$		$	-
3020002	Aggregate Base, LM		Cyd	231	$		$	-
						Option 'B' Sub-total	$	**-**
						BASE BID + OPTION 'A' TOTAL BID	**$**	**-**
						BASE BID + OPTION 'B' TOTAL BID	**$**	**-**

on-the-job seat belt policies and programs for its employees when operating company-owned, rented, or personally owned vehicles.

B. *Reducing Text Messaging While Driving*. Pursuant to Executive Order 13513, 74 Fed. Reg. 51,225 (Oct. 6, 2009), the City encourages Contractor to adopt and enforce policies that ban text messaging while driving.

21. Conflicts and Interpretation. To the extent that any portion of this Addendum conflicts with any term or condition of this Contract expressed outside of this Addendum, the terms of this Addendum shall govern.

CITY OF ANN ARBOR

SPECIAL PROVISION
FOR
TEMPORARY DETECTABLE WARNING SURFACE

a. Description.- This work shall consist of furnishing and installing temporary detectable warning units in compliance to the Americans with Disability Act (ADA). All work shall be in accordance with Section 812 of the MDOT 2020 Standard Specifications for Construction, MDOT Standard Detail R-28 Series as indicated on the plans, and as modified herein.

b. Related Documents.- Americans with Disabilities Act (ADA) Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, Section 4.29.2 Detectable Warnings on Walking Surfaces

c. Submittals.- Submit manufacturer's literature describing products, installation procedures and maintenance instructions. Provide temporary detectable surface applications and accessories as produced by a single manufacturer.

Samples for Verification Purposes: Submit two (2) tile samples minimum 6" x 8" of the kind proposed for use. Samples shall be properly labeled and shall contain the following information: Name of Project; Submitted by; Date of Submittal; Manufacture's Name; Catalog No.; and Date of Fabrication.

Material Test Reports: Submit current test reports from a qualified, independent, testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. The required tests listed elsewhere in this Special Provision shall be performed by a certified and qualified independent testing laboratory on a cast-in-place tactile warning system. All test reports submitted shall be certified by the testing laboratory and shall clearly state that all tests were completed within 5 years of the date of the submittal. The manufacturer shall certify in writing that the materials provided to the project are manufactured with the same materials and manufacturing procedures as those used in the materials on which the test were performed.

c. Criteria.- The temporary detectable warning surfaces shall meet the following material properties, dimensions, and tolerances using the most current test methods:

1. Water Absorption: Not to exceed 0.35% when tested in accordance with ASTM-D570

2. Slip Resistance: 0.80 minimum combined wet/ dry static coefficient of friction on top domes and field area, when tested in accordance with ASTM C1028.

3. Compressive Strength: 18,000 psi minimum, when tested in accordance with ASTM D695.

4. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, urine, chewing gum, soap solution, motor oil, bleach, calcium chloride, when tested in accordance with ASTM D543 or D1308.

5. Wear Depth: 300 minimum, when tested in accordance with ASTM C501.

6. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.

7. Gardner Impact: 50 in.-lbs. minimum, when tested in accordance with Geometry "GE" of ASTM D5420.

8. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM-B117 not to show any deterioration or other defects after 100 hours of exposure

b. Materials.- The following are acceptable products for Temporary Detectable Warning Surfaces. If at any time, the surface shows damage, it must be replaced at the Contractor's expense.

- RediMat by Detectable Warning Systems
- Self-Adhesive Truncated Domes Mats for Asphalt or Concrete by ADA Sign Depot

d. Construction Methods.- Installer's Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for this Project.

The contractor shall follow manufacturer specifications for installation.

e. Measurement and Payment.- The completed work as measured for the following pay items will be paid for at the contract unit prices for the following contract items (pay items):

Contract Item (Pay Item)	**Pay Unit**
Temporary Detectable Warning Surface	Square Foot

The unit price for this item shall include all labor, material, and equipment costs required to complete the work.

CITY OF ANN ARBOR
PARKS AND RECREATION DEPARTMENT

SPECIAL PROVISION
FOR
MAINTAINING RIVER TRAFFIC

a. Description. This work shall consist of maintaining recreational river traffic through the proposed construction zone unless given written approval by City in advance. At all times during construction, at least one span shall remain open and unobstructed to boat traffic unless there is a need to close the river to traffic for safety, such as setting beams, demolition of the existing bridge or other safety related work items that preclude river traffic from proceeding through the construction influence area (CIA). Written approval for complete river closure shall be obtained by the contractor from the city, a minimum of 5 days before the specific work begins.

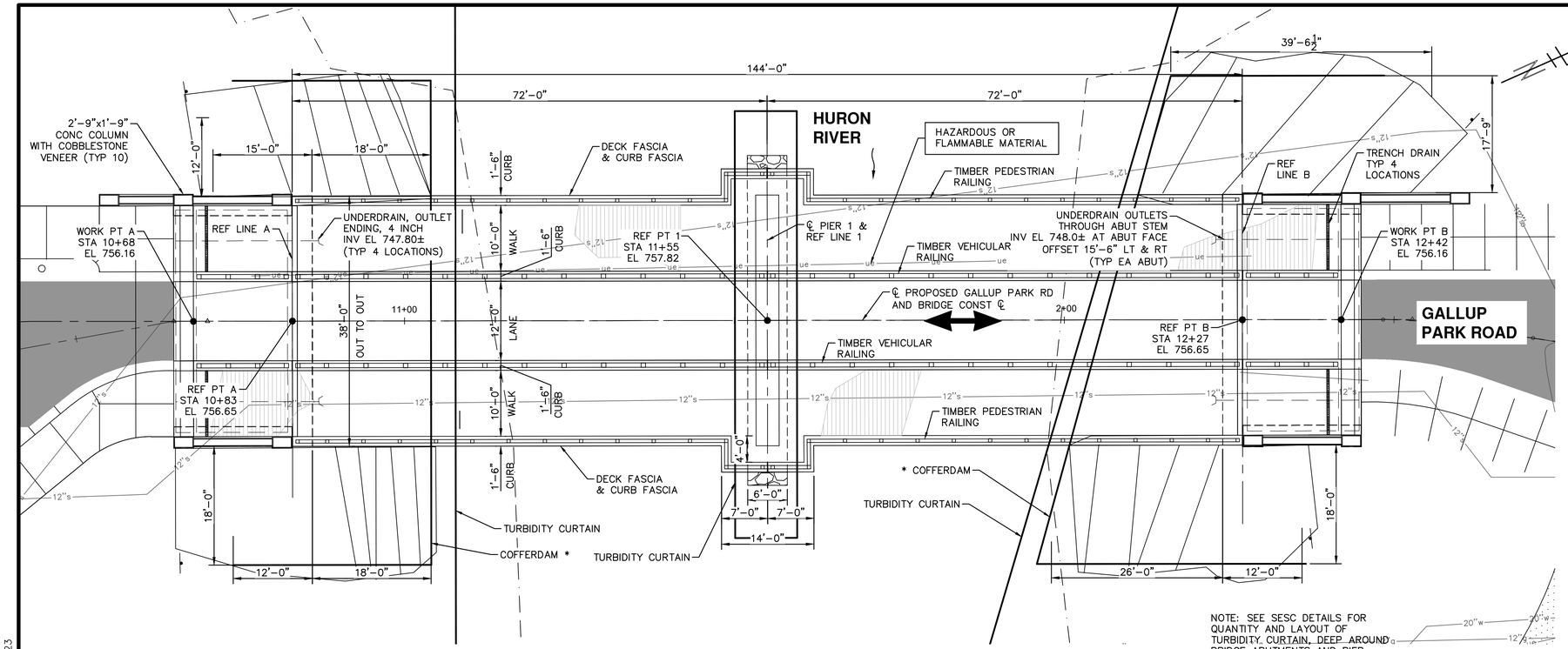
The Contractor shall be responsible for providing necessary signs, arrowboards, floats and other items to adequately route traffic through the area. All signs shall be Type I material with a Type A face, all meeting the requirements of Section 8.26 of the 2020 MDOT Standard Specifications.

All floats or buoys shall have a minimum of 36 inches exposed above the water surface. Buoys shall be similar to Model 1147-R by Roylan Manufacturing Co., or equal. They shall have appropriate signage and taping on them, all in reflectorized material. The Standard Inland Waterway symbol for restricted area shall be placed on each buoy, orange in color, with the wording "KEEP OUT" imprinted on each buoy. All floats and buoys shall be adequately anchored and tied off to each other to prevent them from drifting. Signs shall be securely fastened to the bridge, barges, driven signposts other appurtenances. The Contractor shall be responsible for ensuring the buoys are placed to route traffic to one side or the other of the river or to close the river to through traffic during beam placement or other items of work that may require river closure for safety.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	**Pay Unit**
Maintaining River Traffic	Lump Sum

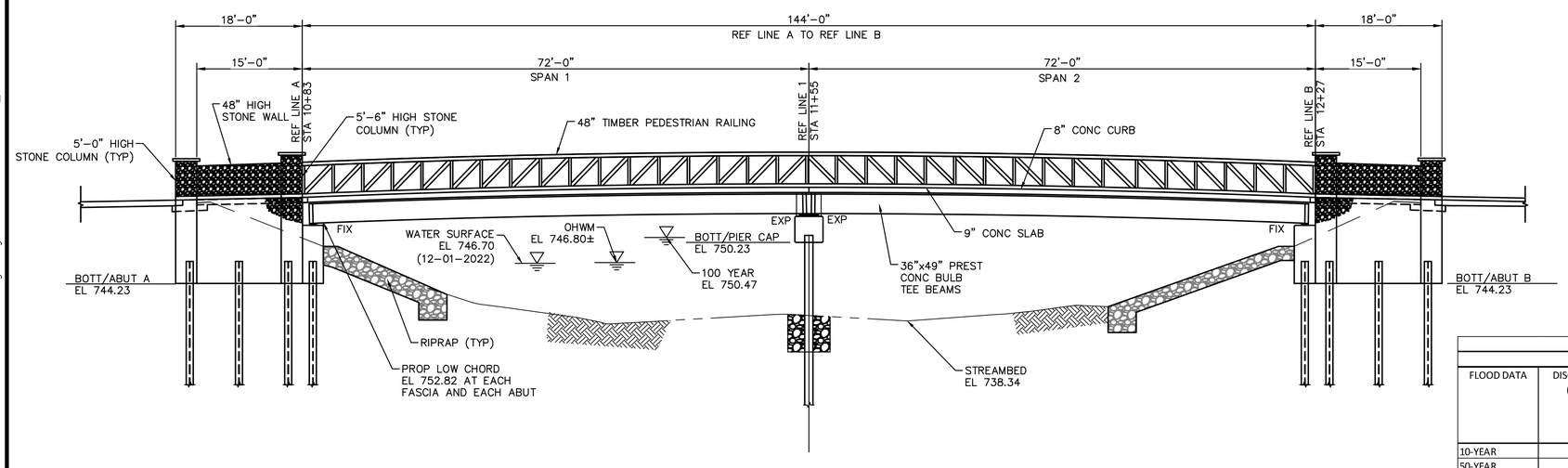
The first 30% of Maintaining River Traffic will be paid for at time of initial installation, the second 40% at time of prestressed beam placement and the final 30% at completion of the project, once all buoys, floats and temporary signs have been removed.



PLAN

NOTE: SEE SESC DETAILS FOR QUANTITY AND LAYOUT OF TURBIDITY CURTAIN, DEEP AROUND BRIDGE ABUTMENTS AND PIER.

* COFFERDAM NOTE:
THE INTENT OF THE COFFERDAM FOR THIS PROJECT IS TO UTILIZE TEMPORARY STEEL SHEET PILING OR SOME OTHER APPROVED WATER DIVERSION METHOD. IF AN ALTERNATIVE MEANS OF WATER DIVERSION IS PROPOSED, IT SHALL BE SUBMITTED FOR APPROVAL PRIOR TO INSTALLING THE COFFERDAM. MEASURES SHALL BE TAKEN TO NOT DISTURB THE EXISTING UNDERGROUND UTILITIES THAT WILL NOT BE RELOCATED. COFFERDAMS SHALL BE PAID ON A LUMP SUM BASIS REGARDLESS OF ACTUAL SIZE AND TYPE USED BY CONTRACTOR TO MEET CONSTRUCTION REQUIREMENTS.



ELEVATION
NORMAL TO REF LINES

WORK THIS SHEET WITH SHEET 17 FOR LIMITS AND TYPE OF RIPRAP

MISCELLANEOUS QUANTITIES

ITEM	QUANTITY	UNIT
Structures, Rem	1	LSUM
Excavation, Fdn	366	Cyd
Backfill, Structure, CIP	389	Cyd
False Decking	9925	Sft
Conc Surface Coating	462	Syd
Underdrain, Fdn, 4 inch	292	Ft
Underdrain Outlet, 4 inch	102	Ft
Vibration Monitoring	1	LSUM
Conc, Low Temperature Protection	536	Cyd
Cofferdam	1	LSUM
Erosion Control, Turbidity Curtain, Deep	380	Ft
Contractor Staking	1	LSUM
Maintaining River Traffic	1	LSUM

RIPRAP CHANNEL PROTECTION QUANTITIES

	OPTION A QUANTITY	OPTION B QUANTITY	UNIT
Riprap, Spec, Class III	455	455	Syd
Riprap, Fieldstone, Spec		300	Ton
Ledge Stone Bank Reinforcement, 12 inch	23	5	Cyd
Ledge Stone Bank Reinforcement, 24 inch	170	55	Cyd
Aggregate Base, LM	231	231	Cyd

OPTION A QUANTITY NOTE
RIPRAP, SPEC, CLASS III PLACED FROM ABUTMENT FACE TO TOE HEADER AND FROM DECK FASCIA TO DECK FASCIA UNDER THE BRIDGE AND AROUND PIER PILES. LEDGE STONE BANK REINFORCEMENT IS PLACED AT EACH QUADRANT PER THE DIMENSIONS SHOWN IN THE PLAN.

OPTION B RIPRAP QUANTITY NOTE
RIPRAP, SPEC, CLASS III PLACED FROM ABUTMENT FACE TO TOE HEADER AND FROM DECK FASCIA TO DECK FASCIA UNDER THE BRIDGE AND AROUND PIER PILES TO THE DIMENSIONS SHOWN IN THE PLAN. LEDGE STONE BANK REINFORCEMENT IS PLACED AT THE NORTHWEST QUADRANT ONLY PER THE DIMENSIONS SHOWN ON THE PLAN. RIPRAP, FIELDSTONE SPEC IS PLACED AT THE SOUTHWEST, SOUTHEAST AND NORTHEAST QUADRANTS PER THE DIMENSIONS SHOWN IN THE PLAN.

NOTES

THE DESIGN OF THIS STRUCTURE IS BASED ON THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING. LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE DEFLECTION DOES NOT EXCEED 1/1000 OF SPAN LENGTH.

THE DESIGN OF THE DECK SLAB IS BASED UP ON THE STRIP METHOD AS DEFINED IN THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION, UTILIZING HL-93 LOADING.

WITHOUT THE PREVENTIVE MEASURES SHOWN ON THESE PLANS, THERE IS A POSSIBILITY THAT STREAMBED SCOUR MAY OCCUR. AT ABUTMENT A (SOUTH), THE ESTIMATED CONTRACTION SCOUR DEPTH IS CALCULATED TO BE 2 FEET (EL 736.00) AND TOTAL SCOUR OF 6 FEET (EL 732.00). AT ABUTMENT B (NORTH) CONTRACTION SCOUR DEPTH OF 2 FEET (EL 736.00) AND TOTAL SCOUR DEPTH OF 4 FT (EL 734.00). AT PIER 1, THE ESTIMATED CONTRACTION SCOUR IS CALCULATED TO BE 2 FEET (EL 736.00) AND TOTAL SCOUR DEPTH OF 6 FEET (EL 732.00). THESE DEPTHS ARE BASED ON A 100 YEAR RUNOFF EVENT. THESE DEPTHS ARE BASED ON A 100 YEAR RUNOFF EVENT.

GEOTEXTILE LINER SHALL BE PLACED ON ALL SLOPES PRIOR TO PLACING RIPRAP. PAYMENT FOR GEOTEXTILE LINER SHALL BE INCLUDED IN PAYMENT FOR RIPRAP.

THE RIPRAP QUANTITY IS BASED ON THE LATERAL DIMENSIONS OF THE AREA TO BE PROTECTED, REGARDLESS OF THE NUMBER OF LAYERS REQUIRED. THE ESTIMATED WEIGHT OF RIPRAP, SPEC, CLASS III IS 736 TONS (OPTION A & OPTION B). LEDGE STONE BANK REINFORCEMENT, 12 INCH IS 50 TONS (OPTION A) OR 11 TONS (OPTION B). LEDGE STONE BANK REINFORCEMENT, 24 INCH IS 368 TONS (OPTION A) OR 119 TONS (OPTION B). RIPRAP, FIELDSTONE, SPEC IS 300 TONS (OPTION B ONLY).

FALSE DECKING AREAS SHALL INCLUDE THE CLEAR SPAN AREAS BOUNDED BY EXPOSED FACES OF ABUTMENTS AND EACH PIER FACE AND OUTSIDE EDGE OF EACH DECK FASCIA. THE ESTIMATED AREA IS 9925 SQUARE FEET DURING CONSTRUCTION.

SUMMARY OF HYDRAULIC ANALYSIS

EXISTING				PROPOSED			
FLOOD DATA	DISCHARGE (CFS)	WATER SURFACE ELEV. AT U/S FACE OF STRUCTURE (FT)	VELOCITY AT D/S FACE (FT)	WATER SURFACE ELEV. AT U/S FACE OF STRUCTURE (FT)	VELOCITY AT D/S FACE (FT)	WATERWAY AREA AT D/S FACE (SQ FT)	CHANGE IN WSEL FROM U/S FACE OF PROPOSED STRUCTURE (FT)
10-YEAR	5000	748.89	5.85	748.78	5.82	859.33	-0.11
50-YEAR	7400	749.99	7.80	749.88	7.73	957.51	-0.11
100-YEAR	8500	750.62	8.49	750.47	8.40	1012.48	-0.15
500-YEAR	11000	752.29	9.34	752.04	9.34	1177.73	-0.25
PROPOSED BRIDGE AREA BELOW LOW CHORD IS 1510 SQUARE FEET							

1. THE EXISTING BRIDGE AREA BELOW THE LOW CHORD IS 1220 SFT.
2. EXISTING OVERTOPPING ELEVATION IS 754.33 FT.
3. PROPOSED OVERTOPPING ELEVATION IS 757.74 FT.
4. DO NOT USE BROKEN CONCRETE FOR RIPRAP.
5. THE WATER SURFACE AND/OR ENERGY GRADE ELEVATIONS SHOWN ON HYDRAULIC TABLE ARE TO BE USED FOR COMPARISON PURPOSES ONLY AND ARE NOT TO BE USED FOR ESTABLISHING A REGULATORY FLOODPLAIN. THE ELEVATIONS MAY BE USED PROVIDED THEY ARE VERIFIED WITH THE WATER RESOURCES DIVISION, MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY.

811 Know what's below. Call before you dig.

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
1	ADDENDUM #1	08-15-23	AS	RRB
	ISSUED FOR BID	06-28-23	AS	RRB

CITY OF ANN ARBOR
COMMUNITY SERVICES
PARKS AND RECREATION
301 EAST HURON STREET
P.O. BOX 8647
ANN ARBOR, MI 48107-8647
734-794-6230
www.a2gov.org/parks

CITY OF ANN ARBOR - COMMUNITY SERVICES - PARKS AND RECREATION

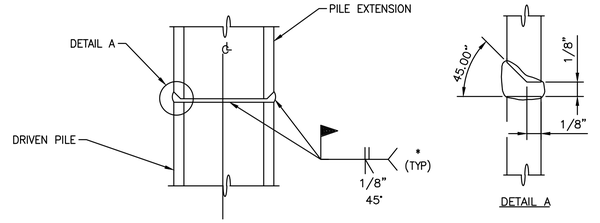
GALLUP PARK VEHICLE AND PEDESTRIAN BRIDGE
DESIGN - BRIDGE REPLACEMENT PLANS

GENERAL PLAN OF STRUCTURE

SCALE

DRAWING No.

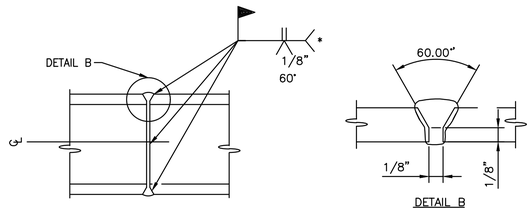
SHEET No.
28 OF 55



SPLICE DETAILS – TYP AT ABUTMENTS

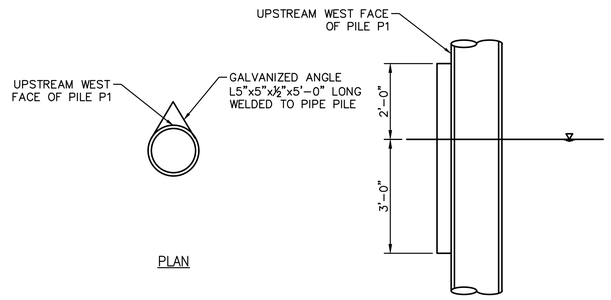
FOR PILES IN PLACE (HORIZONTAL JOINT)

* BACK GOUGE AND GRIND EDGE PREPARATION SMOOTH



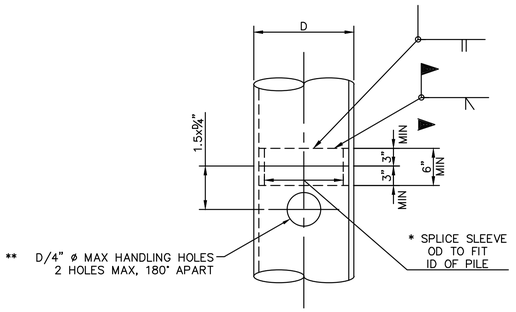
SPLICE DETAILS – TYP AT ABUTMENTS

FOR PILES IN HORIZONTAL POSITION



ICE BREAKER DETAIL

UPSTREAM WEST FACE OF PILE P1 ONLY

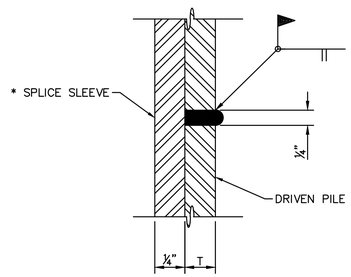


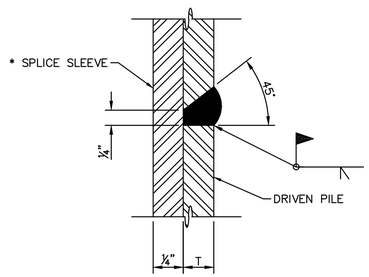
SPLICE DETAILS – TYP AT PIER

FOR SPIRAL WELDED AND SEAMLESS PIPE SHELLS

* SPLIT CHILL RINGS AS RECOMMENDED BY THE MANUFACTURER MAY BE SUBSITUTED FOR SPLICE SLEEVES IF APPROVED BY THE ENGINEER.

** DRILL OR FLAME CUT CIRCULAR HANDLING HOLES. GRIND FLAME CUT HOLES TO MAKE CIRCULAR AND REMOVE HARDENED EDGE OR CUT OFF SECTION OF PILE WITH FLAME CUT HOLES PRIOR TO SPLICING OR CONCRETE PLACEMENT.





SPLICE DETAILS – TYP AT PIER

NOTES:

DRIVE ALL PILES TO A NOMINAL PILE DRIVING RESISTANCE NOT LESS THAN 500 KIPS. DETERMINE NOMINAL PILE DRIVING RESISTANCE (Rndr) USING THE FHWA–MODIFIED GATES DYNAMIC FORMULA.

THE ESTIMATED PILE LENGTH IS BASED ON THE STATIC ANALYSIS.

