

GENERAL STRUCTURAL NOTES

- The structural notes are intended to augment the drawings and specifications. Should conflicts exist between the Drawings, Specifications and the Structural notes, the strictest provision shall govern.
- The Structural drawings form an integral part of Contract Documents, which include Architectural, Structural, Mechanical, Electrical, Civil/Site drawings and Specifications. Contractor shall coordinate the Structural drawings with the requirements shown in the other components of the Contract Documents.
- Typical details and other sections/details apply to conditions that are similar to the conditions described in the sections/details, even if they are not specifically referenced on the plans.
- The Contractor shall be responsible for means, methods, sequences and procedures of construction.
- The structure is designed to be self-supporting and stable after it is fully completed per requirements of Contract Documents. Contractor shall determine erection procedures and sequence, and ensure the safety of the building and its component parts during erection. This includes the addition of temporary bracing, guys or tie_downs if necessary. Contractor shall retain ownership of such material after completion of the project.
- Construction shall comply fully with the applicable provisions of OSHA and the local Governing Codes, current edition, and all requirements specified in the codes shall be adhered to as if they were called for or shown on the drawings. This shall not be construed to mean that requirements set forth on the drawing may be modified because they are more stringent than the code requirements or because they are not specifically required by code.
- International Building Code 2015. Standards listed in structural note sections refer to the version and effective date identified in the REFERENCED STANDARDS Chapter in the Governing Building Code.
- Work constructed per these drawings shall be inspected by an Independent Testing Agency retained to ensure compliance with the requirements shown on the Drawings. Special Inspections required by the Governing Building Code, local building department and the Contract Documents shall be performed by a qualified Special Inspector. Project site visits by the Engineer do not constitute or replace inspection.
- For multi-story Wood construction, flexible joints for architectural, electrical, mechanical, and plumbing work between floors shall be used to eliminate potential issues due to structure movement from wood shrinkage.

SHORING AND BRACING

- Contractor shall provide temporary shoring and bracing of existing construction, new construction, and underground utilities as follows:
 - Where shown or noted on the Drawings.
 - Where existing construction is to be altered or disturbed until permanent support is in place.
 - Where existing construction is not undergoing alteration and is to remain undisturbed but is disturbed as a result of the work of this contract.
 - As required for safe erection, installation of new construction, equipment, etc.
 - When needed for Contractor's "means and methods" of construction and other safety related issues.
- Shoring and bracing shown on the Drawings is conceptual. Contractor shall be responsible for verifying existing conditions, shoring and bracing calculations, methods of installation, transfer of loads through to final load support, and work sequence phasing with new construction.
- Shoring and bracing shall be performed by a Contractor with minimum 5 years demonstrated experience in similar size and scope of shoring and bracing projects.
- Shoring and bracing shall be designed by a Professional Engineer registered in the State of the Project with minimum 5 years demonstrated experience in similar size and scope of shoring and bracing projects. Design loads and methods shall conform to applicable codes. Soil and material strengths shall be verified by tests, unless conservative estimates that do not affect deflections and deformations are approved by the Architect/Structural Engineer.
- Contractor shall submit drawings and calculations sealed and signed by the Contractor's Professional Engineer showing complete design including temporary conditions, final conditions and sequence of work.
- Before starting work, Contractor shall perform condition survey of the existing building structure, exterior façade and interior finishes, including photographic documentation and submit survey to the Owner for record.
- During the shoring and bracing operations, Contractor shall:
 - Keep the existing and new construction in a safe condition.
 - Monitor existing and new construction to detect any signs of distress or deformation.
 - Take immediate steps to prevent distress, deformation or damage.
- Contractor shall continuously monitor the shoring and bracing system. Contractor shall review and ascertain that all field connections are completed according to the Contractor's design and issue approval for inspection of the work by the Testing Agency.
- After completion of shoring and bracing and completion of work requiring shoring and bracing, Contractor shall repair any damage to the existing and new construction, without any cost to the Owner, and to the satisfaction of the Owner and Architect/Structural Engineer.

EXISTING CONSTRUCTION

- Contractor shall visit the site and become familiar with the existing conditions.
- Existing building dimensions and conditions shown are based upon original drawings or partial survey and have not been completely field verified. The Owner and Architect/Structural Engineer take no responsibility for the accuracy of existing dimensions shown. Contractor shall field measure existing dimensions prior to shop drawing preparation and fabrication.
- Contractor shall verify conditions covering or affecting the structural work: obtain and verify all dimensions and elevations to ensure the proper strength, fit and location of the structural work; report to the Architect/Structural Engineer any and all conditions/discrepancies which may interfere with or otherwise affect or prevent the proper execution and completion of the new work in compliance with the Construction Documents. All discrepancies shall be fully resolved prior to commencing work.
- Existing construction not undergoing alteration is to remain undisturbed. Where such construction is disturbed as a result of the operations of this contract, Contractor shall repair or replace as required and to the satisfaction of the Architect/Structural Engineer and Owner's Representative. 5. Contractor shall verify the existence, location and elevation of existing utilities, sewers, drains, etc. in demolition areas before proceeding with the work. All discrepancies shall be documented and reported to the Architect/Structural Engineer and Owner's Representative for resolution.
- Should uncharted piping or other utilities be encountered during excavation, Contractor shall consult the Architect/Structural Engineer and Owner's Representative for resolution.
- Contractor shall provide fire watch during field cutting and welding operations, meeting the Owner's requirements.
- Contractor shall provide temporary protection of existing equipment during execution of work, satisfying the Owner's requirements.
- Contractor shall provide temporary protection to prevent damage from the weather and vandalism.
- Contractor shall coordinate work with the Owner's personnel to avoid any interference in their operations.
- Refer to SHORING AND BRACING notes for additional requirements.

CAST-IN-PLACE CONCRETE

- Concrete structural framing has been designed by the Ultimate Strength Method per ACI 318 "Building Code Requirements for Structural Concrete".
- Concrete work shall conform to the requirements of ACI 301, "Specifications for Structural Concrete for Buildings", and ACI 318 "Building Code Requirements for Structural Concrete" except as modified by Structural requirements noted on the Drawings.
- All concrete work shall conform to ACI 201.2R, "Guide to Durable Concrete". Parking structures shall also conform to ACI 362.1R, "Guide for the Design and Construction of Durable Concrete Parking Structures".
- Cement shall conform to ASTM C150 "Specification for Portland Cement" type I or III.
- Concrete aggregates shall conform to ASTM C33 "Specification for Concrete Aggregates".
- Reinforcing shall conform to ASTM A615 grade 60
- Reinforcement shall be fabricated and erected according to the ACI standards: "Details and Detailing of Concrete Reinforcement", ACI 315 and "Guide to Presenting Reinforcing Steel Design Details", ACI 315R.
- Welded wire fabric shall be furnished in flat sheets (rolls not permitted) and shall conform to ASTM A1064 and have a minimum side and end lap of 8 inches.
- Welding of reinforcing steel is prohibited unless specifically detailed. Welding where detailed shall conform to AWS D1.4 specification.
- Concrete shall have a minimum 28-day compressive strength as follows:

Foundations:	4,000 psi
Walls:	4,000 psi
- Concrete shall be normal weight, unless indicated otherwise.
- Contractor shall comply with ACI 301 and ACI 306.1 for cold weather concrete placement and shall protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- Contractor shall comply with ACI 301 and ACI 305.1 for hot weather concrete placement.
- The approved materials and mix design shall be fully documented and reviewed by the Testing Agency for full compliance. Responsibility for obtaining the required design strength is the Contractor's responsibility.
- Use of calcium chloride, chloride ions, or other salts in concrete is not permitted.
- Contractor shall tie reinforcing steel securely in place prior to placing concrete and provide sufficient supports to maintain the position of reinforcing within specified tolerances during all construction activities. Inserting dowels into wet concrete is not permitted.
- Minimum lap splice shall be Class B per ACI 318.
- Reinforcing steel shall be placed with the following concrete cover and tolerances unless noted otherwise:

A. Concrete cast against earth (not formed):	3"
B. Formed concrete exposed to earth or weather:	
a. #5 bars or smaller:	2"
b. #6 thru #18 bars:	2"
C. Formed concrete not exposed to earth or weather:	
a. Slabs, joists, and walls, #11 bars or smaller:	3/4"
b. Slabs, joists, and walls, #14 bars or larger:	1 1/2"
c. Beams, columns, pedestals, and tensions ties:	1 1/2"
D. Clearance between parallel bars in a horizontal layer shall not be less than the bar diameter, 1", or 4/3 d agg, whichever is greater.	
E. Clearance between parallel bars in two or more horizontal layers shall not be less than 1" between layers.	
F. Clearance between longitudinal bars in columns, pedestal, struts, and boundary elements in walls shall not be less than 1.5 times the bar diameter, 1 1/2", or 4/3 d agg, whichever is greater.	
G. Maximum deviation from these requirements shall be: +3/8" for sections with dimensions of 8" or less +1/2" for sections with dimensions over 8"	
- Tie embeds securely in place prior to placing concrete.
- Curing of concrete surfaces shall conform to ACI 308.1 "Specification for Curing Concrete" and ACI 308R "Guide to Curing Concrete".
- Prior to placing concrete adjacent to existing concrete, mechanically roughen, then thoroughly clean and de-grease existing concrete surfaces. Apply epoxy bonding agent prior to placing fresh concrete. Bonding agent shall be "Sika Armatec 110 EpoCem" by Sika Corporation, or approved equal. Follow all Manufacturer's instructions for surface preparation, mixing, and application.
- Non-shrink grout shall conform to ASTM C1107. Grout shall be premixed, non-shrink, non-catalyzed natural aggregate grout with a minimum 7-day compressive strength of 7,000 psi plastic, 6,000 psi flowable, and 5,000 psi fluid consistency.

POST-INSTALLED ANCHORS

- Post-installed anchors include all mechanical and adhesive anchors noted on Construction Documents. All post-installed anchors shall conform to AC193 for mechanical anchors and AC308 for adhesive anchors.
- Use only code approved anchors with valid ICC-ESR Evaluation Report for use in base material shown on the Construction Documents. Submit ICC-ESR Evaluation Report to Structural Engineer and Special Inspection Agent for approval.
- Installer of post-installed anchors shall be trained by anchor Manufacturer.
- Clear existing concrete surface to solid structural concrete. Grind smooth for full steel contact and to prevent gaps between steel and concrete. Alternatively, provide non-shrink grout in all voids between steel and base material.
- Drill smaller diameter pilot hole in existing concrete and check for existing reinforcing. Do not cut or damage existing reinforcing.
- If existing reinforcing is found, shift hole to avoid existing reinforcing. Submit location of new hole to Structural Engineer for review.
- Install mechanical anchors and adhesive anchors in strict accordance with Manufacturer's written recommendations and procedure detailed in ICC-ESR Evaluation Report.
- Special Inspections are required for all mechanical and adhesive anchors. Inspect and test post-installed anchors as specified in ICC-ESR Evaluation Report.
- Adhesive for rebar and anchors in concrete has been designed based on cracked concrete and seismic applications as applicable, in accordance with ACI 355.4 and ICC-ES AC308. Design adhesive bond strength shall be based on ACI 355.4 Temperature Category A with installation into dry holes, using a carbide drill bit into cracked concrete that has been cured for at least 21 days.
- The following anchors are approved. Submittals for alternative equal anchors will be reviewed by Structural Engineer and approved at their discretion.

Anchor Type:	Approved Anchor	ICC-ESR Report No.	Base Material
Screw Anchors	Hilti Kwik HUS-EZ	ESR-3027	Concrete
		ESR-3056	Grouted Masonry
Adhesive Anchors	Hilti HIT-HY200 SAFESET	ESR-3187	Concrete
	Hilti HIT-HY70 + HAS/REBAR	ESR-3342	Grouted Masonry
	Hilti HIT-HY70 + HAS/REBAR	ESR-2682	Hollow Masonry

Note: Refer to plan notes, details and/or schedules for diameter of anchor rods or size of rebar used and the embed depth required for post-installed anchors.

FOOTINGS AND FOUNDATIONS

- Contractor shall verify all conditions, including underground utilities and field measurements at job site and report any discrepancies to Owner's Representative.
- Provide necessary sheeting, shoring, bracing, etc. as required during excavations to protect sides of excavations.
- Comply fully with requirements of OSHA and other regulatory agencies for safety provisions.
- Top of spread footing elevations noted on plan are minimum elevations. In all cases, footings are to bear on undisturbed natural soils or engineered fill having a minimum net allowable bearing capacity of 1,750 psf.
- Sides of foundations shall be formed. All concrete surfaces shall be maintained smooth and vertical. Slope sides of excavations as approved by the Geotechnical Engineer, and clean up sloughing before and during concrete placement. If existing soil conditions warrant earth forming, Geotechnical Engineer shall make recommendations for specific preparation and procedure to follow.
- Where footing steps are necessary, they shall be no steeper than one vertical to two horizontal unless noted otherwise.
- Footings shall be centered under columns and walls unless specifically detailed otherwise on the Drawings.
- No footings or slabs shall be placed on or against sub-grade containing free water, frost or ice. Should water or frost, however slight, enter a footing excavation after sub-grade approval, the sub-grade shall be re-inspected by the Geotechnical Engineer/Testing Laboratory after removal of water or frost.
- The Contractor shall provide all necessary measures to prevent any frost or ice from penetrating any footing or slab sub-grade before and after placing of concrete until the full building enclosure is completed and heated.
- Excavated material shall be legally disposed of off the Owner's property or stored at the site or used for backfilling operations as required in accordance with the Geotechnical Engineer's recommendations and Project Specification requirements.
- Contractor shall furnish all required de-watering equipment to maintain a dry excavation until backfill is complete.
- Where new footings are adjacent or abut existing foundations, carefully hand excavate and determine bottom of existing foundation. If different than anticipated, adjust new foundations to match existing. In no case shall the new footing be lower than the existing without protection against undermining such as underpinning or shoring.
- Foundation bearing soils shall be inspected by a qualified Geotechnical Engineer. The testing shall include, but not be limited to, identification of soils at and below the foundation bearing level, and the allowable bearing capacity of these soils.
- A Geotechnical Engineer registered in the State of the Project shall inspect the condition and assure the adequacy of all subgrades, fills, backfills before placement of foundations, footings, slabs and walls. They shall submit reports to the Architect/Engineer describing their investigations, including any non-conforming work.
- The design of foundations, retaining walls, and slab on grade is based on the criteria established by G2.

BACKFILLING

- Do not place backfill against foundation walls - designed as supported at top and bottom - until basement level and first floor slabs are in place. Shore and/or brace walls as required if backfilling operations are to be carried out prior to placement of floor slabs.
- Place backfill against basement retaining walls - designed as cantilevered - after concrete has attained design strength and before lower level and first floor slabs are in place.
- Where backfill is to be placed on both sides of foundation walls, provide a balanced backfill against foundation walls to eliminate lateral load effects, or provide necessary temporary lateral support to the top of the wall until permanent support is installed.
- Backfill material shall consist of clean, well grade granular soils, free of organic material, silt and clay, or as specified in the Project Specifications.
- Backfill material shall be compacted to 95% of maximum density, as determined by the Modified Proctor Method (ASTM D1557), in lifts not exceeding 6 inches.



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Project :

THE DOWNS
BRIDGE RETAINING WALLS
& FOUNDATIONS

NORTHVILLE, MI 48167

Issued for :

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Drawn by :E.J.L

Check by :A.L.

