	TA	ABLE 170	5.3		
	TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD 4	IBC REFERENCE
	INSPECT REINFORCEMENT, INCLUDING PRESTRESSING TENDONS, AND VERIFY PLACEMENT.	-	x	ACI 318: Ch. 20, 25.2, 25.3, 26.6.1-26.6.3	1908.4
2.	REINFORCING BAR WELDING: a. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706; b. INSPECT SINGLE-PASS FILLET WELDS, MAXIMUM 5/16";	-	X	AWS DI.4	_
	AND c. INSPECT ALL OTHER WELDS.	Х	X	ACI 318: 26.6.4	
3.	INSPECT ANCHORS CAST IN CONCRETE.	-	X	ACI 318:17.8.2	-
4.	INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS. <sup>b</sup> a. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS.	Х		ACI 318: 17.8.2.4	_
	b. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4.a.		Х	ACI 318: 17.8.2	
5.	VERIFY USE OF REQUIRED DESIGN MIX	-	Х	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
	PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	Х	-	ASTM C172 ASTM C31 AC1 318: 26.5, 26.12	1908.10
	INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X	-	ACI 318: 26.5	1908.6, 1908.7, 1908.8
	VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	-	Х	ACI: 318: 26.5.3-26.5.5	1908.9
٩.	INSPECT PRESTRESSED CONCRETE FOR: a. APPLICATION OF PRESTRESSING FORCES; AND	Х	-	ACI 318: 26.10	-
	6. GROUTING OF BONDED PRESTRESSING TENDONS.	Х	-		
10.	INSPECT ERECTION OF PRECAST CONCRETE MEMBERS.	-	×	ACI 318: Ch. 26.9	-
11.	FOR PRECAST CONCRETE DIAPHRAGM CONNECTIONS OR REINFORCEMENT AT JOINTS CLASSIFIED AS MODERATE OR HIGH DEFORMABILITY ELEMENTS (MDE OR HDE) IN STRUCTURES ASSIGNED TO SEISMIC DESIGN CATEGORY C, D, E OR F, INSPECT SUCH CONNECTIONS AND REINFORCEMENT IN THE FIELD FOR: a. INSTALLATION OF THE EMBEDDED PARTS b. COMPLETION OF THE CONTINUITY OF REINFORCEMENT	X	-	ACI 318: 26.13.1.3 ACI 550.5	-
	ACROSS JOINTS c. COMPLETION OF CONNECTIONS IN THE FIELD	X X	-		
12.	INSPECTION INSTALLATION TOLERANCES OF PRECAST CONCRETE DIAPHRAGM CONNECTIONS FOR COMPLIANCE WITH ACI 550.5	-	x	ACI 318: 26.13.1.3	-
13.	VERIFY IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.	-	X	ACI 318: 26.11.2	-
14	INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF		x	ACI 318: 26.11.2(b)	

a - WHERE APPLICABLE, SEE SECTION 1705.13, SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE.

b - SPECIFIC REQUIREMENTS FOR SPECIAL INSPECTION SHALL BE INCLUDED IN THE RESEARCH REPORT FOR THE ANCHOR ISSUED BY AN APPROVED SOURCE IN ACCORDANCE WITH 17.8.2 IN ACI 318, OR OTHER QUALIFICATION PROCEDURES. WHERE SPECIFIC REQUIREMENTS ARE NOT PROVIDED, SPECIAL INSPECTION REQUIREMENTS SHALL BE SPECIFIED BY THE REGISTERED DESIGN

PROFESSIONAL AND SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO THE COMMENCEMENT OF THE WORK.

INSPECTION TASKS PRIOR TO WE	LDING - TABL	E N5.4-1
INSPECTION TASKS PRIOR TO WELDING	QC	QA
WELDER QUALIFICATION RECORDS AND CONTINUITY RECORDS	Р	0
WPS AVAILABLE	Р	Ρ
MANUFACTURER CERTIFICATIONS FOR WELDING CONSUMABLES AVAILABLE	Р	Р
MATERIAL IDENTIFICATION (TYPE/GRADE)	0	0
WELDER IDENTIFICATION SYSTEM <sup>a</sup>	0	0
<ul> <li>FIT-UP OF GROOVE WELDS (INCLUDE JOINT GEOMETRY)</li> <li>JOINT PREPARATIONS</li> <li>DIMENSIONS (ALIGNMENT, ROOT OPENING, ROOT FACE, BEVEL)</li> <li>CLEANLINESS (CONDITION OF STEEL SURFACES)</li> <li>TACKING (TACK WELD QUALITY &amp; LOCATION)</li> <li>BACKING TYPE AND FIT (IF APPLICABLE)</li> </ul>	0	0
<ul> <li>FIT-UP OF CJP GROOVE WELDS OF HSS T-, Y- AND K-JOINTS WITHOUT</li> <li>BACKING (INCLUDING JOINT GEOMETRY)</li> <li>JOINT PREPARATIONS</li> <li>DIMENSIONS (ALIGNMENT, ROOT OPENING, ROOT FACE, BEVEL)</li> <li>CLEANLINESS (CONDITION OF STEEL SURFACES)</li> <li>TACKING (TACK WELD QUALITY &amp; LOCATION)</li> </ul>	Ρ	0
CONFIGURATION AND FINISH OF ACCESS HOLES	0	0
FIT-UP OF FILLET WELDS • DIMENSIONS (ALIGNMENT, GAPS AT ROOT) • CLEANLINESS (CONDITION OF STEEL SURFACES) • TACKING (TACK WELD QUALITY & LOCATION)	0	0
CHECK WELDING EQUIPMENT	0	-

