

TECHNICAL SPECIFICATIONS

FOR

SHIELDING WALLS

SPEAR INJECTOR PROJECT

IS-439-320-01-RO

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DIVISION 1

GENERAL REQUIREMENTSSECTION 01100 -- SPECIAL CONDITIONS & STATEMENT OF WORKPART I -- GENERAL1.1 LOCATION

The work as outlined in these specifications shall be performed at the Stanford Linear Accelerator Center, 2575 Sand Hill Road, Menlo Park, CA (San Mateo County). The construction site is located southwest of SPEAR Ring and north of End Station A as shown on Dwg. ID-439-320-01.

1.2 STATEMENT OF WORK

The work covered by this specification shall include, but not necessarily be limited to, the following:

1. New concrete masonry walls in the locations, to the dimensions and in the manner shown on drawings, incorporating the existing vertical reinforcing steel and providing vertical reinforcing and dowels where required. Provide and install all indicated horizontal reinforcing steel.
2. Concrete between pairs of masonry walls as shown on drawings.
3. Miscellaneous metals and inserts.

1.3 WORKING HOURS

The Subcontractor will be permitted to work in the construction area during normal working hours, and before 7:30 AM, after 4:30 PM, or on holidays or weekends, when authorized by the University Representative.

1.4 COOPERATION WITH OTHER SUBCONTRACTORS AND SLAC PERSONNEL

- A Other Subcontractors and SLAC technicians may be working in the area within and adjacent to the Subcontractor's work area. The Subcontractor shall cooperate with the University in the scheduling of the work to avoid undue inconveniences to all parties.
- B The roof shielding blocks for the southern portion of the Ring and inside the building are scheduled to be set in place (by others) before the building is erected and after the ring walls are completed in this area, but before the anticipated completion date of this Subcontract.

1.5 DISPOSAL OF WASTE MATERIAL AND EQUIPMENT

Waste material such as lumber, building materials, asphalt paving, concrete, and other debris shall be disposed of by the Subcontractor off the SLAC site.

1.6 UTILITIES

- A Domestic water is available near the work area (WSW of old Building 101) at no cost to the Subcontractor.
- B 120/208 Volt construction power is available near the work area (H-frame NNW of old Building 101) at no cost to the Subcontractor.

1.7 UTILITY OUTAGES

All required utility outages, including power, water, fire protection, sanitary sewer, air, etc., shall be scheduled 72 hours in advance with the University Representative. Certain electrical outages may require additional notice, and shall be scheduled and coordinated through the University Representative.

1.8 SAFETY REQUIREMENTS

- A Flagmen, signs, barricades, fences, lights and similar precautions are the responsibility of and shall be provided by the Subcontractor to assure public safety and properly guard against personal injury or property damage.
- B Mobile crane safety shall be in accordance with applicable sections of OSHA Construction Safety & Health Regulations, Part 1926, particularly, section 1926.550. However, the following is a list of certain aspects of the safety procedure that are highlighted. This list is to be used as a check before a mobile crane is placed in service. A copy shall be placed in the cab in full view of the operator.
1. The mobile crane operator must be qualified and demonstrate, to the satisfaction of his supervisor, his ability to safely operate the model of equipment which he is asked to operate.
 2. The equipment is to be inspected daily and it shall be determined by the operator that it is safe to operate. Any irregularities found that could adversely affect its safe operation shall be reported to his supervisor and corrected prior to placing it in service.
 3. The mobile crane boom angle indicating device shall be operable, properly calibrated and visible to the operator at all times.
 4. The mobile crane's boom extension length must be known to the operator or physically measured by him, before the pick is made.
 5. The weight of the mobile crane's pick must be accurately known by the operator before the pick is made.
 6. The weight vs. reach chart shall be clearly written and shall be posted in the operator's cab, in clear view of the operator.
 7. The mobile crane shall never be operated in a manner in which an outrigger (or if on rubber, a wheel) lifts or is about to lift off the ground.
 8. The supervisor cannot overrule the mobile crane operator on an unsafe pick refusal. The Subcontractor shall require the operator to demonstrate to his supervisor why he considers the pick unsafe.
 9. If the equipment is operated with disregard for any of the above, the Subcontractor shall immediately stop the unsafe

operation. Thereafter, operation shall not be permitted to resume until the University's contract administrator is satisfied that the unsafe practice has been corrected.

