ADDENDUM NO. 1 13 April 1979

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

JOML CREMATORY ADDITION

UNIVERSITY OF MINNESOTA - MINNEAPOLIS CAMPUS
HEALTH SCIENCES EXPANSION

THE ARCHITECTS COLLABORATIVE, INC. Cambridge, Massachusetts

HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.
University Park Plaza - Suite 704
2829 University Avenue Southeast Minneapolis, Minnesota
(612) 378-3833 55414

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

SPECIFICATIONS - MECHANICAL

1 - Section 15800 - Ventilation: (A) The Mechanical Contractor shall locate existing A.C. units in new wall sleeve (by General Contractor). See original electrical detail 3a/E-1; see approvals.

2 - Acceptable Manufacturers - Mechanical. 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.

Section	Item	Manufacturer
15140	Pipe hangers	Michigan Hanger Company
15300	Plumbing carriers	Jay R. Smith
15650-2.1	Unit heater	Reznor
15800-2.6	Utility blower	Twin City Fan
	Fan sets	Greenheck
15810	Crematory chimney	Suscon

SPECIFICATIONS - ELECTRICAL

3 - Section 16010 - General Provisions Electrical: (A) Article 1.5.A. Change first sentence to read: "All wiring shall be tested for opens, shorts, and grounds with approved equipment designed for the purpose prior to acceptance".

4 - Section 16300 - Electrical Distribution System: (A) Article 2.3.D. Add the following paragraph:

D. Circuit breaker current rating shall be visible without removal of cover plate or trim.

5 - Section 16500 - Communications Systems: (A) Article 2.2.C.3. Change the last sentence to read: "A minimum of four hours of instruction .." in lieu of 40 hours as indicated.

(B) Article 2.2.D.5. Change the spelling of the first word to "alarm".

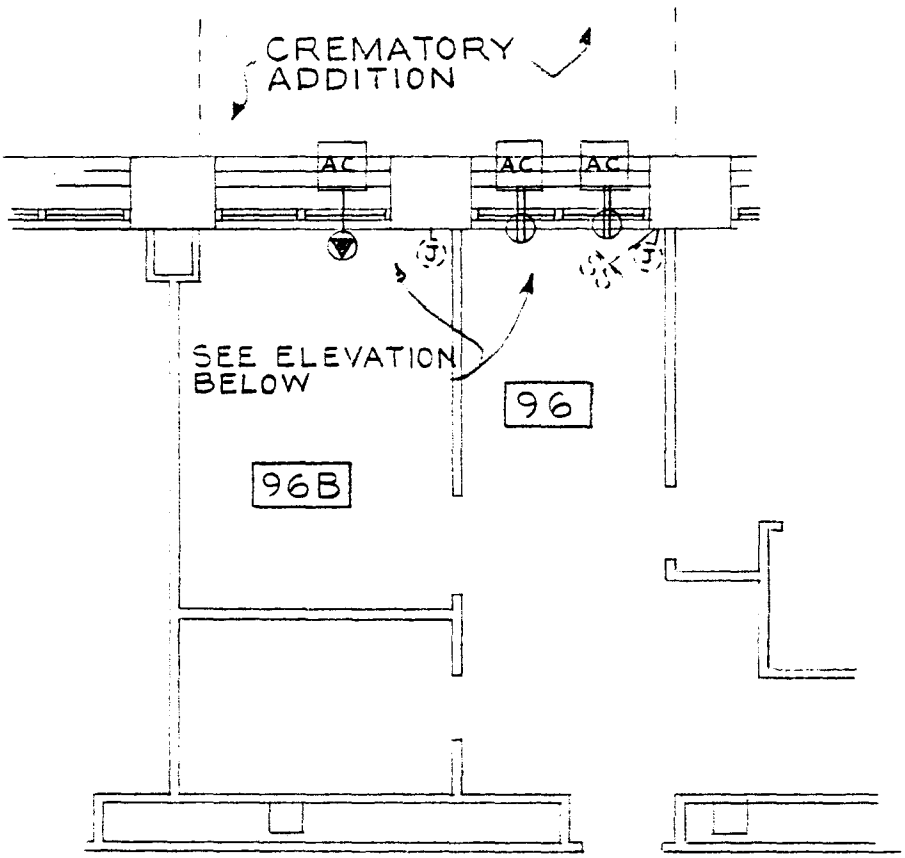
DRAWINGS - ELECTRICAL

6 - Sheet E-1: (A) Motor Schedule. For motors #1 and #6 change reference of fractional starter to "Manual" starter equipped with thermal protection.

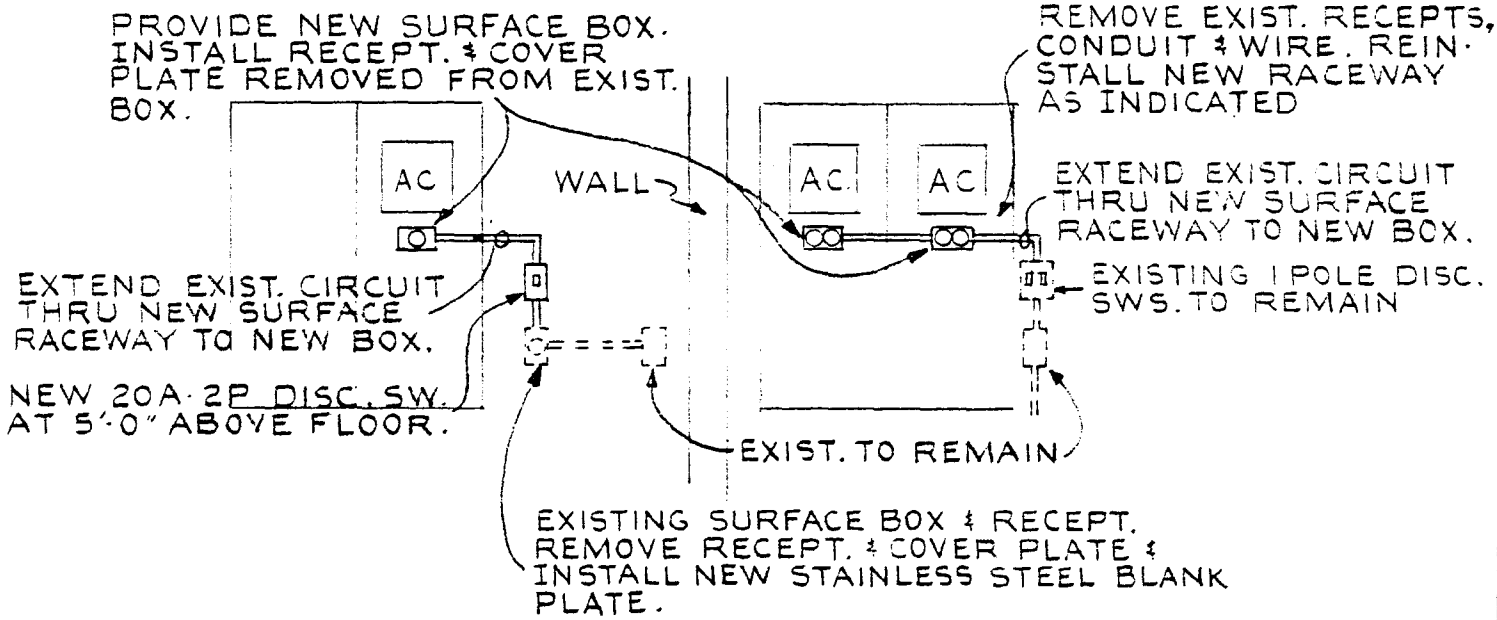
(B) Details #3 and 3a. Delete details #3 and 3a. See attached drawing #1, dated April 13, 1979, for revised power circuits for A.C. unit installation.

(C) Room S67. Existing branch circuit wiring noted to be removed back to panel, originates in existing panel immediately west of entrance to Room #S67 and shall be removed to this point.

ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON THE PROPOSAL FORM



PARTIAL PLAN - BSM'T. JACKSON HALL



NOTES:

1. NEW SURFACE METAL RACEWAY SHALL BE WIREMOLD # 500. NEW BOX SHALL BE WIREMOLD #5748.
2. VERIFY EXACT MOUNTING HEIGHT OF BOX

UNIVERSITY OF MINNESOTA HEALTH SCIENCES EXPANSION

THE ARCHITECTS COLLABORATIVE, INC. CAMBRIDGE, MASS. & THE HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.

JOB NO	280.13
DRAWN	J.H.B.
CHECK	G.A.H.
SCALE	NONE
DATE	13 APRIL 79

JOML CREMATORY ADD'N.
ADDENDUM NO. 1

SHEET NO 1

CONDITIONS, SPECIFICATIONS AND RELATED DOCUMENTS FOR
JOML CREMATORY ADDITION

UNIVERSITY OF MINNESOTA - MINNEAPOLIS CAMPUS
HEALTH SCIENCES EXPANSION

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

Paul E. Kopietz
Director of Engineering and Construction — University of Minnesota

Paul J. Maupin
Health Sciences Planning — University of Minnesota

THE ARCHITECTS COLLABORATIVE, INC. — Cambridge, Massachusetts

HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.
University Park Plaza - Suite 704
2829 University Avenue Southeast — Minneapolis, Minnesota
(612) 378-3833 — 55414

As to Architecture:
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.

Duane E. Blanchard

Date: September 28, 1978 — Reg. No. 8397

ADVERTISEMENT FOR BIDS

JOML CREMATORY ADDITION

UNIVERSITY OF MINNESOTA - MINNEAPOLIS CAMPUS
HEALTH SCIENCES EXPANSION

APPROXIMATE COST: $195,000.00
BIDS CLOSE: 2:00 P.M. CST, APRIL 19, 1979
BIDS RECEIVED AT: ST. PAUL, MINNESOTA

JOML CREMATORY ADDITION

DOCUMENTS DATED: September 28,1978

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 the time and date bids close, specified above. 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 construction of the JOML Crematory Addition for the Health Sciences Expansion on the Minneapolis Campus of the University of Minnesota.

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 withthe Instructions to Bidders, upon making a deposit in the form of a check in the amount of $25.00 payable to Health Sciences Architects and 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
Regents of the University of Minnesota

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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:

JOML CREMATORY ADDITION
University of Minnesota - Minneapolis Campus

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.

2.2 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, 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 All copies of 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 termsstated 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 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 required bid security or data required by the Bidding Documents or a Bid in any way incomplete or irregular.

4.4 Acceptance of Bid (Award)

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 will 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. 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 Should Bidders wish to obtain additional sets of Contract Documents for their convenience in preparing their Bid, additional sets may be obtained from the Architect/Engineer in the same manner and amount as specified in the Advertisement for Bids.

5.1.3 The full deposit for the first set of Contract Documents will be refunded to bidders who submit a bona fide bid to the University, upon the return of the complete set of documents in good condition to the Architect/Engineer, within 10 days after bid date. In the event of damaged or missing documents, the cost of replacement will be deducted from the deposit.

5.1.4 One half (1/2) the deposit for the second (and additional) sets issued to the Bidders will be returned to the Bidder, upon return of the documents as noted in 5.1.3.

5.1.5 In the event multiple sets are requested and issued to various firms for joint venture bids, the deposit on the second and additional sets will be return in accordance with 5.1.4 above.

5.1.6 Any sets issued and subsequently returned prior to bid date shall have the deposit returned in the amount noted under 5.1.4 above.

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 set and 1/2 for the remaining sets.

5.4 Complete Sets Used in Preparing Bids

5.4.1 Complete sets of drawings, specifications and other Contract Documents, including those primarily indicating work of other Contracts or trades 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 Partial sets, copies of individual drawings and pages of specifications may be purchased from the Architect/Engineer at the cost of $ 1.50 per drawing and $ 0.15 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 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 8.1.3. 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 (CONTRACTORS)

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 Site and Documents

10.1.1 Each bidder is obligated to thoroughly examine and study all Contract Documents, Bid and Contract Forms and Bidding Requirements, and to visit the site, 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 In examining the site, the Bidder shall fully inform himself and record his own investigations as to the conditions of the site and surrounding

area, locations and accessibility, existing utilities and features, relocations that might be necessary to accomplish the work under the Contract, available facilities and difficulties that may be encountered therewith, other work that may be in progress thereon at the time the bid is submitted and other relevant matters which may affect his Bid or accomplishment of the work under the Contract Documents.

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 (Contractor) 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 prime contract 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 7 days prior to bid date and hour, unless a longer time period is specified for certain products. 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 Contractor) 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 Contractor) agrees to commence work in accordance with the General Conditions of the Contract, or as otherwise specified in Division 1 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 parts 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.

- - -

BID FORM

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

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

PROPOSAL FOR ALL CONSTRUCTION

PROJECT: JOML CREMATORY ADDITION
HEALTH SCIENCES EXPANSION

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 following Bid for the JOML CREMATORY ADDITION.

(3) The Bidder agrees to accomplish the Work in strict compliance with the drawings, specifications and Contract Documents, dated September 28, 1978, prepared by The Architects Collaborative, Inc., and Health Sciences Architects and Engineers, Inc.

(4) The Bidder, having examined the drawings, specifications and related documents, visited and examined the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed Project 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 on or before the dates specified in 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. Should any Alternate Proposal result in no difference in cost, the Bidder shall write "NO CHANGE" for the Alternate. The Bidder shall submit a bid or "No Change" for each Alternate listed under his Contract Division. Refer to Section 01100 - Alternates.

---

(8) BASE BID

BASE BID: Bidder agrees to perform all Work for the Sum of: _____

_____ $ _____

ALTERNATE 1: Omit the future mechanical room. DEDUCT _____

_____

_____ $ _____

(9) 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.

(10) 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.

(11) Acceptance of Bids: An Award of Contract will be made to the responsible bidder, responsive to all bid conditions submitting the lowest acceptable bid, being the sum of a base bid plus any elected alternates. 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.

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

(13) Certification for Equal Opportunity and Affirmative Action:

(Must be Signed by Bidder)

The bidder hereby certified 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

(14) 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 _____

_____

_____

(15) 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)

UNIVERSITY OF MINNESOTA
BUSINESS ADM. FORM 203
11-76 — 500

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 Owner's authorized representatives 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 are and remain the property of the Owner, and that all charges for the same and for all services in connection therewith are to be paid by 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.

Refer to the General Conditions of the Contract, Paragraphs 3.5 and 14.2

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.

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.

Subject to the conditions of Article 8 of the General Conditions,

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.

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. Except as otherwise specified in the contract documents.

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 claim 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 for Finance and Development 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 for Finance and Development

Recommended by:

_____ Assistant Vice President, Physical Planning

_____ Date

_____ Director of Purchasing and Stores

_____ Date

_____ University Attorney

_____ Date

UM HEALTH SCIENCES
CREMATORY BI-3

AGREEMENT

BETWEEN

Contractor

AND

Owner

FOR

19

AMOUNT OF CONTRACT

$

UM HEALTH SCIENCES
CREMATORY BI-4

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):

_____
_____
(Title)

_____
(Name of contractor), Principal

By _____
_____
(Title)

(Seal)
Attest (or countersigned):

_____
_____
(Title)

_____
(Name of surety), Surety

By _____
_____
(Title)

* Omit inapplicable terms.

UM HEALTH SCIENCES
CREMATORY B2-1

(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

The within Bond and sureties thereon approved and Bond filed _____, 19____

Regents of the University of Minnesota

UM HEALTH SCIENCES
CREMATORY B2-2

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 1 - 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 1, 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 or 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 orlocation 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, ambuigities 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. Omission 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

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 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 decisions 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 the premises. 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 Director 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 accord-

ance 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 unit, 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 Sub-contractors 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 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 eslewhere 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 requirements 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 the 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 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 Use of University Personnel and Property

7.9.1 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.

7.10 University Use or Occupancy of the Premises

7.10.1 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.

7.10.2 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.

7.10.3 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.

7.10.4 The University's beneficial use or occupancy, as provided for in 7.10.1 through 7.10.3 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.

7.10.5 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 interferred 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.

7.11 Additional Definitions

7.11.1 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.

7.11.2 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.

7.11.3 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.

7.11.4 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.

7.11.5 The term "Substantial Completion" shall mean the Work of the Contract (or spearable units or phases as provided in the Contract Documents or otherwise determined by the University) is essneitally 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) 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.

7.11.6 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.

7.12 Or Equal

7.12.1 Wherever materials, products, articles, equipment, systems or similar items are identified by reference to proprietory 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.

7.12.2 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.

7.12.3 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 alloted 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 parts 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 it 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 operationsthat were actually curtailed or suspended. Lockouts, over which the Contractor has control, will not be a valid rason for a time extention.

.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 extention 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 areas 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 offsite, 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.

.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 Sub-contractor) 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 allow 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 Subcontractors 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 Substantial and Final Completion

9.5.1 As applicable to the Work of this Contract, Substantial and Final Completion shall be as defined under Subparagraph 7.11.5 and 7.11.6.

9.5.2 When he 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.

9.5.3 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 utilitie, heating and air conditioning, maintainance 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.

9.5.4 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.

9.5.5 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.

9.6 Final Payment

9.6.1 Final payment, inluding 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 payemnt 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.

9.6.2 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.

9.6.3 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.

9.6.4 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.

9.6.5 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 Subcontractor, 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 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 11 - 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 theContractor'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 Contractal 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 each of Public Liability and Automobile	$300,000 each person $500,000 each occurrence $500,000 aggregate

.4	Property Damage - Public Liability	$250,000 each occurrence $500,000 aggregate
.5	Property Damage - Automobile	$100,000 each occurrence
.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 The University insures its buildings under a master Property Insurance policy. Unless otherwise provided in the Contract Documents, the Work under this Contract will be included as insured under the master policy, to 100% of the insurable value of the Work, including specified allowances, plus debris removal and architectural/engineering fees for services which may be required as a result of a loss. If required by the University, the Contractor shall assist in establishing the insurable value of the Work under this Contract.

11.2.2 Coverage will be provided in accordance with the terms of the master policy of the University. Upon request, the Contractor may obtain a certificate indicating the coverage, terms and exclusions of the "Builders Risk" provisions of the University's master policy. For the Work under construction the policy will insure against all risks of direct physical loss or damage to the property insured from any external cause except for the exclusions contained in the policy. In general, the policy will provide "Builders Risk" type coverage and as a minimum will insure against loss from perils of Fire, Extended Coverage, Vandalism and Malicious Mischief, Theft, and Surface Water, except for the exclusions of the policy.

11.2.3 The policy does not insure:

.1 Contractor's machinery, tools, and equipment (except temporary structure) not destined to become a part of the completed Project;

.2 Accounts, bills, currency, deeds, evidences of debt, notes, money or securities;

.3 Land, trees, shrubs, plants or lawns;

.4 Licensed motor vehicles;

.5 Licensed aircraft;

.6 Nuclear reactors;

.7 Loss of use or occupancy, penalties for non-completion of or in delay in completion of the Contract, or non-compliance with the Contract Documents.

11.2.4 The policy does not insure against the following perils, which are listed here for general information, but shall not be construed as superceding or altering the actual policy exclusions:

.1 Loss or damage caused by or resulting from:

a. Earthquake, landslide, mudflow, or earth sinking, rising or shifting;

b. Flood, waves, tidal water or tidal wave, overflow of streams or other bodies or water, all whether driven by wind or not;

c. Water which backs up through sewers or drains;

d. Water below the surface of the ground including that which exerts pressure on or flows, seeps or leaks through sidewalks, driveways, foundations, walls or floors;

unless fire or explosion ensues and then the Company shall be liable only for such ensuing loss. This exclusion does not apply to personal property off premises or in transit.

.2 Loss or damage to hot water boilers, steam boilers, steam pipes, steam turbines or steam engines caused by any condition or occurrence within such boilers, pipes, turbines or engines; nor explosion of steam boilers, steam pipes, steam turbines or steam engines if owned by, leased by, or operated under the control of the insured. This exclusion does not apply to direct loss resulting from the explosion of accumulated gases or unconsumed fuel within the fire box, or combustion chamber, of any fired vessel or within the flues or passages which conduct the gases of combustion therefrom.

.3 Infidelity or dishonesty of the Insured or its employees; nor any unexplained loss, mysterious disappearance, or loss or shortage disclosed on taking inventory.

.4 Loss or damage caused by electrical current artificially generated unless fire or explosion ensues and then the Insurance Company shall be liable only for such ensuing loss, but electrical arcing is not a fire or explosion within the meaning of this policy.

.5 Loss or damage from freezing to plumbing, heating, air conditioning or other equipment (except fire protective systems) or the resulting leakage or overflow unless the Insured shall have exercised due diligence in maintaining heat or such equipment had been drained and the water supply shut off.

.6 Loss to real property in process of construction caused by or resulting from error, omission or deficiency in design, specifications, workmanship or materials. This exclusion does not apply to loss by fire, lightning, windstorm, hail, explosion, riot or civil commotion, aircraft, vehicles, smoke or discharge from fire protection or building service equipment to the extent that such perils are insured against in this policy.

.7 Loss or damage to watercraft while waterborne.

.8 Loss or damage caused by mechanical breakdown, wear and tear, deterioration, inherent or latent defects; and settling, cracking, bulging, shrinking or expansion of pavements, foundations, walls, floors or ceilings unless loss by a peril not otherwise excluded ensues and then the Insuring Company shall be liable only for such ensuing loss.

.9 Loss or damage caused by or resulting from:

a. Hostile or warlike action in time of peace or war, including action in hindering, combating, or defending against an actual, impending or expected attack, (1) by any government or sovereign power [de jure or de facto], or (2) by military, naval or air forces, or (3) by an agent of any such government, power, authority or forces;

b. Any weapon of war employing atomic fission or radioactive force whether in time of peace or war;

c. Insurrection, rebellion, revolution, civil war, usurped power, or action taken by governmental authority in hindering, combating, or defending against such an occurrence; seizer or destruction under quarantine or customs regulations, confiscation by order of any government or public authority, or risks of contraband or illegal transportation or trade;

.10 Loss or damage by nuclear reaction or nuclear radiation or radioactive contamination, all whether controlled or uncontrolled, or due to any act or condition incident to any of the foregoing, whether such loss be direct or indirect, proximate or remote, or be in whole or in part caused by, contributed to, or aggravated by any of the perils insured against by this policy except that:

a. The Insuring Company shall be liable for direct loss or damage caused by sudden and accidental radioactive contamination including resultant radiation damage resulting directly from the following perils except as excluded elsewhere hereunder: fire, lightning, windstorm, hail, explosion, riot and civil commotion, vandalism and malicious mischief, water discharged accidentally from sprinkler equipment, impact of falling aircraft or objects falling therefrom, impact of vehicles (except aircraft) moving on land or tracks, heat from molten metal which shall have accidentally escaped from equipment, sonic shock waves (generally known as sonic boom), and smoke except accumulative damage resulting from the sudden, unusual and faulty operation of stationery furnace located on the described premises; provided such radioactive contamination arises from materials used or stored or from processes conducted on the described premises, and provided at the time of loss there is neither a nuclear reactor nor any new or used nuclear fuel on the described premises;

b. If fire or sprinkler leakage ensues, liability is specifically assumed for direct loss by such ensuing fire or sprinkler leakage but not including any loss due to nuclear reaction, nuclear radiation or radioactive contamination.

11.2.5 The University's policy contains a loss deductible clause. For any loss which may occur, the Contractor shall be responsible for payment of the first $1,000. of each and every loss occurrence, except the Contractor shall be responsible for the first $5,000. of each and every loss occurrence resulting from surface water. The Contractor shall be responsible for any loss not covered by the University's insurance, including any loss under the deductible amounts specified, and the Contractor may self insure or obtain insurance to cover any losses, at his option. The University will be responsible for and pay the amount of any loss occurrence above the deductible amounts specified herein, up to the deductible amount of the policy as it may be applied to the loss under this Contract. The insuring Company is responsible to pay for the insured loss above the deductible amount of the policy as it is applied to a loss under this Contract.

11.2.6 For the Work under this Contract, the Architect/Engineer, the Contractor and all his subcontractors and lower tier sub-subcontractors, and other agents shall be named, designated or deemed to be in such capacity as insured jointly under the "Builders Risk" coverage of the University's master policy.

11.2.7 Any property not covered by the University's insurance policy, such as the Contractor's tools, machinery or equipment and property of a similar nature not destined to become a part of the Project, shall be the Contractor's responsibility and the Contractor may self-insure or provide other insurance at his option. The University or Architect/Engineer shall not be responsible for any loss or damage to property of any kind owned or leased by Contractor, his subcontractors, his or their employees, servants, or agents. Any policy of insurance covering the Contractor's and subcontractors' owned or leased machinery, tools, and equipment against loss by physical damage shall provide that Underwriters waive their rights of subrogation against the University, Architect, Contractor and all subcontractors.

11.2.8 Any property owned by any of the insureds and destined to become a permanent part of the Project, shall be covered while off the premises or in transit to a maximum of $250,000. per loss occurrence, subject to the same payment for losses under the deductible as specified under 11.2.5 above.

11.2.9 The University, the Architect, the Contractor, other separate Contractors, and the subcontractors and lower tier sub-subcontractors of all Contractors automatically, upon entering into construction agreements in connection with this Project, waive all rights, each against others, for damages caused by fire or other perils insured under the University's Property and Boiler and Machinery Insurance, to the extent of the insurance coverage, except such rights as they may have to proceeds of insurance held by Trustees, the University or the insurer. It is a part of this Contract that no insured shall be held responsible for damage to property of another if the loss is caused by a peril insured under the University's Property and Boiler and Machinery Insurance. The Contractor shall arrange for, and require, similar waivers by Subcontractors and Sub-subcontractors in accordance with Clause 5.3.1.5 of these General Conditions, if necessary.

11.2.10 In addition to the coverage at the actual site of the Project, equivalent coverage will be provided to include any nearby work site established by the University or Contractor for use by the Owner, Architect, Contractor or Sub-contractors for office space or exclusively for delivery or storage of materials or equipment, or for the fabrication of materials to be used on the Project, but excluding fabrication at the Contractor's or any subcontractors' permanent facilities. Such nearby work or storage sites shall be deemed the Project Site and property will not be subject to off-premise or in-transit limitations.

11.2.11 The University's policy provides coverage after the Project is complete. Coverage under the "Builder's Risk" period of coverage will not be invalidated or negated in the event of partial occupancy by the University or other occupants. The University will notify the insurance carrier when the Project is substantially complete.

11.2.12 All losses, whether they appear to be below the specified deductible loss amounts the Contractor is responsible for or not, shall be immediately reported to the University and the Property Insurance carrier, under loss notice procedures as directed by the University.

11.2.13 In the event of a loss which is less than deductible amounts the Contractor is responsible for, the Contractor shall take immediate steps to repair, replace or otherwise remedy the loss to prevent or minimize a delay in progress of the Project. In the event of a loss in excess of the deductible amounts the Contractor is responsible for, the University will provide authorization and/or obtain permission of the insurance carrier to allow the Contractor to immediately replace,repair, rebuild or remedy the loss so the work is accomplished as quickly as practicable and to prevent or minimize any delay in progress of the Project. The University will arrange to compensate the Contractor for the replacement, repairs, rebuilding or other remedy. The Contractor shall cooperate with the University and the insuring company's adjuster to determine the value of the loss. Payment for losses which are satisfactorily rebuilt or remedied shall be made promptly to the Contractor and in the event the work to remedy a loss extends for a period over 30 days, partial payments shall be made at the same time as other Requests for Payment are paid. Any claim for an extention of time as a result of a loss shall be approved by the University.

11.2.14 All losses shall be adjusted by and be payable to the University. Should any insured party have objection to the University adjusting a loss, a committee of the insured parties shall be named to cooperate with and assist the University in settling the loss, with all subcontractors represented by one of the insured subcontractors. After the Contractor has received payment on a loss the Contractor shall pay each Subcontractor a just share of any uninsured loss the Contractor is responsible for (including deductible amounts) and of any insurance moneys received by the Contractor, and by appropriate agreement, written where legally required for validity, shall require each Subcontractor to make payments to his Sub-subcontractors in similar manner.

11.2.15 In the event of a loss, the University shall act as Trustee for any proceeds paid by insurance. The University shall deposit money received from insurance in an account separate from other funds and shall distribute it in accordance with such agreement as parties in interest may reach, or under an award of arbitrators. However, the University shall have no liability for the division, application and payment of proceeds from the insurance except for any improper management, allocations or disbursements made as a result of intentional or willful misconduct. If, after loss, no special agreement is made, replacement of damaged work may be ordered and executed, as provided for under Changes in Work.

11.2.16 After substantial completion of the Work, or upon full occupancy by the University, whichever occurs first, the University's insurance will become permanent property insurance on the Work or the Project under the master policy. When the permanent property insurance is in effect, the University hereby waives all subrogation rights (as required under paragraph 11.2.9 above)

under the permanent insurance for any loss due to an insured peril which may occur during the remainder of the Contract.

11.2.17 With respect to Work under this Contract in existing buildings, inasmuch as the University deems his existing property to be adequately covered by his permanent Property Insurance, the University hereby waives any claim against the Architect/Engineer, the Contractor, and all subcontractors and lower tier Sub-subcontractors on the Work or the Project for possible damage to his existing properties from fire or any other peril insured under the University's Property Insurance during construction and any specified guarantee periods under this Contract, except losses resulting from or arising out of the misconduct or negligence of the Contractor, any subcontractors, any sub-subcontractor, or the employee, business visitors, or agents of any of them.

11.2.18 The University's insurance company may advise and assist the Contractor in establishing a loss prevention program and in eliminating potential loss hazards. While this service shall be advisory only, the Contractor shall comply with all reasonable requests and requirements of the insurance company's loss control engineer. The Fire Safety Director, specified under Article 1.27 of Section 01010 shall consult and cooperate with the insurance company's loss control engineer in developing procedures and regulations, as well as the enforcement of these.

11.3 STEAM BOILER AND MACHINERY INSURANCE

11.3.1 Under a separate master policy, the University has insurance to cover loss or damage to hot water boilers, steam boilers, steam pipes, steam turbines or steam engines caused by any condition or occurrence within such boilers, pipes, turbines or engines; as well as explosion of steam boilers, steam pipes, steam turbines or steam engines if owned by, leased by, or operated under the control of the University as the Insured.

11.3.2 Prior to the testing, use or start up of any equipment of item as enumerated under 11.3.1 which is provided under the Contract, the Contractor, or appropriate subcontractor, shall advise the University in ample time so it may arrange for any required inspections.

11.3.3 The Waiver of Subrogation as provided for under Sub-paragraph 11.2.9 of the preceding Paragraph 11.2 Property Insurance shall also apply to the insurance under this Paragraph 11.3, the same as though repeated herein.

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 pre-determined 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:

	Overhead	Profit	Commission
(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 charge 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 CORRECTIONS 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 Sub-subcontractors 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 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, 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 employement 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 15.1.2. If other Wage Rates are included in the Conract 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.

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
Laws 1973 - Chapter 724
10/30/78

County			
	Anoka	Hennepin	Scott
	Carver	Isanti	Sherburne
	Chisago	Pine	Washington
	Dakota	Ramsey	Wright

Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Laborers					
Classification 1					
Common Laborer	8.75	.60	.40	.45	-
Steel Joist Handler (erection)	8.75	.60	.40	.45	-
Power Buggy Operator	8.75	.60	.40	.45	-
Carpenter Tender	8.75	.60	.40	.45	-
Earth Dumpman	8.75	.60	.40	.45	-
Damp Proof Below Grade	8.75	.60	.40	.45	-
Classification 2					
Reinforced Steel Handler	8.80	.60	.40	.45	-
Classification 3					
Men Handling Cement 2 hours per day (bulk or sack, excluding Mortar Mixer)	8.85	.60	.40	.45	-
Mason Tender	8.85	.60	.40	.45	-
Concrete Joint Saw Operator	8.85	.60	.40	.45	-
Laborer, Demolition and Wrecking (not including remodeling)	8.85	.60	.40	.45	-
Classification 4					
Hot Tar Caulker and Corker	8.90	.60	.40	.45	-
Laborers on Swing Stage Line (Scaffold (not including "Patent" scaffolding)	8.90	.60	.40	.45	-
Automatic Tamper Operator	8.90	.60	.40	.45	-
Chipping Hammer Operator	8.90	.60	.40	.45	-
Paving Buster	8.90	.60	.40	.45	-
Mortar Mixer, Cement or any other substitute materials or composition	8.90	.60	.40	.45	-
Concrete Vibrator Operator	8.90	.60	.40	.45	-
Sheeting Setters and Drivers or Heaving Building Excavation	8.90	.60	.40	.45	-
Classification 5					
Underground Work	9.00	.60	.40	.45	-

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
Laws 1973 - Chapter 724
10/30/78

County			
	Anoka	Hennepin	Scott
	Carver	Isanti	Sherburne
	Chisago	Pine	Washington
	Dakota	Ramsey	Wright

Building Construction

Laborers (cont.)

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Classification 6					
Pipe Layer	9.05	.60	.40	.45	-
Classification 7					
Caisson Work	9.10	.60	.40	.45	-
Underpinning	9.10	.60	.40	.45	-
Classification 8					
Nozzelman	9.15	.60	.40	.45	-
Classification 9					
Foremen	9.25	.60	.40	.45	-
Classification 10					
Dynamite Men	9.455	.60	.40	.45	-
Power Drillers for Blasting Purposes	9.455	.60	.40	.45	-
Classification 11					
Watchman	7.15	.60	.40	.45	-
Classification 12					
Flagman	8.15	.60	.40	.45	-

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.

