

Project Title: **Staging, Storage, Sizing and Treatment Facility (SSSTF)**  
Document Type: **Technical Specifications** Project Number:  
Revision Number: 0

1 SECTION 04220--CONCRETE MASONRY UNITS

2  
3 PART 1--GENERAL

4  
5 SUMMARY:

6  
7 The Subcontractor shall provide all plant, labor, and materials to lay masonry walls, complete  
8 with accessories, reinforcing, mortar, grout fill, caulking, cell insulation, etc., as required by  
9 the drawings and these specifications. The Subcontractor shall be responsible to provide  
10 temporary bracing as required to support walls during construction against winds and other  
11 loading until permanent support provided by additional crosswalls, roofs, etc., is installed.

12  
13 Section Includes: Work includes, but is not limited to:

14  
15 Construct fully grouted CMU walls as indicated on the drawings.

16  
17 REFERENCES:

18  
19 The following documents, including others referenced therein, form part of this Section to the  
20 extent designated herein:

21  
22 **AMERICAN CONCRETE INSTITUTE (ACI)**

23  
24 ACI 530 Building Code Requirements for Masonry Structures  
25 ACI 530.1 Specifications for Masonry Structures

26  
27 **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

28  
29 ASTM A 82 Standard Specification for Steel Wire, Plain, for Concrete  
30 Reinforcement  
31 ASTM A 615 Standard Specification for Deformed and Plain Billet-Steel Bar for  
32 Concrete Reinforcement  
33 ASTM C 90 Standard Specification for Load-Bearing Concrete Masonry Units  
34 (CMU)  
35 ASTM C 140 Standard Test Methods for Sampling and Testing Concrete Masonry  
36 Units  
37 ASTM C 144 Standard Specification for Aggregate for Masonry Mortar  
38 ASTM C 150 Standard Specification for Portland Cement  
39 ASTM C 207 Standard Specification for Hydrated Lime for Masonry Purposes  
40 ASTM C 270 Standard Specification for Mortar for Unit Masonry  
41 ASTM C 331 Standard Specification for Lightweight Aggregates for Concrete  
42 Masonry Units  
43 ASTM C 404 Standard Specification for Masonry Grout  
44 ASTM C 476 Standard Specification for Grout for Masonry  
45 ASTM C 1019 Standard Test Method for Sampling and Testing Grout

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1  
2 NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)

3  
4 NCMA Guide Specifications For Concrete Masonry

5  
6 INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

7  
8 UBC Uniform Building Code

9  
10 **SUBMITTALS:**

11  
12 Submittals include, but are not limited to the following:

13  
14 **Samples:** Submit CMU samples for testing.

15  
16 **Product Data:** Complete description of each type of masonry unit product and accessory;  
17 joint reinforcing, anchor, etc., for approval.

18  
19 **Certificate of Materials:** Prior to delivery of materials to jobsite, submit certification from  
20 manufacturer indicating curing, moisture content and linear shrinkage of all CMU for  
21 compliance with these specifications. Certify mortar and grout compliance. Certify that  
22 CMU delivered to the site are manufactured, cured and dried in the same manner as samples  
23 submitted and are equal in quality, strength and appearance.

24  
25 See Section 01300, Submittals and the Vendor Data Schedule for additional submittal  
26 requirements.

27  
28 **QUALITY CONTROL:**

29  
30 **Qualifications of Workmen:** Cutting and placing shall be done by skilled journeyman  
31 masons who are thoroughly experienced with materials and methods specified. Provide one  
32 skilled journeyman mason at all times to personally direct masonry work.

33  
34 **Regulatory Requirements (Codes and Standards):** Comply with provisions of the following  
35 codes and standards, unless otherwise specified herein:

36  
37 ACI 530.1 Specifications for Masonry Structures  
38 NCMA Guide Specifications For Concrete Masonry  
39 UBC Applicable parts of the Uniform Building Code

40  
41 **Inspection:** Inspection of structural CMU walls will be arranged for by the Contractor. The  
42 installation of concrete unit masonry will be inspected at no cost to the Subcontractor.  
43 However, this shall not relieve the Subcontractor from responsibility for the accuracy of the  
44 work in all details and compliance with specifications.

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1 Contractor Supplied Testing: Provide 10 CMU samples representative of a production run  
2 for testing in accordance with ASTM C 140. Samples of mortar and grout may be taken by  
3 the testing agency, at no additional cost to the Subcontractor.

4  
5 PART 2--PRODUCTS

6  
7 CONCRETE BLOCK:

8  
9 General: Obtain masonry units from one manufacturer, of uniform texture, and color for each  
10 kind required, for each continuous area, and visually related areas.

11  
12 Concrete Masonry Units (CMU): Concrete masonry units shall be hollow, load bearing type.  
13 The units shall not contain any deleterious matter, which can stain adjacent construction work  
14 or corrode metal. The minimum average compressive strength on the average gross area of  
15 three or more units shall be 1000 psi, and the minimum compressive strength of individual  
16 units shall be 800 psi. Water absorption shall not exceed 20-lb/cu ft for the average of five  
17 units. The blocks and aggregate in them shall conform ASTM C 90, Grade N-II and C331,  
18 respectively, except for maximum water absorption.

19  
20 CMU Cells: Cells containing vertical reinforcement shall be a minimum of 2-in. wide and  
21 4 in. long.

22  
23 MORTAR AND GROUT COMPONENTS:

24  
25 Portland Cement: ASTM C 150, Type I-II, nonstaining without air-entrainment, natural  
26 color.

27  
28 Hydrated Lime: ASTM C 207, Type S.

29  
30 Aggregates: Clean, sharp, well graded, and free from injurious amounts of dust, lumps,  
31 shales, alkali, surface coatings, and organic matter.

32  
33 For Mortar: ASTM C 144.

34 For Grout: ASTM C 404.

35  
36 Potable Water: Water shall be clean, fresh, and free from injurious amounts of oil, acid, salt,  
37 alkali, silt or organic matter.

38  
39 MORTAR AND GROUT MIXES:

40  
41 General: Proprietary, premeasured and prebagged mortar and grout may be substituted for  
42 field mixed mortar and grout when constituents and design performance can be certified by  
43 manufacturer, as being in compliance with this specification.

44  
45 Mortar: Mortar shall conform to ASTM C 270, minimum 1800 psi in 28 days, Type "S".

