

March 10, 1977

First Addendum to conditions, specifications, related documents and drawings entitled:

RECEIVED

SURGICAL PATHOLOGY RENOVATION  
JACKSON OWRE MILLARD LYON COMPLEX REMODELING  
MINNEAPOLIS CAMPUS  
UNIVERSITY OF MINNESOTA  
COMMISSION NUMBER 280.03

MAR 10 1977

UNIV. OF MINN.  
HEALTH SCIENCES  
PLANNING OFFICE

THE ARCHITECTS COLLABORATIVE, INC.

Cambridge, Massachusetts

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55414

The additions, revisions, omissions, corrections, and clarifications contained herein shall be made to the drawings and specifications for the project and shall be included in scope of work and in the bids to be submitted. References made below to drawings and specifications shall be used as a general guide only. Bidders and Contractors shall determine for themselves all of the work affected by Addendum Items.

PROJECT IDENTIFICATION

- 1 - Table of Contents: (A) Add: Section 03310 Concrete Topping.
- (B) Add: Section 09300 Tile Work.

DIVISION A - BIDDING REQUIREMENTS

- 2 - Section A3 - Bid Form: (A) Article (10): (1) Change the words "Substitute Corbin Locksets and Latchsets" to read: Substitute Water Saver Faucet Co. equipment.
- (B) Delete Substitution Alternate B in entirety.

DIVISION 1 - GENERAL REQUIREMENTS

- 3 - Section 01100 - Description of Alternates: (A) Part 2: Delete Part 2, Articles 2.1 through 2.5 in entirety and substitute the following:

PART 2: DESCRIPTION OF ALTERNATES OF SCOPE

2.1 Deductive Alternate No. 1

- A. Omit entire fume hood in Room 192.2, base cabinet below hood, and furred wall over. Rough in all plumbing piping and cap at wall for future connection. Omit exhaust duct from hood to vertical shaft, and from penthouse floor through roof, including exhaust fan unit in penthouse. Cap ends of remaining duct. Finish walls and floor at hood location as per Room Finish Schedule, and provide finished ends on adjacent base and wall cabinets.

2.2 Deductive Alternate No. 2

- A. Omit entire ventilation bench in Room 196.1. Rough in all plumbing piping and cap at wall for future connection. Omit exhaust duct from penthouse floor through roof, including exhaust fan unit in penthouse. Cap ends of remaining duct at wall and at floor. Finish wall and floor at bench location as per Room Finish Schedule.

2.3 Deductive Alternate No. 3

- A. Reduce the scope of work in new Rooms 196, 196.3, 198.1, 198.2, and 198.3 as follows:
1. Omit all demolition and new construction work in Rooms 198.1, 198.2, and 198.3.
  2. In Rooms 196 and 196.3, retain existing wood floor, sub-floor and base. Omit new concrete topping, resilient tile floor, and resilient base, except for base at new partition between Rooms 196 and 196.1 and Rooms 196.3 and 196.2.
  3. Except for work required to construct new entrance 196, omit all new construction, radiation enclosure, casework, exterior wall insulation, suspended ceiling, and finishing from Rooms 196 and 196.3.
  4. Omit all work defined by Detail 26/A2 in First Floor corridor shaft South of Rooms 196 and 198.1.
  5. Omit ducts and associated mechanical equipment serving Rooms 196, 196.3, 198.1, 198.2 and 198.3 and cap ends of duct work.
  6. Retain 2 easterly lighting fixtures in each row of existing fixtures in Rooms 196 and 196.3. Remodel switching of these lights as required.
  7. Do all other demolition or new construction work in Rooms 196, 196.3 as called for by drawings or specifications.

2.4 Deductive Alternate No. 4

- A. Omit all sheet vinyl floor and substitute resilient base for sheet vinyl base in Rooms 188, 192, 192.2, and 196.1. Omit resilient tile floor from Rooms 192.1 and 196.2. Install resilient base in all rooms where sheet vinyl or resilient flooring is being omitted.

2.5 Deductive Alternate No. 5

- A. Omit new ceilings from Rooms 188, 192, 192.1, 192.2, 196.1, and 196.2. Install same light fixtures in these rooms except chain-hang.

(B) Part 3: Delete Articles 3.1 and 3.2 in entirety.

(C) Part 3: Add:

3.1 Substitution Alternate A

- A. Refer to Section 15310. Substitute Water Saver Faucet Co. equipment for the Chicago Faucet Co. equipment specified.

4 - Section 01500 - Temporary Facilities: (A) Part 3:

3.4 CONSTRUCTION FENCE

- A. Provide new fencing, complete, with gates, as shown on drawings.
- B. Quality and detail shall be equivalent to U. S. Steel (Cyclone) or Page, Continental Steel or Crowley Fence Company.
- C. Height shall be minimum six (6) feet.
- D. Materials:
  1. Fabric: ASTM A392 Diamond mech, No. 9 gauge wire, 2" woven steel wire fencing fabric, with twisted and barbed bottom and knuckled top. Wire hot dipped galvanized after weaving, minimum zinc coating weight of 1.2 oz. per square foot (Class 1 coating).
  2. Posts and Fittings:
    - a. Galvanizing: Hot dipped galvanized after fabrication, minimum zinc coating in accordance with ASTM A123 and ASTM A153 as applicable.
    - b. Length: Provide posts of sufficient length to provide a minimum 36" setting in concrete footings, except where mounted on walls or over underground structures.
    - c. Intermediate or Line Posts: Provide pipe or "H" column of manufacturer's standard, minimum weight 2.70 lb. per foot, not over 10'-0" o.c.
    - d. Terminal Posts (ends and corners): Provide 2-1/2" or 3" pipe columns, minimum weight 3.65 lbs. per foot.
    - e. Gate Posts: Size and weight as per manufacturer's recommendations for gate width as indicated.
    - f. Posts Tops: All posts shall be equipped with tops. Tubular post tops designed to exclude moisture from posts. Intermediate post tops designed to hold top rail.
    - g. Fittings: Cast iron or pressed steel.
  3. Gates: Provide swinging hinged type of 1-1/2" (2.72 lbs. per foot weight) steel pipe frame, complete with welded fittings, torsion bars, hinges, truss rods, positive type latching device with provision for padlocking, center plunger rod, catch and semi-automatic outer catch to secure gate in opened position.
  4. Top Rail: 1-5/8" o.d. steel pipe 1.8 lbs. per foot. Provide with couplings every 20 feet. Top rail to pass through intermediate post tops and form a continuous brace from end to end of each stretch of fence. Fasten to terminal posts with steel connections.

5. Braces: At terminal posts as per manufacturer's recommendations for secure, rigid installation.

6. Tension Wire: No. 7 gauge coated spring coil tension wire. Coating as specified for fabric.

E. Erection:

1. Erect in rigid, substantial manner, level and plumb in strict accordance with manufacturer's installation instruction. Set all posts in concrete footings.

2. Confirm locations of all underground structures and utilities before excavating post holes. Do not proceed if interference exists. Obtain University approval of any adjustments in location of fence or components.

3. Provide all bracing, guying and other incidentals to provide permanent fence.

SPECIFICATIONS - GENERAL CONSTRUCTION

5 - Section 03310 Concrete Topping is issued as Appendix A to this Addendum.

6 - Section 08700 - Finish Hardware: (A) Article 1.2, paragraph A.1: Delete P & F Corbin, add: Sargent.

(B) Article 2.3, paragraph A: Delete the last 2 sentences.

7 - Section 09300 Tile Work is issued as Appendix B to this Addendum.

DRAWINGS - GENERAL CONSTRUCTION

8 - Sheet A1: (A) Detail Room Finish Schedule: Floor and base at new recessed room entrances shall be quarry tile to match existing corridor floor and base as closely as possible. See also specification, addendum item 7.

9 - Sheet A2: (A) Detail 6: Furnish and install resilient base on wall behind new radiation enclosures.

(B) Detail 9: Note that existing floor construction is unknown, assumed to be wood on sleepers laid in concrete, average depth 2-1/2"

SPECIFICATIONS - MECHANICAL CONSTRUCTION

10 - Section 15010 - Tests: Article 1.13: Add the following data:

9. Heating, Ventilating and Air Conditioning.

a. The Mechanical Contractor shall have ventilating and air conditioning systems installed, cleaned and operating in all areas delivering air through inaccessible ceiling areas so as to remove construction dirt and dust from duct prior to installation of ceilings. Units shall be balanced for the indicated air quantities.

b. All equipment shall be freshly oiled, filters charged with clean media, and installation completely finished prior to acceptance.

c. The Supply Unit #S-119 shall be adjusted to provide air quantity required for this phase of remodeling with provisions made for ultimate capacity at a later date. The equipment used in this unit shall have their guarantee extended to two years beyond final acceptance date to cover final adjustments of ultimate capacities of component parts.

ACCEPTABLE MANUFACTURERS - ALL DIVISIONS

The below listed manufacturers of equipment are acceptable, subject to final acceptance as to satisfying all requirements of the Contract Documents. The extra cost of any changes in other trades' work as a result of substitutions shall be borne by the Contractor making the substitutions.

<u>SPECIFICATION REFERENCE</u>	<u>ITEM</u>	<u>MANUFACTURER</u>
05750-1.3.A	Special Formed Metal	C & R Metal Specialties
11611-2.14.A	Epoxy Resin Tops	Prime-Resin by Prime Industries
15800-2.11	Air Terminals	Anemostat, LSI/Krueger
15800-2.13	Fire Dampers	Phillips, Prefco, Venco
16400-2.1	Fixtures A, A1	LPI
16700-2.3	Motor Control Centers	ITE Imperial

END ADDENDUM 1 - SEE APPENDICES.

ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON THE BID FORM.

## PART 1: GENERAL

1.1 SCOPE

- A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.
- B. Work under this section includes provision of all concrete topping.
- C. Related work specified elsewhere:
1. Tile Work: Section 09300.
  2. Resilient Flooring: Section 09650.
- D. Installed but not furnished under this Section:
1. Certain imbedded items: See other sections.

1.2 REFERENCE STANDARDS

- A. The following specifications and codes are incorporated by reference:
1. American Concrete Institute Publications:
    - a. ACI 301-72, "Specifications for Structural Concrete for Buildings".
    2. National Ready Mixed Concrete Association Publications: "Concrete Plant Standards and Truck Mixer and Agitator Standards".
    3. Portland Cement Association Publications:
      - a. "Design and Control of Concrete Mixtures", 11th edition
      - b. "Curing Concrete" (ST 95)
- B. The Contractor shall at all times keep available on the site for reference the above codes and standards.

1.3 QUALIFICATIONS

- A. Mix design: Mix designs and aggregates testing shall be performed by an independent testing agency approved by the Owner and paid by the Contractor.

1.4 SUBMITTALS

- A. Mix Design: Submit reports in triplicate of all concrete mix designs and aggregate reports to the Architect for approval at least 14 days prior to pouring concrete.

PART 2: PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement:

1. Portland Cement shall be an approved brand conforming to ASTM C150 - Type 1; Penn-Dixie, Universal Atlas Cement, Northwestern or Lehigh.

B. Regular Weight Concrete Aggregates:

1. Fine Aggregate: Washed inert, natural sand conforming to the requirements of ASTM C33.

2. Coarse Aggregate: Well graded crushed stone or washed gravel conforming to the requirements of ASTM C33 as follows:

a.	<u>Location</u>	<u>Maximum Size</u>
	Topping mix . . . . .	3/8"

C. Water: Clean, free of deleterious amounts of acids, alkalies or organic materials.

D. Admixtures:

1. Water Reducing Agent: ASTM C494, W.R. Grace WRDA, Master Builders Pozzolith 100N, or approved equal.

2. Admixtures shall be premixed in solution form and dispensed as recommended by the manufacturer. The water in the solution shall be included in the computation of water-cement ratio.

3. Admixtures containing chloride salts shall not be used in concrete placed over metal decking.

E. Surface Treatments:

1. Curing Compounds and Floor Sealer: Brock-White Crete-Seal, A.C. Horn Clear Seal 150, Sonneborn Kure-N-Seal, Master Builders Company's Masterseal or Protex Triple Seal.

2. Bonding agent: W.R. Grace Hornbond, Uniweld, Sonneborn Sonobond, or approved equal.

2.2 CONCRETE MIXING

A. Mix Design: Employ and pay for the services of an independent testing laboratory, acceptable to Owner, to test the proposed aggregate and design mixes for each type and strength of concrete required. Design mixes shall be proven by preliminary tests prior to concreting in accordance with ASTM C192. Such tests shall show 28 day average strengths at least 25% greater than strengths specified.

B. Types, Strengths and Locations.

1. All concrete and topping used for this construction shall be regular weight concrete topping.

2. All regular weight topping used for this construction shall have a minimum compressive strength of 4000 pounds per square inch at 28 days of age.

C. Minimum Cement Content:

1. The laboratory designed concrete mixes shall have minimum cement contents for each type and strength of concrete as follows:

4,000 lbs per sq inch topping mix - without admixtures  
6.75 sacks per cubic yard for the 3/8" maximum size aggregate.

4,000 lbs per sq inch topping mix - with water-reducing admixture  
6.50 sacks per cubic yard for the 3/8" maximum size aggregate.

D. Slump and Workability:

1. Slump:

a. For the topping concrete the slump shall be not less than 1" nor more than 2".

b. The amount of slump shall be determined by the standard test method ASTM C143.

E. Mixing and Delivery of Concrete:

1. All concrete shall be ready mixed concrete provided by a central mixing plant. All concrete shall be completely plant mixed in a stationary mixer and the mixed concrete shall be transported to the job in agitating type trucks in accordance with ASTM Specification C94.

2. Deliveries shall be timed to insure that all concrete can be placed within one (1) hour after initial mixing water is added.

3. Batching, mixing and delivery equipment, operation and procedures shall conform to the recommendations of the National Ready Mixed Concrete Association.

4. Partially hardened concrete shall not be retempered or used.

PART 3: EXECUTION

3.1 CONCRETE TOPPING

A. Concrete topping shall be placed over existing or new concrete slabs where noted and detailed on the drawings.

B. Preparation:



1. Just prior to placing topping, remove all laitance and loose particles of sand and dirt with a stiff wire broom and by washing with 10% solution of muriatic acid.

2. Remove oil and grease spots by washing with tri-sodium phosphate.

C. Placement: Follow bonding agent manufacturer's instructions where they conflict with the following:

1. After cleaning, hose down the slab with a pressure hose until rinse water is clear.

2. Then allow the slab to dry until visible moisture has disappeared.

3. Brush apply and scrub in one coat of specified bonding agent. Let cure 90 minutes minimum.

4. Spread topping over the slab evenly and float and trowel to a smooth, dense finish.

5. Do not add cement or sand to any of the topping surfaces during finishing.

6. Replace finished topping areas which sound hollow or otherwise indicate separation of topping and base slab.

### 3.2 EMBEDDED ITEMS AND FASTENING DEVICES FOR OTHER WORK

A. Provide for installation of inserts, hangers, metal ties, anchors, bolts, and other fastening devices required for attachment of other work. Properly locate in cooperation with other trades and secure in position before concrete is poured.

### 3.3 COORDINATION WITH OTHER TRADES

A. Include installation of anchors, sleeves, ties, angles, etc., furnished by trades responsible for the facilities to be attached to these devices. Such trades shall be notified by the Contractor and their work done before concreting. Leave openings in walls, for pipes, ducts, etc., required for the ventilation, heating, electrical and plumbing work. Notify all trades concerned with sleeves, inserts, etc., to check their work before concrete is cast.

### 3.4 CONCRETE FINISHING

A. General:

1. Finish only properly set concrete. Under adverse weather conditions, finish only under proper protection.

2. The Contractor, at his own expense, shall do all leveling and grinding of depressed and high spots in concrete surfaces in excess of the tolerances specified herein. In areas where leveling materials are required to provide the proper surface, such materials shall be of a type approved by the Architect.

3. Protect all concrete work against injury from heat, cold and defacement of any nature during construction operations.

B. Flatwork and flatwork finishes:

1. Flatwork placing and finishing shall comply with the procedures and requirements of ACI 301, Chapter 11, except as modified herein.

2. No dry cement or mixture of sand and cement shall be applied to surfaces of any concrete slab to absorb moisture.

3. Protect floors from damage until completion of job.

4. Provide a trowelled finish on all concrete floors.

5. Provide a floated finish on the lightweight concrete roof slab to receive roof insulation and roofing.

3.5 CURING AND PROTECTION

A. Curing and protection shall be performed in accordance with ACI 301, Chapter 12 and the following additions:

1. Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

2. Immediately after placing or finishing, all concrete surfaces not covered by forms shall be protected from loss of moisture by the use of one of the following materials or methods:

a. Covering with waterproof paper or polyethylene film conforming to ASTM C171.

b. Applying specified curing compound conforming to ASTM C309.

3. Sheets of waterproof paper or polyethylene film shall be lapped a minimum of six (6) inches at edges and ends and maintained in place by sealing laps with pressure-sensitive tape and weighting down as necessary.

4. Curing compounds shall be applied within two hours after the concrete has been finished.

5. Curing compounds shall be applied in accordance with the manufacturer's recommendations and shall not be used on any surface against which additional concrete or other cementitious materials are to be bonded.

6. The curing period shall continue until the accumulative number of days not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50°F has totaled seven days.

7. Rapid drying at the end of the curing period shall be prevented.

### 3.6 FLOOR SEALING

A. All new interior concrete floors and ramps shall be treated with specified sealer as follows, which shall be in addition to any curing compound coating previously used:

1. Floors receiving finish materials (carpet, V.A.T. composition). Note: CONFIRM COMPATIBILITY OF SEALER WITH FINISH:

a) Clean floors and apply one coat as soon as possible after curing period is complete, but not less than 28 days after concrete is finished.

b) Clean floors and apply the second coat of sealer immediately in advance of flooring, allowing sufficient time for complete curing of sealer before applying covering.

2. All exposed concrete floors, which will not receive finish covering.

a) Clean floors and apply first coat sealer as soon as possible after curing period is complete, but not less than 28 days after concrete is finished.

b) Clean floors thoroughly and apply two additional coats of sealer immediately before final inspection.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes all ceramic tile and quarry tile.

C. Related work specified elsewhere:

1. Demolition and Removal: Section 01910.
2. Concrete Topping: Section 03310.

1.2 SUBMITTALS

A. Samples: Submit sample colors and panels in duplicate for Architect's selection and approval. Each panel shall have at least 8 tile representing the normal range of color, include the color of grout and be a minimum of 144 square inches.

1.3 REFERENCE SPECIFICATIONS

A. The following specifications and standards are incorporated by reference:

1. Specifications for Quarry Tile and Paver Tile installed with Portland Cement Mortar, ANSI A108.3-1967.
2. Tile Council of America, Inc. Handbook for Ceramic Tile Installation, 1976 edition.

1.4 HANDLING, DELIVERY, STORAGE

A. Tile and other materials shall be properly packaged and brought to the site in original, unopened containers with grade, type, and quality indicated on the labels.

B. Containers shall be stored and protected, raised above floor level and kept dry until ready for use.

1.5 EXTRA STOCK

A. Provide minimum 1% additional stock of each color and/or type of material for future maintenance and patching.

B. Deliver in standard containers, unopened to the University as directed.

C. If smallest standard container exceeds 1%, provide at least one full container.

## PART 2: PRODUCTS

### 2.1 MATERIALS

A. Tile: TCA A137.1-1976, and Federal Specification SS-T-308c; Master Grade Certificate; United States Ceramic Tile Co., American Olean Tile Co., Inc., Florida Tile, or approved equal. Where indicated to patch; match existing, size, type and color.

1. Quarry Tile: Quarry tile or clay paver tile selected to match existing tile in corridor.

2. Quarry Tile Base: Round top, cove base to match existing.

3. Provide special shapes as required by the details.

4. Extra tile: provide one carton of each pattern and color of tile to Owner for future patching.

B. Mortar Materials:

1. Portland Cement: Cement shall conform to ASTM C150-74, Type 1.

2. Aggregate: Sand shall be clean and graded in accordance with ASTM C144-70 for mortar or for grout as required. Fine sand shall pass a 16-mesh screen.

3. Hydrated Lime: Lime shall conform to ASTM C206-49 or ASTM C207-74, Type S.

4. Water: Water for mixing shall be clean and potable.

C. Grout for floors and bases: Hydroment as manufactured by Upco Company, the equivalent product of Atlas Mineral and Chemical Division of ESB, Inc., or approved equal. Color as selected by the Architect. Any standard color or mixture of colors may be selected.

D. Reinforcing Wire Fabric: ASTM A82-72, 2" x 2" - 16/16 welded wire fabric.

E. Metal divider strips at all junctions between quarry tile and dissimilar floor finish materials shall be aluminum angles  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $\frac{1}{4}$ ". Strips shall have a minimum of 2-3/8" expansion anchors shim to suit conditions of the job.

## PART 3: EXECUTION

### 3.1 EXAMINATION OF SURFACES

A. Refer to Section 01910 and schedules for specified removal by General Contractor exposing existing structural slab. In general, concrete topping or quarry tile and mortar beds are being removed, exposing the rough slab. Work of this section begins at rough slab.

B. Inspect surfaces to which tile is to be applied with the Contractor and the University to determine the suitability of surfaces. Commencement of work implies acceptance of surface and assumption of responsibility.

C. Work shall commence only after grounds, anchors, plugs, hangers, bucks, and electrical and mechanical work to be in or behind tile have been installed. All surfaces shall be dry and clean before setting bed is applied.

### 3.2 SETTING

A. Set all tile work in accordance with the requirements of the Tile Council of America, Inc. Handbook for Installation, 1976 edition and as specified herein.

1. Set floor tile according to Method F112, cement mortar bonded at slabs on grade.

2. Set tile base according to Method F-113, dry-set-mortar.

3. Match existing tile patterns and joint sizes.

B. Do all necessary cutting, fitting and drilling of tile to accommodate the work of other trades.

C. Room temperatures at areas in which ceramic materials are being installed shall be maintained at not less than 40°F for a period of 24 hours prior to commencement of tile work, during tile work, and afterwards until completion of construction. Areas in which tile work is being done shall be closed to traffic until the installation has set.

D. As far as possible, lay out work so that no tile less than half size occurs. Align joints in wall tile vertically and horizontally except where other patterns are shown or specified. Align joints in floor tile at right angles to each other and straight with walls to conform to patterns selected. Verify locations of accessories before installing tile. Coordinate with plumbing and other trades. Fully tile surfaces behind all surface-mounted items.

E. Install all tile using lighting conditions that will closely approximate the proposed lighting required in the areas involved in order to achieve uniformity in finished work.

### 3.3 GROUTING

A. Quarry Tile Grouting: Grout quarry tile in accordance with the applicable portions of ANSI 108.6-1969 and the grout manufacturer's instructions.

### 3.4 FLOOR TILE INSTALLATION (PORTLAND CEMENT BED)

A. Set in Portland Cement setting beds in accordance with listed standards. Clean concrete and waterproofing or cleavage membrane surfaces, and thoroughly wet surface of concrete prior to placing setting bed mortar.

B. Setting bed mortar mix shall consist of one (1) part Portland Cement and six (6) parts dry sand, by volume, to which not more than 1/10 parts of hydrated lime may be added. Mix in approved waterproofing compound in accordance with manufacturer's instructions.

C. When mixed with water, the mortar mix shall be of such consistency and workability as to produce maximum density. Determine consistency by stroking the mortar surface with a trowel. When of correct consistency, the troweled surface readily assumes a smoothed, slickened appearance.

D. Spread setting bed mortar and screed to provide smooth, dense beds with true planes properly pitched to drains. Install reinforcing mesh in all setting beds over waterproof membranes. The thickness of bed shall be such that the floor tile will finish flush with top of division strips and adjacent finish flooring, but in any case, not less than 3/4" nor more than 1 1/4" thick. Where additional build-up is required, apply as separate layers.

E. Install metal dividing strips where tile floors abut other finish floor materials. Separate dividing strips a reasonable distance from control joints to assure firm anchorage of the strips. Where divider strips are located across door openings, locate strip on the door side, in line with the edge of door stop, terminating at the rabbet; set strip in place while under-bed is still semi-plastic.

F. After bed has set sufficiently to be worked over, trowel or brush a thin layer, 1-32" to 1/16" in thickness, of neat Portland cement paste over the bed or the back of tile or apply a thin layer of dry Portland cement over the setting bed worked in lightly with a trowel. Do not prepare larger setting bed than can be covered with tile before the mortar sets.

G. Press tile firmly into the bed tamping with wood blocks to obtain smooth surface. All tile shall be properly aligned, with straight joints in even widths. Joints width shall be determined by spacers on ceramic tile. Tamping shall be completed within one (1) hour after placing tile. Adjust work out of line within this period. See drawings for locations of expansion joints. All expansion joints shall be clear of grout to receive filler and sealant.

H. Fit tile closely around pipes running through walls and floors. Pitch floors to drain.

### 3.5 BASE AND WALL TILE INSTALLATION (Dry-Set Mortar)

A. Set in dry-set mortar, 1/8" to 1/4" setting thickness, in accordance with ANSI A108.5.

B. Press tile firmly into the bed tamping with wood blocks to obtain smooth surface. All tile shall be properly aligned, with straight joints in even widths. Tamping shall be completed within one (1) hour after placing tile. Adjust work out of line within this period. See drawings for locations of expansion joints. All expansion joints shall be clear of grout to receive filler and sealant.

### 3.6 CONTROL JOINTS

A. Cut through setting beds at perimeter joints and at projections through the floor. Install neoprene or butyl rubber strip (Shore A hardness 70) full depth of setting bed. Provide specified joint sealant.

B. Provide control joints where floor tiles meet restraining surfaces such as perimeter walls, cove bases, curbs, columns, pipes, etc., and directly over control or expansion joints in sub-surfaces. Control joints shall be placed as specified in Article 3.2. Form control joints in neat, straight lines. Cut tile cleanly and to accurate radius at exposed junctions with pipes, etc. Tile control joints shall be full width of control joint in sub-surfaces and same width as grouted joints (but not less than  $\frac{1}{4}$ " ) at quarry tile.

C. Fill control joints that will be exposed in the finished work to full depth of setting beds from sub-surface to rear face of tile, with control joint backing. Keep remaining void clear of grout and debris. After completion of grouting operations, seal control joints with specified sealant of color to match adjoining grout.

### 3.7 CLEANING, PATCHING, PROTECTION

A. After completion, clean all work, point open joints and replace defective work. After cleaning, protect work with a suitable covering of paper before other trades have access to area.

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ADDENDUM NO. 2

RECEIVED

Second Addendum to conditions, specifications, related documents and drawings<sup>1977</sup> entitled:

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JACKSON OWRE MILLARD LYON COMPLEX REMODELING  
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The additions, revisions, omissions, corrections, and clarifications contained herein shall be made to the drawings and specifications for the project and shall be included in scope of work and in the bids to be submitted. References made below to drawings and specifications shall be used as a general guide only. Bidders and Contractors shall determine for themselves all of the work affected by Addendum Items.

DIVISION 1 - GENERAL REQUIREMENTS

1 - Section 01010 - Summary of Work: (A) Article 1.5, paragraph A: In third line after the words "retained by the University", add: after future construction work (JOML-B).

(B) Article 1.8, paragraph H: Bidders' attention is drawn to this mandatory item.

2 - Section 01500 - Temporary Facilities: (A) Article 3.4, paragraph A: (Addendum 1, Item 4), Add: Construction fence shall become the property of the University and shall be left in place for the use of future contractor(s).

DRAWINGS - MECHANICAL CONSTRUCTION

3 - Sheet M-2: Change motor for Exhaust Fan #F-142 to 3 HP.

4 - Sheet E-2 - Motor Schedule: Change Motor #2 from 2-1/2 HP to 3 HP.

END OF ADDENDUM 2

ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON THE BID FORM.

CONDITIONS, SPECIFICATIONS AND RELATED DOCUMENTS FOR

SURGICAL PATHOLOGY RENOVATION  
JACKSON OWRE MILLARD LYON COMPLEX REMODELING  
MINNEAPOLIS CAMPUS  
UNIVERSITY OF MINNESOTA  
COMMISSION NUMBER 280.03

James F. Brinkerhoff  
Vice President for Finance and Development                                  University of Minnesota

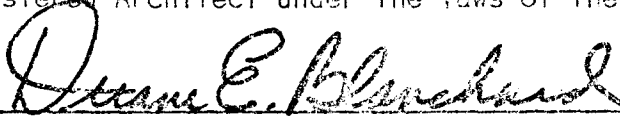
Clinton N. Hewitt  
Assistant Vice President for Physical Planning                                  University of Minnesota

THE ARCHITECTS COLLABORATIVE, INC.                                  Cambridge, Massachusetts

HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.  
University Park Plaza - Suite 704  
2929 University Avenue South East                                  Minneapolis, Minnesota  
(612) 378-3833    55414

The Cerry Associates, Inc.                                  Minneapolis, Minnesota  
Hammel Green and Abrahamson, Inc.                                  Saint Paul, Minnesota  
Setter, Leach and Lindstrom, Inc.                                  Minneapolis, Minnesota

I hereby certify that these plans, specifications or reports were prepared by me or under my direct supervision, and that I am a duly Registered Architect under the laws of the State of Minnesota.

  
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Date: February 17, 1977

Reg. No. 8397

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UM HEALTH SCIENCES

ADVERTISEMENT FOR BIDS

SURGICAL PATHOLOGY RENOVATION

JACKSON OWRE MILLARD LYON COMPLEX REMODELING

UNIVERSITY OF MINNESOTA - MINNEAPOLIS CAMPUS

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BIDS CLOSE: 2:00 P.M. CST MARCH 17, 1977  
BIDS RECEIVED AT: ST. PAUL, MINNESOTA

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SURGICAL PATHOLOGY RENOVATION  
COMMISSION NUMBER 280.03  
DOCUMENTS DATED: FEBRUARY 17, 1977

THE ARCHITECTS COLLABORATIVE, INC., AND  
HEALTH SCIENCES ARCHITECTS AND ENGINEERS, INC  
UNIVERSITY PARK PLAZA - SUITE 704  
2829 UNIVERSITY AVENUE S.E.  
MINNEAPOLIS, MINNESOTA 55414

Sealed lump sum Bids will be received on behalf of the University of Minnesota Board of Regents, at the office of Robert James, Director of Purchasing and Stores, in the Administrative Services Building, 2610 University Avenue, St. Paul, Minnesota 55114 until 2:00 P.M. CST, March 17, 1977. Bids received after this time will not be accepted nor opened. Immediately after closing time, Bids will be opened publicly and read aloud.

The Project consists of furnishing all labor, material, equipment and incidentals for complete construction of building addition and alterations for Surgical Pathology Department in Jackson Hall on the Minneapolis Campus of the University of Minnesota, in connection with the Jackson Owre Millard Lyon Complex Remodeling.

Bids will be received for a single lump sum contract for all work required by Contract Documents.

No bidder may withdraw his bid until 30 days after the date of opening of Bids.

Bidding requirements, bid and contract forms, drawings and specifications may be examined at:

Office of the Architect/Engineer, listed above.

Office of the Engineering and Construction Division, Folwell Hall,  
University of Minnesota, Minneapolis, Minnesota.

The Builders Exchanges of Minneapolis and Saint Paul, Minnesota

F. W. Dodge Corporation Plan Room, Minneapolis, Minnesota.

One complete set of the documents for this Work may be obtained from the office of Health Sciences Architects and Engineers, Suite 704 University Park Plaza, 2829 University Avenue, S. E., Minneapolis, Minnesota, 55414, in accordance with the instructions to Bidders, upon making a deposit in the form of a check in the amount of \$25.00 payable to Health Sciences Architects Engineers, Inc. Sets requested to be mailed will be forwarded C.O.D.

The full deposit will be returned to bidders who submit a bona fide prime contract bid to the University, upon the return of the complete set of documents in good condition to the Health Sciences Architects and Engineers, Suite 704 University Park Plaza, 2829 University Avenue S.E., Minneapolis, Minnesota 55414, within 10 days after bid date. Deposits will be returned to others in accordance with the Instructions to Bidders, upon return of the complete set of documents under the same time and conditions.

A bid security in the amount of five percent (5%) of the maximum amount of the Bid, shall be submitted with each Bid in such form and subject to the conditions stated in the Instructions to Bidders.

The attention of all bidders is called to the Equal Employment Opportunity requirements for contractors, subcontractors and suppliers, as stated in the Contract Documents.

The University reserves the right to reject any and all bids, accept any bid it deems to be in its best interest, to waive any informalities in bids submitted and waive minor discrepancies in bidding procedures.

REGENTS OF THE UNIVERSITY OF MINNESOTA

By: Robert James

Director of Purchasing and Stores for the  
Regents of the University of Minnesota

## INSTRUCTIONS TO BIDDERS

### ARTICLE 1 - INVITATION FOR BIDS

#### 1.1 Invitation

1.1.1 The Regents of the University of Minnesota, referred to as the University, invite qualified bidders to submit lump sum bids for the Project identified as:

SURGICAL PATHOLOGY RENOVATION  
JACKSON OWRE MILLARD LYON COMPLEX REMODELING  
MINNEAPOLIS CAMPUS  
UNIVERSITY OF MINNESOTA

as prepared by:

THE ARCHITECTS COLLABORATIVE, INC., CAMBRIDGE, MASS.  
and  
HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.  
University Park Plaza - Suite 704  
2829 University Avenue S.E.  
Minneapolis, Minnesota 55414

#### 1.2 Types of Bids

1.2.1 Bids will be received for a single lump sum Contract for the entire construction described in the Contract Documents.

### ARTICLE 2 - BIDDING PROCEDURES

#### 2.1 Bid Time and Place

2.1.1 Bids shall be submitted to the designated location indicated in the Advertisement for Bids, by the designated time or any extension thereof made by Addendum. Bids received after the time and date for receipt of bids will not be opened.

2.1.2 Bidder shall assume full responsibility for timely delivery at location designated for receipt of bids.

2.1.3 Because of University schedule commitments to operation needs, no extension of bidding period will be considered.

#### 2.2 Preparation of Bid

2.2.1 One copy of the bid shall be submitted in the form included in the specification. Forms are available from the Architect/Engineer.

2.2.2 All blank spaces on the Bid Form shall be filled in by typewriter or manually in ink, expressing the sums both in words and figures. In all cases the written and numerical figures must agree, otherwise it may be cause for rejection of the Bid.

2.2.3 Any interlineation, alteration or erasure must be initialed by the signer of the Bid.

2.2.4 A Bid for all alternates, if any, either additive or deductive, shall be submitted in accordance with the Bid Form listing and Description of Alternates, except any alternate which may be listed as optional does not require a Bid.

2.2.5 In the event unit prices are called for, a Bid for each unit price shall be submitted.

2.2.6 The Bidder shall not make any additional stipulations or alternates, nor qualify his Bid in any other manner.

2.2.7 Bidder shall state all addenda received or considered in preparing his Bid.

2.2.8 Each copy of the Bid shall include the legal name of Bidder and a statement whether Bidder is a sole proprietor, a partnership, a corporation, or any other legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. If the Bidder is a partnership, the names of all partners shall be stated. A Bid by a corporation shall further give the State of incorporation and have the corporate seal affixed.

2.2.9 The signature on the Bid shall be in longhand, in ink.

### 2.3 Submission of Bids

2.3.1 The Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope.

2.3.2 The envelope shall be addressed to the party receiving the bids and shall be identified with the Project name, the Bidder's name and address, and the portion of the project or category of work for which the Bid is submitted. If the Bid is sent by mail the sealed envelope shall be enclosed in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof.

### 2.4 Modification or Withdrawal of Bid

2.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of bids, and Bidder so agrees in submitting his Bid.

2.4.2 Prior to the time and date designated for receipt of bids, bids submitted early may be modified only by notice to the party receiving bids at the place and prior to the time designated for receipt of bids.

.1 Such notice shall be in writing over the signature of the Bidder or be by telegram; if by telegram, written confirmation over the signature of the Bidder must have been mailed and postmarked on or



before the date and time set for receipt of Bids; it shall be so worded as not to reveal the amount of the original Bid. If the written confirmation is not received by the party receiving bids within 24 hours after bid closing time, no consideration will be given the telegraphic modification.

2.4.3 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these instructions to Bidders.

2.4.4 Bid security, shall be in an amount sufficient for the bid as modified or resubmitted.

### ARTICLE 3 - BID SECURITY

#### 3.1 Form of Security

3.1.1 The Bid shall be accompanied by a bid security in accordance with these requirements. The bid security shall pledge that the Bidder will enter into a contract with the University on the terms stated on his Bid, in accordance with the Contract Documents, and will furnish the required Performance Bond.

3.1.2 The bid security shall be in the form of a certified or cashier's check drawn on a solvent bank, or a bid bond, drawn to the order of the "Regents of the University of Minnesota".

3.1.3 Bid bonds shall be duly executed by the bidder as principal, issued by a corporate surety company authorized to do business in the State of Minnesota, with a current copy of Power of Attorney of the Attorney-in-Fact who executes the bond on behalf of the surety attached, as well as proper acknowledgements.

3.1.4 The amount of the bid security shall be as stated in the Advertisement for Bids, but in no event less than 5% of the maximum amount of the Bid, including additive alternates, if any.

#### 3.2 Retention of Bid Security

3.2.1 The University shall have the right to retain the bid security of all bidders until either (a) the Contract has been executed and bonds required, have been furnished or (b) the specified time has elapsed so that bids may be withdrawn, or (c) all bids have been rejected. Thereafter, bid security in the form of checks will be returned to bidders and bid bonds returned upon request of the Bidder.

#### 3.3 Forfeiture of Bid Security

3.3.1 Should the Bidder be awarded a contract and fail or refuse to execute and deliver the Contract and performance bonds required within 10 days after he has received notice of the acceptance of his bid, he shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his bid. In the event the Contract has not been prepared

for signature within 10 days after notice of award, the bidders shall have three days after it is prepared and offered to execute the Contract and provide the performance bond.

#### ARTICLE 4 - CONSIDERATION OF BIDS

##### 4.1 Opening of Bids

4.1.1 Bids will be opened publicly and read aloud immediately after the time for receipt of bids.

##### 4.2 Informalities

4.2.1 The University reserves the right to consider informal any Bid not prepared in strict accordance with requirements herein and to waive said informalities and to waive minor discrepancies in bidding procedures.

##### 4.3 Rejection of Bids

4.3.1 The University shall have the right to reject any or all bids and in particular to reject a Bid not accompanied by any data required by the Bidding Documents or a Bid in any way incomplete or irregular.

##### 4.4 Acceptance of Bid (Award Procedures)

4.4.1 In consideration of alternates, it is the intent of the University, if it accepts any alternates, to accept them in the order in which they are listed on the Bid Form. However, the University reserves the right to accept alternates in any order if such acceptance out of order does not change the low Bidder.

4.4.2 The low Bidder will be determined on the basis of the sum of the Base Bid and any alternates accepted.

4.4.3 In evaluating alternates which affect more than one contract, the University reserves the right to consider the total value of the alternate under all contracts and accept such alternates of the Bidders the University may deem in its best interest. In some instances it may result in additive amounts to some contracts and deductive amounts to others.

4.4.4 The University reserves the right to reject unit prices of a low Bidder if the unit prices are significantly out of balance with other bids, indicating a hardship may be imposed on the University. In such instances, the University may negotiate reasonable unit prices prior to award of the Contract.

4.4.5 The University reserves the right to award a contract it deems in its best interest and consider all factors. Serviceability, maintenance costs, life cycle costs, energy conservation, interchangeability with other facilities, flexibility, uniformity of appearance and similar factors may be considered.

4.4.6 It is the intent of the University to award a contract to the lowest responsible Bidder, all factors considered, provided the Bid has been

submitted in accordance with the requirements of the bidding requirements and Contract Documents, is judged to be reasonable, and does not exceed the funds available. However, the University shall not be obligated to award a contract in any event.

4.4.7 The University reserves the right to disqualify bids, before or after opening, upon evidence of collusion, intent to defraud or other illegal practices on the part of the Bidder.

#### 4.5 Execution of Contract

4.5.1 Upon award of a Contract, the successful Bidder shall execute the Agreement within 10 days after it is offered to him, and provide the required performance bond. In the event the Agreement is not prepared, ready for execution, within 10 days after award, the Contractor shall execute the Agreement within 3 days after its preparation.

### ARTICLE 5 - DOCUMENTS FOR BIDDING

#### 5.1 Documents for Bidders for a Contract with the University

5.1.1 Prospective bidders may obtain one complete set of drawings, specifications and other Contract Documents from the Architect/Engineer by making a deposit in the form of a check in favor of the Architect/Engineer in the amount specified in the Advertisement for Bids.

5.1.2 Sets requested to be mailed to Bidders will be forwarded C.O.D.

#### 5.2 Documents for Subcontract Bidders, Suppliers, Manufacturers and Quantity Surveyors

5.2.1 One set of drawings, specifications and other Contract Documents may be obtained from the Architect/Engineer for the amount noted in Advertisement for Bids.

5.2.2 One half (1/2) the deposit for the set will be returned upon return of the documents in good condition within 10 days after bid date.

#### 5.3 Return of Documents

5.3.1 All documents remain the property of the Architect/Engineer and shall be returned to him promptly after bid date, except a Bidder receiving a Contract with the University may retain his set and his full deposit will be returned for the first full set and 1/2 deposit for the remaining sets.

#### 5.4 Complete Sets Used in Preparing Bids

5.4.1 Complete sets of drawings, specifications and other Contract Documents, shall be used in preparing bids. Neither the Owner nor the Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

## 5.5 Partial Sets

5.5.1 Copies of individual drawings and pages of specifications may be purchased from the Architect/Engineer at the cost of \$1.50 per drawing and \$0.25 per page. The cost of these sheets will not be refunded.

5.5.2 Individual sheets or pages issued shall be used at the risk of the Bidder or subcontract bidders and shall not relieve the user from examining the complete set of drawings, specifications or other Contract Documents.

## 5.6 Use of Documents for Bidding

5.6.1 The University and Architect/Engineer, in making copies of the drawings, specifications or other Contract Documents available on the above terms, do so only for the purpose of obtaining bids on the Project and do not confer a license or grant for any other purpose.

## ARTICLE 6 - INTERPRETATION OR CORRECTION OF DOCUMENTS

### 6.1 Notice and Request for Interpretations and Clarifications

6.1.1 Bidders shall promptly notify the Architect/Engineer of any alleged ambiguity, inconsistency or error they may discover upon examination of the Contract Documents, Bidding Requirements, the site or local conditions.

6.1.2 Bidders requiring clarification or interpretation of the Documents shall make his request to the Architect/Engineer.

6.1.3 All notices of alleged ambiguities, inconsistencies or errors and requests for clarification or interpretation shall be made in writing and forwarded so it is received by the Architect/Engineer at least seven (7) days prior to bid date, unless longer periods are specified elsewhere for certain conditions.

### 6.2 Response to Notices and Requests

6.2.1 Corrections, interpretations and clarifications involving or providing information which is not already a part of the Bidding Requirements or Contract Documents will be made only by written addenda and supplemental or revised drawings if required.

6.2.2 Corrections, interpretations and clarifications will not be made in any other manner than by addenda and unless they are included in addenda, bidders shall not rely on information provided or received in any other manner. Neither the Architect/Engineer nor the University will be responsible for, nor honor any claims resulting from, or alleged to be the result of, misunderstanding by the Bidder (and subsequently the Contractor) of any discussion of the Project conditions prior to receiving bids. Any verbal communications during the bidding period are subject to inclusion in addenda; otherwise, they shall not be binding on the University nor the Architect. Any item not clarified by addenda shall be subject to interpretation by the Architect or University in accordance with the provisions of the General Conditions of the Contract or other Contract Documents.

## ARTICLE 7 - ADDENDA

### 7.1 Issuing Addenda

7.1.1 The Architect/Engineer will issue all required addenda, in writing, which may include supplemental or revised drawings.

7.1.2 Addenda will be mailed or delivered to all prospective bidders for a contract directly with the University, who have been issued a complete set of Documents are on record at the Architect/Engineer's office as a bidder. Bidders shall furnish the proper address for mailing of addenda.

7.1.3 Addenda will also be issued to the locations noted in the Advertisement for Bids where Contract Documents are on file for examination.

7.1.4 It is the intent that written addenda will not be issued less than 3 days prior to bid date.

### 7.2 Incorporating and Acknowledging Addenda

7.2.1 All addenda issued, and the information included therein, shall become part of the Contract Documents and shall be incorporated in all bids submitted.

7.2.2 All bidders, including those submitting subcontract or supply bids, shall be responsible to ascertain the addenda that have been issued prior to bid date, examining all of the addenda and determining the effect of addenda provisions on their bids and their work. Failure of any bidder to receive any such addendum or interpretation shall not relieve him from any obligation to complete the Work in accordance with the Contract Documents if awarded a Contract.

7.2.3 All bidders shall state on the Bid Form the number of addenda received and incorporated in their Bid.

## ARTICLE 8 - CONTRACTOR'S BOND

### 8.1 Bond for Performance and Payment

8.1.1 A bond for faithful performance and completion of the Project and for payment for all just claims in connection with the Project is required. The cost of said bond shall be included in all bids to the University.

8.1.2 The bond shall be in the form of the University's Contractor's Bond, as bound into the Documents or available from the University, and shall meet all requirements specified in the General Conditions of the Contract, paragraph 7.5. The properly executed Contractor's Bond shall be provided to the University at the time of execution of the Agreement with the University, and shall be accompanied by a certified and effectively dated copy of the Power of Attorney for the Attorney-in-Fact.

## ARTICLE 9 - QUALIFICATIONS OF BIDDERS

### 9.1 Qualifications

9.1.1 The University reserves the right to consider the competency and

responsibility of a Bidder in making an award, which may include, but not be limited to: (1) Proof of financial responsibility, (2) quality of similar work, (3) amount of experience with similar projects, (4) facilities, personnel and equipment, (5) reputation for performance, including service after Substantial Completion, (6) capability to complete the work on time, and (7) Integrity of the Bidder.

9.1.2 The University reserves the right to make any investigations necessary to satisfy itself that the Bidder is properly qualified to execute the work of the Project under the Contract. The University may make such investigations as it deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the University all such information and data for this purpose as the University may request. The University reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the University that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

## ARTICLE 10 - OBLIGATIONS OF BIDDER

### 10.1 Examination of Documents

10.1.1 Each bidder is obligated to thoroughly examine and study all Contract Documents, Bid and Contract Forms and Bidding Requirements, if necessary, to fully inform himself as to all conditions, requirements and other factors which will affect his Bid or execution of the work under the Contract Documents. By submitting a Bid, the Bidder represents that he has made such examinations and study, that he understands the requirements of the Contract Documents and Bidding Requirements, that he is familiar with the site, site conditions and local conditions, and that his Bid is made in conformance with all requirements.

10.1.2 Bidders may examine drawings for the related JOML Contracts at the Architect's office, upon appointment.

10.1.3 In examining the drawings, specifications and other Contract Documents, the Bidder shall study and examine the entire set of Contract Documents, including those drawings and specifications primarily intended to portray the work which may be under another Contract with the University or for trades not normally in the employ of the Bidder, so as to be totally familiar with the scope of the entire Project and all factors which will affect the Bid or accomplishment of the work under the Contract Documents.

10.1.4 The Bidder is obligated to obtain clarifications and interpretations, as well as to notify the Architect/Engineer of alleged errors, ambiguities or inconsistencies in accordance with Article 6 of the Instructions to Bidders.

10.1.5 No allowance or extras will be granted the Bidder who is awarded a Contract as a result of misunderstanding of the extent or scope of the work as a result of his failure to study all documents and conditions and record his own findings, or for neglecting any specified instructions in the preparation of his Bid.

## 10.2 Labor

10.2.1 Each Bidder shall investigate and fully inform himself as to the availability, local labor and union conditions and cost of the employment of labor for the Project, both skilled and unskilled, and shall consider such matters in the preparation of the Bid.

## 10.3 Materials, Equipment and Systems

10.3.1 By submitting a Bid, the Bidder represents that his Bid is based on the materials, equipment, systems and other similar items in full compliance with requirements and descriptions in the Contract Documents, without exception.

## 10.4 Sales Tax

10.4.1 Bidders shall include the cost of the Minnesota Excise and Use Tax, as applicable, in their Bids.

## ARTICLE 11 - SUBCONTRACTORS

### 11.1 Acceptance of Subcontractors

11.1.1 Bidders are advised that any person, firm or organization to whom an award of a subcontract is proposed under the Contract must be acceptable to the University and the Architect/Engineer as specified under Article 5 of the General Conditions of the Contract.

## ARTICLE 12 - PROPOSED ALTERNATE MATERIALS AND EQUIPMENT

### 12.1 Intent

12.1.1 The intent of this Article is to encourage and permit competition on qualified products by reputable and qualified contractors, subcontractors, suppliers and manufacturers, whose products, reputations and performance warrant acceptance for the conditions, intent of design and performance considerations required for this Project. For consideration of alternate products, the procedures, time requirements and other provisions of this Article must be complied with.

12.1.2 To avoid hardships resulting from non-acceptance of a proposed product that has been bid, and to provide the equitable condition for all bidders, subcontract bidders and suppliers by their having the same knowledge of which products, in the opinion of the Architect/Engineer, will be acceptable as meeting the Project requirements, the evaluation period for proposed products shall be prior to the bid date, instead of after receipt of bids.

12.1.3 The word "product" herein means any material, equipment, system, assembly, manufacturer, brand, trade name, element, item or similar description as applicable.

12.1.4 Wherever a product is named on the drawings or in the specifications the phrase "or acceptable equal in the opinion of the Architect/Engineer" shall be implied throughout the specification, whether specifically noted or not.

## 12.2 Procedure

12.2.1 All requests for consideration of proposed alternate products in lieu of those specified shall be made in writing. Requests shall clearly define and describe the product for which acceptance is requested, and shall be accompanied by manufacturer's literature, specifications, drawings, cuts, performance data, list of references, model numbers, or other information necessary to completely describe and evaluate the item.

12.2.2 All requests shall be submitted to the Architect/Engineer so it is received a minimum of 14 days prior to bid date and hour, unless a longer period of time is specified in technical sections. Requests received after this time will not be reviewed nor evaluated.

12.2.3 Products which the Architect/Engineer deem basically acceptable for bidding purposes will be included in addenda. Information on acceptance will be provided in no other manner.

12.2.4 Acceptance of a product for bidding purposes shall not relieve the Bidder from complying with all requirements of the Contract Documents, including the criteria established in the Contract Documents and these Instructions to Bidders.

## 12.3 Criteria

12.3.1 Any product or manufacturer used as basis of the specifications shall generally set the basic criteria. It shall be expressly understood that any other product or manufacturer listed in the specification, or any addenda, as an acceptable alternate, will be acceptable provided they fully comply with the requirements and match the basic and essential criteria of the product used for base specification, including the level of workmanship quality, as determined by the Architect/Engineer. For final acceptance for use in the work, the Architect/Engineer shall have right to accept or reject proposed deviations. Should a proposed product be unable to meet the necessary requirements, the product shall not be used.

12.3.2 The use of references to standards, manufacturers, brands and similar designations is intended to establish the measure of quality as to minimum standards of design, function, appearance, type, strength, durability, construction, efficiency, sound level, finish, availability, service and similar characteristics, which have been determined as requisite for this Project.

12.3.3 Proposed alternate products shall also: be available in the same range of colors, textures, dimensions, gauges, types, and finishes as the material or article specified; must equal the specified item in strength, durability, efficiency, serviceability, ease and cost of maintenance; must be compatible with the building design and not necessitate design modifications, nor impose additional work or require changes in the work of any Contractor, or any other Subcontractor, vendor, or materials supplier, nor result in any additional cost to the University. The supplier or manufacturer providing any acceptable product shall bear the cost of any required modifications to spaces, services, utilities and other features as the result of the use of his product, including but not limited to larger capacity mechanical or



electrical service, devices or utilities resulting from acceptance of the product for bidding purposes, as well as to pipes, conduits, ducts, and controls for conveying, distributing, and controlling those services or utilities; as well as insulation, wrappings, coatings, or other integral features of the lines or items conveying those lines.

12.3.4 For any same or like product for this Project, only one brand, manufacturer, source or type shall be used, as approved by Architect/Engineer and the University.

#### 12.4 Use of Products

12.4.1 Where two or more products are shown or specified, the Bidder (and Vendor) has his option of which to use, provided the product proposed will meet all requirements of the specifications and the design criteria. The right is reserved by the Architect/Engineer to accept or reject proposed deviations in design, function, construction or similar differences that will affect design intent or quality.

12.4.2 For products specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturers, trade names or similar reference, the Bidder obligates himself to submit proposals and accept award of a Contract based upon the use of such products as specified or accepted in addenda.

### ARTICLE 13 - COMMENCEMENT AND COMPLETION OF THE WORK

#### 13.1 Commencement of Work

13.1.1 By submitting a bid, and execution of the Agreement, the Bidder (and Vendor) agrees to commence work in accordance with the General Conditions of the Contract, or as otherwise specified in Division I of the specifications.

#### 13.2 Completion of Work

13.2.1 By submitting a bid, and execution of the Agreement, the Bidder (and Contractor) agrees to complete the Project within the time specified, including any separate phases, elements or areas of the entire Project which may be specified, and that time for completion is an essential condition of the Contract.

13.2.2 By submitting a Bid, and execution of the Agreement, the Bidder (and Contractor) expressly agrees the time (or times for various phases) for completion is reasonable, considering all factors. The Bidder (and Contractor) further represent he has: analyzed the Project, including the equipment, materials and methods; considered his own capabilities and work load; determined availability of qualified mechanics and unskilled labor; considered the time of year for commencement of work; made a reasonable allowance for weather variations and other potential delays encountered in the construction process; the condition of the site; considered the constraints specified; evaluated the effects of other contractors who may be on the site; and has taken these and other relevant factors bearing on the progress of the work into account.

## ARTICLE 14 - LAWS AND REGULATIONS

### 14.1 Compliance with Laws and Regulations

14.1.1 Applicable laws, rules, regulations and ordinances of the Federal Government, the State of Minnesota and municipalities, or other authorities, with jurisdiction over the construction of the Project shall be complied with.

## ARTICLE 15 - WAGES

### 15.1 Minimum Wage Rates

15.1.1 The attention of bidders is drawn to the Regents' policy on minimum wages, as specified under Article 16 of the General Conditions of the Contract.

## ARTICLE 16 - EQUAL EMPLOYMENT OPPORTUNITY

### 16.1 University Policy on Equal Employment Opportunities and Affirmative Action

16.1.1 It is the policy of the Regents of the University of Minnesota to promote equal opportunity of employment without discrimination based on race, creed, color, sex, or national origin. Henceforth, the Regents will require that all Contractors with the University, including suppliers supplying goods or services to it, regardless of where located or the form of the contractual relationship, be equal opportunity employers, whose business is guided by the principle that there shall be no difference in the treatment of persons because of race, creed, color, sex, or national origin. The Regents will also require that the Contractor take affirmative action to ensure implementation of this policy, such action to include but not to be limited to the following: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training including apprenticeship.

16.1.2 The attention of bidders is drawn to the Equal Employment Opportunity Requirements under Article 15 of the General Conditions of the Contract.

16.1.3 Monthly reports will be required of the Contractor from the start of the Project until completion.

### 16.2 Affirmative Action Plan

16.2.1 The Affirmative Action Plan is required of successful Contractors only and shall follow the specified requirements and the guidelines required by the University's Affirmative Action Officer, the State of Minnesota's Equal Employment Opportunity Officer and interested Federal Agencies. If a bidder has a question or needs assistance they may contact the University's Office of Equal Opportunity, Room 419, Morrill Hall, on the Minneapolis Campus, 373-7969.

ARTICLE 17 - EXAMINATION OF EXISTING CONDITIONS

17.1 Arrangements for Examination

17.1.1 Bidders may examine exterior areas and public spaces (ie: corridors and lobbies) in adjacent buildings at their convenience at any time from 8:30 A.M. to 4:30 P.M.

17.1.2 For all other interior areas of adjacent spaces, the Bidders shall make arrangements to examine the areas by appointment. Arrangements may be made to examine the areas each Monday and Wednesday, starting at 9:00 A.M. Arrangements shall be made with Mr. Paul Maupin at the University Health Sciences Planning Office, telephone (612) 373-8590.

BID FORM

TO THE: REGENTS OF THE  
UNIVERSITY OF MINNESOTA  
MINNEAPOLIS, MINNESOTA

PROPOSAL FOR: Complete Construction

ATTENTION: ROBERT JAMES  
DIRECTOR OF PURCHASING  
AND STORES  
2610 UNIVERSITY AVENUE  
ST. PAUL, MINNESOTA 55114

PROJECT: SURGICAL PATHOLOGY RENOVATION

LOCATION: MINNEAPOLIS, MINNESOTA

DATE: \_\_\_\_\_

- (1) Bid of \_\_\_\_\_  
(Firm name - hereinafter referred to as the "Bidder")
- (2) The Bidder, in compliance with Advertisement for Bids, hereby submits the Bid for the COMPLETE CONSTRUCTION OF SURGICAL PATHOLOGY RENOVATION, JACKSON OWRE MILLARD LYON COMPLEX REMODELING MINNEAPOLIS CAMPUS, UNIVERSITY OF MINNESOTA.
- (3) The Bidder agrees to accomplish the Work in strict compliance with the drawings, specifications and Contract Documents, dated October 25, 1976, prepared by the Architects Collaborative, Inc., and Health Sciences Architects and Engineers, Inc., Commission Number 280.03.
- (4) The Bidder, having examined the drawings, specifications and related documents, and being familiar with all of the conditions of the proposed work, including the availability of materials and labor, hereby proposes to furnish all labor, materials, services, and supplies, and to accomplish the Work for which this Bid is submitted, in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this Bid is a part.
- (5) Addenda: The Bidder hereby acknowledges that Addendum instructions numbered \_\_\_\_\_ have been received and/or the requirements therein have been incorporated in this Bid.
- (6) Completion of Work: The Bidder hereby agrees to commence work under this Contract on or before the time stipulated in the written "Notice to Proceed" in accordance with the General Conditions, and to complete all Work under this Contract in accordance with the requirements of Specification Section 01200 and other provisions of the Contract Documents.
- (7) In completing this Bid, the Bidder shall complete the Bid in both words and figures.
- (8) Base Bid: Bidder agrees to provide all work required by the Contract Documents for the lump sum of \_\_\_\_\_

\$ \_\_\_\_\_

(9) Alternates of Scope: Bidder agrees to deduct from the Base Bid the following amounts for omission of certain work. See Section 01100.

Deductive Alternate No. 1. Omit fume hood and related work in Room 192.2. Deduct the lump sum of \_\_\_\_\_

\_\_\_\_\_ dollars \$ \_\_\_\_\_

Deductive Alternate No. 2. Omit ventilating bench and related work in Room 196.1. Deduct the lump sum of \_\_\_\_\_

\_\_\_\_\_ dollars \$ \_\_\_\_\_

Deductive Alternate No. 3. Omit all work in Rooms 196, 196.3, 198.1, 198.2 and 198.3. Deduct the lump sum of \_\_\_\_\_

\_\_\_\_\_ dollars \$ \_\_\_\_\_

Deductive Alternate No. 4. Omit all resilient flooring, except base. Deduct the lump sum of \_\_\_\_\_

\_\_\_\_\_ dollars \$ \_\_\_\_\_

Deductive Alternate No. 5. Omit all acoustical ceilings and modify light fixture suspension. Deduct the lump sum of \_\_\_\_\_

\_\_\_\_\_ dollars \$ \_\_\_\_\_

(10) Materials Alternates: Bidder agrees to add to or deduct from the Base Bid the as appropriate, the following amounts if the Owner elects to substitute products as described. See Section 01100.

Substitution Alternate A. Substitute Corbin Locksets and Latchsets. (ADD) (DEDUCT) the lump sum of \_\_\_\_\_

\_\_\_\_\_ dollars \$ \_\_\_\_\_

Substitution Alternate B. Substitute Russwin Locksets and Latchsets. (ADD) (DEDUCT) the lump sum of \_\_\_\_\_

\_\_\_\_\_ dollars \$ \_\_\_\_\_

(11) Bid Security: The Bidder submits the attached Bid Security in the form of a Certified Check, Cashier's Check or Bid Bond, in accordance with the instructions to Bidders, drawn to the order of the Regents of the University of Minnesota. The Bidder acknowledges the Bid Security may be retained by the University as specified in the Instructions to Bidders and agrees if the Bidder defaults in executing the Contract within the time set forth, or in furnishing the Performance Bond as specified, the check will become the property of the University (or the Surety will pay the University in the amount of the bond) as liquidated damages for the delay and additional expense to the Owner caused thereby.

(12) Holding of Bids: The Bidder agrees this Bid shall be good and may not be withdrawn for thirty (30) days after the scheduled time and date for receiving bids.

(13) Acceptance of Bids: The Bidder understands the University reserves the right to accept any Bid it determines in its best interest, and to reject any and all Bids. Upon receipt of notice of award of a Contract (acceptance of this Bid) the Bidder will execute the Agreement, in the specified form, within 10 days thereafter and to deliver a Contractor's Performance Bond, in the stipulated form, in accordance with Article 8 of the Instructions to Bidders and Paragraph 7.5 of the General Conditions.

(14) Informalities: It is understood by the Bidder the University reserves the right to waive informalities in bids received and minor discrepancies in bidding procedure.

(15)

Certification for Equal Opportunity  
and Affirmative Action:

(Must Be Signed By Bidder)

The bidder hereby certifies that all of the specified requirements for Equal Opportunity and Affirmative Action, General Conditions Article 15, will be fully complied with, as stated, for this project.

\_\_\_\_\_  
(Signed)

\_\_\_\_\_  
, Title

(16) Information about Bidder:

If a Corporation, Incorporated in the State of \_\_\_\_\_

Qualified to conduct business in the State of Minnesota? \_\_\_\_\_

If a Partnership, full names of all Partners are \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

(17) Respectfully submitted:

Correct and full name of Bidder

Name \_\_\_\_\_

Address \_\_\_\_\_

By \_\_\_\_\_ Title \_\_\_\_\_

By \_\_\_\_\_ Title \_\_\_\_\_

(Affix Corporate Seal if bid is by a corporation)

Date \_\_\_\_\_

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A310

**Bid Bond**

KNOW ALL MEN BY THESE PRESENTS, that we

as Principal, hereinafter called the Principal, and

a corporation duly organized under the laws of the State of  
as Surety, hereinafter called the Surety, are held and firmly bound unto

as Obligee, hereinafter called the Obligee, in the sum of

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_),  
for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind  
ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by  
these presents.

WHEREAS, the Principal has submitted a bid for

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract  
with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding  
or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt  
payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter  
such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty  
hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract  
with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain  
in full force and effect.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_

\_\_\_\_\_  
(Witness) } \_\_\_\_\_ (Principal) (Seal)  
\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Witness) } \_\_\_\_\_ (Surety) (Seal)  
\_\_\_\_\_  
(Title)



This Agreement, made this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_,

by and between

(hereinafter designated the Contractor), and the Regents of the University of Minnesota (hereinafter designated the Owner),

Witnesseth, that the Contractor in consideration of the agreements herein made by the Owner, agrees with the said Owner as follows:

ARTICLE I. The Contractor shall and will provide all the materials and perform all the work for the

as shown on the drawings and described in the specifications prepared by the Architect, which drawings and specifications are a part of this contract.

ARTICLE II. It is understood and agreed by and between the parties hereto that the work included in this contract is to be done under the direction of the Owner's authorized representatives.

It is further understood and agreed by the parties hereto that any and all drawings and specifications prepared for the purposes of this contract by the said Architect, are and remain the property of the Owner, and that all charges for the same and for the services of said Architect are to be paid by the said Owner.

ARTICLE III. No changes shall be made in the work except upon written order of the Owner through its authorized representatives; the amount to be paid by the Owner or allowed by the Contractor by virtue of such changes to be stated in said order.

ARTICLE IV. The Contractor shall provide sufficient, safe and proper facilities at all times for the inspection of the work by the authorized representatives of the Owner and shall, after receiving written notice to that effect, proceed to remove from the grounds or buildings all materials condemned by them, whether worked or unworked, and to take down all portions of the work which, by like written notice, condemn as unsound or improper, or as in any way failing to conform to the drawings and specifications, and shall make good all work damaged or destroyed thereby.

ARTICLE V. / ~~Should the Contractor at any time refuse or neglect to supply a sufficient number of skilled workmen, or sufficient material of proper quality, or fail in any respect to prosecute the work with promptness and diligence; or fail in the performance of any of the agreements herein contained such refusal, neglect or failure being certified by the authorized representatives of the Owner, they shall be at liberty, after written notice to the Contractor, to provide any such labor or material, and to deduct the cost thereof from any money then due or thereafter to become due to the Contractor under this contract; and if the authorized representatives of the Owner shall certify that such refusal, neglect or failure is sufficient ground for such action, they shall also be at liberty to terminate the employment of the Contractor for the said work and to enter upon the premises and take possession for the purpose of completing the work included under this contract, of all material, tools, and appliances thereon, and to employ any other person or persons to finish the work, and to provide the material therefore; and in case of such discontinuance of the employment of the Contractor, he shall not be entitled to receive any further payment under this contract until the said work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expense incurred by the Owner in finishing the work, such excess shall be paid by the Owner to the Contractor; but if such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner, as herein provided, either for furnishing material or for finishing the work, and any damage incurred through such default, shall be audited and certified by the authorized representatives of the Owner, whose certificate thereof shall be conclusive upon the parties.~~ 14.2

ARTICLE VI. The Contractor shall complete the several portions, and the whole of the work comprehended in this agreement by and at the time or times hereinafter stated, to-wit:

time being of the essence of this contract. Should said contractor fail or neglect to prosecute said work as herein provided, and complete the same within the time above stated, he shall pay the Owner (1) the actual damages sustained by the delay, or (2) the sum specified in the specifications, plans and addenda, for each day said work shall remain uncompleted after said date, that amount being mutually agreed upon as liquidated damages in lieu of actual damages for such delay.

ARTICLE VII. / ~~Should the Contractor be delayed in the prosecution or completion of the work by the act, neglect or default of the Owner, or of any other Contractor employed by the Owner upon the work, or by any damage caused by fire or other casualty for which the Contractor is not responsible, or by combined action of workmen in no wise caused by or resulting from default or collusion on the part of the Contractor, then the time herein fixed for the completion of the work shall be extended for a period equivalent to the time lost by reason of any or all the causes aforesaid, which extended period shall be determined and fixed by the authorized representatives of the Owner, but no such allowance shall be made unless a claim therefore is presented in writing to the authorized representatives of the Owner within the time specified of the occurrence of such delay as contained in the specifications and plans.~~ Subject to the conditions of Article 8 of the General Conditions

ARTICLE VIII. It is hereby mutually agreed between the parties hereto that the sum to be paid by the Owner to the Contractor for said work and material shall be

subject to additions and deductions as herein provided, and that such sum shall be paid by the Owner to the Contractor in current funds and only upon certificates of the authorized representatives of the Owner as follows:

Except as otherwise specified in the Contract Documents,  
/ Ninety (90) percent of the actual cash value of all labor performed and material furnished in place each calendar month shall be paid on proper vouchers during the next succeeding calendar month, and the balance upon the full completion of the job.

If, at any time, there shall be evidence of any claim for which, if established, the Owner of the said premises might become liable, and which is an obligation chargeable to the Contractor, the Owner shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify it against such claim. Should there prove to be any such claim after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging any lien or claim on said premises in consequence of the Contractor's default.

It is further stipulated and agreed that out of any retained amounts, the Owner may at his option pay, in whole or in part, any just claim against the Contractor for labor or material furnished him by persons not parties hereto, where such labor or material has been expended in the carrying out of work covered by this agreement.

ARTICLE IX. It is further mutually agreed between the parties hereto that no certificate given or payment made under this contract, shall be conclusive evidence of the performance of this contract, either wholly or in part, and that no payment shall be construed to be an acceptance of defective work or improper materials.

ARTICLE X. The Owner, through its authorized representatives, has the power and duty to decide all questions as to the due performance of this contract.

The said parties, for themselves, their heirs, successors, executors, administrators and assigns, do hereby agree to the full performance of the covenants herein contained.

*In Witness Whereof*, the parties have hereunto set their hands and seals the day and year first above written, and caused these presents to be executed in their behalf by the Vice President, Finance, Planning and Operations of the University of Minnesota and the Contractor by its .....

*In the presence of:*

..... Witness Contractor  
..... Witness Contractor

REGENTS OF THE UNIVERSITY OF MINNESOTA

By.....  
Vice President, Finance, Planning and Operations

Recommended by:

..... Date  
Assistant Vice President  
..... Date  
Purchasing Agent  
..... Date  
University Attorney

# AGREEMENT

BETWEEN

Contractor

AND

Owner

FOR

19

AMOUNT OF CONTRACT

\$

# CONTRACTOR'S BOND

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned \_\_\_\_\_

\_\_\_\_\_ of \_\_\_\_\_  
(Corporate or firm name of contractor) (Address of contractor)

a corporation,\* organized and existing under the laws of the State of \_\_\_\_\_, partnership,\* individual,\* duly authorized by law to do business as a construction contractor in the State of Minnesota, hereinafter called the "Principal," and \_\_\_\_\_

\_\_\_\_\_ of \_\_\_\_\_  
(Corporate name of surety) (Address of surety)

a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to do a surety business under the laws of the State of Minnesota, hereinafter called the "Surety," are held and firmly bound unto *Regents of the University of Minnesota*, hereinafter called the "Obligee," in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_),

(Amount of contract price)

lawful money of the United States, for the payment of which well and truly to be made unto said Obligee, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents, as follows:

The conditions of this obligation are such that, whereas on the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, the said Principal entered into a written Contract with said Obligee for the construction of \_\_\_\_\_

(Brief description of work to be done)

located at \_\_\_\_\_ as set forth in detail in the advertisement for bids, general conditions, information for bidders, proposal, plans and specifications, and other related contract documents referred to in said Contract, all of which are hereby made a part hereof, and by reference incorporated herein.

Now, THEREFORE, If the said Principal shall well and truly perform and complete said project in strict accordance with said Contract, advertisement for bids, general conditions, information for bidders, proposal, plans, specifications and related documents; shall comply with all the requirements of the Laws of the State of Minnesota; shall pay as they become due all just claims for work, tools, machinery, skill materials, insurance premiums, equipment and supplies, for the completion of the Contract in accordance with its terms; and shall defend, indemnify and save harmless said Obligee against any and all liens, encumbrances, damages, claims, demands, expenses, costs and charges of every kind, including patent infringement claims, except as otherwise provided in said specifications and other contract documents, arising out of or in relation to the performance of said work and the provisions of said Contract, then this Bond shall be void, otherwise it shall remain in full force and effect.

This obligation is made for the use of the Obligee and of all persons doing work or furnishing skill, tools, machinery or materials, or insurance premiums, or equipment, or supplies for any camp maintained for the feeding or keeping of men or animals, or any combination thereof, engaged under or for the purpose of the execution of said Contract and may be sued on thereby.

The said Surety, for value received, hereby stipulates and agrees that no assignment, modification or change, extension of time for completion, alteration or addition to the terms of said Contract or to the work to be performed thereunder or the specifications accompanying the same, shall in any wise affect its obligations on this Bond or release the Surety, and it does hereby waive notice of any such change, extension of time for completion, alteration or addition to the terms of the Contract as to the work or to the specifications.

IN TESTIMONY WHEREOF, the parties hereunto have caused the execution hereof in \_\_\_\_\_ original counterparts as of the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_.

(Seal, if any)

Attest (or countersigned):

\_\_\_\_\_, Principal  
(Name of contractor)

By \_\_\_\_\_

(Title)

(Title)

(Seal)

Attest (or countersigned):

\_\_\_\_\_, Surety  
(Name of surety)

By \_\_\_\_\_

(Title)

(Title)

\* Omit inapplicable terms.

(Acknowledgment by Natural Person)

STATE OF MINNESOTA,

County of \_\_\_\_\_

} ss.

On this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, before me personally appeared \_\_\_\_\_ to me known to be the person—described in and who executed the foregoing instrument, and acknowledged that \_\_\_\_\_ executed the same as \_\_\_\_\_ free act and deed.

My Commission expires \_\_\_\_\_

(Acknowledgment by Corporation)

STATE OF MINNESOTA,

County of \_\_\_\_\_

} ss.

On this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, before me appeared \_\_\_\_\_ to me personally known, who, being by me duly sworn, did say that he is the \_\_\_\_\_ of \_\_\_\_\_, corporation, and that the seal affixed to the foregoing bond is the corporate seal of said corporation, and that said bond was executed in behalf of said corporation by authority of its Board of Directors, and said \_\_\_\_\_ acknowledged said instrument to be the free act and deed of said corporation.

My Commission expires \_\_\_\_\_

(Justification by Sureties)

STATE OF MINNESOTA,

County of \_\_\_\_\_

} ss.

being each duly sworn, did each for himself depose and say that he is a resident and freeholder of the State of Minnesota and one of the sureties on the foregoing bond, and that he is worth the sum hereinafter set opposite his name over and above his debts and liabilities, and property exempt from execution.