PREVAILING HOURS OF LABOR

The " prevailing hours of labor" for all classes of laborers and mechanics to be employed on State contract building 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
10/30/78

County					
	Aitkin	Dodge	Kanabec	Nicollet	Sibley
	Anoka	Faribault	Koochiching	Nobles	Stearns
	Benton	Fillmore	Lake	Olmsted	Steele
	Blue Earth	Freeborn	LeSueur	Pine	Wabasha
	Carlton	Goodhue	Martin	Ramsey	Waseca
	Carver	Hennepin	McLeod	Rice	Washington
	Chisago	Houston	Meeker	Rock	Winona
	Cook	Isanti	Mille Lacs	St. Louis	Wright
	Crow Wing	Itasca	Morrison	Scott	
	Dakota	Jackson	Mower	Sherburne	

Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Power Equipment Operators (cont.)					
Locomotive Operator	11.40	.55	-	.50	.05
Master Mechanic	11.65	.55	-	.50	.05
Mechanic or Welder	11.28	.55	-	.50	.05
Mechanical Space Heater (Temporary Heat)	10.00	.55	-	.50	.05
Oiler or Greaser	10.00	.55	-	.50	.05
Overhead Crane Operator (inside building perimeter)	11.40	.55	-	.50	.05
Pick-up Sweeper (1 cu. yd. and over Hopper capacity)	10.45	.55	-	.50	.05
Power Plant Engineer (100 KW and over on multiples equal to KW and over)	11.20	.55	-	.50	.05
Pumpcrete and Concrete Pumping Machine Operator	11.28	.55	-	.50	.05
Straddle Carrier Operator	11.20	.55	-	.50	.05
Tower Crane - Stationary	11.40	.55	-	.50	.05
Tractor Operator, D-2 or similar size and Front End Loader Operator up to 1 cu. yd.	10.93	.55	-	.50	.05
Tractor Operator, Over D-2	11.20	.55	-	.50	.05
Tractor Operator with Boom	11.40	.55	-	.50	.05
Traveling Tower Cranes	11.75	.55	-	.50	.05
Truck Crane Oiler	10.45	.55	-	.50	.05
Truck and Crawler Cranes up to and not including 150 ft. of boom including jib	11.40	.55	-	.50	.05
Truck and Crawler Cranes with 150 ft. of boom up to and not including 200 ft. of boom including jib	12.10	.55	-	.50	.05

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
Laws 1973 - Chapter 724
10/30/78

County					
	Aitkin	Dodge	Kanabec	Nicollet	Sibley
	Anoka	Faribault	Koochiching	Nobles	Stearns
	Benton	Fillmore	Lake	Olmsted	Steele
	Blue Earth	Freeborn	LeSueur	Pine	Wabasha
	Carlton	Goodhue	Martin	Ramsey	Waseca
	Carver	Hennepin	McLeod	Rice	Washington
	Chisago	Houston	Meeker	Rock	Winona
	Cook	Isanti	Mille Lacs	St. Louis	Wright
	Crow Wing	Itasca	Morrison	Scott	
	Dakota	Jackson	Mower	Sherburne	

Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Power Equipment Operators					
Classifications					
Air Compressor Operator, 375 CFM or over, Pump and/or Conveyor Operator, Fireman, Temporary Heat	10.45	.55	-	.50	.05
Air Compressor Operator, 375 CFM or over, Pump Operator and/or Conveyor Operator, 2 or more machines	11.28	.55	-	.50	.05
Boom Truck Operator	11.20	.55	-	.50	.05
Brakeman	10.45	.55	-	.50	.05
Concrete Batch Plant Operator	10.93	.55	-	.50	.05
Concrete Mixer Operator	11.20	.55	-	.50	.05
Derrick (Guy & Stiff Leg)	11.40	.55	-	.50	.05
Drill Rigs-Heavy Rotary or Churn when used for caisson drilling for elevator cylinder on building construction	11.20	.55	-	.50	.05
Fireman, Chief License	11.40	.55	-	.50	.05
Fireman, 1st Class License	10.93	.55	-	.50	.05
Fork Lift Operator	11.28	.55	-	.50	.05
Front End Loader Operator	11.20	.55	-	.50	.05
Gunite Operator	10.93	.55	-	.50	.05
Helicopter Operator (hoisting material)	14.60	.55	-	.50	.05
Hoist Engineer (One Drum)	11.20	.55	-	.50	.05
Hoist Engineer (Two Drums)	11.28	.55	-	.50	.05
Hoist Engineer (Three Drums or more)	11.40	.55	-	.50	.05

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
Laws 1973 - Chapter 724
10/30/78

County					
	Aitkin	Dodge	Kanabec	Nicollet	Sibley
	Anoka	Faribault	Koochiching	Nobles	Stearns
	Benton	Fillmore	Lake	Olmsted	Steele
	Blue Earth	Freeborn	LeSueur	Pine	Wabasha
	Carlton	Goodhue	Martin	Ramsey	Waseca
	Carver	Hennepin	McLeod	Rice	Washington
	Chisago	Houston	Meeker	Rock	Winona
	Cook	Isanti	Mille Lacs	St. Louis	Wright
	Crow Wing	Itasca	Morrison	Scott	
	Dakota	Jackson	Mower	Sherburne	

Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Power Equipment Operators (cont.)					
Truck and Crawler Cranes with 200 ft. of boom and over including jib	12.95	.55	-	.50	.05
Welding Machine Operator	10.45	.55	-	.50	.05
Well Point Pump Operator	11.20	.55	-	.50	.05

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 increase labor costs if and when additional classifications are subsequently required or wage rates increase prior to the awarding of contracts.

PREVAILING HOURS OF LABOR

The "prevailing hours of labor" for all classes of laborers and mechanics to be employed on State contract building 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
10/30/78

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

Building Construction Work

Truck Drivers

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TR
Group 1 (Five axle or more)					
Truck Driver (hauling machinery for employer's own use, including operation of hand and power operated winches)	9.80	.50	-	.50	-
Mechanic-Welder	9.80	.50	-	.50	-
Group 2					
Tri Axle Trucks (including four axles)	9.45	.50	-	.50	-
Group 3					
Bituminous Distributor Driver	9.35	.50	-	.50	-
Bituminous Distributor (one man operation)	9.35	.50	-	.50	-
Tandem Axle Trucks	9.35	.50	-	.50	-
Slurry Drivers	9.35	.50	-	.50	-
Group 4					
Bituminous Distributor Spray Operator (Rear End Oiler)	9.15	.50	-	.50	-
Boom and "A" Frame Driver	9.15	.50	-	.50	-
Dumpman	9.15	.50	-	.50	-
Greaser and Truck Serviceman	9.15	.50	-	.50	-
Pilot Car Driver	9.15	.50	-	.50	-
Ready-Mix Concrete Truck Driver	9.15	.50	-	.50	-
Tank Truck Helper (gas, oil, road oil and water)	9.15	.50	-	.50	-
Teamster and Stableman	9.15	.50	-	.50	-
Tractor Operator (wheel type used for any purpose)	9.15	.50	-	.50	-
Self-propelled Packer	9.15	.50	-	.50	-
Slurry Operator	9.15	.50	-	.50	-
Single Axle Trucks	9.15	.50	-	.50	-

NOTICE TO BIDDERS, WAGE DETERMINATIONS

The wage determinations include classifications which the Commissioner of t Department of Labor and Industry has determined to be the classes of labor mechanics commonly employed in building construction work. Additional classifications may be drawn from the omission of classifications which hav local usage. Further, the State will not be liable for increase labor cost if and when additional classifications are subsequently required or wage rates increase prior to the awarding of contracts.

PREVAILING HOURS OF LABOR

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Building Construction

			BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Bricklayer/Stonemason							
County:	Anoka Carver Chisago Dakota Hennepin	Isanti Ramsey Scott Washington Wright	10.76	.65	.56	.53	-
	Faribault Freeborn (west part)	Steel Waseca	10.50	.70	-	.35	-
	Aitkin (west part) Crow Wing	Koochiching Mille Lacs	10.65	.60	.30	.30	-
	Aitkin (east part) Carlton Cook Kanabec	Lake Pine St. Louis (south part)	11.02	.40	.50	.30	.05
	Goodhue (west part)	Rice Steel	11.125	.70	-	.35	-
	Blue Earth Le Sueur	Nicollet Sibley	10.405	.65	.61	.61	-
	Morrison		11.15	-	-	.30	-
	Goodhue (east part) Wabasha		11.00	.70	-	.35	-
	Dodge Fillmore Freeborn (east part)	Mower Olmsted	10.575	.70	.50	.25	-
	Benton Sherburne	Stearns	10.40	-	1.00	.25	-

Building Construction

			BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG
Asbestos Worker							
County:							
Anoka Benton Blue Earth Carver Chisago Dakota Dodge Faribault Fillmore Freeborn Goodhue Hennepin Houston	Isanti Jackson Kanabec Le Sueur Martin McLeod Meeker Mille Lacs Morrison Mower Nicollet Nobles Olmsted	Ramsey Rice Rock Scott Sherburne Sibley Stearns Steele Wabasha Waseca Washington Winona Wright	11.13	.70	1.00	.65	.02
Aitkin Carlton Cook Crow Wing Itaska	Koochiching Lake Pine St. Louis		12.95	.45	1.00	.25	-

NOTICE TO BIDDERS, WAGE DETERMINATIONS

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

			BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Boilermakers							
County:	Aitkin	Martin					
	Anoka	McLeod					
	Benton	Meeker					
	Blue Earth	Mille Lacs					
	Carlton	Morrison					
	Carver	Mower					
	Chisago	Nicollet					
	Cook	Nobles					
	Crow Wing	Olmsted					
	Dakota	Pine					
	Dodge	Ramsey					
	Faribault	Rice					
	Fillmore	Rock					
	Freeborn	St. Louis					
	Goodhue	Scott					
	Hennepin	Sherburne					
	Houston	Sibley					
	Isanti	Stearns					
	Itaska	Steele					
	Jackson	Wabasha					
	Kanabec	Waseca					
	Koochiching	Washington					
	Lake	Winona					
	Le Sueur	Wright	12.00	1.15	-	1.00	.03

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Carpenters (cont.)						
County:						
Lake (north part)	St. Louis (northeast part)	10.39	.40	.30	-	-
Carlton	Pine (north part)	10.05	.40	.50	.40	-
Aitkin (south part)	Crow Wing	10.70	-	-	-	-
Kanabec (north part) Mille Lacs (north part)	Morrison	10.05	-	-	-	-
Benton Mille Lacs (southwest part)	Sherburne (west part) Stearns	10.83	-	.75	-	-
McLeod (west part)	Meeker	9.60	.40	-	-	-
Anoka Carver Chisago Dakota Hennepin Isanti Kanabec (south part) McLeod (south part) Mille Lacs (southeast part)	Pine (south part) Ramsey Scott Sherburne (east part) Washington Wright	10.46	.65	.50	.50	.02

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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Carpet/Linoleum Layers						
County:						
Anoka, Carver, Chisago, Dakota, Hennepin, Isanti	Kanabec, McLeod, Meeker, Mille Lacs, Pine, Ramsey	10.10	.61	.88	.54	.02
Cook, Lake (south part)	St. Louis (south part)	9.90	.40	.75	.50	-
Dodge, Fillmore (west part)	Olmsted, Wabasha (south part)	10.20	.50	-	.50	-
Koochiching, St. Louis (northwest part)		10.15	.40	-	.30	-
Jackson, Nicollet (west part)	Nobles, Rock	10.20	-	-	-	-
Blue Earth, Le Sueur (west part)	Martin, Nicollet (east part)	10.90	.50	-	-	.02
Faribault, Freeborn (west part)	Waseca (south part)	10.82	-	-	-	-
Le Sueur (east part), Rice	Steele, Waseca (north part)	9.35	.50	.50	.50	-
Freeborn (east part)	Mower	10.82	-	-	-	-
Fillmore (east part)	Winona, Houston	10.32	-	-	.50	-

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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Carpet/Linoleum Layers (cont.)						
County:						
Goodhue	Wabasha (north part)	10.10	-	-	-	-
Aitkin (north part), Itasca (west part)		9.89	.40	.30	.50	-
Itasca (east part), Lake (north part)	St. Louis (w. cen. part), St. Louis (northeast part)	10.39	.40	.30	-	-
Carlton		10.05	.40	.50	.40	-
Aitkin (south part), Crow Wing		10.70	-	-	-	-
Morrison		10.05	-	-	-	-
Benton	Stearns	10.83	-	.75	-	-

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Cement Masons					
County:					
Anoka, Carver, Chisago, Dakota, Hennepin, Pine (south part), Isanti, Kanabec, McLeod, Mille Lacs, Ramsey, Sherburne, Sibley, Scott, Washington, Wright	10.88	.60	-	.60	-
Aitkin, Carlton, Cook, Lake, Pine, St. Louis (south part)	11.095	.40	-	-	-
Itasca, St. Louis (north part)	10.70	.40	-	-	-
Blue Earth, Dodge (west part), Fillmore (east part), LeSueur, Nicollet, Rice, Waseca, Winona	11.05	-	-	-	-
Dodge (east part), Fillmore, Olmsted	11.05	-	-	-	-
Crow Wing, Koochiching	10.30	.60	.30	.30	-
Benton, Stearns	9.55	-	1.00	.25	-
Morrison	10.80	-	-	.30	-
Meeker	10.15	-	.35	.25	-
Goodhue, Wabasha	10.65	.70	-	.35	-
Faribault, Freeborn (west part)	9.60	.70	-	.50	-
Freeborn (east part), Mower	9.35	.70	.50	.25	-

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Cement Masons (cont.)					
County:					
Houston, Jackson, Martin, Nobles, Rock, Winona (east part)	10.50	-	-	.25	-

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ilding Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
ectrical Workers						
unty:						
asca	St. Louis					
ochiching	(north part)	11.28	4%	11%	3%	1%
tkin	Lake					
rlton	Mille Lacs (no. part)					
ok	Morrison					
ow Wing	Pine (north part)					
nabec (no. part)	St. Louis (so. part)	11.43	4%	11%	8%	¼%
noka (east part)	Mille Lacs (so. part)					
sago	Pine (south part)					
kota	Ramsey					
odhue	Rice					
(west part)	Sherburne					
nabec	(east part					
(south part)	Washington					
santi						
e Sueur						
(east part)		11.20	5 3/4%	11%	2 7/8%	1 3/4%
noka (west part)	McLeod					
enton	Meeker					
lue Earth	Nicollet					
arver	Scott					
aribault	Sherburne					
ennepin	(west part)					
ackson	Sibley					
eSueur	Stearns					
(west part)	Waseca					
artin	Wright	11.35	7%	10½%	6%	1 3/4%
reeborn	Steele					
ower		10.65	.60	6%	3%	¼%
odge	Olmsted					
illmore	Wabasha					
oodhue (east part)		10.65	.60	6%	3%	¼%
ouston	Winona	11.15	.65	-	3%	-

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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Electrical Workers (cont.)						
County:						
Nobles	Rock	10.40	.40	6%	.50	½%

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Glaziers						
County:						
Blue Earth	Nicollet					
Jackson	Nobles					
Le Sueur (west part)	Rock					
Martin	Sibley	8.20	-	-	-	-
Anoka	Ramsey					
Carver	Rice					
Chisago	Sherburne (east part)					
Dodge (northwest part)	Scott					
Dakota	Steele (north part)					
Goodhue	Wabasha (north part)					
Hennepin	Waseca (north part)					
Isanti	Washington					
Le Sueur (east part)	Wright (south part)					
Mc Leod						
Pine (south part)		10.50	.45	.35	.50	.01
Dodge (south part)	Mower					
Freeborn (east part)	Steele (southeast part)	9.57	-	.13	.30	-
Benton	Sherburne (west part)					
Kanabec	Stearns					
Mille Lacs	Wright (north part)					
Morrison		10.03	.40	-	-	-
Faribault	Steele (south part)					
Freeborn	Waseca (south part)	9.65	-	.50	-	-
Dodge (northeast part)	Olmsted					
Fillmore	Wabasha					
Goodhue (southeast part)	Winona					
Houston		10.06	-	.30	-	-

DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Elevator Constructors						
County: Aitkin	Martin					
Anoka	McLeod					
Benton	Meeker					
Blue Earth	Mille Lacs					
Carlton	Morrison					
Carver	Mower					
Chisago	Nicollet					
Cook	Nobles					
Crow Wing	Olmsted					
Dakota	Pine					
Dodge	Ramsey					
Faribault	Rice					
Fillmore	Rock					
Freeborn	St. Louis					
Goodhue	Scott					
Hennepin	Sherburne					
Houston	Sibley					
Isanti	Stearns					
Itasca	Steele					
Jackson	Wabasha					
Kanabec	Waseca					
Koochiching	Washington					
Lake	Winona					
Le Sueur	Wright	11.31	.895	1.02	.56	.025

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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Ironworkers						
County:						
Anoka	Meeker					
Benton	Mille Lacs					
Blue Earth	Morrison					
Carver	Mower					
Chisago	Nicollet					
Dakota	Olmsted					
Dodge	Pine (south part)					
Faribault	Ramsey					
Fillmore	Rice					
Freeborn	Scott					
Goodhue	Sherburne					
Hennepin	Sibley					
Houston	Stearns					
Isanti	Steele					
Kanabec (south part)	Wabasha					
	Waseca					
Le Sueur	Washington					
Martin	Winona					
McLeod	Wright	11.65	.75	-	.60	.04
Jackson	Rock					
Nobles		10.62	.62	-	.45	.04½
Aitkin	Kanabec (north part)					
Carlton	Koochiching					
Cook	Lake					
Crow Wing	Pine (north part)					
Itasca	St. Louis	11.75	.30	.50	.55	.02

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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Lathers						
County:						
Anoka	Le Sueur					
Benton	McLeod					
Blue Earth (north part)	Meeker					
	Mille Lacs					
Carver	Morrison					
Chisago (west part)	Nicollet					
	Rice					
Dakota (west part)	Scott					
	Sherburne					
Hennepin	Sibley					
Isanti	Stearns					
Kanabec	Wright	10.19	.50	.70	.65	.01
Blue Earth (south part)	Martin (east part)					
	Mower					
Dodge	Olmsted					
Faribault	Steele					
Fillmore	Wabasha					
Freeborn	Waseca					
Houston	Winona	10.26	-	1.00	-	-
Aitkin	Koochiching					
Carlton	Lake					
Cook	Pine					
Crow Wing	St. Louis					
Itasca		10.45	.40	.75	-	-
Chisago (east part)	Goodhue					
	Ramsey					
Dakota (east part)	Washington					
		10.19	.50	.70	.65	.01
Jackson	Nobles					
Martin (west part)	Rock	9.96	-	-	-	-

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Millwrights					
County:					
Aitkin (south part), Anoka, Benton, Blue Earth, Carver, Chisago, Crow Wing, Dakota, Dodge, Faribault, Fillmore, Freeborn, Goodhue, Hennepin, Houston, Isanti, Jackson, Kanabec, Le Sueur, Martin, McLeod, Meeker, Mille Lacs, Morrison, Mower, Nicollet, Nobles, Olmsted, Pine, Ramsey, Rice, Rock, Scott, Sherburne, Sibley, Stearns, Steele, Wabasha, Waseca, Washington, Winona, Wright	10.46	.65	.50	.50	.02
Aitkin (north part), Carlton, Cook, Itasca, Koochiching, Lake, St. Louis	10.05	.40	.50	.40	-

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Marble Setters					
County:					
Aitkin, Anoka, Benton, Blue Earth, Carlton, Carver, Chisago, Cook, Crow Wing, Dakota, Dodge, Faribault, Fillmore, Freeborn, Goodhue, Hennepin, Houston, Isanti, Itasca, Jackson, Kanabec, Koochiching, Lake, Le Sueur, Martin, McLeod, Meeker, Mille Lacs, Morrison, Mower, Nicollet, Nobles, Olmsted, Pine, Ramsey, Rice, Rock, St. Louis, Scott, Sherburne, Sibley, Stearns, Steele, Wabasha, Waseca, Washington, Winona, Wright	10.76	.65	.56	.53	-

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Building Construction

Painters	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
County:					
Chisago, Dakota, Pine (south part), Ramsey, Washington					
Brush	10.84	.55	-	.25	.13
Structural Steel	11.34	.55	-	.25	.13
Spray	11.34	.55	-	.25	.13
Swing Stage	11.34	.55	-	.25	.13
Anoka, Carver, Hennepin, Isanti, McLeod, Kanabec, Scott, Sherburne (south part), Wright					
Brush	10.76	.55	-	.25	.13
Structural Steel	11.26	.55	-	.25	.13
Spray	11.26	.55	-	.25	.13
Swing Stage	11.26	.55	-	.25	.13
Carlton, Cook, Lake, Pine (north part), St. Louis, Koochiching, Itasca					
Brush	10.81	.40	-	.40	.11
Structural Steel	11.31	.40	-	.40	.11
Spray	11.31	.40	-	.40	.11
Swing Stage	11.31	.40	-	.40	.11
Dodge, Faribault, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Wabasha, Winona					
Brush	10.15	.37	-	.30	.08
Structural Steel	10.15	.37	-	.30	.08
Spray	10.15	.37	-	.30	.08
Swing Stage	10.15	.37	-	.30	.08

DEPARTMENT OF LABOR AND INDUSTRY WAGE [redacted] DETERMINATION
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Building Construction

Pipefitter/Steamfitter	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
County:					
Benton, Meeker, Morrison, Sherburne (west part), Stearns	10.82	.53	1.00	.50	.06
Anoka, Carver, Hennepin, Isanti, McLeod, Mille Lacs, Scott, Sherburne (east part), Wright	11.14	.53	1.25	.50	.05
Blue Earth, Jackson, Le Sueur, Martin, Nicollet, Nobles, Rock, Sibley	11.72	.53	1.00	-	.05
Cook (north part), Itasca, Lake (north part), St. Louis (north part)	11.33	.56	1.00	.68	.05
Carlton, Cook (south part), Kanabec, Lake (south part), Pine, St. Louis (south part)	10.66	.40	1.50	.75	.05
Koochiching	12.40	.75	-	.75	-
Dodge, Faribault, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Waseca, Winona	11.06	.50	1.30	.20	.03
Aitkin, Crow Wing	10.06	.53	1.00	.80	.06
Chisago, Dakota, Ramsey, Washington	10.97	.53	1.52	.50	.06

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Building Construction

Pipefitters/Steamfitters (cont.)

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Plasterers						
County:						
Jackson Martin	Nobles Rock	10.50	-	-	.25	-
Houston		11.20	-	.70	-	-
Anoka Carver Hennepin Isanti Kanabec McLeod	Mille Lacs Scott Sherburne Sibley Wright	10.60	.50	.70	.45	.02
Chisago Dakota Pine (south part)	Ramsey Washington	10.65	.70	.65	.25	.01
Blue Earth Le Sueur	Nicollet Waseca (west part)	11.20	-	.70	-	-
Meeker		10.95	-	.35	.25	-
Faribault Freeborn	Mower	11.20	-	.70	-	-
Dodge (east part) Fillmore (west part)	Olmsted	11.20	-	.70	-	-
Itasca	St. Louis (north part)	11.095	.40	-	-	-
Aitkin Carlton Cook	Lake Pine (north part) St. Louis (south part)	11.095	.40	-	-	-
Benton	Stearns	9.55	-	1.00	.25	-
Crow Wing	Koochiching	10.65	.60	.30	.30	-

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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Plasterers (cont.)						
County:						
Dodge (west part) Rice	Steele Waseca (east part)	10.20	-	.70	-	-
Fillmore (east part)	Winona	10.20	-	.70	-	-
Goodhue	Wabasha	11.00	.70	-	.35	-
Morrison		11.15	-	-	.30	-

NOTICE TO BIDDERS, WAGE DETERMINATIONS

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PREVAILING HOURS OF LABOR

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		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Plumbers						
County:						
Benton Meeker Morrison	Sherburne (west part) Stearns	10.82	.53	1.00	.50	.06
Anoka Carver Hennepin Isanti McLeod	Mille Lacs Scott Sherburne (east part) Wright	11.09	.53	1.35	.50	.05
Blue Earth Jackson Le Sueur Martin	Nicollet Nobles Rock Sibley	11.72	.53	1.00	-	.05
Cook (north part) Itasca	Lake (north part) St. Louis (north part)	11.33	.56	1.00	.68	.05
Carlton Cook (south part) Kanabec	Lake (south part) Pine St. Louis (south part)	10.66	.40	1.50	.75	.05
Koochiching		12.40	.75	-	.75	.05
Dodge Faribault Fillmore Freeborn Goodhue Houston Mower	Olmsted Rice Steele Wabasha Waseca Winona	11.06	.50	1.30	.20	.03
Aitkin	Crow Wing	10.06	.53	1.00	.80	.06
Chisago Dakota	Ramsey Washington	10.92	.53	1.52	.50	.04

NOTICE TO BIDDERS, WAGE DETERMINATIONS

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Building Construction

Plumbers (cont.)

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		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Roofers						
County:						
Blue Earth	Freeborn					
Faribault	Waseca	9.95	.55	.75	.20	-
Carlton	Lake					
Cook	Pine					
Itasca	St. Louis					
Koochiching		10.33	.40	1.25	.35	-
Aitkin	Meeker					
Anoka	Mille Lacs					
Benton	Morrison					
Carver	Nicollet					
Chisago	Nobles					
Crow Wing	Ramsey					
Dakota	Rice					
Goodhue	Rock					
Hennepin	Scott					
Isanti	Sherburne					
Jackson	Sibley					
Kanabec	Stearns					
LeSueur	Wabasha					
Martin	Washington					
McLeod	Wright	9.95	.75	1.00	.35	.03
Dodge	Olmsted					
Fillmore	Steele					
Houston	Winona					
Mower		9.62	-	-	.20	-

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ding Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
blasters						
ty:						
ago	Ramsey					
ta	Washington					
(south part)		11.34	.55	-	.25	.13
a	Kanabec					
er	Scott					
epin	Sherburne					
ti	(south part)					
od	Wright	11.26	.55	-	.25	.13
lton	St. Louis					
k	Koochiching					
e	Itasca					
e (north part)		11.31	.40	-	.40	.11
e Earth	Rice					
kson	Rock					
Sueur	Steele					
tin	Sibley					
ollet	Waseca					
les		10.40	.50	-	.15	.11
ton	Morrison (so. part)					
ker	Stearns					
lle Lacs	Sherburne (no. part)	8.40	-	3%	-	-
dge	Houston					
ribault	Mower					
llmore	Olmsted					
eeborn	Wabasha					
odhue	Winona	10.15	.37	-	.30	.08
tkin	Morrison					
ow Wing	(north part)	9.10	-	-	-	.08

NOTICE TO BIDDERS, WAGE DETERMINATIONS

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Building Construction

Sandblasters (cont.)

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ıilding Construction

	BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
heetmetal Workers					
ounty:					
enton, Sherburne, ille Lacs, Stearns, orrison	10.97	.52	.30	.20	.03
lue Earth, Mower, odge, Nicollet, 'aribault, Nobles, 'reeborn, Olmsted, ;oodhue, Rock, Jackson, Steele, .eSueur, Wabasha, 'artin, Waseca	9.44	.60	1.00	.55	.02
Meeker (west part)	9.12	.47	1.00	.44	.02
Crow Wing	10.71	.52	.40	.22	-
Anoka, Chisago, Dakota, Isanti, Washington, Kanabec, Pine, Ramsey, Rice	10.71	.79	1.15	.90	.06
Aitkin, Carlton, Fillmore, Houston, Cook, Lake, St. Louis (so. part), Winona	10.81	.40	1.25	.55	.03
Carver, Hennepin, McLeod, Meeker (east part), Scott, Sibley, Wright	11.22	.52	1.00	.81	.06
Itasca, Koochiching, St. Louis (north part)	10.30	.52	1.00	.77	.04

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lding Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
inklerfitters						
nty:						
ka	Ramsey					
ota	Scott					
nepin	Washington	11.38	.65	.50	.95	.02
tkin	Martin					
nton	McLeod					
ue Earth	Meeker					
rlton	Mille Lacs					
rver	Morrison					
isago	Mower					
ok	Nicollet					
ow Wing	Nobles					
dge	Olmsted					
ribault	Pine					
llmore	Rice					
eeborn	Rock					
odhue	St. Louis					
uston	Sherburne					
anti	Sibley					
asca	Stearns					
ckson	Steele					
nabec	Wabasha					
oochiching	Waseca					
ke	Winona					
Sueur	Wright	11.93	.75	-	1.05	.08

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Building Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
Terrazzo Workers						
Terrazzo Worker Helpers						
County:						
Aitkin	Martin					
Anoka	McLeod					
Benton	Meeker					
Blue Earth	Mille Lacs					
Carlton	Morrison					
Carver	Mower					
Chisago	Nicollet					
Cook	Nobles					
Crow Wing	Olmsted					
Dakota	Pine					
Dodge	Ramsey					
Faribault	Rice					
Fillmore	Rock					
Freeborn	St. Louis					
Goodhue	Scott					
Hennepin	Sherburne					
Houston	Stearns					
Isanti	Sibley					
Itasca	Steele					
Jackson	Wabasha					
Kanabec	Waseca					
Koochiching	Washington					
Lake	Winona					
LeSueur	Wright					
Terrazzo Workers		11.27	.64	-	.25	-
Terrazzo Worker Helpers		10.26	.64	.69	-	-

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DEPARTMENT OF LABOR AND INDUSTRY WAGE RATE DETERMINATION
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.ding Construction

		BASIC WAGE RATE PER HOUR	H & W	VAC.	PENSION	TRNG.
› Setters/Layers						
ıty:						
ge	Olmsted	10.75	.62	.66	.50	-
kin (east part)	Lake					
lton	St. Louis					
k	(south part)	10.75	.62	.66	.50	-
kin (west part)	McLeod					
ka	Meeker					
ton	Mille Lacs					
e Earth	Morrison					
ver	Mower					
sago	Nicollet					
w Wing	Nobles					
ota	Pine					
ibault	Ramsey					
lmore	Rice					
eborn	Rock					
dhue	St. Louis (no. part)					
nepin	Scott					
ston	Sherburne					
nti	Sibley					
sca	Stearns					
kson	Steele					
abec	Wabasha					
chiching	Waseca					
Sueur	Washington					
rtin	Winona					
	Wright	10.75	.62	.66	.50	-

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PART 1: SUMMARY OF WORK

1.01 DIVISION 1

A. The requirements of all sections of Division 1 apply to and govern the Contract and the Work of each Contractor and all (sub)contractors and vendors of material for this Project. Where the provisions of Division 1 or the technical specifications assign a specific requirements or responsibility to a particular (sub)contractor he shall have the responsibility to provide, accomplish, assume or enforce, but the Contractor and all (sub)contractors shall be governed by the requirements and shall cooperate in its fulfillment.

1.02 WORK COVERED BY THE CONTRACT DOCUMENTS

A. Work under this Contract consists of furnishing and installing all materials, labor, equipment and machinery, incidentals, and other facilities and services necessary for the proper execution and completion of JOML (Jackson Owre Millard Lyon Complex) Crematory Addition for the University of Minnesota.

B. The Project Site is located on the Minneapolis Campus of the University of Minnesota, south and east of the intersection of Church Street S.E. and Washington Avenue S.E. adjacent to Jackson Hall, the Complex identified for purposes of this Contract as the Jackson Owre Millard Lyon (JOML) Complex.

C. Related Requirements Specified Elsewhere:

1. Alternates: Section 01100

D. The drawings applicable to the Work of this Contract are entitled JOML Crematory Addition, dated September 28, 1978 and enumerated on Sheet A1 of drawings.

1.03 CONTRACT

A. Work shall be accomplished under a single lump-sum Contract.

1.04 ACTIVITIES BY OTHERS

A. JOML-B Contract: Remodeling work in the existing JOML Complex is underway and will be completed during June of 1979.

B. The University is acting to acquire the portion of the building area as indicated outside of the property line from the Minnesota Department of Transportation. The University will assume responsibility for the location of the building beyond the property line in the event clear title is not assumed prior to commencement of construction.

C. Contractor's Superintendent shall have authority from Contractor to provide all necessary field coordination of Work of this Contract with that of other Contracts.

D. The Contractor shall cooperate and coordinate all of his work with the University and all other contractors, and shall schedule all of his Work with the other contractors and the University.

1.05 FUTURE WORK

A. Future contracts: The University may award future contracts for other remodeling projects in the Jackson Owre Millard Lyon Complex, and reserves the right to demand the cooperation of this Contractor with all others on and about the JOML Complex.

1.06 CONTRACTOR USE OF PREMISES

A. It is imperative and mandatory to schedule and coordinate all activities with the JOML-B Contractor, other contractors, all sub-contractors and the University.

B. Should field dimensions be required, the Contractor and sub-contractors shall cooperate to obtain or provide them. 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 Contractor shall guarantee necessary dimensions, to the various fabricators and be responsible to insure the dimensions.

C. Storage areas and work spaces at the project site are very limited. The Contractor shall generally utilize offsite storage until deliveries can be made directly to the proper 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 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/and around the building, as approved by the University.

G. 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.

H. The Contractor shall confine his apparatus, materials, equipment, 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, Contractor shall meet with the University and agree to the use of available areas for storage. The Contractor shall then confine their storage and operations to said agreed limits and to University directions.

I. 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. 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.

J. 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.

K. 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.

L. 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.

M. 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, and entrances shall be kept clear and free of all Contractor's equipment, material and debris at all times. Remove debris promptly.

N. 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.

O. The University reserves the right to let other contracts in connection with this Project, or in connection with adjacent 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.

P. 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.

Q. 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.

R. Material deliveries are to be scheduled appropriately so that trucks are promptly unloaded upon arrival at the site.

S. Accomplish all work outside the construction limits, as required to complete the project, as expeditiously as possible. Keep such work to a minimum and confine operations and materials to the immediate area of the work. Schedule all work in advance with the University and with other authorities having jurisdiction.

T. For any work that must necessarily block or encroach upon streets and walks temporarily, the Contractor shall obtain approval of the appropriate government agency, such as the City of Minneapolis or Minnesota Department of Transportation. Contractor shall obtain any permits, file bonds, and comply with any restrictions, instructions or regulations as directed and required.