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1  
2 Grout: Grout shall conform to ASTM C 476, minimum 2500 psi in 28 days, Type "Coarse  
3 Grout". Compressive strength samples shall be made in conformance with ASTM C 1019.  
4

5 Admixtures: Use of admixtures is prohibited, except when approved by the Contractor.  
6

7 ACCESSORIES:  
8

9 Reinforcing Bars: Reinforcing bars shall conform to ASTM A 615, Grade 40 or 60.  
10

11 Horizontal Joint Reinforcement: Horizontal joint reinforcement shall be manufactured from  
12 cold drawn steel wire conforming to ASTM A 82, and shall consist of two deformed  
13 longitudinal rods welded at 16 in. intervals to a continuous diagonal cross rod forming a truss  
14 design. Out to out spacing of side rods shall be approximately 2 in. less than the nominal  
15 thickness of the wall or wythe. Provide minimum No. 9 gage stringers and crossbands, with  
16 a minimum total effective areas of 0.048 sq. in. for nominal 8 in. wall, 0.051 sq. in. for  
17 nominal 4 in. wall, as manufactured by Dur-O-Wall, National Wire Products, Ty-Wal, or  
18 approved equal, every second course.  
19

20 Miscellaneous Anchors: All other inserts and anchors such as straps, bars, bolts and ties shall  
21 be hot-dipped galvanized.  
22

23 Insulation: Mineral fiber insulation of size and thickness required to fill voids above  
24 partitions and at penetrations, Owens Corning "Sill Sealer", or approved equal.  
25

26 PART 3--EXECUTION  
27

28 INSPECTION:  
29

30 Prior to start of work, carefully inspect work of other trades and notify the Contractor's  
31 Representative of any condition that would effect performance of unit masonry. Do not  
32 proceed until discrepancies have been fully resolved. Coordinate openings required by  
33 mechanical and other trades.  
34

35 Verify that concrete masonry has been completed in strict accordance with all pertinent codes  
36 and regulations, and intent of design.  
37

38 PRODUCT HANDLING:  
39

40 Protect masonry material during storage and construction from rain, snow, ground water or  
41 materials likely to cause staining.  
42

43 Protect reinforcements and anchors from weather. Do not use metal reinforcing or anchors  
44 having rust or foreign coatings.  
45

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1 Do not use masonry units that contain ice or frost.

2  
3 Do not use masonry units with chips, cracks, or voids that are not minor or incidental from  
4 manufacturing.

5  
6 JOB CONDITIONS:

7  
8 Environmental Requirements: Commence masonry work only when ambient temperature is  
9 40° F for 48 hours or above and rising, or when building is enclosed, covered and heated.

10  
11 Protection: Protect exposed walls with insulated blankets or other methods approved by the  
12 Contractor during cold weather.

13  
14 Mortar Protection: Store mortar materials in location above 40° F. Should materials be  
15 exposed to colder temperatures, heat those materials until acclimatized to 70° F ± 10° F.

16  
17 Protective Period: All new masonry work shall be protected against freezing for a period of  
18 not less than 72 hours subsequent to laying.

19  
20 PROPORTIONING AND MIXING:

21  
22 Proportioning of mixes, mortar and grout shall be in accordance with ASTM C 270 and C  
23 476, respectively.

24  
25 Use mechanical mixer of one sack minimum capacity.

26  
27 Mix in mechanical mixer for at least 5 minutes. Do not use calcium chloride in mortar or  
28 grout.

29  
30 Mortar which has stiffened due to evaporation may be retempered, only by adding water  
31 within a basin formed with the mortar and the mortar reworked into the water. Do not heat  
32 mixing water above 150° F.

33  
34 Deliver mortar to mason's board within 45 minutes after mixing. Any mortar or grout that  
35 has begun to set or is not used within 2-1/2 hours after initial mixing shall be discarded and  
36 removed from the project.

37  
38 BOND PATTERN AND JOINT TOOLING:

39  
40 Spread mortar bed joints to a uniform thickness with fresh mortar. Throwing mortar  
41 scrapings or slushing mortar into joints is prohibited. Furrowing of bed joints will not be  
42 permitted. Where no bond pattern is indicated on drawings, masonry units shall be laid in  
43 running bond. Bond corners and intersections.

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1 Cut joints flush in concealed areas and where surface will receive ceramic tile. Tool all  
2 exposed joints smooth, dense and slightly concave, so that not less than 5/8 in. coverage  
3 occurs at joint reinforcement. Tool after mortar has taken partial set but before fully set.  
4

5 Joint thickness shall be 3/8 in. and shall meet control heights indicated on drawings  
6 throughout the building.  
7

#### 8 INSTALLATION: 9

10 Lay masonry units plumb, true to line, and with accurately spaced level courses. Vertical  
11 joints shall fall on centerline of unit below. (Lay up CMU such that units are more than  
12 1/2 blocks when exposed to view wherever possible.)  
13

14 Use a masonry saw for masonry units requiring cutting. Do not install any broken or cracked  
15 units. Cut, drill or block out chases for other trades or as indicated on drawings.  
16

17 Lay masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs  
18 in mortar in starting course on the concrete floor and where adjacent to cells to be filled with  
19 grout.  
20

21 Adjust each unit to final position while mortar is still soft and plastic. Remove any unit  
22 disturbed after mortar has stiffened and relay with fresh mortar.  
23

#### 24 Allowable variations: 25

26 Maximum variation of bed joint thickness: 1/8 in.  
27

28 Maximum variation of bed joint from level: 1/4 in. in 10 ft, 1/2 in. maximum.  
29

30 Maximum variation of head joint from plumb (vertical alignment): 1/2 in. in 10 ft,  
31 1/2 in. maximum.  
32

33 Maximum variation of wall thickness, multiple wythes: 1/4 in.  
34

35 Maximum vertical variation of wall alignment (plumb): 1/4 in. in 10 ft, 1/2 in.  
36 maximum per floor, and 1 in. maximum per total height.  
37

38 Maximum horizontal variation of wall alignment (level): 1/4 in. in 10 ft, and 1/2 in.  
39 maximum.  
40

41 Maximum horizontal variation of wall from plan location: 1/4 in. in 10 ft, and 1/2 in.  
42 maximum variation.  
43

44 Maximum variation in level of top surface of bearing walls between adjacent floor  
45 elements: 1/8 in. in 10 ft and 1/16 in. within width of a single unit.

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1  
2 Lay only surface dry units, except that in hot weather, when units are warm to the touch,  
3 surfaces only may be wetted with a light fog spray.

4  
5 Clean out mortar openings for vertical cell reinforcing.

6  
7 As work progresses, build in all items shown on the drawings. Saw cut CMU to fit around  
8 frames, ducts, pipe chases and other construction with a clearance not greater than 1/2 in. Fill  
9 spaces between masonry and doorjambes or other built-in items solidly with mortar. Fill cells  
10 receiving anchors or anchor bolts solidly with grout.

11  
12 Install bond beams where shown on the drawings using load-bearing bond beam units.  
13 Reinforce as shown on the drawings (with at least two No. 5 bars) and fill with grout. Lap  
14 reinforcement 30 diameters or 12 in. whichever is greater.

15  
16 Where bond beams are used for lintels, extend at least 40 diameters past the opening, except  
17 as otherwise shown.

18  
19 Place horizontal joint reinforcement in every other course in accordance with manufacturer's  
20 instructions. Fabricate corners and intersections to maintain continuous unbroken  
21 reinforcement. Lap ends a minimum of 6 in.