Sworn to and subscribed before me }  
this \_\_\_\_\_ day of }  
\_\_\_\_\_, 19\_\_\_\_ }

\_\_\_\_\_\$  
\_\_\_\_\_\$  
\_\_\_\_\_\$  
\_\_\_\_\_\$

BOND OF

Contractor,

FOR WORK AT

UM HEALTH SCIENCES  
SURG. PATH. R-2

The within Bond and sureties thereon approved and Bond filed \_\_\_\_\_, 19\_\_\_\_

Regents of the University of Minnesota

## DIVISION C - GENERAL CONDITIONS OF THE CONTRACT

Where any Article, Paragraph, Subparagraph or Clause of the General Conditions is modified, supplemented or deleted by other provisions of the Contract Documents, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect. Where provisions of the General Conditions are modified elsewhere in the Contract Documents, any references to those General Conditions provisions shall be read as referring also to the same subject matter contained elsewhere in the Contract Documents.

### ARTICLE I - THE CONTRACT DOCUMENTS

#### 1.1 Definitions

##### 1.1.1 The Contract Documents

The Contract Documents consist of the University-Contractor Agreement, the Performance Bond, the Instructions to Bidders, the Conditions of the Contract (General, Supplementary and other Conditions), the Drawings, the Specifications, all Addenda issued prior to execution of the Contract, and all Modifications thereto. A Modification is (1) a written order or amendment to the Contract signed by both parties, (2) a Change Order, (3) a written interpretation issued by the University or Architect pursuant to Subparagraph 1.2.5, or (4) a written order for a minor change in the Work issued by the University or Architect pursuant to Paragraph 12.4.

##### 1.1.2 The Contract

The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification as defined in Subparagraph 1.1.1, except that changes to the Contract involving the Contract Sum or Contract Time, may be made only by Change Order.

##### 1.1.3 The Work

The term Work includes all labor and services necessary to produce and fully complete the construction required by the Contract Documents, and all materials and equipment incorporated in such construction.

##### 1.1.4 The Project

The Project is the total construction designed by the Architect, or designed by others in consultation or collaboration with the Architect and included in the Contract Documents, of which the Work performed under the Contract Documents may be the whole or a part.

##### 1.1.5 The Specifications

The Specifications include all Sections of Division I, General Requirements, and all Sections of the Technical Divisions for the Project.

## 1.2 Execution, Correlation, Intent and Interpretations

1.2.1 The Agreement shall be signed in not less than triplicate by the University and Contractor. To the extent necessary, the Architect shall identify the Drawings and Specifications of the Contract Documents.

1.2.2 By executing the Contract, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents and Bidding Requirements. However, he does not represent having examined conditions that are not exposed without demolition unless the necessary demolition is specified or authorized by the University. The Contractor also represents he has examined all Contract Documents for the Project, including those intended for work or trades not normally performed by the Contractor's own forces, and has become thoroughly familiar with all conditions which may pertain to or affect the Work, and its costs, under this Contract.

1.2.3 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. The intention of the Documents is to include all labor, materials, equipment and other items as provided in Subparagraph 4.4.1 necessary for the proper execution and satisfactory completion of the Work, including proper operating condition. For any of the Work that is shown, indicated, noted or referred to in any of the Contract Documents, or is reasonably inferable therefrom as being necessary to produce the intended results, and which is not covered under any heading, section, branch, class or trade of the specifications, shall be provided in accordance with the Architect's instructions without additional cost to the University or Architect. Should there be an inconsistency in the quality or quantity of Work required under the Contract Documents, it shall be interpreted that the greater quality or quantity of Work is required under the Contract, without increase in the Contract Sum. Words which have well-known technical or trade meanings are used herein in accordance with such recognized meanings. The Contract Documents generally do not set forth the basis and analysis of design and the Contractor shall obtain such information as may be necessary to satisfactorily perform and complete the Work.

1.2.4 The organization of the Specifications into Divisions, Sections and Articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade, unless it is specified that a subcontract include specific phases or elements to complete a certain part of the Work for reasons of coordination or responsibility. Where the Specification has been divided into Sections, it is for convenience in use. The Architect and the University assume no responsibility for the placement of materials, equipment or other phases of the Work into the proper Division or Section of the Specifications, nor for the arrangement of Work shown on the Drawings. Neither the Architect nor the University shall be obligated to enter into any jurisdictional or other dispute as a result of the organization, arrangement or location of parts of the Work in the Specifications or Drawings, nor serve as an arbitrator to establish subcontract limits between the Contractor and any Subcontractor.



1.2.5 Written interpretations necessary for the proper execution of the Work, in the form of drawings or otherwise, will be issued with reasonable promptness by the Architect or the University and in accordance with any schedule agreed upon. In general, requests for interpretation of design intent shall be directed to the Architect. Either party to the Contract may make written requests to the Architect for such interpretations. Other requests for interpretation shall be directed to the University, who may consult with the Architect at its discretion. Interpretations shall be consistent with and reasonably inferable from the Contract Documents. The Contractor is responsible to request interpretations and clarifications for those matters which appear to be inconsistencies, ambiguities or omissions in the Contract Documents. The Contractor shall execute the Work in accordance with the decision, clarification or interpretation provided to him.

1.2.6 Where a reference in the Contract Documents to an American Society for Testing and Materials standard, American National Standards Institute standard, Federal Specification or other recognized standard does not include the date of the standard, the edition current as of the date of the Contract Documents shall apply.

1.2.7 The general character and scope of the Work is called for by the Contract Documents. Where a portion of the Work is fully drawn and the remainder is merely indicated, the portion fully drawn shall apply to all same parts of the Work. Drawings intended primarily as information for one trade may not necessarily show the work of other trades, but this shall not be construed as indicating there are no other related materials or adjacent work.

1.2.8 Figured dimensions shall be followed in preference to measurement by scale. In the event of discrepancies between dimensions, or between drawings, the intent shall be interpreted by the Architect, which shall be binding on the Contractor. Where a dimension may be missing, the Work shall be accomplished in accordance with the directions and dimensions provided by the University or the Architect. Dimensions on drawings, as well as detail drawings themselves are subject in every case to measurements of existing, adjacent, incorporated and completed work which shall be taken by the Contractor before undertaking any work depending upon such data. Dimensions pertaining to the Work or its installation shall be verified at site by the Contractor.

1.2.9 Where the Specifications are of the abbreviated or "streamlined" type, they shall be construed as complete sentences, as shall notes on the drawings. Omissions of words such as "the", "the Contractor shall", and "as shown on the drawings" is intentional. The words "shall" or "shall be" are to be supplied by inference. Imperative or directive instructions, directions or the Specifications apply to and refer to the Contractor. The words "symmetrical" and "similar" are used in the general sense and need not mean "identical." Where a number is specified (as for gauges, weights, temperatures, an amount of time, and similar references), and the specified number cannot be obtained, the number shall be interpreted as the next better, as available.

1.2.10 The Contractor shall examine all Contract Documents and use all specifications and drawings for the Project, including those that may

primarily pertain to other work the Contractor normally does not perform with his own forces. The Contractor shall use all of the Project drawings and specifications: for a complete understanding of the Project and his Work; to determine the type of construction and systems; for coordination; to determine what other work may be involved throughout; to anticipate and notify others when their coordinated efforts will be required; and all other relevant matters related to the Project and the Contractor's Work. The Contractor shall also be bound by all the requirements to complete his Work, that are applicable to, pertain to, or affect his Work, as may be shown or reasonably inferable from the entire set of drawings and specifications.

### 1.3 Copies Furnished and Ownership

1.3.1 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, a reasonable number of copies of Drawings and Specifications, as necessary for the execution of the Work.

1.3.2 The copies of all Drawings and Specifications furnished to the Contractor are and shall remain the property of the University. They are not to be used on any other project, and, with the exception of two contract sets, are to be returned to the University on request at the completion of the Work.

## ARTICLE 2 - THE ARCHITECT/ENGINEER

### 2.1 Definition

2.1.1 The Architect or Engineer is the design professional or organization whose name appears on the Contract Documents and identified as such in the Agreement, referred to throughout the Contract Documents as singular in number and masculine in gender. The term Architect, or Engineer, means the Architect, or Engineer, and his authorized representatives.

2.1.2 For reference ease, the term Architect is used in the General Conditions. For Contract Documents developed by the engineering disciplines, the term Engineer shall be substituted for Architect.

2.1.3 A Consultant is any person or firm who has provided specialized design services for the Project, in consultation or collaboration with the Architect or the University and whose design services are represented in the Contract Documents. The Consultant, or his representative, shall have the authority to make decisions on his design to the extent authorized by the Architect or the University.

2.1.4 Nothing contained in the Contract Documents shall create any contractual relationship between the Architect and the Contractor.

### 2.2 Administration of the Contract

2.2.1 During construction the Architect will advise, and consult with, the University in the general administration of the Contract, to the extent required by the University, acting on behalf of the University to the extent provided by the Contract Documents or otherwise authorized by the University.

2.2.2 The Architect, and the University, shall at all times have access

to the Work wherever it is in preparation and progress. The Contractor shall provide safe and convenient facilities for such access.

2.2.3 Periodically the Architect will visit the site to assist the University in the administration of the Construction Contract, to generally familiarize himself with the progress and quality of Work and to consult and advise the University on questionable matters in need of interpretation or modification. The Architect will not be required to make continuous, detailed or exhaustive on-site observations to check the quality or quantity of the Work.

2.2.4 The Architect and the University will not be responsible for construction means, methods, techniques, progress, sequences or procedures, or for safety precautions and programs in connection with the Work, and they will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.

2.2.5 The Architect does not approve the Contractor's Request for Payment, but upon request may advise the University regarding the sums requested.

2.2.6 The Architect will, in the first instance, interpret the requirements of the Contract Documents and judge the Contractor's performance thereunder, when required by the University or the Contractor. The Architect will, within a reasonable time, render such interpretations as he may deem necessary for the proper execution or progress of the Work.

2.2.7 Claims, disputes and other matters in question between the Contractor and the University relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred to the Architect in writing for decision, which he will render within a reasonable time.

2.2.8 All interpretations and decision of the Architect shall be consistent with the intent of the Contract Documents. In his capacity as interpreter and judge, he will exercise his best efforts to insure faithful performance by both the University and the Contractor as required by the Contract Documents.

2.2.9 The Architect's decision in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.

2.2.10 Any written decision by the Architect on a claim, dispute or other matter covered by such decision shall become final and binding on the Contractor and the University, without further appeal or recourse, thirty days after the decision is received by the parties unless written notice is served within the thirty days to the Architect and other party of the intent of further appeal or action.

2.2.11 The Architect, as well as the University, will have authority to reject Work which does not conform to the Contract Documents. Rejected Work shall be immediately removed from production or the site. Whenever, in the reasonable opinion of the Architect or the University it is considered necessary or advisable to insure the proper implementation of the intent of the Contract Documents, they shall have authority to require special inspection or testing of the Work in accordance with Subparagraph 7.8.2 whether or not such Work be then fabricated, installed or completed.

However, neither the Architect's or University's authority to act under this Subparagraph 2.2.11, nor any decision made by them in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Architect or the University to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work.

2.2.12 The Architect will review Shop Drawings and Samples as required in Subparagraph 4.13.1. Additionally, certain shop drawings and samples, as determined by the University, are also reviewed by the University.

2.2.13 The Architect will prepare Change Orders in accordance with Article 12, and will have authority to order minor changes in the Work as provided in Subparagraph 12.4.1.

2.2.14 The duties and limitations of authority of the Architect during construction as set forth in these General Conditions will not be modified or extended without written consent of the University and the Architect.

2.2.15 The Architect will not be responsible for the acts, procedures, programs, or omissions of the Contractor, any Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.

2.2.16 In case of the termination of the employment of the Architect, the University shall appoint an architect whose status under the Contract Documents shall be that of the former architect.

### ARTICLE 3 - THE OWNER

#### 3.1 Definition

3.1.1 The Owner is the Regents of the University of Minnesota, a State of Minnesota Constitutional and Educational Corporation, herein referred to as the University.

3.1.2 The University acts through Clinton Hewitt, Assistant Vice President for Physical Planning, or his authorized representatives, except for certain functions which are the responsibility of the University's Purchasing Agent. Unless otherwise indicated, all papers and formal written notice required to be delivered to the University shall be delivered to Clinton Hewitt, Assistant Vice President, Room 340, Morrill Hall, University of Minnesota, Minneapolis, Minnesota 55455.

3.1.3 The University Purchasing Agent functions to receive bids for construction contracts and issues the Notice to Proceed to the successful Contractor.

3.1.4 The administration of the construction contract is performed by the Assistant Director of Planning of the Engineering and Construction Division of the University of Minnesota, or his authorized representatives.

3.1.5 At the commencement of the Work, the representatives of the University will be identified to the Contractor by name, function and authority.

## 3.2 Information and Services Provided by the University

3.2.1 Except as may otherwise be required by the Contract Documents, the University shall furnish all surveys describing the physical characteristics, legal limits and utility locations for the site of the Project.

3.2.2 The University shall secure and pay for easements for permanent structures or permanent changes in existing facilities.

3.2.3 For building projects, the University will establish a point locating one corner of the building on the site and furnish the location and elevation of a bench mark, all of which shall be verified by the Contractor.

3.2.4 The University shall select the appropriate testing agencies for the required tests, unless otherwise specified.

3.2.5 Information or services under the University's control shall be furnished by the University with reasonable promptness to minimize delay in the orderly progress of the Work.

3.2.6 During progress of the Work, the University will generally issue instructions to the Contractor, except for those instructions the University delegates to the Architect.

3.2.7 The foregoing are in addition to other duties and responsibilities of the University enumerated in the Contract Documents and especially those in respect to Payment and Insurance in Articles 9 and 11 respectively.

## 3.3 Administration of the Construction Contract

3.3.1 The University through its authorized representative will provide the general administration of the Construction Contract, functioning through a general, routine review and examination of the work to (1) judge the Contractor's performance of the Work under the Contract; (2) assist in avoiding defects, deficiencies and omission in the Work; (3) assist the Contractor in interpreting the Contract Documents, when necessary; (4) make determinations on questionable or ambiguous matters relating to the Work; (5) determine amounts due the Contractor for periodic payments; (6) make other judgments and determinations as may be necessary for the satisfactory completion of the Work to fulfill the intent of the Contract Documents.

3.3.2 The University will consult with the Architect at its discretion for interpretations, decisions on the quality of materials and workmanship, intent of the Contract Documents, progress of the Work and similar Contract matters, when necessary.

3.3.3 The University will receive and review the Contractor's submittals of the Performance Bond and insurance evidence.

3.3.4 The University will review the Contractor's progress schedule and reserves the right to question the schedule, comment on the schedule and require changes in the schedule to help assure proper scheduling to complete

the Work on time or benefit the overall progress of the Project. The University will provide the general coordination of schedules of separate contractors to assist in resolving possible conflicts of activities or priorities, but will assume no responsibility for the progress and completion of the Work by the Contractor.

3.3.5 The University will review certain shop drawings submitted to the Architect by the Contractor, prior to their being returned to the Contractor and the Contractor's timing of shop drawing submissions shall allow for the University review.

3.3.6 The University shall at all times have access to the Work, as provided in Subparagraph 2.2.2.

3.3.7 The University will be continuously represented at the site or, at its option, will visit the site and review the Work at such times and frequency it deems necessary to be familiar with the general progress and to generally determine if the Work is in accordance with the Contract Documents. The University will not be responsible to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work, which shall be the Contractor's responsibility.

3.3.8 The University, in consultation with the Architect when appropriate, will decide on proposed Changes in the Work.

3.3.9 The University will review the Contractor's Request for Payment and determine the amounts due the Contractor, based on the Contract requirements and the University's evaluation of the progress of the Work.

3.3.10 Requests for required interpretations, clarifications and similar matters arising out of the Contract Documents, or the construction, shall first be made to the University, who will consult with the Architect when necessary or advisable. The University's interpretation and decisions shall be consistent with the intent of the Contract Documents.

3.3.11 The University shall have the right and authority to reject any of the Work and to order special inspections or testing, in accordance with Subparagraph 2.2.11.

3.3.12 The University will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and review written guarantees and related documents required by the Contract and assembled by the Contractor.

3.3.13 The University shall not be responsible for the Contractor's activities as specified under Subparagraph 2.2.4. Neither the titles nor functions of the University, or the Architect, and their representatives shall be construed as (1) assuming or imposing any of the Contractor's responsibilities on the University or Architect; (2) supervising the Work under the Contract Documents; (3) being responsible in any way for the performance, acts, omissions or inaction of the Contractor, his Subcontractors, anyone employed directly or indirectly by any of them or any one for whose acts they may be liable.

### 3.4 University's Right to Stop the Work

3.4.1 If the Contractor fails to correct defective Work or persistently fails to supply materials or equipment in accordance with the Contract Documents, does not allow others sufficient time to perform their work or otherwise is in substantial violation of the Contract, the University may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated.

### 3.5 University's Right to Carry Out the Work

3.5.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision of the Contract, the University may, after seven days' written notice to the Contractor and his Surety, require the Surety to assume the obligations of the Contractor to complete the Work under the terms of the Contract. Should the Surety fail to assume the obligations within ten days after receipt of the written notice, the University, without prejudice to any other remedy it may have, may make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor, or the Surety, the cost of correcting such deficiencies, including the cost of the Architect's additional services made necessary by such default, neglect or failure. The Architect shall approve both such action and the amount charged to the Contractor. If the payments then or thereafter due the Contractor, or the Surety, are not sufficient to cover such amount, the Contractor or his Surety shall pay the difference to the University.

## ARTICLE 4 - THE CONTRACTOR

### 4.1 Definition

4.1.1 The Contractor is the person or organization identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Contractor means the Contractor or his authorized representative.

### 4.2 Review of Contract Documents

4.2.1 The Contractor shall carefully study and compare the Contract Documents and shall at once report to the University any error or alleged error, inconsistency or omission he may discover. The Contractor shall obtain necessary drawings, specifications or instructions when required to satisfactorily complete any of the Work which is questionable.

### 4.3 Supervision and Construction Procedures

4.3.1 The Contractor shall supervise and direct the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences, programs, safety and procedures and for coordinating all portions of the Work under the Contract.

### 4.4 Labor and Materials

4.4.1 Unless otherwise specifically noted, the Contractor shall provide all labor, material, equipment, facilities, systems, tools, temporary

facilities, services and related items to properly execute and satisfactorily complete the Work.

4.4.2 The Contractor shall employ and assign labor that is skilled and competent in the assigned tasks and shall maintain order and discipline among his employees

4.4.3 The Contractor shall provide and perform all Work to comply with the requirements of the Contract Documents.

#### 4.5 Warranty

4.5.1 The Contractor warrants to the University and the Architect that all materials and equipment furnished under the Contract, as a permanent part of the Project, will be new unless otherwise specified, and that all Work will be of first quality as acceptable to the University and Architect, free from faults and defects and in conformance with the Contract Documents. All Work not so conforming to these standards may be considered defective. If required by the University or the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

#### 4.6 Taxes

4.6.1 The Contractor shall pay all sales, excise, consumer, use and other similar taxes required by law.

#### 4.7 Permits, Fees and Notices

4.7.1 The Contractor shall obtain and pay for all permits, fees, licenses or other charges required or bearing on the conduct of the Work, where property other than University property is involved (i.e. municipalities, other governmental units, utilities) including connections to water, sewer or other utilities, or where sidewalks, streets and alleys not on University property must be disturbed or used. Other required permits and licenses applicable to University property will be obtained or provided by the University without cost to the Contractor.

4.7.2 The Contractor shall give all notices and comply with all codes, laws, ordinances, rules and regulations of any public authority having jurisdiction which bears on the performance of the Work.

#### 4.8 Cash Allowances

4.8.1 By executing the Agreement, the Contractor represents the Contract Sum includes all cash allowances stated in the Contract Documents.

#### 4.9 Superintendent

4.9.1 The Contractor shall employ a competent Superintendent and necessary assistants who shall be in attendance at the Project site during the progress of the Work. The Superintendent shall be satisfactory to the University and Architect, and shall not be changed except with the consent of the University, unless the Superintendent proves to be unsatisfactory



to the Contractor and ceases to be in his employ. The Superintendent shall be the executive representative of the Contractor and all communications given to the Superintendent shall be as binding as if given to the Contractor. When requested by the Contractor, important communications will be confirmed in writing.

4.9.2 Unless specifically approved by the University, the Contractor's Superintendent shall be constantly present during all working hours from start to completion of the Work, including those times when only Subcontractors are performing work at the site or minor activity is in progress. During the final stages of completion of the Work, the Superintendent shall continue to be constantly present at the site during all working hours to expedite, coordinate and direct the Work to final completion.

#### 4.10 Responsibility for Those Performing the Work

4.10.1 The Contractor shall be responsible to the University for the acts and omissions of all his employees and all Subcontractors, their agents and employees, and all other persons performing any of the Work under a contract with the Contractor.

#### 4.11 Progress Schedule

4.11.1 The Contractor shall prepare and submit for University approval, the progress schedule required by the Contract Documents.

#### 4.12 Drawings and Specifications at The Site

4.12.1 The Contractor shall maintain at the site for his use and that of the University one copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders and other Modifications, in good order and marked to record all changes made during construction. These shall be available to the University and the Architect.

#### 4.13 Shop Drawings and Samples

4.13.1 The Contractor shall provide and submit all shop drawings and samples required by the Contract Documents.

#### 4.14 Use of Site

4.14.1 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits, the Contract Documents or the University's directions and shall not unreasonably encumber the site with any materials, equipment or debris.

#### 4.15 Cutting and Patching of Work

4.15.1 The Contractor shall do all cutting, fitting or patching of his Work that may be required to make its several parts fit together properly, and shall not endanger any work by cutting, excavating or otherwise altering the Work or any part of it.

#### 4.16 Cleaning Up

4.16.1 The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the Work he shall remove all his waste materials and rubbish from and about the Project as well as all his tools, construction equipment, machinery and surplus materials.

4.16.2 At the completion of the Project, the Contractor shall perform all cleaning to leave the Work "thoroughly clean" as required by the Contract Documents, unless otherwise specified.

4.16.3 If the Contractor fails to maintain the premises or clean up as specified, the University may do so after two days notice, with the cost paid for by the Contractor.

#### 4.17 Communications

4.17.1 The Contractor shall provide to the Architect a copy of all communications to the University.

#### 4.18 Indemnification

4.18.1 The Contractor shall indemnify and hold harmless the University and the Architect and their agents and employees from and against all claims, damages, losses, and expenses including attorney's fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

4.18.2 In any and all claims against the University or the Architect or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Paragraph 4.18 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

4.18.3 The obligations of the Contractor under this Paragraph 4.18 shall not extend to the liability of the Architect, his agents or employees arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications, or (2) the giving of or the failure to give directions or instructions by the University or the Architect, their agents or employees provided such giving or failure to give is the primary cause of the injury or damage.

## ARTICLE 5 - SUBCONTRACTORS

### 5.1 Definition

5.1.1 A Subcontractor is a person or organization who has a direct contract with the Contractor to perform any of the Work at the site, or to furnish materials, equipment or systems specifically fabricated for the Work. The term Subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Subcontractor or his authorized representative.

5.1.2 A Sub-subcontractor is a person or organization who has a direct or indirect contract with a Subcontractor to perform any of the Work at the site or to furnish materials, equipment or systems specifically fabricated for the Work. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Sub-subcontractor or an authorized representative thereof.

5.1.3 Nothing contained in the Contract Documents shall create any contractual relation between the University or the Architect and any Subcontractor or Sub-subcontractor.

### 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

5.2.1 Unless another time is specified in the Contract Documents, within 14 days after notice of award of the Contract, letter of intent to award, Notice to Proceed, or execution of the Contract, whichever occurs first, the Contractor shall furnish to the Architect in writing, for acceptance by the University and the Architect, a list of the names of all Subcontractors, and their Sub-subcontractors where appropriate, he proposes to use for the Work. No subcontracts shall be finally executed until the list has been reviewed by the University and Architect and the Contractor notified of the acceptance or non-acceptance of those listed. The Architect shall, with reasonable promptness, notify the Contractor if either the University or the Architect does not accept any Subcontractor or Sub-subcontractor on the list. At the request of the University or the Architect, the Contractor shall submit the names of proposed Subcontractors or Sub-subcontractors for portions of the Work not on the list. The listed Subcontractors or Sub-subcontractors will be deemed acceptable unless the Contractor is notified of the University's or Architect's objection or non-acceptance within a reasonable time established by the Contractor and the Architect.

5.2.2 The proposed Subcontractors or Sub-subcontractors shall be established, reputable firms of recognized standing with a record of successful and satisfactory past performance with the type work and/or items proposed to be provided or furnished by them. Where specifically named Subcontractors may be specified for certain portions of the Work, only the specified Subcontractors will be acceptable for those parts of the Work.

5.2.3 The right to reject any Subcontractor or Sub-subcontractor will be exercised by the University or the Architect when, in their opinion, it is believed the proposed Subcontractor or Sub-subcontractor: (1) cannot provide, or proposes deviations in, materials, equipment, systems, methods,

facilities or other Work as required by the Contract Documents; (2) cannot provide labor and skill necessary to accomplish the part of the work for which he is proposed, including but not limited to quality of workmanship; (3) lacks experience appropriate to the proper execution and completion for that part of the Work for which he is proposed; (4) has previously failed to perform satisfactorily, including cooperation and necessary services after project completion; (5) cannot satisfactorily perform the part of the Work for which he is proposed within the time schedule, due to financial status, size of organization, existing work load, or other considerations; (6) cannot demonstrate his ability, through examples of representative work, to perform the part of the Work for which he is being considered; (7) is of questionable integrity; or (8) there are other considerations bearing on the probability of unsatisfactory performance.

5.2.4 The Contractor shall not contract with any Subcontractor, nor use any Sub-subcontractor or any person or any organization (including those who are to furnish materials, equipment, systems or other items fabricated specially for the Work) who has been rejected by the University or the Architect. Except whereby the submission of the bid by the Contractor under the conditions of the Contract Documents indicates or implies he has accepted the use of a particular specified Subcontractor, the Contractor will not be required to contract with any Subcontractor or person or organization against whom he has a reasonable objection.

5.2.5 If the University or Architect refuses to accept any Subcontractor or person or organization on a list submitted by the Contractor in response to the requirements of the Contract Documents or the Instructions to Bidders, the Contractor shall submit an acceptable alternative.

5.2.6 If the University or the Architect requires a change of any proposed Subcontractor, Sub-subcontractor or person or organization previously accepted by them, the Contract Sum shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued. No increase in the Contract Sum will be allowed where the change is a result of subsequent evidence of any of the reasons for rejection under 5.2.3.

5.2.7 The Contractor shall not make any substitution for any Subcontractor, Sub-subcontractor or person or organization who has been accepted by the University and the Architect, except for just cause acceptable to the University and the Architect, and unless the substitute is acceptable to the University and the Architect. In the event of a proposed change, the Contractor shall submit, in writing, the reasons for the change and the proposed substitutions. No change will be allowed for the improvement of the schedule where the Contractor, or his Subcontractors, have failed to properly order or schedule delivery or installation of materials and equipment. The proposed change is subject to all conditions of Paragraph 5.2.

### 5.3 Subcontractual Relations

5.3.1 All work performed for the Contractor by a Subcontractor shall be pursuant to an appropriate agreement between the Contractor and Subcontractor (and where appropriate between Subcontractors and Sub-subcontractors) which shall contain provisions that:

- .1 Preserve and protect the rights of the University and the Architect under the Contract with respect to the Work to be performed under the subcontract so that the subcontracting thereof will not prejudice such rights;

- .2 Require that such Work be performed and guaranteed in accordance with the requirements of the Contract Documents.
- .3 Require submission to the Contractor of applications for payment under each subcontract to which the Contractor is a party, in reasonable time to enable the Contractor to apply for payment in accordance with Article 9;
- .4 Require that all claims for additional costs, extensions of time, damages for delays or otherwise with respect to subcontracted portions of the Work shall be submitted in writing to the Contractor (via any Subcontractor or Sub-subcontractor where appropriate) in sufficient time so that the Contractor may comply in the manner provided in the Contract Documents for like claims by the Contractor upon the University;
- .5 Waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance described in Paragraph 11.2, except such rights as they may have to the proceeds of such insurance held by the Trustee for the insurance proceeds, and
- .6 Obligate each Subcontractor specifically to consent to the provisions of this Paragraph 5.3.

#### 5.4 Payments to Subcontractors

5.4.1 The Contractor shall pay each Subcontractor, upon receipt of payment from the University an amount equal to the percentage of completion allowed to the Contractor on account of such Subcontractor's Work, less the percentage retained from payments to the Contractor. The Contractor shall also require each Subcontractor to make similar payments to his subcontractors.

5.4.2 If the University fails to make payment for any cause which is the fault of the Contractor and not the fault of a particular Subcontractor, the Contractor shall pay that Subcontractor on demand, made at any time after the payment should otherwise have been made, for his Work to the extent completed, less the retained percentage.

5.4.3 The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor under Article 11, and he shall require each Subcontractor to make similar payments to his subcontractors.

5.4.4 The University may, on request and at its discretion, furnish to any Subcontractor, if practicable, information regarding percentages of completion certified to the Contractor on account of Work done by such Subcontractors.

5.4.5 Neither the University nor the Architect shall have any obligation to pay or to see to the payment of any moneys to any Subcontractor.

#### ARTICLE 6 - SEPARATE CONTRACTS

##### 6.1 University's Right to Award Separate Contracts

6.1.1 The University reserves the right to award other contracts in

connection with other portions of the Project under these or similar Conditions of the Contract.

6.1.2 When separate contracts are awarded for different portions of the Project, "the Contractor" in the Contract Documents in each case shall be the Contractor who signed each separate contract.

## 6.2 Mutual Responsibility of Contractors

6.2.1 The Contractor, and his Subcontractors, shall cooperate with and coordinate their work with each other and all other contractors and the University to facilitate general progress of the Project and to prevent delaying the progress of other contractors. The Contractor shall give reasonable notice and afford other contractors reasonable opportunity for the introduction and storage of their materials and equipment and the installation or execution of their work, and shall properly connect and coordinate his Work with theirs. The Contractor, and his Subcontractors, shall obtain layout drawings, roughing-in detail sheets and other pertinent information directly from the other contractors to coordinate all phases of the Work, and all contractors shall within a reasonable time provide such necessary information. For coordination with the University's equipment or materials, information shall be obtained from the University. After timely notification by the Contractor of the need to accomplish a particular phase or element of the Work, the other contractors shall, within a reasonable time, perform their work so as not to delay or impede the Contractor.

6.2.2 If any part of the Contractor's Work depends for proper execution or results upon the work of any other separate contractor, the Contractor shall inspect, including measurements and inspection of work already in place, and shall promptly report to the University any apparent or alleged discrepancies or defects in such work that render it unsuitable for such proper execution and results. Failure of the Contractor so to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper to receive his Work, except as to defects which may develop in the other separate contractor's work after the execution of the Contractor's Work.

6.2.3 Should the Contractor cause delay or damage to the work or property of any separate contractor on the Project, the Contractor shall, upon due notice, settle with such other contractor by agreement or arbitration, if he will so settle. If such separate contractor sues the University on account of any delay or damage alleged to have been so sustained, the University shall notify the Contractor who shall defend such proceedings at the Contractor's expense, and if any judgment or award against the University arises therefrom the Contractor shall pay or satisfy it and shall reimburse the University for all attorney's fees and court costs which the University has incurred.

## 6.3 Cutting and Patching Under Separate Contracts

6.3.1 The Contractor shall be responsible for any cutting, fitting and patching that may be required to complete his Work except as otherwise

specifically provided in the Contract Documents. The Contractor shall not endanger any work of any other contractors by cutting, excavating or otherwise altering any work and shall not cut or alter the work of any other contractor except with the written consent of the Architect or the University.

6.3.2 Any costs caused by defective or ill-timed work shall be borne by the party responsible therefor.

#### 6.4 University's Right to Clean Up

6.4.1 If a dispute arises between the separate contractors as to their responsibility for cleaning up as required by Paragraph 4.16, or elsewhere in the Contract Documents, the University may clean up and equitably charge the cost thereof to the several contractors.

### ARTICLE 7 - MISCELLANEOUS PROVISIONS

#### 7.1 Governing Law

7.1.1 The Contract shall be governed by the laws of the State of Minnesota.

#### 7.2 Successors and Assigns

7.2.1 The University and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder, without the previous written consent of the University.

#### 7.3 Written Notice

7.3.1 Written notice shall be deemed to have been duly served if delivered in person to the individual or member of the firm or to an officer of the corporation for whom it was intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice. Written notice to the University shall be addressed as noted under Subparagraph 3.1.2.

#### 7.4 Claims for Damages

7.4.1 Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the other party or of any of his employees, agents or others for whose acts he is legally liable, claim shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

#### 7.5 Performance/Guaranty Bond

7.5.1 At the time of execution of the Agreement between the University and the Contractor, the Contractor shall furnish a Bond in the full amount of the Contract Sum, signed by the Contractor and a Corporate Surety authorized to provide bonds in the State of Minnesota and approved by the University. A valid and enforceable Bond shall be maintained by the Contractor throughout the life of the Contract and its Guarantee Periods.

7.5.2 The minimum requirement for University approval of the Surety shall be that the Surety is listed by the United States Treasury Department as acceptable for bonding Federal projects and that the bond amount is within the limit set by the Treasury Department as the net limit on any single risk. There shall be no affiliation between the Contractor and the Bonding Agent or Agency.

7.5.3 The Bond shall guarantee the Contractor will perform each and every part of the Contract, cover all guarantees called for and insure prompt payment to all persons furnishing material or labor required in prosecution of the Work under the Contract. In the event of additions to the Contract, the University reserves the right to require evidence of additional bond.

7.5.4 The Bond shall provide: (1) for additions or deductions from the Work in any amount; (2) that completion time shall not be extended by reason of such changes, unless agreed to at time of change; (3) that no notice of aforesaid alterations, additions or omissions need be given the Surety; and (4) permit occupancy by the University at any time.

7.5.5 Unless otherwise stipulated in the Contract Documents or Bidding Requirements, the form of bond shall be provided by the University. (Contractor's Bond, Business Administration Form 204).

7.5.6 If it shall at any time appear that Contractor has unlawfully, fraudulently or through collusion with any representative of University, supplied inferior materials or workmanship or has departed from the terms of the Contract, or should the University make a claim under the Guarantee provisions, the final inspection and acceptance of the Work shall not be binding on the University and the University shall have the right to cause the Work to be properly performed and satisfactory material supplied to the extent the University may deem necessary, all at expense of the Contractor or his Surety. The University shall have right to recover against the Contractor, or his Surety, such damages as may be incurred by the University therefrom.

7.5.7 Final acceptance of the Work shall not relieve the Contractor nor his Surety from their obligations under this Contract, including guarantees of materials, equipment, installation or service.

## 7.6 Rights and Remedies

7.6.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

## 7.7 Royalties and Patents

7.7.1 The Contractor shall pay all royalties and license fees and shall secure to the University for all times the free and undisputed right to the use of any and all patented design, process, method or product used in performance of the Work. The Contractor shall defend all suits or claims for infringement of any patent rights and shall save the University harmless from loss on account thereof.



## 7.8 Tests

7.8.1 If the Contract Documents, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction, or instructions of the University or Architect requires any of the Work to be inspected, tested or approved, the Contractor shall make all arrangements for the tests, inspections or approvals and notify all appropriate parties in ample time to make the inspections, tests or approvals. The Contractor shall give the University and Architect timely notice of readiness for testing and inspection and the dates set for tests, inspections and approvals by public authorities so they may observe such tests and inspections if they choose. The Contractor shall bear all costs of such inspections, tests or approvals except as otherwise specified in the Contract Documents. Any of the Work requiring testing, inspection or approval which is covered or otherwise made inaccessible without the consent of those requiring or making the inspection or test, shall be uncovered or made accessible by and at the expense of the Contractor.

7.8.2 If after the commencement of the Work the University or the Architect determines that any Work requires special inspection, testing, or approval which Subparagraph 7.8.1 does not include, the University may instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as in Subparagraph 7.8.1. If such special inspection or testing reveals a failure of the Work to comply (1) with the requirements of the Contract Documents, or (2) with respect to the performance of the Work, with laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, the Contractor shall bear all costs thereof, including the Architect's additional services made necessary by such failure; otherwise the University shall bear such costs, and an appropriate Change Order shall be issued.

7.8.3 Certificates of required inspection, testing or approval shall be secured by the Contractor and promptly delivered by him to the University and the Architect.

7.8.4 Neither the observations by the University or the Architect, nor inspections, tests or approvals by persons other than the Contractor shall relieve the Contractor from his obligations to perform the Work in accordance with the Contract Documents.

## 7.9 (Not Used)

### 7.10 Use of University Personnel and Property

7.10.1 Unless the Contract Documents call for University property to be supplied to the Contractor, or installed or connected by the Contractor under the Contract, no property, supplies, equipment or personnel of the University shall be used by the Contractor in the performance of the Contract.

### 7.11 University Use or Occupancy of the Premises

7.11.1 The University reserves the right to jointly use the premises with the Contractor in the performance of his duties and functions. The University reserves the right to: (1) enter into the Project and premises at all

times; (2) make installations of materials and equipment at appropriate times as the Work progresses; (3) store property in essentially completed areas; (4) install furniture and furnishings when spaces are at appropriate stages of completion; (5) and use the premises for other similar activities. The Contractor shall coordinate the Work with the work of the University or other contractors and shall cooperate with them, to minimize undue interferences. Such activities shall not be construed as occupancy.

7.11.2 If any part, unit or the entire Work or Project is Substantially Complete or ready for occupancy, the University may, upon notice to the Contractor, enter into and make use of the Work that is Substantially Complete or otherwise suitable for the University's purposes.

7.11.3 If the Work is not complete at the time included in the Contract, but the Work is to a state of readiness to permit partial or full use or occupancy by the University, the University reserves the right, upon notice to the Contractor, to enter into and make use of those parts that are suitable for his needs. The Contractor shall cooperate with and coordinate his operations in completing the Work with the University to minimize disturbance of the University's programs and functions.

7.11.4 The University's beneficial use or occupancy, as provided for in 7.11.1 through 7.11.3 shall not be construed as acceptance of the Work or any of its materials and equipment. Such use and occupancy shall be subject to any corrections or deficiencies, damage or omissions noted. Damage occurring after occupancy, not caused by the Contractor, will be the responsibility of the University or other contractors causing the damage.

7.11.5 To the extent applicable to the Work, as determined by the University, the Contractor shall conform to the provisions of this Subparagraph. Upon occupancy by the University, complete and usable facilities of light, power, exits, heat, ventilation, air conditioning, utilities, toilets and similar facilities necessary for safety, comfort and University's functions shall be available at all times, so the Work can be used without hazards, discomfort or inconvenience. After occupancy by the University, its program, functions or normal use shall not be unnecessarily interrupted nor interfered with and unnecessary inconvenience will not be permitted. The Contractor shall schedule and arrange the Work with the University to accomplish this objective. If the Work is not complete by the time in the Contract, and if necessary, work shall be scheduled on weekends, or other times when the Work is not in use, without additional cost to the University. The Contractor will be allowed reasonable access to the areas as necessary to complete the Work. All operations or activities relating to electrical, heating, air conditioning, ventilation, plumbing services and phases shall be accomplished in accordance with a sequence schedule planned with the University so that complete facilities are maintained.

#### 7.12 Additional Definitions

7.12.1 The term "provide" shall mean to furnish and install complete, including as applicable all connections to utilities or service, complete anchorage and suspension, fastening or anchor devices, controls, trim, supports, standard accessories, finishes, adjustments for proper operation and other related items or labor, unless specifically specified otherwise.

7.12.2 The terms "Approved," "Satisfactory," "Equal to," "Proper," and similar terms shall mean the decision is vested in the Architect and the University, which shall be binding upon the Contractor and Subcontractors. For decisions relating to artistic effect or interpretation and intent of the Contract Documents, the Architect's decision will be final.

7.12.3 The terms "Project," "Work," "Job", as may be used in the technical sections of the Specifications or on the drawings, may be used interchangeably and are synonymous. They shall mean the facility, construction and/or improvement within the intent or scope of the Contract Documents. The terms shall mean the entire facility, or separable parts as appropriate to the use of the term.

7.12.4 The term "Notice to Proceed" shall mean written notice by the University to the Contractor to commence his work of the Contract, issued either before or after execution of the Contract. In issuing the Notice, stipulations may be included in the Notice, or in the Contract Documents, as to time and other requirements that may condition commencement of the Work at the site. In the absence of a specific Notice to Proceed, the execution of the Agreement shall be deemed as such Notice, conditional upon the submission of a proper Performance Bond and proper insurance evidence.

7.12.5 The term "Substantial Completion" shall mean the Work of the Contract (or separable units or phases as provided in the Contract Documents or otherwise determined by the University) is essentially and satisfactorily complete in accordance with the Contract Documents, as modified by approved Change Orders or other written orders, ready for full occupancy or use by the University in the manner intended without inconvenience or discomfort. The determination by the University on the status of Substantial Completion shall be final. As may be applicable to this Project and Work of this Contract, it is the intent that Substantial Completion shall generally mean: all materials, equipment, systems, controls, features, facilities, accessories and similar elements are installed in the proper manner and in operating condition; spaces and surfaces (except minor areas or spaces) have been painted or otherwise finished throughout; masonry and concrete cleaned with any sealer or other finish applied; casework installed, complete with tops, sinks, fittings and other related items installed and services connected; utilities and systems connected and functioning; sitework essentially complete; permanent heating, ventilating, air conditioning and other systems properly operating with proper controls; lighting and electrical systems installed, operable and controlled; and other work to a similar state of essential and satisfactory completion. A minor amount of work, as determined by and at the discretion of the University, such as installation of minor accessories or items, a minor amount of painting, minor replacements of defective work, minor adjustment of controls, completion or correction of minor exterior work that cannot be completed due to weather conditions, will not delay determination of Substantial Completion. For the purposes of Substantial Completion, specified areas of the entire Work or Project (or as otherwise determined by the University) may be individually judged as Substantially Complete.

7.12.6 The terms "Complete", "Completion" or "Final Completion" shall mean when all of the Work of the Contract fulfills all of the terms of the Contract Documents in all respects.

### 7.13 Or Equal

7.13.1 Wherever materials, products, articles, equipment, systems or similar items are identified by reference to proprietary terms, model numbers, catalog numbers, trade names, manufacturers or similar reference, it is intended to establish the minimum standard or measure of quality that has been determined as requisite or intended for the Work. During bidding competition is encouraged from contractors, subcontractors, suppliers, manufacturers and producers whose products, systems, reputation, performance and service warrant acceptance for the conditions, intent of design, requirements and other considerations of the Work under the conditions specified in the Instructions to Bidders. Where not specifically stated, the phrase "or acceptable equal as determined by the Architect" shall be implied throughout. The Architect consults with the University in the determination of products to be used and their acceptable equals.

7.13.2 The determination of products for use may be based on the construction, design, function, type, size, capacity, performance, strength, durability, efficiency, sound level, finish, aesthetic quality, service, matching existing work, the University's standards for repair, replacement and maintenance or other characteristics and criteria. Acceptance or rejection of proposed alternate or similar products, equipment or system may be based on any of the factors and criteria. The final decision on acceptance or rejection of proposed alternate or similar products, equipment or system shall be vested in the Architect and his determination may or may not express the reason for the decision, at his option.

7.13.3 The product, equipment, system or manufacturer used as the basis for the design or specification shall generally set the criteria. It shall be expressly understood that any product, equipment, system or manufacturer listed in the Contract Documents as acceptable shall meet and be in full compliance with the requirements and criteria, including those established by the product, equipment, system or manufacturer used as the basis for the specification. The Architect and the University shall have the right to reject any proposed deviations from specified criteria or characteristics, or deviations from the criteria and characteristics of the product, system or manufacturer used as the basis of the Contract Documents.

## ARTICLE 8 - TIME

### 8.1 Definition

8.1.1 The Contract Time is the period of time allotted in the Contract Documents for completion of the Work.

8.1.2 The date of the commencement of the Contract Time is the date of the University's Notice to Proceed or the date of the Agreement, whichever is first. In the absence of a time or date established in the Notice to

Proceed or, in the Contract Documents, work at the site shall commence within 21 days after the Notice to Proceed or Contract execution, whichever occurs first, unless a later time is agreed to or directed by the University.

8.1.3 The date of Substantial Completion of the Work or designated portion thereof is the date determined by the University when construction is sufficiently complete, in accordance with the Contract Documents, so the University may occupy the Work or designated portion thereof for the use for which it is intended and the Work meets the requirements of Subparagraph 7.12.5. The date of Final Completion shall be determined by the University when the Work meets the requirements of Subparagraph 7.12.6.

8.1.4 The term day as used in the Contract Documents shall mean calendar day.

## 8.2 Progress and Completion

8.2.1 All time limits or dates stated in the Contract Documents are essential conditions of the Contract. In executing the Contract, the Contractor agrees the Contract Time is reasonable for the Work.

8.2.2 The Contractor shall begin the Work in accordance with Subparagraph 8.1.2. No work at the site shall be commenced until proper evidence of the required insurance has been submitted to the University. The Contractor shall carry the Work forward expeditiously with adequate forces to maintain progress in accordance with the Progress Schedule and to complete the Work within the Contract Time.

8.2.3 Except for constraints which may be specified for certain part of the Work or otherwise imposed by the University, the Work shall not be suspended or shut down, but shall progress continuously and expeditiously, unless otherwise approved by the University. The Contractor shall assemble materials and equipment in advance of the need and, as may be appropriate to the progress, shall prefabricate assemblies which will comply with the Contract Documents, as may be specified, or if not specified as may be permitted by labor agreements, to expedite the Work and insure completion on time.

8.2.4 If completion dates or times are specified or otherwise included in the Contract, it shall mean the date of Final Completion as defined under Subparagraph 7.12.6, unless otherwise specified in the Contract Documents.

8.2.5 If the Contractor shall neglect, fail or refuse to complete the Work within the time specified, or any proper extensions thereof granted by the University, unless liquidated damages are specified, the Contractor will be subject to paying actual damages suffered by the University resulting from non-completion on time and default under the Contract.

## 8.3 Delays and Extensions of Time

8.3.1 If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the University or the Architect, or by any employee of either, or by any separate contractor employed by the University,

or by changes ordered in the Work, or by labor disputes, fire, unusual delay in transportation, unavoidable casualties or any causes beyond the Contractor's control, or by any other cause which the University determines may justify a delay, the Contract Time may be extended by Change Order for such reasonable time as the University may determine. Claims for extensions of time will be considered valid only under the following conditions:

- .1 Only those enumerated conditions over which the Contractor has no control will be considered. The burden of proof to substantiate the claim for an extension of time shall rest with the Contractor, including evidence that the cause was beyond his control. It shall be deemed the Contractor has control over the supply of labor, materials, equipment, methods, techniques and over his Subcontractors.
- .2 A delay in the progress of the Work actually occurred as a result of one of the valid causes for time extension.
- .3 Any unusual delay in transportation is solely due to transportation. An extension of time will not be granted for delays in deliveries where said delivery was not properly scheduled or when orders were not promptly and properly placed.
- .4 With respect to a claim for an extension of time as result of climatic conditions, the Contractor shall consider the location of the site and recognize the existence, as normal, of variations from "average" conditions. Foul weather in itself will not be a valid reason for time extension. Requests for time extension because of delay resulting from weather extremes will not be considered unless a substantial variation from usual weather conditions occurs for a significant period of time and operations necessarily were suspended to a significant degree when they would otherwise have been in progress. In considering the time extension, the weather conditions both before and after the period in which the delay is claimed will be evaluated.
- .5 For Changes in the Work which significantly affects the time and progress of the entire Work, any time extension shall be made no later than when the Change is authorized by the University. Any claim shall be made at the time the Change is requested. For Changes in the Work which do not affect the progress of the entire Work, the University reserves the right to grant a time extension only for the area, phase or element of the entire Work affected by the Change.
- .6 Delays resulting from a labor dispute will result in a time extension no longer than the dispute period, in addition to a reasonable mobilization period that is unavoidable, and may be less depending on the actual affect the dispute had on the overall progress and the operations that were actually curtailed or suspended. Lockouts, over which the Contractor has control, will not be a valid reason for a time extension.

- .7 No time extension will be granted as a result of improper scheduling or for failure to have shop drawings or samples submitted in ample time for review under a reasonable schedule.
- .8 Delays caused by Subcontractors will be valid reasons for time extension only under the same conditions as Paragraph 8.3.

8.3.2 Except for Changes in the Work, all claims for extension of time shall be made in writing to the University no more than ten days after the beginning of the occurrence of the delay; otherwise they shall be waived. In the case of a continuing cause of delay only one claim is necessary.

8.3.3 If no schedule or agreement is made stating the dates upon which written interpretations as set forth in Subparagraph 1.2.5 shall be furnished, then no claim for delay shall be allowed on account of failure to furnish such interpretations until fifteen days after demand stating a delay will result is made for them, and not then unless such claim is reasonable.

8.3.4 All extensions of time shall be determined by the University, in consultation with the Architect when necessary, and its decisions shall be final and binding.

8.3.5 In the event of separate contractors for the Work, if a time extension is granted to one or more contractors for a valid delay, a time extension may also be granted other contractors if, in the opinion of the University, their progress or work schedule is materially affected by the time extension granted. If no time extension is allowed to the Contractor, or should the Contractor decline a time extension offer, the Contractor shall make no claim against the University for damages alleged to be the result of any time extension granted to others.

8.3.6 This Paragraph 8.3 does not exclude the recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 - PAYMENTS AND COMPLETION

### 9.1 Contract Sum

9.1.1 The Contract Sum is stated in the Agreement and is the total amount payable by the University to the Contractor for the performance of the Work under the Contract Documents.

### 9.2 Schedule of Values and Cash Flow Schedule

9.2.1 Unless otherwise specified, the Contractor shall submit a Schedule of Values (cost breakdown) at least 14 days prior to the first Request for Payment, in such form and detail as required by the Contract Documents and as directed by the University.

9.2.2 Upon request of the University, the Contractor shall prepare and provide a schedule of estimated periodic requests for payment for the University's guidance in its financial planning to have funds available.

The schedule shall indicate the anticipated amount that will be requested each month, taking into consideration the work schedule, expected deliveries and the retained amount. The Contractor will not be bound to the estimated amounts, but should the actual requested amounts tend to vary substantially from the estimates, the Contractor shall revise the schedule, at the request of the University.

### 9.3 Progress Payments

9.3.1 As the Work progresses, after a bona-fide start at the site, the Contractor may make periodic Requests for Payment, but no more often than monthly, for work satisfactorily completed or materials suitably stored and protected at Project site, or as otherwise provided under Subparagraph 9.3.5. With the Request for Payment, the Contractor shall provide such supporting data as may be required by the University to substantiate the Contractor's right to payment.

9.3.2 Requests for Payment shall be submitted to the University in five copies on forms provided by the University. Each periodic payment request shall be in itemized detail form, following the Schedule of Values accepted by the University and as directed by the University. The processing procedures and time for submitting Requests for Payment shall be as directed by the University.

9.3.3 Payment will be made only for the Work that has been satisfactorily executed or accomplished and, except as provided for under Subparagraph 9.3.5, only for materials and equipment that are on the job site and adequately protected from the elements, pilferage, vandals or other damage. Requests for Payment which are incorrect, incomplete or are based on anticipated progress and deliveries will be rejected.

9.3.4 For payments that are to be made on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the site, such payments shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the University to establish the University's title to such materials or equipment or otherwise protect the University's interest, including applicable insurance. No payment will be made for materials until a bona fide and substantial on-site start has actually been made.

9.3.5 Where there is limited storage area on the site of the Work of this Contract, and it will improve the schedule or benefit the progress of the Work, the University will consider making payment for certain materials and equipment which are stored off the site. The University shall be the sole judge as to the types of materials and equipment it will pay for while in off-site storage and the conditions for the payment. The University will not pay for items in off-site storage which are: (1) damaged or otherwise defective; (2) off-the-shelf type materials; (3) held at the producer's plant; (4) produced over a period of time and normally would be installed to a schedule over a period of time as they are delivered, unless the University has caused a significant change in the schedule. For consideration of payment for items stored off-site, at the start of the Work the Contractor shall submit a proposed list to the University for review and concurrence, provide the reasons for each, the proposed storage locations and the anticipated delivery time. The list shall include: (1) the item; (2) proposed storage location; (3) anticipated delivery time to the off-site storage. To qualify for consideration, the material or equipment shall be:



- .1 A major item.
- .2 Specially fabricated or produced for the Work of this Contract and shall be in accordance with the Contract Documents; or
- .3 A critical material which is in short supply or which has an uncertain long lead time delivery schedule.
- .4 Properly stored and protected as approved by the University, including marking with the Project name.
- .5 Paid for in full by the Contractor (or by the Subcontractor purchasing the item) with the evidence of a paid receipt submitted with the Request for Payment. The Contractor (or Subcontractor) shall also certify the item is in storage and will be immediately available when required.
- .6 Examined by the University at the place of storage.
- .7 Properly insured, with insurance coverage (as a minimum) equal to the Property Insurance for the Project, as specified under Paragraph 11.2, and insurance evidence provided to the University. The Contractor shall also provide a Consent of the Surety to allowing payment for the item.
- .8 Furnished at no additional cost or expense to the University except the time required to examine the items.

9.3.6 The Contractor warrants and guarantees that title to all Work, materials and equipment covered by a Request for Payment, whether incorporated in the Project or not, will pass to the Owner upon the receipt of such payment by the Contractor, free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to in this Article 9 as "liens"; and that no Work, materials, or equipment covered by a Request for Payment will have been acquired by the Contractor, or by any other person performing the work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the Seller or otherwise imposed by the Contractor or such other person.

9.3.7 Unless otherwise specified in the Contract Documents, progress payments will be made for ninety percent (90%) of the value of the Work satisfactorily executed, or for materials and equipment furnished, installed or suitably stored in an approved manner, including all additions or deductions to the Contract Sum approved by Change Order, and less any previous payments made to Contractor or payments made for his account. No payment for engineering, shop drawings or other similar costs will be made until materials are delivered and satisfactorily stored or incorporated in the Work.

9.3.8 By submitting any Request for Payment the Contractor attests to the accuracy of the amounts requested, represents that the Work has been satisfactorily executed in compliance with the Contract Documents and he is entitled to the amount shown. By submitting the second or any subsequent

Request for Payment, the Contractor attests that he has paid all just claims for labor, materials, equipment, subcontracts or other expenses represented by all previous Requests for Payment.

9.3.9 No progress payment, nor partial or full use or occupancy of the Project, shall be construed as acceptance of any Work not in accordance with the Contract Documents. All Work is subject to an evaluation for conformance with the Contract Documents upon Completion, to the results of any subsequent tests required by the Contract Documents, to minor deviations from the Contract Documents correctable prior to Completion, and to any specific qualifications stated by the University or Architect. The making of a payment by the University shall not thereby be deemed to represent that it has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that it has reviewed the construction means, methods, techniques, sequences or procedures, or that it has made any examination to ascertain how or for what purpose the Contractor has used the moneys previously paid on account of the Contract Sum.

9.3.10 Full or partial payment on the Contract Sum, or in reducing the retained amount (percentage) shall not relieve the Contractor or his Surety from fulfilling all obligations of this Contract, including guarantee of the Work. Under the conditions of the Contract, the Contractor and his Surety agree that they waive any actual or alleged rights of subrogation or action against the University and Architect as a result of such payments being made. The Surety at any time may examine the status of the Work, as well as any payments and may request the University withhold additional sums as they consider appropriate to protect their interests.

9.3.11 In the event the University is unable to approve payment in the full amount requested, due to work not satisfactorily complete in the amount represented by the Request for Payment, it may revise the amount indicated as due, process for payment and advise the Contractor of the change.

9.3.12 At the time any request is made to make full payment on a periodic Request for Payment or to reduce the retained percentage, the Contractor shall submit a written "Consent of Surety" to said reduction, without invalidating any obligation under the Bond.

#### 9.4 Payments Withheld

9.4.1 The University may decline to approve a Request for Payment in whole or in part, to the extent necessary to reasonably protect its interests. The University may also decline to approve any Request for Payment or, because of subsequently discovered evidence or subsequent inspections, it may nullify the whole or any part of any Request for Payment previously issued, to such extent as may be necessary in its opinion to protect the University from loss because of:

- .1 Defective work not remedied,
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims,
- .3 failure of the Contractor to make payments properly to Sub-contractors for labor, materials or equipment,

- .4 reasonable doubt that the Work can be completed for the unpaid balance of the Contract Sum,
- .5 damage to another contractor,
- .6 reasonable indication that the Work will not be completed within the Contract Time, or
- .7 unsatisfactory prosecution of the Work by the Contractor.

#### 9.5 Not Used

#### 9.6 Substantial and Final Completion

9.6.1 As applicable to the Work of this Contract, Substantial and Final Completion shall be as defined under Subparagraph 7.12.5 and 7.12.6.

9.6.2 When the Contractor determines that the entire Work, or a specified or designated area or part thereof as established by the University, is Substantially Complete, the Contractor shall submit to the University and Architect a written statement that the Work meets the requirements for Substantial Completion. At the same time, the Contractor shall submit to the University and the Architect a list of all items and Work to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Based on observations at the site, if the University agrees to the status of the Work, it will schedule and make an inspection of the Work and provide the Contractor with a list of any additional items to be completed, replaced or corrected. If the Work is not Substantially Complete, in the University's opinion, the Contractor will be advised and a subsequent date set for the inspection. In the absence of any other date established by the University, the day on which the University completed its inspection of the Work, or part, and determined the Work, or part, as Substantially Complete, will be the Substantial Completion date.

9.6.3 When the entire Work, or specified or designated area or part thereof as established by the University, is determined as Substantially Complete, or upon the University's full occupancy of the entire Work or established area or part thereof, the Contractor and the University shall review and agree on necessary changes in responsibilities as may be provided in the Contract Documents which are related to the Work, such as insurance, cost of services and utilities, heating and air conditioning, maintenance and similar matters. In no case shall Substantial Completion or occupancy relieve the Contractor from his obligations under the Contract. Unless otherwise specified, the change in responsibilities shall be effective the day after the Work is determined as Substantially Complete, or if full occupancy occurs earlier, on the first day of full occupancy.

9.6.4 The Contractor shall recognize the need for proper procedures and diligence to complete the Work and shall continuously prosecute it to completion, including the period after Substantial Completion. The Contractor shall organize and methodically prosecute all phases of completing the Work according to a schedule acceptable to the University.

9.6.5 Upon receipt of written notice from the Contractor that the Work is complete, all corrections made, all reports and other data filed, all equipment and systems tested and there is no other unfinished Work, the University will make one final inspection on the items previously noted to be completed or remedied. Final payment will not be made until the University has been fully and properly instructed in use and operation of all of the Work, equipment and systems under the Contract and all manuals, bonds and similar items have been provided.

## 9.7 Final Payment

9.7.1 Final payment, including any retained amount on the Contract Sum, will not become due until the Contractor provides any submittals the University may require to substantiate the Contractor's right to payment, such as: (1) affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the University or his property might in any way be responsible, have been paid or otherwise satisfied; (2) consent of surety, if necessary to final payment and (3) other data establishing payment or satisfaction of all obligations, such as receipts, releases and waivers of liens arising out of the Contract, to the extent and in such form as may be designed by the University. If any Subcontractor refuses to furnish a release or waiver as may be required by the University, the Contractor may furnish a bond satisfactory to the University to indemnify it against any such lien. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the University all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

9.7.2 Prior to final payment, the Contractor shall file with the University the certificate, Form 134, "Affidavit for Obtaining Final Settlement of Contract with the State of Minnesota", showing he has complied with M.S.A. 290.92 requiring withholding of income tax on wages at the source.

9.7.3 If after Substantial Completion of the Work, Final Completion thereof is materially delayed through causes not under the control of the Contractor, or a very minor amount of the Work remains incomplete or uncorrected due to weather, unsuitable conditions for testing or other circumstances, and the Architect so confirms, the University may, without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. In such case, the University will retain at least 3 times the value of the incomplete or uncorrected parts of the Work. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims, nor termination of the Contract.

9.7.4 The making of final payment shall constitute a waiver of all claims by the University except those arising from:

- .1 Unsettled liens;
- .2 faulty, defective, missing, substandard or improperly installed work previously noted or appearing or found after Substantial Completion;

- .3 failure of any of the Work to comply with the requirements of the Contract Documents; or
- .4 terms of any standard of special guarantees required by the Contract Documents.

9.7.5 The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and still unsettled.

## ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

### 10.1 Safety Precautions and Programs

10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. All of the Work shall be performed in a safe manner.

### 10.2 Safety of Persons and Property

10.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

- .1 all employees on the Work and all other persons who may be affected thereby;
- .2 the public, including University staff and employees;
- .3 all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-Subcontractors;
- .4 materials, equipment, supplies or construction of other contractors; and
- .5 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other improvements and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall comply with all applicable codes, laws, ordinances, rules, regulations and lawful orders of any public authority, including the University's Environmental Health and Safety Division, having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

10.2.3 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents and

other safety or protection measures. This person shall be the Contractor's superintendent unless otherwise designated in writing by the Contractor to the University.

10.2.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel. No explosives shall be used without the permission of the University.

10.2.5 The Contractor shall provide and maintain adequate fire extinguishers or other fire fighting systems or devices in and around the construction area, available to all workmen, but shall not use extinguishers that are to be installed in the Work.

10.2.6 The Contractor shall not load or permit any loading which will endanger the safety of or in any way damage the Project, the Work, or any existing or adjacent facilities.

10.2.7 All damages or loss to any property referred to in Clauses 10.2.1.3 through 10.2.1.5, caused in whole or in part by the Contractor, any Sub-contractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, shall be remedied and paid for by the Contractor, except damage or loss solely attributable to faulty Drawings or Specifications, or to the acts or omissions of the University, or Architect or anyone employed by either of them or for whose acts either of them may be liable, and not attributable to the fault, acts, operations, methods or negligence of the Contractor.

### 10.3 Emergencies

10.3.1 In any emergency at the site affecting the safety of persons or property, the Contractor shall act, at his discretion, to prevent threatened damage, injury or loss and shall immediately notify the University. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 12 for Changes in the Work.

## ARTICLE II INSURANCE

### 11.1 Contractor's Liability Insurance

11.1.1 The Contractor shall purchase and maintain such insurance as will protect him from claims which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by himself or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable; such insurance shall, as a minimum, cover:

- .1 claims under workmen's compensation, disability benefit and other similar employee benefit acts;

- .2 claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;
- .3 claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;
- .4 claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and
- .5 claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

11.1.2 The insurance required by Paragraph 11.1 shall be written for not less than the limits of liability specified in Subparagraph 11.1.10, other requirements of the Contract Documents, or required by law, whichever is greater. The Contractor is solely responsible to purchase and provide adequate and additional insurance for work under the Contract, subject to the specified minimum requirements. The insurance shall be written on a Combination Comprehensive Liability Form with Broad Form Property Damage coverage.

11.1.3 Unless otherwise specified in the Contract Documents, as a minimum the liability coverage shall include:

- .1 General Public Liability.
- .2 Workmen's Compensation, with All States or Universal endorsement.
- .3 Employee's Liability, with All States or Universal endorsement.
- .4 Premises and Operations.
- .5 Contractor's Protective Contingent Liability.
- .6 Elevators (if any under this Contract).
- .7 Personal Injury, Groups A, B, and C.
- .8 Explosion, Collapse and Underground Property (The University will consider the exclusion of one or more of these hazards only if the Contractor provides a sworn statement which certifies no work involving these hazards will be performed under the Contract by the Contractor, any Subcontractor or anyone employed by them.)
- .9 Contractual Liability.
- .10 Completed Operations, which shall be maintained a minimum of one year after final completion.
- .11 Automobile, including owned, non-owned and hired vehicle coverage.

11.1.4 The Contractor's Contractual Liability Insurance shall cover the Contractor's obligations under Paragraph 4.18. Insurance for said agreement shall, as a minimum, provide limits as specified for any claim arising out of the hold harmless agreement and said limits shall not be reduced as the result of any claim made under the Public Liability Insurance.

11.1.5 If any insurance policy is written to cover more than one exposure, the minimum limit specified for each exposure shall be available for claims under each of the exposures.

11.1.6 The insurance companies for all policies shall waive the right to assert immunity of the University as a defense to any claim made, and endorsements to policies or the certificate shall indicate the waiver.

11.1.7 Within 14 days after receipt of the Notice to Proceed or Contract execution, whichever occurs first, and prior to commencing the Work at the site, the Contractor shall submit to the University three copies, with one copy to the Architect, of a certificate of Liability Insurance indicating all coverages. The certificates shall be one Minnesota CICC Form 701, latest edition.

11.1.8 The Contractor shall not allow insurance to be cancelled, lapse, change by decrease in limits or coverage during the life of the Contract, including guarantee periods. In event of any such change or termination, 15 days prior written notice shall be given the University, the Architect, and all insured parties. Certificates shall bear acknowledgement of the notice requirement.

11.1.9 The Contractor's Surety for the Bond specified under Paragraph 7.5 shall be held until all claims against the insurance (including claims under Paragraph 4.18) have been settled and suitable evidence of the settlement has been provided to the University.

11.1.10 Unless otherwise specified in the Contract Documents, the minimum limits for liability insurance shall be as follows, unless higher limits are required by law:

- .1 Workmen's Compensation: As required by law
- .2 Employee's Liability: \$100,000
- .3 Bodily Injury - For \$300,000 each person  
each of Public Liability \$500,000 each occurrence  
and Automobile \$500,000 aggregate
- .4 Property Damage - \$250,000 each occurrence  
Public Liability \$500,000 aggregate
- .5 Property Damage - \$100,000 each occurrence  
Automobile
- .6 Personal Injury \$300,000 each person  
\$500,000 each occurrence
- .7 Contractual Liability Same limits as .3 and .4 above



.8 Umbrella Excess Liability: If such policy is used to supplement the underlying limits, it shall be written for not less than \$1,000,000 and both the underlying policy and the umbrella policy shall provide for X-C-U coverage.

## 11.2 Property Insurance

11.2.1 Unless otherwise provided in the Contract Documents, the Contractor shall purchase and maintain Property Insurance in the amount of 100% of the insurable value of Work under the Contract plus 1/4 of 1% of the Contract Sum for architectural fees which may be required as a result of a loss. This insurance shall include the interests of, and name or designate as joint insureds, the University, the Architect, the Architect's Consultants, and all other agents, the Contractor, his Subcontractors and Sub-subcontractors on the Work and shall, as a minimum, insure against the perils of Fire, Extended Coverage, Vandalism, Malicious Mischief and Multiple Perils, and shall cover debris removal. (Builder's Risk with Multiple Peril Form, with coverage equal to an Inland Marine Form)

11.2.2 The Property Insurance shall be placed into effect and two copies of the policy provided to the University prior to starting any work at the site, the delivery of any materials to the site or exposure to any loss may occur. The policy shall provide that in the event of cancellation or expiration, a minimum of 15 days written notice shall be provided the University and the Architect. In addition to providing copies of the policy to the University, the Contractor shall submit one copy of the policy to the Architect.

11.2.3 Property Insurance shall be maintained by the Contractor until completion of the Work under the Contract, or full occupancy by the University, whichever occurs first, as determined by the University. Prior to termination of the insurance, at a time approved by the University, 15 days written notice of the proposed termination shall be provided to the University and Architect.

11.2.4 At the time the policy is issued, an endorsement shall be attached to the policy granting "permission for partial occupancy," to prevent the insurance from becoming invalid for partial occupancy by the University.

11.2.5 The University, the Architect, the Contractor, any other separate contractor on the Project performing work under these General Conditions, and all their Subcontractors, upon execution of construction agreements in connection with the Project automatically waive all rights, each against all others, for damages caused by fire or other perils to the extent covered by insurance under this Paragraph 11.2, except such rights as they may have to proceeds of such insurance held by the Trustee. Any policy issued with a clause negating this waiver shall have the clause voided by endorsement or the policy will be unacceptable. The Contractor shall arrange for, and require, similar waivers by Subcontractors and Sub-subcontractors in accordance with Clause 5.3.1.5., if necessary.

11.2.6 The Property Insurance policy may include a deductible amount as specified, but not to exceed \$1,000 per occurrence, which shall not apply to the coverages of fire, windstorm, hail, lightning, smoke, explosion,

riot, civil commotion, aircraft, vehicles or the upset, overturning or collision of a transporting conveyance. The Contractor shall be responsible for any damage to his Work not covered (including damage subject to the deductible) by the insurance and he may self-insure or obtain insurance to cover any losses, at his option.

11.2.7 Any other property not covered by insurance provided under this Paragraph 11.2 (such as Contractor's tools, machinery or equipment and property of similar nature not destined to become a part of the Project) shall be Contractor's responsibility and Contractor may self-insure or provide other insurance at his option.

11.2.8 Any insured loss is to be adjusted with the University and made payable to the Contractor as Trustee for the insureds, as their interests may appear. The Contractor as Trustee shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within five days after the occurrence of loss to the exercise of this power. If such an objection is made, settlement with the insurers shall be made by the Contractor, the University and a third insured selected by them.

11.2.9 If required in writing by any party in interest, the Contractor as Trustee shall, upon the occurrence of an insured loss, give bond for the proper performance of his duties. He shall deposit in a separate account any money so received, and he shall distribute it in accordance with such agreement as the parties in interest may reach, or in accordance with an award by arbitration.

11.2.10 In the event of an insured loss, with University agreement, the Contractor shall immediately arrange with his insurance carrier to allow the Contractor to replace, repair, rebuild or remedy the loss so the work is accomplished as quickly as possible and to prevent (or minimize) any delay in job progress. Any claim for time extension as a result of a loss shall be approved by the University.

11.2.11 Upon termination of the Contractor's Property Insurance, the University hereby waives any claim against the Architect, Contractor and his Subcontractors and Sub-subcontractors for damage to its property from the perils covered under the terminated Contractor's Property Insurance which may occur during the completion of the Work and the guarantee period.

11.2.12 For work involving additions, remodeling or repair to existing property, the University hereby waives any claim for damage to his existing properties against the Architect, and any claim against the Contractor and his Subcontractors and Sub-subcontractors for damage to its existing properties from fire or other peril insured by the Contractor's property insurance or the cost of such damage which is in excess of the specified minimum limit for the Contractor's Public Liability Property Damage coverage.

### 11.3 Steam Boiler and Machinery Insurance

11.3.1 Should the Work under the Contract include such equipment as steam boilers, other pressure vessels, hot water boilers, fired storage water

heaters, fired coil water heaters and similar equipment or objects, the Contractor shall effect and maintain appropriate broad coverage steam boiler and machinery insurance as required by law or the Contract Documents. Such coverage shall, as a minimum insure against loss or damage, including death or bodily injury, from explosion, rupture or bursting of the equipment, piping and normally covered appurtenances.

11.3.2 The policy shall name, as insureds, the Contractor, the University, the Architect, other contractors for the Work, Subcontractors and Sub-subcontractors.

11.3.3 The insurance shall be placed into effect prior to the start up and testing of the equipment and have a policy period of at least one year but in any event shall be maintained until Final Completion of the Work.

11.3.4 The policy shall cover, as a minimum (1) loss to property of the insured, including extra costs of temporary repair, (2) death or bodily injury liability, including defense, settlement and supplementary payments, and (3) property damage liability including defense, settlement and supplementary payments.

11.3.5 Unless otherwise specified in the Contract Documents, the minimum limits shall be \$500,000 per occurrence.

#### 11.4 Loss of Use Insurance

11.4.1 The University at its option, may purchase and maintain such insurance as will insure it against loss of use of its property due to fire or other hazards, however caused, except delay caused by the Contractor.

#### 11.5 Other Insurance

11.5.1 If other insurance is required by the University or the Contractor to insure against particular hazards not specified under Article 11 or elsewhere in the Contract Documents, they shall effect and pay for such special coverage as they may individually require or wish to carry.

11.5.2 If construction or any of the Work entails special hazards, the Contractor shall provide a rider or riders to be attached to the appropriate policies specified to cover such special hazards.

11.5.3 If any government agency requires special coverage for work on or adjacent to public streets or property, the Contractor shall comply with and provide such insurance, endorsements or extensions as may be required by the agency.

### ARTICLE 12 CHANGES IN THE WORK

#### 12.1 Change Orders

12.1.1 The University, without invalidating the Contract, may order Changes in the Work consisting of additions, omissions or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such Changes in the Work shall be authorized by Change Order, or other

established written procedures, and shall be executed under the applicable conditions of the Contract Documents. Such Changes in the Work may be made without notice to the Surety on the Bond given under the Contract. The University reserves the right to require additional security when additions are made if, in its judgment, such security is necessary to protect its interests.

12.1.2 A Change Order is a written order to the Contractor signed by the University, issued after the execution of the Contract, authorizing a Change in the Work or an adjustment in the Contract Sum or the Contract Time. A Change Order may also be signed by the Contractor if he agrees to the adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order.