PART 2: SPECIAL REQUIREMENTS

2.01 SPECIAL CONSTRAINTS

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, who will coordinate with University Hospitals.

D. 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.

E. Contractor shall provide, in addition to the schedule updating required by Section 01200, weekly notice to the University of all work contemplated which will cause noise or vibration so that users are able to adjust to any adverse effect to the University's use of the premises caused by the construction work.

2.02 LAYING OUT THE WORK

A. The General Contractor shall locate and layout the work with relation to reference points. The General Contractor shall consult with the University and demonstrate to the University's satisfaction that significant points and elevations are correctly established.

B. 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.

C. As the Work progresses, the Contractor shall lay out the exact location of partitions and similar features, as guide to all trades.

D. 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 utiliziation 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. 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.

2.03 CONTRACT DOCUMENTS FOR THE CONTRACTOR

A. The Contractor will be provided, free of charge, twenty-five (25) complete 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.

2.04 ADDITIONAL DEFINITIONS

A. Owner: Where used, the term is synonymous with the University. Refer to Article 3 of the General Conditions.

B. Site: In general, the term refers to the actual site within the construction limits indicated, adjacent areas outside the construction limits where work must be performed to complete the Contract and nearby adjacent areas indicated as staging/storage areas and the access to these areas.

C. Quantity: 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.

2.05 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.

D. The entire installation shall comply with all codes and regulations, including the State of Minnesota and the University.

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PART 1: GENERAL

1.1 GENERAL INFORMATION AND REQUIREMENTS

A. Each bidder shall submit a proposal for each Alternate.

B. Each Alternate Bid shall be submitted as an individual cost for the particular Alternate (not accumulative) and shall be proposed under the premise all previous Alternates, in the listed order, 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. Alternates are numbered and listed for the entire project in the order in which they will be accepted.

D. Each Bid under an Alternate shall include the work of all trades as they may be affected and all adjustments to accommodate the change shall be made. All work shall meet all the requirements of the Contract Documents, including drawings and specifications.

E. 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.

F. Deductive Alternates accepted by the Owner will be used to determine the low bidder.

G. 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 thirty (30) days after receipt of bids.

PART 2: DEDUCTIVE ALTERNATES

2.1 DESCRIPTION OF ALTERNATES

DEDUCTIVE ALTERNATE NO. 1 - Omit future Mechanical Room

A. General Construction Work: Omit construction of the future mechanical room, NWSB-3, as indicated. Under this alternate the wall at Grid 3 becomes poured concrete, the same as indicated on Grid 1, and the quantity of earth support structure is reduced to accommodate the new construction and maintain the angle of repose indicated.

B. Mechanical Construction Work: Omit Unit Heater #2 and cap 3/4" HWS and HWR at tee in Room NWSB-3. Cap 3" waste below grade at wall between rooms NWSB-3 and NWSB-S. New gas meter and associated piping will be located in Room NWSB-3 rather than Room NWSB-5 as shown on plans. The Jackson Hall water Service shall be relocated around new construction and the water meter shall remain on its existing location.

C. Electrical Construction Work: Omit all electrical materials, equipment and installation in Room NWSB-5 west of grid #3 including light fixtures, branch circuit wiring, thermostat and unit heater connections.

PART 1: GENERAL

1.01 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.

1.02 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 elegible 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.

1.03 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.

1.04 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 the appearance of defective 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.

1.05 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.

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PART 1: GENERAL

1.01 GENERAL REQUIREMENTS

A. Refer to General Conditions, Article 8, for general conditions relating to the Contract Time, commencement of the Work, progress, completion and delays. Refer to Sections 01010 - Scope of Work and Special 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.

C. 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.

PART 2: COMMENCEMENT OF WORK

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. 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.

C. The Contractor shall commence work within 14 days after the University's Notice to Proceed or execution of the Contract, whichever occurs first. However, he shall not commence work until he has confirmed his delivery dates for critical materials and equipment so that the Work can be pursued in an orderly and continuous manner with the minimum of disruption. It is intended that maximum care be exercised in protecting the water integrity of the existing structure throughout the construction period. University approval of commencement day shall be required as an essential condition of the Construction Schedule. See Article 3.02 herein.

D. Once work on the site has commenced, the Contractor shall pursue the work continuously and diligently to completion within the specified time.

2.02 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 bi-weekly (unless job conditions warrant differently) 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.

2.03 COMPLETION SCHEDULE

A. Refer to General Conditions Subparagraphs 7.11.5 and 7.11.6 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. Substantial Completion of the entire Project shall be accomplished on or before 140 calendar days after Notice to Proceed or execution of Contract whichever is earlier.

C. Final Completion of the entire Project shall be accomplished within 28 days after Substantial Completion.

D. 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 Contractor and subcontractors shall work closely in timeing 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 shallbe given the time required for the installation of materials to be furnished and installed under other contracts with the Owner.

2.04 EXTENTION 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

3.01 UNIVERSITY ESTABLISHED CONSTRUCTION CONSTRAINTS AND COMPLETION TIMES

A. Work at the site shall be carefully coordinated among the various sub-contractors and vendors of this Contract and with any separate Contractor, as

well as the University and its agencies, and the JOML-B Contractor. All periods stated shall be in consecutive calendar days.

3.02 CONSTRUCTION SCHEDULE

A. Initial Schedule:

1. Within 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 thirty 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, site preparation, structural work, electrical and mechanical work, stop drawings submittal, review and revision, materials delivery, and acquisition and installation of fabricated 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 and similar information shall be submitted in accordance with this article.

B. Shop drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor, and which illustrate some portion of the work at the Project. Shop drawings are both specially developed data for the Project and standard prints, brochures or other pre-developed descriptive data applicable to the Project.

C. 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.

D. The Contractor shall provide two complete sets of the final shop drawings to the University plus two additional final sets of erection drawings.

E. After the award of the general construction contract for construction, this Contractor shall also submit shop drawings to the general contractor for his review and use. At this time field verified dimensions shall be obtained from the general contractor and any conflicts between various parts, elements or materials of the Project shall be resolved between the Contractor and the general contractor for construction. A minimum of four complete sets of final shop drawings and six sets of final erection drawings shall be provided to the general contractor, for his use and use by his subcontractors.

F. 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 40 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 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.

G. Drawings submitted, including transparencies, shall be marked with name of the Project, Contractor, Architect, whether "preliminary" or "final"in nature.

H. Transparencies will not be required for catalog 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.

I. 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 Owner and to be so minor as not to involve a change in contract price or time for performance, Architect will accept drawings.

J. If a deviation is proposed, or becomes necessary in the Contractor's opinion, the proposed deviation shall be specifically called to the Architect's attention by a bold "Note Deviation" or similar specific indication.

K. Acceptance of shop drawings and setting drawings will be general and, except as otherwise provided under paragraph "I" above, 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.

L. Checking and acceptance by Architect shall not relieve Contractor of responsibility for deviations from the Contract Documents 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.

M. Contractor shall coordinate the work of all 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 Owner or Architect.

2.2 SAMPLES

A. Deliver samples of materials, equipment, assemblies and components as required by specifications to Architect 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 the Project 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. Submit all other samples in duplicate.

2.3 LIST OF MATERIALS

A. Within 10 days after award of the Contract, the Contractor shall submit a complete itemized list of all products he proposes to furnish, including: specific products being provided "as specified"; specific products from the list of alternate products specified or listed in an addendum; specific products specified by reference to ASTM or similar standards; specific products proposed to be furnished by the Contractor or under a subcontract; shop drawings need not be submitted, but the products shall be sufficiently described to be easily identified. If necessary, literature, specifications, drawings, performance data or other information required to evaluate the product shall be submitted. After review and acceptance of any listed product by Architect, no change will be permitted, except as specified under Article 1.12 of the Special Requirements, Section 01010.

B. Where two or more makes or kinds of items are named in the specifications (or additional names are listed in an addendum), the Contractor shall state which particular make or kind of each item he proposes to provide. If the Contractor fails to state a preference, the Owner shall have the right to select any of the makes or kinds 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 Owner's acceptance.

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 equipments shall be specifically named, not listed "as specified".

2.4 LIST OF SUBCONTRACTORS

A. Within ten (10) days after the award of the Contract, the Contractor shall submit 3 copies of a complete list of any work he proposes to subcontract and the 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 Owner. The list shall be in the form prescribed by the Architect. When appropriate, or when requested by the Architect, the list shall include other 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 toreject 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, the 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.

2.6 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 Consitions and Articles 1.3 and 1.4 of Section 01150
Liability Insurance	Paragraph 1.11 of General Conditions and Article 1.11 of Section 01010.
Equal Employment and Prevailing Wages	Articles 15 and 17 of General Conditions
Testings and Inspection	Section 01400 and Technical Sections
Form 134 Affidavit	Subparagraph 9.7.2 ofGeneral Conditions
Reports Certificates Samples Guarantees	Technical Sections

PART 1: GENERAL

1.1 TESTING

A. Refer to 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 as detemmined by the Architect and the University.

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 qualificaations 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 on "similar" material will not be acceptable.

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 quality 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. At least ten days prior to commencing fabrication on the following products, or others the University advises the Contractor of, the University shall be notified of the scheduled date for commencing production:

1. Miscellaneous metals, as designated by the Owner

B. The University's right to inspect the fabrication facilities and fabrication of products for the Project shall not be limited to the products listed. After notice, the University may inspect any and all facilties 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 specification 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.

1.8 FEDERAL INSPECTION

A. The authorized representatives and agents of the Federal Government shall be permitted to inspect all Work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.

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PART 1: CONSTRUCTION HEAT, LIGHT AND POWER, WATER, TELEPHONE

1.01 TEMPORARY (CONSTRUCTION) HEAT

A. Temporary Heat: As used in this specification, temporary heat shall mean all heat required and provided during construction until backfill is accomplished. Maintain above freezing temperatures. During finishing work maintain temperature not lower than 60°F.

B. Existing Heating System: Not permitted for use.

C. Temporary Heating Units or Devices: All units or devices used are subject to approval of the University. Portable units must be vented and provide smokeless units at times and locations necessary to prevent smoke and toxic fume damage or stains to building or materials. Restore damage as directed. Temporary devices used inside when fully or partially enclosed shall be acceptable (smokeless and vented if oil or gas fired portable unit heaters) with motor driven fan. Electric heaters will not be permitted unless approved by the University as the only reasonable solution.

D. Miscellaneous Requirements: Provide temporary heat such that no damage results to building, materials or installed work as may be caused by dampness, cold, thermal chock, smoke or similar damage related to heat. Maintain adequate and continuous temperatures to prevent any such damage. Keep workmen or watchmen present constantly when open fires are burning.

1.02 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, 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 exceedthe service and any damage resulting from misuse, faulty equipment or overloading shall be paid for by responsible persons.

2. 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 University 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 indicated the available service may reach capacity the Contractor and Subcontractors requiring such service shall provide their own service after being advised by the University when such condition is likely to exist.

D. Existing Service: 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 as soon as practicable and when approved by the University.

1. The Electrical subcontractor shall provide temporary wiring, sockets and outlets for lighting and hand tools.

F. Lamps: Throughout the construction period, lamps in temporary lighting systems shall be provided, including replacements, 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.

1.03 SAFETY LIGHTING

A. The Contractor shall provide lighting at temporary walkways or temporary lighting at permanent walkways, constructed under this Project, until permanent lighting is installed.

B. When temporary lighting is no longer required, the Contractor shall remove the temporary facilities, at a time approved by the Owner.

1.04 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 freezing and damage at all times.

B. Domestic Water Service: An existing inside loop inside the JOML Complex can be utilized to provide domestic water service. The fire line to Lyons Lab can be shut down during the time for relocation. Notify the University of Minnesota and the Fire Department prior to shutdown.

C. There is no permanent water service under this Contract.

D. The Owner will allow free use of water, provided the privilege is not abused and unnecessary running of water is prevented.

PART 2: FIRE SAFETY

2.01 FIRE SAFETY DEVICES AND SYSTEM

A. General: Contractor shall be alert to fire hazards and remove or protect against hazards and shall comply with directions 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 (i.e. oil, electrical) at those areas where unusual hazards may exist. The number and distribution of devices shall be adequate for effective fire control, to the satisfaction of the University.

C. Fire Hydrants: The area fire hydrants must be accessible at all times. Fences and construction work must be arranged and accomplished to provide immediate access to hydrants.

PART 3: OFFICE, TOILETS, STORAGE ENCLOSURES

3.01 CONSTRUCTION OFFICES AND CONFERENCE SPACE

A. Contractor shall maintain an office at a designated location in the existing building immediately adjacent to the construction area suitable for storing of records and for conferences. 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. Contractor shall provide a temporary partition with lockable door as approved by the University to separate the office space from the normal building activities.

D. At the completion of project Contractor shall remove his material and

equipment from the construction office, remove the temporary partition, return the space to its original condition and turn it over to the University.

3.02 SANITARY FACILITIES

A. The University will designate toilet rooms in the existing buildings for the use of Contractor and his employees. Contractor shall maintain clean use and care of these facilities.

3.03 STORAGE

A. General: The Contractor (and each subcontractor) shall provide adequate enclosures and coverings to protect and preserve all materials stored at the site. Materials such as wood, finished metal, cement, masonry materials, equipment of any type, conduit and similar materials, shall not be piled directly on ground. Any material subject to damage, deterioration or weathering when exposed shall be covered or in protective enclosures. The University reserves the right to direct such protection, which shall be complied with by the Contractor. Coverings shall be durable, watertight, fully cover sides as well as top, substantial and well anchored to prevent blowing away. Any protection which becomes damaged shall be replaced immediately.

1. When no longer required, the Contractor shall remove storage enclosures.

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.

3.04 CONSTRUCTION FENCE

A. The existing fence surrounding the site is the property of the University and is under the care and control of the JOML-B Contractor presently working at the premises.

B. The Crematory Contractor shall assume care and control of the fencing and move and reconstruct the fencing as indicated. Provide matching additional fencing as required. Any damage to fencing due to Work under this Contract shall be repaired.

C. Upon completion of work under this contract, or prior to completion as approved by the University, remove fencing and deliver to the University at a Twin City location as designated by the University.

PART 4: MISCELLANEOUS PROVISIONS

4.01 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.

4.02 PROTECTION IN GENERAL

A. Refer to Article 10 of the General Conditions, other Articles of this Section 01500 and 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 accepts any responsibility of the Contractor to provide all protection required for persons or property.

B. Contractor and each subcontractor shall provide protection for all his own equipment, hoists, and other facilities used in the prosecution of the work, to prevent operation of unauthorized personnel.

4.03 TEMPORARY CLOSURES AT EXISTING BUILDINGS

A. The Contractor shall provide neat and approved temporary closures wherever work of this Project interfaces with existing buildings or spaces. In general, closures shall be partition types (not canvas or similar material), with doors or access between the spaces only as required. Surfaces facing adjacent finished or occupied spaces shall have equivalent of gypsum board surface, smooth and undamaged. Temporary closures shall be located as approved by the University, with minimum encroachment on the existing spaces. Closures shall not block required exits nor unduly restrict circulation or activities in the adjacent space. The Contractor shall provide a schedule to the University, on a floor-by-floor and location-by-location basis when areas need to be vacated to install closures, or when areas will be closed off.

B. Temporary closures shall provide security from passage between the spaces (new spaces and existing space remaining in use by University), as well as provide protection from weather and from the transfer of dust. When any closure will be exposed to weather from November to April, it shall be insulated with 3" minimum blanket insulation. Perimeters and penetrations shall be sealed with masking tape, caulk or other appropriate seal to eliminate passage of air and dust. Closures shall be well maintained to protect against weather, dust and to provide security.

C. Painting of surfaces facing adjacent finished or occupied spaces will be done by the University, if required.

D. At a time agreed upon by the University and Contractor, temporary closures shall be removed and all permanent surfaces cleaned and restored by the Contractor.

4.04 SIGNS

A. Job Sign: Custom job sign not required.

B. Office Sign: Contractor may provide a sign to identify the project and directional signs from nearest main street to project area; professional lettered signs only.

C. No other signs permitted, including signs on structure.

PART 1: GENERAL

1.01 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. 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.

C. 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.

D. 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 theUniversity and the Architect of any conditions which may exist in the Contract Documents which will affect proper operation or first quality installation.

E. 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 subcontractor 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 adjustment during preparation of shop drawings or in advance of field or shop work to accommodate other work to prevent unsatisfactory items or installation.

F. 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.

G. 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.

1.02 PROPOSED MATERIALS AND EQUIPMENT

A. Refer to Article 12 of the Instructions to Bidders, Paragraph 7.13 of the General Conditions and Article 2.03 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 ordersfor 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, 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 Contractor's 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.

1.03 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 ot Architect's acceptance.

1.04 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.

1.05 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 where casting-in may be difficult to coordinate, provided they will not damage the concrete or cause any spalling around the anchor.

F. Sleeves shall be provided for all pipes, conduit and similar features that pass through walls, floors, roof slabs, concrete joists, concrete beams or girders, or concrete bridging, 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. Unless otherwise called for, sleeves passing through walls, slabs, beams, bridging, 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. Sheet metal sleeves may be used only where specifically approved. Unless otherwise called for: sleeves through walls shall extend full thickness of wall and be cut flush with finished surface; sleeves through exterior building walls, above or below grade 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" (all equipment rooms and similar spaces) the sleeves shall extend 1-1/2" above finished floor; where concealed, sleeves through floor shall be cut flush with floor. Where sleeves occur in rows or clusters, a minimum of 4" of concrete shall be left between sleeves and if the normal spacing of reinforcing bars cannot be maintained, or are interrupted because of sleeve size or cluster locations, extra reinforcing shall be provided as directed by the Architect. In no case shall sleeves impair the structural capability of the Work, new or existing.

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.

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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 programs 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 subcontractors, as well as his own work, obtain firm commitments from subcontractors on completion of their work and coordinate his effort with all others 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 at the date of substantial completion.

C. After substantial completion, the Contractor shall continue to diligently prosecute all remaining work in an organized, efficient manner.

PART 2: PROJECT CLOSE OUT

2.1 REQUIREMENTS SPECIFIED ELSEWHERE

A. Insurance: Refer to General Conditions, Article 11.

1. Upon completion of last phase of the work and final payment, provide a certificate of insurance that indicates the specified Completed Operations will be provided a minimum of one year after the University's acceptance of the entire Project.

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, Article 9 Sub-paragraph 9.3.12. 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 9.6.2.

E. Guarantees - Warranties: Refer to General Conditions, Sub-Paragraphs 4.5.1 and 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 or a specific guarantee is referenced, submit guarantee in the specified form. Submit guarantees prior to final payment. 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 2.6. 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 progress permits.

J. Sanitary Facilities: Refer to Section 01500. Restore the rooms as specified, prior to substantial completion.

K. Temporary Facilities:

1. As the job progresses and facilities are no longer needed, they shall be removed by the Contractor, at a time approved by the University.

2. Prior to final payment, the Contractor shall remove all temporary sheds, offices, barricades, surplus materials, debris and other materials or items not part of the Project.

L. Identification of Equipment: Prior to substantial completion, the Contractor shall provide the identification tags or plates, or other identification means, as specified under the Technical Sections of the specifications, such as at valves, panelboards and similar items. Plates with directions, circuit data and similar information shall also be affixed.

2.2 CLEAN-UP

A. Refer to General Conditions, Article 4.16, for general requirements of cleaning during construction. Unless otherwise specified, each subcontractor shall be responsible for cleaning the materials and equipment of his work, as well as the removal (hauling away) of all his own debris, cartons, crates, surplus materials and maintaining his work neat and orderly.

B. It is intended the general "final" cleaning 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 all trades, and each shall schedule their operations to conform to the cleaning plan. In general, the Mechanical and Electrical Sub-contractors shall perform their cleaning and debris removal from the spaces first, with the General Contractor last.

C. Contractor shall thoroughly clean the materals, 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 at future mechanical room shall be "broom clean". 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.

D. 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.

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PART 1: GENERAL

1.01 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 removal 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. The University will disconnect and remove window air conditioner units.

E. 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.

F. 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 Subcontractors shall make removals of work normal to their activities or as may be called for, for reuse or relocaiton, 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.

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

2.01 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.

2.02 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.

2.03 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. Cleaning or restoration of the University's salvage materials is not required.

PART 3: EXECUTION

3.01 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 so as to prevent damage from water and the elements and prevent excessive heat loss from the existing building.

C. Refer to Article 4.02 of Section 01500. 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.

3.02 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.

3.03 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.

3.04 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 (ie: 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.

3.05 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 buried in floors or walls (not in chases or concealed spaces), providing that it is disconnected from its source. There shall be no "dead end" water, sewer, or vent piping existing in the completed work. Abandoned piping, duct work, conduit or other mechanical or electrical items in chases, vertical enclosures or concealed above ceilings shall be completely removed.

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.

3.06 WORK OF EACH SUBCONTRACT

A. Each Subcontractor shall carefully review the Contract Documents including 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.

3.08 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 or 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 painted 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 01600 - Materials and Equipment, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes all earthwork required by the Construction Documents within the defined construction limits as well as outside the construction limits as may be required to accomplish all phases of work under the general Construction Contract. The following broadly outlines the intent of work under this section; do not construe as describing all phases, operations, details, methods or requirements. Perform, provide and accomplish all similar and related items to complete the work.

1. Removal and disposal of existing paving, walls, utilities, curbs, trees, shrubs, buried foundations, slabs and miscellaneous structures.

2. Removal and disposal of excavated materials which are excess or not suitable for fill, backfill or topsoil.

3. Earth excavations required for construction and site development including excavations for footings.

4. Backfilling and compacting against footings and walls.

5. Placing and compacting of fills, backfills and cushions.

6. Grading of site within the construction limits.

7. Protection of buildings, structures, streets, paving, curbs, manholes, walks, utilities and underground services and other new or existing items to remain from damage.

8. Provide to site all materials of kinds required to accomplish work shown and specified, unless available at the site.

9. Removal and disposal of abandoned, or to be abandoned, underground services uncovered in the course of excavation, except do not remove services to be abandoned until they have been capped and are no longer used.

10. Mechanical and Electrical Sub-contractors are generally responsible for excavations and trenching necessary solely for their own work, such as pipe trenches, including backfilling and compacting. The General Contractor shall examine their work as it progresses, particularly backfilling in and about the building, to determine the quality of materials, methods and compaction are consistent with the requirements of general construction.

C. Related work specified elsewhere:

1. Cutting, Removal and Patching: Section 01910.

2. Protection, Excavation Support Walls: Section 02400.

3. Cast-in-Place Concrete: Section 03300.

D. Work Not in Contract:

1. Topsoil, N.I.C.: By Owner.

1.2 CONDITIONS AT THE SITE

A. Refer to General Conditions and Section 01010 - Summary of Work and Special Requirements. Bidders shall completely familiarize themselves with the site and the drawing sheets showing the conditions as they are expected to exist. No extra compensation will be allowed for unforeseen conditions that can be determined from a careful examination of the site, drawings and specifications.

1.3 TESTING

A. The Owner will retain the services of qualified engineers employed by an independent testing laboratory to analyze the soils and perform tests, report findings and determine whether the required soil values are obtained.

B. The Contractor shall extend full cooperation to these engineers in obtaining samples for field and laboratory use.

1.4 INSPECTIONS AND APPROVAL

A. The methods of excavation for footings, shall be subject to the approval of the Owner and Architect.

B. The final conditions at the bottoms of the excavations will be inspected by the Owner and testing laboratory. Approval of conditions found must be obtained from the Owner before concrete is placed.

PART 2: MATERIALS

2.1 EARTHWORK MATERIALS

A. Granular fill and backfill. Reasonably well graded pit run granular materials, sand or sand-gravel, clean course and sharp in character, free of debris, cobbles and boulders, free of clay and silt, free of organic material or other material which will prevent compaction and support for heavy loading (3000 psf) without displacement or flowing. Use material classified under ASTM D2487-69 and D2488-69 as SW, SP, GW, GP or GM-SM. Suitable material from site may be used after analysis and classification by soil laboratory. Use for:

1. General fill and backfill within and at buildings.

2. Backfill at foundations interior and exterior.

3. Backfill at underground ducts, trenches and similar excavations.

4. Fill and sand cushion under exterior concrete walks.

B. Site Sill: For general fill at site, use best classes of materials available at the site, using coarse grained soils as far as possible and avoiding use of silty and other poor soils. Use fill material free from debris and organic matter. Use for general site fill at unsurfaced areas.

C. Laboratory tests on types of materials to be used for general fill and backfill and granular cushion will be provided by the Soils Engineer, retained by the Owner in accordance with Article 1.3 and 3.4. Two tests to be provided for each type of soil. Contractor shall consult with the Soils Engineer, who shall make a recommendation of optimum moisture content, method of providing this moisture and methods of compaction for each type of fill. Contractor shall moisten or dry out fill and provide and accomplish compaction as recommended by laboratory. Copies of tests shall be provided to Architect, University and Contractor.

2.2 THICKNESS OF MATERIAL

A. Sand or sand-gravel cushions under floors and walks: 6".

PART 3: EXECUTION

3.1 DEMOLITION AND SITE CLEARANCE

A. Demolish existing foundations, paving, drives, curbs, and utilities as necessary to excavate and grade on the site. Remove all debris and legally dispose away from the site. Where debris is mixed with soil, both the soil and the debris shall be removed. Remove all trees, shrubs, plantings, root systems and stumps not scheduled to remain. Protect existing adjacent buildings, trees, shrubs, and areas, features, and property. Replace any sidewalks, curb, gutter and other structures broken as result of operations under this Contract which are to remain within the construction limits. Provide utilities indicated to remain in service.

3.2 EXCAVATION

A. Plan Grades: All new grades shown on Sheet A-1 are "Finish" grades. Grades at points between spot elevations or contours are to be determined by interpolation between given grades or elevations.

B. Soil Excavation:

1. Perform no excavation adjacent to existing features until proper precautions or protection have been provided or will be provided as excavations progress. Immediately replace any damage and restore services.

2. Within areas of building and walks, excavate and remove all black soils, soil with organic content, fill materials or soft soil materials as may be found which are unsuitable for loads. No footings or similar loads are to bear on fill or soil with inadequate bearing capacity.

3. Excavate to lines, levels, dimensions shown and required with allowances for slabs, cushions and other features. Hand excavate lower levels (at least 10") of footing and trench excavations and work adjacent to existing utilities, pipes and buildings. See Excavation Support Walls and Protection, Section 02400.

4. Keep footing trenches level and free of loose dirt, debris or water. Provide excavations for footings and walls wide enough to accommodate forms as all concrete shall be formed.

5. Remove all frost from ground such that no building feature is placed on frozen ground.

6. Fill any excavations made below required level with mass concrete, 2000 psi minimum.

C. Excavated Material: Excavated material, if suitable as determined by Soil Testing Laboratory, shall be retained on the site for use as described under Article 2.1. All unsuitable materialand other excess earthwork materials shall become the property of the Contractor and shall be disposed by him off the limits of the University at no further cost to the Owner. Conduct operations such that excavation material and aterial used for fill shall not be subject to erosion and he shall be responsible for any damage to adjacent properties, because of erosion, or diversion of surface water drainage.

D. Water:

1. All footing excavations must be kept free of surface water by grading the surface adjacent to the excavation to divert water.

2. Provide pumping of ground water or other water to keep excavations free of water, including time of placing and curing concrete and compaction or other work subject to water damage.

3.3 BACKFILLING

A. Backfilling Methods:

1. All excavated areas of the site shall be thoroughly cleaned of all debris before backfill operations are begun.

2. All backfill material shall be in accordance with Article 2.1.

3. Backfill shall be placed in uniform, successive layers approximately 8" in compacted thickness. Each layer shall be level, smooth and thoroughly compacted by appropriate means over the entire surface before placing successive layers.

4. Embankments shall not be constructed during periods when the soil will freeze while being placed and compacted, not shall any embankment material be placed on soil that is frozen. Frozen soil shall not be placed in embankments. All embankments more than 2 feet in thickness shall be compacted by mechanical means.

5. The Contractor shall provide the necessary vibratory or rolling equipment to obtain the required compaction.

6. Compaction by grading equipment shall not be considered adequate for uniform compaction.

7. Small vibratory or hand tamping compactors shall be required wherever fill or backfill is placed adjacent to walls or around footings and columns.

8. Where fill or backfill materials are placed on both sides of walls, they shall be placed in layers alternately on opposite sides of the walls to maintain levels that will avoid displacement of, or damage to, the walls.

9. Where fill or backfill materials are placed on one side of a wall the wall shall be adequately shored and braced or the material shall not be placed until the supporting floor slab has been poured and set.

10. Any trenches dug in the compacted fill or backfill materials shall be backfilled firmly in uniform layers not exceeding eight inches in loose depth with each layer being compacted with a small vibratory or hand tamping compactor to the density specified in Article 3.4.

11. Fills and backfills shall be formed and maintained to provide proper drainage.

12. The finished subgrade surfaces shall be reasonably smooth, compacted and free from irregular surface changes.

B. Drainage: As necessary during the progress of work, provide adequate temporary drainage facilities that will prevent erosion damage or unnecessary delay of the work, and shall restore original drainage as soon as the work will permit. Provide and maintan drainage away from any building or work area during the construction period.

C. Removal of Water: Dispose of any water entering the excavation and at all times maintain the excavation in a clean and dry condition. Water shall not be conducted onto adjacent property.

D. Inspection:

1. The Architect and University will inspect all excavations, fills and backfills prior to the placement of footings. Footings and slabs on grade shall not be placed until inspections of excavation or tests of fills and backfills are completed.

2. Laboratory tests (sieve analysis, density tests, etc.) of the fill and backfill materials and the methods or compaction must be accepted by the University before starting work.

E. Grading:

1. All grades shown on plan sheet A-1 are finish grades. All grading shall be worked such that smooth contours will result and that the subgrade shall be reasonably smooth and free from lumps, boulders, branches, etc. Hand level around all obstructions. At areas not to be saved, grade to finish grade less 6". 6" topsoil to be placed by Owner.

2. Grade the site at areas which are to be paved (concrete) making allowances for gravel cushions and thickness of pavement.

3.4 FIELD AND LABORATORY TESTS

A. Laboratory and field testing of soils prior to and during excavation, filling backfilling and compaction operations shall be done in accordance with the following:

1. The Owner shall retain an independent testing laboratory which shall provide inspection of excavations, soils evaluation tests and soil density tests.

2. Tests of compacted fills against building foundations shall be made on each 2 feet of fill depth and 75 lineal feet of wall. On each compacted fill layer, make one field density test for each 1000 sq.ft. of building area or paved surface.

3. The independent testing laboratory shall submit to the Owner, in triplicate, plus a copy to the Architect and Contractor, complete written reports of all inspections and tests performed as soon as practical after they are made.

4. No fill or backfill materials shall be placed until the necessary tests have been made and approval obtained by the Architect and Owner.

5. Field Density Tests of the compacted fills and/or backfills shall be performed in accordance with ASTM D1556.

6. All material to be used for granular fill, backfill and gravel cushion shall be tested by Mechanical analysis (AASHO) to determine conformance with specifications.

7. Compaction of the following shall meet or exceed the following percentages of Proctor Density (ASTM D698):

- 96% for: All fill and backfill within building; backfill against building foundations and other backfill and cushions under all concrete slabs (interior or exterior); all backfill within 25 feet of building.

- 92% for: General site fill which is more than 20 feet from building and not under slabs or paved areas.

B. If tests indicate that the materials specified have not been furnished, placed and compacted in compliance with these specifications, the materials shall be removed, replaced, recompacted and retested and the entire cost of this additional work, including the costs of the retests, shall be paid for by the Contractor.

3.5 PROSECUTION AND CLEAN-UP

A. Be aware of and comply with work priorities outlined in these specifications and other adjustments in work schedule, as may be required to properly coordinate the construction work with other Contractors or the Owner's requirements.

B. Leave the site in an orderly condition free of all debris. All areas outside the Contract limits which have been disturbed shall be restored to their original condition.

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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 01600 - Materials and Equipment for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

1.2 WORK INCLUDED IN THIS SECTION

A. Work under this section includes all temporary excavation support walls and all other temporary or permanent protection structures required by the Contract Documents or necessary for the proper execution of this work. The below listing of work is furnished for the Contractor's convenience. Do not construe this list to be a complete description of work or operations required.

Barricades
Excavation support walls
Anchorages
Engineering designs, installations and maintenance of excavation support walls.
Removal of the excavation support walls

PART 2: SYSTEMS AND INSTALLATION

2.1 EXCAVATION SUPPORT WALLS

A. The Contractor shall design, provide, install and maintain the excavation support walls.

B. The Contractor shall submit to the Architect and Owner for review, complete design calculations, plans and details for walls.

C. These design calculations, plans and details shall be prepared and signed by a Professional Engineer registered in accordance with the laws of the State of Minnesota.

D. The design criteria for the excavation support walls and the lateral load diagram that will be used by the Architect for reviewing the calculations, plans and details for the wall are shown on the drawings. The design calculations submitted for the wall shall include investigations for each stage of construction, based on the maximum depth of excavation for that stage, as well as at the final depths of excavations.

E. Materials and installation methods to be used and followed for the design and installation of the walls shall be those commonly used for this type of work, based on proven engineering principles.

F. The anchorages provided for the excavation support walls shall provide an excavation completely free and clear of internal braces, rakers or struts.

G. The materials used for the construction of the wall shall be designed in accordance with the following:

1. Unit stresses for structural steel sections shall not exceed 120% of the design unit stresses for permanent loadings given in the 1963 Manual of Steel Construction, Sixth Edition, with current amendments, published by the American Institute of Steel Construction, Inc.

2. Unit stresses for steel sheet piling shall not exceed 70% of the minimum yield stress for the grade of steel used.

3. Unit stresses for timber lagging shall not exceed the design unit stresses for permanent loadings given in the National Design Specifications for Stress Grade Lumber and its Fastenings, published by the National Lumber Manufacturers Association.