22  
23 Maintain joint bed thickness of at least twice the diameter of wire stringers and equal mortar  
24 face coverage on each face.

25  
26 Maintain at least 1/2 in. clearance between reinforcement and interior faces of units. Place  
27 vertical reinforcement central in cores except where shown on the drawings.

28  
29 Maintain masonry unit temperatures above 40<sup>o</sup> F when laid.

30  
31 Bolts, anchors and other inserts that attach adjoining construction should be bedded in mortar  
32 joints and held in proper position until wall is grouted.

33  
34 When starting and resuming work, clean exposed surfaces of set masonry of all loose mortar  
35 and grout prior to laying fresh masonry.

36  
37  
38  
39  
40 **GROUTING:**

41  
42 Grouting shall conform to either the "low-lift grouted construction" requirements of the  
43 Uniform Building Code or to the "high-lift grouted construction" requirements.

44  
45 Clean all mortar drippings out of cores before grouting.

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1  
2 Place vertical reinforcement in cores at openings and where shown on the drawings. Place  
3 bars in 6 ft or longer lengths. Lap bars at least 30 diameters and secure with approved ties.  
4 Do not splice bars at section of maximum flexure. Fill the cores with grout and rod the grout  
5 in solid. Fill the cores in lifts no greater than 4 ft high unless approved by the Contractor.  
6 Provide key for next lift by ending below top course.

7  
8 Grout all reinforced cells full.

9  
10 When grouting is stopped for one hour or longer, horizontal construction joints shall be  
11 formed by stopping the pour of grout not less than 2 in. below the top of the uppermost unit  
12 grouted.

13  
14 Grout shall be consolidated by puddling or mechanical vibrating during placing and  
15 reconsolidated after excess moisture has been absorbed but before plasticity is lost.

16  
17 REPAIR, POINTING AND CLEANING:

18  
19 Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise  
20 damaged, or if units do not match adjoining units as intended. Do not cover up damaged  
21 work. Repair immediately before continuing.

22  
23 Install new units to match adjoining in fresh mortar and grout, pointed to eliminate evidence  
24 of replacement.

25  
26 During tooling of joints, enlarge any holes and fill with mortar. Point up joints at corners to  
27 provide a neat, uniform appearance.

28  
29 At the end of each day's work, and after final pointing, clean all exposed masonry by dry  
30 brushing. Remove all spots and droppings. Take care, while cleaning, to keep from  
31 roughening tooled mortar joints.

32  
33 Provide temporary bracing as required. Shore up openings and projections until grout or  
34 concrete has reached required strength.

35  
36  
37  
38  
39 FIELD QUALITY CONTROL:

40  
41 Samples: As CMU are unloaded and made ready to use, compare units with job samples for  
42 appearance and quality. Reject and return broken, battered or damaged block.

43

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- 1 Test Units: In addition to preconstruction tested units additional units (up to 10 CMU) may  
2 be taken by testing agency from stock piled units at jobsite. Units will be selected at random  
3 by Contractor's Representative.  
4
- 5 Straight Edge: Lay 10-ft straight edge on walls at random directions and locations. Measure  
6 indentation and/or projection of wall. Compare to specified maximum tolerances. Remove  
7 or repair discrepancies as specified above.  
8
- 9 Grout: Samples for testing of grout mixtures for compressive strength may be taken at any  
10 point during grouting operations by Contractor's Representative.  
11
- 12 Surveillance will be performed by the Contractor's Representative to verify compliance of the  
13 work to the drawings and specifications.  
14
- 15 END OF SECTION 04220

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1 SECTION 05060--STRUCTURAL WELDING

2  
3 PART 1--GENERAL

4  
5 SUMMARY:

6  
7 Section Includes: Work includes, but is not limited to:

8  
9 All structural welding on carbon steel, stainless and nickel-based alloys, and  
10 aluminum.

11  
12 Related Sections: Welding of structural metals directly to piping, vessels and other pressure  
13 boundaries shall be made in accordance with the requirements of Section 15024 PRESSURE  
14 PIPING/VESSEL WELDING.

15  
16 REFERENCES:

17  
18 The following documents, including others referenced therein, form part of this Section to the  
19 extent designated herein.

20  
21 AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

22  
23 AISC (LRFD) Specification for Structural Steel Buildings  
24 AISC (ASD) Specification for Structural Steel Buildings-Allowable Stress Design  
25 (ASD) and Plastic Design  
26 AISC N690 Nuclear Facilities - Steel Safety-Related Structures for Design  
27 Fabrication and Erection

28  
29 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

30  
31 ANSI Z49.1 Safety in Welding and Cutting

32  
33 AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

34  
35 ASNT SNT-TC-1A Personnel Qualifications and Certification in Nondestructive  
36 Testing

37  
38 AMERICAN WELDING SOCIETY (AWS)

39  
40 AWS A2.4 Symbols for Welding and Nondestructive Testing  
41 AWS A3.0 Welding Terms and Definitions  
42 AWS D1.1 Structural Welding Code - Steel  
43 AWS D1.2 Structural Welding Code - Aluminum  
44 AWS D1.3 Structural Welding Code - Sheet Steel

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1 AWS D1.4 Structural Welding Code - Reinforcing Steel  
2 AWS QC1 AWS Standard for Qualification and Certification of Welding  
3 Inspectors  
4

5 AMERICAN SOCIETY FOR MECHANICAL ENGINEERS (ASME)

6  
7 ASME Sect. V Boiler and Pressure Vessel Code (Nondestructive Examination)

8  
9 IDAHO NATIONAL ENGINEERING LABORATORY (INEEL)

10  
11 INEEL Welding Manual.

12  
13 SUBMITTALS:

14  
15 Submittals include, but are not limited to the following:

16  
17 No Vendor data required for this section unless an "or-equal" item is proposed.

18  
19 Vendor data required includes but is not limited to:

20  
21 Cleaning procedures for stainless steel.

22  
23 Handling storage and control procedures for filler materials and backing material.

24  
25 Welding procedures and procedure qualification reports performed in accordance with  
26 AWS D1.1, D1.2, D1.3, or D1.4 as applicable for off-site welding including a list of  
27 procedures selected for use from the INEEL Welding Manual. These procedures shall  
28 be referenced on the shop drawings, erection drawings, and Subcontract drawings as  
29 applicable.

30  
31 Welding personnel qualification records.

32  
33 Subcontractor's nondestructive examination procedures.

34  
35 Subcontractor's nondestructive examination personnel qualification records.

36  
37 [Filler metal manufacturer or independent testing lab certified mill test reports of  
38 actual [typical may be used for shielded metal arc electrodes] chemical properties and  
39 heat number identification for all filler metals.]

40  
41 The heat number shall be marked on the CMTR. The CMTR shall certify that the  
42 material has been inspected and tested in accordance with the requirements of the  
43 specification and that the results of the chemical analysis meet the requirements of the

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1 specification for the AWS material classification. Straight lengths of bare filler metal  
2 shall be marked on each end with heat number and AWS material classification.