12.1.3 The cost or credit to the University shall be determined in one of the following ways and, unless otherwise approved or directed by the University, in the precedence of the order listed:

- .1 By an accepted Unit Price proposed in the Contractor's original bid and incorporated in the Contract or a Unit Price comparable to unit costs in the Contractor's Schedule of Values.
- .2 By a lump sum cost acceptable to the University, based on the Contractor's detailed, itemized breakdown of the actual basic cost, with allowance for the Contractor's profit and overhead, as provided for under Subparagraph 12.1.5.
- .3 By mutually agreeable Unit Prices for the actual cost, with allowance for the Contractor's profit and overhead, computed in a similar manner as provided for in Subparagraph 12.1.5.
- .4 On the actual basic cost of the Change, as determined by payroll records and paid receipts, plus allowance for the Contractor's profit and overhead as provided for in Subparagraph 12.1.5, subject to a predetermined maximum amount.

12.1.4 The Contractor shall provide or perform additional work, make other Changes in the Work and comply with the provisions of a Change Order, the same as though the Changes had been a part of the original Contract Documents, when and as ordered in writing by the University.

12.1.5 Except for Unit Prices included in the Contract, and unless otherwise approved by the University, for proposed Changes in the Work the Contractor shall submit an itemized list of quantities with the applicable unit cost and extended price for each, in such form and detail as required by the University or Architect.

- .1 As a minimum the detailed breakdown shall include and indicate the items enumerated below. Items (a) and (b) constitute the cost of labor and items (a), (b), (c) and (d) constitute the actual "basic costs" referred to under this Article 12.

(a) Actual labor costs, itemized by each trade involved showing the hourly rates for each. Labor rates shall be the same for extra and credit computations.

(b) Burden on labor, which shall be the actual costs of mandatory fringe benefits, taxes on labor, workmen's compensation, insurance on labor as affected by payroll, unemployment taxes, including FICA and FUTA.

(c) Actual quantities of material and equipment, with their actual unit costs.

(d) The cost of subcontracted work, computed in the same way as provided for under this Subparagraph 12.1.5.

(e) Overhead, profit or commission.

(f) Applicable sales tax on materials.

- .2 The maximum that will be allowed for overhead, profit or commission shall be as follows, expressed as a percentage of the actual basic cost of the change. The percentages for profit, overhead and commission allowed by the University may be less, depending on the nature, extent or complexity of the change, where the percentage is not commensurate with the responsibility and administration involved (such as the Contractor merely processing a substantial Change Order to a Subcontractor) but in no event shall they exceed the following:

	<u>Overhead</u>	<u>Profit</u>	<u>Commission</u>
(a) To the Contractor and/or his Subcontractor for work performed with his own forces	10%	10%	---
(b) To the Contractor for work performed by other than his own forces	---	---	10%

- .3 The burden on labor may be indicated as a dollar/cents addition to the hourly rate or may be expressed as a percentage of the extended hourly rate costs. If required by the University or Architect, the Contractor shall provide a detailed breakdown to justify the labor burden. The University reserves the right to reject any labor burden which is inconsistent with other similar contractors.
- .4 Material costs shall be at the actual cost to the Contractor, or Subcontractor. Upon request, the Contractor (or Subcontractor) shall submit evidence to substantiate the costs. Materials shall be quoted at trade discount prices, with quantity discounts also applied where the quantities warrant. Cash or prompt payment discounts need not be credited. In any proposal with material credits, the credit shall be based on the actual Contract cost of the material (including trade and quantity discounts) less any charges actually incurred for handling or returning a material which has been delivered. No "cancellation" charge will be allowed when material has not been shipped.

- .5 The percentages allowed for overhead, profit or commission under Clause 12.1.5.2 shall be deemed to include: (1) field and office supervision and administration, including the field superintendent and administrative foremen; (2) general insurance, except that listed as the labor burden; (3) use of small tools; (4) shop burden; (5) equipment rental (other than required additional hoisting equipment or required excavating equipment necessary solely as a result of the Change); (6) engineering and estimating costs; (7) performance (guaranty) bond; (8) cost of safety measures (including those imposed by OSHA); (9) shipping, drayage and demurrage; (10) and all other costs except those enumerated under Clause 12.1.5.1.
- .6 Except for changes based on Unit Prices included in the Contract, cost changes shall be computed by determining the actual basic costs enumerated under Clause 12.1.5.1, to which the overhead may be added, then the profit figure may be added and finally adding the sales tax on materials.
- .7 Subcontractors shall compute their costs in the same way and are subject to the same maximum percentages for overhead and profit. To the Subcontractor's price, the Contractor may add up to 10% commission.
- .8 Not more than three percentages for overhead, profit and commission will be allowed. The mark-up on any part of the Work a Subcontractor subcontracts will be limited to one overhead figure and one profit figure, in addition to the Contractor's commission. The Subcontractor and Sub-subcontractor may divide the overhead and profit amount as they agree upon.
- .9 For Changes involving extra cost by a Subcontractor and the Contractor, the commission shall be applied directly to the Subcontractor's price, with the overhead and profit figure applied only to the Work the Contractor performs with his own forces.
- .10 For Changes involving both extra and credit amounts, the overhead and profit, or commission, shall be applied only to net difference where the extra exceeds the credit.
- .11 For Changes resulting in a credit in the basic costs, a reasonable allowance for overhead, profit or commission shall be credited the Owner, as determined by the University. In general no credit for overhead, profit or commission will be required where the net change credit is minor or where the Change in Work indicates it is reasonable for no credit be allowed to the University. In the event of substantial subcontract credits, or for Work performed by the Contractor, a reasonable overhead, profit or commission credit shall be allowed to the University, in an amount acceptable to the University.

12.1.6 On Changes where the value or extent of Work cannot be reasonably pre-determined or agreed upon, the University, at its sole discretion, may

authorize Work to proceed on an agreed upon cost plus basis, not to exceed a pre-determined maximum amount. In such cases, the basic costs and mark-up for overhead, profit and commission will be in accordance with this Paragraph 12.1.

12.1.7 Unit Prices proposed on the bid form and included in the Contract are not subject to further profit, overhead or commission adjustments, nor the conditions of Subparagraph 12.1.5. The Contract Sum will be adjusted by the direct extension of the number of units and the Unit Prices.

12.1.8 The University may, at its discretion, initiate procedures for Modifications for Changes in the Work involving the Contract Sum, prior to preparation of a formal Change Order. Such Modifications shall be signed by authorized representatives of the University, shall be subject to the same conditions and cost proposals as Change Orders, shall order and authorize the Contractor to proceed with the Changes in the Work and shall have the same effect as a Change Order, except the Contract Sum or Contract Time will not be changed until the Modification has been incorporated in a subsequent Change Order.

12.1.9 Except in an emergency endangering life or property, the Contractor shall make no Changes in the Work affecting the Contract Sum or Contract Time unless in pursuance of a Change Order or other written order from the University, or from the Architect and approved by the University, whereby the scope of the change and the cost, or basis of payment, is agreed upon.

12.1.10 Should Contractor find during progress of the work that, in his judgment, existing conditions or requirements make desirable, or beneficial, a Modification in the Contract requirements, he shall promptly report such matters to University and Architect, in writing, for decision and instruction.

12.1.11 If Unit Prices are stated in the Contract Documents or subsequently agreed upon, and if the quantities originally contemplated are so changed that application of the agreed unit prices to the quantities of Work proposed will create a hardship on the University or the Contractor, the applicable unit prices shall be equitably adjusted to prevent such hardship.

12.1.12 Should concealed or subsurface conditions encountered in the performance of the Work be at significant variance with the conditions indicated by the Contract Documents, or in other information available to the Contractor including his own investigations, or should a significant variance from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract, be encountered, the University and the Architect shall be notified immediately before the conditions are disturbed. Upon the determination that a significant difference exists, such changes shall be made as determined to be necessary and the Contract Sum shall be equitably adjusted by Change Order upon claim by either party made within fourteen days after the first observance of the conditions.

## 12.2 University's Right to Perform Changes in the Work

12.2.1 If the University does not accept proposals of the Contractor for additional Work or Changes in the Work and no agreement is reached, or if

it does not seem advisable or expedient to proceed on the basis of the Contractor's proposal, the University reserves the right to perform additional Work or Changes in the Work with its own personnel or to employ others for Changes in the Work.

### 12.3 Claims for Additional Cost

12.3.1 If the Contractor wishes to make a claim for an increase in the Contract Sum, he shall give the University and the Architect written notice thereof within fourteen days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor and approval to proceed issued prior to the Contractor proceeding to execute the Work, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with Subparagraph 10.3.1. No such claim shall be valid unless so made. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.

12.3.2 If the Contractor claims that additional cost is involved because of (1) any written interpretation issued pursuant to Subparagraph 1.2.5, (2) any written order for a minor change in the Work issued pursuant to Paragraph 12.4, the Contractor shall make such claim as provided in Subparagraph 12.3.1.

### 12.4 Minor Changes in the Work

12.4.1 The Architect and the University shall have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time and not inconsistent with the intent of the Contract Documents. The University and Architect also reserve right to make minor changes in dimensions, locations, arrangements, or details to accommodate changes in other materials and equipment, improve the Work or prevent unforeseen interference with structural or other features. Such changes shall be made without change in the Contract Sum.

## ARTICLE 13 - UNCOVERING AND CORRECTION OF WORK

### 13.1 Uncovering of Work

13.1.1 If any Work should be installed or covered contrary to the provisions of the Contract Documents or request of the University or Architect, it must, if required by the University or Architect, be removed or uncovered for observation and replaced at the Contractor's expense. The Contractor shall give timely notice to the University and Architect of the readiness of work for observation.

13.1.2 If any other Work has been covered which the Contract Documents, University or Architect has not specifically requested to observe prior to being covered, the University or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work be found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be paid by the University. If such Work be found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it be found that this condition was caused by a separate contractor employed as provided in Article 6, and in



that event the separate contractor shall be responsible for the payment of such costs.

### 13.2 Correction of Work

13.2.1 The Contractor, all Subcontractors, and Subsubcontractors shall be bound by the conditions of this Paragraph 13.2. The Contractor shall promptly correct all Work rejected by the Architect or the University as defective or as failing to conform to the Contract Documents whether observed before or after Completion and whether or not fabricated, installed or completed, unless the University elects to accept the Work as provided for under 13.3. The Contractor shall bear all costs of correcting such rejected Work, including the cost of the Architect's additional services thereby made necessary. Work rejected before Final Completion shall be corrected prior to final payment.

13.2.2 If, within one year after date of Substantial Completion, or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any of the Work is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the University to do so unless the University has previously given the Contractor a written acceptance of such condition. The University shall give such notice promptly after discovery of the condition.

13.2.3 Except as provided under Subparagraph 13.2.5 the commencement of the specified guaranty or correction of Work periods covered by this Article, or any other special specified period, shall be the date of the inspection for Substantial Completion of the last unit, part or phase of the Work, except for any work then noted as incomplete or unsatisfactory. The guarantee period for said incomplete or unsatisfactory work shall start on the date of final correction or remedy and the acceptance of these features by the University. In the absence of specifically noted dates of inspection for Substantial Completion (or of acceptance, in writing, by the University of corrected work), the date of the final payment on the entire Contract will be the start of the guarantee period. Occupancy or use of the Work shall not be construed as commencing guarantee periods at any earlier date.

13.2.4 The specified correction of Work or general guarantee periods, or other special guarantees specified for other periods of time, or by law, shall not be limited by any warranty of a manufacturer, producer, supplier or Subcontractor or other source. The specified guarantees shall be provided by the Contractor, who shall make his own arrangements with the manufacturer, producer, supplier, Subcontractor or other source as he may choose. Where a manufacturer, producer, supplier or Subcontractor guarantees or provides warranties in excess of the general guarantees, the extended guarantees and warranties shall be passed to the University, the same as though they were specified under this Article 13.

13.2.5 Should special circumstances indicate an earlier commencement of guarantee or correction of Work periods than on Substantial Completion is reasonable for certain parts of the Work, in the opinion of the Architect or University, the University may consider such earlier start provided suitable credit is given the University. An earlier start of the periods

shall be only with the University's written approval of the time and acceptance of the credit by Change Order.

13.2.6 The expiration of any guarantee or correction of Work period shall not relieve the Contractor of the obligation to correct, at his own expense, any latent defect in the Work or deficiencies which are not readily ascertained, including but not limited to defective materials and workmanship, defects attributable to substitutions for specified materials, substandard performance or any of the Work otherwise not in compliance with the Contract Documents. Such latent defects or deficiencies shall be corrected as provided in this Paragraph 13.2. Following the correction or replacement of any of the Work, as above specified, the Contractor shall correct any defects or deficiencies in the corrected or replaced materials and workmanship, which is found within one year after the date of correction or replacement.

13.2.7 All such defective or non-conforming Work under Subparagraphs 13.2.1 and 13.2.2 shall be removed from the site if necessary, and the Work shall be corrected to comply with the Contract Documents without cost to the University or Architect.

13.2.8 The Contractor shall bear the cost of making good all work of separate contractors destroyed or damaged by such removal or correction.

13.2.9 If the Contractor does not remove such defective or non-conforming Work within a reasonable time fixed by written notice from the University or the Architect, the University may remove it and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten days thereafter, the University may upon ten additional days' written notice sell such Work at auction or at a private sale and shall account for the net proceeds thereof, after deducting all the costs that should have been borne by the Contractor, including compensation for additional architectural services. If such proceeds of sale do not cover all costs which the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate Change Order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the University.

13.2.10 If the Contractor fails to correct such defective or non-conforming Work, the University may correct it in accordance with Paragraph 3.5.

### 13.3 Acceptance of Defective or Non-Conforming Work

13.3.1 If, in the opinion of the University, it is expedient, or in its best interest, or should the University choose to accept defective or non-conforming Work for convenience, it may do so instead of requiring the removal and correction, in which case a Change Order will be issued to reflect an appropriate reduction in the Contract Sum for the difference in value together with an allowance for damage or loss of quality. If the amount is determined after final payment, it shall be paid by the Contractor or his Surety. The amount shall be determined by the University.

## ARTICLE 14 · TERMINATION OF THE CONTRACT

### 14.1 Termination by the Contractor

14.1.1 If the Work is stopped for a period of thirty days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with the Contractor, or if the Work should be stopped for a period of thirty days by the Contractor for University's failure to make payment within 30 days after payment is due then the Contractor may, upon ten days' written notice to the University and the Architect, terminate the Contract and recover from the University payment for all Work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit. Such right to termination, however, shall not extend to material shortages as a result of market conditions, diminishing resources or other causes except a formally declared emergency specifically restricting or preventing the use of materials.

### 14.2 Termination by the University

14.2.1 If the Contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials to satisfactorily prosecute and complete the Work according to schedule and within the Contract Time, or if he fails to make prompt payment to Subcontractors or for materials or labor, or disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a substantial violation of a provision of the Contract Documents, then the University, with the advice of the Architect, may, without prejudice to any right or remedy and after giving the Contractor and his Surety seven days' written notice, require the Surety to promptly take over and complete the Work under the terms of the Contract. Should the Surety fail to assume the obligations of completing the Work within ten days after receipt of the written notice, the University may, upon seven days' additional notice, terminate the Contract (except the obligations under the Bond) and take possession of the site and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever method it may deem expedient. In such case the Contractor or his Surety shall not be entitled to receive any further payment until the Work is finished.

14.2.2 If the University completes the Work and the unpaid balance of the Contract Sum exceeds the costs of finishing the Work, including the University's additional costs, attorneys' costs and compensation for the Architect's additional services, an amount shall be paid to the Contractor only to the extent as will compensate him for the Work the Contractor actually performed, based on the actual basic costs as defined under Clause 12.1.5.1. If such cost for the University to complete the Work exceeds such unpaid balance, the Contractor or his Surety shall pay the

difference to the University. The costs incurred by the University as herein provided shall be certified by the University.

## ARTICLE 15 - EQUAL EMPLOYMENT OPPORTUNITY

### 15.1 Non-Discrimination, Equal Employment Opportunity

15.1.1 Unless other Equal Employment Opportunity provisions are included in the Contract Documents, the Contractor shall comply with the University of Minnesota Construction Contract Non-Discrimination requirements of Subparagraphs 15.1.2 through 15.1.12 throughout the life of the Contract.

15.1.2 The Contractor shall not discriminate against any employee or applicant for employment because of race, creed, color, national origin, or sex. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, national origin, or sex. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

15.1.3 The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the University of Minnesota setting forth the provisions of this non-discrimination clause.

15.1.4 The Contractor shall designate an Equal Employment Opportunity Officer, who shall have authority and responsibility for the implementation of equal employment opportunity and affirmative action programs under this Contract. The Contractor shall submit for approval a written copy of its program within fifteen (15) days after receipt of notice from the University of Minnesota.

15.1.5 The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, national origin, or sex.

15.1.6 The Contractor shall send to each labor union or representative of workers with which he has a collective bargaining agreement or other contracts or understanding, a notice to be provided by the University of Minnesota advising the labor union or workers' representatives of the Contractor's commitments under this policy and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

15.1.7 The Contractor shall be required to give evidence of persistent and prolonged efforts to increase the number of minority group employees. The Contractor shall make maximum use of apprentices to develop qualified minority personnel. The Contractor shall seek to fill labor shortages for apprentices and skilled journeymen by upgrading present employees including qualified minority employees.

15.1.8 The Contractor shall furnish to the University of Minnesota information and periodic reports necessary to substantiate his compliance with the requirements of this policy during the duration of the Contract. These reports shall include an appraisal of the effectiveness of the Contractor's equal employment opportunity and affirmative action programs, and shall list any factors and conditions which impede, restrict, or account for less than complete success of the program. The Contractor shall permit access to his books, records, and accounts by the University of Minnesota for purposes of investigation to ascertain compliance with these provisions.

15.1.9 Non-compliance with any requirements of these provisions shall be a breach of a condition of the Contract and will afford the University any and all rights otherwise described under the terms of the contract as applying to the breach of condition.

15.1.10 The Contractor shall include the provisions of Subparagraphs 15.1.2 through 15.1.10 in every subcontract, unless exempted by the provisions of this policy, so that provisions will be binding on each Subcontractor. The Contractor shall take such action as may be required to enforce such provisions.

15.1.11 Contracts and subcontracts not exceeding \$10,000 are exempt from the reporting requirements of this Article.

15.1.12 Except in the case of subcontracts for the performance of construction work at the site of construction, provisions of Subparagraphs 15.1.2 through 15.1.10 shall not be required to be inserted in subcontracts below the second tier.

## ARTICLE 16 - WAGE RATES

### 16.1 Minimum Wage Rates

16.1.1 Unless other Wage Rates are included in the Contract Documents, the Contractor shall comply with the provisions of Subparagraph 16.1.2. If other Wage Rates are included in the Contract Documents, such other rates that are higher than required under Subparagraph 16.1.2 and 16.1.3 shall be paid by the Contractor for labor on the Work.

16.1.2 For any Contract for construction, alteration, or repair of University buildings or other major structures, financed in whole or in part by State appropriation and which exceeds \$2,500 in total cost, the Contractor and his Subcontractors shall pay to their respective laborers and mechanics employed directly on the Work at the site at least the wage rates as determined by the Minnesota Department of Labor and Industry and issued by the Department in their Wage Rate Determination schedules. The Contractor shall comply with the requirements of the Minnesota Department of Labor and Industry's Wage Determinations with respect to any Contract which exceeds \$2,500, in lieu of the Contract Amount Conditions stated in Minnesota Statute 177-43 (1974) as amended (Chapter 191 Laws of Minnesota for 1975). Subdivision 7.

16.1.3 A copy of the Wage Rate Determinations provided by the Minnesota Department of Labor and Industry, applicable to the County in which the Project is located,

is hereinafter bound in the specifications for reference. The Contractor shall examine any wage rate schedule included in the Contract Documents for completeness or accuracy. If any trade which will be used for the Work is omitted, or any wage rate shown is incorrect from prevailing wages of the area, such omission and discrepancies shall be reported to the University. If the only applicable wage rate schedule is that of the Minnesota Department of Labor and Industry, and any rate is missing or appears incorrect, the Contractor shall obtain the proper rate from the Department of Labor and Industry. If necessary, the Contractor shall assist in obtaining decisions on incorrect or missing rates.

16.1.4 By requiring the Contractor to pay the wages under Subparagraph 16.1.2 and 16.1.3, or to pay any other minimum wage rates, neither the University nor the Architect represent that labor may be employed at the minimum hourly wage called for. The Contractor shall investigate and verify the conditions at the location of the Work, to satisfy himself as to the availability and cost of labor required to perform the Work.

16.1.5 The Contractor shall post and maintain the Wage Rate Schedule in a conspicuous place accessible to all employees working on the Project.

STATE OF MINNESOTA/DEPARTMENT OF LABOR AND INDUSTRY

CERTIFICATION OF PREVAILING HOURS OF LABOR  
AND WAGE RATES IN ALL AREAS OF THE STATE  
FOR ALL CLASSES OF LABOR AND MECHANICS  
COMMONLY EMPLOYED IN STATE PROJECTS

CERTIFIED PURSUANT TO MINNESOTA STATUTES SECTION 177.42-44 (1974) AS AMENDED

TO: DEPARTMENT OF ADMINISTRATION  
DEPARTMENT OF AERONAUTICS  
DEPARTMENT OF NATURAL RESOURCES  
HISTORICAL SOCIETY  
STATE COLLEGE SYSTEM  
STATE ZOOLOGICAL BOARD  
UNIVERSITY OF MINNESOTA

FROM: MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY

CERTIFIED BY:

  
E. I. MALONE, COMMISSIONER

DATE: October 1, 1975

PREVAILING HOURS OF LABOR

The "prevailing hours of labor" for all classes of laborers and mechanics to be employed on State contract highway construction work are eight hours per day and forty hours per calendar week.

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka Carver Chisago Dakota	Hennepin Isanti Pine Ramsey	Scott Sherburne Washington Wright
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Other Building Work Basic Wage Rate Per Hour

Laborers	Eff. 10/1/75	Eff. 5/1/76	Eff.
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Classifications

Air Actuated Tool	\$ none	\$ none	\$ none
Bituminous Baker, floater & utility man	none	none	none
Bituminous Shovelor	none	none	none
Block Tender	none	none	none
Block Tender handling 12 inch concrete blocks or larger	none	none	none
Bottom man (sewer, water or gas trench)	none	none	none
Bricklayer Tender	none	none	none
Building Torch Demolition	7.45	7.90	none
Calson worker	7.70	8.15	none
Carpenter tender	7.35	7.90	none
Cement Coverman (batch trucks)	none	none	none
Cement Gun Operator (1 1/2" and over)	none	none	none
Cement Hand Mixer	none	none	none
Cement Handler (bag or bulk - over 2 hrs. per day)	none	none	none
Cement Mortar (1 bag)	none	none	none

FRINGE BENEFITS - In addition to the wages set forth herein, 40c shall be paid into the Health and Welfare Fund, 45c per hour to the Pension Fund, plus 40c per hour to the Vacation Fund, effective 10/1/75.

Effective 5/1/76 Health & Welfare - 45c, Pension - 45c, Vacation - 40c.

NOTICE TO BIDDERS, WAGE DETERMINATIONS

The wage determinations include classifications which the Commissioner of the Department of Labor and Industry has determined to be the classes of labor and mechanics commonly employed in building construction work. Additional classifications may develop between certifications by the Commissioner. Therefore, no inference may be drawn from the omission of classifications which have local usage. Further, the state will not be liable for increased labor costs if and when additional classifications are subsequently required or wage rates increase prior to the awarding of contracts.

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka Carver Chisago Dakota	Hennepin Isanti Pine Ramsey	Scott Sherburne Washington Wright
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Other Building Work Basic Wage Rate Per Hour

Laborers	Eff. 10/1/75	Eff. 5/1/76	Eff.
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Classifications

Chain Saw Man	\$ none	\$ none	\$ none
Chipping Hammer Operator	7.50	7.95	none
Coffroad Work	none	none	none
Common Laborer	7.35	7.80	none
Compaction Equipment (hand operated)	none	none	none
Concrete Mixer Operator (1 bag capacity)	none	none	none
Concrete Shovelor, Tamper & Puddler (paving)	7.50	7.95	none
Concrete Vibrator Operator	7.50	7.95	none
Conduit Layers (without wire)	none	none	none
Ditch Man	none	none	none
Drill Runner (wagon, truck, etc.)	none	none	none
Dump Man	none	none	none
Dynamite Men - power drillers (for blasting purposes & tunnel miners)	8.055	8.50	none
Dynamite Man	8.055	8.50	none
Earth Dump Man	7.35	7.80	none
Flagman	7.35	7.80	none
Formsetter (municipal type curb, sidewalk)	none	none	none
Formsetter (pavement)	none	none	none
Gunit Machine Operator	none	none	none
Hand Frame - pneumatic concrete & power operated tamper operator	none	none	none
Handling Creosote	none	none	none
Hod Carrier	none	none	none
Hot Tar Caulker & Corker	7.50	7.95	none
House Moving	none	none	none
Jackhammer Man Operator	7.50	7.95	none
Joint Sawyer Operator	7.45	7.90	none
Kettleman (bituminous or lead)	none	none	none
Laborer on rope swing scaffold (not safety scaffold)	7.50	7.95	none
Leadman	none	none	none
Landscape gardner, sod layer & nurseryman	none	none	none
Mason Tender	7.45	7.90	none
Men handling cement (2 hours per day) (bulk or sack excluding Mortar Mix)	7.45	7.90	none
Men unloading cars of dry sack cement or bulk cement (over 4 hours per day)	none	none	none
Minor Helper	none	none	none
Mortar Mixers	7.40	7.85	none
Nozzelman	7.35	7.80	none



DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1975 - Chapter 724  
 10/1/75

County	Anoka Carver Chicago Dakota	Hennepin Isanti Pine Ramsey	Scott Sherburne Washington Wright	Basic Wage Rate Per Hour		
				Eff. 10/1/75	Eff. 5/1/76	Eff.
Other Building Work						
Laborers						
<u>Classifications</u>						
				\$ 7.50	\$ 7.95	\$ none
Paving Buster				none	none	none
Paving Breaker Operator				7.65	8.10	none
Pipe Layer Gas				none	none	none
Plaster Tender				none	none	none
Powderman				7.35	7.80	none
Power Bussay Operator				8.05	8.50	none
Power Drillers for blasting purposes				none	none	none
Pumpman Operator				none	none	none
Pump Operator (3" and under)				none	none	none
Rebar Operator				7.40	7.85	none
Reinforced Steel Handler				7.50	7.95	none
Salamander Heater & Blower Tender				none	none	none
Sheeting Settlers & Drivers or Heavy Building Excavation				7.45	7.90	none
Signal Man				none	none	none
Snowblower Operator				7.55	7.90	none
Steel Joint Handler (erection)				none	none	none
Stone Mason Tender				7.35	7.80	none
Tunnel Laborer (atmospheric pressure)				none	none	none
Tunnel Miner				none	none	none
Tunnel Work				none	none	none
Underground Work (8 feet or more below the adjoining ground where the excavation is not more than 9 feet wide)				7.60	8.05	none
Underpinning Work				7.70	8.15	none
Watchman				6.55	6.90	none
Wrecking & Demolition (not including re- modeling)				7.45	7.90	none
Foreman				7.85	8.30	none

UM Health Sciences  
 SURG PATH C2-3

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1975 - Chapter 724  
 10/1/75

County	Aitkin Anoka Beltrami Benton Big Stone Blue Earth Brown Carlton Carver Chisago Clearwater Cook Grant	Crow Wing Dakota Dodge Faribault Fillmore Freeborn Goodhue Hennepin Houston Hubbard Isanti Itasca Lincoln	Jackson Kanabec Koochiching Lake Lake of the Woods LeSueur Mahnomon Martin McLeod Meeker Mille Lac Roscau	Morrison Hower Nicollet Nobles Olausted Pine Pipestone Ramsey Red Lake Rice Rock St. Louis Traverse	Scott Sherburne Sibley Stearns Steele Todd Wabasha Wadena Waseca Washington Wilkin Winona Wright	Basic Wage Rate Per Hour		
						Eff. 10/1/75	Eff. 5/1/76	Eff. 5/1/77
Other Building Work								
Power Equipment Operators								
<u>Classifications</u>								
Air Compressor Operator, 375 CFM or over, Pump and/or Conveyor Operator, Fireman, Temporary Heat						\$ 8.90	\$ 9.55	\$ 10.10
Air Compressor Operator, 375 CFM or over, Pump Operator and/or Conveyor Operator, 2 or more Machines						9.55	10.10	10.65
Doom Truck Operator						9.35	10.10	10.65
Brakeman						8.90	9.55	10.10
Concrete Batch Plant Operator						9.18	9.85	10.50
Concrete Mixer Operator						9.45	10.10	10.65
Derrick (Guy or Stiff Leg)						9.65	10.30	10.95
Drill Rigs - Heavy Rotary or Churn when used for Caisson drilling for elevator cylinder on building construction						9.45	10.10	10.65
Fireman, Chief License						9.75	10.40	11.05
Fireman, 1st Class License						9.18	9.85	10.50
Fork Lift Operator						9.55	10.10	10.65
Front End Loader Operator						9.45	10.10	10.65
Gunite Operator						9.18	9.85	10.50
Helicopter Operator (hoisting material)						12.85	13.50	14.15
Hoist Engineer (One Drum)						9.45	10.10	10.65
Hoist Engineer (Two Drums)						9.55	10.10	10.65
Hoist Engineer (Three Drums or More)						9.65	10.30	10.95
Locomotive Operator						9.65	10.30	10.95
Master Mechanic						9.90	10.55	11.20
Mechanic or Welder						9.55	10.10	10.65
Mechanical Space Heater (Temporary Heat)						8.45	9.10	9.75

FRINGE BENEFITS - Plus 45% payable to the Health & Welfare Fund, and  
 35% payable to the Pension Fund beginning 10-1-75.

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
Laws 1973 - Chapter 724  
10/1/75

County	Aitkin	Crow Wing	Jackson	Morrison	Scott
	Anoka	Dakota	Kanabec	Nower	Sherburne
	Beltrami	Dodge	Koochiching	Nicollet	Sibley
	Benton	Faribault	Lake	Nobles	Stearns
	Big Stone	Fillmore	Lake of the	Olmsted	Steele
	Blue Earth	Freeborn	Woods	Pine	Todd
	Brom	Goodhue	LeSueur	Pipestone	Wabasha
	Carlton	Hennepin	Mahnomen	Ramsey	Wadena
	Carver	Houston	Martin	Red Lake	Waseca
	Chisago	Hubbard	McLeod	Rice	Washington
	Clearwater	Isanti	Hecker	Rock	Wilkin
	Cook	Itasca	Mille Lacs	St. Louis	Winona
	Grant	Lincoln	Roseau	Traverse	Wright

Other Building Work

Lower Equipment Operators

Classifications

	<u>Basic Wage Rate Per Hour</u>		
	Eff. 10/1/75	Eff. 5/1/76	Eff. 5/1/77
Oilier or Greaser	\$ 8.45	\$ 9.10	\$ 9.75
Overhead Crane Operator (inside building perimeter)	9.65	10.30	10.95
Pick-up Sweeper (1 cu. yd. & over hopper capacity)	8.90	9.55	10.20
Power Plant Engineer (100 KWH & over on multiples equal to 100 KWH and over)	9.45	10.10	10.75
Pumcrete and Concrete Pumping Machine Operator	9.55	10.19	10.85
Straddle Carrier Operator	9.45	10.10	10.75
Tower Cranes - stationary	9.65	10.30	10.95
Tractor Operator, D-2 or similar size and Front End Loader Operator up to 1 cu.yd.	9.19	9.83	10.48
Tractor Operator, Over D-2	9.45	10.10	10.75
Tractor Operator with Boom	9.65	10.30	10.95
Traveling Tower Cranes	10.00	10.65	11.30
Truck and Crawler Cranes up to and not including 150 ft. of boom including jib	9.65	10.30	10.95
Truck and Crawler Cranes with 150 ft. of boom up to and not including 200 ft. of boom including jib	10.10	10.75	11.40
Truck and Crawler Cranes with 200 ft. of boom and over including jib	10.45	11.10	11.75
Truck Crane Oilier	8.90	9.55	10.20
Welding Machine Operator	8.90	9.55	10.20
Well Point Pump Operator	9.45	10.10	10.75

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
Laws 1973 - Chapter 724  
10/1/75

County	Anoka	Cook	Lake	Sherburne
	Carlton	Dakota	Ramsey	Washington
	Carver	Hennepin	St. Louis	Wright
	Chisago	Itasca	Scott	

Truck Drivers

Basic Wage Rate Per Hour

Eff. 10/1/75    Eff. 5/1/76    Eff.

Classifications

	Eff. 10/1/75	Eff. 5/1/76	Eff.
<u>Group 1 (Five axels or more)</u>			
Truck Driver (hauling machinery for Employer's own use, including operation of hand and power operated winches)	\$ 8.25	\$ 8.75	\$ none
Truck Trains	8.25	8.75	none
Mechanic-Welder	8.25	8.75	none
Tractor Trailer Driver	8.25	8.75	none
Off-Road Truck Driver	8.25	8.75	none
<u>Group 2</u>			
Tri Axle Trucks	7.95	8.45	none
<u>Group 3</u>			
Bituminous Distributor Driver	7.85	8.35	none
Bituminous Distributor (one man operation)	7.85	8.35	none
Tandem Axle Trucks	7.85	8.35	none
Slurry Drivers	7.85	8.35	none
<u>Group 4</u>			
Bituminous Distributor Spray Oper. (Rear End Oiler)	7.65	8.15	none
Boom and "A" Frame Driver	7.65	8.15	none
Dumpman	7.65	8.15	none
Greaser and Truck Serviceman	7.65	8.15	none
Pilot Car Driver	7.65	8.15	none
Ready-Mix Concrete Truck Driver	7.65	8.15	none
Tank Truck Helper (gas, oil, road oil & water)	7.65	8.15	none
Teamster & Stableman	7.65	8.15	none
Tractor Oper. (wheel type used for any purpose)	7.65	8.15	none
Self-Propelled Packer	7.65	8.15	none
Slurry Operator	7.65	8.15	none
Single Axle Trucks	7.65	8.15	none

FRINGE BENEFITS - In addition to the wages as set forth herein, an additional 35c shall be paid into the Health & Welfare Fund, plus 45c per hour payable to the Pension Fund, effective 10/1/75.

Effective 5/1/76 - Health & Welfare 40c per hour  
Pension 45c per hour

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

MINIMUM RENTAL RATES FOR TRUCK HIRE

Paid To Those Who Own And Operate The Truck For  
 All Counties Of The State

All minimum rates listed in the following schedule include compensation for all costs of operating such trucks except the owner-operator's wages and workmen's compensation insurance or any other assessments or taxes based on such wages.

TRUCKS, TRACTORS, TRAILERS, ETC.

Trucks, tractors and trailers and trailing units shall be paid for on the following hourly basis. (This shall be payment in full.)

Service/Utility Truck Rates based on manufacturers ratings shall be:

Pickups of all classes	1.50/hr.
1 Ton & 1 1/2 Ton	1.75/hr.
2 Ton	2.10/hr.
2 1/2 Ton	3.00/hr.

Dump Trucks and Trailing units will be paid for on the following basis:

Trucks	5 cy	4.80	9 1/2 cy	8.50
	6 cy	5.30	10 cy	8.85
	8 cy	7.50	12 cy	9.50
	8 1/2 cy	7.80	14 cy	10.35
	9 cy	8.15	16 cy	11.10
			over 16 cy	11.90

Pups 3.90

Special consideration will be given when other than ordinary conditions exist.

Specially equipped trucks shall be paid for at a rate combining equipment and truck rental rates on a monthly basis.

PREVAILING HOURS OF LABOR

The "prevailing hours of labor" for all classes of laborers and mechanics to be employed on State contract highway construction work are eight hours per day and forty hours per calendar week.

UM Health Sciences  
 SURG PATH. C2-5

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka	Grant	Olmsted	Winona
	Benton	Hennepin	Ramsey	Wright
	Big Stone	Houston	Rice	
	Blue Earth	Isanti	Scott	
	Brown	Kanabec	Sherburne	
	Carver	LeSueur	Sibley	
	Chisago	McLeod	Stearns	
	Dakota	Martin	Steele	
	Dodge	Meeker	Todd	
	Faribault	Mille Lacs	Traverse	
	Fillmore	Morrison	Wabasha	
	Freeborn	Mower	Waseca	
	Goodhue	Nicollet	Washington	

Other Building Work

Special Trades

Classification

Asbestos Worker

Basic Wage Rate & Fringe Benefits Per Hour

Eff. 10/1/75    Eff. 6/1/76    Eff.

\$ 9.82    \$ 10.57    \$ none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County Anoka  
 Carver  
 Chisago  
 Dakota  
 Hennepin

Isanti  
 Ramsey  
 Scott  
 Washington  
 Wright

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
 Benefits Per Hour

Eff. Eff. Eff.  
 10/1/75 10/15/75 5/1/76

Classification

Bricklayers/Stone Masons

\$ 10.355 \$ 10.555 \$ 11.155

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County

Aitkin  
 Anoka  
 Beltrami  
 Benton  
 Big Stone  
 Blue Earth  
 Brown  
 Carlton  
 Carver  
 Chisago  
 Clearwater  
 Cook  
 Crow Wing  
 Dakota  
 Dodge  
 Faribault  
 Fillmore  
 Freeborn  
 Goodhue  
 Grant  
 Hennepin  
 Houston

Hubbard  
 Isanti  
 Itasca  
 Jackson  
 Kanabec  
 Koochiching  
 Lake  
 Lake of the Woods  
 LeSueur  
 Lincoln  
 Mahanoma  
 Martin  
 McLeod  
 Meeker  
 Mille Lacs  
 Morrison  
 Mower  
 Nicollet  
 Nobles  
 Olmsted  
 Pine

Pipestone  
 Ramsey  
 Red Lake  
 Rice  
 Rock  
 Roseau  
 St. Louis  
 Scott  
 Sherburne  
 Sibley  
 Stearns  
 Steele  
 Todd  
 Traverse  
 Wabasha  
 Wadena  
 Waseca  
 Washington  
 Wilkin  
 Winona  
 Wright

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
 Benefits Per Hour

Eff. Eff. Eff.  
 10/1/75

Classification

Boilermaker

\$ 11.17 \$ none \$ none

UM Health Sciences  
 SURG PATH C2-6

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Aitkin	Fillmore	Mahnomen	Roseau
	Anoka	Freeborn	Martin	St. Louis
	Beltrami	Goodhue	McLeod	Scott
	Benton	Grant	Necker	Sherburne
	Big Stone	Hennepin	Mille Lacs	Sibley
	Blue Earth	Houston	Morrison	Stearns
	Brown	Hubbard	Mower	Steele
	Carlton	Isanti	Nicollet	Todd
	Carver	Itasca	Nobles	Traverse
	Chicago	Jackson	Olmsted	Wabasha
	Clearwater	Kanabec	Pine	Wadena
	Cook	Xochiching	Pipestone	Waseca
	Crow Wing	Lake	Ramsey	Washington
	Dakota	Lake of the Woods	Red Lake	Wilkin
	Dodge	LeSueur	Rice	Winona
	Faribault	Lincoln	Rock	Wright

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75	5/1/76	5/1/77

Classification

Carpent/Linoleum Layers

\$ 9.52    \$ 10.52    \$ 11.30

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka	McLeod (Eastern part)
	Carver	Mille Lacs (Lower east half)
	Chicago	Pino (Southern part)
	Dakota	Ramsey
	Hennepin	Scott
	Isanti	Sherburne (Eastern half)
	Kanabec (Southern part)	Washington
		Wright

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75	5/1/76	

Classification

Carpenter

\$ 10.11    \$ 10.51    \$ none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1975 - Chapter 724  
 10/1/75

County	Basic Wage Rate & Fringe Benefits Per Hour		
	Eff. 10/1/75	Eff. 10/15/75	Eff. 5/1/76
Anoka			
Carver			
Chicago			
Dakota			
Hennepin			
Isanti			
Kanabec			
McLeod			
Hille Lacs			
Pino (Southern part)			
Ramsey			
Scott			
Sherburne			
Sibley			
Washington			
Wright			
Other Building Work			
Special Trades			
<u>Classification</u>			
Cement Mason	\$ 9.88	\$ 10.08	\$ 10.68

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1975 - Chapter 724  
 10/1/75

County	Basic Wage Rate & Fringe Benefits Per Hour		
	Eff. 10/1/75	Eff. 10/15/75	Eff. 5/1/76
Anoka (Western Part)			
Denton			
Big Stone			
Blue Earth			
Brown			
Carver			
Faribault			
Hennepin			
Jackson			
LeSueur (Western part)			
Lincoln			
Mahnomen			
Martin			
McLeod			
Meeker			
Nicollet			
Scott			
Sherburne (Western part)			
Sibley			
Stearns			
Waseca			
Wright			
Other Building Work			
Special Trades			
<u>Classification</u>			
Electrician	\$ 10.56	\$ none	\$ none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County    Statewide

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
 Benefits Per Hour

Eff.            Eff.            Eff.  
 10/1/75

Classification

Elevator Constructor

\$ 10.56    \$ none    \$ none

Elevator Constructor Helper

7.64            none            none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Aitkin	Hubbard	Pipestone
	Anoka	Isanti	Ramsey
	Beltrami	Itasca	Red Lake
	Benton	Jackson	Rice
	Big Stone	Kenabece	Rock
	Blue Earth	Koochiching	Roseau
	Brown	Lake	St. Louis
	Carlton	Lake of the Woods	Scott
	Carver	LeSueur	Sherburne
	Chisago	Lincoln	Sibley
	Clearwater	Mahnomen	Stearns
	Cook	Martin	Steele
	Crow Wing	McLeod	Todd
	Dakota	Necker	Traverse
	Dodge	Mille Lacs	Wabasha
	Faribault	Morrison	Wadena
	Fillmore	Mower	Waseca
	Freeborn	Nicollet	Washington
	Goodhue	Nobles	Wilkin
	Grant	Olmsted	Winona
	Hennepin	Pine	Wright
	Houston		

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
 Benefits Per Hour

Eff.            Eff.            Eff.  
 10/1/75      11/3/75      5/1/76

Classification

Glazier

\$ 9.76    \$ 9.86    \$ 10.36

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka	Hennepin	Ramsey
	Benton	Houston	Rice
	Big Stone	Isanti	Scott
	Blue Earth	Kanabec (Southern part)	Sherburne
	Brown	LeSueur	Sibley
	Carver	Martin	Stearns
	Chisago	McLeod	Steele
	Dakota	Necker	Todd
	Dodge	Mille Lacs	Traverse
	Faribault	Morrison	Wabasha
	Fillmore	Mower	Waseca
	Freeborn	Nicollet	Washington
	Goodhue	Olmsted	Winona
	Grant	Pine (Southern part)	Wright

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75	5/1/76	

Classification

Iron Worker	\$ 10.72	\$ 11.47	\$ none
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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka	Isanti	Scott
	Benton	Kanabec	Sherburne
	Big Stone	LeSueur	Sibley
	Blue Earth (Northern part)	McLeod	Stearns
	Brown (Northeastern part)	Meeker	Todd
	Carver	Mille Lacs	Traverse
	Chisago (Western part)	Morrison	Wadena (SE/SW part)
	Dakota (Western part)	Nicollet	Wilkin
	Grant	Rice	Wright
	Hennepin		

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75	5/1/76	

Classification

Lather	\$ 10.24	\$ 11.46	\$ none
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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Aitkin Anoka Beltrami Benton Big Stone Blue Earth Brown Carlton Carver Chicago Clearwater Cook Crow Wing Dakota Dodge Faribault Fillmore Freeborn Goodhue Grant Hennepin Houston	Hubbard Isanti Itasca Jackson Kanabec Koochiching Lake Lake of the Woods LeSueur Lincoln Mahnomon Marlin McLeod Necker Mille Lacs Morrison Mower Nicollet Nobles Olmsted Pine	Pipestone Ramsay Red Lake Rice Rock Roseau St. Louis Scott Sherburne Sibley Stearns Steele Todd Traverse Wabasha Wadena Waseca Washington Wilkin Winona Wright
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County	Aitkin (Southern part) Anoka Beltrami Benton Big Stone Blue Earth Brown Carver Chicago Clearwater Crow Wing Dakota Dodge Faribault Fillmore	Freeborn Goodhue Grant Hennepin Houston Hubbard Isanti Jackson Kanabec LeSueur Lincoln Mahnomon Martin McLeod	Mooker Mille Lacs Morrison Mower Nicollet Nobles Olmsted Pine Pipestone Ramsay Red Lake Rice Rock Roseau	Scott Sherburne Sibley Stearns Steele Todd Traverse Wabasha Wadena Waseca Washington Wilkin Winona Wright
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Other Building Work

Special Trades

Basic Wage Rate & Fringe Benefits Per Hour

Eff. 10/1/75	Eff. 11/1/75	Eff.
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Classification

File & Marble Helper

\$ 9.04	\$ 9.24	\$ none
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Marble Setter

9.93	10.13	10.71
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Other Building Work

Special Trades

Basic Wage Rate & Fringe Benefits Per Hour

Eff. 10/1/75	Eff.	Eff.
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Classification

Millwright

\$ 10.13	\$ none	\$ none
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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County Anoka  
 Carver  
 Hennepin  
 Isanti  
 McLeod

Kandoo  
 Scott  
 Sherburne (Southern part)  
 Wright

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
 Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75	11/1/75	5/1/76

Classification

Painters

Brush  
 Structural Steel  
 Spray  
 Swing Stage

\$ 9.65	\$ 10.02	\$ 10.32
<u>10.15</u>	<u>10.50</u>	<u>10.82</u>
<u>10.15</u>	<u>10.30</u>	<u>10.82</u>
<u>10.15</u>	<u>10.30</u>	<u>10.82</u>

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County Anoka  
 Carver  
 Hennepin  
 Isanti  
 McLeod

Mille Lacs  
 Scott  
 Sherburne (Eastern part)  
 Wright

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
 Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75		

Classification

Pipofitter/Steamfitter

\$ 10.31	\$ none	\$ none
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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Basic Wage Rate & Fringe Benefits Per Hour		
	Eff. 10/1/75	Eff. 5/1/76	Eff.
Anoka			
Carver			
Hennepin			
Isanti			
Kanabec			
McLeod			
Mille Lacs			
Scott			
Sherburne			
Sibley			
Wright			
Other Building Work			
Special Trades			
<u>Classification</u>			
Plasterer	\$ 10.31	\$ 10.94	\$ none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Basic Wage Rate & Fringe Benefits Per Hour		
	Eff. 10/1/75	Eff.	Eff.
Anoka			
Carver			
Hennepin			
Isanti			
McLeod			
Mille Lacs			
Scott			
Sherburne			
Wright			
Other Building Work			
Special Trades			
<u>Classification</u>			
Plumbers	\$ 10.29	\$ none	\$ none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Aitkin	Dakota	Lincoln	Pipestone	Todd
	Anoka	Goodhue	Martin	Ramsay	Wabasha
	Benton	Hennepin	McLeod	Rice	Wadena
	Big Stone	Hubbard	Meeker	Rock	Washington
	Brown	Isanti	Hille Laas	Scott	Wright
	Carver	Jackson	Morrison	Sherburne	
	Chicago	Kanabec	Nicollet	Sibley	
	Crow Wing	LeSueur	Nobles	Stearns	

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75		

Classification

Roofers  
 Build-Up  
 Composition  
 Kettelman

\$ 10.11	\$ none	\$ none
<u>10.11</u>	<u>none</u>	<u>none</u>
<u>none</u>	<u>none</u>	<u>none</u>

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka	Kanabec	Wright
	Carver	McLeod	
	Hennepin	Scott	
	Isanti	Sherburne (Southern part)	

Other Building Work

Special Trades

Basic Wage Rate & Fringe  
Benefits Per Hour

Eff.	Eff.	Eff.
10/1/75	11/1/75	5/1/76

Classification

Sandblaster

\$ 9.65	\$ 10.30	\$ 10.62
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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Carver Hennepin McLeod Hecker (Eastern part)	Scott Sibley Wright	Basic Wage Rate & Fringe Benefits Per Hour		
			Eff. 10/1/75	Eff.	Eff.
Other Building Work					
Special Trades					
<u>Classification</u>					
Sheetmetal Worker					
			\$ 11.10	\$ none	\$ none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Anoka Dakota Hennepin	Ramsey Scott Washington	Basic Wage Rate & Fringe Benefits Per Hour		
			Eff. 10/1/75	Eff.	Eff.
Other Building Work					
Special Trades					
<u>Classification</u>					
Sprinklerfitter					
			\$ 10.11	\$ none	\$ none

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Aitkin Anoka Beltrami Benton Big Stone Blue Earth Brown Carlton Carver Chisago Clearwater Cook Crow Wing Dakota Dodge Faribault Fillmore Freeborn Goodhue Grant Hennepin Houston	Hubbard Isanti Itasca Jackson Kanabec Koochiching Lake Lake of the Woods LeSueur Lincoln Mahomes Martin McLeod Mecler Mille Lacs Morrison Mower Nicollat Nobles Olsted Pine	Pipestone Ramsey Red Lake Rice Rock Roseau St. Louis Scott Sherburne Sibley Stearns Steele Todd Traverse Wabasha Wadena Waseca Washington Wilkin Winona Wright
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Other Building Work

Special Trades

Classification	Basic Wage Rate & Fringe Benefits Per Hour		
	Eff. 10/1/75	Eff. 3/1/76	Eff. 5/1/76
Bricklayer Worker	\$ 9.91	\$ 10.11	\$ 10.81
		11/1/75	
Bricklayer Worker Helper	8.89	9.09	9.79

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION  
 Laws 1973 - Chapter 724  
 10/1/75

County	Aitkin (Western part) Anoka Beltrami Benton Big Stone Blue Earth Brown Carver Chisago Clearwater Crow Wing Dakota Faribault Fillmore Freeborn Goodhue Grant Hennepin Houston Hubbard	Isanti Itasca Jackson Kanabec Koochiching Lake of the Woods LeSueur Lincoln Mahomes Martin McLeod Mecler Mille Lacs Morrison Mower Nicollat Nobles Pine Pipestone	Ramsey Red Lake Rice Rock Roseau St. Louis (North ern part) Scott Sherburne Sibley Stearns Steele Todd Traverse Wabasha Wadena Waseca Washington Wilkin Winona Wright
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Other Building Work

Special Trades

Classification	Basic Wage Rate & Fringe Benefits Per Hour		
	Eff. 10/1/75	Eff. 11/1/75	Eff. 5/1/76
Tile Setter/Layer	\$ 9.86	\$ 10.06	\$ 10.64

1.1 DIVISION ONE

A. The requirements of all Sections of Division I apply to and shall govern each Contractor and all Subcontractors for this Project. Where provisions and requirements are referred to as the responsibility of a particular Contractor, or a Subcontractor, he shall have the primary responsibility to accomplish, provide, assume, and enforce, but all Contractors and all Subcontractors shall be governed by the requirements and cooperate fully in fulfilling the requirements.

1.2 GENERAL SUMMARY OF WORK

A. Location: The Project site is located on the Minneapolis Campus of the University of Minnesota, in Jackson Hall of the Jackson Owre Millard Lyon Complex.

B. General Summary: The Work under this Contract consists of furnishing and installing of all labor, equipment, materials and incidentals necessary to the completion of UM Surgical Pathology Renovation Project.

C. Other Contracts: Separate other contracts will be or will have been awarded for the Jackson Owre Millard Lyon Complex Remodeling Projects (JOML-A, JOML-B or Mortuary Science Renovation).

1.3 SCOPE OF WORK

A. Work included: Work of this Contract includes the complete construction of Surgical Pathology Renovation including materials, equipment and installation of work of all trades under a single lump sum Contract.

B. The Contractor shall cooperate and coordinate all of his work with the work of the JOML-A or JOML-B Contractor, and with the University, and shall schedule all of his Work with the other contractors and the University.

C. Singular notations and specifications shall be considered plural where plural application is reasonably inferrable. Mention or indication of extent of work under any work Division of specification Section is done only for the convenience of Contractor and shall not be construed as describing all work required under that Division or Section.

D. The Contractor shall provide a competent supervisor or foreman at the site, as well as qualified workmen, to coordinate with the other contractors and to supervise all installations. If the Contractor does not regularly employ certain required skilled tradesmen required for the installations, he shall employ them, or subcontract the work.

E. The entire installation shall comply with all codes and regulations, including the State of Minnesota Board of Health and the University.

F. Except where reusing of existing materials or equipment is required by the Contract Documents, all equipment and material shall be new, undamaged,

in proper operating condition, serviced and ready for full use of the University after installation.

#### 1.4 LIST OF DRAWINGS

A. The drawings applicable to the Work of this Contract are entitled Surgical Pathology Renovation JOML Complex Remodeling, dated October 25, 1976 and enumerated on Drawing No. A1.

#### 1.5 ADDITIONAL DEFINITIONS

A. Test and Balance Consultant: An independent firm specializing in testing and balancing services of air and hydronic systems in building construction, which will be retained by the University to perform the services outlined in Section 15010.

B. Owner: Where used, the term is synonymous with the University.

C. Site: In general, the term refers to the actual site within the construction limits indicated, adjacent spaces outside the construction limits where work must be performed to complete the Contract, the nearby adjacent spaces indicated as staging/storage areas and the access to these spaces.

#### 1.6 PRECONSTRUCTION CONFERENCE AND SITE MEETINGS

A. After award of contracts, at time designated by the University, the Contractor and key sub-contractors shall attend a Pre-construction Conference at a location in the Metropolitan Twin City area. Government requirements, procedures to be followed, coordination efforts and similar matters will be reviewed.

B. During construction, periodic site meetings will be held under the supervision of the University at times directed by the University. These meetings will be held weekly (unless job conditions do not warrant) and may be held more frequently if job progress and needs indicate. Except when excused as being not necessary due to the status of work, Contractor and all key sub-contractors shall have one or more responsible representatives in attendance. The General Contractor shall be responsible for recording "minutes" of the meeting and distributing them to all interested parties. A separate monthly meeting may be held after the periodic up date.

#### 1.7 START AND COMPLETION

A. The date on the Owner's written notice to proceed or letter of intent shall be the official starting date of the Project, which shall also be the date of the Contract.

B. It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that each date of commencement of work, Substantial Completion and Final Completion as specified in Section 01200 is an Essential Condition of this Contract.

C. The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure Substantial and Final Completion within the times specified. It is expressly



understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for the work. In submitting a proposal, and in accepting a Contract, the Contractor (and subcontractors) are representing and indicating they have analyzed the Project, the materials and methods involved, availability of qualified mechanics and unskilled labor, time of year, their own work load and capacity to perform the Work and are indicating their agreement that the specified completion times are reasonable for the Work to be done, considering Project conditions, materials and equipment involved, usual industrial conditions, climatic conditions prevailing in the locality of the Project, and other factors, with reasonable allowance for variations from typical or ideal conditions.

#### 1.8 COORDINATION, DIMENSIONS AND WORK AREAS

- A. It is imperative and mandatory to schedule and coordinate all activities with the other contractors, all sub-contractors and the University. All equipment for a particular space shall be scheduled, delivered and installed as soon as the space is sufficiently complete to receive the installation.
- B. Should field dimensions be required, the Contractor and sub-contractors shall cooperate to obtain or provide them. Each Contractor shall cooperate in obtaining dimensions to prevent fabrication delay. In the event it is impractical to have work in place to permit field dimensions, the appropriate Contractor shall guarantee necessary dimensions, to the various fabricators and be responsible to insure the dimensions.
- C. Storage areas and work spaces (other than the spaces being remodeled) at the project site are virtually nil. The Contractor shall utilize off-site storage until deliveries can be made directly to the proper room locations, for installation immediately after delivery. The Contractor shall alert and advise subcontractors and suppliers of the need to hold deliveries until they are notified the materials are required.
- D. The Contractor shall confine his unloading, unpacking and storage at the site to areas as directed by the University. In general, assembly and similar installation activities shall be confined to the particular location or space for the installation, unless specifically approved by the University.
- E. The Contractor shall cooperate with other contractors, with due respect for the methods and schedules of the others, and shall work in close coordinated effort to the benefit of the completion of the Project and so as not to delay or impede the work of other contractors. In the event of conflict or need to establish priority, the University shall make the determination of the precedence or other required decision to the benefit of the overall Project and its progress, which shall be binding on all contractors.
- F. All work shall be accomplished to cause a minimum of disruption of the University's activities, uses, functions and programs in the building, as approved by the University.

G. Contractor shall take particular care to schedule the installation of waste lines and related cutting and patching of basement ceiling so as to work from one end of the building to the other with the least possible disturbance in the smallest area at any one time.

H. The Mortuary Science Cooler and the adjacent Prep Room (Rooms 88.1 and 88.2) may not be shut down for more than 72 hours for installation of waste lines for Surgical Pathology project overhead. Contractor shall take all measures necessary to so limit the downtime for these spaces.

#### 1.9 PERMITS AND FEES

A. Refer to Paragraph 4.7 of the General Conditions. The University will obtain and pay for all permits and connection charges of the State, City of Minneapolis and utility companies, at no cost to the Contractors, except as noted in C. following.

B. The University will pay all fees to the State, as may be required for review and inspection services.

C. The Contractors shall make their own arrangements, and pay any charges including parking costs and bonds, for use of public streets or roads in transporting, loading/unloading or use of construction equipment on the streets.

#### 1.10 USE OF ELEVATORS

A. The free use of elevators will be allowed by the University. However, elevator use must be scheduled in advance with the University, to avoid conflicts with other University functions.

B. The University will direct which elevators may be used, and the time of use. No elevator shall be loaded above its rated capacity.

#### 1.11 CONTRACT DOCUMENTS FOR THE CONTRACTOR

A. The Contractor will be provided, free of charge, sixteen (16) sets of drawings and specifications. Additional sets may be obtained at the cost listed in the Instructions to Bidders as the "Deposit" amount. (No refunds will be given). Subcontractors shall obtain sets from the Contractor; free sets will not be issued to Subcontractors by the Architect/Engineer or University.

#### 1.12 CONDITION AND CARE OF SITE AND PROJECT

A. Refer to Article 4.14 of General Conditions. From the time the Contractor and subcontractors for this Project commence work at the site until their Contracts are completed, Contractor (and/or subcontractor) is responsible for the care of the site and Project to the extent his work, acts, operations or use of the site affects the site and Project, subject to the rights of the University and the University's workmen thereon.

B. The Contractor shall confine his apparatus, materials, equipment, shacks and operations of workmen to the site limits indicated on drawings or otherwise imposed by law or ordinance. The site and Project shall not be unreasonably encumbered with materials and equipment. Neat and orderly stockpiling and other operations shall be maintained and debris shall be regularly removed from the building. Before any work is started, Contractors shall meet with the University and agree to the use of available areas for storage. The Contractors shall then confine their storage and operations to said agreed limits and to University directions.

C. All improvements in or about the building which are not shown to be altered, removed or otherwise changed shall be restored to the conditions which existed previous to starting work. All existing buildings, structures, or other features shall be protected from damage by any operation in connection with the Project. Each Contractor shall replace or repair, at his own expense (and to the satisfaction of the University), all damage to existing buildings, sidewalks, curbs, drives, lawns, plants, trees, shrubbery, and other property resulting from work of his Contract, from whatever cause.

D. The General Contractor shall install and maintain temporary board or plank protection at all sides of openings in finished or exposed construction where materials may be moved, including (but not limited to) sills and jambs of door, window or similar openings through which material may be passed. Any damaged surfaces shall be removed and replaced as directed.

E. Utilities or other services which are shown, or not shown but encountered or otherwise found, shall be protected by the Contractor from any damage from excavation or other work and operations of this Contract, unless or until they are abandoned. If the utilities or services are not abandoned, or to be abandoned, the Contractor shall immediately restore any damage from his work or operations to place the utilities and service in an equal or better condition to that which existed. Where utilities or services are shown to be abandoned or moved, they shall remain in service, and be protected by the Contractor, until new utilities and services have been provided, tested and are ready for use.

F. Insofar as practicable, the drawings indicate all existing systems which must be removed and/or relocated to provide proper clearances for new work. If, however, the Contractor finds existing work, not noted for removal, which interferes with the new work, he shall immediately notify the University and request instructions. In no case will additional compensation be allowed for removal or relocation work pursued without instruction nor for correction of errors resulting from such work without instruction.

G. The normal functions of the University and Campus shall not be disturbed, except within the construction areas of this Contract. Except when work is in progress at areas indicated for Work to be performed, or as otherwise necessary to complete the Contract, all walks, driveways, parking areas, and entrances shall be kept clear and free of all Contractor's equipment, material and debris at all times. Remove debris promptly.

H. The University will continue to occupy the surrounding areas and buildings and continue the normal functions, including parking and delivery. The University's employees and staff shall have full access to surrounding areas and shall be allowed to perform their duties therein without any restriction.

I. The University reserves the right to let other contracts in connection with this Project, with JOML Complex, or in connection with existing buildings. This Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and execution of their work, and shall properly connect and coordinate his work with theirs.

#### 1.13 WORK IN AND AT EXISTING AND OCCUPIED BUILDINGS

A. Refer to Section 01200 for constraints, schedule and timing requirements and 01910 for temporary closures for work in and around existing buildings.

B. In addition to the commencement and completion of work at various areas being scheduled in the Contractor's Construction Schedule, the Contractor shall verify the timing and advise the University in advance of work in all existing and occupied spaces, to permit the spaces to be vacated and related arrangements to be made. Occupied spaces will require longer notice periods.

C. Materials and equipment shall be assembled, including that of subcontracts, and subcontractors committed to a firm schedule, prior to commencing work to accomplish the work as expeditiously as possible. After work commences in any existing space it shall be continued without interruption to completion, except where work phases require otherwise.

D. All work shall be accomplished to cause a minimum of disruption of the University's activities, uses, functions and programs in the building, as approved by the University.

#### 1.14 LAYOUT OF THE WORK

A. Contractor shall correctly locate his work in relation to the existing building features, to all requirements imposed by the drawings and good construction practice. Contractor shall verify the locations of all existing work to which his Work must fit and all lines, levels and dimensions shown on the drawings and report any errors or inconsistencies in above to University before commencing work.

B. As the Work progresses, the General Contractor shall lay out the exact location of partitions and similar features, as guide to all trades.

C. The Contractor shall recognize that the drawings necessarily are diagrammatic, in many instances. All work and in particular exposed piping, ducts, conduit and similar items shall be neatly and carefully laid out to provide the most useful space utilization and the most orderly appearance. Piping and similar work shall be installed as close to ceilings and walls as conditions permit, located to prevent interference with other work or with the use of the spaces in the manner required by the functions of the room and staff. Valves shall be located in inconspicuous places. Before proceeding with any work, particularly where exposed, the Contractor shall carefully plan the layout and review it with the University for acceptability of location.

### 1.15 REFERENCES TO STANDARDS AND CODES

A. If the Contractor observes that the drawings and specifications are at variance with any applicable code or regulation of a governmental unit having authority, he shall promptly notify the University and Architect in writing, and any necessary changes shall be adjusted as provided in the Contract for Changes in the Work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the University, he shall bear all costs and damages arising therefrom.

B. The standards referred to, such as ASTM, Federal Specifications and similar standards, shall have full force and effect as though printed in the specifications, except as modified in the specification. These standards are not furnished to bidders and the Contractor as it is assumed that manufacturers and trades involved are familiar with their requirements.

C. Any material specified by reference to the number, symbol or title of a specific standard, such as ASTM, Commercial Standard, a Federal Specification, a trade association standard, or other similar standard, shall comply with the requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of The Contract Documents, unless otherwise noted.

D. For products specified in accordance with a Federal Specification, ASTM Standard, American National Standards Institute or similar association standards, upon request the Contractor shall provide an acceptable affidavit by independent testing laboratory, or other source approved by the University and Architect, certifying that product furnished for this Project complies with particular standard specifications. Where necessary, requested or specified, supporting test data shall be submitted to substantiate compliance. The manufacturer is subject to Architect's acceptance.

### 1.16 CHARACTER OF WORK, MATERIALS AND INSTALLATION

A. The Work shall conform in all respects with requirements of all Contract Documents, and workmanship shall be first quality, the best obtainable at the present state of the crafts. Incompetent or careless workmanship shall not be permitted by the Contractor and will not be accepted by the University.

B. If, in opinion of the Contractor (or any Subcontractor) any Work is indicated on drawings or specified in such manner as to make it impossible to produce Work of highest quality, within space shown, or which may be considered improper for use and conditions, including the effects of expansion and contraction, or should discrepancies appear between drawings, or drawings and specifications, the Contractor shall refer same to the University and the Architect before proceeding. If the Contractor does not request such interpretation, no excuse will be entertained thereafter for failure to carry out and guarantee the Work in a satisfactory manner. Elements of the Work intended to protect against weather shall be guaranteed weather and water tight.

C. Proper performance of the Contract shall imply, among other things, correct and proper placement, proper or published results for products and equipment, fitting and operation of fixed or movable and operating parts of the Work, including doors, windows, hardware and all systems and equipment. All materials and equipment shall be complete in every respect, with all parts, connections, anchors, devices, backing, fittings and other necessary items, and shall be completely installed, anchored, fitted and placed in operating condition. Before buying, constructing or installing work, the Contractor shall notify the University and the Architect of any conditions which may exist in the Contract Documents which will affect proper operation or first quality installation.

D. Throughout project, various materials and pieces of equipment are fitted to others, various materials are applied to which other materials attach and similar installation relationship. Each manufacturer, Contractor and sub-contractor shall take all reasonable precautions to insure his materials, devices, items, equipment or other products can be satisfactorily applied or installed to each other or work of others and he shall make necessary adjustments during preparation of shop drawings or in advance of field or shop work to accommodate other work to prevent unsatisfactory items or installation.

E. All materials or equipment shall be installed or applied according to directions of the manufacturer or recommendations of an association dealing primarily with materials, unless specifically designated otherwise. In no case shall the installation, including any temporary work necessary (i.e. shoring), be below the standard recommended by the manufacturer. Where specified requirements exceed the manufacturer's standards, the specification shall govern. Fabrication (including reinforcing and accessories) and installation shall be provided to insure proper placement and use of the item or material under the location, use, condition and available space to serve intended function and to meet code requirements.

F. Equipment and devices shall be provided and installed to "fail safe" in all circumstances and it shall be Contractor's obligation to provide and install work in such manner.

#### 1.17 GUARANTEES

A. In addition to the general one year guarantee on all Work under this Contract, any extended guarantee of the manufacturer on any item shall be provided to the University as a part of this Contract, and shall remain in force and effect for the University.

B. The Contractor shall complete all manufacturer's warranty registrations for all items, components and units so warranted, and shall file copies of the warranties with the University. Manufacturer's standard warranties for periods shorter than one year shall not limit the one year guarantee period by the Contractor as required under the Contract.

## 1.18 PROPOSED MATERIALS AND EQUIPMENT

A. Refer to Article 12 of the Instructions to Bidders, Paragraph 7.13 of the General Conditions and Article 2.3 of Section 01300, Submittals. The Contractor shall provide materials, articles, equipment, systems and other items (products) that have been specified, or listed in addenda, under the specified conditions and criteria. Requests for the use of alternate products after bids have been received will not be considered, nor changes allowed in the accepted list of products, except when the specified or accepted product subsequently is determined as not meeting the requirements of the Contract Documents or the product becomes unavailable, and then only under the following conditions:

1. The Contractor (or subcontractor) has placed orders for the specified materials and equipment (products) promptly upon award of contract and acceptance of list. No excuse or proposed substitution will be considered for products due to unavailability unless proof is submitted that firm orders were placed immediately.

2. The reason for unavailability is beyond the control of the Contractor. Unavailability will be construed as being due to prolonged strikes or lockouts which will seriously delay the entire Project to an extent the University finds unacceptable, bankruptcy of product manufacturer, discontinuance of manufacture of a product or Acts of God.

3. The request for the use of an alternate product is submitted in writing within 10 days after the date the Contractor has ascertained the product does not comply with the specifications or has become unavailable, accompanied by supporting evidence.

4. The Contractor proposes to use an alternate product that was specified or listed in an addendum, along with complete data on the product.

5. There is no extra cost to the University.

6. The alternate product is acceptable to the University and Architect.

B. If, after acceptance of the Contractors proposed list of materials, required under Section 01300, by subsequent evidence or investigation the University or Architect determines a product has been misrepresented and will not comply with, or perform in accordance with, the Contract Documents, they shall have the right to require a change to a complying product without increase in cost to the University.

## 1.19 PROTECTION IN GENERAL

A. Refer to Article 10 of the General Conditions, Section 01500 and other Articles of this Section 01010 for more specific requirements. The University may require the Contractor to provide additional protection, where protective measures appear inadequate, but assumes no obligation to do so nor any responsibility of the Contractor to provide all protection required for persons or property.

B. When it is noted or specified for a particular Contractor to provide protection; it is the intent that Contractor provides the basic routine or normal protection, but shall not be construed to establish the total responsibility, as each Contractor shall have the protection responsibility as affected by his Work, labor, operations, materials, equipment spaces and similar conditions.

C. Each Contractor shall provide protection for all his own equipment, hoists, and other facilities, used in the prosecution of the work to prevent operation by unauthorized personnel.

D. The General Contractor shall provide visual barriers at installed glass (including existing) which conceivably could be walked into, or otherwise damaged by construction operations, using boards or similar protection, not by tape or marks on glass.

E. Each contractor shall take particular note that spaces in and adjacent to, above and below the work areas have high cost and delicate laboratory equipment in them. Contractors shall exercise every caution necessary to protect such equipment and each shall be held full responsible for repair and for replacement of any equipment damaged incidental to the performance of the work.

#### 1.20 EQUIPMENT LAYOUTS AND ROUGH-IN

A. It is the intent that for equipment for the Project full layout and rough-in data is to be provided by the Contractor or subcontractor supplying the equipment, to the Contractors requiring the data, in sufficient time to facilitate proper and accurate rough-in, in so far as practicable. For existing equipment of the University, the University will provide the rough-in data.

B. When rough-in details are not available at the time service systems are being installed (either from the University or from other Contractors) the final rough-in shall be postponed until the data is available.

C. At core drilled holes, the specified sleeves will generally be required, except where the omission is specifically approved by the University. Refer to Article 1.24, this Section. Where omission of a sleeve is approved, the hole shall be drilled approximately one inch larger than the outside diameter of the pipe or conduit, or one inch larger than the outside diameter of the insulation, where insulated. When the pipe is installed, centering wedges shall be inserted to insure the pipe remains in the center of the hole, with the wedges held down one inch minimum below the floor line. An approved rod-stock backing for sealant shall be inserted around the pipe, held down 1/2 inch below the floor. Sealant shall then be applied, level with the floor at the concrete edge, sloped up about 20 degrees to the pipe to form a water-shed. The sealant shall be a two-part urethane type, Eternaflex or approved equal, with a Shore A hardness of 40 to 50, color as selected by Architect. All sealant work shall be provided by the Contractor installing the pipe or conduit and shall be installed in accordance with the workmanship provisions, including clean surfaces, of Section 07900 of these specifications.



## 1.21 FIELD DIMENSIONS FOR CASEWORK AND EQUIPMENT

A. The need to obtain accurate field dimensions in ample time to permit fabrication of casework and equipment, for delivery and installation in accordance with the schedule, shall be recognized. Each Contractor shall cooperate in completing work phases to accommodate the schedule for obtaining dimensions and to prevent fabrication delay. In the event it is impractical to have work in place to permit field dimensions, the Contractors shall guarantee necessary dimensions, before construction, to the various fabricators and be responsible to insure the dimensions.

## 1.22 SPECIAL REQUIREMENTS AND CAUTIONS

A. Refer to Sections 01200 - Contract Time, 01300 - Submittals, 01500 - Temporary Facilities 01910 - Cutting, Removal and Patching, other articles of this Section and technical sections for other special requirements.

B. In deference to the welfare of patients in adjacent hospital buildings, no operations creating loud noises will be allowed between the hours of 8:00 P.M. and 7:00 A.M. This shall include such operations as jack hammering and other noisy operations and equipment.

C. Any work required outside the normal working hours (8:00 A.M. to 5:00 P.M.) shall be specifically scheduled with and approved by the University Hospitals Administration.

D. It is the intent that spaces are generally complete prior to the installation of casework and similar equipment, except for the final coat of wall paint, floor tile and base, final connections to equipment and installation of electrical outlet plates. The subcontractor shall accomplish their work to have spaces generally complete to reduce potential damage to equipment and casework through a minimum amount of work over and around casework and equipment.

E. After the installation of casework and equipment, care must be exercised to prevent marring of surfaces or other damage. Work over and around casework and equipment is to be minimized by completing as much work (except necessary finishing of painting, floor covering and final connections) as possible prior to casework and equipment installation. During any subsequent work, protect the casework and equipment, including from paint spatters or other spatters or other soil. During work around or over the casework or equipment, provide hardboard covers on tops and cover the casework and equipment to extent necessary to insure prevention of scratches, dents or other damage. The Contractor performing the follow-up work shall provide the protections.

F. Where work is performed over finished floors (ie: ceramic tile, terrazzo, concrete, VAT) or where the area is used as a passage, provide hardboard or plywood cover to protect against damage or stains. Covering at passages to be provided by General Contractor. At other locations, covering shall be provided by the Contractor performing the work.

G. Certain finishing operations may occur over installed carpeted areas. The General Contractor shall protect carpet from damage during these operations by covering (as a minimum) with heavy duty, non-staining reinforced covering and maintain free from holes or gaps. At hard use areas, such as passages, also provide hardboard or plywood surfacing to prevent damage. All Contractors shall use extreme care in working over carpeting, and its covering, and any damage or stains caused shall be paid for by the responsible Contractor.