4. The maximum design working load for tie-back rods or tendons shall be 60% of their ultimate load and they shall be load tested during installation to 120% of the maximum loading at each tie-back before releasing to 100% of the maximum design loading.

H. The installation of the walls shall be performed by qualified workmen experienced in this type of work.

I. The Contractor shall not start the excavation, nor purchase the materials for the walls, until the design calculations, plans and details for the walls have been reviewed by the Architect and Owner.

J. Maintenance of the excavation support wall shall continue from the time of installation until the removal of the walls during the backfilling operations adjacent to the walls.

2.2 PROTECTION

A. Provide the necessary excavation support wall shown on the drawings and all other protections required for any existing construction, service lines, utilities, streets, drives, walks, existing grades that are to remain, etc., which may be subject to damage during the excavation operations.

B. All protective methods shall be based on sound, proven engineering principles and which will not disturb the soil supported existing structures, not disturb soil on which new construction will bear, and will prevent soil from flowing out from under the structures.

C. All side slopes in soils shall be cut on stable angles, but in no case shall slopes be steeper than one to one.

D. Box and protect all trees in the construction area that are shown to remain.

E. Any damage to existing items that are to remain shall be repaired, or the damaged items shall be replaced, by the Contractor without cost to the Owner.

F. All barricades and work protections shall conform to the requirements of the rules of the National Board of Fire Underwriters, Laws of the State of Minnesota, and applicable ordinances and codes.

G. All work shall comply with the recommendations of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America.

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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 01600 - Materials and Equipment, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes all formwork for cast-in-place concrete.

C. Related work specified elsewhere:

1. Concrete Reinforcements: Section 03200.
2. Cast-in-Place Concrete: Section 03300.
3. Structural Steel: Section 05120.

1.2 REFERENCE STANDARDS

A. American Concrete Institute, (ACI), ACI 347-68, "Recommended Practice for Concrete Formwork".

B. ACI 301-72, "Specifications for Structural Concrete for Buildings".

C. ACI 318-71, "Building Code Requirements for Reinforced Concrete".

PART 2: PRODUCTS

2.1 MATERIALS

A. Construct forms of wood, metal or other material to the following requirements.

B. For exposed concrete, use BB Plyform Class I or II Exterior, HD Overlay Plyform Class I or II Exterior, Exterior Plyron with smooth tempered hardboard faces or 1/4" thick Tempered Presdwood Masonite form liners, free of torn grain, worn edges, hole patches or other defects.

C. Metal forms may be used, upon approval of the Owner and Architect, and shall produce surfaces equal to those of wood forms specified.

D. Sound boards, plank or metal forms may be used where concrete is not exposed, except structural slabs shall be formed with plywood.

E. Suitable moldings or chamfer strips shall be placed in the corners of column, beam and wall forms where the concrete will be exposed to view. Refer to architectural drawings.

F. Positive means of adjustment (wedges or jacks) of shores and struts shall be provided.

G. Form Oil: Non-staining paraffin-based meeting Federal Specification P-O-361.

H. Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be a commercially manufactured type. Nonfabricated wire is not acceptable. The portion remaining within the concrete shall leave no metal within one inch of the surface when the concrete is exposed to view. Spreader cones on ties shall not exceed one inch diameter. Ties for walls below grade shall be snap ties or have cones and shall incorporate a water-seal washer.

I. PVC Waterstop: Sonneborn-Contech Hydrocide Vinylstop 4316 S or equivalent of Williams Products Company, W.R. Grace, Vinylex, Valcan, or W.R. Meadows, Inc., or approved equal.

PART 3: EXECUTION

3.1 REMOVABLE FORMWORK

A. Construction: Construct forms to shapes, lines and dimensions called for on drawings, true to line, plumb and level, with joints mortar tight. Provide proper bracing and supports of sufficient strength to carry, without appreciable deflection and with absolute safety, the dead load of concrete as a liquid together with live loads of men, equipment and materials.

1. Provide sufficient forms so that work can be carried out without delay. Build forms of material of sufficent strength to hold concrete without bulging or sagging between supports. For concrete to be exposed to the weather, the edges shall be glued or otherwise sealed to prevent loss of any of the matrix. Edges of form panels in contact with concrete shall be flush within 1/16" and forms for plane surfaces shall be such that the concrete will be plane within 1/16" in four (4) feet.

2. Construct forms with proper camber resulting in level construction when the concrete has been placed in the forms.

3. Construct forms for exposed concrete with particular care to avoid appreciable deflection and to eliminate bulges, offsets or other unsightly features in the finished surfaces.

4. Design forms so they may be removed in the proper sequence and without damage to the concrete.

5. Provide side forms for beams and slabs which are removable without disturbing the bottom forms or the shoring beneath them.

6. Provide satisfactory foundations for formwork supported on the ground to carry the loads imposed during and after construction, without appreciable settlement.

7. Adjust shores and struts to take up all settlement during concrete placing operations.

8. Forms for walls and columns shall have removable panels where required for cleaning, inspection and application of bonding paste.

9. Design and construct formwork to insure that concrete surfaces will conform to the following tolerances.

a. Variation from the plumb:
   1. In the lines and surfaces of columns, piers and walls:
      In any 10 feet of length - - - - - - - - - - - - - - - - 1/4 in.
      In any story or 20 feet maximum - - - - - - - - - - - - 3/8 in.

   2. For exposed corners, control-joint grooves and other conspicuous lines:
      In any bay or 20 foot length - - - - - - - - - - - - - - 1/4 in.
      Maximum for entire length - - - - - - - - - - - - - - - 1/2 in.

b. Variation from the level or from the grades indicated on the drawings:

   In slab and beam soffits:
      In any 10 feet - 1/4 in.
      In any bay or 20 foot length - - - - - - - - - - - - - - 3/8 in.
      Maximum for entire length - - - - - - - - - - - - - - - 3/4 in.

c. Variation of the linear building lines from established position in plan and related position of columns, walls & partitions.
   In any bay or 20 foot length - - - - - - - - - - - - - - - 1 in.

d. Variation in the size and locations of sleeves, floor openings and wall openings - - - - - - - - - - - - - - - - + or - 1/4 in.

e. Variation in cross-section dimensions of columns and beams and in the thickness of slabs and walls:
   Minus - 1/4 in.
   Plus - 1/2 in.

f. Footings:

   1. Variations in dimension in plan
      Minus - 1/2 in.
      Plus - 2 in.
   2. Misplacement or eccentricity
      2% of the footing width in the direction of misplacement but not more than - - - - - - - - - - - - - - - - - - - 2 in.
   3. Reduction in thickness
      Minus - - - - - - - - - - - - - - - 5% of specified thickness

B. Soil Supported Forms: If soil supporting forms is not suitable to carry loads imposed without compressing, provide trussed supports.

C. Openings: Form all openings, chases, recesses, etc., shown on the drawings.

D. Cleaning and Oiling: Sweep, clean and oil coat forms before reinforcing is placed.

E. Re-use: Before form material is re-used, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged places repaired, and all projecting nails withdrawn. Re-use of form material shall be subject to specific approval of the Architect and Supervising Engineer.

F. Joints: Provide expansion and contraction joints where shown on the drawings. Provide construction joints as detailed and where required. Construct joints in accordance with ACI 301-72.

G. Wetting Forms: In hot weather, wet down forms with hose immediately before placing concrete.

H. Built-in Items: Cooperate with all trades for the installation of reinforcement, inserts, anchors, sleeves, and other built-in items.

I. Edge Forms and Screeds: Set edge forms and screeds accurately to produce the designed elevations, slopes in the finished surfaces. Provide required slope to drains.

3.2 REMOVAL OF FORMS

A. Forms shall be removed in accordance with requirements of the ACI Building Code Requirements for Reinforced Concrete, No. 318-71, Chapter 6, and the ACI publication "Recommended Practice for Concrete Formwork", No. 347-68, except as modified below, without damage to concrete and in a manner to insure complete safety of the structure. Leave shoring in place until concrete member will safely support its own weight plus any live loads that may be placed upon it.

B. All shores under slabs having 16'-0" or less clear span shall remain for a minimum of 7 days providing the 7 day test cylinder shows at least 3/4 of the 28 day compressive strength requirement. Add 1/2 day shoring time per foot for each foot over 16'-0" span to maximum of 14 days.

C. In all weather, all concrete slabs having 16'-0" or less clear span shall have had 3 days of 70°F and 4 days of 50°F before shore removal. Spans over 16'-0" shall have had 3 days of 70°F and 50°F for the remaining days providing that the 7 day test cylinder shows at least 3/4 of the 28 day compressive strength requirement. In cold weather (below 40°F) an extra 7 day test cylinder shall be job cured under the same conditions as the concrete.

D. Shoring under beams shall remain a minimum of 28 days and the concrete must have achieved full 28 day strength prior to stripping. Forms shall be built so that column forms can be removed first, then the sides of beams where they occur, than the slab forms. Shoring for beams must be placed on the column center lines and the beam bottoms and their shoring shall be so constructed that they can be left in place after the rest of the forms have been removed.

E. Removal of Shores and Reshoring: After form removal at slabs, "back-post" within four hours after original shores are removed. Backposting shall remain in place a minimum of 28 days and longer when required to carry added loads on the slab from forms supporting newly cast concrete and other loads from the construction of floor or floors above.

F. Upon removal of forms, the Architect shall be notified by the Contractor in order that an inspection of the newly stripped surfaces may be made prior to patching.

G. Freshly stripped surfaces shall not be pointed up or touched in any manner before having been inspected by the Owner and Architect.

3.3 INSPECTIONS OF CONCRETE SURFACES

A. The Owner and Architect will inspect the completed concrete work after the forms have been removed. Work that does not conform to the shapes, lines and dimensions shown on the drawings, within the tolerances specified under Article 3.1.A.9 as determined by the Owner and Architect, shall be repaired and/or removed and replaced by the Contractor at his own expense.

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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 01600 - Materials and Equipment, 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 reinforcement for cast-in-place concrete including all accessories required. Welded wire fabric reinforcement in slabs and wrappings for concrete encased steel beams, girders and columns are included under this section.

C. Related work specified elsewhere:

1. Concrete Formwork: Section 03100.
2. Cast-in-Place Concrete: Section 03300.
3. Masonry Reinforcement: Section 04200.

D. Furnished and installed under other sections:

1. Reinforcing for concrete filled lintels and bond beams: Section 04200.

1.2 REFERENCE STANDARDS

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

1. American Concrete Institute, Manual of Standard Practice for Detailing Reinforced Concrete, ACI 315-65.

2. American Concrete Institute, Building Code Requirements for Reinforced Concrete, ACI 318-71.

3. American Concrete Institute, Specifications for Structural Concrete Buildings, ACI 301-72.

4. Concrete Reinforcing Steel Institute, Placing Reinforcing Bars, 2d Edition, 1975.

5. Concrete Reinforcing Steel Institute, Manual of Standard Practice, 1973.

1.3 SUBMITTALS

A. Shop Drawings: Submit fabrication and placing drawings in accordance with Section 01300.

PART 2: PRODUCTS

2.1 MATERIALS

A. Welded wire fabric: ASTM A185.

B. All reinforcing bars: ASTM A615, Grade 60.

C. Supports and Accessories: Conform to ACI 315-65. Where concrete surface is exposed to view or weather, use plastic supports, include all spacers, chairs, ties, slab bolsters, clips, chair bars and other devices for properly assembling, placing, spacing, supporting and fastening the reinforcement. Metal supports shall be of such a type as not to penetrate the surface of the formwork and show through the surface of the concrete. Individual and continuous slab bolsters and chairs shall be of a type to complement the various conditions encountered and must be capable of supporting a 300-pound load without crushing.

2.2 DETAILING

A. Detail concrete reinforcement in accordance with ACI 315-65 and ACI 318-71.

2.3 FABRICATION

A. Shop fabricate to size, dimension and shape shown on approved shop drawings and within tolerances specified in ACI 301-72. After fabrication, sort, bundle, and metal tag reinforcement before delivery to the job site.

B. Concrete slabs on grade shall be reinforced as follows, unless noted or detailed otherwise on the drawings:

Slabs 4" or less in thickness - - - - - - 6 x 6 - 10/10 welded wire fabric.
Slabs 5" thick - - - - - - - - - - - - - - 6 x 6 - 8/8 welded wire fabric.
Slabs 6" thick - - - - - - - - - - - - - - 6 x 6 - 6/6 welded wire fabric.

C. Cast-in-place concrete walls shall be reinforced in accordance with Chapter 14 of the American Concrete Institute Building Code (ACI 318-71), unless noted or detailed otherwise on the drawings.

PART 3: EXECUTION

3.1 PLACEMENT

A. Place concrete reinforcement in accordance with the approved placing drawings, CRSI recommendations and CRSI Manual of Standard Practice and in accordance with tolerances specified in ACI 301-72.

B. Place only reinforcement that is free of mill scale, excessive rust, or other coating that would prohibit proper bond with the concrete.

C. Support reinforcement and guard against displacement during concreting.

3.2 FIELD QUALITY CONTROL

A. Notify the University when all reinforcement is in place for each pour at least 24 hours in advance of placing concrete. Allow no placing of concrete until the Owner has inspected concrete reinforcement in place in forms.

B. Corrections shall be made by the Contractor at his expense.

C. Exposed reinforcing steel in finished work, indicating the bars are not properly located, will be sufficient cause for the rejection, removal and replacement of the concrete section.

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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 01600 - Materials and Equipment, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes all cast-in-place concrete work.

C. Related work specified elsewhere:
1. Concrete Formwork: Section 03100.
2. Concrete Reinforcement: Section 03200.
3. Structural Steel: Section 05120.
4 Miscellaneous Metals: Section 05500.

D. Furnished by Owner:

1. Retain and pay for testing agency for field quality control only. (Contractor shall retain and pay for testing agency for materials testing and mix design.)

E. Furnished and installed under other sections:

1. Concrete bond beam and lintel fill: Section 04200.

1.2 REFERENCE STANDARDS

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

1. American Concrete Institute Publication:

a. ACI 301-72, "Specifications for Structural Concrete for Buildings".
b. ACI SP-15, Field Reference Manual.
d. ACI 613, "Recommended Practice for Selecting Proportions for Concrete".

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. "Construction Joints" (AC 19.3)
c. "Curing Concrete" (ST 95)
d. "Specification for Vibrating Concrete" (ST 26)

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 University and paid by the Contractor.

B. Testing Agency: Testing agency for field quality control will be selected and paid by the Owner.

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 I,

B. 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.

Location	Maximum Size
Footings	1-1/2"
All other concrete	3/4"

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, Eucon WR, or approved equal.

2. Admixtures (e.g., calcium chloride) causing accelerated setting of cement in concrete shall not be used without written approval of the Architect.

3. 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.

E. Grout: Pre-mixed, nonshrinking grout, Master Builders Embeco Grout, U.S. Grout Company Five Star Grout, Sonneborn Ferrolith G "D.S.", Eucon Firmix, Grace Darex, Sika Kemox, or approved equal.

F. Surface Treatments:

1. Curing Compounds and Floor Sealer: Brock-White Crete-Seal, A.C. Horn Clear Seal 150, Sonneborn Kure-N-Seal, Eucon Eucocure Rez-Seal, North Central Clear Cote, 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 RELATED MATERIALS

A. Vapor barrier: 6 mil polyethylene, clear, vapor permanence rating not exceeding 0.5 perm as determined by ASTM E96, Procedure E, fungi resistant.

B. Polyethylene Tape: Brock-White 3322, Seamless Rubber Company 670, or Dow Polyethylene Tape, clear.

C. Wall Expansion joint fillers: Preformed, non-extruding type. Non-bituminous type, ASTM D1752 where used with a sealant.

D. Floor expansion joint seals: Elastalum expansion joint seals by Construction Specialties, or approved equal seals by M M Systems or Metaliners Elastomeric, color as selected.

E. Dovetail Slots: 22 gauge G.I. Dovetail Anchor Slots equivalent to Gateway Beehive Slot.

2.3 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 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 strength specified.

1. The Contractor shall make available to the Testing Agency all materials and mixtures for the concrete mix designs as well as sufficient samples of fine and coarse aggregates for qualitative acceptance tests. All samples shall be available at least five (5) weeks before the Contractor proposes to use them in the work. Duplicate small samples shall be plainly and neatly labeled with the source, where proposed to be used, date and name of the collector, and presented to the Architect for permanent reference. The materials acceptance tests, trial mix data, and recommended job mixtures shall be presented to the Architect for approval as soon as possible and at least five (5) working days prior to the proposed beginning of concreting. Materials shall not be delivered to the site or used until the samples shall have been approved, and as used they shall in all respects be equal to the approved samples.

2. Sample and test each type of aggregate in accordance with applicable ASTM procedures.

3. Design concrete mixes in accordance with ACI 301, except as modified herein.

B. Types, Strengths and Locations.

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

2. All concrete 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 of concrete as follows:

4,000 lbs. per sq. inch (regular weight) - without water reducing admixture
6.25 sacks per cubic yard for the 3/4" maximum size aggregate.
6.00 sacks per cubic yard for the 1-1/2" maximum size aggregate.

4,000 lbs. per sq. inch (regular weight) - with water reducing admixture
5.75 sacks per cubic yard for the 3/4" maximum size aggregate.
5.50 sacks per cubic yard for the 1-1/2" maximum size aggregate.

D. Slump and Workability:

1. Slump:

a. The slump shall be not less than 1" nor more than 4".

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

2. Workability.

a. Workability shall be such that when adequately vibrated with high cycle internal vibrators the concrete will consolidate completely without segregation.

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.

5. Concrete placed in air temperatures below 40°F shall have a temperature of 60°F. Temperature of individual materials, including mixing water, shall not exceed 140°F.

6. Adding water to mix: No water shall be added after the initial introduction of the mixing water for the batch, except under special conditions. When on arrival at the jobsite it is found that the slump of the concrete is less than specified under such conditions, additional water to bring the slump within limits may be added only with the approval of the University's

representative. It shall be injected into the mixer under such pressure and direction of flow that the requirements for mix uniformity are met. The drum or blades shall be turned an additional 30 revolutions or more if necessary, at mixing speed, until uniformity of the concrete is within these limits. When water is added to the batch upon arrival at the jobsite, it must be noted on the delivery ticket and signed by the University's representative. Water shall not be added to the batch at any later time.

F. Changes in materials:

1. If, during the progress of the work, the Contractor desires to use materials other than those approved (originally) or if the materials from the source originally approved change in characteristics, additional tests shall be made with new materials which will produce concrete meeting with the stated requirements and not cause objectionable change in the color or appearance of the structure. These additional tests shall be made by the Testing Agency, at the expense of the Contractor. No concrete made from such different materials shall be used in the work until the Architect has given his approval.

2. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished by the Vendor, the Architect may order such changes in the proportions or materials, or both, as may be necessary to secure the desired properties, subject to the stated requirements. Any changes so ordered shall be made at the Contractor's expense, and no extra compensation will be allowed by reason of such changes.

PART 3: EXECUTION

3.1 CONCRETE PLACEMENT

A. Inspection of Forms and Reinforcing: At least 24 hours prior to placing of concrete notify the University's representative so that he may inspect forms and reinforcing in place.

B. Placing: Prepare, convey and deposit concrete in accordance with ACI 301, except as modified herein.

1. Remove water and foreign matter from forms and excavations and, except in freezing weather or as otherwise directed, sprinkle porous subgrade and wood forms just prior to placing concrete to eliminate suction. Place no concrete on frozen soil and provide protection against frost action.

2. Deposit concrete continuously and in layers or sections of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section.

3. All concrete shall be thoroughly compacted and consolidated following procedures recommended by ACI 609, "Consolidation of Concrete".

4. Contractor shall provide sufficient labor and equipment to thoroughly compact all freshly placed concrete by internal mechanical vibration. Before each concrete placing operation is started, the Contractor shall have on hand at the project two complete high cycle vibrator outfits in good operating

condition of each size and type of vibrator needed to adequately consolidate the concrete scheduled to be placed. All concrete shall be compacted with the aid of high cycle internal electrical mechanical vibrators for a sufficient duration and intensity to fill all voids, thoroughly consolidate and compact the concrete in place, to produce a dense mass of smooth surface concrete without honeycomb and a minimum of bug holes.

5. Deposit concrete so as to maintain, until the completion of the unit, a plastic surface approximately horizontal. In thin sections (such as walls and columns) of considerable height, concrete shall be placed in such a manner as will prevent segregation, rehandling or flowing and accumulations or hardened concrete on the forms or reinforcement above the mass of concrete being placed. To achieve this end, suitable hoppers, spouts with restricted outlets, tremies, etc., shall be used as required. Openings in the side of the walls will not be permitted. Vertical free drops shall not exceed four feet. Place concrete in layers not exceeding 12" in depth, each layer compacted by mechanical vibrating equipment.

C. Grouting structural steel: Install a full bed of non-shrinking mortar grout under all steel base plates and bearing plates bearing on concrete. Proportion, mix and place in accordance with the manufacturer's instructions.

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.

B. Embed no pipes other than galvanized electrical conduit in concrete. Embed conduit only under the following conditions:

1. Do not cut or displace reinforcement.

2. In slabs restrict conduit diameter to 1/3 of slab thickness and locate within middle half of slab.

3. Run conduit larger than 1/6 of slab thickness approximately parallel or at right angles to reinforcing, not diagonally.

4. Place parallel conduits apart at least six times conduit diameter.

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 CONSTRUCTION JOINTS

A. Vertical construction joints in walls shall be located where noted on the drawings and constructed as detailed.

B. Vertical construction joints in slabs supported on steel framing shall be located over the structural steel supports.

C. Construction joints in concrete slabs-on-grade shall be constructed as detailed.

D. Unless detailed otherwise, all reinforcing steel and welded wire fabric shall be continued across joints.

E. Keys and dowels at construction joints shall be provided as detailed or directed by the Architect.

F. Provide preformed expansion joint seals at all intersections of slabs on grade (including interior) with vertical surfaces. Install expansion seals in accordance with manufacturer's printed instructions.

3.5 CONCRETE FINISHING

A. General:

1. The intent of this Specification is to secure for the job materials and workmanship of such quality that only nominal finishing will be required to produce concrete surfaces equal to the best obtainable with the concrete and forming materials specified. Surfaces which reveal, upon removal of forms, imperfections of such magnitude as to seriously impair the appearance of the structure, in the opinion of the Architect, shall be deemed cause for rejection, and concrete members containing such imperfections shall be entirely removed and replaced without damage to adjacent material or extra expense to the Owner. Lesser imperfections of concrete surfaces shall be patched and finished in accordance with the procedures hereinafter specified.

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

3. 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.

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

B. Repairing and finishing of formed surfaces.

1. It is the intent of this Specification to require forms, mixtures of concrete and workmanship so that concrete surfaces, when exposed, will require no patching except for plugging of tie holes. Repairable defective areas, as determined by the Architect, and all tie holes shall be repaired in accordance with the procedure outlined in the ACI 301, Chapter 9, except as modified herein.

2. As soon as the forms have been stripped, fins and projections shall be removed and the areas smoothed out with wet carborundum stones or power grinders to the extent directed, in areas where the concrete surfaces will be exposed.

3. Efflorescence, stains, oil, grease, or any unsightly accumulation of foreign materials visible on the exposed surface of finished concrete will require remedial action to remove these blemishes.

4. Finishing of concealed concrete surfaces: At surfaces to receive waterproofing membranes, chip off fins and other projections and trowel patch all voids, honeycombs and air pockets exceeding 1/2" in any dimension. Patch voids formed by tie-rod cones flush with adjacent surfaces. At other concealed surfaces, patching, if any, shall be as directed and shall, in general, be only such as is required to assure or protect the structural integrity of concrete or reinforcing.

C. 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 troweled finish on all concrete floors.

3.6 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. If forms are to be removed during the curing period, one of the curing materials or methods specified for concrete surfaces not covered by forms shall be employed immediately and continued for the remainder of the curing period.

7. The curing period shall continue until the accumulative numbef 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.

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

9. Curing and surface treatment of concrete floors: Damp cure concrete. When concrete is cured, apply a coat of sealer to prevent stains and discoloration. Cover all surfaces and protect floors to minimize dirt and stains. Apply final coat of sealer just prior to final inspection.

B. Cold weather protection:

1. Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing weather and near freezing weather. Concrete materials and reinforcements, fillers, forms and ground with which the fresh concrete is to come in contact shall be free from frost.

2. Arrangements for heating, covering, and insulation shall be made in advance of pouring concrete and shall be adequate to maintain the required temperature and moisture conditions without injury to the concrete due to concentration of heat or carbon dioxide flue gases. In general, except as herein specified, follow the recommendations of ACI 306 "Recommended Practice for Cold Weather Concreting".

3. When the temperature of the surrounding air is below 40°F fresh concrete, when placed, shall have a minimum temperature of 60°F and a maximum temperature of 80°F depending on the existing conditions.

4. Special precautions must be taken to protect concrete slabs scheduled to receive a troweled finish, from cooling too rapidly or from surface freezing during the finishing operations. Slabs to be troweled shall not be cast during cold windy weather unless an enclosed heated shelter is provided above the area to be cast and finished.

5. Curing temperature for structural concrete shall be maintained as follows:

a. Regular concrete made with Type I regular Portland Cement shall be maintained at not less than 70°F for the first 72 hours and 50°F for the next 3 days.

b. High early strength concrete made with regular Portland Cement may be obtained by the addition of 25% more cement to the mix or by adding 1% calcium chloride in standard solution dissolved in a part of the mixing water, according to directions of the Calcium Chloride Institute. Sikacrete may be used as recommended by the manufacturer. Accelerators are not to be considered as a substitute for any type of protection from freezing. Calcium chloride shall not be used in concrete placed over permanent metal forms or concrete that will be permanently exposed to the weather.

c. High early strength concrete made by adding 25% more cement as an accelerator shall be maintained at 70°F for the first 24 hours and 50°F for the next three days.

6. At the end of any curing period, the concrete shall be allowed to cool gradually (approximately 1°F per hour) by leaving the covering protection in place and intact for a minimum of 24 hours. In no case shall structural concrete be exposed to freezing for a full 6 days after it has been cast and has developed strength required to support itself and any superimposed loads that may be placed on the concrete.

7. High early strength concrete shall not be used for casting thick sections of concrete. Specific approval must be obtained from the Architect and the University before using any high early strength concrete.

8. During freezing weather the Contractor shall take the temperature of the concrete at regular intervals during the curing period and maintain temperature records of the various concrete sections at locations as directed by the University to insure proper curing temperatures are being maintained.

C. Hot Weather Concreting:

1. Care shall be exercised during hot weather to keep concrete temperatures and mixing and placing time to a minimum.

2. Transport trucks shall be dispatched to avoid delays and the work shall be organized to use the concrete promptly to prevent unnecessary additional mixing at the jobsite.

3. When necessary, arrangements for installation of windbreaks, shading, spraying, sprinkling or wet covering of a light color shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

4. Production, delivery, placement and protection shall comply with the American Concrete Institute Standard entitled "Recommended Practice for Hot Weather Concreting" (ACI 605), except that concrete shall be placed within one hour after the initial mixing water is added.

D. Wet Weather: Unless adequate protection is provided do not place concrete in rain, sleet, or snow.

3.7 FLOOR SEALING

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

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

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

3.8 FIELD QUALITY CONTROL (TESTING)

A. Slump Tests: Make slump tests whenever concrete is being poured at the direction of the Owner in accordance with ASTM C143.

B. Compression Tests:

1. The casting of concrete test cylinders shall be performed by the Contractor at the times selected by the University and under his direct supervision. The Contractor shall arrange and pay for all transportation of concrete test cylinders to the testing laboratory at the proper time as specified.

2. The University will select the testing laboratory for delivery and compression testing of concrete cylinders and will pay for these tests.

3. Prepare standard test cylinders during the placing of concrete in accordance with ASTM 31 and ASTM 172 in sets of two. One set (two cylinders) is required for each day's pour. If the day's pour exceeds 25 cubic yards, prepare an additional set of cylinders for each additional 50 cubic yards or fraction thereof.

4. The test cylinders shall be laboratory tested and shall be stored at the site in 60-80°F temperature range, and so no injury to cylinders will occur, for 24 to 48 hours. After this time the Contractor shall deliver the cylinders to the testing laboratory, taking care not to freeze, crack or damage the specimens. These cylinders shall be laboratory cured and tested at 7 and 28 days of age with tests indicating concrete strengths for compliance with the specifications.

5. During freezing, or near freezing weather (or for special conditions where early removal of forms is requested by the Contractor, and approved by the Owner) concrete test cylinders shall be taken in sets of three. One of the three cylinders shall be a "field condition" cylinder to be placed as near as possible to the final location of the concrete from which the sample was taken and shall receive the same curing and protection as adjacent concrete. The Contractor shall deliver this "field condition" cylinder to the laboratory 28 days after casting or at an earlier age when an earlier field strength data is desired. The other two cylinders shall be stored at the site and delivered to the laboratory for curing and testing as outlined in paragraph 4.

6. Each cylinder shall be marked by the Contractor with the job name, location of pour, date of pour, slump, mix number and strength of concrete specified.

C. Evaluation of Test Results and Failure to Meet Strength Requirements:

1. Test results shall be evaluated according to the "Recommended Practice for Evaluation of Compression Test Results of Field Concrete", ACI 214.

2. Evaluations shall be valid only if the samples have been taken and tests have been conducted in accordance with ACI and ASTM specifications and methods as applicable.

3. If strength tests performed on concrete cylinders, cast at the time the concrete is placed, fail to meet the specified 28 day value, or if the samples have not been taken and tests conducted as specified, the concrete represented by such tests shall be considered questionable and shall be subject to further testing at the expense of the Contractor.

4. These additional tests of questionable concrete shall be performed by an independent testing laboratory, approved by the Architect, and shall be conducted in accordance with ACI 301, Chapter 17 when concrete cores may be obtained in the field or by load tests conducted and results evaluated in accordance with ACI 318, Chapter 20.

5. If the additional tests fail to demonstrate strengths adequate for the intended purpose of the member, or members, in question, as determined by the University and the Architect, all the questionable concrete shall be removed and replaced with concrete meeting the specifications at the expense of the Contractor.

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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 01600 - Materials and Equipment 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 work.

C. Related work specified elsewhere:

1. Concrete for bond beams and/or lintels: Section 04200.

2. Unit masonry: Section 04200.

3. Wall expansion joint fillers: Section 03300.

D. Furnished but not installed under this section:

1. Mortar is installed under Section 04200.

1.2 SUBMITTALS

A. Test Reports: Submit information copies of all test reports in duplicate to the Architect.

1.3 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 1.

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 2-1/2 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	1/4	Not less than 2-1/4 times and not more than 3 times the sum of the volumes of the cement and lime used.
S	1	over 1/4 to 1/2	

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 after mixing.

5. Plain grout: Type M mortar to which water is added to produce consistency for pouring without segregation of the constituents of the mortar. After adding water, stir and work all grout at frequent intervals.

6. Control and accurately maintain the specified proportions of mortar materials during the entire progress of the work.

7. Thoroughly mix cementitious materials and aggregates with the amount of water to produce workability. Machine mix all mortar.

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:

Mortar Type	Average Compressive Strength at 28 days-psi
M	2500
S	1800

PART 3: EXECUTION

3.1 TYPE OF MORTAR REQUIRED

A. Type: Use Type M for masonry in contact with earth and in exterior walls and Type M or S for all other 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 (2-1/2) hours after mixing. Mortar that has stiffened within this time may be retempered with the minimum amount of water necessary to obtain desired workability.

3.2 TESTING MORTAR

A. Owner will select an independent testing laboratory to perform testing as follows:

B. Determine the water retentivity and compressive strength of mortar in accordance with the Test Procedures described in ASTM C91 with the exceptions noted in ASTM C270. Contractor shall pay for these tests.

C. Before starting masonry work make tests on trial mortar mix. Mix mortar for testing in the laboratory from representative samples of mortar materials and proportions to be used in the construction. Contractor shall pay for these tests.

D. Make compressive strength tests on one set of samples from first mortar batch and as directed by the University. Owner will pay for these tests.

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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 01600 - Materials and Equipment 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.
2. Insulation: Sections 07210.
3. Sealants, Gaskets, etc.: Section 07900.

1.2 SUBMITTALS

A. Test Reports: Submit test reports in duplicate indicating compliance with applicable specifications for compressive strength, absorption, weight, moisture content and dimensions for each type of masonry unit. Reports on manufacturer's normal quality control will be acceptable for all units for initial acceptance.

1.3 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.

1.4 ENVIRONMENTAL CONDITIONS

A. In freezing weather, lay no masonry when the temperature of the outside air is below 40°F, or is anticipated to fall below 40°F, unless suitable means are provided to heat the masonry materials and protect the completed work from freezing.

B. Heat the masonry materials to at least 40°F and maintain an air temperature above 40°F on both sides of masonry for at least 48 hours if Type M mortar is used, and 72 hours if Type S mortar is used.

C. In order to avoid "thermal shock" in concrete block walls, turn heat (either temporary or permanent) on or off at a rate not to exceed 2°F per hour or approximately 50°F per 24 hours.

PART 2: PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete masonry units shall be of modular dimensions and shall be high pressure steam cured in an Autoclave at a temperature of 350°F to 365°F and a pressure of 120 to 150 PSI and shall conform to the ASTM Specifications and the modifying and additional requirements as indicated below:

1. Hollow load-bearing units: ASTM C90, grade U-1. Use for all concrete masonry units unless otherwise indicated or specified.

2. Solid load-bearing units: ASTM C145, grade U-1. Use only where solid block is indicated or specified.

3. Concrete building brick: ASTM C55, grade U-1.

4. Face shell and web thicknesses shall conform to Table IV of ASTM C90 except that twelve (12) inch wide units shall have a face shell thickness of not less than one and one-half (1-1/2) inches.