C In addition, see GENERAL CONDITIONS, Safety & Health.

1.9 HAZARD COMMUNICATION STANDARD

The Subcontractor's attention is specifically directed to the Federal O.S.H.A. "Hazard Communications" Standard (29 Code of Federal Regulations 1910.1200).

The Subcontractor is required to comply with this STANDARD in all respects, including, but not limited to the furnishing to the University and the appropriate posting at the job site, of copies of the Material Safety Data Sheets (MSDS) for all hazards. The University Representative shall approve in advance all deliveries of such materials.

1.10 JOB YARD

Staging and parking area for the Subcontractor's use is shown on Drawing S-1. Subcontractor shall limit such activities to this area. Area shall be returned to its original condition upon completion of work.

1.11 TOILET FACILITIES

The Subcontractor shall provide and maintain chemical toilet(s) at the construction site in accordance with OSHA requirements.

1.12 PROTECTION OF EXISTING FACILITIES

A Existing facilities, including but not limited to: materials, surfaces, paving, equipment, pipes, conduits and appurtenances not specified for disposal, which are damaged by any operations under this Subcontract, shall be replaced or repaired, neatly patched and refinished, all as may be necessary to restore the work to the original condition and to leave the work in a thoroughly complete, operable and finished condition.

B All damage to existing buildings or equipment, as a result of the Subcontractor's activities, shall be repaired to the satisfaction of the University.

- C Work and materials shall be protected against damage due to construction operations, weather, or other hazards. The Subcontractor shall provide suitable covering of all exposed trenches, excavations and equipment to protect the work from damage.
- D All areas used by the Subcontractor shall be restored to their original condition and the area left in a clean condition. All roads shall be kept clear of haul material and other debris.
- E Storm drains are to be used for clean water only.

1.13 MATERIALS ACCESS AND DELIVERY

- A Access to the work site for delivery of material and equipment shall be through the main entrance located at 2575 Sand Hill Road east of the intersection with Interstate Highway 280, and then through Gate 17, and shall be arranged in advance with the University Representative.
- B Delivery of materials or equipment to the work site will be permitted during normal working hours, 7:30 AM to 4:30 PM, Monday through Friday, and at other times when authorized in advance by the University.
- C No material deliveries will be accepted by the University on behalf of Subcontractors. All deliveries shall be properly labeled or identified as follows:
 - (Subcontractor) ---
 - c/o SLAC Jobsite Office, near SSRL Building 120
 - 2575 Sand Hill Road
 - Menlo Park, CA. 94025

1.14 DOSIMETER BADGES

Dosimeter badges that measure exposure to ionizing radiation will be issued by the University to the Subcontractor for all personnel working in the construction area. Although no personal radiation exposure above natural background radiation is anticipated, the badges are required for compliance with Department of Energy regulations and for site security. These badges will be issued to the Subcontractor's personnel at Gate 17 by the guard on duty. Radiation dosimeters are to be carried at all times while inside the Research Areas. Persons entering the area will be required to show their badge to the guard at the gate house. Subcontractor is responsible for

maintaining a current list of badgeholders. A copy of the list shall be submitted to the University Representative whenever a change is made. The Subcontractor is responsible for insuring that all dosimeters are returned to the University upon completion of the work and prior to final payment.

1.15 VISIT TO CONSTRUCTION SITE

All prospective bidders should plan to visit the construction site prior to submission of bids to inspect the site for location, existing conditions, and accessibility of work to be accomplished. See Invitation for Bids for further information regarding a bidders conference. See General Conditions, "Site Investigation and Representations".

1.16 AS-BUILT DRAWINGS

At the beginning of the work, the University will furnish to the Subcontractor one set of prints for recording as-built conditions. As the work progresses, the Subcontractor shall record on these prints in red pencil the actual locations of all items where there is a variance with the drawings. Approval must be received from the University before any item is relocated. Upon the completion of the work, the Subcontractor shall forward these prints to the University.

1.17 FIELD SURVEYS

The Subcontractor shall furnish all construction surveys required for correct location and installation of all work, using control points furnished by the University as shown on the drawings.