FOR THE PIER, DRIVE PILES IN A SEQUENCE THAT BEGINS WITH THE CENTER OF THE PILE GROUP AND PROCEEDS OUTWARD IN BOTH DIRECTIONS OR FROM ONE SIDE OF THE PILE GROUP TO THE OTHER SIDE. THE CONTRACTOR MAY REQUEST ENGINEER APPROVAL TO SEQUENCE THE PILE DRIVING FROM THE CENTER OF THE PILE GROUP OUTWARD IN A CLOCKWISE OR COUNTERCLOCKWISE PATTERN IF FOUR OR MORE ROWS OF PILES EXIST.

FOR THE PIERS, STEEL PILES USED FOR PILE BENTS ARE CONSIDERED MAIN MEMBERS AND ALL WELDING MUST BE ACCORDING TO AASHTO/AWS D1.5 BRIDGE WELDING CODE, AS MODIFIED BY THE CURRENT SPECIAL PROVISION FOR STRUCTURAL STEEL AND ALUMINUM CONSTRUCTION.

FOR THE ABUTMENTS, USE ONLY THE PILE SPLICE DETAILS WITHIN THE PLANS.

AT ABUTMENT WALLS AND RETURN WALLS, USE HP14x73 STEEL PILES. AT PIER 1, WITH THE CAST–IN–PLACE CONCRETE PILES, USE 16 INCH OD STEEL PILE SHELLS WITH A MINIMUM OF 0.500 INCH NOMINAL WALL THICKNESS.

DRIVE PILES TO SUCH ACCURACY THAT THE ENDS OF THE PILES TO BE EMBEDDED IN THE CONCRETE ARE WITHIN 3" OF THE LOCATION SHOWN ON THE PLANS.

USE STEEL H–PILES AND SPLICES THAT HAVE A YIELD STRENGTH NOT LESS THAN 50 KSI.

USE STEEL PILE SHELLS AND SPLICE SLEEVES FOR CIP CONC PILES MEETING THE REQUIREMENTS OF ASTM A252 GRADE 3 MODIFIED (50 KSI).

THE FACTORED PILE RESISTANCE AVAILABLE TO RESIST ALL FACTORED LOADS INCLUDING THE ESTIMATED FACTORED DOWNDRAG IS EQUAL TO 50 PERCENT OF NOMINAL PILE DRIVING RESISTANCE.

PILES SHALL BE DRIVEN IN THE ORIENTATION SHOWN ON THE PILE LAYOUT PLAN.

STEEL PILES USED FOR PILE BENTS ARE CONSIDERED MAIN MEMBERS AND ALL WELDING MUST BE ACCORDING TO AASHTO/AWS D1.5 BRIDGE WELDING CODE, AS MODIFIED BY THE CURRENT SPECIAL PROVISION FOR STRUCTURAL STEEL AND ALUMINUM CONSTRUCTION.

USE ONLY THE PILE SPLICE DETAILS WITHIN THE PLANS.

USE PILE POINTS AT EACH PILE LOCATION AT ABUTMENTS AND PIER.

GALVANIZE THE 16 INCH CIP PILES AT THE CENTER PIER FROM THE PILE CUT–OFF ELEVATION TO EL 739.0± (BOTTOM OF THE RIVER).

CIP PILE POINTS SHALL BE PER MDOT BDG 8.21.03.

UTILITIES, INCLUDING AN ELECTRICAL DUCT BANK, OCCUR WITHIN THE PILE DRIVING AREAS. PRIOR TO DRIVING ANY PILE, THE CONTRACTOR SHALL UTILIZE SOFT DIGGING TECHNIQUES TO THE APPROPRIATE DEPTH TO INSURE THAT NO UTILITIES WILL BE DISTURBED OR DAMAGED DURING PILE DRIVING OPERATIONS.

⚠1

PILE, STEEL, FURN AND DRIVEN, 14 INCH HP14x73

LOCATION	PILE TYPE	NUMBER OF PILES	ESTIMATED LENGTH FURNISHED & DRIVEN		PILE POINTS (EACH)	SPLICES (EACH)	CUT-OFF ELEV.
			EACH FEET	TOTAL FEET			
Abutment A & SW & SE Return Walls	TEST-VERT	1	80	80	1	1	748.23
	VERTICAL	10	70	700	10	10	748.23
	TOTAL	11		780	11	11	
Abutment B & NW & NE Return Walls	TEST-VERT	1	80	80	1	1	748.23
	VERTICAL	10	70	700	10	10	748.23
	TOTAL	11		780	11	11	
COMBINED TOTAL		22		1560	22	22	

PILE, CIP CONC, FURN AND DRIVEN, 16 INCH (0.50 INCH WALL THICKNESS)

LOCATION	PILE TYPE	NUMBER OF PILES	ESTIMATED LENGTH FURNISHED & DRIVEN		PILE POINTS (EACH)	SPLICES (EACH)	CUT-OFF ELEV.
			EACH FEET	TOTAL FEET			
Center Pier 1	TEST-VERT	1	85	85	1	1	751.73
	VERTICAL	6	75	450	6	6	751.73
	TOTAL	7		535	7	7	
COMBINED TOTAL		7		535	7	7	

QUANTITIES THIS SHEET

ITEM	QUANTITY	UNIT
Pile Driving Equipment, Furn	1	LSUM
Pile, Steel, Furn and Driven, 14 inch	1560	Ft
Test Pile, Steel, 14 inch	2	Ea
Pile Point, Steel	22	Ea
Pile, Steel, Splice	29	Ea
Pile, Galv	1	LSUM
Prebore, Fdn Piling	653	Ft
Pile, CIP Conc, Furn and Driven, 16 inch	535	Ft
Test Pile, CIP Conc, 16 inch	1	Ea
Pile Point, CIP Conc	7	Ea

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GALLUP PARK VEHICLE AND PEDESTRIAN BRIDGE
DESIGN - BRIDGE REPLACEMENT PLANS

PILE DETAILS

SCALE

DRAWING No.

SHEET No.
32 OF 55

C:\pw_work2\d1264804\SDT-PLTS-PileDetails2-Gallup.dwg Dwg Created: 28-Jun-23 — _a2 standard bw.stb — Plot Date: 15-Aug-23

Digital EGLE/USACE Joint Permit Application (JPA) for Inland Lakes and Streams, Great Lakes, Wetlands, Floodplains, Dams, Environmental Areas, High Risk Erosion Areas and Critical Dune Areas

version 1.30

(Submission #: HPN-PQGB-G9S7C, version 1)

Details

Submission ID	HPN-PQGB-G9S7C
Submission Reason	New
Status	In Process

Fees

Fee	$1,600.00
Payments/Adjustments	$0.00
Balance Due	$1,600.00 (Due)

Form Input

Instructions

To download a copy or print these instructions. Please click this link (recommended).

Contact Information

Applicant Information (Usually the property owner)

First Name	Last Name
Hillary	*Hanzel*

Organization Name
City of Ann Arbor

Phone Type	Number	Extension
Business	7347946230	42548

Email
hhanzel@a2gov.org

Address
Guy C. Larcom City Hall
301 E Huron Street
Ann Arbor, MI 48104

Is the Property Owner different from the Applicant?
No

Has the applicant hired an agent or cooperating agency (agency or firm assisting applicant) to complete the application process?
Yes

Upload Attachment for Authorization from Agent
DesignatedAgent_Wade Trim_Gallup Bridge.pdf - 11/22/2022 08:09 AM
Comment
Wade Trim Authorization letter from City of Ann Arbor

Agent Contact

First Name	Last Name
Michael	*Nicolls*

Organization Name
Wade Trim

Phone Type	Number	Extension
Business	7349479700	

Email
mnicolls@wadetrim.com

Address
25251 NORTHLINE RD
TAYLOR, MI 48180

Are there additional property owners or other contacts you would like to add to the application?
Yes

Additional Contact Information (1 of 1)

Contact Role(s)
Consultant

Contact Information

Prefix
Mr.

First Name	Last Name
Robert	*Breen*

Title
Project Manager

Organization Name
Wade Trim

Phone Type	Number	Extension
Business	7349479700	

Email
rbreen@wadetrim.com

Address
25251 Northline Road
Taylor, MI 48180

Project Location

DEQ Site Reference Number (Pre-Populated)
-7551561331337469287

Project Location
42.275727492584934,-83.70219477317362

Project Location Address
3227 Gallup Park Rd
Ann Arbor, MI 48104

County
Washtenaw

Is there a Property Tax ID Number(s) for the project area?
No

Is there Subdivision/Plat and Lot Number(s)?
No

Is this project within Indian Lands?
No

Local Unit of Government (LUG)
Ann Arbor

Directions to Project Site
Bridge is Located within Gallup Park, 850 feet south of the park entrance at Fuller Road; The park entrance is located 400 feet west of the Huron Parkway intersection with Fuller/Geddes Road and 1.3 miles west of US-23/Geddes Road interchange.

Background Information

Has the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and/or United States Army Corps of Engineers (USACE) conducted a pre-application meeting/inspection for this project?
Yes

Provide the date of the pre-application meeting/inspection
05/23/2022

Pre-application File Number:
HPG-VSY5-862ET

EGLE and/or USACE staff person involved in the pre-application meeting/inspection:
Kathryn Kirkpatrick

Has the project scope or design changed since the pre-application meeting/inspection?
No

Has the EGLE completed a Wetland Identification Program (WIP) assessment for this site?
No

Environmental Area Number (if known):
NONE PROVIDED

Has the United States Army Corps of Engineers (USACE) completed either an approved or preliminary jurisdictional determination for this site?
No

Were any regulated activities previously completed on this site under an EGLE and/or USACE permit?
Yes
List the permit numbers.
WRP036386 v1.0

Describe the regulated activities that were previously permitted.
Soil Borings - Bore an up to 6-inch diameter hole 45 feet deep in the bed of the Huron River. Boring will be performed from the existing Gallup Park bridge deck. Upon completion the borehole will be backfilled with grout.

Have any activities commenced on this project?
No

Is this an after-the-fact application?
No

Are you aware of any unresolved violations of environmental law or litigation involving the property?
No

Is there a conservation easement or other easement, deed restriction, lease, or other encumbrance upon the property?
No

Are there any other federal, interstate, state, or local agency authorizations associated with this project?
Unknown

Permit Application Category and Public Notice Information

Indicate the type of permit being applied for.
Minor Project for wetlands, lakes, streams, floodplains, or Great Lakes

If you are applying for a minor project permit, which project type(s) is being proposed?
MP 11. Culverts and Bridges Large- Large
MP 51. Temporary Construction; Access; and Dewatering

If you are applying for a general permit, which project type(s) is being proposed?
NO GP CATEGORY (MP Category only)

Project Description

Project Use: (select all that apply - Private, Commercial, Public/Government/Tribal, Receiving Federal/State Transportation Funds, Non-profit, or Other)
Public/Government/Tribal

Project Type (select all that apply):
Transportation
Other: Parks and Recreation - Park roadway

Project Summary (Purpose and Use): Provide a summary of all proposed activities including the intended use and reason for the proposed project.
Bridge Replacement of the Gallup Park Road Bridge over the Huron River in the City of Ann Arbor's Gallup Park. The existing bridge structure is a 3-span timber bridge. The proposed bridge structure is a 2-span, prestressed concrete beam superstructure supported by integral abutments on steel H-piles and at the center of the bridge, the pier bent consists of a reinforced concrete pier cap supported by vertical cylindrical reinforced concrete piles encased in steel pipe pile shells. The proposed bridge is offset to the west from the existing bridge with approximately 7 feet of clearance between the structures. The proposed bridge is wider than the existing structure with widened pedestrian walkways on each side of the single 12 foot lane. The scope of work extends the current bridge length into the road approaches north and south of the existing bridge, with new approach slabs and timber rails. The offset layout requires reconstructing the approach roadways to connect into the approach roadways at each end. The offset configuration of the proposed bridge also allows the existing bridge to be accessible during construction.

Project Construction Sequence, Methods, and Equipment: Describe how the proposed project timing, methods, and equipment will minimize disturbance from the project construction, including but not limited to soil erosion and sedimentation control measures.
1. Maintenance of Traffic setup with partial closure of approach areas of existing bridge with traffic maintained on the existing bridge during demolition and construction. 2. Setup of Sedimentation and Erosion Control measures such as silt fence and turbidity curtains in waterway. 3. Installation of cofferdams or other water diversion methods. 4. Bridge substructure abutment excavation at each end; 5. Abutment H-pile foundation construction and pier steel pipe pile driving activities. 6. Bridge substructure abutment Abutment wall forming and pouring and return wall construction. 7. Pier Cap forming and pouring. 8. Installation of of Riprap channel protection at each end and around pier piles. 9. Placement of prestressed concrete girders. 10. Construction of Deck slab, sleeper slabs. and approach slabs. 11. Construction of timber decking, timber vehicular and pedestrian railings on bridge and approaches. 12. With new bridge constructed and open, closure of existing bridge and demolition with pile extraction in the River. 13. Removal of Sedimentation and Erosion Control measures. Approximate 12 month timeframe for construction, beginning to end. Adherence to mussel removal and fish migration limits from xxxxx to xxxxx to be accounted for in construction schedule.

Project Alternatives: Describe all options considered as alternatives to the proposed project, and describe how impacts to state and federal regulated waters will be avoided and minimized. This may include other locations, materials, etc.
Multiple alternatives were considered with a comprehensive study including public input leading to this preferred alternative. Multiple options including a skewed structure and separate vehicle and pedestrian bridges were analyzed. The preferred alternative is offset 7 ft from the west face of the existing bridge

Project Compensation: Describe how the proposed impacts to state and federal regulated waters will be compensated, OR explain why compensatory mitigation should not be required for the proposed impacts. Include amount, location, and method of compensation (i.e., bank, on-site, preservation, etc.)
No mitigation or compensatory actions planned.

Upload any additional information as needed to provide information applicable to your project regarding project purpose sequence, methods, alternatives, or compensation.
NONE PROVIDED
Comment
NONE PROVIDED

Resource and Activity Type

SELECT THE ACTIVITIES from the list below that are proposed in your project (check ALL that apply). If you don't see your project type listed, select "Other Project Type". These activities listed require additional information to be gathered later in the application.
Bridges
Shore Protection such as Seawalls, RipRap, and Bioengineering

The Proposed Project will involve the following resources (check ALL that apply).
Stream or River
100-year Floodplain

Major Project Fee Calculation Questions

Is filling of 10,000 cubic yards or more proposed (cumulatively) within wetlands, streams, lakes, or Great Lakes?
No

Is dredging of 10,000 cubic yards (cumulatively) or more proposed within streams, lakes, or Great Lakes? (wetlands not included)
No

Is new dredging or adjacent upland excavation in suspected contamination areas proposed by this application?
No

Is a subdivision, condominium, or new golf course proposed?
No

Stream Project Information (1 of 1)

Please provide a name for the stream, river, channel:
Huron River

Stream Water elevation reference* (show elevation on plans with description):
NAVD 88

Ordinary High Water Mark (OHWM) elevation (feet):
746.80

Date of observation (M/D/Y)
11/10/2022

What length (feet) does the project activity(ies) extend waterward of the OHWM?
78

What length (feet) does the project activity(ies) extend landward of the OHWM?
20

Is the drainage area upstream of the proposed project area greater than 2 sq. miles?
Yes

What is the the width (feet) of the stream where the water begins to overflow its banks. This is called the Bankfull width.
136

Will a turbidity curtain be used during the proposed project?
Yes

Inland Lakes, Great Lakes and Stream Impacts (1 of 1)

The following impact description applies to: (select only one at a time, duplicate this entire section if there are impacts to multiple waterbody types):
Stream

Linear feet of stream affected by your project

Category	Affected linear feet (ft)
Permanent	76
Temporary	76
	Sum: 152

Select from the following list all Fill Activities (select all that apply to this waterbody impacted):
Riprap
Backfill

Complete this table for projects involving Fill below the Ordinary High Water Mark. Enter each activity/ location that corresponds with each activity selected in the previous question and enter the dimensions. Activities may be entered in one line of the table if they occupy the same impact footprint and cannot be broken out separately (Example: Activity - Driveway and Riprap slope). Multiple activities in different locations should be listed on different lines of the table.

Activity	Length (feet)	Width (feet)	Depth (feet)	Area (square feet)	Volume (cubic feet)	Volume (cubic yards	Corrected Value for complex impact Area (square feet)
South Abut A - Under Bridge - Riprap below OHWM	15.5	38	2	589	1178	44	NONE PROVIDED

Activity	Length (feet)	Width (feet)	Depth (feet)	Area (square feet)	Volume (cubic feet)	Volume (cubic yards	Corrected Value for complex impact Area (square feet)
North Abut B - Under Bridge - Riprap below OHWM	9	38	2	342	684	25	NONE PROVIDED
South Abut A - Toestone under bridge - Riprap below OHWM	4	38	4	152	608	23	NONE PROVIDED
North Abut B - Toestone under bridge - Riprap below OHWM	4	38	6	152	912	34	NONE PROVIDED
Center Pier 1 - Under Bridge - Riprap below OHWM	12	46.3333333333333333	5	556	2780	103	NONE PROVIDED
SW Quadrant Riprap - waterward of OHWM	12.5	19	2	237.5	475	18	NONE PROVIDED
SE Quadrant Riprap - waterward of OHWM	12.5	19	2	237.5	475	18	NONE PROVIDED
NW Quadrant Riprap - waterward of OHWM	9	19	2	171	342	13	NONE PROVIDED

Activity	Length (feet)	Width (feet)	Depth (feet)	Area (square feet)	Volume (cubic feet)	Volume (cubic yards	Corrected Value for complex impact Area (square feet)
NE Quadrant Riprap - waterward of OHWM	12.5	19	2	237.5	475	18	NONE PROVIDED
South Abut A & Return Walls Perimeter - Structure Backfill below OHWM	154	2.8	2.6	431.2	1121.12	42	NONE PROVIDED
North Abut B & Return Walls Perimeter - Structure Backfill below OHWM	154	2.8	2.6	431.2	1121.12	42	NONE PROVIDED
				Sum: 3536.9	Sum: 10171.24	Sum: 380	Sum: NaN

Type of Fill
Other: Heavy well-graded riprap under bridge - Riprap Class III

Source of Fill
Off-site

Is riprap proposed?
Yes
Indicate size range of riprap:
12-30 inches

Type of riprap
Angular rock

Will material be installed under the riprap?
Yes

Type of material installed under riprap:
Filter fabric

Activities Involving Dredging or Excavation: Select from the following list for Excavation/Dredge Activities (select all that apply to this waterbody impacted):
Excavation for toestone installation

Projects involving Excavation/Dredging below the Ordinary High Water Mark:

Activity	Length (feet)	Width (feet)	Depth (feet)	Area (square feet)	Volume (cubic feet)	Volume (cubic yards)	Corrected value for complex impact Areas (square feet)
South Abut A & Return Walls Perimeter - Foundation Excavation below OHWM	154	8.6	2.6	1324.4	3443.44	128	NONE PROVIDED
North Abut B & Return Walls Perimeter - Foundation Excavation below OHWM	154	8.6	2.6	1324.4	3443.44	128	NONE PROVIDED
Center Pier 1 - Excavation for Riprap below OHWM	12	46.33333333333333333	5	556	2780	103	NONE PROVIDED
				Sum: 3204.8	Sum: 9666.88	Sum: 359	Sum: NaN

Has this area been previously dredged?
No

Is long-term maintenance dredging proposed?
No

What is the method used to be dredged?
Mechanical

Has the dredge material been tested?
No

Spoils Disposal

Will the excavation/dredge spoils be disposed of on site or off site?
On site

If your project includes STRUCTURES then select all of the proposed activities in the following list. If your activity is not shown, then select "None of the Above" and move to the next question. Only enter an impacted area in one of the impact tables (do not duplicate impact entries).:
Bridge

Projects involving Structures constructed below the Ordinary High Water Mark:

Activity	Length (feet)	Width (feet)	Depth (feet)	Area (square feet)	Volume (cubic feet)	Volume (cubic yards)	Corrected value for complex impact AREAS (square feet)
South Abutment A - Substructure Concrete - below OHWM	3.25	38	2.6	123.5	321.1	12	NONE PROVIDED
North Abutment B - Substructure Concrete - below OHWM	3.25	38	2.6	123.5	321.1	12	NONE PROVIDED
SW Return Wall - Substructure Concrete - below OHWM	3.25	17.9167	2.6	58.229275	151.396115	6	NONE PROVIDED
SE Return Wall - Substructure Concrete - below OHWM	3.25	17.9167	2.6	58.229275	151.396115	6	NONE PROVIDED
NW Return Wall - Substructure Concrete - below OHWM	3.25	17.9167	2.6	58.229275	151.396115	6	NONE PROVIDED
NE Return Wall - Substructure Concrete - below OHWM	3.25	17.9167	2.6	58.229275	151.396115	6	NONE PROVIDED
				Sum: 479.9171	Sum: 1247.78446	Sum: 48	Sum: NaN

If your project includes Other Activities not listed in this section, then select from the proposed activities in the following list. If your activity has not been listed in this Section, then select "Other" and enter a description of your activity. Only enter an impacted area in one of the impact tables (do not duplicate impact entries). If you selected a Fill, Excavation/Dredging, or Structure activity above in this section, but do not have an activity listed as Other, then select None of the Above for this question.
Structure removal (except dam removal)

Does the proposed project include mitigation?
none

Shore Protection Project such as Seawalls, RipRap, or Bioengineering

Select all that apply to your project.
RipRap

Is a cumulative length of seawalls, bulkheads, or revetments of 500 feet or more in length proposed?
No

Is the proposed structure going to extend 150 feet or more into a lake or stream?
No

Distance from the project to the adjacent property lines

Distance from property line to the left (feet)	Distance from property line to the right (feet)
0	0

Distance of project from an obvious fixed structure (example - 50 ft from SW corner of house)
40 ft west of Sea Wall at NE corner of existing bridge

Will any existing structures be removed as part of this project including walls or any other structure?
Yes
Please Describe.
Existing Bridge will be removed after proposed bridge is operational

Bridges and Culverts (1 of 1)

Unique Identifier:
Gallup Park Huron River Bridge

STREAM INFORMATION

Width of the stream

Upstream (feet)	Downstream (feet)
136	136

Cross-sectional area of primary channel (square feet):
1100

The width of the stream where the water begins to overflow its banks. Bankfull width (feet):
136

Is there an existing structure?
Yes

Is the existing Structure perched?
No

Help for the following Table
Structure Width: Enter the total width of culvert or bridge in feet.

Culvert Length or Bridge span: Enter the total length perpendicular or across the stream in feet.

Culvert Height Prior to any burying: Enter the total width of culvert in feet at this location as it measures on land. Do not subtract any depth the culvert may be buried. For bridges enter "0".

Depth culvert buried: Enter total feet the culvert bottom will be buried. Does not apply to bridges so enter "0".

Bottom of bridge beam (upstream) elevation (feet): For culverts enter "0".

Bottom of bridge beam (downstream) elevation (feet): For culverts enter "0".

Stream Invert Elevation (feet) Upstream: This is the elevation at the bottom of the culvert as it lies in place after installation on the upstream end of the culvert, not including any fill on the culvert bottom.

Stream Invert Elevation (feet) Downstream: This is the elevation at the bottom of the culvert as it lies in place after installation on the downstream end of the culvert, not including any fill on the culvert bottom.

Bride rise from bottom of beam to streambed or culvert crown height (feet): This is the elevation at the top of the culvert as it lies in place after installation, for bridges this is from the bottom of the beam. Do not including any fill on top of the culvert or the bridge structure.

Total structure waterway area above streambed (square feet): This is the total square foot area that would allow passage of water through the structure opening.

Total structure waterway area below the 100-year elevation (square feet) (if known): This is the total square foot area that would allow passage of water that is below the 100-year flood elevation.

Elevation of road grade at structure (feet): Enter the elevation at the road above the structure.

Elevation of low point in road (feet): Enter the elevation of the lowest point in the road nearest the structure.

Distance from low point of road to mid-point of structure (feet): How far (in feet) from the structure does any fill used for the structure extend before it reaches the existing grade?