5. The moisture content of the units at the time of delivery shall not exceed 30% of the total absorption.

6. Fire-resistance rated units shall meet requirements of the Underwriters Laboratories, Inc., as to minimum face shell and web thickness to produce fire ratings as indicated on the drawings.

7. Provide special shapes of ordinarily available types such as bullnose units, header units, jamb units, cap blocks, etc.

8. General Appearance Requirements: Exposed units shall be light in color, with uniform fine texture, free of face smears. Broken units shall not be used, and chipped or other defective units will not be acceptable or used where exposed. Not over 5% of units will be permitted to have chips and chips shall not exceed 3/8" in any dimension. Exposed concrete unit walls to have units uniform in size, texture and color, including all shapes. Architect reserves right to reject a unit masonry manufacturer, if in Architect's opinion, unit quality, color or texture is unacceptable with design intent. Appearance requirements may be waived by University (at its option) for concealed units.

2.2 ANCHORS, TIES, ACCESSORIES

A. Zinc coating of wires: ASTM A116, Class 3.

B. Concrete block wall reinforcing: Galvanized, butt welded truss design, formed from #9 gauge wire with deformed side rods. Provide in widths of manufactured standards for each wall thickness. Dur-O-Wall or AA Wire Products.

C. Anchors in Concrete: Furnish galvanized dovetail anchors, bolt anchor fixtures, power driven fasteners, etc., as required for anchoring to concrete (slots are furnished under 03300).

2.3 CONCRETE FILL

A. Concrete fill for bond beam lintels and/or piers shall be 4,000 psi concrete conforming to Section 03300.

2.4 CONCRETE REINFORCEMENT

A. Concrete reinforcement for bond beams, lintels, and/or piers shall conform to Section 03200.

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 (2-1/2) hours after mixing. Mortar that has stiffened within this time may be retempered with the minimum amount of water necessary to obtain desired workability.

D. Type: All masonry shall be laid in mortar of the type specified in the table below:

TYPE OF MORTAR REQUIRED

Kind of Masonry	Mortar Type
Masonry in contact with the ground and in exterior walls	M
Masonry above grade, interior	M or S

3.2 LAYING CONCRETE BLOCK

A. Lay concrete block in straight, uniform courses, plumb and true to line and plane in running bond pattern unless otherwise indicated on the drawing.

B. Use face shell bedding with full coverage of face shells for hollow units, full bed for solid units.

C. Cut flush all joints in block for tooling.

D. Cut flush all joints in concealed spaces. Fill solid with concrete, two courses under bearing plates, top course of all bearing walls and under beam and lintel bearings. Provide control joints as shown on the drawings.

E. Hollow masonry units shall be filled solid with mortar or concrete at following locations:

1. The first two cells of units abutting door frames (mortar).

2. All cells of units of course immediately above head of door frames (mortar).

3. All cells of units where called for on Drawings (concrete or mortar as indicated).

4. Where necessary for embedment of anchors, bolts, bearing of steel members, and where shown (concrete or mortar as indicated).

5. Bond beams, lintels and/or piers (concrete).

F. Wherever metal items, anchors, bolts, etc., are embedded in mortar or concrete within the concrete unit masonry, provide screen wire stops of galvanized steel insect screening to prevent mortar, or concrete from dropping through the voids below.

G. Reinforce all concrete block masonry work with wall reinforcing starting at second course and at every second course thereafter. Wall reinforcing splices shall have 6" laps. Corners shall be formed by cutting and bending to fit or by use of prefabricated corner units. Place reinforcing in the first and second bed joint above and below openings or recesses where possible. Terminate reinforcing on each side of control joints.

H. Unless otherwise shown bond each course at corners and intersections, and break vertical joints at least 4". Fill in with concrete brick where units cannot be used. Provide recesses for built-in items.

I. Horizontal Control Joints: All full height non-loadbearing walls and partitions shall be finished 3/8" below concrete slab above for filler and caulking under Section 07900.

K. Partitions that abut exterior walls and columns shall be bonded thereto at least once every two feet in height. Use rigid steel anchors where bonding is not possible.

L. Provide reinforced concrete block lintels over all square head openings unless otherwise noted on the drawings and as detailed. Use bond beam (8" high only) units to construct lintels at exposed locations. Fill lintels solid with 4,000 psi concrete conforming to Section 03300 and reinforce with steel rods as shown on the drawings conforming to Section 03200. Provide a minimum of 8" bearing at ends. Providing shoring for at least 7 days after setting, or precast at least 7 days before setting.

3.3 MASONRY REINFORCING

A. Wall Installations: Provide reinforcing in every concrete block wythe including 4" walls, if any.

B. General Requirements: Provide proper width for all thickness to insure complete imbedment of side rods or tab ties in full mortar bed. Carry continuously along walls, lapping ends 6" minimum, except do not carry through control and expansion joints. As a minimum, all reinforcing as specified herein.

C. Types: Provide truss design for all types. Provide types as follows:

1. At concrete block walls and partitions, provide normal truss type with diagonal cross rods welded to side rods.

D. Corners: At all corners and wall intersections, except intersections intending to act as control joint, provide prefabricated corner and intersection units.

E. Location and Spacing: Unless otherwise indicated, provide reinforcing as follows:

1. 16" o.c. vertical dimension, continuous full length of wall.

2. At bed joint at top course of wall or partition, continuous full length of wall.

3. In first and second courses below and above each wall opening, extending at least three feet beyond opening jamb, in addition to continuous reinforcing noted under "1" above.

4. Do not carry through control joints.

3.4 JOINTS

A. Where fresh masonry joins masonry that is partially set or toally set, the exposed surface of the set masonry shall be cleaned so as to obtain the best possible bond with the new work.

B. If it becomes necessary to "stop off" a horizontal run of masonry, this shall be done only by racking back one half unit length in each course and, if grout is used, stopping grout 4" back of the rack. Toothing will not be permitted, except upon written approval of the University.

C. Where cutting of exposed units is necessary, the cuts shall be made with a motor-driven masonry saw.

D. Exposed mortar head and bed joints in block walls shall have a thickness equal to the difference between the actual dimension and the nominal dimension of the unit either in height or in length, but in no case less than 1/4" nor more than 1/2". Joints shall be as uniform as possible.

3.5 POINTING, TOOLING, CLEANING

A. Exposed joints in walls of concrete masonry units shall be, unless otherwise noted, tooled with a round or other approved jointer when thumb-print hard. The jointer shall be slightly larger than the width of the mortar joints so that complete contact is made along the edges of the units, compressing and sealing the surface at the joint. Wipe joint, if necessary, to remove all excess mortar, so no rough edges remain.

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 exposed concrete block.

3. Pre-soak prior to cleaning operations.

4. Saturate masonry with clean water and flush off loose mortar and dirt. Scrub down walls with a solution of 1/2 cup trisodium phosphate (Calgon) plus 1/2 cup household detergent dissolved in one gallon of clean water. Scrub with a stiff fiber brush only. Thoroughly wash off all cleaning solution, dirt and mortar crumbs using clean pressurized water. Sonneborn-Contech and Sure-Klean masonry cleaners will be acceptable.

5. Do not use muriatic acid or proprietary cleaning compounds without the prior written approval of the Architect. Do not use metal cleaning tools and brushes or abrasive powders.

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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 01600 - Materials and Equipment, 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 erection of all structural steel and related items.

1. Structural steel and related items includes the shapes, end connections, base plates, cap plates, anchor bolts, connection bolts, expansion bolts and other structural steel items shown on the structural drawings.

C. Related work specified elsewhere:

1. Masonry: Sections 04100, 04200.
2. Metal Fabrications: Section 05500.

D. Furnished by Owner:

1. Retaining and paying for Testing agency.

1.2 REFERENCE STANDARDS

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

1. American Institute of Steel Construction (AISC), Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, February 12, 1969, and Supplements 1 through 3.

2. AISC, Code of Standard Practice for Steel Buildings and Bridges, adopted effective July 1, 1970.

3. American Welding Society, Code for Welding in Building Construction D1.1-72.

4. American Institute of Steel Construction (AISC) Specification for Structural Joints using ASTM A325 or A490 Bolts.

5. Steel Structures Painting Council Manual, Volume 2, Systems and Specifications, Second edition, 1969.

B. Where ASTM standards or specifications or other recognized trade or industry standards or specifications are referenced in this specification, such standards or specifications shall be the latest editions effective at the time of bidding.

1.3 SUBMITTALS

A. Shop Drawings: Submit fabrication and erection drawings in accordance with Section 01300, Submittals.

1.4 QUALIFICATIONS

A. Welding procedures, welders, welding operations and tackers shall be qualified in accordance with AWS Building Code. Inspection of such qualifications shall be in accordance with Article 604 of AWS Code.

1.5 PRODUCT HANDLING

A. Handle, store and erect structural steel and related items in a manner that will avoid damage or deformation.

B. Storage of Materials:

1. Structural steel members which are stored at the project site shall be above ground on platforms, skids or other supports.

2. Other materials shall be stored in a weathertight and dry place, until ready for use in the work.

3. Packaged materials shall be stored in their original unbroken package or container.

PART 2: PRODUCTS

2.1 MATERIALS

A. Structural steel shapes and plates: ASTM A36.

B. Unfinished Bolts: ASTM A307, Grade A. (Use for anchor bolts and other connections where noted on details.)

C. High-Strength Threaded Fasteners: ASTM A490.

D. Welding Electrodes: E70XX.

E. Expansion Bolts: McCulloch Industries "Kwik-Bolts", Wej-it Expansion Products, Inc. "Wej-it Bolts", or approved equal.

F. Grout: Grout is included under Section 03300.

2.2 DETAILING

A. Prepare detailed fabrication and erection drawings in accordance with the AISC Code of Standard Practice for Steel Buildings and Bridges and the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

B. Mark all items of structural steel showing sizes, lengths, locations, details, ASTM designations and painting where noted or specified.

2.3 FABRICATION

A. Fabricate structural steel in accordance with the Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings and the Code of Standard Practice for Steel Buildings and Bridges of the American Institute of Steel Construction.

B. Provide punching, drilling, clips, connections, etc. as indicated on the structural drawings or specified herein.

C. Shop connections shall be welded in accordance with the American Welding Society Code for Welding in Building Construction unless otherwise shown or noted.

2.4 FABRICATION TOLERANCES

A. Structural steel shall be fabricated so that straightness and length are in accordance with the tolerances specified in Article 1.23.8 of the AISC Specification.

PART 3: EXECUTION

3.1 ERECTION

A. Erect structural steel as shown on approved erection drawings and in accordance with the AISC Specification and AISC Code of Standard Practice.

B. Storage on-site for structural steel is extremely limited. Erection shall be accomplished directly from the trucks unless permission for the use of specific areas for on-site storage is obtained from the Owner.

C. Bolted connections: Use ASTM A490 bolts at all steel to steel connections unless specifically noted otherwise on details.

D. Welded connections: Make welded connections as shown on the structural drawings and in accordance with AWS Code for Welding in Building Construction.

E. Bracing: Provide temporary bracing and connections in accordance with Article 1.25 of the AISC Specification.

F. Erection Tolerances: The structural steel framing shall be erected to be within the tolerances specified in Article 7(h) of the AISC Code of Standard Practice for Steel Buildings and Bridges.

G. Field Assembly:

1. Structural steel frames shall be accurately assembled to the lines and elevations indicated, within the specified erection tolerances.

2. The various members forming part of a complete frame or structure after being assembled shall be aligned and adjusted accurately before being fastened.

3. Fastening of splices of compression members shall be done after the abutting surfaces have been brought completely into contact.

4. Bearing surfaces and surfaces which will be in permanent contact shall be cleaned before the members are assembled.

5. Field connections shall be as indicated on the drawings.

6. Report to the Architect any construction deviation that prevents the proper assembling, fitting or connecting of structural steel and obtain his approval of all reaming, chipping, cutting, welding, shimming or any other method of correction to be used.

7. Do not cut openings in the field through structural steel members for the passage of conduit, pipes, ducts, etc., without obtaining prior approval of the Architect. Whenever approval to cut openings in the field is obtained, provide openings and additionally reinforce the member as directed by and under the supervision of the Architect.

H. Grouting: See Section 03300.

3.2 FIELD QUALITY CONTROL

A. Testing Agency retained and paid by Owner will perform the following:

1. Inspection of erected structural steel work for conformance with the requirements specified.

2. Inspection of Field Assembled High Strength Bolted Connections shall be in accordance with Section 6, AISC Specifications for Structural Joints.

3. Inspection of Field Welds shall be in accordance with Section 6 of AWS Code and as follows:

a. Ultrasonic inspection of the field welds indicated in accordance with Appendix C of AWS Code.

B. Work that is not approved shall be corrected by the Contractor at no additional cost to the 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 01600-Materials and Equipment 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 miscellaneous metal items, such as slab channel inserts, access panel eye bolts with metal closure caps and metal railings.

C. Related work specified elsewhere:

1. Structural metal: Section 05120.

2. Hollow metal doors and frames: Section 08110.

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.

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. 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 ranges. For structural steel, provide ASTM A36-75.

C. Galvanizing: Hot dipped galvanizing in accordance with ASTM A386-73, Class B, 2.0 oz. of pure zinc on thickness 3/16" and over, 1.5 oz. on thickness of metal under 3/16". (Metal thickness or gauges are before galvanizing.) Clean, degrease and pickle steel prior to galvanizing. Clean, remove drips or teats on exposed work. Galvanize after fabrication, no cutting or welding after galvanizing. Galvanize to prevent warping, distortion or similar defects and conform to ASTM A-384-76 and A-385-76 as applicable.

D. Slab channel inserts: Unistrut P3300 Series continuous insert channels, or equivalent inserts by Globestrut. Provide inserts with P3380 end caps.

E. Pipe: Smooth, unpitted, undamaged.

F. 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.

2.2 FINISHES

A. Paint:

1. On ferrous metal: Approved rust inhibitive paint, Rust-Oleum #769 or Pratt and Lambert's Noxide Primer.

2. On galvanized metal: 80% metallic zinc dust primer, Federal Specification TT-P-641B, paint all galvanized work that is exposed unless noted herein.

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: 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. Formed Metal: Bend metal without marking or rupture of metal. Unless otherwise indicated, make bends as sharp as possible.

D. Railing: At tube and pipe railings, provide flush end closure plates at exposed otherwise open ends. Provide accurately set sleeves for close, uniform fit to post, leaving proper amount of space for grout. Grout space solidly full of lead or sulphur.

E. Edges: Ease sharp edges or corners, as approved, that might be source of injury.

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.

B. Exposed Work: Use plug welding including field joints, where required or where plug welds will provide best possible joints. Provide other exposed welding by cutting and grinding a suitable "vee" to receive weld and insure rigid connection flush with original surface. Provide full length welds, generally. Grind and finish as previously specified.

3.3 PAINTING

A. General: Apply, in shop, a uniform coat of paint to all ferrous and galvanized 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.

3.4 ERECTION

A. Set metal fabrication items level, straight and true. Securely anchor in-place by welding or bolting to form rigid and permanently anchored units.

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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 01600 - Materials and Equipment, 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 plates, nailers, blocking, bucks, stripping, furring, backing, grounds, nailers and blocking for millwork wood grounds (permanent and temporary) and similar wood and carpentry items.

2. Install hollow metal doors furnished ready-to-hang, under Section 08110.

3. 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. Bolts, nuts, washers for connecting wood framing to steel and concrete. Anchors for securing wood to masonry, steel or concrete.

4. Temporary enclosures required to protect work and public, temporary wood self-closing doors opening into heated spaces.

5. Installation of finish hardware furnished under Section 08700, and installation of plastic laminate millwork furnished under Section 06220.

C. Related work specified elsewhere:

1. Concrete Formwork: Section 03100.
2. Hollow Metal: Section 08110.
3. Finish Hardware: Section 08700.
4. Plastic laminate millwork: Section 06220.

C. Related work specified elsewhere:

1. Concrete Formwork: Section 03100.
2. Hollow Metal: Section 08110.

1.2 PRODUCT HANDLING

A. Protect all lumber at job site from exposure to moisture and weather.

PART 2: MATERIALS

2.1 GENERAL LUMBER

A. Lumber: Douglas Fir, "Construction". Equivalent grades of Ponderosa Pine, Sitka Spruce or White Pine acceptable.

B. Grading: All lumber graded according to WCLIB Standard 16, "Dry".

C. 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 ROUGH HARDWARE, FASTENERS, ANCHORAGE DEVICES

A. Extent: Provide all rough hardware required, including nails, screws, bolts, lag screws, grommets, cinch anchors, 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.

PART 3: EXECUTION

3.1 NAILERS, BUCKS

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. 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.

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, and similar work to provide permanent support. Use bolts and screws to eliminate loosening up of joints, sagging or similar movement.

3.2 FINISH HARDWARE

A. 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.

3.3 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, slivers, gouges, etc. Set all nails at exposed wood 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 01600 Materials and Equipment for requirements on pre-bid and post-bid evaluation of proposed substitute products, emthods and other conditions.

B. Work under this section includes providing all millmade plastic laminate shelves. All shelf standards and hardware required for plastic laminate millwork.

C. Related work specified elsewhere:

1. Installation of plastic laminate millwork: Section 06100.

1.2 QUALIFY ASSURANCE

A. Quality Standards: Except as otherwise shown on drawings or specified herein, comply with Section 500 B, Premium Grade for High Pressure Laminate Paneling, Architectural Woodwork Quality Standards of Architectural Woodwork Institute (illustrated copyrighted 1975), and by reference they are made a part of this specification.

1.3 SUBMITTALS

A. Shop Drawings: Submit shop drawings in accordance with Section 01300.

B. Samples: Submit samples of plastic laminate in accordance with Section 01300, for color selection and finish acceptance.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver under cover, store and handle laminated plastic millwork and all accessories in a manner that will prevent damage. Repair or replace damaged materials.

PART 2: PRODUCTS

2.1 PLASTIC LAMINATE AND CORE

A. Quality Grade: Material and workmanship of plastic laminate work shall conform to Section 500, Premium Grade requirements of AWI Quality Standards.

B. Provide where shown on drawings and as specified herein.

C. Components:

1. Plastic Laminate: General purpose, 1/16" thick, General Purpose Grade, high pressure laminate plastic for all exposed surfaces, both horizontal and vertical.

2. Core: Thickness as noted on drawings, particle board (40-45 pound density), or hardwood faced, 5 ply core plywood.

3. Backing Sheet: .030" thick, Backing Sheet Grade as made by laminate manufacturer. Apply to concealed side of all laminated work.

4. Adhesive: Modified ureaformaldehyde type, Urac-185, or approved equal and Wilson Art.

2.2 HARDWARE

A. Shelf standards and brackets: KV #87-187 extra heavy duty standard with bracket by Knape and Vogt Manufacturing, with Anochrome finish.

B. Folding shelf brackets: #V772 heavy duty folding shelf bracket by Stanley, with zinc plated finish.

2.3 FABRICATION

A. Fabricate plastic laminate millwork shelving in accordance with reviewed shop drawings. Eliminate joints in shelving units. Machine pressure bond plastic laminate using waterproof adhesive with shear strength not less than 200 lbs. per sq. in. Apply matching laminate to all exposed edges. Provide bevel edge. Seal all core surfaces not laminate-faced with clear synthetic resin sealer as recommended by laminate manufacturer.

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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 01600 - Materials and Equipment, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods, and other conditions.

B. Work under this section includes all elastomeric membrane waterproofing.

C. Related work specified elsewhere:

1. Cast-In-Place Concrete: Section 03300.

2. Building Insulation: Section 07210.

3. Sealants: Section 07900.

1.2 GENERAL INFORMATION

A. Compatibility: Where any membrane or other material, new or existing, (including sealants and gaskets) are to be built into, or be in contact with each other, verify the compatibility of the materials prior to commencing work. Do not use materials that are incompatible, will soften or cause deterioration to plastic or cold applied membranes or other materials. If necessary, provide and use alternate materials as approved, without additional cost.

B. Installation of insulation and other covering materials: Coordinate and schedule all work with insulating subcontractor so that membrane is protected and cover provided without delay.

C. 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.

D. Certificate: Provide manufacturer's certificates, prior to starting work, certifying all materials are in accordance with specified requirements.

E. Instructions: Conform to the material manufacturer's directions, instructions or specifications, unless these project specifications are in excess of (but not in conflict with) the manufacturer's directions, in which case these specifications shall govern.

1.3 GUARANTEE AND INSURANCE

A. Guarantee: Provide 5 year written guarantee for work of this Section, and the work to repair any leaks shall include the removal and replacement of the surface (and other) materials above the membrane.

1.4 SUBMITTALS

A. Guarantee: Submit specified membrane guarantee in duplicate to the Architect.

B. Certificates: Submit certificates specified in 1.2.E, herein, in duplicate to the Architect.

1.5 DELIVERY, STORAGE, HANDLING

A. Package, handle, deliver and store all materials at the jobsite in a manner which will avoid damage, contamination or spoilage.

B. Storage: Store all materials off the ground and keep under waterproof covering. 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 materials to such weights as will damage deck or insulation.

PART 2: PRODUCTS

2.1 ACCEPTABLE SYSTEMS

A. The system of W.R. Grace Construction Products Division (Bituthene) is specified to establish standards of quality and performance. Any of the following systems are acceptable subject to approval of deviations in details by the Architect and University:

1. Bituthene by W.R. Grace.
2. HLM 1000/1300 by Sonneborn.
3. Jiffy Seal by Protecto Map.
4. Tremproof 50 by Tremco.

2.2 WATERPROOFING MEMBRANE

A. Membrane: Rubberized asphalt, integrally bonded to polyethylene film .064" thickness, W.R. Grace & Company's Bituthene.

B. Primer: Bituthene Primer.

C. Mastic: Bituthene Mastic.

PART 3: EXECUTION

3.1 GENERAL WORKMANSHIP REQUIREMENTS

A. Workmanship: Conform to best practice and accomplish by using only skilled mechanics. SPILL NO MEMBRANE MATERIALS ON BUILDING OR OTHER MATERIALS. Spilled materials on exposed surface will result in applicator repairing, resurfacing or replacing the stained work. See Section 01010 for conditions for working on 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 membrane materials manufacturer. After starting work, applicator is responsible for complete water integrity of the membrane, and for providing properly applied membranes which will insure a satisfactory life of not less than 20 years. Therefore, applicator 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 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 the deck and conditions by this Subcontractor.

3. Review all drawing and specification requirements and establish control and test procedures to insure compliance.

4. Exercise care to insure adequate quantities of materials are used.

5. Maintain competent foremen continuously supervising the work, with authority to discard unsuitable materials or remove unsatisfactory workmen.

6. Supervise installation of, and be responsible for seeing that drains, curbs, and other work is properly set and membrane is not damaged, make membrane repairs as necessary; advise Supervising Engineer and Prime Contractor of any potential leaks due to work of others.

7. Resolve questionable installation work prior to proceeding.

8. Inspect deck with Owner representative prior to starting work.

3.2 PREPARATION IN GENERAL

A. Surfaces: Properly prepare all surfaces to provide and insure best installation. Decks and other surfaces must be clean and dry. Sweep and clean areas thoroughly before starting work. Do not start work during threatening weather. Notify General Contractor of any areas unsuitable for applying membrane. Do not proceed over frosty or damp surfaces nor until deck is proper. Remove snow from decks and dry thoroughly before starting.

B. Deck Smoothness: Check deck for smoothness and for suitability to receive membrane waterproofing. Refer to Section 03300 for required concrete finish. Install no barrier over deck with ridges and/or depressions that will result in unsatisfactory base for work under this section. Have all corrections made to provide deck that meets project requirements and applicator's approval.

3.3 INSTALLING WATERPROOFING MEMBRANE

A. General: Install membrane waterproofing in accordance with manufacturer's instructions and requirements of this section. Coordinate all work. Provide extra plies of membrane as called for by the manufacturer or as otherwise indicated in the Contract Documents, whichever is the greater requirements.

B. Preparation of Substrate:

1. Concrete Finish: Horizontal concrete surfaces will have a troweled finish as a minimum, vertical concrete with formed surfaces, or as otherwise called for under Section 03300.

2. Surface Condition: Concrete surfaces shall be surface-dry and must be cured for seven days before application of membrane or primer. Surfaces shall be broom-cleaned and free of voids, loose stones and sharp protrusions prior to priming or applying membrane.

3. Priming: Membrane is generally applied directly to concrete; all surfaces must be primed with specified or approved primer. Apply by brush, roller or spray at the rate of 200 to 400 square feet per gallon until the surface is black, using more than one pass if necessary. Membrane must be applied only after the primer solvents have flashed off and the primer has become tack-free (at least 60 minutes after priming, but not over 36 hours). After 36 hours, surface must be reprimed. Metal, plastics and other dense surfaces need not be primed, but must be clean, dry and free of grease, oil and dust.

4. Temperature: Ambient surface and materials temperatures shall be over 40°F and under 100°F during application of membrane primer and mastic to ensure a good bond. At temperatures below 40°F, special techniques may be used for certain applications on recommendation of membrane manufacturer.

C. Application:

1. Joints: Lay membrane from the low point to the high point across the fall line so that the laps whed water. Apply membrane in double thickness over control and construction joints. Provide a loop of excess material across joints as shown and as necessary to relieve the strain.

2. Sealing Edges: Membrane shall be finished off by sealing it into a reglet joint, or by drawing the membrane down over the edge of a slab , setting and pressing or rolling it down firmly and completely in two parallel 1/4" beads of mastic and finished with a troweled bead of mastic. If nails are used, use large head nails and cover with a 6" strip of membrane.

3. Sealing Seams: All seams shall be overlapped at least 2-1/2", and pressed or rolled firmly in place. The succeeding strip shall be laid with a minimum 2-1/2" overlapping and rolled down firmly and completely. Misaligned or inadequately lapped seams shall be covered with a minimum 6" wide strip of membrane.

4. Corner Details: All inside and outside corners (vertical or horizontal) including where a cant strip occurs, shall be double-covered with membrane by applying an initial strip of 11" minimum width, centered along the axis of the corner. This strip shall be completely covered by the regular application of membrane. Outside corners shall be rounded and inside corners filled with an inorganic cant strip or mortar fillet prior to application. Seams must be carefully sealed in corners. Any exposed edge of membrane shall have troweled bead of mastic over these edges.

5. Membrane Protection, Vertical Surfaces: Within 5 days, cover the membrane. Temporarily hold in place, if necessary until backfilling or other cover is placed. Shield from sunlight.

6. Membrane Protection, Exterior Horizontal Areas: Immediately after testing the membrane, it shall be covered and protected. Also cover areas at cant strips of flashing to protect the membrane. Promptly advise other sections so the membrane areas are promptly covered and protected by the final finishes.

D. Precautions:

1. Punctures and Tears: Care shall be taken not to puncture or tear the membrane prior to covering it. Backfill, insulation or protection board shall be placed immediately to protect membrane. Careful inspection shall be made prior to covering membrane, and any ruptures shall be patched with membrane and mastic.

2. Exposed Edges: If the work must be left partially complete, the exposed edges of the outside strips shall be set and pressed or rolled down in two parallel 1/4" beads of mastic and the edge sealed with a trowelled bead of mastic.

3.4 TESTS

A. Flood Tests: Perform flood tests upon completion of the horizontal membrane areas, prior to placing protection board or any subsequent fill or finishes. Construct watertight dams, using membrane materials, and temporarily close drains. Flood area to depth of 1" minimum, maintaining flooded condition for at least 24 hours. Thoroughly test intersections and flashings by flooding or hose testing. Notify the University in advance of testing and inspect the work with the Owner's representative. Repair any leaks and repeat flood test until there is no evidence of leaks.

3.5 FOLLOW-UP INSPECTIONS AND SERVICE

A. Project Completion: Just prior to acceptance of entire Project, or covering with finish surfaces, membrane applicator shall inspect entire membrane, remove all nails, wire, cut metal and other debris. Remove any drips of bitumen. Any "ridging", blisters and similar defects shall be cut open and repaired.

B. Annual Inspection: Provide the inspection and services for three years, in connection with specified guarantee.

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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 dampproofing of exterior foundation walls.

C. Related work specified elsewhere:

1. Earthwork: Section 02200.

2. Membrane waterproofing: Section 07110.

3. Sealants: Section 07900.

1.2 DELIVERY, STORAGE, HANDLING

A. Package, handle, deliver and store at the job site in a manner that will avoid damage.

B. Deliver all materials in their original, unopened containers, seals intact.

PART 2: PRODUCTS

2.1 MATERIALS

A. Mastic Coating: Trowelled on pitch base material. Celotex Pitch Base Plastic Cement or similar product of Koppers, or approved equal.

PART 3: EXECUTION

3.1 APPLICATION, WALLS

A. Extent: Provide dampproofing on outside (earth side) face of all below-grade foundation walls from top of footing to membrane waterproofing. Dampproofing is not required where membrane waterproofing is indicated.

B. Trowel on as recommended by manufacturer to a coat 1/16" to 1/8" thick.

C. Apply to clean, dry surfaces, free of loose particles, projections and similar defects. Remove all such obstructions.

D. Where dampproofing is contiguous with asphaltic waterproofing, provide mask of minimum 6 mil aluminum foil. Cement foil to asphaltic membrane with asphaltic plastic cement for top 6" of aluminum foil then apply pitch-base dampproofing to entire outside face of foil, then fold foil back (up) on itself to produce pocket to retain pitch base material. If the detail calls for asphaltic material above the dampproofing, reverse this foil procedure, folding foil back over asphaltic material.

E. Provide workmanship in best practice, accomplished by skilled mechanics trained in their trade and in strict accordance with manufacturer's instructions. Provide finished work free of damage, blisters, cracks, open joints, pin holes, skips, holidays, thin spots, etc.

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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 01600, Materials and Equipment for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes all thermal insulation and insulation protection board.

1.2 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle all materials at job site in a manner that will avoid damage. Crushed or broken rigid insulation shall not be used.

PART 2: PRODUCTS

2.1 THERMAL INSULATION

A. Rigid Insulation: Extruded closed-cell expanded polystyrene board Styrofoam SM by Dow Chemical complying with FS HH-I-524, Type II, Class B, 30 psi compressive strength, 0.6 perm-inch maximum vapor transmission, 0.7% maximum water absorption and thermal conductivity K-value of 0.20.

B. Miscellaneous Insulation: Fiberglass batt or blanket insulation.

C. Adhesives: Use only adhesives which are recommended by the insulation manufacturer for use with the specific insulation on the specific substrates to insure permanent bond.

2.2 PROTECTION BOARD

A. Protection Board: Pre-molded minimum 1/8" thick asphalt protection board, W. R. Meadows "Sealtite" PC-1, or equivalent products of Celotex or Sonneborn. Adhesives as recommended by manufacturer. Confirm compatibility with insulation.

PART 3: EXECUTION

3.1 INSTALLATION

A. Apply adhesives to substrate surface in sufficient quantity to secure insulation boards. Ties, anchors, pipes and other items penetrating insulation shall be sealed with additional spot of adhesive. Edges of insulation boards shall be butted tight with no voids.

B. Secure insulation in place to prevent displacement.

C. Install protection on insulation and membrane waterproofing with lapped joints, to protect insulation and membrane from damage by backfilling or sunlight.

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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 01600 - Materials and Equipment for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes all stainless steel sheetmetal flashing.

C. Related work specified elsewhere:

1. Membrane waterproofing: Section 07111.

PART 2: PRODUCTS

2.1 MATERIALS

A. Stainless steel: "soft" chrome-nickel "Micro Flex" stainless steel by Washington Steel, or approved equal, dull matte finish, thickness 0.012".

B. Fastenings: Stainless steel, type and size as recommended by sheetmetal manufacturer.

2.2 FABRICATION

A. Fabricate sheetmetal free from holes, waves, buckles, pinch marks or other defects.

PART 3: EXECUTION

3.1 INSTALLATION

A. Install sheetmetal flashing in accordance with Sheet Metal Contractor's Association Handbook and Recommendations.

B. Dimensions: Carefully form and install metal work to conform to dimensions indicated and to field confirmed dimensions.

C. Existing construction: Where necessary at existing construction; cut out groove to receive flashing or flashing inserts.

D. Location of joints: Joints may be placed where convenient to metal lengths, not over 10 foot lengths.

E. Types of joints: Lapped joint, lap 2".

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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 01600 - Materials and Equipment, 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 and sealing, except that specifically required under other sections. This section includes compressible urethane foam fillers.

1.3 SUBMITTALS

A. Color Samples: Submit actual samples of full color pallette 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. Sealant: Sealant shall be a gun-grade class B, non-sag two-part polysulfide sealant licensed by Thiokol Chemical Corp. as conforming to Thiokol Building Trade Performance Specification, such as Tremco "Lasto-Meric", W. R. Grade Hornflex, Pecora Synthacalk GC-5, Sonneborm Sonolastic (two-art), or approved equal. Provide in-place samples, after preliminary selection, for final approval.

B. High Temperature Sealant: Silicone, conforming to Federal Specification TT-S-00230C and be able to perform within a temperature up to 200°F.

C. Primer: Provide primer type as supplied or as recommended by manufacturer of sealant or gasket material, including "conditioner" for exterior slab sealant.

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 Polycel backer rod (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.

2.3 COMPRESSIBLE FOAM FILLERS AND GASKETS

A. Foam Filler: Shok-Pak flexible semi-closed cell urethane filler by Brock-White, or equal filler by Williams Products.

B. Gaskets: Acmaseal Numbers A-056 and A-125.

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 porous masonry and porous concrete.

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 backer 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

A. General: 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 1/4" depth. Fill joints over 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. 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.

D. 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.

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 of air or water; hardening, cracking, pulling away from adjacent surfaces; loss of bond; crumbling; sagging; shrinking; running of compound; staining of adjacent work by compound; improper levels; surfaces which are not smooth.

3.4 COMPRESSIBLE FOAM FILLERS AND GASKETS

A. Install in accordance with manufacturer's printed instructions.

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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 01600 - Materials and Equipment 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. Provide standard and special anchors, clip angles, etc., required for installation.