H. At no time shall Contractor's vehicles be allowed to obstruct traffic on the streets or sidewalks adjacent to the site nor to drive over any sidewalk unless it has first been planked to protect from overloading.

### 1.23 ANCHORAGE, SUPPORTS AND SLEEVING

A. The requirements of technical sections of the specifications or as shown on drawings, which are more specific or in excess of the general requirements herein, shall take precedence over these general requirements.

B. The Contractor and his subcontractors shall furnish and install proper anchorage devices to securely and in the best manner, fasten, hang, mount, anchor, support all work in a neat and substantial way. Unless otherwise specified, subcontractors shall furnish all devices for fastening their work together and for fastening to the structure.

C. The Contractor and each subcontractor shall furnish and install all their own sleeves, anchors, inserts and other devices as work progresses to accommodate their own materials or work. Methods and devices, as well as location, may be subject to the Architect's and University's approval and shall not impair, violate or alter structure, water integrity or aesthetic value of the Work.

D. In general, provide bolts and shields for anchorage to solid materials, toggle bolts into hollow construction or through bolts and washers where necessary, unless otherwise shown or specified. Wood plugs into solid materials, toggle bolting to vertical lath and plaster, or bolting into shields at hollow units, will not be acceptable. The Contractor shall provide adequate backing for all fastenings and supports to prevent pull-out, deflection or undue stresses. For concrete, anchorage devices shall generally be cast-in, not drilled in later, unless otherwise specified.

E. At concrete, shot or drilled-in anchor devices will be permitted provided they will not damage the concrete or cause any spalling around the anchor. Shot anchors will not be permitted in bottoms of joists, in the underside of slabs 4" or less in thickness nor where spalling may result. Any shot anchors at concrete joists shall be at the side of the joist, above center-line. A representative number of anchors shall be field loaded above anticipated loads to insure their adequacy. Drilled-in expansion anchors, which have the same hole size as the bolt size, such as "Kwik-Bolt" or "Wej-it" will be permitted provided there is no spalling around the holes, the holes are neatly drilled and approved test reports indicate adequate shear and pull-out strength with ample safety factor.

F. Sleeves shall be provided for all pipes, conduit and similar features that pass through walls or floors, whether specifically indicated or not. (No sleeves permitted thru columns). Sleeves shall be provided by the Contractor or the Subcontractor requiring the hole for his work. At all concrete penetrations, sleeves shall be uncoated or galvanized pipe, not less than Schedule 40 steel pipe. At exposed or concealed masonry walls, sleeves shall be same as for concrete penetrations. Unless otherwise called for, sleeves shall be 1/2" greater in inside diameter than external diameter of pipe (including insulation), or conduit passing through the sleeves. All sleeves shall be of new material, cut square, reamed. Unless otherwise called for: sleeves through walls shall extend full thickness of wall and be cut flush with finished surface; sleeves through floor slabs for piping where piping or conduit will be exposed shall extend 1/2" above finished floor except at potentially "Wet areas" (Laboratories and similar spaces) the sleeves shall extend 1-1/2" above finished floor; where concealed, sleeves through floor shall be cut flush with floor. In no case shall sleeves impair the structural capability of the Work.

G. Sleeves at core drilled holes shall conform in dimension, material and height to the requirements of paragraph F above. The sleeves shall provide a good fit to core drilled hole and shall be set in place with a full coating of approved epoxy adhesive to insure remaining in place and a good seal between the hole and the sleeve.

H. As pipe, conduit or other feature is installed through a sleeve, it shall be wedged to keep in the center of the sleeve, with wedges held 1" back from end of sleeve. Pipe, conduit or other features through walls or other vertical surfaces, shall be caulked both sides of wall, exposed or concealed. Pipe, conduit or other features through floors and roofs shall be caulked at the top in all cases, and at the bottom where exposed in a finished space. An approved rod-stock backing for sealant shall be inserted around the pipe, conduit or other feature, held back 1/2 inch from end of sleeve. Sealant shall then be applied, sloped up about 20 degrees to the pipe to form a watershed. The sealant shall be G. E. Silpruf Sealant, or approved equal, with a Shore A hardness of 40 to 50, color as selected by Architect. All sealant work shall be provided by the Contractor installing the pipe or conduit and shall be installed in accordance with the workmanship provisions, including clean surfaces, of Section 07900 of these specifications. At all penetrations through roof and floor slabs, fire and smoke rated walls or partitions and shaft or core enclosing walls, the space between the sleeve and pipe shall be provided with an approved fire stop. Prior to placing the rod stock backing and sealant, insert Johns-Manville, Cerablanket-FS ceramic fibre blanket insulation filling the entire space between sleeve and pipe or conduit, a minimum of 1-1/2" in depth. Hold back from edge of sleeve to allow for rod stock backing and sealant. Installation shall be made to maintain an effective fire stop. (Cerablanket material available from Tremco).

#### 1.24 CLEANING UP

A. Refer to Paragraphs 4.16 and 6.4 of the General Conditions and Section 01700, Project Closeout. It is the intent the building spaces be maintained in clean, neat and free of debris at all times.

B. In addition to removing rubbish, waste materials, packing materials and other debris as it is generated, the job site shall be cleaned up by noon each Friday. Contractor shall assign sufficient labor to accomplish the cleanup. In the event the Contractor fails to maintain the building clean and free of debris, the University will have it done by others and assess the cost to the Contractor.

C. At least monthly, the General Contractor shall sweep or vacuum the floors of the building areas of work. The General Contractor shall sweep or vacuum the major access areas (entrances, elevator lobby, major traffic corridors, and similar areas) as often as necessary to keep them reasonably free from dirt and debris as approved by the University.

D. During finishing operations in particular, care shall be taken by each sub-contractor to remove his debris after working in a partially finished space. The General Contractor shall continue to sweep or vacuum the areas as specified under C above, and he shall require his sub-contractors to remove stacks or piles of cartons, rubbish or debris.

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## PART 1: GENERAL

- A. This section describes the limits of the requested alternates to the basic contract work. Refer also to the technical specifications and drawings for the various trades for information pertaining to the work of each alternate.
- B. The Owner may, at his option, vary the scope of the Work by ordering alternates which either add to or deduct from the work, or he may substitute materials, equipment or methods by ordering materials alternates.

1.2 GENERAL REQUIREMENTS

- A. Each proposal under an Alternate shall include work of all trades as they may be affected and all adjustments to accommodate the changes shall be made. All work shall meet the requirements of drawings and specifications. In submitting the Proposal and in accomplishing the Work, provisions for future work or future completion shall be made, unless otherwise stated. All work shall be provided in accordance with appropriate details and specification sections, and provided (or omitted as appropriate) by the subcontractor for that section.
- B. Each alternate proposal shall be submitted as an individual cost for the particular Alternate (not accumulative) and shall be proposed under the premise no other Alternates have been accepted. Should the work of an Alternate called for by the Bid Form not affect the cost of the work, "No Change" shall be stated.
- C. Materials Alternates may be accepted by the Owner in any order and will not be used to determine the low bidder.
- D. Each bidder shall submit a proposal for each Alternate.
- E. Alternates of Scope are numbered and listed for the entire project in the order in which they will be accepted, whether or not they affect each separate trades. Each numbered Alternate as a whole, will be deductive, resulting in a reduction of the Project cost, even though the work for one of the separate trades involved may be additive.
- F. Each Bid under an Alternate shall include the work of all trades as they may be affected and all adjustments to accommodate the changes shall be made. All work shall meet all the requirements of the Contract Documents, including drawings and specifications.
- G. In submitting the Bid and in accomplishing the Work, provisions for future work or future completion shall be made, unless otherwise stated. All work shall be provided in accordance with appropriate details and specification Sections, and provided (or omitted as appropriate) by the subcontractor for that Section.
- H. Alternates of Scope accepted by the Owner will be used to determine the low bidder. Materials Alternates are to provide Owner's options and will not be used to determine low bidder.

X  
1. The University reserves the right to selectively reinstate the work of any accepted deductive alternate by written order at the deductive price at any time up to one hundred twenty (120) days after receipt of bids.

PART 2: DESCRIPTION OF ALTERNATES OF SCOPE

2.1 DEDUCTIVE ALTERNATE NO. 1

A. Omit entire fume hood, cabinet and all related duct work from Room 192.2.

2.2 DEDUCTIVE ALTERNATE NO. 2

A. Omit entire ventilating bench and related ductwork from Room 196.i.

2.3 DEDUCTIVE ALTERNATE NO. 3

A. Omit all work in offices and screening rooms, Rooms 196, 196.3, 198.1, 198.2 and 198.3.

2.4 DEDUCTIVE ALTERNATE NO. 4

A. Omit all resilient flooring. Provide resilient base at all walls and cabinet bases.

2.5 DEDUCTIVE ALTERNATE NO. 5

A. Omit all acoustical lay-in ceilings. Use same light fixtures except chain hang.

PART 3: DESCRIPTION OF MATERIALS ALTERNATES

3.1 SUBSTITUTION ALTERNATE A

A. Refer to Section 08700. Substitute Corbin Series 7500-3/4 Locksets and Latchsets for the specified locksets and latchsets.

3.2 SUBSTITUTION ALTERNATE B

A. Refer to Section 08700. Substitute Russwin A23000 Series Locksets and Latchsets for the specified locksets and latchsets.

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## PART I: GENERAL

1.1 BASIS FOR PAYMENT

- A. Refer to the Bid Form and General Conditions Article 9.
- B. The basis for payment is a lump sum for all work under the Contract, to be paid in increments as the progress of the Work permits. Adjustments in the lump Contract Sum will be made only pursuant to, and upon approval of Change Orders in accordance with Article 12 of the General Conditions.
- C. The University will make payment directly to the Contractor in accordance with the General Conditions and the conditions specified herein.

1.2 SCHEDULE OF VALUES

- A. Refer to the General Conditions, Paragraph 9.2
- B. The form and detail of the Schedule of Values (cost breakdown) shall be acceptable to the University and shall provide the means for simple and ready monitoring of the Work satisfactorily completed and eligible for payment. The Schedule shall provide the means for evaluating the extent of completion of each line item and the quantities of products, equipment or materials, as well as determining the state of completion of other costs incorporated into the Contract Sum.
- C. The Contractor shall develop a Schedule of Values for review and acceptance by the University and revise as may be required by the University. The Schedule of Values shall bear a sworn, notarized statement by an officer of the contracting firm that the Schedule of Values represents a true and accurate allocation of costs of the Contract Sum and that each item includes its proper share of overhead and profit.
- D. The costs of General Conditions and Division 1 items (i.e.: bond, insurance, temporary facilities, etc.) and similar non-material costs shall be listed individually, with unit or increment quantities and their prices where applicable.

1.3 PROGRESS PAYMENTS

- A. Refer to General Conditions, Paragraph 9.3.
- B. On the first Request for Payment, the University will make payment for the value of the Performance Bond and similar lump sum cost items which must be paid in full by the Contractor at the start of the Work. Thereafter, no further payments will be made until a bona-fide and substantial on-site start has been made.
- C. Progress billings (Requests for Payment) shall indicate the detailed and itemized costs of the Work for which the current Request for Payment is made and a summary total of costs previously billed and payments made.

#### 1.4 RETAINAGE

- A. Refer to General Conditions Subparagraphs 9.3.7 through 9.3.12.
- B. Ten percent (10%) of the satisfactorily completed work of the Schedule of Values, as approved by the University on Requests for Payment, will be retained until 75% of the work is satisfactorily completed. Thereafter, no additional sums will be retained.
- C. If at any time after the reduction in any retained percentage, there appears reasonable evidence that the work is not proceeding satisfactorily, including materials and workmanship, or the work is not on schedule, the University may again retain such amounts as it deems necessary to protect its interest until such time as all requirements for reducing the retainage are again satisfied.
- D. Final payment of retained amounts will be made after final completion of the Work of the Contract except as provided in Paragraph 9.7.5 of the General Conditions.

#### 1.5 UNIVERSITY EXAMINATION

- A. Refer to General Conditions, Subparagraph 9.3.5. Any materials or equipment the University agrees to pay for in off-site storage, shall be stored in the Metropolitan Twin City Area. Upon submittal of a Request for Payment for materials in the Contractor's off-site storage, the University will examine the materials, with travel cost, any subsistence and time of University personnel paid by the University. The Contractor shall provide access, facilities and assistance to verify the accuracy of the materials claimed as complete, relating to the Schedule of Values.



## PART 1: GENERAL

1.1 GENERAL REQUIREMENTS

A. Refer to General Conditions, Article 8, for general requirements and conditions relating to the contract time, commencement of the Work, progress, completion and delays. Refer to Sections 01010 - General Requirements, Section 01300 Submittals, Section 01500 Temporary Facilities, Section 01700 - Project Closeout and Articles of this Section which relate to the commencement, schedule, progress and completion of the Work.

B. The Work shall be prosecuted regularly, diligently, without interruption or shutdown at such rate of progress as will insure Substantial and Final Completion within the Contract Time. By execution of the Contract, the Contractor represents he has analyzed the Project, the materials and methods involved, the systems of the building, availability of qualified mechanics and unskilled labor, restrictions of the site, constraints imposed, his own work load and capacity to perform the Work and indicates his agreement that the specified completion times are reasonable considering the Project conditions, usual industrial conditions, climatic conditions prevailing in the locality of the Project, and other factors, with reasonable allowance for variations from average, typical or ideal conditions.

## PART 2: COMMENCEMENT AND COMPLETION OF PROJECT

2.1 COMMENCEMENT OF WORK

A. The Contractor shall commence the Work at the site as soon as possible after required and proper insurance evidence has been submitted to the University. All submittals shall be prepared and submitted by the specified times and temporary heat, light and power shall be installed where required, without delay.

B. The Contractor shall commence construction within 14 days after the University's Notice to Proceed or execution of the Contract, whichever occurs first. Commencement of demolition work will be acceptable as a bona-fide start.

C. Within 14 days after execution of the Contract, the Contractor shall submit to the University proof of the placement of equipment orders and confirmation of the delivery schedule by the manufacturer. The evidence shall consist of copies of the orders, with delivery schedule specified, and copies of the manufacturer's confirmations that deliveries will be made on schedule.

2.2 COMPLETION SCHEDULE

A. Refer to General Conditions Subparagraphs 7.1.5 and 7.1.6 for definitions of Substantial Completion and Completion. Within the framework of the general definitions, the University shall be the judge of the status of completion. The definitions shall apply to the Project as a whole as well as separable spaces or areas where the University may assume beneficial occupancy or use of the facilities.

B. At any space or area specified, or later scheduled, to be occupied or used by the University before the entire Project is complete, all elements and systems of the Work shall be substantially complete in these areas by the scheduled time. Systems shall be tested, balanced or otherwise placed in full and proper operating condition.

C. Substantial Completion of the entire Project shall be accomplished on or before 150 calendar days after Notice to Proceed or execution of Contract whichever is earlier.

D. Final Completion of the entire Project shall be accomplished within 15 days after Substantial Completion. Final Completion of any area or space occupied or used by the University prior to completion of the entire Project, shall be accomplished within 14 days after the specified or scheduled substantial completion, unless otherwise approved by the University.

E. In addition to the time of commencement, substantial completion and final completion dates, other events, factors, and constraints shall be carefully considered in establishing the work progress for the Project. The contractors and subcontractors shall work closely in timing of operations and shall have materials, equipment and other elements ready (in off-site storage, where necessary) to be able to immediately fulfill their obligations in the overall schedule. Consideration shall be given the time required for the Owner to move in the Project, as well as the work that follows various installations.

### 2.3 EXTENSION OF TIME

A. Refer to General Conditions, Paragraph 8.3, for requirements for time extensions. Time extensions will be allowed only for the portions, phases or elements of the Work affected by the enumerated conditions for valid delay. Extension of the time for completion of the entire Project will be allowed only for such valid delays as will affect all Work of the Contract.

## PART 3: TIMING OF WORK

### 3.1 CONSTRUCTION SCHEDULE

#### A. Initial Schedule:

1. Within ten (10) days after issuance of Notice to Proceed or execution of the Contract, whichever comes first, the General Contractor shall prepare the Construction Schedule for scheduling and management of the Project.

2. Within fifteen (15) days from the Notice to Proceed, the General Contractor shall provide the Architect, the Owner, and all sub-contractors with copies of the Schedule.

3. The Construction Schedule shall contain detailed representation of all significant aspects of the construction plan, including, but not restricted to, demolition and removal, cutting and patching, interior finishing, electrical and mechanical work, casework, equipment, shop drawings submittal, review and revision, materials delivery, and acquisition and installation of special equipment and materials. A weekly time period shall be followed for all activities.

4. The Construction Schedule shall generally conform to the Schedule of Values required under the General Conditions and Section 01150 so that progress can be monitored and compared with application for payment.

B. Updating Schedule:

On a set date each month, established by Contractor in cooperation with University, Contractor shall revise his schedule, as necessary to reflect actual progress and correct for critical delays in the work and return the work to a satisfactory schedule. Each schedule revision shall be submitted to the University for his use in monitoring progress.

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## PART 1: GENERAL

1.1 SCOPE

A. This section defines procedures for the following submittals required of the Contractor.

## PART 2: REQUIRED SUBMITTALS

2.1 SHOP DRAWINGS, EQUIPMENT BROCHURES AND PRODUCT DATA

A. Required submittals of shop, fabrication, or erection drawings, equipment brochures and/or product data, composite systems (including those by one or more Subcontractors or suppliers) and similar information shall be submitted in accord with this Article.

B. "Shop Drawings" shall mean all similar types of product data, including specially prepared drawings, standard prints, brochures and other descriptive data.

C. Drawings submitted, including transparencies, shall be marked with name of project, Contractor, Architect, whether "preliminary" or "final" in nature, and shall bear stamp of approval of the Contractor, as evidence that drawings have been checked (including field dimensions) by the Contractor. The Contractor shall field verify or otherwise determine interferences or conflicts between various materials and resolve dimensions or methods resulting therefrom as approved by the Architect and University. Any drawings submitted without the Contractor's approval will not be considered or reviewed and will be returned to the Contractor.

D. The Contractor shall submit shop drawings to the Architect with such promptness as to cause no delay in his work or the work of any other contractor or subcontractor on the project. Adequate time shall be allowed for checking by the Architect and University. Contractor shall submit schedule of submittals within 21 days after Notice to Proceed.

E. Prepared shop drawings shall be submitted in the form of clear, sharp, reproducible transparencies until acceptable to the Architect. Each drawing shall have a clear space of not less than 20 square inches for Architect's stamps and be transmitted in mailing tubes. After the drawings have been checked, the Architect will obtain prints of the transparency for his records and the University's records and return the transparency to the Contractor. Transparencies returned "Accepted" or "Accepted as Noted" shall be printed by the Contractor in quantity required for his use. When drawing transparencies are returned "Not Accepted" or "Resubmit", the Contractor shall correct the drawing and resubmit a new transparency of the corrected original until final acceptance is obtained. The final shop drawings shall show field verified dimensions.

F. It is not intended that field verified dimensions are required prior to the Architect's acceptance of shop drawings. If however, field dimensions requires changes in the shop drawings in size, detail and similar considerations, a revised shop drawing shall be submitted for review and acceptance.

G. Transparencies will not be required for catalogue cuts, equipment brochures or similar items; however layout drawings shall be prepared where necessary or required by the Architect. Such items shall be submitted in a minimum of 7 copies unless otherwise specified. If acceptable, the copies will be so stamped and 3 copies returned to the Contractor. If notations indicate revision of data is required, resubmit as directed. The Contractor shall not furnish, fabricate, proceed with, or install work until shop drawings receive final acceptance.

H. Checking and acceptance of Shop Drawings by the Architect is for general conformance with design intent and Contract requirements and does not relieve the Contractor of responsibility to verify accuracy of dimensions, obtain field dimensions, coordinate dimensions with work of others, and prevent interference with other equipment and other features of the Work. If a drawing as submitted is in accordance with Contract requirements, or specifically indicated deviation from Contract requirements which Architect finds to be in interest of the University and to be so minor as not to involve a change in contract price or time for performance, Architect will accept drawings.

I. Acceptance of shop drawings and setting drawings will be general and, except as otherwise provided in preceding paragraph, shall not be construed as: (1) permitting any departure from contract requirements, (2) relieving Contractor of responsibility from errors in details, dimensions or otherwise that may exist, (3) accepting departures from additional details or instructions previously furnished by Architect and, (4) confirming clearances or lack of interference.

J. Checking and acceptance by Architect shall not relieve Contractor of responsibility for deviations from drawings and specifications unless such deviation is specifically called to Architect's attention by a specific indication of "note deviation" or similar clear and bold indication at time of submission, nor shall it relieve him of responsibility for errors or omissions in shop drawings.

K. Refer to Article 6 of General Conditions and Article 1.8, of Section 01010 for coordination and cooperation of contractors. This Contractor shall cooperate with all other contractors as may be required to coordinate the work with all contractors and their subcontractors. Shop drawings shall be provided or exchanged as necessary or beneficial to the coordination effort, with the exchange directly by the contractors involved, not through the University or Architect.

## 2.2 SAMPLES

A. Deliver samples of materials, equipment, assemblies and components as required by specifications to Architect (or other designated location) with delivery costs prepaid. At Architect's direction, remove samples after approval. Samples shall be of like kind to the product to be provided for building and shall have finish and other characteristics required by work. Samples shall indicate type of construction and quality proposed for installation in the Project.

B. Where the Contractor requires approved samples to be returned, submit the number of samples required by the Contractor plus two which shall be retained by the Architect and University. Submit all other samples in duplicate.

### 2.3 LIST OF MATERIALS

A. Within 14 days after the award of the Contract (notice to proceed or letter of intent), the Contractor shall submit 5 copies of a complete list of all materials, products, and equipment proposed to be used in construction to the Architect for acceptance. Materials shall not be ordered until the proposed listed materials are accepted.

B. Where two or more makes or kinds of items are named in the specifications (or additional names are called for in an addendum), the Contractor shall state which particular make or kind of each item he proposed to provide. If the Contractor fails to state a preference, the University shall have the right to select any of the makes or kinds named without change in price.

C. This list shall be submitted in the form prescribed by the Architect and arranged in order of specification sections. The items listed shall fully conform to project requirements and specifications. All materials are subject to the Architect's and University's acceptance. After acceptance, there shall be no changes or substitutions, except as provided in Article 7 of the General Conditions and Article 1.18 of Section 01010.

D. The list shall clearly identify the material, product or equipment by manufacturer and brand by listing the names for all items, including those where only one material or product is specified. Each and all materials, products and equipment shall be specifically named, not listed "as specified."

### 2.4 LIST OF SUBCONTRACTORS

A. Within 14 days after the award of the Contract (notice to proceed or letter of intent), the Contractor shall submit 5 copies of a complete list of all subcontractors (and major material suppliers) he proposes to use in performance of the Contract to the Architect for review and acceptance by the Architect and University. The list shall be in the form prescribed by the Architect. When appropriate, or when requested by the Architect, the list shall include proposed Sub-subcontractors. No subcontracts shall be executed until the proposed listed subcontractors are accepted.

B. The proposed subcontractors or sub-subcontractors shall be established, reputable firms of recognized standing with a record of successful and satisfactory past performance with the type work and/or items proposed to be provided or installed by them. Only those subcontractors (and sub-subcontractors when appropriate) who are acceptable to the Architect and the University shall be used on the Work.

C. The right to reject any subcontractor or sub-subcontractor, is reserved by the Architect and University. The right to reject will be exercised by the Architect or University as specified under sub-paragraph 5.2.3 of the General Conditions.

### 2.5 RECORD SET OF DRAWINGS

A. Contractor shall provide a record set of drawings to the University at the completion of his Contract.

B. During construction, Contractor shall maintain a clean set of drawings for the sole purpose of recording changes and actual "as-installed" information.

C. Marking of the record set shall be done methodically as work progresses, clearly and neatly, in color.

D. As a general guide, the type of information to be recorded on the record set includes: (1) revisions made except minor or non-critical dimensions; (2) omissions, including work omitted by accepted alternates; (3) dimensioned locations of major or main utility lines, such as main conduit runs, piping mains and similar work; (4) locations of control valves; (5) additions to the work; (6) changes in significant details (i.e.; for water protection); and (7) other similar data.

## 2.7 OTHER SUBMITTALS

A. Provide other required submittals as specified. In particular, refer to:

Progress Schedule	Paragraph 4.11 of General Conditions, and Sections 01200, 01250.
Performance Bond	Paragraph 7.5 of General Conditions
Schedule of Values	Paragraph 9.2 of General Conditions and Article 1.2 of Section 01150
Payment Requests	Paragraph 9.3 of General Conditions and Articles 1.3 and 1.4 of Section 01150
Liability Insurance	Paragraph 11.1 of General Conditions
Property Insurance	Paragraph 11.2 of General Conditions
Equal Employment and Prevailing Wages	Articles 15 and 16 of General Conditions
Testing and Inspection	Section 01400 and Technical Sections
Form 134 Affidavit	Subparagraph 9.7.2 of General Conditions
Project Closeout Requirements	Section 01700
Reports Certificates Samples Guarantees	Technical Sections

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## PART 1: GENERAL

1.1 TESTING

A. Refer to the technical specifications for specific testing requirements and methods.

B. Unless otherwise provided in the specifications, the Contractor shall provide all materials, samples, mock-ups or assemblies for all tests specified in various sections of specifications or as directed by Architect or University and pay shipping costs of such samples to laboratory or other testing location and facility. Unless specifically specified otherwise, all tests shall be made by an approved independent testing laboratory and reports shall be provided to Architect and University.

C. Tests shall be provided and accomplished in accordance with the standard used as the reference for the particular material or product, unless other test methods or criterion are specified. In the absence of a referenced standard, tests shall be accomplished in accordance with applicable ASTM Standards or Test Methods.

1.2 QUALIFICATIONS OF TESTING AGENCY

A. "Approved independent testing laboratory" shall mean an independent testing agency acceptable to the University and the Architect and possessing the professional qualifications and equipment to perform the specified tests and to evaluate and report the results.

1.3 PAYMENT FOR TESTS

A. Where specifically specified, the University will pay for the costs of tests (field or laboratory), directly to the laboratory. The University will also select the testing agency and advise the Contractor.

B. The cost of all other tests shall be paid by the Contractor, including any retesting required when initial tests indicate non-compliance.

1.4 TESTS TO DEMONSTRATE QUALIFICATION

A. In addition to tests specified, should the Contractor propose a product, material, method or assembly that is of unknown or questionable quality to Architect, the Architect or the University, may require and order suitable tests to establish a basis for acceptance or rejection. Such tests will be paid for by the Contractor, or by the Subcontractor requesting approval. "Standard" test reports or reports on "similar" material will not be accepted.

B. The University and Architect reserve the right to require certification or other proof that the material, assembly, equipment or other product furnished, or proposed to be furnished, for this Project is in compliance with any test or standard called for. The certificate shall be signed by a representative of the independent testing laboratory.



C. Any tests required to qualify the Contractor or any of his workmen for any phase of the work, and any test of a method, system or equipment that may be required by specification or law to qualify the item for use, shall be made or taken without cost to the University or Architect.

#### 1.5 INSPECTIONS

A. Should the specifications, Architect's instruction, laws, ordinances or any public authority require any work to be inspected or approved, the Contractor shall give timely notice of its readiness for inspection and a reasonable date fixed for such inspection. If any work requiring inspection should be covered up without approval or consent of the approving agency or the University's representatives, it must be uncovered for examination at Contractor's expense.

#### 1.6 OWNER'S INSPECTION OF FABRICATION

A. The University reserves the right to inspect the fabrication facilities and the fabrication of products for this Project. The producer shall permit such inspections and cooperate with the University to facilitate the inspections.

B. After notice, the University may inspect any and all facilities and product fabrication.

C. For such inspections of fabrication and fabrication facilities, the University will pay for its own travel and subsistence. The Contractor and producer shall cooperate in such inspections and make the facilities and products available on time so the University does not incur any other costs.

#### 1.7 CERTIFICATES

A. Except for test reports provided and signed by approved independent testing laboratories, all certificates required by the specifications shall be signed by an authorized official of the firm providing the certificate, with the signature notarized, when such certificates by the producer are acceptable to the University.

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## PART 1 CONSTRUCTION HEAT, LIGHT AND POWER, WATER, TELEPHONE

1.1 TEMPORARY (CONSTRUCTION) HEAT

A. Temporary Heat: As used in this specification, temporary heat shall mean all heat required and provided during construction, whether by temporary heating units and devices, or the permanent existing or new heating system and devices, until the Project is occupied or accepted by the Owner.

B. Existing Heating System:

1. The existing heating systems shall be kept operative throughout the entire construction. Contractor shall cooperate with University personnel to effect all modifications to systems with minimum interruption to building services.

2. The University will make in existing spaces no charge for temporary heat. Contractor and subcontractors, however, shall not waste University furnished heat. Openings cut and windows removed during remodeling shall be provided with insulated and secure temporary closures until permanent closure is installed and sealed.

C. Ventilation: During construction and particularly during tile work, plaster and similar finishing operations, adequate ventilation and dehumidification shall be provided, including spaces without windows. Use power exhausts where necessary. Frosting or sweating of glass and metal will be an indication of excess humidity to be corrected. Give special attention to adequate ventilation immediately after building enclosure as well as during roofing operations (particularly in or after cold weather) to remove moisture from building. Prevent condensation in building and prevent moisture from being driven up to roofing. General Contractor shall be responsible for the ventilation, except at spaces without windows where a ventilation system is to be provided, the Mechanical Subcontractor shall install the system as soon as practicable.

1.2 CONSTRUCTION LIGHT AND POWER

A. Reference: Refer to Section 16010 for additional details.

B. Energy Costs and Objectives: Except as otherwise specified, the University will furnish electrical energy free to Contractor and Subcontractors throughout the construction of the Project, which is provided within the capacity of the existing and new services described in Sections 16010 and 16300, provided the privilege is not abused. However, the University will assume no responsibility or liability for power outages, or damages resulting from outages, and the Contractor shall hold the University harmless from all claims and costs from outages. Not only the conservation of energy but minimum expense to the University are objectives, within the intent to provide good lighting conditions and adequate working conditions for high quality workmanship, as well as safety and security measures. The Contractor shall comply with University directions on the temporary installations, lighting conditions and use of energy.

C. General:

1. Except as otherwise specified, throughout construction Contractor and Subcontractors shall provide their own temporary wiring, cords, outlets, lamps, devices and connections as required. Installation, service, wiring and devices shall be safe, substantially supported and adequately connected and meet all codes. Demand shall not exceed the service and any damage resulting from misuse, faulty equipment or overloading shall be paid for by responsible persons.

2. Electric heaters shall not be used for heating unless approved by the University as the only reasonable solution.

3. Energy costs and services for cranes, hoists, large welders and similar heavy loads shall be provided and paid for by Contractor and Subcontractors requiring such service and they shall arrange for their own service and meters. Limited use of energy and service, when being paid for by the Owner will be permitted for loads of others for such equipment as grinders and pipe threaders provided their use does not limit the service for normal lighting and power tool loads. In the event such equipment use indicates the available service may reach capacity the Contractor and Subcontractors requiring such service shall provide their own service after being advised by the Owner when such condition is likely to exist.

D. Existing Service: In so far as possible, existing electrical service, outlets, fixtures etc. shall be used to provide light and power for construction. During "down" time in any area, procedures for temporary building service specified in paragraph E, below, shall be used.

E. Temporary Building Service: As work progresses, the Electrical Subcontractor shall install the permanent service and energize the permanent secondary electrical system as soon as practicable and when approved by the University. Permanent service characteristics are specified in Section 16300.

1. The Electrical subcontractor shall provide temporary wiring, sockets and outlets for lighting and hand tools, as specified herein and in Section 16010.

2. Permanent convenience outlets shall not be used, and permanent fixtures shall not be installed until finish operations are in process but fixtures shall be installed prior to equipment installation. Other temporary wiring and devices shall be provided by each contractor as required, safe, substantially supported and adequately connected. Electrical Subcontractor shall install the permanent convenience outlets when approved by the University, just prior to occupancy.

3. For use of the heating plant, system and its equipment, the Electrical Subcontractor shall install all services, panels, devices and connections necessary to use the plant and system.

F. Lamps, Incandescent Bulbs and Fluorescent Tubes: Throughout the construction period, lamps in temporary lighting systems shall be provided, including replace-

ments, by the General Contractor and installed by the Electrical Subcontractor. In general, lamps shall not be over 200 watts, except where necessary. The Electrical Contractor shall also remove and replace burned out lamps as they occur.

1. As work progresses and permanent incandescent light fixtures are used for lighting, the General Contractor shall provide the lamps and the Electrical Subcontractor shall install as specified in preceding paragraph. Just prior to final inspection the Electrical subcontractor shall remove all construction bulbs and install proper new bulbs. The University shall be advised when this replacement is being made so they may verify the installation of new bulbs.

2. In permanent fluorescent fixtures, the Electrical Subcontractor shall install new lamps as the fixtures are installed. The Electrical Subcontractor shall replace tubes as they burn out during construction and replace all burned out lamps just prior to final inspection so all lamps are good at the time of inspection.

### 1.3 CONSTRUCTION WATER

A. General: Contractor, and subcontractors where appropriate, shall provide their own hoses (or piping), connections and other equipment to use water, and protect their own equipment. Needless and wasteful running of water, when provided through the General Contractor's or the University's service, will not be permitted. When water is being used, the service shall be protected from damage at all times.

B. The Owner will allow free use of water, provided the privilege is not abused and unnecessary running of water is prevented.

### 1.4 TELEPHONES

A. Contractor's Phones: Contractor shall arrange and pay for telephone service to the work space. Service shall not be connected thru University service. Costs of long distance calls on the Contractor's phones shall be paid for by the person incurring the expense.

## PART 2 FIRE SAFETY

### 2.1 FIRE SAFETY DEVICES AND SYSTEM

A. General: Refer to Section 01010 for general requirements and for Fire Safety Director. Contractor shall be alert to fire hazards and remove or protect against hazards and shall comply with directions of the Fire Safety Director of the University on hazards and fire safety.

B. Fire Extinguishers: The General Contractor shall provide and maintain adequate and proper fire extinguishing devices in and about the construction area, available for use by all workmen. The devices shall not be the units to be later installed in the Project. Appropriate devices shall be provided for the class of the potential hazard (ie. oil, electrical) at those areas where unusual hazards may exist, including in mechanical rooms. Fire hoses shall be connected to adequate sized water lines.

C. Fire Hydrants: The area fire hydrants must be accessible at all times. Fences and construction work, if any, must be arranged and accomplished to provide immediate access to hydrants.

### PART 3: OFFICE, TOILETS, STORAGE ENCLOSURES

#### 3.1 CONSTRUCTION OFFICES AND CONFERENCE SPACE

A. Contractor shall maintain a desk and file at a designated location in the existing building suitable for storing of records. Maintain copy of Contract Documents, shop drawings, correspondence, Architect's directions. Maintain neat housekeeping. Keep separate bound files, kept neat and up-to-date. Only shop drawings accepted by Architect/Engineer shall be kept on file.

B. Contractor shall meet with University before work begins to locate office, storage areas, etc., and to coordinate work.

C. When Project nears completion, remove offices and finish space as required by Contract Documents.

#### 3.2 SANITARY FACILITIES

A. University will designate existing toilets to be used during construction for all trades. Toilets shall be well maintained, not create a nuisance, be screened from view. Contractor shall provide and maintain adequate supply of tissue.

#### 3.3 STORAGE

A. General: Refer to Section 01010 for areas of storage.

B. Limited Area: With the extremely limited storage area, the Contractor shall carefully schedule material deliveries for immediate installation to minimize the need for storage area. Any storage structures required shall be located on the Contractor's allocation of site space. Inside buildings, storage shall be limited to work areas only.

### PART 4: MISCELLANEOUS PROVISIONS

#### 4.1 PARKING AND LOADING - UNLOADING

A. General: All campus regulations, signs and directions regarding parking and loading - unloading shall be followed. The Contractor is responsible to instruct his workmen. For unusual conditions, the Contractor shall consult with the University on proposed procedures and locations, should a temporary variance be required, and follow the instructions issued.

B. Absolute Zones: All zones which are marked NO PARKING - NO STOPPING ANY TIME, must be strictly adhered to. All deliveries and pickups by contractors, subcontractors and suppliers must be made on side streets, alleys, or on University driveways and loading zones.

C. Parking is available for cars of contractors' foreman and workmen working on campus in University parking lots at regular parking rates.

#### 4.2 SIGNS

- A. Job Sign: Custom job sign not required.
- B. Office Sign: Contractor may provide a sign to identify location of work and directional signs from nearest building entry to project area; professional lettered signs only.
- C. No other signs permitted, including signs on structure.

#### 4.4 ELEVATORS

- A. During all periods of work on the Project, Contractor shall arrange for temporary use of elevators for moving men and materials so as not to interrupt the normal operations of any area of the Complex nor interfere with the movement of University Staff or materials.
- B. When using existing elevators Contractor shall provide adequate protection of all services so that cars and machines are returned to University in undamaged condition.

## PART 1: GENERAL

1.1 GENERAL REQUIREMENTS

A. The nature of the Project, the schedule of substantial completion and final completion as specified in Section 01200, the time necessary for the University to move in and occupy the Project and the urgent need for the University to commence the services scheduled for the Project requires careful and efficient planning to facilitate an orderly completion process within a short period of time. The Contractor shall organize and schedule a coordinated completion process and prosecute the work efficiently and diligently. The Contractor shall organize and schedule the work of sub-contractors, as well as his own work, obtain firm commitments from sub-contractors on completion of their work and coordinate his effort with all other Contractors and the University to achieve completion on time.

B. As applicable, the specified requirements shall apply to substantial completion specified in Section 01200. Where appropriate or possible, the specified requirements shall be accomplished on or before the date of substantial completion.

C. After substantial completion, the Contractor shall continue to diligently prosecute all remaining work in an organized, efficient manner.

D. As may be appropriate, the requirements of this section apply to, and shall be accomplished for any individual area, floors, spaces or other parts of the total Project which the University may take over and assume beneficial occupancy or use.

## PART 2: PROJECT CLOSE OUT

2.1 REQUIREMENTS SPECIFIED ELSEWHERE

A. Insurance: Refer to General Conditions, Article II.

1. Upon completion of last phase of the work and final payment, provide a certificate of insurance that indicates the specified Completed Operations Insurance will be provided a minimum of one year after the University's acceptance of the entire Project.

2. The specified Property Insurance (Multiple Peril Builder's Risk) may be cancelled at a time approved by the University after occupancy of the entire project by the University, or upon final completion and final acceptance by the University of the entire Project, whichever occurs first.

B. Change Orders: All Change Orders shall be resolved prior to final payment, including the adjustment of any allowances.

C. Consent of Surety: Refer to General Conditions, Sub-Paragraph 9.7.1. The consent of the Surety must be obtained prior to any reduction in retained percentage and prior to final payment.

D. State Income Tax Withholding Certificate: Refer to General Conditions, Sub-Paragraph 9.7.2.

E. Guarantees - Warranties: Refer to General Conditions, Sub-Paragraph 13.2.2 for the general guarantee requirements.

1. In addition to the general guarantee, provide all written guarantees specified in the technical Sections of the specifications. Where the guarantee terms are included in the specifications (i.e.: Section 07510) or a specific guarantee is referenced, submit guarantee in the specified form. Submit guarantees at substantial completion. The Contractor shall provide a check list of required guarantees, by Section numbers.

F. Test Reports and Certificates: Provide all test reports and certificates required in the technical Sections, prior to final payment. The Contractor shall provide a check list of required reports and certificates, by specification Sections.

G. Retention of Records: Retain all records as required by law and good business practice.

H. Record Set of Drawings: Refer to Section 01300, Article 2.5. Deliver the record set to the University upon final completion of the Project. Review the set with designated personnel of the University, to clarify or explain changes that may be necessary. Obtain a receipt for the set.

I. Temporary Utilities: Refer to Section 01500.

1. Remove all temporary facilities and utilities as the job progresses permits. Read all meters at the times specified for the transfer of services cost from the Contractor to the University, as applicable.

2. The Contractor shall pay the University for all charges for utilities (except those paid directly to the utility company) he is responsible for, prior to final payment on the Contract to the University.

J. Elevators: Refer to Section 01500, Article 4.4.

1. At a time approved by the University, the Contractor shall remove all protective linings provided by him in elevators that have been in temporary use and shall restore the elevators, as required to return them to existing condition. It is intended this work be accomplished just prior to final completion of the entire Project.

K. Temporary Facilities:

1. As the job progresses and facilities are no longer needed, they shall be removed by the Contractors, at a time approved by the University.

L. Construction Cores and Keys: At the time of substantial completion, just prior to occupancy, the University will replace the construction cores and install the permanent cores in the locks. Thereafter, access to the spaces will be by having the University open the doors.



## 2.2 SYSTEMS AND EQUIPMENT TESTING

A. The Contractors are responsible for testing all equipment and systems of their contract and demonstrating they are correctly installed and operating properly, in the intended and planned manner. The Contractors shall operate and test each system and provide a written record of the tests and the results. (Note: The Owner will employ a separate service to balance air and hydronic systems of the mechanical contract. See Section 01010, Article 1.12.

B. The operation and testing of the systems may be concurrent with instructing the University's representatives, specified in 2.2 above, provided a representative of the University is present.

## 2.3 CLEAN-UP

A. Refer to General Conditions, Article 4.16, and Section 01010, Article 1.25 for general requirements of cleaning during construction. Unless otherwise specified, each subcontractor shall be responsible for cleaning the materials and equipment of his subcontract, as well as the removal (hauling away) of all his own debris, cartons, crates, surplus materials and maintaining his work neat and orderly under the general direction of the General Contractor.

B. It is intended the general "final" cleaning of all areas affected by the work of the Project be accomplished just prior to the inspection for substantial completion and occupancy, typically within the week prior to the inspection. Cleaning shall be a planned, organized effort to avoid working in spaces after they have been cleaned. The General Contractor shall schedule the cleaning sequence, in cooperation with subcontractors and other Contractors and all shall schedule their operations to conform to the cleaning plan. In general, the mechanical and electrical subcontractors shall perform their cleaning and debris removal from the spaces first, with the General Contractor last.

C. The following requirements are a general guide to the required cleaning; do not construe as a complete description of all the cleaning required, as the work of the entire Project shall be thoroughly cleaned, including any specific cleaning required under other sections. As an area is cleaned, each Contractor shall remove the accumulated dust, dirt and debris.

D. Each Contractor or subcontractor shall thoroughly clean the materials, equipment or other items of his Contract. Cleaning shall be done by appropriate methods (scrubbing, washing, damp mopping, dusting, vacuuming) to leave surfaces, areas, spaces and interiors free from stains, discolorations, oil, grease, dirt, dust or other soil to leave the work in a clean and streak-free condition, except for floors and walls where "broom clean" is later specified. All labels shall be removed, except those labels, plates or tags that are necessary to leave for the proper use of the equipment or item, or have data and characteristics that are necessary to leave.

E. Just prior to substantial completion, at a time approved by the University, the General Contractor shall wash all new glass and existing glass in remodeled spaces (except glass in work provided under other Contracts) both inside and out of all glass panes. Subcontractors shall wash the glass in the items provided by them, as in doors, shelves and similar items.

F. The electrical subcontractor shall clean the interiors of cabinets, panelboards and other equipment provided under his Contract, and clean light fixtures which have become dusty and lenses which are dirty.

G. At contiguous normally occupied areas, such as service areas, passages and corridors and similar spaces, the General Contractor shall: clean all his work to the "thoroughly clean" condition previously specified; provide floors (including concrete) that are free of stains and discoloration; adjust hardware and polish any that has become discolored; and perform such other cleaning as required to turn the Project and its spaces over to the University in a new, well maintained building condition, ready for full use and occupancy.

H. After cleaning for inspection for substantial completion and occupancy, any subsequent work in any space shall likewise be cleaned upon the completion of the work by the Contractor or subcontractor, as above.

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## PART 1: GENERAL

1.1 SCOPE

- A. Conditions of Contract and Division 1 General Requirements apply to all work of this Section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.
- B. Refer to Sections 01010, 01200, and 01500 for special requirements, protection, constraints, timing of work, scheduling of work, enclosures and similar requirements relating to this Section.
- C. This Section covers cutting, demolition, removal work, patching and restoration of work as necessary to accomplish and complete all work under the Contract, including and relocation or reuse of existing materials, equipment, systems or other work, as well as the disposition of salvaged materials or debris. This Section governs all Subcontracts and trades.
- D. It is the intent that, unless otherwise specifically shown on the drawings or specified, each subcontractor shall be responsible for all cutting, demolition, removal, patching or restoration as may be required to complete his work, under the general direction of the General Contractor.
- E. Except for general demolition of entire areas it is the intent that at each area, or space, each subcontractor shall make the removals, perform demolition and accomplish relocations of work normal to his trade (ie: Mechanical subcontractor removes or relocates piping, ductwork and similar; Electrical subcontractor removes or relocates panelboards, conduit, lighting and similar). At areas of general demolition of the entire spaces, the Mechanical and Electrical shall make removals of work normal to their Contract or may be called for, for reuse or relocation, make any necessary relocations and cut-off, terminate, cap or otherwise discontinue services that will be abandoned or removed in the space. The General Contractor shall then demolish or remove all abandoned or unwanted electrical or mechanical materials, items or elements in the area.
- F. For areas of work in the existing building, existing conditions plans have been included in the set of drawings. These existing condition drawings indicate the general existing features, the general limits of work and general indications of removals to be made. These drawings shall not be construed as indicating all conditions and details or required work which may be encountered. The Contractor shall examine the spaces themselves to determine the actual conditions and requirements. All removals, demolition, cutting, restoration, new installations and other work shall be accomplished to transform the existing spaces to the new conditions required under the Contract.
- G. All work under this section shall be coordinated with the other Contractors and the University and shall be accomplished at times acceptable to the University.

## PART 2: DISPOSITION OF MATERIALS

### 2.1 UNSALVABLE MATERIALS

A. All unsalvable materials shall be removed in a manner that will avoid damage to materials or equipment to remain and shall be completely removed and legally disposed away from the site.

### 2.2 SALVABLE MATERIALS TO BE RE-USED IN THE WORK

A. Salvable materials designated for re-use or relocation shall be removed by the applicable trades, stored (off site if required), and protected from damage until they are incorporated into the new work.

B. Carefully remove, salvage, clean and preserve materials and equipment indicated to be reused or needed for reuse to match existing work. Exercise extreme care in removals to prevent damage or to make materials unsuitable for reuse. For materials shown or called for to be reused and which are damaged, replace with equivalent and matching work.

### 2.3 SALVABLE MATERIALS TO BE STORED FOR THE UNIVERSITY

A. All salvable materials not designated for reuse in the work are hereby designated to remain the property of the University. These shall be carefully removed by the applicable trades, protected from damage and stored as directed on the site until removed by the University.

B. Consult the University for any salvage the University may wish to retain and the salvagability of all items. Carefully remove and salvage any materials the University wishes to retain. Remove finish hardware from the item or material taken out of the building and turn over to University. Cleaning or restoration of the University's salvage materials is not required.

C. Removal from the site storage to University storage will be by the University.

## PART 3: EXECUTION

### 3.1 TEMPORARY PROTECTION

A. Provide temporary bracing, shoring, needling and support during demolition, cutting, remodeling and related new construction as necessary for the execution of the Work and the protection of persons and property. Perform all work with appropriate supports, protection and methods to prevent collapse, settling or damage to property or persons. Provide adequate supports for the loads to be carried, with loads properly distributed including to lower levels, if necessary.

B. Provide protective coverings and enclosures necessary to prevent damage to existing spaces and materials to remain. Protect openings in exterior walls and roofs so as to prevent damage from water and the elements and prevent excessive heat loss from the existing buildings.

C. Provide dust-proof temporary enclosures separating areas under demolition and remodeling from the remainder of the building. Provide temporary hinged

doors in temporary enclosures where necessary. Temporary and permanent doors shall be completely sealed with tape or other suitable material during demolition work and shall remain sealed until dust has settled.

D. Each contractor shall take particular note that spaces in and adjacent to, above and below the work areas have high cost and delicate laboratory equipment in them. Contractors shall exercise every caution necessary to protect such equipment and each shall be held fully responsible for repair and for replacement of any equipment damaged incidental to the performance of the work.

### 3.2 GENERAL REQUIREMENTS

A. Accomplish all work of cutting, removal, demolition, patching or other restoration using only mechanics skilled in the trade. If necessary, sublet the work to skilled contractors or subcontractors.

### 3.3 DEMOLITION AND CUTTING

A. Demolish and remove existing construction as shown, indicated or required to be removed. Where new Work is to be installed in or adjacent to existing construction or existing work is to be replaced, remove or cut the existing construction as necessary to complete the Work of the Project.

B. Execute work with care. Existing construction that is to remain which is loosened, cracked, or otherwise damaged or defaced as a result of the Work and is unsuitable for use intended shall be removed and replaced at no additional cost to the University.

C. Clean demolition areas and remove debris, waste and rubbish from the building at the conclusion of each day's work. Transport debris and rubbish in such a manner so as to prevent spread of dust.

D. Debris from upper levels shall be transported to ground in covered chute or other approved means. No free-fall debris removal is permitted. Moisten debris with spray where practical. Take all precautions to minimize dust. Promptly remove debris from site as demolition progresses and debris accumulates. Do not store or permit debris storage at site. Do not burn debris, rubbish or waste at the site. Keep adjacent areas unencumbered and clean. Keep walks and similar areas broom clean.

E. One or more window openings shall be cleared (sash removed) in Room 192 for the removal of demolition debris and the placing of material in the building. Refer to Article 1.12 of Section 01010 for temporary closures and protection of window frames.

F. Moving of demolition debris through corridors to doors is prohibited, only new materials may be moved through building. Debris shall be removed from building only through the cleared window openings.

### 3.4 PATCHING, REMODELING AND RESTORATION

A. Patch or otherwise restore disturbed existing construction as indicated on the drawings, or as otherwise required to restore the work and surfaces. Patching or restoration shall be carried to natural breaks (i.e.: corners)

wherever reasonable. Where existing construction is removed, cut, exposed or otherwise disturbed by Work of the Project, patch defective and incomplete surfaces. Repair any damage to existing construction which is to remain.

B. Patching work shall be done by skilled mechanics experienced in the particular type of work involved. Patching work shall conform to the standards of the Specifications where applicable, and where not specified, work shall conform to the highest standards of the trade.

C. Patch existing construction to match existing work (unless otherwise called for) except provide new materials and accomplish as for new work. Examine existing surfaces to be patched before proceeding with the work. Report all conditions where existing materials, colors and finishes cannot be matched to the University, and do not proceed until the University has issued instructions.

D. Existing construction that has been damaged as a result of the Work shall be repaired to an extent and as required to match adjacent existing undamaged construction.

E. Thoroughly clean and prepare all surfaces to receive new finish or covering. Completely remove dirt, dust, grease, oil, paint, loose materials and soil. Clean, etch where necessary, and place surfaces in most suitable condition for the finish, as approved by University.

### 3.5 MECHANICAL AND ELECTRICAL WORK EXPOSED

A. Where unknown mechanical piping or electrical conduit is exposed during removal of partitions or walls, removal or rerouting shall be accomplished by the Mechanical or Electrical subcontractor as applicable. Rerouted piping shall be located where directed and shall be connected to maintain all functions in proper operation. Abandoned piping may be left in place where it is concealed in floors or walls, providing that it is disconnected from its source. There shall be no "dead end" water, sewer, or vent piping existing in the completed work.

B. Removals, capping or otherwise terminating services which are abandoned shall be accomplished without additional cost to the University. Relocations and rerouting of services that were unknown shall be paid for as Changes in the Work.

### 3.6 WORK OF EACH SUBCONTRACT

A. Each Subcontractor shall carefully review the Contract Documents including those for other trades, with respect to the coordination of the demolition, removal and remodeling work and perform such removals normal to their Contract as may be shown, noted or otherwise required. Cutting and patching incidental to demolition, removal and or remodeling of general construction work shall be construed as the work of another trade when specifically noted or called for on documents primarily for another trade, or the cutting and patching is done solely to accomplish work of another trade. Mechanical and Electrical subcontractors shall perform their own cutting and patching to accomplish their work unless indicated on Architectural drawings as being done by the General Contractor.

### 3.7 PAINTING

A. Mechanical or Electrical Subcontractor shall be responsible for painting or repainting of patched or remodeled areas where he has performed work, except for those areas shown are required to be remodeled under the General Contract, in which case the new, patched and remodeled paintable surfaces shall be repainted by the General Contractor. It is the intent the Mechanical and Electrical Subcontractors paint or repaint surfaces at locations where demolition, cutting and patching is accomplished only for their work.

B. Painting, including preparation, materials, workmanship and number of coats shall comply with Section 09900. Painting of surfaces patched shall extend to natural breaks, such as corners, as approved by the University.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements of pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes mortar for all unit masonry.

C. Related work specified elsewhere:

1. Unit masonry: Section 04200.

D. Furnished but not installed under this section:

1. Mortar is installed under Section 04200.

1.2 PRODUCT HANDLING

A. Handle, transport and store mortar materials in a manner that will prevent damage or deterioration from the elements.

## PART 2: PRODUCTS

2.1 MATERIALS

A. Conform to ASTM standard specifications as follows:

1. Portland Cement: ASTM C150, Type I.

2. Quick Lime: ASTM C5.

3. Hydrated Lime: ASTM C207, Type S.

4. Aggregates: ASTM C144.

5. Water: Clean and free of deleterious amounts of acids, alkalies or organic materials.

B. Use of masonry cement is prohibited.

2.2 MEASURING AND MIXING

A. Measure and mix in accordance with ASTM C270 and the following:

1. Shovel measurement is prohibited.

2. Mix mortar as required for immediate use only and discard any mixed for a period exceeding 2½ hours.



3. MORTAR PROPORTIONS BY VOLUME			
Mortar Type	Parts by Volume of Portland Cement	Parts by Volume of Hydrated Lime or Lime Putty	Aggregate measured in a damp, loose condition
M	1	$\frac{1}{4}$	Not less than $2\frac{1}{4}$ times and not more than 3 times the sum of the volumes of the cement and lime used.

4. Lime Putty: A stiff mixture of lime and water. Keep moist until used. Putty made from quick lime shall be slaked and allowed to soak at least 72 hours before using. Putty made from 92% hydrated lime may be used immediately after mixing.

5. Control and accurately maintain the specified proportions of mortar materials during the entire progress of the work.

6. Thoroughly mix cementitious materials and aggregates with the amount of water to produce workability.

### 2.3 MORTAR PROPERTIES

A. Conform to the property specifications of ASTM 270 and the following:

1. Compressive Strength: The average compressive strength of three 2" cubes of mortar shall not be less than the strength given in the following table for the mortar type specified:

<u>Mortar Type</u>	<u>Average Compressive Strength at 28 days-psi</u>
M	2500

## PART 3: EXECUTION

### 3.1 TYPE OF MORTAR REQUIRED

A. Type: Use Type M mortar for all masonry.

B. Tempering: Adjust the consistency of the mortar to the satisfaction of the mason by adding only as much water as is necessary to obtain workability.

C. Use mortar within two and one half ( $2\frac{1}{2}$ ) hours after mixing. Mortar that has stiffened within this time may be retempered with the minimum amount of water necessary to obtain desired workability.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes furnishing and installing all unit masonry shown on the drawings and specified herein.

C. Related work specified elsewhere:

1. Mortar: Section 04100.

D. Installed but not furnished under this section:

1. Anchors, etc. for work of other trades: Applicable Sections.

1.2 PRODUCT HANDLING

A. Handle, transport and store at the job site in a manner that will avoid damage.

B. Protect masonry units from wetting prior to use. Cube units on pallets at the time of manufacture and deliver to the job with waterproof coverings. Make sure that units remain covered on the job.

## PART 2: PRODUCTS

2.1 CLAY MASONRY MATERIALS

A. Structural Clay Facing Tile: Conforming to ASTM C56, Grade NB. Surfaces of tile with exposed surfaces shall be finished smooth; match existing in dimension, texture and color.

## PART 3: EXECUTION

3.1 MORTAR

A. Mortar proportioning and mixing is specified in Section 04100.

B. Tempering: The consistency of mortar may be adjusted to the satisfaction of the mason, but only as much water shall be added as is necessary to obtain desired workability.

C. Mortar shall be used within two and one-half (2½) hours after mixing. Mortar that has stiffened within this time may be retempered with the minimum amount of water necessary to obtain desired workability.

### 3.2 WETTING CLAY MASONRY UNITS

A. All tile having absorption rates (determined in accordance with ASTM Specifications C67) in excess of 0.025 oz. per sq. in. per min. shall be wetted sufficiently so that the rate of absorption when laid does not exceed this amount.

B. The method of wetting shall be such as to insure that each unit is nearly saturated, surface dry when laid.

### 3.3 LAYING CLAY WALL TILE

A. Lay each course of tile plumb and true to line with each course breaking joint with course below. Lay tile in solid bed of mortar with vertical joints buttered their entire length.

B. Bond each course at corners and intersections and bond into adjacent masonry. Use ties and galvanized perforated steel anchors where necessary to reinforce the bonding of the tile and where tile cannot be otherwise adequately bonded.

C. Fill solid with mortar and masonry the space around all built-in items. Set all plates, beams, lintels, anchors, ties, etc., in a full bed of mortar.

D. Fill solid with mortar the space behind electric outlet boxes for a sound barrier.

### 3.4 POINTING, TOOLING, CLEANING

A. Joints in new tile in and adjacent to existing walls shall be tooled to match existing joints.

B. Cleaning:

1. Upon completion, cut out defective mortar joints, cut out cracked, broken, chipped or badly scratched brick or block and replace with matching units. Point up all exposed masonry.

2. Remove all excess mortar spots, drips and smears from tile.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this Section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes furnishing and installing all utilitarian miscellaneous metal and ornamental metal items manufactured, fabricated or otherwise specially modified to meet requirements of this Project and not specified under other sections of this specification, including roof framing angles at new openings as at detail 25/A2 and Service panels as at detail 2/A2.

C. Related work specified elsewhere:

1. Masonry: Section 04200.
2. Special Formed Metal: Section 05750.
3. Carpentry: Section 06100.
4. Hollow Metal Frames: Section 08110.
5. Lath and Plaster: Section 09100.

1.2 SUBMITTALS

A. Shop Drawings: Submit shop drawings of all items furnished under this Section in accordance with Section 01300. Show all gauges and weights of metals, type of metal, finish, fastening, welds, joinings, reinforcements, supports, anchors, relation to adjacent materials, accessories and other pertinent data.

1.3 PRODUCT HANDLING

A. Protect, handle, deliver and store in a manner that will avoid damage or deformation. Store metal off ground and provide covering for metal in storage.

1.4 COORDINATION

A. Coordinate work directly with Contractor and other Subcontractors. Provide and obtain necessary dimensions, clearances and similar data for work related to items provided under this Section. Where necessary to insure proper fitting and assembly work, ship fabricated metalwork to other Subcontractors with all shipping charges paid by metal fabrications subcontractor.

1.5 FIELD DIMENSIONS

A. Obtain and verify all necessary dimensions in field to accurately fit to conditions as constructed. The nature of the various other materials including concrete and masonry, makes it mandatory to obtain dimensions, elevations, squareness of openings and similar conditions affecting work of this Section.

## 1.6 QUALITY OF WORK

A. General: Miscellaneous and ornamental metals have been combined in one metal fabrications section as result of close relationship of various elements and since similar end products would be provided under separate sections. Do not construe the combining of two sections as relieving Contractor of furnishing and installing exposed work, where appearance is a prime consideration, in any other manner than to highest quality of work. Deliver, store and protect such items (where first and highest quality work is required for appearance) and any in unsatisfactory condition will be rejected.

B. Standards in General: Conform to standards of Architectural Metal Manufacturers Association in absence of project specification or drawing requirement.

C. Exposed Work: Appearance is a prime consideration for items similar to those designated above. Steel shall be smooth surfaced, cold formed, cold rolled or drawn steel that is free from blemishes.

## PART 2: PRODUCTS

### 2.1 MATERIALS

A. General Metals: Metals shall be free from defects impairing strength or durability and be of best commercial quality for use. For exposed work, where appearance is a factor, provide smooth, unblemished metal, free of rust, scale, pitting, mill marks and similar markings.

B. Steel: Hot rolled mild steel 0.15% to 0.25% carbon range. For structural steel, provide ASTM A36. Where appearance is of prime consideration, provide cold rolled steel and non-structural shapes of mild steel which has been cleaned or pickled and rolled or drawn through dies producing a material free from scale and accurate to size or gauge, equal to samples in Architect's office. Structural shapes, where appearance is a prime consideration (and shapes noted or specified as cold rolled but not so made) shall be sand blasted as necessary to achieve unblemished smooth surface, essentially equivalent to cold rolled steel. Select steel for exposed work to eliminate dented, bent, crooked, warped or otherwise damaged steel and to provide best possible appearance. Provide full length pieces, no built-up lengths, crops or stubs. Provide tube and pipe steel that is straight, with proper wall thickness, free of dents, warps, twist or similar defects.

C. Service Panels: Steel, cold formed, prime quality pickled and annealed, stretcher leveled, free from surface defects. Unless noted, provide 16 gauge material.

D. Fastenings: Best, most appropriate type for connections to be made, of sufficient number and strength for intended use. Provide all fastenings and holes for joining work of this section together and to other building components. Provide stainless steel screws at aluminum work and non-ferrous (not galvanized) screws or bolts at exterior work and at areas where moisture is present.

### 2.2 FINISHES

A. Paint:

1. On ferrous metal: Approved rust inhibitive paint. Use zinc chromate

iron oxide type, Rust-Oleum #769 or Pratt and Lambert's Noxide Primer.

## PART 3: EXECUTION

### 3.1 FABRICATION IN GENERAL

A. General: Fit and assemble in shop, ready for erection so far as possible. Fabricate and erect square, plumb, level, straight and true. Fit accurately with tight joints and intersections. Make substantial and securely fasten. Meet highest standards of trade.

B. (\*)Exposed Work: Give particular attention to work where appearance is a consideration to obtain smooth unblemished surface finish. Grind off all mill marks, burrs and similar rough edges. Fill flush and smooth out all holes, pits, joints and cracks. Grind smooth, flush with adjacent surfaces. At any reworked surfaces, such as welds or removed mill marks, smooth the surface by filing and buffing to provide finish matching remainder of surface, without grind marks, hollows, depressions or other noticeable surface variation.

C. Joints: Provide joints, connections, intersections in best miscellaneous or ornamental practice as appropriate. Provide splined, doweled, shouldered, pinned or similar positive joints as necessary and approved. Where necessary at exterior, provide permanently weathertight joints, connections and intersections exposed to weather. Provide continuous weld (by "skip" welding if necessary) where such weld will best exclude weather. Use paste solder, where required and specifically approved by Architect, to fill field joint cracks.

D. Edges: Ease sharp edges or corners, as approved, that might be source of injury. Ease all sharp edges of handrails.

### 3.2 WELDING

A. General: Conform to American Welding Society's Code for Welding in Building Construction, latest edition as applicable, using skilled welders. For "structural" type welds, use care to provide welds which will develop proper stresses in welds, using licensed welders, inspected by qualified welding inspectors. Conform to other requirements specified elsewhere herein.

### 3.3 PAINTING

A. General: Apply, in shop, a uniform coat of paint to all ferrous surfaces. Apply to clean degreased surfaces free of dirt, rust, oil, moisture, other foreign material that will interfere with coating functions. Apply paint carefully, smoothly finish and with full coverage including connections. Allow to fully dry before handling. Provide paint film suitable to protect work during building construction and suitable to receive painter's finish, with no runs on exposed surfaces.

B. Touch-Up: Apply coat of paint at scratched or abraded areas and field weld areas immediately after erection; erected work to show no bare metal or scratched paint.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes furnishing and installing custom fabricated special formed metal (S.F.M.) items including the following:

1. Radiation enclosures including baffles, primary and secondary supports, framing and facings and all other components except gypsum board facings.
2. Accessories for radiation enclosures including aluminum bar grilles.
3. Fastenings for work of this section.
4. Shop finishing of items furnished under this section.

C. Related work specified elsewhere:

1. Metal Fabrications: Section 05500.
2. Plastic Laminate Window Stools: Section 06100.
3. Sheet metal work: Section 07600.
4. Hollow metal frames: Section 08110.
5. Insulation, gypsum wallboard and plaster at wall: Section 09100.
6. Metal Laboratory Casework
7. Service piping, brackets and supports: Division 15.

1.2 SUBMITTALS

A. Shop Drawings: Submit fabrication and installation drawings of special formed metal items in accordance with Section 01300. Show all features of construction, dimensions, gauges, fastening, welds, mechanical joinings, reinforcements, supports, cutouts, anchorage to adjacent construction, accessories, finishes and other pertinent data.

B. Samples: Submit to Architect as follows:

1. Fabrication: Provide one full size sample of each fabricated metal item at a joint condition. Sample to be approximately a 10" wide section, indicating joint construction as fabricated, complete with fastenings and all accessories.

2. Finish and Color: Provide three (3) 8" x 8" samples of finish and color as selected, applied on typical Project metal. Provide for steel and aluminum.

### 1.3 QUALITY ASSURANCE

A. The following manufacturers are acceptable as special formed metal fabricators subject to complying with the design requirements of drawings and conforming to the specifications herein:

1. Hofmeister Company
2. Mark Hot, Inc.

### 1.4 PRODUCT HANDLING

A. Package, handle, deliver and store in a manner that will avoid damage or deformation.

### 1.5 COORDINATION

A. Coordinate work directly with Contractor and other Subcontractors. Provide and obtain necessary dimensions, clearances and similar data for work related to items provided under this section.

## PART 2: PRODUCTS

### 2.1 MATERIALS

A. Steel: Cold formed, prime quality, pickled, annealed stretcher leveled steel, free from scale, pitting or other surface defects. Unless otherwise indicated on drawings, provide not lighter than 16-gauge steel.

B. Fastenings: As indicated. Provide Phillips head screws where screws are indicated. Fabricate steel clips of spring steel.

C. Aluminum Grilles: Hofco Bar Grille Type HA, consisting of H-82 linear bars at 5/8" on centers with H-52 crossbars one inch from each end and equally spaced intermediate cross bars at maximum 6" o.c. Notch cross bars to fit around primary and secondary bracket. Provide turn catch (CAM) to secure grilles to primary bracket. Provide without border. Provide proper alloy required to produce integral intergral "hardcoat" colors of architectural class 1, AA-A42 designation, color as selected by Architect. Provide grilles within a single unit in one-piece.

### 2.2 STEEL FINISHING

A. Material: M&T Coating B-65, vinyl organosol, by M&T Chemicals Inc., Subsidiary of American Can Company, Rahway, New Jersey, or as approved equal.

B. Finish and Color: Satin finish, custom color as selected by Architect. Only one color will be selected for all finished metal, unless noted otherwise.

C. Metal Preparation: Phosphate treatment, providing surface free from grease, soil or residual salts.

D. Coating Procedure: In accordance with manufacturers instructions. Coat



clean, phosphated surface with approximately 5 mils of spray applied coating; air-dry 1 to 5 minutes and bake 12 to 15 minutes at 250-300°F to obtain desired satin finish.

### 2.3 FABRICATION

A. General: Fabricate to profiles and dimensions as indicated. Consider and provide for erection procedures. Shop assemble to greatest extent possible, considering shipping and erection. Completely shop assemble and disassemble prior to shipment, marking pieces for proper field assembly. Provide all supports, anchoring devices, anchor bolts, screws, clips, seals and gaskets and other accessories.

B. Formed Corners: Neat, sharp, continuous, free of break marks. Corner radius shall be twice the metal thickness.

C. Flat Surfaces: Free of waves, buckles, dents, hollows, oil-canning.

D. Welding: In accordance with appropriate recommendations of American Welding Society using proper procedures. Welds behind finished surfaces shall be accomplished so as to minimize distortion and discoloration from finished side. Remove weld spatter and welding oxides from finished surfaces by descaling and grinding. Grind and polish weld beads on exposed surfaces to match and blend with finish on adjacent parent metal.

## PART 3: EXECUTION

### 3.1 INSTALLATION

A. General: Erect in accordance with approved erection drawings by workmen skilled and experienced with this type of metal installation.

B. Installation: Erect plumb, level, rigid and in proper alignment complete with all fastenings secured. Use concealed anchorages. Form tight joints with gasket material in firm, uniform contact with adjacent surfaces to form effective sound barrier.

C. Touch-Up: Field touch-up all scratches and abrasions with specified finish to match finish of adjacent surface. Return items which cannot be refinished in the field to the shop, replace or make the required alternations and refinish the entire unit.

D. Protection: General Contractor shall provide protection from damage until building is occupied or accepted by Owner.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this Section: The following outline is a general listing of the type and character of work required under this Section. Do not construe as listing all work, materials or areas, nor describing each part of the work.

1. Wood furring, plates, nailers, blocking, bucks, stripping, backing, grounds, including nailers and blocking for casework, radiation, etc.

2. All other wood items shown or required and not provided under other sections.

3. Install wood doors furnished, under Section 08200 and hardware furnished under Section 08700.

4. Furnish and install wood curbs, cants at new roof opening.

5. Furnish and install plastic laminate window stools.

6. Fireproofing and preservative treatment of wood as specified herein.

7. Furnish and install rough hardware, including framing anchors, nails, spikes, bolts, carriage bolts, nuts, washers, screws, toggle bolts, recessed grommets, etc., as required for work of this section.

8. Temporary enclosures required to protect work and public.

9. All other carpentry required.

C. Related work specified elsewhere:

1. Hollow Metal: Section 08110.

2. Wood doors: Section 08200.

3. Finish Hardware: Section 08700.

4. Lath and plaster: Section 09100.

1.2 PRODUCT HANDLING

A. Protect all lumber and millwork at job site from exposure to moisture and weather. Protect millwork from damage, dust and dirt. Stack doors in flat position, with spacers as recommended by manufacturer.

B. General Contractor and Millwork supplier shall jointly be responsible to make certain that material is not delivered until the building area is sufficiently dry so that the material will not be damaged by excessive changes

in moisture content. Maximum allowable, as outlined in "Forest Products Laboratory Handbook."

## PART 2: MATERIALS

### 2.1 GENERAL LUMBER

A. Dimension and Framing Lumber: Douglas Fir, "Construction" and "Select Structural" as applicable. Where any piece may be exposed, it shall be clean and smooth (sand if necessary), sound and straight.

B. Other Non-Finish and Non-Framing Board Lumber: Douglas Fir, "Construction". Equivalent grades of Ponderosa Pine, Sitka Spruce or White Pine acceptable.

C. Grounds, Stripping and Furring: #1 Common Ponderosa Pine, or equivalent Idaho White Pine, Northern White Pine, KD, surfaced.

D. Grading: All lumber graded according to WCLIB Standard 16, "Dry". Where part of a member may be exposed (i.e. at reveals), provide clean, sanded, smooth and sound members.

E. General: All lumber shall be dry material, surfaced 4 sides (unless otherwise indicated), each piece grade marked (except boards). Provide new wood for all lumber used at permanent part of the work (unused during construction).

### 2.2 FIREPROOFING TREATMENT

A. General: Pressure impregnated with Koppers Company, Inc.'s "Non-Com" chemicals to comply with requirements of Underwriter's Laboratories, so marked or branded when delivered to site. Store indoors, completely protected from weather, moisture. Treat after cutting to shape.

B. Moisture Content: All material furnished fireproofed shall be kiln dried to an average of 18% or less.

C. Appearance: Fireproofed material used shall be without twist, warp, split, check or other defects resulting from fireproofing and re-drying process which would adversely affect work or function of any member. Discoloration will not be regarded as a defect.

D. Extent of Work: Fireproof treat all wood used for furring strips and blocking.

### 2.3 PRESERVATIVE TREATMENT OF WOOD

A. General: Treat by vacuum or pressure method, using approved preservative that will not stain or bleed, is paintable and will not cause softening or deterioration of roofing where wood member is built into roof. Subcontractor performing treatment shall: Review all conditions; confirm applicability of treatment and advise Architect if change in treatment is recommended; submit a proposed list of treatments for approval; dry thoroughly before installation; treat after cutting to shape, ends of preservative treated wood that are job cut shall be given two swab coats of Penta-WR.

B. Preservative Treatment, Exposed Wood: "Penta-WR" water repellent preservative meeting Federal Specification TT-W-572, accomplished by vacuum process, treated to refusal (approximately 2 lbs. of solvent per cubic foot).

C. Preservative Treatment Concealed Wood: For wood at roof, exterior and interior concealed wood, treat by pressure process using Wolman Salts, dried after treatment, retention about 3.5 lbs. dry chemical per cubic foot. Retention as recommended by manufacturer and treating plant for condition.

D. Extent of Preservative Treating: Treat all wood at (1) cant strips, nailers, curbs, blocking and other wood a permanent part of structure at roof (2) all permanent wood at exterior of building, (3) other wood subject to damp or humid conditions.

#### 2.4 ROUGH HARDWARE, FASTENERS, ANCHORAGE DEVICES AND STEEL STUDS

A. Extent: Provide all rough hardware required, including nails, screws, bolts, lag screws, grommets, cinch anchors, joist hangers, toggle bolts, shot anchors, and similar items.