a - THE FABRICATOR OR ERECTOR, AS APPLICABLE, SHALL MAINTAIN A SYSTEM BY WHICH A WELDER WHO HAS WELDED A JOINT OR MEMBER CAN BE IDENTIFIED. STAMPS, IF USED, SHALL BE THE LOW-STRESS TYPE. 0 - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS. P - PERFORM THESE TASKS FOR EACH WELDED JOINT OR MEMBER.

INSPECTION TASKS DURING WE	LDING - TABLE	N5.4-2
INSPECTION TASKS DURING WELDING	QC	QA
CONTROL AND HANDLING OF WELDING CONSUMABLES • PACKAGING • EXPOSURE CONTROL	0	0
NO WELDING OVER CRACKED TACK WELDS	0	0
ENVIRONMENTAL CONDITIONS • WIND SPEED WITHIN LIMITS • PRECIPITATION AND TEMPERATURE	0	0
<ul> <li>WPS FOLLOWED</li> <li>SETTINGS ON WELDING EQUIPMENT</li> <li>TRAVEL SPEED</li> <li>SELECTED WELDING MATERIALS</li> <li>SHIELDING GAS TYPE/FLOW RATE</li> <li>PREHEAT APPLIED</li> <li>INTERPASS TEMPERATURE MAINTAINED (MIN./MAX.)</li> <li>PROPER POSITION (F, V, H, OH)</li> </ul>	0	0
WELDING TECHNIQUES • INTERPASS AND FINAL CLEANING • EACH PASS WITHIN PROFILE LIMITATIONS • EACH PASS MEETS QUALITY REQUIREMENTS	0	0
PLACEMENT AND INSTALLATION OF STEEL HEADED STUD ANCHORS	Р	Р

0 - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS.

P - PERFORM THESE TASKS FOR EACH WELDED JOINT OR MEMBER.

INSPECTION TASKS AFTER WE	LDING - TABLE	N5.4-3
INSPECTION TASKS AFTER WELDING	QC	QA
WELDS CLEANED	0	0
SIZE, LENGTH AND LOCATION OF WELDS	P	P
WELDS MEET VISUAL ACCEPTANCE ©RITERIACRACK PROHIBITION • WELD/BASE-METAL • ERSIDER CROSS SECTION • WELD PROFILES • WELD SIZE • UNDERCUT • POROSITY	Ρ	Ρ
ARC STRIKES	P	Р
k-AREA <sup>a</sup>	P	P
WELD ACCESS HOLES IN ROLLED HEAVY SHAPES AND BUILT-UP HEAVY SHAPES <sup>b</sup>	Р	Р
BACKING REMOVED AND WELD TABS REMOVED (IF	Р	Р
REQUIRED) REPAIR ACTIVITIES	Р	Р
DOCUMENT ACCEPTANCE OR REJECTION OF WELDED JOINT OR MEMBER	Р	Р
NO PROHIBITED WELDS HAVE BEEN ADDED WITHOUT THE APPROVAL OF THE EOR.	0	0

a - WHEN WELDING OF DOUBLER PLATES, CONTINUITY PLATES OR STIFFENERS HAS BEEN PERFORMED IN THE K-AREA, VISUALLY INSPECT THE WEB K-AREA FOR CRACKS WITHIN 3 IN. (75 mm) OF THE WELD. b - AFTER ROLLED HEAVY SHAPES (SEE SECTION A3.1c) AND BUILT-UP HEAVY SHAPES (SEE SECTION A3.1d) ARE WELDED, VISUALLY INSPECT THE WELD ACCESS HOLES FOR CRACKS.

0 - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS. P - PERFORM THESE TASKS FOR EACH WELDED JOINT OR MEMBER.