Length of approach fill from edge of bridge/culvert to existing grade (feet):

Existing and Proposed Bridge and/or Culvert Information

Question	Existing	Proposed
Bridge width or Culvert length (parallel to stream) (feet)	24.3	38.0
Bridge span or Culvert width/diameter (perpendicular to stream) (feet)	123	138
Height of culvert prior to burying (if bridge enter 0)	0	0
Depth culvert buried (feet) (if bridge enter 0)	0	0
Bottom of bridge beam (feet) upstream (if culvert enter 0)	750.83	752.82
Bottom of bridge beam (feet) downstream (if culvert enter 0)	750.83	752.82
Stream invert elevation at bridge (feet) upstream	738.4	738.4
Stream invert elevation at bridge (feet) downstream	738.4	738.4
Bridge rise from bottom of beam to streambed or culvert crown height (feet)	12.43	14.82
Total structure waterway opening above streambed (square feet)	1220	1510
Total structure waterway area below the 100-year elevation (square feet) (if applicable)	977.35	1012.48
Elevation of road grade at structure (feet)	753.1	756.16
Elevation of low point in road (feet)	751.32	751.32
Distance from low point in road (feet)	198	190
Length of approach fill from edge of bridge/culvert to existing grade (feet)	198	190

Bridge Type

Existing	Proposed
Timber	Concrete I-beam

Structure Entrance Design Type:

Existing	Proposed
Mitered	Wingwalls

Certification Upload
NONE PROVIDED
Comment
NONE PROVIDED

Floodplain

Proposed Activity
Bridge
Excavation/Cut
Fill

100-Year Floodplain Elevation

Please provide a name for the stream, river, channel, or waterbody:	100-Year Floodplain Elevation (feet)	Datum	Source of Datum
Huron River	750.0	NAVD88	FEMA

Upload Documents for Datum Source
Full_FIRM_281802b7-7e86-4ef4-b3ad-f7a698c874d6.pdf - 07/13/2023 05:09 PM
Comment
NONE PROVIDED

Excavation/Cut volume below the 100-year floodplain elevation (cubic yards)
0

Fill volume below the 100-year floodplain elevation (cubic yards)
192

Source of Fill Material:
Off-site

Type of Fill
Gravel
Sand

Calculations Upload
2023-0621 Excavation Calculations.pdf - 07/13/2023 05:17 PM
Comment
NONE PROVIDED

Is this project located in the floodway?
Yes

Were one or more Hydraulic Analyses completed for this project?
Yes

How many Hydraulic Analyses were completed for this project?
1

Upload a copy of the Hydraulic Report and Associated Files

GALLUP PARK HEC-RAS.zip - 07/13/2023 05:14 PM

Comment

Gallup Park Hydraulic Analysis

Local Unit of Government (LUG) Acknowledgement Letter Upload

NONE PROVIDED

Comment

NONE PROVIDED

Is there an existing building on site?

No

Upload of Proposed Site Plans

Required on all Site Plan uploads. Please identify that all of the following items are included on your plans that you upload with this application.

Site Plan Features	Existing and Proposed Plan Set
Scale, Compass North, and Property Lines	Yes
Fill and Excavation areas with associated amounts in cubic yards	Yes
Any rivers, lakes, or ponds and associated Ordinary High Water Mark (OHWM)	Yes
Exterior dimensions of Structures, Fill and Excavation areas associated with the proposed project	Yes
Dimensions to other Structures and Lot Lines associated with the project	N/A
Topographic Contour Lines from licensed surveyor or engineer when applicable	Yes

Upload Site Plans and Cross Section Drawings for your Proposed Project

Site Plans and General Structure Sheets_2023-06-28-Gallup Park Final Plans.pdf - 07/13/2023 05:41 PM

Comment

NONE PROVIDED

Additional Required and Supplementary Documents

PreAppLetter 301 303 (WORD).pdf - 07/13/2023 05:23 PM

Gallup Park Final Report 12-22-2022.pdf - 07/13/2023 05:34 PM

Comment

Gallup-Mussels Final Report and Pre-application Number

Fees

Minor Project Fee:
+$100.00

Hydraulic Review Fee:
+$1500.00

Total Fee Amount:

$1600.00

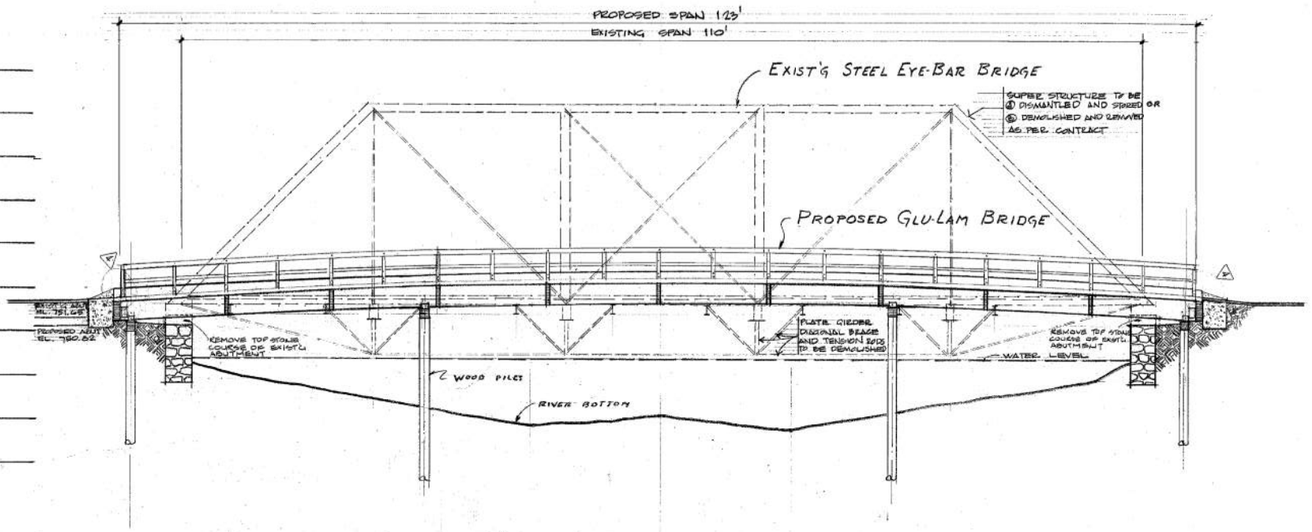
Is the applicant or landowner a State of Michigan Agency?
No

Attachments

Date	Attachment Name	Context	User
7/13/2023 5:41 PM	Site Plans and General Structure Sheets_2023-06-28-Gallup Park Final Plans.pdf	Attachment	Michael Nicolls
7/13/2023 5:34 PM	Gallup Park Final Report 12-22-2022.pdf	Attachment	Michael Nicolls
7/13/2023 5:23 PM	PreAppLetter 301 303 (WORD).pdf	Attachment	Michael Nicolls
7/13/2023 5:17 PM	2023-0621 Excavation Calculations.pdf	Attachment	Michael Nicolls
7/13/2023 5:14 PM	GALLUP PARK HEC-RAS.zip	Attachment	Michael Nicolls
7/13/2023 5:09 PM	Full_FIRM_281802b7-7e86-4ef4-b3ad-f7a698c874d6.pdf	Attachment	Michael Nicolls
11/22/2022 8:09 AM	DesignatedAgent_Wade Trim_Gallup Bridge.pdf	Attachment	Michael Nicolls

Status History

	User	Processing Status
10/25/2022 3:06:59 PM	Michael Nicolls	Draft
7/17/2023 2:37:08 PM	Michael Nicolls	Submitting
7/17/2023 2:37:19 PM	Michael Nicolls	Submitted
7/17/2023 2:37:22 PM	Michael Nicolls	In Process



BRIDGE ELEVATION - PROPOSED OVER EXISTING

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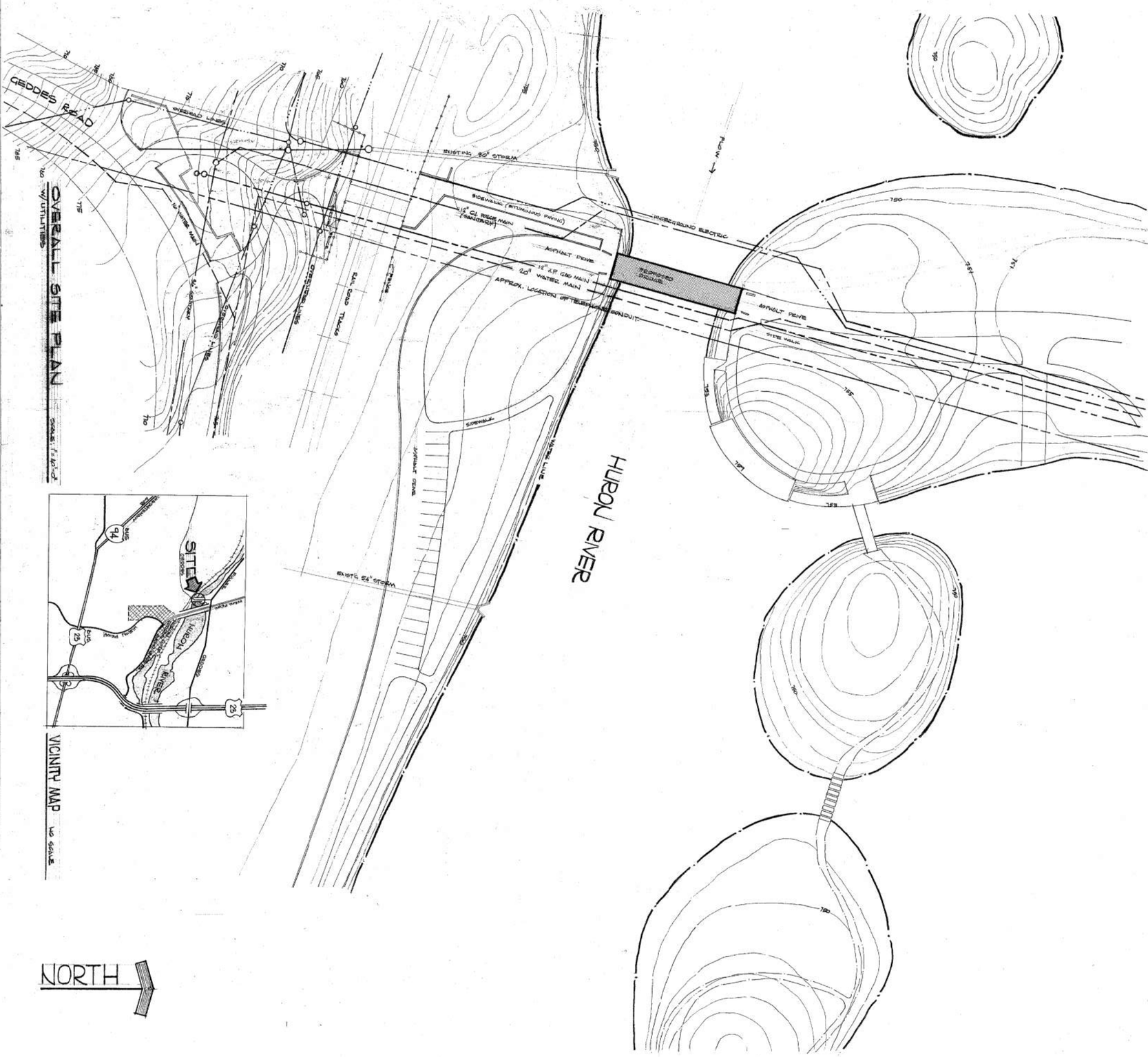


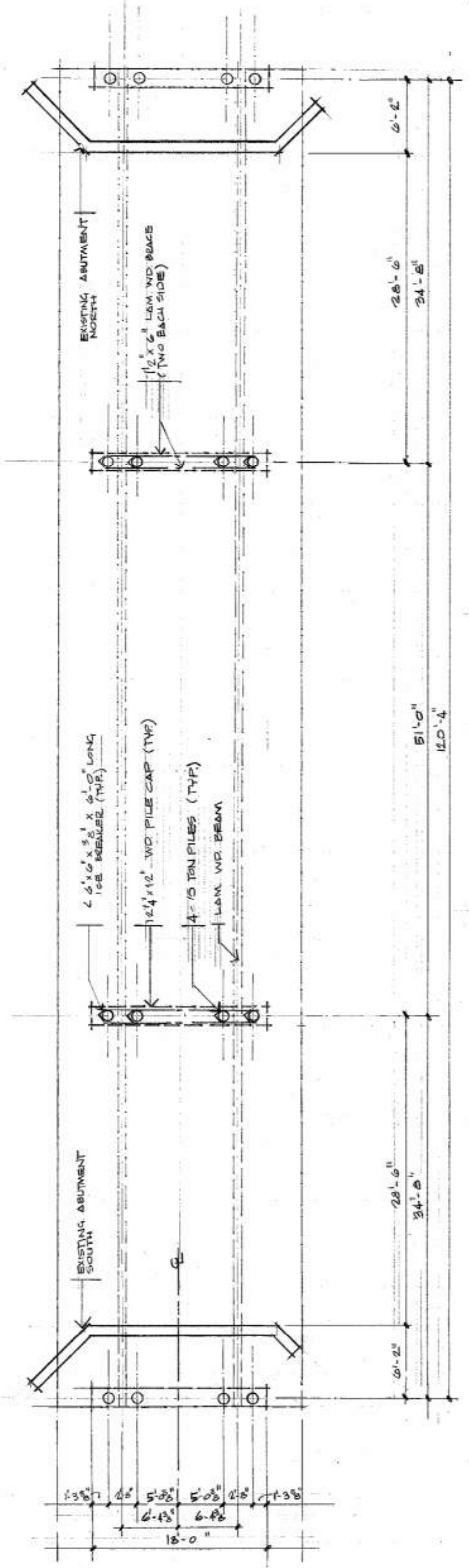
NORTH

JOB NO.	DATE: 2-4-76		
76-004-D	DRAWN BY: DB		
	CHECKED BY: JJ		
SHEET NO.	REVISIONS		
1	NO.	DATE	BY
	1	3-5-76	DB/JJ
	2	6-15-76	MZ/JJ
	3	8-24-76	MZ
	4	8-31-76	RTM

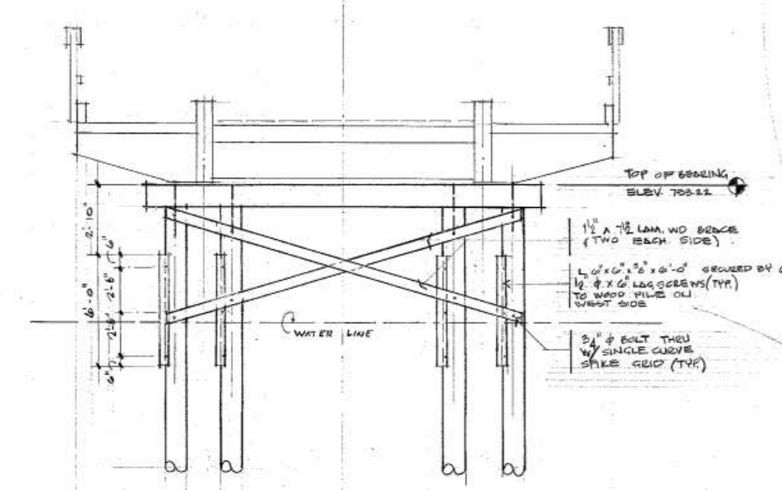
SHEPPARD ENGINEERING
3210 N. MAIN — ROYAL OAK, MICH. 48073
ISAAC SHEPPARD JR. PH.D. P.E. — TELEPHONE: 313-585-4240
MICH. NO. 12959

DEPARTMENT OF PARKS AND RECREATION - SUPERINTENDENT GEORGE R. OWERS
ANN ARBOR CITY HALL, 100 NORTH FIFTH AVENUE, 48103

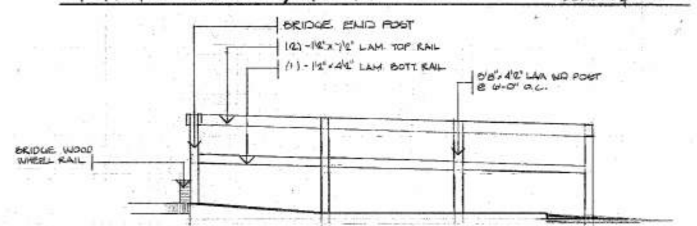
PARK PLANNERS:		DATE:	REVISIONS:	DRAWN:	JOB NO.	SHEET:
		SCALE:		CHECKED:		OF:



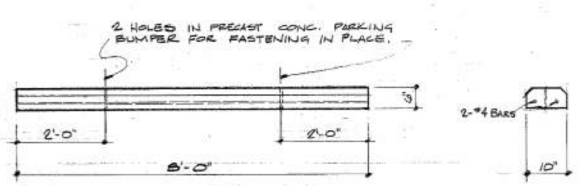
PILE PLAN SCALE: 1/8" = 1'-0"



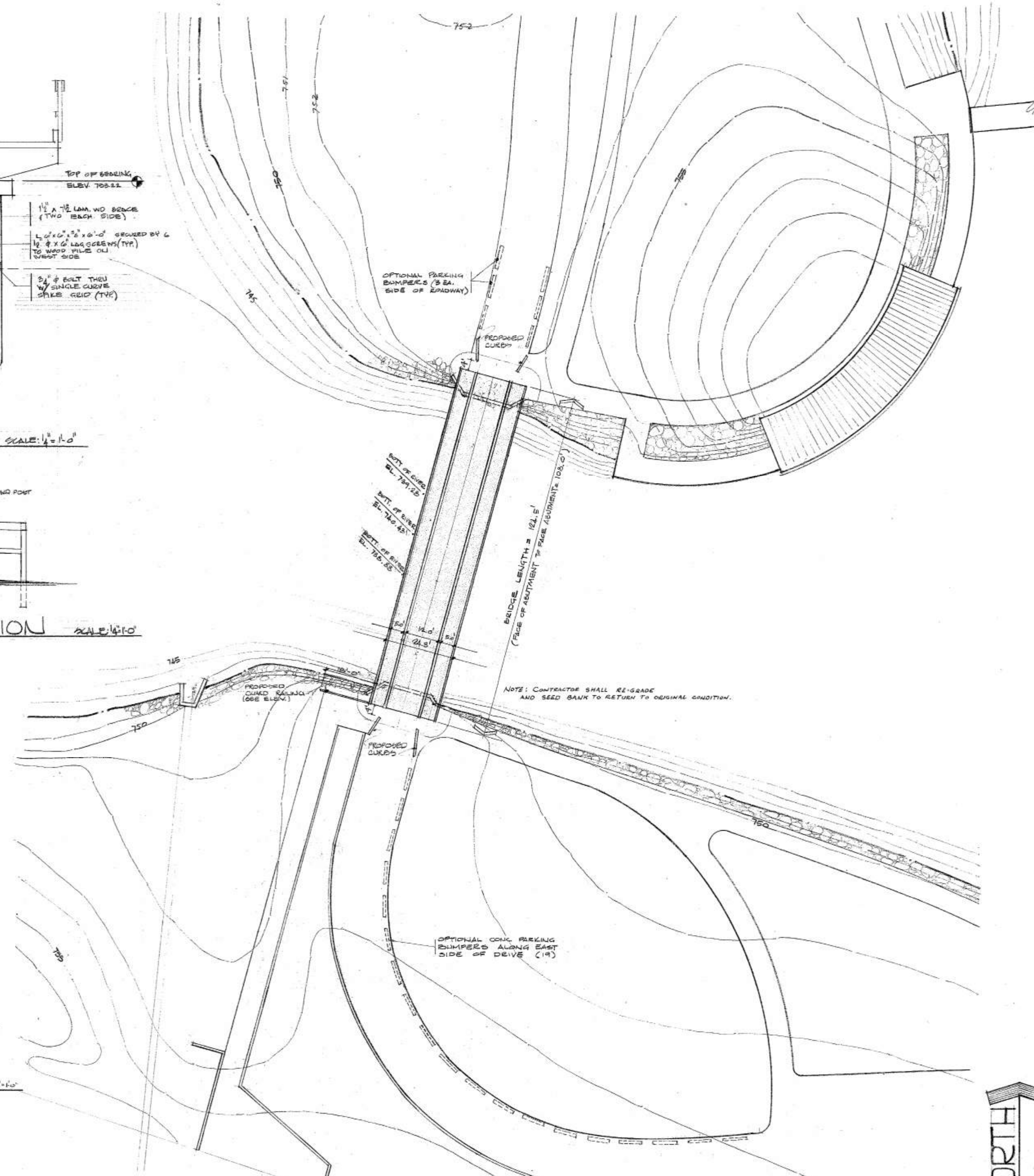
PIER ELEVATION SCALE: 1/4" = 1'-0"



GUARD RAILING ELEVATION SCALE: 1/4" = 1'-0"



PARKING BUMPER DETAIL SCALE: 1/2" = 1'-0"



SITE PLAN SCALE: 1" = 20'-0"

DEPARTMENT OF PARKS AND RECREATION - SUPERINTENDENT GEORGE R. OWERS
ANN ARBOR CITY HALL, 100 NORTH FIFTH AVENUE, 48103

PARK PLANNERS:

DATE:	REVISIONS:	DRAWN:	JOB NO.	SHEET:
SCALE:		CHECKED:		OF:

SHEPPARD ENGINEERING
3210 N. MAIN ROYAL OAK, MICH. 48073
ISAAC SHEPPARD JR. PH.D. P.E. TELEPHONE:
MICH. NO. 12959 313-585-4240

JOB NO. 76-004-D
DATE: 2-4-76
DRAWN BY: [illegible]
CHECKED BY: [illegible]
SHEET NO. 2

NO.	REVISIONS DATE	BY
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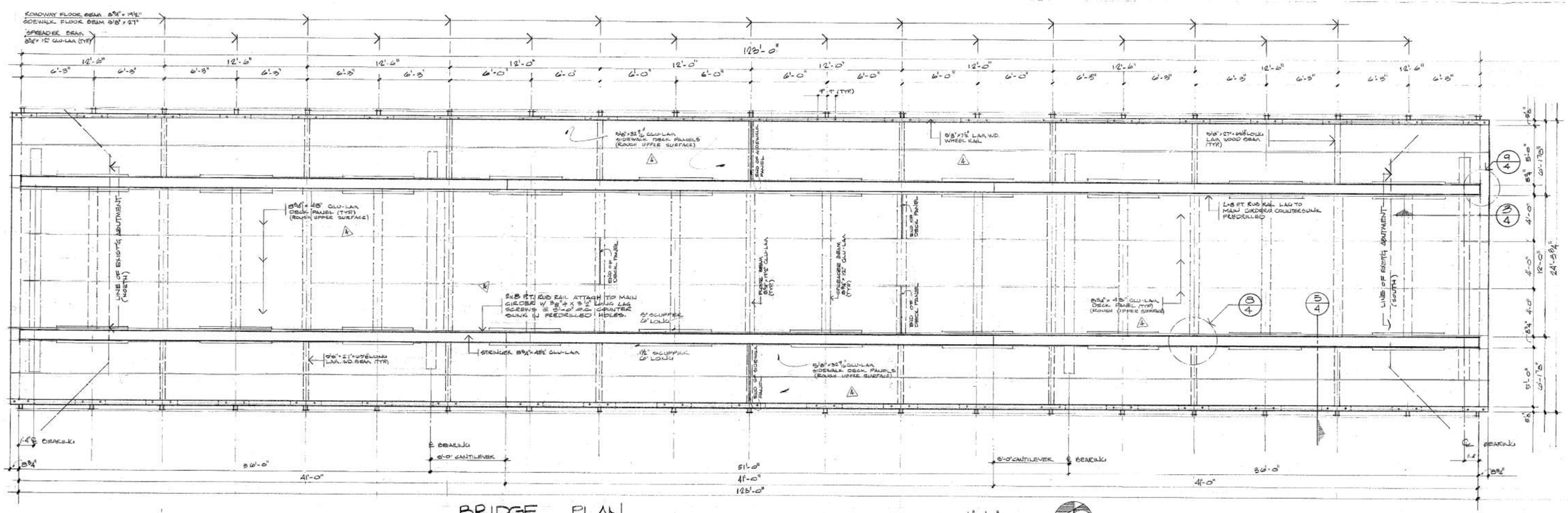
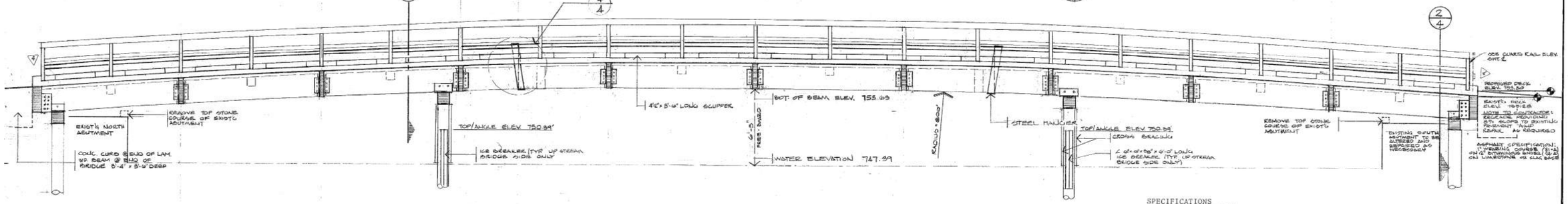
2	3-12-76	
3	3-19-76	
4		
5		