B. General: Provide proper size and type for use intended and for materials to be fastened. Install adequate hardware to insure substantial and positive anchorage. Anchor wood ground with toggle bolts or similar approved device. Nailing into wood plugs is not acceptable for any work. Where shot anchors are noted or specified or used, use Ramset of type and size recommended by manufacturer for conditions of use.

#### 2.5 PLASTIC LAMINATE WINDOW STOOLS

A. 1/16" ga. General Purpose Grade conforming to NEMA LD1-1971, Type 1, Class 1, by Formica, Micarta or Textolite; colors as selected.

B. Core: Particle board with minimum density of 45 lb. per cubic foot. Core shall be not less than 1-1/8" thick.

### PART 3: EXECUTION

#### 3.1 FRAMING, NAILERS, BUCKS, CURBS, CANT STRIPS

A. General: Install plumb, level, true and square to dimensions shown and required. Allow for finishes and proper clearances where necessary. Provide sound bearing, square cuts, full bearing surfaces. Framing to be 16" o.c. unless specifically noted otherwise. Set crown up for horizontal members. Provide double top plates and single bottom plates at stud partitions. Locate studs, horizontal members or backing behind all joists. Provide solid support under end joints. Shim and block where required. Eliminate crooked, twisted, cupped or bowed framing where such defects will interfere with or prevent highest finishing with other materials. Anchor in substantial, accurate manner to hold dimensions required. Shim and block where required. Provide blocking above ceiling for ceiling mounted items.

B. Anchorage: Adequately anchor, fasten and support all members in best, trade practice to form secure, substantial and accurate anchorage and to hold required dimensions and prevent twist. Exercise care at all hangers, ceiling

frames and similar work to provide permanent support. Use bolts and screws to eliminate loosening up of joints, sagging or similar movement.

### 3.2 FURRING, STRIPPING, GROUNDS AND BACKING

A. Install plumb, level, true and square. Anchor substantially for permanent installation. Install stripping or furring for paneling 16" o.c. unless otherwise specified. Set and shim to a straight edge so finish wall is true and straight. Provide grounds and backing as shown or required. Allow for finishes and shim out to form level surfaces. Verify ground sizes and locations before installation. Firestop 8' o.c. each way.

### 3.3 FINISH HARDWARE

A. General: Refer to Article 1.1.C this section, for information relative to hardware. Carefully install hardware, using skilled finish carpenters. Fit before painter's finish is applied, remove and install after finish is complete. Install hardware so that all operating parts operate smoothly, close tightly and do not rattle. At all screw holes install proper screws, install hardware firmly anchored.

B. Doors: Hang doors so they will stand in any open position. At each door, install bumper, stop or holder. Set door stops so bumpers occur at reinforced areas of doors. Verify condition for stops prior to installation. Where conditions permit, doors shall swing over 90° and install for 180° swing wherever possible. Stops shall be securely anchored to guarantee permanent installation.

C. Closers: Adhere to manufacturer's directions for closers, including location at opening (as well as distance from door edge), closer size, anchorage and other factors affecting proper installation. Verify any questionable installations with hardware supplier prior to installing closers. All closer installations shall be done by thoroughly skilled and trained workmen. One trained workman shall adjust (and re-adjust) all closers after installation.

### 3.4 GENERAL WORKMANSHIP

A. Provide all workmanship to meet highest standards, accomplished by skilled mechanics. For finished millwork use experienced finished carpenters only. All exposed wood shall be free of hammer marks, abrasions, splinters, gouges, etc. Set all nails at exposed wood surfaces.

### 3.5 WORK OF OTHERS

A. Examine all sections of Specifications and drawings so as to properly anticipate work which must be built into, attached to, butted against, concealed by, etc. work of others and furnish and install such bucks, backing, supports, openings and other items as may be required.

### 3.6 FIREPROOFING TREATMENT

A. Pressure treat all exposed millwork except plastic laminate veneers. Conform to requirements of Article 2.2 of Section 06100.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes patching existing roofs and related rigid roof insulation at new roof openings.

C. Related work specified elsewhere:

1. Carpentry: Section 06100.

D. Not furnished under this section, but built-in under this section:

1. Metal Roof Flashing and Trim which is built into plies of roofing membrane: Section 07600.

1.2 GENERAL INFORMATION AND REQUIREMENTS

A. Information in this Article is intended to complement and clarify the intent of the drawings, but do not construe as outlining all required work. Provide all materials and installation to complete the work. P & G used herein means pitch and gravel construction or asphalt and gravel construction as applicable.

B. Flashing:

1. In cooperation with sheet metal subcontractor (or others, as appropriate), build-in any metal flashing (furnished under other Sections) which is inserted into plies of roofing.

2. Provide and install all plastic sheet under metal copings, roof edges and similar locations.

C. Compatibility: Where any "plastic" flashing or membrane is to be built-into, or be in contact with, built-up membranes, verify the compatibility of the proposed "plastic" flashing with the built-up membrane materials. Do not use any "plastic" flashing that is incompatible, will soften or cause deterioration to plastic or built-up membrane.

D. Notice: Give notice to University when materials are delivered to permit examination and testing. Give at least 7 days notice before starting any work to permit inspections to be scheduled.

E. Certificate: Prior to starting work, provide certificates from the manufacturers that the materials being provided to the job are in accordance with the specified requirements.

### 1.3 FOLLOW-UP INSPECTIONS AND SERVICE

A. Project Completion: Just prior to acceptance of entire project, roofer shall inspect patched roof, remove all debris, nails, wire, cut metal and re-spread gravel over thin or bare spots. Provide additional gravel and bitumen as required. Remove any drips of bitumen. Send written confirmation to Owner and Architect when such services have been performed. Any "ridging", blisters and similar defects shall be cut open and repaired.

### 1.4 DELIVERY, STORAGE, HANDLING

A. Package, deliver and store materials in a manner that will avoid damage.

B. Store all materials off the ground and keep under waterproof covering, approved by University. Do not allow covering to be torn, displaced or otherwise damaged. Store rolls by stacking on end, with adequate platform and clearance to prevent penetration of moisture from grade. Do not pile roof materials to such weights as will damage deck or insulation.

### 1.5 SUBMITTALS

A. Certificate: Submit 2 copies of certificates specified in Article 1.2.E herein.

## PART 2: PRODUCTS

### 2.1 MANUFACTURERS OF ROOFING MATERIALS

A. Provide materials of best grades of Barrett, Koppers, or approved equal. Strictly adhere to manufacturer's requirements for twenty years roofing and flashing for type of deck and other conditions, or as specified herein, whichever requirement is the most rigid or demanding. Note that certain requirements herein may be in excess of normal bonded roof specifications and such additional requirements shall be provided. As reference, Barrett may be named. For all built-up membrane materials, provide products of one manufacturer.

### 2.2 ROOFING AND PLASTIC FLASHING MATERIALS

A. Provide materials conforming to ASTM standards, where they apply, as minimum requirements, as well as equal to Barrett's materials.

1. Base Sheet: 40-45 lb. coated base felt equal to Barrett.
2. 15 lb. Asphalt Felt: ASTM-226, with Underwriter's label, 15 lb/100 sq ft.
3. 15 lb Tarred Felt: ASTM D227, with Underwriter's label, 15 lb/100 sq ft.
4. Asbestos Finishing Felt: ASTM D250, 15 lb/100 sq ft.

5. Reinforced Asbestos Base Flashing: Barrett AB-20, or approved equal.
6. Steep Roofing Asphalt: ASTM D312, Types II, III or IV as appropriate for slopes.
7. Coal Tar Pitch: ASTM D450, Type A, straight run, high bitumen coal tar pitch.
8. Plastic Cement: As recommended by roofing manufacturer, minimum standards Federal Specification SS-C-153, Type I or II as compatible with roofing.
9. Sealant: G.E. silicone Construction Sealant, or Dow-Corning Silicone Sealant.
10. Gravel: Water worn gravel, ½" to 5/8" in size, washed, clean, dry, generally rounded aggregate and suitable for use on roofing, ASTM D1863 (no slag).

### PART 3: EXECUTION

#### 3.1 STANDARDS FOR INSTALLATION

A. Workmanship: Conform to best practice and accomplish by using only skilled mechanics. Exercise special care at openings through roof and at roof edges. SPILL NO ROOFING MATERIALS ON BUILDING OR OTHER MATERIALS. Spilled materials on exposed surface will result in roofer repairing, resurfacing or replacing the stained work. Requirements for installing roofing applies to similar operations for vapor barrier and insulation work. See Section 01010 for conditions for working on roof and over membranes, and Section 01500 for Temporary Heat requirements.

B. General Responsibility: Perform no work in conflict with, contrary to or below the standards established by roofing materials manufacturer. After starting work, roofer is responsible for complete water integrity of the membranes which will insure a satisfactory roof life of not less than 20 years. Therefore, roofer shall:

1. Not apply membranes or other work under any conditions which are not proper and in best recommended practices, including surfaces or weather.
2. Examine roof decks and other surfaces with prime contractor for suitability of surfaces and not proceed until corrections have been made where necessary (start of work means acceptance of deck and conditions by the roofer).
3. Not overheat bitumens and in event of accidental high temperatures, discard entire batch.
4. Review all drawing and specification requirements and establish control and test procedures to insure compliance.
5. Exercise care to insure adequate quantities of materials are used.
6. Maintain competent foremen continuously supervising the work, with



authority to discard unsuitable materials or remove unsatisfactory workmen.

7. Supervise installation of, and be responsible for seeing that ventilators, drains, curbs and other work is properly set and roof is not damaged; make roof and flashing repairs as necessary; advise University and Prime Contractor of any potential leaks in work of others.

8. Resolve questionable installation work prior to proceeding.

9. Inspect deck with University Representative prior to starting work.

### 3.2 PATCHING BUILT-UP P & G ROOFING

A. General: Coordinate schedule and work with other operations to apply membrane over insulation immediately. Use only dry, undamaged felts and properly heated bitumen. For first ply of all built-up membranes, use 15 lb. tarred felt. Complete membrane in one operation, without phases. Lay all plies "Shingle fashion" at one time (no "combination" laying), except for first ply if specifically recommended by manufacturer. Spread bitumen by mopping to full coverage of surfaces.

B. Cut and rewire existing roofing and patch and reflash as for new work.

C. Protection: Keep all felts covered, clean and dry. Perform all work, including use of equipment to transport materials, to prevent damage to fill, insulation or deck. Roofer shall do all preparation work, take all precautions and be responsible for preventing any bitumen dripping onto or into building.

D. Heating: DO NOT OVERHEAT BITUMEN: Discard any overheated material. Do not use on project. Do not heat pitch over 400° and apply to surface above 350°. Do not heat asphalt over 450° and apply to surface above 400°. (If manufacturer recommends lower heat temperature, follow manufacturer's recommendations). Temperatures apply to membrane, vapor barrier and insulation work. Roofer shall keep accurate thermometers at site for use of workmen and Owner's representative. (Thermometers shall not be built-in kettle thermometers.)

E. Membrane Plies: Install at least 4 plies of saturated tarred felt, lapping each 27½" over preceding felt and mopping each felt uniformly and fully so in no place does felt touch felt. Use minimum 30 lbs of pitch per ply per 100 sq ft. Lay all felts without buckles and wrinkles and broom in each ply to form intimate contact over entire surface so plies are completely bonded together with bitumen.

F. Flood Coat: Over entire surface pour uniform coating of bitumen, using 75 lbs of pitch per square. Apply within two days of completion of membrane but not until cut tests have been taken.

G. Gravel Surface: At all built-up membranes, while flood coat bitumen is still hot, uniformly spread and imbed gravel. At roofs use not less than 400 lbs per 100 sq ft.

H. Vertical Surfaces: Where membranes are continuous over a vertical or steep sloped surface, install all plies in full uniform trowelled coating of plastic

cement and apply plastic cement top surface approximately 1/8" thick. At these areas, in lieu of built-up membrane, the 55-60 mil plastic sheet membrane may be provided instead, built into membrane a minimum of 8".

J. Obstructions and Roof Penetrations: Perform and install all work around openings with plastic cement, including drains, vents and similar items. Double felt strip flanges into membrane. At pipes, conduits and similar round items (without flanges) which penetrate roof, install plastic flashing sealed to obstruction and carried out onto membrane at least 8", built into membrane. Construct all work to insure no pitch drips into building.

K. Determine existing materials and do not use asphalt with coal tar pitch.

### 3.3 INSTALLING FLASHING

A. General: Examine all drawings, including mechanical and electrical work for general indication of curbs, openings, skylights, vents, joints and similar work, as well as types of flashing work. Drawings are not represented as indicating all obstructions or features that may occur nor do details indicate all requirements or methods of flashing work. Metal flashings are provided under Section 07600.

B. Vertical Surfaces, Built-up Membranes: At intersections of horizontal surfaces to walls, curbs and similar vertical surfaces with cant strip, carry all felts of built-up membrane up cant and cut off evenly. Either full height of curb or up 8" minimum apply specified composition flashing system. Cover entire surface with plastic cement and imbed surfaced cap sheet. Nail tops of flashing plies to backup with tin discs. Seal entire top edge of flashing plies with liberal application of plastic cement. When flashing must be installed in cold weather, with the specific approval of the Architect, hot steep asphalt may be substituted for plastic cement to imbed the cap sheet (final ply) by using a heavy hot mopping on the surface of the ply under the cap sheet and also over the surface of the cap sheet.

C. Equipment Curbs: Construct as detailed. Seal all penetrations through flashing at supports. Flash as for vertical surfaces.

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## PART 1: GENERAL

1.1 SCOPE

- A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 10101, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.
- B. Work under this section includes all sheet metal work.
- C. Related work specified elsewhere:
1. Special Formed Metal: Section 05750.
  2. Built-up Bituminous Roofing: Section 07510.
  3. Field Painting: Section 09900.
- D. Furnished under this Section, built-in under other Sections:
1. Sheet metal for roof flashing and trim: Built-in under Section 07510.

1.2 GENERAL LOCATION OF TYPES OF SHEET METAL WORK

- A. Provide all required sheet metal work, of the general types and character outlined herein. Provide galvanized iron (G.I.) for all metal work.
1. 20 ga. G.I. cover - counter flashing at curbs.
- B. Provide all other sheet metal work and related materials of similar nature, for flashing, counterflashing, curbs, enclosures, caps and all other sheet metal except as may be provided under other sections.

1.3 SUBMITTALS

- A. Samples: Submit full size samples of each type of typical counter flashing, prior to fabricating metal for the Project. Show joints for each type.
- B. Shop Drawings: Submit fabrication and erection drawings of all sheet metal work including full size details, prior to fabrication. Show locations of proposed joints at exposed metal work. Submit in accord with Section 01300.

1.4 DELIVERY, STORAGE, HANDLING

- A. Deliver, handle and store at the jobsite in a manner that will avoid damage. Scratched, dented, or deformed metal items will be rejected.

## PART 2: PRODUCTS

### 2.1 MATERIALS

A. Galvanized Sheet Metal: ASTM A525 and ASTM A361, 1.25 oz. class (G90) by Armco, US Steel, Wheeling or Toncan Metal, or approved equal. Prime on both sides. Gauges of metal as specified, shown on drawings and required to provide highest quality installation.

#### B. Painting:

1. Asphaltic coating: Coat metal built into roof type membranes, or under insulation, with bituminous paint on parts to be built in.

2. Galvanized metal: For all other G.I. flashing (not built into roofing) thoroughly clean metal of all dirt, grease, oil, or other residue, properly treat surface to insure adhesion, then apply one full coat of zinc dust primer on both sides of metal before installation. Primer to be Type 1, in accordance with Federal Specification TT-P-641-D with 80% metallic zinc dust. No substitutions. See Article 2.2 below.

#### C. Fastenings:

1. General: Provide appropriate and recommended type and size of non-rusting fastenings for all metal to insure: proper and permanent alignment; metal remaining permanently in place; restricted movement; permanently tight joints. Provide screws or rivets at all soldered joints to take the stresses. No nails to be used where exposed. Where exposed fastenings are required, provide screws. Fastenings shall penetrate wood a minimum of 3/4".

2. Galvanized metal: Hot dip zinc coated steel nails and screws, except screws holding removable counter flashing shall be stainless steel.

3. Watertight washers: For screws at coping caps, tops of curbs and similar locations, provide neoprene washers under the head to insure watertight hole.

#### D. Solder:

1. Galvanized Iron work: 50-50 tin-lead alloy.

#### E. Joint Sealer, Mastic and Miscellaneous:

1. Roofer's Mastic: Plastic cement as specified for roofing, Section 07510.

2. Concealed sealant (bedding sealant): Tremco Curtainwall Sealant, Polyisobutylene-butyl type, or approved equal.

3. Caulking compound-sealant: As specified for sealant under Section 07900.

## 2.2 FABRICATION WORKMANSHIP

A. General: Provide metal free from holes, waves, buckles, pinch marks and other defects. Imperfect metal will be rejected and shall be replaced. Coping covers and roof edge covers will be rejected if not straight and level.

B. Peeling Paint: Thoroughly cleaned metal is a requirement prior to priming to insure proper provide adhesion. Paint that peels or blisters from metal work (primed under this section) at the line of primer and metal, within two years after acceptance by Owner, shall be basis for rejection of painting and this subcontractor shall brush, reclean and repaint such work as directed at the expense of this subcontractor. If repainting is required, two coats of paint shall be provided and entire metal will be cleaned and repainted.

### PART 3: EXECUTION

#### 3.1 WORKMANSHIP

A. General: Conform to best practice, accomplish by using skilled mechanics, in accordance with Sheet Metal Contractor's Association Handbook and Recommendations and to details shown. Provide metal work that is substantial, securely fastened, neatly installed, with clean sharp breaks, water and weatherproof at exterior and below plaza locations. At roof locations, provide metal work to meet roofer's requirements and approval for twenty year bonded type roof. Insulate between dissimilar material with asphalt paint or other approved insulator, such as plastic sheet.

B. Verify conditions: Prior to starting work, verify that all nailers, etc., are true to size and line and securely anchored. Notify General Contractor of unsatisfactory work and do not proceed until corrections are made so straight, level, plumb and properly sized work results. Verify dimensions in field to provide proper and accurate fit.

C. Dimensions: Carefully form and install metal work, including at masonry, to conform to dimensions indicated and to field confirmed dimensions.

D. Joints: Construct all joints with laps in direction of flow. At butt and locked joints, construct joints watertight.

E. Hemmed edges: Turn back metal to form hemmed edges wherever the edge creates a hazard or where it may cut into membranes. Provide hemmed edges at lower edges of flashing, counter flashing.

F. Soldering: Screw, spot weld or rivet all soldered joints to take stress, with solder acting only as sealant between metal. Keep solder work neat, smooth, with no greater spread than required to seal the joint. For stainless steel solder work, carefully follow manufacturer's directions. Thoroughly clean all flux from surfaces and for acid type flux scrub residue, neutralize with ammonia or washing soda and rinse with clean water.

G. Keepers and wedges: Where shown, or required to firmly hold metal in place, provide continuous keepers, screeds or cleats of same metal as metalwork. Provide lead wedges where noted or where required to hold metal work firmly in place.

H. Built-in work: Furnish metal to proper trades for installation when other work is in progress. Sheet metal fabricator is responsible to be aware of job progress and to provide built-in metal at proper time to prevent delays at job-site.

### 3.2 TYPES OF JOINTS

A. Counterflashing: Lapped joint.

### 3.3 JOINT CONSTRUCTION

A. Lapped Joints: Lap 2" in direction of water flow. At counter flashings and similar work, lock bottom edges together.

B. General: At all corners, inside or outside type, provide sections built up in shop, with soldered joints. Corner units to be neat and follow profile of adjacent metal. No nails permitted at exposed surfaces of exposed roof metal, use only screws. Form metal as indicated to field verified dimensions.

### 3.4 COUNTER AND CURB FLASHING

A. General: Install metal counterflashing after composition flashing and cap sheets are installed. Lap joints and lock lower edges together. Counterflashing to provide watertight closure over top of composition flashing. At corners, curbs and similar intersections, solder watertight. Carry counterflashing down 45° cant strip to about 1" above roofing membrane.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes all caulking, sealing, and gasket work except that specifically required under other sections.

C. Related work specified elsewhere:

1. Caulking and sealants related to roofing: Section 07510.
2. Caulking and sealants related to sheet metal flashing: Sections 07600.
3. Caulking, sealants and gaskets related to glazing: Sections 08800, 08900.
4. Caulking, sealants and gaskets related to acoustical sealing of partitions: Section 09100.

1.2 GENERAL INFORMATION

A. Following outline is intended to indicate the locations and general types of work under this Section as well as to complement and clarify drawing requirements. Do not construe as indicating all work required by this Section, describing all operations or mentioning each type of sealing requirement. Refer to drawings and other Sections for additional requirements.

1. Interior vertical surface joint sealer (caulking): This is the primary interior sealant for all uses in joints in vertical surfaces except acoustical sealant.

1.3 SUBMITTALS

A. Color Samples: Submit actual samples of full color palette of each material for Architect's selection.

B. Manufacturer's Recommendation: Submit technical data including performance requirements, recommendations and application instructions to the Architect for approval of materials used.

## PART 2: PRODUCTS

### 2.1 SEALANTS

- A. Interior Vertical Surface Joint Sealant: Tremco Synthetic Resin Sealant or equivalent of W.R. Grace, Pecora or Sonneborn.
- B. Primer: Provide primer type as supplied or as recommended by manufacturer of sealant, if required for substrates.

### 2.2 BACKING AND BOND BREAKERS

- A. Backing and Rod Stock Backstops: Refer to other Sections (including Sections 03300, 04200) for backstop provided under other sections. Where appropriate backing for proper joint configuration is not supplied by others, or where backing is too deep in joint, provide "Ethafoam" rod stock (or other similar recommended rod type backing) oversize for joint. At all locations, provide approved backstop that will prevent sealant adhesion at backside and use as separator between non-compatible sealant materials.
- B. Bond Breaker: Aluminum foil or other sheet goods, compatible with sealants.

## PART 3: EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

- A. DILUTION: DO NOT DILUTE, CUT, GAS, ADULTERATE OR OTHERWISE CHANGE ANY SEALANT. SUCH PRACTICE WILL RESULT IN AUTOMATIC REJECTION OF CAULKING SUBCONTRACTOR. IN ADDITION, ALL CAULKING DONE WILL BE REJECTED, REMOVED AND REPLACED BY OTHERS AT EXPENSE OF OFFENDING SUBCONTRACTOR, TO EXTENT DIRECTED BY ARCHITECT OR UNIVERSITY.
- B. Joint Condition: Do not work until joints are in proper condition for best results. Caulking subcontractor shall perform all work to insure joints that are clean, dry, and free from frost, dust, oil (including form oil) or other residue that will prevent or reduce adhesion. Joint defects, including lack of adequate depth or size shall be corrected by prime contractor.
- C. Primer: At porous surfaces and elsewhere recommended by sealant manufacturer, prime joints with clear primer made for that purpose, as recommended by manufacturer. Surface to show gloss. Primer is required at stone, porous masonry and porous concrete. Provide primer (conditioner) at all joints to receive exterior slab sealant.
- D. Clean Sealant: Keep surface of all sealant clean until "skinning" has taken place. Do not caulk under conditions which will permit dust to adhere to surface.
- E. Joint Design and Configurations: Details provide only general indications as to where sealants occur. Provide proper depth of material in relation to width, with proper configuration to insure proper adhesion, without exceeding adhesion abilities of the sealant. Obtain manufacturer's recommendations and keep copy at jobsite to permit reference. Joint size and configuration shall be as recommended by manufacturer for location, proportion, type of stress and shape, including joints in shear. In all cases, provide backstop or bond breaker



at backup to prevent sealant from adhering to backup.

F. Instructing Mechanics: Prior to commencing work, thoroughly instruct all mechanics in the proper methods and techniques required to insure best possible end result. In addition to reviewing instruction of each of the manufacturers involved, review requirements of temperature, surface of sealant with relation to surrounding materials, cleaning joints, priming joints, backstops and joint configurations.

### 3.2 CAULKING AND SEALING

A. General: Do not caulk during period of precipitation nor immediately thereafter. Provide proper backing at all joints. Provide rod stock typically at all joints, including raked back mortar, except where gaskets are provided. Use oversize rod stock to insure proper shape and to hold rod stock backing firmly in place. Follow manufacturer's recommendations on joint proportions. Caulking depth generally shall be two-thirds of joint width, but not less than  $\frac{1}{4}$ " depth. Fill joints over  $\frac{3}{8}$ " in width by at least 3 passes, running a bead in each corner and finish by a bead down center.

B. Preparation: Before caulking, take all measures to insure clean, dry joints. Brush, degrease, dry and clean all grooves. Use solvents recommended by manufacturer.

C. Temperatures: Caulk under ideal temperatures, above  $40^{\circ}$ . If necessary, provide heated enclosures to accomplish work under ideal temperatures.

D. Caulking: Use proper and approved guns, with proper size nozzles, including offset nozzles at limited clearance spaces. Mask adjacent surfaces as required to prevent surplus or misplaced sealant. If caulking operations indicate careless workmanship, misplaced sealant or sealant smeared (or overlapping) adjacent surfaces, masking will be required (and provided without extra cost) at all locations. Finish joints by neatly pointing with beading tool. Apply surface coating to surface of sealant before tooling only if recommended by manufacturer and if coating will not discolor caulking.

E. Cleanup: Immediately clean adjacent materials which have been soiled; leave work in a neat, clean condition; finish work to be smooth, clean, even surfaces, neat, free from holes, pits and absolutely watertight.

F. Recessed Caulking: Where shown, caulk so surface of caulking is uniformly back from adjacent surface. Where not otherwise indicated at recessed caulking, hold surface back about  $\frac{1}{4}$ ".

### 3.3 WORKMANSHIP

A. Conform to best practice and accomplish by using mechanics skilled in their trade. Caulking shall accomplish its purpose to prevent admittance of air and water. Remove and replace defective caulking. Requirements herein specified are minimum requirements as to materials and methods and perform work and use all means as necessary to insure best results. Assume responsibility for defective work. Following types of failure will be adjudged defective work: Leakage

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes all hollow metal shown on drawings and specified herein which includes the following but not limited to: Interior hollow metal frames. Provide standard and special anchors, clip angles, etc, required for installation. Miscellaneous metal frames are not included.

C. Related work specified elsewhere:

1. Grouting of frames: Sections 04200, 09100.
2. Metal Fabrications: Section 05500.
3. Carpentry: Section 06100.
4. Wood Doors: Section 08200.
5. Finish hardware: Section 08700.
6. Field painting: Section 09900.

1.2 SUBMITTALS

A. Shop Drawings: Submit shop drawings of hollow metal items in accordance with Section 01300. Show all features of construction, dimensions, gauges, reinforcements, cutouts, anchorage to adjacent construction and other pertinent data.

1.3 PRODUCT HANDLING

A. Handle, transport and store hollow metal work in a manner that will prevent damage and deterioration. Provide proper packaging to protect all items. Store at the project site in an upright position under cover and on wood sills.

## PART 2: PRODUCTS

2.1 MATERIALS AND MANUFACTURERS

A. This specification is based on Trussbilt Stockline Hollow Metal Doors and Frames.

B. Comparable products manufactured by Overly Mfg Co., Pioneer, Steelcraft or Curries Manufacturing, Inc, or approved equal which conforms to these specifications will be acceptable.

2.2 FABRICATION

A. Construct all work in a first class manner in accordance with details and

approved shop drawings. All joints and mortises shall be to hairline accuracy, with all welds continuous and ground smooth and with all items square and true.

B. Factory assemble frames in the largest size units permitted by shipping restrictions for minimum assembly of related parts at the job site.

C. Frames:

1. Provide one piece welded unit type construction formed to the profiles shown on details. Construct frames of hot-rolled pickled and annealed steel. Use 16-gauge for all frames. Label frames, 16 gauge or heavier if required by label.

2. Miter all corners, including stops, to hairline accuracy continuously arc welded on the back side. Grind frame faces smooth for invisible joint. At mullion intersections of special frames, arc weld faces of frames and stops. Welding and grinding to flush, smooth surfaces shall be done to preserve the original profile of the frame and to maintain crisp square corners. Spot welding of reinforcement shall be invisible on exposed surfaces.

3. Provide at least three anchors at each jamb for anchoring frame to adjacent construction. Type of anchor shall be determined by the type of construction and as recommended by the frame manufacturer. Provide 2" x 3½" x 12-gauge floor clip angles. Where no separate structural lintel is indicated for frames in 4" walls, provide a 12-gauge channel head reinforcement, welded to frame head.

D. Hardware Preparation:

1. Mortise, reinforce, drill and tap frames for hardware using templates furnished by the hardware supplier. Provide the minimum reinforcements and components required by the Steel Door Institute Standards for template doors and frames.

2. Provide three Glynn-Johnson GJ64 moulded, non-staining rubber mutes for all interior door frames.

### 2.3 PAINTING

A. After fabrication, thoroughly clean all items of rust, oil, grease or other impurities, spot glaze where necessary to correct defects and apply coat of red oxide primer, baked-on.

## PART 3: ERECTION

### 3.1 ERECTION

A. Erect frames in position plumb, rigid and in true alignment. Provide the necessary bracing and spreaders to prevent displacement or distortion until adjacent construction is completed. Securely attach frames to floor and adjacent construction. Frames in masonry walls shall be grouted full of mortar at jambs and anchors built into joints by the mason as the walls are laid up.

B. Drill and tap for field splices and connections after erection. Caulk splices and connections and leave finished work smooth and free from warps and buckles.

C. After erection, touch up field splices, connections, welds and abrasions with specified primer.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes furnishing all wood doors, shown on the drawings, (with door number indication).

C. Related work specified elsewhere:

1. Installation of doors: Section 06100.
2. Architectural Woodwork: Section 06400.
3. Hollow Metal: Section 08110.
4. Finish Hardware: Section 08700.
5. Glass and Glazing: Section 08800.
6. Field Finishing: Section 09900.

1.2 GENERAL INFORMATION

A. Field Dimensions: Field measure building features as required to insure proper fitting of work.

B. Samples: Provide Painting Subcontractor with four unfinished samples (two of each) of Project veneers. Samples shall be uniform in size, approximately one square foot. Identify Project in ink directly on one surface of sample. Provide sample pieces which will be representative for each species.

1.3 JOB CONDITIONS

A. General Contractor shall not permit delivery until job conditions, including humidity, are suitable. Do not deliver until building is sufficiently dry to insure no damage to doors will result; as a minimum, plastering and similar moisture shall have been out of entire building for at least ten days, relative humidity shall be less than 50% and in cold weather, heat shall have been provided for at least ten days prior to delivery, with frames and construction conditions ready to finish and hang doors.

1.4 DELIVERY, HANDLING AND STORAGE

A. Package, handle, deliver and store at the jobsite in a manner that will avoid damage. Damaged doors will be cause for rejection.

B. Store doors flat and support in such a way as to prevent marring or crushing.

C. Store doors in unopened containers until ready to hang.

## 1.5 SUBMITTALS

A. Shop Drawings: Submit shop drawings of all wood door items in accordance with Section 01300. Show all features of construction, dimensions; and all other pertinent data.

## 1.6 GUARANTEE

Guarantee interior doors for five years. Guaranty shall cover faulty workmanship, materials, delamination or splitting of veneer or warp in excess of  $\frac{1}{4}$ " for doors up to 7'-0" and warp in excess of  $\frac{3}{8}$ " for doors over 8'-0". Replace doors complete including fitting, hanging and finishing.

## PART 2: PRODUCTS

### 2.1 MANUFACTURERS

A. Acceptable Wood Door Manufacturers: Doors by Eggers Hardwood Products Corp., US Plywood (Algoma-Made), Weyerhaeuser, Aaron Carlson Company, or approved equal, conforming to the below specifications will be acceptable.

### 2.2 WOOD DOORS

A. Quality Grade: Except as otherwise specified herein, provide Premium Grade, as defined in AWI Quality Standards, Section 1300.

B. Flush Door Construction: Solid core, wood flake board core, 28 to 32 lb. per cubic foot density; or single thickness slab of 3-ply particle board; conforming to Commercial Standards CS236-66, Type 1, Density C, Class I. Stile edges 1- $\frac{3}{8}$ " to 1 $\frac{1}{2}$ ", top and bottom edges 1 $\frac{1}{4}$ " thick, overlays as specified under 2.3 herein.

C. All wood doors shall bear a minimum 20 minute UL label.

### 2.3 FACE VENEER

A. Veneers for Paint Finish: Medium density overlay on hardware face veneer. Face veneers with open joints, face depressions, glue or other stains, or telegraphing core variances will be cause for rejection and replacement of doors. Unless otherwise noted all new wood veneer doors are for paint finish.

### 2.4 FABRICATION AND PACKAGING

A. Openings: Manufacturer shall cut for glass where required if any, as shown. Openings shall have mouldings tacked in place for field glazing. Seal all cutout openings at mill prior to tacking in mouldings. Prevent any stains on face of door.

B. Numbering: Provide door opening number on either top or bottom edge of door. Location of numbers shall be consistent.

C. Packaging: Pack doors individually in heavy cardboard cartons; paper bag packaging not acceptable. Provide door opening number on shipping carton.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes furnishing of all finish hardware shown on drawings and specified herein except for that specified under other sections.

C. Related work specified elsewhere:

1. Hollow Metal: Section 08110.
2. Other finishing hardware specifically included with manufactured items or under specific fabrication or erection specifications: Applicable sections.
3. Rough hardware: Applicable sections.

D. Furnished but not installed under this section:

1. Finish hardware is installed under Section 06100.

E. Outline and schedules contained herein have been listed to indicate scope of work. Under this Section provide all work reasonably required by the general scope as outlined herein, and all work shown on drawings. Provide items, articles, materials, operations and methods listed, mentioned or scheduled herein or on drawings, in quantities as required to complete the project. Provide hardware which functions properly and advise Architect of any items that will not operate properly and are improper for conditions or will not remain permanently anchored before hardware is furnished.

1.2 SUBMITTALS

A. Schedule: Submit in accordance with Section 01300 and the following:

1. Numbers in this schedule are taken from catalogs of P&F Corbin, Lawrence, LCN, Rixson, Hiawatha, Best, Ives, and Glynn-Johnson. Submit three copies of hardware schedule to Architect.

2. Resubmit six corrected copies.

3. Submit a brochure of all approved items to facilitate Architect's checking of catalog items.

B. Templates: Submit necessary templates and schedules as soon as possible to hollow metal, wood door, and aluminum entrance fabricators in accordance with the schedule they require for fabrication.

### 1.3 DELIVERY, STORAGE, HANDLING

A. Properly and carefully pack items to guard against damage in transit. Pack each group separately and mark clearly to show its contents and place in building for which it is intended. Do not deliver hardware until General Contractor has suitable locked storage space.

### 1.4 GUARANTEE AND ADJUSTMENTS

A. The hardware distributor shall guarantee all workmanship and material against defective manufacture, and he shall replace and make good all defective workmanship and material appearing within a period of one year. Hardware distributor shall not be responsible for faulty application.

B. Where hardware indicates improper operation, hardware supplier or manufacturer shall visit job and make necessary adjustments and corrections. Where hardware is inadequate for required function, exposure or use, replace with suitable hardware as directed.

C. Shortages and/or incorrect items (based on the plans and specifications and approved samples lists and schedules) shall be furnished and/or replaced with correct material by the hardware distributor, at no additional cost to the Owner.

D. At completion of project, General Contractor shall notify hardware subcontractor, who shall have a qualified factory representative make inspection of closer installations. Final adjustments of closers shall be made by representative and a letter sent to Architect reporting conditions and that final adjustments have been made.

## PART 2: PRODUCTS

### 2.1 GENERAL QUALITY

A. Furnish new hardware, free from defects, scratches, mars, etc. Furnish hardware complete with necessary screws, shields, grommets, etc., for correct installation onto door, frame or other supporting surface for which each item is intended.

B. Unless specifically called for herein, furnish no hardware with aluminum components.

### 2.2 FINISH AND MATERIALS

A. Butts:

1. Butts for Interior Doors: Dull chrome on steel, US26d.

B. Closers:

1. Closers: Prime coated for field finish coats under Section 09900.



- C. Kick Plates for Wood Doors: US32D, stainless steel.
- D. Balance of Hardware: US26d dull chrome on brass metal, unless noted.

### 2.3 LOCKS AND KEYING

A. Provide locks and latchsets of "heavy duty" mortise locks, equal to Sargent 12-8200 series, with lever handles and escutcheons, with adjustable armored fronts and anti-friction latch bolts with minimum 3/4" throw. Furnish strikes with lips sufficient length to protect trim and elsewhere as required. All lever lock sets to be UL listed for labeled fire doors. Equivalent products of Corbin and Russwin are acceptable. See alternates.

B. Provide Best Universal Lock Company's 7-pin cylinder with Best's interchangeable cores, typically #1E74, US26d.

C. Unless otherwise specified, provide Sargent lever handle 1446F trim special (all edges eased), stainless steel. Escutcheons to be 7-5/8" x 1-5/8" cast stainless steel, through bolted top and bottom (concealed outside), similar to Sargent LE1. Trim on doors in mechanical spaces to be similar to Sargent MRL stainless steel x 1653 knobs. All doors to have same lock trim each side of door.

D. Keying will be determined by Owner in conjunction with representative of Best Universal Lock Company. Ship permanent cores directly to University of Minnesota, for installation by Owner. If Contractor desires temporary construction cores for certain locksets during construction, Owner will, upon application, furnish and install reasonable number of such cores without charge.

### 2.4 BUTTS

A. Type: - Interior doors BB4101 4½ x 4½

B. Size: - As above for 1-3/4" doors.

C. Number: - Two pair for doors 3'-4" or more in width or 7'-6" or more in height.  
- 1½ pair for all other doors.

D. Ball Bearing Butts: Flush barrel with concealed ball bearings and bushings for lateral load.

E. Tips: Flush tops, all butts.

F. Manufacturer: All butts by one manufacturer, Lawrence BB4101, Stanley FBB179, Hager BB 1279 or McKinney TB2714.

### 2.5 CLOSERS

A. For any bracket mounted closer, provide not less than size recommended by manufacturer for parallel arm installation. At any pair of doors provide same closer installation and size, with size equal to largest closer required.

B. Back Check: Provide back check for all closers.

C. Opening: Do not restrict door opening. Provide closers which permit full 180° swing wherever possible by jamb/wall conditions. In all cases closers shall permit swing over 90°.

D. Typical Closers:

1. Typical Interior Doors:

a. 2'-8" or less in width any degree opening or 3'-0" or less in width 90° opening: 4030 Series.

2. Acceptable Closers:

<u>LCN</u>	<u>Norton</u>
4020	J7730
4030	7400
4010	7700

## 2.6 KICK PLATES

A. Kick Plates: 14" high generally, .050 thickness with countersunk screw holes. Width shall be 1½" less than door width on stop side of doors and ½" less than door width on hinge side of doors. Where one kick plate is specified, install on stop side of door. Packaging, workmanship and quality equal to Hiawatha hardware.

B. Furnish kick plates for all doors with closers and in addition for doors in hardware groups with kick plates specified.

## 2.7 STOPS AND HOLDERS

A. Provide a stop or holder for all doors, whether noted in schedule or not. Provide door holders for doors where listed in hardware groups. Provide a stop type WB50X or GJ500A series, as required for all doors not equipped with holders or other specified stop. Furnish WB50X wherever possible. Furnish GJ500A series for all doors shown not to swing against walls and for all hardware groups prefixed "OH". Stops by Ives, Glynn Johnson, Baldwin or Quality. Secure stop or holder with toggle bolt at all steel stud partition locations. Furnish holders W20X or W20AX for all doors with hardware groups prefixed "H". Furnish holders GJ120 for all doors with hardware groups prefixed "OHH".

## 2.8 PAIRS OF DOORS

A. Unless otherwise specified, furnish two bolts Corbin 2846 - or equal, Ives, Russwin, or Sargent for all pairs of non-labeled doors with locks or latch sets. Furnish dustproof strike plates for bottom bolt. Unless otherwise specified, trim each leaf of a pair of doors identically. Bottom bolt 12" size, top bolt size required to mount approximately 6' up from floor.

PART 3: HARDWARE SCHEDULE

GROUP 1

Doors 188A, 188B,  
192.1, 192A, 192.2B, 196.1B (All B-  
Label) 196 (20 Minute Label)

- 1 Lockset 8237
- 1 Closer
- 1 Kickplate (except 192.1)

Group 2

Doors 192B, 192.2A, 196.1A,  
(All B-Label).

- 1 Latchset 8215
- 1 Closer
- 1 Kickplate

Group 5

Doors 196.2, 198.1, 198.2, 198.3

- 1 Lockset 8237

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes all glass unless specifically called for other sections and related glazing and setting materials and accessories.

C. Related work specified elsewhere:

1. Wood Doors: Section 08200.

## PART 2: PRODUCTS

2.1 GLASS

A. Provide glass of type and thickness indicated on drawings and of manufacture and quality specified. Provide  $\frac{1}{4}$ " plate glass if type and thickness are not otherwise indicated.

1. Wire Glass: Polished wire, plate glass,  $\frac{1}{4}$ " thick; set so wires run vertical and horizontal. Mississippi Glass, Polished Baroque; L.O.F., equivalent Polished Wired, or approved equal, which conforms to these specifications will be acceptable. All wire glass shall be UL approved.

2.2 SHIMS AND BLOCKS, ACCESSORIES

A. Pure vinyl or neoprene, minimum 1" long. Setting block portion under glass about 70-80 durometer hardness, shims between glass and stops 40-50 durometer hardness. Sizes as recommended by a glass manufacturer.

2.3 GLAZING COMPOUNDS AND SEALANTS

A. Glazing Compound: (For use at interior glass) Tremco's Tremglaze or equivalent mastic compound of DAP PRC or Presstite.

B. Glazing Tape: Tremco 440 Tape or equivalent by Protective Treatments, Inc, or approved equal, size as required to provide minimum 1/8" tape after depression, width as required.

## PART 3: EXECUTION

3.1 GENERAL

A. Accomplish work in accordance with project specifications. In absence of project specification requirements, follow recommendations of glass manufac-

turer, glazing material manufacturer and Glazing Manual of Flat Glass Jobbers Association. Obtain Architect's written direction, before proceeding with work, in the event project specifications are at variance with manufacturer's recommendations. In no case shall installation be below standard recommended by manufacturer.

B. Obtain shop drawings directly from frame, door or window unit fabricator, determine conditions and dimensions. Architect will not furnish such data.

C. Check stop lengths and locations and advise fabricator, in writing, of any missing stops, improper or ill-fitting stops, improper clearance - prior to starting work. Do not set glass until corrections are made. Replace stops lost, damaged, misplaced or misapplied subsequent to check.

D. Glaze only into rabbets providing proper clearance between glass and stops, i.e. 1/8" at interior openings.

E. Clean, just prior to glazing, rabbets, stops and glass free of dirt, rust, oil, grease, moisture, frost, temporary protective films or other foreign matter. Notify Contractor of any unsuitable conditions. Glaze when all surfaces are clean, dry.

F. Follow manufacturer's recommendations for protection of edges. Examine each piece of glass for nicked or otherwise damaged edges and install only glass free of such damage.

G. Set glass with factory attached labels in place.

H. Set glass with reams (waves) running horizontally.

I. Glaze only with proper sized glass i.e.: with edge clearance as recommended by manufacturer and with glass lapping stops not less than 2/3 of stop depth.

J. Off set shims and setting blocks so no "through-joint" occurs in glazing material.

K. Place setting blocks at locations recommended by glass manufacturer, generally between ¼ points and 6" from corner. Use blocks of length required to properly support glass. Offset approximately 1" from shims.

### 3.2 INTERIOR GLAZING

A. Use glazing compound, sealant or tape both sides of glass for entire perimeter of interior openings.

B. Center glass in opening and in rabbet, using shims both sides.

C. Use sealant at sound retardent glass, fill all spaces around glass solid with sealant.

D. Apply full bed of compound to rabbet and apply loose stop in compound so that rabbet is completely filled, without voids. Remove surplus compound so flush with daylight edge of stops. Strip to straight, unpitted smooth surface meeting at corners with sharp intersection.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements apply to all work of this section. Refer to Article 12 of the Instructions to Bidder, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes furnishing and installing all metal stud partition systems, metal furring, gypsum lath and plaster accessories, plaster work indicated or specified.

1.2 REFERENCE STANDARDS

A. Lathing and furring work shall conform to the Specifications for Interior Lathing and Furring, ANSI A42.4-1967, unless otherwise specified herein.

B. Gypsum plastering work shall conform to the Specifications for Gypsum Plastering, ANSI A42.1-1964, unless otherwise specified herein.

C. Where a fire resistance rating is required, the partitions or ceilings shall be constructed strictly according to the rated design so that the completed installation will achieve the required fire resistance rating.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver packaged materials in their original, unopened packages, containers or bundles with labels intact. Deliver, store and handle materials to prevent damage. Protect from water and the elements. Store gypsum lath and gypsum indoors in dry locations, neatly stacked flat on wooden pallets. Protect metal items from rusting and damage to painted finishes. Do not unwrap gypsum board until ready for actual use.

B. Protect plaster, lime and cement from water, the elements and other damage during delivery, storage and handling. Store cementitious materials in watertight sheds with elevated floors or indoors in dry location on wooden pallets.

1.4 JOB CONDITIONS

A. No gypsum lath, plaster, stucco, nor gypsum drywall shall be applied when the temperature is below 55°F and a minimum temperature of 55°F shall be maintained throughout the curing period.

B. Protect wood, glass, metal and other finished surfaces by placing adequate coverings over such surfaces before starting work. Damaged, stained or soiled surfaces shall be replaced or restored.

C. Provide adequate ventilation during and after installation throughout curing period avoid uneven drying.

PART 2: PRODUCTS

2.1 LATHING AND FURRING MATERIALS

A. Metal studs shall be screw type, channel studs formed from 20 gauge galvanized steel with knockouts for pipe and conduit. Runners shall be channel shaped with 1" minimum legs formed from 20-gauge galvanized steel. Studs and accessories shall be manufactured by National Gypsum, U.S. Gypsum, Milcor Inland Ryerson, Wheeling, Penn Metal, or approved equal. Furnish studs in widths indicated on the drawings.

B. Drywall furring channels shall be 7/8" deep, hat-shaped sections with a 2-3/4" wide back and a 1-3/8" face formed from 25 gauge galvanized steel or resilient channels (furring). Provide appropriate channels or clips for condition.

C. Furring channels and runners shall be 3/4", 1 1/2" or 2" cold rolled steel channels. Minimum weight per lineal foot shall be 0.300 pounds for 3/4" channels, 0.475 pounds for 1 1/2" channels and 0.590 pounds for 2" channels. Channels shall be coated with rust inhibitive paint after forming.

D. Metal lath shall be flat or self-furring lath manufactured from copper bearing steel and conforming to Federal Specification QQ-L-101a. Lath shall be coated with rust inhibitive paint after fabrication. Minimum weight of lath (painted) shall be 3.4 pounds per square yard.

E. Tie wire and clips shall be galvanized, soft annealed steel. Hanger wire shall be galvanized steel wire, #9 gauge except in fire rated ceilings where #8 gauge shall be used.

F. Gypsum lath and accessories shall be manufactured by National Gypsum, U.S. Gypsum, or approved equal.

1. Gypsum lath for veneer plaster shall comply with ASTM C588 of thickness noted on the drawings. Use as large panels as is practicable to minimize joints. Fire retardant gypsum lath for veneer plaster shall be Type 'X'.

2. Gypsum lath or plaster base shown laminated to 1 1/2" insulation and 1 1/2" rigid insulation at exterior walls shall be Insul Wall panels as manufactured by Panel Era or approved equal system. Using veneer plaster gypsum lath, laminated to urethane foam board with the following properties:

Foam core tested without facers.

Density, core, pcf . . . . .	1.9
Compressive strength, psi @ yield parallel to rise . . . . .	21
Initial "K" factor (facers prevent loss of "K" factor with aging). . . . .	0.12
Porosity, % closed cells . . . . .	88
Friability, loss in 10 minutes (%) . . . . .	1.1
Moisture vapor transmission perm-inches . . . . .	1.5
Cold age, -20°F, % delta V, 7 days . . . . .	1.2
Dry Heat Age, 230°F, Amb. R.H. %delta V, 28 days . . . . .	21
Humid Age, 158°F, 100% R.H., %delta V, 28 days . . . . .	15

Butler Chimney Test, % wt. retained . . . . .	24
N.B.S. Smoke Chamber, Dm (corrected), flaming . . . . .	59
Fire Rating Classification . . . . .	Class II
Flammability Rating, ASTM E-84 (Steiner Tunnel)	
Flame Spread . . . . .	36
Fuel Contributed . . . . .	19
Smoke Developed . . . . .	6

3. In addition to the above requirements, lath shall be installed in contact with foam plastic insulation and in a manner that will assure they will remain in place for the entire 15 minutes of the finish rating test.

4. Accessories for gypsum lath for veneer plaster shall be formed from galvanized sheet and shall be manufactured by Inland-Ryerson (Milcor), National Gypsum, U.S. Gypsum, or approved equal as follows:

- a. Joint reinforcement: USG Imperial tape, type S.
- b. Corner bead: USG 900.
- c. Casing bead: USG 701-A or 701-B.
- d. Control joint: USG 093.

G. Clips, screws and other accessories for the attachment of metal studs, runners and drywall furring channels shall be manufacturer's standard type for intended use.

H. Ceiling Inserts: Brock-White 3308 drive-in type or shell type inserts or powder driven eye pins at the subcontractor's option capable of supporting 150 pounds without pulling out.

I. Acoustical insulation: USG Thermafiber Sound Attenuation Blankets.

2.2 PLASTER MATERIALS

A. Plaster materials shall conform to ASTM standard specifications as follows:

1. Veneer plasters:

- a. Basecoat: USG Imperial basecoat plaster or comparable product of National Gypsum Company Kal-Kote, Georgia-Pacific Denscote Systems or approved equal.
- b. Finish: USG Quick Set Structo-Gauge - lime putty or Keenes-lime-sand float plaster or comparable products of National Gypsum Company, Georgia Pacific or approved equal.

B. Water shall be clean, potable and free of deleterious amounts of acids, alkalies or organic materials.

2.3 PLASTER MIXES

A. Base Coat Proportions:



1. Base coat for veneer plaster is mill mixed.

B. Finish Coat Proportions:

1. Veneer finish plasters:

a. Trowel finish veneer plaster shall be mixed in proportions of 1 part gauging plaster to 2 parts lime putty by dry weight.

b. Sand float finish veneer plaster shall be mixed in proportions of 100 lb. Keenes cement to 50 lb. lime to 400 lb. sand by dry weight.

C. Mixing.

1. Accurately measure materials.

2. If mixing by hand, mix plaster and aggregate to a uniform color at one end of the box before adding water, hoe into water at the other end and thoroughly mix to the proper consistency. Clean tools and mixing box after each batch.

3. If using a power mixer, add approximate amount of water, approximately half the sand, all the plaster and the remainder of the sand, in that order, while the mixer is in continuous operation, and mix to proper consistency adding additional water as necessary. Clean mixer after discharging each batch.

4. Plaster shall be accelerated, if necessary to provide a setting time of not more than 4 hours after addition of mixing water.

5. Discard material which has partially set. No retempering will be permitted.

PART 3: EXECUTION

3.1 INSPECTION

A. Examine supporting materials and surfaces to receive work of this section before commencing work. Do not proceed until conditions which would result in a less than first class installation are satisfactorily corrected. Commencing work shall be construed as acceptance of the surface by this Contractor as satisfactory to receive furring, lath, plaster or gypsum wallboard.

3.2 INSTALLATION OF METAL STUDS

A. Install metal studs, runners and accessories strictly according to manufacturer's recommendations. Align partitions accurately. Coordinate with work of other trades.

B. Secure floor runners to concrete floor with concrete stub nails or powder driven anchors spaces not over 24" on center, except no powder driven anchors within 3" of any slab edge.

C. Anchor ceiling runners at approximately 24" on center. If through finished

ceilings; securely attach ceiling runners to structure above.

D. Locating studs: Space studs 16" o.c. unless otherwise indicated. Install additional studs or adjust location of basic studs to accommodate the following:

1. Plumbing chases.
2. Wall architectural woodwork. Locate studs at each shelf standard or counter bracket.
3. At all intersections of walls and partitions.
4. At all changes in partition and wall types.
5. Where any other equipment or shelf standard is to be mounted on the wall or partition.

E. Studs shall be full height without splices. Securely attach all studs to floor and ceiling runners.

F. Place studs directly against jambs of hollow metal door frames, abutting partitions, internal partition corners, partition terminals and similar locations, and anchor such studs to runner channels with screws or other positive fasteners.

G. Securely anchor studs to jamb and head anchor clips at hollow metal door frames with screws or bolts. Install a runner track with web and flanges bent down at each end across head of hollow metal frames, and screw each flange to vertical studs. Install jack studs above frame.

H. Locate extra studs not more than 2" from jambs of hollow metal door frames, abutting partitions, internal partition corners, partition terminals and similar locations and anchor such studs to runner channels with screws or other positive fasteners.

I. Install sound insulation in partitions where indicated on the drawings.

J. Reinforce partitions as necessary to receive and support casework and other equipment mounted on the walls.

### 3.3 INSTALLATION OF WALL FURRING

A. Install drywall furring channels vertically. Attach to masonry and concrete surfaces with concrete stub nails or powder driven anchors spaced not over 24" on center and staggered on opposite flanges. Make splices by nesting at least 8", and securely anchor with 2 anchors in each flange.

### 3.4 SUSPENDED CEILING GRILLAGE

A. Securely attach hanger wires to structure above. Space hangers along direction of main runners not over 48" on center, and locate hangers not more than 6" from ends of runners. Use #8 gauge hanger wires where ceilings require fire rating. Provide resilient suspension system to same criteria as Section 13500, using resilient connectors.

B. Main runners shall be 1½" furring channels spaced not over 36" on center. Locate main runners within 6" of parallel walls. Keep ends of main runners at least 1" away from walls. Install main runners level, true to plane, at the required elevation with hangers saddle tied.

C. Where hanger spacing must exceed 48" on center, use #8 gauge hangers spaced not over 60" on center and 2" furring channels spaced not over 36" on center.

D. Where main runners are spliced, lap ends with channel flanges interlocked not less than 12", and tie each end of the lap with double loops of #16 gauge wire.

E. Cross runners shall be ¾" furring channels or metal furring channels spaced 16" on center maximum and saddle tied to main runners with 16-gauge wire or a double strand of #18 gauge wire at each crossing. Locate cross runners about 1" from parallel walls, and keep ends at least 1" away from walls.

F. Where main runners or cross runners are interrupted by light fixtures, grilles and registers and other openings, install additional runners to frame openings. Reinforce grillage as necessary to support light fixtures, grilles and registers and other items mounted in the ceiling with a maximum allowable deflection of 1/360 of the span.

G. Grillage shall not be suspended from ductwork or piping. Where hanger spacing and spans exceed the specified spans, use hangers with a larger capacity, larger main runners or additional reinforcing members, hangers, stiffening or bracing as necessary to support the loads without exceeding the specified deflection.

### 3.5 MISCELLANEOUS METAL FRAMING

A. Construct miscellaneous metal framing and furring as indicated on the drawings. Use metal studs, or use drywall furring channels screwed to 1½" furring channels. Space members not over 24" on center. Brace vertical members with diagonal bracing spaced not over 48" on center.

### 3.6 INSTALLATION OF GYPSUM LATH

A. Starting at the bottom, install gypsum lath at right angles to the supports with face out. Butt joints together. Locate end joints between studs with joints staggered in successive courses. Screw lath to studs and support ends of lath strictly according to manufacturer's instructions. Cut lath to fit neatly around electrical boxes, pipe, grilles and registers and similar items. Attach lath to each support with 2 screws, each located 2" from edge.

B. In ceilings, install gypsum lath at right angles to the ¾" furring channel cross runners. Butt joints together. Locate end joints between runner channels with joints staggered in alternate courses. Attach lath to furring channels screws installed strictly according to manufacturer's instructions. Support end joints. Cut lath neatly around light fixtures, grilles and registers and other openings.

C. Reinforce corners of openings with not less than 12" long self-furring strip lath installed diagonally across corners.

### 3.7 INSTALLATION OF METAL LATH

A. Install metal lath with long dimension of sheets perpendicular to supports. Attach lath to supports not over 6" on center. Tie lath to metal furring and other metal supports with 18 gauge wire.

B. Lap ends of 3.4 pound metal lath not less than 1" and sides not less than ½". Stagger end laps where possible. Lace or tie end laps occurring between supports not over 9" on center with 18-gauge wire. Tie side laps to supports, and tie side laps not over 9" on center between supports.

C. Reinforce corners of openings in metal lath with a 12" by 24" piece of 3.4 pound self-furring metal lath installed diagonally across corners.

D. Where partitions are to receive Portland Cement plaster, lath with 3.4 lb. self-furring metal lath screwed to studs 6" on center. Where partitions are to receive Portland cement plaster on one side only, cover studs with polyethylene vapor barrier before installing lath. Seal joints and edges of vapor barrier with polyethylene tape.

### 3.8 INSTALLATION OF PLASTER ACCESSORIES

A. Veneer Accessory Application:

1. Joint reinforcement shall be applied over the full length of all lath joints but shall not overlap at intersections.

a. Type S Tape shall be stapled not over 12" o.c. with 3/8" staples to insure a firm wrinkle-free attachment.

2. Corner Bead - All vertical and horizontal exterior corners shall be reinforced with corner bead fastened with staples not over 12" o.c. on both flanges along the entire length of the bead.

3. Casing Bead - When a plaster veneer wall or partition terminates against masonry or other dissimilar material, USG Metal Trim shall be applied over the Plaster Base and fastened on the perforated side with staples spaced 12" o.c.

4. Screws shall be power-driven with an electric screwdriver and set so that the screwhead is flush with the surface of the Plaster Base without tearing through the face paper.

5. Control joints shall be provided in the non-resilient face layer as required above and shall be fastened with staples not over 12" o.c. on both flanges along entire joint length.

### 3.9 MISCELLANEOUS LATHING AND FURRING

A. Install miscellaneous lathing and furring according to ANSI A42.4.

### 3.10 APPLICATION OF VENEER PLASTERS

A. Basecoat:

1. Use as basecoat plaster for all veneer plaster.

2. Veneer basecoat plaster applied directly to veneer gypsum lath shall be used to embed tape and fill beads, and allowed to set; then scratch and immediately double back to a thickness of 1/16" to 3/32" in accordance with manufacturer's directions.

B. Finish Coats:

1. Trowel finish coat shall be scratched in thoroughly to basecoat and immediately double back to fill out to a smooth, dense surface for decoration, free of surface blemishes and irregularities. Finish coat shall be applied as thin as possible preferably 1/16" to not more than 1/8".

### 3.11 PATCHING

A. After plaster is cured, rake out expansion joints and clean beads adjacent to other materials. Patch defects as required to produce a true unblemished surface.

### 3.12 GROUTING OF FRAMES

A. Partitions with plaster finish: At hollow metal frames, grout heads and jambs full with basecoat plaster.

### 3.13 EXISTING SURFACES

A. If more than 35% of an existing surface is required to be patched, panelize the surface to nearest panel break (such as corner, control joint or door jamb) remove the finish coat for the entire panel, patch the scratch and brown coat as required, and provide a new finish coat for the entire surface of panel. If oil based paint exists on existing wall, apply an approved bonding agent and provide new finish coat to panel surface.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this Section includes furnishing and installing all acoustic lay-in ceilings.

C. Related work specified elsewhere:

1. Lath and Plaster: Section 09100.
2. Lighting Fixtures: Division 16.

1.2 SUBMITTALS

A. Samples: Submit three (3) samples of each tile proposed by the manufacturer. The Architect will select and approve the texture and pattern for the Project.

1.3 GENERAL INFORMATION AND REQUIREMENTS

A. General: Except as otherwise specified herein, recommendations of the Acoustical Materials Association and the manufacturer, whichever is most stringent, shall be followed.

B. Quantity, location: Refer to drawings, including Room Finish Schedules and notes, for extent of acoustical treatment.

C. Relationship to Features: Note the ceiling heights as they relate to masonry courses, frames, lintels and other features and maintain relationship shown.

1.4 PRODUCT HANDLING

A. Package, handle, transport and store materials at the jobsite in a manner that will avoid damage. Repair or replace all damaged material.

B. Ceiling materials shall be delivered in manufacturer's original labeled, unopened cartons, suitably stored within the building and protected from damage until ready for installation.

1.5 JOB CONDITIONS

A. Inspection: Before commencing ceiling work, inspect all surfaces to receive work of this Section to assure that conditions are suitable for installa-

tion of the work, including checks for form oil and other deleterious materials. Notify Architect in writing of unsatisfactory conditions and do not proceed with the work until Architect's instructions have been received. Commencement of work shall be construed as acceptance of conditions.

B. Environmental Conditions: The building shall be glazed and have a relative humidity not exceeding 50% plus or minus 15% before materials are delivered to the site or work is begun. Uniform temperature of at least 60°F shall be maintained during and after the installation.

C. Coordination: Coordinate ceiling work with that of related trades.

#### 1.6 EXTRA STOCK

A. Provide minimum 1% additional stock of each color and/or type of material for future maintenance and patching.

B. Deliver in standard containers, unopened to the University as directed.

C. If smallest standard container exceeds 1%, provide at least one full container.

### PART 2: MATERIAL

#### 2.1 SUSPENSION SYSTEM

A. Suspension system for acoustical lay-in ceilings shall be Donn AB Exposed Grid System as manufactured by Donn Products, Inc., or equivalent System of Chicago Metallic Corporation Roper Eastern, Lok Products Co., or National Rolling Mills Co., or approved equal.

B. Components shall be formed from aluminum.

C. Exposed parts shall be finished satin white.

D. System shall support entire ceiling assembly including lighting fixtures, diffusers, grilles and registers, sprinkler heads (not system), speakers and acoustical material with a maximum deflection of 1/360 of the span.

E. Pattern shall be as shown on the drawings.

#### 2.2 ACOUSTICAL UNITS, GENERAL

A. All acoustical units of each type shall be products of one manufacturer and shall have same appearance throughout. Submit samples of all tile prior to shipping to job as outlined under Article 1.2.

B. Criteria listed under each type acoustical units is considered as minimum requirements for type, performance and appearance.

C. Unless otherwise noted, units to be Class 25 in accordance with SS-S-118a with UL label; AMA Class I when tested under ASTM E84. Washable, white painted finish with minimum 75% light reflectivity or mylar film coated as indicated.

D. Entire work shall be accomplished by a Subcontractor approved by manufacturer of tile and qualified on installation.

## 2.3 ACOUSTICAL UNITS, PERFORMANCE CRITERIA

### A. Acoustic Ceiling Board

1. Size: 24" x 48" x 5/8" Lay-in Board.
2. NRC: .50-.60 minimum
3. STC: 35-39 minimum (continuous ceiling test).
4. Light Reflectance: LR-1 (over 75%).
5. Flame Spread Classification: ASTM E84.

### B. Finish: Plastic Coated

C. Acceptable Materials: Subject to satisfactorily meeting all criteria of physical properties, size, pattern, and appearance, as well as final approval of samples are:

1. Armstrong: Minaboard Panels, Fissured Design, Plastic Coated.
2. Celotex Corporation: Safetone Lay-in Panels, Fissurtone Design, Plastic Coated.
3. Conwed Corporation: Fissura Lay-in Panels, Plastic Coated.
4. Gold Bond Building Products, Division of National Gypsum Company. Solitude Lay-in Panels, Fissured Design, Plastic coated.
5. Johns-Manville: Spintone Lay-in Panels, DCF Design, Plastic Coated.
6. United States Gypsum: Auratone Lay-in Panels, Fissured Design, Plastic Coated.
7. Approved equal which conforms to these specifications will be acceptable.

## PART 3: EXECUTION

### 3.1 SUSPENSION SYSTEM

- A. Install suspension system in strict accordance with system manufacturers installation instructions and the approved layout and erection drawings.
- B. All suspension shall be from the structure and not from ductwork, piping or other equipment.
- C. Where recommended hanger spacing is exceeded, provide such sub-framing and reinforcement as is necessary to reduce the span between hangers and maintain the specified structural properties.

### 3.2 ACOUSTICAL UNITS

- A. Install acoustic panels in the finished grid system after all other work in and above ceiling has been completed.



B. Take care to avoid damaging or soiling acoustical units.

C. Where required, cut acoustical material to fit and accommodate the work of other trades.

D. Where edge member panel occurring would be less than 6" wide, cut 2'x 4' panels to the proper width (so that edge panels may be 2' x up to 2'-6").

### 3.3 WORKMANSHIP AND GUARANTEE

A. Workmanship shall be of the highest quality, using skilled mechanics thoroughly trained in their trade. Finished work shall be clean, free of mars or other defects. Clean or replace dirty and damaged units and panels that have sagged. Workmanship or material to be guaranteed for one year against faulty workmanship or materials. Replace all tile that falls off, joints that open up or tile that becomes loose or is sagging, at no cost to Owner.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1 - General Requirements apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, etc.

B. Work under this section includes furnishing and installing the resilient base materials shown on the drawings and specified herein.

1.2 PRODUCT HANDLING

A. Deliver materials in their original unopened containers with manufacturer's labels intact.

B. Store and handle materials in a manner that will prevent damage and provide protection against moisture and the elements. Store materials at the job site for at least 24 hours prior to installation.

C. Store materials containing solvents in tightly sealed containers. Assume fire and safety protection.

## PART 2: PRODUCTS

2.1 MATERIALS

A. Resilient Tile: Vinyl Asbestos Tile, 12" x 12" x 1/8" thick, equivalent to Armstrong Imperial Modern, Fed spec SS-T-312, Type IV, color as selected. Acceptable manufacturers are Armstrong, Flint-Kote, GAF, Kentile.

B. Resilient Base (in tile floor areas): Vinyl or rubber, cove type, dimensions shown, of colors selected by the Architect. Provide pre-formed internal and external corners. Acceptable manufacturers are the above and Johnson Rubber Co., VPI and Mercer.

C. Adhesive: Waterproof type as recommended by above material manufacturers.

D. Resilient sheet flooring and base (vinyl): Multiflor Granit as manufactured by Tarkett AB, the equivalent produce of Armstrong Cork Co., or approved equal.

1. Composition and Materials: Thickness - .090" (2.0mm): Width - 6'-0" (72", 184cm): Length - 82 Lin. Ft. (25m). Chemical Composition: Polyvinyl Chloride 80%; Color Pigments, stabilizers and plasticizers 20%. Pattern and color shall extend throughout total thickness of material.

## 2. Technical Data:

a. Chemical Resistance: (Surface immersed for 24 hours.) Resists most chemicals and miscellaneous foreign materials.

b. Wear Resistance: The Taber Abrasion resistance of using an H-18 abrasive wheel with a load of 500 grams shall be at least an average of 23,000 cycles.

c. Tensile Strength: PVC surface must be at least 2,750 psi.

d. Fire Resistance: material shall have been tested per ASTM E84-70 with a flame spread rate of 45 and fuel contribution of 0.

e. Flexibility: Material shall not crack, separate or fracture after repeated cycles of 360° bending and/or flexure.

3. Trim for base: Tarkett Standard Metal trim, cap, outside corner and end cap as detailed.

4. Cove form: Standard wood cove form or equivalent PVC, feather edge.

5. Adhesive: As approved by manufacturer.

6. Seam material: Tarkett Welding Rod.

### PART 3: EXECUTION

#### 3.1 EXAMINATION OF SURFACES

A. Examine surfaces to receive resilient flooring and base and notify the Contractor in writing if any condition exists that will prevent satisfactory results. Do not proceed with installation until unsatisfactory conditions are corrected. Commencement of work implies acceptance of surfaces and assumption of responsibility for satisfactory results.

#### 3.2 INSTALLATION

A. Install resilient tile: Apply adhesive and install resilient tile flooring and base in accordance with manufacturer's recommendations.

1. Vinyl Asbestos Tile: Lay and fit tile with joints tight and in true alignment. Layout tile starting at center of floor, as indicated by north-south, east-west lines on drawings. Continuous joints to run east-west. At individual spaces lay tile symmetrical about center lines of rooms or spaces with no border tile less than one-half size. Lay tile with alternating rows of tile breaking joint at midpoint of previous rows, grain pattern continuous. Cut tile to fit around permanent fixtures and fit accurately at joining with other materials. Install vinyl reducer strips where edge of tile is exposed.

2. Resilient Base: Install base on walls where shown and on built-in casework and other similar items in rooms scheduled to have base. Use cove type at all flooring. Firmly cement base to backing, straight and true with tight butt joints. Apply after floor tile is in place.

B. Install resilient sheet flooring in strict accordance with manufacturer's installation instructions using approved adhesive by an approved, qualified installer.

1. In all areas, side and end seams shall be mechanically welded with Tarkett Welding Rod.

2. Set cove form and roll floor material into base. Weld inside base corners. Use metal trim at outside corners and caps.

### 3.3 CLEANING AND FINISHING

A. Just prior to final inspection, thoroughly clean surfaces of above materials in accordance with manufacturer's instructions. Upon completion, leave clean, smooth and free of buckles and projecting edges.

### 3.4 PROTECTION

A. Protect finished work from damage until final acceptance. Replace any damaged work.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this Section includes field finishing of all materials scheduled and/or specified for paint, enamel, transparent finish and similar field painting not specified under other sections.

C. Related work specified elsewhere:

1. Metal Fabrications: Section 05500.
2. Carpentry: Section 06100.
3. Hollow Metal: Section 08110.
4. Wood Doors: Section 08200.
5. Lath and Plaster: Section 09100.

D. General Outline of Work: Following outline is intended to complement and clarify the drawings. Do not construe as listing all surfaces, materials or finishes.

1. Exterior:

- a. Exposed Sheet Metal at Roof.

2. Interior:

- a. All walls and ceilings at rooms and surfaces, where indicated. Where plaster ceilings occur in spaces with painted, enameled, stained and varnished or other finish on walls, such ceilings shall be painted unless otherwise noted. Paint interior surfaces of windows and trim in all painted spaces.

- b. Hollow metal, including frames and other hollow metal. Paint on all sides including at rooms or spaces not otherwise painted or finished.

- c. Wood shelves, hook strips, trim and other unfinished millwork (custom woodwork) throughout.

- d. Bare or insulated piping, hangers, saddles, brackets, stands, supports, panel boards and similar metal throughout, including at: finished rooms, equipment rooms, vaults, utility cores, switch gear room and similar accessible spaces.

- e. Rooms or spaces in existing building where general contractor

does remodeling, demolition and cutting, walls and/or ceilings shall be entirely repainted under Section 09900, except as specifically noted otherwise on drawings.

E. Work excluded from this section (areas or materials):

1. Exterior: No other exterior painting is required except that scheduled above.

2. Interior:

a. The walls and ceilings of any room or space not scheduled for paint in Room Finish Schedules.

b. Plastic laminate.

c. Piping, ducts and conduit concealed in shafts and above ceilings accessible and non-accessible and their supports and hangers.

d. Brass, bronze, stainless steel, hardware, except prime coated.

e. Prefinished equipment.

## 1.2 INTENT OF DOCUMENTS

A. The Subcontractor providing the work of this Section shall examine the specifications for the various other trades and other contractors and shall familiarize himself with all their provisions regarding their painting and it shall be clearly understood that all surfaces that are left unfinished or have prime coat only by the requirements of other specifications shall be field painted or finished as a part of this Section.

B. Painting under this Section includes and means all specified or required preparatory work and application of paint systems including primers, sealers, stains, fillers, varnishes, paints, clear silicone treatments, and other similar finishes not specified under other Sections.

C. It is the intent to paint the entire new work as well as adjacent spaces and surfaces in existing building affected by work of this Project, except for specifically omitted areas and items.

D. In painting new work of this Project, paint all paintable surfaces except those explicitly omitted herein under Article 1.1.E. Paintable surfaces are: concrete; concrete masonry (brick and block); plaster and stucco; hardboard; gypsum board; cement-asbestos board; wood and plywood; metal, insulated or bare, (including piping, hangers, supports, ducts, brackets and other miscellaneous metal); ducts, insulated or bare; piping and equipment insulation and insulation covering; other surfaces listed under Painting Outline above.

E. Except for factory finish coats and prime or finish coats on certain identified mechanical and electrical work, no painting is required of Mechanical and Electrical Subcontractors; field painting of all such surfaces shall be done by

Painting Subcontractor under this section. Refer to Mechanical and Electrical drawings and specifications for extent of piping, conduit, duct work and equipment.

F. The number of coats specified are field painted coats, in addition to prime or shop coats, after all touch up work has been done to restore shop coats to full coverage. Use only first line products of manufacturers specified, of types of paint specified.

### 1.3 SUBMITTALS

A. Painting Systems: Submit for Architect's approval descriptive data in duplicate for paint materials and systems to be furnished. In this submittal, indicate each specified system, locations of use and the substitute system proposed.

B. Colors: The Architect will select all colors. If color selections are made which are not in the color line of the paint to be furnished, submit in duplicate for approval, 8" x 10" color cards showing the selected color in the paint to be furnished.