INSPECTION TASKS PRIOR TO	BOLTING - TABL	.E N5.6-1
INSPECTION TASKS PRIOR TO BOLTING	QC	QA
MANUFACTURER'S CERTIFICATIONS AVAILABLE FOR FASTENER MATERIALS	0	P
FASTENERS MARKED IN ACCORDANCE WITH ASTM REQUIREMENTS	0	0
CORRECT FASTENERS SELECTED FOR THE JOINT DETAIL (GRADE, TYPE, BOLT LENGTH IF THREADS ARE TO BE EXCLUDED FROM THE SHEAR PLANE)	0	0
CORRECT BOLTING PROCEDURE SELECTED FOR JOINT DETAIL	0	0
CONNECTING ELEMENTS, INCLUDING THE APPROPRIATE FAYING SURFACE CONDITION AND HOLE PREPARATION, IF SPECIFIED, MEET APPLICABLE REQUIREMENTS	0	0
PRE-INSTALLATION VERIFICATION TESTING BY INSTALLATION PERSONNEL OBSERVED AND DOCUMENTED FOR FASTENER ASSEMBLIES AND METHODS USED	Р	0
PROPER STORAGE PROVIDED FOR BOLTS, NUTS, WASHERS AND OTHER FASTENER COMPONENTS	0	0

0 - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS. P - PERFORM THESE TASKS FOR EACH BOLTED CONNECTION.

INSPECTION TASKS DURING BOI	LTING - TABLE	N5.6-2
INSPECTION TASKS DURING BOLTING	QC	QA
FASTENER ASSEMBLIES PLACED IN ALL HOLES AND WASHERS AND NUTS ARE POSITIONED AS REQUIRED.	0	0
JOINT BROUGHT TO THE SNUG-TIGHT CONDITION PRIOR TO THE PRETENSIONING OPERATION	0	0
FASTENER COMPONENT NOT TURNED BY THE WRENCH PREVENTED FROM ROTATING	0	0
FASTENERS ARE PRETENSIONED IN ACCORDANCE WITH THE RCSC SPECIFICATION, PROGRESSING SYSTEMATICALLY FROM THE MOST RIGID POINT TOWARD THE FREE EDGES	0	0

O - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS. P - PERFORM THESE TASKS FOR EACH BOLTED CONNECTION.

INSPECTION TASKS AFTER BOL	TING - TABLE	N5.6-3
INSPECTION TASKS AFTER BOLTING	QC	QA
DOCUMENT ACCEPTANCE OR REJECTION OF BOLTED CONNECTIONS	Р	Ρ

O - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS. P - PERFORM THESE TASKS FOR EACH BOLTED CONNECTION.

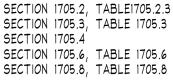
REQUIRED SPECIAL INSPECTIONS AND TABLE 1705.6	TESTS OF S	oils -
TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.	-	x
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	_	X
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	-	X
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	X	_
5. PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	-	Х

REQUIRED SPECIAL INSPECTIONS AND DEEP FOUNDATION ELEMENTS -		•••••
TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. VERIFY ELEMENT MATERIALS, SIZES AND LENGTHS COMPLY WITH	v	-

<ol> <li>VERIFY ELEMENT MATERIALS, SIZES AND LENGTHS COMPLY WITH THE REQUIREMENTS.</li> </ol>	X	-		
2. DETERMINE CAPACITIES OF TEST ELEMENTS AND CONDUCT ADDITIONAL LOAD TESTS, AS REQUIRED.	X	-		
3. INSPECT DRIVING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH ELEMENT.	X	-		
4. VERIFY PLACEMENT LOCATIONS AND PLUMBNESS, CONFIRM TYPE AND SIZE OF HAMMER, RECORD NUMBER OF BLOWS PER FOOT OF PENETRATION, DETERMINE REQUIRED PENETRATIONS TO ACHIEVE DESIGN CAPACITY, RECORD TIP AND BUTT ELEVATIONS AND DOCUMENT ANY DAMAGE TO FOUNDATION ELEMENT.	Х	-		
5. FOR STEEL ELEMENTS, PERFORM ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.2.	IN ACCORDANCE WITH SECTION 1705.2			
6. FOR CONCRETE ELEMENTS AND CONCRETE-FILLED ELEMENTS, PERFORM TESTS AND ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.3.	IN ACCORDANCE W	IN ACCORDANCE WITH SECTION 1705.2		
7. FOR SPECIALTY ELEMENTS, PERFORM ADDITIONAL INSPECTIONS AS DETERMINED BY THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE.		IN ACCORDANCE WITH STATEMENT OF SPECIAL INSEPCTIONS		