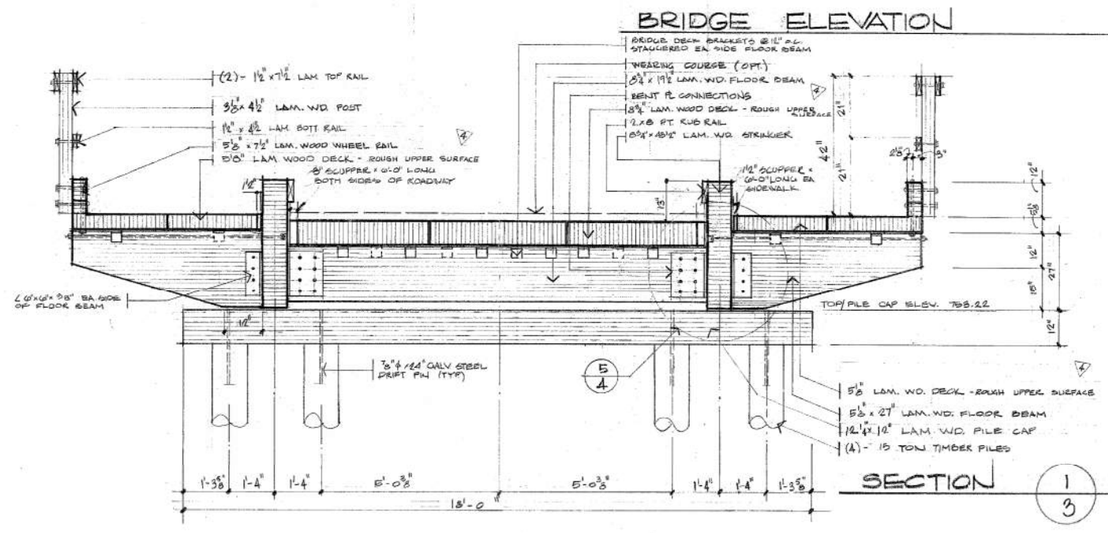
BRIDGE PLAN

SCALE: ¼" = 1'-0"



BRIDGE ELEVATION

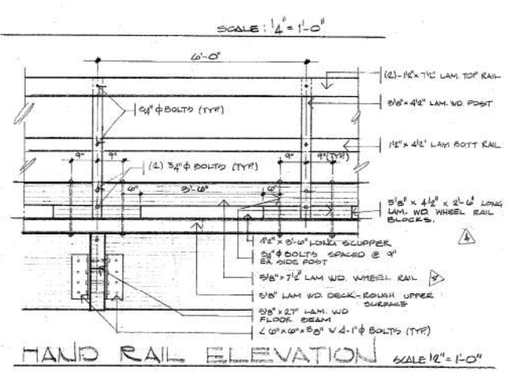
SCALE: ½" = 1'-0"



SECTION

1/3

SCALE: ½" = 1'-0"



HAND RAIL ELEVATION

SCALE 1½" = 1'-0"

SPECIFICATIONS

LUMBER:
GLUE LAMINATED GIRDERS, FLOOR BEAMS AND OTHER MEMBERS SHALL BE SOUTHERN PINE GLU-LAM MANUFACTURED IN ACCORDANCE WITH PS 56-73 TO THE FOLLOWING SPECIFICATIONS:
GIRDERS AND FLOOR BEAMS:
COMBINATION 24F (OR BETTER) WEYERHAEUSER BRIDGE INDUSTRIAL.
DECK:
WEYERHAEUSER LAMINATED BRIDGE DECK.
WHEEL RAILS, POSTS, RAILS AND PILE CAPS:
COMBINATION 20F (OR BETTER) WEYERHAEUSER BRIDGE INDUSTRIAL.

PRESERVATIVE TREATMENT:
ALL LAMINATED MATERIAL SHALL BE PRESSURE-TREATED IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:
GIRDERS, FLOOR BEAMS, PILE CAPS, WHEEL RAILS AND DECK:
8 LB. RETENTION OF A 5% SOLUTION OF PENTACHLOROPHENOL IN GRADE I FUEL OIL IN ACCORDANCE WITH CURRENT A.W.P.A. STANDARDS C-1 AND C-28.
RAILINGS AND POSTS:
8 LB. RETENTION OF A 5% SOLUTION OF PENTACHLOROPHENOL IN LIQUIFIED PETROLEUM GAS IN ACCORDANCE WITH CURRENT A.W.P.A. STANDARDS.

TIMBER PILES:
TIMBER PILES SHALL HAVE A MINIMUM DIAMETER OF 12", 3' FROM THE BUTT, AN 8" DIAMETER AT THE TIP, AND BE PRESSURE TREATED WITH A 12 LB. TREATMENT OF CREOSOTE. PILES AND METHOD OF DRIVING SHALL CONFORM WITH THE SPECIFICATIONS OF THE M.D.S.H.

DECK BRACKETS:
WEYERHAEUSER ALUMINUM ALLOY BRACKETS PER MANUFACTURERS SPECIFICATIONS.

STRUCTURAL STEEL AND HARDWARE:
COR-TEN OR APPROVED WEATHERING STEEL. WASHERS MAY BE CAST IRON OR MALLEABLE IRON. (ALTERNATE : A-36 STEEL GALVANIZED)

CAMBER:
ALL LAMINATED STRINGERS SHALL HAVE A RADIUS OF 800 FT.

LOADING:
THIS BRIDGE IS DESIGNED TO SUPPORT A HS 15-44 HIGH WAY LIVE LOADING PLUS DEAD LOAD.

BOLTS:
TIMBER BOLTS SHALL BE USED WHERE BOLT HEAD BEARS ON WOOD (MALLEABLE WASHERS SHALL BE USED UNDER NUT)

DEPARTMENT OF PARKS AND RECREATION - SUPERINTENDENT GEORGE E. OWERS
ANN ARBOR CITY HALL, 100 NORTH FIFTH AVENUE, 48103
PARK PLANNERS:
DATE: SCALE: REVISIONS: DR.MN: CHECKED: JOB NO. SHEET: OF:

SHEPPARD ENGINEERING
3270 N. MAIN ROYAL OAK, MICH. 48073
ISAAC SHEPPARD JR. PH.D. P.E. TELEPHONE: 313 585-4740
MICH. NO. 12889

JOB NO. 76-COUP
DATE 2-4-76
DRAWN BY DS
CHECKED BY JH
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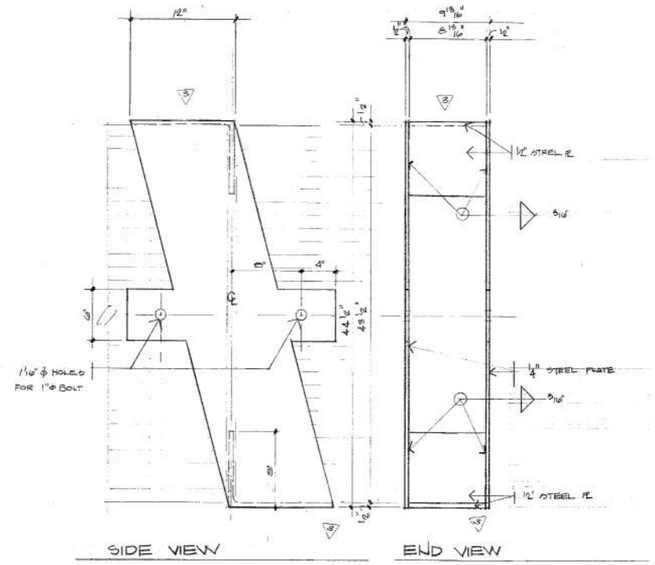
REVISIONS: NO. 1 DATE 3-3-76 BY MN; NO. 2 DATE 4-5-76 BY MN; NO. 3 DATE 5-24-76 BY DMN



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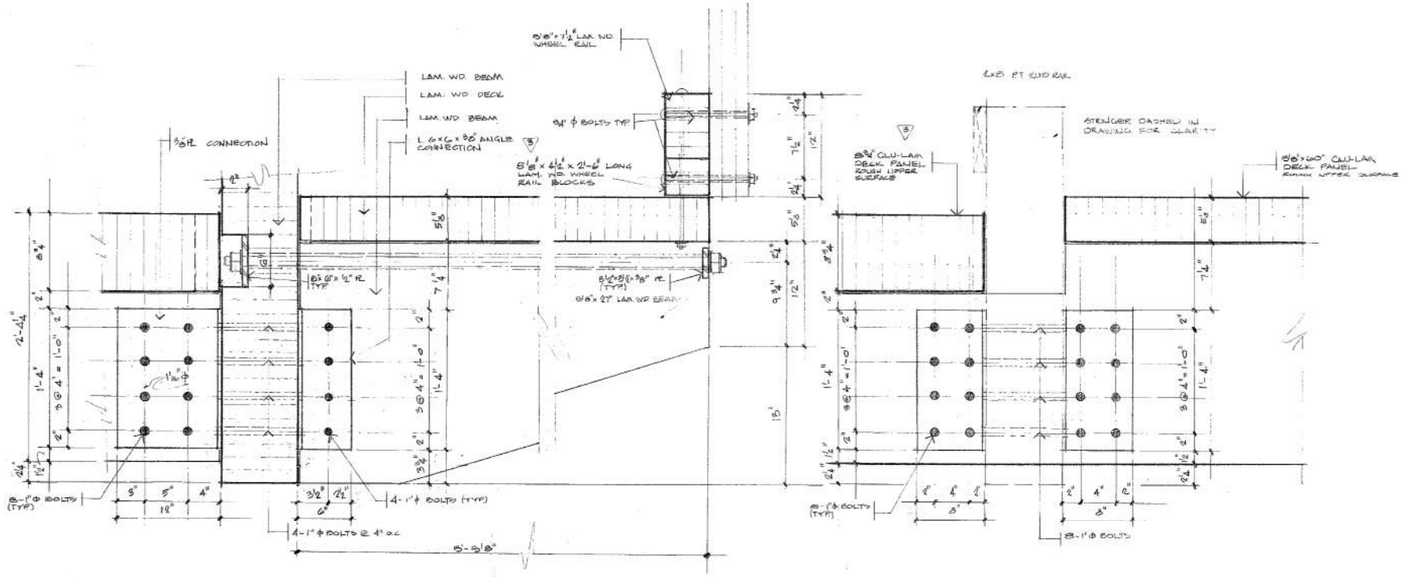

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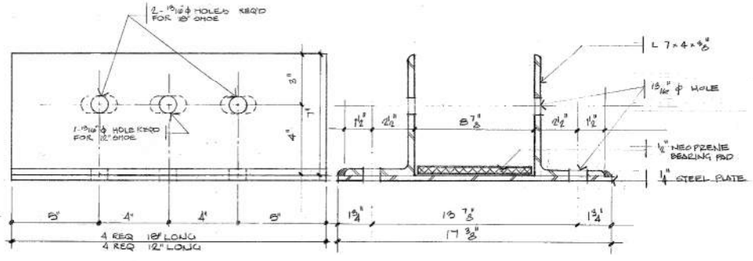

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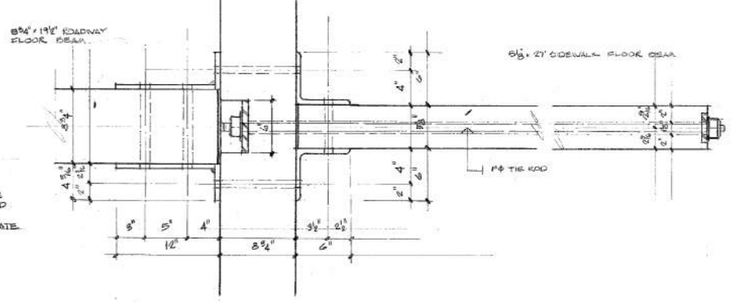

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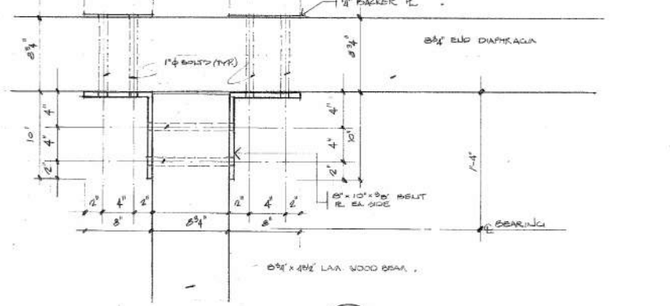

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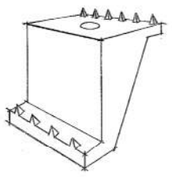

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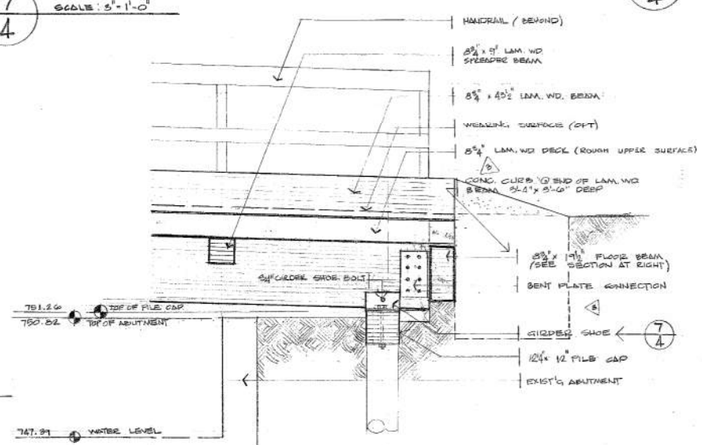

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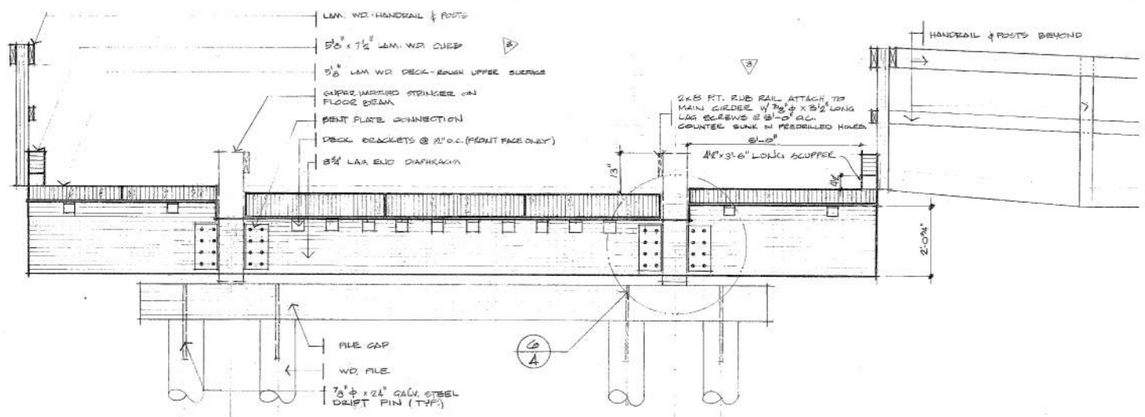

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DEPARTMENT OF PARKS AND RECREATION - SUPERINTENDENT GEORGE R. OWERS
ANN ARBOR CITY HALL, 100 NORTH FIFTH AVENUE, 48103
PARK PLANNERS:
DATE: SCALE: REVISIONS: DRAWN: CHECKED: JOB NO. SHEET: OF:

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JOB NO. 76-004-D
DATE 3-5-76
DRAWN BY: B.T.S.
CHECKED BY: J.J.
REVISIONS BY
NO 1 2 3 4
SHEET NO. 4

SUBSURFACE UTILITY ENGINEERING REPORT
QUALITY LEVELS A AND B

GALLUP PARK BRIDGE REPLACEMENT
ANN ARBOR, MI

MSG PROJECT NO. W2220001

AUGUST 16, 2023

PREPARED FOR:

WADE TRIM

25251 NORTHLINE ROAD
TAYLOR, MI 48180

PREPARED BY:

THE MANNIK & SMITH GROUP, INC.

2365 HAGGERTY ROAD SOUTH
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Appendices

1.0 INTRODUCTION

This report presents the results of a Quality Levels A and B Subsurface Utility Engineering (SUE) investigation performed for the City of Ann Arbor as a subcontractor to Wade Trim to locate known utilities for the Gallup Park Bridge Replacement project. Our scope of work was completed in general accordance with our proposal OP No. 221835, dated September 30, 2022 and revised October 4, 2022.

The SUE services include the area within 200 feet of the proposed bridge abutments (100 feet each direction from the center of the abutment). The area is a cross the Huron River immediately to the west of the existing one lane bridge on Gallup Park Road in Ann Arbor, Michigan.

2.0 QUALITY LEVEL B

2.1 Quality Levels C and D Utility Plans

To collect available information about utility plans, we submitted a MISSDIG Design ticket and collected available utility plans. Design ticket information and associated utilities are included in Appendix B. A summary of utility owners' responses is presented below.

Table 1: Utility Responses

Utility	Response
123.net, Inc. Fiber Optics	No Response
Ann Arbor City Potable Water	Watermain
Ann Arbor City Sanitary Sewer	Abandoned sewer
AT&T Telephone	Clear
DTE Energy Electric	Electrical Lines
DTE Energy Gas	Gas Main
Century Link Fiber Optics	Clear

As shown, the only facility owner to fail to respond is 123.NET Inc. Fiber Optics. City of Ann Arbor Engineering clarified via email on February 14, 2023 that the sanitary sewer west of the Gallup Park Road Bridge is abandoned and unable to be accurately marked due to buried manholes.

2.2 Field Geophysical Survey and Limitations

MSG completed a QL-B field verification of utilities for the entire project area(s). Work included providing materials, equipment and personnel to designate and mark existing underground utilities. MSG personnel designated utilities using Metrotech-Vivax Pipe and Cable locators, using a 10-Watt transmitter and VLOC5000 receiver, and Ground Penetrating Radar surveys for utility location using a GSSI SIR-4000 data acquisition unit and 350-MHz (350 HyperStacking) antenna mounted on a 4-wheel cart. Field activity reports, field notes and photo logs are included in Appendix C. Survey of marked utilities was completed by the Smith Group.

Due to the nature of the geophysical methods commonly used in subsurface utility locating, it is possible that facilities can be missed because of either physical properties, the properties of the surrounding soil, or a combination of both. In general, the estimated depth of GPR signal penetration is approximately six to eight feet below the ground surface (bgs) using a 400 MHz or 350 MHz antenna. However, signal response is dependent on the utility material type as well as other factors such as surface conditions, soil type, presence of subsurface debris, and additional ambient sources of radio frequency noise (e.g., electrical transmission lines, railroad tracks, etc.). Signal response from metal

structures or utilities is generally better than non-metallic materials such as fiberglass, concrete, clay, or PVC. Limitations to pipe and cable locator use include utility depth, utility composition, uninsulated or poorly insulated utilities, proximity to other buried utilities, and utility grounding.

Using available utility information and the results of the utility locating activities, we used professional judgement and prepared utility plans with appropriate noted quality levels for the utilities identified within the project boundaries as shown on the Topographic Survey prepared by the Smith Group and included in Appendix A.

As shown, in In general, we were able using geophysical methods (Quality Level B) to locate existing electrical conduit, water main, gas main, and sanitary sewer on both sides of the Huron River. However, utilities across the river were designated as Quality Level C and D.

3.0 QUALITY LEVEL A

Following the completion of the Quality Level B activities, eleven locations were selected for locating the water main, gas main, sanitary sewer, and electric conduit. Prior to initiating excavation work MISSDIG was contacted 72 hours before work commenced to ensure safe excavation.

Our subcontractor, Badger Daylighting, Inc., attempted to expose the existing utilities using hydro-excavating methods at eleven locations across the site as shown in the Quality Level A Test Hole Plan and Summary included in Appendix A. The following table summarizes the exploration efforts.

Table 2: Quality Level A Summary

Test Hole	Utility	Depth (ft.)	Notes
1	Water	5.15	
2	Gas	3.82	
3	Test Hole	4.88	Utility not encountered, possible anomaly
4	Electric	6.59	Hole collapse and water infiltration halted advancement. Approximate depth based on MetroTech is just over 7 feet.
5	Test Hole	5.75	Utility not encountered, possible anomaly
6	Gas	3.82	
7	Water	5.76	
8	Sanitary	5.55	
9	Electric	-	Utility not encountered
10	Electric	-	Utility not encountered
11	Sanitary	4.46	

Upon completion of data recording, excavations were backfilled with compacted MDOT Class II granular material, and sealed with asphalt patch accordance with the MDOT Standard Specifications for Construction. The sand was compacted using a tamper. Surface elevation at a point directly above the suspected utility location was recorded. A daily field report documenting the work, individual test hole data sheets, as well as general site photographs are included in Appendix C.

Since we were unable to expose the electrical conduit, an additional visit was made to further designate the electrical line and collect estimated depth information. A summary of these supplemental information is presented in the table below. We note that these depths are approximate and should be used as a guide.

Table 3: Summary of Supplemental Electric Line Data

Northern	Eastern	GSE (ft.)	Estimated Depth
283525.4	13303226	751.238	4' 8"
283517.7	13303206	750.19	6' 10"
283510.4	13303191	749.564	7' 5"
283495.5	13303179	748.798	10' 4"
283356.5	13303120	750.546	15' 9"
283342.1	13303114	750.988	14' 7"
283321.0	13303110	751.454	11' 3"

4.0 QUALITY ASSURANCE

Quality assurance forms used to track all aspects of the project including planning, permitting, notifications is included in Appendix C.

5.0 CERTIFICATION

I, Ibraheem S. Shunnar, PE, being a Professional Engineer licensed registered in the State of Michigan, do hereby certify that the Subsurface Utility Engineering project deliverables submitted were completed under my supervision and are in accordance with the project scope and that the proper quality assurance / quality control was performed to ensure the subsurface utility engineering information provided is accurate. The files correctly represent the existing conditions at the time the survey was completed.

Ibraheem S. Shunnar, PE
Michigan Professional Engineer No. 6201039106
August 16, 2023

GEOTECHNICAL INVESTIGATION REPORT

GALLUP PARK BRIDGE REPLACEMENT
ANN ARBOR, MICHIGAN
MSG PROJECT NO.: W2220001

APRIL 19, 2023
REVISED MAY 2, 2023

PREPARED FOR:
WADE TRIM ASSOCIATES
25251 NORTHLINE ROAD
TAYLOR, MICHIGAN 48180

PREPARED BY:
THE MANNIK & SMITH GROUP, INC.
2365 HAGGERTY ROAD SOUTH
CANTON, MICHIGAN 48188

April 19, 2023

Revised May 2, 2023

Mr. Robert R. Breen, PE
Senior Project Manager
Wade Trim Associates
25251 Northline Road
Taylor, Michigan 48180

RE: Geotechnical Investigation Report
Gallup Park Bridge Replacement
Ann Arbor, Michigan
MSG Project Number: W2220001

Dear Mr. Breen,

This report presents the results of our geotechnical investigation in support of the proposed Gallup Park bridge replacement located in Ann Arbor, Michigan. We prepared this report in accordance with our proposal No. OP221835, dated September 30, 2022 and revised October 4, 2022.