### 1.4 JOB CONDITIONS

A. Paint under conditions best suited for first quality work, including dry surfaces, dust free spaces, minimum temperature of 40° or higher as recommended by manufacturer. Paint exterior surfaces only when not subject to damage from present or subsequent rain, frost or other inclement weather, or when base surface is thoroughly dry. Test materials such as plaster to insure the base surface is dry. Paint in spaces not subject to entrance of dust or moisture from adjacent areas. Work with adequate illumination. Avoid painting of surfaces while they are exposed to hot sun.

B. Protection:

1. Protect all surfaces subject to damage and misplaced paint by covering with drop cloths, by masking, by other suitable covering or by removing from area.

2. Take particular care in working over and around factory finished materials and casework, as well as other pre-finished work. Provide hardboard covering at tops to prevent accidental damage and adequately cover or mask equipment.

3. Make good any damage caused by painting operations.

4. General Contractor shall isolate, cover or protect as necessary to insure no damage, stains, abrasions, other disfigurement of finish painted surfaces immediately upon completion by painter of final application to such surfaces.

5. Maintain 10# CO extinguisher in paint storage, mixing rooms. Remove oily rags and other fire hazards at end of day's work. Keep cans tightly covered. Take every precaution to avoid danger of fire.

D. Cleanup:

1. Remove oily rags, waste, etc. from building every night.
2. Upon completion of work, remove all misplaced paint, stains, etc. and remove all debris, rubbish, materials and equipment, and excess materials from the premises.

1.5 PRODUCT HANDLING

A. Delivery: Deliver all materials in the original containers, with seals unbroken and labels intact.

B. Storage:

1. Store and mix materials in designated places only. Protect walls and floors of storage rooms.
2. Post storage and mixing areas "NO SMOKING" and strictly enforce.

1.6 GUARANTEE

A. Guarantee all work for one year against blistering, peeling, or other loss of adhesion, yellowing, excessive chalking, other defects in material or workmanship. Remove defective work, prepare and repaint surface without cost to Owner. Repaint all of surface (i.e. wall, ceiling, door, etc.) on which work is defective to exact match of other adjacent similar surface; if exact match cannot be provided, then repaint adjacent surfaces to extent required to insure exact match.

PART 2: PRODUCTS

2.1 MATERIALS

A. Use only materials of brand and quality specified, if brand and quality are not specified, use material approved by Architect and Owner.

B. Provide paint manufactured with lead-free pigments and colors. Verify with manufacturer.

C. Provide turpentine, alcohol, mineral spirits, bonding solution, sundries, etc., of highest quality, pure and with identifying label on container and in accordance with paint manufacturer's recommendations.

D. Use no material over paint product of another manufacturer except as otherwise specified or permitted by Architect, and only if recommended by manufacturers.



E. Before applying paint over any shop coat or other pre-primed surfaces, verify compatibility of coatings.

## 2.2 COLORS

A. General: Architect will select colors, which may be from University of Minnesota Standard Color Palette. Mix paint to match color chips where necessary. Prepare actual samples, including natural finish as directed.

B. Electrical Conduit: At finished spaces, paint all conduit to blend out as directed, different color each coat.

## 2.3 PAINTING SYSTEMS

A. Painting systems are specified using the products of Pratt and Lambert Company to establish standards of quality. Comparable systems of O'Brien Paint Company, Benjamin Moore & Company, Sherwin Williams, Martin Senour Company, Pittsburgh Plate Glass, The Glidden Company and Devoe & Reynolds, or approved equal, will be acceptable subject to approval by the Architect of the systems and specific products.

B. Use the materials of the same manufacturer for each system insofar as possible.

C. Interior Systems:

1. Plaster or Gypsum Board Walls:

2 - Coats P&L Pro-Hide Latex Satin Enamel

2. Plaster Ceilings:

2 - Coats P&L Vapex Flat Wall Finish.

3. Wood Trim, Millwork, Casework and other Wood for Transparent Finish (\$&V)

1 - Coat P&L Paste Filler

1 - Coat P&L Tonetic Wood Stain

2 - Coats P&L "38" Pale Trim Varnish gloss

1 - Coat P&L "38" Pale Trim Varnish Satin

4. Covered Pipe, and Ducts - canvas jacketed - painted spaces:

1 - Coat Rubber base sizing

1 - Coat H.B. Fuller Inscoc BC-716, White

1 - Coat finish as for adjacent wall or ceiling.

5. Covered Pipe, unjacketed:

Finish as for 4 above, except omit sizing.

6. Bare Pipe - Ungalvanized - All bare ungalvanized pipe in painted areas:

1 - Coat P&L Noxide Metal Primer, then finish same as adjoining wall or ceiling.

1 - Coat P&L Noxide Metal Primer, then finish same as adjoining wall or ceiling.

7. Bare Pipe - Galvanized - all galvanized pipe in painted area:

1 - Coat 80% zinc dust - zinc oxide primer, Federal Specification TT-P-641b, then finish same as adjoining wall or ceiling.

8. Wood doors, Hollow Metal Frames and other Ferrous Metal

1 - Coat P&L Pro-Hide Primer/Undercoating

2 - Coats P&L Pro-Hide Latex Satin Enamel

PART 3: EXECUTION

3.1 EXAMINATION OF SURFACES

A. The Subcontractor shall examine the surfaces to be finished prior to commencing work. If woodwork, metal or any other surfaces to be finished cannot be put in proper condition for finishing by customary cleaning, sanding and puttying operations, notify the Contractor in writing or assume the responsibility for and rectify any unsatisfactory finish resulting. Test surfaces for dry condition to receive paint.

3.2 WORKMANSHIP

A. Job Site Sample Areas: Make sample application on Project surfaces to extent directed by Architect or Owner. Obtain acceptance of sample field application before making additional applications. Accomplish all work to equal or exceed standards established by approved samples. Protect and maintain approved field samples through completion of Project.

B. The workmanship shall be of the very best, employing only skilled mechanics. Spread the materials on in even, thorough coats without runs, sags or other blemishes. Meet standards and recommendations for "Type 1 - Recommended" type work of Painting and Decorating Contractors of America, as minimum requirements, in absence of more stringent Project specification requirements.

C. Consult with Architect and/or manufacturer's technical representative if in doubt as to suitability of material to application. Verify that paint is compatible with shop coat of others.

D. Apply succeeding coats only after prior coat has been approved by Owner, otherwise no credit will be given for the coat.

E. Coordinate work with others to insure that work to be painted is given maximum possible protection by applying coatings at times as will best insure

such work against deterioration of any kind. Apply back prime and prime coats to millwork as soon as practicable after delivery to job.

### 3.3 SURFACE PREPARATION

A. All surfaces to be painted shall be cleaned and free of dirt, grease, rust, and dust before painting is started. Knots, streaks and sappy spots shall be touched up with an approved primer or sealer after removing pitch.

B. All necessary puttying of nail holes, cracks, etc. shall be done after the first coat, with putty of color to match that of the finish. Fill countersunk screw heads metal anchorage (not stop screws) with paste metal "body putty". Sand smooth and flush.

C. Touch up metal where shop coats are abraded. Clean down to bare metal and touch up paint used for shop coat.

D. All metal surfaces shall first be washed with mineral spirits to remove any dirt or grease before applying materials. Where rust or scale is present, it shall be wire brushed or sandpapered clean before painting.

E. Remove and reset hardware as required to completely finish surfaces and prevent misplaced paint. Cooperate with other trades and schedule painting operations prior to final setting and adjustment of hardware.

F. All woodwork to be finished with varnish or enamel shall be sanded smooth and the surfaces cleaned before proceeding with the application of the first coat. Sand between coats with fine sandpaper to produce an even smooth finish, except do not sand stain.

G. All coats shall be thoroughly dry before applying succeeding coats.

H. Prime, seal or stain and seal all surfaces of all millwork and paneling immediately upon arrival at the job. All interior and exterior trim shall be back primed before installation.

I. General Contractor shall repair holes, cracks, fissures and other defects in concrete and concrete masonry and remove excess mortar before prime coat is applied by Painting Subcontractor.

J. Patch small holes, abrasions and similar defects in plaster with spackle after prime coat. Patch flush and smooth with adjacent surfaces. Large imperfections shall be patched by plasterer. Seal spackle or patch before succeeding coats.

### 3.4 PREPARATION OF EXISTING SURFACES

A. General: Wash all surfaces to be repainted. Remove all grease, oil, soil or other matter which will interfere with proper bond of new material. Scrape and wire brush all loose or flaking paint to clean down to sound surfaces, sand edges to feather out. Remove all rust, scrape and brush to provide bright clean metal. Surfaces shall be clean, smooth, free of cracks, alligatoring, loose

material. Etch surface of paint by using chemical wash. Fill cracks, voids and similar defects. Above work shall be done in addition to any other required preparation. Do all work necessary to place in best possible condition for re-painting.

B. Unless specifically indicated otherwise, painting in corridors and spaces adjacent to remodeled spaces is only required on patched or new surfaces. Paint out to nearest panel break (such as corner or control joint, door jamb).

### 3.5 APPLICATION

A. Apply all materials without reduction, unless reduction is explicitly required by manufacturer's original container label or unless otherwise directed or approved by Architect. Adulterate no material.

B. Apply all coatings smoothly, evenly and free of runs, sags, crawling, impurities and skins.

C. Apply over only thoroughly dry preceding coat. Follow manufacturer's printed directions for drying time of undercoats. (Generally 24-hour minimum will be required.)

D. Use roller or brush on plaster and concrete surfaces; thoroughly fill all pores, each coat.

E. Spray first coat on concrete ceilings as approved, to thickness and hiding equivalent to properly brushed or rolled coat of material. Coat voids in concrete. Brush or roll succeeding coats, unless spray coats (equal in hiding and thickness to sample areas of brushed coats) are applied for comparison in Owner's presence. Spray may be used at pan and joist ceilings which are exposed, subject to the "equal coat" provision specified.

F. Color each paint coat to approximate color, somewhat lighter, of succeeding coat.

G. Stain and seal wood paneling, including edges and tongue and groove, prior to erection.

H. Finish tops and bottoms of doors same as rest of door, as well as all faces and edges of shelves, with all coats of paint. Should painter fail to paint tops and bottoms of wood doors, including cabinet doors, with all specified coats, and any door warps, painter shall be held responsible for entire cost of door replacement, including new door, fitting, sanding and refinishing.

I. Lightly sand before applying each coat of stain, sealer, varnish, enamel at wood (except do not sand stain), and elsewhere that runs or uneven build-up occurs, to insure smooth coats and adhesion.

J. At existing building, repaint walls and/or ceilings surface entirely that have been disturbed by work of the General Contractor. "Patch" or "Spot" painting is not acceptable.

K. When painting around glazed openings, paint exposed glazing compound or putty and slightly, uniformly lap paint onto glass.

L. Apply paint adjoining other materials or other colors with full, clean cut lines without overlapping and to straight line.

M. Apply all work so free of runs, holidays, dead spots, roller or brush marks, foreign materials and impurities, etc., and uniform in color and sheen. Apply additional coats at no expense to Owner to areas showing such deficiencies or thin spots or other lack of hiding.

N. At completion of work of other trades, touch up and restore all painted work where damaged or defaced, free of blemishes.

O. Discard all containers as they are emptied. Reuse will be prohibited.

- - -

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1, General Requirements, apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010, Summary of Work and Special Requirements, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes furnishing and installing all metal laboratory casework indicated on the drawings or specified herein. The work includes, but is not limited to, the following:

1. Metal laboratory casework including floor mounted base cabinets, full height storage cases, wall mounted storage cases, aprons, legs, back panels and filler panels.

2. Countertops for base units including curbs, backsplashes, reagent racks and box curbs.

3. Supports for sinks and other built-in equipment occurring in casework.

4. Fume hoods and supporting cabinets and work tops, asbestos lined volatile storage cabinets where indicated. Volatile storage cabinets to comply with NFPA No. 30 - Flammable and Combustible Liquids Code.

5. Light fixtures occurring in fume hoods with switch and connecting conduit and wire. Light bulbs for light fixtures. Electrical outlets, and pilot lights mounted in fume hood walls with connecting conduit and wire to a junction box.

6. Metal covers for service columns.

7. Undercounter Glasswasher.

8. Tests and samples as specified.

9. Support systems for all casework, shelving, sinks, counters and similar items.

10. Ventilating benches and related stainless steel counters and integral sinks.

11. Volatile Storage Cabinets.

12. Other related & miscellaneous work to complete the work of this section.

C. Related work specified elsewhere:

1. Resilient base against walls and base against toe space of floor mounted casework on resilient flooring: Section 09650.

2. The following work is specified under Division 15:

a. Sinks, cup sinks, drains and drain fittings including outlets, sink plugs, strainers, overflows, tailpieces, traps and plaster traps, (except as specified in Article 1.1.B.10 above)

b. Installation of sink outlets, strainers, plugs overflows and tailpieces furnished under this section (11611).

c. Plumbing service fixtures including oxygen, carbon dioxide, nitrogen, nitrous oxide, gas, air and vacuum cocks and turrets; steam cocks and mixing valves; hot, cold and distilled water faucets, cocks and stops, remote controls; steam cones and steam baths; and similar items.

d. Plumbing rough-in and piping including piping occurring within casework, fume hoods, pipe chases behind casework, box curbs, reagent racks and service columns. Pipe supports, brackets, bolts, clips and similar accessories for piping.

e. Ductwork (from fume hood outlet) and blowers for fume hoods and ventilating benches.

3. The following work is specified Under Division 16.

a. Electrical outlets, switches, plug mold, pilot lights, conduit, wiring, boxes and similar electrical work (except as specified in Article 1.1.B.5 above).

D. Furnished by Owner:

1. Refer to drawings for N.I.C. equipment.

## 1.2 QUALIFICATIONS

A. The metal laboratory casework manufacturer shall have an established organization and production facilities, specializing in this type equipment, shall be currently engaged in the manufacture of metal laboratory casework, shall have the demonstrated ability to produce the specified metal laboratory casework of the required quality and the proven capacity to complete an installation of this size and type within the required time limits.

B. The Casework Subcontractor (and Bidders) shall have an established resident local representative in the Minneapolis-St. Paul Metropolitan Area who is fully qualified in laboratory casework and has the authority to make decisions and act for the subcontractor.

C. All metal laboratory casework furnished under this Section shall be the product of one manufacturer, except for those elements (i.e. tops, glasswashers, volatile storage cabinets) which may be specified by naming another manufacturer or producer.

D. Casework shall be Modular Steel Hospital Casework with NSF approval as manufactured by Hamilton Industries Division of American Hospital Supply Corporation. The equivalent products of Kewaunee Scientific Equipment Corporation, Jamestown Metal Products Co. and St. Charles Manufacturing Co. will be acceptable subject to the approval of the Architect of minor deviations in detail from the products specified.

E. All casework and equipment shall meet the requirements of the National Sanitation Foundation.

### 1.3 COORDINATION

A. The metal laboratory casework subcontractor shall be responsible for coordination with the Mechanical (sub)Contractor, Electrical (sub)Contractor and other contractors and subcontractors having equipment, fixtures, outlet boxes or fittings built into or mounted on or adjacent to the metal laboratory casework.

B. Contact other contractors directly and obtain fixture and equipment lists, fixture and equipment sizes and locations, rough-in dimensions, holes and cutout sizes and locations, equipment weights and supports required, methods of attachment and space requirements to connect and service equipment.

C. At locations indicated on drawings, provide undercounter openings and install undercounter glasswasher. Provide filler panels as required.

### 1.4 SUBMITTALS

A. Shop Drawings. Submit shop drawings in accordance with Section 01300.

1. Shop drawings shall be prepared specifically for this Project. Provide drawings for rough-in for building construction promptly to prevent construction delays and if necessary, furnish rough-in drawings prior to other shop drawings. Provide overall plans, details, sections and connections to adjacent work. Shop drawings shall indicate; method of attaching wall mounted cases to walls; field joints, fillers and scribe strips; size and location of equipment fixtures and fittings furnished by other contractors to be built into or mounted on or adjacent to the casework; rough-in dimensions and size and location of holes and cutouts. Manufacturer's "standard" shop drawings are acceptable for individual pieces of casework provided, holes, cutouts, rough-in and similar data is indicated. Shop drawings shall include all plans, elevations, details and other information necessary to insure a complete installation.

2. Shop drawings shall locate all critical studs for mounting or anchoring casework items, including shelving and all wall mounted casework. A stud shall be located within 4" in from the end of a wall case. Locate studs by dimension from grid lines.

3. Take field measurements and verify field conditions as necessary. Indicate field measurements and other field conditions on shop drawings.

4. Submit shop drawings and erection drawings to other contractors concerned.



B. Test Reports: Promptly after award of Contract, prior to commencing shop drawings and fabrication, submit certified reports of tests of the (1) bending properties, chemical resistance and moisture resistance of the metal casework finish, (2) physical properties chemical resistance and heat resistance of the solid epoxy resin tops and (3) performance capabilities of the fume hoods. Tests shall be conducted by a nationally recognized, independent testing laboratory, and reports shall indicate the testing procedures and certify the findings. Test procedures shall be as specified hereinafter.

C. Fume Hood Demonstration. As soon as practicable after award of Contract, conduct a demonstration of fume hood performance at the specified face velocity maintaining the required exhaust rate. The demonstration may take place at the casework manufacturer's plant or at another location determined by the casework manufacturer. The test demonstration shall be conducted by, or witnessed by, an independent testing laboratory, with the report results certified by the laboratory. Conduct the test in general conformance with Article 3.2. Notify Owner and Architect in advance to permit their observing the test, if they choose. Submit certified reports to Owner and Architect.

E. Maintenance and Cleaning Instructions: Submit written maintenance and cleaning instructions and instruct the Owner's personnel in the care and maintenance of all casework and equipment furnished under this section (refer to Section 01300).

#### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle metal laboratory casework in a manner that will prevent damage. Repair or replace damaged material.

B. Deliver casework to insure completion in accordance with the Contractor's Construction Schedule and to meet the Project completion date. Coordinate delivery of casework with the actual status of work at the site. If items of casework are too large to be moved through permanent openings in the building, deliver casework to its approximate final location before access is restricted by surrounding construction and make arrangements with other contractors to provide temporary openings or ship casework in subassemblies which may be moved through permanent openings and then assembled. Protect casework from damage during storage.

### PART 2: PRODUCTS

#### 2.1 MATERIALS

A. Sheet steel shall be prime grade, cold rolled stretcher or roller leveled mild furniture steel free of scale, ragged edges, deep scratches and other injurious defects. Gauges shall be US Standard Gauge.

B. Stainless steel shall be chromium-nickel steel sheet conforming to ASTM A-167-70, Type 316. Finish of exposed surfaces shall be AISI No. 4 mechanical finish. Gauges shall be US Standard Gauge.

C. Glass for frameless sliding doors shall be ¼" plate or float glass. Glass used in fume hoods or other hazardous locations, shall be combination laminated safety glass. Use tempered glass where specified or required. Frames glass shall be 1/8" thick double strength glazing quality.

D. Cement-asbestos board shall be asbestos fibers and Portland cement combined under extreme pressure into homogeneous integrally colored sheets of the thickness shown, specified or otherwise required, Transite, or approved equal.

E. Sheet lead shall be 99.9% pure virgin lead free from dross, oxide inclusions, laminations, scale, blisters or cracks.

F. Structural steel, if any, shall conform to ASTM A36. Any structural steel that is exposed to view shall have the same smooth surface as the sheet steel, free from pits, scale, depressions and other defects.

## 2.2 METAL CABINETS - GENERAL

A. Metal cabinets shall be designed and constructed so that each case is a complete and integral, rigid, self-supporting unit that may be used by itself or in an assembly of cabinets. Metal cabinetry shall be rigidly constructed and so assembled that it can be relocated at any time. No manufacturer's label shall be applied to the exterior of cabinetry, nor on inside faces of drawers and doors. Any proposed labels shall be approved by the Owner, in inconspicuous locations.

B. Metal cabinet parts shall be notched, keyed, tightly fitted and electrically welded to form rigid units. Cabinets shall have a smooth, cleanable interior. The channel shape at the front upright of cases shall be closed to provide a cleanable interior. Formed metal shapes for drawer and door stops shall be fully closed on the interior, including at top and bottom. Die-pierced slots and perforations required for the mounting of drawers channels, hinged or shelf brackets, shall not be visible from the exterior of the assembled cabinet. Cabinets shall be completely welded to present a finished, smooth exterior and shall have reinforced corner gussets behind intersecting members.

C. Cabinets shall have a finished, flush, smooth face at all exposed sides. Where members intersect, they shall be on the same plane (not overlapped) to provide the flush, smooth surface across the joint. Exposed finished ends of cabinets shall have no punched holes, nor fastenings which are not flush with the end panel.

D. Minimum gauges of steel for cabinet construction shall be as follows:

1. Drawer assembly, door assembly and adjustable shelves - 20 gauge.
2. Front horizontal rails, table legs and aprons - 16 gauge.
3. Hinge reinforcements, case and drawer support channels and corner gussets - 14 gauge.

4. Table leg corner brackets - 11 gauge.

5. All other parts not otherwise specified - 18 gauge.

E. Metal cabinetry shall be manufactured to the dimensions indicated on the drawings. Exact widths and heights may vary slightly; nominal dimensions differing from these exact widths will be permitted. Vertical dimensions shown, but bottom edges of both low and high counter units shall align at the same height above the floor. Typical nominal base cabinet depth is 1'-10".

F. Full height cabinets may vary plus or minus  $\frac{1}{2}$ " from the 7'-0" height indicated. Wall case heights may vary plus or minus 1" from dimensions indicated, but shall be mounted with the top at the same height as the full height cases.

G. Construct cabinets, frames, tops and other components to provide the full, clear pipe space dimensions called for, in a single pipe space chase.

H. All cabinets shall have bottoms. Bottoms shall be pan type with sides and backs turned up.

I. All cabinets shall have backs. Backs may be welded to the cabinet framing. At units in front of piping or other services, provide removable backs. At units 30" wide or less, provide the removable back in one piece, full height between top rail and cabinet bottom, full width between end panels or end panel and intermediate vertical back post, formed for rigidity. At cabinets over 30" wide, removable back may be two-piece, split vertically, with formed offset to insure positive snug fit. Removable backs may be pan construction or have other forming at the four edges to provide rigid panel. Removable backs and cabinets shall be constructed so the back is held snugly in place, without rattling, utilizing snap-in devices if necessary. Removable backs shall be removable without the use of tools. Provide finished backs on cabinets with backs exposed to view.

J. Hinged doors and drawer fronts may either overlap cabinet ends, top and bottom or may be recessed (inset) within the cabinet and be flush with the cabinet ends, top and bottom. If recessed doors and drawers are used, cabinet openings shall be rabbetted on four sides to receive the doors and drawers.

K. Cabinets shall be constructed to have shelf adjustment on approximately 1" centers by means of shelf adjustment holes.

L. Stainless steel cabinets shall be of the same construction as the metal casework described below, except that the metal shall be of the specified stainless steel and of the gauges indicated for other steel cabinets.

### 2.3 UNDERCOUNTER CABINETS - GENERAL

A. Intermediate horizontal rails shall be provided between door and drawer sections occurring in a single cabinet, concealed when door and drawers are closed. Intermediate rails shall be provided wherever required for locking of drawers. Wherever locked doors or locked drawers occur, provide horizontal rail above the locked drawer or door, with security panel above the cabinet space or drawer. Security panels may be locked-in type.

B. Intermediate vertical rails shall be furnished at cabinets only where required for a half-width bank of drawers and be removable. Vertical rails shall not be used at the center of double door cabinets.

#### 2.4 FLOOR MOUNTED BASE CABINETS

A. Floor mounted base cabinets shall be conventional floor mounted metal laboratory cabinets. Cabinets shall have an integral or removable metal base with a toe space not less than 4" high and 3" deep.

B. Floor mounted base cabinets shall support the countertops directly in the conventional manner.

C. Provide table frames and legs for knee spaces. Legs shall be square steel tubing with a recessed leveling bolt with bottom flange. Each leg shall have a 2½" high, coved, molded, black rubber shoe. Provide removable back panels for knee spaces. Provide casters for movable tables.

D. Provide support struts for all floor mounted base cabinets as necessary to support plumbing and water piping and conduit occurring within pipe chases behind casework and elsewhere as indicated on the drawings. Support struts shall be spaced 8'-0" maximum on center. Support struts shall consist of two 16 gauge channel uprights fastened top and bottom with two U-shaped spreaders. Channels shall receive standard fittings.

E. All other details of construction shall be as specified above, in Articles 2.2 and 2.3.

#### 2.5 WALL MOUNTED STORAGE CASES

A. Wall mounted storage cases shall have a fixed back, solid top and flush finished bottom or flush soffit panel at bottom. Other details of construction shall be as specified in Article 2.2 above.

B. Wall mounted storage cases shall be attached to walls and partitions using the casework manufacturer's standard method of attachment. (In general, partitions are steel stud partitions with either plaster or gypsum drywall.) Wall mounted storage cases shall be capable of supporting a load of 250 pounds per square foot evenly distributed over the bottom of the case without failure of the attachment to the wall. On shop drawings, locate critical stud locations for other trades, with a stud within 4" in from cabinet end.

#### 2.6 FULL HEIGHT STORAGE CASES

A. Full height storage cases shall have a fixed back, a solid top and a toe space not less than 4" high and 3" deep. Other details of construction shall be as specified in Article 2.2 above. Full height cases shall be securely anchored

to surrounding construction. Provide leveling devices and gussets at each corner.

## 2.7 HINGED SOLID DOORS

A. Hinged solid doors shall be approximately 3/4" thick, double wall construction and fully sound-deadened.

B. Hinged doors shall be readily removable from the cabinetry and easily interchangeable among cabinets of equal size. Hinged doors shall swing through a 180° arc.

C. A hinged solid door, mounted on a cabinet shall be capable of supporting without permanent distortion, a concentrated load of 200 pounds at its outer top edge, while door is being swung.

D. The outer door pan of all hinged solid doors shall be provided with a recessed door pull as specified in Article 2.13 below. A 14 gauge hinge reinforcement member shall be electro-welded to the inner pan at each hinge location. All four corners of outer door pan shall be welded and finished smooth before painting. All parts of the door assembly which will be concealed after the door is assembled shall be painted completely before assembly. Each door shall be equipped with rubber bumpers applied to the inner door face. Doors three feet high or less shall have two bumpers, and door greater than 3 feet high shall have three bumpers.

E. Where locks are required, the outer door pan shall be pierced for that purpose. Where locks are required on double door cabinets, the left hand door shall be furnished with up-and-down bolts and a concealed astragal. Alternate methods of locking pairs of small cabinet doors will be acceptable, subject to the method providing positive locking of both doors and it is not possible to spring doors open. Up and down bolts at full height case doors are required, as specified under Article 2.13.H.

F. Provide security panels between drawer space and cabinet behind doors wherever drawers occur above doors to be locked.

G. Hinged doors shall be fastened to the cabinet side by use of 2½", five knuckle institutional type, heavy duty chrome-plated steel hinges. Each hinged door shall be provided with a nylon roller-type friction catch assembly. For doors 36" or less in height, heavy duty knife type hinges (minimum 11 gauge) will be acceptable. No painted hinges permitted.

## 2.8 GLASS SLIDING DOORS

A. Framed glass sliding doors shall have top, bottom and side framing with outer edges flanged and return flanged with inner edges formed to receive glass and glazing U-shaped neoprene channel. Doors 48" high and over to have horizontal cross rail. Joints to be flush with reinforcing plates, welded and ground smooth. Two nylon guides at top. Bottom guides are bronze bearing sheaves rolling on steel track. Each door with recessed satin chrome pull.

B. Provide rubber bumpers at jambs, top and bottom of opening. Provide solid pull at bottom shoe, each panel, for wall cases. At full height door panels, provide solid block-type pull at about mid-point of door panels.

## 2.9 DRAWERS

A. Drawers shall be manufactured to the heights as scheduled and/or indicated on the drawings. Where height of drawers have a specific dimension, drawers shall be manufactured to these exact dimensions. Where drawers are indicated to be equal height, a combination of drawers of two different heights will be permitted, provided the height of the drawers does not vary more than 1", unless otherwise indicated on the drawings.

B. Drawer assembly shall consist of an inner drawer head, an outer drawer head, a drawer body and a drawer back. The drawer head shall be not less than 3/4" thick, square edges and sound-deadened. The drawer body shall be electro-welded to the drawer back and to the drawer head assembly. Drawer body may be one piece construction, with removable drawer head. The outer drawer head shall not present an exposed raw edge of metal along the top inside edge of the drawer. Where locks are required the outer drawer head shall be perforated for that purpose. Both the inner and the outer drawer heads shall be fully painted before assembly. Drawer heads shall be provided with pulls as specified in Article 2.13 below. As a minimum, the top corners of the outer drawer head shall be welded and finished smooth before painting; bottom corners may be welded or butted to a hairline seam. The assembly of drawer head shall provide the head securely held in place, to a true vertical face which cannot be displaced out of plane. 48" wide drawer bodies shall be reinforced on the bottom by a full length plug hat reinforcement.

C. Drawers shall operate quietly and smoothly on a nylon roller and channel suspension, with front rollers set into case channels and rear rollers set into drawer channels. Nylon rollers shall be large diameter, of the type with steel ball bearing races. Case channels shall maintain alignment of drawer and provide an integral drawer stop to prevent the inadvertent removal of the drawer, but drawers shall be removable without the use of tools. Drawers shall have not less than two rubber bumpers on the inside drawer head to cushion closing the drawer.

D. Shallow drawers at knee spaces which do not permit use of drawer suspension specified above shall have steel guide angles and nylon slides. Drawers shall be arranged for smooth operation and easy removal. Drawers shall have rubber bumpers as specified above.

E. Provide security panels above drawers to be locked.

## 2.10 ADJUSTABLE SHELVES

A. Adjustable shelves should be constructed with a double channel at the front

and rear edges, full depth, and flanged down at the sides. Adjustable shelves over 38" in length shall be reinforced by a flanged channel welded to the underside of the shelf.

#### 2.11 CLOSURE PANELS, FILLER PANELS AND SCRIBE STRIPS

- A. Knee spaces shall have back panels, except where top is less than 25" deep.
- B. Provide closure panels to close exposed ends of pipe chases. Where back of pipe chases are exposed to view, provide closure panels to close back.
- C. Provide filler panels where indicated on the drawings or as required for a flush front at banks of components.
- D. Knee space panels, closure panels and filler panels, knee space and pipe space closure shall be removable and interchangeable between similar locations.
- E. Where casework extends from wall to wall, provide equal width scribe strips at each end to close openings between casework and walls.
- F. Where shown, provide access doors in back panels.

#### 2.12 CASEWORK FINISH AND COLOR

- A. After units have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of finish system to metal and to aid in prevention of corrosion. Physical and chemical cleaning of the metal shall be accomplished by washing with a hot alkaline cleaner followed by a thorough rinsing. The clean metal shall then be treated with metallic phosphate solution, followed by a thorough water rinse and a chromic acid rinse to set the phosphate surface. The resulting uniform, fine-grained, crystalline phosphate surface shall provide excellent bond for the finish coats and provide increased protection against humidity and corrosion.
- B. Immediately following the phosphate treatment, a corrosion-resistant synthetic resin primer shall be applied to all surfaces and baked at a high temperature. Primed units shall then be cooled, inspected, and sanded where necessary prior to the application of the durable finish coat.
- C. A high-bake, synthetic resin finish coat shall be applied over the primed surfaces and baked at the required high temperature to produce optimum coating properties.
- D. Colors shall be as selected by the Architect and may include colors which are not standard with the casework manufacturer, requiring special colors. In general, doors, drawer fronts and cabinet bodies shall be the same color. Two-tone painting will not be required and all cabinets in a room will be the same color. Up to six colors for the entire Project may be selected.
- E. Paint the doors (not cabinet frame) of selected solvent storage cabinets with yellow fire retardant paint. Across the front, letter FLAMMABLE STORAGE - KEEP FIRE AWAY in red, Helvetica Medium lettering style. Letter size as selected or approved by the Architect.

F. The finish shall be able to withstand a 180° bend over a 3/8" diameter mandrel without chipping or flaking using a Gardener Conical Mandrel #1620 or equivalent, conforming to ASTM D522 procedure.

G. The finish shall be highly resistant to moisture and chemicals and shall meet the performance requirements of the casework manufacturer's current, published moisture and chemical performance tests.

H. In scheduling the fabrications, finishing and delivery of casework, the fabricator shall recognize and take into consideration the multiple colors of finishing. To assure timely delivery of casework to meet the installation sequence and schedule, it may not be possible to finish all casework of a particular color at the same time, unless the fabricator is prepared to store later delivery casework and is able to finish all various colors to meet the required installation schedule.

### 2.13 HARDWARE AND ACCESSORIES

A. In general, it is desirable to match hardware with that in Unit A, and as far as possible provide matching hardware. All chrome plated hardware shall have satin brushed chrome finish.

B. Door and Drawer Pulls: Drawer and hinged door pulls shall be anodized aluminum with No. 4 finish on all surfaces exposed to view. Pulls shall be nominal 4" wide by 1½" high. Pulls shall be recessed flush with drawer and hinged door fronts. Locate pulls as generally as shown on drawings. The locations of pulls may vary slightly, from drawings and specifications, subject to Architect's approval in appearance and function. Confirm final locations when final samples of casework are submitted.

1. Base Units: On base units pulls shall be positioned horizontally with the top of the pulls, approximately 3/4" below the top of the door or drawer.

2. Overcounter Units: On overcounter units pulls shall be positioned horizontally as indicated on drawings, approximately 3/4" from the bottom of the door.

3. Full Height Units: Pulls are to be positioned vertically, 3/4" from the edge and at door centerline. Full height units may have latch handle or knobs of approved design.

C. Hinges: Shall be 2½" five knuckle institutional type, heavy-duty chrome plated steel hinges. Hinges shall have hospital tips and full 180° opening. Hinged doors 36" or less in height shall have one pair of hinges per door, and hinged doors greater than 36" in height shall have 1½ pairs of hinges per door. Hinges shall not be welded to the cabinet or to the door. Hinges shall be applied with four 8-32 by 3/8" flathead screws. For doors 36" or less in height, heavy duty (minimum 11 gauge) stainless steel knife type hinges will be acceptable, subject to meeting the load test. No painted hinges permitted.



D. Continuous Hinges: 0.045" thick wrought steel. Finish as specified for metal.

E. Locks: Provide locks for doors and drawers where indicated on the drawings. Locks for the purpose of coordinating keying systems, shall be Illinois "Duo", Type A, or approved equal, offering 2 sets of 5 primary tumblers and one set of 4 secondary tumblers. Locks shall be Grand Master keyed to Owner's existing GM Key System. Controlled key blanks and registered key plan shall be used to assure a complete security system. Use and installation of locks shall assure a complete security system. Locks offering other than a non-duplicating system will not be accepted. Keying as directed by Owner. Casework contractor shall meet with Owner to establish keying schedule.

F. Friction Catches: Shall be spring actuated, adjustable nylon-roller type friction catches. Properly sized magnetic catches will be acceptable, provided they are of sufficient power to hold the door as firmly as the specified catches. Catches determined to be undersized by the Owner shall be replaced.

G. Elbow Catches: Cadmium-plated steel elbow catches and strike plates shall be used on left-hand doors of double door cases where locks are used.

H. Sink Supports: Sink supports and reinforcing shall be adequate to support a fully loaded sink without causing deflection, distortion or sink movement. Where necessary on large sinks, provide an additional line of supports. Coordinate dimensions with Mechanical Contractor to properly locate the sink supports, with allowance for adjustment in the leveling devices. Sink supports shall be hanger type, suspended from top front and top rear horizontal rails of cabinet by four 1/4" rods, threaded at bottom end and offset at top to hang from two full length reinforcements welded to the front and rear rails. Two 3/4" by 1 1/2" by 12 gauge channels shall be hung on the threaded rods to provide an adjustable sink cradle for supporting sinks. In lieu of hanger type sink supports, the supports at base cabinets may be heavy cross channels securely fastened to cabinet framing, or reinforced back, to form a sturdy support system. All support systems shall have 4 point leveling.

I. Bumpers: All drawers and doors shall close against rubber bumpers, minimum of two with additional bumpers as specified elsewhere. Bumpers shall be type that are "locked-into" holes in casework by means of retaining collar. Stripable "tape" type rubber cushions are not acceptable.

#### 2.14 SOLID MODIFIED EPOXY RESIN TOPS

A. Solid modified epoxy resin countertops and working surfaces shall be Duriron Company Durcon 2A 1 1/2" thick.

B. Solid modified epoxy resin countertops and working surfaces shall be molded from a modified epoxy resin that has been especially compounded and cured to provide the optimum physical and chemical resistance properties required of a heavy-duty laboratory table top. Tops and curbs shall be a uniform mixture throughout their full thickness, and shall not depend upon a surface coating that is readily removed by chemical or physical abuse. Tops and curb shall be non-glaring and black in color.

C. Tops shall have a level true surface and uniform thickness. Tops shall have drip grooves on the underside exposed edges. Exposed edges, except as indicated below, shall be rounded to approximately a  $\frac{1}{2}$ " radius at front top edge and at vertical corners. Provide  $\frac{3}{4}$ " thick epoxy resin backsplash or 4" high curbs as indicated on drawings. A curb shall be provided against all walls (at back and ends) unless otherwise shown, set in chemically resistant adhesive. At fume hoods, the curb shall be integral with the top; coved to approximately  $\frac{3}{4}$ " radius.

D. Sink cutouts shall be smooth and uniform without saw marks and the top edge shall have a uniform radius of approximately  $\frac{1}{8}$ ". The bottom edge of the sink opening shall be finished smooth with the edge eased to prevent sharpness. Corners of sink cutouts shall be radiused not less than  $\frac{3}{4}$ ".

E. Where indicated on the drawings, table tops shall be indented not less than  $\frac{1}{2}$ " to provide a raised rim approximately  $\frac{5}{8}$ " wide around all exposed edges. The front top edge of the raised rim and exposed vertical corners of the top shall be rounded to not less than  $\frac{1}{8}$ " radius. The junction between the raised rim and the top surface shall be coved to approximately a  $\frac{1}{4}$ " radius. See Article 2.18.E for front ledge at fume hoods.

F. Physical properties of modified epoxy resin tops shall include flexural strength (ASTM D790-49T), compressive strength (ASTM D695-54), Rockwell M hardness (ASTM D785-51); heat resistance and chemical resistance of solid epoxy resin top shall equal the Duriron Company's current published specifications.

1. Heat and chemical resistance performance tests shall be conducted according to the test procedures contained in the Duriron Company's current published specifications.

## 2.15 STAINLESS STEEL VENTILATION BENCHES, TOPS, COUNTERS, INTEGRAL SINKS

A. All stainless steel shall be as specified under Article 2.1.B, with the specified finish at all exposed surfaces. Use Type 316 for all work, except as specifically noted under 2.1.B.

B. Except where a lighter gauge may be specifically noted on drawings for minor surfaces, provide minimum of 16 gauge stainless steel. Provide heavier gauge as may be necessary for the intended use and to maintain flat surfaces, free of distortion and oil-canning. Gauges are "after finishing".

C. In general, fabricate without framing as far as possible, with structural strength being achieved by the gauge of metal and integrally formed edges. However, reinforce tops, counters and similar surfaces on the back or underside with 16 gauge formed carbon steel channels or other appropriate shapes, spaced as necessary, where required to provide and maintain flat surfaces under heavy loading and to prevent twisting, warping, oil-canning or buckling. All metal work shall be free from pinch marks, buckles, creases or other defacing marks.

D. In general, detail and fabricate in accordance with National Sanitary Foundation (NSF) standards for food service equipment. Shop fabricate into

complete units as far as possible. When manufacturing process or welding destroys original finish, regrind and polish to match adjoining surfaces. No bracing, support or other features shall show through finished tops. Provide rounded external (free) corners, as at tops. Construct to eliminate unsightly connections, free from sharp edges or corners, without fins, projections or other hazards. Fabricate to eliminate field joints as far as possible. Where field joints are required by the size of the unit, field weld, grind and polish the joint to match remainder of surface finish. Detail and fabricate to details indicated on drawings where they are not inconsistent with NSF standards.

E. Except as otherwise shown, form exposed edges of tops and similar surfaces into a channel shape,  $1\frac{1}{4}$ " high. Form special edges as indicated. Form edges, curbs, backsplashes and similar formed shapes of the same sheet as the top (or other surface) or welded and finished to form an integral and match part of the top. Form top of backsplashes and curbs into a channel shape. Provide curbs and backsplashes of heights indicated, but not less than 4". Provide suitable wood inserts at edges, or other appropriate fastening device for securing the tops to the supporting structure. At exposed ends of splashbacks, provide welded closures for the open ends.

F. Where stainless steel sinks are called for in stainless steel work surfaces, weld the sink bowl to the top, grind and polish to provide the sink as an integral part of the top and to simulate one-piece construction. For sinks, cove all corners on inside to provide smooth and sanitary construction, approximately 1" radius. Pitch bottoms to provide complete drainage. Grind corners smooth and polish, with vertical and horizontal corners coved to about 1" radius. Partitions between sinks to be double wall with round top edge. Weld sink integral with tops of drainboards to simulate one-piece construction.

G. Form all marine type edges and other integrally formed work as indicated on drawings. Pitch work surfaces adjacent to sinks to the sink to provide positive drainage.

H. Welded parts and work to be non-porous and free of imperfection, pits, cracks, buckles, discolorations, or other distortions. At stainless steel, provide homogeneously heli-arc welds, ground, buffed and polished to original finish, smooth without pits or depressions. Maintain metal thickness, show no weld or grind marks and simulate one-piece construction. Weld and finish field joints to match rest of unit. Soldering of sinks, curbs, backsplashes or other items to tops will not be permitted.

I. Sound deaden the undersides of all tops, counters, other work surfaces and sink bowls (except where exposed), with a  $1/8$ " thick smooth spray coat of Minnesota Mining and Manufacturing Company's Coating No. EC-549, or approved equal.

J. At stainless steel sinks, provide a stainless steel, stamped drain outlet fitting for  $3\frac{1}{2}$ " opening top diameter with a 3" perforated grid strainer and 4" x  $1\frac{1}{2}$ " o.d. stainless steel tailpiece with connecting nut.

## 2.16 AIR FOIL FUME HOODS - GENERAL

A. Provide fume hoods of the air foil type, designed with radiused foil sec-

tions at the top, bottom and sides of the hood opening to ensure maximum operating efficiency of the hoods. Sizes as indicated on drawings. All fume hoods shall extend to the ceiling, as indicated, with the grilles shown at the front and extensions of the side panels at all exposed sides.

B. Provide double wall end panels for fume hood super-structures, with the front of the panel at the hood opening radiused, providing a streamlined section and ensuring a smooth, even flow of air into the hood. The hood interior end panels shall be flush with the entrance shape to prevent eddy and backflow of air. The area between the double wall ends shall be closed to house the sash counterbalance weight and remote control valves as required.

C. Provide an air foil, similar to the sides, installed at the bottom of the hood opening. This foil shall be mounted with a minimum of 1" open space between the foil and the top front edge of the working surface to direct an air stream across the hood work top to prevent any backflow of air at this point. The air foil shall extend back under the sash, so that the sash closes on top of the foil, and thus does not close the 1" opening.

D. Provide an automatic air bypass for the hoods at the top of the sash opening. This air bypass shall limit the maximum air velocity through the face of the hood, and provide a relatively constant volume of air through the hood (regardless of sash position) when hood exhaust blowers are in operation. By lowering the sash to a distance of 10" from the deck of the hood, the face velocity shall increase by not allowing the bypass to function. The bypass shall function for the last ten (10) inches of travel before complete closure only. The hood air bypass shall not be dependent on mechanical or electrical linkage, and shall be completely positive in operation.

E. Provide a removable baffle, with adjustable openings at top and bottom, at the rear of the hoods. Adjustable baffle openings shall be provided to allow the air through the hood to be adjusted to compensate for types of gases, apparatus or heat sources used in the hoods.

F. Hood working surface shall have a raised ledge along the front of the hood to confine spillage away from the hood face. For epoxy resin tops, the working surface shall be constructed not less than  $\frac{1}{4}$ " thick solid modified epoxy resin formed into a  $\frac{1}{2}$ " deep watertight pan. For stainless steel top, provide formed "marine edge".

G. Vertical sliding sash shall be composed of not less than 18 gauge painted steel rolled shape,  $\frac{3}{4}$ " thick x  $2\frac{1}{2}$ " wide, mitered, welded and ground smooth to provide a complete frame with no visible joints. Glass shall be  $\frac{1}{4}$ " thick, 3 ply safety glass, except hoods with steam baths shall have  $\frac{1}{2}$ " thick tempered plate glass. The internal glass retaining strips shall be of stainless steel, and the strips shall be attached to the sash frame with stainless steel screws. The sash shall be counterbalanced with a single sash weight and sash cable system to prevent tilting of the sash during operation. Double sash weight and cable counterbalance system may be provided. (Spring type counterbalances are not acceptable.) Sash cables shall be stainless steel and shall operate on ball-bearing sheaves. The sash frame shall be equipped with plastic glides which operate in stainless steel sash guides to ensure proper operation of the sash and prevent metal-to-metal contact.

H. Provide a two-tube fluorescent light fixture of the longest practical length at the top of the hoods, shielded from the hood interior by a tempered glass panel sealed into the hood body with chemical rubber channels. The seal of the glass panel separating the fluorescent tubes from the interior of the hood shall be vaportight. Furnish and install light bulbs.

I. Hood exterior shall be constructed of cold-rolled steel, with component parts screwed together to allow removal of the end panels, front end fascia pieces, top fascia or grille, and air foil strips, to allow replacements or to afford access to the plumbing lines and fixtures. Spacers or reinforcements shall be welded to these main parts. After fabrication and before final assembly, all cold rolled steel parts shall be cleaned, phosphate treated and finished as specified for metal casework finish.

J. Removable access panels to mechanical service fixtures shall be set flush with hood interior except in stainless steel hoods.

K. Standard hood interior shall be of cement-asbestos. Cement-asbestos panels and all surfaces in contact with fumes shall be coated with fire and acid-resistant finish. The end panels, back panel, baffle and top shall be not less than  $\frac{1}{4}$ " thick, screwed together, with cleats or steel angles to form a completely rigid assembly to which the exterior cold-rolled steel parts can be mounted. Joints shall be backed up with angles or cleats to eliminate gaps. Screws used to assemble the panels shall be stainless steel truss head screws, which are not countersunk, in order to provide maximum strength to the screwed joints. No metal, except stainless steel, shall be exposed on the interior of the hood.

L. The hood baffle shall be screwed to cleats at the rear of the hood with stainless steel screws. Adjustment strips made of the lining materials, which are adjustable by means of plastic knobs, shall be provided in the top of the hood plenum chamber in back of the top sloping baffle. Provide a slot in baffle to create better flow.

M. The hood widths shall be the same dimension as, in line with, the base cabinet below.

N. Provide stainless steel duct collars at all hoods. (Ducts from collars and all fans are under Division 15 - vendor of fume hoods to include in his price the cost of any necessary modifications to ductwork shown on drawings.)

O. Provide interior light, light switch, red pilot light to indicate when fan is operating, receptacles as specified in a later article. Install all electrical items according to National Electrical Code.

P. For each pilot light, provide a two color engraved plastic laminate plate to identify the fan number. Plates to read "Fan No. XX" (with appropriate number). Characters approximately  $\frac{1}{4}$ " high. (Fan operation switched from central control panel.)

Q. Locate cupsinks and holes for faucets so all faucets drip into the cup sink and so the tip of the faucet is 6" to 8" above the sink.

## 2.17 FUME HOOD PERFORMANCE

A. Hoods shall contain and remove fumes generated within the hoods. Hoods shall be designed to provide a face velocity of 100 cubic feet per minute across the full open face of the hood, except 150 cubic feet per minute at isotope hoods. Hood design shall be such that it will exhaust light or heavy gases efficiently, when the hood is used for ordinary laboratory work in a room free from cross drafts, and without high thermal loads or other special conditions. The air velocity shall be uniform, to a tolerance of  $\pm 10$  FPM, over the face of the hood when measured at the top, bottoms, center and sides of the hood face. No reverse currents of air shall occur along the sides, top, bottom or front of the hood.

B. When the sash is down, the air bypass shall control the maximum velocity of air being drawn through the hood so that it does not exceed  $4\frac{1}{4}$  times the face velocity with the sash in the open position.

## 2.18 SOLVENT STORAGE CABINETS

A. Type A - Conform to OSHA requirements and the following:

1. Custom fabricate cabinets to same criteria as other undercounter base cabinets.

2. Type A cabinets shall be lined with cement-asbestos panels not less than  $\frac{1}{4}$ " thick and equipped with one 16 gauge, type 316 stainless steel expanded metal shelf. Ventilation holes or slots shall be provided at top of cabinet doors covered with heavy copper screen on inside.

3. Provide screened stainless steel flange at rear of cabinet as detailed.

B. Type B - Conform to OSHA requirements and the following:

1. Provide cabinets equivalent to Protectoseal Co. 5500 Series, or Justrite 25000 Series of dimensions and configurations shown.

2. Type B cabinets shall be vented to the fume hood superstructure above by means of stainless steel vent pipes (extending to near bottom of cabinet) extending up to 1" or more through the hood deck behind baffle. All cabinets below fume hoods shall be vented. Only one cabinet per standard location shall be painted for flammable storage, as specified under Article 2.12, Paragraph E.

3. Provide all accessories and fittings required by the drawings.

## 2.19 HOLES AND CUTOUTS

A. Cut holes, cutouts and other openings in casework, fume hoods, countertops, working surfaces, curbs, backsplashes and other items of metal laboratory casework as necessary to receive sinks, plumbing service fixtures, piping, ductwork, electrical fixtures and devices, conduit and wiring and other equipment, fixtures or fittings to be built into or mounted on or adjacent to the metal laboratory casework.

B. Holes, cutouts and openings shall be factory cut where possible. Where size and location of holes and cutouts cannot be determined in advance or depend on future field conditions, hole and cutouts may be made in the field. Field cut holes and cutouts shall be accurately located and neatly made, and surrounding surfaces shall not be damaged.

## 2.20 ELECTRICAL FIXTURES

A. Electrical fixtures (for fume hoods and other locations noted to be supplied under the casework subcontract) shall be as follows:

1. Switch: 20 amp, single pole, 277 volt, A.C.; Hubbell #1221 or approved equal.
2. Receptacle: 20 amp, 2P-3W grounded type, 125 volt, duplex, Hubbell #5362, or approved equal.
3. Pilot: Red neon, 125 volt, single gang, Hubbell #1375 or approved equal.
4. Plates: Sierra type 302 satin stainless steel.
5. Light Fixtures: Fluorescent rapid start or trigger start, HPF, 120 volt.
6. Lamps: Fluorescent, white (F40W typical). Lamps shall be provided and installed for all fixtures.
7. Combination Receptacle: 20A, 2P-3W, grounded type, 125/250 volt, duplex, Hubbell #5492, or approved equal.

B. The above items shall be pre-wired to a single junction box located behind the fume hood superstructure. The junction box shall be accessible. Provide a ground wire in all flexible conduit.

C. Furnish all items standard to fume hood with preceding as minimum.

## 2.21 REAGENT SHELVES

A. Casework fabricator shall provide all shelving and reagent shelving complete, including framing or blocking. Detail and fabricate to meet the details shown on drawings, reinforced as necessary and with adequate supports to adequately support the loads.

B. Epoxy resin shall be as specified in Article 2.14. Fabrication shall be in accordance with the requirements of other similar work and materials of this Section.

## 2.22 GLASSWASHER

A. Provide Labconco Undercounter Model #44003 with distilled water pump, stainless steel six different cycles, button controlled with "cancel and drain"

# memo

to Surg. Path.

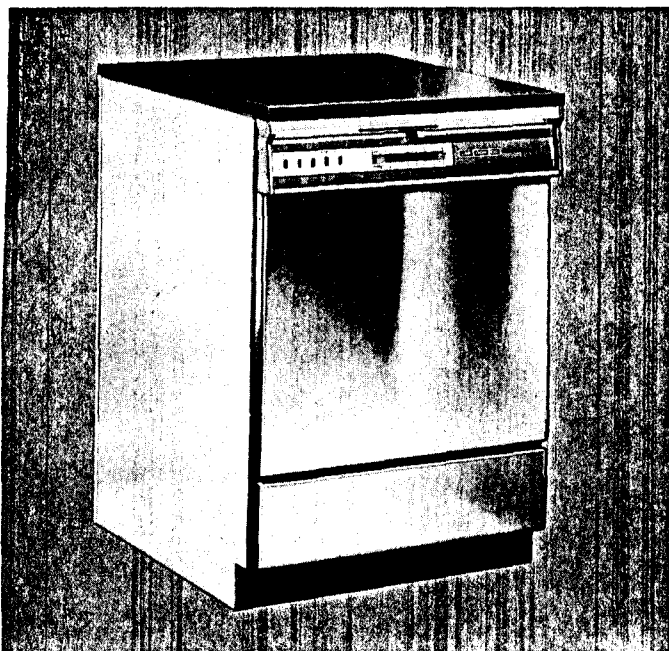
from \_\_\_\_\_

- For your information LABCONCO
- For your approval 44003
- Approved 120 v.
- For your attention HCW
- Note and file A H20
- Note and return D
- Note and forward 120 v.
- Please advise JOANNA
- Please comment SAMUELSON
- Please reply
- Please handle 6-5474
- Send copy
- Please see me

Date \_\_\_\_\_ 19\_\_\_\_



# Washers



97-980

No knobs to turn; no dials to read. Simple pushbutton controls. Just select cycle you want and push start button.

**(1) Full Cycle:**

Prewash, intermediate rinse, complete detergent wash, two room temperature rinses, final room temperature distilled water rinse, dry cycle. All in 59 min.

**(2) High Temp/Full Cycle:**

Same as Full Cycle, except final rinse is tap water heated to 74°C. In 59 min plus time required to raise final rinse temperature.

**(3) Distilled Water Rinse Only Cycle:**

To simply rinse handwashed glassware or brand new items. Time, 10 min.

**(4) Wash and Tap Water Rinse Only Cycle:**

For washing without distilled water. Includes dry cycle. Takes 59 min.

**(5) Plasticware Cycle:**

Wash, two rinses, and dry cycle for plasticware or only slightly dirty glassware. Just 40 min.

**(6) Dry Only Cycle:**

For glassware washed and rinsed by hand. Hot air blower system dries glassware in 23 min.

To add forgotten piece of glassware during cycle: simply push safety lock to left . . . wait until internal action stops . . . open door and add forgotten piece. Close door and reset lock . . . washer continues cycle.

If you want to stop and drain washer completely, push "Cancel and Drain" button at any stage in any cycle. Then remove glassware or select another cycle.

Three-way washing action provides thorough cleaning. Two washing baskets slide right into washer directly above arms of H-shaped washing mechanism. Fast-moving streams of hot, detergent-activated water shoot through large spray ports in three directions: (1) upward through bottom basket, (2) upward through top basket, and (3) downward through bottom basket.

All stainless steel. Corrosion-resistant. Special sound-dampening insulation. With top and bottom basket. Eight different rack inserts are available.

**Three Models**

Available in permanent undercounter model, mobile model (can be converted to undercounter installation later), or free-standing model. With or without distilled water pump. 115V 60Hz.



Labconco No.	Model	With Distilled Water Pump	Supplied with	Shipping Wt	Cat. No.	Est.
44002	Undercounter	No	Distilled water system with solenoid valve*	59kg (131 lb)	97-980	1330\$
44003	Undercounter	Yes	—————	63 (138)	97-980D	1470\$
44001	Mobile	No	Rubber casters, connection for tap water, black laminated top, distilled water system with solenoid valve*	85 (188)	97-981	1530\$
44000	Mobile	Yes	Rubber casters, connection for tap water, black laminated top	88 (194)	97-981D	1600\$
44005	Free-Standing	No	Black laminated top, distilled water system with solenoid valve*	78 (173)	97-982	1470\$
44004	Free-Standing	Yes	Black laminated top	82 (180)	97-982D	1530\$

\*For labs where distilled water supply has at least 1.4kg/cm<sup>2</sup> line pressure.

button. Include all racks and accessories and inserts and automatic booster heater; All equipment for 115 volt, 60 Hz, AC.

### PART 3: EXECUTION

#### 3.1 INSTALLATION

A. Metal laboratory casework and accessories shall be installed under the technical supervision of the manufacturer. The manufacturer shall have a technically qualified superintendent on the site at all times during the installation of the metal laboratory casework. Casework shall be installed by skilled mechanics experienced in this type of work.

B. Coordinate installation with the Mechanical Contractor, Electrical Contractor and other contractors and subcontractors so that piping and wiring may be completed and sinks, service fixtures and equipment can be set in place and connected in the proper sequence.

C. Erect casework plumb, true, square and level in a substantial manner strictly according to approved shop drawings and manufacturer's instructions. Fasten adjacent units together, and securely anchor casework to floors and walls as required. Install all doors, drawers, shelves and other accessories.

D. Install scribe strips and filler panels accurately scribed to abutting construction.

E. Where tops, reagent shelves, sink units, backsplashes, curbs or box curbs abut the wall, seal the casework item to the wall. Apply a bead of approved chemical resistant sealant (adhesive may be noted on the drawing) to seal the voids or cracks. Where exposed, finish smooth at the top. At stainless steel work, a vinyl sealing strip, which clips to the metal, may be used.

F. Level tops, and anchor in place. Cement field joints. After cement is cured, finish joints to form watertight, flush joints without offsets in adjoining surfaces.

G. Install hardware and adjust for proper operation. Tag keys and turn over to Owner as directed.

H. Touch up scratches and other damage to casework finish.

I. Clean casework and leave ready for use. Refer to Section 01700.

#### 3.2 FUME HOOD PERFORMANCE TESTS

A. The metal laboratory casework contractor shall test the first fume hood installed on each floor and one additional fume hood per floor as selected by the Architect and submit a written report of each test to the Architect before final acceptance. Tests shall be conducted in cooperation with the Mechanical Contractor.

B. Hoods shall be tested in an area where there is at least 5 feet of clear space in front and on each side for observation of the airflow pattern entering the hood. This area shall be without cross-drafts or other air currents exceeding 10 FPM that would affect the hood performance in the area in front and around the hood. Exhaust air volume shall be variable to show hood operation at different face velocities within the Specification range.

C. Fume hood face velocities shall be verified as follows: With exhaust blower on, the quantity of air being exhausted shall be determined by measuring the velocity of the air entering the hood face, and multiplying this velocity by the square feet of hood opening. The air velocity shall be determined by averaging at least 6 velocity readings taken at the hood face. Readings shall be taken in the center of a grid made up of 3 sections across the top half of the hood face, and 3 sections across the bottom half of the hood face. Readings shall not vary more than +10 FPM from the average face velocity. When the desired face velocity has been established, the following tests shall be made:

1. Make a complete traverse of the hood face with a cotton swab dipped in titanium tetrachloride to demonstrate that a positive flow of air is maintained into the hood over the entire hood face. No reverse air flows or dead air spaces shall be permitted.

2. Paint a strip of titanium tetrachloride along each end and across the working surface of the hood, in a line parallel with the hood face and 6" back into the hood to demonstrate that no backflows of air exist at these points. The flow of smoke shall be directly to the rear of the hood, without swirling turbulence or reverse flows.

3. A smoke bomb (one-half minute size), shall be discharged within the hood area to show the exhaust capability of the hood and its design efficiency. No reverse air flows will be permitted. Place lighted bomb in the hood area and move it to various places, checking end panels and working surface to verify that no reverse air flows exist at any point. Lower the sash to closed position to verify that a sufficient air volume is flowing through the hood working area to carry away fumes from a massive fume source. Immediately after the smoke bomb stops discharging smoke, the hood area should be purged of smoke.

4. Place a pan of dry ice in hot water in the hood and observe flow of the heavy, white vapors generated. The flow of fumes shall be carried away to the back of the hood. No reverse flows of fumes along the work surface toward the front of the hood shall occur.

D. Repeat tests 1, 2, 3 and 4 for every face velocity setting selected to be tested in the 70-100 FPM range.

E. The fume hood automatic air bypass shall maintain a relatively constant flow of air into the hood at all sash positions. When the sash is down, the air bypass shall control the maximum air velocity being drawn through the hood so that it does not exceed  $4\frac{1}{2}$  times the face velocity when the sash is full open.

F. Check sash operation by raising and lowering sash. Sash shall glide smoothly and freely and hold at any height without creeping; assuring proper counterbalance. No metal-to-metal contact will be allowed.

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CONDITIONS, SPECIFICATIONS AND RELATED DOCUMENTS FOR

SURGICAL PATHOLOGY RENOVATION  
JACKSON OWRE MILLARD LYON COMPLEX REMODELING  
MINNEAPOLIS CAMPUS  
UNIVERSITY OF MINNESOTA  
COMMISSION NUMBER 280.03

James F. Brinkhoff  
Vice President for Finance and Development University of Minnesota

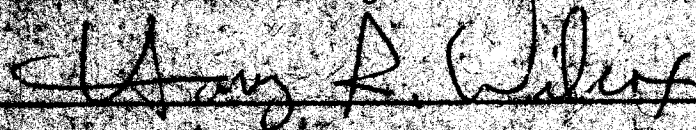
Clinton N. Hewitt  
Assistant Vice President for Physical Planning University of Minnesota

THE ARCHITECTS COLLABORATIVE, INC. Cambridge, Massachusetts

HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.  
University Park Plaza - Suite 704  
2829 University Avenue South East Minneapolis, Minnesota  
(612) 378-3833

The Cerny Associates, Inc. Minneapolis, Minnesota  
Hamer Green and Abrahamson, Inc. Saint Paul, Minnesota  
Bettar, Leach and Lindstrom, Inc. Minneapolis, Minnesota

I hereby certify that these plans, specifications or reports were prepared by me or under my direct supervision, and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



Date: 17 February 1977

Reg. No. 9603

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this Division. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. These conditions supplement provisions of General Conditions and Division 1.

1.2 SHOP DRAWINGS AND EQUIPMENT BROCHURES

A. Refer to and comply with Section 01300.

1.3 DRAWINGS

A. In general, the drawings of the mechanical systems and equipment are to scale. However, to determine exact locations of walls and partitions, the Contractor should consult the architectural and/or structural drawings. Drawings shall not take precedence over field measurements.

B. Plans of piping and ductwork although shown on scale drawings are diagrammatic only. They are intended to indicate size and/or capacity where stipulated, approximate location and/or direction, and approximate general arrangement of one phase of work to another, but not the exact detail or exact arrangement of construction. If it is found, before installation of any or all construction phases, that a more convenient, suitable or workable arrangement of any or all phases of the project would result by varying or altering the arrangement indicated on the drawings, the Architect/Engineer may require the Contractor to change the location or arrangement of his work without additional cost to the Owner, in accordance with directions from the Architect/Engineer.

C. Where discrepancies are discovered after certain portions or phases of any contract have been installed, the Architect/Engineer reserves the right to require the Contractor to make minor changes in pipe, duct, fixture, or equipment locations or arrangements to avoid conflicts with other work at no additional cost to the Owner.

D. Because the drawings are to a relatively small scale to show as large a portion as is practical, the fact that only certain features of the system are indicated does not mean that other similar or different features or details will not be required. Contractor shall furnish all incidental labor, material or equipment for the systems in their control so that each system is a complete and operating one unless otherwise specifically stipulated in the detailed body of the specifications.

E. In general, pipe lines requiring drainage shall be laid out at the site first, then large pipe mains, then space for air ducts, then electrical conduit. The Mechanical Contractor shall provide extra stub risers, drip-trap-and-rise

installations, and drip and trap assemblies at low points in steam systems as may be required; air vents, rises and drops in forced hot water mains as may be required; and extra lengths and fittings in all phases as may be required to install all systems in the space available and as necessary to avoid interferences.

#### 1.4 CONNECTIONS AND LAYOUT

A. It shall be the responsibility of this Contractor to make connections at terminal points of contract. The piping, ducting and equipment, etc., may be shown with excess clearances for clarity. However, the Contractor shall group pipe and arrange all ducts and equipment to present a neat and workmanlike appearance and to avoid blocking of passageways.

#### 1.5 SERVICE INTERRUPTION

A. This Contractor shall schedule his work in such a manner that he does not interrupt any services to any University of Minnesota buildings unless authorized by the University. Refer to and comply with requirements of General Conditions, and Division 1.

B. Any service interruptions to a building, or portion of a building shall be cleared and scheduled with the University prior to the interruption.

#### 1.6 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Refer to and comply with Section 01700 requirements. The Contractor shall prepare a portfolio, as soon as possible after equipment has been ordered, of all mechanical equipment furnished by him on the project. This portfolio shall include manufacturer's shop drawings, parts' lists and operating and maintenance instruction of such equipment. Information shall be submitted in triplicate, neatly folded to approximately 8-1/2" x 11" size and bound in indexed loose-leaf binders of adequate size to contain the material. Each binder shall be properly identified. Upon completion of these portfolios, the Contractor shall turn over to the Architect/Engineer, prior to the Owner taking over the building, for approval and delivery to the Owner.

B. Instructions shall contain the following information and services:

1. Manufacturer's recommended cleaning and maintenance procedures.
2. List of materials recommended for maintenance.
3. Complete operating instructions.
4. Name and address of authorized service organizations and parts depot.
5. Where indicated in the specifications, the Contractor shall provide the services of a factory trained representative to instruct the Owner's authorized personnel in the operation, control and maintenance of equipment.
6. Refer to Sections of specifications for additional information to be furnished by the Contractor.

7. The Mechanical Contractor shall instruct the Owner's representative in the use of all equipment and systems, as specified in Section 01700.

#### 1.7 OTHER WORK

A. Other work will be performed by separate trades. This Contractor shall give careful consideration to work of all of the general, electrical, elevator and other trades, and all subsidiary trades, and shall organize his work so that it will not interfere with the work of other trades. He must consult all the specifications for correlating information and all drawings for details, dimensions, foundations, pits, etc.

B. All scaffolding required for mechanical work shall be provided by this contractor.

#### 1.8 CLEANING

A. Refer to and comply with requirements of General Conditions, Section 01010 and 01070. The Contractor and Subcontractors for the various phases of the work of this Division shall promptly clear away all debris, surplus materials, etc., resulting from their work or operations, leaving the job and equipment furnished under any or all contracts in a clean first-class condition.

B. All plumbing fixtures shall be thoroughly cleaned of all plaster, stickers, rust stains, and other foreign matter or discoloration, leaving every part in an acceptable condition and ready for use. Thoroughly clean all items of equipment furnished such as traps, strainers, pumps, motors, etc., leaving each item in a clean first-class condition.

#### 1.9 PAINTING AND STENCILING

A. Painting of final field coats on materials and equipment furnished under the mechanical portion of the contract will be done under the general construction contract as described in Section 09900. This Contractor shall, however, refinish and restore to the original conditions and appearance all mechanical equipment which has sustained damage to the manufacturer's prime and finish coats of enamel or paint. Materials and workmanship shall be equal to the requirements described in Section 09900. All painting or paint finish referred to in Division 15 is to be provided by this contractor. This Contractor shall identify piping and indicate direction of flow, by marking the equipment as frequently as necessary for painting and stenciling by General Contractor. Laboratory water piping systems shall be labeled "Water Unsafe for Drinking" in accordance with the Minnesota State Plumbing Code.

#### 1.10 DEMOLITION, REMODELING, CUTTING AND PATCHING

A. Refer to and comply with requirements of Section 01910.

B. The relocation of existing equipment and piping systems shall be accomplished in the least possible time. Work shall be scheduled so as to minimize the down time for the respective systems involved, and the schedule approved by the University in advance. This will be required for existing services being revamped and/or relocated and all interconnecting portions of these systems shall be installed as complete as practicable prior to actual shut-down for final connections.

C. As applicable, work shall be coordinated with the other contractors, other trades and with the University. In areas where work involved may interfere with existing building operations or require temporary or permanent cessation or relocation of building functions, the University must be consulted so that work schedules can be set up acceptable to all concerned.

D. This Contractor shall furnish and install all materials and equipment to complete remodeled areas of the existing building as shown on the plans specified herein, or required to complete the work indicated under this Contract, including all minor items necessary for complete and operating installation. This Contractor shall offset existing piping and ductwork as indicated on the drawings or as required to accomplish the remodeling indicated.

Refer to the architectural drawings for remodeling required.

E. This Contractor shall be responsible for all necessary cutting and patching required in connection with his work and where necessary because of removal or change of existing work. Cutting of structural members and finished surfaces shall not be allowed without permission from the Architect or Structural Engineer. These cutting and patching requirements will be modified only if general construction specifications and drawings specifically and clearly state that certain or all portions of same required for each of the various trades is to be performed by the General Contractor.

F. Cutting and patching to expose and remodel existing mechanical systems shall not be construed as the work of another contract unless specifically called for on another contractor's documents. In general, all patching caused by Mechanical Contractor's cutting and demolition work to accomplish the work of the Mechanical Contractor shall be done by the Mechanical Contractor, except as indicated to be done by the General Contractor on the Architectural Drawings.

G. Cutting required for plumbing, heating, ventilating and air conditioning work, etc., shall be done by the Mechanical Contractor to the entire satisfaction of the University and Architect/Engineer. Cutting shall be kept to a minimum which will allow the proper placement of the materials.

H. All unsalvageable materials shall be removed in a manner that will avoid damage to materials or equipment to remain and shall be completely removed and legally disposed away from the site.

I. Salvageable materials designated for re-use or relocation shall be carefully removed and shall be protected from damage until they are incorporated into the new work.

J. Salvageable mechanical equipment not specifically stated or specified to be reused should be reviewed with the University's representative as to disposition. If the University desires to retain, the equipment should be carefully removed, protected from damage and turned over to the University at a location outside the building. If the University does not desire the equipment, it should be completely removed and legally disposed away from the site. Equipment shall include but not be limited to ductwork, diffusers, control instruments, tubing, piping, valves, plumbing fixtures, trim, drains, cleanouts etc.



K. See Sections 01010 and 01500 for special requirements such as the use of construction tools, barricades, and protection of the existing building.

L. The Mechanical Contractor shall repaint all areas where he has performed cutting and patching at rooms, spaces or locations that are not repainted under the General Contract, generally these will be locations where no demolition, cutting and patching is performed by the General Contractor.

M. Refer to Sections 09110, 04200, 09100 and 09900 for execution and requirements for patching and painting and comply with applicable provisions as to materials and workmanship.

#### 1.11 GOVERNING CODES

A. The mechanical installation shall conform to the current provisions of all local and State codes pertaining to plumbing, heating, ventilation and refrigeration work including, but not necessarily limited to the following:

1. Minnesota Building Code
2. Minnesota State Plumbing Code
3. American Water Works Association
4. National Electric Code
5. Minnesota State Board of Health
6. Minnesota Safety Code and Regulations
7. Sheet Metal and Air Conditioning Contractors National Association
8. Local applicable ordinances

#### 1.12 STANDARDS

A. All materials supplied under the mechanical contract requirements shall conform to the latest editions of the following standards:

1. All applicable standards as published by the American Society of Testing Materials.
2. All applicable standards as published by the National Fire Protection Association.
3. American Standards Association
4. American Society of Mechanical Engineers
5. American Society of Heating, Refrigeration and Air Conditioning Engineers.
6. Air Moving and Conditioning Association

### 1.13 TESTS

A. All work shall be inspected, tested and approved as required by the State of Minnesota and local regulations. Tests shall be made in presence of proper Inspectors and Architect/Engineer or their duly authorized representatives. All tests shall be made by the Contractor at his own expense, and he shall furnish three (3) test certificates each to the University and Architect/Engineer.

B. All work shall prove absolutely tight under required tests. All types of piping systems, except final tests of completed systems shall be made before pipe is covered or connected to fixtures and equipment. Tests required shall not be less than specified in the following paragraphs.

C. All gauges, tools, pumps, gas, air or other equipment required for testing and initial adjusting of piping systems shall be purchased and provided by this contractor.

#### D. Piping Tests

1. Sweat copper joints. Provisions shall be made for removal of one (1) percent of the sweat joints in copper piping for inspection and testing. Additional joints may be required to be removed if failure occurs in original one (1) percent tested.

2. Silver Brazed Copper Joints. Mechanics doing silver brazing are required to pass a certifying test. Test shall simulate job conditions using fittings of size and type specified.

a. Test sample shall be two (2) nipples (12" long) and one (1) coupling of the largest size to be used at the job (2" minimum size). Execute one (1) sample in horizontal position, 6'-0" above floor, and one (1) sample in vertical position 5'-0" above floor with upward flow of brazing.

b. Test samples shall be sent to an independent testing laboratory by the contractor, and contractor shall pay all costs of test.

#### 3. Welding

a. All welding shall be done by certified welders and licensed fitters who are thoroughly trained in electric arc and/or gas welding and experienced in the welding positions and materials required. Certification shall be for type of work being performed by welder and shall be accomplished in accordance with ASME "Qualification Standard for Welding Procedures, Welders and Welding Operations." No welds shall be made by any welder until copies of his certification have been submitted to Engineer/Architect.

b. Test Coupons shall be taken as follows, unless otherwise directed by the University as work progresses:

1) Less than 25 welds - 2 coupons

2) Over 25 welds - one coupon, and one coupon per each 50 welds

c. Location of test coupon to be selected by University.

d. In lieu of test coupons as above specified, or in the event of evidence of coupons failing to pass; then X-ray may be used to evaluate the welding.

e. All welds shall be stronger than the parent metal. A minimum of two passes shall be used on all arc welded joints.

f. The University will pay for all laboratory tests of the coupons, except tests taken as a result of failures which shall be paid for by the Contractor.