INSPECTION OR EXECUTION TA PLACEMENT - ANSI/S		D DECK	Exhibit B4		
TASK	QC	QA	<b>Preliminary Metals I</b>	nsnecti	on Requ
VERIFY COMPLIANCE OF MATERIALS (DESK AND AND ALL DECK ACCESSORIES) WITH CONSTRUCTION DOCUMENTS, INCLUDING PROFILES, MATERIAL PROPERTIES, AND BASE METAL THICKNESS.	Ρ	P		nopeon	onnequ
<ul> <li>DOCUMENT ACCEPTANCE OR REJECTION OF DECK AND DECK ACCESSORIES</li> <li>O - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEI FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH WITH THE APPLICABLE DOCUMENTS.</li> <li>P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITEM</li> </ul>	HAT THE WORK HAS BEEN P		SPECIAL INSPECTION REQUIREMENTS - 1. THE QUALIFIED AGENCY AND PERSONNEL RETAINED FOR THESE SPECIAL INSPECTION SERVICES SHALL BE APPROVED BY THE OWNER, THE ARCHITECT AND THE ENGINEER OF RECORD PRIOR TO START OF CONSTRUCTION. AN OUTLINE OF THE SCOPE OF SERVICES TO BE	BC 2021 EDI1	<u>EION</u>
INSPECTION OR EXECUTION T	ASKS AFTER	DECK	PERFORMED BY THE INSPECTING AGENCY IS TO BE SUBMITTED FRIGRART OF CONSTRUCTION. 2. IN ACCORDANCE WITH SECTION 1705 OF THE INTERNATIONAL BUILDING CODE 2021 EDITION, WITH LOCAL AMENDMENTS PER NJ EDITION 2021, PERIOD AND/OR CONTINUOUS INSPECTIONS OF THE CONSTRUCTION PROGRESS	νIC	
PLACEMENT - ANSI/S	QC DI TABLE 1.2	QA	SHALL BE MADE BY AN INDEPENDENT APPROVED AGENCY IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS; STEEL CONSTRUCTION SECTION 1705.2, TABLE170	05.2.3	
VERIFY COMPLIANCE OF DECK AND ALL DECK ACCESSORIES	P	P	CONCRETE CONSTRUCTIONSECTION 1705.3, TABLE 17MASONRY CONSTRUCTIONSECTION 1705.4SOILSSECTION 1705.6, TABLE 17	705.6	
INSTALLATION WITH CONSTRUCTION DOCUMENTS. VERIFY ALL DECK MATERIALS ARE REPRESENTED BY THE MILL CERTIFICATIONS THAT COMPLY WITH THE CONSTRUCTION DOCUMENTS. DOCUMENT ACCEPTANCE OR REJECTION OF INSTALLATION OF DECK AND DECK ACCESSORIES.	- P	P	CAST-IN-PLACE DEEP FOUNDATIONS SECTION 1705.8, TABLE 17 STRUCTURAL OBSERVATIONS	705.8	
<ul> <li>O - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEI FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH WITH THE APPLICABLE DOCUMENTS.</li> <li>P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITEM</li> </ul>	HAT THE WORK HAS BEEN P		1. STRUCTURAL OBSERVATIONS SHALL BE PROVIDED BY A REGISTERED DESIGN PROFESSIONAL OTHER THAN THE ENGINEER OF RECORD. THE DESIGNATED PROFESSIONAL SHALL PERFORM VISUAL OBSERVATIONS OF THE STRUCTURAL SYSTEM AT SIGNIFICANT CONSTRUCTION STAGES AND AT THE COMPLETION OF THE STRUCTURAL SYSTEM FOR GENERAL		
INSPECTION OR EXECUTION TASKS ANSI/SDI TABL		ELDING -	CONFORMANCE TO THE APPROVED CONSTRUCTION DOCUMENTS. ANY OBSERVED DEFICIENCIES SHALL BE REPORTED IN WRITING TO THE OWNER, THE CODE ENFORCEMENT OFFICIAL, THE ARCHITECT AND THE ENGINEER OF RECORD.		
TASK	QC	QA	2. AT THE CONCLUSION OF THE WORK, THE DESIGNATED PROFESSIONAL SHALL SUBMIT A WRITTEN STATEMENT TO THE CODE ENFORCEMENT OFFICIAL, INDICATING THAT THE BUILDING WAS CONSTRUCTED IN CONFORMITY WITH THE PLANS FILED WITH THE BUILDING DEPARTMENT,		
WELDING PROCEDURE SPECIFICATIONS (WPS) AVAILABLE.	0	0	ALL NECESSARY SITE VISITS HAVE BEEN MADE AND THAT ANY REPORTED DEFICIENCIES HAVE BEEN RESOLVED TO THE BEST OF HIS KNOWLEDGE.		
MANUFACTURER CERTIFICATIONS FOR WELDING CONSUMABLES AVAILABLE. MATERIAL IDENTIFICATION (TYPE/GRADE).	0	0	3. PRIOR TO THE START OF CONSTRUCTION, THE DESIGNATED INSPECTION AGENCY SHALL SUBMIT A PROPOSED INSPECTION AND TESTING SCHEDULE TO THE ARCHITECT AND ENGINEER OF RECORD FOR		
CHECK WELDING EQUIPMENT. O - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEE FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH			REVIEW AND APPROVAL.		
WITH THE APPLICABLE DOCUMENTS. P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITER			REQUIRED SPECIAL INSPECTIONS		