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STRUCTURAL GENERAL
NOTES

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S001

DESIGN CRITERIA

<p>Note: The structure is designed for the following live loads, in addition to the lateral loads and super-imposed dead loads self-weight of the structure. Where applicable, the live loads are reduced in accordance with the provisions of the Building Code.</p>		
	CODE REFERENCE	
RISK CATEGORY	II	ASCE Table 1.5-1

FLOOR LIVE LOADS

LIVE LOADS		
		CODE REFERENCE
PEDESTRIANS	90 psf	AASHTO LRFD US-7
H5 VEHICLE	5700 lbs	N/A

SNOW LOADS

SNOW CRITERIA		
		CODE REFERENCE
Ground Snow Load	Pg = 25 PSF	ASCE Fig. 7-1
Flat Roof Snow Load	Pf = 25 PSF (Minimum)	ASCE Sec. 7.3
Exposure Factor	Ce = 1.0	ASCE Table 7-2
Importance Factor	Is = 1.0	ASCE Table 1.5-2
Thermal Factor	Ct = 1.0	ASCE Table 7-3
<p>Note: Snow loads adjacent to vertical projections, or on lower roofs adjacent to high roofs or sloped roofs are increased for the effect of drifting.</p>		

WIND LOADS

WIND CRITERIA		
		CODE REFERENCE
Ultimate Design Wind Speed (3 sec. gust)	Vult = 115 mph	ASCE Fig. 26.5-1A
Nominal Design Wind Speed	Vasd = 89 mph	MBC Sec. 1609.3.1
Exposure Category	C	ASCE Sec. 26.7.3
Internal Pressure Coefficient	+/- 0.18 (Enclosed)	ASCE Fig. 26.11-1
Components and Cladding	Per Code Requirement based on above	ASCE Chapt. 30

SEISMIC LOADS

SEISMIC CRITERIA		
		CODE REFERENCE
Seismic Importance Factor	Ie = 1.0	ASCE Table 1.5-2
Short Period Mapped Spectral Response Acceleration Parameter (5% of Critical Damping)	Ss = 0.091g	ASCE Sec. 11.4.1
1.0 sec Mapped Spectral Response Acceleration Parameter (5% of Critical Damping)	S1 = 0.046g	ASCE Sec. 11.4.1
Soil Site Class	D	ASCE Sec. 11.4.2
Design Spectral Response Acceleration Parameter (for short period)	Sos = 0.097g	ASCE Sec. 11.4.4
Design Spectral Response Acceleration Parameter (for 1 sec. period)	Sd1 = 0.074g	ASCE Sec. 11.4.4
Seismic Design Category	B	ASCE Sec. 11.6

EARTH PRESSURE LOADS

LATERAL EARTH EQUIVALENT FLUID PRESSURE		
Walls Un-braced at Top	ACTIVE PRESSURE	80 pcf
	PASSIVE PRESSURE	205 pcf
Allowable Soil Bearing capacity	1750 psf	
<p>Notes: 1. Refer to geotechnical report for additional information. 2. Lateral earth pressure is based upon undrained soil.</p>		

SPECIAL INSPECTION NOTES

- SPECIAL INSPECTIONS SHALL BE PERFORMED IN ACCORDANCE WITH THE 2012 MICHIGAN (INTERNATIONAL) BUILDING CODE CHAPTER 17 AND AS MODIFIED HEREIN.
- DESIGNATIONS**
 SI: SPECIAL INSPECTOR QUALIFIED WITH DEMONSTRATED COMPETENCE DOCUMENTED BY CERTIFICATIONS FROM RECOGNIZED AGENCIES SUCH AS AWS, ACI, MASONRY INSTITUTE OF MICHIGAN (MIM), ETC., AS SUBMITTED AND APPROVED BY THE BUILDING OFFICIAL. SPECIAL INSPECTOR MAY BE A FIRM WITH MULTIPLE SPECIALISTS AND A PROJECT MANAGE PROVIDING REPORTS.
 TA: TESTING AGENCY QUALIFIED TO TEST AND INSPECT MATERIALS AND ASSEMBLIES. TESTING AGENCY SHALL BE UNDER THE SUPERVISION OF THE SPECIAL INSPECTOR.
 GE: GEOTECHNICAL ENGINEER WHO PROVIDED THE ORIGINAL PROJECT GEOTECHNICAL SOILS INVESTIGATION REPORT.
 SE: SPECIALTY ENGINEER RESPONSIBLE FOR DESIGNING ASSEMBLIES SUCH AS PRECAST CONCRETE, STEEL JOISTS, COLD FORMED FRAMING ASSEMBLIES, ETC. SPECIALTY ENGINEER SHALL PROVIDE OBSERVATION OF FABRICATED AND INSTALLED ITEMS OF THEIR DESIGN, IN ADDITION TO THE SPECIAL INSPECTION.
- TA, GE AND SE SHALL SUBMIT RECORDS OF THE INSPECTION RESULTS TO THE SI. THE SI SHALL COMPILER AND SUBMIT INSPECTION RECORDS TO THE ARCHITECT/ENGINEER AND BUILDING OFFICIAL. RECORDS SHALL INCLUDE STATEMENTS OF TESTS, WHETHER INSTALLED/FABRICATED ITEM COMPLIES WITH CONTRACT DOCUMENTS, REMEDIAL WORK PERFORMED, RETESTS.
- SI SHALL PROVIDE A DAILY REPORT OF ANY DISCREPANCIES FROM THE CONTRACT DOCUMENTS FOUND ON THE SAME DAY OF THE INSPECTION TO THE ENGINEER OF RECORD. FORMAL REPORTS OF COMPLIANCE CAN FOLLOW BY A MAXIMUM OF 2 WEEKS. SI SHALL PROVIDE AND SIGN A FINAL REPORT WITH A SUMMARY OF ALL TESTS PERFORMED AND RESULTS TO THE ENGINEER OF RECORD AND BUILDING OFFICIAL.
- SI, TA & GE SHALL BE PAID BY THE OWNER IN COMPLIANCE WITH THE MICHIGAN (INTERNATIONAL) BUILDING CODE.

SPECIAL INSPECTION REQUIREMENTS - SOILS AND FOUNDATIONS

TASK	INSPECTION FREQUENCY		REFERENCED STANDARD	IBC REFERENCE	RESPONSIBLE AGENT
	CONTINUOUS	PERIODIC			
1. SITE PREPARATION: A. VERIFY SITE PREPARED IN ACCORDANCE WITH APPROVED GEOTECHNICAL REPORT.	-	X	GEOTECHNICAL REPORT	1705.6, 1803.5	SI/GE
2. EXCAVATION: A. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	-	X	GEOTECHNICAL REPORT	1705.6	SI/GE
3. FILL PLACEMENT: A. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS. B. VERIFY USE OF PROPER MATERIALS, DENSITIES, AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL. C. PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT THE SITE HAS BEEN PREPARED PROPERLY.	-	X	GEOTECHNICAL REPORT	1705.6, 1803.5	SI/GE/TA
4. SHALLOW FOUNDATIONS: A. IDENTIFICATION OF SOILS AT AND BELOW FOUNDATION BEARING LEVEL. B. VERIFY ALLOWABLE BEARING CAPACITY OF FOUNDATION BEARING SOILS.	-	X	GEOTECHNICAL REPORT	1705.6	SI/GE