#### E. Systems Tests

1. All soil, waste, storm water and vent conductors, etc., shall be tested with air of 5 psi pressure and shall remain constant for 15 minutes without the addition of air.

2. Cold and hot water piping shall be tested and proven watertight under a hydrostatic pressure of 125 psi pressure or 1-1/2 times the working pressure, whichever is greater, for a period of two (2) hours prior to application of pipe insulation and final connection to fixtures.

3. Gas piping shall be tested with air at 50 psi pressure for a period of two hours. Soap test all joints.

4. Vacuum piping systems shall be tested at 25 inches of vacuum for a period of one hour with all outlets closed and pump not working. The drop in vacuum shall not exceed 1/4" of mercury during the test.

5. Deionized water piping shall be hydrostatically tested at 75 psi pressure for a period of two (2) hours. After the piping additions have been completed and pressure tested the new distilled water system shall be flushed and cleaned to obtain the proper quality standards.

6. Pump Motors. All motors and/or equipment under the mechanical contract shall be tested under load conditions with the RPM and amperage readings taken and listed on the required certificate.

#### 7. Fire Safety Precautions

a. See Article 1.33 Section 01010

#### 8. Sterilization of Domestic and Laboratory Water Pipes

a. Upon completion of new cold, hot water, and circulating hot water piping systems and before connecting into existing piping system, this Contractor shall sterilize these new systems with chlorine before they are placed in operation. Amount of chlorine applied shall be such as to provide a dosage of not less than 50 parts per million. Following a contact period of not less than 6 hours, the heavily chlorinated water shall be flushed from the system with clean water until the residual chlorine content is not greater than 0.2 parts per million. All valves in water lines being sterilized shall be opened and closed several times during the 6 hour period. Then the temporary water supply shall be removed and final connecting to existing systems can be made.

b. All sterilization work shall be performed in a manner and with methods such as to meet approval of inspector's Office of State Board of Health. Water shall be sampled and tested by the Division of Environmental Health, University Health Service before being placed in service.

c. Special care shall be taken in sterilizing, cleaning and flushing piping to eyewashers and emergency showers.

#### 1.14 IDENTIFICATION

A. All mechanical equipment furnished under these specifications shall be identified with black-white-black laminated 1/8" plastic plates. Plates attached with self-tapping screws. Verify typical locations with Architect prior to installation. Submit samples of one and two line plates for approval prior to ordering.

#### 1.15 CONNECTIONS TO EXISTING BUILDINGS

A. Connections to the existing building systems shall be made as shown on the plans. Any existing equipment and/or systems affected by these connections shall be replaced into proper operation.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract Division I General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. This section specifies the basic materials and workmanship for the various mechanical trades. Its provisions apply to all work of the Mechanical Contractor.

## PART 2: INSTALLATION

2.1 GENERAL

A. All pipes shall be required size, round and straight and shall be cut, reamed, threaded, beveled for welding and/or otherwise prepared for joining with proper tools. All piping shall be properly enclosed, supported, guided, anchored, sway braced, connected, tested, cleaned and flushed out, properly insulated and protected where required, and run in a neat and orderly manner to the satisfaction of the Architect/Engineer. Lines required to be enclosed in ceilings, chaseways or similar spaces shall be installed to permit such enclosure as intended. This Contractor must lay out his work, properly locate the apparatus and add necessary pipe, sleeve, etc., and take his own measurements at building.

B. All pipes shall be run with proper grade to provide for easy draining and in group runs where applicable. Pipe sizes shown on the drawings are nominal pipe sizes and not outside diameters. Pipes shall be run substantially as indicated on the drawings; however, Architect/Engineer reserve the right to require this contractor to make minor changes in pipe locations where conflicts occur with other trades. Such changes shall be made without extra cost to the Owner.

C. All piping shall be installed with ample provisions for expansion and contraction to prevent damage to same or to building structure. Such provisions shall be made by means of piping offsets, changes in directions, expansion loops and/or suitable expansion joints. Suitable anchors and guides shall be provided to permit proper deflection and compression of offsets, loops and expansion joints. Expansion joints shall not be used in lieu of offsets, changes in direction or loops, except where specified and/or indicated on the drawings or where otherwise obviously necessary.

2.2 PLUMBING PIPING SYSTEM

A. The continuous waste and vent piping method shall be followed for the additions to the existing plumbing system. Provide laboratory and domestic hot, circulating hot and cold water, deionized water, natural gas, and vacuum lines to all outlets, junction boxes, and fixtures as shown on drawings or specified herein.

B. All water piping shall be pitched to drain points, and up from hot water tanks, supply mains or risers 1/8" per 10 feet wherever possible.

C. All waste and vent piping shall be properly pitched 1/4" to the foot where possible and 1/8" minimum unless indicated otherwise so that all waste piping will drain back to main stacks and vent pipe will drain back to fixture unless loop venting indicates other pitch. Piping shall be properly supported so that it will not sag and form pockets. Joints between cast iron pipe and fittings shall be caulked with pitched oakum, thoroughly forced into joints with caulking tools. The joints shall then be filled with molten lead solidly caulked even with the hub top. Joints for acid resistant waste and vent shall be glass bead with stainless steel or glass reinforced nylon compression type assemblies with teflon liner. Where acid resistant piping connects to cast iron piping, the connecting fitting and the common line shall continue as acid resisting material. Preformed molded rubber rings may be used where specified under Section 15110.

D. Glass pipe shall be installed in accordance with manufacturer's recommendation. Vertical runs of 3", 4" and 6" pipe shall be supported by a ring clamp under the coupling at each floor. 1-1/2" and 2" vertical runs supported every other floor. Horizontal runs supported every 8 to 10 feet.

E. All gas piping shall be installed with plugged drip pockets at low points. Pipe shall be extended to all gas equipment, including safety valves where required or noted to be installed.

F. Consult manufacturer's data and details of rooms containing plumbing fixtures on architectural drawings before roughing-in piping. Plug or cap piping immediately after installation. Waste stuffed in open ends of piping shall be removed before installation of next length of pipe. Minimum size of all water piping shall be 3/4" except for short stubs immediately at fixtures.

G. All groups of fixtures shall have main valves including drain cocks with valves spotted in accessible, but concealed locations. Sectionalizing valves shall be provided where shown.

H. All vacuum piping shall be run with as few offsets as possible. Special care shall be given to reaming ends of pipe for this system to eliminate all rough edges.

### 2.3 HEATING PIPING SYSTEM

A. All hot water heating piping shall be installed with a minimum pitch of 1/8" per 10 feet to free itself of water when drained and/or air when operating. If rises and drops are required in horizontal pipe runs, install a 3/4" IPS by 6" high capped pipe air chamber for hydronic main supply and return risers. Through a reducer, connect a 1/8" copper tube and run the stubs to discharge over a janitor's slop receptor or an equipment room floor drain. On the end of the copper tube near the drain, install a key-operated manual air vent. Provide a gate valve and union on inlet to air vent. On the high side of all hot water finned tube radiation, furnish and install an air vent.

B. Under no circumstances shall any pipe connections in the field be made by punching a hole in a pipe and inserting or saddling a branch take-off. Reduction in line size for all piping shall be with eccentric fittings, butt-weld, or screwed according to size and application. Flanged connections required to match field equipment may be made using slip-on flanges.

#### 2.4 CONNECTIONS TO MISCELLANEOUS EQUIPMENT

A. Due to the fact that the manufacture of the equipment purchased may vary slightly from that specified and therefore requires some rearranging of equipment different from that indicated on the drawings, the Contractor shall make connections to such re-arranged equipment without additional cost to the Owner. That is for an initial installation arrangement other than that indicated on the drawings.

B. This Contractor shall make all water, waste, vacuum, vent, gas, and ductwork connections to all equipment that is installed for this project whether or not such equipment is furnished by this Contractor, other contractors, or by the Owner. This includes furnishing and installing piping, shut-off valves, unions, fittings, ductwork, air control devices and insulation.

C. The unpacking, assembling and setting of equipment furnished under other than mechanical sections of these specifications, will be performed by other than this Contractor. This list includes, but is not necessarily limited to the following which are listed in the General and Electrical sections of the specifications and/or Architectural and Electrical drawings:

1. Laboratory Equipment other than what is specified in Section 15310
2. Owner furnished equipment. Section 01010 (1.12).
3. Generally, connection types and sizes are described in the above lists and/or shown on the drawings.

#### 2.5 CONCRETE FOUNDATIONS AND SUPPORTS

A. Foundations, anchors, concrete cover, anchor bolts, sleeves, grouts, shims, etc., required for properly placing mechanical equipment furnished under this contract shall be provided by this Contractor, unless specifically stated otherwise. Housekeeping pads, four (4) inches thick, of 3000 pound, 28 day strength concrete, shall be furnished for all mechanical equipment located on floor slabs.

B. All new floor openings in fifth floor equipment room shall have 4" concrete curbs around them by the Mechanical Contractor.

#### 2.6 ELECTRIC MOTORS AND WIRING

A. Motors:

1. Furnish electric motors as required for each motor driven unit. All motors must conform in every respect to the standard specifications of NEMA and bear nameplate of manufacturer, with current operating characteristics noted thereon.

a. Horsepower ratings: All electric motors shall be sized to meet the horsepower requirements of the driven unit at design characteristics including all V-belt and/or drive and coupling losses which are incurred without loading the motor beyond its nameplate horsepower rating. Where V-belt drives are employed the motor horsepower nameplate ratings shall not be less than 107% of the driven unit brake horsepower requirements.

2. All motors shall be provided with ball or roller bearings complete with grease cups. Motors shall be quiet when operating under full load conditions.

3. Unless otherwise specified, motors shall be of the induction type and shall be of speeds, sizes and for electric current characteristics as given in this specification and in schedule on the drawings. Motors shall be mounted on sliding cast iron bases as required. Motors shall be General Electric, Century, Allis--Chalmers, Westinghouse, Wagner or approved equal.

4. Motors of 1/3 HP and smaller shall be wound to operate on 120 volts, single phase, 60 cycles, A.C. and motors 1/2 HP and larger shall be wound to operate on 208 volts, 3 phase, 60 cycles, A.C. except where otherwise indicated.

#### B. Wiring

1. The Electrical Contractor will provide and install starters for all new motors. He will also provide and install all power wiring to all new motors and from motors to starters. Any additional wiring required shall be provided by the Mechanical Contractor, unless otherwise specified.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes performing all labor and furnishing all piping materials, fittings, joining methods, protection and pressure for piping used on this project to connect all fixtures and equipment, pipe and fittings of material and type for various services as list below:

C. Related work specified elsewhere:

1. Basic Materials and Methods: Section 15100.

## PART 2: PRODUCTS

2.1 PLUMBING PIPE AND MATERIALS

A. At all fixture connections where nipples are necessary between copper tubing and fixtures, such nipples shall be standard weight full iron pipe size brass pipe nipples with suitable brass or copper adapters. Steel or iron nipples will not be permitted at any location in copper lines where connections are made to brass fixture valves or trim.

1. Water Piping

a. Above-ground Piping: All water lines shall be Type "L" hard drawn ASTM B88-58, with soldered joints and fittings. For 2" and larger size pipe on cold and 140 degree F. hot water all soldered joints shall be made using silver solder with sil-fos, Eutectic 1800, or approved equal. For 1-1/2" and smaller size pipe on all cold and 140 degree F. hot water, all soldered joints shall be made using 95/5 solder with No. 50 non-corrosive flux.

2. Waste Piping

a. Pipe - service weight cast iron (above grade in building). Piping under 2" shall be cast iron pipe with screwed joints. Above 2" shall be hub and spigot with molded rubber rings.

b. Fittings - same material as pipe.

c. Hubless cast iron soil pipe and fittings are permitted. Mechanical joints for hubless cast iron system shall be made by using neoprene sleeve and stainless steel as specified in CISPI standard 301.

3. Vent Piping

- a. Pipe - Schedule 40 galvanized steel.
- b. Fittings - cast iron.
- c. Joints - screwed, caulked.

4. Acid-Resistant Piping

a. Pipe - These lines shall be "Kimax" or "Pyrex" regular schedule glass pipe or Duriron with Mechanical Joint above grade and "Duriron" or Pyrex with Bury-Pac below grade.

b. Fittings - Hub and spigot below grade. Bead to bead or bead to plain end with compression type coupling made of stainless steel or glass reinforced nylon and teflon liner above grade. Slip joints not permitted after fixture trap.

5. Air and Vacuum Piping

- a. Pipe - Government Type "L" hard copper tubing.
- b. Fittings - wrought copper solder type.
- c. Joints - 95-5 solder.

6. Natural Gas

- a. Pipe - Schedule 40 black steel pipe.
- b. Fittings - Extra heavy black malleable iron fittings.
- c. Joints - Screwed. Welded when concealed.

7. Exposed Water and Waste Piping to Institutional Equipment

a. Pipe - Red brass pipe standard weight screwed full iron pipe size chromium plated.

b. Fittings - Screwed standard weight brass fittings chromium plated.

8. Distilled Water

a. Pipe - Kimax or Corning, small bore low expansion borosilicate glass pipe, equal to Corning's 7740 beaded pressure pipe.

b. Fittings - Same requirements as pipe.

c. Joints - Bead end with compression type joint with teflon liner.

9. Silencer Vent from Vacuum Pipe

- a. Pipe - Schedule 40 galvanized steel.
- b. Fittings - Same as pipe.

c. Joints - Screwed.

10. Condensate Drain Lines

a. Pipe - Schedule 40 galvanized steel.

b. Fittings - Same as pipe.

c. Joints - Screwed.

2.2 HEATING PIPE AND MATERIALS

A. The Contractor shall furnish and install all pipe indicated on drawings and other small pipes not indicated but necessary for proper operation.

1. Hot Water Heating

a. Pipe - Schedule 40 #A53 butt welded black steel pipe.

b. Fittings - up to 2" - service weight cast iron screwed.

c. Joints - welded or screwed.

2. Steam Pipe

a. Pipe - 2-1/2" and larger shall be Schedule 40 A53 seamless black steel pipe. Pipe 2" and less shall be A-53 butt welded.

b. Fittings - Up to 2" use socket weld fittings and couplings. Over 2" use butt weld fittings with back-up rings.

c. Joints: Welded.

3. Condensate Returns

a. Pipe - Schedule 80 seamless black steel pipe. Pipe 2" and under shall be A-53 electric resistance weld.

b. Fittings - Same as for steam pipe except extra heavy weight.

c. Joints - Welded.

B. All pipes 2" in diameter and less shall have screwed joints, unless otherwise specified.

C. No weldolets shall be used on pipe 2" in diameter or smaller. On pipe 2-1/2" in diameter or larger, where pipe reduction is two sizes or more, weldolets or sockolets may be used where applicable, subject to field inspection before connecting to branch line take-offs.

D. Eccentric and concentric reducers shall be steel butt weld fittings.

E. All welding fittings shall be of the long radius pattern wherever possible.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes furnishing and installing all valves where shown on the drawings and where necessary for proper control of equipment.

C. Related work specified elsewhere:

1. Basic Materials and Methods: Section 15100.
2. Piping Specialties: Section 15130.
3. Mechanical Support Devices: Section 15140.

## PART 2: PRODUCTS AND INSTALLATION

2.1 GENERAL

A. All valves shall have name or trademark stamped or cast into body. All valves shall be designed for a minimum of 150 pounds working pressure unless otherwise noted, but figure numbers may indicate greater pressures.

B. Valves of Powell, Stockman, Walworth, Lunkenheimer, Crane, Sarco, Mueller, Ohio, Hoke, Jenkins, Nibco-Scott, Hammond, Rockwell Nordstrom, RP&C, or Hancock manufacture will be accepted.

C. Of the manufacturers listed, the Contractor is requested to standardize on one make as much as practical but not to the extent of sacrificing quality listed.

D. Provide positive dead-end shut-off valves at all pieces of equipment. Valves shall be individually supported so that equipment can be removed and piping system can remain unstressed and in operation.

2.2 VALVE SCHEDULEA. Domestic and Laboratory Water Valves

1. Valves 2" and smaller shall be soldered brass body, 150# WSP, rising stem, solid wedge disc gate valve, Crane #431 UB or Ohio 7150.

2. Ball valves may be used on domestic water pipe for shutoff service up to and including 1" size shall be Appolo Series 70-100 or equal bronze ball valve with blow-out proof stem, chrome plated ball with large size port,

teflon seats and stuffing box rings. Capacity index of these valves shall be 9.8 for 1/2" size, 18 for 3/4" size and 32 for 1" size. Use Apollo Series 70-300 or 70-400 union joint valves with viton "O" ring seal. Valves in insulated piping shall be provided with extended stems for 1-1/4" extension. All valves shall have steel lever handle with vinyl grip.

#### B. Vacuum Valves

1. Valves on vacuum piping shall be Stockham B22 or Ohio 520 for 150# WSP with air disc.

#### C. Gas Valves

1. Valves on gas piping 2" and smaller shall be Walworth #559, brass square head gas cock.

2. Valves on gas piping for shut-off valves at mains and branches shall be Nordstrom No. 143, lubricated plug valve.

3. Valves on gas piping for shutoff shall be NCG Series 480090 ball valve for 1/2" size and Series 480092 for 1" size ball valve, steel body, screwed. Worcester, Consolidated Brass, Lance and Hills-McCama are approved equal. Valves shall be mounted in recessed cabinet with latch and hinged glass door. Cabinet by this contractor. Minimum cabinet dimensions are 8" x 8" x 3-5/8".

#### D. Deionized Water

1. Valves on deionized water piping shall be Chemflow Model 2420 approved equal with beaded pressure ends.

#### E. Hot Water Heating System

1. Gate valves 2" and under shall have screwed ends, bronze 150# WSP body, rising stem, solid wedge, Crane No. 431 UB, Stockham No. B120.

2. Ball valves may be used on piping for shutoff service up to and including 1" size shall be Apollo Series 70-100 or equal bronze ball valve with blow-out proof stem, chrome plated ball with large size port, teflon seats and stuffing box rings. Capacity index of these valves shall be 9.8 for 1/2" size, 18 for 3/4" size and 32 for 1" size. Use Apollo Series 70-300 or 70-400 union joint valves with Viton "O" ring seal. Valves in insulated piping shall be provided with extended stems for 1-1/4" extension. All valves shall have steel lever handle with vinyl grip.

3. Check valves 2" and under shall be screwed ends, bronze 125# WSP body, Jenkins No. 92, or approved equal. Centerline and Metraflex.

4. Balancing cocks 2" and smaller shall be Crane #250, 125# W.P. Nordstrom #173, Rockford #350, 175# W.P. on all radiation. Dezurik balancing cocks are equal and approved.

## F. Low Pressure Steam and Low Pressure Condensate Return

1. Gate valves 2-1/2" and over ahead of heating coils shall be Jenkins 651, Powell Figure No. 1793 flanged ends cast iron 125# WSP body renewable seat and solid wedge.

2. Gate valves 2-1/2" and over for other services than 1. above shall be flanged or weld ends, as specified for application, steel 150# WSP body, rising stem, OS&Y renewable stainless steel seat rings and solid wedge, Powell Figure No. 1503 or Jenkins 1009-CM or 2009-CM or approved equal.

3. Globe valves 2-1/2" and over shall be flanged or weld ends as specified for application, steel 150# WSP body, rising stem, OS&Y renewable stainless steel disc and seat, Powell Figure No. 1531, or approved equal.

4. Gate valves 2" and under shall be screwed ends, bronze 150# WSP body, rising stem, solid wedge, Lunkenheimer Figure No. 2151, Crane 431 UB, Powell No. 514S, or approved equal.

5. Globe valves 2" and under shall be screwed ends, bronze 150# WSP body, renewable composition disc, Powell Figure No. 150, Crane No. 7, or approved equal.

### 2.3 VALVE TAGS

A. All valves not in sight of fixtures or equipment isolated by that valve shall be provided with an approved aluminum, brass or plastic tag. Tags shall be 1/16" thick minimum for metal and 1/8" for plastic and 1.5" diameter (or 1" x 1.5" rect.). Plastic tags shall be P.V.C. or nylon material. Fastening hole drilled 1/4" dia. by 3/8" from edge. Tags shall be stamped for metal and engraved or raised for plastic and numerals filled with contrasting color. Numerals shall be 3/8" high. Fasten to hand wheel with "S" hook. The valve list shall contain the following information:

1. Valve numbers in sequence.
2. Service (with pressure and/or temperature). Identified in accordance with Section 09900.
3. Floor where located.
4. Room number.
5. Nearest column grid intersection.
6. Distance and direction from Item 5.
7. Description and room location of equipment isolated by subject valve. (Abbreviated description of equipment served)

The Health Sciences Physical Plant Maintenance and Operations Group will furnish the Contractor with blank forms to be used as a guide for the above requirements.

B. The gate valves on the emergency showers shall be wired open and tagged "DO NOT CLOSE".

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes all piping system specialties required to place the mechanical systems in complete working order.

C. Related work specified elsewhere:

1. Basic Materials and Methods: Section 15100

## PART 2: PRODUCTS AND INSTALLATION

2.1 UNIONS AND FLANGES

A. Unions or flanged connections shall be used in piping adjacent to all equipment, valves, etc., as applicable for removal of equipment or to facilitate repairs.

B. On hydronic water piping 2" and smaller furnish and install malleable iron unions, 250# WSP with bronze to iron ground joint.

C. Unions for copper water piping shall be Streamline, or approved equal, ground joint type.

D. Furnish and install Petro #1150, 3000# WOG steel to steel, forged steel unions in the following piping systems.

1. Gas piping, through 3" pipe size.

2.2 DIELECTRIC UNIONS AND FITTINGS

A. All copper water piping, and vacuum piping shall have insulated type unions wherever it contacts iron or steel. This includes copper piping connections to iron or steel valves, tanks, and piping. These connections to and including 1-1/2" size shall be Universal insulating union, Series 2000, Styles 3 and 4.

2.3 STRAINERS

A. All strainers shall be Y type with brass screens. All strainers shall be complete with blow down gate valve nipple and pipe cap on blow off. Strainer manufactured by Sarco, Mueller, McLean, and Metraflex are approved.

B. Strainers shall be installed where shown on drawings and ahead of all traps. When trap used has integral strainer, a separate strainer need not be installed. Where strainers are installed in steam lines to coils, convertors, etc., strainer before coil or convertor trap may be omitted. Strainers shall be full line size.

C. All drip piping shall be welded except for connections to screwed strainers and traps.

D. On sizes through 3" where used ahead of traps, or steam regulating valves, the screens shall be 20 mesh; from 4" through 8" they shall be 3/64" perforated and over 8", 1/16" perforated.

#### 2.4 FLOOR, WALL AND CEILING PLATES

A. Where uncovered, exposed pipes pass through wall or floors, they shall be fitted with wall or floor plates. Plates shall be at least 1/32" thick, and shall be equipped with set screws for locking around pipe. Plates shall be finished cast brass chromium plated. Plates shall be set tight against wall or floor.

#### 2.5 PIPE SLEEVES

A. Provide sleeves for all pipes that pass through walls, slabs or partitions. Sleeves shall be set and maintained in place by this contractor during the progress of the work. All sleeves shall be cut from new material, cut square and reamed.

B. All pipe sleeves through walls, slabs or partitions shall be 1/2" greater in inside diameter than the external diameter of pipe passing through sleeve except for insulated piping where sleeve shall be large enough to allow for insulation on the piping.

C. All sleeves through partition walls shall be Schedule 40 steel pipe extending full thickness of partition and shall be flush with the finished surface.

D. Sleeves through floor slabs for concealed piping shall be constructed of Schedule 40 steel pipe and shall extend 1/2" unless detailed otherwise above finished floor in classrooms, offices, corridors, etc.

E. Pack space between pipe and all sleeves with oakum, leaving 1" depth for plastic caulking. Caulking shall be Presstite, Dura-gum or approved equal.

#### 2.6 WATER HAMMER ARRESTORS

A. Furnish and install water hammer arrestors, of the size called for, and location as noted, on the plan or on water riser diagrams. Provide arrestors at main ends, glassware washers, sterilizers, etc.

B. Sizes and locations of water hammer arrestors are in accordance with data set forth by the Plumbing and Drainage Institute, Standard PDL-WH-201, for average plumbing systems.

C. Symbol designations shown on the drawings are for sizes established by PDI corresponding to units of various manufacturers that have been accepted by a certification testing program.



D. Arrestors as manufactured by Josam, Wade, Zurn, Blake, Jay R. Smith and Precision Plumbing Products, are accepted.

### 2.7 VACUUM BREAKERS

A. Vacuum breakers shall be installed on all supplies to flush valve, domestic water, hose sprays, lab water outlets, janitor sinks, equipment connections, and at each point where code requires on the potable water system. Vacuum breaker shall be Chicago or Watts.

### 2.8 STEAM TRAPS

A. At the outlet of all new heating coils, sterilizers, convertors and at the end of steam main drip points, furnish and install Armstrong Bucket traps.

B. Series #880 inverted bucket traps with thermic vent shall be used on all low pressure steam lines, at drip lines, unit heaters, coils and low points in steam lines.

C. All bucket traps shall be furnished with integral strainers on smaller sizes where capacity permits. Brass strainers on low pressure traps and stainless steel strainers on high pressure traps.

D. Series 215 and 216 inverted bucket traps shall be used for high capacity flows.

E. Permissible condensate flow in pounds per hour (low pressure to 15 psig, 1 psig differential):

<u>Series No.</u>	<u>Pounds per hour</u>
880	300
881	550
882	1100
338	2100
314	3200
215	5400
216	9500

F. A safety factor of 2 shall be used in determining the size of traps for all drip lines and a safety factor of 3 shall be used in determining the size of traps for preheat coils.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing and installing of hangers and supports as required to install all lines under contract.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100.
2. Pipe and Pipe Fittings: Section 15110.
3. Valves: Section 15120.
4. Piping Specialties: Section 15130
5. Mechanical Systems Insulation: Section 15160.

D. Hangers shall be of proper strength and placed on correct centers to support the lines with no sagging. (See Schedule below). Any additional steel members required to run the pipes or where indicated on drawings shall be furnished and installed by this Contractor.

E. Groups of three or four lines may be supported on trapeze type hangers in a neat evenly spaced manner. Where any piping, over groups of three, are run along walls or tunnels, they shall be racked vertically on side wall to allow maximum clearance space.

F. Pipe hangers and supports may be secured to steel trusses or beams by welding or using toggle expansion bolts, impact type fasteners or through bolts, as conditions require. Grinnell Fig. 60 welded beam attachment shall be used for large diameter pipes.

G. Where hanger attachments are welded to beams or trusses the attachment shall be fireproofed equal to supporting members.

## PART 2: PRODUCTS AND INSTALLATION

2.1 PIPE HANGERS AND SUPPORTS

A. All individual pipes 3" and smaller shall be supported with Grinnell ring type No. 107-R, or approved equal; larger pipe shall be supported with Grinnell Company #260 or approved equal. Clevis hangers as required of sizes to span the insulated pipe. Elcen, Carpenter and Patterson or Fee and Mason of .

identical type are approved equal. Hangers that support copper pipe shall be copper-plated.

C. Unistrut, Powerstrut or Grinnell vertical and horizontal structural supports shall be used with sufficient anchorage to side walls using inserts and anchor bolts. Any inserts or cinch anchors for pipe hangers shall be furnished and set in place by this Contractor unless otherwise noted. All piping shall be supported as specified in A. above. Where clearance conditions dictate that a Fig. #260 clevis hanger cannot be used, this Contractor shall use the Fig. #171 or 175 pipe rolls.

D. Hangers for insulated piping shall be large enough to encompass insulation and metal shield for same. Provide at hanger points hydrous-calcium silicate insulation in sections 2" longer than hanger shield. Insulation shall have same finish as adjacent covering.

E. Shields shall be provided for all insulated piping at hangers or trapeze bars. Shields for 6" and smaller shall be constructed of 16 gauge galvanized iron. Shields shall be 6" longer than pipe diameter; however, the shielding shall be a minimum of 6" long and a maximum of 18" long. Shields shall completely encompass the covering.

F. Vertical pipes shall be supported at each floor by riser clamps.

G. Whenever copper piping comes directly in contact with steel support system, and copper plated hangers are not available for use, it shall be this Contractor's responsibility to wrap the pipe with two layers of Minnesota Mining and Manufacturing Company's #33 Electrolytic Tape. The length of tape shall be such to provide 2" overlap on each side of support.

H. Contractor shall consult and cooperate with all other contractors in arrangements of and routing of all supported lines so as to provide maximum clearances, minimum interference and a neat, first-class appearance and accessibility.

I. The following schedule shall be used in establishing distances between supports for steel pipe. When different sizes of pipes are supported on a common hanger, smallest size line shall govern unless an intermediate support is used.

<u>Pipe or Tube Size</u>	<u>Hanger Spacing</u>	<u>Minimum Rod Diameter</u>
1/2" tube only	5'	1/4"
1/2" - 1"	7'	3/8"
1-1/4" - 1-1/2"	9'	3/8"
2"	10'	1/2"
2-1/2"	11'	1/2"
3"	12'	1/2"

J. The following schedule shall be used in establishing distances between supports for copper pipe. The smallest pipe hung shall determine the distance between hangers where pipes are supported on trapeze hangers.

<u>Pipe or Tube Size</u>	<u>Hanger Spacing</u>	<u>Minimum Rod Diameter</u>
1/2"	6'	3/8"
3/4"	6'	3/8"
1"	8'	3/8"
1-1/4"	8'	3/8"
1-1/2"	9'	3/8"

K. Pipe hangers and spacing for sewer and waste lines shall be as listed above except that horizontal runs of cast iron and acid resistant piping shall be supported at least once for each pipe section. If glass is used for acid waste piping the pipe hanger spacing shall be in accordance with the pipe manufacturer's recommendations.

L. Horizontal piping behind laboratory casework shall be supported individually every 6'-0" on Unistrut 13/16" channels with Unistrut standard pipe strap. One hole clamp for piping under 1" o.d. may be used.

## 2.2 PIPE SUPPORT BEHIND CASEWORK

A. This Contractor shall provide adjustable framing channels behind the casework for racking the service piping. Refer to Architectural drawings for piping details. This Contractor shall provide all necessary channels, framing, fittings, braces, pipe clamps, bolts and nuts, etc., as required to install mechanical work on the frames such as drainage, vent, air, gas, vacuum and water piping.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division I General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing and installing all vibration eliminators required to prevent excessive vibration transfer to occupied areas.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100.
2. Pipe and Pipe Fittings: Section 15110.
3. Mechanical Supporting Devices: Section 15140.
4. Mechanical Systems Insulation: Section 15160.
5. Ventilation and Air Conditioning: Section 15800.

D. Mechanical equipment which shall have vibration isolation are pumps, motors, fans, and all moving or rotating units.

E. Provide substantial bases under all units, fans and motors elevated above floor as noted on drawings.

F. Isolator types shall be Mason Industries, Consolidated Kinetics Corporation, Kor Fund Industries, Amber Booth, Vibration Mounting & Controls, Vibragenics, and Vibration Eliminator Company.

## PART 2: PRODUCTS AND INSTALLATION

2.1 EQUIPMENT ISOLATOR ASSEMBLIES

A. General: As noted on the drawings and in these specifications all mechanical equipment shall be mounted on vibration isolators to prevent excessive transmissions of vibration structure borne noise into the building structure. These specifications, will indicate the type of vibration isolator assembly along with the minimum static deflection, in inches, of the isolators to be used. The static deflection referred to is that of the isolators under the load of the supported equipment. Vibration isolators shall be selected in accordance with the weight distribution of the equipment so as to produce reasonably uniform deflection. Mounting systems exposed to high temperature, oil, rust, or other adverse environments shall be suitably resistant to deterioration in such environments. Isolator types described below are Mason Industries.

## B. Description of Equipment Isolator Assemblies.

### 1. Type A Isolator Mounting - Exhaust Units

a. Double deflection neoprene mountings shall have a minimum static deflection of 0.35. All metal surfaces shall be neoprene covered to avoid corrosion and have friction pads both top and bottom. Bolt holes shall be provided.

### 2. Type B Isolator Mounting - Supply Fans and Pumps

a. Spring isolators shall be free-standing and laterally stable without any housing and complete with 1/4" neoprene acoustical friction pads between the base plate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflections, compressed spring height and solid spring height. Mountings shall be SLF. Units shall have a minimum deflection of 2.5 inches.

### 3. Type J Isolator Mounting - Supply Fans and Pumps

a. Vibration isolator manufacturer shall furnish rectangular structural beam or channel concrete forms for floating foundations. The base depth need not exceed 12" unless specifically recommended by the base manufacturer for mass or rigidity. In general, bases shall be a minimum of 1/12th of the longest dimension of the base, but not less than 6". Forms shall include minimum concrete reinforcement consisting of half-inch bars or angles welded in place on 6" centers running both ways in a layer 1-1/2" above the bottom, or additional steel as is required by the structural conditions. Forms shall be furnished with drilled steel members with sleeves welded below the holes to receive equipment anchor bolts where the anchor bolts fall in concrete locations. Height saving brackets shall be employed in all mounting locations to maintain a 1" clearance below the base. Bases shall be type K.

## C. Structural Ties and Rigid Connections

1. All vibration isolated equipment shall be free of any structural tie or rigid connection that can short-circuit or block the vibration isolators. All building trash shall be removed from under the base of any isolated equipment. Connecting piping, ductwork and electrical conduit shall not restrict movement of the equipment on its vibration isolators. The preferred method is to use a flexible connection of sufficient length and with a loop if necessary.

### 2.2 FLEXIBLE PIPE CONNECTORS

A. For all water or air connections to pumps, furnish and install Flexonics Model 301, Flexweld, Universia, Metraflex or approved equal, braided corrugated bronze metal hose for size up to 2 inches. For pipe sizes 2-1/2 inch to 4 inches use Flexonics Model 391, Flexweld, or approved equal. Hose construction shall be for 200 degrees F. water and 200 psi working pressure.

B. At the suction and discharge of each reheat coil circulating water pump, furnish and install Flexijoint Model DIBA-4, Garlok, Resistoflex, Dore or approved equal, teflon connectors. Connectors shall have 125 psi flanges and rated for minimum of 250 psi burst pressure at 220 degrees F.

C. At discharge of vacuum pumps furnish and install flexible pipe connections as specified in Paragraph A above.

D. All piping with flexible connectors shall be independently supported so that there is no weight on the connection.

E. At the steam coils piping connection between coil and first valve in the condensate return, furnish and install a flexible pipe connector as shown in drawing details. Flexonics Model 301 or approved equal, braided corrugated stainless steel metal hose with single braid covering for size up to 2 inches. For pipe sizes 2-1/2 inch to 4 inches, use Flexonics Model 401 or approved equal. Hose construction shall be for 250 degrees F. water and 200 psi working pressure. Size of flexible connector shall be same size as stem coil outlet tapping.

### 2.3 PIPING

A. All piping on the inlet and discharge connections to all rotating machinery, such as pumps, compressors, etc., shall be vibration isolated from its supports over its entire length.

B. Piping runs within each mechanical equipment room or 30 feet from any connected machinery whichever is greater, shall be supported by resilient hangers providing a minimum static deflection of 1/4 inch. Metallic surfaces of resilient hangers shall be separated by a neoprene rubber element. For non-liquid filled pipes the resilient hangers shall be Mason Industries type HD, or equal. For liquid filled pipe the resilient hangers shall have spring diameter and hanger box lower hole large enough to permit the hanger rod to swing through a 30° arc before contacting the hanger box and short circuiting the spring. Hangers shall be decompressed to the rated deflection so as to keep the piping at a fixed elevation. The hangers shall be designed with a release mechanism to free the spring after installation is complete and the hanger is to be subjected to its full load. Deflection shall be indicated by means of a scale. Resilient hangers shall be Mason Industries, type PC30N, or approved equal.

C. Piping runs more than 30 feet from connected machinery and not within a mechanical equipment room shall be supported by non-metallic elements providing a minimum of 1/4 inch separation between the pipe and both the building and any metallic support such as a hanger, clip or strap. Suitable materials include neoprene, glass fiber or felt, but shall in all cases be appropriate for the particular temperatures encountered. Metallic hangers, externally surrounding pipe that is insulated is sufficient for this separation. Hangers shall be Mason type HD or equal.

### 2.4 DUCTWORK

All supply and exhaust ductwork within mechanical equipment rooms shall be resiliently supported by non-metallic element as providing static deflection of between 1/8 and 1/4 inch. Hangers shall be Mason Industries type WHD or equal.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the thermal insulation of all hot and cold piping, ductwork, vessels, equipment and other components of the mechanical systems.

C. Related work specified elsewhere:

1. Basic Materials and Methods: Section 15100.
2. Painting: Section 09900.

1.2 DEFINITIONS

A. Concealed insulated surfaces shall mean piping, ductwork and equipment located above suspended ceilings, and in chases.

B. Exposed insulated surfaces shall mean piping, ductwork and equipment located in shafts, mechanical rooms, and rooms without suspended ceilings, etc.

## PART 2: PRODUCTS AND INSTALLATION

2.1 APPLICATION

A. Insulation shall be applied to clean, dry surfaces with pipe surfaces at room temperature. Insulation shall be butted firmly together. Longitudinal and end joints shall be sealed with compatible jackets, facings and adhesives.

B. Insulation shall be continuous through sleeves and wall and ceiling openings.

C. Metal shields will be provided under Section 15140 at insulated piping hangers.

2.2 INSULATION MATERIALS

A. Insulation materials shall be furnished by Johns-Manville, Owens-Corning Fiberglas, Baldwin-Ehert-Hill, Certainteed Saint Gobain, Gustin Bacon, or approved equal.

B. Adhesives, mastics and coatings shall be furnished by Benjamin Foster (B.F.) Insul-Coustic (I.D.), Chicago Mastic (CMC) or approved equal.



C. All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to the insulation) fire and smoke hazard ratings as tested by procedure ASTM E-84, NFPA 255 and UL 723. Flame spread rating shall not exceed 25 and smoke developed rating shall not exceed 50 or in the case of flexible insulation as specified herein (Armstrong Armaflex) flame spread rating shall not exceed 25 and smoke developed rating shall not exceed 50. Accessories such as adhesives, mastics, cements, tapes, glass fabric and asbestos cloth for fittings shall have the same component ratings.

D. Calcium silicate rigid inserts shall be installed at all outside hangers. Inserts between the pipe and pipe hangers shall consist of rigid pipe insulation of equal thickness to the adjoining insulation and shall be provided with vapor barrier where required. Insulation inserts shall not be less than the following lengths:

1/2" to 2-1/2" pipe size	12" long
3" to 6" pipe size	15" long

E. P.V.C. Insulated Fitting Covers: Fittings where indicated herein, shall be finished with preformed fitting covers equal to J. M. Unifit, Zeston or Speed Line.

### 2.3 JACKETS AND FACINGS

A. Where a jacket is specified, the insulation jacket for fiberglass insulation shall be an all service jacket. Jackets and end laps shall be sealed with insul-Coustic 215 adhesive or Chicago Mastic 17-465 adhesive applied to two surfaces or with self-sealing type lap system.

B. Insulation on all cold surfaces where vapor barrier jackets are used shall be applied with a continuous, unbroken vapor seal.

### 2.4 COLD PIPING INSULATION

A. All domestic cold water piping shall be insulated.

B. The insulation shall be a sectional type fiberglass pipe insulation 1" thick, 3 lbs. per cubic ft. density suitable for temperatures -60° F. to 450° F. having a vapor barrier jacket cemented on. Piping in equipment rooms shall also have a 6 oz. canvas jacket cemented on. Fittings, valve bodies and flanges for cold piping for sizes 3" and smaller shall be insulated with JM-301 or equivalent cement equal to thickness of adjacent pipe insulation. Over 3" fittings shall be insulated with mitered segments of pipe insulation secured with 16 gauge copper wire. A finish coat of 301 cement shall be applied over segments. Apply Unifit or Zeston cover with CMC adhesive 17-465 on the throat and secure it to adjacent pipe covering. Further secure with two wraps of 1-1/2" wide Unifit tape. Stapling of vapor barrier jacket will not be allowed.

### 2.5 HOT PIPING INSULATION

A. All steam piping, condensate return piping, hot water heating piping, re-heat coil piping, domestic hot and recirculating hot water piping shall all be insulated.

B. The insulation shall be a sectional type fiberglass pipe insulation of 3 lb. per cubic ft. density suitable for temperatures of  $-60^{\circ}$  F. to  $450^{\circ}$  F. and having an all service jacket cemented on. Piping in equipment rooms shall have an additional cover, a 6 oz. canvas jacket cemented on. Fillings, valve bodies and flanges on piping 3" and smaller shall be insulated with JM-301 or equivalent cement equal to thickness of adjacent pipe insulation. Over 3" fittings shall be insulated with mitered segments of pipe insulation secured with #16 gauge copper wire. A finish coat of #301 cement shall be applied over segments. Apply Unifit or Zeston cover with CMC adhesive 17-465 on the throat and secure it to adjacent pipe covering. Further secure with two wraps of 1-1/2" wide Unifit tape.

C. Insulation shall be of the following thickness:

1. Hot Water

a. Temperature of  $100^{\circ}$  to  $149^{\circ}$  F.

3" and smaller - 1" thick  
3-1/2" and smaller - 1-1/2" thick

b. Temperature of  $150^{\circ}$  F. to  $212^{\circ}$  F. (includes condensate returns)

3" and smaller - 1-1/2" thick  
3-1/2" thru 6" - 2" thick  
8" and larger - 2-1/2" thick

2. Steam

a. Zero to 50 psig

2" and smaller - 2" thick  
2-1/2" thru 4" - 2-1/2" thick  
5" thru 6" - 3" thick  
8" and larger - 3-1/2" thick

2.6 DUCTWORK INSULATION

A. All supply ductwork shall be insulated internally with 1" thick, 1-1/2 lb. density fiberglass duct liner having a black fire resistant skin surface rated for velocities up to 4000 fpm. Insulation shall meet NFPA Pamphlets 90A and 90B fire-resistant requirements and shall conform to U.L. Publication #181.

B. The insulation shall be applied in fabricated pieces size to the interior duct surfaces with the black coated surface exposed to the air stream. It shall be firmly held in place with a fire resistant adhesive such as Benjamin Foster 85-10 or 85-20, or approved equal covering a minimum of 100% of the duct surface. In addition, insulation on the top and sides of horizontal ducts and all sides of vertical ducts shall be further secured with Omark, Duradyne KSM capacitor discharge studs and caps, or approved equal, on 15" centers. Discharge stud and cap shall be an integral unit so that the stud does not penetrate the cap. Exposed longitudinal edges of insulation shall be coated with a heavy layer of Benjamin Foster's 60-30 fire resistive mastic, or approved equal, prior to installation in the duct system. Transverse edges shall be covered with a "U" shaped sheet metal protector secured to the duct.

1. Duct sizes listed on the drawings are internal sizes. Where insulation is applied to the inside of the ducts, the metal size of the duct shall be increased in amount to result in internal dimensions equal to that shown on the drawings.

## 2.7 OUTDOOR AIR DUCTS AND UNUSED LOUVERS

A. All ducts and internal louver covers shall be fabricated of double walled galvanized sheet metal with 2" thick, 6 lb. density fiberglass insulation between. Outer cover shall be #18 gauge with #22 gauge galvanized sheet metal on the inside. All outside seams shall be soldered water tight.

## 2.8 EXHAUST AIR DUCTS

A. Apply insulation to all exhaust air ducts from exhaust louver or roof outlet back through the duct system to the exhaust damper and 3 feet beyond the damper or 5' back from roof outlet for all fume hood exhaust ducts.

B. The ducts shall be insulated with 2" thick, 3 lb. density fiber glass board with all purpose vapor barrier jacket, foil scrim kraft jacket, Johns-Manville 814 Spin Glass FSK or approved equal. Insulation shall have a conductivity of 0.23 BTU/in per square foot per °F per hour at a mean temperature of 75° F.

C. Insulation shall be applied with edges tightly butted and impaled over welded pins and secured with clips. Pins shall be spaced to hold insulation securely in place but not over 18" centers. Joints shall be sealed with FSK tape.

D. Roll type aluminum cover bead shall be applied at all corners. JM Duramesh 20 x 20 glass fabric shall be applied as finish over FSK embedding the fabric in a coat of Benjamin Foster 30-36 Sealfas. A finish brush coat of adhesive shall be applied over fabric.

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## PART 1: GENERAL

1.1 SCOPE

- A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.
- B. Work under this section includes furnishing all equipment, materials and performing all labor necessary to connect the soil and waste piping systems and other related systems.
- C. Related work specified elsewhere:
1. Basic methods and materials: Section 15100.
  2. Pipe and pipe fittings: Section 15110.

## PART 2: PRODUCTS AND INSTALLATION

2.1 CLEANOUTS

- A. Cleanouts, placed in accessible locations, shall be provided in all drainage lines where indicated on the drawings and where necessary to permit rodding out of the entire drainage system.
- B. Cleanout plugs and tees for bell and spigot piping shall have a cast iron body and a Minneapolis pattern cast brass plug. On threaded piping, cleanouts shall consist of a Minneapolis pattern cast brass plug screwed into a suitable fitting. Cleanouts on piping installed in inaccessible furred spaces above inaccessible ceiling or below floors on grade shall be provided with extensions to bring cover flush with finished wall or floor.
- C. Cleanouts on acid-proof piping shall be of acid-proof material. See list below for type of frame and cover to be provided in the wall or floor.
- D. All cleanouts shall be Zurn Manufacturing Company of the following figure numbers. Products as manufactured by Josam, Jay R. Smith, Blake or Wade are acceptable.
1. Finished Floors of Asphalt, Vinyl, Rubber or Other Composition: ZN-1325-5, bronze plug cleanout with nickel bronze round frame and round recessed cover.
  2. Finished Floors of Terrazzo or Cement: ZN-1325 bronze plug cleanout with ZN-1385-2 nickel bronze round frame and round cover.
  3. Walls: Wall cleanout plugs in finished walls shall be Fig. ZN-1329-20 and square access covers shall be Fig. No. ZN-1375-1. Wall cleanouts in

unfinished walls shall be Fig. ZN-1370 cleanout plug and housing with secured round access cover.

4. Ceilings: Cleanouts shall be provided with full size cleanout pipe with a brass coupling and a Fig. No. ZN-1329-20 polished nickel, bronze plug.

All exposed cleanout covers shall be chromium plated in walls and shall be nickel bronze in floors.

## 2.2 ROOF JACKETS

A. Vent from vacuum pump exhaust shall be extended at least 12" above roof, and shall be encased in frostproof jackets, Moore, Sure Seal or equal, each having an air space of at least 1" between the outside surface of pipe and inside surface of frost jacket. Roof jacket shall be constructed of 16 oz. copper.

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## PART 1: GENERAL

1.1 SCOPE

- A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.
- B. Work under this section includes the furnishing of all equipment, materials and performing all labor necessary to connect the plumbing fixtures, trim and other related systems.
- C. Related work specified elsewhere:
1. Basic Methods and Materials: Section 15100.
  2. Pipe and Pipe Fittings: Section 15110.
  3. Valves: Section 15120.
  4. Piping Specialties: Section 15130.
  5. Mechanical Supporting Devices: Section 15140.
  6. Mechanical Systems Insulation: Section 15160.

## PART 2: PRODUCTS AND INSTALLATION

2.1 GENERAL

- A. Furnish and install fixtures and trim of first grade quality and finish, free from flaws and scratches. All fixtures shall have ground backs groups of fixtures shall be matched. Fixtures and trim are to be furnished as listed and shown under catalog numbers, unless otherwise noted and described.
- B. The following fixtures are taken mainly from the American-Standard, and Duriron Company, inc., catalogs and are used to designate type of fixtures desired. Fixtures of similar type and grade may be used in place of those specified, all subject to Engineer's approval. Crane, Kohler, Haws, Watrous, Just, Carlton, Halsey-Taylor and Speakman are approved.
- C. All faucets, loose key stops, and flexible tube risers listed shall be Chicago Faucet Company. All supplies shall have loose key stops.
- D. Trim of similar type and grade may be used in place of those specified, all subject to Engineer's approval.

## 2.2 FINISH OF TRIMMINGS

A. All exposed waste and supply pipes at the fixtures shall be chromium plated brass pipe, iron pipe size. The faucets, stops, valves, pop-up wastes, traps, etc., shall be heavy cast brass, chromium plated. All chromium plate shall be applied over a nickel plated base.

## 2.3 FIXTURE SUPPORTS

A. Fixtures hung from partitions, finished one side only, are to be supported as the type of fixture may demand, either with bolts extending directly from the fixture or from bolts extending from the fixture hanger, entirely through the partition. Bolts shall be welded to a steel plate, set plumb, on the opposite side of the partition and securely anchored. End of bolts or rods shall have C.P. cap nuts.

B. Fixtures hung from partitions finished both sides, the fixture shall be hung in a like manner mentioned above, except that anchor plates shall be placed within the partition and securely anchored. End of bolts or rods shall have C.P. cap nuts.

C.. Anchor bolts for supporting plumbing fixtures shall be the sole responsibility of the Mechanical Contractor. He shall furnish the bolts and/or anchorage and shall be solely responsible for the correct location of the bolts. All anchors are to be placed as the walls are being laid up to avoid drilling.

D. All anchor holes in the fixtures are to be utilized.

## 2.4 CLEANING

A. After fixtures and trim are installed, place suitable guards on fixtures and trim to prevent use and protect from paint and plaster during construction. Prior to final inspection, clean off all labels and remove any construction dirt, rust, paint and plaster.

## 2.5 FIXTURE ROUGH-IN

A. Roughing-in for waste, vent and supply connections at the various fixtures shall be as follows:

<u>Fixture</u>	<u>Waste</u>	<u>Vent</u>	<u>H.W.</u>	<u>C.W.</u>
Lavatory	1-1/2"	1-1/2"	1/2"	1/2"
Sinks	1-1/2"	1-1/2"	1/2"	1/2"
Eyewash	1-1/2"	1-1/4"	-	1/2"
Drinking fountain	1-1/4"	1-1/4"	-	1/4"
Shower-emergency	-	-	-	1"

## 2.6 FIXTURE MOUNTING HEIGHTS

A. Fixture mounting heights shall be as shown on the architectural drawings.

## 2.7 PLUMBING FIXTURE SCHEDULE

A. The fixtures listed herein refer to fixture numbers noted on the drawings.

### Item F-1 Lavatory

Lavatory: American-Standard  
No. 0350.066 S9

20" x 18" "Lucerne" vitreous china; faucet hole at right; front overflow; soap depression.

Trim:

Faucet: Chicago Faucet Co.  
No. 626-E3

Gooseneck spout with No. GN2A-E3 spout, No. E3 softflow, flange to end of shank 2-1/4".

Wall Hung Pedal Valves: Chicago Faucet Co.  
No. 834-EP

Wall hung double pedal valve with long pedals and No. 698 loose key angle stops with straight tailpieces. Wall to tip of pedals, 14"

Waste: American-Standard  
2412.013

Lavatory drain, 4" tailpiece, 1-1/2" diameter and integral perforated grid.

Trap: American-Standard  
4403.010

Adjustable "P" cast brass trap with tubing drain to wall, 1-1/2" linet, 1-1/2" outlet, ground swivel joints, cleanout plug, slip inlet with brass coupling nut, escutcheon and chrome finish.

Support:

Cast iron wall hanger and lag screws through anchor holes for block walls. Hanger for stud wall shall be full back plate between studs fastened and lavatory attached with through going bolts.

### Item F-2 Eye/Face Wash

Eye-wash: Haws Model  
7760-BT

Wall mounted aerated eye/face wash complete with mounting brackets; stay-open ball valve activated by push handle; stainless steel bowl; strainer and 1-1/2" O.D. tailpiece; 1/2" I.P.S. supply.

Supply: Chicago Faucet Co.  
442-LK

1/2" I.P. female inlet and outlet angle stop with lock shield cap and No. 293-6 loose key handle; polished chromium plated.

Trap: American-Standard  
4403.044

Adjustable "P" cast brass trap with tubing drain to wall; 1-1/2" inlet and outlet; ground swivel joint; cleanout plug; slip inlet; escutcheon; chrome finish.

### Item F-3 Emergency Shower

Head and Valve : Haws Model  
8162Y

Wall mounted lifesaver emergency shower complete with 10" diameter deluge shower head with 1" inlet and 1" I.P.S. self-closing valve with chain pull ring, wall flange and interconnecting fittings.



## PART 1: GENERAL

1.1 SCOPE

- A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.
- B. Work under this section includes the furnishing, installation and connection of all laboratory fixtures and trim as located on the drawings and scheduled herein including all piping, sleeves, valves, stops, sinks, and sink and laboratory fixtures and trim furnished under other sections or furnished by the Owner.
- C. Related work specified elsewhere:
1. Laboratory Casework: Section 11611 and 11620.
  2. Basic Materials and Methods: Section 15100.
  3. Mechanical Systems Insulation: Section 15160.
  4. Plumbing Fixtures and Trim: Section 15300.
- D. Connected but not furnished or installed under this section:
1. Dishwasher and stainless steel sinks and troughs. The trim, traps, supplies, rough-in and final connections to the fixtures, however, shall be provided and installed by Mechanical Contractor as scheduled herein.
  2. All fixtures furnished by the Owner as identified on the drawings.

## PART 2: PRODUCTS

2.1 LABORATORY FIXTURES

- A. The fixtures schedules refer to fixture numbers noted on the drawings.
- B. All sink supplies shall be supplied with loose key stops.
- C. This Contractor will furnish and install composition sinks and seal sinks to underside of table top with an acid-proof, waterproof compound, Johns-Manville Company "Volsel", or approved equal. All supports for sinks in metal cabinets will be furnished by the General Contractor. This Contractor shall provide the General Contractor with dimensional data for support of sinks in metal cabinets.
- D. Exposed water piping at fixtures shall be iron pipe size, chromium plated brass pipe.

E. Sinks, composition material shall be Durcon 2A as manufactured by Duriron Company, Inc., Kemresin by Kewaunee Manufacturing Company, or approved equal. Durcon numbers are scheduled.

F. Stainless steel sinks will be furnished with holes to receive trim as herein specified.

G. Deionized faucets to be mounted at right of cold water.

## 2.2 LABORATORY TRIM

A. Index Buttons: All brass furnished shall be identified with a color coded plastic index button on the fixture handle as herein scheduled and noted under the particular fixture number that call for cross arm or wheel handles.

<u>Service</u>	<u>Lettering and Color</u>	<u>Button Color</u>
Cold water	CW-white	Green
Hot Water	HW-White	Red
Gas	GAS-White	Blue
Vacuum	VAC-White	Yellow
Deionized water	DW-Black	White

## 2.3 SCHEDULE OF LABORATORY FIXTURES

A. The fixtures listed herein refer to fixture numbers noted on the drawings.

### Item L-1 Sink

<u>Sink:</u>	Durcon No. 55	25"L x 15"W x 10"D single compartment composition sink with drain outlet drilled for waste as specified herein.
<u>Trim:</u>	Chicago Faucet Co. No. LC931 and No. LC969	Double sink fitting with No. L7 swing spout with No. E3 softflo, single sink fitting with GNZB-E7 gooseneck spout, modified to swing, with E7 nozzle, 823-X self-closing unit.
<u>Waste:</u>	Kimax No. 6720 with 6728 Tailpiece	1-1/2" sink assembly consisting of strainer, sink outlet, gasket and locknut.
<u>Supplies:</u>	Chicago Faucet Co. No. 1006	Supply with No. 995 angle valve with 1/2" I.P. female inlet.
<u>Trap:</u>	Kimax No. 6700-2020	2" x 2" swivel "P" trap assembly; Kimax No. 6655 adapter coupling.

Item L-1A Sink: Same as Item "L-1" except that a dishwasher tee shall be installed in tailpiece of sink.

### Item L-2 Sink

Sink: Stainless steel, single compartment, integral with counter. See Section 11611.

Trim: Chicago Faucet Co. Double sink fitting with No. L7 swing spout  
LC931 and with No. E3 softflo; single sink fitting with  
No. LC969 GN2B-E7 gooseneck spout, modified to swing;  
E7 nozzle; 823-X self-closing unit.

Waste: Elkay No. Type 302 stainless steel drain fitting with  
LK-18B 3" perforated grid strainer and 1-1/2" O.D.  
tailpiece.

Supplies: Chicago Faucet Co. Supply with No. 995 angle valve with 1/2" I.P.  
No. 1006 female inlet.

Trap: Kimax No. 2" x 2" swivel "P" trap assembly with Kimax  
6700-2020 No. 6655 adapter coupling.

Item L-3 Sink

Sink: Durcon No. 5C 14"L x 10"W x 6"D single compartment composition  
sink with drain outlet drilled for waste as  
specified herein.

Trim: Chicago Faucet Co. Double sink fitting with No. GN2B-VB-E7 gooseneck  
No. LC930 and spout modified to swing with vacuum breaker  
No. LC969 and No. E7 serrated nozzle. Single sink fitting  
with GN2B-E7 gooseneck spout modified to swing  
with E7 nozzle; 823-X self-closing unit.

Waste: Kimax No. 6720 1-1/2" sink outlet with Kimax No. 6728 1-1/2"  
tailpiece assembly.

Supplies: Chicago Faucet Co. Supply with No. 995 angle valve with 1/2" I.P.  
No. 1006 female inlet.

Trap: Kimax No. 2" x 1-1/2" swivel "P" trap assembly with  
6700-2015 Kimax No. 6655 adapter coupling.

Item L-4 Trough Sink

Trough Sink: Stainless steel integral with counter. See  
Section 11611.

Trim: Chicago Faucet Co. Single sink fitting with No. GN2B-VB-E7 rigid  
No. LC928 gooseneck spout with vacuum breaker and No. E7  
serrated nozzle.

Waste: Elkay No. LK-18B Type 302 stainless steel drain fitting with  
3" perforated grid strainer and 1-1/2" O.D.  
tailpiece.

Supply: Chicago Faucet Co. Supply with No. 995 angle valve with 1/2" I.P.  
No. 1006 female inlet.

Trap: Kimax No. 6700-2015 2" x 1-1/2" swivel "P" trap assembly with  
Kimax No. 6655 adapter coupling.

Item L-5 Trough Sink

Specification for Item "L-5" same as Item "L-4".

Item L-6 Trough Sink

Trough Sink: Durcon Style  
T-3 Sec. 1

18" long x 4" wide composition sink with drain outlet end drilled for waste as specified herein.

Trim: Chicago Faucet Co.  
No. LC928

Single sink fitting with No. GN2B-VB-E7 rigid gooseneck spout with vacuum breaker and No. E7 serrated nozzle.

Waste: Kimax 6720

1-1/2" sink outlet with Kimax No. 6728 1-1/2" tailpiece assembly.

Supply: Chicago Faucet Co.  
No. 1006

Supply with No. 995 angle valve with 1/2" I.P. female inlet.

Trap: Kimax No.  
6700-2015

2" x 1-1/2" swivel "P" trap assembly with Kimax No. 6655 adapter coupling.

Item L-6A Trough Sink

Trough Sink: Same as Item "L-6".

Trim: Same as Item "L-6".

Waste: Kimax No. 6720

1-1/2" sink assembly consisting of strainer sink outlet, gasket and locknut.

Supply: Chicago Faucet Co.  
No. 1006

Supply with No. 995 angle valve with 1/2" I.P. female inlet.

Trap: Kimax No.  
6700-2020

2" x 2" swivel "P" trap assembly with 6655 adapter coupling.

Item L-7 Fume Hood

Cup Sinks (2):  
Durcon No. CS4

3" x 6" Durcon oval cup sink.

Trim: 2 cold water, 2 gas and 2 vacuum outlets.

A. Cold water outlets and remote controls: Chicago Faucet Co. No. LC980-E7 turret with No. E7 serrated nozzle; No. E-23 nickel vacuum breaker installed between turret and serrated nozzle. No. LC962-V0 remote control valve with 1/2" angle valve and 90° rod guide flange. Indexed C.W.

B. Gas and Vacuum Outlets and Remote Controls: Chicago Faucet Co., No. LC986-E7 wall flange with 3/8" T.I.P. female inlet shank and No. E7 serrated nozzle. No. LC962-V0-6 remote control valve with 1/2" angle valve; 90° rod guide flange; No. 855-XM-SN needle unit. Indexed gas and vacuum.

Note: All fittings exposed within fume hoods shall be coated with aluminum bronze epoxy finish.

Waste: Kimax No. 6728 (2) 1-1/2" tailpiece assembly  
Supply: Chicago Faucet Co. (2) Supply with No. 995 angle valve with  
No. 1006 1/2" I.P. female inlet.  
Trap: Kimax No. (2) 2" x 1-1/2" swivel "P" trap assembly  
6700-2015 with Kimax No. 6655 adapter coupling.

Item L-8 Fume Hood

Cup  
Sink Same as Item "L-7" except only one required.  
Trim: Same as item "L-7" except only one each required.  
Waste: Same as Item "L-7" except only one required.  
Supply: Same as item "L-7" except only one required.  
Trap: Same as Item "L-7" except only one required.

Item L-9 Dishwasher

Dishwasher: See Section 11611.

Connections: Mechanical Contractor to provide waste connection to tail piece of sink, 1/2" hot, cold and deionized water piping to dishwasher and make all final connections.

Item L-10 Ventilating Bench

Ventilating Bench: See Section 11611.

Waste: Elkay No. LK-18B Type 302 stainless steel drain fitting with  
3" perforated grid strainer and 1-1/2" O.D.  
tailpiece.  
Trap: Kimax No. 2" x 1-1/2" swivel "P" trap assembly with  
6700-2015 Kimax No. 6655 Adapter coupling.

Item L-11 Sink

Sink: Durcon No. 30 18"L x 15"W x 11"D single compartment composition  
sink with drain outlet drilled for waste as  
specified herein.  
Trim: Chicago Faucet Co. Double sink fitting with No. GN2B-VB-E7 gooseneck  
No. LC930 and spout modified to swing with vacuum breaker  
No. LC969 and No. E7 serrated nozzle, single sink fitting  
with GN2B-E7 gooseneck spout modified to swing  
with E7 nozzle, 823-X self-closing unit.  
Waste: Kimax No. 6720 1-1/2" sink outlet with Kimax No. 6728  
1-1/2" tailpiece assembly.

Supply: Chicago Faucet Co. Supply with No. 995 angle valve with 1/2" I.D.  
No. 1006 female inlet.

Trap: Kimax No. 2" x 1-1/2" swivel "P" trap assembly with  
6700-2015 Kimax No. 6655 adapter coupling.

#### 2.4 GAS AND VACUUM OUTLETS

A. This Contractor shall furnish and install gas and vacuum outlets where shown on the plans and specified herein. The outlets to be furnished with inlet shanks, washers and coupling nuts for deck and reagent installation.

B. The following items scheduled herein are for type of trim as designated on the drawings for all outlets for vacuum and gas.

##### Item G and V - Single Outlet - Reagent Mounted

Gas and Vacuum: Chicago Faucet Co. No. LC980 turret with one side opening  
No. LC986-907. with LC907 ground key cock.

##### Item G, and V, - Single Outlet - Deck Mounted

Gas and Vacuum: Chicago Faucet Co. No. LC980 Turret with one side opening  
No. LC980-907. with LC907 ground key code.

##### Item G2 and V2 - Double Outlet - Deck Mounted

Gas and Vacuum: Chicago Faucet Co. No. LC981 Turret with two side openings  
No. LC981-907 on 180°, with LC907 ground key cock.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing of all equipment and material, and performing all labor necessary to provide natural gas at all outlets shown.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100.
2. Pipe and Pipefitting: Section 15110.
3. Valves: Section 15120.
4. Piping Specialties: Section 15130.
5. Mechanical Supporting Devices: Section 15140.
6. Laboratory Fixtures and Trim: Section 15310.

## PART 2: PRODUCTS AND INSTALLATION

2.1 GAS SERVICE REQUIREMENT

A. The natural gas requirements consist entirely of that required for laboratory outlets. Provide new connection to existing gas risers and extend to new equipment as indicated on plans.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing of all equipment and material, and performing all labor necessary to provide vacuum at all outlets shown.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100
2. Pipe and Pipe Fittings: Section 15110
3. Valves: Section 15120
4. Piping Specialties: Section 15130
5. Mechanical Supporting Devices: Section 15140
6. Laboratory Fixtures and Trim: Section 15310

2.1 MATERIALSA. Laboratory Vacuum Pumps

1. Furnish and install one duplex vacuum unit, Size MHC-50 as manufactured by the Nash Engineering Company. The Unit shall be capable of passing fluids directly through the pump to waste and shall include the following:

2. Two (2) Model MHC-50 single stage, positive displacement, non-pulsating, liquid seal, rotary vacuum pumps. The pumps shall have enclosed rotors with conical porting that facilitates adjustment of internal clearances.

3. Each pump shall have a capacity of 40 cfm at 20" Hg. Each pump shall be driven by a close coupled 3 hp, 1750 rpm, ODP motor powered by 208 volts, 3 phase, 60 cycles. Each pump shall be mounted on a steel base, bolted to a 6" framed concrete base suspended on vibration eliminator springs.

4. The pump manufacturer shall conduct operating tests to verify that actual performance is within five percent of nominal setting. Certified test data for the vacuum pumps shall be made available to the Owner at no charge.

5. Provide and install a discharge separator-silencer, seal water line strainer, 120 volt solenoid valves, anti-siphon fitting and vacuum switch.

6. Provide all controls, relays and terminal strip mounted in a NEMA 1A enclosure for the two units. Control voltage shall be 120 volt, 60 cycle. Provide an electric alternator for pumps, high and low vacuum switches and necessary relays for fully automatic operation.



8. The Electrical Contractor will provide a H-O-A magnetic starter and power wiring to each starter-motor. He will also provide control wiring for the electric alternator, vacuum switches and solenoid switches.

9. Provide one (1) welded steel vacuum control tank, 24" diameter x 60" high, ASME construction, vertical, galvanized inside and out equipped with vacuum gauge, gauge glass, tank supports, and all necessary provisions for pipe connections. Provide vibration eliminator under support legs of tank.

10. Sieman Hinsch equipment is approved as equal.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing of all equipment, material and performing all labor necessary for the deionized water system.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100.
2. Pipe and Pipe Fittings: Section 15100.
3. Valves: Section 15120.
4. Piping Specialties: Section 15130.
5. Mechanical Supporting Devices: Section 15140.
6. Laboratory Fixtures and Trim: Section 15310.

## PART 2: PRODUCTS AND INSTALLATION

2.1 DEIONIZED WATER SYSTEM

A. Provide new connection to existing piping system in third floor ceiling and external piping down to remodeled area making connections to each outlet as indicated.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing all equipment, materials and performing all labor necessary to connect the steam heating systems and other related systems.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100.
2. Pipe and Pipe Fittings: Section 15110.
3. Valves: Section 15120.
4. Piping Specialties: Section 15130.
5. Mechanical Supporting Devices: Section 15140.
6. Vibration Isolation: Section 15150.
7. Mechanical Systems Insulation: Section 15160.

D. Furnished but not installed under this section:

1. Steam coils.

E. Installed but not furnished under this section:

1. Pneumatic control valves on steam coils.

## PART 2: PRODUCTS AND INSTALLATION

2.1 HUMIDIFIERS

A. Furnish and install humidifiers in built-up air handling unit where shown on the drawings. Humidifiers shall be of a type which discharge clean, dry steam without drip or objectionable noise. Humidifier design shall utilize a steam jacketed valve and separating chambers, an asbestos muffler and an insulated stainless steel steam jacketed distribution manifold for this purpose. Each humidifier shall be furnished with a normally closed, full modulating direct acting pneumatic valve, a .045" perforated strainer, an inverted bucket type steam trap, and stainless steel discharge manifolds suitably sized to traverse plenum and equipped with internal stainless steel silencing screen. Each humidifier shall be accurately sized according to pounds of steam required per hour and 12 psi inlet steam pressure. Humidifier shall be Armstrong Series 30 or approved equal.

B. On all multiple manifold installations in built-up air handling unit housings the humidifier supplier shall furnish a normally open temperature switch which shall be installed as shown on the drawings and will be wired under temperature control.

C. See drawings for humidifier capacities.

## 2.2 PREHEAT COILS

A. Preheat coils for built-up air handling unit shall be wing Model VIFB. Capacities shall be based on 4 psi coil inlet pressure. Maximum face velocity shall be 800 F.P.M. and number of rows shall be as scheduled on the drawings.

1. Each heating coil shall consist of built-in series of vertical finned heating elements and by-passes with interlocked dampers controlled by pneumatic damper motor and air stream thermostat. Dampers shall be constructed and arranged so as to completely enclose and isolate the heating coil passes when no temperature rise is required.

2. Finned heating elements shall be fabricated of 5/8" O.D. seamless copper tubes with rectangular aluminum fins. Each tube shall be individually secured to steam and return headers by a brazed joint. Finned elements shall be factory tested at 200 psig steam and 1,000 pounds hydrostatic pressure.

3. The coil shall be prepitched and casings shall be constructed of 14 gauge galvanized and painted with rust inhibitive paint. Dampers shall be constructed of 16 gauge cold rolled steel with baked enamel finish. The volume of air passing through the coil shall not vary more than  $\pm 5\%$ , regardless of the position of the internal dampers.

4. Structural supports shall be provided for the steam preheat coils. Provide 2-1/2" x 2-1/2 x 3/16 angle iron frame arranged so that coil support is continuous and dead level. Support legs shall be set in 6 x 6 x 1/4" plates spaced at not more than 4 feet apart. Bottom of coils shall be 18" minimum above floor. Coils shall be bolted to frame for easy removal. Paint all black steel with two coats of approved paint.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing all equipment, materials and performing all labor necessary to remodel portions of the existing hot water heating system. The existing radiation shall be removed, reinstalled on the new walls and a pneumatic control valve installed on each unit. The existing piping shall be revised as required to make the new installation. A system of reheat coil piping system shall also be installed.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100.
2. Pipe and Pipe Fittings: Section 15110.
3. Valves: Section 15120.
4. Piping Specialties: Section 15130.
5. Mechanical Supporting Devices: Section 15140.

D. Installed but not furnished under this section:

1. Pneumatic control valves on room radiation and reheat coils.

## PART 2: PRODUCTS AND INSTALLATION

2.1 BOOSTER PUMP

A. Furnish and install forced hot water circulating pumps having a leakproof mechanical seal, John Crane specifically for water service from 40°F. to 210°F. Pumps shall be Allis-Chalmers, Chicago Pump Company, Peerless, Armstrong, Aurora, Ingersoll-Rand, Bell & Gossett, Taco Dunham Bush and Thrush.

B. In line booster pump shall be supported independent of system piping. Certified pump curves shall be furnished with shop drawings. Special emphasis is placed on flat head characteristics of pump operation. Pump impeller diameter shall not be less than 90% of the maximum diameter to promote quiet operation.

C. Pump shall have grease lubricated ball bearings. Piping to pump shall be properly installed and aligned to prevent any distortion of the pump casing under all operating conditions. Pump characteristics shall be as scheduled on the drawings.

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division I General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing all equipment, materials and performing all labor necessary to connect the ventilation and air conditioning systems.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100
2. Mechanical Supporting Devices: Section 15140.
3. Vibration Isolation: Section 15150.
4. Mechanical Systems Insulation: Section 15160.

## PART 2: PRODUCTS AND INSTALLATION

2.1 SHEET METAL WORK

A. All ducts shall be constructed from zinc-coated iron or steel sheets unless listed otherwise, and they shall conform accurately to the dimensions indicated on the drawings. All ducts shall be installed in accordance with the recommendations of the latest edition of the ASHRAE Handbook (1975 Equipment Volume) Chapter on Air Duct Design. Gauges of metal and reinforcing shall be in accordance with the tables as follows:

Table #4	Low Pressure Ducts	-	Return exhaust ducts
Table #5	Low Pressure Ducts	-	Round exhaust ducts
Table #7	Medium Pressure Ducts	-	Supply ducts, fume hood ducts

B. All joints on supply air duct work shall be sealed with 3M Brand Sealer EC-800, or approved equal, with application, according to manufacturer's recommended procedure. Relief and exhaust air ducts at the point of entering or leaving the building, ductwork containing duct humidifiers, and any point where moisture can collect, shall be soldered absolutely water tight.

C. Flat areas of duct over 18" in either dimension shall be cross broken. Cross breaking is not required if the ducts are insulated.

D. All ductwork shall be run substantially as shown on the drawings. However, where conflicts occur with other trades, the Architect/Engineer reserves the right to require the contractor to make minor changes in duct locations. Whenever possible, ducts shall be run close to beams or floor slabs above, and where two or more ducts cross each other they must be arranged in such a manner as to get the greatest possible clearances underneath. This Contractor shall avoid running ductwork in the plumbing or electrical strata. This Contractor shall not cover service panels or electrical outlets.

E. Where internal thermal insulation is specified for ducts, they shall be constructed so the sizes shown on the drawings are the dimensions inside the insulation. A reduction in duct area because of the installation of thermal insulation will not be permitted.