1.18 SHOP DRAWINGS AND SUBMITTALS

Shop drawings and submittals shall be submitted to the University for review as required by the various sections of this specification and shall conform to the requirements of General Conditions. Submittals are required for specified items, as well as "or equal" items proposed by the Subcontractor.

1.19 MATERIALS AND SUBSTITUTIONS

See General Provisions ("Materials and Workmanship," Article VII).

1.20 TESTING, INSPECTION, AND APPROVALS

Except as otherwise specified herein, testing, inspection, approvals, and other actions by the University, other than changes issued in writing by the Contract Administrator, do not relieve the Subcontractor of any Subcontract requirement or otherwise change the Subcontract. Any approval of the work or of substitutions is based on representations made by the Subcontractor. The Subcontractor remains responsible for costs of correction of any work that is not in conformance with the Subcontract requirements, regardless of any testing, inspection, or approvals performed by the University. The Subcontractor expressly agrees that testing, inspection, and approvals performed by the University are for the benefit of the University and are not for the benefit of the Subcontractor; that any reliance by the Subcontractor on any such testing, inspection, and approvals is at the Subcontractor's risk; that the performance by the Subcontractor of work not in conformance with contract requirements constitutes a material cause of any resulting costs of correction, and that any unintentional failure on the part of the University to discover or notify the Subcontractor of a deficiency constitutes an immaterial cause of any resulting costs of correction.

1.21 HISTORICAL AND SCIENTIFIC SPECIMENS

All articles of historical or scientific value, including but not limited to fossils and archaeological artifacts which may be uncovered by the Subcontractor during the progress of the work, shall become the property of the University. Such findings shall be reported immediately to the University Representative who will determine the method of removal, where necessary, and the final disposition thereof.

1.22 DRAWINGS AND WORKMANSHIP

The drawings are diagrammatic and indicate the general arrangement of the work. Drawings shall not be scaled for dimensions. All dimensions shall be verified in the field. Only quality workmanship will be accepted. Haphazard or poor construction practice will be cause for rejection of the work by the University.

1.23 CONSTRUCTION SCHEDULE

Prior to commencement of work, a construction schedule shall be submitted showing individual work items, and expected starting and completion dates. A cost breakdown shall also be submitted for payment purposes showing the cost of individual work items.

1.24 DRAWING LIST

All work covered by this specification shall be in strict accordance with the following subcontract drawings:

| <u>Number</u> | <u>Sheet</u> | <u>Title</u> |
|------------------|--------------|--|
| ID-439-320-01-CO | S-1 | SPEAR Injector Project Shielding Walls Structural Plan and Sections |
| ID-439-320-02-CO | S-2 | SPEAR Injector Project Shielding Walls Structural Details |

DIVISION 3

CONCRETE

SECTION 03300 -- CONCRETE WORK

PART I -- GENERAL

3.1 DESCRIPTION

- A Furnish all labor, materials, and equipment necessary to complete the work of this Section.
- B Produce concrete which will present an appearance satisfactory to the University when finished as specified in this section of the specifications.
- C Examine all drawings and other sections of these specifications for extent and detail of all items required to be inserted in the forms for attachment of other work.

3.2 RELATED WORK SPECIFIED ELSEWHERE

Section 05500 Miscellaneous Metals

3.3 COOPERATION

- A Obtain information and instruction from all trades and suppliers in ample time to schedule and coordinate the installation of items to be embedded in concrete under this section so that provisions for all work can be made without delaying the project.

- B Take all precautions to maintain alignment and prevent damage to such items during placement of concrete.

3.4 APPLICABLE DOCUMENTS

- A The following documents form a part of this specification to the extent indicated by the reference thereto.