INSPECTION OR EXECUTION TASK ANSI/SDI TABL		LDING -	PLACE DEEP FOUNDATION ELE	CONTINUOUS	PERIODIC SPECIAL
TASK	QC	QA	TYPE INSPECT DRILLING OPERATIONS AND MAINTAIN COMPLETE ¢	SPECIAL INSPECTION X	INSPECTION
USE OF QUALIFIED WELDERS.	0	0	ACCURATE RECORDS FOR EACH ELEMENT. VERIFY PLACEMENT LOCATIONS AND PLUMBNESS, CONFIRM ELEMENT	X	_
CONTROL AND HANDLING OF WELDING CONSUMABLES.	0	0	DIAMETERS, BELL DIAMETERS (IF APPLICABLE), LENGTHS, EMBEDMENT INTO BEDROCK (IF APPLICABLE), AND ADEQUATE END - BEARING STRATA CAPACITY. RECORD CONCRETE OR GROUT VOLUMES.		
ENVIORNMENTAL CONDITIONS (WIND SPEED, MOISTURE, TEMPERATURE). WPS FOLLOWED.	0 0	0 0	FOR CONCRETE ELEMENTS, PERFORM TESTS AND ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.3.	_	_
<ul> <li>O - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEI FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH WITH THE APPLICABLE DOCUMENTS.</li> <li>P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITEM</li> </ul>	HAT THE WORK HAS BEEN P		REQUIRED SPECIAL INSPECTIONS , PLACE DEEP FOUNDATION ELE		
INSPECTION OR EXECUTION TASK ANSI/SDI TABL		DING -		CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
TASK	QC	QA	<ol> <li>INSPECT DRILLING OPERATIONS AND MAINTAIN COMPLETE \$         ACCURATE RECORDS FOR EACH ELEMENT.</li> <li>VERIFY PLACEMENT LOCATIONS AND PLUMBNESS, CONFIRM ELEMENT</li> </ol>	×	-
VERIFY SIZE AND LOCATION OF WELDS, INCLUDING SUPPORT, SIDELAP, AND PERIMETER WELDS.	Ρ	P	DIAMETERS, BELL DIAMETERS (IF APPLICABLE), LENGTHS, EMBEDMENT INTO BEDROCK (IF APPLICABLE), AND ADEQUATE END - BEARING STRATA CAPACITY. RECORD CONCRETE OR GROUT VOLUMES.	<b>^</b>	
WELDS MEET VISUAL ACCEPTANCE CRITERIA. VERIFY REPAIR ACTIVIES.	P	P	3. FOR CONCRETE ELEMENTS, PERFORM TESTS AND ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.3.	IN ACCORDANCE W	ITH SECTION 1705.3
DOCUMENT ACCEPTANCE OR REJECTION OF WELDS.	Ρ	Р			
<ul> <li>O - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEI FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH WITH THE APPLICABLE DOCUMENTS.</li> <li>P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITEM</li> </ul>	HAT THE WORK HAS BEEN P				
INSPECTION OR EXECUTION TASKS FASTENING - ANSI/SDI TA	G	ECHANICAL			
TASK	QC	QA			
MANUFACTURER INSTALLATION INSTRUCTIONS AVAILABLE FOR MECHANICAL FASTENERS.	0	0	-		
PROPER TOOLS AVAILABLE FOR FASTENER INSTALLATION.	0	0			
<ul> <li>PROPER STORAGE FOR MECHANICAL FASTENERS.</li> <li>O - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEI FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH WITH THE APPLICABLE DOCUMENTS.</li> </ul>			J		
P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITED INSPECTION OR EXECUTION TASK FASTENING	S DURING ME	CHANICAL			
- ANSI/SDI TA TASK					
FASTENERS ARE POSITIONED AS REQUIRED.	۵C 0	QA 0			
FASTENERS ARE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. 0 - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEE FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH					
WITH THE APPLICABLE DOCUMENTS. P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITEN			7		
NSPECTION OR EXECUTION TASKS AFT - ANSI/SDI TAE		AL FASTENING	-		
TASK CHECK SPACING, TYPE, AND INSTALLATION OF SUPPORT	QC	QA P	-		
CHECK SPACING, TYPE, AND INSTALLATION OF SUPPORT CHECK SPACING, TYPE, AND INSTALLATION OF SIDELAP FASTENERS.	P	P P			
CHECK SPACING, TYPE, AND INSTALLATION OF PERIMETER FASTENERS.	Ρ	P			
VERIFY REPAIR ACTIVITIES.	P	P	-		
O - INSPECT THESE ITEMS ON AN INTERMITTENT BASIS. OPERATIONS NEE	P ED NOT BE DELAYED PENDII	P NG THESE INSPECTIONS.		D'DONNE	
FREQUENCY OF OBSERVATIONS SHALL BE ADEQUATE TO CONFIRM TH WITH THE APPLICABLE DOCUMENTS. P - PERFORM THESE TASKS PRIOR TO FINAL ACCEPTANCE FOR EACH ITEN	HAT THE WORK HAS BEEN P		10/15/2024 701 MARKET S	TRUCTURAL EN STREET   SUITE 6000   PHILA	GINEERS