We trust that this report addresses your project needs. We appreciate the opportunity to work with you on this project. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,

The Mannik & Smith Group, Inc.

Kevin D. Brown, PE
Geotechnical Engineer

Ibraheem Shunnar, PE
Principal

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APPENDICES

1.0 INTRODUCTION

1.1 General

The Mannik & Smith Group, Inc. (MSG) was retained by Wade Trim Associates (Wade Trim) to conduct a geotechnical investigation for the proposed Gallup Park bridge replacement project in Ann Arbor, Michigan. The approximate site location is depicted as Figure 1 in Appendix A. This geotechnical investigation was performed in general accordance with MSG Proposal Number OP221835, dated September 30, 2022 and revised October 4, 2022.

1.2 Project Information

The overall project consists of the full replacement of the existing Gallup Park Bridge over the Huron River. The current plan is to replace the existing three-span timber bridge with a two-span bridge, of structural concrete beams and decking. The proposed bridge is anticipated to have a length of about 144 feet (measured from the back of the abutment walls), and will be a one-lane bridge with pedestrian walkways on either side.

The proposed bridge is planned to be constructed to the west of the existing bridge, while the existing bridge remains in operation. The new bridge is planned to be supported on two abutments and one center pier; we understand the bridge configuration incorporates the use of integral abutments. Driven steel H-piles are planned for the support of the abutments, and driven steel pipe piles with cast-in-place (CIP) concrete for the support of the pier. Return walls on either side of the abutment are planned to be supported by driven steel H-piles. New approach pavement is proposed along Gallup Park Road to facilitate the operation of the new bridge once bridge construction is complete.

1.3 Site Conditions

The existing bridge structure is located within Gallup Park, along Gallup Park Road approximately 850 feet south of Fuller Road. The existing structure over the Huron River carries a single lane for vehicular traffic and sidewalks along both sides of the bridge for pedestrians. The structure is oriented from northeast to southwest across the river. The north approach to the bridge is on a peninsula of land; the bridge itself is the only access for vehicles to the south side of the Huron River.

The three-span timber bridge structure was constructed in about 1976 and consists of glue laminated timber members for the main girders, floor beams, spreader beams, decking and railings. The bridge deck is arched with an elevation difference of about 4.5 feet from the center of the bridge to the abutments. The overall structure length is approximately 120.3 feet between the abutments. The main span between the two piers is 51 feet, and the spans between the abutments and piers are both 34.7 feet. The existing bridge substructures are currently supported by timber piles.

The approaches to the structure consist of asphalt pavement in fair condition, including the pedestrian paths. The areas around the pavement is grass-covered with a few trees and bushes. The top of the existing bridge elevation is approximately 756.0 feet at the center. The bottom of the river elevation is about 738.4 feet. The Ordinary High Water Mark (OHWM) is about 746.5 feet (water surface was recorded at 746.7 feet by others on December 1, 2022). The anticipated 100-year flood water surface elevation is 750.0 feet.

2.0 SUBSURFACE INVESTIGATION

2.1 Field Exploration

The subsurface investigation consists of a total of three (3) soil borings and two (2) hand augers. The soil borings are located near the proposed bridge substructure footings; the hand augers are located within the proposed bridge approach pavement area. The soil borings were designated as SB-01 to SB-03, and the hand augers designated as HA-01 and HA-02. Soil borings SB-01 and SB-03 were advanced to a depth of 70 feet below

ground surface (bgs), while soil boring SB-02 was advanced to 45 feet from the bridge deck. Hand augers extended to depths of 4 to 5 feet bgs. Surveying of the boring and hand auger locations was not performed. The approximate boring locations were field marked by MSG personnel by measuring from existing site features. A Soil Boring Location Plan is presented as Figure 2 of Appendix A.

The drilling operations for this investigation were performed on various days: October 25 and October 26, 2022, December 2, 2022, and February 13, 2023. The soil borings were performed using a track-mounted Geoprobe 3230DT drill rig. The soil borings at the abutments (SB-01 and SB-03) were advanced using 3.25-inch inner diameter hollow stem augers; soil boring SB-02 was advanced through the bridge deck by first coring through the wooden deck and then hydraulically pushing 3.25-inch inner diameter steel casing. The hand augers were advanced by manually turning a 3-inch hand auger bucket. Upon completion, the soil borings were backfilled to the surface with cement-bentonite grout; the hand augers were backfilled with soil cuttings. At SB-02, the wood deck was repaired by securing a sheet of plywood to the surface with screws.

Standard Penetration Test (SPT) and soil sampling was conducted in accordance with ASTM D1586 procedures ("Standard Method for Penetration Tests and Split Barrel Sampling of Soils") and was completed at 2.5-foot intervals for the first 10 feet and at 5-foot intervals thereafter. At each interval, a 2-inch outer diameter split spoon sampler is driven 18 inches into the soil with blows of a 140-pound hammer falling 30 inches. The sampler is generally driven in three successive 6-inch increments with the blows for each 6-inch increment being recorded. The number of blows required to advance the sampler through 12 inches after an initial penetration of 6 inches is termed as the Standard Penetration Test resistance (N-value) and is presented graphically on individual Soil Boring Logs.

Soil samples were recovered using a split-spoon sampling procedure in general accordance with ASTM D1586 Standard ("Standard Method for Penetration Tests and Split Barrel Sampling of Soils"). Soil samples were recovered from the hand auger borings at each apparent soil strata encountered. All collected samples were labeled with the soil boring designation and a unique sample number. The samples were sealed in glass jars in the field to protect the soil and maintain the soil's natural moisture content. All samples were transferred to MSG's laboratory for further analysis and testing. The soil samples collected from this investigation will be retained in our laboratory for a period of 30 days after the date of submission of the final report, after which they will be discarded unless we are notified otherwise.

Whenever possible, groundwater level observations were made during the drilling operations and are shown in the Soil Boring Logs. Prior to backfilling, each open borehole was observed again for groundwater. During drilling, the depth at which free water was observed, where drill cuttings became saturated or where saturated samples were collected, was indicated as the groundwater level during drilling. In particular, in pervious soils (granular soils), water levels are considered relatively reliable when solid or hollow-stem augers are used for drilling. It should be noted that seasonal variations and recent rainfall conditions may influence the groundwater table significantly.

2.2 Laboratory Testing

Each sample recovered from the borings was examined and visually classified according to ASTM D2488. This examination was performed to verify conditions identified within field boring logs, to select samples for further laboratory evaluation, and to perform visual-manual classification of samples not subject to further laboratory testing. During the examination process, the geotechnical engineer finalized the soil boring logs.

Representative soil samples were subjected to laboratory tests consisting of sieve and hydrometer analysis (ASTM D422), Atterberg Limits (ASTM D4318). A brief description of each test performed by MSG is provided in Laboratory Test Procedures in Appendix C.

All soil samples were classified in general accordance with the Unified Soil Classification System (USCS). The USCS group symbol determined from the visual-manual classification is shown in parentheses at the end of the sample description for each layer shown on the Soil Boring Logs.

The results of the soil classification and the laboratory test results are included on the Soil Boring Logs and Soil Laboratory Test Data, which are presented in Appendices B and C, respectively. Also included in Appendix B are General Soil Sample Notes, and a Boring/Well Log Key that illustrates the soil classification criteria and terminology used on the Soil Boring Logs.

3.0 SUBSURFACE CONDITIONS

3.1 Subsurface Classification

The subsurface soil and groundwater conditions encountered in the borings drilled at the site are presented in the Soil Boring Logs contained in Appendix B. The following sections describe the subsurface conditions in terms of major soil strata for the purposes of geotechnical exploration. The soil boundaries indicated are inferred from non-continuous sampling and observations of the drilling operations and/or sampling resistance. The subsurface conditions discussed in the following sections and those shown on the boring logs represent an evaluation of the subsurface conditions based on interpretation of the field and laboratory data using normally accepted geotechnical engineering judgement and common engineering practice standards. The subsurface conditions described herein may vary beyond the boring locations and at different times of the year. A generalized soil profile of the subsurface conditions encountered across the site of the proposed site improvements, beginning at the ground surface and extended downward is as follows:

Surficial Material
Topsoil with a thickness ranging from 4 to 12 inches was encountered at all soil boring and hand auger locations. At boring SB-02, approximately 8 inches of wood decking was recorded, and the river bottom was encountered about 16 feet below the bridge deck surface.

Stratum 1 – Clayey/Silty Sand (SC, SM)
Very loose to loose brown clayey sand or silty sand material with variable amounts of gravel was encountered at the hand auger locations and borings SB-01 and SB-03. This material extended to depths from 3.5 to 15 feet bgs (approximate elevation 747 to 737 feet).

Stratum 2 – Sand (SP, SP-SM, SW-SM)
Loose to very dense brown to gray poorly graded to well graded sand with variable amounts of silt and gravel was encountered below Stratum 1. This material extended to depths from 43.5 feet (approximate elevation 708.5 feet) at boring SB-03, to the termination depths of boring SB-01 and SB-02 at 70 feet and 45 feet bgs, respectively (approximate elevation 679 feet to 711 feet).

Stratum 3 – Silt (ML)
Dense to very dense, gray silt with variable amounts of sand and gravel was encountered below Stratum 2 in boring SB-03. This material extended to the termination depth of boring SB-03 at 70 feet bgs (approximate elevation 682 feet).

3.2 Groundwater Observations

Groundwater was encountered during the drilling operations and summarized in Table 3.2 below. Water levels reported are accurate only for the time and date the borings were drilled. The borings were backfilled and sealed

the same day that they were completed. Long term monitoring of the boreholes was not included as part of the scope of our subsurface investigation.

Table 3.2-1: SUMMARY OF ENCOUNTERED GROUNDWATER CONDITIONS

Boring No.	Depth (ft.) At Time of Drilling	Elevation (ft.) At Time of Drilling
SB-01	3.5	746.5
SB-02	9	747.0
SB-03	6	746.0
HA-01	4	747.0
HA-01	Not encountered	Not encountered

It should be noted that the elevation of the natural groundwater table, and the elevation and quantity of the perched groundwater, is likely to vary throughout the year depending on the amount of precipitation, runoff, evaporation and percolation in the area, as well as on the water level in the surface water bodies in the vicinity affecting the groundwater flow pattern. Long term monitoring with monitoring wells or piezometers would be necessary to accurately assess the groundwater levels and fluctuation patterns at the site.

4.0 ANALYSES AND RECOMMENDATIONS

The following sections discuss in detail the results of our analyses and geotechnical recommendations with respect to the design and construction of the proposed bridge replacement.

4.1 Design Soil Profile

Based on our review of the subsurface soil conditions, we have developed the following design soil profile for this project. This soil profile will be used in the completion of our analysis.

Table 4.1-1: DESIGN SOIL PROFILE

Layer No	Soil Description	Top Elevation (ft)	Thickness (ft)	Total Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)
1	Very loose to loose clayey/silty sand (SC/SM)	750.0	18.0	115.0	0	28
2	Medium dense sand (SP/SP-SM/SW-SM)	732.0	24.0	125.0	0	34
3	Medium dense to dense sand/silt (SP/ML)	708.0	28.0	130.0	0	36

Based on the information provided in the "Gallup Park Vehicle and Pedestrian Bridge Design - Bridge Replacement Plans" dated March 2, 2023, we understand the water surface elevation is 746.7 feet; the 100-year flood elevation is 750.0 feet.

4.2 Foundation Recommendations

Foundation recommendation presented herein are based on the information provided in the "Gallup Park Vehicle and Pedestrian Bridge Design - Bridge Replacement Plans" dated March 2, 2023, relevant bridge design parameters used in our analyses are as follows:

Table 1.2-1: BRIDGE DESIGN PARAMETERS

	Abutment A (South)	Pier 1	Abutment A (North)
Proposed Surface Elevation (at ref. point)	756.93 feet	758.69 feet	756.93 feet
Bottom of Pile Cap Elevation	744.51 feet	751.02 feet	744.51 feet
Streambed Elevation	n/a	738.4 feet	n/a
Footing Length	38.0 feet	38.0 feet	38.0 feet
Return Wall Footing Length	15.0 feet	n/a	15.0 feet
Total Axial Load, Service I	740 kips	1,070 kips	740 kips
Total Horizontal Load, Service I	200 kips	300 kips	200 kips

In general, based on the soil conditions and anticipated loading conditions, driven piles are the preferred foundation option for support of these substructures, due to the presence of very loose and loose granular soil at the foundation elevation and the potential for scour to occur. In addition, we understand that the bridge design incorporates integral abutments where the bridge deck is connected monolithically with the abutment walls.

4.2.1 SHALLOW FOUNDATIONS

A spread foundation system may be a feasible option for the proposed substructures, though several factors may limit their use, including right-of-way constraints, design scour elevation, and adjacent utilities, among others. For spread footings, the bottom of the footing elevation cannot be higher than the design scour elevation. In the presence of a scour event, the supporting soil material can erode and lead to a foundation support failure. The bottom of the footing must extend below the design scour elevation (which may not be economical if deeper excavations and more aggressive groundwater control is required), or deep foundations should be considered.

Based upon our review of the existing soil conditions in the planned foundation areas, the soils encountered at the anticipated abutment foundation depth consist of very loose to loose clayey or silty sand. We recommend that shallow foundations should be designed for maximum allowable bearing capacity of 2,000 psf. Soils that are loose require compaction to prepare the bearing soils for the foundation loads. Note that without groundwater control, moisture conditioning of the subgrade soils for compaction operations will be difficult.

If it is necessary to achieve a higher soil bearing capacity, the footing size can be increased or the loose soils should be undercut and replaced with dense engineered fill. We recommend MSG be retained to evaluate the foundation subgrades to determine the undercut locations and depths and perform the compaction testing of the engineered fill.

4.2.2 PILE FOUNDATIONS

Deep foundations are recommended for support of structures where building spread footings may not be feasible or cost prohibitive. The preferred type of deep foundation to support the bridge substructures are driven piles. Due the presence of mainly granular soils encountered in the soil borings for this project, Norland/Thurman method in cohesionless soils was utilized for the static analysis of the driven piles in accordance with the American Association of State Highway and Transportation Officials Load Resistance Factor Design - Bridge Design Specifications, 9th Edition (AASHTO LRFD). MSG has determined the factored nominal resistances of the pile sections using the following assumptions:

- The piles are axially and laterally loaded;
- Loss of section due to deterioration throughout the life of the structure is not appreciable;
- The pile is fully embedded in granular material along its entire length;

- For the above mentioned method, a resistance factor of 0.45 was used in accordance with AASHTO LRFD (Table 10.5.5.2.3.1 Resistance Factors for Driven Piles);
- Groundwater depth was considered at elevation 746.7 feet;
- Piles are driven into the dense granular soil (Stratum 3).

We estimated the factored nominal resistance (R_R) for selected piles driven to refusal using the guidelines in Section 7.03.09 of the Michigan Design Manual. The resistance factor for driven piles (φ_{dyn}) used in the design determines the construction quality control method that must be used to certify the nominal pile driving resistance (R_{ndr}). In general, the resistance factor for the dynamic analysis of driven piles is 0.50 assuming that the nominal pile driving resistance is verified using the FHWA-modified Gates Dynamic Formula (Gates). However, if dynamic test with signal matching (PDA) is proposed, a resistance factor of 0.65 can be used in the design. The results of our estimation for common H-pile sizes are summarized in Table 4.2.2-1.

Table 4.2.2-1: VERTICAL FACTORED NOMINAL DRIVING RESISTANCE

Pile	Nominal Pile Driving Resistance, R_{ndr} (kips)	Factored Nominal Driving Resistance, R_R (kips)	
		Gates (φ_{dyn} = 0.50)	PDA (φ_{dyn} = 0.65)
14" CIP Pipe	350	175	225
16" CIP Pipe	400	200	260
HP12x53	350	175	225
HP12x74	500	250	325
HP14x73	500	250	325
HP14x89	600	300	390

The factored nominal axial resistances were estimated based on pile length and tip elevation for various pile types and are presented in Table 4.2.2-2 and 4.2.2-3. We note that no reductions in factored axial resistance of the piles have been made due to scour. If the scour occurs below the anticipated design scour elevation, loss of lateral support may result in pile buckling, as well as loss of pile capacity due to reduction in skin friction. Appropriate scour protection shall be included in the design and regular inspection, maintenance and repair of the scour protection shall be performed. Additional vertical loading on the piles induced by downdrag force is not anticipated.

Table 4.2.2-2
SUMMARY OF PILE AXIAL RESISTANCE - ABUTMENTS

Pile	Pile Top Elevation (feet)	Factored Nominal Axial Resistance (kip)			
		Pile Length = 50 ft Tip EL = 694.5 ft	Pile Length = 55 ft Tip EL = 689.5 ft	Pile Length = 60 ft Tip EL = 684.5 ft	Pile Length = 65 ft Tip EL = 679.5 ft
14" CIP Pipe	744.5	130	150	170	195
16" CIP Pipe	744.5	170	200	230	260
HP12x53	744.5	65	80	100	115
HP12x74	744.5	75	95	110	135
HP14x73	744.5	85	105	130	155
HP14x89	744.5	95	115	140	165

Table 4.2.2-3
SUMMARY OF PILE AXIAL RESISTANCE - PIER

Pile	Pile Top Elevation (feet)	Factored Nominal Axial Resistance (kip)			
		Pile Length = 55 ft Tip EL = 696.0 ft	Pile Length = 60 ft Tip EL = 691.0 ft	Pile Length = 65 ft Tip EL = 686.0 ft	Pile Length = 70 ft Tip EL = 681.0 ft
14" CIP Pipe	751.0	105	125	145	165
16" CIP Pipe	751.0	135	160	190	220
HP12x53	751.0	50	60	75	95
HP12x74	751.0	55	70	90	110
HP14x73	751.0	65	80	100	125
HP14x89	751.0	70	90	110	135

Due to the granular nature of the encountered soils, we do not anticipate any significant settlement of the abutment substructures bearing on pile foundation systems. Elastic compression of the piles should be 0.5 inch or less.

A factored uplift resistance of 30 kips per pile at the abutments and 25 kips per pile at the pier can be considered in the substructure design. The uplift resistance is based on applying an uplift factor (φ_{up}) of 0.25 to the side resistance of 65-foot long piles at the abutment and 70-foot long piles at the pier. However, the structural connection between the pile and the pile cap will limit the uplift capacity. If it is determined that uplift is an issue, a detailed analysis for uplift can be performed.

MSG performed a lateral capacity evaluation of the proposed pile sections using LPILE software by Ensoft, Inc. The nominal lateral capacities represent the load anticipated to generate a lateral displacement of 1 inch. A concrete strength of 4,000 psi and steel thickness of 0.5-inch was used in the analysis for the CIP pipe piles. The lateral loads have been determined assuming the axial compressive loads acting on the piles are at the maximum allowable capacities which presents the worst case loads. Note that for integral abutments, the lateral resistance of the pile should consider a fixed connection. Based on the maximum factored nominal axial loads and the assumption that the pile head deflection is limited to 1 inch, the lateral capacities for the piles are presented in Table 4.2.2-4. We note that no reductions in the lateral resistance of the piles have been made due to scour.

If the lateral load capacity of a vertical pile is used to resist design forces, then only transient forces, such as wind loading, should be applied to this lateral capacity. Substantial lateral loading should be resisted by battered piles and not by the lateral load resistance of vertical piles.

Table 4.2.2-4
MAXIMUM NOMINAL LATERAL RESISTANCE (PIN CONNECTION) – MAXIMUM DEFLECTION OF 1-INCH

Pile	Abutment			Pier		
	Vertical Pile Maximum Nominal Lateral Resistance (kip)	Minimum Pile Tip Depth (feet)	Elevation of Minimum Pile Tip Depth (feet)	Vertical Pile Maximum Nominal Lateral Resistance (kip)	Minimum Pile Tip Depth (feet)	Elevation of Minimum Pile Tip Depth (feet)
14" CIP Pipe	14.9	32.5	712.0	1.5	42.0	709.0
16" CIP Pipe	19.2	37.0	707.5	2.6	44.0	707.0
HP12x53	12.0	29.0	715.5	0.4	39.0	712.0
HP12x74	13.8	31.0	713.5	0.7	41.0	710.0
HP14x73	16.3	33.0	711.5	1.0	42.0	709.0
HP14x89	17.9	34.0	710.5	1.2	43.0	708.0

Table 4.2.2-5
MAXIMUM NOMINAL LATERAL RESISTANCE (FIXED CONNECTION) – MAXIMUM DEFLECTION OF 1-INCH

Pile	Abutment			Pier		
	Vertical Pile Maximum Nominal Lateral Resistance (kip)	Minimum Pile Tip Depth (feet)	Elevation of Minimum Pile Tip Depth (feet)	Vertical Pile Maximum Nominal Lateral Resistance (kip)	Minimum Pile Tip Depth (feet)	Elevation of Minimum Pile Tip Depth (feet)
14" CIP Pipe	42.4	33.5	711.0	8.8	43.0	708.0
16" CIP Pipe	53.2	38.0	706.5	12.6	46.0	705.0
HP12x53	32.6	31.5	713.0	5.4	40.0	711.0
HP12x74	40.5	33.0	711.5	7.5	42.5	708.5
HP14x73	45.2	35.0	709.5	8.9	43.5	707.5
HP14x89	51.8	36.0	708.5	10.4	45.0	706.0

At the pier, the anticipated elevation of the top of the pile is planned at about 751 feet. With the bottom of the river situated at elevation 738.5 feet, the top 12.5 feet of the pile would not be in contact with any soil that would contribute to the lateral resistance of the pile. Therefore, the lateral resistance of piles at the pier are considerably less than at the abutment. In order to increase the lateral resistance, we recommend reducing the unsupported length of pile or utilizing battered piles. For the battered piles, the lateral loading will be dependent on the axial load applied to the pile.

Final pile embedment should be based on the observed pile performance during driving and may deviate from preliminary estimated pile lengths. However, the maximum pile tip elevation is the minimum depth that a vertical pile must be driven to achieve the lateral resistance presented in Tables 4.2.2-4 and 4.2.2-5. Generally, piles are driven deeper than the minimum pile depth to achieve the required axial resistance, but if the required number of blows/ft is satisfied prior to the minimum pile depth, the pile will still need to be driven to the minimum pile depth. Piles that are terminated with tip elevations above maximum pile tip elevation will have a reduced lateral load capacity.

Based the final pile configuration, pile group effect may need to be evaluated for the foundation design. We recommend that the piles be spaced at least 3 pile diameters from center to center to provide sufficient room for pile driving equipment and to maintain the integrity of the natural sand.

The pile capacity considerations discussed in this report are based on static analysis methods. The final set or driving criteria for pile foundations should be determined using specified quality control methods. The quality control method should be performed to determine the pile driving criteria and if the proposed pile driving system is capable of obtaining the design working loads without damaging the pile. The quality control methods should be performed by a qualified licensed professional engineer. However, this analysis requires specific information on the type of hammer, cushion materials, and other information usually not available until a pile contractor is selected.

The contractor should submit a wave equation analysis incorporating the pile driving system that is anticipated to be used on the project. The wave equation analysis must demonstrate that the anticipated system is capable of developing the ultimate pile bearing capacity without damaging the pile or the protective tip. The maximum compressive driving stress in the pile must not exceed 90% of the yield stress of the steel in the pile. The energy delivered to the pile head should be verified by suitable methods. In general, the Resistance Factor for Driven Piles (φ_{dyn}) is 0.50 assuming that the Nominal Pile Driving Resistance (R_{ndr}) is verified using the FHWA-modified Gates Dynamic Formula. The Resistance Factor (φ_{dyn}) is 0.65 when dynamic testing with signal matching (PDA testing) is used and (φ_{dyn}) is 0.80 with static load tests. Pile load testing should be performed in accordance with the 2015 Michigan Building Code and MDOT Bridge Design Manual or as determined by the structural engineer of record.

All production piles must be driven with the same or identical hammer and with the same settings, as was used in the analysis or test pile program. If more than one type of pile driving hammer is used, a separate analysis and energy verification is required for each hammer. Pile driving may result in slight heave of previously driven piles. To avoid detrimental effects, all of the piles may be re-tapped at the end of the pile driving activities.