3  
4 Subcontractor's identification and control procedures for tools and equipment.

5  
6 Weld histories including requirements in special conditions such as reports of each  
7 inspection, examination and test.

8  
9 Detailed weld repair procedures.

10  
11 Weld repair reports including weld identification, welder identification number, test  
12 procedure, reason for rejection, number of repairs required, and documentation that  
13 weld is repaired and accepted.

14  
15 [Weld map which shall include the following information: process and weld  
16 procedure specification, NDE requirements and unique identification number  
17 including welder's identification and completion date.]

18  
19 Shop drawings showing all welds. All necessary information such as location, size,  
20 weld preparation, etc., shall be shown. The drawings shall differentiate between shop  
21 and field welds. The weld procedures and filler material to be used shall be indicated.

22  
23 See Section 01300, Submittals and the Vendor Data Schedule for additional submittal  
24 requirements.

25  
26 QUALITY CONTROL:

27  
28 Codes and Standards Regulatory Requirements (Codes and Standards): Comply with  
29 provisions of the following codes and standards, unless otherwise specified herein:

30  
31 AISC ASD Specification

32  
33 General:

34  
35 Components with welds will not be accepted unless the welding has been specified or  
36 indicated in the design documents or otherwise approved. Welding shall be as specified in  
37 this Section except where additional requirements are indicated or are specified in other  
38 sections.

39  
40 Weld Procedure Qualification:

41  
42 Off-Site Procedures: The Subcontractor shall establish and qualify Weld Procedure  
43 Specifications (WPS) for any off-site welding performed during this Subcontract in  
44 accordance with the requirements of AWS D1.1, D1.2, D1.3 or D1.4 as applicable.

1 Approval will not relieve the Subcontractor of the sole responsibility for preparing  
2 procedures in accordance with the above referenced specification.  
3

4 The Subcontractor may use welding procedures from the INEEL Welding  
5 Manual listed in PART 3 Welding Processes paragraph for off-site welding if  
6 a letter is submitted as vendor data stating that these procedures are being  
7 adopted for use in performance of this subcontract.  
8

9 On-Site Procedures: Welding procedures from the INEEL Welding Manual  
10 listed in PART 3 Welding Processes paragraph shall be used for on-site  
11 welding.  
12

13 Welder Qualification:  
14

15 Off-Site: Off-site welding shall be performed by welders or operators qualified in  
16 accordance with AWS D1.1, D1.2, D1.3 or D1.4 as applicable. Welders or welding  
17 operators qualified to INEEL Welding Manual procedures can be used for off-site  
18 welding if the applicable INEEL weld procedures are identified and submitted as  
19 Vendor Data. When using INEEL Welding Manual procedures for off-site welding,  
20 welders shall be qualified at the INEEL Welder Test Facility.  
21

22 On-Site: All on-site welding performed under this specification shall be performed  
23 by welders or welding operators qualified at the INEEL Welder Test Facility using  
24 the applicable procedures specified from the INEEL Welding Manual.  
25

26 Certification: Upon successful completion of the qualification test, the welder shall be  
27 provided with a certificate card by the Subcontractor (off-site) or in compliance with the  
28 INEEL Welding Manual (on-site). The certificate shall state the welding process, codes, and  
29 procedures under which the welder is qualified, and individual who issued the certificate.  
30 The welder shall carry the certificate card when performing welding under this contract. The  
31 Subcontractor shall have on file documentation, affidavits, and records of testing and test  
32 results which qualified the welder for certification. These records shall be certified by the  
33 Subcontractor and shall be submitted to the Contractor as vendor data.  
34

35 Welder's Identification: The Subcontractor shall assign each welder with an identifying  
36 number, letter, or symbol. This symbol shall be used by the welder to identify all welds  
37 made by him.  
38

39 Renewal of Qualification: Renewal of qualification for a welder or welding operator working  
40 on-site shall be in accordance with the INEEL Welding Manual. Renewal of qualifications  
41 of a welder or welding operator working off-site shall be as required in AWS D1.1, D1.2,  
42 D1.3, or D1.4 as applicable.  
43

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1 Nondestructive Examination Procedures: The Subcontractor shall establish detailed  
2 inspection procedures and acceptance criteria for each nondestructive examination required in  
3 accordance with the requirements specified in PART 3--EXECUTION - SOURCE AND  
4 FIELD QUALITY CONTROL and additionally as required to ensure conformance of the  
5 work to the subcontract requirements.

6  
7 Subcontractor's Nondestructive Examination Personnel Qualifications: The Subcontractor's  
8 nondestructive examination (including visual examination) personnel shall be qualified for  
9 the applicable nondestructive testing method in accordance with the requirements of ASNT  
10 SNT-TC-1A for Levels I, II, or III as applicable. Qualification as an AWS Certified Weld  
11 Inspector is an acceptable alternative for visual examination. The Subcontractor shall have  
12 on file documentation, affidavits, and records of testing and test results which qualified the  
13 nondestructive examination personnel.

14  
15 DEFINITIONS AND SYMBOLS:

16  
17 Definitions for welding terms shall be in accordance with AWS A3.0 and weld symbols shall  
18 be in accordance with AWS A2.4, unless otherwise indicated.

19  
20 DELIVERY, STORAGE, AND HANDLING:

21  
22 Except as otherwise specified, filler materials and fluxes shall be stored and handled in  
23 accordance with Manufacturer's Recommendations and approved procedures (off-site) or the  
24 INEEL Welding Manual Volume 2 (on-site). In addition, filler material shall be controlled in  
25 accordance with approved procedures (off-site) or the INEEL Welding Manual Volume 2  
26 (on-site). After filler material has been removed from its original package, it shall be  
27 protected or stored so that its characteristics and welding properties are not affected. All  
28 consumable welding material shall be kept free of oil, grease, and foreign matter.  
29 Precautions shall be taken to minimize absorption of moisture.

30  
31 SAFETY:

32  
33 As a minimum, safety precautions during welding shall conform to ANSI Z49.1 as well as  
34 any additional requirements specified in the subcontract documents.

35  
36 PART 2--PRODUCTS

37  
38 GENERAL:

39  
40 Welding equipment, electrodes, filler material, and fluxes shall be capable of producing  
41 satisfactory welds when used by a qualified welder or welding operator utilizing qualified  
42 welding procedures.