SPECIAL INSPECTION REQUIREMENTS - CONCRETE CONSTRUCTION

TASK	INSPECTION FREQUENCY		REFERENCED STANDARD	IBC REFERENCE	RESPONSIBLE AGENT
	CONTINUOUS	PERIODIC			
1. INSPECTION OF REINFORCING STEEL, INCLUDING PRESTRESSING TENDONS, AND PLACEMENT.	-	X	ACI 318: 3.5, 7.1-7.7	1910.4	SI
2. INSPECTION OF REINFORCING STEEL WELDING IN ACCORDANCE WITH TABLE 1705.2.2, ITEM 2b.	-	-	AWS D1.4 ACI 318: 3.5.2	-	SI
3. INSPECTION OF ANCHORS AND EMBEDS CAST IN CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED OR WHERE STRENGTH DESIGN IS USED.	-	X	ACI 318: 8.1.3, 21.1.8	1908.5, 1909.1	SI/TA
4. INSPECTION OF ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS.	-	X	ACI 318: 3.8.6, 8.1.3, 21.1.8	1909.1	SI/TA
5. VERIFYING USE OF REQUIRED DESIGN MIX.	-	X	ACI 318: Ch. 4, 5.2-5.4	1904.2, 1910.2, 1910.3	SI/TA
6. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X	-	ASTM C172 ASTM C31 ACI 318: 5.8, 5.8	1910.10	SI/TA
7. INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X	-	ACI 318: 5.9, 5.10	1910.6, 1910.7, 1910.8	SI
8. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	-	X	ACI 318: 5.11-5.13	1910.9	SI
9. INSPECT FORMWORK FOR SHAPE, LOCATION, AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.	-	X	ACI 318: 6.1.1	-	SI/SE/TA

CONCRETE REINFORCING BAR DEVELOPMENT LENGTH SCHEDULE

BAR SIZE	BEAM & MAT TOP BARS (CLASS B)			BEAM & MAT BARS OTHER THAN TOP BARS (CLASS B)			COLUMN & WALL BARS IN TENSION (CLASS B)			COLUMN & WALL BARS IN COMPRESSION	
	4000 PSI	5000 PSI	6000 PSI	4000 PSI	5000 PSI	6000 PSI	4000 PSI	5000 PSI	6000 PSI	ALL PSI	
f _c '=											
3	18"	17"	15"	14"	13"	12"	14"	13"	12"	9"	
4	25"	22"	20"	20"	18"	16"	19"	18"	16"	11"	
5	32"	29"	26"	24"	22"	20"	24"	22"	20"	14"	
6	37"	34"	30"	28"	26"	23"	28"	26"	23"	17"	
7	54"	49"	44"	42"	38"	34"	42"	38"	34"	20"	
8	62"	56"	50"	48"	44"	40"	48"	44"	40"	22"	
9	70"	64"	57"	54"	49"	44"	54"	49"	44"	25"	
10	78"	71"	64"	60"	55"	49"	60"	55"	49"	28"	
11	87"	79"	71"	67"	61"	55"	67"	61"	55"	31"	

CONCRETE REINFORCING BAR LAP SPLICE

BAR SIZE	BEAM & MAT TOP BARS (CLASS B)			BEAM & MAT BARS OTHER THAN TOP BARS (CLASS B)			COLUMN & WALL BARS IN TENSION (CLASS B)			COLUMN & WALL BARS IN COMPRESSION	
	4000 PSI	5000 PSI	6000 PSI	4000 PSI	5000 PSI	6000 PSI	4000 PSI	5000 PSI	6000 PSI	ALL PSI	
f _c '=											
3	24"	22"	20"	19"	17"	15"	19"	17"	15"	12"	
4	32"	28"	26"	25"	22"	20"	25"	22"	20"	15"	
5	40"	36"	33"	31"	28"	25"	31"	28"	25"	19"	
6	48"	44"	40"	37"	33"	31"	37"	33"	30"	23"	
7	70"	64"	58"	54"	49"	44"	54"	49"	44"	26"	
8	80"	73"	66"	62"	55"	51"	62"	55"	50"	30"	
9	90"	82"	74"	70"	63"	57"	70"	63"	57"	34"	
10	102"	93"	83"	79"	70"	64"	79"	70"	64"	38"	
11	USE MECH. TENSION SPLICE FOR 125% TENSILE CAPACITY OF REINFORCEMENT.									42"	

CONCRETE REINFORCING BAR TENSION HOOK SCHEDULE

BAR SIZE	EMBEDMENT LENGTH			90 DEGREE LEG			180 DEGREE LEG		
	4000 PSI	5000 PSI	6000 PSI	4000 PSI	5000 PSI	6000 PSI	4000 PSI	5000 PSI	6000 PSI
f _c '=									
3	8"	7"	6"	5"	5"	5"	3"	3"	3"
4	10"	9"	8"	6"	6"	6"	3"	3"	3"
5	12"	11"	10"	8"	8"	8"	3"	3"	3"
6	16"	14"	12"	9"	9"	9"	3"	3"	3"
7	18"	16"	14"	11"	11"	11"	4"	4"	4"
8	20"	18"	16"	12"	12"	12"	4"	4"	4"
9	22"	20"	18"	14"	14"	14"	5"	5"	5"
10	24"	22"	20"	16"	16"	16"	5"	5"	5"
11	27"	25"	22"	18"	18"	18"	6"	6"	6"



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Project :

THE DOWNS
 BRIDGE RETAINING WALLS
 & FOUNDATIONS

NORTHVILLE, MI 48167

Issued for :

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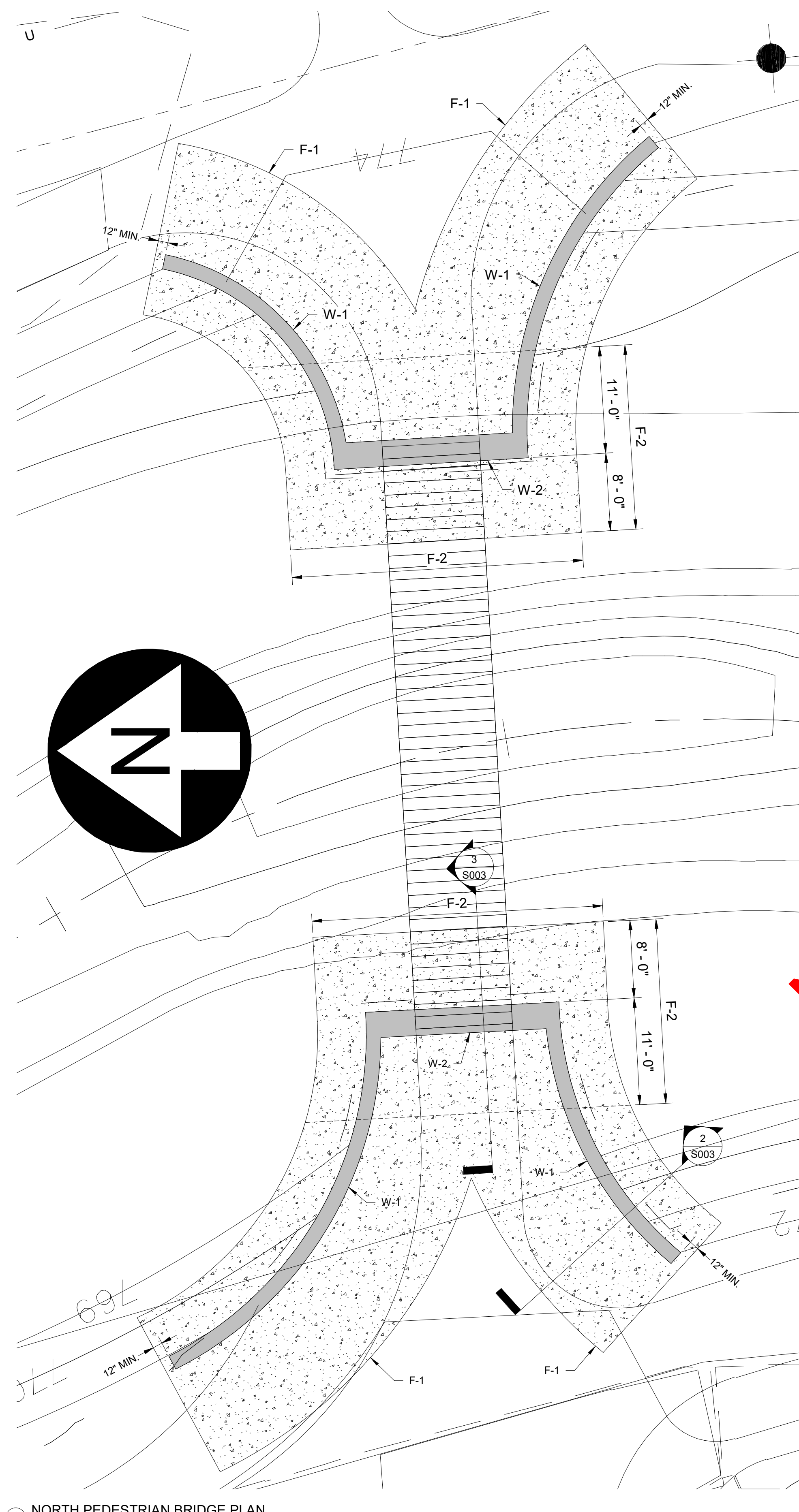
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 23-1091