Obstruction to pile penetration could be encountered above the design pile tip elevation. For piles where refusal is encountered at elevations significantly above the expected elevations, the pile should be presumed to have stopped on a cobble, boulder or other material and should be evaluated to determine its load carrying capacity. Based on the soil boring information, harder driving conditions should be anticipated within the dense to very dense sand or silt layers. Protective cast steel point protectors should be used on all piles, consistent with the MDOT Special Provision for Structural Steel Foundation Piling Material, dated May 1, 2007.

4.3 Scour Protection

Grain size analyses were performed on two soil samples of sediment to evaluate the gradation of the soils near the bridge. One sediment sample analyzed was taken from the first SPT split spoon in boring SB-02. The second sediment sample analyzed was taken from the top 12 inches of the river bed at the northern shoreline using a hand-auger bucket.

The diameter of the median grain size (D_{50}) of the native material is needed for use in the scour analysis. Based on the results of the grain size analyses, the D_{50} ranged from 0.819 and 1.576 millimeters (mm). The percent of fines (smaller than the #200 sieve) ranged between 4.0 and 5.6%. Graphical results of the grain size analyses are included in Appendix C.

A hydraulic study and scour analysis for the proposed bridge shall be performed. As the proposed abutments and pier are in or adjacent to the waterway, the tops of the proposed abutment footings shall be situated at or

below the estimated elevation of scour. In addition, countermeasures to prevent scour shall be incorporated according to MDOT, FHWA and AASHTO standards. Regular inspection, maintenance and repair of the scour protection should be performed during the life of the structure as disturbance and loss of the scour protection measures may occur over time.

4.4 Lateral Earth Pressures

Lateral earth pressures (horizontal stresses) are developed during soil displacements (strains). Lateral earth pressure for design is determined utilizing an earth pressure coefficient to relate horizontal stress to vertical stress. Three separate earth pressure coefficients are utilized to determine lateral earth pressure: at-rest; active; and passive. Active earth pressure addresses displacement of a vertical soil face away from the retained soil. Passive earth pressure addresses displacement against the retained soil. At-rest earth pressure addresses a negligible displacement scenario. Walls that are restrained at the top and bottom such that negligible movement is allowed to occur should be designed using at-rest earth pressures.

Applied horizontal stress can be determined by multiplying the appropriate earth pressure coefficient by the applied vertical stress. Earth pressure coefficients are a direct function of the internal friction of a soil. Laboratory testing to determine internal friction angles for soil was not performed. However, index laboratory and field data obtained can be utilized to approximate earth pressure coefficients based upon empirical relationships.

To minimize lateral earth pressures, MSG recommends the zone adjacent to the abutment walls and wingwalls be backfilled with MDOT Class II granular fill. To provide effective drainage, a zone of free-draining gravel (similar to MDOT 6AA gravel) should be used directly adjacent to the walls with a minimum thickness of 18 inches. This granular zone should drain to weepholes or a pipe drainage system to prevent hydrostatic pressures from developing against the walls.

The type of backfill beyond the free-draining granular zone will govern the magnitude of the pressure to be used for structural design. Clean granular soil is recommended as the backfill material against retaining structures to minimize lateral earth pressures. Lateral earth pressure coefficients for granular are provided in Table 4.4-1. The equivalent fluid pressure can be determined by multiplying the total unit weight by the appropriate pressure coefficient.

Table 4.4-1: RECOMMENDED LATERAL EARTH PARAMETERS

Clean Granular Fill Soil	
Total Unit Weight (pcf)	125
Internal Friction Angle (°)	30
At-rest Pressure Coefficient, K_o	0.5
Active Pressure Coefficient, K_a	0.3
Passive Coefficient, K_p	3.0
Concrete/Soil Friction Coefficient	0.50

The coefficients of friction between concrete and soil subgrade were also provided in the table above. These friction coefficients can be used for evaluating the factor of safety against sliding of foundations. The recommended minimum safety factor against sliding is 1.5. Passive pressure resistance of the top 3.5 feet below final grade should generally be neglected in designing the abutment walls and return walls to resist sliding failure due to the freeze-thaw cycle that can significantly weaken soils and the potential for the material to be removed at a future date for installation of utilities or other construction-related activities.

The recommended lateral earth pressures are applicable for the design of standard gravity or cantilevered retaining structures or below grade walls. The design of braced retaining walls or flexible modular retaining walls require further analysis as the earth pressures developed are different for these wall systems. Any additional lateral earth pressure due to surcharge loading conditions including, but not limited to, sloping backfill, traffic loading, and construction loads, should be incorporated into the wall design.

4.5 Global Stability

Global stability of the abutment sections were performed using the Slide2 software by Rocscience. This program analyzes the stability of soil slip surfaces and calculates the safety factor of circular or non-circular failure surfaces in soil or rock slopes. The software uses several different analysis methods, including Bishop Simplified, Janbu Simplified, and Spencer methods, which are identified as acceptable methods in AASHTO LRFD (Section 11.6.2.3).

The constructed abutment sections at the proposed bridge were analyzed assuming circular-shaped failure surfaces to verify stability. Since clay is not present at the site, the soil conditions post-construction are anticipated to be similar to long-term conditions. As such, the stability model assumes one soil condition. In addition, the stability model assumes abutments are supported on piles, and that the foundation loads are transferred to the piles and not bearing directly on the soil. However, the driven pile elements were not considered in the model; therefore, the calculated factor of safety does not rely on the pile shear strength to resist ground movement. A surcharge load of 360 psf was considered for the analyses to simulate the anticipated vehicular traffic along the roadway.

For both Abutment A (south) and Abutment B (north) post-construction, the factor of safety reported from the analyses ranged from 1.50 to 1.53, respectively. These factors of safety are considered acceptable. Proper maintenance of the slopes and streambed, including scour countermeasures, is required for long-term success in maintaining global stability.

4.6 Pavements

Site preparation recommendations presented in Section 4.7 shall be followed to provide subgrade conditions suitable for pavement support. Adequate drainage should be provided to the pavement structure to ensure a successful pavement service life is achieved. MSG recommends that underdrains be utilized around catch basins and in other low areas of the proposed pavements to limit the accumulation of water below the pavement structures. Surface edge drains should be used at curbs.

California Bearing Ratio (CBR) testing was not performed. Based on the soil characteristics from the geotechnical investigation and anticipated proposed elevations, a design CBR value of 6 was assumed. This design CBR value assumes any loose/soft soils have been sufficiently compacted or removed and replaced.

Pavement design information was not provided for this project. The pavement design input parameters are established based on the procedures contained in the 1993 Guide for Design of Pavement Structures by AASHTO. For the basis of the design, MSG assumed the following input parameters:

Table 4.6-1: ASSUMED PAVEMENT DESIGN PARAMETERS

Design Life	20 Years
Design ESAL	100,000 (Light Duty); 1,000,000 (Heavy Duty)
Reliability	80 %
Original Serviceability Index	4.2 (Flexible Paving); 4.5 (Rigid Paving)
Terminal Serviceability Index	2.0
Overall Standard Deviation	0.45 (Flexible Paving); 0.35 (Rigid Paving)

For flexible pavement design, MSG assumed structural number coefficients of 0.42 and 0.14 for asphalt concrete and aggregate base, respectively. Based on the above assumptions, recommended flexible pavement sections are provided in the following table.

Table 4.6-2: RECOMMENDED FLEXIBLE PAVEMENT SECTIONS

Pavement Materials*	Light Duty	Heavy Duty
Surface Course	2.0	1.5
Intermediate Course	2.0	3.5
Aggregate Base (MDOT 21AA)	8.0	10.0

* Use pavement materials as outlined above, or engineer/owner approved equivalent.

For rigid pavement design, MSG assumed a concrete elastic modulus (E_c) of 5,000,000 psi, a concrete rupture modulus (S'_c) of 700 psi and a load transfer coefficient (J) of 2.7. Based on the above assumptions, recommended rigid pavement sections are provided in the following table.

Table 4.6-3: RECOMMENDED RIGID PAVEMENT SECTIONS

Pavement Materials*	Light Duty	Heavy Duty
Portland Cement Concrete	6.0	6.0
Aggregate Base (MDOT 21AA)	6.0	8.0

* Use pavement materials as outlined above, or engineer/owner approved equivalent.

Final pavement elevations should be designed to provide positive surface drainage. The minimum surface slope of 1.5 percent is recommended. The pavement surface should be smooth, free of roller marks or depressions, and should not contain any irregularities which would pond or impede water flow.

4.7 Site Preparation

The following are our recommendations for the site soil preparation based on the geotechnical investigation performed for this project. These recommendations should be incorporated into the project specifications.

Before proceeding with construction, surface soils, vegetation, topsoil, root systems, refuse, asphalt, concrete including any existing abandoned buried foundations, and other deleterious materials should be stripped from the proposed construction areas. The contractor is responsible for controlling surface water at the construction site using Contractor's Means and Methods. Every effort should be taken to minimize disturbance during compaction or over excavation and storm water should be diverted away from the construction perimeter or pumped out using a sump to accommodate proper site preparation and soil compaction.

Utilities exist within or in the vicinity of the construction area. Plans shall be made to protect existing utilities and any other feature or structure within or in the vicinity of the construction area.

Generally, areas exposed by stripping operations on which subgrade preparations are to be performed should be compacted in place to 98 percent of Standard Proctor or 95 percent of Modified Proctor. Any backfill placed in areas near the proposed bridge foundation, head walls and wing walls of the bridge, should be MDOT Class II granular material. The fill material should be free of organics, debris, frozen soils or any other deleterious materials. Existing granular material may be used as backfill material. The fill material should be verified by an approved testing laboratory or by a geotechnical engineering firm.

It is recommended that the prepared subgrade for pavement areas be proof-rolled to detect any unstable areas. Proof-rolling should be accomplished by making a minimum of two complete passes in each of two perpendicular directions with a fully-loaded tandem-axle dump truck, or other approved pneumatic-tired vehicle, with a minimum weight of 20 tons. If proof-rolling reveals the presence of unstable areas within the subgrade, certain remedial measures will be required to stabilize the subgrade. Depending on the severity of distress encountered during proof rolling, undercutting of 24 to 36 inches below subgrade and backfilling with engineered fill as outlined in Section 4.5 may be performed. If an undercut and replacement of the top 24 to 36 inches fails to stabilize the subgrade, use of granular backfill with geogrid stabilization may be required. Undercuts may be reduced to 12 to 18 inches if geogrid and granular backfill is utilized. Alternately, chemical stabilization of the upper 12 to 18 inches with cement or lime may be performed. The actual undercut depths and/or subgrade remediation measures required should be determined by the on-site Geotechnical Engineer or a designated representative.

4.8 Fill Placement and Engineered Fill Requirements

Any fill placed in areas which will support new foundations and pavement should be free of organics, debris, frozen soils or any other deleterious materials. On-site natural and inorganic clay soils are generally considered suitable for reuse as fill for non-paved or landscaped areas but may require moisture conditioning effort. High plasticity clay or organic soils, where encountered, are not considered suitable for reuse as fill.

The fill material should be verified by an approved testing laboratory or by a geotechnical engineering firm. All fine grained fill soils should be checked for plasticity index and liquid limit before placement. Cohesive fill materials should have a liquid limit less than 40 percent and plasticity index less than 20 percent (i.e., non-expansive).

Coarse crushed granular material is recommended as fill for utility trench backfill and as aggregate base material for pavement and slab-on-grade areas. The granular material shall consist of natural aggregate materials that meet the gradation requirements of MDOT 21AA or engineer approved equivalent. Typical lift thickness utilized for this material is 8 inches. In utility trenches, granular backfill material should extend at least two pipe diameters above the pipe's crown.

Fill should be compacted to 98 percent of the Standard Proctor or 95 percent Modified Proctor maximum dry density and should be compacted at ± 2 percent of optimum moisture content. Fill materials should be placed in horizontal lifts and adequately keyed into stripped and scarified subgrade soils and adjacent fill. Proper drainage should be maintained during and after fill placement to prevent water from impacting compaction efforts or long-term fill integrity. A qualified geotechnical consultant should be retained to monitor all fill placement in order to assure that materials are placed according to their suitability and compaction requirements are achieved. In-place soil moisture/density testing should be performed during fill placement activities to assure proper fill compaction. A commonly used testing criterion is one test per 2,500 square feet per lift in areas to support proposed structures and one test per 5,000 square feet in parking lots, driveways, exterior slabs, etc., with a minimum of three tests per lift. Areas that do not achieve compaction requirements after initial placement should be re-compacted to meet project requirements.

The actual lift thickness suitable for fill placement is dependent upon the soil type, compaction equipment, and the compaction specification. In general, fill should be placed in 9-inch loose thickness lifts (8-inch compacted); assuming appropriately weighted and ballasted compaction equipment is utilized. In confined areas where hand operated compaction equipment is required, 4-inch and 6-inch loose thickness lifts should be utilized for hand operated vibratory plate compactors and hand operated vibratory drum rollers weighing at least 1,000 pounds, respectively. Sand fills should be compacted using smooth vibratory rollers. Clay fills should be compacted using a sheep foot compactor. The geotechnical engineer, as part of the construction monitoring, should review the equipment utilized for compaction to confirm suitability relative to the specified loose lift thickness. If necessary, the geotechnical engineer will recommend a revised lift thickness suitable to the equipment performing compaction.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Excavation and Slope

Familiarity with applicable local, state and federal safety regulations, including current OSHA excavation and trench safety is vital. Therefore it should be a requisite for both the Owner and Contractor with the Contractor by and large being responsible for the safety of the site. Activities at the site, including demolition, foundation construction, utilities, and site preparation, may require excavations at significant depths below the ground surface. Slope height, slope inclination, and excavation depth should in no case exceed those specified in local, state, or federal safety (OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 Subpart P) regulations. Such regulations are strictly enforced and, if not followed, the Owner, Contractor, or earthwork or utility Subcontractors could be liable for substantial penalties.

Flatter slopes are required where soils are stockpiled or in the vicinity of existing structures. If sufficient room is not available for sloping the excavation walls, temporary shoring will be required. It is our recommendations that any excavation in excess of 5 feet in depth or excavations requiring temporary shoring should be designed by a professional engineer.

Alternatively, vertical excavation may be performed if steel sheet pile is used to retain the soils and constructability concerns are addressed. Steel sheeting should be designed to account for the lateral soil pressure, groundwater hydrostatic loading, and minimize deflections at the top of the sheeting to no more than 2 inches. Steel sheeting is recommended to be left in place after construction of the bridge foundations.

For excavations where groundwater control is necessary, a cofferdam will be required. Cofferdams should be designed with required bracing to maintain acceptable stresses on the vertical members.

5.2 Groundwater Control

Groundwater was encountered during drilling operations as presented in Table 3.2-1. Typically, the groundwater elevation fluctuates and is higher during the spring and lower in summer and early fall. The location of the level of groundwater is of importance in foundations for a number of reasons. Most importantly, the bearing capacity of the soil is affected by the presence of a high water table, decreasing the bearing capacity. The OHWM elevation is about 746.5 feet, which is higher than the anticipated bottom of foundations elevation. Therefore, groundwater management/dewatering will be required.

The amount and type of dewatering required during construction will depend on the weather, groundwater levels at the time of construction, and the effectiveness of the Contractor's techniques in preventing surface water runoff from entering open excavations and lowering the groundwater.

Cofferdams will be necessary to divert river water away from the excavation areas for the foundations. Cofferdam design is beyond the scope of this report. Proper management of surface water flows should also be implemented. **A tremie seal (concrete slab) will also be required to seal the bottom of cofferdam and control intrusion of water into the bottom of excavation area.** This will allow the excavation to be dewatered prior to the construction of the pile cap or footings. The tremie seal should be designed to resist the hydrostatic pressure at the bottom of the tremie in accordance with Section 7.03.06 of Michigan Bridge Design Manual. If groundwater is not adequately controlled, bottom instability of the excavation, groundwater piping, or disturbance of the subgrade may occur.

5.3 Geotechnical Instrumentation and Monitoring Program

Driven piles shall not be located within a 25 feet radius of existing spread footings, critical utilities, or in-service pavements without mitigation and/or vibration and settlement monitoring. If utilities and structures are in close proximity to the construction activities (specifically excavation, driven piles and sheet pile installation), we recommend that a monitoring program be established to observe/inspect the stability and integrity of nearby structures and utilities. The monitoring program shall include the following:

1. Perform a pre-construction condition survey of the existing structures.
2. If needed, install crack-meters.
3. Installation of survey monitoring points.
4. During construction and sheet pile driving operations:
    - Take survey data to inspect any soil subsidence and/or structural settlement.
    - Inspect crack-meters to monitor any crack openings.
    - Monitor vibration using blast-mate.
5. Perform a post-construction condition survey of the existing structures.

For the vibration monitoring, the contractor should submit a geotechnical instrumentation and monitoring plan for engineering review. Threshold and action limits should be included as part of the plan.

6.0 GENERAL QUALIFICATIONS AND LIMITATIONS

The evaluations, conclusions and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the geotechnical investigation, our understanding of the project and our experience during previous work, with similar sites and subsurface conditions. Data used during this exploration included:

- Three (3) exploratory borings and two (2) hand augers performed during this investigation;
- Observations of the project site by our staff;
- Results of laboratory soil testing; and,
- Results of the geotechnical analyses.

The subsurface conditions discussed in this report and those shown on the boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. MSG is not responsible for independent conclusions, opinions, or recommendations made by others based upon information presented in this report.

We strongly recommend the final project plans and specifications be reviewed by MSG's geotechnical engineer to confirm that the geotechnical aspects are generally consistent with the recommendations of this report. In particular, the specifications for excavation and foundation construction should be prepared and/or reviewed by MSG's

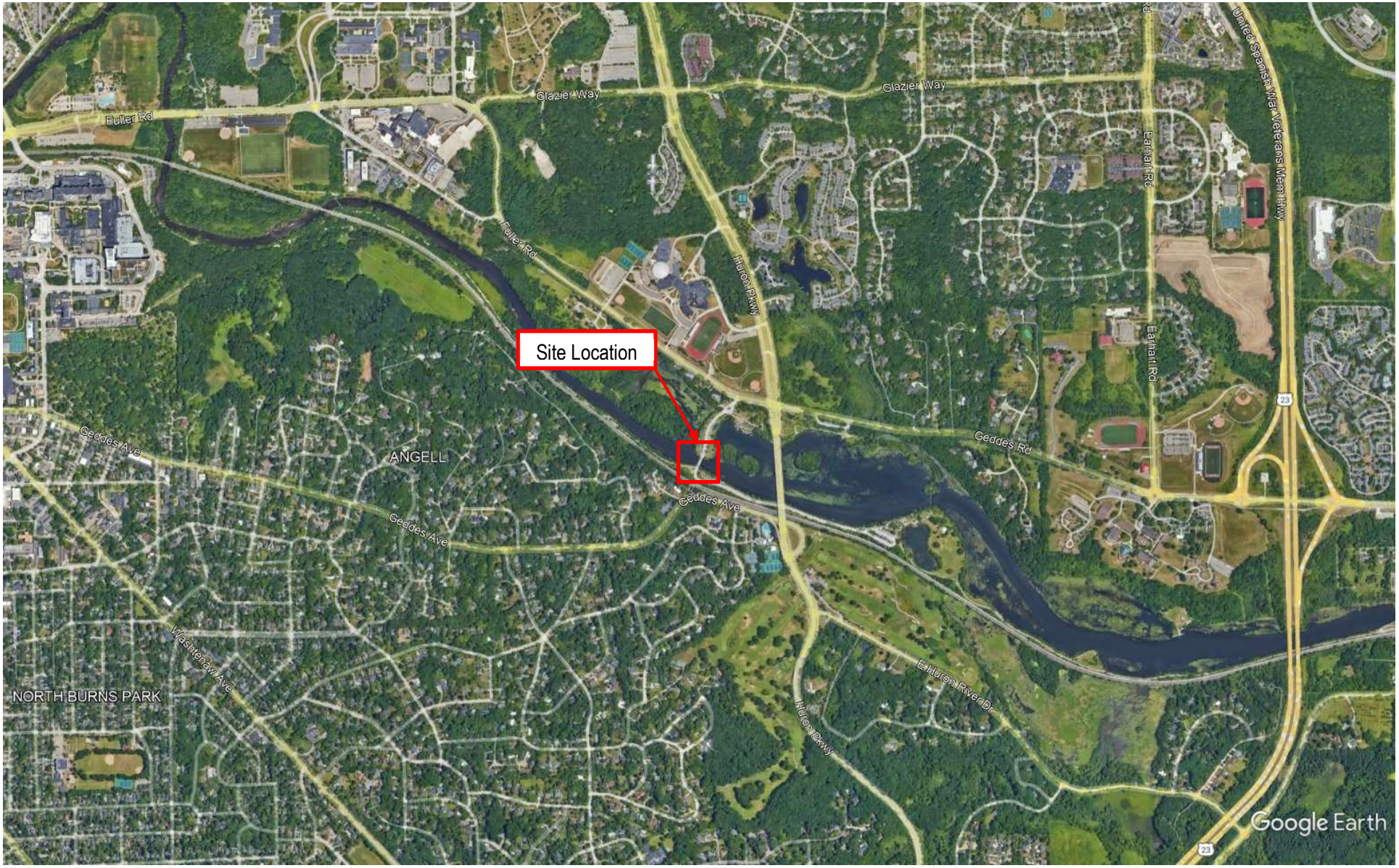
Geotechnical Engineer of Record. In addition, we recommend site subgrade preparation, fill compaction activities, and foundation installation activities should be monitored by MSG's geotechnical engineer or his/her representative.

This report and evaluation reflects only the geotechnical aspects of the subsurface conditions at the site. Review and evaluation of environmental aspects of subsurface conditions are beyond the scope of this report.

APPENDIX A

FIGURE 1 – SITE LOCATION MAP

FIGURE 2 – SOIL BORING LOCATION PLAN



Mannik Smith GROUP
2365 Haggerty Road South
Canton, Michigan 48188
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Fax: 734-397-3131
www.MannikSmithGroup.com

Figure 1: Site Location Map
Gallup Park Bridge Replacement
Ann Arbor, Michigan
MSG Project Number: W2220001

No Scale
Map Adapted from
Google Earth 2023 ®

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Mannik Smith GROUP
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Tel: 734-397-3100
Fax: 734-397-3131
www.MannikSmithGroup.com

Figure 2: Soil Boring Location Map
Gallup Park Bridge Replacement
Ann Arbor, Michigan
MSG Project Number: W2220001

No Scale
Map Adapted from
Google Earth 2023 ®

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APPENDIX B

SOIL BORING LOGS

GENERAL SOIL SAMPLE NOTES

Unless noted, all terms utilized herein refer to the Standard Definitions presented in ASTM D653.

Standard Penetration Test (ASTM D1586): A 2.0-inch outside-diameter (O.D.), 1-3/8-inch inside-diameter (I.D.) split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

COHESIVE SOILS			COHESIONLESS SOILS	
Consistency	Approximate Range of N	Unconfined Compressive Strength (psf)	Density Classification	Approximate Range of N
Very Soft	0 – 1	Below 500	Very Loose	0 – 4
Soft	2 – 4	500 – 1,000	Loose	5 – 10
Medium Stiff	5 – 8	1,000 – 2,000	Medium Dense	11 – 30
Stiff	9 – 15	2,000 – 4,000	Dense	31 – 50
Very Stiff	16 – 30	4,000 – 8,000	Very Dense	Over 50
Hard	31 – 50	8,000 – 16,000		
Very Hard	Over 50	Over 16,000		

CLASSIFICATION

The major soil constituent is the principal noun, i.e. sand, silt, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor Constituents (percent by weight)
Trace – 1% to 11%	Trace – 1% to 11%
Adjective – 12% to 35% (clayey, silty, etc.)	Little – 12% to 22%
	Some – 23% to 33%
And – Over 35%	

PARTICLE SIZES

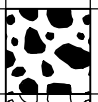
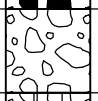
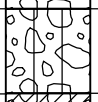
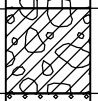
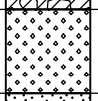
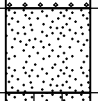
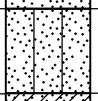
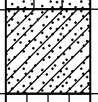
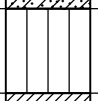
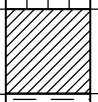
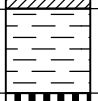
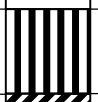
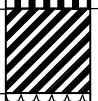
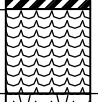
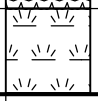
Boulders		- Greater than 12 inches (305 mm)
Cobbles		- 3 inches (76.2 mm) to 12 inches (305 mm)
Gravel:	Coarse	- ¾ inches (19.05 mm) to 3 inches (76.2 mm)
	Fine	- No.4 (4.75 mm) to ¾ inches (19.05 mm)
Sand:	Coarse	- No. 10 (2.00 mm) to No. 4 (4.75 mm)
	Medium	- No. 40 (0.425 mm) to No. 10 (2.00 mm)
	Fine	- No. 200 (0.074 mm) to No. 40 (0.425 mm)
Silt		- 0.005 mm to 0.074 mm
Clay		- Less than 0.005 mm

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier: i.e., silty clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils: i.e., silty clay, trace sand, little gravel.