1. ASTM Standards

| | |
|---------|--|
| A615-82 | Specification for Deformed Billet-Steel Bars for Reinforcement |
| A185-79 | Specification for Welded Steel Wire Fabric for Concrete Reinforcement |
| C31-81 | Method of Making and Curing Concrete Compression and Flexure Test Specimens in the field |
| C33-82 | Specification for Concrete Aggregates |
| C39-81 | Method of Test for Compressive Strength of Molded Concrete Cylinders |
| C94-81 | Specifications for Ready-Mix Concrete |
| C150-81 | Specification for Portland Cement |
| C260-77 | Specification for Air-Entraining Admixtures for Concrete |
| C309-81 | Specification for Liquid Membrane-Forming Compounds for Curing Concrete |
| C494-80 | Specification for Chemical Admixtures |

2. ACI Standard

| | |
|------------|---|
| ACI 318-83 | Building Code Requirements for Reinforced Concrete |
| ACI 315 | Manual of Standard Practice for Detailing Reinforced Concrete Structures. |

B General

Coordinate all trades for installation of embedded items. Suitable templates or instructions, or both, shall be provided for setting items not placed in the forms. Embedded items shall have been inspected and approved by the University before concrete is placed. All concrete shall comply with the ACI standard "Building Code Requirements for Reinforced Concrete (ACI 318-83)."

C Submittals

Shop drawings and data shall be submitted to the University for the reinforcing steel, detailed in conformance with ACI 315, showing material sizes, cutting and bending dimensions, and placement details. Shop drawings shall be reviewed by the University prior to commencement of fabrication. Concrete mix

design shall be submitted to the University in accordance with paragraph 3.9.

PART II -- PRODUCTS

3.5 FORMWORK

A Materials

1. APA "Plyform" for all vertical concrete surfaces, except for footings or keyways placed in earth trenches.
2. W.J. Burke Co. "Burke Form Release Oil," or approved equal.
3. Richmond "Snap-Type," or approved equal, for ties.

B Construction

Furnish and erect to profiles, lines and levels as required and shore and brace against movement or bellying. Coat all forms with release oil before placing concrete.

C Inserts

All inserts, sleeves and other embedments as shown on the drawings shall be set into the formwork where required, prior to requesting approval of forms by the University.

3.6 REINFORCING STEEL

A Materials shall be as follows:

1. Bars: ASTM A615, Billet-Steel - Grade 60.
2. Tie wire: Minimum 16 gauge black annealed type.

B Fabrication and Erection

Furnish and place to details and locations shown, securely tie and anchor against displacement. Use concrete blocks to support work above grade. Provide bends and hooks as detailed, cold-bent. Laps shall be 32 diameters minimum, or as shown on the drawings. Clean all bars free from dirt, scale, rust, etc., just prior to placing concrete. Clean all formwork of debris and other deleterious substances prior to placement of concrete. All reinforcement and embedded items shall be inspected and approved by the University prior to placing of concrete. Fabrication and erection shall comply with ACI 318-83.

3.7 SOURCES OF CONCRETE

Ready-mixed concrete shall be used. Except for materials herein specified, ready-mix concrete shall conform to ASTM C94. Water shall not be added to the mix at the site without the approval of the University representative.

3.8 CONCRETE MATERIALS

A Portland cement shall conform to the requirements of ASTM C150, Type II, unless otherwise directed by the University representative.

B Aggregate shall conform to ASTM C33 and shall be granite or limestone.

C Admixtures shall be used in all concrete as follows: Water reducing admixture conforming to all requirements of ASTM C494. Air entraining admixtures complying with ASTM C260 shall be used. Air content of freshly mixed concrete shall not exceed four (4) percent or be less than two (2) percent.

D Water used in concrete shall be clean, domestic water.

E Curing Materials

Concrete shall be cured with a membrane curing compound conforming to the requirements of ASTM C309, Type I, with fugitive dye, provided that where the surfaces are exposed to the direct rays of the sun, Type 2 white pigment shall be used.

3.9 MIX DESIGN

Minimum design compressive strength shall be 2500 psi at 28 days.

3.10 TESTING

Three test cylinders shall be provided to the University by the Subcontractor for each 50 cubic yards, or fraction thereof, of concrete placed each day. Cylinders and slump determinations shall be made in accordance with ASTM C31 by a certified testing laboratory, employed by the University under another Subcontract. Compression tests will be made at seven days and 28 days in accordance with ASTM C39.