STEEL CO	NSTRUCTION
CONCRETE	CONSTRUCTION
MASONRY	CONSTRUCTION
SOILS	



REQUIRED SPECIAL INSPECTIONS AND TESTS OF CAST-IN- PLACE DEEP FOUNDATION ELEMENTS- TABLE 1705.8		
TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SP
INSPECT DRILLING OPERATIONS AND MAINTAIN COMPLETE \$ ACCURATE RECORDS FOR EACH ELEMENT.	X	-
VERIFY PLACEMENT LOCATIONS AND PLUMBNESS, CONFIRM ELEMENT DIAMETERS, BELL DIAMETERS (IF APPLICABLE), LENGTHS, EMBEDMENT INTO BEDROCK (IF APPLICABLE), AND ADEQUATE END - BEARING STRATA CAPACITY. RECORD CONCRETE OR GROUT VOLUMES.	X	-
FOR CONCRETE ELEMENTS, PERFORM TESTS AND ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.3.	-	-





RESERVE FOR DCA STAMP

Requirements



ARCHITECT HKS, P.C. 1250 I (EYE) STREET NW, SUITE 600 WASHINGTON, DC 20005

ASSOCIATE ARCHITECT / INTERIOR DESIGNER ARRAY

1 WEST ELM STREET, SUITE 500 CONSHOHOCKEN, PA 19428

- STRUCTURAL ENGINEER O'DONNELL & NACCARATO
- 701 MARKET ST, #6000 PHILADELPHIA, PA 19106 MEP-FP / LOW VOLTAGE
- ENGINEER BR+A CONSULTING ENGINEERS 2401 WALNUT ST SUITE 701
- PHILADELPHIA, PA 19103 HIGHLAND ASSOCIATES 102 HIGHLAND AVE
- CLARKS SUMMIT, PA 18411



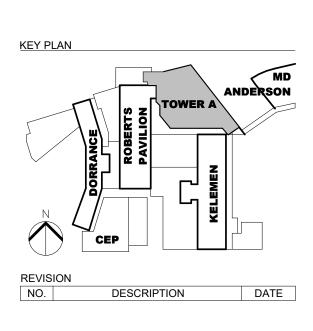
# OWNER

COOPER UNIVERSITY HEALTHCARE 1 COOPER PLAZA CAMDEN, NJ 08103

PROJECT MANAGER HAMMES 2700 S. QUINCY STREET, SUITE 540

ARLINGTON, VA 22206 CIVIL ENGINEER / LANDSCAPE LANGAN

1818 MARKET STREET, SUITE 3300 PHILADELPHIA, PA 19103



HKS PROJECT NUMBER 25695.100 DATE 10/15/2024 ISSUE PERMIT SET

SHEET TITLE SPECIAL INSPECTIONS

SHEET NO.

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S-00
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## **SECTION 051200**

#### STRUCTURAL STEEL FRAMING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Provide the work of this Section in accordance with requirements of the Contract Documents.
- B. This Section includes:
  - 1. Structural steel.
  - 2. Grout.
- C. Related Sections:
  - 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
  - 2. Division 05 Section "Architecturally Exposed Steel Framing" for additional requirements for Architecturally Exposed Structural Steel.
  - 3. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
  - 4. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.
  - 5. Division 05 Section "Metal Stairs."
  - 6. Division 09 painting Sections and Division 09 Section "High-Performance Coatings" for surface preparation and priming requirements.
  - 7. Division 03 Section "Cast-In-Place Concrete."
  - 8. Division 04 Section "Masonry."
  - 9. Division 05 Section "Cold-Formed Metal Framing."
  - 10. Division 07 Section "Spray-On Fireproofing."

### 1.2 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Heavy Sections: Rolled and built-up sections as follows:
  - 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
  - 2. Welded built-up members with plates thicker than 2 inches.
  - 3. Column baseplates thicker than 2 inches.

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#### 1.3 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
  - 1. Select and complete connections using schematic details indicated and AISC 360.
  - 2. Use ASD; data are given at service-load level.
- B. Moment Connections: Type PR, partially and FR, fully restrained.
- C. Construction: As indicated on Contract Documents.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components. The contractor shall deliver to the engineer, at the completion of the job, one (1) electronic version of the final field copies of all steel erection drawing shop drawings.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  - 5. For structural-steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
  - 1. Power source (constant current or constant voltage).
  - 2. Electrode manufacturer and trade name, for demand critical welds.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer, Fabricator, Professional Engineer, and Testing Agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

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- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
  - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 2. Direct-tension indicators.
  - 3. Tension-control, high-strength bolt-nut-washer assemblies.
  - 4. Shear stud connectors.
  - 5. Shop primers.
  - 6. Nonshrink grout.
- F. Source quality-control reports.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P3 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
  - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- D. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC 303.
  - 2. AISC 341 and AISC 341s1.
  - 3. AISC 360.
  - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Preinstallation Conference: Conduct conference at Project site.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

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- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

#### 1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. W-Shapes: ASTM A 992/A 992M
- C. Channels, Angles: ASTM A 36/A 36M
- D. Plate and Bar: ASTM A 36/A 36M
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C structural tubing, Fy = 50 ksi for square/rectangular sections and Fy = 46 ksi for round sections.
- F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
  - 1. Weight Class: As indicated on documents.
  - 2. Finish: Black, except where indicated to be galvanized.
- G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- H. Steel Forgings: ASTM A 668/A 668M.
- I. Welding Electrodes: Comply with AWS requirements.