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1 MATERIALS:  
2

3 Filler Material: All filler material used in fabrication shall comply with the applicable  
4 requirements of AWS D1.1, D1.2, D1.3 or D1.4 (as applicable) and have a typical certified  
5 material test report (CMTR) issued by the original manufacturer or independent testing  
6 laboratory performing material testing.  
7

8 Gases: Shielding and purge gas(es) shall be in accordance with the applicable weld  
9 procedure.  
10

11 Liquid Penetrant: All liquid penetrant materials shall meet the requirements of ASME  
12 Section V, Article 24, SE-165, Method B, Procedure B-3, Visible Solvent-Removable  
13 Penetrants. Penetrant materials shall meet the requirements of Section V,  
14

15 PART 3--EXECUTION  
16

17 WELDING OPERATIONS:  
18

19 Both off-site and on-site welding shall be accomplished in accordance with the qualified and  
20 approved welding procedures using qualified welders and/or welding operators. The use of  
21 such procedures will not relieve the Subcontractor of his responsibility for producing  
22 weldments conforming to the specified workmanship requirements. Welding shall not be  
23 done when the quality of the completed weld could be impaired by the prevailing working or  
24 weather conditions.  
25

26 Welding Processes:  
27

28 Off-Site: Subject to approval of the Subcontractor's welding procedures, acceptable welding  
29 processes are indicated in Table 1 - Welding Process Application.  
30

31 Other welding processes may be used subject to specific approval. The Subcontractor shall  
32 submit pertinent data and proposed application of said other welding processes for evaluation  
33 by the Contractor prior to performing weld procedure qualification.  
34

35 On-Site and Off-site Using INEEL Welding Manual:  
36

37 Carbon Steel Tubular Sections, Plate and Structural Shapes: INEEL Welding  
38 Procedures C-2.11, C-3.5, C-6.9 or C-6.10, as applicable.  
39

40 Stainless Steel: INEEL Welding Procedures S-2.24, S-3.16, or S-6.13, as applicable.  
41

42 Stainless Steel to Carbon Steel: INEEL Welding Procedure, CS-2.7, CS-3.04, or  
43 CS-6.5, as applicable.  
44

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1 Aluminum: INEEL Welding Procedures, A2.5, A2.11, A2.14, A2.15, A2.18, A2.19,  
2 A6.10, A6.12, A6.13, or A6.15, as applicable.  
3

4 Tools and Equipment: Tools and equipment used in the fabrication of stainless steel and  
5 nickel based alloys shall be free from corrosion and shall be maintained free of grease,  
6 carbon steel particles, or any other foreign matter detrimental to fabrication. Mechanical  
7 cleaning tools used for stainless steel shall not cause carbon steel to be embedded into the  
8 surface. Wire brush material shall be of a material compatible with the parent material.  
9 Grinding wheels shall be resin bonded. Metal removal tools, wire brushes, and grinding  
10 wheels shall not have been previously used for other than the parent material. The  
11 Subcontractor shall establish and maintain identification and control procedures for  
12 equipment and tools including wire brushes and grinding wheels.  
13

14 Preparation of Base Metal: Surfaces within 2 in. of any weld location shall be free of any oil,  
15 grease, paint, or other material that would prevent proper welding or produce objectionable  
16 fumes while welding. If the joints of carbon steel are prepared by arc cutting, the surface  
17 shall be ground to bright metal by mechanical means before welding. Plasma arc or laser  
18 beam cutting of austenitic stainless steel is permitted provided the cut surface is machined or  
19 ground a minimum of 1/16 in. to bright metal.  
20

21 Cleaning Stainless Steel: The weld joint and surrounding metal for at least 2 in. back from  
22 the joint preparation shall be cleaned before welding. Cleaning shall be accomplished by  
23 brushing with a clean stainless steel brush and by scrubbing with a clean lint free cloth  
24 moistened with an approved low (less than 35 ppm) chloride or chloride-free solvent. When  
25 the weld has cooled, remove all visible weld spatter, flux, arc-strikes, and scale, however, the  
26 base material thickness shall not be compromised. Stainless steels shall not be descaled with  
27 nitric-hydrofluoric acid solutions. Final cleaning shall be performed after inspection and  
28 when nondestructive testing is complete.  
29

30 Preheat and Interpass Temperature Requirement: Preheat and interpass temperature shall be  
31 in accordance with the welding procedure specification.  
32

33 Welding Requirements: Fillet, groove, seal, pipe and tube welds shall provide a surface that  
34 is free from cracks, seams, laps, lamination, and porosity in excess of the specified  
35 acceptance requirements. Arc strikes outside the area of permanent welds shall be avoided  
36 on base metal. Arc strikes shall be removed by grinding as described in cleaning paragraph.  
37

38 Fillet Welds: Fillet welds shall be made to the size and length as indicated. Where length of  
39 welds is not specified, the weld shall be continuous for full length of joint. Where spacing of  
40 intermittent or staggered weld is shown, the spacing shall be considered maximum only.  
41

42 Unless fillet sizes are indicated as maximum size, oversize welds shall not exceed the  
43 thickness of the thinner part joined. Fillet weld surface shall have a uniform transition from  
44 the joined material into the weld deposit. Undercut shall be limited to the requirement of

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1 AWS D1.1, D1.2, D1.3 or D1.4 as applicable and unfused overlap of the weld deposit shall  
2 be unacceptable.

3  
4 Groove Welds: Groove welds shall be 100% complete joint penetration welds unless  
5 otherwise indicated. Groove welds shall be made to the requirements of the drawings and  
6 specification.

7  
8 Stud Welds: Welds for studs and shear connectors shall be made with automatically timed  
9 stud welding equipment in accordance with AWS D1.1, Section 7.

10  
11 Arc Spot (Puddle) Welds: Metal deck to structural steel arc spot welds shall be fusion welds  
12 conforming to AISI Cold-Formed Steel Design Manual, Specification for the Design of  
13 Cold-Formed Steel Structural Members and AWS D1.3.

14  
15 Temporary Welds: Temporary welds shall be subject to the same welding procedure  
16 requirements as the final welds. Temporary welds shall be removed unless otherwise  
17 permitted by the Contractor. Surface of removed temporary welds shall be made flush with  
18 the original surface.

19  
20 Backing Strips and Weld Runoff Plates: The use of backing strips and weld runoff plates is  
21 permitted on weldments. The backing strips and weld runoff plates shall be removed after  
22 welding, unless otherwise indicated. Surface of removed temporary welds shall be made  
23 flush with the original surface.

24  
25 Identification of Welds: The welder shall permanently affix his assigned identification mark  
26 and applicable weld identification number adjacent to the weld using a vibro-etch tool. The  
27 welder shall also record this information on the weld map.

28  
29 Weld Repairs:

30  
31 Defects shall be completely removed by grinding or other approved means to clean,  
32 sound metal. Excavated areas shall be MT or PT inspected by ASNT-TC-1A certified  
33 personnel to assure defect removal.

34  
35 Repairs to correct weld defects shall be made using the same procedure used for the  
36 original weld or other previously authorized weld repair procedures.

37  
38 Repaired areas shall be re-examined using the same inspection procedures by which  
39 the defect was originally detected and the inspection which was originally specified  
40 for the weld.

41  
42 Two repair attempts will be allowed on any one weld:

43  
44 Cutting out and rebeveling then rewelding is a considered a weld repair.

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1 No further attempts to repair shall be carried out without the written  
2 authorization of the Contractor.

3  
4 Weld repairs subsequent to the first two repair attempts shall be made after  
5 receiving written approval of Subcontractor's repair procedures.