PART III -- EXECUTION3.11 CONCRETE PLACEMENT

- A Two days advance notice of any concrete placement is required.
- B Concrete shall be placed between two masonry walls no less than 72 hours after masonry walls have been grouted solid.
- C Concrete shall be placed within 90 minutes after the cement has been intermingled with the aggregate and/or 45 minutes after addition of water and admixture.
- D Concrete shall be consolidated to the maximum practicable density, using vibrators. Vibrators shall be electric or pneumatic, power-driven, immersion type.
- E When depositing concrete at freezing or near-freezing temperature, the concrete shall have a temperature of at least 50 degrees F, but not more than 120 degrees F for not less than 72 hours after placing, or until the concrete has thoroughly set and hardened. When necessary, concrete materials shall be heated before placing.
- F Maximum slump of concrete at time of placement shall be 4".

3.12 CURING

All concrete shall be membrane cured. Concrete shall not be water cured. Membrane curing compounds shall be used as specified in Article 3.8 of this Section. Membrane curing shall consist of an application of a liquid membrane-forming compound which forms a water-retaining membrane on the surface of the concrete. The curing compound shall be applied and protected in accordance with the manufacturer's instructions.

3.13 REPAIRS

All imperfections in the work shall be repaired by the Subcontractor to the satisfaction of the University, using materials and methods as directed.

3.14 FINISHING

1. All elevations shall be within 1/4" of designated elevation shown.
2. Formed surfaces that will be exposed to view in the completed work shall have fins, projections, and loose material removed, and shall be cleaned of form oil. All tie holes shall be patched with grout.
3. Formed surfaces that will not be exposed to view in the completed work shall be left unfinished.

DIVISION 4

MASONRY

SECTION 04340 -- REINFORCED UNIT MASONRY SYSTEM

PART I -- GENERAL

4.1 DESCRIPTION

Work included:

1. Furnish and install all concrete masonry units.
2. Provide reinforcement, anchorage, and accessories.

4.2 RELATED WORK SPECIFIED ELSEWHERE

Section 03300 - Concrete Work
Section 05500 - Miscellaneous Metals

4.3 APPLICABLE DOCUMENTS

The latest issue of the following standards form a part of this specification to the extent indicated by the reference thereto:

1. ASTM Standards

| | |
|------|---|
| A615 | Deformed and Plain Billet-Steel Bars for Concrete Reinforcement |
| C5 | Quicklime for Structural Purposes |
| C90 | Hollow Load-Bearing Concrete Masonry Units |
| C91 | Masonry Cement |

- C94 Ready-Mix Concrete
- C140 Sampling and Testing of Concrete Masonry Units
- C144 Aggregate for Masonry Mortar
- C207 Hydrated Lime for Masonry Purposes
- C404 Aggregates for Masonry Grout

2. ACI

ACI 315 Details and Detailing of Concrete Reinforcement

3. Uniform Building Code

UBC Uniform Building Code Standards, latest edition.

4.4 QUALITY ASSURANCE

Perform work in accordance with the UBC, Chapter 24.

4.5 SUBMITTALS

- A Submit shop drawings under provisions of Section 01100.
- B Submit mix design for grout.
- C Submit samples under provisions of Section 01100.
- D Submit manufacturer's certificate that masonry units meet or exceed the requirements of this Subcontract.

4.6 ENVIRONMENTAL REQUIREMENTS

Maintain materials and surrounding air temperature to minimum 50 degrees F (10 degrees C) prior to, during, and 48 hours after completion of masonry work.

PART II -- PRODUCTS

4.7 ACCEPTABLE CONCRETE MASONRY UNIT MANUFACTURERS

1. Best's Blocks, Inc.
2. Basalite Block.
3. Substitutions: Under provisions of Section 01100.

4.8 CONCRETE MASONRY UNITS

Hollow Load Bearing Units: ASTM C90, Grade N, Type I, light weight.

Plain Units: 8 x 8 x 16, nominal size smooth faced units.

4.9 MATERIALS FOR MORTAR AND GROUT

- A Portland Cement: ASTM C150, Type II.
- B Hydrated Lime: ASTM C207, Type S.
- C Quick Lime: ASTM C5, except 100 percent shall pass the No. 20 sieve and 90 percent shall pass the No. 50 sieve.
- D Aggregate for Grout: ASTM C404.
- E Aggregate for Mortar: ASTM C144.
- F Water: Clean and potable.
- G Admixtures: Only with University's approval and not adversely affecting bond or compressive strength.

4.10 MORTAR MIXES

- A Conform to UBC, Table 24A, Type S.
- B Mix in a batch mechanical mixer permitting accurate control of water. Lime shall be the last material added to mixer. Mix 3 to 10 minutes.