Sheet No. :

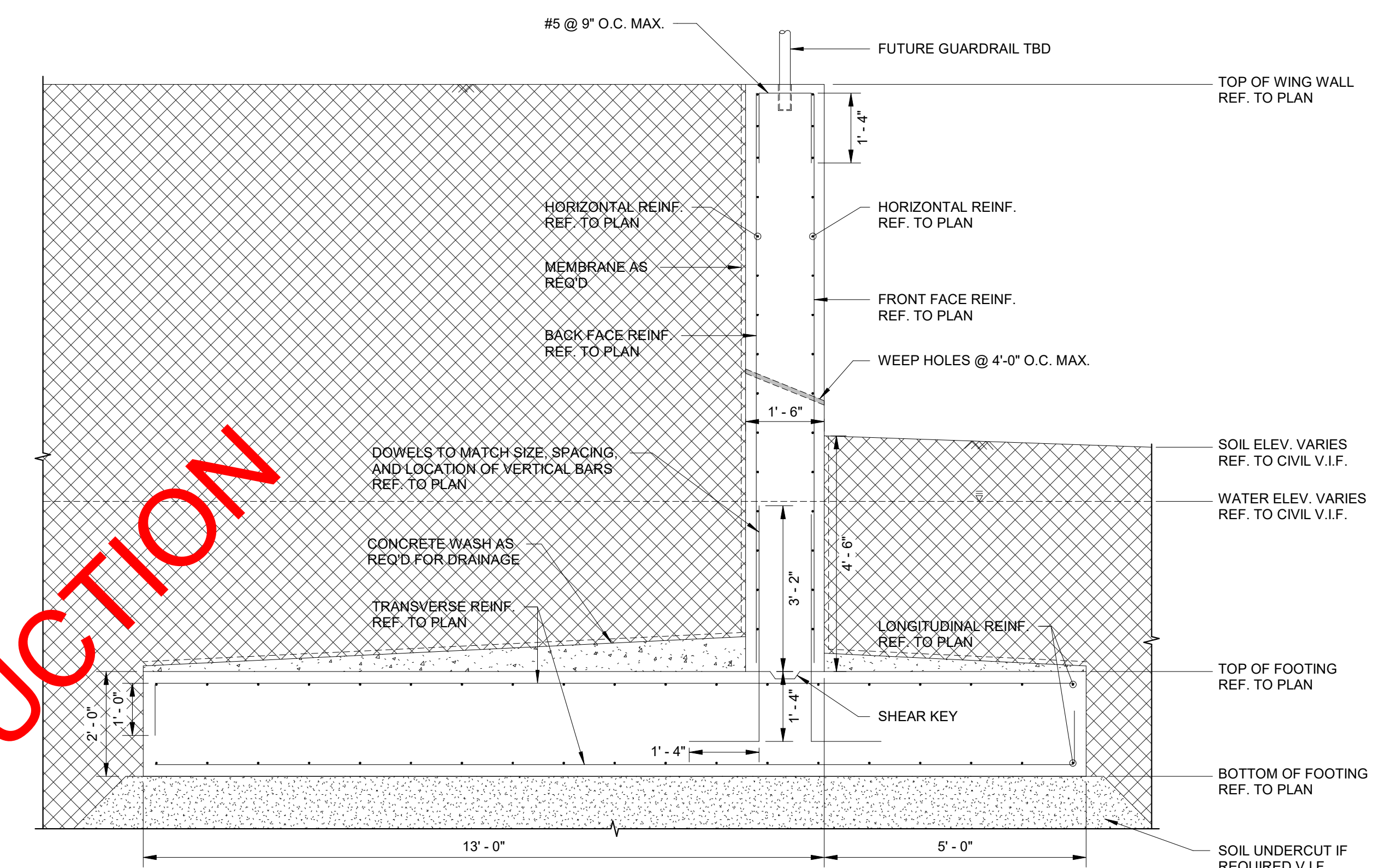
S002



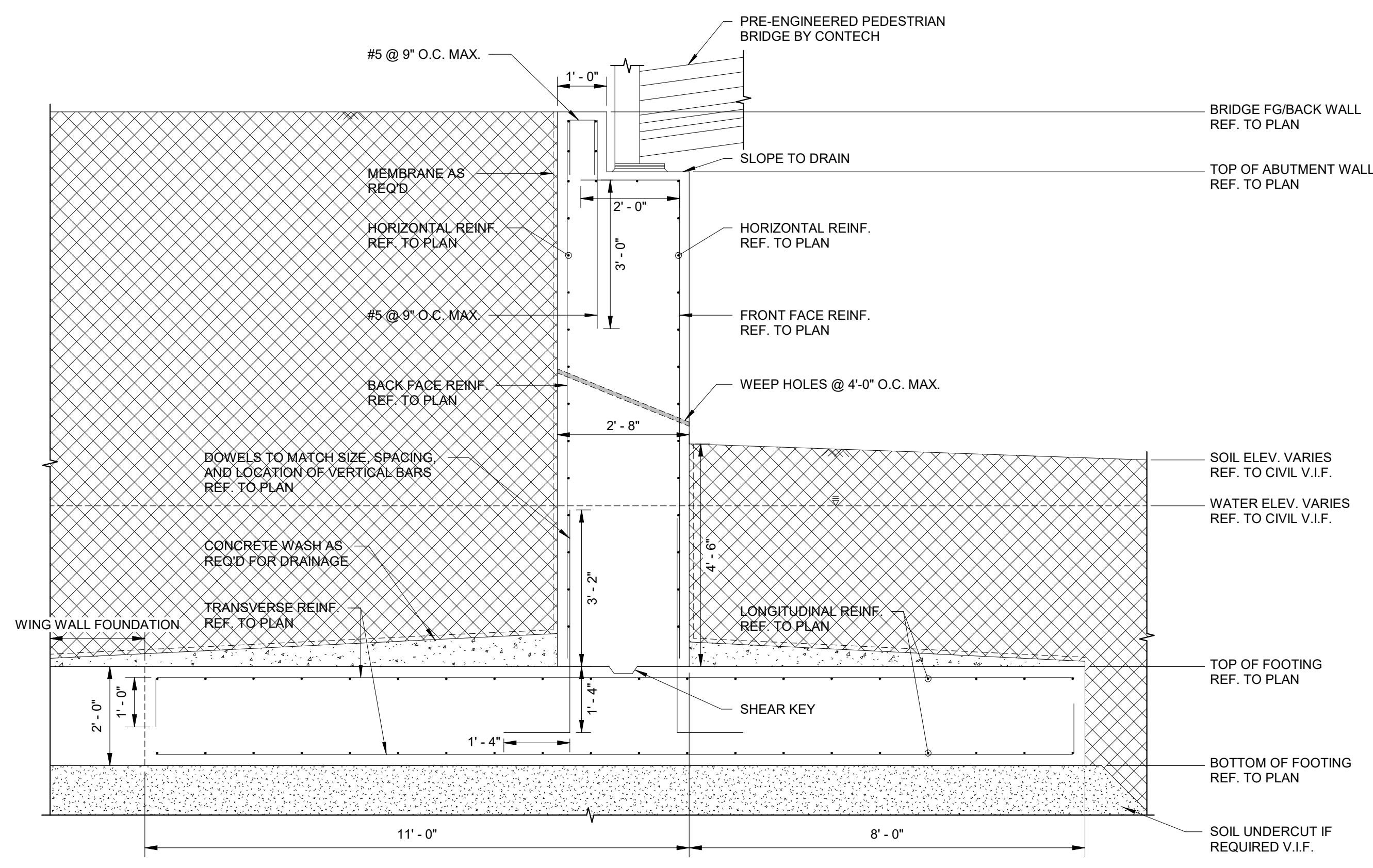
1 NORTH PEDESTRIAN BRIDGE PLAN
1/8" = 1'-0"