6  
7 Arc Strikes: Cracks and blemishes caused by arc strikes shall be ground to a smooth  
8 contour but no more than 1/32 in. of the base metal shall be removed. Arc strikes  
9 extending more than 1/32 in. into the base metal shall be considered as a weld defect  
10 and repaired as specified. Ground arc strikes in carbon steel shall be subjected to  
11 magnetic particle examination and in stainless steel shall be subjected to liquid  
12 penetrant examination.

13  
14 FIELD QUALITY CONTROL:

15  
16 Inspections, examinations, and tests for welds and weldments shall be performed by qualified  
17 inspection, examination, and testing personnel in accordance with the approved procedures.  
18 All welds are subject to inspection by the Contractor's Representative who reserves the right  
19 to accept, reject or demand removal of welds which are in violation of this specification or  
20 the applicable welding procedure specification. The Subcontractor shall provide access for  
21 this activity.

22  
23 Weld Testing and Inspection:

24  
25 Visual Weld Inspection: All welds shall receive a visual (VT) examination. VT inspection  
26 shall be performed, evaluated and documented by the Subcontractor for off-site welds.  
27 Visual examination procedures shall be in accordance with AWS D1.1, D1.2, D1.3 and D1.2  
28 as applicable. The evaluation of indications and the acceptance criteria shall be in  
29 accordance with AWS D1.1, D1.2, D1.3 or D1.4 as applicable.

30  
31 Liquid Penetrant Examination:

32  
33 Liquid penetrant (PT) examination shall be performed in accordance with ASME  
34 Section V, Article 6 using solvent removable penetrant.

35  
36 Welds shall receive PT of the final pass.

37  
38 PT inspection shall be performed, evaluated and documented by the Subcontractor for  
39 on-site welds and by the Subcontractor for off-site welds.

40  
41 Evaluation of liquid penetrant indications and acceptance criteria shall be in  
42 accordance with AWS D1.1, D1.2, D1.3 or D1.4 as applicable, except rounded  
43 indications greater than 1/16 in. shall be unacceptable.

44

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1 Contractor Inspection: Surveillance will be performed by the Contractors Representative to  
2 verify compliance of the work to the drawings and specifications.

3

4 END OF SECTION 05060

5

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1 SECTION 05100--STRUCTURAL STEEL AND MISCELLANEOUS METALS

2  
3 PART 1--GENERAL

4  
5 SUMMARY:

6  
7 The Subcontractor shall supply all labor, equipment, and materials required to construct items  
8 listed hereafter and as shown on the drawings.

9  
10 Section Includes: Work includes, but is not limited to:

11  
12 Structural steel framing not included in Section 13120 Metal Building  
13 Structural steel framing for door canopies  
14 Miscellaneous steel such as guard posts, hand rails, ladders, stairs, anchors and  
15 embedments  
16 Structural steel pipe supports  
17 Structural steel equipment supports or platforms  
18

19 REFERENCES:

20  
21 The following documents including others referenced therein, form part of this Section to the  
22 extent designated herein.

23  
24 AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

25  
26 AISC Code of Standard Practice for Steel Buildings and Bridges  
27 AISC (LRFD) LRFD Specification for Structural Steel Buildings  
28 AISC (ASD) Specification for Structural Steel Buildings - Allowable Stress Design  
29 (ASD) and Plastic Design  
30

31 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

32  
33 ANSI Z49.1 Safety in Welding  
34

35 AMERICAN WELDING SOCIETY (AWS)

36  
37 AWS D1.1 Structural Welding Code - Steel  
38 AWS D1.3 Structural Welding Code - Sheet Steel  
39

40 RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS

41  
42 RCSC Specification for Structural Joints Using ASTM A325 or A490 bolts  
43  
44

45 STEEL STRUCTURES PAINTING COUNCIL (SSPC)

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- 1
- 2 SSPC SP-7 Brush-off Blast Cleaning
- 3 SSPC Paint 25 Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer
- 4 (without Lead and Chromate Pigments)
- 5

6 The following specifications are referenced in regard to materials:

7  
8 **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

- 9
- 10 ASTM A 36 Structural Steel
- 11 ASTM A 53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- 12 ASTM A 307 Carbon Steel Bolts and Studs, 60000 psi Tensile Strength
- 13 ASTM A 325 High-Strength Bolts for Structural Steel Joints
- 14 ASTM A 490 Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile
- 15 Strength
- 16 ASTM A 500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in
- 17 Rounds and Shapes
- 18 ASTM A 572 High-strength, Low-alloy Columbium-Vanadium Steels of Structural
- 19 Quality
- 20 ASTM A 611 Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
- 21 ASTM A 653 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process,
- 22 Structural (Physical) Quality
- 23 ASTM A 924 Sheet Steel, Zinc Coated (Galvanized) by the Hot Dip Process
- 24 ASTM B 209 Standard Specification for Aluminum and Aluminum Alloy Sheet and
- 25 Plate
- 26

27 **SUBMITTALS:**

28  
29 Submittals include, but are not limited to the following:

30  
31 **Shop Drawings:** Submit shop drawings including all shop and erection details, and members  
32 (with their connections) not shown on the Subcontractor drawings. All welds shall be  
33 indicated by standard welding symbols of AWS D1.1.

34  
35 **Erection:** Prior to erection, submit an erection plan of the structural steel framing. This  
36 erection plan shall conform to the requirements of AISC Code of Standard Practice. The  
37 erection plan shall describe all necessary temporary supports, including the sequence of  
38 installation and removal. Plan shall show sufficient detail and instructions to ensure the  
39 structure has been evaluated for stability throughout the contract.

40  
41 **Materials:** Certified copies of mill tests reports for [structural steel, structural bolts, nuts and  
42 washers].  
43

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1 Procedures: Submit procedures for tightening of "slip critical" bolts. The procedure shall  
2 include necessary materials, tightening methods, and inspection methods or criteria if direct  
3 tension indicator tightening is used.

4  
5 Welders: Submit certified copies of welders qualification test records.

6  
7 Samples: Submit [3] high-strength bolt, nut and washer assemblies from each lot supplied  
8 for testing. The assemblies shall be a random sample selected by the Contractor's  
9 Representative.

10  
11 See Section 01300, Submittals and the Vendor Data Schedule for additional submittal  
12 requirements.

13  
14 QUALITY CONTROL:

15  
16 Qualification for Welding Work:

17  
18 See Section 05060--Structural Welding.

19  
20 DELIVERY, STORAGE AND HANDLING:

21  
22 Store material to permit easy access for inspection and identification. Protect members and  
23 materials from corrosion and deterioration.

24  
25 Do not store materials in a manner that might cause distortion or damage to members or  
26 supporting structures. Repair or replace damaged materials that do not meet these  
27 specifications.

28  
29 PART 2--PRODUCTS

30  
31 MATERIALS:

32  
33 Structural Steel Shapes: ASTM A 36/A 572 Grade 50, except where other type steel is  
34 indicated.