4.11 GROUT MIXES

- A Grout shall be coarse grout designed to attain a compressive strength of 2000 psi at 28 days in accordance with ASTM C91.
- B Grout shall be composed of Portland Cement, hydrated lime or quicklime, fine aggregate, coarse aggregate, and sufficient water to attain a slump between 8 and 10 inches without segregation. Larger coarse aggregate conforming to ASTM C33 may be used in large grout spaces where approved by the University Representative.
- C Materials for grout shall be measured in suitable calibrated devices. After the addition of water, all materials shall be mixed for at least three minutes in a drum-type batch mixer. Mixing equipment and procedures shall produce grout with the uniformity required for concrete by ASTM C94.

4.12 REINFORCEMENT

Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, plain finish.

PART III -- EXECUTION4.13 PREPARATION

- A Clean laitance, dirt, and other foreign materials from concrete surfaces upon which masonry is to be placed. Roughen surface to expose aggregate. Sandblasting is also an acceptable method.

- B Verify items provided under all Sections of work are properly sized and located.
- C Establish lines, levels, and coursing. Protect from disturbance.
- D Provide temporary bracing during erection of masonry work as necessary.

4.14 COURSING

- A Erect masonry units in accordance with UBC, Chapter 24.
- B Place masonry to lines and levels indicated.
- C Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
- D Lay concrete masonry units in running bond. Course one block unit and one mortar joint to equal 8 inches (200 mm). Form raked and tooled smooth mortar joints at exterior and interior exposed locations. Form smooth struck mortar joints at concealed locations.
- E Preserve the vertical continuity of cells. The minimum clear horizontal dimensions of vertical cores shall be 3 x 4 inches.

4.15 PLACING AND BONDING

- A Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
- B Fully bond intersections, and external and internal corners.
- C Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- D Remove excess mortar.

- E Perform jobsite cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.
- F Step back unfinished work for joining with new work. Do not use toothing.

4.16 REINFORCING STEEL

- A Place reinforcement in accordance with ACI 315.
- B Locate reinforcing splices as indicated.
- C Place reinforcing bars supported and secured against displacement at intervals shown on drawings. Maintain position within 1/2 inch (13 mm) of true dimension.
- D Verify reinforcement is clean, free of scale, dirt, or other foreign coatings which would reduce bond to grout.

4.17 GROUTING

Provide cleanout holes at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 48 inches. Where all cells are to be grouted, construct cleanout courses with open-bottom bond beam units inverted to permit cleaning of all cells by flushing. Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours. Cleanouts shall be not less than 3 x 4 inch openings cut from one face shell. Do not plug cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected.

- A Placement: Use a hand bucket, concrete hopper, or grout pump. Place grout in final position within 1-1/2 hours after mixing. Where grouting is discontinued for more than one hour, stop the grout one inch below the top of a course to form a key at pour joints. Place grout so as to completely fill the grout spaces without segregation of the aggregates. Do not insert vibrators into lower pours that are in a semi-solidified state.
- B Place grout using high lift or low lift method.

- C Low Lift Grout Method: Place grout as masonry is erected at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. If mortar has been allowed to set prior to grouting, remove all fins protruding more than 1/2 inch into the grout space. Rod or puddle grout during placement using a long 1 x 2 inch wood stick or a mechanical vibrator. When grout lift exceeds 2 feet, reconsolidate grout after excess moisture has been absorbed, but before workability is lost.
- D High Lift Grout Method: Lay masonry to the top of a pour before placing grout. Do not place grout in hollow unit masonry until mortar joints have set for at least 24 hours. Clean mortar droppings from the bottom of the grout space and from reinforcing steel. Remove mortar fins protruding more than 1/2 inch into the grout space by dislodging the projections with a rod or stick as the work progresses or by washing the grout space at least twice a day during erection using a high pressure stream of water. Place grout in lifts not to exceed 4 feet in height, with a waiting period between lifts, dependent on weather and absorption rate of the masonry, in order to place the succeeding lift after the preceding lift becomes plastic but prior to initial set. The first lift shall be consolidated using mechanical vibrators. After the required waiting period, place the second lift and consolidate with the vibrator extending 12 to 18 inches into the previous lift. Repeat the waiting, placing, and consolidating process until the top of the grout pour is reached. Reconsolidate the top lift after the required waiting period. The high-lift grouting of any section of wall between lateral flow barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the resulting horizontal construction joint cleaned.