C. Related work specified elsewhere:

1. Grouting of frames: Section 04200
2. Carpentry: Section 06100
3. Finish hardware: Section 08700
4. 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, Mesker, Steelcraft or Curries Manufacturing, Inc., or approved equal which conform 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 the 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 3 1/2" x 12-gauge floor clip angles.

D. Doors:

1. Provide hollow metal doors of size and type shown. Construct of cold rolled, stretcher-leveled furniture steel. Use 18 gauge face sheets for interior doors. No seams on face sheets. Provide an 18 gauge steel channel on top and bottom of doors. Door edges shall be flush and smooth, without visible seam or joint.

2. Provide continuous true truss inner core, full height and width, spot welded to face sheets 3" on center both vertically and horizontally.

or

2. Provide an inner core consisting of verticaly stiffeners of 16-gauge channel or zee members spaced 6" on center and spot welded to face sheet 3" on center.

E. Hardware Preparation

1. Mortise, reinforce, drill and tap doors and 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 the following coats of red oxide primer, each coat baked-on.

1. Frames - 1 coat.
2. Doors - 2 coats.

PART 3: EXECUTION

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. Install doors with uniform margin at jambs and head.

D. 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 01600 - Materials and Equipment, 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, VonDuprin, 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 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 made 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 Hollow Metal Doors: Dull chrome on steel, US26d.

2. Closers for Hollow Metal Doors: Prime coat of paint sprayed on cast iron or steel.

C. Kick Plates for Hollow Metal 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, Sargent 8-7700 Series, with knobs and escutcheons scheduled, fully reversible, with adjustable armored fronts and anti-friction latch bolts with minimum 5/8" throw. Furnish strikes with lips sufficient length to protect trim and elsewhere as required.

B. Provide Best Universal Lock Company's 7-pin cylinder with Best's interchangeable cores, typically #1E74, US26d.

C. Unless otherwise specified, provide cast ball knobs 2-1/8" ± diameter, with concealed screw attachements. Escutcheons to be 8" x 2" ± x cast through bolted top and bottom (concealed) outside. All similar to Sargent KWIB trim.

D. Master keying will be determined by Owner in conjunction with representative of Best Universal Lock Company. Keying to be three levels, master, submaster and individual keys. 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 hollow metal doors BB9101 4-1/2 x 4-1/2

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.

1-1/2 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 BB 9100, Stanley BB600 Series, or McKinney TB2714 Series.

2.5 CLOSERS

A. For any bracket mounted closer, provide not less than size recommended by manufacturer for parallel arm installation.

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:

LCN	Norton
4020	J7730
4030	7400
4010	7700

2.6 KICK PLATES AND ARMOR PLATES

A. Kick Plates: 14" high generally, .050 thickness with countersunk screw holes. Width shall be 1-1/2" less than door width on stop side of doors and 1/2" 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".

PART 3: HARDWARE SCHEDULE

Group 1

1 Lockset 8-7704 less outside trim
1 Flush Cup Pull, Hiawatha 1459 (inside)
1 Closer (delayed action)
1 Armor plate (48" high)
1 Stop G-J WB50

Group 2

Each door shall have

A. Butts as required
B. 1 Lockset 8-7705
C. 1 Closer

Group 3

Each door shall have

A. Butts as required
B. Lockset 8-7715
C. 1 Stop G-J WB60

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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 01600 - Materials and Equipment 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 furring and gypsum plaster.

1.2 REFERENCE STANDARDS

A. Lathing and furring work shall conform to ASTM C841, unless otherwise specified herein.

B. Gypsum plastering work shall conform to ASTM C842, unless otherwise specified herein.

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 elements. Protect metal items from rusting and damage to painted finishes.

B. Protect plaster, lime and cement from water, the elements, and other damage during delivery, storage and handling. Store cementitious materials in water-tight sheds with elevated floors or indoors in dry location on wooden pallets.

1.4 JOB CONDITIONS

A. No gypsum plaster 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 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 adeqaute ventilation during and after installation throughout curing period avoid uneven drying.

PART 2: PRODUCTS

2.1 LATHING AND FURRING MATERIALS

A. Furring channels 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.

B. 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.

C. Cornerite and strip lath shall be 2.5 pound flat expanded metal lath. Cornerite shall be bent at right angles with 3" wide legs on each side. Strip lath shall be 6" wide.

D. Tie wire and clips shall be galvanized, soft annealed steel.

2.2 PLASTER MATERIALS

A. Plaster materials shall conform to ASTM standard specifications as follows:

1. Gypsum Plaster: Gypsum neat plaster conforming to ASTM C28.
2. Gauging Plaster: ASTM C28.
3. Hydrated Lime: ASTM C206, Type S.
4. Sand: ASTM C35 Sand for job mixed finish coats shall be white silica sand.

B. Water shall be clean, potable and free of deleterious amounts of acids, alkalis, or organic materials.

2.3 PLASTER MIXES

A. Base Coat Proportions:

1. Scratch coat for three-coat work over metal lath shall be mixed in proportions of 100 pounds gypsum neat plaster to 200 pounds (2 cubic feet) damp, loose sand. Brown coat shall be mixed in proportions of 100 pounds gypsum neat plaster to 300 pounds (3 cubic feet) damp loose sand.

2. Base coat for two-coat work over gypsum lath shall be mixed in proportions to 100 pounds gypsum neat plaster to 250 pounds ($2\frac{1}{2}$ cubic feet) damp, loose sand.

B. Finish Coat Proportions:

1. Gypsum Lime Putty Trowel Finish shall be mixed in proportions of 1 part gypsum gauging plaster to not more than 3 parts lime putty by volume.

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 INSTALLATION OF WALL FURRING

A. Install 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.

3.2 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 1/2". 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.

3.3 APPLICATION OF PLASTER

A. Thickness and number of coats.

1. Gypsum plaster on existing masonry walls shall be applied in 2 coats. Thickness of plaster including the finish coat shall be not less than 5/8".

2. Gypsum plaster on metal lath shall be applied in three coats and total thickness of plaster shall be not less than 3/4" measured from face of lath.

B. Two Coat Work. Apply base (first coat) with sufficient materials and pressure to form a good bond and cover well. Do not scratch. Before the material has set, double back with material of the same proportions to bring plaster out to grounds. Straighten to a true surface without application of water, and cross rake or scratch to receive the finish (second) coat.

C. Three Coat Work. Apply scratch (first) coat with sufficient material and pressure to form full keys with the lath, cover well and have enough depth to allow for scratching. Before coat hardens, scratch to a rough surface. After scratch coat has set firm and hard, apply brown (second) coat. Bring out to grounds, straighten to a true surface without application of water and cross rake or scratch to receive the finish (third) coat.

D. Finish Coats. Dampen the surface of the base coat evenly by brushing or spraying as necessary to produce uniform suction before applying the finish coat. Avoid excessive use of water in applying finish coats.

1. Trowel Finishes. Apply finish coat approximately 1/16" to 1/8" thick. Scratch in thoroughly, double back and fill out to a true, even surface. Allow to draw a few minutes, and then trowel well with water to a smooth finish, free of cat-faces and other blemishes or irregularities.

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 01600, Materials and Equipment, 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. Carpentry: Section 06100.

2. Hollow metal: Section 08110.

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 prefabricated metal chimney, chimney bands and metal bracing.

b. Metal louver.

c. Metal railing

d. Concrete at air intake stack.

2. Interior:

a. All walls and ceilings at rooms and surfaces, where indicated.

b. Hollow metal,. including doors, frames and other hollow metal. Paint on all sides including at rooms or spaces not otherwise painted or finished.

c. Prime coated hardware.

d. Exposed ducts, and similar items (bare or insulated) in painted rooms.

e. Exposed conduit and wire mould at finished or painted spaces.

f. Bare or insulated piping, hangers, saddles, brackets, stands, supports, including at: Finished rooms. Piping identification.

E. Work excluded from this section (areas or materials):

1. Interior:

a. The walls and ceilings of any room or space not scheduled for paint finish in Room Finish Schedule.

b. Plastic laminate millwork (Section 06220).

c. Brass, bronze, stainless steel.

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 sealers, stains, fillers, varnishes, paints, clear silicone treatments, and other similar finishes not specified under other Sections.

C. 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 & block); wood and plywood; plaster; 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.

D. Except for factory finish coats and prime coats on certain mechanical and electrical work, no painting is required of Mechanical and Electrical Contractors; 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.

E. 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 paints 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. 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.

C. 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.

D. Cleanup:

1. Remove oily rags, waste, etc. from building every night.

2. Upon completion of work, remove all misplaced paint 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 room.

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 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.

C. Use no material over paint product of another manufacturer except as otherwise specified or permitted by Architect, and only if recommended by manufacturers.

D. 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. Mechanical piping and electrical conduit: At painted rooms, paint the items to blend out, as directed, each coat a different color.

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. Exterior Systems:

1. Ferrous Metal:

1 - Coat P & L Effecto Enamel Primer. (Spot prime if existing)
2 - Coats P & L Effecto Enamel.

2. Ferrous Metal: (Prefabricated metal chimney, including below grade)

2 - Coats Glidden Glid-Guard silicone-alkyd enamel high-temperature

3. Galvanized Metal: Chemically treat bare (unprimed) surface with #46 Metal Pre-Treatment before painting to provide good bond followed within 8 hours by:

1 - Coat 80% Zinc Dust-Zinc Oxide Primer, Federal Specification TT-P-641b (omit if surface is shop primed).
2 - Coats P & L Vapex House Paint.

4. Concrete and Concrete Masonry:

2 - Coats P & L Vapex Masonry Paint.

D. Interior Systems:

1. Concrete Walls - where paint is scheduled or indicated:

2 - Coats P & L Pro-Hide Latex Satin Enamel

2. Concrete Masonry:

1 - Coat P & L Pro-Hide Block Filler (Omit if there is an existing finish)
2 - Coats P & L Pro-Hide Latex Satin Enamel

3. Covered Pipe, and Ducts - canvas jacketed - painted spaces:

1 - Coat Rubber base sizing
1 - Coat H.B. Fuller Insco BC-716, White
1 - Coat finish as for adjacent wall or ceiling.

4. Covered Pipe, unjacketed:

Finish as for 3 above, except omit sizing.

5. Bare Pipe - Ungalvanized - All bare ungalvanized pipe in painted areas.

1 - Coat P & L Noxide Primer, then finish same as adjoining wall or ceiling.

6. Bare Pipe - Galvanized - all galvanized pipe in painted areas shall be treated with #46 Premetal Treatment, then apply:

1 - Coat 80% zinc dust - zinc oxide primer, Federal Specification TT-P-641b, then finish same as adjoining wall or ceiling.

7. Hollow Metal and Ferrous Metal:

1 - Coat P & L Vitralite Enamel Undercoating
1 - Coat P & L Vitralite Enamel Gloss
1 - Coat P & L Vitralite Enamel Eggshell

8. Plaster Walls:

2 - Coats P & L Pro-Hide Latex Satin Enamel.

9. Metal at Cremator:

2 - Coats P & L Heat Resistant Aluminum No. 7227

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. 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 I - Recommended" type work of Painting and Decorating Contractors of America, as minimum requirements, in absence of more stringent Project specification requirements.

B. 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.

C. Apply succeeding coats only after prior coat has been approved by Owner, otherwise no credit will be given for the coat.

D. 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.

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.

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 coats shall be thoroughly dry before applying succeeding coats.

G. 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.

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 repainting.

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 preceeding coat. Follow manufacturer's printed directions for drying time of undercoats. (Generally 24-hour minimum will be required.)

D. Prior to painting concrete or concrete block, spray or brush treat all voids (including air or water voids) thoroughly coating the voids to provide a painted finish in the voids.

E. Apply block filler at rate not to exceed 75 square feet per gallon on blocks or 100 sq.ft. per gallon on concrete walls.

F. Use roller or brush on concrete and masonry surfaces; thoroughly fill all pores, each coat. Brush or spray masonry joints to insure full coverage, each coat.

G. Spray first coat on concrete walls and ceilings as approved, to thickness and hiding equivalent to properly brushed or rolled coat of material. Coat voids in concrete, as specified under D. Brush or roll succeeding coats, unless spray coast (equal in hiding and thickness to sample areas of brushed coats) are applied for comparison in Owner's presence.

H. Color each paint coat to approximate color, somewhat lighter, of succeeding coat.

I. Paint primed hardware, including closers, carefully, neatly and so no hardware paint shows on doors or frames. Keep other finished hardware completely free of stain, varnish and paint.

J. Apply paint adjoining other materials or other colors with full, clean cut lines without overlapping and to straight line.

K. 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.

L. At completion of work of other trades, touch up and restore all painted work where damaged or defaced, free of blemishes.

M. Discard all containers as they are emptied. Reuse will be prohibited.

3.6 IDENTIFICATION OF PIPING

A. General: At all finished spaces and at accessible unfinished spaces, such as unpainted rooms, shafts, utility cores, and similar locations where walls and ceilings are unpainted, identify all bare or insulated piping as to type of service and direction of flow. Mechanical Contractor will mark piping for guidance of painter.

B. Other Services: Mark identification every 25 feet, at each change of direction and at least once per room or space.

C. Stenciling: Mark with stenciling black letters on a yellow background. letters minimum 1" high yellow background in neat rectangular pattern. Use non-running stencil paint. Indicate flow direction by black arrow on yellow background.

3.7 CLEAN-UP

A. Upon completion of work, remove all misplaced paint, debris, rubbish, materials and equipment.

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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 louvers.

C. Related work specified elsewhere:

1. Field painting: Section 09900.

1.2 QUALITY ASSURANCE

A. Products of Airolite Company are specified to establish standards of quality and performance. Products of Industrial Louvers, Inc.; Ventilouvre Company, Inc.; Louvers and Dampers, Inc.; American Warming and Ventilating, Inc.; are acceptable.

1.3 SUBMITTALS

A. Shop Drawings: Submit fabrication and installation drawings in accord with Section 01300.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver in sections as large as practicable for handling and installation.

B. Protect as required during handling to preclude damage. Replace any damaged units or patts.

PART 2: PRODUCTS

2.1 STATIONARY LOUVERS

A. Type and Manufacturer: Airolite Type 638 stationary louvers.

B. Fabrication: Of 16 gauge galvanized steel.

C. Screen: Bird screen in folded "U" type frame.

D. Finish: Factory prime paint.

PART 3: EXECUTION

3.1 INSTALLATION

A. Install louvers in accordance with reviewed shop drawings and manufacturer's printed instructions. Provide dissimilar metal protection for louver units.

B. Set louver units plumb, level and true to line, without warp or rack of frames. Anchor securely in place.

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PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and Division 1 General Requirements govern work of this section.

B. Work Included: Gas-fired cremator complete with installed refractory firebrick work from cremator to bottom of roof slab at chimney.

C. Work Not in this Section:

1. Foundation for cremator.

2. Pre-fabricated chimney.

3. Precast concrete floor access panel.

4. Electrical and gas connections to cremator.

5. Field applied finish painting.

6. Concrete block masonry work.

1.2 SUBMITTALS

A. Shop Drawings: Provide in accordance with Section 01300.

B. Maintenance and Instruction Manual: Provide University with printed service instruction and operation instructions manual contained in a hard bound binder. Operational instructions shall also be affixed at the cremator for instant reference.

1.3 QUALITY ASSURANCE

A. Applicable Codes and Standards: Furnish in accordance with applicable requirements of the following codes and standards.

1. National Fire Protection Association
2. National Electrical Code
3. Gas Appliance Manufacturers Association
4. Uniform Building Code

B. Qualifications: All work of this section shall be furnished and installed by a subcontractor having a minimum of five years experience in successful installations of cremators of the type as herein specified. If requested by the University, furnish a list of completed installations and references.

C. Approved Subcontractors: G & S Crematory Company, 4800 Pershing Road, Downers Grove, Illinois 60515, 312-969-0305.

D. Other Subcontractors: Conform to procedure established under Instructions to Bidders, Article 12, and General Conditions of the Contract, Article 7.12.

1.4 PERSONNEL TRAINING

A. Provide cremator personnel with a one session thorough training lesson in cremator operation, scheduled in cooperation with the University.

1.5 REQUIREMENTS

A. Design and Dimensions:

1. Cremator shall be 5'-4" wide, 10'-0" long, and 5'-6" high above finished floor, with a minimum ceiling height of 10'-0".

2. Cremator shall have three chambers, consisting of (1) Cremation, (2) Combustion, and (3) Secondary Combustion.

B. Capacity: The Cremator shall be able to completely cremate the average body (approximately 150 pounds) and wooden casket on an average of 90 minutes without nuisance from smoke, ash, and in accordance with smoke abatement and air pollution regulations.

1.6 GUARANTEES

A. General: Repair or replace at no cost to the University, work of this section which may fail because of defective material or faulty workmanship within a period of one year from date of initial operation.

B. Additional Guarantees: The following conditions of operation shall be fulfilled when the cremator is being operated by a competent attendant, using natural gas fuel having not less than 1000 BTU per cubic foot:

1. Not more than one attendant will be required to operate the cremator in simultaneous operation.

2. The time required to completely reduce the average body and wooden casket will average 90 minutes.

3. The residue of cremation will be thoroughly reduced and will contain no unconsumed organic matter.

4. When operated in accordance with the subcontractor's instructions, there will be no smoke of an objectionable density from the chimney, and operation will be in compliance with smoke abatement and air pollution regulations. Also, there will be no obnoxious odors or gases emitted from the chimney.

PART 2: PRODUCTS

2.1 CREMATOR

A. Steel Casing: The Cremator shall be encased in 3/16" steel plates, properly fabricated to withstand stresses of thrust due to firebrick expansion. Steel work shall be shop fabricated and bolted together in the field. No part of the metal casing shall be exposed internally.

B. Refractories: All firebrick shall be of standard shapes, Super duty dry press grade backed up with first quality brick. All refractories shall be field laid up in air setting high temperature cement, with the joints as thin as possible and free from voids. All firebrick walls in the cremation and combustion chamber as well as top arch shall be a minimum thickness of 9". The hearth floor shall be 2-1/2" thick. The side walls of the exhaust chamber and lower two arches shall be a minimum of 4-1/2" thick, with a floor of 2-1/2" thick in the exhaust chamber.

C. Insulation: The insulation between the steel casing and refractory lining of the cremator over the main arch, between the concrete foundation and refractory lining, shall be of 1600°F castable block mix - cast in place. The steel charging door shall be insulated with above block and lined with at least 4-1/2" thickness of insulating brick which will withstand 2600°F. The observation ports shall be protected by insulating firebrick, properly rasped out to correct size and shape.

D. Apertures: Each cremator shall have the requisite number of observation ports, exhaust ports, air supply jets, and burner opening. The observation port shall be closed with door fitted with pyrex glass.

F. Flues: Insulate and line the underfloor flue between the cremator unit foundation and chimney. Minimum insulation shall be 2" thick on sides, and 4" thick over arches.

F. Vestibule Doors: The cremator shall be equipped with a pair of steel hinged vestibule doors and frame, attached to steel vestibule front, and equipped with handles and latch bars for convenient operation.

G. Closure Door: Each cremator shall be equipped with a welded steel closure door insulated and lined, which shall operate vertically in channel-iron guides, and shall be counterbalanced for manual operation. Door shall be hung on roller chair over cast iron spocket and shaft mounted in ball bearing pillow blocks. Door shall be equipped with fast acting latch screws and asbestos millboard seal.

H. Sampling Ports: Provide two sampling ports to enable sampling for pollution control standards.

I. Heat Resistant Expandable Gasket: Ceraform Board 126.

2.2 GAS BURNERS

A. General: Provide two gas burners with timers. Both the cremation and combustion burners shall have an input capacity of 1,200,000 Btuh per hour, designed to meet local code requirements.

B. Type and Manufacturer: Mid-Continent Metal Products Company, J Series Incinomite.

C. Ignition: Each burner shall be equipped with gas electric ignition and electronic flame failure devices similar to RAE-890.

2.3 MINIMUM DESIGN AND PERFORMANCE REQUIREMENTS

A. General

1.	Waste Type:	75# Casket:	Type 0 Waste - 300#/hr.
		150# Cadaver:	Type 4 Waste - 100#/hr.
2.	Average Heating Value		6,625.B.T.U./lb.
3.	Average Flow Rate:		60.6 cu. ft./sec. @1400°F.
4.	Hearth Area:		21.95 sq. ft.

5.	Burning Rate:	18.2#/hr./sq. ft. of Hearth
6.	Primary (Cremation) Chamber Volume:	78.8 cu. ft.
7.	Secondary (Combustion) Chamber Volume:	92.1 cu. ft.
8.	Total Cremator Volume:	168.9 cu. ft.
9.	Total Heat Available:	4,083,333 B.T.U./hr.
10.	Primary Chamber Heat Release:	42,318 B.T.U./hr./cu. ft.
11.	Total Heat Release:	24,176 B.T.U./hr./cu. ft.
12.	Velocity of Secondary Chamber:	
	a. Down Pass:	26.93 ft./sec.
	b. First Pass:	2.78 ft./sec.
	c. Checkerwork:	9.6 ft./sec.
	d. Second Pass:	12.4 ft./sec.
	e. Flue Tunnel:	25.53 ft./sec.
13.	Total Retention Time:	1.36 sec.

14. Air Supply: Provide fan for each burner for obtaining adequate combustion air from operating room.

2.4 CONTROL WIRING

A. The following devices and controls shall be supplied and wired as a part of the cremator: Timer switches, flame failure device, thermal switches, automatic gas valves, limit or operating controls, igniter valves, and necessary relays and motor end switches for cooling system operation.

2.5 PAINTING

A. Primer: All steel work shall be given a protective coat of tnemec #1009 Gray Metal Primer.

PART 3: EXECUTION

3.1 INSTALLATION

A. General: Install to accomplish proper functioning and operating crematory.

B. Drying Out: On completion of construction, dry out refractory work by means of a slow fire, which shall be gradually increased in temperature and intensity until all moisture is evaporated and the brickwork is ready for high temperatures.

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CONDITIONS, SPECIFICATIONS AND RELATED DOCUMENTS FOR
JOML CREMATORY ADDITION

UNIVERSITY OF MINNESOTA - MINNEAPOLIS CAMPUS
HEALTH SCIENCES EXPANSION

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

Paul E. Kopletz
Director of Engineering and Construction — University of Minnesota

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Health Sciences Planning — University of Minnesota

THE ARCHITECTS COLLABORATIVE, INC. — Cambridge, Massachusetts

HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.
University Park Plaza - Suite 704
2829 University Avenue Southeast — Minneapolis, Minnesota 55414
(612) 378-3833

As to Electrical Engineering:
I hereby certify that these plans, specifications or reports were prepared by me or under by direct supervision, and that I am a Professional Engineer under the laws of the State of Minnesota.

Date: September 28, 1978 — 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 section. Refer to Article 12 of the Instructions to Bidders, Article 7 of the General Conditions and Section 01600-Materials and Equipment, 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.

B. All lines shall be constructed from the utility mains, shown on the drawings or designated by the utility company, and connecting to utility service lines on the site, in the building or other structures. Connections shall include piping, fittings, valves, etc.

C. Contractor shall arrange for and pay for all costs involved in extending, rerouting and connecting the utilities whether or not part of the work must necessarily be performed by the various utility company crews. Any charges for connections to mains, valving, extending to curb property line or building, furnishing meters or equipment, etc., shall be paid for as part of the work of this division. Regardless of whether the Owner may have to sign with the utility company for any or all of these services, the Contractor shall apply for and include in his bid all fees, city inspection charges, permit charges, (except permits paid by University - see Section 01010) work charges, etc., and shall be ready to deposit with the utility company said fees when required at time of Owner's signing for same.

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, 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.

1.8 CLEANING

A. Refer to and comply with requirements of General Conditions, Section 01010 and 01910. 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. Air surfaces of all coils, convectors, fan housings, fan wheels, fan motors, air unit plenums and all air filters shall be wiped or vacuumed clean or washed, if required, leaving the installation in a first-class condition.

C. 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. The surface of all floor drains, clean-outs and other equipment shall be cleaned and each item shall be left in a first-class condition. Thoroughly clean all items of equipment furnished such as traps, strainers, pumps, motors, compressors, condensers, 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.

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 buildings 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 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. This Contractor shall remove existing mechanical work as shown, or is required to accomplish the work as indicated on the drawings. Where required, existing piping, ductwork and other mechanical work and systems shall be relocated or rerouted to accomplish and complete the work.

G. 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.

H. 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.

I. All unsalvagable 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.

J. Salvagable 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.

K. Salvagable 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.

L. See Sections 01010 and 01500 for special requirements such as the use of construction tools, barricades, and protection of the existing building.

M. 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.

N. 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.

1.11 EXCAVATING

A. This Contractor shall do all trenching, excavating and backfilling required for his work. Any street, sidewalks, curb or paved area repairs necessary because of this work shall be his responsibility. Refer to General Conditions, Section 02200 and Section 02400 for requirements of trenching, excavating, backfill and compaction; comply with applicable provisions.

1.12 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

1.13 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

7. University of Minnesota Standards

1.14 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, unless specifically noted otherwise, 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. 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. Welded joints to be tested shall be selected by the University Construction Superintendent. Number selected shall be 2% of joints made, but not less than two (2).

c. Selected joints shall be radiographed by an independent testing laboratory and evaluated on the basis of appropriate codes and construction standards covering services installed. Use APA 1104 from American Petroleum Institute or ANSI-B31.1 where required.

d. All welds shall be stronger than the parent metal. A minimum of two passes shall be used on all arc welded joints.

e. Contractor and the University shall agree upon the degree of examination and the basis of rejection of welding prior to installation.

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, hot and recirculating 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. All Steam and return piping shall be subjected to an air test of not less than 75 psi pressure or 1-1/2 times the working pressure whichever is greater. The pressure shall be maintained for a period of two (2) hours with no drop in pressure. Soap test all joints.

5. All Hotwater Reheat and Radiation Piping; same as Steam Piping System as specified in 4.

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.

a. All pumps in addition shall have flow and head listed.

7. Heating, Ventilating, and Air Conditioning

a. All ventilating and air conditioning systems shall be balanced by the Mechanical Contractor.

b. The Mechanical Contractor shall have ventilating and air conditioning systems installed, cleaned and operating.

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

8. Hydronic Systems.

a. All hydronic systems will be balanced by the Mechanical Contractor.

9. Fire Safety Precautions

a. See Section 01010

10. Automatic Temperature Control

a. All temperature control systems shall be checked out under operating conditions with the actual operations verified and temperature readings taken around each control point to prove the correct control function or operation. All damper function shall be similarly verified. These facts shall also be included with the required certificates.

11. Sterilization of Domestic Water Pipes

a. Upon completion of cold, hot water, and circulating hot water piping systems, including water service connection, this Contractor shall sterilize these 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 hours period.

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 eyewashes and emergency showers.

12. Cleaning and Flushing of Piping Systems. The Contractor in the presence of the University shall thoroughly flush the chilled and condenser water system, hydronic heating systems, Glycol water engine coolant systems, using Wyandott Chemical Corporation's "Conquer" liquid cleaner. The cleaning and flushing procedure shall be in accordance with the following:

a. After the piping systems have been completed and pressure tested, set all hand valves and control valves in an open position.

b. Fill the systems with clean water and start the system pumps.

c. Using the chemical feeders on the hydronic systems, add one (1) liquid ounce of "Conquer" liquid cleaner per gallon of water in the systems. Isolate new construction and install temporary pump for circulating the cleanser in new portion of system.

d. After the cleaner has been added to the systems, continue to run the pumps for a period of 4 hours. During this period, the pump strainers shall be inspected and cleaned as required to prevent damage to the pumps, but in no case shall inspection and cleaning be done at greater than one hour intervals.

e. At the end of the 4 hour run, drain all systems completely, then flush with clean water for a 2 hour period discharging dirty water to sewer.

f. Drain systems, disconnect temporary pumps and chemical feeders, remove, clean, and replace all strainer screens and fill systems with clean water.

1.15 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.

1.16 RESTORATION OF CONSTRUCTION DISTURBED FOR UTILITIES

A. Refer to General Conditions and Section 01010.

1.17 CONNECTIONS TO EXISTING BUILDINGS

A. Connections to the existing building shall be made as shown on the plans. Any existing equipment and/or systems affected by these connections shall be replaced into proper operation. Add isolating valves at point of connection to existing services.

1.18 ENTRY OF LARGE EQUIPMENT

A. If any equipment cannot be brought through regular entrances, Contractor shall so notify the University and Contractor for General Construction, and arrange with him to leave suitable openings for accommodation of such large equipment. All such arrangements shall be subject to approval of Architect/ Engineer. Without such arrangements, equipment shall be delivered in sections small enough to permit use of regular entrances. This latter practice is not preferred.

1.19 TEST AND BALANCE SERVICE

A. The Mechanical Contractor will provide the testing and balancing service for air and piped systems, such as:

1. Complete ventilating, air conditioning and exhaust systems, including balancing the air flow to and from all openings, adjusting dampers, fan speeds and such other adjustments necessary to provide fully balanced systems performing as intended by the Contract Documents.

2. Piped/pumped systems of all hydronic, and other systems, balancing the flow to/from each device and making such tests and adjustments necessary to meet the required volume and performance intended by the Contract Documents.

B. Where applicable, the consultant shall test and balance systems in operation at both the normal and emergency mode conditions.

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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 01600-Materials and Equipment 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.

D. All heating and cooling piping systems shall conform with all applicable requirements of the Code for Pressure Piping, ASA B31.1 and with all applicable state and local codes, except that where type and quality of materials, weights, thicknesses, design, pressures or fabrication techniques are called for in these specifications which exceed or upgrade such code requirements, these specifications shall govern.

2.2 PLUMBING PIPING SYSTEM

A. The continuous waste and vent piping method shall be followed for entire plumbing system. Provide domestic hot, cold water, waste, vent, natural gas, to all outlets, 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.

D. 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.

E. 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.

F. All groups of fixtures shall have main valves including drain cocks with valves spotted in accessible, but concealed locations.

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. See Article 2.4 of Section 15130. 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.

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. Flanged connections required to match field equipment may be made using slip-on flanges.

C. Work done in approved prefabrication shops field located or otherwise may be done as follows: Submit prefab pipe for University of Minnesota inspection before installation.

1. Provide welding tees on all full size branch take-offs from pipe mains.

2. Provide a welding tee and reducer fitting at branch connections that are one size smaller than the main. Reducing tees may be used.

3. When the branch pipe is at least two sizes smaller than the main pipe, the branch may be saddled to the main on 2-1/2" diameter and larger pipes.

4. Slip on flanges or weld neck flanges are permitted.

5. Omit back-up rings specified for each joint in welded pipe sizes 2-1/2" and larger.

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, vent, gas, hot water heating 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. Crematory Ovens (By Owner)

2. Temperature Control Valve Installations and Damper Set.

3. Owner furnished equipment. Section 01010.

4. Generally, connection types and sizes are described in the above lists and/or shown on the drawings.

D. The Mechanical Contractor shall coordinate work between the various trades to insure proper installation and operation of all systems.

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. See Architectural and Structural drawings for concrete work to be furnished by General Contractor.

B. All floor openings at equipment rooms above grade shall have 4" concrete curbs around them by the General 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. Motors shall be mounted on sliding cast iron bases as required. Motors shall be General Electric, Century, Allis-Chalmers, Westinghouse, and Gould or approved equal.

4. Except as noted 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 480 volts, 3 phase, 60 cycles, A.C. except where otherwise indicated. Except as noted all motors shall operate at 1750 RPM.

5. All mechanical equipment using motors 1/2 HP and larger shall have listed with shop drawing information.

a. Motor efficiency at various loadings.

b. Motor power factor at various loadings.

c. Recommended overload protection.

d. Recommended power factor correction to a minimum of 90% power factor.

6. This Contractor's electrical work shall comply with the requirements of the National Electrical Code. Where this specification or the plans indicate requirements in excess of those of NEC, the compliance with NEC will not relieve the Contractor from furnishing and installing work as shown or specified.

7. All switching, protective devices and control for equipment furnished under these specifications shall be identified with black-white-black laminated 1/8" plastic plates. Plates attached with self-tapping screws.

2.7 EARTHWORK

A. This Contractor shall furnish all equipment, materials, skills and

services required for excavation, backfill and compaction required to perform the work under this contract. Contractor shall refer to Section 02200, Earthwork for general information.

B. All trench work shall be dug, ripped, blasted or jack-hammered to the alignment and depth shown and in segments of minimum length to minimize the time of open trench. Trenches in soil shall be adequately braced and sheeted so as to provide safe and efficient working conditions. All trenches shall be kept free of water at all times. The trench width may vary with regard to required depth and the nature of the undersoil conditions. The finish trench shall be sufficient dimensions to allow the pipe to be laid and joined in the manner intended.

C. All pipes in soil shall be laid on a 6" gravel cushion foundation placed upon sound soil cut true and even so that the pipe will have a bearing for its full length. Gravel cushion to be in accordance with the 1972 Minnesota Standard Specifications for Highway Construction, Section 2502.2, Subdrainage Backfill. Pipe to be located in rock or soils with rock, shall be laid on a 12" minimum thickness sand foundation with at least 12" of sand at sides. At any area where soil stability is unsuitable or questionable, the Contractor shall further excavate until stable soil is reached. Contractor shall then backfill with compacted granular material until proper elevation is reached.

D. All backfill shall be clean granular fill (See Article 2.1, Section 02200) compacted in 8" lifts to 96% standard Proctor density (ASTM D-698-70).

E. The Owner will retain an independent testing laboratory which shall provide the following tests:

1. Soil analysis of four samples which represent backfill material.

2. Field density tests of the compacted backfills in accordance with ASTM D1556. (One test on every third lift for every 100 feet of trench.)

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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 01600 - Materials and Equipment 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.