F. All horizontal ductwork shall be securely anchored to the building construction in a manner to be free from vibration and swaying under all conditions of operation. Hangers for ducts smaller than 30" x 15" shall be supported with trapeze hangers, consisting of galvanized steel straps metal screwed to the duct in accordance with the following schedule.

<u>STRAP SIZE</u>	<u>DUCT SIZE</u>	<u>HANGER SPACING</u>
18 ga. x 1" W	Up to 17" x 11"	8'-0" o.c.
18 ga. x 1" W	18" x 12" to 30" x 15"	6'-0" o.c.

Ductwork larger than 30" x 15" shall be supported with trapeze hangers consisting of rods and angles. Rivets or bolts shall be used for attaching hangers to ductwork.

G. All vertical duct risers that pass through floors shall have supporting angles that shall be securely fastened to ducts with rivets (no screws) attached to the ducts with the angles supported on adjoining floor or beam construction in an approved manner. Angles shall be galvanized and shall be placed on at least two sides of the duct.

<u>ANGLE SIZE</u>	<u>DUCT SIZE</u>
1-1/2" x 1-1/2" x 1/8"	36" x 18"
2" x 2" x 1/8"	48" x 24"
2" x 2" x 3/16"	Larger than 48" x 24"

H. The minimum duct size shall be 6" x 6". Curved elbows shall have a centerline radius equal to 1-1/2 times the width of the duct. Where space conditions prevent the curved elbows specified above and/or where square turns are indicated on the drawings, the contractor shall use multi-type turning vanes, such as "Ducturns" or he may construct the vanes to conform with the following requirements. Changes in size throughout shall be of perfect rectangular cross section. Vanes shall be well-braced and rough or raw edges shall be avoided to prevent objectionable noise, they shall be double thickness type and shall be the same gauge as the duct in which they are installed. Vanes shall be pre-assembled on runners before being installed in the elbow. Vanes shall conform to the following table:

<u>DUCT WIDTH INCHES</u>	<u>VANE SPACING INCHES</u>	<u>INSIDE BLADE RADIUS INCHES</u>	<u>OUTSIDE BLADE RADIUS INCHES</u>	<u>FUNNER WIDTH INCHES</u>
Up to 25"	1-1/2 centers	2	1	5
Above 25"	3-1/4 centers	4-1/2	2-1/4	9

I. All weather louvers in outside walls will be furnished and installed under the general construction work section of these specifications. This contractor shall make watertight connections to louver frames for all weather louvers. At fresh air intakes provide soldered drain pans with threaded drain connections to collect any waste water entering through louvers or accumulating from melting snow. Extend pan drains to floor drains. Contractor shall blank-off all unused weather louvers areas with sheet metal and insulate blanked-off section as per Section 15160.

J. Acoustical Vanes: Where indicated on the drawings, furnish and install acoustical type turning vanes. These shall be Sono-Turn, as manufactured by Sound Control products or Acoustiturn as manufactured by Air Filter Corporation. Acoustical type turning valves shall be commercially manufactured with published sound attenuating data available. Field or stop fabricated items are not approved.

K. Backdraft dampers shall be constructed of rolled aluminum leaves, 26 gauge, attached to steel rods supported in a steel frame. Dampers shall be provided with position indicators. Each leaf of the shutter shall be edged with a neoprene strip tightly folded into the metal to prevent "rattling". All leaves shall be linked together to operate as a unit.

L. Provide protective rubber or armafex type bumpers on all hangers and corners of ducts that could be dangerous to maintenance personnel.

## 2.2 VOLUME, AIR FLOW DEVICES AND BALANCING DAMPERS

A. This Contractor shall furnish and install the required air devices necessary to produce the specified air volumes without excess air resistance or noise. Butterfly dampers shall be installed at all branch take-offs or in trunk ducts at branch take-off locations. Dampers shall be reinforced to prevent vibration, and shall be equipped with approved damper rods, quadrants and locking devices. Quadrants shall be marked to indicate damper position. Where ducts are insulated, quadrants shall be set to finish flush with insulation. Up to and including 3 square feet duct area, use one butterfly damper, from 3 square feet duct area up to and including 6 square feet duct area use two butterfly dampers each with locking quadrant. Maximum blade width shall be 6". Splitter dampers shall be used only where specifically shown on drawings. No dampers shall be installed in fume hood exhaust ductwork.

## 2.3 SHEET METAL DUCTWORK FOR FUME HOOD

A. All ductwork used for fume hood exhaust shall be factory made, similar to Semco, Inc. spiral ducts having circumferential slip joints for straight lengths and fittings. Joints shall be cemented together with an epoxy cement and joint covered with a "Hardkast" epoxy patch suitable for 400° F. inside temperature. Ducts shall be fabricated of type 316 stainless steel.



B. All ducts shall be round or oval with 5 piece curved or sweep elbows. Square elbows will not be allowed. Dampers, turning vanes, deflectors, etc. and other similar duct inserts will not be allowed as ducts must be open from hood to roof discharge.

C. All ducts shall be supported at each floor penetration and hung from ceiling construction as detailed on plans.

D. Make bolted flange connections to fume hood exhaust fan and to roof discharge as detailed on plans.

#### 2.4 SOUND ATTENUATING FAN ENCLOSURES

A. This Contractor shall construct acoustical enclosures for the new supply air unit. Enclosures shall be assembled from factory made panels, floor channels, corner brackets, insulated access doors, etc., all as manufactured by Semco, Inc. or equal and approved. Equipment manufactured by Koppers Company, Industrial Acoustics Company, United Sheet Metal will be approved as equal. The enclosure shall have two sides and top of acoustical panels.

B. Panels shall be 4" nominal thickness, fabricated with 22 gauge galvanized steel or aluminum perforated sheets on the interior and 18 gauge galvanized steel or aluminum sheets on the exterior. Edges of panels shall be sealed with channel frames or extrusions for structural stability. Sound retarding and absorbing fill shall be incombustible, inert, mildew resistant and vermin proof. Panels shall have a minimum "U" factor of .16 BTU per hour per square foot per degree F.

C. Plenum design shall have combustion requirements that do not exceed the following:

1. Flame Spread - not over 25
2. Smoke Developed - not over 50

D. Openings for fan shall be cut and framed by this Contractor. Panel connections and erection shall be in accordance with the manufacturer's recommendations. The entire enclosure shall be capable of withstanding a negative internal pressure of 6 inches W.C. Panels shall set on a 6" high x 8" wide concrete curb provided by the General Contractor. This Contractor shall provide necessary angle irons or channels at wall juncture to provide air tight and structural strength at that connection.

E. Panels and doors shall have the following minimum transmission loss characteristics.

Frequency (CPS)	125	250	500	1000	2000	4000
Attenuation (DB)	27	34	30	51	61	66

Acoustical and absorption coefficients shall be compatible with the above sound transmission class.

## 2.5 SOUND ATTENUATORS

A. This Contractor shall furnish and install sound attenuators of types as scheduled on the drawings. Units shall be as manufactured by Koppers Company, Inc. or Industrial Acoustics or approved equal. The attenuators shall be constructed of 22 gauge galvanized steel sheets with an acoustical filler of 435# fiberglass. Units shall be Industrial Acoustics low static pressure resistance type "L" and be 5 feet long minimum except as noted otherwise.

B. Attenuators shall have the following minimum transmission loss characteristics.

Frequency (CPS)	106	212	425	850	1700	3400	6000
Attenuation (DB)	8	13	19	29	37	29	21

## 2.6 ACCESS DOORS, PANELS AND CLEANOUTS

A. Where fire dampers, control equipment, etc., are installed in ducts, provide access panels made air tight with gasketed edges. Provide access doors between obstructions at each change of direction and/or not more than 20'-0" o.c. on horizontal ducts and at the bottom of each duct riser. Access doors shall be sized in accordance with equipment maintenance and duct cleaning requirements of the system. Additional access panels beyond those on the drawings shall be installed to fulfill this spacing requirement. Use Ventlok sponge rubber gasketing material. The panels shall be double wall construction with 1" of rigid insulation fill and shall be attached to the duct with cam latches. Omit access panel insulation and double wall construction if ducts are not specified to be insulated. The access panels shall be of adequate size to permit maintenance of the equipment.

B. See paragraph 2.13 for access panels at fire dampers.

## 2.7 FLEXIBLE DUCT CONNECTIONS

A. Install flexible connections at connections between all fan suction and discharge openings, and sheet metal ducts or housings. These connections shall be made of fire resistant, waterproof duct fabric, closely woven glass fabric, double-coated with neoprene material, 30 oz. weight, similar to "Ventglass", as manufactured by Ventfabrics.

B. This contractor shall use 1" x 1" x 1/2" angles to clamp the duct fabric to the rectangular ductwork, fan suction and discharge openings, using 5/16" stove bolts or rivets on approximately 6" centers. Use #14 gauge, 1" wide bands to bolt fabric to round openings. Joints shall not be located at corners of ducts and must be lapped joints and completely airtight. All connections shall be a minimum of 6" wide and shall be made with slack in the fabric.

## 2.8 FLEXIBLE DUCT

A. Flexible insulated ducts shall be a factory assembled unit, with spin-on fitting with integral volume damper with locking quadrant device for connection to the branch duct and a downstream coupler specifically designed to lock in to the coupler collar furnished on the air diffusers.

B. The duct shall consist of a galvanized or vinyl coated spring steel wire helix or resilient steel band and woven fiberglass mesh liner, 1" insulation and a factory sealed vapor barrier. The product shall bear UL Class I air duct label as tested under UL 181 and required by NFPA 90A.

1. Flame Spread - not over 25
2. Smoke Developed - not over 50

C. Flexible duct assembly shall have a thermal conductivity "K" factor of 0.25 at 75 degrees F. mean. Assemblies shall be constructed for conveying air at 250 degrees F. at a maximum velocity of 2400 F.P.M. and 1-1/2 inches of maximum internal positive static pressure and 1/2" maximum negative pressure.

D. Assemblies shall consist of insulated duct lengths of 2'-0" to 5'-0", with no splices in a run of duct with 45 degrees total bends the maximum that are allowed in the 5'-0" run. The assembly shall have a minimum straight run acoustical attenuation of the following:

Frequency (CPS)	125	250	500	1000	2000	4000
Attenuation (DB)	15	18	17	18	14	9

E. Flexible insulated ducts assembly shall be Owens-Corning Fiberglass, XLC, Glass Flex Type OC-41, wiremold 49-K Thermaflex Type M-KA, H. K. Porter Co., or Genflex.

## 2.9 EQUIPMENT

A. Centrifugal Fan: The supply air fan shall be manufactured by Trane, Peerless, Barry or approved equal. The fan shall be AMCA rated and certified, non-power overloading, airfoil blade, backward curved fan in Class II Construction. Fan shall have 1-1/4" tapping in bottom of scroll, with plug for drainage. Fan shall be arrangement 3. Refer to Schedule on drawings for size and capacity of unit required.

1. The supply air fan shall be equipped with two or more heavy duty grease lubricated anti-friction bearings. Class II fans shall have precision built spherical roller bearings.

2. All fan wheels, shafts and the interior and exterior of fan housing shall be factory cleaned of rust, mill scale, etc. degreased then given a primer coat of red lead or zinc chromate, and then sprayed with two (2) coats of chlorinated rubber base paint to prevent corrosion.

3. Adjustable inlet vanes shall be provided on all supply air fans. Inlet vanes shall have positive control linkage and be individually supported at both ends by a precision bronze bearing.

4. AMCA certified test curves shall be provided on all centrifugal fans which will be required to operate at an initial condition different from its ultimate future requirement. Test shall be run at initial and final CFM and static pressure conditions.

B. Fume Hood Exhaust Fans: Fume hood exhaust fans shall be industrial type units Buffalo type AW, Barry Series 600AH, Peerless Series A, or Sturtevant Series 400A, having a backwardly inclined high efficiency air handling wheel. Fan housings shall be cast iron or steel plate construction with frictionless self-aligning, resilient mounted, pillow type bearings. No oilite type bearings are to be used. All hood exhaust fans shall be arrangement 9 and shall have 1-1/4" tapping in bottom of scroll, with plug for drainage. The entire interior of the exhaust fans, including fan wheels and shafts, shall be coated with six (6) coats of baked phenolic (approximately 5 mils thick), Plasite, Heresite, or approved equal.

1. All fans shall be equipped with a bolted on scroll access panel, rolled to fit the scroll curvature and made of metal same gauge as the scroll. Panels shall be fitted with asbestos gaskets and made airtight.

C. Belt Guards: All fans shall be furnished with variable speed drives and installed with guards to enclose all belts, drive shafts and rotating equipment. These guards are to be constructed of 20 gauge galvanized steel with 16 gauge 3/4" diamond mesh screen or expanded metal. The mesh screen or expanded metal shall be spot or stitch welded to the frame. The guard shall be supported on brackets from the floor or fan base. Openings shall be provided in guards to permit tachometer readings for both motor and driven unit. Guards shall comply with the requirements of the Minnesota Industrial Commission and be designed for easy removal for belt replacement.

D. Belt Drives: All fans shall be equipped with V-belt drives, adjustable motor sheaves and belts. See fan schedule for units requiring 2 sets of drives, sheaves and belts. Drives shall be as manufactured by Allis-Chalmers Company, Browning Manufacturing Company, and Gates Rubber Company. All pulleys shall be carefully and accurately balanced for static and dynamic accuracy. The number of belts and grooves for each unit shall be based on a 150% overload rating. The overloading rating shall be applied to motor nameplate horsepowers for each fan, not brake horsepower. Pitch diameter of pulleys are not given, but driven speed must be maintained as closely as possible where regular stock size pulleys are used with 1750 RPM motors. Variable speed sheaves shall be selected so the pitch diameter at design conditions is midway between the minimum and maximum for the particular sheave. All drives shall be supplied with at least the minimum number of belts as outlined below.

0 - 1-1/2 HP -- 1 belt  
2 - 7-1/2 HP -- 2 belts

All drives above 7-1/2 HP shall be supplied with number of belts as recommended by the drive manufacturer. The belts shall be furnished in match and sealed sets.

## 2.10 GRILLES, DIFFUSERS AND CONTROL DEVICES

A. This Contractor shall furnish and install all grilles, diffusers, etc. and such air distribution accessories indicated, shown and/or tabulated on the drawings, that are necessary to effect uniform distribution of air. All grilles and diffusers furnished by the Mechanical Contractor shall have prime and finish coat as selected by the Architect. Draw all air outlet and return

devices tight to ceilings and/or walls to eliminate dirt streaking using extra screws if necessary to secure a tight fit. This contractor shall refer to architectural drawings for type of ceilings and be responsible for proper type of frame for that type of ceiling. The various grilles, and diffusers are indicated on the plans according to the following schedule. Grilles, diffusers and control devices by Waterloo-Anemostat, Carnes, Krueger and Tuttle & Bailey are approved as equal to Titus as specified.

B. Linear supply diffusers shall be Titus Model #TBDI-2700-2, 2800-2 and 2900-2 insulated T-bar diffuser of size - capacity indicated in schedule on drawings. Units shall be furnished with a center T-bar, air pattern controllers; exposed surfaces finished in an off-white baked enamel.

C. Relief air grilles in walls and ceilings shall be Titus #3-FL having all aluminum construction with horizontal face bars and baked enamel finish of color selected by the Architect. Provide a #115 mounting frame for all grilles.

## 2.11 AIR TERMINAL UNITS

A. Terminal units shall be of sizes indicated on the drawings and of capacities indicated in schedule on the drawings. Units shall be designed for medium pressure operation (1" to 5" SP), shall be pressure independent and shall reset air volume mechanically within  $\pm 5\%$  of required air flow regardless of changes in system air pressure. Terminals shall be two stage in air delivery with capabilities to change air volume from 100% to 50% when repositioned by a pneumatic damper. Units shall be as manufactured by Titus, Tempmaster, Barber Colman and Metco Corporation.

B. Terminal units shall have heavy gauge galvanized steel casings lined with 1" thick 1-1/2 lb density fiberglass duct insulations. Units shall be supplied with a 1 row hot water heating coil. Unit radiated sound without allowance for ceiling absorption shall not exceed NC-25 at .75 inches w.g. inlet static pressure. Manufacturer shall submit both Sound Power Level data regarding 10-12 watts in Center Frequency Preferred Octave Bands and Noise Criteria ratings for both discharge and radiated sound.

C. A pneumatic motor for each unit will be sent to the unit manufacture to install motor at the factory for proper operation of dampers. A P.E. switch by Temperature Control Contractor will position the pneumatic damper motor to change the unit discharge air volume from 100% to 50%.

## 2.12 DUCT SLEEVES

A. Furnish and install sleeves at all locations where ducts pass through walls, floors, or partitions not fire rated. Sleeves shall be fabricated of 16 gauge galvanized iron with angle iron stiffeners as required to prevent bending.

B. Sleeves shall be 1/2" larger in dimension than the duct passing through and shall be 1/2" larger than through-going insulated duct.

C. Sleeves passing through finished walls, ceilings and partitions shall be set flush with finished surface. Sleeves through floors in exposed and concealed areas shall be extended 1/2" above the finished floors.

D. Seal the space between the duct and sleeve with plastic caulking such as Presstite or Duragum. Sleeves shall be set and maintained in place by this Contractor during the progress of the work.

E. Where ducts pass through fire partitions the ducts and sleeves shall be constructed per Paragraph 2.11.

### 2.13 AUTOMATIC FIRE DAMPERS

A. Furnish and install fire dampers in all ducts where shown on the drawings, where required by the City of Minneapolis, where required by NFPA Pamphlet 90-A and Minnesota Building Code and as indicated below:

1. Where horizontal supply air and relief air ducts pierce fire partitions.

2. At each point where a vertical supply air duct pierces a floor.

B. All fire dampers shall bear UL label and shall be constructed and installed in accordance with NFPA Pamphlet 90-A. Steel sleeves shall be attached to walls and to the fire damper. Accordion type fire dampers shall be larger than duct connection with stacked blades out of the air stream.

C. All dampers shall have approved damper position indicators so that damper position can be determined without removing the access panel. Access panels with glass insert will be acceptable in lieu of damper position indicator. Glass used shall have essentially the same fire rating as a metal panel. Where possible fire damper access panels shall be installed on the sides of ducts, although best access to fusible links shall govern. Minimum access panel size shall be 14" x 14" clear access. Where one dimension of duct allows less than 14", the other dimension shall be increased to 18" minimum.

D. Fire dampers shall be Air Balance, Advanced Air, Ruskin and Air Stream, United Sheet Metal Co., Tuttle & Bailey or approved equal.

### 2.14 FUME AND CANOPY HOODS

A. Fume hoods will be furnished and installed by General Contractor. The canopy hood in Lab Room #188 shall be fabricated and installed by Mechanical Contractor. Mechanical Contractor shall make duct connections to all hoods as shown and detailed on the drawings.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the furnishing all equipment, materials and performing all labor necessary for air filtration systems and related systems.

C. Related work specified elsewhere:

1. Basic Methods and Materials: Section 15100.
2. Ventilation and Air Conditioning: Section 15800.

## PART 2: PRODUCTS AND INSTALLATION

2.1 AIR FILTERS

A. Air filters shall be as manufactured by the American Air Filter Company, Inc., Cambridge Filter Corporation, Farr, Mine Safety Appliance, or Continental Air Filter Company. All units shall be similar to physical dimensions to permit satisfactory installation and servicing in the space allocated on the plans. The Electrical Contractor will provide a separate electrical circuit terminating in a junction box near the air supply unit. All wiring from the junction box, including the necessary fused disconnect switches and other materials and labor necessary to complete the power wiring and control circuits for the filter assembly shall be furnished and installed by the Mechanical Contractor. On roll type filters, an auxiliary switch shall be provided by the Mechanical Contractor to permit manual operation of the filter drive motor when the unit supply fan is not operating. For sizes see drawing schedule.

B. Roll Type Prefilters. These shall be American Air Filter Company's Roll-O-Matic, Type H, Model G horizontal and Type V Model J, Verticals, Cambridge Filter Corporation Type Var or Har, Farr, Mine Safety Appliance, Continental Conomac Type VA or Type ELA, automatic renewable media type air filter, complete with casing, top and bottom media covers, 1/6 HP motor and external drive mechanism, timer, screens, rolls of glass fiber filter material, control box, media feed switch, incline draft gauge, relay and media runout switch and light. The control shall be automatic pressure drop type which senses filter pressure drop and advances the media one complete new section by automatically controlling the drive motor through the timer. The glass fiber blankets shall be sprayed with a fine Underwriter's approved non-inflammable Visco Filter media shall perform satisfactorily down to -20°F. Pressure drop across the clean filter assembly shall not exceed 0.17" W.G. The air filter gauge shall be Dwyer Model No. 250-AF. This Contractor shall

provide one new roll of filter media for unit at time of air balance and an extra packaged supply of filtering media equal to one complete refilling shall be given to the Owner. The media shall be 2" thick and have an efficiency of 85% by the NBS dust spot method.

C. Electrostatic Type After-Filter. These shall be AAF Model D, Rollotron, Cambridge or approved equal, consisting of an electrostatic section of the entering side and an automatic disposable media type on the air leaving side. The filters shall be sized for the air volumes indicated for the specific units with an efficiency of not less than 90% as measured by the NBS Dust Spot Test Method using atmospheric air. The collector elements in the agglomerating section shall be of all aluminum construction. Ionizing voltage shall be 12,000 volts and plate voltage shall be 5,800 volts. The storage section shall be heavy gauge zinc coated steel with a 2" thick glass fiber blanket pre-coated with a fine non-inflammable, Underwriter's approved adhesive. The average operating resistance shall be 0.35" of water gauge. The fiberglass media shall be fed across the air stream automatically from a compressed clean roll at a pre-determined rate by an adjustable electric timing device. Used media and accumulated dirt shall be compressed and wound into an enclosed compact roll for easy disposal. The unit shall be furnished complete with:

1. External and internal agglomerator housing, agglomerating cells and storage units for assembly of the filter bank and miscellaneous assembly hardware.
2. Power pack for end mounting.
3. Two unit access door switches, manual reset type.
4. Two unit access door switch warning lights.
5. Two combined switch and signal lights for inside unit housing.
6. Two enameled warning signs for unit access doors.
7. Spare ionizing wires.
8. High voltage cable from power pack to agglomerator.
9. One roll of media for each filter section.
10. Media runout control
11. Control panel, including automatic cascade timer control, warning signal light and a manual switch.
12. Trash screen. (Air distribution baffle screen).
13. 1/6 HP motor and external drive assembly with removable cover.
14. Provide and install at each electrostatic filter bank a Dwyer 250AF or equal and approved air filter draft gauge inclined tube type with a range of 0.10 1.0 inches of water, furnished complete with static pressure tips, tubing, mounting assembly, extra bottle of red gauge oil, oil dropper and instructions. Accessories shall be mounted in a suitable metal case with hinged door and cam lock and shall be secured to housing adjacent to draft gauge.



15. An extra packaged supply of filtering media equal to one complete refilling shall be given to the Owner by this Contractor when the building is occupied by the Owner.

D. Start-up condition (Electrostatic Filter). The built-up supply air system will be set up to operate with less than 50% of their final design air quantity. It shall be this Contractors responsibility to blank off on two sides with sheet metal a certain percentage of the collector cells. (See drawings schedule) to maintain a proper minimum air velocity across the electrostatic filter. If filter manufacturer recommends removal of the blanked off collector cells, these shall be turned over to the Owner for future use.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division I General Requirements and Section 15010 General Provisions - Mechanical apply to all work of this section. Refer to Article 20 of the Information for Bidders and Article 1.23 of the General Conditions for requirements on pre-bid and post-bid evaluation of proposed substitute products, materials, etc.

B. Work under this section includes furnishing all equipment, materials and performing all labor required to complete the automatic temperature control systems.

C. Related work specified elsewhere.

1. Basic methods and materials: Section 15100.

2. Pipe and pipe fittings: Section 15110.

D. Furnished but not installed under this section.

1. Pneumatic control valves for steam coils and room radiators.

## PART 2: PRODUCTS AND INSTALLATION

2.1 AUTOMATIC CONTROL SYSTEMS

A. The Automatic Control System shall consist of Honeywell, Johnson Service, or Powers Regulator temperature control equipment. The system shall be a pneumatic control type. The system shall be installed under the full-time supervision of an authorized installation engineer. Air supply for the remodeled area shall be taken from the existing air compressor in the basement equipment room of Jackson Hall.

2.2 CONTROL INSTRUMENTS AND EQUIPMENT

A. In general, the control instruments and equipment furnished for this installation shall be the best product of its type produced by the manufacturer. The following specifications are intended to set a minimum standard for the particular device described.

2.3 CONTROL INSTRUMENTS AND EQUIPMENT

A. In general, the control instruments and equipment furnished for this installation shall be the best product of its type produced by the manufacturer. The following specifications are intended to set a minimum standard for the particular device described.

B. Dampers: Frames shall be constructed of two hot dipped sheets welded together to form a corrugated blade. Frames shall be hot dipped galvanized steel. Blade width shall be a maximum of 6". All blades shall have replaceable rubber seals along the blade edge. Frames shall have metal stops with rubber seals to seat against ends of each blade. Dampers shall have nylon bearings and oil impregnated shafts. All linkages shall have oil

impregnated bearings and shall be enclosed in the dampers frame. No linkage shall be allowed in the airstream. Modulating dampers shall be opposed blade; two-position dampers shall be parallel blade.

C. Pneumatic Space Thermostats: They shall be of the proportional-positioning type with adjustable throttling range, non-bleed, key operated type, internal stops and be capable of operating on a change in temperature of plus or minus 1°F. at the thermostat location. Furnish four dozen keys with the installation. Thermostat finish shall be as selected by architect. Stat located on outside wall shall be insulated to prevent cold wall influence.

D. Pneumatic Insertion Sensors: Sensors shall be proportioning in action, of corrosion resistance construction, with appropriate range. Fahrenheit on a calibrated gauge located as indicated on plan. Sensors shall be factory calibrated with all adjustments at the centrally located controller. Provide a red reading angle duct, industrial type thermometer beside each insertion sensor.

F. Pneumatic Sensor Controllers: These shall be force-balance, non-bleed pneumatic amplifiers designed for corrosion resistance to high humidity and with integral gauge ports. Controllers shall be field adjustable to either direct or reverse action and for width of proportional band.

1. Authority of compensating sensors shall also be adjustable at the controller.

2. Controllers shall have capability of remote control point adjustment from a proportional manual switch located as directed.

G. Pneumatic Space Humidistats: Shall be similar in design to the space thermostats. Units shall be actuated by a human-hair bi-wood element, with modulating key set and adjustable throttling range of 20 to 80 percent.

H. Electronic Pneumatic Relays: Electronic - pneumatic relays shall be completely transistorized and contained in unitized completely closed cabinets. Cabinet shall contain terminal strip and all pneumatic and electronic adjustments. Electronic signals from controllers shall be converted to modulating pneumatic signal to operators.

I. Relays and Switches: Relays of the positive and gradual-acting type and switches shall be furnished and installed as required for the successful operation of the system. All switches shall include suitable indicating plates. Positive positioning devices shall be utilized on all operators where sequencing is specified.

J. Control Valves:

1. Valves for reheat coil hot water service and room hot water radiation shall be gradual acting types. Valves shall be suitable for use with 210°F. hot water and shall be leakproof under a static head of 100 psi. Valves shall have renewable composition discs and parabolic throttling guides. Valves shall have a shut-off rating of not less than 50 psi. Valves shall be Honeywell VP 514C, Johnson V-3752, V-5250, or equal.

2. Valves for steam service, unless otherwise specified on coils, shall be of the single seated, dead end service type, except those specified double seated. All valves have linear characterized throttling plugs. Valves for sequence control shall have positive positioning devices. All other valves shall be standard motor equipped. See schedule of drawings for valve capacity.

3. All valves located where it is not obvious what equipment the valves series shall be tagged as described in Section 15120.

K. Control Panel: All control elements for the supply air vent shall be mounted inside an enameled 14 gauge steel control panel. Panel shall have a hinged and locking door. Panel shall be mounted near supply unit in Penthouse. Flush mounted gauges (2-1/2" diameter) on panel door shall indicate temperatures of outdoor air, preheat coil discharge and supply fan discharge.

#### 2.4 GAUGES

A. There shall be a minimum of one gauge on all branch lines from all controls. There shall also be sufficient gauges on main lines to indicate pressure in location of groups of controls. There will not have to be a gauge on main line to thermostats in finished rooms, but there shall be a gauge installed in the branch line to the hot water reheat coil valves in the suspended ceiling spaces and in the branch lines to the room unit valves. The gauges shall be a standard product of the control manufacturer for measuring air line pressure.

#### 2.5 AIR PIPING

A. Air piping shall be harddrawn seamless copper tubing with extruded or wrought copper fittings joined with 50-50 solder. All piping shall be concealed except in mechanical equipment rooms where it can be exposed. Tubing shall be fastened at regular intervals and shall be installed parallel to building lines.

B. Non-metallic polyethylene tubing per ASTM-D-1693 and ASTM 635 may be used if installed inside rigid conduit or metallic raceways or encased in metallic springs. Tubing shall not be installed in poured concrete floors or walls. Tubing installed in concealed locations shall be adequately supplied, be suitably protected at probably points of mechanical damage and shall be installed in a neat workmanlike manner. All tubing shall be color coded.

#### 2.6 ELECTRICAL WORK

A. All wiring of PE and EP switches, relays, electrical control devices, etc. shall be performed by this Contractor, unless otherwise noted.

#### 2.7 REMODELING, CUTTING AND PATCHING

A. Refer to and comply with requirements of Section 01910 and 15010.

#### 2.8 OPERATING INSTRUCTIONS

A. Upon completion of the work, the manufacturer shall have a qualified representative fully acquainted with the installation to instruct the Owner's Operator in the fundamentals and operation of the system. This instruction period shall not be less than ten (10) full working days. The manufacturer shall also, upon completion and acceptance of the work, provide the Owner with

three (3) typewritten and/or printed sets of operating and maintenance instructions including sheets describing fundamentals of each system in the installation. One (1) similar set shall be provided for the Architect-Engineer, all sets being neatly clipped in heavy manilla folders.

B. The manufacturer shall also mount one (1) set of charts consisting of complete control diagrams, wiring diagrams, etc., adjacent to the equipment in a conspicuous location. Charts shall be mounted in a glass enclosed case, or laminated plastic.

C. When the system is completely installed and proven to be in operating condition by the control manufacturer and ready for acceptance, the manufacturer shall furnish to the Owner twelve (12) extra packaged gauges of the same type supplied on the instruments in the equipment rooms. Also he shall supply the Owner with twelve (12) complete sets of instrument adjusting keys and any special wrenches, screw-drivers, or tools necessary for normal service of the same.

## 2.9 SEQUENCES OF CONTROL

### A. Supply Air Unit #S-119:

1. Unit motor will be controlled by a H.O.A. switch mounted in the motor control center located in the Jackson Penthouse.

2. When fan motor is energized, the fresh air dampers shall fully open. A static pressure controller with its sensing bulb in the discharge duct shall maintain proper duct pressure by modulating the inlet vanes on the supply air blower intake.

3. A heat-cool switch located in the supply unit control panel shall control the cycles of operation as follows

a. Heat Cycle: The future chilled water coil valve shall be positively closed. The normally open preheat coil steam valves and the coil face and by-pass dampers shall be placed under the control of an averaging type sensor/controller with the sensor located in the preheat coil discharge. The sensor/controller shall modulate the coil steam valves and the face and by-pass dampers to maintain 45°F. discharge temperatures. When outdoor temperature is below 35°F. the steam valves will remain fully open. Two steam valves sized 1/3 and 2/3 capacity shall be provided for the preheat coils.

A sensor/controller with the sensor located in the supply fan discharge duct shall modulate the normally open coil steam valve on the reheat coil to maintain discharge air temperature of 57°F.

A humidistat located in the suction duct of Exhaust Unit GE #119 shall modulate the normally closed humidifier steam valve to maintain desired relative humidity. A high limit stat located in the humidifiers discharge air shall prevent relative humidity from exceeding 90%.

A low limit stat with its sensor in the discharge duct shall stop the blower motor at all temperatures below 45°F.

b. Cool Cycle: The preheat coil steam valves shall be positively closed, the face and by-pass dampers fully open to the by-pass position, the reheat coil steam valve and the humidifier steam valve shall all be positively closed.

A sensor/controller and a modulating chilled water valve will be added in the future to control temperature from the chilled water coils. Selected room thermostats shall be capable of resetting the discharge temperature.

B. Reheat System Convertor Control:

1. The new circulating water pump will be controlled by a push button mounted in the motor control center located in the Jackson Penthouse. Pump shall run continuously.

2. The existing convertor has pneumatic controls for temperature control. New water piping connections shall be made to supply and return pipes at convertor for new system indicated. Adjust existing controls as required for increased load to existing convertor.

C. Room Control:

1. A direct acting room thermostat shall modulate the normally closed hot water reheat coil valve and the normally open hot water radiation valve to hold space at stat setting. The radiation valve will be sequenced to modulate open on a continuing temperature fall after the box discharge air is at its maximum temperature. The reheat coil is installed inside the air terminal boxes for the air supply system for each room.

2. The air terminal boxes will be furnished with two discharge air quantity capabilities. When the exhaust hood fan in that respective room is on high speed, the box will discharge 100% capability. When the exhaust fan is switched to low speed and EP switch shall position a pneumatic damper on the terminal box to reduce the air discharge capacity to 50%. The pneumatic damper motor shall be sent to the box manufacturer for factory mounting and adjustment. The EP switch will be wired by the Electrical Contractor.

D. Air Flow Indicators:

1. Furnish and install pressure differential switches in all new fume hood exhaust systems FE-142 through FE-146. Units shall operate properly with the varying pressure differentials expected. Switch shall actuate an indicator lite mounted on the hood. Switch shall be installed within one foot of hood connection. Wiring of switch will be provided by the Electrical Contractor.

E. Central Data Center:

1. The control systems as described shall be fully compatible for integration into the Central Data Center. All controls shall be compatible for requirements of the existing system. Provisions shall be made in the form of resistance, thermocouple, capped tees, shut-off valves, etc. to provide the following indication.

a. Supply Unit #S-119

- |                           |   |
|---------------------------|---|
| Supply Fan                | - Indicate running, flow alarm                      |
| Freeze                    | - Wire to alarm                                     |
| Filter                    | - Wire (2) to alarm                                 |
| Air leaving pre-heat coil | - Temperature indication                            |
| Air leaving unit          | - Temperature indication & control point adjustment |
| Air entering unit         | - Temperature indication                            |
| Relative humidity         | - Relative indication and control point adjustment  |

b. Exhaust Fans (5)

Fan Motors - Indicate running and flow alarm

- - -

CONDITIONS, SPECIFICATIONS AND RELATED DOCUMENTS FOR

SURGICAL PATHOLOGY RENOVATION  
JACKSON OWRE MILLARD LYON COMPLEX REMODELING  
MINNEAPOLIS CAMPUS  
UNIVERSITY OF MINNESOTA  
COMMISSION NUMBER 280.03

James P. Brinkerhoff  
Vice President for Finance and Development University of Minnesota

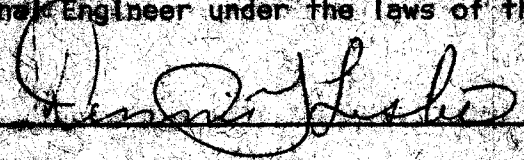
Clinton N. Havitt  
Assistant Vice President for Physical Planning University of Minnesota

THE ARCHITECTS COLLABORATIVE, INC. Cambridge, Massachusetts

HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.  
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(612) 378-3853 55414

The Cerny Associates, Inc. Minneapolis, Minnesota  
Hammel Green and Abrahamson, Inc. Saint Paul, Minnesota  
Satter, Leach and Lindstrom, Inc. Minneapolis, Minnesota

I hereby certify that these plans, specifications or reports were prepared by me or under my direct supervision, and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



Date: February 17, 1977

Reg. No. 2142



## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division I General Requirements and Section 16010 General Provisions - Electrical apply to all work of this Division. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Provisions of this section apply to all work of the Electrical Contractor.

1.2 CODES AND STANDARDS

A. The entire installation shall meet all requirements of the 1975 National Electrical Code (NFPA 70) and all State and local regulations as they may apply. Standards of the following associations or organizations shall be followed and applied where applicable as minimum requirements.

(UL)	Underwriters Laboratories
(IEEE)	Institute of Electrical and Electronic Engineers
(NEMA)	National Electrical Manufacturers Association
(NFPA)	National Fire Protection Association
(NBFU)	National Board of Fire Underwriters
(EEL)	Edison Electric Institute
(IPCEA)	Insulated Power Cable Engineers Association
(ASTM)	American Society for Testing and Materials
(OSHA)	Occupational Safety and Health Act of 1970
	National Electric Safety Code (Handbook H30) of the National Bureau of Standards.

B. The rules and regulations of the University of Minnesota Physical Planning and Development Department shall be checked and complied with where applicable.

1.3 PERMITS AND LICENSES

A. All licenses shall be secured and paid for by this Contractor before actual work is started and he shall observe any requirements stipulated thereon. The University will obtain required permits from the State and Municipality.

1.4 INSPECTION

A. The installation shall be made in a neat and workmanlike manner by persons licensed and skilled in the trade and shall be done under the supervision of a master electrician licensed to do work in the State of Minnesota.

1.5 GUARANTEES AND TESTS

A. All wiring shall be tested for opens, shorts and grounds with megger equipment prior to acceptance. Contractor shall be responsible for proper installation of all items in this Contract and shall remedy, free of charge, any defects in

materials and workmanship and repair all damage resulting therefrom in accordance with provisions of the General Conditions.

B. Specific equipment warranties different than one year shall take precedence. Specific tests beside those mentioned above shall be performed as required in other sections of these specifications.

C. Incandescent lamps are excluded from the provisions of guarantees, but they shall not be installed until final completion of the project to replace the temporary incandescent lamps used for construction lighting.

#### 1.6 DIMENSIONS AND CORRELATION

A. For the purpose of clearness and legibility the drawings are essentially diagrammatic and are intended to indicate size, capacity and location but not exact details or arrangements of construction. Architectural, mechanical and structural drawings shall be examined so that all details of the project are understood and work procedures known before bid and installation. Exact locations and details shall be obtained from dimensioned drawings but shall not take precedence over field dimensions.

B. Miscellaneous equipment (pull boxes, junction boxes, fittings and expansion joints) necessary to complete the work satisfactorily shall be furnished and installed even though not specifically shown on plans.

C. This Contractor shall cooperate with other contractors for proper anchorage, placement and accomplishing of all work. In general, plumbing and ventilating lines are laid out first. Interference between the work of the various contractors shall be resolved before installation. In the event of conflict of space requirements or location with other trades, he shall refer the matter to the University for decision.

#### 1.7 CUTTING, PATCHING AND DEMOLITION

A. This Contractor shall be responsible for all necessary cutting and patching required in connection with his work and where necessary because of removal or change or existing work. Cutting of structural members and finished surfaces shall not be allowed without permission from the Architect or Structural Engineer. These cutting and patching requirements will be modified only if general construction specifications and drawings specifically and clearly state that certain or all portions of same required for each of the various trades is to be performed by the General Contractor.

B. This Contractor shall remove existing electrical conduits, wires, fixtures, boxes and wiring devices from the existing construction to accomplish the work as shown on the plans. Electrical equipment not shown to be reused shall remain the property of the University and shall be salvaged or removed from the site as specified in Article 1.8 of this Section of the specification. Abandoned conduit in ceilings, walls and floor slab shall be cut off below new finish line to allow new finish surface to be applied. Contractor shall verify that circuits or wiring removed do not interrupt service of any kind beyond remodeled area. If necessary, Contractor shall re-route conduit and wire to maintain services to areas beyond the remodeled spaces.

C. The Electrical Contractor shall repaint all areas where he has performed cutting and patching at rooms, spaces or locations that are not repainted under the General Contract. Generally these will be locations where no demolition, cutting and patching is performed by the General Contractor.

D. Contractor shall carefully review the Contract Documents for all other contractors with respect to coordination of the demolition, removal and remodeling work. Cutting and patching to expose and remodel existing mechanical or electrical systems shall not be construed as the work of another contract unless specifically called for on another contractor's documents.

E. Refer to Sections 01910, 04200, 09100 and 09900 for execution and requirements for patching and painting and comply with applicable provisions as to materials and workmanship.

#### 1.8 SALVAGEABLE MATERIAL AND EQUIPMENT

A. All existing electrical materials and equipment are to be removed by this Contractor and shall remain the property of the University unless indicated otherwise by the University.

B. Removed materials and equipment that the University no longer wishes to retain shall become the property of the Contractor, and he shall dispose of it off the University of Minnesota's property at no additional cost to the University.

C. Any removed materials and equipment to be delivered to the University shall be delivered to the following address:

University of Minnesota  
Como Yard  
3009 Como Avenue Southeast  
Minneapolis, Minnesota 55414

1. All materials and equipment delivered or returned to Como Storage Yard shall be in the same condition it was prior to being removed from project sites or Como Storage Yard.

2. Delivery shall be made to the Como Yard during regular working hours or as the University may direct. The Como Yard has personnel and equipment to handle the material delivered to the Yard.

D. All removed materials and equipment shall be tagged with the following information.

1. General description.
2. Location removed from.
3. Date removed.
4. Contractor's name.

E. When removing existing equipment and material, the Contractor shall take particular care to prevent damage to or loss of equipment and material which are to remain.

## 1.9 CLEANING

- A. The Contractor shall periodically remove waste and rubbish and maintain order. Premises shall be left clean and free of debris and unused construction materials before acceptance. Refer to Sections 01010 and 01700 and comply with applicable provisions.
- B. All electrical materials, equipment and apparatus including light fixtures and lamps shall be thoroughly cleaned, to be free of dust, dirt, rust and foreign materials before acceptance.

## 1.10 PAINTING AND LABELING

A. All equipment furnished under this Contract shall be factory finished and painted or galvanized. Any marred finishes on this equipment shall be painted to match as a responsibility of this Contractor.

B. Provide updated typewritten card index with plastic cover describing circuits in each existing panelboard.

C. Provide engraved 1/8" black-white-black laminated bakelite or plastic labels securely fastened with screws or escutcheon pins to identify electrical equipment as follows:

1. All motor control stations, combination starters in motor control centers, starters and disconnects, except when these items are adjacent to each other, only one label is necessary.

2. Plastic imprinted adhesive labels (Dymo Tape) will not be acceptable except for Item (3).

3. All main power and special system junction boxes: Locate these on the inside of flush boxes and in finished areas and outside of the box where they are surface mounted or in equipment spaces.

D. Provide engraved identification on plates for flush mounted pushbutton stations where shown on plans. All engraving shall be sized as large as possible and shall be paint filled, black.

## 1.11 QUALITY AND WORKMANSHIP

A. All materials shall be new, free from defects and shall be listed by, or bear the Underwriter's label where subject to such approval. Materials shall be of the same manufacture or brand for each type of material unless designated otherwise.

B. All materials and finishes shall be adequately protected during construction, from moisture, temperature extremes and physical abuse. All materials shall be assembled in a workmanlike manner in accordance with current recommended standard practice. Certain work such as painting, patching, core drilling and welding shall be done at the Electrical Contractor's direction, responsibility and expense but accomplished by workmen skilled in the particular trades.

## 1.12 SHOP DRAWINGS

A. Refer to Section 01300.

1.13 LIST OF MATERIALS, LIST OF SUBCONTRACTORS AND OTHER SUBMITTALS

A. Refer to Section 01300

1.14 SAMPLES

A. Refer to Section 01300.

1.15 OPERATION AND MAINTENANCE INSTRUCTIONS AND AS-BUILT DRAWINGS

A. Refer to Section 01700.

1.16 TEMPORARY ELECTRIC SERVICE AND LIGHTING

A. This Contractor shall install temporary secondary electric services and lighting for new construction as outlined in Temporary Facilities, Section 01500 and herein.

B. Provide from existing panelboards EC-11, 2 temporary secondary electric centers as herein described for the construction area:

Temporary service center shall be nominal 60 ampere, 120/208 volt, 3 phase, 4 wire. Provide a 60 ampere, 3 phase circuit breaker in existing panelboard. Provide 1-1/4"-4#6 THW to the temporary service center located central to the construction. Provide a 8 circuit load center panel, 8-20 amp. 1 pole breakers. From load center panelboard install a receptacle panel consisting of 6-20 ampere, 120 volt, 3 wire grounding type duplex receptacles. Each receptacle shall be served by a separate circuit. Provide GFI breakers or receptacles as required by code.

C. From the temporary service locations each individual contractor shall provide his own portable cords and outlets for hand tools.

D. Within the construction area provide a sufficient number of rubber covered lamp sockets uniformly spaced so that in general 200 watt lamps (maximum) will provide satisfactory lighting on temporary cable connected to the temporary service or existing light outlets and located for all trades. Lighting shall be adequate to provide suitable working conditions for high quality workmanship, as approved by the University, and safe lighting conditions. All trades will provide their own portable cords and outlets in the building for portable tools. All light bulbs will be furnished by General Contractor, but shall be installed, removed and reinstalled as burn outs occur by the Electrical Contractor.

E. The entire installation of construction light and power shall meet code requirements and shall be safe, substantially supported and adequately connected.

F. Temporary electric energy costs will be paid by the University. Electric service and energy costs for heavy electrical loads such as large welders shall be provided by each Contractor and shall not be taken from this service. The energy demand shall not exceed the service and any damage

## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 16010 General Provisions - Electrical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements of pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the basic construction materials for erection and installation of the building electrical systems.

## PART 2: PRODUCTS AND INSTALLATIONS

2.1 RACEWAYS AND FITTINGS

A. All electrical conduit shall be galvanized rigid steel conduit, except that EMT 1-1/4" or smaller may be used in furred ceilings, interior partitions, walls or where exposed and not subject to mechanical injury. No conduit smaller than 3/4" shall be used except on specific instruction from the Engineer or where noted on the plans. EMT shall not be used in poured concrete construction.

B. Flexible conduit, Greenfield, shall be used for motor connections and between recessed fixtures, and their junction boxes. Provide jacketed type Sealtite conduit for connections to exterior or wet location equipment. For motors, conduit shall not exceed 18" in length, and an equipment grounding conductor shall be provided within the raceway run with the circuit conductors. Greenfield may be used inside of counters and cabinets when approved by the Engineer.

C. All steel conduit and all locknuts, fittings, couplings, nipples and connectors shall be protected from corrosion by hot dip galvanizing or cadmium coating both inside and out, except electrical metallic tubing shall have only enamel or epoxy coating on the interior. All rigid conduit shall have standard pipe threads.

D. Conduits shall be dried, cleaned and de-burred before wire is pulled. Standard locknuts and fittings shall be used with rigid conduits; O.Z. Type A or B insulated steel bushings shall be used on all 1-1/4" or larger conduits. Terminations at cabinets and junction boxes shall be with double locknuts and phenolic bushings (1" and larger). Conduits connecting to dry type transformers shall be O.Z. type HRK bushings.

E. All exposed conduit shall be run parallel to wall and floors and shall be supported in a substantial manner with pipe straps expansion bolts, screws, lag screws, clamps, mineralac clamps or Kindorff or Unistrut trapeze hangers.

<u>Conduit Sizes</u>	<u>Maximum Spacing of Supports</u>
3/4" and under	7 feet
1" and over	10 feet

F. Condulets shall not be used for 1-1/2" or larger conduits. EMT conduit fittings shall be raintight gland compression type or equivalent approved by the Engineer. Indenter, set screw or slip-on types are not acceptable. Couplings and connectors shall be malleable iron or steel.

G. All conduit where possible shall be concealed in the ceiling, floor or wall construction unless indicated as exposed on the plans.

H. Conduit shall be Youngstown, Republic or equal.

## 2.2 OUTLET, JUNCTION AND PULL BOXES

A. All outlet boxes shall be galvanized. Standard 4" octagonal boxes shall be used for ceiling outlets except as otherwise specified or required. Ceiling outlet boxes shall be equipped with 3/8" fixture studs where required. Outlet boxes in furred construction shall be supported by bar hangers or lightweight channel iron; exposed ceiling outlet boxes shall be secured by wood screws, machine screws, toggle bolts or lead anchors as applicable. All boxes shall be supported independently of support from connecting conduit.

B. Standard 4" square boxes with proper plaster rings shall be used for device outlets in plastered walls. Gang boxes with plaster rings shall be used where more than two devices occur at one location.

C. Use properly sized tile boxes and covers for device outlets in glazed tile, brick and unfinished concrete block walls. These boxes shall be ganged where two or more devices occur at one location.

D. Standard 4-11/16" square boxes shall be used for ceiling and other outlets as required for additional wire space.

E. Covers shall be provided for all outlet boxes, as required, and shall be of a design to fit the particular box and location, and shall be readily adjustable for alignment with the walls and finishes. Where these covers are to receive a finish coat of paint, Electrical Contractor shall furnish same with one coat of primer. In finished spaces, covers shall be similar to those specified under finishing plates, Section 16310.

F. Light fixtures without integral J-boxes suitable for wiring temperature rating shall have J-boxes installed in an accessible location close to fixture.

G. All pull boxes are not shown on the plans but they shall be provided as required for ease of wire pulling and in long runs (90 feet or more), or when more than four quarter bends shall occur in any conduit run. All pull boxes shall be sized to conform to requirements of the National Electrical Code. Pull boxes shall be recessed in all finished portions of building.

H. Outlet boxes shall be Appleton, Steel City, Raco, or equal.

## 2.3 WIRE AND CABLE

A. All wire and cable furnished and installed under this contract shall be new and of the best quality. Wire and cable shall be of size, type and number shown on plans. All conductors shall be of soft annealed copper of not less

than 98% conductivity and in all other respects to the requirements of the ASTM specifications, latest edition. Unless otherwise noted, insulation shall be rated at 600 volts.

B. All branch circuit wiring shall be color coded according to Article 210-5 of the National Electrical Code and as follows:

1. 120/208 volt: A - black; B - red; C - blue; Neutral - white;  
Ground - green; travelers - yellow;

2. All feeders if not color coded shall be permanently marked with paint or tape at their terminations for identification.

C. All feeder wire shall be type THW and branch circuit wire shall be type THW or THWN-THHN, unless indicated otherwise, of sizes shown on plans. All wire larger than Number 6 shall be stranded. Unless indicated otherwise, no wire smaller than Number 12 shall be used for branch circuits. Number 14 may be used for relay and motor control.

D. All wire pulled through the wiring channels of continuously mounted fluorescent fixtures shall be type RHH and THWN. Wire connected to recessed type and vaportight fixtures shall be type AF. All underground wires exterior to the building shall be in conduit and shall be type THW or THWN. Branch wire in high ambient areas shall be type THHN.

E. Interior helical spring twist type connectors shall be used on number 8 and smaller wire sizes. These shall be Ideal 70 or 450 Series, Scotchlocks or approved equal.

F. Number 6 and larger wires shall terminate in solderless lugs. All terminations taps and splices shall be compression type Burndy, Hydent or approved equal.

G. No splices shall be made in any conductor except when absolutely necessary and then in approved junction or pull boxes. Secondary service wires and feeders shall be of one continuous run without splices.

H. To relieve strain on the insulation and the conductors when pulling wire, a wire pulling lubricant shall be used, powdered soapstone or approved equal.

I. Wire and cable shall be General Cable, General Electric, Rome, Hatfield, Anaconda or equal.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 16010 General Provision - Electrical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the basic installations, assemblies, methods of fabrication and supporting devices for the electrical system.

## PART 2: PRODUCTS AND INSTALLATIONS

2.1 GROUNDING CONTINUITY

A. All conduit systems, equipment housings, material housings, junction boxes, cabinets, motors, ducts, wireways, light fixtures, portable equipment and all other conductive surfaces shall be solidly grounded in accordance with the National Electrical Code to form a continuous, permanent and effective grounding system.

B. Grounding continuity shall be established by using standard couplings, connectors, fittings and green jacketed copper conductor jumper in conduit with circuit conductors for motors feeding from motor control centers.

2.2 CASEWORK ELECTRICAL UTILITIES

A. The Electrical Contractor shall furnish and install all receptacles, boxes, plates, and all conduit and wiring required and shown on the plans for all casework electrical requirements. The Casework Contractor will provide the countertop pedestals and all of the cutouts for the electrical outlet boxes required for the various electrical devices.

B. Fume hoods will be package units and will come complete with their components installed and partially prewired. The Electrical Contractor shall provide all power circuits to these units and make all connections.

2.3 EQUIPMENT CONNECTIONS

A. Completely wired outlets and disconnects shall be installed as required for equipment furnished by others. Verify connection requirements for all equipment, installed or furnished by others, before installation.

B. In general, the service to equipment is laid out for anticipated electrical requirements as listed on Architectural Equipment Schedule. Actual equipment furnished may differ and shall be checked from the shop drawings to assure proper power supply. Report any differences to the University for procedure or adjustment.

## 2.4 INSTALLATION IN STEEL STUD PARTITION WALLS

- A. As shown on architectural plans most interior walls are steel stud, drywall type. These walls fit to horizontal members at the ceiling and floor consisting of 18 gauge sheet steel or 1/8" aluminum channels.
- B. All low voltage wiring, telephone cable and all 120 volt and higher circuits shall be installed in conduit. All steel stud openings to permit horizontal conduit runs shall be cut by this Contractor if not furnished as standard by the stud subcontractor.
- C. All openings in these walls for all electrical devices will be provided by the wall subcontractor as directed by the Electrical Contractor. Provide box cover rings or other mounting devices where required.
- D. All openings in the horizontal wall support members for conduit shall be provided by the Electrical Contractor. These openings shall be neatly drilled to the approximate size of the service entering.
- E. The Electrical Contractor at his option may wire duplex receptacles shown in partitions by providing a junction box above the ceiling and dropping a single conduit run to each receptacle in lieu of running continuous conduit from receptacle to receptacle.

## 2.5 FASTENERS AND SUPPORTS

- A. All fastening and supports shall be of an approved type. The use of wire, nails, etc., for fastening exposed conduits is prohibited. Threaded inserts, expansion or toggle bolts shall be used for fastening to masonry walls.
- B. Where possible conduits shall be grouped together and rigid racks of angle iron or structural channels shall be provided. Individual conduits shall be clipped to the ceiling or wall with malleable iron pipe straps wherever possible. Where individual conduits must be hung from the ceiling approved conduit supports and rod hangers must be used.
- C. Provide rigid rods or bars for the support of lighting outlet boxes and grid boxes. No perforated metal straps may be used.
- D. Provide supporting frame racks of angle iron, flat bar, and channel structural members wherever required for the support of wiring troughs, safety switches, motor starters and controls, and associated equipment. Supporting frame racks shall be rigidly bolted or welded together and adequately braced to provide a substantial structure. The welds and edges of all brackets shall be filed or ground smooth for painting. Racks, supports and frames shall be Kindorf, Steel City, Unistrut or approved equal.

## 2.6 TELEPHONE CONDUIT SYSTEMS

- A. Provide empty conduit and boxes for telephone system as shown on plan. All conduit shall be 3/4" MT unless noted otherwise, all boxes shall be two gang with single gang ring unless noted otherwise. Plates shall be stainless steel to match wiring devices, and shall have 3/4" bushed openings.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 16010 General Provisions - Electrical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes all secondary electrical distribution equipment and accessories herein specified and shown on plans to provide a complete connected and fully operating system.

C. All equipment and wiring shall be designed and connected for operating on a 120/208 volt, 3 phase, 4 wire, grounded secondary system.

## PART 2: PRODUCTS AND INSTALLATION

2.1 SECONDARY VOLTAGE INTERRUPTIONS

A. Electric service interruptions involving University property or required by the contractor to perform his work shall be arranged for and approved by the University before interruption.

B. Requests for outages shall be submitted in writing to the University's Electrical Construction Superintendent for approval at the earliest possible date, and in no case later than two weeks prior to the outage. Proposed outage information shall be submitted on a University of Minnesota "Request for Electric Outage" form (3 copies) available from the University's Electrical Construction Superintendent.

C. The Electrical Contractor shall verify with the University's Electrical Superintendent that all equipment and installation involved is completed, tested, and ready for service and that all related shop drawings and operational data have been submitted before submitting the outage.

D. Scheduled outages will be scheduled at the convenience of the University. The University reserves the right to cancel or change the scheduling of any such outage up to 24 hours before its previously approved starting time. There shall be no additional cost to the University for scheduled outages, or for outages rescheduled at the University's request where at least 24 hours notice has been given by the University to the Contractor.

E. All outages shall be held during evenings or on weekends and/or holidays. The Contractor shall figure these costs at premium pay rates. No cost extra will be allowed because the outages or the work during the outages is on an overtime basis.

2.3 EXISTING BRANCH CIRCUIT PANELBOARD

A. Existing branch circuit panelboards as indicated on the drawings shall

be maintained and used for new and existing circuits. Provide new circuit breakers where indicated and required.

B. All new circuit protective devices for existing panelboards shall be front removable bolt-in molded case circuit breakers with thermal magnetic trips for 120/208 volt sized as indicated. All two and three pole circuit breakers shall have common trips. 120/208 volt breakers shall be rated for 10,000 amperes, sym. I.C. at 240 volt RMS and shall match existing panelboard and circuit breakers.

C. New up-dated index shall be provided.

#### 2.4 FUSES

A. Provide and install secondary fuses in all fusible switches.

B. Fuses shall be of the proper voltage rating (250 volt class) as required for the particular equipment. Fuses shall be Bussmann or approved equal. All current limiting fuses shall be Class R rejection type.

I. All motors, whether served from individual disconnects or from a motor control center, shall be protected by Buss Dual Element Fusetron Fuses - FRN (250V); to 150 amperes and Buss Low Peak LPN (250V) from 150 amperes and above based on nameplate amperes and service factor.

#### 2.5 SAFETY SWITCHES

A. Provide safety switches where required and as shown, sized according to the load served, for motors and equipment. Switches shall be fused or unfused as indicated and as required.

B. Safety switches shall be heavy duty type, 250 volt and 2 pole or 3 pole as required. Switches shall be visible blade type with quick-make, quick-break operating mechanism, full cover control circuit interlock and means for padlocking.

C. Safety switches shall be NEMA 1 or NEMA 3R raintight for wet or outdoor locations.

D. Safety switches shall be Westinghouse, General Electric, Allen Bradley, Square D, Federal Pacific or I.T.E.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 16010 General Provisions - Electrical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes the wiring devices, relays, and miscellaneous electrical equipment permanently installed to operate and control with 120/208 volt electrical system loads.

## PART 2: PRODUCTS AND INSTALLATION

2.1 WIRING DEVICES AND PLATES

A. Provide wiring devices as shown on the plans and identified by the appropriate symbols. Hubbell numbers are used to identify the particular type of devices required except where otherwise noted. Pass & Seymour, Leviton, Sierra, General Electric or approved equal switches and receptacles shall be provided. All switches and receptacles shall be U.L. listed and meet NEMA WD-1-1971 performance tests for specification grade devices.

B. All receptacles shall be grounding type. Connect green covered ground conductor to ground terminal at each receptacle.

C. Switch, receptacle and all other plates (including telephone, and for all empty outlet boxes) shall be satin stainless steel, Sierra 302 or approved equal with Type 302, stainless steel screws.

D. All receptacle bodies and switch toggles shall be brown.

E. Receptacles:

Poles/ Wires	Volts	Amps	NEMA Configuration	Hubbell Cat. No.	Use	Remarks
2P-3W	125	20A	5-20R	5362	Equipment General & Surface Raceway	Single Duplex-

F. Pedestal Receptacles:

1. Pedestal type receptacles indicated on the plans and located on casework countertops, laboratory tables, etc. shall be furnished by the casework supplier and shall be Hamilton Industries or approved equal as follows:

a. Single Face - Hamilton #36L115 with brown, 125 volt grounding receptacle, 20 ampere Duplex NEMA 5-20R as specified in this section.

b. Double Face - Hamilton #36L117 with brown, 125 volt grounding receptacles, 20 ampere duplex NEMA 5-20R as specified in this section.

2. Electrical Contractor to install complete and wired where indicated on the plans.

G. Switches:

Poles	Amps.	Volts.	Cat. No.	Remarks
Single	20 amp.	120 - A.C.	1221	Toggle - Quiet
Three-Way	20 amp.	120 - A.C.	1223	Toggle - Quiet

H. Clocks:

1. Provide wired electric clock outlets as indicated on the plans. All clocks shall operate from 120 volt A.C. with the power source connected to the building wiring system as shown.

2. Clock Outlets shall be a clock hanger outlet Sierra #2123 with NEMA #5-15R receptacle and stainless steel plate.

3. Clocks will be provided and installed by the University.

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 16010 General Provisions - Electrical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes furnishing and installation of all fixtures complete with lamps and ballasts where required as shown on the plans and on the fixture schedule. Capital letters adjacent to outlets indicate the fixture type and small letters indicate the manner of switching. Unless otherwise noted a suitable and typical fixture shall be furnished and installed at each fixture outlet (or as otherwise indicated on the drawings) though inadvertently not identified on the plans or not listed on the fixture schedule.

## PART 2: PRODUCTS AND INSTALLATION

2.1 INSTALLATION

A. Fixtures shall be hung from the suspended ceiling grid, tees, etc., except industrial and strip fluorescent fixtures shall be mounted from structure. Provide all clips, sheet metal screws, anchors, etc. for a secure installation.

B. Electrical Contractor shall coordinate the fixture installation for all ceiling types and shall check ceiling finishes, clearances, structure suspension system etc., before placing fixture orders to insure correct application. Refer to architectural reflected ceiling plans and details for details of ceiling systems and exact locations of fixtures.

1. Coordinate the installation, placement and cutting of suspended ceiling components with the ceiling system manufacturer and/or installer.

2. Provide plaster frames for recessed fixtures where applicable.

3. Provide all additional structural members where required for fixture support when not furnished with the ceiling system or by the ceiling installer.

4. Surface mounted fluorescent fixtures shall be mounted from Steel City #6029 or edgewise 1-1/2" Lather's channels provided by the Electrical Contractor.

C. All fixtures shall be hung straight and true and as design of fixture and accepted practice dictate. All fixtures shall be cleaned immediately before the final inspection. All fixtures shall be newly lamped and in perfect operating condition at the completion of the job. All necessary devices and auxiliary fittings required for a complete and workmanlike installation shall be furnished and installed by this Contractor.

## 2.2 LAMPS

- A. All incandescent lamps shall be inside frosted, rated at 125 volts unless otherwise noted in the fixture listing. Lamps shall be standard 1000 hour life type.
- B. Rapid start fluorescent lamps shall be T-12 white, 3200 (min.) initial lumens and 20,000 hours lamp life.
- C. Lamps shall be Sylvania, Westinghouse, General Electric or approved equal.

## 2.3 BALLASTS

- A. Fluorescent ballasts shall be for 120 volts (except where noted otherwise), premium high power factor and CBM-ETL approved. Provide multiple lamp ballasts wherever possible. Ballasts shall have internal thermal automatic resetting protection and inert solid fill and capacitor protection to meet Class "P" U.L. rating. Sound ratings shall be "A" for rapid start. Fluorescent ballasts shall be "Premium" Jefferson, General Electric, Westinghouse or Universal equivalent to Advance Mark II Kool Koil.
- C. The fluorescent ballast manufacturer shall provide a two-year guarantee against defects in workmanship or material which includes an in-warranty service program providing for the payment of authorized labor charges incurred in the replacement of defective in-warranty ballasts.

## 2.4 LIGHT FIXTURES

- A. All fixtures shall be U.L. approved and manufactured, installed and wired in accordance with the latest rulings of the National Board of Fire Underwriters and national, state and local codes and ordinances.
- B. Incandescent fixtures shall be wired with asbestos-covered, heat resistant wire as required. Fluorescent fixtures shall be internally wired and with not less than No. 16 stranded wire with thermoplastic, asbestos or silicone insulation as listed in Table 402-3 of the National Electrical Code.
- C. All fluorescent fixtures shall be designed, tested and guaranteed by the manufacturer for ballast coil temperature not to exceed the U. L. limit of 105°C and ballast case temperature not to exceed 90°C for the particular application.
- D. The major suspended ceiling is a 2' x 4' inverted "T" lay-in system. All light fixture details and mounting methods shall be designed to accommodate the ceiling system where fixtures are installed within the ceiling system.

## 2.5 FIXTURE SCHEDULE

<u>Type</u>	<u>Description</u>	<u>Lamp</u>
A	A four lamp lay-in recessed 2'x4' fluorescent fixture with two ballasts and framed lens construction. Chassis, wiring channel and end plates shall be constructed of not less than 20 gauge steel, chemically treated, then finished in high temperature baked white enamel to obtain	4-F40W RS



<u>Type</u>	<u>Description</u>	<u>Lamp</u>
	<p>at least 85% reflectance factor. Lamp socket supports shall be 18 gauge minimum. Lens shall be extruded virgin acrylic pattern 19. Ballasts shall be split per Detail 3/E-1 to provide dual level lighting. Fixture shall be on air handling type with both return and heat extraction capabilities and shall be capable of at least 230 CFM of air flow with a negative static pressure of 0.05 inches of water. Damper vanes for both return and extract are required. Fixture shall be designed for mounting in a suspended exposed inverted "T" bar ceiling system. Fixture shall be same as Columbia 2444G-K19-244 or approved equal.</p>	
A-1	<p>Same as "A" except 3 lamp with 2 ballasts split per Detail 5/E-1, fixtures shall be Columbia 2444G-K19-243 or approved equal.</p>	3-F40W RS
B	<p>A vaportight wall bracket fixture with junction box and guard, Miller #AC-2092, Stonco equivalent or approved equal.</p>	1-150/A-21

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## PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 16010 General Provisions - Electrical apply to all work of this section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01010 - Summary of Work and Special Requirements for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Contractor shall provide all equipment, materials and wiring necessary for complete installations of the systems herein specified and as shown on the plans, and in the motor schedules. Refer to Section 16900 for work not included in this section of the specifications.

## PART 2: PRODUCTS AND INSTALLATION

2.1 MOTOR WIRING

A. The Contractor shall provide and install all disconnect switches, motor starters, push buttons or special starting controls unless indicated by others on the motor schedule. He shall provide and install all conduit boxes, fittings and wiring for all motors and controls (except as noted below) as shown on the plans or as required. He shall oil all motors if required before starting and verify the mechanical or equipment supplier to see that any motor he connects is running in the proper direction. Check all overloads and fuses under operating conditions to assure that they are sized for proper motor protection without nuisance tripping and replace those found inadequate or improper. All overloads shall be sized for maximum rating allowed by Code to actual nameplate data rather than schedule. Overloads are not required on single phase motors equipped with internal thermal protectors. The motor schedule on the plans is included for the Contractor's convenience and any motor inadvertently omitted from this list but shown on the plans shall be connected.

B. In general, equipment and control wiring shall be provided as follows.

1. All wiring, unless otherwise indicated on the drawings shall be provided by the Electrical Contractor. Provide wiring and connections for pressure switches, float switches, etc., as noted in the Motor schedule and required, unless otherwise indicated.

2. Electrical Contractor shall provide power outlets, disconnects and power wiring for package units.

C. The Mechanical and Equipment Contractors will furnish schematic wiring diagrams to the Electrical Contractor for all of their equipment that must be wired by the Electrical Contractor. Where manual-off-automatic switches are specified make connections so pneumatic switch or controlling device is in the automatic circuit only.

D. Electrical Contractor shall furnish and install fused disconnect switch sized and fused if necessary, where required by Code for each motor.

E. All fractional HP manual starters, push buttons, controllers, disconnects, and selector switches shall be labeled by Electrical Contractor with "Equipment" as shown on motor schedule with an engraved black bakelite plate fastened with Minnesota Mining permanent adhesive. Where no push button is required, furnish and install same type of label on disconnect switch or starter. All flush switches which are in public access areas (not closets or equipment rooms), shall have labels engraved directly onto the plate. Wherever the controller and disconnect are together, only one label is required.

F. Provide fuses for all disconnect switches and combination as specified in Section 16300.

## 2.2 MOTOR CONTROLS

A. Provide magnetic starters with three overload elements, push button or selector switch and reset button as required on housing, or remote push button or selector switch and pilot light if shown for all motor controllers shown on plans and designated in the motor schedule.

1. Coil voltages shall be 120 volts as required.

2. Provide auxiliary contacts for each starter as indicated in the motor schedule in addition to the holding contact where required.

B. All relays and pilot or control transformers shall be separately fuse protected.

C. All motor controls shall be Square D, General Electric, Westinghouse, Allen Bradley, Federal Pacific, or approved equal. Controls shall be of the same manufacturer.

## 2.3 MOTOR CONTROL CENTERS

A. Motor control centers shall be designed for 208 volt, 3 phase, 3 wire combination motor starters detailed and scheduled on the plans. The control centers shall be totally enclosed, dead front, free standing, 90" high constructed of code gauge steel with structures bolted together to form one NEMA Class I assembly. Units shall be finished with baked gray enamel.

1. The combination fused switch and magnetic starter units shall be hinged door type.

2. The fused switches shall be quick-make, quick-break, handle operated. Switches for all starters with interlock control circuits shall be provided with integral electrical interlock disconnect.

3. Magnetic starters shall be across-the-line, full voltage type with controls as indicated on the motor schedule.

4. Horizontal and vertical bus shall be of copper or tin plated aluminium construction with horizontal bus rated as shown on plans.

5. Motor control centers shall be front mounted only, NEMA Class I, Type B construction.

6. Provide fuses for each starter switch as specified in Section 16300. Provide 3 spare fuses for each size of starter switch in each motor control center.

7. Each combination starter unit shall be stab connected to the buses, except bolt-in above 400 amp. All combination starters shall have numbered unit pre-wired terminal boards. Provide same type disconnect switch only where indicated.

8. Each section shall have unobstructed horizontal wireways at top and bottom which shall match with adjacent units to provide continuous horizontal wireway. Each section shall include vertical wireway. Horizontal and vertical wireways shall be isolated from busses.

9. Unused spaces shall be covered by blank plates, and all other spaces shall be fully equipped for future use.

B. Individual combination starters shall be equipped with reset buttons, selector or push buttons and pilots as indicated on the drawings.

1. Each starter shall have three overload protectors. These shall be individually supplied for the exact motor that each is intended to protect as verified by the nameplate at the job which may not necessarily agree with the size indicated in the motor schedule. Size all overloads for the largest maximum size permitted by the NEC.

2. Starters shall have auxiliary contacts plus a holding coil contact. The required number of auxiliary contacts shall be furnished to accomplish the specified sequences and interlocks.

3. Provide a transformer for each starter pre-wired into the circuits for reduction of 480 volts to 120 volts as required for pilot and control duty. Transformers shall be fuse protected and shall be connected to the load side of the disconnect switch.

4. Two speed motor starter shall be 2 winding starters made up of 2 - 3 pole starters with 6 overloads and necessary control wiring to operate with the controls shown on the motor schedule.

5. Each two speed starter shall include an automatic sequence decelerating relay which will interpace a time delay between high speed and low speed whether in the remote mode of operation or local mode of operation.

C. Automatic temperature control devices requiring electrical connections and all pneumatic electric switches, electric pneumatic switches, control relays and interlocking relays shall be furnished in NEMA type I enclosure. The MCC and temperature control device enclosure shall be factory wired and tested as a single unit prior to delivery to job site. Complete terminal to terminal wiring diagrams shall be submitted prior to fabrication. All devices within enclosure will be factory wired to numbered terminal strip with 10% spare terminals.

D. Provide permanent labels on the front of each combination starter or disconnect to identify the equipment controlled. Label shall be engraved black-white-black bakelite fastened with permanent bonding adhesive.

E. All motor control centers shall be structured with buses supported to withstand 40,000 amperes RMS symmetrical for short circuit conditions.

F. Motor Control Centers shall be as manufactured by Square D, General Electric, Westinghouse, Federal Pacific, Allen Bradley or approved equal.

#### 2.4 INSTALLATION IN EXISTING MOTOR CONTROL CENTERS

A. Existing motor control center located in Jackson Hall Penthouse requires the addition of magnetic starters and disconnect switches within existing cubicles. These shall be provided under this Section of the specification by the Electrical Contractor.

1. The existing motor control centers are of Cutler-Hammer manufacture. All new starters, disconnects, and equipment required to expand these motor control centers shall be Cutler-Hammer.

a. The combination circuit breaker and magnetic starter units to be added shall be of the hinged door type.

b. The magnetic starters shall be across-the-line, full voltage type with controls as indicated on the schedule.

c. Motor control centers shall be front mounted only, NEMA Class 1, Type B.

d. Each combination starter unit shall be stab connected to the buses. All combination starters shall have numbered unit pre-wired terminal boards. Provide same type disconnect switch only where indicated.

B. Individual combination starters shall be equipped with reset buttons, selector or push buttons and pilots as indicated on the drawings.

1. Each starter shall have three overload protectors. These shall be individually supplied for the exact motor that each is intended to protect as verified by the nameplate at the job which may not necessarily agree with the size indicated in the motor schedule. Size all overloads for the largest maximum size permitted by the NEC.

2. Starters shall have auxiliary contacts plus a holding coil contact. The required number of auxiliary contacts shall be furnished to accomplish the specified sequences and interlocks.

3. Starters shall be Cutler-Hammer and shall match the existing equipment.

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