4.18 TOLERANCES

- A Variation from Unit to Adjacent Unit: 1/32 inch (1.5 mm) maximum.
- B Variation from Plane to Wall: 1/4 inch in 10 feet (6 mm/3 m) and 1/2 inch in 20 feet (13 mm/6 m) or more.
- C Variation from Plumb: 1/4 inch (6 mm).
- D Variation from Level Coursing: 1/8 inch in 3 feet (3 mm/m); 1/4 inch in 10 feet (6 mm/3 m); 1/2 inch (13 mm) maximum.

- E Variation of Joint Thickness: 1/8 inch in 3 feet (3 mm/m)/
- F Maximum Variation from Cross Sectional Thickness of Walls:
Plus or minus 1/4 inch (6 mm).

4.19 CLEANING

- A Remove excess mortar and smears.
- B Point all holes or defective mortar joints in exposed masonry. Where necessary, cut out and replace defective mortar. Match adjacent work.
- C Clean soiled surfaces daily with a non-acidic solution which will not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable cleaners.
- D Use non-metallic tools in cleaning operations.

4.20 PROTECTION

- A Protect finished installation under provisions of Section 01100.
- B Maintain protective boards at exposed external corners which may be damaged by construction activities.
- C Provide protection without damaging completed work.
- D Protect previously completed work from work going on by installing vinyl sheets over completed work.
- E At day's end, cover unfinished walls to prevent moisture infiltration.

4.21 FIELD QUALITY CONTROL

Testing and inspection may be performed under provisions of Section 01100.

DIVISION 5

METALSSECTION 05500 -- MISCELLANEOUS METALSPART I -- GENERAL5.1 SCOPE

All miscellaneous metals necessary for a complete job, unless specifically noted otherwise in the specifications, shall be furnished and installed under this Section, including but not necessarily limited to the following:

1. Angles, anchors, bolts, plates, etc.
2. Pipe sleeves

5.2 RELATED WORK SPECIFIED ELSEWHERE

Not applicable.

PART II -- PRODUCTS5.3 QUALITY ASSURANCE

The following specifications shall be considered as extensions of these specifications in the determination of quality standards for material and workmanship.

- | | |
|---------------------------|-----------------------------------|
| 1. Galvanizing | ASTM A-123, zinc (hot galvanized) |
| 2. Steel Shapes and Plate | ASTM A-36 |
| 3. Steel Studs | Nelson or Approved Equal |
| 4. Welding | AWS |
| 5. Steel Pipe | ASTM A-53 Grade B |

PART III -- EXECUTION5.4 WORKMANSHIP FOR STEEL - GENERAL

In addition to the requirements contained in the referenced specifications, comply with the following:

1. All work shall strictly conform to standard codes and practice. Standard commercial products conforming to the requirements of the drawings and specifications may be used subject to the approval of the University Representative.
2. All welding exposed to the weather shall be continuous and watertight. Welding shall be done only by certified welding mechanics, and done to AWS Specification Standards. Where exposed to view or where people may come in contact with them, welds shall be ground smooth.
3. No welding or burning of galvanized surfaces will be permitted until the galvanizing has been removed to a distance of 4" all around by an approved method. Galvanized areas burnt off by welding or otherwise damaged during construction shall be treated with Galvalloy as manufactured by Metalloy Products Co.
4. Steel pipe sleeves for drains shall be galvanized. Fabricate into largest practical components before galvanizing.
5. Execute work in best possible manner using skilled metal workers only. Do only such work at site as cannot be performed reasonably at the shop. Cuts, bends, punching and drilling must be accurate, neat and properly located.
6. Furnish all necessary templates and patterns required by all trades. Supervise and be responsible for the proper location and installation of all miscellaneous metals furnished. Members shall be punched, drilled, etc., as required to accommodate the work of all trades, but shall be done in such a manner as not to render the strength of the members inadequate for their intended use.
7. Install all items specified herein, unless otherwise noted, true to line and plane, plumb, square and accurately fitted.