2. Vibration Isolation: Section 15150

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. Underground Piping: These lines shall be Government Type "K" sinous copper tubing with cast bronze or wrought copper fittings, 15% silver brazing alloy (Handry Harmon, Sil-Fos) or equal in joining pipe with silver solder. See Section 15200 for underground water service.

b. 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, 140 degree F. hot and 140 degree recirculating hot water and all sizes on 180 degrees F. hot and recirculating 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, 140 degree F. hot and 140 degree F. recirculating hot water, tepid water supply and tepid water recirculating all soldered joints shall be made using 95/5 solder with No. 50 non-corrosive flux.

2. Sanitary Sewage Piping and Storm Water Piping

a. Underground - beneath building floors - For pipe sizes to 15" these lines shall be service weight cast iron pipe with hub and spigot joints and fittings. Joints for sanitary piping shall be made using packed oakum and melted lead which shall be caulked even and solid with tools until filled full to bead line. For underground storm only, fittings to be C.I. hub and spigot coated with preformed molded rubber ring. Sealing rings shall conform to ASTM 564-65 requirements.

b. Underground - beneath building and outside of building: Pipe larger than 15" and all pipe outside of building shall be reinforced concrete pipe (RCP). Class 2 ASTM 76. Joints shall be made with "O" ring type seal, such as Cretex R-4.

3. Waste Piping

a. Pipe - service weight cast iron (above grade in building). Piping under 2" shall be Schedule 40, galvanized steel with screwed joints.

b. Fittings - same material as pipe.

c. Joints caulked.

d. 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 clamps as specified in CISPI Standard 301.

4. Vent Piping

a. Pipe - Schedule 40 galvanized steel with exception that urinal vents shall be cast iron.

b. Fittings - cast iron

c. Joints - screwed, caulked.

5. Rainwater Drainage

a. Pipe - Schedule 40 galvanized steel to 10" - above 10" use coated service weight C.I. with hub and spigot. Joints shall be made with preformed molded rubber rings.

b. Fittings - black cast iron drainage.

c. Couplings normally furnished with lengths of pipe shall not be used in the installation of threaded piping. Extra heavy steel, malleable or drainage couplings shall be used. .

d. Victaulic fittings and companion flanges may be used in lieu of screwed fittings as specified above for fittings.

6. Natural Gas

a. Pipe - Schedule 40 black steel pipe. Outside underground pipe shall be coated with two coats of No. 50B bitumastic.

b. Fittings - Standard weight black malleable iron fittings.

c. Joints - Screwed. All sizes exposed. (Includes cores and shafts).

- Welded. All sizes concealed. (Includes space above suspended ceiling.)

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 A-53 seamless black steel pipe 2" and larger. Pipe 1-1/2" and less shall be A-53 butt weld.

b. Fittings - up to 2" - "XH" cast iron screwed. 2-1/2" and larger same as for steam piping.

c. Joints - welded or screwed.

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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 01600-Materials and Equipment, 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 SCHEDULE

A. Domestic Water Valves

1. Valves 2" and smaller size shall be screwed brass body, 150# WSP, rising stem, solid wedge disc gate valve, Crane #431 UB, or Ohio 7150.

2. Valves 1" and smaller may be Apollo series 70-100 or approved equal, bronze ball valve with blow-out proof stem, chrome plated ball with large size port, teflon seats and stuffing box rings. Capacity index for these

valves shall be 9.8 for 1/2" size, 18 for 3/4" size and 32 for 1" size. For solder joint valves, use Apollo series 70-200 or approved equal ball valve with externally replaceable stem, chrome plated ball with large size port, teflon seats and stuffing box rings. Capacity as noted above. Valves for insulated piping shall have 1-1/2" stem extension. All valves shall have steel lever handles with vinyl grip.

3. 2-1/2" and larger shall be flanged, cast iron body, bronze trim bronze stem, 125# WSP rising stem outside screw and yoke, solid wedge disc gate valve, Powell #1793, Jenkins 651A.

4. Valves 2" and 2-1/2" size on copper water piping may be Walworth #11WS.

B. Gas Valves

1. Valves on gas piping 2" and smaller shall be Walworth #559, brass square head gas cock for individual gas shut-offs.

2. Valves on gas piping for shut-off valves at mains and branches shall be Nordstrom No. 143, lubricated plug valve.

C. Hot Water Heating System

1. Gate valves 2-1/2" and over shall have flanged ends, cast iron 125# WSP body, rising stem, OS&Y renewable seat and solid wedge, Powell Figure No. 1793, Jenkins No. 651-A, or approved equal. All gate valves in condenser water system that are located in basement shall have cast iron 250# flanges.

2. Gate valves 2" and under shall have screwed ends, bronze 150# WSP body, rising stem, solid wedge, Crane No. 431 UB, Stockham No. B120.

3. Valves on branch and mains and shut-offs 1" and smaller may be Apollo series 70-100 or approved equal, bronze ball valve with blow-out proof stem, chrome plated ball with large size port, teflon seats and stuffing box rings. Capacity index for these valves shall be 9.8 for 1/2" size, 18 for 3/4" size and 32 for 1" size. For solder joint valves, use Apollo series 70-200 or approved equal ball valve with externally replaceable stem, chrome plated ball with large size port, teflon seats and stuffing box rings. Capacity as noted above. Valves for insulated piping shall have 1-1/2" stem extension. All valves shall have steel lever handles with vinyl grip.

4. Balancing valves shall be combination balancing and shut-off type Illinois 4000 or approved equal up to 1-1/4" size and Illinois Serive 5000 or approved equal from 1-1/2"size up to 4" size. Sarco IBV combination balancing and shut off valves are approved up to 2" size.

5. Check valves 2" and under shall be screwed ends, bronze 125#, WSP body, Jenkins No. 92, or approved equal. Centerline and Metraflex.

6. Check valves 2" and over shall have flanged ends, cast iron 125# WSP body, Crane #373.

7. 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.

8. Balancing cocks 2-1/2" to 4" shall be lubricated plug type, and shall be Walworth No. 1796, 1797F 175# WOG. Dezurik balancing cocks are equal and approved.

9. Hot water systems drain valves (riser and low points of mains). All 3/4" size shall be Rockford No. 350, or approved equal, 125#, bronze stem cock with hose end adapter.

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.

2.4 CHAIN WHEELS

A. All valves having hand wheels located 7'-6" or higher above the equipment rooms floor shall have Lunkenheimer Fig. 1940, or equal and approved, adjustable sprocket rims with chain guide and rust-proof chain.

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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 01600 - Materials and Equipment, 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.

E. All hydronic water piping 2-1/2" and over use 150# forged steel gasket type welding neck flanges, Tubeturn Series 15.

2.2 DIELECTRIC UNIONS AND FITTINGS

A. All copper water piping, shall have insulated type unions wherever it contacts iron or steel. This includes copper piping connections to iron or steel valves, tanks, water heaters and piping. These connections to and including 1-1/2" size shall be Universal Insulating union, Series 2000, Styles 3 and 4.

B. The above piping connections 2" size and over shall be "Insulket" insulated flange joint as manufactured by Service Engineers, Inc. Gasket shall be sandwich type consisting of a 1/16" layer of Grade XX industrial formica bonded between two 1/32" layers of non-graphitized asbestos gasket material. Provide one phenolic sleeve and two phenolic washers and two steel washers for each bolt. Washer shall be provided on each flange. Flange on copper side shall be brass or bronze.

2.3 STRAINERS

A. All strainers shall be Y type with brass screens, except stainless steel screens shall be used on high pressure steam (over 15 psig). 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 full line size.

C. All drip piping shall be welded except for connections to screwed strainers and traps.

D. On water service the screens on strainers through 3" shall be 20 mesh, over 3" shall be 1/8" perforated.

E. Duplex strainers where shown on drawings shall be Hayward No. 50, bronze with brass basket strainer.

2.4 AIR VENTS

A. Provide and install Bell and Gossett No. 17 Sr. automatic air valve, or approved equal as detailed. This air vent shall be designed to provide manual adjustment in three positions as follows: Automatic Venting Position, Manual Venting Position, or Complete Positive Shut-off. Air vents shall be 1/8 N.P.T.

B. Provide and install Sarco 13W or approved equal automatic air vent at top of all hydronic supply and return risers. Air vents shall be installed in accessible locations with a 3/8" discharge pipe run to nearest F.D. or janitor sink. Provide a gate valve and union on inlet to air vent.

2.5 EXPANSION JOINTS, GUIDES, LOOPS AND ANCHORS

A. Provide and install expansion compensators, expansion joints, guides and anchors as required, shown or specified to handle all thermal expansion and contraction in piping systems.

B. Wherever practical, properly installed expansion loops shall be used to compensate for thermal expansion in piping systems. The loops shall be made of dimensions shown, fabricated with long radius elbows and piping of maximum lengths that space permits where dimensions are not given. Loops shall be installed with "cold spring" so that loop in operation will have approximately equal contraction and expansion from fabricated position. Provide guides for loop as detailed on the drawings. Provide lead sheet wrap where copper pipe would otherwise come in contact with steel guide.

C. Anchors and Guides

1. Anchors and guides shall be provided as necessary as detailed on the drawings. Pipe guides are required on each side of an expansion joint in quantity required by manufacturer. This contractor shall submit detailed drawings showing stops and guides for all expansion joints and loops. Guides for copper piping shall have lead sleeve for electrolytic isolation.

2.6 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.

2.7 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 piping where piping or conduit will be exposed shall extend 1-1/2" above finished floor. Where concealed, sleeves through the floor shall also extend 1-1/2" above finished floor.

E. Sleeves concealed under cabinets or laboratory equipment etc. shall be Schedule #40 steel pipe extending 2" above floor. Space between pipe and sleeve shall be packed with approved plastic material flush with top of sleeve to make watertight joint.

F. Refer to Section 01600, for additional sleeving requirements, firestop and caulking requirements.

2.7 WATER HAMMER ARRESTORS

A. Furnish and install water hammer arrestors at main ends at fixtures.

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.

2.8 HOSE BIBBS AND HYDRANTS

A. Furnish and install hose bibbs and hydrants as shown and located on the plans. Interior hose bibbs shall have 3/4" hose thread outlets with integral vacuum breaker. Exterior hydrants shall be of non-freeze with 3/4" hose thread

outlets with loose key handles and include vacuum breakers. Similar hydrants as manufactured by Wade, Blake, Jay R Smith and Zurn will be accepted as equal.

I. Hose Bibbs - Chicago No. 998 rough chromium plated with vacuum breaker 293.4 handle. Support hose bibb with pipe clamp.

2.9 FLOW INDICATORS

A. Provide and install flow measuring venturies at each unit heater as shown on the drawings as manufactured by Rinco Engineering & Gerrish Company. Robertson Venturies are equal and approved. This shall be a coordinated system, including individual Venturi Flow Stations. Each venturi station shall be complete with quick disconnect valves and a safety shut-off valve, metal identification tag on chain, giving pipe size, venturi series, station identification and meter reading at specified flow rate. Venturi stations shall be one piece brass screwed 3/4" through 2". Venturies sized 2-1/2" and over shall be manufactured from steel with bevel ends for welding. Venturi size and series shall be selected so that design flow rates as shown on the drawings shall be between 10 and 40 inches of water pressure differential with permanent pressure loss of not more than 25% of indicated flow rate differential pressure.

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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 01600 - Materials and Equipment 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.

6. Vibration Isolation: Section 15150.

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 of 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. 66 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.

H. Provide and install protective rubber or armaflex type bumper on all hangers that could be dangerous to maintenance personnel.

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. Floor supported pipe shall be supported on Grinnell Company Fig. #276, or equal. 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. Trapeze hangers and tunnel support systems shall be Unistrut channels at top and wall 8'-0" o.c. Pipe straps shall be Unistrut P2558. Provide for pitch as required. Support members in trapeze hangers shall not be a torch cut. On trapeze hangers provide full circle shield and U-clamp pipes to trapeze. U-clamps shall be Unistrut P-1109 through P-1126.

E. 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.

F. 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 where pipes are "U"-clamped to trapeze hangers. All other shields shall cover only bottom half of pipe covering.

Shields for 8" through 14" pipe size shall be constructed of 14 gauge galvanized steel and shall be 24" long.

Shields for 16" and larger pipe shall be constructed of 12 gauge galvanized steel and shall be 24" long.

G. Vertical pipes shall be supported at each floor by riser clamps.

H. Piping subjected to thermal expansion shall be guided at each floor in lieu of riser clamps. An anchor and base support will then be required.

I. 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.

J. 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.

K. 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.

Pipe or Tube Size	Hanger Spacing	Minimum Rod Diameter
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"
4"	14'	5/8"
5"	16'	5/8"
6"	17'	3/4"
8"	19'	7/8"
10"	22'	7/8"
12"	23'	7/8"
14"	25'	1"
16"	27'	1"
18"	28'	1-1/8"
20"	30'	1-1/4"
24"	32'	1-1/2"
30"	34'	1-3/4"
32"	36'	2"
34"	38'	2"

L. 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.

Pipe or Tube Size	Hanger Spacing	Minimum Rod Diameter
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"
2"	9'	3/8"
2-1/2"	10'	1/2"
3"	10'	1/2"
3-1/2"	10'	1/2"
4"	10'	1/2"
5"	12'	5/8"
6"	14'	3/4"

M. Pipe hangers and spacing for sewer and waste lines shall be as listed above except that horizontal runs of cast iron piping shall be supported at least once for each pipe section.

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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 01600- Materials and Equipment, 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 is exhaust fan.

E. Provide substantial bases under all units, fans and motors elevated above floor as noted on drawings. Units suspended from overhead construction shall be spring isolated from the structural frame work.

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, and the equipment schedules on the drawings will indicate by alphabetical letters 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 combined load of the supported equipment plus any integral subbase or inertia block. 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 D Isolator Mounting

a. Vibration hangers shall contain a steel spring and 0.3" deflection neoprene element in series. The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing thru a 30° arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Hanger shall be Type 30N.

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.

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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 01600 - Materials and Equipment, 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 core shafts, mechanical rooms, tunnels 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 shall be provided under Section 15140 for installation 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 150. Accessories such as adhesives, mastics, cements, tapes, glass fabric and asbestos cloth for fittings shall have the same component ratings. At cold piping as stated in Article 2.4 a 1/2" thick FR Armaflex with a flame spread of 25 and a smoke developed rating of 150 will be acceptable.

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
8" to 10" pipe size	18" long
12" and over pipe size	24" 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 (and Domestic Hot Piping, etc.)

A. Domestic cold water, and hot water 1" and smaller. Insulation shall be flexible foamed plastic tubular pipe insulation. Minimum density 6 pounds per cubic foot.

Insulation Material	Insulation Thickness
FR Armstrong Armaflex (or approved equal)	1/2"

The pipe or tubing may be insulated wherever possible by slipping the molded insulation over the lines. Lines already connected shall be insulated by slitting the tubular insulation section and applying them around piping or tubing. All butt ends and longitudinal joints shall be sealed with O.C. 500, JM 57, Armstrong 520, C.M.C. 17-462. All fittings shall be insulated with fabricated sections of tubing insulation nesting sizes mitering joints and

sealing with adhesive. Vapor barrier adhesive shall be applied to all seams and joints sealed in accordance with the manufacturer's recommendations to obtain proper adhesion. Where flexible foamed plastic tubular insulation is used, the section at each pipe hanger shall be rigid foam plastic of the same thickness and manufacturer as the adjacent insulation. Inserts shall be installed in such a manner to completely support the pipe and not crush the insulation or damage the vapor barrier.

B. Domestic hot and cold water greater than 1" pipe size.

Insulation Thickness in Inches
for Pipe Sizes

1-1/4" - 3"	4" and over
1"	1-1/2"

The insulation shall be sectional type fiberglass pipe insulation and shall have an average thermal conductivity not to exceed .23 BTU inch per square foot per degree F. per hour at 75 degrees temperature. Insulation shall be 3#/cu. ft. Exposed and concealed piping shall have all service jacket. Fittings, valve bodies, flanges, etc. shall be insulated with fabricated insulation of the same material and thickness equal to adjoining pipe insulation (mitered pipe insulation segments) secured with 3 ply jute twine and finished with one coat of mineral fiber cement. Apply P.V.C. cover over fittings with C.M.C. adhesive 17-465 on the throat and secure it with adjacent pipe covering. Further secure with two wraps of 1-1/2" wide Unifit tape. Stapling of vapor barrier jacket will not be allowed. Exception to above is that all insulated water and waste piping in chases behind casework may be the contractor's option be insulated with 1/2" flexible foamed plastic insulation similar to Armstrong FR "Armaflex".

2.5 HOT PIPING

A. Hot water supply and return in exposed and concealed areas shall all be insulated.

B. The insulation shall be a sectional type fiberglass pipe insulation of 3 lb per cubic foot density suitable for temperatures of -60°F to +450°F. and having an all service jacket cemented on. Fittings, 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

Temperature of 150° F to 212°F
3" and smaller - 1-1/2" thick
3-1/2" through 6" - 2" thick
8" and larger - 2-1/2" thick

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 01600 - Materials and Equipment for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes furnishing equipment, materials and performing all labor necessary to reroute domestic and fire protection water services.

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

PART 2: PRODUCTS AND INSTALLATION

2.1 WATER SERVICE

A. Remove existing manhole and provide new manhold No. 3 (see plans and detail). Reroute existing 4" fire main to Lyon Labs around New Crematory.

B. Extend new 4" Jackson Hall service to Crematory. This Contractor shall relocate existing Jackson Hall water meter and accessories to new Crematory and extend service from Crematory to connect to existing main in Jackson Hall. (See plans). This Contractor will make all arrangements with the Minneapolis Water Department and pay any costs incurred.

C. The service main shall be extra heavy ductile iron with 250 lb. mechanical joints and lead-tipped gaskets. Provide insulating union at connection between copper and iron piping. Provide clamps on cast iron bend fittings.

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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 01600 - Materials and Equipment 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 GENERAL

A. All floor drains provided under this contract shall be of Josam Manufacturing Company, Jay R. Smith, Wade Manufacturing Company, Zurn Industries or approved equal, of size specified or indicated on the drawings. Except where otherwise specified or indicated, strainers for 3" drains shall be at least 7" in diameter. Drains shall have nickel bronze strainers unless otherwise specified. Floor drains in floors resting on earth shall have spigot or hub outlet for caulked joint. The following numbers are taken from the Josam catalog.

B. Floor drains shall have threaded, spigot or hub outlet as required for proper connection to piping and shall be provided with a trap having a cleanout. Drains installed in connection with waterproofing membrane, copper or lead flashing shall be provided with drainage flange, weepholes and flashing clamp.

2.2 FLOOR DRAINS IN FLOORS ON GRADE

A. 3" Josam No. 38000--60 cast iron body floor drain, integral spigot outlet, cleanout flush with floor and backwater valve.

2.3 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.

C. 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. Unfinished Floors and Traffic Areas: ZN-1420-25 bronze plug cleanout with cast iron frame, heavy duty grate and anchorage lugs.

All exposed cleanout covers shall be chromium plated nickel bronze.

2.4 MANHOLES AND CATCH BASINS

A. Furnish and install such units where shown and as detailed on drawings as part of the storm and sanitary sewer systems.

B. The manholes shall be of Cretex Companies, Inc., or equal, manufactured of prefabricated reinforced poured concrete ring type and of 4'-0" diameter. The top sections where shown shall be of concentric or eccentric reducer, 48" diameter to 27" diameter.

C. Manhole and catch basin frames and covers shall be as specified on the detail plans. Frames to be fastened by bolts and grouting.

2.5 SUMP PUMPS

A. Furnish and install where shown and detailed on the drawings complete duplex sump pumps each to be an Enpo-Cornell Model 1602, 1/3 HP, 120 volt, 60/1 phase, bronze impeller. Each unit shall pump 21 gpm against 14 feet of head. Pumps shall be provided with 36" round by 30" deep cast iron sump basin, installed by Mechanical Contractor. Provide bolt down cover for basin having manhole, vent connection, discharge pipe connection, and electrical cable connection.

B. Provide 4 Mercury switches in basin and electric cable from switches and pumps to a wall mounted control panel. Duplex panel shall contain high water alarm and electric alternator. The Electrical Contractor will provide power wiring to the control panel. All other wiring required shall be provided by the Mechanical Contractor. Controls shall allow both pumps to operate in event of high capacity return. Panel shall be capable of selecting lead pump. A remote alarm bell shall be installed and wired by this Contractor where shown on 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 01600 - Materials and Equipment, 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 Roof and Area Drainage 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. Mechanical Supporting Devices: Section 15140.

4. Mechanical Systems Insulation: Section 15160.

PART 2: PRODUCTS AND INSTALLATION

2.1 GENERAL

A. Storm sewer and area drainage piping and drains shall be removed or relocated as shown on drawings.

B. Refer to drawings for exact locations of all drains and piping.

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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 01600-Materials and Equipment 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. Existing stainless steel service sink and trim shall be removed from Jackson/Owre Hall Room S67 at the direction of Owner. Cap all existing piping flush with wall or at mains. Remove sink legs and provide 2 Elkay 14 GA Type 302 stainless steel brackets to convert to wall mount.

B. Reinstall sink, hung from wall at same height as existing, in Crematory. Reuse existing faucet, strainer, tailpiece and P-trap. Provide Chicago 932-VB-E7 vacuum breaker backmounted cold water faucet with serrated nozzle. Drill backsplash on existing sink to allow mounting of new faucet left of existing faucet (when facing sink).

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, flush valves, 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.

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 01600 - Materials and Equipment, 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 Suppporting Devices: Section 15140.

PART 2: PRODUCTS AND INSTALLATION

2.1 GAS SERVICE

A. The Minneapolis Gas Company shall relocate existing Jackson Hall meter and pressure regulator and accessories to New Crematory and connect to existing high pressure (15 PSI) gas service. This Contractor shall remove existing high pressure gas piping to Jackson Hall and extend new low pressure (7" W.C.) service from the New Crematory to connect to existing main in Jackson Hall.

B. The Minneapolis Gas Company will also provide and install a new meter and regulator in the Crematory for the Cremator gas burners (2 at 1,200,000 BTUH input and 7" W.C. each) and connect to the existing high pressure gas service. This Contractor shall extend piping from this meter and connect to the Cremator (by others).

C. This Contractor will make all arrangements with the Minneapolis Gas Company and pay any costs incurred.

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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 01600 - Materials and Equipment, for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes furnishing equipment, materials and performing all labor necessary to connect the hot water 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. Mechanical Systems Insulation: Section 15160.

7. Environmental Control Systems: Section 15950.

PART 2: PRODUCTS AND INSTALLATION

2.1 HORIZONTAL PROPELLER UNIT HEATERS

A. Furnish and install horizontal type unit heaters where shown on the drawings. Unit heaters as manufactured by Nesbitt, Trane, Modine, Webster, Westinghouse, McQuay, Dunham Bush, or Airtherm are approved.

B. Unit heaters shall have copper tubes, non-ferrous fins and cast headers. Fans shall be quiet operating and direct drive with 120 volts, 60 cycles, single phase motors with overload protection. Outlet shall have adjustable multi-blade louvers, two-way deflection.

C. Heaters shall have the capacities listed on the drawings. Units shall be sized for 190°F entering water and 170°F leaving water with 65°F air inlet temperatures.

D. Units shall have factory baked enamel finish. Color selected by Architect.

E. See details on the drawings for piping of unit heaters.

F. Units shall be complete with starters with thermal overload protection.

UNIT NO.	CAPACITY MBH	CFM	GPM	HP
1	49	940	4.9	1/15
2	15	290	1.5	1/25

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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 01600 - Materials and Equipment, 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 - Exhaust ducts

B. All joints on supply duct work shall be sealed with 3M Brand Sealer EC-800, or approved equal, with application, according to manufacturer's recommended procedure.

C. Flat areas of duct over 18" in either dimension shall be cross broken.

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. 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.

STRAP SIZE	DUCT SIZE	HANGER SPACING
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.

F. 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:

DUCT WIDTH INCHES	VANE SPACING INCHES	INSIDE BLADE RADIUS INCHES	OUTSIDE BLADE RADIUS INCHES	RUNNER WIDTH INCHES
Up to 25"	1-1/2 centers	2	1	5
Above 25"	3-1/4 centers	4-1/2	2-1/4	9

G.. Provide protective rubber or armaflex 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.

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. Up to and including 6 square feet duct area use two butterfly dampers each with locking quadrant. Over 6 square feet duct area use opposed blade dampers with standard channel welded frame and oilite brass bearings. Maximum blade width shall be 6".

2.3 ACCESS DOORS, PANELS AND CLEANOUTS

A. Where shown, provide access panels made air tight with gasketed edges. Access doors shall be sized in accordance with equipment maintenance and duct cleaning requirements of the system. Use Ventlok sponge rubber gasketing material. The panels shall be single wall construction and shall be attached to the duct with cam latches.

2.4 FLEXIBLE DUCT CONNECTIONS

A. Install flexible connections at connections between all fan suction and discharge openings, and sheet metal ducts. 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 3" wide and shall be made with slack in the fabric.

2.5 CONNECTION TO OUTSIDE AIR INTAKE SHAFT

A. Outside air intake shaft will be provided by the General Contractor. This Contractor shall install motorized dampers and operators (provided under Specification Section 15950) in a weathertight duct section connected to air intake shaft. Provide 20 gauge galvanized drip pan as shown on drawings.

2.6 EQUIPMENT

A. Utility Blower Fan Sets: Utility sets as scheduled shall be Trane, Champion, Chicago Blower, American Standard, Barry, York, Carrier or Peerless. Units shall be standard built together, motor and fan mounted on a common base with hood. Fan wheels, in general, shall be backward curved, belt drive, certified non overloading except where noted. Fans shall be equipped with frictionless self-aligning, resilient mounted, pillow type bearings. No oilite type bearings shall be used. Fans shall be rated and certified per AMCA. Fan shall have spark resistant wheel and also have aluminum inlet and shaft rings. All fan wheels, shafts and the interior and exterior of fan housing shall be 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. All of this work shall be done at the factory.

Exhaust Fan Schedule

CFM	Wheel Diam.	Outlet Vel.	S. P.	ARR.	HP
400	9"	850 FPM	.5"	TH	1/6

B. Belt Drives: All fans shall be equpped with V-belt drives, belt guards, adjustable motor sheaves and belts. All pulleys shall be carefully and accurately balanced for static and dynamic accuracy. 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.

2.7 REGISTERS, GRILLES DIFFUSERS AND CONTROL DEVICES

A. Draw all air outlet and return devices tight to ductwork to eliminate dirt streaking using extra screws if necessary to secure a tight fit. The various grilles, registers and diffusers are indicated on the plans by alphabetical letters, according to the following schedule. Registers, grilles, diffusers and control devices by Waterloo-Anemostat, Carnes & Kreuger and Titus are approved as equal to Tuttle & Bailey as specified.

B. Type "A". Filter Sidewall Exhaust Registers, Titus #50 FOG, aluminum construction with horizontal face bars 1/2" center, hinged mounting frame with space for a 1" filter pad. Color selected by Architect. Provide 1" throw-away filters (AA-F-Amer Glass or equal and approved) as required. (2) 12 x 10 reg. 200 CFM each.

C. Type "B". Titus # 272-RL, steel supply grille with 2-way deflection 1/2" centers, color selected by architect. (1) 14 x 10 grille 400 CFM.

2.8 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.

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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 01600 - Materials and Equipment, 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 the pre-fabricated section of the Crematory chimney.

C. Related work specified elsewhere:

1. Basic Materials and Methods: Section 15100.

2. Painting: Section 09900.

PART 2: PRODUCTS AND INSTALLATION

2.1 EQUIPMENT

A. Furnish and install where indicated on the drawings a complete 76 foot, 18 inch inside diameter factory built Underwriters' Laboratories, Inc., listed Model HT factory-built chimney as manufactured by Van-Packer Company.

B. The chimney manufacturer shall furnish all items which form a part of the assembly, including straight sections, draw bands, all guying, base anchor lugs, brackets, etc. for a complete installation as shown on plans. Chimney shall be furnished in 4 foot sections, 11 gauge hot rolled steel jacket construction, sandblasted and primed at factory for final finish by General Contractor. The insulating refractory shall be capable of withstanding temperatures up to 2000°F.

C. All chimney sections shall be joined with acid resistant cement supplied by the manufacturer. In addition, joints shall be made watertight with high temperature silicone per manufacturer's recommendations. Provide smoke tight expansion joints as required. Installation shall be made in accordance with manufacturer's recommendation and in compliance with the Underwriters' Laboratory, Inc. listing.

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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 01600 - Materials and Equipment 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 to accomplish all required work for environmental control systems.

C. Related Work Specified elsewhere:

1. Basic methods and materials: Section 15100.

2. Pipe and Fittings: Section 15110.

3. Piping specialties: Section 15130.

4. Hot water heating system: Section 15650.

5. Ventilation: Section 15800.

6. Electrical construction: Section 16000.

D. Furnished but not installed under this Section:

1. Dampers and Operators

2. Thermostats

PART 2: PRODUCTS AND INSTALLATION

2.1 AUTOMATIC TEMPERATURE CONTROL SYSTEMS

A. The automatic temperature control system shall be as manufactured by Honeywell, Inc., Johnson Controls, or Powers Regulator.

B. Provide thermostats for unit heaters No. 1 and 2, to be installed and wired by Electrical Contractor. Provide 36" x 36" motorized dampers and operators for outside air intake shaft, to be installed under Section 15800 and wired by Electrical Contractor.

2.2 SERVICE AND GUARANTEE

A. The control system herein specified shall be free from defects in workmanship and material under normal use and service. If, within one year from date of acceptance by Owner, any equipment or workmanship is found defective, it shall be replaced or repaired free of charge. The Contractor shall provide all service incidental to the proper performance of the control system under

guarantee during this period. After completion of the installation, the Contractor shall regulate and adjust all thermostats, operators and other equipment provided under this contract.

2.3 CONTROL INSTRUMENTS AND EQUIPMENT

A. The following specifications are intended to set a minimum standard for the particular device described.

B. Air Flow Control Dampers

1. This Contractor shall furnish all automatic controlled dampers as indicated on the drawings.

2. All two-position control dampers shall be sized from minimum pressure drop, at the specified duct size.

3. All damper blades shall be of not less than 16 gauge galvanized steel formed for strength and high velocity performance. Blades on all dampers must be of not over 8 inches in width. Blades shall be secured to 1/2 inch diameter zinc plated axles by zinc plated bolts and nuts. All blade bearings shall be nylon. Blade side edges shall seal off against spring stainless steel seals. Teflon coated thrust bearings shall be provided at each end of every blade to minimize torque requirements and insure smooth operation. All blade linkage hardware shall be constructed of corrosion resistant, zinc plated steel and brass.

4. Dampers shall be suitable for operation within the following temperature limits: -40° to 200°F. The control manufacturer shall submit leakage and flow characteristics plus a size schedule for all controlled dampers. All control dampers shall be of the parallel blade design with low leakage edging, Honeywell Moduflow Low Leakage or equal and approved.

C. Electric Actuator Motors

1. All shall be 120 volt, sized to operate their appropriate dampers with sufficient reserve power to provide smooth two-position action as specified. When more than two actuators are to be operated in sequence to each other, provide position feedback positive positioners with adjustable start point and operating range.

D. Thermostats

1. Thermostats shall be heavy duty line voltage type with guard. Thermostats shall have "fan only" switch to permit manual control of unit heater fan.

E. Control Valves:

1. Valves for hot water service shall be heavy duty line voltage 2-way 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.

2.4 SEQUENCES OF CONTROL

A. Unit Heaters: The line voltage space thermostat shall modulate control valve and cycle the unit heater fan to maintain space temperature. "Fan only" switch shall permit manual control of unit heater fan for ventilation.

B. Outside Air Intake Shaft Dampers: A two-position wall switch shall open dampers fully when on and close them fully when off. Switch and wiring by Electrical Contractor.

C. Bone Crusher Exhaust Fan: Shall be activated by a wall mounted switch and wiring by Electrical Contractor.

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CONDITIONS, SPECIFICATIONS AND RELATED DOCUMENTS FOR
JOML CREMATORY ADDITION

UNIVERSITY OF MINNESOTA - MINNEAPOLIS CAMPUS
HEALTH SCIENCES EXPANSION

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

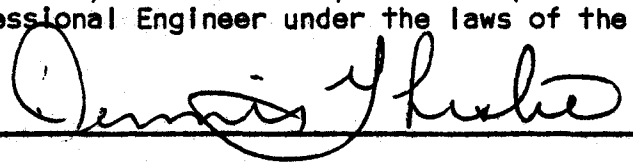
Paul E. Kopietz
Director of Engineering and Construction — University of Minnesota

Paul J. Maupin
Health Sciences Planning — University of Minnesota

THE ARCHITECTS COLLABORATIVE, INC. — Cambridge, Massachusetts

HEALTH SCIENCES ARCHITECTS & ENGINEERS, INC.
University Park Plaza - Suite 704
2829 University Avenue Southeast — Minneapolis, Minnesota 55414
(612) 378-3833

As to Mechanical Engineering:
I hereby certify that these plans, specifications or reports were prepared by me or under by direct supervision, and that I am a Professional Engineer under the laws of the State of Minnesota.



Date: September 28, 1978 — Reg. No. 9112

PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contact, 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 01600 - Materials and Equipment, for requirements of 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 1978 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
(EEI)	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
(ANSI)	American National Standards Institute

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.

B. All electrical work or wiring accomplished on University of Minnesota property shall be inspected by a University Electrical inspector. The electrical contractor shall file a University of Minnesota Request for Electrical Inspection. The request forms are available from the Engineering and Construction Division of the Physical Planning Department and will normally be given to the Electrical Contractor at a pre-construction meeting.

C. No project consisting of electrical work or wiring shall be installed until a request is on filed with the Engineering and Construction Division, Electrical Inspection Office. The Electrical Contractor shall retain a copy of the request, which has been signed by the University Electrical Inspector.