If sand particle size is greater than 11% by weight of the total sample weight, the adjective (i.e., fine, medium or coarse) is added to the soil description for the sand portion of the sample, provided sand is the major or second major constituent.

SAMPLE DESIGNATIONS

AS	Auger Sample - directly from auger flight	ST	Shelby Tube Sample - 3-inch diameter unless otherwise noted
BS	Miscellaneous Samples - Bottle or Bag	PS	Piston Sample - 3-inch diameter unless otherwise noted
MC	Macro-Core Sample - 2.25-inch O.D., 1.75-inch I.D., 5 feet long polyethylene liner	RC	Rock Core - NX core unless otherwise noted
LB	Large-Bore (Micro-Core) Sample - 1-inch diameter, 2 feet long polyethylene liner	CS	CME Continuous Sample - 5 feet long, 3-inch diameter unless otherwise noted
SS	Split Spoon Sample - 1-inch or 2-inch O.D.	HA	Hand Auger
LS	Split Spoon (SS) Sampler with 3 feet long liner insert	DP	Drive Point
NR	No Recovery	CM	Coring Machine

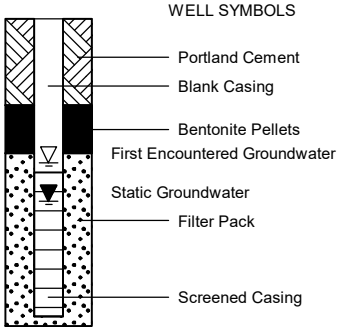
MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LESS THAN 15% FINES	GW		WELL-GRADED GRAVELS WITH OR WITHOUT SAND
			GP		POORLY-GRADED GRAVELS WITH OR WITHOUT SAND
		GRAVELS WITH 15% OR MORE FINES	GM		SILTY GRAVELS WITH OR WITHOUT SAND
			GC		CLAYEY GRAVELS WITH OR WITHOUT SAND
	SANDS MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 15% FINES	SW		WELL-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP		POORLY-GRADED SANDS WITH OR WITHOUT GRAVEL
		SANDS WITH 15% OR MORE FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OL		ORGANIC SILTS OR CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CH		INORGANIC CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OH		ORGANIC SILTS OR CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

SYMBOLS KEY

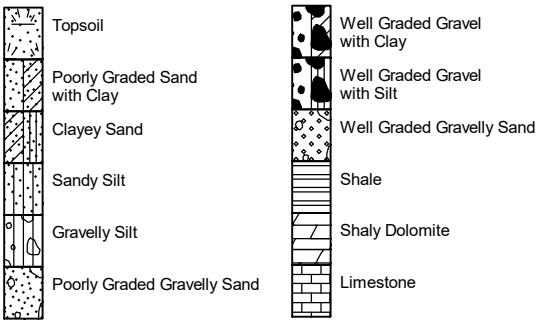
SAMPLE TYPES

- Rock Core
- Split Spoon sample, 1 inch or 2 inch outer-diameter.

WELL SYMBOLS



OTHER MATERIAL SYMBOLS



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BORING / WELL LOG KEY

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BORING ID: HA-01

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 12/2/22 **COMPLETED** 12/2/22
BORING COORDINATES 283530.0 N;13303202.1 E FEET
DRILLING METHOD Hand Auger
GROUND ELEVATION 751.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 4.0 FT **BACKFILL** Cuttings
DRILL RIG N/A **HAMMER TYPE** N/A
LOGGED BY GR **CHECKED BY** KDB
DRILLER GR
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
750.7		TOPSOIL (4 inches)	0.0							
749.6		Brown, POORLY GRADED FINE SAND WITH CLAY, moist (SP-SC)								
747.3		Dark brown to brown, CLAYEY FINE SAND, trace gravel and organics, moist (SC)	2.5							
747.0		Brown POORLY GRADED FINE SAND, trace silt and gravel, wet (SP)								
		Bottom of borehole at 4.0 feet.								

▲ SPT N VALUE ▲
10 20 30 40

◇ UNCONF. COMP. STRENGTH (PSF) ◇
2000 4000 6000 8000

ATTERBERG LIMITS
PL MC LL
20 40 60 80

☐ DRY DENSITY (PCF) ☐
100 110 120 130

LEGEND:

- ▽ **WATER LEVEL AT TIME OF DRILLING** 4 FEET
- ▼ **WATER LEVEL AT END OF DRILLING** 4 FEET
- ▼ **WATER LEVEL AFTER DRILLING** N/A

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
P = POCKET PENETROMETER TEST
T = TORVANE SHEAR TEST

AASHTO R18

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www.manniksmithgroup.com

BORING ID: HA-02

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 12/2/22 **COMPLETED** 12/2/22
BORING COORDINATES 283294.7 N;13303121.4 E FEET
DRILLING METHOD Hand Auger
GROUND ELEVATION 754.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 5.0 FT **BACKFILL** Cuttings
DRILL RIG N/A **HAMMER TYPE** N/A
LOGGED BY GR **CHECKED BY** KDB
DRILLER GR
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
753.5		TOPSOIL (6 inches)	0.0							
		Brown, CLAYEY FINE SAND, trace gravel, moist (SC)	2.5							
749.0		Bottom of borehole at 5.0 feet.	5.0							

▲ SPT N VALUE ▲ (10 20 30 40)
◇ UNCONF. COMP. STRENGTH (PSF) ◇ (2000 4000 6000 8000)
ATTERBERG LIMITS PL MC LL (20 40 60 80)
☐ DRY DENSITY (PCF) ☐ (100 110 120 130)

LEGEND:

- ▽ **WATER LEVEL AT TIME OF DRILLING** N/A
- ▽ **WATER LEVEL AT END OF DRILLING** N/A
- ▼ **WATER LEVEL AFTER DRILLING** N/A

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
P = POCKET PENETROMETER TEST
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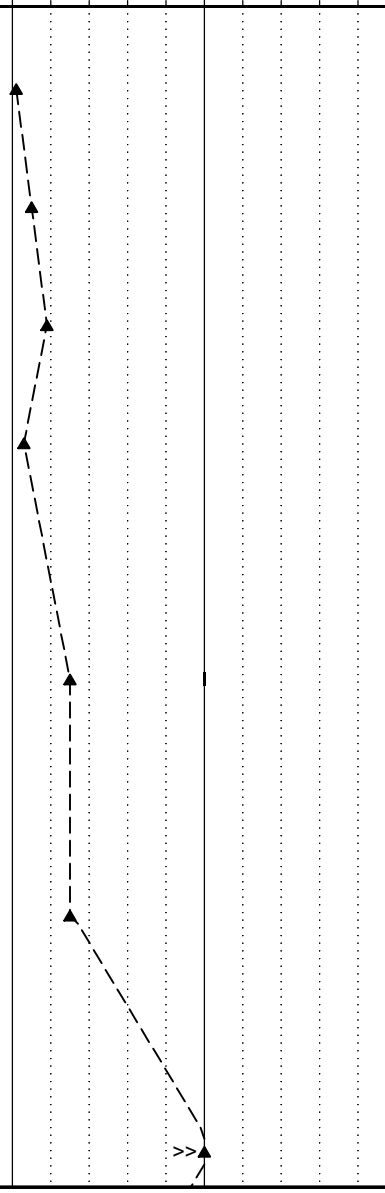
BORING ID: SB-01

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 10/25/22 **COMPLETED** 10/25/22
BORING COORDINATES 283500.3 N;13303178.5 E FEET
DRILLING METHOD 3.25" Hollow Stem Auger
GROUND ELEVATION 749.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 70.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY AN **CHECKED BY** KDB
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
748.0		Sandy TOPSOIL (12 inches)	0							
		Very loose to loose, brown CLAYEY FINE TO MEDIUM SAND, trace gravel, wet (SC)		SS 1	0-1-0	1	0			
744.0			5	SS 2	2-1-4	5	39			
		Very loose to loose, brown POORLY GRADED MEDIUM SAND, trace silt, wet (SP)		SS 3	10-4-5	9	67			
			10	SS 4	2-1-2	3	39			
735.5										
		Medium dense, brown WELL GRADED FINE TO COARSE SAND WITH SILT, trace gravel, wet (SW-SM)	15	SS 5	9-7-8	15	72			
730.5										
		Medium dense to very dense, brown POORLY GRADED FINE TO MEDIUM SAND, trace silt and gravel, wet (SP)	20	SS 6	7-7-8	15	55			
			25	SS 7	5-20-32	52	72			
724.0										



LEGEND:

WATER LEVEL AT TIME OF DRILLING 3.5 FEET
WATER LEVEL AT END OF DRILLING 3.5 FEET
WATER LEVEL AFTER DRILLING N/A

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
P = POCKET PENETROMETER TEST
T = TORVANE SHEAR TEST

AASHTO R18

GEOTECH STANDARD LOG - GINT STD US LAB.GDT - 3/15/23 11:46 - W:\PROJECTS\PROJECTS U-Z\W2220001\ADMIN\GEOTECH\LAB\BORING LOGS.GPJ

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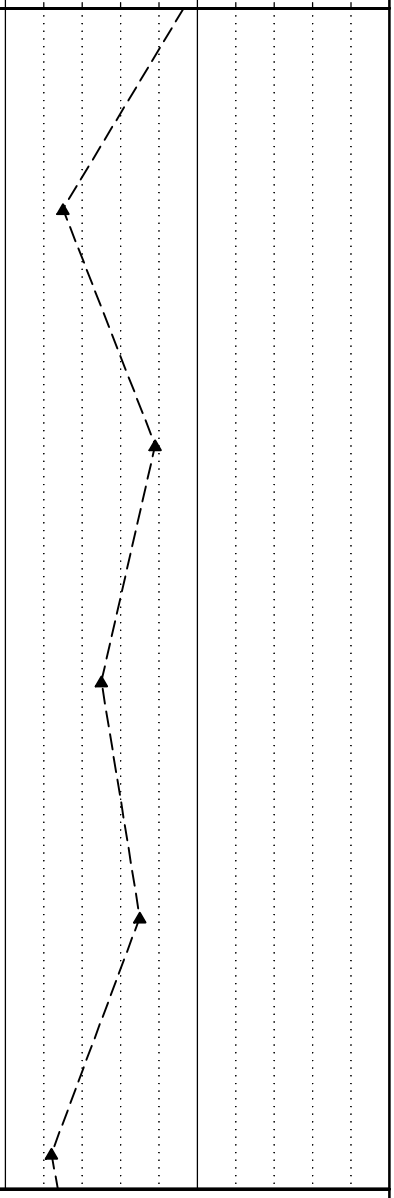
BORING ID: SB-01

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 10/25/22 **COMPLETED** 10/25/22
BORING COORDINATES 283500.3 N;13303178.5 E FEET
DRILLING METHOD 3.25" Hollow Stem Auger
GROUND ELEVATION 749.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 70.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY AN **CHECKED BY** KDB
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
		Medium dense, brown POORLY GRADED FINE TO COARSE SAND, trace silt and gravel, wet (SP)	25							
720.5		Medium dense to dense, brown POORLY GRADED FINE TO COARSE SAND, trace silt and gravel, wet (SP)	30	SS 8	4-7-8	15	55			
			35	SS 9	5-25-14	39	78			
			40	SS 10	7-12-13	25	67			
			45	SS 11	14-20-15	35	67			
700.5			50	SS 12	6-5-7	12	72			



LEGEND:

WATER LEVEL AT TIME OF DRILLING 3.5 FEET
WATER LEVEL AT END OF DRILLING 3.5 FEET
WATER LEVEL AFTER DRILLING N/A

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
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PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 10/25/22 **COMPLETED** 10/25/22
BORING COORDINATES 283500.3 N;13303178.5 E FEET
DRILLING METHOD 3.25" Hollow Stem Auger
GROUND ELEVATION 749.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 70.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY AN **CHECKED BY** KDB
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
		Medium dense to dense, gray POORLY GRADED FINE TO COARSE SAND WITH GRAVEL, trace silt, wet (SP) *(continued)*	50							
			55	SS 13	5-16-7	23	83			
			60	SS 14	5-12-16	28	55			
			65	SS 15	8-13-15	28	39			
			70	SS 16	2-17-20	37	33			
679.0		Bottom of borehole at 70.0 feet.								

▲ SPT N VALUE ▲ (10 20 30 40)
◇ UNCONF. COMP. STRENGTH (PSF) ◇ (2000 4000 6000 8000)
ATTERBERG LIMITS PL MC LL (20 40 60 80)
☐ DRY DENSITY (PCF) ☐ (100 110 120 130)

LEGEND:

- WATER LEVEL AT TIME OF DRILLING 3.5 FEET
- WATER LEVEL AT END OF DRILLING 3.5 FEET
- WATER LEVEL AFTER DRILLING N/A

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
P = POCKET PENETROMETER TEST
T = TORVANE SHEAR TEST

AASHTO R18

GEOTECH STANDARD LOG - GINT STD US LAB.GDT - 3/15/23 11:46 - W:\PROJECTS\PROJECTS U-Z\W2220001\ADMIN\GEOTECH\LAB\BORING LOGS.GPJ

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BORING ID: SB-02

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 2/13/23 **COMPLETED** 2/13/23
BORING COORDINATES 283406.3 N;13303185.4 E FEET
DRILLING METHOD Direct Push
GROUND ELEVATION 756.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 45.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY KY **CHECKED BY** MFT
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
755.3		BRIDGE WOOD DECK (8 inches)	0							
			5							
			10							
			15							
740.0		Loose, brown POORLY GRADED FINE TO COARSE SAND WITH GRAVEL, trace silt, wet (SP-SM)		SS 1	4-3-5	8	20			
			20	SS 2	7-5-3	8	60			
735.5		Medium dense to dense, brown POORLY GRADED MEDIUM TO COARSE SAND WITH SILT AND GRAVEL, wet (SP-SM)		SS 3	10-10-9	19	80			
			25	SS 4	12-14-14	28	67			

▲ SPT N VALUE ▲ (10 20 30 40)
◇ UNCONF. COMP. STRENGTH (PSF) ◇ (2000 4000 6000 8000)
ATTERBERG LIMITS PL MC LL (20 40 60 80)
☐ DRY DENSITY (PCF) ☐ (100 110 120 130)

LEGEND:

- ▽ **WATER LEVEL AT TIME OF DRILLING** 9 FEET
- ▽ **WATER LEVEL AT END OF DRILLING** 9 FEET
- ▼ **WATER LEVEL AFTER DRILLING** 9 FEET

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
P = POCKET PENETROMETER TEST
T = TORVANE SHEAR TEST

AASHTO R18

GEOTECH STANDARD LOG - GINT STD US LAB.GDT - 3/15/23 11:46 - W:\PROJECTS\PROJECTS U-Z\W2220001\ADMIN\GEOTECH\LAB\BORING LOGS.GPJ

(Continued Next Page)

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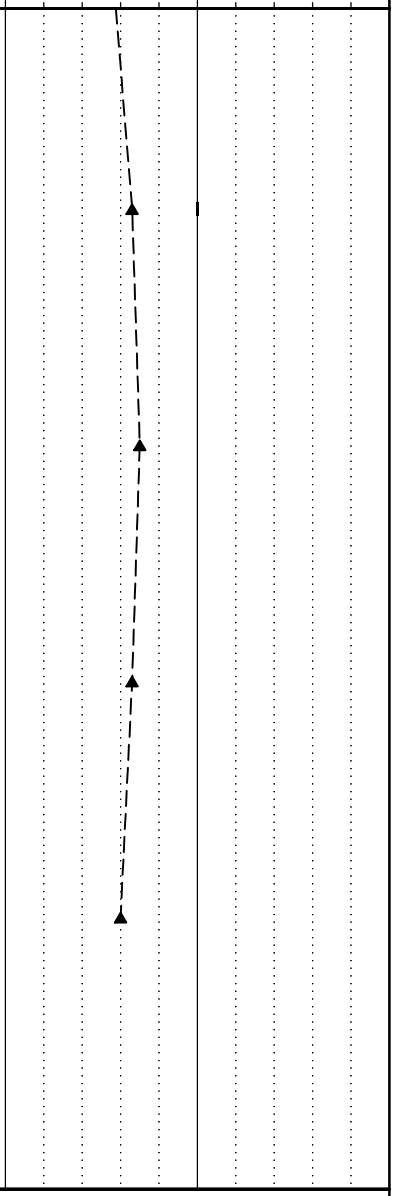
BORING ID: SB-02

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 2/13/23 **COMPLETED** 2/13/23
BORING COORDINATES 283406.3 N;13303185.4 E FEET
DRILLING METHOD Direct Push
GROUND ELEVATION 756.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 45.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY KY **CHECKED BY** MFT
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
		Medium dense to dense, brown POORLY GRADED MEDIUM TO COARSE SAND WITH SILT AND GRAVEL, wet (SP-SM) *(continued)*	25							
			30	SS 5	15-17-16	33	80			
			35	SS 6	16-17-18	35	73			
			40	SS 7	15-16-17	33	73			
711.0			45	SS 8	17-16-14	30	73			
		Bottom of borehole at 45.0 feet.								



LEGEND:

- WATER LEVEL AT TIME OF DRILLING 9 FEET
- WATER LEVEL AT END OF DRILLING 9 FEET
- WATER LEVEL AFTER DRILLING 9 FEET

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
P = POCKET PENETROMETER TEST
T = TORVANE SHEAR TEST

AASHTO R18

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
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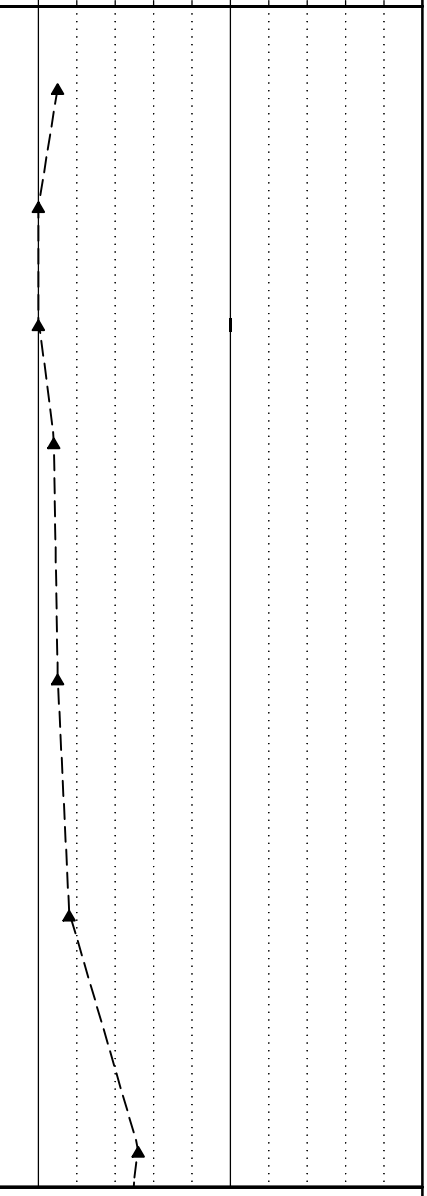
BORING ID: SB-03

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 10/26/22 **COMPLETED** 10/26/22
BORING COORDINATES 283347.2 N;13303122.3 E FEET
DRILLING METHOD 3.25" Hollow Stem Auger
GROUND ELEVATION 752.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 70.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY AN **CHECKED BY** KDB
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
751.0	Sandy TOPSOIL (12 inches)	0							
748.5	Loose, brown SILTY FINE TO MEDIUM SAND, trace gravel, moist (SM)		SS 1	5-3-2	5	0			
	Very loose, brown SILTY FINE SAND, trace gravel, damp (SM)	5	SS 2	0-0-0	0	39			
			SS 3	1-0-0	0	67			
742.0		10	SS 4	1-0-4	4	39			
	Loose, brown SILTY FINE TO MEDIUM SAND, wet (SM)								
737.0		15	SS 5	8-2-3	5	72			
	Loose, brown POORLY GRADED FINE TO MEDIUM SAND WITH SILT, trace gravel, wet (SP-SM)								
		20	SS 6	3-4-4	8	55			
728.5									
		25	SS 7	25-13-13	26	72			



LEGEND:

- ▽ **WATER LEVEL AT TIME OF DRILLING** 6 FEET
- ▼ **WATER LEVEL AT END OF DRILLING** 6 FEET
- ▼ **WATER LEVEL AFTER DRILLING** N/A

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
P = POCKET PENETROMETER TEST
T = TORVANE SHEAR TEST

AASHTO R18

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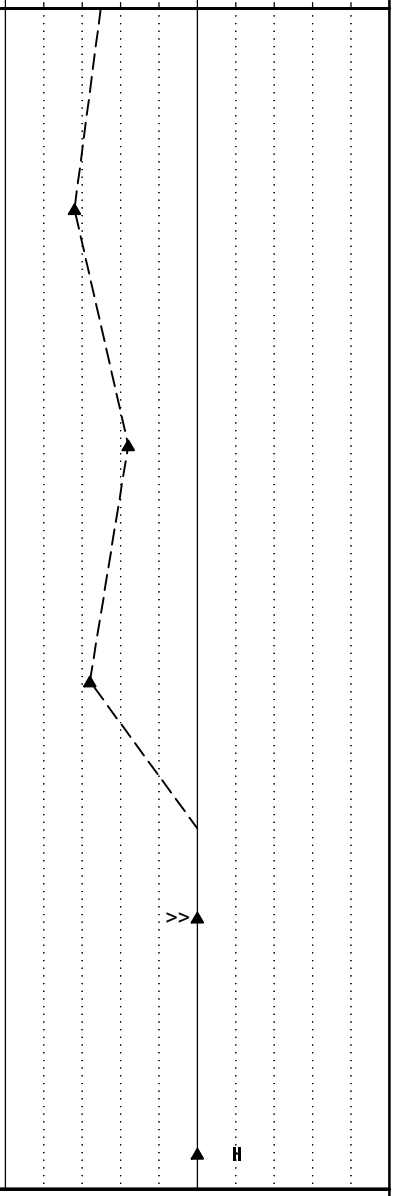
GROUND ELEVATION 752.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 70.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY AN **CHECKED BY** KDB
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
		Medium dense to dense, brown POORLY GRADED FINE TO MEDIUM SAND WITH SILT, trace gravel, wet (SP-SM) *(continued)*	25							
			30	SS 8	22-12-6	18	55			
			35	SS 9	2-7-25	32	78			
			40	SS 10	1-4-18	22	67			
708.5		Dense to very dense, gray SILT, trace sand and gravel, damp (ML)	45	SS 11	16-31-36	67	67			
			50	SS 12	14-26-24	50	72			



LEGEND:

WATER LEVEL AT TIME OF DRILLING 6 FEET
WATER LEVEL AT END OF DRILLING 6 FEET
WATER LEVEL AFTER DRILLING N/A

D = UCS TEST PERFORMED ON DISTURBED SAMPLE
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T = TORVANE SHEAR TEST

AASHTO R18

GEOTECH STANDARD LOG - GINT STD US LAB.GDT - 3/15/23 11:46 - W:\PROJECTS\PROJECTS U-Z\W2220001\ADMIN\GEOTECH\LAB\BORING LOGS.GPJ

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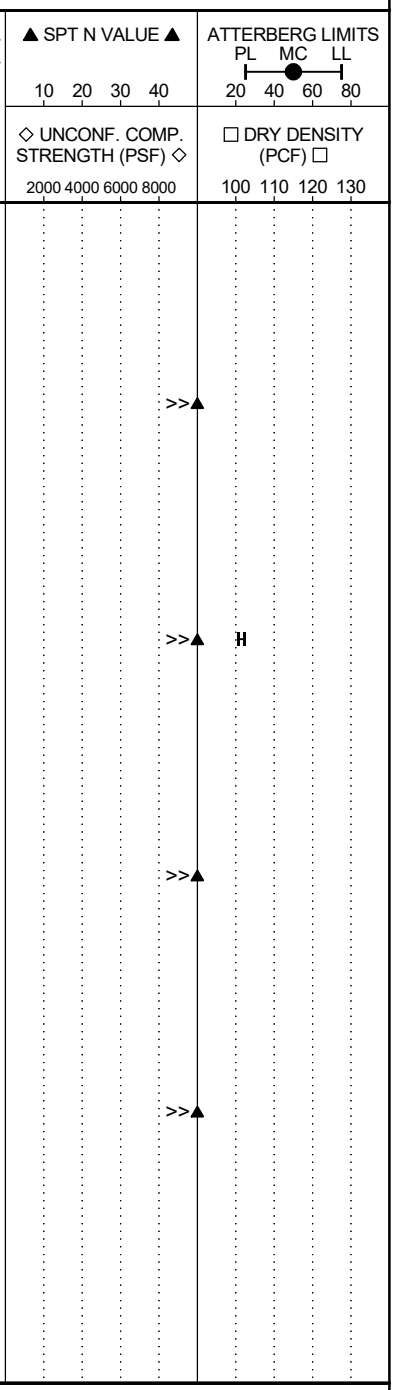
BORING ID: SB-03

CLIENT Wade Trim Associates
PROJECT NAME Gallup Park Bridge Replacement
PROJECT NUMBER W2220001
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 10/26/22 **COMPLETED** 10/26/22
BORING COORDINATES 283347.2 N;13303122.3 E FEET
DRILLING METHOD 3.25" Hollow Stem Auger
GROUND ELEVATION 752.0 FEET
DRILLING CONTRACTOR MSG
TOTAL DEPTH 70.0 FT **BACKFILL** Grout
DRILL RIG Geoprobe 3230DT **HAMMER TYPE** Automatic
LOGGED BY AN **CHECKED BY** KDB
DRILLER RS
REMARKS Coordinates and elevation estimated from Google Earth™

ELEVATION (FEET)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (FEET)	SAMPLE TYPE NUMBER	BLOW COUNTS	SPT N VALUE	RECOVERY % (RQD)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	MOISTURE CONTENT (%)
		Dense to very dense, gray SILT, trace sand and gravel, damp (ML) *(continued)*	50							
			55	SS 13	11-30-43	73	83			
693.5		Very dense, gray SILT, trace sand, damp (ML)	60	SS 14	8-29-38	67	55			
			65	SS 15	7-26-39	65	39			
682.0			70	SS 16	6-24-43	67	33			
		Bottom of borehole at 70.0 feet.								