#### 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
  - 1. Finish: Hot-dip zinc coating.
  - 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavyhex or round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
  - 1. Finish: Plain.
- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- F. Headed Anchor Rods: ASTM F 1554, Grade 36 (ASTM F 1554, Grade 55, weldable can be substituted for Grade 36) straight with heavy-hex head, or as indicated on documents.
  - 1. Nuts: ASTM A 563 heavy hex carbon steel.
  - 2. Plate Washers: ASTM A 36/A 36M carbon steel to be used at all column baseplate locations.
  - 3. Washers: ASTM F 436 Type 1, hardened carbon steel.
  - 4. Finish: Plain
- G. Threaded Rods: ASTM A 36/A 36M
  - 1. Nuts: ASTM A 563 heavy hex carbon steel.
  - 2. Washers: ASTM F 436 Type 1, hardened carbon steel.
  - 3. Finish: Plain
- H. Clevises and/or Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

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- I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.
- K. Expansion Anchors: Type and size as indicated on documents. Wedge type, torque-controlled, with impact section to prevent thread damage and wedge ridges to prevent spinning during installation, complete with required nuts, washers, and manufacturer's installation instructions. All expansion anchors shall be equipped with length identification markings.
  - 1. Interior Use: For use in conditioned environments free from potential moisture, provide carbon steel anchors with zinc plating in accordance with ASTM B633.
  - 2. Exposed Use: In exposed, potentially wet, or otherwise corrosive environment, provide anchors of Type 304 or Type 316 stainless steel with stainless steel nuts, and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded faster. All nuts shall conform to ASTM A563 Grade A unless otherwise specified. Stainless steel anchors shall not be installed in contact with galvanized steel, aluminum, or other galvanically dissimilar metals.
  - 3. Products: Provide the following:
    - a. Hilti Kwik Bolt TZ Expansion Anchor for installation into concrete.
    - b. Hilti Kwik Bolt III Expansion Anchor for installation into masonry.
- L. Cartridge Injection Adhesive Anchors and rebar doweling: Threaded steel rod or inserts, complete with nuts, washers, polymer, cementitious, epoxy, or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on documents.
  - 1. Interior Use: For use in conditioned environments free from potential moisture, provide threaded carbon steel rods conforming to ISO898, ASTM A36, or ASTM A 193, Grade B7 as indicated on documents.
  - 2. Exposed Use: In exposed, potentially wet or otherwise corrosive environments provide stainless steel anchors, nuts, and washers in accordance with ASTM F593. Provide nuts and washers with matching alloy group and minimum poof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform with ASTM F594 unless other otherwise specified. Stainless steel anchors shall not be installed in contact with galvanized steel, aluminum, or other galvanically dissimilar metals.
  - 3. Products: Provide the following:
    - a. Hilti HAS or HIT threaded rods or rebar (by others) with Hilti HIT HY-150 Adhesive for anchorage to masonry or stone. Hilti HIT HY-20 Adhesive System for anchorage to brick or concrete masonry (with screen tubes).
    - b. Hilti HAS, HIS threaded rods or rebar (by others) for doweling with Hilti HIT-RE 500-SD Adhesive Anchoring System for anchorage to concrete.
- M. Structural Slide Bearings: Low-friction assemblies, of configuration indicated, that provide vertical transfer of loads and allow horizontal movement perpendicular to plane of expansion joint while resisting movement within plane of expansion joint.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
    - a. Amscot Structural Products Corp.
    - b. Fluorocarbon Company Limited.
    - c. R.J. Watson Bridge & Structural Engineered Systems.

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- d. Seismic Energy Products, L.P.
- 2. Mating Surfaces: PTFE and PTFE.
- 3. Coefficient of Friction: Not more than 0.05.
- 4. Design Load: Not less than 2,000 psi (13.7 MPa.
- 5. Total Movement Capability: as indicated on documents.

#### 2.3 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer, complying with MPI #79 and compatible with topcoat unless otherwise indicated on documents or in Division 09.
- C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20, ASTM A 780.

#### 2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

#### 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Complete structural-steel assemblies, including welding of units, before starting shoppriming operations.
- B. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC 303 for structural steel identified as architecturally exposed structural steel.
  - 1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.

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- 2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- D. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
- G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- H. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wallopening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- I. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk, machine screws, uniformly spaced not more than 10 inches o.c., unless otherwise indicated on documents.
- J. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members with reinforcing as indicated on documents.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
  - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

# 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened or slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC 303 for mill material.