D. Requests for electrical inspection will give the phone number to call for all inspections required by the Office of Electrical Inspection. A request for final inspection shall be made within 48 hours of project completion.

E. A permit number for the project will be assigned to the Request for inspection by the University. A permit application will be made and fee paid to the University Building Official by the appropriate University departments and will not be the contractor's responsibility.

F. All requirements of the latest Minnesota State Building Code applicable to electrical installations will be enforced.

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. Provide testing of materials, equipment and installations as specified below.

1. In addition to the tests required under industry standards, the Contractor shall inspect and test all materials and equipment as specified herein. Acceptance of the work by the University shall be contingent upon satisfactory completion of these tests.

2. All portions of the work shall be subjected to a careful and thorough visual inspection to detect, insofar as possible, any erroneous or loose connections, damaged components, presence of foreign objects or materials, poor workmanship, incorrect ratings of overcurrent protective devices, or other abnormal conditions. Instrument and operational tests set forth herein shall be made after such visual inspection. All instruments, safety equipment and other devices, as well as competent personnel required for making the tests, shall be furnished by the Contractor. Instruments shall be of types specifically designed for the tests and methods prescribed, and shall be certified or demonstrated to be accurate within reasonable limits. Persons assigned to such testing shall be familiar with the procedures, equipment, and precautions required. In the event that the Contractor fails to demonstrate reasonable compliance with these provisions, the Engineer may require that any or all of the tests be performed and certified by a recognized testing laboratory, the cost thereof being borne by the Contractor.

3. All tests shall be scheduled at least 48 hours in advance with the University Electrical Construction Superintendent and Engineer and shall be conducted in his presence. All results shall be tabulated neatly and legibly on standard test forms by the Contractor. The test reports shall include the pertinent readings or observations, a description of the method used and list of the equipment employed. Test reports shall include all pertinent data as to failures or abnormal readings, the cause if determined, and corrective measures taken. In all cases of test failure, the Contractor shall demonstrate that corrective measures proposed are adequate before making repairs, adjustments, or replacement.

Test reports shall be submitted to the University (two copies); and Engineer (one copy) within 24 hours after completion of the test.

4. Provide the following tests:

a. Feeders (600 volts or less) shall have the following tests:

1. Insulation test, phase to phase and phase to ground with a 500 volt D. C. megger.

2. Continuity check.

b. Demonstrate proper functioning of lighting equipment, controls, and the existence of correct rotation.

c. Determine the load balance and total load on each secondary feeder. (Tabulate and submit three copies to Engineer).

d. Properly coordinate and set overcurrent devices. Should any operating condition be encountered which would require abnormal or unsafe settings of protective devices of any sort, this fact shall be immediately brought to the attention of the Engineer.

5. In all cases where tests indicate failure or abnormal results, the final corrective measure shall be as directed by the Engineer. All corrective measures required and any replacement of damaged equipment and/or cable shall be by the Contractor at no additional expense to the Owner.

a. Any undue heating or other departure from normal operation shall be reported to the engineer.

b. Any equipment involved in fault conditions during initial energization shall be repaired or replaced.

c. In any case where the installed equipment cannot be repaired and/or corrected to obtain correct test results, the Contractor shall replace and re-test the equipment and/or cable as directed by the Engineer.

6. 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.

7. 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.

8. In addition to the requirements of the General Conditions covering guarantees, this Contractor shall reimburse the University for switching costs in connection with repair of the faulty part or parts, the cost of temporary services associated therewith, and for the costs which the University may incur in thelocation of such faulty part or parts.

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. It is the intent of the electrical construction drawings to indicate branch circuit conduit layouts. These conduit layouts shall not be combined by the Contractor to reduce branch circuit conduit home runs to panelboards or other distribution equipment. These conduit layouts shall be utilized by the Contractor for only the wiring indicated on the drawing. Other wiring shall be provided with separate conduit except that motor power and control wiring may be combined within the same conduit system where acceptable by the NEC. 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 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. Refer to Section 01910.

B. This Contractor shall remove existing electrical conduits, wires fixtures boxes, and wiring devices to accomplish the work as shown on the plans. Light fixtures and electrical equipment not shown to be reused shall be turned over to the University and all other conduit, wire boxes, etc. shall be removed from the site by the Contractor. Abandoned conduit in ceilings, walls and floor slab shall be cut off below new finish line to allow new finish surface to be applied. Contractorshall 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 unless specifically called for on another contractor's documents.

E. Refer to General Construction Specifications 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 prperty 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 General Requirements 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 typewritten card index with plastic cover describing circuits in each 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. Panelboard name, and voltage fastened on inside of hinged door.

2. 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.

3. Existing distribution switchboard - new distribution breaker.

4. Plastic imprinted adhesive labels (Dyno Tape) will not be acceptable except for Item (2).

D. Provide engraved identification for motor controls. Engrave on 3/8" black-white-black plastic laminate.

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

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 Jackson Main Switchboard #1, temporary secondary electric service as herein described for the construction area.

1. Upon start of construction, contractor shall install new feeder for panel #ECB-2 which shall be utilized for installation of temporary electric service to a temporary panelboard as indicated in paragraph A.2 below.

2. Temporary service center shall be nominal 60 ampere, 120/208 volt, 3 phase, 4 wire. Provide 1-1/4" - 4 #6 THW feeder tap from new panel #ECB-2 feeder. Temporary service center shall be 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 (25) 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 resulting from misuse, overloading or faulty equipment shall be paid for by the responsible persons.

G. After the electrical installations are complete, prior to occupancy and when approved by the University, all temporary electrical services, wire, conduits, devices and equipment shall be removed by the Electrical Contractor.

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PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract, Division 1 General Requirements and Section 16010 General Providions - 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 01600 - Materials and Equipment, 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 system.

PART 2: PRODUCTS AND INSTALLATIONS

2.1 RACEWAYS AND FITTINGS

A. Conduits crossing building expansion joints shall be provided with O.Z. grounding type expansion fittings, Type EX or AX. Provide cable support in all vertical conduit runs at intervals required by the NEC or as recommended by the cable manufacturer, whichever is the shortest interval. Cable supports shall be segmented canvas bakelite type, non-ventilated, for 600 volt insulated cables. Supports shall be O.Z. types S, M or equal. Standard locknuts and fittings shall be used with rigid conduits. Insulated steel bushings shall be used on all 1-1/4" or larger conduits; O.Z. type A or B. Terminations at cabinets and junction boxes shall be with double locknuts and phenolic bushings. Grounding bushings shall be O.Z. Type BLG. 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. Flexible metal conduit fittings at outlet boxes shall be an approved grounding type T & B #300 Series or equal. All couplings, connectors, bushings shall be malleable iron or steel and shall be O.Z., Thomas & Betts, Raco or Appleton.

B. 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, minerallac clamps or Kindorff or Unistrut trapeze hangers as required.

Conduit Sizes	Maximum Spacing of Supports
3/4" and under	7 feet
1" and over	10 feet

C. All conduit where possible shall be concealed in the ceiling, floor or wall construction unless indicated as exposed on the plans. Conduit shall be dried, cleaned and deburred before wire is pulled. Conduit outlet bodies may be used for 1-1/4" conduit and smaller for use as a pulling outlet or 90° bend only.

D. Electrical conduit shall be provided as specified and required by code. Conduit shall be Youngstown, Republic, Allied or equal.

1. Conduit size shall be a minimum of 3/4" for all power and branch circuit wiring except as noted below.

a) Conduit shall be a minimum of 1/2" for flexible conduit connectors to individual recessed lighting fixtures.

b) Conduit shall be a minimum of 1/2" for motor interlock and control wiring.

c) Conduit shall be a minimum of 1/2" for communication systems where specifically indicated in the communication specification articles.

2. All electrical conduit shall be galvanized rigid steel conduit, except that EMT 1-1/4" or smaller shall be used in furred ceilings, interior partitions, walls or where exposed and not subject to mechanical injury. EMT shall not be used in poured concrete construction on or above grade.

3. Rigid steel conduit shall be used for all other wiring installations except as otherwise specified. Intermediate metal conduit (IMC) may be used in lieu of rigid steel conduit where approved by code for the purpose.

4. Flexible metal conduit shall be used for motor connections and between recessed fixtures, and their junction boxes. Provide liquidtight flexible metal conduit for connections to exterior or wet location equipment. Flexible metal conduit shall not exceed 18" in length for motors and 72" in length for recessed light fixtures. Equipment grounding conductor shall be provided within the raceway run with the circuit conductors for all flexible conduit. The lengths flexible metal conduit shall be cut to the dimension as required for use. General pre-cut lengths will not be accepted.

5. Conduit for secondary circuits run underground within the building or in concrete slabs on grade shall be rigid galvanized conduit with 20 MIL bonderized PVC cover, Robroy Industries, Plasti-Bond or equal.

E. 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 be enamel or epoxy coating on the interior. All rigid conduit and intermediate metal conduit shall have standard pipe threads.

F. The Electrical Contractor shall install 3-hour fire rated fitting O-Z/Gedney CFS Series Fire seal when penetrating block walls, concrete walls or floor slabs.

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 device rings shall be used for device outlets in sheet rock or plastered walls. Ganged boxes with device rings shall be used where more than two devices occur at one location. Device rings shall be square-cut type in sheet rock and plastered walls.

C. Use properly sized masonry boxes with square-cut (tile) 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. Square boxes with industrial covers shall be used for exposed wall outlets.

F. Covers shall be provided for all outlet boxes 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 identical to those specified under wiring devices and plates.

G. Light fixtures without integral J-boxes suitable for wiring temperature rating shall have J-boxes installed in an accessible location adjacent to fixture.

H. 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 NEC. Pull boxes shall be recessed in all finished portions of building.

I. All junction and pull boxes shall be accessible and permanently labeled to identify the system and wiring within. Refer to Section 16010.

J. 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 copper. 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 the NEC and as follows:

1. 120/108 volt: A - black; B - red; C - blue; Neutral - white; Ground - green; travellers - yellow;

2. All feeders, if not color coded, shall be permanently marked with paint or tape at their terminations for identification.

C. Feeder wire shall be type THW. Branch circuit wire shall be type THW or THWN-THHN. Wire sized No. 8 and larger shall be stranded. Wire sized smaller than Number 12 shall not be used for branch circuits. Number 14 wire may be used for relay and control systems only.

D. All wire pulled through the wiring channels of continuously mounted fluorescent fixtures shall be type RHH and THHN. Wire connected to recessed type and vapor-tight fixtures shall be type AF. Wire in high ambient areas shall be rated at 90°.

E. Interior helical spring twist type connectors shall be used on number 8 and smaller wire sizes. These shall be Scotchlocks or approved equal. Number 6 and larger wires shall terminate in solderless lugs. All terminations, taps and splices shall be compression type Burndy-Hydent or approved equal. Tap and splice devices shall be covered with approved electrical tape.

F. Splices shall not be made in any conductor except where absolutely necessary and then in approved junction or pull boxes. Secondary service wires and feeders shall be of one continuous run without splices. Provide cable supports and junction boxes as required by Code in all vertical runs of conduit. To relieve strain on the insulation and the conductors when pulling wire, a wire pulling lubricant shall be used.

G. Wire and cable shall be Continental Cable, General Electric, cyprus/Rome, Cerro, Cresent, Coleman or equal.

2.4 SURFACE RACEWAY

A. Surface metal raceway shall be provided where shown on plans. Provide all fittings, boxes, bases, and covers as described on plans.

B. All surface raceway shall be provided with a green color insulated copper ground conductor. This conductor shall be connected to the supply panelboard ground bus and to ground screw on receptacle.

C. Install receptacles and stainless steel plates of types as specified under wiring devices and plates section 16100-2.5.

D. Surface raceway shall be Wiremold #500 or approved equal, complete with boxes and fittings with beige finish.

2.5 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, Circle-F 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. All receptacles shall be grounding type.

B. Switch, receptacle and all other plates (including telephone, television, etc., and for all empty outlet boxes) shall be satin stainless steel, Sierra 302 or approved equal with Type 302, stainless steel screws.

C. All receptacle bodies and switch toggles shall be brown. Certain equipment receptacles available in black phenolic only may be black.

D. All receptacle plates other than the standard duplex 125 volt 20 ampere type shall be engraved with black filled letters indicating volts, amperes, and phase; for example, "208V-20A-1PH".

E. Receptacles:

Poles/ Wires	Volts	Amps	NEMA Configuration	Hubbell Cat. No.	Use	Remarks
2P-3W	125	20A	5-20R	5362	General	Duplex

F. Switches:

Poles	Amps.	Volts.	Cat. No.	Remarks
Single	20 amp.	277 - A.C.	1221	Toggle - Quiet

PART 3: INSTALLATION

3.1 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 in Architectural Specifications. 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.

3.2 EQUIPMENT GROUNDING SYSTEM

A. All conduit systems, equipment housings, material housings, junction buxes, cabinets, motors, ducts, wireways, light fixtures, portable equipment and all other conductive surfaces shall be solidly grounded in accordance with the NEC to form a continuous, permanent and effective grounding system.

B. Grounding continuity shall be established by using standard couplings, connectors, fittings and green jacked copper conductor jumper in conduit with circuit conductors for motors.

C. All non-current carrying conductive surfaces of electrical equipment subject to personal contact shall be grounded by an insulated green jacked copper conductor sized in accordance with NEC Table 250-95 and installed in the conduit system with the circuit conductors. All branch circuit wiring shall include this ground conductor which shall be connected to the panelboard ground bus from the wiring device, equipment or outlet as required.

3.3 FASTENERS AND SUPPORTS

A. All fastening and supports shall be of an approved type. Threaded inserts, expansion or toggle bolts shall be used for fastening to masonry walls. Provide rigid rods or bars for the support of lighting outlet boxes and grid boxes. No perforated metal straps may be used.

B. Where possible conduits shall be grouped together and rigid racks of angle iron or structural channels shall be provided. Individual conduits may be clipped to the ceiling or wall with malleable iron pipe straps. Where individual conduits must be hung from the ceiling, approved conduit supports and rod hangers must be used. Provide additional ceiling support where electrical installations exceed suspended ceiling support weight design.

C. Provide rigid rods or bars for the support of lighting outlet boxes and grid boxes. No perforated metal straps may be used.

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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 01600 - Materials and Equipment 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, 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.

2.2 PANELBOARDS

A. Panelboards shall be the dead front type with mains arranged as shown on the panelboard schedule for 120/208 volt, 3 phase, 4 wire, wye connection. Enclosures shall be code grade steel complete with door-in-door type trim.

The inner door shall be the locking type and the outer door shall be secured by trim type screws on the side opposite the hinge. Trim type screws shall be wide pan head installation in drilled and tapped holes. The outer door for flush cabinets shall be completely framed. The outer door for surface cabinet may be a continuously hinged side door. Shop drawings shall detail these items. Circuits shall be listed on clear plastic covered, typewritten card indexes attached to the inner side of the inner doors. Each protective device shall be designated by a number at the device. Final room numbers as provided by the University shall be used for all circuit indexes.

B. Panel bus bars shall be solid copper and shall be aligned and rigidly supported on back pan by insulators connected to a removable mounting panel. All lugs shall be copper-bronze for bolted lug connection. Each panelboard shall contain individual insulated neutral bus of same ampacity as the main bus. Where scheduled, panelboards shall contain a separate ground bus which shall consist of a minimum of 16 solderless connector lugs for 30 circuit panelboards Solderless connector lugs shall be sized for #14 through #4 conductors and a single lug for up to #1/0 with each ground bus. All circuit breakers shall be attached to bus by means of machine screw connections, and shall be removable from the front within de-energizing the panel. Rough-in boxes shall have a minimum width of 20" and minimum depth of 4-1/2". Full length vertical buses and cross breaker connection including all hardware shall be provided and installed in all future circuit breaker spares and spaces. All panelboards shall be keyed with identical Corbin Lock #157-67, using WEM-1 key.

C. Each panelboard shall be identified with a black -white-black laminated plastic plate attached to the inner trim. Letters and numbers shall be cut through the black and into the white of the plate. Inscription shall be symmetrical about the centerline of the plates, and plates shall be attached with self-tapping screws. Identification shall correspond to designations used in the specifications and on the plans.

D. The lighting and three-phase motor panelboards shall be dead front type with front removable bolt-in circuit breakers with thermal magnetic trips of sizes shown on schedule on plans. Panelboards shall be designed for 120/208 volt, 3 phase, 4 wire, wye connected, solid neutral. The receptacle and small appliance panelboards shall be dead front type with front removable bolt-in circuit breakers with thermal magnetic trips of sizes shown on schedule on plans. Contractor shall provide a suitable circuit breaker sized for the load for each branch circuit shown on the plans if inadvertently not identified or noted in the panelboard schedule. Panelboards shall be designed for 120/208 volt, 3 phase, 4 wire, wye connected, solid neutral.

E. Circuits shall be connected as shown on the plans for a balanced three phase load. Circuit breaker number for all 3 pole and 2 pole breakers shall have numbers in sequence as follows: 3 pole breaker shall be labeled 1,2,3. Typewritten index shall have corresponding numbers in sequence to allow index labeling of a 3 pole circuit without spaces between these numbers. Final room numbers as identified by the Owner shall be used on the index.

F. All circuit protective devices shall be molded case circuit breakers with thermal magnetic trips for 120/208 volts. All two and three pole circuit breakers shall have common trips.

1. Circuit breakers shall conform to the following minimum characteristics based upon General Electrical nomenclatures:

a. Branch Circuit Panelboards, 120/208 volt.

Amps.	Volts	Frame	Sym. I.C. - RMS - 240V
15-100	240	THQB	10,000

G. Panelboards shall be Square D, Westinghouse, General Electric, I.T.E., Federal Pacific or approved equal. Manufacturer's shop drawings shall include busing details, mounting methods and lug arrangements.

2.3 EXISTING SWITCHBOARD MODIFICATIONS

A. The existing switchboard shall be modified as indicated on the drawing and as specified. The existing switchboard manufacturer is identified on the drawings.

B. Provide new circuit breaker where indicated connected to the existing switchboard bus to serve the new feeder. Circuit breakers shall be sized typed and the interrupting capacity as scheduled on the drawing. Provide all hardware, bus bars, taps for new circuit breaker attachment as required for a complete installation.

C. Contractor shall provide laminated plastic name plate identification plate adjacent to each circuit breaker installed or modified. (Modified refers to modification to breaker or feeder.) The following information shall be on identification plates "breaker frame, trip, load service, and date".

2.4 FUSES

A. Provide and install secondary fuses in all fusible switches, sized as shown on the plans and required. Provide spare fuses as specified.

B. Fuses shall be 250 volt class as required for the particular equipment. Fuses shall be Bussmann or approved equal.

C. All motors shall be protected by Buss Dual Element Fusetron Fuses - FRN (250V); based on nameplate amperes and service factor.

D. Contractor shall furnish to the University one set of three each, of each size and type of fuses used for each motor and each power panel. The Contractor shall indicate by letter to the University with copy to Engineer the list and location of all spare fuses.

2.5 SAFETY SWITCHES

A. Provide safety switches where required and as shown, sized according to the load served or the feeder or branch wire capacity, 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.

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 01600 - Materials and Equipment 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. Where continuous row fixtures are specified, it shall be understood that the capital letter next to the outlet identifies all fixtures in the row and all rows are made up of either four or eight foot long fixtures in combination to complete the row. Catalog numbers listed below are for basic four foot long fixtures. Contractor shall be responsible for exact quantities of fixtures required in any row. The channels may be eight feet long, but all plastics, hinged doors and louver sections shall not exceed four feet long. 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 flourescent fixtures shall be mounted from Steel City #6029 or edgewise 1-1/2" Lather's channels provided by the Electrical Contractor. Provide 3/16" studs and locknuts for every four feet and at the ends of all fixture rows. Channels shall rest on the ceiling support system and shall be securely fastened into place.

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 fitting 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 except R and PAR Type 2000 hours.

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 120 volt, 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.

B. 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.

2.5 FIXTURE SCHEDULE

Type	Description	Lamp
A	A pendant mounted 1'x 4' industrial fluorescent fixture with baked white enamel finish, 10% uplight and turret type sockets. Provide pendant length as required to suspend fixture at 9'-0" above floor. Miller #ID-2101-04-120 Volt, Sylvania #QY-10-2404-120 Volt or approved equal.	2-F40W
B	A porcelain keyless socket, P & S #44 or equal	1-150W A-21

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PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and 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 Conditons and Section 01600 - Materials and Equipment for requirements on pre-bid and post-bid evaluation of proposed substitute products, methods and other conditions.

B. Work under this section includes completely installed, connected, operating and tested systems as herein specified and as shown on the plans and riser diagram details. Equipment shall consist of factory assembled components with warranties and guarantees as herein specified.

PART 2: PRODUCTS AND INSTALLATION

2.1 PUBLIC TELEPHONE CONDUIT SYSTEM

A. Electrical Contractor shall install conduit and outlet boxes for those telephone outlets indicated on the plans ceiling spaces. Outlet boxes shall be double gang with single gang mud ring. In all conduit runs, provide a heavy gauge stranded nylon pull cord. Provide blank stainless steel single-gang plates to match those specified under "Wiring Devices", for all such outlets.

B. All telephone conduit shall be 3/4 inch, unless otherwise shown. Pull boxes are not shown on the plans, but shall be provided, as required for ease of wire and cable pulling; and in conduit runs that would otherwise be more than 90 feet in length; and in runs that would otherwise contain more than two 90-degree bends. Double offsets and kicks will not be allowed in any telephone conduit run.

C. All pullboxes in telephone conduit runs shall be sized according to schedule shown on the drawings. Pullboxes shall be recessed in all finished portionsof the building.

D. All telephone equipment, services and cables will be installed by Northwestern Bell Telephone Company. This contractor shall cooperate as necessary to aid in location, provide prints and/or identify conduit locations.

2.2 FIRE ALARM AND SMOKE DETECTION SYSTEM

A. Scope:

1. The fire alarm system for the Crematory Addition contract shall include the extension of the following:

a. Fire alarm and smoke detection system.

b. Fire alarm signaling system.

2. The fire alarm system specified herein and shown on the drawings is Honeywell, Inc., equipment and is an extension of an existing Honeywell system. It is the intent of these specifications to describe the performance criteria and a level of equipment quality and function.

3. Coordinate all new work with the existing JOML-B installation.

4. In general conduit and wiring layouts associated with the fire alarm system are shown on the electrical drawings as required for the system. All electrical installation work and wiring associated with the fire alarm system shall be performed by the Electrical Contractor under the supervision of the fire alarm system supplier. Installation shall be in accordance with the plans and specifications and the fire alarm system installation drawings. All wiring shall be in conduit and in accordance with the appropriate sections of the National Electrical Code and applicable state and local codes.

5. It is the intent of this specification to define a Fire Protective Signaling System in accordance with the standards established by the National Fire Protective Association (NFPA). Underwriter's Laboratories (UL) standards for equipment testing will be used to establish conformance to NFPA requirements.

a. The UL listing shall be for the following types of service:

1) Automatic fire alarm

2) Manual fire alarm

3) Signaling devices

b. The UL listing shall be for the following system types: Local: Intended to be installed per NFPA 72A.

c. The system shall be supplied with all hardware and installed to comply with all requirements of NFPA 72A Standards for Local Protective Signaling Systems. The system shall meet NFPA 72A signaling systems requirements.

B. Shop Drawings and Instruction Manuals

1. The fire alarm system supplier shall submit reproducible engineering and installation shop drawings of the fire alarm system extension prior to installation of any equipment. These drawings shall include catalog equipment data and complete wiring schematics and diagrams of all components.

2. All FM alarm system shop drawings required under paragraph A above shall be submitted to the Engineer and University within 120 days of award of the electrical contract. These drawings shall be certified by a Registered Professional Engineer of the State of Minnesota prior to submittal.

3. Complete operators instructions for all specific components of the fire alarm system. Instructions shall include general information, basic operating and emergency procedures of fire alarm system, operator's terminal, and printer module.

4. Input/output summaries and references including event program summary and directory of graphic displays.

5. Programming and point entry and assignment instructions.

6. Maintenance instructions of all periodic maintenance required for components of system.

7. Testing procedures for all components of system.

8. These manuals shall be submitted to the Engineer and University for review prior to acceptance.

C. Guarantee, Testing and Instructions

1. The entire fire management system installation shall carry a one-year guarantee after acceptance of the complete system by the University. Acceptance is defined as the date upon which the University and Engineer have granted approval of complete system installation.

a. FM supplier shall guarantee all devices against defects in material or workmanship and shall guarantee all installation, material and labor provided under this section of work by the allied trades.

b. Electrical Contractor shall guarantee all conduit, wire and electrical installation labor.

2. The completed system shall be totally tested and include a check-out of all manual and automatic system functions to insure proper system operation. Testing shall be provided as recommended by the manufacturer for all system components.

3. Provide a complete and thorough training and instruction period to the Owner's designated representatives in the operation of the fire alarm system. Instructions shall explain in detail all system functions as they relate to the operation of this installation. Instructions shall cover periodic testing and check out requirements of the system and components. A minimum of 40 hours of instruction to the University shall be provided under this contract and shall be scheduled at a time approved by the University.

4. Provide comphensive instruction manuals for the operation, testing and maintenance of the system and its components as specified in Article 1.2 above. These manuals shall be provided at the training and instruction period specified and shall be used as a training guide.

D. Operation

1. The fire alarm system is an extension of the northwest quadrant and operates as an independent local fire alarm system. The activation of any manual station or heat detector shall cause the following:

a. Sound all alarm horns located within that quadrant at 120 beats per second.

b. All smoke door holders shall be released.

c. The annunciator located at the fireman's entrance sounds a local audible alarm and by means of an individual LED indicates the alarm zone. The audible alarm may be acknowledged and silenced at the annunciator, but the LED remains lighted.

d. The printer shall provide local audible alarm and red printout of fire alarm zone by floor, device, and quadrant with year, month, day and time of alarm occurrence. The audible alarm may be silenced by operation of silence switch at printer.

e. Any subsequent alarms will be annunciated at the annunciator as described above and recorded at the printer on a change of state basis.

2. When the fire alarm control unit for the alarm quadrant has been reset to Normal the following will occur:

a. The local audible alarm at the annunciator will sound. Operation of acknowledge switch at annunciator will silence local alarm and extinguish the alarm LED.

b. The printer will record "Return to Normal" condition with Time of Day.

3. Proof of Central Processor Operation: The existing central processor incorporates circuitry which continuously monitors the scanning and data processing cycles. On central processor failure, an audible/visual signal shall operate if scanning fails or if incoming data is not processed. A means for testing the central processor failure circuitry shall be provided to prove operation.

4. Event Commands: The existing system has the capability of providing an automatic output (contact closure) as the result of an alarm input. This capability automatically trips auxiliary protective signaling devices, releases all door holders in all quadrants, trips remote station protective signaling devices, and provides remote pilot light annunciation.

5. Alaarm Display and Annunciation: All protection system alarm signals shall provide audible signal, nixie tube or dot matrix display of the alarm point and type of alarm, as well as a printed record for alarm acknowledge and return to normal changes of state.

6. Fault Detection and Isolation: A fault detector shall be provided to automatically condition the circuit when a fault occurs so that the data transmission continues on an uninterrupted basis. Both audible and visual annunciation of a fault condition shall be provided. A printed record shall be provided to show the remote signal encoding devices affected by the fault.

7. Standby Power: Power for the system furnished under this contract shall be supplied from two sources: a primary (main) power supply; and secondary (standby) supply. The primary and secondary power sources shall supply all data gathering panels. To provide this reliable source of standby power for the system, an uninterruptible power supply consisting of batteries and battery charger shall be used.

8. Start-up Operation: The existing fire alarm system is fully operational. The system shall remain fully operational during the time the new zones are being programmed. Operation during this construction phase includes sounding of fire alarm signaling devices, annunciation of specific zone at JOML entrance, and fully operational printer in Room B19 of Lyons Laboratory.

9. All data transmitted between the central processor, annunciator, data gathering panels and printer shall be transmitted in digital form. Individual data bits are to be grouped into word format and transmitted as coded messages. A double transmission, echo transmission, or multi-parity bit technique must be used to insure message integrity. Transmission system failure must be annunciated immediately as a "no response" with printout of time and address of the data group failing to respond. The printer will provide an hourly log of all remote groups not responding.

E. Equipment

1. Fire alarm annunciator is an existing Honeywell #WI003 located at the fireman's entrance to JOML. Add two (2) new zones.

a. Provide two light emitting diode (LED) annunciators and an alarm/trouble acknowledge switch for each new fire alarm zone.

LED No. 1 indicates a fire alarm condition in that specific zone.

LED No. 2 indicates a trouble condition in that specific zone.

b. Engrave annunciator:

"Area Heat - Crematory"

"Man. Stat. - Crematory"

c. A tone shall occur at the existing annunciator on occurrence of any alarm or trouble condition and LED No. 1 or LED No. 2 will flash indicating alarm or trouble. Acknowledging the alarm or trouble condition at the annunciator will silence the tone and cause the proper LED to remain "steady on" indicating the existence of the alarm or trouble condition.

d. The existing annunciator includes the ringback feature on rest of fire alarm panel or correction of trouble condition.

e. Located at the existing annunciator are two (2) existing notebooks containing mylar graphic identification on a per floor basis of all zones reporting at the annunciator. Provide additional graphic identification consisting of floor plans with all necessary rooms, stairs or equipment to identify the zones. The new zones shall be labeled as it reads on the annunciator and printer with any explanation or translocation to clearly describe the zone. An attachment shall be provided and the notebook shall be firmly attached to the building structure.

2. Fire alarm printer is an existing Honeywell #WI002A located in Room B19 Lyons Laboratory.

3. Central processing unit is an existing Honeywell Delta 1000 located in Room 75 on the third floor of Unit B/C.

a. The CPU has the capability of automatically initiating commands upon an alarm occurrence. Any input point may be assigned as an event initiator.

b. A change of status at the alarm initiator shall cause a pre-defined series of commands, called an event program, to occur.

c. Present use of the alarm initiator capability shall be to cause all alarm signaling devices in all quadrants to sound and all door holders in all quadrants to release when an alarm occurs in one quadrant. It shall be possible to select which type alarm initiating devices shall cause all signaling devices in other quadrants to sound.

d. All programming circuits, or hardware including interface equipment, necessary to cause the existing central processor to function as described below shall be provided in this contract.

1) Add all necessary software to allow printer (described above) to printout alarm and trouble status of the (2) new zones.

4. Data Gathering Panels shall be Honeywell #WI020 series. Add one (1) new data gathering panel where shown on drawing.

a. All data gathering panels shall be of solid state plug-in circuit board construction and shall be supplied factory pre-wired.

b. All data gathering panels shall be provided with the capability to monitor digital inputs for four-wire supervised detection loops. End of line resistors will be located in the panel.

c. All data gathering panels shall be able to receive an alarm from any zone even if there is a trouble condition on that zone.

d. All data gathering panels shall include an alternate signaling circuit to provide for alarm transmission to the quadrants control unit and to the municiapl fire department. This alarm circuit shall be fully supervised to provide a signal output for all fire alarm conditions of the primary digital transmission alarm circuit. Discrete visual identification shall be made for fire and trouble conditions. The primary and alternate signaling circuits shall remain independent so that any failure on one will not render the other system inoperative. The alarm signal transmitted to the municipal fire department shall be transmitted by both the digital transmission system and the alternate circuit.

5. Manual stations shall be Honeywell S464, semi-flush, breakglass type. Stations shall be red with raised white lettering. A spare glass rod shall be provided with each station. Semi-flush stations shall mount to standard electrical boxes.

6. Thermal detectors shall be Honeywell T4057 or approved equal 190°F fixed temperature or combination 135°F fixed temperature and rate of rise type as indicated on the drawings.

7. Fire alarm horns shall be Honeywell SC805 series. Units shall be red, surface mounted and operate on 24 volt d.c.

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PART 1: GENERAL

1.1 SCOPE

A. Conditions of Contract and 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 01600 - Materials and Equipment for requirements on pre-bid and post-bid evaluation or 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.

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. 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. 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. 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 any motor inadvertently omitted from this list but shown on the plans shall be connected.

B. Thermostats, valves and motorized dampers shall be furnished by Mechanical Contractor and wired by the Electrical Contractor. Equipment furnished shall be 120 volt. See Section 15950 for sequence of operation.

C. Electrical Contractor shall provide all power interlock wiring of controllers for Mechanical and Equipment Contractors as required unless otherwise indicated.

D. Electrical Contractor shall provide line voltage wiring and fractional horsepower starter for cabinet horizontal unit heaters.

E. Electrical Contractor shall furnish and install fused disconnect switch sized and fused if necessary, where required by Code for each motor.

F. All francional 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 3M permanent adhesive. Where no push button is required, furnish and install same type on 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.

G. Provide where shown on plans fractional HP manual starting switch units complete with overload elements, neon type pilot light and number of poles as required. Equip these starters with Satin Stainless Steel plates in finished areas to match.

H. Provide fuses for all disconnect switches and combination starters as specified in Section 16300. Provide electrical control interlock disconnect devices for all switches with interlock or control circuits.

I. Provide capacitors for power factor correction as indicated in the motor schedule and specified in 16700-2.2.

2.2 POWER FACTOR CORRECTION

A. Provide and install power factor correction capacitors for certain new motors as indicated and sized on the motor schedule. Capacitors shall be integrally fused, indoor or outdoor, dustproof or weatherproof with factory attached brackets for wall, floor or shelf mounting as required for the application. All capacitors shall have discharge resistors.

B. Capacitors shall be connected at the motor terminals and switched with the motor starter unless otherwise indicated on the plans. Provide all necessary mounting hardware, brackets, channels, etc., for a secure installation.

C. Capacitors shall be non-PCB, mounted in oil tight enclosed complete with fuse and blown fuse indication. Calmount "E" Myron Zacker, Inc., or equivalent Sprague, Westinghouse or General Electric.

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