- NORTH PEDESTRIAN BRIDGE STRUCTURAL PLAN NOTES:**
- TOP OF WING WALL/BACK WALL/BRIDGE FG ELEVATION = 774.61'
TOP OF RETAINING WALL ELEVATION = 773.4'
TOP OF FOOTING ELEVATION = 763.4'
BOTTOM OF FOOTING ELEVATION = 761.4'
 - FOUNDATIONS ARE DESIGN TO BEAR ON NATIVE, UNDISTURBED, NATURAL SOILS OR ENGINEERED FILLS HAVING A NET ALLOWABLE SOIL BEARING CAPACITY OF 1750PSF V.I.F.
 - VERIFY IN FIELD ALL CONDITIONS PRIOR TO PROCEEDING WITH NEW WORK. NOTIFY SEOR IMMEDIATELY IF ANY DISCREPANCIES ARE DISCOVERED.
 - COORDINATE THE STRUCTURAL DRAWINGS WITH ALL OTHER PROJECT DRAWINGS TO ENSURE THE DESIGN INTENT IS SATISFACTORILY IMPLEMENTED.
 - PREVIDE TEMPORARY SUPPORT, SHORING, AND FORMING AS REQUIRED DURING CONSTRUCTION.
 - DO NOT REMOVE ANY TEMPORARY SUPPORTS UNTIL THE FINAL STRUCTURE IS COMPLETED.
 - PROVIDE COMPACTED GRANULAR BACKFILL MATERIALS COMPACTED IN LIFTS AS REQUIRED AND COMPATED TO 95% OF THE MODIFIED PROCTOR.
 - REFER TO STANDARD DETAILS, GENERAL NOTES, SPECIAL INSPECTIONS, AND DESIGN CRITERIA FOR ADDITIONAL INFORMATION/REQUIREMENTS.
 - DO NOT SCALE THE PLANS OR DETAILS.
- DESIGNATIONS:**
- F-1: CONCRETE FOUNDATION - 18'-0"x2'-0" (WIDTHxTHICKNESS)
REINFORCE W/ #5 @ 12" O.C. LONGITUDINAL T&B
REINFORCE W/ #8 @ 12" O.C. TRANSVERSE T&B
 - F-2: CONCRETE FOUNDATION - 19'-0"x2'-0" (WIDTHxTHICKNESS)
REINFORCE W/ #5 @ 12" O.C. LONGITUDINAL T&B
REINFORCE W/ #8 @ 12" O.C. TRANSVERSE T&B
 - W-1: CONCRETE RETAINING WALL - 18" THICK
REINFORCE W/ #7 @ 10" O.C. VERT. BACK FACE
REINFORCE W/ #5 @ 12" O.C. VERT. FRONT FACE
REINFORCE W/ #5 @ 12" O.C. HORIZ. EA. FAC
 - W-2: CONCRETE RETAINING WALL - 32" THICK
REINFORCE W/ #7 @ 10" O.C. VERT. BACK FACE
REINFORCE W/ #5 @ 9" O.C. VERT. FRONT FACE
REINFORCE W/ #5 @ 9" O.C. HORIZ. EA. FACE

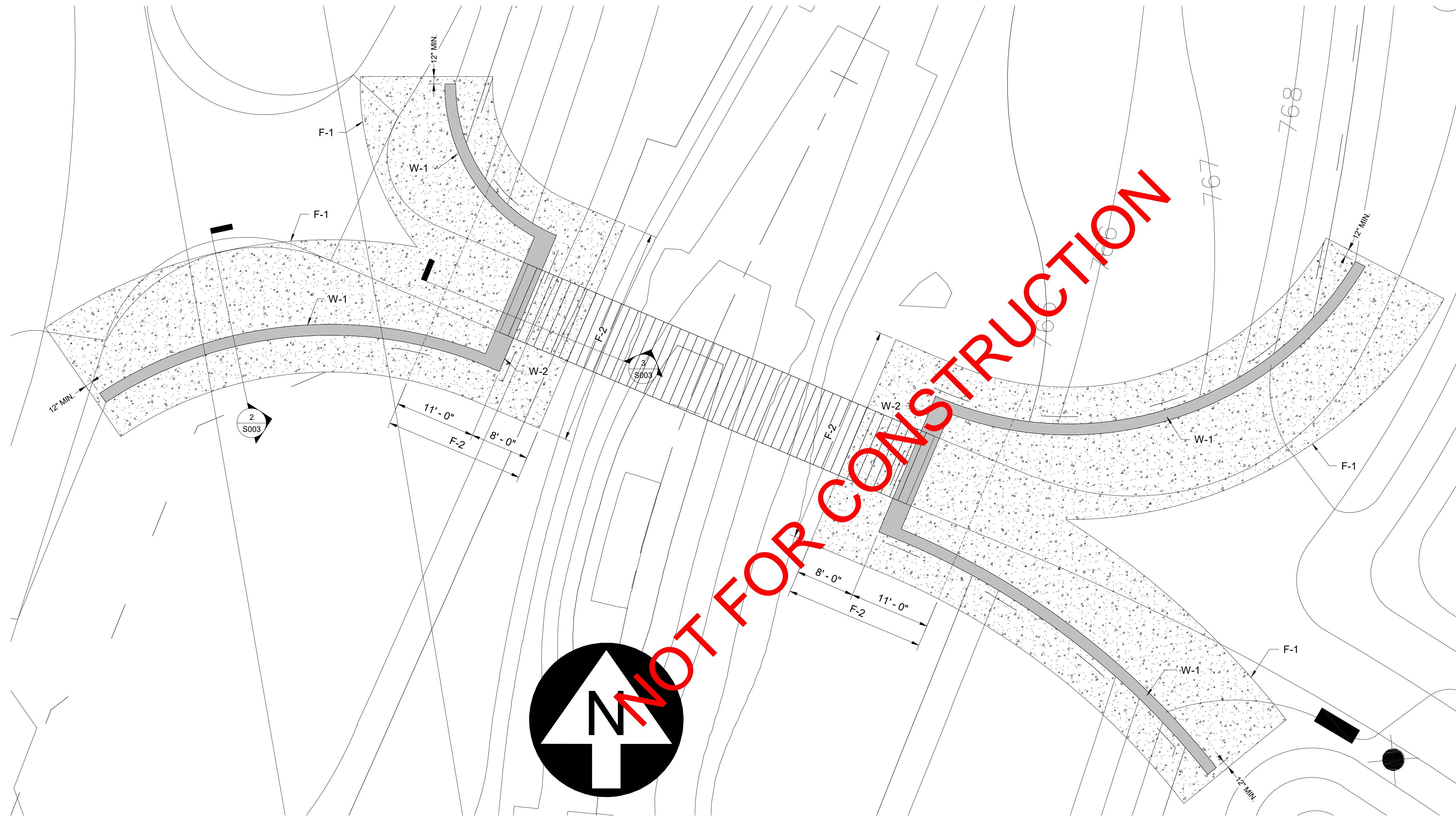
NOT FOR CONSTRUCTION



2 WING WALL SECTION
1/2" = 1'-0"



3 RETAINING WALL SECTION
1/2" = 1'-0"



SOUTH PEDESTRIAN BRIDGE STRUCTURAL PLAN NOTES:

1. TOP OF WING WALL/BACK WALL/BRIDGE FG ELEVATION = 772.75'
TOP OF RETAINING WALL ELEVATION = 771.54'
TOP OF FOOTING ELEVATION = 760.5'
BOTTOM OF FOOTING ELEVATION = 758.5'
2. FOUNDATIONS ARE DESIGN TO BEAR ON NATIVE, UNDISTURBED, NATURAL SOILS OR ENGINEERED FILLS HAVING A NET ALLOWABLE SOIL BEARING CAPACITY OF 1750PSF V.I.F.
3. VERIFY IN FIELD ALL CONDITIONS PRIOR TO PROCEEDING WITH NEW WORK. NOTIFY SEOR IMMEDIATELY IF ANY DISCREPANCIES ARE DISCOVERED.
4. COORDINATE THE STRUCTURAL DRAWINGS WITH ALL OTHER PROJECT DRAWINGS TO ENSURE THE DESIGN INTENT IS SATISFACTORILY IMPLEMENTED.
5. PROVIDE TEMPORARY SUPPORT, SHORING, AND FORMING AS REQUIRED DURING CONSTRUCTION.
6. DO NOT REMOVE ANY TEMPORARY SUPPORTS UNTIL THE FINAL STRUCTURE IS COMPLETED.
7. PROVIDE COMPACTED GRANULAR BACKFILL MATERIALS COMPACTED IN LIFTS AS REQUIRED AND COMPATED TO 95% OF THE MODIFIED PROCTOR.
8. REFER TO STANDARD DETAILS, GENERAL NOTES, SPECIAL INSPECTIONS, AND DESIGN CRITERIA FOR ADDITIONAL INFORMATION/REQUIREMENTS.
9. DO NOT SCALE THE PLANS OR DETAILS.

DESIGNATIONS:

- F-1: CONCRETE FOUNDATION - 18'-0"x2'-0" (WIDTHxTHICKNESS)
REINFORCE W/ #5 @ 12" O.C. LONGITUDINAL T&B
REINFORCE W/ #8 @ 12" O.C. TRANSVERSE T&B
- F-2: CONCRETE FOUNDATION - 19'-0"x2'-0" (WIDTHxTHICKNESS)
REINFORCE W/ #5 @ 12" O.C. LONGITUDINAL T&B
REINFORCE W/ #8 @ 12" O.C. TRANSVERSE T&B
- W-1: CONCRETE RETAINING WALL - 18" THICK
REINFORCE W/ #7 @ 10" O.C. VERT. BACK FACE
REINFORCE W/ #5 @ 12" O.C. VERT. FRONT FACE
REINFORCE W/ #5 @ 12" O.C. HORIZ. EA. FACE
- W-2: CONCRETE RETAINING WALL - 32" THICK
REINFORCE W/ #7 @ 10" O.C. VERT. BACK FACE
REINFORCE W/ #5 @ 9" O.C. VERT. FRONT FACE
REINFORCE W/ #5 @ 9" O.C. HORIZ. EA. FACE

① SOUTH PEDESTRIAN BRIDGE PLAN
1/8" = 1'-0"



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248-561-2035

Project :

THE DOWNS
BRIDGE RETAINING WALLS
& FOUNDATIONS

NORTHVILLE, MI 48167

Issued for :

REVIEW 04.19.2024

Drawn by :E.J.L.

Check by :A.L.

Sheet Title :

SOUTH PEDESTRIAN
BRIDGE RETAINING
WALLS & FOUNDATIONS

Project No. :

23-1091

Sheet No. :

S004



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Project :

THE DOWNS
BRIDGE RETAINING WALLS
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NORTHVILLE, MI 48167

Issued for :

REVIEW 04.19.2024

Drawn by :E.J.L.

Check by :A.L.

Sheet Title :
BEAL STREET WING WALLS

Project No. :
23-1091

Sheet No. :

S005

DRIVEN PILE SPECIFICATION NOTES:

- Steel piles shall be new HP 14x73 ASTM A572 Grade 50.
- Pile Driving Criteria
 - Piles shall be driven to a nominal pile driving resistance not less than 150 kips. Determine nominal pile driving resistance using FHWA Modified Gates Formula.
 - Piles shall be driven into hardpan soils at an estimated elevation of +730 feet.
 - Piles shall be driven to a minimum of 24 blows per foot, and not in excess of 120 blows per foot.
- An impact hammer shall be used to confirm the piles achieve the required capacity.
- Furnishing and installation of the test piles and production piles shall be in accordance with the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction.
- Contractor's licensed professional engineer currently registered in the State of Michigan and experienced deep foundation engineering shall perform a wave equation analysis for piles (WEP) to confirm the proposed driving system can install the piles to the required capacity without exceeding the maximum allowed stress of 0.9f_y.
- A representative bridge technical engineer shall be present during pile installation to confirm the piles meet the project specifications and are driven to the required capacity.
- Piles shall be driven with a 2% maximum variation from plumb.
- A tolerance of 3 inches from the designed location shall be permitted in the installation of each pile as measured from the pile head, without reduction in load capacity of the pile group unless otherwise noted on the foundation plans.

BEAL STREET WING WALLS STRUCTURAL PLAN NOTES:

- TOP OF WING WALL ELEVATION = 778.95'
TOP OF FOOTING ELEVATION = 766'
BOTTOM OF FOOTING ELEVATION = 763.5'
- WING WALL FOUNDATIONS ARE PILE SUPPORTED.
- VERIFY IN FIELD ALL CONDITIONS PRIOR TO PROCEEDING WITH NEW WORK. NOTIFY SEOR IMMEDIATELY IF ANY DISCREPANCIES ARE DISCOVERED.
- COORDINATE THE STRUCTURAL DRAWINGS WITH ALL OTHER PROJECT DRAWINGS TO ENSURE THE DESIGN INTENT IS SATISFACTORILY IMPLEMENTED.
- PROVIDE TEMPORARY SUPPORT, SHORING, AND FORMING AS REQUIRED DURING CONSTRUCTION.
- DO NOT REMOVE ANY TEMPORARY SUPPORTS UNTIL THE FINAL STRUCTURE IS COMPLETED.
- PROVIDE COMPACTED GRANULAR BACKFILL MATERIALS COMPACTED IN LIFTS AS REQUIRED AND COMPACTED TO 95% OF THE MODIFIED PROCTOR. BACKFILL SIDES OF WALLS EVENLY.
- REFER TO STANDARD DETAILS, GENERAL NOTES, SPECIAL INSPECTIONS, AND DESIGN CRITERIA FOR ADDITIONAL INFORMATION/REQUIREMENTS.
- DO NOT SCALE THE PLANS OR DETAILS.