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- 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
  - a. Grind butt welds flush.
  - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

#### 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches
  - 2. Surfaces to be field welded.
  - 3. Surfaces to be high-strength bolted with slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials.
  - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 3, "Power Tool Cleaning", unless indicated otherwise on documents or in Division 09.

#### 2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
  - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
  - 2. Galvanize lintels and shelf angles attached to structural-steel frames and/or located in exterior walls.

#### 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

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- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify, with Steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, for compliance with requirements.
  - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
  - 1. Do not remove temporary shoring supporting composite deck construction until cast-inplace concrete has attained its design compressive strength.

#### 3.3 ERECTION

- A. Set structural steel accurately in locations, to elevations indicated, and according to AISC 303 and AISC 360.
- B. Base, Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bondreducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of base plate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

#### 3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

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- 1. Joint Type: Snug tightened or slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  - 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
    - a. Grind butt welds flush.
    - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field fillet welds will be visually inspected according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, all suspect field fillet welds and all field full/partial penetration welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

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#### 3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 051200

# **SECTION 053100**

# STEEL DECKING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Provide the work of this Section in accordance with requirements of the Contract Documents.
- B. Section includes:
  - 1. Roof deck.
  - 2. Composite floor deck.
- C. Related requirements:
  - 1. Division 03 Section "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
  - 2. Division 03 Section "Lightweight Insulating Concrete" for lightweight insulating concrete fill over steel deck.
  - 3. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
  - 4. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
  - 5. Division 09 painting Sections for repair painting of primed deck and finish painting of deck.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
  - 2. The contractor shall deliver to the engineer, at the completion of the job, one (1) electronic version of the final field copies of all deck layout shop drawings.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.
- D. Evaluation Reports: For steel deck.
- E. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code Sheet Steel."
- C. FMG Listing: If required by Owner, provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings, unless otherwise indicated on documents.
- D. Conduits within concrete slabs on composite steel floor Deck: No conduit shall be placed within concrete slabs on metal deck without compliance with the latest version of <u>The Design Manual</u> <u>For Composite Decks</u>, Form Decks, And Roof Decks. The contractor shall notify the architect and obtain written approval prior to any installation.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

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D. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

#### 2.2 ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Canam United States; Canam Group Inc.
  - 2. CMC Joist & Deck.
  - 3. Epic Metals Corporation.
  - 4. Nucor Corp.; Vulcraft Group.
  - 5. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following (Note: All roof deck to be fire-rated must have G60 (Z180) zinc coating minimum):
  - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230) G60 (Z180) zinc coating.
  - 2. Deck Profile: As indicated on documents.
  - 3. Profile Depth: As indicated on documents.
  - 4. Span Condition: Triple span or more.
  - 5. Side Laps: Overlapped or interlocking seam at Contractor's option unless otherwise indicated on documents.

#### 2.3 COMPOSITE FLOOR DECK

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Canam United States; Canam Group Inc.
  - 2. CMC Joist & Deck.
  - 3. Epic Metals Corporation.
  - 4. Nucor Corp.; Vulcraft Group.
  - 5. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
  - 2. Profile Depth: As indicated on documents.

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- 3. Design Uncoated-Steel Thickness: As indicated on documents.
- 4. Span Condition: Triple span or more.

#### 2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth or as indicated on documents.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Piercing Hanger Tabs: Not acceptable.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch or 0.0747 inch thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.
- J. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Galvanizing Repair Paint: ASTM A 780 SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- J. Suspended ceiling, light fixtures, ducts, pipes, or other utilities shall not be supported by the steel deck.

#### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
  - 1. Weld Diameter: 5/8 inch (16 mm), nominal, or as indicated on documents.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (450 mm) apart maximum or as indicated on documents.
  - 3. Weld Washers: Install weld washers at each weld location where uncoated steel thickness is less than 0.028 inch (0.71 mm).
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches (914 mm), with self-drilling, No. 10 (4.8 mm) diameter or larger, carbon-steel screw, or for deck that is a minimum of 0.0474 inch (1.20 mm) thick, by welding with a minimum of 1-1/2 inch (38 mm) long welds.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
  - 1. End Joints: Lapped 2 inches (51 mm) minimum or butted at Contractor's option.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches (305 mm) apart with at least one weld or fastener at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

#### 3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
  - 1. Weld Diameter: 5/8 inch (16 mm), nominal, or as indicated on documents.
  - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart, or as indicated on documents.
  - 3. Weld Washers: Install weld washers at each weld location where uncoated steel thickness is less than 0.028 inch (0.71 mm).
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (914 mm), with self-drilling No. 10 (4.8 mm) diameter or larger carbon-steel screw or, for deck that is a minimum of 0.0474 inch (1.20 mm) thick, by welding with a minimum of 1-1/2 inch (38 mm) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
  - 1. End Joints: Lapped or butted and taped at Contractor's option.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.

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E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

#### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

#### 3.6 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100