35  
36 Miscellaneous Steel Plates and Bars: ASTM A 36, except where other type steel is indicated.

37  
38 Cold-Formed Steel Tubing: ASTM A 500, Grade B.

39  
40 Steel Pipe: ASTM A 53, Type E or S, Grade B or ASTM A 120, Grade B.

41  
42 Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated  
43 joists and accessories before application of shop paint.

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1 Apply one shop coat of steel prime paint to joists and accessories, by spraying, dipping, or  
2 other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

3  
4 Floor Grating: Floor grating shall be welded, open steel bar type with bearing bars as  
5 indicated on the drawings. Acceptable manufacturers and types include the following:

6  
7 Klemp Grating Type KW by Klemp Corporation

8  
9 Ry-Weld Standard Grating by Ryerson, Inland Steel Company.

10  
11 Grating shall be 1 1/2-in deep, galvanized steel Grip Strut Grating as manufactured by GS  
12 Metals or approved equal.

13  
14 Grating shall be capable of supporting an uniform load of 100 psf over the clear spans shown  
15 on the drawings with a deflection no greater than 1/360 as a minimum. All grating edges  
16 shall be banded.

17  
18 Stair Treads:

19  
20 Galvanized pressure locked or welded steel grating with 1-1/4 in. or 3/16 in. bearing  
21 bars at 5/16 in. on center and cross bars at 4 in. on center, with checker plate nosing as  
22 manufactured by Grating Pacific Inc., or approved equal.

23  
24 Sheet Metal: ASTM A 924, galvanized steel of the thickness (gages) shown on the drawings.  
25 Screws, nails and accessories shall be galvanized.

26  
27 Anchor Bolts: ASTM A 307.

28  
29 Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon  
30 steel.

31  
32 High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and  
33 hardened washers, as follows:

34  
35 Quenched and tempered medium-carbon steel, bolts, nuts and washers, complying  
36 with ASTM A 325 or A 490, [Type 1]

37  
38 Direct tension indicators shall be as made by J&M Turner Inc., or approved equal.

39  
40 Concrete Anchors: Concrete anchors shall be wedge anchors as manufactured by one of the  
41 following manufacturers or approved equal:

42  
43 "Red Head" by ITT Phillips Drill Company

44 "Hilti Kwik-Bolt II" by Hilti Inc.

45 Electrodes: Comply with AWS D1.1 for shop welding. See Welding Section 05060.

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1  
2 Structural Steel Primer Paint: Primer shall conform to [Painting Section 09900] [SSPC Paint  
3 25].

4  
5 FABRICATION:

6  
7 Shop Fabrication and Assembly: Fabricate items of structural steel in accordance with AISC  
8 Specification.

9  
10 Fabrication and assembly shall be done in the shop to the maximum extent possible.

11  
12 Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except  
13 where welded connections are indicated. Provide high-strength threaded fasteners for bolted  
14 connections, except where otherwise indicated. Use 3/4 in. diameter unless otherwise noted.  
15 Install high strength threaded fasteners in accordance with Specification for Structural Joints  
16 Using ASTM A 325 or A 490 Bolts. All connections using high-strength threaded fasteners  
17 shall be considered "slip-critical" unless otherwise indicated. Acceptable methods for  
18 tightening of "slip-critical" bolts are (in order of preference): direct tension indicator  
19 tightening, turn-of-nut tightening; installation of alternate design bolts; and calibrated wrench  
20 tightening.

21  
22 Weld Construction: Comply with AWS D1.1 for procedures, appearance and quality of  
23 welds, and methods used in correcting welding work. See welding specification Section  
24 05060.

25  
26 Shop Painting:

27  
28 General: Shop paint structural steel, except those members or portions of members to  
29 be embedded in concrete or mortar. Do not paint surfaces to be welded or with "slip  
30 critical" bolted connections. Apply two (2) coats of paint to surfaces, which are  
31 inaccessible after assembly or erection. See 09900--Painting for finish painting  
32 materials and requirements.

33  
34 Surface Preparation: After inspection and before shipping, clean steel work to be  
35 painted. Remove loose rust, loose mill scale, and splatter, slag or flux deposits.  
36 Clean steel in accordance with SSPC [SP-7 "Brush-off Blast Cleaning"].

37  
38 Painting: Immediately after surface preparation, apply structural steel primer paint in  
39 accordance with manufacturer's instructions.

40  
41  
42  
43  
44 PART 3--EXECUTION

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1 ERECTION:  
2

3 Surveys: Check elevations of concrete and masonry bearing surfaces, and locations of anchor  
4 bolts and similar devices, before erection work proceeds, and report discrepancies to the  
5 Contractor. Do not proceed with erection until corrections have been made or until  
6 compensating adjustments have been agreed upon with the Contractor.  
7

8 Temporary Shoring and Bracing: Provide temporary shoring and bracing members with  
9 connections of sufficient strength to bear imposed loads.  
10

11 Anchor Bolts: Furnish anchor bolts and other connectors required for securing steel to  
12 foundations and other in-place work. Furnish templates and other devices as necessary for  
13 presetting bolts and anchors to accurate locations.  
14

15 Tighten anchor bolts after supported members have been positioned and plumbed. Do not  
16 remove wedges or shims, but if protruding, cut off flush with edge of base prior to packing  
17 with grout.  
18

19 Setting Bases and Bearing Plates: Clean all surfaces of bond-reducing materials. Set loose  
20 and attached base plates and bearing plates on wedges or other adjusting devices. Pack grout  
21 solidly between bearing surfaces and bases or plates. Finish exposed surfaces, protect  
22 installed materials and allow to cure.  
23

24 Field Assembly: Set structural steel accurately to lines and elevations indicated. Align and  
25 adjust various members before permanently fastening. Clean surfaces which will be in  
26 contact before assembly. Perform necessary adjustments to compensate for discrepancies in  
27 elevations and alignment. Level and plumb individual members of structure within specified  
28 AISC Code of Standard Practice tolerances.  
29

30 Banding of Grating: Holes for pipe or other penetrations through grating, which are not  
31 prepared by the fabricator, shall be cut and banded in the field by the Subcontractor. Banding  
32 shall include providing A 36 material, fabrication and welding of the same in the field, and  
33 field touchup painting. Grating panels shall be split around the holes to permit easy removal.  
34 Where repaired to split grating panels, the area of exposed bearing bars shall also be banded.  
35 Banding for split grating shall be 1/4 in. material the same width as the grating thickness.  
36 Banding shall clear pipe, pipe and insulation, or other penetrating component by not less than  
37 1 in. except where the arrangement of the hole must allow for the displacement of the pipes  
38 due to expansion or contraction without contact with the grating. When the clear opening  
39 between the banding and the pipe, and insulation or component is less than 2 in., the banding  
40 shall match the bearing bars and project 1 in. above the grating. If the clear opening is 2 in.  
41 and does not exceed 4 in., the banding shall be fabricated from material 1/4 in. thick by the  
42 grating thickness plus 4 in. so that the projection of the banding above grating will be 4 in.  
43 Splice members only where indicated and accepted on shop drawings.  
44

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1 Comply with AISC Specification and Code of Standard Practice for bearing, adequacy of  
2 temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3  
4 Field Connections: Do not use gas cutting in field for correcting fabrication errors in  
5 structural framing:

6  
7 Bolted Connections: Install high strength threaded fasteners in accordance with  
8 "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts." All  
9 connections using high-strength threaded fasteners shall be considered "slip-critical"  
10 unless otherwise indicated.