DESIGNATIONS:

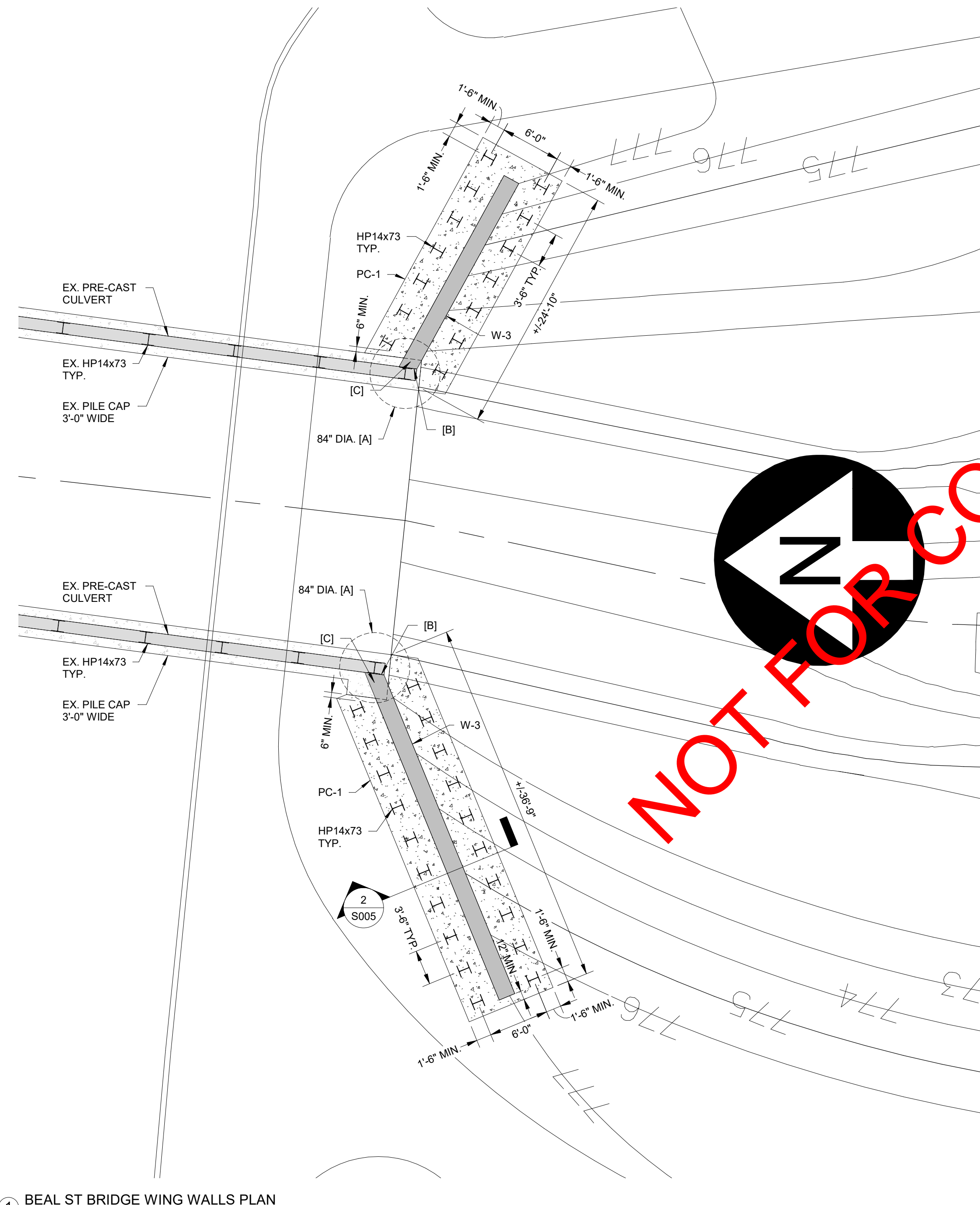
CP-1: CONCRETE PILE CAP - 3'-0" THICK
REINFORCE W/ #9 @ 8" O.C. TRANSVERSE T&B
REINFORCE W/ #6 @ 12" O.C. LONGITUDINAL T&B

W-3: CONCRETE WING WALL - 20" THICK
REINFORCE W/ #8 @ 9" O.C. VERT. BACK FACE
REINFORCE W/ #5 @ 12" O.C. VERT. FRONT FACE
REINFORCE W/ #5 @ 12" O.C. HORIZ. EA. FACE

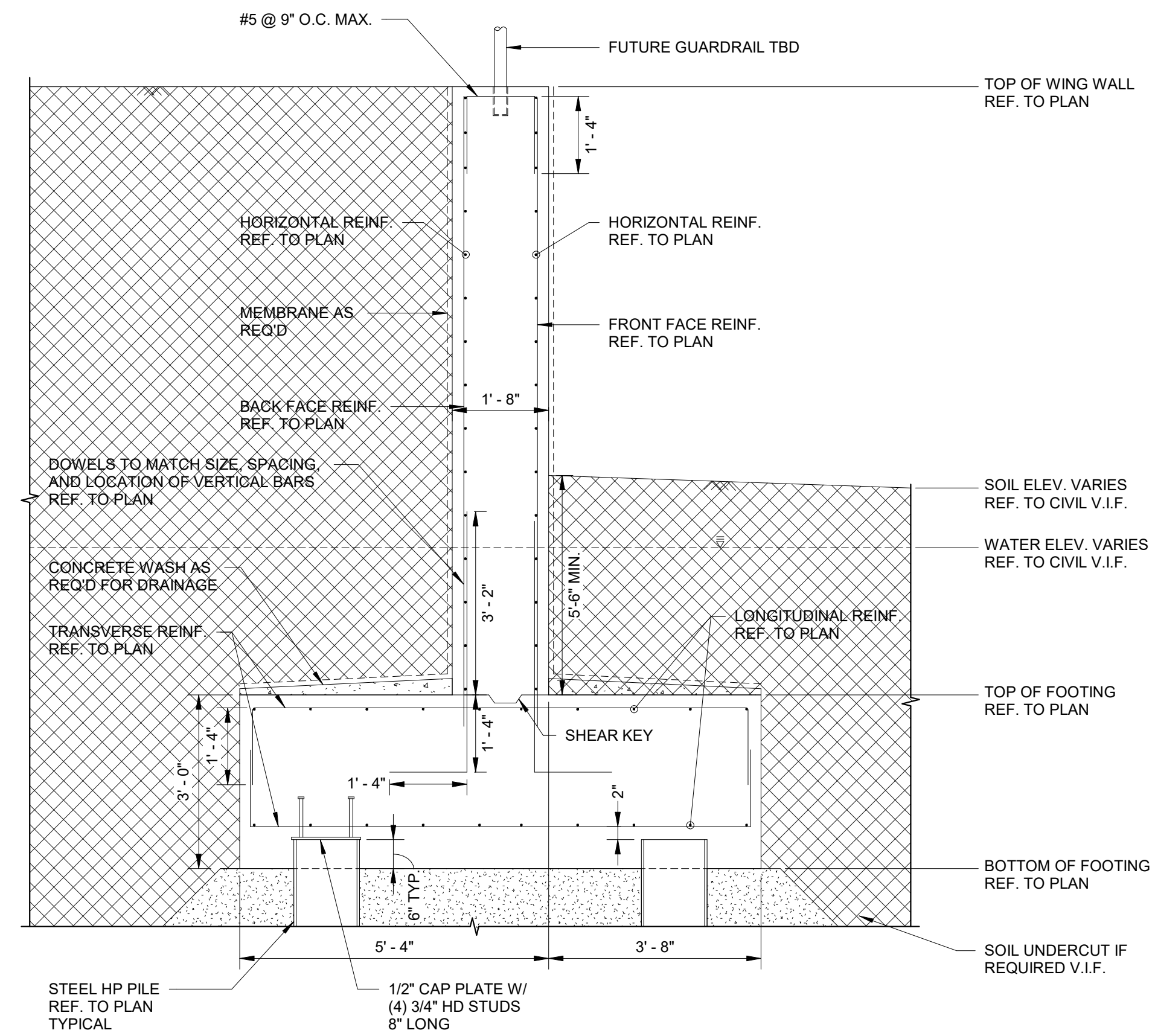
[A]: CENTER OF ADJACENT PILES IS TO REMAIN OUTSIDE THIS PERIMETER

[B]: PROVIDE ISOLATION JOINT BETWEEN NEW WING WALL AND EXISTING CONCRETE CULVERT STRUCTURE

[C]: CAST NEW WING WALL ON 1" THICK NEOPRENE PAD TO ISOLATE THE BOTTOM OF WALL FROM TOP OF EXISTING PILE CAP



1 BEAL ST BRIDGE WING WALLS PLAN
1/8" = 1'-0"



2 BEAL ST WING WALL SECTION
1/2" = 1'-0"