LEGEND:

WATER LEVEL AT TIME OF DRILLING 6 FEET
WATER LEVEL AT END OF DRILLING 6 FEET
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APPENDIX C

LABORATORY TEST RESULTS

LABORATORY TEST PROCEDURES

A brief description of the most common laboratory tests performed at the Geotechnical Engineering Laboratory at the Mannik Smith Group is provided in the following sections.

DESCRIPTION OF SOILS (VISUAL-MANUAL PROCEDURE) (ASTM D2488)
The visual classification of soil samples are performed in accordance with ASTM D2488 standard. Our engineers use this test method to describe each soil sample using visual examination and simple manual tests. Visual classification helps grouping similar soil samples so that only a minimum number of laboratory tests are required for positive soil classification.

POCKET PENETROMETER
In the pocket penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small, calibrated spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square foot.

NATURAL MOISTURE CONTENT (ASTM D2216)
Natural moisture content represents the ratio of the weight of water in a given amount of soil to the weight of solid particles. Natural moisture content is expressed as a percentage (%). In this test method the water content is measured in the laboratory by noting the weight loss after drying the soil at specific temperature for 24 hours.

ATTERBERG LIMITS (ASTM D4318)
The Atterberg Limits test is performed in accordance with ASTM D4318. Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI) of the soil sample are determined using this test method. The Liquid Limit is the moisture content at which the soil begins to behave as a liquid material and starts to flow. The Plastic Limit is the moisture content at which the soil changes from plastic to semi-solid stage. The Plasticity Index (PI = LL - PL) is the range of moisture content at which the soil is in a plastic stage. Typically, a soil's potential for volume change increases with increase of plasticity indices.

PARTICLE SIZE ANALYSIS (ASTM D421, D422 and D1140)
These tests are performed to determine the partial soil particle size distribution. The soil sample is prepared according to ASTM D421 test method. The amount of material finer than the openings on the No. 200 sieve (0.075 mm) is determined by wash sieve method according to ASTM D1140. The hydrometer test is used to determine particle size distribution of material finer than 0.075 mm according to ASTM D422 test method.

STANDARD PROCTOR COMPACTION TEST (ASTM D698)
The Standard Proctor compaction test is used to determine maximum dry density and optimum moisture content of the soil sample. In this test, the soil is compacted in the Proctor mold in three lifts of equal volume using a standard effort by the free falling of a 5.5 lb rammer from 12 inches above soil surface. The test procedure is repeated on samples at several different moisture contents and a parabolic graph showing the relationship between moisture content and dry density of the soil is established. The maximum dry unit weight of the compacted sample and the respective moisture content is reported as maximum dry density and optimum moisture content of the soil sample.

MODIFIED PROCTOR COMPACTION TEST (ASTM D1557)
Modified Proctor compaction is similar to the Standard Proctor test. In this test, the soil is compacted in the Proctor mold in five lifts of equal volume using a standard effort by the free falling of a 10 lb rammer from 18 inches above the soil surface. The maximum dry unit weight of the compacted sample and the respective moisture content is reported as maximum dry density and optimum moisture content of the soil sample.

LABORATORY CALIFORNIA BEARING RATIO (ASTM D1883)
The CBR value is the ratio of forces required for 0.1-inch penetration of a 2-inch diameter circular plunger at the rate of 0.05 inch/min into a compacted soil sample compared to the same penetration in a certain standard crushed stone.

LOSS ON IGNITION TEST (LOI) (ASTM D2974)
LOI tests are performed on peat or suspected organic soils. An oven-dried sample is ignited in a furnace at 440°C (Method C) or 750°C (Method D). The ash content of the soil sample is determined as a percentage of the weight of the oven-dried sample. The organic content is the loss of weight due to ignition and reported as a percentage of the weight of the oven-dried sample.

ONE-DIMENSIONAL CONSOLIDATION TEST (ASTM D2435)
The consolidation test data is used to estimate the magnitude and rate of both differential and total settlement of a structure. A one-dimensional consolidation test is performed in a consolidation ring that does not allow lateral displacement of the sample. The sample is subjected to various vertical loading and unloading cycles. The deformation of the sample due to loading and unloading is recorded and used for the plotting a void ratio-applied pressure graph. The pre-consolidation pressure for the soil can also be determined from this test.

UNCONFINED COMPRESSION TEST ON ROCK SAMPLES (ASTM D7012)
In the unconfined compression test, the unconfined compressive strength (q_u) of a rock sample is estimated by measuring the resistance of the sample in compression when an axial loading is applied to the cylindrical specimen (with a height to diameter ratio of approximately 2) to reach the failure condition.

UNCONFINED COMPRESSION TEST ON SOIL SAMPLES (ASTM D2166)
In the unconfined compression test, the unconfined compressive strength (q_u) of a cohesive soil sample is estimated by measuring the resistance of the sample in compression when an axial loading is applied to the cylindrical specimen (with a height to diameter ratio of 2 to 2.5) to reach the failure condition or 15 percent (%) of axial deformation, whichever is secured first.

UNCONSOLIDATED-UNDRAINED (UU) TRIAXIAL COMPRESSION TEST (ASTM D2850)
Triaxial Shear tests are used to determine the shear strength of soil samples under various loading conditions. The test is performed on a relatively undisturbed sample extruded from a Shelby tube. In this test method, fluid flow is not permitted into or out of the soil specimen as the load is applied (undrained condition), therefore pore pressure builds up in the sample. The compressive strength of a soil is determined in terms of the total stress. The various confining pressures help determining the shear strength of the soil at different depths.

CONSOLIDATED-UNDRAINED (CU) TRIAXIAL COMPRESSION TEST (ASTM D4767)
The shear characteristics of cohesive samples (collected from relatively undisturbed sample extruded from a Shelby tube) are measured in this test under undrained conditions. This test represents field conditions where fully consolidated soils under one set of stresses are subjected to a sudden change in stress without sufficient time for further consolidation (undrained condition). The data from this test is used to analyze the shear strength parameters of the soil at different depths. The compressive strength of a soil is reported in terms of the effective stress.

WATER SOLUBLE SULFATE, RESISTIVITY AND PH
To evaluate the corrosion potential of the site, MSG performs sulfates (Ohio DOT Supplement 1122), resistivity (ASTM G187), and pH tests (ASTM D4972) on select soil samples.

SPECIFIC GRAVITY (ASTM D854)
Specific gravity is defined as the ratio of the unit weight of soil solids only to unit weight of water at a specific temperature. MSG performs specific gravity tests for soils according to ASTM D854 test procedure.

PERMEABILITY (ASTM D2434 and ASTM D5084)
This test method covers laboratory measurements of the hydraulic conductivity (the coefficient of permeability) of water-saturated granular and cohesive materials. MSG performs multiple methods for permeability tests according to ASTM D2434 and ASTM D5084.

DIRECT SHEAR TEST (ASTM D3080)
The direct shear tests are performed to determine the maximum and residual shear strength. A horizontal load is applied at a constant rate of strain. The soil sample is placed in a box where the lower half of the box is mounted on rollers and is pushed forward at a uniform rate by a motorized apparatus. The upper half of the box bears against a steel proving ring, the deformation of which is shown on a dial gauge indicating the shear force. The various information that can be obtained from the results includes the maximum (peak) shear strength and the ultimate (residual) shear strength.

GRAIN SIZE DISTRIBUTION

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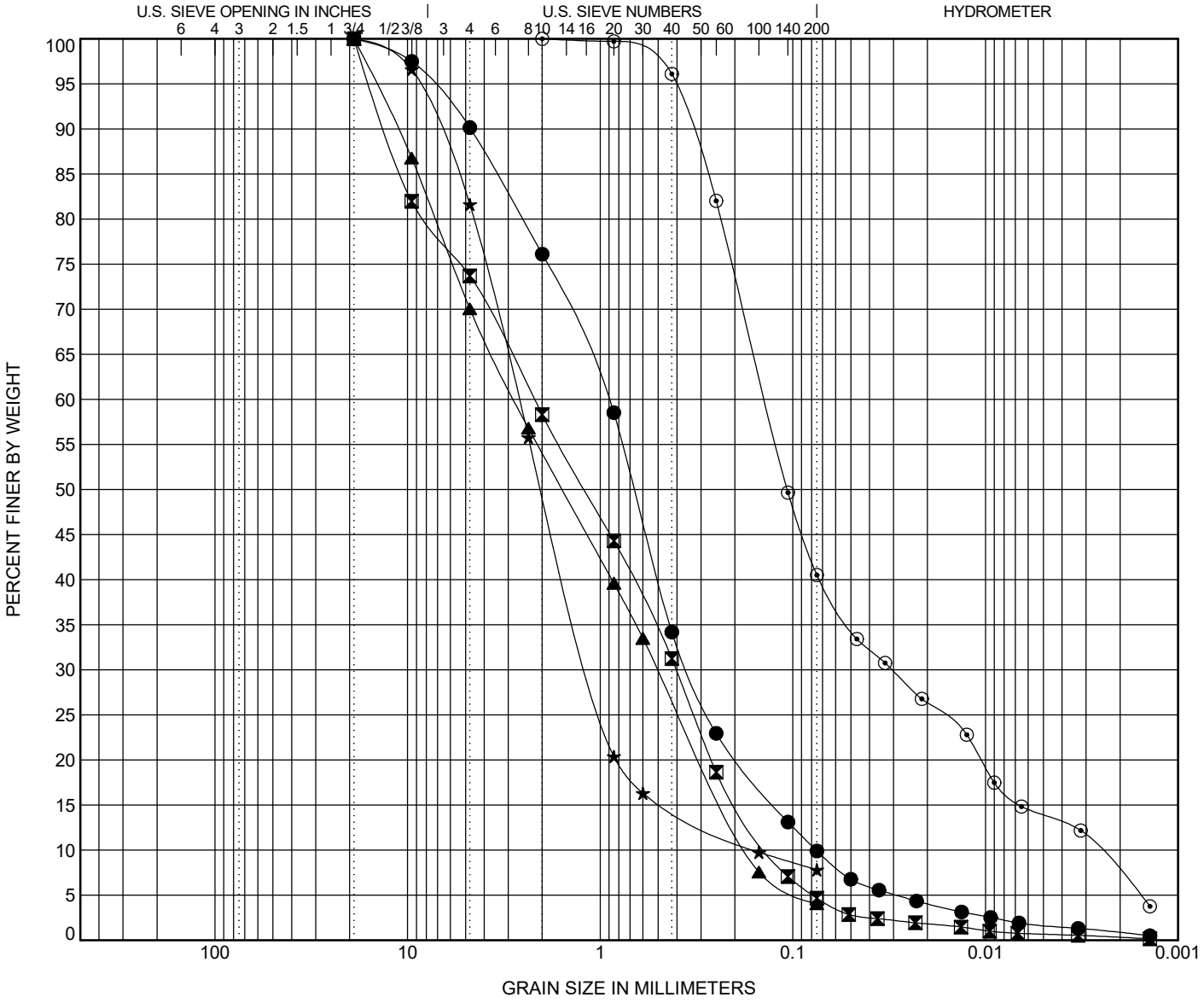
CLIENT Wade Trim Associates **PROJECT NAME** Gallup Park Bridge Replacement

PROJECT NUMBER W2220001 **PROJECT LOCATION** Ann Arbor, Michigan



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● SB-01 / SS-5	13.5	WELL-GRADED SAND with SILT (SW-SM)	NP	NP	NP	1.76	12.05
⊠ SB-01 / SS-13	53.5	POORLY GRADED SAND with GRAVEL (SP)	NP	NP	NP	0.56	16.71
▲ SB-02 / SS-1	16.0	POORLY GRADED SAND with GRAVEL (SP)	NP	NP	NP	0.52	16.35
★ SB-02 / SS-5	28.5	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	NP	NP	NP	3.01	16.74
⊙ SB-03 / SS-3	6.0	SILTY SAND (SM)	NP	NP	NP	2.59	53.94

Specimen Identification		D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● SB-01 / SS-5	13.5	19	0.913	0.667	0.349	0.076	9.8	80.2	9.1	0.8
⊠ SB-01 / SS-13	53.5	19	2.201	1.204	0.403	0.132	26.3	69.1	4.3	0.3
▲ SB-02 / SS-1	16.0	19	2.795	1.576	0.498	0.171	30.0	66.0	4.0	
★ SB-02 / SS-5	28.5	19	2.646	1.998	1.122	0.158	18.4	73.8	7.8	
⊙ SB-03 / SS-3	6.0	2	0.139	0.107	0.031	0.003	0.0	59.5	33.1	7.4

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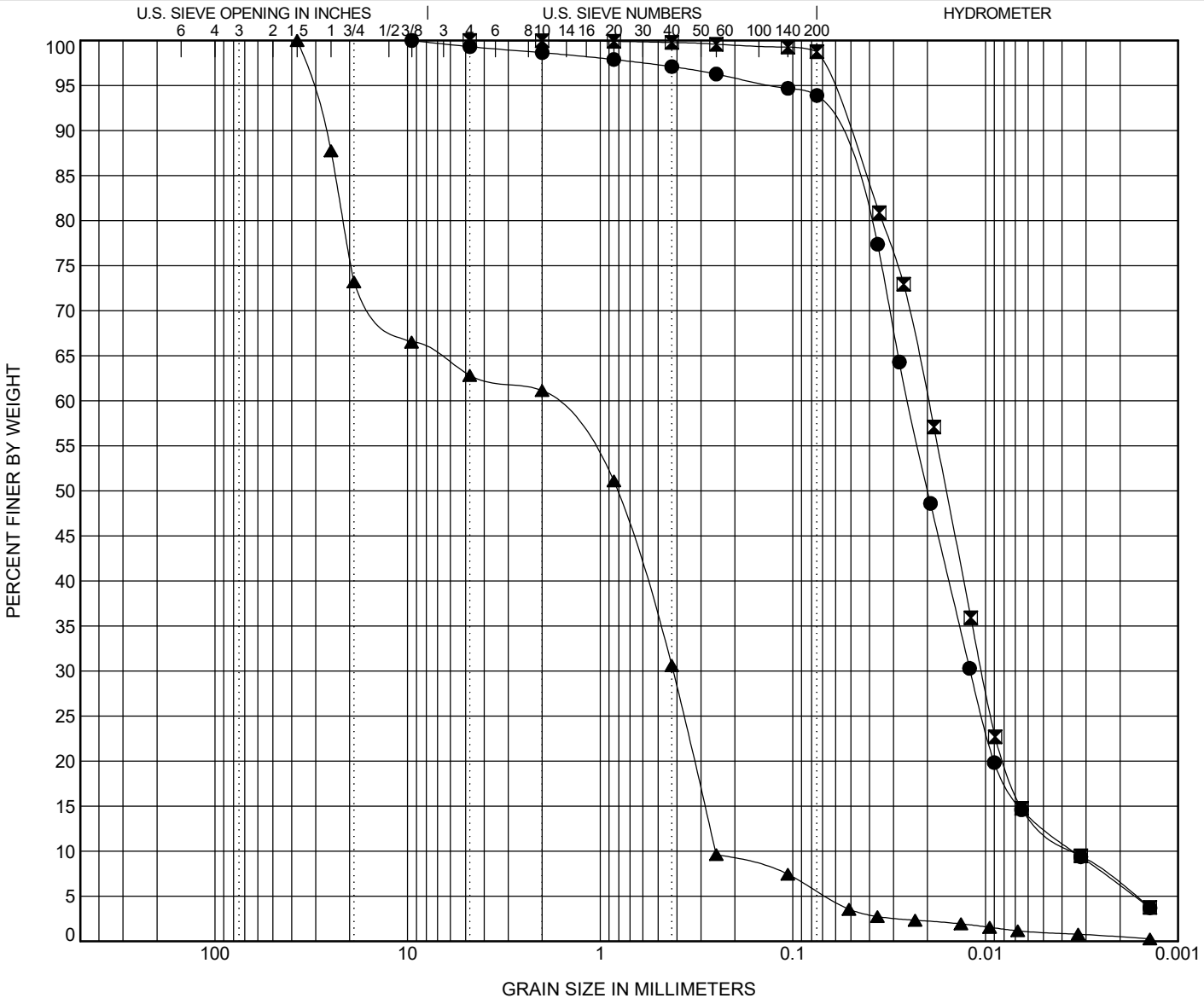

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● SB-03 / SS-12	48.5	SILT (ML)	22	19	3	1.63	7.26
⊠ SB-03 / SS-14	58.5	SILT (ML)	24	21	3	1.61	5.76
▲ SED-1 / GB-1	0.0					0.38	7.19

Specimen Identification		D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● SB-03 / SS-12	48.5	9.525	0.025	0.02	0.012	0.003	0.7	5.4	87.7	6.2
⊠ SB-03 / SS-14	58.5	4.75	0.02	0.016	0.01	0.003	0.0	1.2	92.5	6.2
▲ SED-1 / GB-1	0.0	37.5	1.815	0.819	0.419	0.252	37.2	57.2	5.1	0.5

ATTERBERG LIMITS' RESULTS

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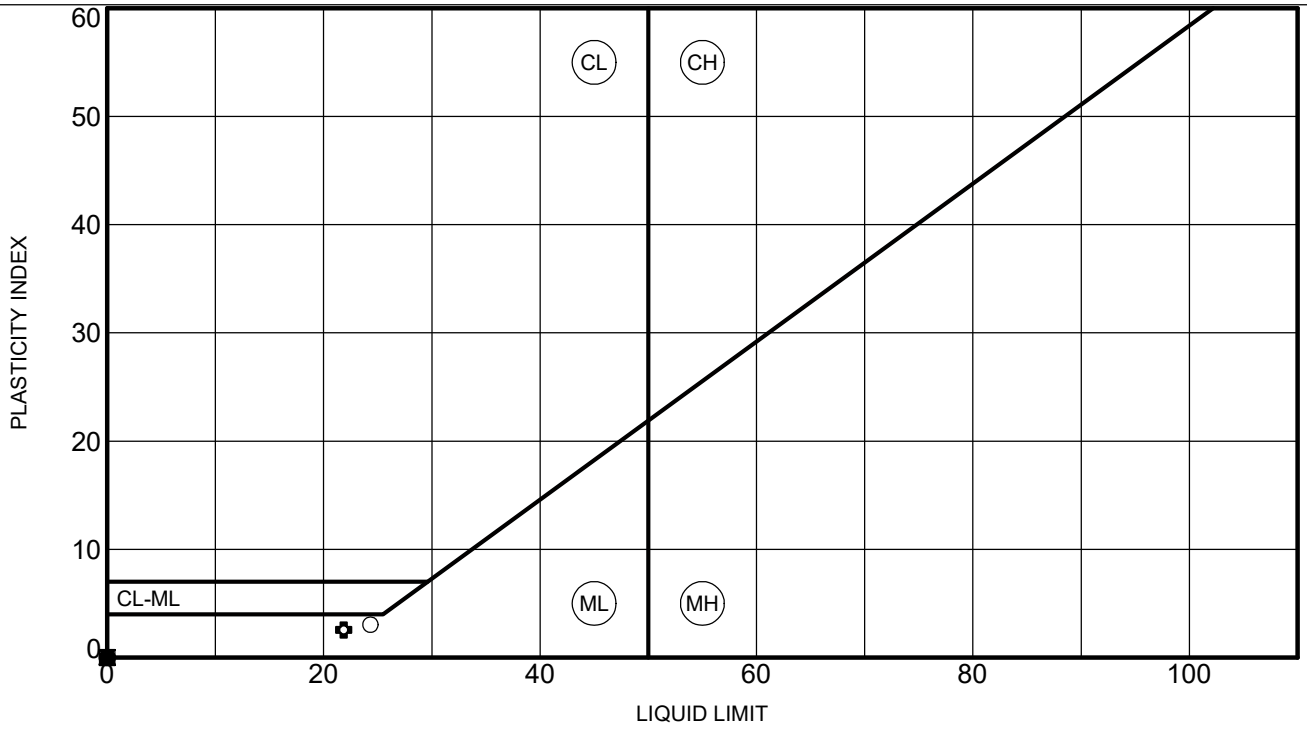

	Specimen Identification		LL	PL	PI	Fines	Classification
●	SB-01 / SS-5	13.5	NP	NP	NP	10	WELL-GRADED SAND with SILT (SW-SM)
⊠	SB-01 / SS-13	53.5	NP	NP	NP	5	POORLY GRADED SAND with GRAVEL (SP)
▲	SB-02 / SS-1	16.0	NP	NP	NP	4	POORLY GRADED SAND with GRAVEL (SP)
★	SB-02 / SS-5	28.5	NP	NP	NP	8	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)
⊙	SB-03 / SS-3	6.0	NP	NP	NP	41	SILTY SAND (SM)
✿	SB-03 / SS-12	48.5	22	19	3	94	SILT (ML)
○	SB-03 / SS-14	58.5	24	21	3	99	SILT (ML)