11  
12 Field Welding: Field welding shall be done in accordance with the AWS D1.1, the  
13 INEEL Welding Manual and applicable INEEL Welding Procedures C-2.11, C-3.5,  
14 C-6.9, or C-6.10.

15  
16 FIELD QUALITY CONTROL:

17  
18 Contractor Supplied Testing: The Contractor's Representative will inspect high-strength  
19 bolted connections and welded connections and perform tests and prepare test reports unless  
20 noted otherwise. The Contractor's Representative will perform visual inspection of all field  
21 welds in accordance the Section 6 of AWS D1.1 as applicable. A visual receipt inspection of  
22 shop welds may also be performed.

23  
24 Contractor Inspection: Surveillance will be performed by the Contractor's Representative to  
25 verify compliance of the work to the drawing and specifications.

26  
27 Subcontractor Supplied Testing:

28  
29 Shop Bolted Connections: Inspect in accordance with the Specification for Structural  
30 Joints Using ASTM A325 or A490 bolts.

31  
32 Shop Welding: Certify welders, inspect and test during fabrication of structural steel  
33 per AWS D1.1 and AISC Specification. Record types and locations of defects and  
34 work required and performed to correct deficiencies. As a minimum visually inspect  
35 all welds per Section 6 of AWS D1.1 as applicable.

36  
37 END OF SECTION 05100

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1 SECTION 05400--LIGHTGAGE METAL FRAMING

2  
3 PART 1--GENERAL

4  
5 SUMMARY:

6  
7 Section Includes: Work includes, but is not limited to furnishing and installing:

8  
9 Light gage steel wall construction as shown on the drawings.

10  
11 REFERENCES:

12  
13 The following documents, including others referenced therein, form part of this Section to the  
14 extent designated herein:

15  
16 **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTN)**

17  
18 **ASTM A 570** Standard Specification for Steel, Sheet and Strip, Carbon, Hot Rolled,  
19 Structural Quality

20 **ASTM A 611** Standard Specification for Structural Steel, Sheet, Carbon, Cold-  
21 Rolled

22  
23 SUBMITTALS:

24  
25 No Vendor Data required for this section unless an "or-equal" item is proposed.

26  
27 QUALITY CONTROL:

28  
29 DELIVERY AND STORAGE:

30  
31 Protect metal framing units from rusting and damage. Deliver to project site in  
32 manufacturer's unopened containers or bundles, fully identified with name, brand, type and  
33 grade. Store off ground in a dry ventilated space or protect with suitable waterproof  
34 coverings.

35  
36 PART 2--PRODUCTS

37  
38 MANUFACTURERS: Manufacturers offering products complying with requirements for  
39 lightgage metal framing components include the following:

40  
41 Alabama Metal Industries  
42 Bostwick Steel Framing Co.  
43 Dale/Incor Industries  
44 Dietrich Industries, Inc.  
45 Stud-Rite Steel Framing Systems

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1 U.S. Gypsum  
2 U.S. Steel  
3 Wheeling  
4

5 **MATERIALS:** Metal studs in bearing walls shall be 25 gage 3-1/2 in. wide, or as shown on  
6 the drawings, fabricated of commercial quality steel sheet with a minimum yield point of  
7 33,000 psi, conforming to ASTM A 570, or A 611. Provide studs with 1.625-in. flange and  
8 flange return tip.  
9

10 **COMPONENTS:** With each type of metal framing required, provide manufacturer's standard  
11 steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and  
12 accessories as recommended by manufacturer for applications indicated, as needed to provide  
13 a complete metal framing system.  
14

15 **FINISH:** Provide galvanized finish to metal framing components complying with  
16 minimum G60 coating.  
17

18 **FABRICATION:**  
19

20 **General:** Framing components may be prefabricated into panels prior to erection. Fabricate  
21 panels plumb, square, true to line and braced against racking. Perform lifting of prefabricated  
22 panels in a manner to prevent damage or distortion.  
23

24 **Fastenings:** Attach similar components by screws, as standard with manufacturer.  
25

26 Wire tying of framing components is not permitted.  
27

28 **PART 3--EXECUTION**  
29

30 **INSTALLATION:**  
31

32 **Manufacturer's Instructions:** Install metal framing systems in accordance with manufacturer's  
33 printed or written instructions and recommendations, unless otherwise indicated.  
34

35 **Runner Tracks:** Install continuous tracks sized to match studs. Align tracks accurately to  
36 layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for  
37 type of construction involved, except do not exceed 24 in. o.c. spacing for nail or power-  
38 driven fasteners, nor 16 in. o.c. for other types of attachment. Provide fasteners at corners  
39 and ends of tracks. Top runners at bearing walls shall be 16 gage.  
40

41 **Studs:** Set studs plumb, except as needed for diagonal bracing.  
42

43 **Installation of Wall Stud System:** Secure studs to top and bottom runner tracks by screw  
44 fastening at both inside and outside flanges.

Project Title: **Staging, Storage, Sizing and Treatment Facility (SSSTF)**  
Document Type: **Technical Specifications** Project Number:  
Revision Number: 0

1 Wall Openings: Frame wall openings larger than 2 ft-0 in. square with double stud at each  
2 jamb of frame except where more than two are either shown or indicated in manufacturer's  
3 instructions. Install runner tracks and jack studs above and below wall openings. Anchor  
4 tracks to jamb studs with stud shoes or by screws, and space jack studs same as full-height  
5 studs of wall.

6  
7 Stiffeners: Install horizontal stiffeners in stud system, spaced (vertical distance) at not more  
8 than 5 ft 0 in. o.c. Attach at each intersection.

9  
10 Field Painting: Touchup shop-applied protective coatings damaged during handling and  
11 installation. Use galvanizing repair paint for galvanized surfaces.

12  
13 Partition Bracing: Provide diagonal bracing for the top of metal stud walls of more than 8 ft  
14 unbraced length up to closest roof purlin or joist. Use metal studs or heavy gage hat channel  
15 and two screws into the top wall runner and two screws into the roof purlin. Locate braces at  
16 not more than 6 ft 0 in. o.c. Angle between a vertical line above ceiling and brace shall not  
17 exceed 60. Coordinate with ductwork so as to cause no interferences.

18  
19 FIELD QUALITY CONTROL:

20  
21 Surveillance will be performed by the Contractor's Representative to verify compliance of the  
22 work to the drawings and specifications.

23  
24 END OF SECTION 05400  
25